VOL. XV. No. 12. DECEMBER 1930.

MECCANO MAGAZINE

THE WORLD'S LARGEST SHOVEL. (see page 930)

6D.

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MECCANO MAGAZINE

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Liverpool
England

Vol. XV. No. 12
December, 1930

With the Editor

Christmas Greetings To You All!

This month I have once again the pleasant duty of wishing my readers in all parts of the world a Very Merry Christmas. Although Christmas is still three weeks away, we are all making our plans and looking forward eagerly to the good time we hope to have. It is wonderful how the old fascination of Christmas endures as the years go on, and how it grips us all in its spell. Summer holidays and birthdays are great occasions, but they cannot compare with Christmas. On Christmas morning my first thought will be of you all. I wish I could travel round the world on the magic carpet and visit you in your homes and join in your fun!

All through the year the great brotherhood of Meccano and Hornby Train boys has grown steadily. The membership of the Meccano Guild is bigger than ever, and the old-established Meccano Clubs are flourishing and full of activity, whilst new ones are rapidly getting into their stride. The younger organisation, the Hornby Railway Company, has developed far beyond anticipations, and there are already nearly 160 Branches. The H.R.C. is now recognised as the greatest international model railway organisation in the world. Day by day the H.R.C. model railway experts at headquarters are busy replying to the immense correspondence that pours in from members; layouts are designed or improved; signalling problems are solved; and advice is given on every phase of the model railway hobby. It is well worth while to become a member of the H.R.C., and by next year at this time I fully expect its membership to be more than doubled.

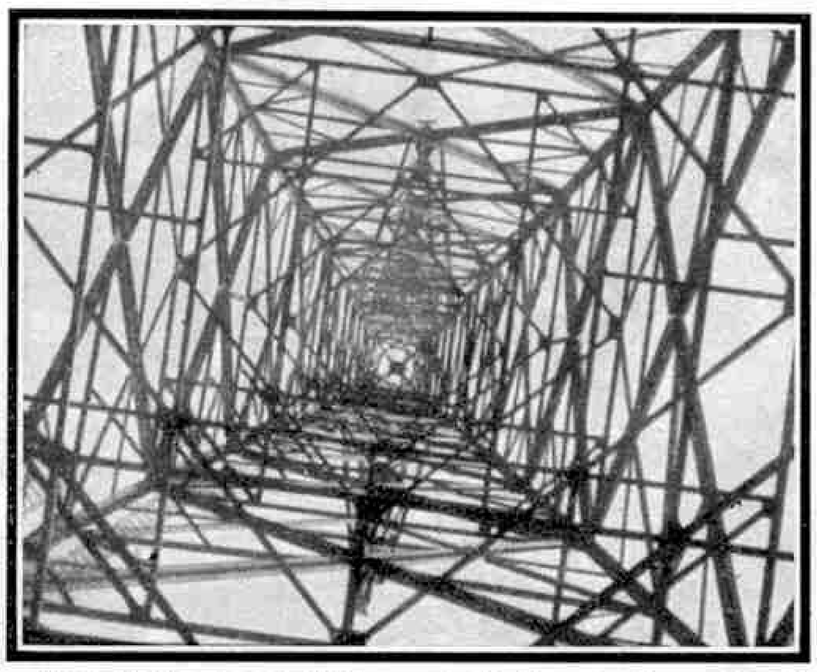
Wonderful Progress of the "M.M."

The "*M.M.*" made its first appearance during the difficult conditions of war time—in September 1916—when it consisted of only four pages, was issued once every two months, and was provided free. In 1920 it was enlarged, and a price of 1d. per copy was fixed. Two years later it was decided to issue it monthly, and from that time the magazine has appeared regularly without a break, and has grown steadily to its present standard size of at least 80 pages. In August 1923 the Magazine first achieved the dignity of a cover, and in May of the following year appeared the first of the series of coloured covers that still continue.

The "*M.M.*" catered for the requirements of the English-speaking world, but it soon became evident that this was not sufficient. One of the most wonderful features of Meccano is its international character—the hobby quickly established itself in the affections of boys in every civilised country and instructional literature was issued in one language after another, until now it is printed in no less than sixteen languages, even including Chinese! Before long the boys of foreign nations began to ask for a Magazine in their own language, and as a first step towards supplying this demand it was decided to publish a French Magazine. This also began as a four-page leaflet issued every two months, but now it appears every month, and consists of at least 24 pages with an attractive coloured cover on similar lines to that of the English issue. The French magazine appeals to boys in many countries where French is spoken rather than English.

This month another great step forward is made by the publication of the "*M.M.*" in Spanish, which will brighten the lives of Meccano boys of Spain and also of all the Spanish-speaking countries of South America. Through the Spanish "*M.M.*" thousands of boys in these countries will be brought into closer touch with the great engineering achievements of the world. What is, perhaps, of greater importance is the fact that the "*M.M.*" will create in Spain and South America a general demand for more British-made goods, and, the magazine will thus do its share in relieving to some extent the terrible problem of unemployment that is causing so much concern at the present time in this country.

No. 25. WHAT EVER IS IT?



Here is the twenty-fifth puzzle in the popular series of mystery photographs. Can you identify this mysterious object?

To the first reader to send an exact answer or, if nobody is successful in this, to the one who gets nearest, I will send an autographed copy of my book "Engineering for Boys."

Solutions should be written on postcards only and addressed "Editorial Competition, No. 25, 'Meccano Magazine,' Old Swan, Liverpool." Closing date, 31st December.

Our Careers Articles

The articles on careers that have appeared in the "*M.M.*" during the past year have been of outstanding interest and importance. They have dealt with the many branches of modern engineering and will be followed during 1931 by others giving equally valuable information in regard to other professional careers.

Since these articles began to appear the volume of my correspondence on the all important subject of "What Shall I Be?" has grown by leaps and bounds, a proof that the series is greatly appreciated by readers. I wish to emphasise that it is only possible to deal with the general features of each career taken up. For this reason I hope that every reader who is interested in any special career, and requires further information to suit his particular circumstances, will take the advice that I have so often given to "write to the Editor about it." Nothing gives me greater pleasure than to be able to help readers who are genuinely in search of guidance.

Editorial Competition No. 24

The picture that was the subject of the 24th Mystery Photograph Competition was deliberately withheld until the football season had started, because we were quite sure that everybody would recognise the objects as a pair of cricket bails! We were not far wrong; several hundreds of competitors guessed correctly and David J. Charley, Taunton, can say quite truthfully that the autographed copy of my book "*The Railway Book for Boys*" awarded to him as his prize in this competition, was gained by the thickness of a post card!

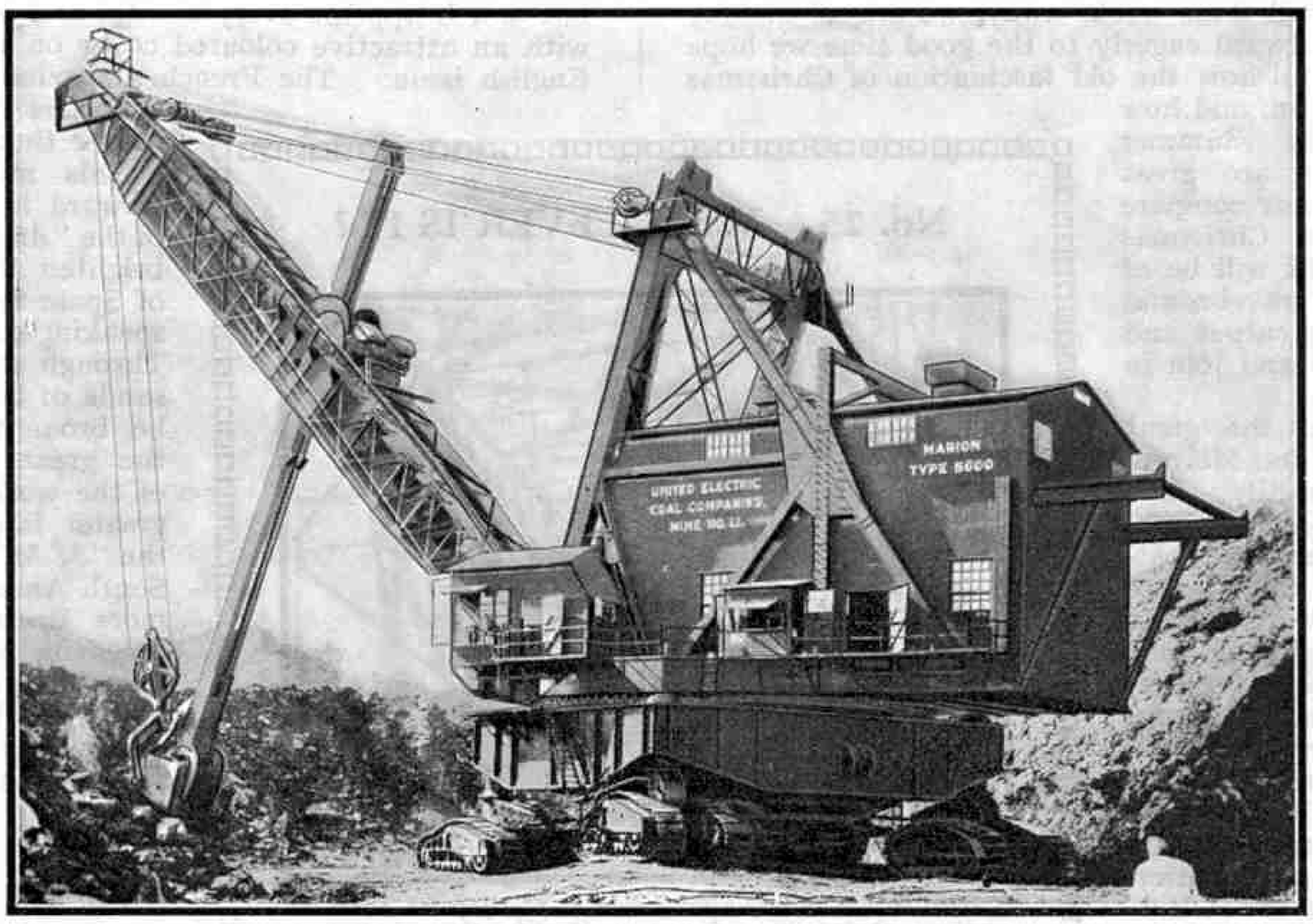
World's Largest Shovel

Electrical Digging Machine That Weighs 1,600 Tons

OUR cover this month shows the largest shovel in the world. It is electrically driven, and is so enormous that the bucket—a comparatively small part of the machine—is capable of holding 16 tons of coal, or more than sufficient to heat a good-sized dwelling for a year. In point of size a saloon car makes a comfortable load for it!

This huge machine was built by the Marion Steam Shovel Company, the electrical equipment being provided by the International General Electric Company, and was designed for use in the coal mining region of Du Quoin, Illinois, in the United States. It weighs about 1,600 tons, which is more than fifty times that of the average shovel used in ordinary excavation work, and it is twice as heavy as the largest previously made.

In spite of its enormous size, the machine is so speedy in action that it bites out from 16 to 20 c. yds. of coal, dumps this where required, and returns for another load in less than a minute. The part that moves most quickly is the bucket itself, of course, for it swings round on the end of a long arm and in doing so travels at the rate of 20 miles per hour.



The world's largest shovel stripping the overburden from coal in the open pit mine at Du Quoin, in the United States. The electrically operated scoop is capable of lifting 16 tons of coal. For this and the illustrations on the opposite page we are indebted to the International General Electric Company.

An onlooker standing by the side of the monster is completely dwarfed. The deck on which it is built is carried on eight enormous caterpillar tracks and is 20 ft. above the ground. If it were cleared there would be sufficient room on it to hold a dance, for it is 60 ft. in length and 30 ft. in width. But the entire space is occupied by what can only be described as a huge building that houses the electrical machinery of the shovel and, towering above this to a height of 110 ft., is the great superstructure of steel girders to which are attached the cables employed in raising and lowering the outer end of the jib and in operating the shovel itself.

Quite as remarkable as the speed with which material can be dug up is the height to which it may be raised. The huge scoop could easily lift a motor car from ground level to the roof of an average seven-storey building, for the machine is designed to dump coal and other excavating material at a point 85 ft. above ground level. This is 20 ft. more than the height reached by any shovel previously built.

The use to which the monster is put is no less noteworthy than its size, for it is employed in digging coal out of the ground. Mention of coal immediately suggests a mine reached by descending shafts hundreds of feet in depth, and in the dark galleries of which miners hew the coal, or cut it out by means of electrical machinery, in order to load it into tubs that are laboriously hauled up to the surface. But the Fidelity mine at Du Quoin, where this shovel is in regular use, is of quite another kind. There the coal is not won by burrowing underground; it is uncovered by stripping off the earth and rock that hide it, and is then dug out by huge shovels that dump it directly into the cars that carry it to the cleaning and grading plant.

"Open pit mining," as this method is called, is giant's work. The seam of coal at Du Quoin that is exploited in this manner is from 6 to 8 ft. in thickness, and is sufficiently extensive to provide coal at the rate of one and a half million tons annually for the next 40 years. Three pits have been opened, and in order to extract the coal as rapidly and as cheaply as possible machines of unusual size and power have been introduced.

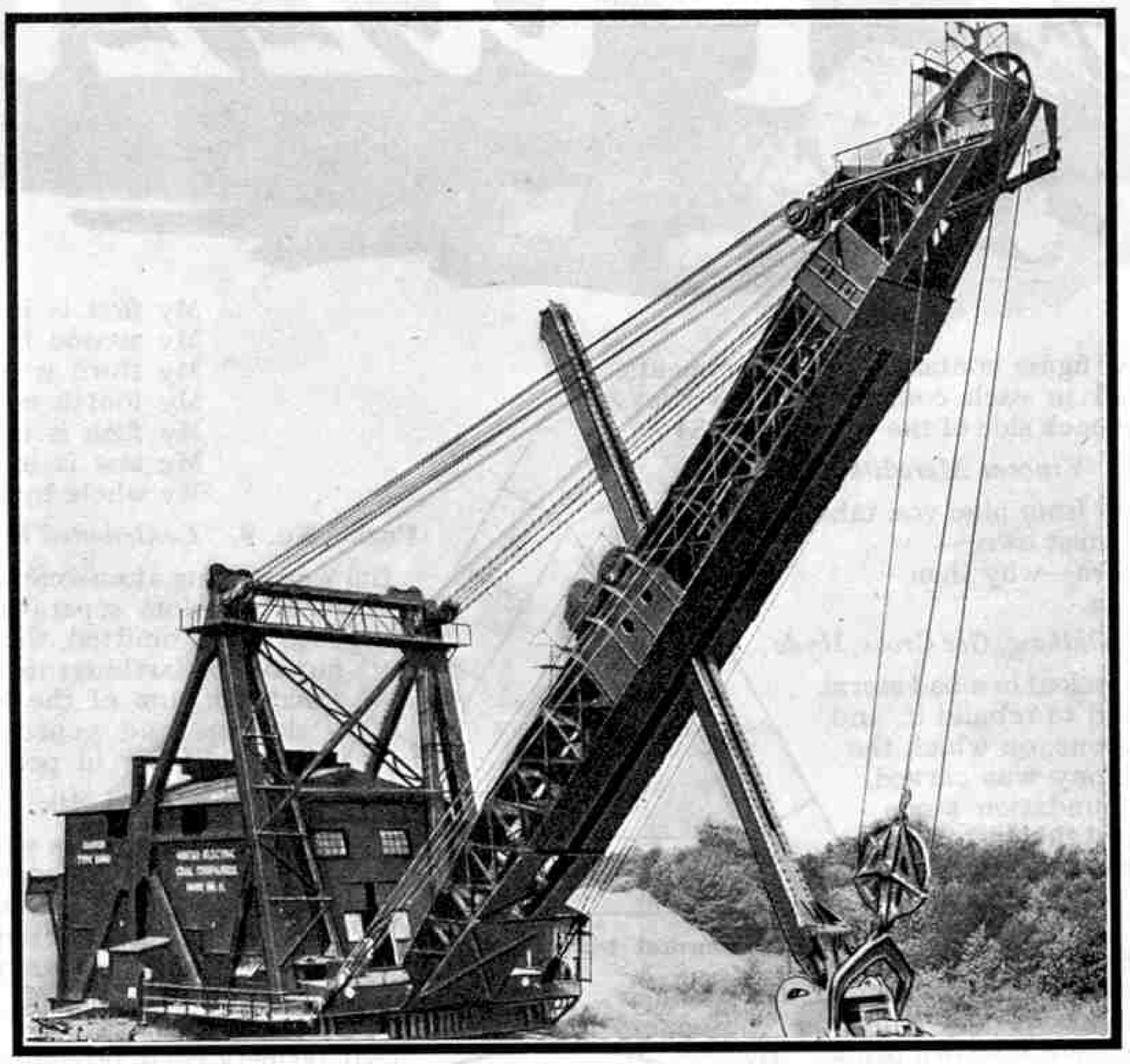
In two of the pits draglines are used to remove the top soil. These are of immense size, their buckets having capacities of 10 c. yds. The work is continued with the aid of electric shovels that are capable of lifting 12 c. yds. of earth in one bite. These complete the removal of the "overburden," or covering, that hides the actual coal. Where this is rocky in character and must be blasted out, liquid oxygen produced in a plant established near the pits is used and the shovels clear away the debris.

At the remaining pit the electric shovel shown on our cover carries out the whole of the work, removing both the top soil and the rocky overburden. In addition it digs out the coal and dumps it into waiting cars.

The sight of the immense shovel at work is very impressive. In spite of its great weight the towering structure moves about readily on its enormous caterpillar

tracks. These are arranged in four pairs and compensating mechanism is fitted in order that the deck of the machine may remain horizontal when it moves over the uneven ground on which it works.

Behind the shovel trails a three-inch cable through which the necessary current supply reaches it. When the giant digger is in position, the scoop is lowered and driven with enormous power into the coal to be picked up—the dipper has a pushing capacity of about 100 tons—after which it is raised into the air. The machine then swings round in order that the contents of the scoop may be shot into one of the cars on the tracks leading to the screening plant, after which it returns in order to take another bite. All this is done with almost incredible speed, and the machine is instantly obedient to the slightest wish of the man in control.



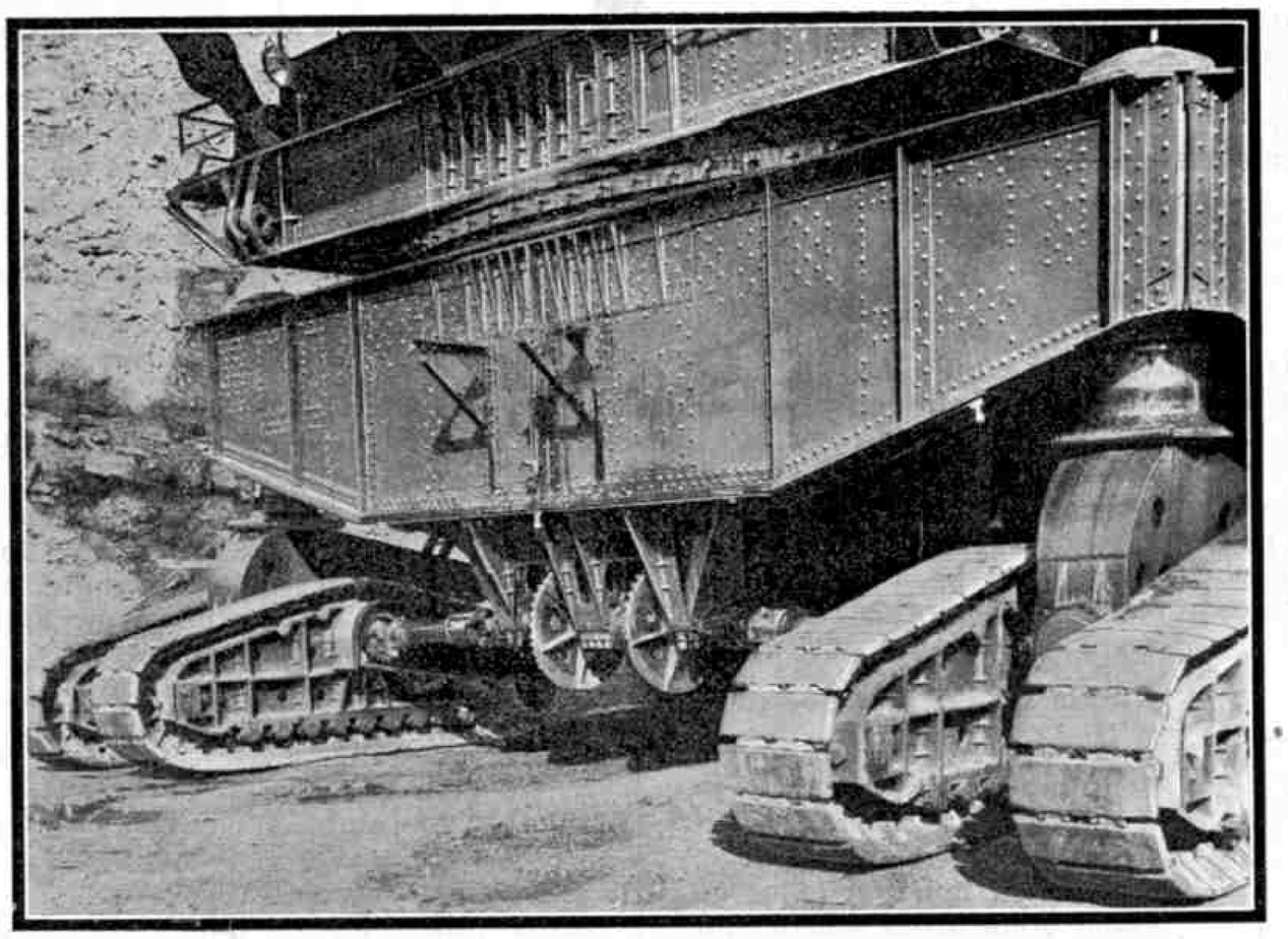
A motor car fits comfortably into the bucket of the giant electric shovel described in the accompanying article. This is capable of digging from 16 to 20 c. yds. of coal in less than a minute.

The electrical machinery with which the shovel is equipped develops 4,500 h.p. It is installed under cover on the deck of the machine and includes a 1,700 h.p. motor that is supplied through the trailing cable with current at 4,000 volts. The purpose of this motor is to drive the three generators providing current for the motors that drive the shovel, swing the machine round and give it other necessary motions.

One of the generators produces direct current at 800 volts. This is used to drive the two 450 h.p. motors that provide the hoisting motion. The speed at which these motors run may be varied to suit the nature of the work being performed, the maximum being 500 r.p.m. The two remaining generators give current at 1,000 volts. Each is of 350 k.w. capacity and the current they produce is supplied to two 150 h.p. motors that swing the shovel round. Other motors for various purposes also are actuated by current from the generators, these including one that drives the scoop into the ground and two 3 h.p. squirrel-cage induction motors employed to operate oil pumps. Power for driving the two last-named motors is supplied by small auxiliary transformers.

A particularly interesting feature of the machinery of the giant shovel is a 50 k.w. exciter, driven by the large motor, that generates direct current at 125 volts. The purpose of this is to excite the electro-magnets that provide the magnetic fields of the motors and generators. Varying the fields of the generators gives a simple method of controlling the operation of the machine, for this is followed by alteration in the voltage of the output. This method of control has been adopted because it allows rapid manœuvring and quick reversing, and all the operations may be controlled quite easily by one man. An additional important reason for the employment of variable voltage control is that its use limits the torque to a definite safe value, and therefore mechanical parts are not subjected to undue strains and stresses.

The rest of the plant installed at the Fidelity mine is planned on the same gigantic scale as the shovels used for extracting the coal from the earth. The material dug out is loaded into 40-ton drop-bottom cars, equipped with roller bearings, and in these it is carried to the largest and best equipped "tipple," or screening and sorting plant, ever built for grading coal won by stripping off the overburden. This is operated electrically, and thus, with the exception of the haulage equipment, the mine is completely electrified.



Close-up view of the caterpillar traction and lower frame-propelling machinery of the giant shovel. This weighs 1,600 tons, but moves freely on its eight enormous tracks.

On arrival at the tipple the coal is dumped on to a conveyor that carries it direct to the screens, but if necessary it may be diverted to a preliminary crushing plant where refuse is picked out. As the huge screens rotate, the coal automatically is graded into pieces of varying sizes. These are passed to the picking tables, where the remaining refuse is removed before they are loaded

(Continued on page 959)

Puzzle No. 1.

The accompanying triangular figure contains 15 compartments. What numbers must be placed in each compartment so that the totals of the six numbers on each side of the triangle are 84 ?

Puzzle No. 2. *Contributed by R. Vincent Meredith, Runcorn.*

If from six you take nine, and from nine you take ten—
(This seems rather strange I must own)—
And if fifty from forty be taken—why then
You'll leave half-a-dozen alone.

Puzzle No. 3. *Contributed by R. Oldham, Gee Cross, Hyde*

An old building was totally wrecked in a bad storm. A firm of contractors were asked to rebuild it, and to replace the old foundation stone, on which the date of the stone-laying ceremony was carved. Unfortunately they left the foundation stone upside down, yet nobody noticed the mistake. What was the date on the stone ?

Puzzle No. 4.

Our printers were given a short piece of verse to set up, and just before starting they found that all their vowels had been used up. Consequently only the consonants could be put into type, and the result is shown below. By placing the necessary vowels in their correct positions, readers will be able to see the verse as it was sent to the printers.

Thtmhscmthwlrssd
Ttlkfmnythngs ;
fshsndshpsndslngwx,
ndcbbgsndkngs.

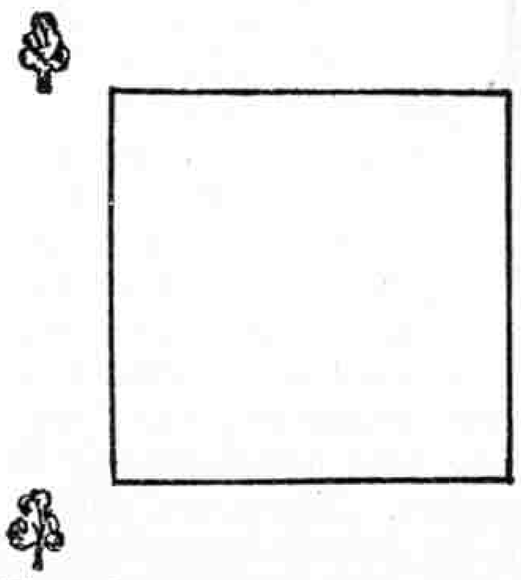
Puzzle No. 5.

The jumbled sentences given below form palindromes, or sentences reading the same forward or backward, when rearranged in proper order. What are they ?

Opposed opportunities art no it is trade sees
Elba able I ere I was saw
Adam madam I'm
No name man one.

Puzzle No. 6.

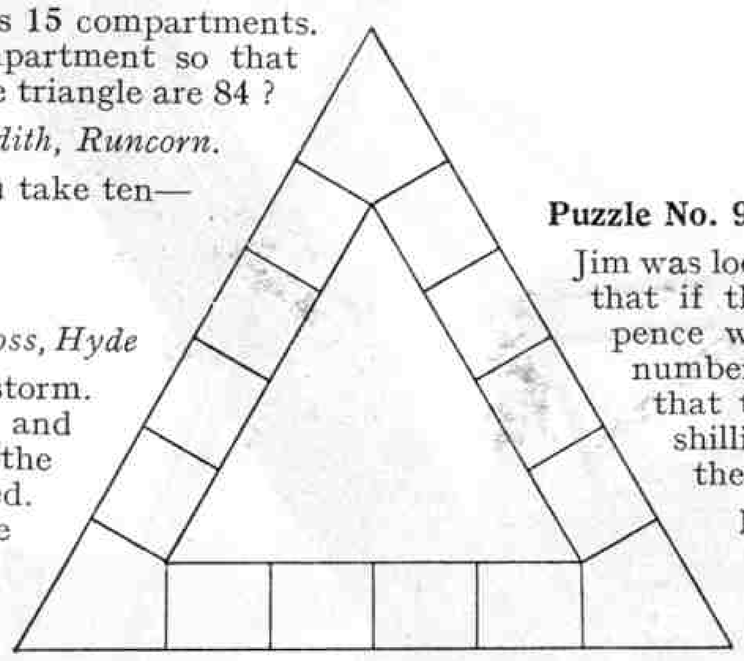
Ten black cats were kept as pets by an old man. As the cats were always quarrelling and fighting among themselves, he determined to separate them. He therefore drew in his garden a circle around which he built a fence. The cats were then placed inside in the positions shown in the diagram in the centre of this page. Three other circles were next drawn by the old man, and when fences had been constructed round these, it was found that no cat could reach another cat. How were the circles drawn ?



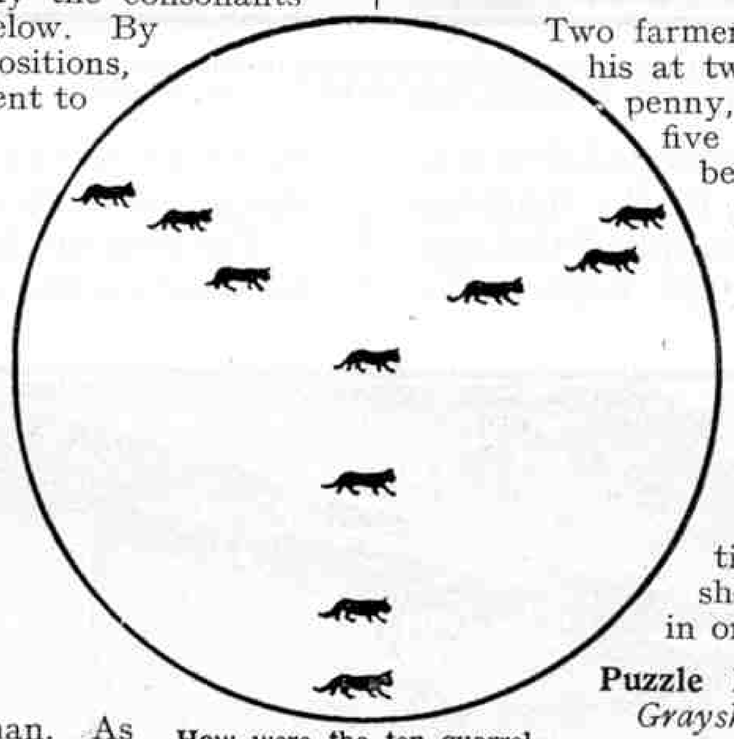
The puzzle of the square pond. (Puzzle No. 10).

Puzzle No. 7. *Contributed by G. Lesson, Derby.*

John was always trying to " show off " at the expense of his younger brother, George. One day, however, George came home from school and asked John if he could arrange the numerals from 1 to 9 inclusive so that they would add up to 100. John could not do this, and it was not until his father had found five solutions that he really believed it possible. What were the solutions ?



The numerical triangle. (Puzzle No. 1).



How were the ten quarrelsome cats separated ? (Puzzle No. 6).

Puzzle No. 8. *Contributed by S.E.R., London, N.15.*

My first is in rough but not in lout,
My second is in hail but not in shout.
My third is in mac but not in gown,
My fourth is in damp but not in drown.
My fifth is in coke but not in coal,
My last is in cavern but not in hole.
My whole by a schoolboy is held in esteem.

Puzzle No. 9. *Contributed by G. Lesson, Derby.*

Jim was looking at an amount in a paper, when he noticed that if the dots separating the pounds, shillings and pence were omitted the number left was the exact number of farthings in the amount. He also noticed that the sum of the figures denoting the pounds, shillings and pence was four times larger than the number of pence. What was the amount ?

Puzzle No. 10.

A man had a square pond with a tree at each corner as shown. He wanted to double the size of the pond, however, still keeping it square, but wished to do this without moving the trees. How did he do it ?

Puzzle No. 11.

Two farmers each brought 30 apples to market. A sold his at two for a penny, and B sold his at three for a penny, Next time they co-operated and sold them at five for twopence, thinking the final result would be the same. Instead there was a loss of one penny on the second transaction. Why ?

Puzzle No. 12.

Seven of the chief towns in a certain county are connected by rail. The diagram on this page shows the routes and distance in miles, and in the small squares are given the initial letters of the town.

The railway official superintending this section of railway decided to make an observation tour of all the various lines. What is his shortest route and how many miles must he cover in order to pass over every section at least once ?

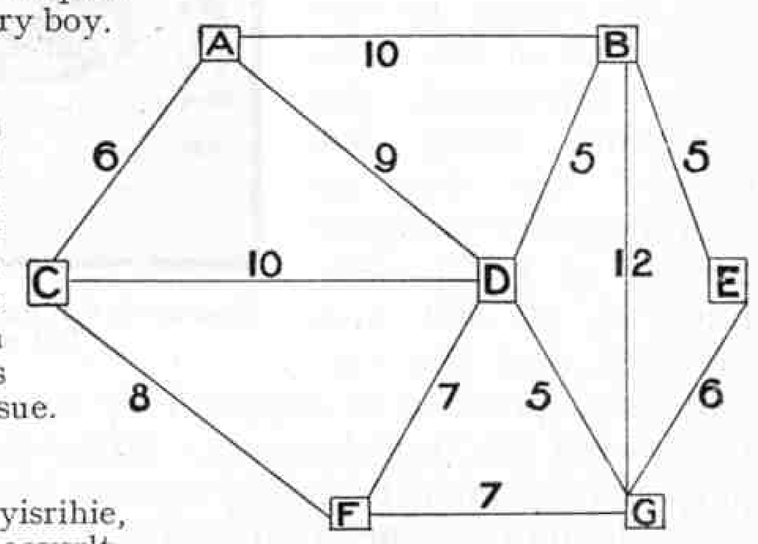
Puzzle No. 13. *Contributed by E. F. Hope-Jones, Grayshott, Surrey.*

My first is in monkey, but not in zoo,
My second is in seven, but not in two.
My third is in haddock, but not in hake,
My fourth is in crimson, but not in lake.
My fifth is in happy, and also in sad,
My sixth is in naught but not in bad.
My last is in sorrow and also in joy,
My whole is quite
certain to please every boy.

Puzzle No. 14.

We give below a number of jumbled words. When put in correct order the letters give the names of six well-known Hornby Train Sets mentioned in this issue. What are these ?

Aceeeilnnnoprsstt,
Vribueeailr, Rancoryisrihie,
Singyclotneams, Ooacysrlt,
Ooatemtrlpni.



A puzzle for H.R.C. members. (Puzzle No. 12).

Puzzle No. 15. *Contributed by E. Midgley, Worsley, Manchester.*

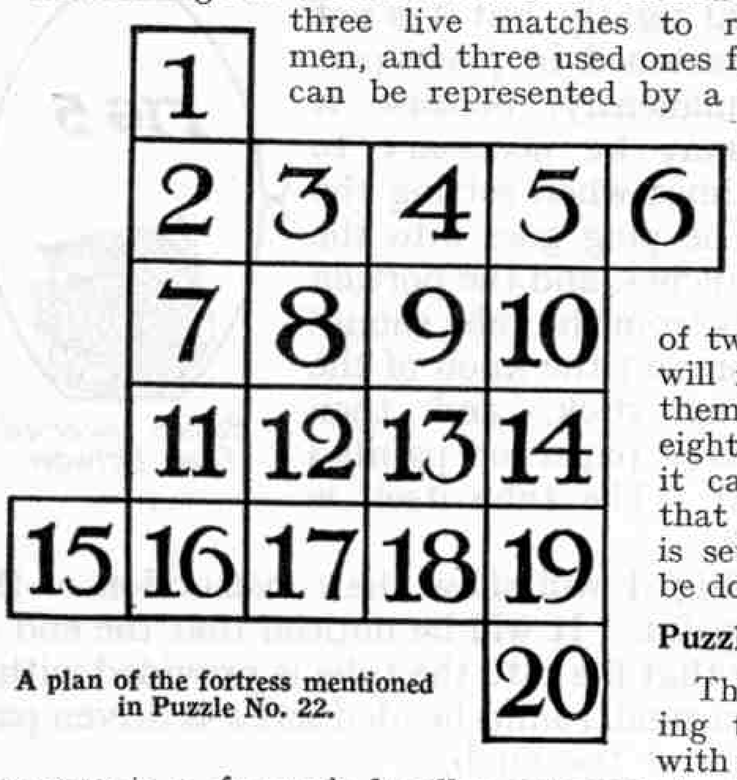
My first is in pencil, but not in lead,
My second is in blanket, but not in bed.
My third is in come, but not in go,
My fourth is in cotton, but not in sew.
My fifth is in dome, but not in bell,
My sixth is in peal, but not in knell.
My seventh's in run, but not in walk,
My eighth is in speak, but not in talk.
My ninth is in hot, but not in cold,
My tenth is in brave, but not in bold.
My eleventh's in hen, but not in cock,
My twelfth is in sand, but not in rock.
My thirteenth's in tin, but not in box,
My fourteenth's in badger, but not in fox.
My fifteenth's in love, but not in hate,
My sixteenth's in stride, but not in gait.
My whole is quite incomprehensible.

Puzzle No. 16.

Three white men, A, B, and C, were shipwrecked on a desert island on which there were three cannibals, D, E, and F. A short distance away there was another larger island on which good supplies of food were to be found. The only means of crossing the shark-infested sea between the islands was a small rowing boat that would carry two people. All the white men, and one of the cannibals, D, were able to row.

All six men naturally wanted to cross to the other island, but as it was unsafe for the white men to be outnumbered by the cannibals, they were in despair for a time, thinking it would be impossible to make the crossing. Eventually, however, A thought out a way of getting across, by which the number of white men ould always be at least equal to that of the cannibals. What was A's plan ?

In working out the moves readers will find it a great help to use three live matches to represent the white men, and three used ones for the cannibals. D can be represented by a used match broken in two.



A plan of the fortress mentioned in Puzzle No. 22.

Puzzle No. 17.

Most mathematicians will tell you that the half of twelve is six, and you will naturally agree with them. With the aid of eight matches, however, it can easily be proved that the half of twelve is seven. How can this be done ?

Puzzle No. 18.

The diagram illustrating this puzzle is made with thirteen matches and represents a farmer's hurdles arranged to form six sheep pens all of the same size. One of the hurdles was stolen one night, and next day the farmer was in despair. After a great deal of thought, however, he found that by re-arranging the remaining twelve hurdles, he could still enclose six pens of equal size. How did he do it ?

Puzzle No. 19.

What nautical term is hidden in each of the sentences given below ?

1. I do not mind about the risk. If four of you are prepared to come with me I'll start right away.
2. His form, as the club's best forward, was not up to his usual standard.
3. Now that he was an experienced pilot his favourite pastime was looping the loop.
4. Do artists have to pay very high rents for their studios ?
5. Often Derrick would wander out of the garden and be lost for a few hours.
6. Will you please lend me your soft rubber ? The one I bought yesterday is too hard.
7. " Sarah at Chelmsford ! " he saw on the posters.

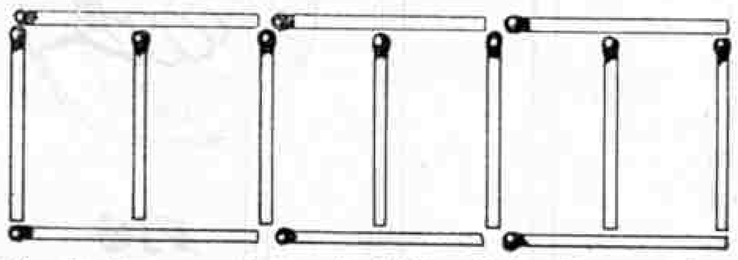
The cat and mice. (Puzzle No. 20).

Puzzle No. 20.

The illustration to this puzzle shows a cat, with 13 mice arranged in circular order around her. Twelve of these mice are black and the thirteenth is white. The cat kills the mice one by one, starting to count at a certain mouse and counting to the thirteenth mouse every time. She kills the thirteenth and proceeds each time to count from the next living one. From which mouse must she start in order to kill the white one last ?

Puzzle No. 21.

Jimmy had not been paying attention during the English lesson, and his teacher made him stay in after school. Thinking to punish him by keeping him longer than usual, the teacher wrote seven letters a,e,i,o,u,w and y, on the blackboard, and told Jimmy that he could not go until he had made a sentence using only those seven letters. Jimmy, however, being quite a bright boy, soon found out a sentence using the letters, and was able to go out and join the rest of the class at football. What sentence did Jimmy write ?



The six sheep pens before the thirteenth hurdle was stolen. (Puzzle No. 18)

Puzzle No. 22.

Twenty men were imprisoned in a fortress containing twenty cells. There were four British, four French, four German, four Russian and four Italian prisoners. They were arranged so that no prisoner had one of his own countrymen in an adjoining cell. How was this done ?

Puzzle No. 23.

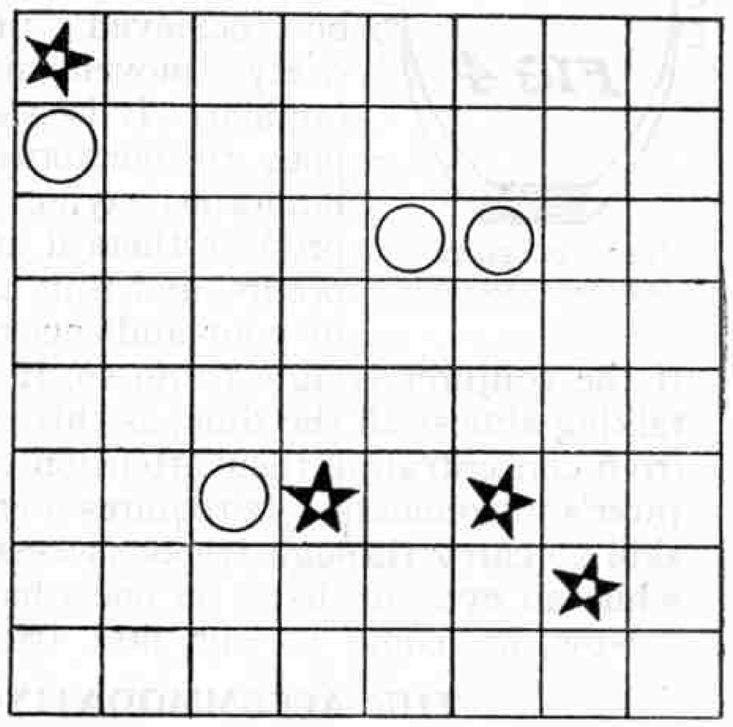
One letter, appearing in five places, has been omitted from the letters below. What is the complete sentence ?

ITTYNITTEDHAIILTS.

Puzzle No. 24.

A foreign power had stolen the plans of a secret new type of submarine which, although only in its experimental stages, was expected to revolutionize marine warfare. Naturally no expense was spared by the Admiralty in endeavours to retrieve the plans, but all attempts met with failure.

The foreign power constructed a submarine to the designs they had stolen, but they were unable to make certain of one important measurement of a vital part, and consequently the submarine was a failure. The measurement that could not be found out was given on the plans as "$\frac{\text{CH3ES}}{\text{L}}$." What was the actual measurement in feet ?



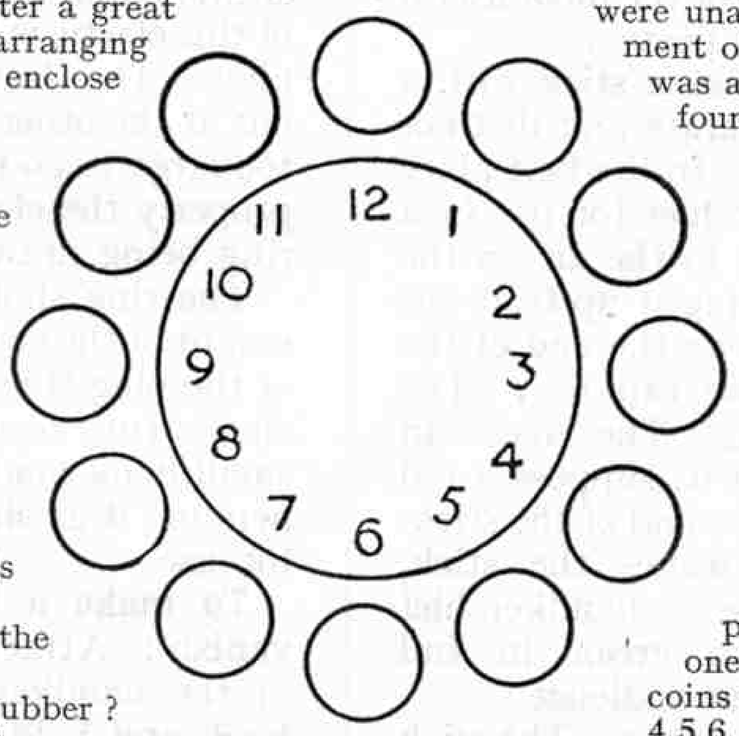
Can you divide this square into four equal parts ? (Puzzle No. 25).

Puzzle No. 25.

How may the figure shown above this puzzle be divided into four equal parts, each of the same shape and each containing one star and one circle ? The divisions must be made along the horizontal and vertical lines of the figure.

Puzzle No. 26.

Arrange twelve pennies or counters in a circle as shown opposite. Now take up one penny, pass it over two others and place it on the third one. Repeat the process until, after six moves, the coins are arranged in six pairs in the positions 1,2,3, 4,5,6, You may travel in either direction round the circle at each move and the two pennies jumped over may be either two separate coins or a pair.



Put these twelve counters into six piles. (Puzzle No. 26).

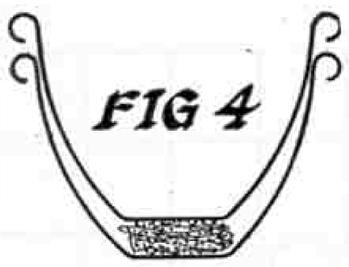
Mysteries for Sharp Eyes

Simple Conjuring Tricks for Christmas

By Norman Hunter

CHRISTMAS does not seem complete without a few conjuring tricks, and however simple these may be they are always popular if neatly carried out. Elaborate mysteries that require the use of a great deal of apparatus are out of the question for most amateurs, and the same may be said of certain types of tricks that demand a high degree of technical skill.

The tricks described in this article require only simple home-made apparatus, and are not in the least difficult to perform. I should like to impress upon all readers, however, the necessity of practising each trick a few times in private before performing it before even the smallest audience. Success depends entirely upon carrying out the trick in an easy and natural manner, and this cannot be achieved unless every movement is familiar. It is a good plan to memorise a few jokes and humorous sayings, so as to be able to produce them if any hitch in the trick occurs, and thus distract the attention of your audience at a critical moment. If the conjurer is able to do so, it is better to keep on talking almost all the time, as this prevents the audience from concentrating their attention too much on the conjurer's movements. It requires a great deal of technical skill to carry through tricks successfully in dead silence while all eyes are fixed on one's hands!



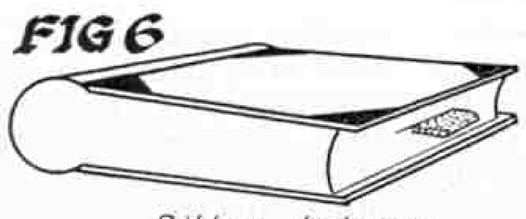
Flag concealed between basins

Now we come to our first trick, which is called:

THE ACCOMMODATING STICK

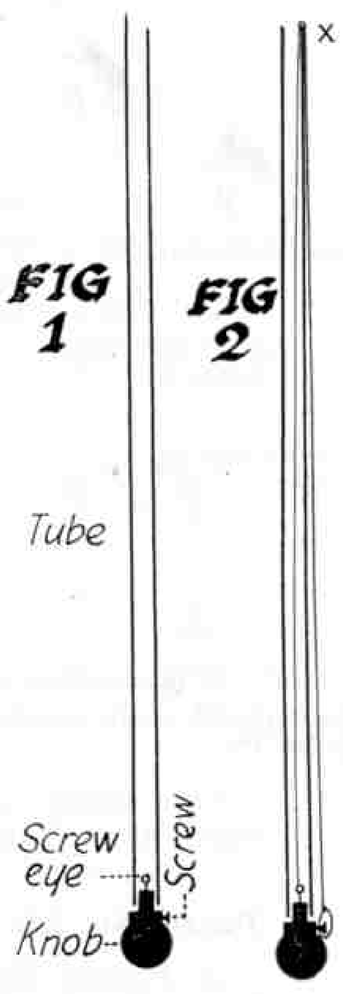
This piece of apparatus, which can be made at home quite easily at practically no cost, is one of the most useful articles that the amateur conjurer can possess.

In appearance it is a plain black walking stick with a silver knob, but no less than three separate and distinct feats of magic are possible with its aid. In the first place if the conjurer requires a silk handkerchief for use in a trick, he can catch the required article in the air on the end of the stick instead of simply picking it up from his table. Secondly, a handkerchief hung on the end of the stick will disappear with lightning-like rapidity. The third effect is even more astonishing. The magician hangs a coloured silk handkerchief—let us suppose a red one—on the end of the stick. He then waves the stick, and the handkerchief changes to green in full view of the audience!



Ribbon between pages of book

How it is done: The stick is actually not a stick at all, but a hollow tube. A piece of metal tubing is the most satisfactory on account of its strength, but it must be seamless tubing, otherwise the handkerchiefs will be liable to catch in the seam. A cheaper tube, which with care will do all that is necessary, may be made very simply by taking a large sheet of strong brown paper, pasting or gluing one side thoroughly, and then rolling the paper round a rod of suitable size. The sheet of paper should be large enough to give sufficient turns round the rod to form a perfectly safe tube. The tube should have an inside diameter of about one inch, and should be the same length as an ordinary walking stick.



Having made the tube, the next step is to get a wooden plug to fit into one end of it. This plug must fit tightly, but it is not fastened in place permanently, because it may be necessary to remove it sometimes when setting the stick for use. The plug goes into the tube a couple of inches, and the portion of it that projects from the tube should be shaped to represent the knob of the supposed walking stick, and then covered with silver paper or painted with silver paint. The tube itself is enamelled black.

Basins inverted - Flag between

Reference to Fig. 1 will show the construction of the stick up to this point. It will be noticed that the end of the wooden plug that fits into the tube is provided with a screw eye, while a small round-headed screw is driven part way into the side of the knob.

The next requirement is a piece of strong black cord elastic about an inch or so shorter than the tube. One end of this elastic is tied firmly to the screw eye on the wooden plug. The elastic is then passed through the tube, pulled out at the other end, and tied to a ring that is just a little too large to go into the tube. If the work has been done properly the elastic will be just taut inside the tube, the ring being drawn up against the open end of the tube.

The ring should now be taken, pulled out to the full extent of the elastic, and slipped over the screw in the side of the plug (Fig. 2). At the point X in Fig. 2, where the elastic runs over the edge of the tube, should be sewn a small hook made by cutting off part of a safety pin and bending it as shown in the inset. The stick is now ready for use.

To make a handkerchief vanish: Attach the centre of the handkerchief to the hook and hold the stick by the knob end. Wave the

Long ribbon laid on book over concealed piece of ribbon

FIG 8

stick about and push the ring off the screw head; when the elastic will catch the handkerchief inside the stick, the ring flying back to its normal position on the end of the stick.

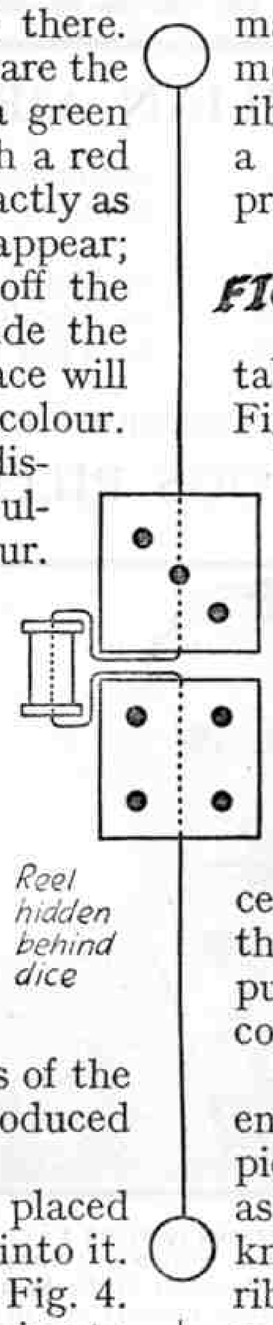
To catch the handkerchief on the stick : Commence by drawing the ring down and slipping it over the screw as before. Take the handkerchief and pass it half-way through the ring; bunch up the handkerchief and keep it concealed in the hand that holds the stick. To produce the handkerchief it is only necessary to push the ring off the screw and make a lunge with the stick. The handkerchief will fly to the end of the stick and thus will appear to have been caught there.

To cause a handkerchief to change colour : Prepare the stick as described for the last effect with, say, a green handkerchief. Bring the stick forward and attach a red handkerchief to the hook at the end of the stick, exactly as if you were going to make the red handkerchief disappear; see Fig. 3. Wave the stick and push the ring off the screw. The red handkerchief will be drawn inside the tube, and the green one flying to the end in its place will create the illusion of the handkerchief changing colour. Actually, of course, this effect is simply the disappearance of one handkerchief and the simultaneous production of another of different colour.

The handkerchiefs used should be of fine silk about twelve inches square.

THE TRAVELLING FLAG

The conjurer picks up from his table two ordinary pudding basins, one inside the other, and allows the audience to see that they are empty. He then turns them mouth to mouth and hangs a flag on the end of a stick. The flag vanishes, and is found between the basins.



How it is done: The disappearance of the flag, which is a silk one, is brought about by means of the special stick I have just described. The flag produced from between the basins is a duplicate.

At the outset the duplicate flag is folded and placed inside one basin, the other basin being " nested " into it. The flag is placed between the basins as shown in Fig. 4. The inner basin may be shown quite empty, and owing to the fact that both basins nest closely together, the audience will take it for granted that the other basin cannot contain anything. The basins are then placed mouth to mouth and turned over so that the folded flag falls from one into the other, unfolding and filling the basins (Fig. 5).

This trick, which is very suitable for commencing a performance, should be presented fairly quickly and with a flourish, in order to produce the best effect.

INVISIBLE MENDING

Bringing forward a piece of ribbon about three yards in length the conjurer hands it to a member of the audience and asks him to examine it and measure it. When this has been done the performer takes the ribbon by the centre and deliberately cuts it in two with scissors. He then holds the cut ends in the flame of a candle, rubs them together, and to everyone's astonishment the ribbon is seen to be completely restored to its original condition without the slightest sign of a join! Once again the ribbon is examined and measured. It is found to be exactly the same length as before, and no clue to the mystery can be discovered.

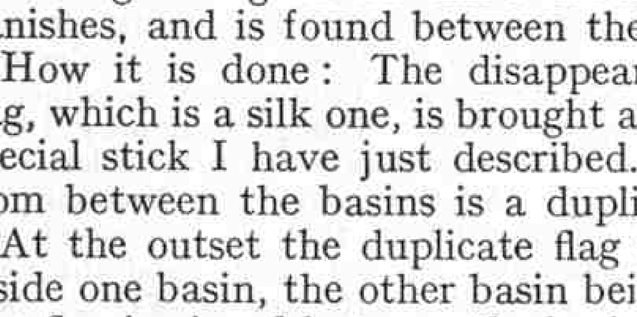


FIG 11

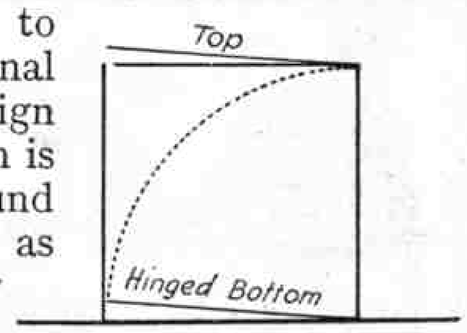


FIG 10

How it is done: There are several methods of performing tricks similar in effect to this, but the one I am going to describe has the advantage of being very easy, and of needing no special apparatus.

For this trick we require a length of ribbon about an inch in width and three yards in length. Paper ribbon may be used if desired, but silk is, of course, showier and more attractive. There are required also a short piece of ribbon about five inches in length to match the long piece; a pair of scissors, a book, a candle and matches. To prepare for the trick a short piece of ribbon is folded in half and the ends are placed between the pages of the book so that a little of the folded part of the ribbon projects. The book is placed on the table with the back towards the audience, as shown in Fig. 6.

FIG 9

When the long ribbon has been examined it is folded somewhere near the centre and laid down on the book, so that the folded part comes just over the projecting end of the concealed piece of ribbon (Fig. 7). Both hands are shown to be empty. The ribbon is taken up by the centre, the folded end of the short piece of ribbon is pinched against the folded part of the long ribbon, and they are then lifted together, the short piece being behind the long piece. They are placed in the left hand as shown in Fig. 8. Now the centre of the long ribbon is apparently drawn through the closed fist, but actually part of the short piece only is pulled out, leaving the folded centre of the long piece concealed in the hand.

The projecting piece of ribbon can now be cut and the ends trimmed as described, and the whole of the small piece of ribbon be allowed to be reduced to ashes. The ashes are rubbed away and the centre of the ribbon is kneaded with the fingers and drawn out. Of course the ribbon, not having been cut at all, shows no sign of a join and is still the same length as it was at first. Moreover, there is nothing in the way of short ends of ribbon or attachments to be got rid of, and therefore both hands may be shown empty.

AN APPARENT IMPOSSIBILITY

The conjurer displays a length of cord having threaded upon it two large dice. Both ends of the cord have metal rings tied to them, so that although the cord runs freely through the two dice neither of these can be removed from the cord.

A large handkerchief is thrown over the dice and the cord, and a member of the audience is asked to hold the latter. The performer then exhibits a small reel of coloured silk. He places his hand beneath the handkerchief and takes the handkerchief away; when the audience see that the reel of silk has become threaded on to the cord between the two solid dice. Cord, dice and reel may be handed round for close

(Continued on page 1005)

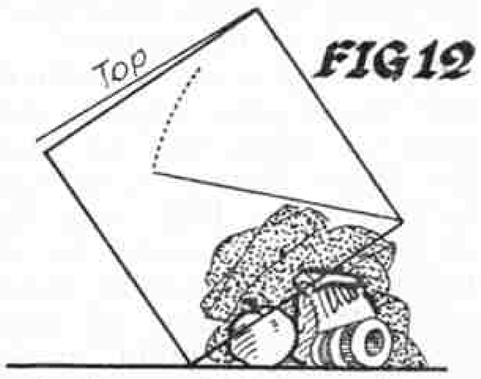


FIG 12

What Shall I Be ?

XIV.—A CIVILIAN AIR PILOT

IN the "*M.M.*" for June 1930 there appeared an article in this series dealing with aeronautical engineering. In it we reviewed the prospects of the manufacturing side of aviation, and described the means by which boys could qualify for positions of various kinds in connection with the construction of aeroplanes and aero engines. This month we deal with the flying side of aviation, and explain how pilots are trained, and in what directions employment is open to them.

In this profession perhaps more than in any other it is necessary to look well ahead. Aviation is still comparatively new, and there exists in the minds of large numbers of people the feeling that flying is dangerous in comparison with other means of transport. Until this idea has been rooted out, and the travelling public generally have become air-minded, the development of commercial aviation must be slow. As a matter of fact aircraft can produce records of freedom from accident that compare very favourably with any other form of transport. Reliable as are the best machines of to-day, however, it is certain that those that will be developed in the next few years will be even more stable and easier to control. Once a sufficient standard of reliability and safety has been attained, progress is certain to be very rapid, both in the direction of speed and in the development of larger passenger and freight carrying machines. When this period of rapid development commences—and it is not likely to be long delayed—there will be a big demand for pilots, and the man who is already qualified and has had flying experience will be in a very favourable position. At present it cannot be denied that openings for pilots are not numerous; but the prospects are improving month by month.

There can be no doubt that the best training for a flying career is to be obtained in the Royal Air Force. The military pilot is expected to fly at all times and in all kinds of weather, and may be called upon to serve with any type of aircraft in any part of the world. He therefore gains a wider experience of flying under all conditions than he could do as a civilian, and moreover he gains this experience at comparatively small expense to himself or his parents.

There are various methods of entering the Royal Air Force, but those who hope eventually to obtain good positions in civil aviation will be well advised to take advantage of the Short Service Commission scheme. This was introduced in November 1922 with the object of building up a reserve of pilots who would be immediately available in the event of war. Those who obtain commissions under the scheme serve for a period of five years on the active list, after which they remain on the reserve for a further four years. During this time they serve for a fortnight each year.

Candidates for admission under the scheme must be between the ages of 18 and 29. They are not required to pass a written examination, but instead they make application to the Air Ministry on a special form. Each case is considered by the Air Council, and approved applicants are required to appear before a special selection committee and to attend a medical board in London. Successful candidates qualify for service rank as Pilot Officers on probation. They are given a fortnight's preliminary training at the Royal Air Force depot, Uxbridge, and if they prove satisfactory during this, they are posted to one of the R.A.F. flying training schools or to a service squadron for flying training.

The course of training occupies from eight to twelve months, and includes instruction in aviation and in the various technical subjects involved. On completion of one year's satisfactory service probationary Pilot Officers are confirmed in their rank and become eligible for promotion to the grade of Flying Officer. In order to attain this rank a special examination must be passed, and normally promotion occurs after 18 months' service.

The pay of officers serving under the Short Service Commission scheme is quite good. The probationary Pilot Officer commences with a salary of £273 15s. per year. On becoming a Flying Officer this is increased to £343 14s. 2d. per year; and the pay of a Flight Lieutenant is £447 2s. 6d. per year.

During his five years' service an officer under the Short Service Commission scheme receives a thorough and intensive training in aviation that will equip him for good posts of many kinds. His prospects in this respect are very much better if he has equipped himself with special knowledge before taking up his commission. The age limits at which entry into the R.A.F. may be gained are very wide, and those who are really keen to qualify for posts of the highest class have excellent opportunities of becoming fully qualified engineers before making application for admission. Those who are able to do so should spend the necessary time at a recognised University or technical school to enable them to take a degree in engineering, and this course cannot be too strongly recommended. An alternative that may appeal to many candidates for Short Service Commissions is to take up the study of photography and surveying, or some other subject that is likely to be of value in special branches of civil aviation work.

At the conclusion of his term of service an officer who has been granted a commission under the Short Service scheme may decide to remain in the Air Force. He can only do this if his commission is extended, of course. A limited number of permanent commissions are awarded each year, and in addition, what are known as medium service commissions may be granted, providing for a further term of five years in the R.A.F. If he decides to leave, in order to enter civil aviation, for example, a grant of £375 is awarded, and it may be noted that those who serve a complete term of ten years in the R.A.F. receive a retiring

A FAMOUS PILOT

Mr. C. D. Barnard learned to fly on a Farman biplane in 1915 and later served with No. 3 Squadron of the R.F.C. in France. At the close of the War he became interested in civil aviation and was one of the earliest commercial air pilots.

Mr. Barnard has made many notable flying records, among which are return flights to Karachi and Cape Town in seven and 20 days respectively More recently he made non-stop flights to Tangiers and Malta in a "Puss Moth," in each case returning non-stop to London on the following day.

grant of £1,000, and remain on the reserve for four years.

There are many types of work for which those who have held commissions in the R.A.F. should be eligible. The most remunerative branches are air line piloting and air surveying. The pilots employed by a well-established air line company may receive £1,000 or more per year, and in addition may be given bonuses varying according to the number of miles flown. Air surveying is a fascinating branch of civil aviation. It demands skill in photography, in addition to a knowledge of the usual methods of surveying, and in order to obtain an appointment of this kind a University degree in engineering is practically a necessity. This branch of aviation is not one for which only R.A.F. officers are eligible. To a certain extent technical qualifications are more important than flying ability, and anyone who possesses these and has gained at least 500 hours' flying experience should be capable of doing well in this class of work.

A post for which a retired officer of the Royal Air Force is suitable is that of instructor in a flying school. This is highly responsible work for which the nature of the training that he has received gives him special qualifications. This is well recognised by the officials of flying clubs and training schools, and most of the instructors employed by them have received their training in the R.A.F.

Although the best positions in civil aviation are secured by ex-R.A.F. officers, it is by no means impossible to enter the profession without taking a commission. Those who for any reason are unable to follow this course should learn to fly in one of the many schools or flying clubs that have been established in this country. Training of this kind is not so intensive and complete as that received in the Air Force, but there is no difficulty in complying with the official regulations under which flying licences are granted. These licences are two in number, and are known as "A" and "B" licences. The first merely constitutes permission to fly, and the second must be the chief aim of those who wish to enter civil aviation, for its possession is official permission to fly "for hire or reward." A candidate for the "B" licence must already have gained the more restricted one, and must have carried out at least 100 hours' solo flying during the two years before his application is made. During that time he is required to make a minimum of 30 solo landings. In the actual flying test that he must undertake he must make a cross-country solo flight of 200 miles in the course of which two landings are necessary. Other tests include a flight with an examiner as a passenger, during which three forced landings must be made; and a night flight of at least 30 minutes.

Mere flying ability is not sufficient qualification for the "B" licence. A pilot upon whose skill the lives of passengers may depend must be acquainted with the peculiarities of aircraft of various types, and also must have a thorough knowledge of aero engines, navigation and elementary meteorology. In addition he must be able to carry out running repairs on aeroplanes and engines and is required to be familiar with air legislation. Those who wish to rise in their chosen profession therefore must devote considerable attention to these important studies, and should not be satisfied until they have gained a navigator's licence. A second-class licence of this kind calls for at least 300 hours' flying and a total of 600 hours is necessary before the first-class navigator's licence may be obtained. The final stage of a complete civilian training is marked by the gaining of a Master Pilot's certificate, and in order to qualify for this, 1,000 hours' flying must have been carried out, and the applicant must have served as a pilot for at least five years.

It will be seen that it takes time to become a fully qualified pilot, but the necessary experience may be gained while in actual employment. After obtaining an ordinary "B" licence there is the possibility of joining the staff of a firm running aeroplanes for hire or the newly-qualified pilot may buy an aeroplane and commence work of this kind for himself. In each case the flying time that he puts in helps to bring up his total to that necessary for the higher certificates.

To enter the flying profession in this manner is necessarily a little expensive. It is impossible to give even approximately the cost of obtaining a Master Pilot's certificate, but an outlay of from £25 to £50 is required in order to qualify for the "A" licence, the exact amount depending on the aptitude of the pupil and also on the particular flying club or school at which he receives this training. The usual charge made for the use of machines owned by these institutions is from £1 to £1/10/0 per hour, and thus the cost of the preliminary flying necessary to qualify for the "B" certificate is from £100 to £150.

One of the best and most interesting methods of securing experience after qualifying for a "B" licence is that afforded by employment with a company specialising in air taxi work. A pilot engaged in this may be called upon to make flights of varied character, for one day he may be required to fly to a neighbouring town and this may be followed shortly afterwards by a flight abroad.

Another means of gaining flying experience is giving "joy rides," a plan that was followed by quite a number of pilots who are now world-famous. Colonel Lindbergh began his active flying career in this manner, and it was in "barnstorming," as the Americans call it, that he gained the mastery of the air that enabled him to make his celebrated Atlantic flight. The great disadvantage of this class of air work is that for the most part it is only a seasonal occupation.

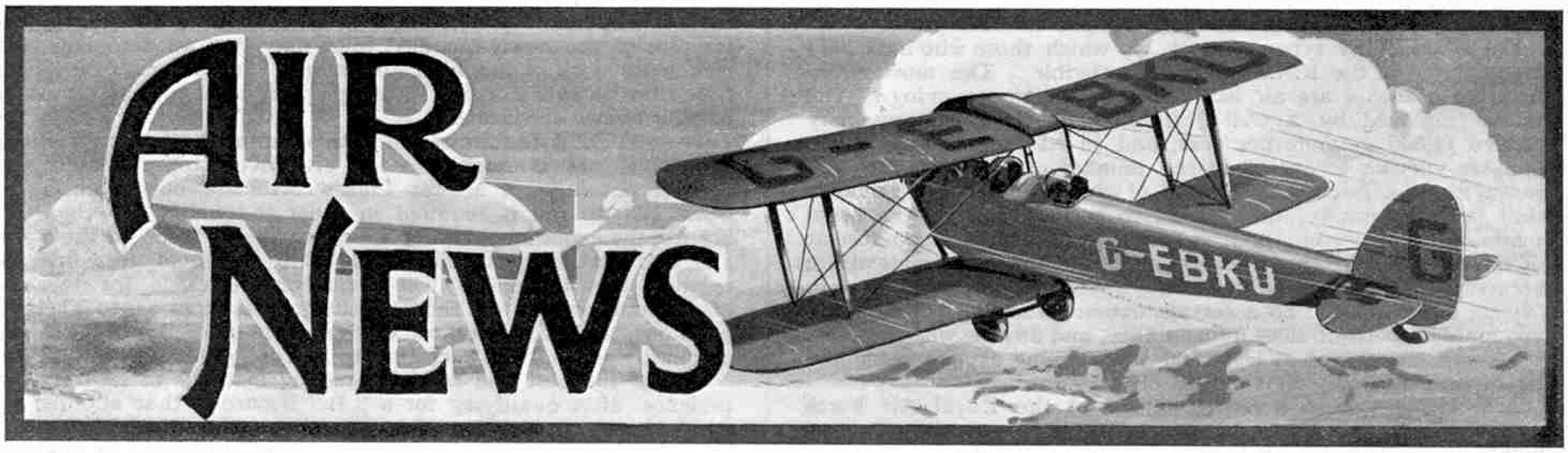
In addition to the openings already mentioned, a limited number of positions are available with commercial firms, newspapers, and private owners. Many up-to-date firms realise that the possession of an aeroplane is a great advantage, for their representatives are able to cover more ground in a given time than is possible by any other means. An aeroplane is also very useful to a firm with branches in various parts of the country, for with its aid directors and other responsible executive officials are able to complete in one day a tour of inspection that by other means of travel would occupy several days. The saving of time is not the only gain, for general travelling and hotel expenses are reduced.

Carrying photographs or important documents for newspapers is a very interesting task for which aeroplanes are now often used. An outstanding instance of the value of aircraft for this purpose was given recently when photographs of the coronation of the Emperor of Abyssinia were brought from Addis Ababa to this country by air, the distance of 1,050 miles being covered in five days. The first 650 miles of the journey were made over country where a forced landing would have been disastrous. As a rule machines are hired from air taxi firms for work of this kind, but it is also becoming the practice for newspapers to own a special staff aeroplane.

The qualifications required for employment as a staff pilot with a newspaper, a commercial firm or a wealthy private owner, are not very difficult to fulfil. The pilot must, of course, be in possession of a "B" licence, but in most cases the position does not carry so much responsibility as does air-line piloting, and further specialised knowledge is not usually required.

As in other careers previously dealt with in this series of articles, an association has been formed to guard the interests of those actively engaged in civil aviation. This is known as the Guild of Air Pilots and Navigators. It is not exactly equivalent to the well-known engineering institutions, however, for there are no junior grades, and it is necessary to become a fully certified pilot or navigator before entry may be obtained.

An aerial view of Croydon Aerodrome, the headquarters of Imperial Airways Ltd., and the starting point of numerous air line services. The two machines that can be seen in front of the hangars are Handley-Page "W.10's" as used on Imperial Airways continental services.



Speed Record for Commercial Aircraft

An official speed record for large commercial aircraft has been set up by a Ford sixteen-seater aeroplane that attained a speed of 164.4 m.p.h. over a 62½-mile course. The previous record of 142.6 m.p.h. was held by a "Bach" machine.

The Ford aeroplane employed was a triple-engined all-metal monoplane fitted with three Pratt and Whitney "Wasp" engines, and was of similar design to the one described on page 849 of our issue for November, 1929. Its normal cruising speed is 120 m.p.h. and when it attained the record speed, the machine carried a load equivalent to the weight of 27 passengers.

It is interesting to note that a new operation record was recently set up by a Ford commercial machine. This made 1,712 flights between 133 airports situated in three different countries. On these flights 98,082 miles were covered in a total flying time of 984½ hours, and 17,196 passengers were carried.

Two Ford monoplanes were brought to England a short time ago and assembled at Hooton Aerodrome, Cheshire, the headquarters of the Liverpool and District Aero Club. The machines were then flown to various places in order to give demonstrations.

Two-Stroke Engine for Aircraft

An interesting two-stroke aero engine has been designed by C. F. Caunter, a British engineer. The engine is of the air-cooled five-cylinder radial type, and it is estimated that at 2,000 r.p.m. it will develop from 55 to 60 h.p. As the experimental model weighs about 160 lb., this will give a power-weight ratio of 3 lb. per horse power. The overall diameter of the engine is about 33 in.

The most interesting feature of the engine is the stepped piston that works in two superimposed cylinders. The smaller of these is the actual working cylinder. The larger, which is nearer the crankcase, acts as a pumping cylinder. At the bottom it is closed by a ball slide through which the piston rod passes. It is double-acting in character, the space on the crankcase side of the piston being employed for compressing the working fuel, while that on the opposite side receives the exhaust gases from the smaller cylinder.

When the engine is in operation gas is fed to the pumping cylinder through "poppet" valves of normal type. This takes place during the upward travel of the piston. The downward stroke effects the necessary compression and the charge is forced into the working cylinder through an inlet port uncovered in the usual manner by the movement of the piston. The same stroke forms a vacuum in the portion of the pumping cylinder further from the crankcase and into this the exhaust gases from the working cylinders are transferred on the opening of the exhaust port. This action takes place before the inlet valve opens and thus the exhaust gases are removed from the working cylinder before the compressed charge of fuel for the following stroke is admitted.

It is believed that the simplicity of the engine will make it comparatively easy to manufacture and that in production it may be built at a cost of £1 per horse power.

Courtesy ["*The Aeroplane*"

The de Havilland "Moth" amphibian. This interesting machine may be used as a land or seaplane, and the float is provided with a water rudder that is clearly shown in our illustration.

THIS MONTH'S AIR STORY

Susie: "What is a monoplane?"
Sammy: "An aeroplane with only one wing."
Susie: "Which side is it on?"

The New Single-Seater Interceptor Fighter

The Hawker "Hornet" interceptor fighter, referred to on page 875 of our last issue, is now called the "Fury." The Napier "Halford" aero engine has also been renamed and is now known as the "Rapier."

New Bristol "Jupiter" Engines

Until recently engines for aircraft could be conveniently grouped in two classes, one consisting of engines developing maximum power at sea level only, and the other of those that are fitted with high-speed superchargers to enable them to perform most efficiently at much greater altitudes. A demand has now arisen for aero engines that will develop their maximum power at intermediate heights, however, and in order to fulfil this requirement the Bristol Aeroplane Company have introduced two new types of their famous "Jupiter" engines. These are the Bristol "Jupiter" series X.F. AM. and X.F. BM. They are similar in design, and in general features they resemble the normal Bristol "Jupiter," an illustrated description of which appeared on page 35 of the "*M.M.*" for January 1929. There is one important difference, however, in the new engines, the supercharger employed is of the moderate speed type and permits full throttle operation at heights about 5,000 ft. The new engines are suitable for use in general purpose military machines and in certain commercial machines operating over routes where much flying has to be carried out in mountainous districts. Imperial Airways Limited have already selected the new "Jupiters" for employment in the new four-engined flying boats to be used on the London—Cape Town air line that is to be inaugurated shortly. They have also been chosen for service in the large new Handley-Page 40-seater landplanes that are to operate on the route to India.

The new Bristol "Jupiters" are nine-cylinder air-cooled radial engines. They have a bore and stroke of 5¾ in. and 7½ in. respectively, and the total swept volume is 1,753 c. in. On the series X.F.BM type, the propeller speed is half that of the engine, while the normal speed of the engine is 2,000 r.p.m., and the maximum 2,200 r.p.m. The rating at normal r.p.m. is 555 b.h.p. at 4,000 ft., while when the engine is running at maximum speed, 600 b.h.p. is developed at 5,000 ft. The series X.F.AM engine has a propeller speed 0.656 that of the engine. The normal r.p.m. is 2,000, at which the propeller has a speed of 1,312 r.p.m.

A three-quarter front view of one of the batch of Westland " Wessex " machines produced for S.A.B.E.N.A., the well-known Belgian Air Liner Company. This photograph is published by courtesy of Westland Aircraft Works.

The Westland " Wessex "

The Westland aircraft works have produced a new type of machine for commercial work that is known by the name of the Westland " Wessex." This is a single-seater cabin monoplane of the semi-cantilever high-wing type, and is fitted with three Armstrong Siddeley " Genet Major " engines, each of which develops 105-110 h.p. It has been designed for use on air lines of medium length that serve as feeders to trunk routes, and is also particularly suitable for air taxi work, or for the private owner or business man who requires a machine that is roomier and more comfortable than a 2-3-seater coupé.

An important feature of the " Wessex " is that any two of the three engines will maintain the machine in flight. In the unlikely event of breakdown of two engines, the machine would lose height very slowly and the pilot would have time in which to select an emergency landing ground.

It is interesting to note that a special rudder trimming device is provided on the machine. When this is in action the aeroplane is kept flying in the direction for which the rudder has been set. The pilot may then remove his hands and feet from the controls for considerable periods in order to obtain a rest.

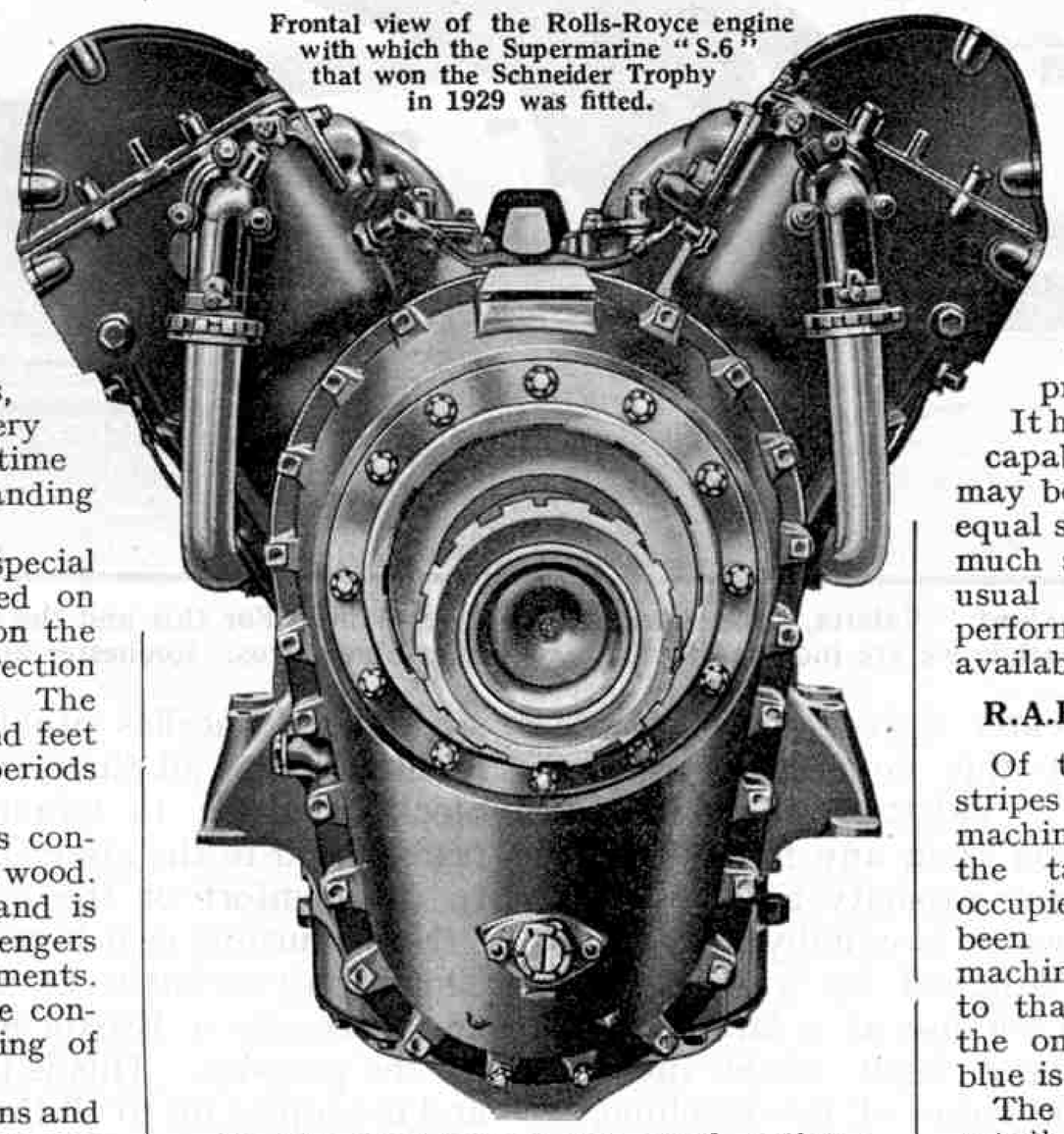
The fuselage of the " Wessex " is constructed partly of metal and partly of wood. The cabin is of wood throughout and is large enough for four or six passengers according to the internal arrangements. The forward portion is of composite construction, and contains the mounting of the central engine.

The wing structure is in two sections and is of wooden construction with rigid type internal bracing. Two 50-gallon fuel tanks are fitted into it. The fin and tail plane also are constructed of wood, but the ailerons, rudder and elevators are built of tubular duralumin spars and sheet metal ribs.

The " Wessex " has a length of 38 ft., a span of 57 ft. 6 in. and weighs 5,750 lb. when fully loaded. Its maximum speed at ground level is 108 m.p.h. and the cruising speed is 95 m.p.h. The rate of climb at ground level is 530 ft. per minute, while the service ceiling is 10,000 ft. and the absolute ceiling 12,300 ft.

Aero Engine Cooled by Steam

An engine that is officially described as being " steam cooled " has been produced by Rolls-Royce Ltd. A Fairey " Fox " day bomber fitted with it is reported to have successfully carried out a number of flying tests, and apparently the engine has now passed the experimental stage for it is employed in the Hawker " Hart " day bomber that has recently been adopted for use in the Royal Air Force.



Frontal view of the Rolls-Royce engine with which the Supermarine " S.6 " that won the Schneider Trophy in 1929 was fitted.

In the new engine the usual radiator is dispensed with, its place being taken by a condenser situated in the leading edge of the wing of the aeroplane to which it is fitted. In this position it is cooled by the air stream. Steam generated in the water jackets of the engine cylinders is passed to the condenser and allowed to return to the jackets when condensation has taken place.

Engines employing condensers may be designed with a very small frontal area and their introduction will enable better stream-lining to be obtained. A great saving in weight also may be effected.

Interesting Aeroplane Invention

Flettner rotors have been substituted for wings in an interesting new type of aeroplane that has recently been produced in America. These are hollow cylinders that when rotated are acted upon by the wind very much as if they were sails. They have been used successfully for propelling ships and a full account of the trial trips of the rotor ship " *Barbara* " was given on page 126 of the "*M.M.*" for January 1927. This vessel is no longer fitted with rotors, for their use is not economical.

The new aeroplane appears to be merely an open framework carrying a cockpit for the pilot, and it obtains its lift from three rotors. These are constructed of metal and are two feet in diameter. A radial engine of normal type is fitted to the machine and this operates a propeller with three blades.

It has been stated that the rotor plane is capable of lifting ten times the load that may be taken by an ordinary machine of equal size, and it is also claimed that it is much speedier than an aeroplane of the usual type. Authentic details of the performance of this invention are not yet available, and will be awaited with interest.

R.A.F. Identification Marking Changed

Of the red, white and blue vertical stripes on the rudders of Royal Air Force machines, the red one is now that nearest the tail. Previously the blue stripe occupied this position. The change has been made because French military machines are marked in a similar manner to that formerly used in this country, the only difference being that a lighter blue is used in France.

The familiar red, white and blue " targets " painted on the wings of military machines remain unaltered. These cannot lead to confusion, for on French machines the innermost circle is blue, and on those of the British Royal Air Force it is red.

Berlin to Tokyo in 10 Days

An excellent flight from Berlin to Tokyo has been made by Yoshihara, a well-known Japanese pilot, in a Junkers " Junior " light aeroplane with an Armstrong Siddeley 80-88 h.p. " Genet " radial engine. The journey was more than 6,500 miles in length and this was covered in nine days, 22 hrs., 10 mins.

The Short "Valetta"

The World's Largest and Fastest Seaplane

ONE of the most interesting of recent British aircraft is the Short "Valetta," the world's largest seaplane. This has been built by the well-known firm of Short Bros., Rochester, who were also the constructors of the Short "Calcutta," the first British all-metal passenger flying boat. The "Valetta" is larger than the "Calcutta," its loaded weight being 22,400 lb. or about 10 tons, while that of the "Calcutta" is 20,200 lb. when fully loaded.

Although it is heavier than the flying boat, the new machine is faster and has a higher rate of climb. The comparison is interesting, for the "Valetta" has been built to the order of the British Air Ministry in order to obtain as much information as possible in regard to the relative merits of seaplanes and flying boats of equal size. The seaplane is not as seaworthy as the flying boat, and for this reason can only be used to the best advantage for service over comparatively sheltered waters. This limitation is compensated by greater speed and better climbing performance, and in this connection it is interesting to note that the "Valetta" is claimed to be from 15 to 20 m.p.h. faster than any flying boat biplane of similar weight-carrying capacity and power, and that its take-off from the water is equally as good.

A side view of the Short "Valetta," the world's largest seaplane. For this and the other photographs illustrating this article we are indebted to the courtesy of Short Bros. (Rochester and Bedford) Ltd.

The "Valetta" has been designed as a seaplane but it may be readily adapted for use as a landplane, the undercarriage fittings having been made interchangeable. This increases the value of the machine, for it means that the "Valetta" may be used on all stages of an air line that passes over both land and water. An instance of this is the projected route from London to Cape Town. Certain parts of this will be covered in land machines and others in flying boats. By using the "Valetta" throughout, some machines being fitted with floats and others with wheels, the task of maintaining the service would be made more economical, for the supplies of spares to be maintained at stations along the route would be reduced to a minimum, and in addition, the engineering staffs would be less.

As the illustrations to this article show, the Short "Valetta" is a twin-float seaplane of the high wing monoplane type, and with the exception of the covering surfaces it is made entirely of metal. The floats with which it is equipped are very large. They are nearly 40 ft. in length, but a better idea of their size may be obtained by remembering that this is nearly two-thirds the length of a standard cricket pitch. In spite of their great bulk the floats are very efficient. Their shape was settled by means of many careful experiments with models in a testing tank, and as a result, their passage through the water causes very little disturbance. No spray is thrown over the machine when it is taxi-ing over the surface, and the bow wave from each float flows away very smoothly.

Three Bristol "Jupiter" XIF engines are fitted in the "Valetta." These are of the geared type and each develops 490 h.p. at 2,000 r.p.m. The central engine is mounted in the nose of the fuselage and the wing engines in streamlined nacelles situated under the wing. A novel feature is that all three engines are mounted on rubber blocks in order to minimise the amount of vibration transmitted to the aircraft structure. This adds greatly to the comfort of the crew and passengers.

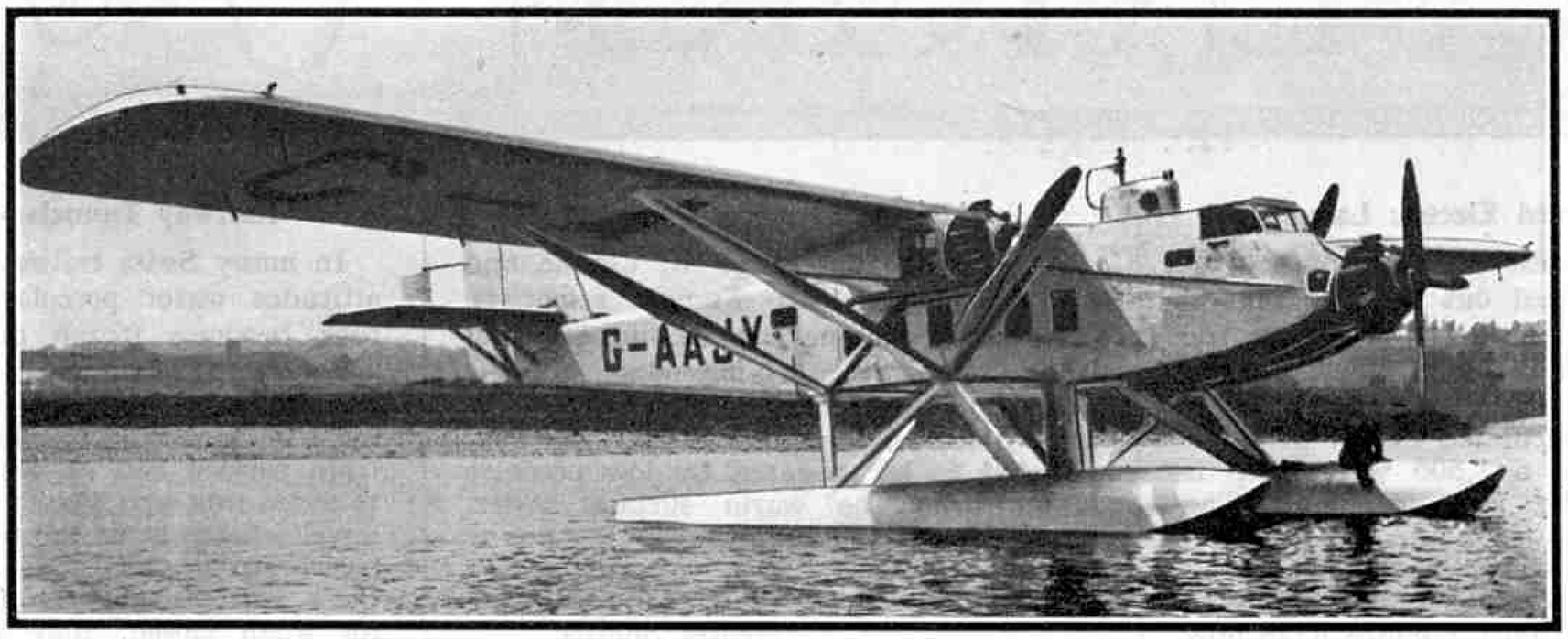
Hand-turning gear is provided for starting the engines. This is only meant to be used in an emergency, however, and normally a Bristol engine gas-starter is employed for the purpose. This is installed on top of the fuselage and is coupled up to all three engines. When the aircraft is stationary upon the water the starting engine may be usefully employed in driving the dynamo that provides the necessary current for the lighting and wireless services.

It is interesting to note that if any repair work on the engines is necessary, and there are no facilities for beaching the machine, the engines may be removed and refitted while the aircraft is afloat by means of a specially designed derrick.

The engines are fed entirely by gravity from two tanks situated in the planes and new supplies of fuel are taken in through the pipes leading from the tanks

to the underside of the fuselage. The tanks are interconnected and thus the three engines may be fed from each of them. The engines are fitted with separate oil systems that incorporate external oil coolers.

The machine is intended to carry a crew of two pilots and a mechanic. The cockpit is situated immediately behind the central engine and during flight or when landing an excellent view is obtained. In order to add to their comfort and to prevent undue fatigue on long distance flights, the heights of the seats for both pilots have been made adjustable. In addition, a sliding roof has been fitted to the cockpit. As the windscreen is continued round the pilots, the cockpit is entirely enclosed, but when desired the glass at the side of the windscreen may be slid aside.



A three-quarter front view of the "Valetta" at anchor. An idea of the size of the floats may be gained by comparing them with the figure seated on one of them.

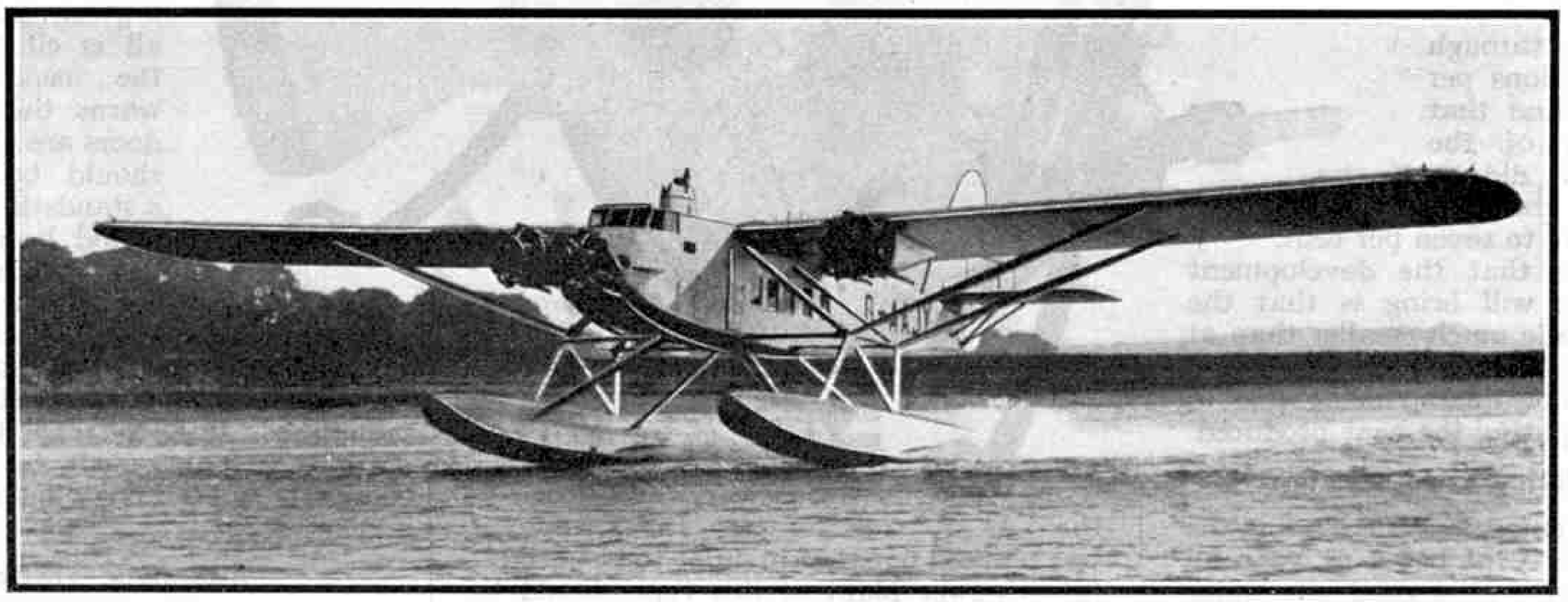
Immediately behind the pilots' cockpit is a space for the wireless apparatus and in which effects of the crew or light luggage may be stored. At the aft end of this compartment there is a bulkhead with a sliding door, through which access may be gained to the main cabin. This is extremely roomy, being 17 ft. in length, 6 ft. 2 in. in breadth, and 6 ft. in height, and the absence of internal bracing enables passengers to move about freely.

In the cabin there are seats for 17 passengers. Of these 12 are arranged on one side in pairs and the remaining five singly on the other side of a narrow gangway. Large windows are fitted and these are rather low in order to enable passengers to look out while remaining comfortably seated, and these may be opened if desired.

Special attention has been paid to a number of details that ensure comfort for the passengers. For instance, parts of the cabin have been lagged with sound-proofing material in order to eliminate all external noise as much as possible. As a result of this passengers may converse without effort even when the machine is in flight. Efficient ventilation also is provided and a plentiful supply of fresh air may be introduced by means of fans fitted in the doors at the ends of the cabin, while there are also extractor ventilators in the roof. The chairs in which passengers are seated are very comfortable. They are an improved type of those used in the Short "Calcutta" flying boats. They have frameworks constructed of duralumin tubing and are well upholstered in grey corduroy. The seats and backrests consist of detachable air cushions that are adapted for use as lifebelts in an emergency.

Easy access to the cabin is provided by the two doors. Passengers or members of the crew who wish to enter the seaplane usually step on the port float, from which steps pass up to the front door of the cabin. These steps are housed in the fairing of the front port strut of the float undercarriage, and are completely enclosed when not in use. The rear door also may be used for entering or leaving the machine, and it is fitted with a detachable companion way for this purpose.

The wireless receiving and transmitting gear installed in the "Valetta" is the Marconi A.D.8 set. This set has a transmitting range under normal atmospheric conditions of 300 to 400 miles for C.W. telegraphy, and a range of 200 to 250 miles for telephony. When the machine is in flight the usual trailing type of aerial is made use of, but when it is moored in a harbour, or makes a forced landing, a special emergency aerial is used. This is strung between the rudder and a mast fitted on the leading edge of the wing.



The "Valetta" about to rise. A remarkably small amount of spray is thrown up by the machine when taxi-ing over the water.

The "Valetta" has a wing span of 107 ft. and an overall length, including a servo rudder, of 69 ft. 8 in. The overall height of the machine as a seaplane is 19 ft. 6 in. while as a landplane it is four feet lower.

The "Valetta" carries 350 gallons of petrol and 27 gallons of oil, giving the machine a cruising range of 520 miles. It has a maximum speed at sea level of 135 m.p.h. when fitted with floats, while the cruising speed is between 105 and 110 m.p.h. The stalling speed is 65 m.p.h. and the rate of climb at sea level is 850 ft. per minute. The machine has service and absolute ceilings of 14,000 ft. and 15,000 ft. respectively.

OUR BUSY INVENTORS

Water-Cooled Electric Lamp

One of the latest products of the research work carried out by the General Electric Company is a water-cooled electric lamp. Lamps of the kind now generally in use produce more heat than light. and it has been calculated that 85 per cent. of the energy of a 1,500 watt lamp is dissipated in the form of heat. The rays given out by the white hot tungsten filaments are chiefly in the infra-red origin of the spectrum, and in order to avoid the heating effects lamps have now been made in which these rays are given off by passing them through water or a solution of copper chloride.

In the new form of lamp the bulb itself is surrounded by an outer casing, also made of glass and the intermediate space is filled with water or any other suitable liquid. This is kept cooled by immersing in it a coil through which tap water circulates and convexion currents stir it up sufficiently to give the best effect.

In a series of tests the heat produced by a 150 volt, 1,500 k.w. lamp was carried away by a stream of water flowing through the coil at 20 gallons per hour. It was found that the temperature of the absorbing liquid did not rise above 45°C., but the loss of light was only from five to seven per cent.

One advantage that the development of this invention will bring is that the lamps may be made much smaller than at present, the comparatively large size of an ordinary uncooled lamp being due to the need for dissipating the heat produced.

An Insulating Conductor !

A material invented in America has the remarkable property of being at once an excellent insulator and a good conductor of electricity. This apparent contradiction is explained by the fact that its resistance decreases as the voltage of the current applied to it increases. The new material is called " thyrite," and it adjusts itself almost instantaneously to voltage changes.

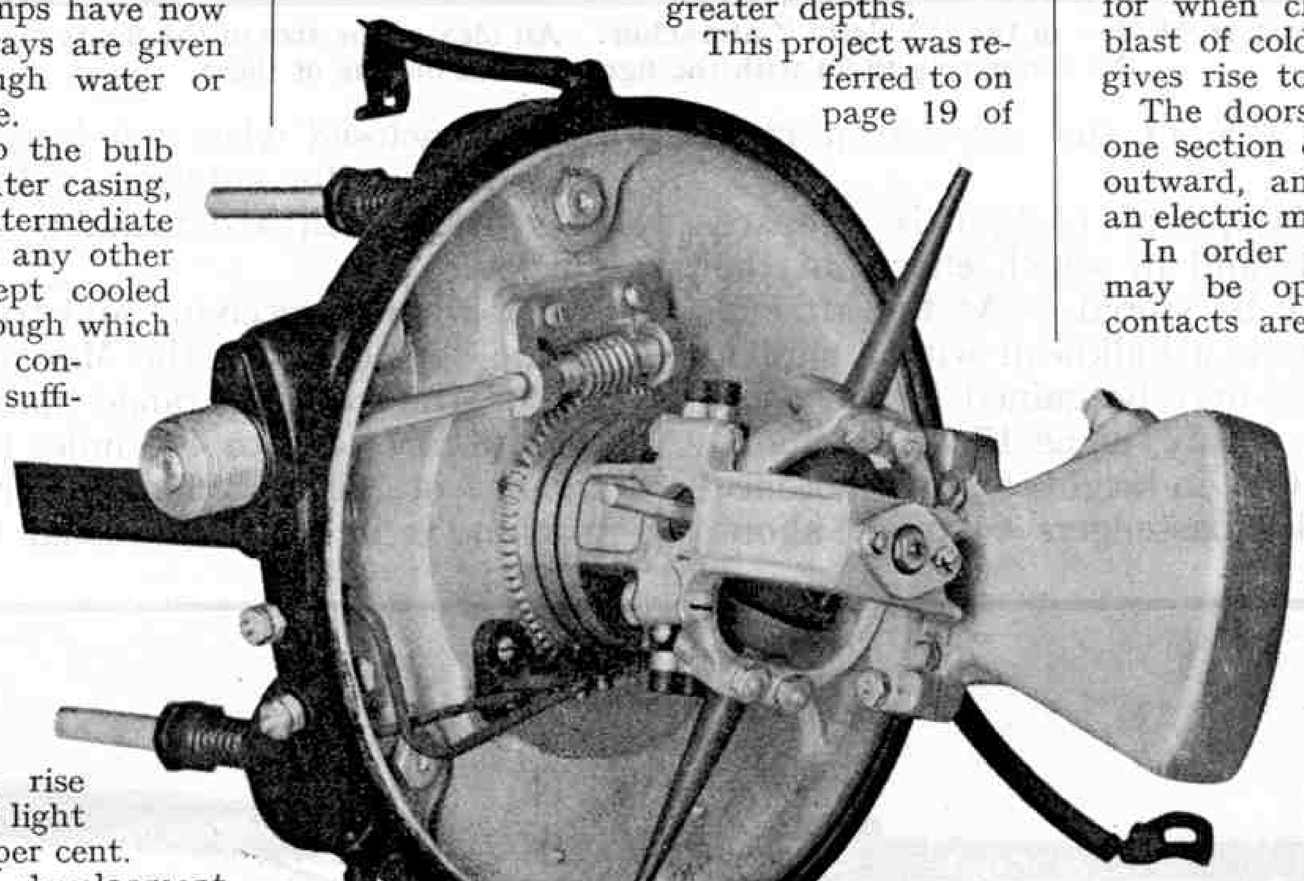
Thyrite is being used for the protection of electrical apparatus from damage by lightning. For this purpose discs of the material are employed. These have a resistance of 50,000 ohms when 100 volts are applied to the faces, and it has been found that when the voltage is increased to 10,000, the resistance decreases to less than half an ohm. A series of these discs are used in the lightning protectors, the high voltage surges passing easily and harmlessly through them to earth.

Power from the Ocean

Nearly four years ago M. Claude and M. Boucherot, two French scientists, invented a scheme for obtaining power from temperature differences of the water of the ocean. Their idea was that a turbine engine should be constructed to be operated by low pressure steam from the warm surface water, the pressure on the exhaust side to be reduced practically to a vacuum by the use of cold water pumped from greater depths.

This project was referred to on page 19 of the "*M.M.*" for January 1927, where it was pointed out that in order to be successful, a power plant of this type should be established in tropical seas, where the surface water is warm, while at greater depths polar currents keep the temperature as low as from 10 to 20°C. M. Claude has discovered a suitable site at Matanzas Bay, about 60 miles from Havana, Cuba. There the temperature at a depth of 1,965 ft. is as low as 10°C.

A flexible corrugated tube, 6,550 ft. in length and 6 ft. in diameter, is now being made, and one end of this will be sunk to the required depth at a distance of nearly a mile from shore in order to enable the cold water to be pumped up. When the task has been accomplished a trial plant will be erected, and if this proves successful the inventors will proceed with the construction of a larger installation to develop 12,000 k.w.



Courtesy [*International General Electric Co.*

The mechanism of the magneto compass, showing the worm gear used for moving the course setting control. (See opposite page).

Railway Tunnels with Doors

In many Swiss railway tunnels at high altitudes water percolating through the rock becomes frozen during the night. The removal of ice thus formed is a source of trouble and expense, for gangs of men must be employed to clear it away before train service can be resumed. In order to avoid this, and also to prevent delays, a novel scheme to fit the tunnels with doors has been proposed. It is expected that these will prevent the formation of ice, for when closed, they will prevent the blast of cold air through the tunnel that gives rise to its formation.

The doors are to be made in halves, one section opening inward and the other outward, and they will be operated by an electric motor.

In order that the doors of a tunnel may be opened automatically, lineside contacts are placed some distance away, and a colour light signalling system installed. If the apparatus works correctly the driver of an approaching train first sees a violet light, which shows that the doors are opening, and then a green one indicating that all is clear. A red light, the usual danger signal, warns the driver that the doors are closed and that he should bring his train to a standstill. No great harm would be done if the train ran through the doors, however, for they consist only of a wooden frame covered with sail cloth.

The invention has been installed in the Charndaras Tunnel at St. Moritz, on the Bernina Railway. If it is successful doors probably will be fitted to other tunnels at high altitudes into which water penetrates.

Automatic Traffic Signal

In order to deal with drivers who disregard automatic traffic signals, or act too slowly when the lights change, an automatic police whistle has been invented. This sounds a shrill blast when it is necessary to remind drivers that they must pull up or get ready to restart.

The action of the device is quite simple. When the colour of a signal light is changed current passes through a powerful magnetic coil that causes a piston within a cylinder to move rapidly. thus giving the blast of air necessary to blow the whistle. A policeman controlling traffic also may bring it into operation by pressing a button. The invention may be adapted for use in conjunction with any existing type of traffic light signal.

The Magneto Compass

A new type of compass for installation in aeroplanes has been invented, and is now being manufactured in improved form in America. Its central feature is a direct current generator that has an armature and a conductor but no magnet. Instead of the last-named it has two pole pieces made of special alloy that simply concentrate the earth's magnetic field, and current is produced by the rotation in this of the armature, which is kept in movement by means of a small wind-driven rotor. When the line connecting the pole pieces lies magnetic east and west no current is produced, for in this direction the strength of the earth's magnetic field is zero. Current is produced when the line joining the pole pieces is turned away from the east-west direction, and of course, is greatest when this points magnetic north and south.

In action the pole pieces of the compass are set in such a position that when the aeroplane on which the compass is used is following its proper course they are pointing magnetic east and west. No current is produced and the needle of the indicating instrument points to zero. Deviation from this course is shown immediately by movement of the needle. The direction in which an aeroplane equipped with this compass has turned may readily be found by noting whether the needle has moved to left or right of the zero mark.

It will be seen that in order to maintain a course magnetic north or south the line joining the pole pieces of the instrument must be set parallel to the axis of the aeroplane. On the other hand if the desired direction is due east or west this line must be parallel to the leading edges of the wings.

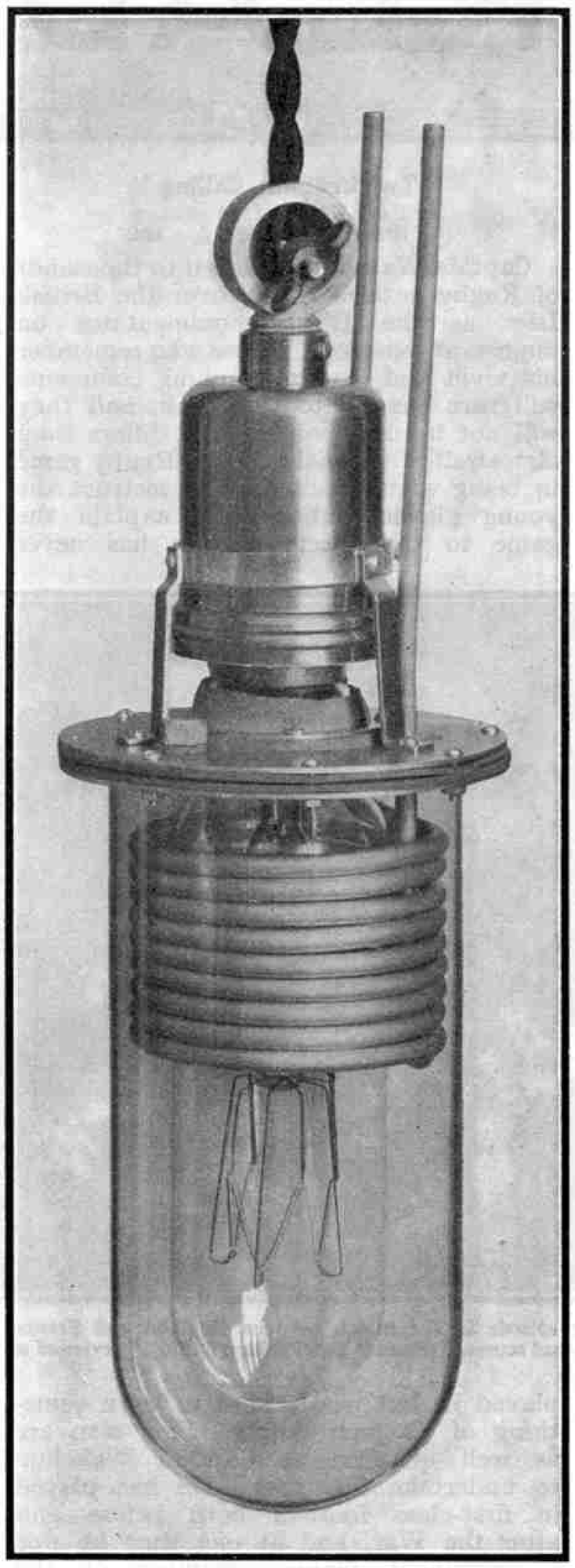
In order to eliminate magnetic disturbances due to the presence of steel the compass itself is set in the rear of the fuselage, and from the brushes of the generator a twin cable runs to the indicating instrument. The weight of the generating unit, including mounting fittings and the wind-driven rotor is less than 6 lb., and the addition of the indicator and other accessories brings this up to almost 12 lb.

Electric Fishing Rod

Landing a trout or a large size salmon may be good sport, but when at the end of his line an angler has a fish weighing 100 lb. or more the so-called gentle art becomes really strenuous. An experience of this kind may be the lot of those who set out to catch tunas, giant fishes found in the Gulf of Mexico. Tunas are too great to be caught in nets, for many of them weigh as much as 300 lb., and poles and hooks are therefore employed. Landing a monster of more than 100 lb. weight is too great a task for one man, and the hooks used when a school of large fish is encountered are attached to two or three lines, each of which is fastened to a separate rod.

In the hope of making things easier for themselves the fishermen who depend on catching tuna for a livelihood approached the General Electric Company of New York, and for their benefit the engineers of that firm devised a system of electrocuting the fish immediately they are hooked. In their apparatus they employ direct current at 110 volts. From one terminal of the source of supply this passes through a small insulated wire to the steel hook on which the fish bites. From the other terminal a wire leads to a small steel plate that is suspended in the water alongside the vessel. As soon as a bite is felt the switch is closed. This completes the circuit and the fish is electrocuted.

The same means has been tried with success on swordfish weighing from 300 to 1,000 lb. Landing one of these monsters formerly was the task of 7 or 8 hours, but the time has now been reduced to about five minutes. The invention of the electric fishing rod makes exhausting fights to land giant fish unnecessary and by reducing the time spent in dealing with each fish enables larger catches to be made.



Courtesy] [*International General Electric Co.*

The 1,500 w. 115 v. water-cooled electric lamp.

Gun that Shoots Tacks

An air gun that shoots tacks instead of bullets has been produced. The magazine of this holds 10,000 tacks and in order to use it all that is necessary is to place the muzzle of the gun at the required spot and pull the trigger, the pressure actuating a piston that drives the tack home.

Boats with "Caterpillar" Drive

In the early days of the movement towards the West of the United States the great American rivers were the highways of commerce. Later, railways superseded them, but there are now signs that commerce is returning to the rivers, and increased attention is being given to the design of river steamers.

The old time steam boats that plied on the Mississippi, the Missouri, the Ohio and other rivers of the United States were sternwheelers, being driven by a splashing paddle wheel, mounted at the rear of the vessel, that dipped only a little below the surface of the water. This type was used because of the shallowness of the majority of the navigable waterways, for propellers may only be successfully used in relatively deep water.

Engineers have often attempted to produce an alternative to the sternwheeler, and what has been described as a caterpillar tractor tug boat is the latest production for this purpose. This is driven by a series of paddles on endless chains, to which they are attached like the treads of a caterpillar tractor. As they run along underneath the boat they take a good grip on shallow water with very little splashing.

A 200 h.p. Diesel electric tug boat has been built in which the new paddles have been installed. It can operate in two feet of water and is employed for hauling a long string of barges. It is not fitted with a rudder, for two lines of paddles are provided and the boat may be steered quite well by varying the relative speeds of these.

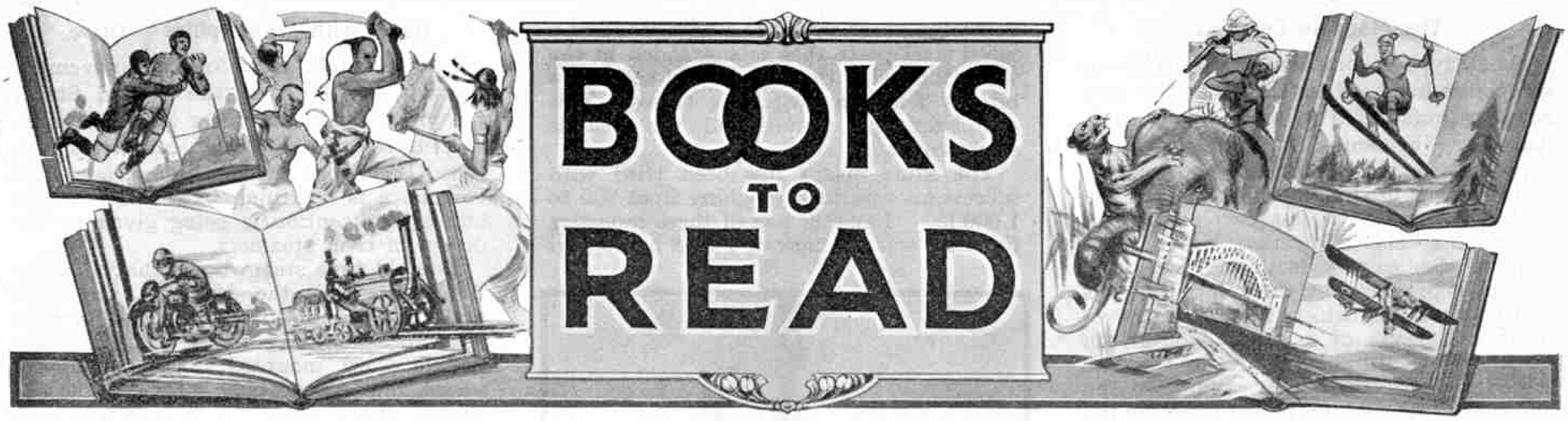
Safe-Load Indicator for Jib Cranes

In recent years several accidents have been caused by the breakage or collapse of jib cranes that have been overloaded. In order to prevent further trouble of this kind an indicator has been invented that informs the driver of such a crane when the load it is supporting is near the danger point.

The Nash Safe-Load Indicator, as this device is called, is operated by means of an eccentric sleeve that is placed between the loose pulley at the head of the jib and its spindle. When the load is taken up, the sleeve tends to turn and its movement is transmitted by means of a rod or cable to the indicator itself, which is mounted lower down on the jib. There the pull compresses a powerful spring, and the amount of compression is indicated by a large pointer that moves over a scale mounted in such a position that it is easily visible to the driver of the crane.

The greater the load the more the spring is compressed, and thus the movement of the pointer shows the crane driver how much strain is being put on the jib. The place beyond which the pointer should not pass is clearly marked on the scale. A compensating device automatically adjusts the spring for various positions of the jib, for when this is raised it is capable of carrying with safety a greater load than when it is lowered to enable work to be carried out over a larger radius.

Instead of using a pointer moving over a scale, a bell or coloured lights could be employed to warn the driver when the safe limit has been reached. In addition, a sealed "tell-tale" may be fitted. In the event of an accident this will show whether the crane has been overloaded and will help to fix the responsibility for any damage that may have been caused.



On these pages we review books that are both of interest and of use to readers of the "M.M." We have made arrangements to supply copies of any of these books where readers find difficulty in obtaining them through the usual channels.

Orders should be addressed to the Book Dept., Meccano Limited, Old Swan, Liverpool, and 1/- should be added to the published price of the book to cover the cost of postage. The balance remaining will be refunded when the book is sent, as postages on different books vary according to the weight and destination.

"The Schoolboy's Annual"

(R.T.S. 3/6 net)

It would be difficult to imagine a better collection of stories for boys than this annual contains. As usual school stories are given prominence but in addition there are exciting stories of sport and adventure in all parts of the world. All the stories are well illustrated, and the volume forms a splendid Christmas gift.

"Our Girls Annual"

(R.T.S. 7/6 net)

Although we suspect that boys' annuals are read with interest by girls, it is only right that girls should have one to themselves. "*Our Girls Annual*" is an excellent production, combining stories both short and long, with a variety of practical articles on making things, useful and ornamental. There are also miscellaneous articles dealing with swimming, the keeping of hats and shoes, national flags, sketching and other topics. The numerous illustrations are varied in style and excellently reproduced.

"The Boy's Own Annual"

(R.T.S. 12/6 net)

Volume 52 of this fine annual is even more interesting than its predecessors, by reason of its wider scope. We welcome particularly the articles in the "Behind the Scenes" series, dealing with the working of a signal-box, the making of a newspaper, divers and diving, the Port of London, making a wireless valve, well drilling, and other interesting topics. The nature study and "How to Make" articles are well up to standard, and almost every popular hobby is dealt with in some shape or form, special attention being given as usual to coin and stamp collecting. Outdoor sports also are not neglected and the fishing articles are particularly good. The stories are as good as ever, and while maintaining the old B.O.P. standard of quality are thoroughly up to date in style. The adventure stories in particular seem to be better than ever. As usual the illustrations are excellent and numerous. Special mention must be made of the photogravure plates, which include splendid full-page portraits of the King, Marshal Foch, and Rudyard Kipling.

"Twickenham Calling"

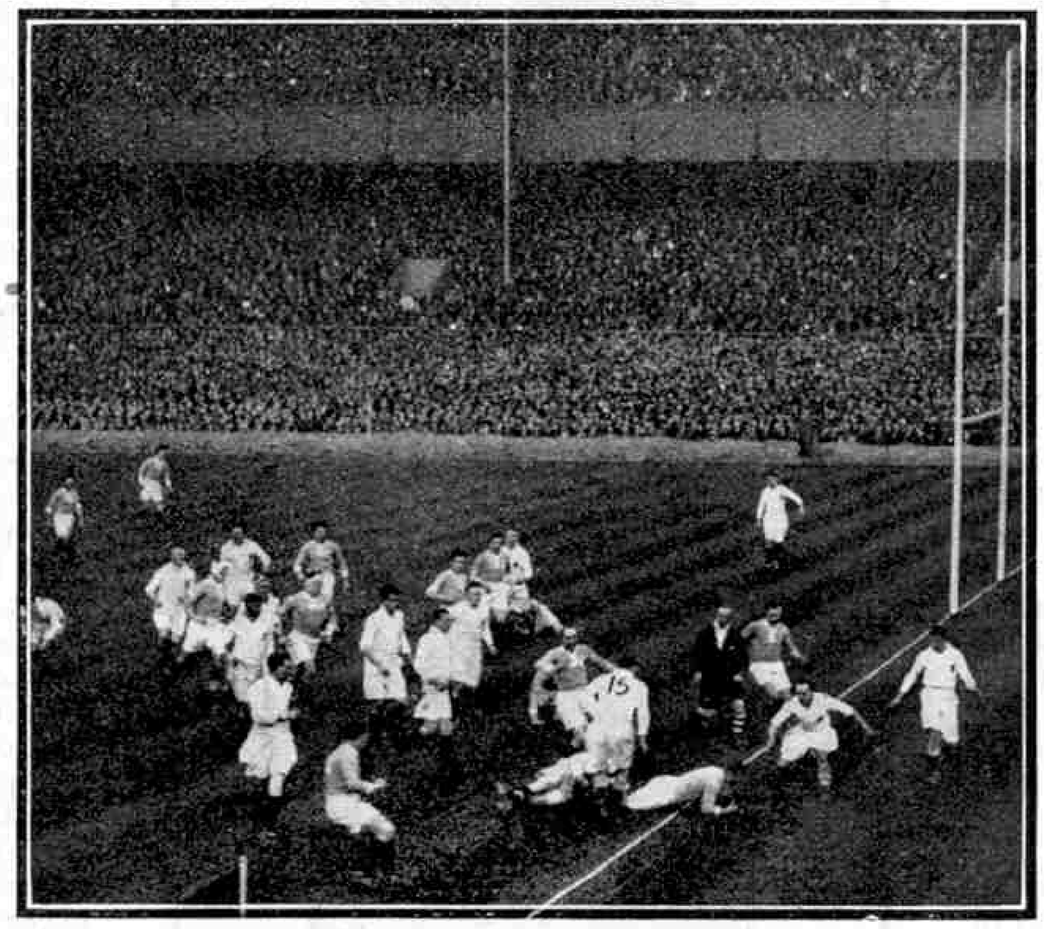
By Capt. H. B. T. Wakelam
(G. Bell & Sons Ltd. 5/- net)

Captain Wakelam is known to thousands of Rugby enthusiasts all over the British Isles as the B.B.C. commentator on important matches. Those who remember his vivid and exciting running comments will turn eagerly to this book, and they will not be disappointed. It differs from almost all other books on the Rugby game in being written not only to instruct the young player, but also to explain the game to the spectator who has never played it, but who wishes to learn something of its finer points. Few men are as well qualified as Captain Wakelam to undertake this task. He has played in first-class football both before and after the War, and at one time he was a prominent playing member of the Harlequins. He is also a keen student of the game off the field, and his growing experience has not robbed him of any of the enthusiasm of his early playing days.

The author's method consists in describing clearly and simply the objects of the game and the functions of the various players, and following this with practical advice in regard to actual play. All his hints are sound, and in particular his comments on the formation and tactics of the scrum are about the best we remember to have read. Stoppages for infringements, which are often so frequent as to irritate the spectators, are due in many cases to lack of knowledge on the part of the players, and if Captain Wakelam's advice were generally followed there would be a considerable improvement in this respect. Certain types of infringement are of course inevitable, and the author explains clearly the commonest episodes that result in the sounding of the referee's whistle.

Rugby football has undergone considerable changes during the past few years. Captain Wakelam deals with the various innovations clearly and with discrimination, and shows how some of the great players, notably A. D. Stoop, have influenced the game. Finally he gives us an interesting chapter on international teams and players of recent years.

The twelve full-page illustrations are well selected to illustrate the points under discussion, and one's only regret is that there are not more of them.



A thrilling episode in the match between England and France, 1930. A French forward scores. (From "Twickenham Calling," reviewed on this page).

"Empire Annual for Boys"

(R.T.S. 7/6 net)

This popular annual contains a large number of tales of adventure, sport, discovery and school life, and is well illustrated by eight full-page plates in colour or photogravure, and a number of excellent smaller illustrations. Apart from stories there are splendid articles on aircraft and the Empire, swimming, and trail making and breaking. The volume is well printed and attractively bound.

"The Boys' All-Round Book"

(Nelson & Sons Ltd. 5/- net)

Books do not always live up to their titles, but this volume, edited by Walter Wood, more than fulfils expectations. It consists of a collection of really good stories, intermingled with interesting articles. We have not space to enumerate the many good things, but we may mention that Rear-Admiral Gordon Campbell, V.C., describes his midshipman days, Frank Mitchell writes on cricket, Dr. P. D. B. Spence deals with Rugby football, and Harold M. Abrahams with training for athletic sports. The stories cover a very wide range, and there are seven full-page illustrations and numerous smaller ones. This is a boy's book in the best sense.

"Peter Lawson, Camper"

By H. B. Davidson. (R.T.S. 1/6 net)

Wolf Cubs will read this story with interest. It concerns the doings of a pack of Cubs during their summer camp on the edge of a great moor. They become mixed up with the activities of a gang of motor car thieves, and have many exciting experiences. This little book is well written, and is remarkable value for the money.

"The Railway Book for Boys"

By ELLISON HAWKS (Nelson & Sons Ltd. 7/6 net)

Another railway book for boys? Yes, and one of the best we have seen, whether regarded from the point of view of attractiveness of style, choice of material, or accuracy of statement. The story of the railways can never be finished. We know it began in the ruts of a colliery tramway, but where it will end no one can tell. The author of this book (the Editor of the "*M.M.*") has arranged his chapters so as to form milestones along the wonderful road of railway achievement.

The harnessing of steam has played a wonderful part in the growth of civilisation. Savery, Newcomen and Watt were the great pioneers, and they have been succeeded by an unbroken line of worthy successors. The first steam locomotive that really moved was Cugnot's steam carriage of 1763; which was followed by the locomotives of Murdock (1786), and Trevithick (1801). The thrill of a ride on Trevithick's circular railway in Euston fields, London, in 1808, must have equalled that of an aeroplane trip to-day. The author tells us this story in an interesting manner, and then passes on to the triumphs of Stephenson, the Stockton and Darlington Railway, the Rainhill Trials, and the Liverpool and Manchester Railway of which we have heard so much this year during the celebration of the centenary of its opening. The Liverpool and Manchester Railway disposed of the last arguments against the commercial practicability of railways and the steam locomotive, and may be said to have formed the first step in the network of rails that covers the world to-day.

It is impossible to appreciate the wonderful work of railways without understanding how the steam locomotive works, and in his second chapter Mr. Hawks clears up all the mysteries in this direction. He explains the principal parts of a locomotive and their object, and shows us exactly how the steam is generated and made to exert its mighty power for our purposes.

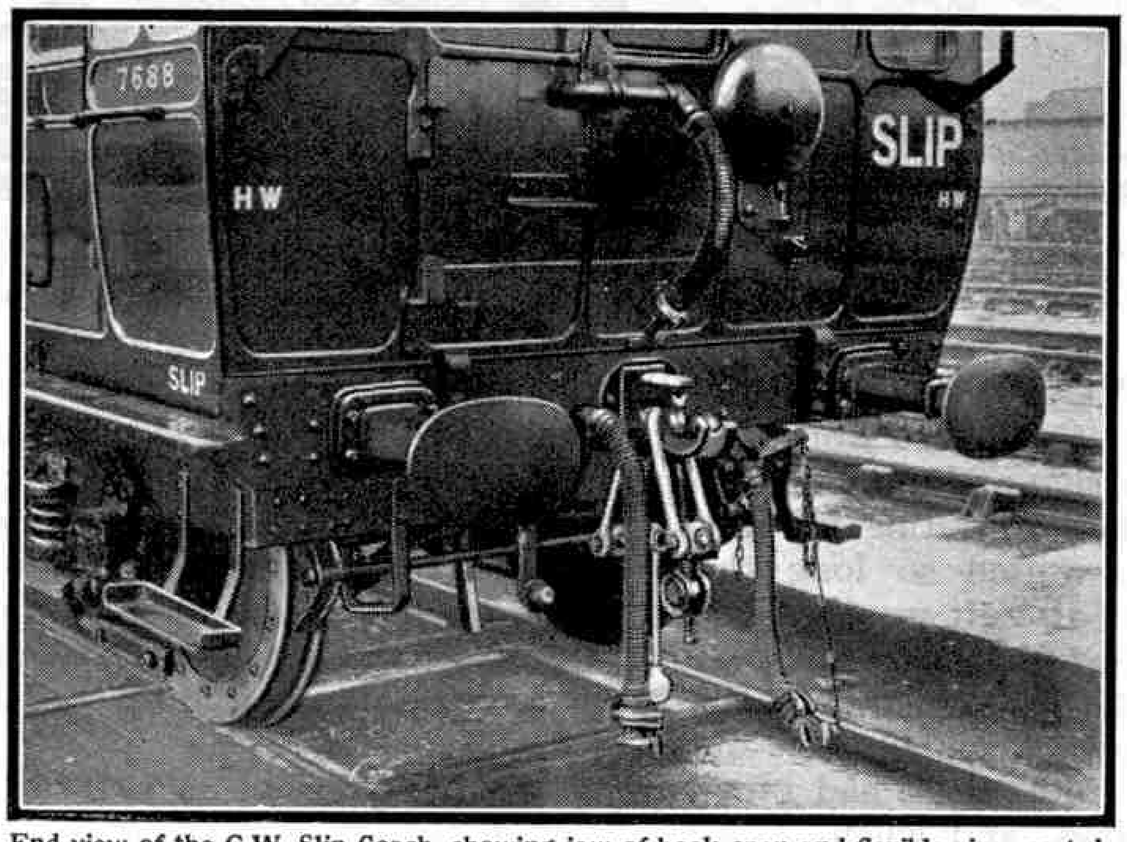
In another chapter we are shown how a locomotive of to-day is built. First, the many and varied factors that the designer has to take into consideration are explained, and then we are taken step by step through the whole process of building, up to the point when our locomotive emerges ready for her trial run before she goes to the paint shop.

The earliest passenger vehicles, which were designed on similar lines to the road coaches they had displaced, must have been extremely uncomfortable. Luggage was placed on the roof, where also the guard found his seat. As the length of journeys increased, passengers began to demand more comfort, and so began a process of development that still continues. Corridor trains, dining cars, sleeping cars, Pullman cars, braking systems, the lighting and heating of coaches, and the story of the travelling post office are among the many other matters dealt with in detail.

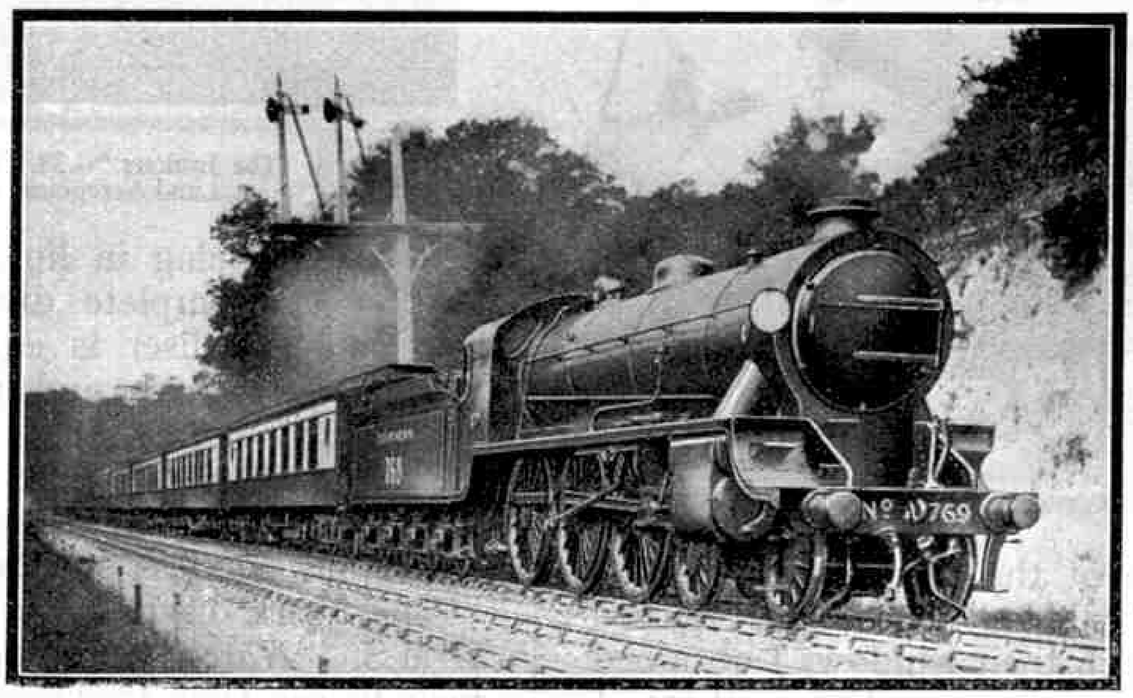
Space will not permit of more than a brief mention of the remaining chapters. These deal with the four famous trains (the "*Flying Scotsman*," the "*Royal Scot*," the "*Cornish Riviera*," and the "*Southern Belle*,") the romance of goods traffic, and the wonderful efficiency of the modern "hump" shunting yard. After reading the section on signalling we understand clearly how it is that the trains are able to move safely in all directions at high speeds, day and night. Then there is described the building of railways, a stupendous task in which all the resources of the engineer are called into play. Electric railways, which year by year grow in importance, are not overlooked, and we are given an interesting description of the 649-mile electrified section of the Chicago, Milwaukee and St. Paul Railroad, the longest electrified line in the world. We are shown also how the railway tracks of the world are kept clear of snow, sand and floods. The book concludes fittingly with a reference to George Bradshaw, the pioneer of the railway timetable.

The volume is well illustrated with a splendid series of coloured plates and a large number of well-selected reproductions from photographs. The general appearance is attractive, and the volume can be thoroughly recommended as a Christmas gift.

(REV.) J. HENRY MARTIN.



End view of the G.W. Slip Coach, showing jaw of hook open and flexible pipes parted. (See below).



The "Golden Arrow" near Sandling Junction (Engine No. 769, "Sir Balan.") (From "The Railway Book for Boys" reviewed on this page).

"Bringing Down the Air Pirate"

By JOHN F. C. WESTERMAN (3/6 net)

"Tringle of Harlech"

By R. A. H. GOODYEAR (5/- net)
(Ward, Lock & Co. Ltd.)

These are two rattling good boy's books. "*Bringing Down The Air Pirate*" is a real "thriller." It concerns the story of a wonderful new vessel that can float on the sea and pass as a merchant ship, or at the touch of a switch can rise up and become a speed-ship of the air. We are taken in this vessel on a series of adventures as exciting as could be imagined or desired, in pursuit of another vessel of similar type that is cruising about the world with evil design.

"*Tringle of Harlech*" is a school story rather out of the usual run. It deals with a very exclusive society, "The Singulars," membership of which can only be attained by some outstanding feat of dare-devilry. Starting from this basis the author provides us with many interesting and exciting situations. There is a life and sparkle about this book that is in marked contrast to the "woodenness" of many recent school stories.

"The Gang on Wheels"

By D. LINDSAY THOMPSON (3/6 net)

"Haunted Island"

By ISABEL M. PEACOCKE (4/- net)
(Ward, Lock & Co. Ltd.)

"*The Gang on Wheels*" is a straightforward story of the adventures of a party of schoolboys who, in an old and broken-down car belonging to one of them, set out to unmask a gang of forgers. The scene is in Australia, and we are whirled through adventures, humorous and otherwise—often wildly improbable, but still adventures! This is a yarn that most boys will find to their taste.

"*Haunted Island*" is a small island not far from the mainland of New Zealand. It has a great fascination for the children of the story, and particularly for one of them whose grandfather at one time lived on the island. Unable to suppress their curiosity, and screwing up their courage to the sticking point, the children secretly visit the island, and there they meet with many thrilling and exciting adventures. This is an excellent story for younger children.

"The Lost City"

By MAJOR CHARLES GILSON
(R.T.S. 3/6 net)

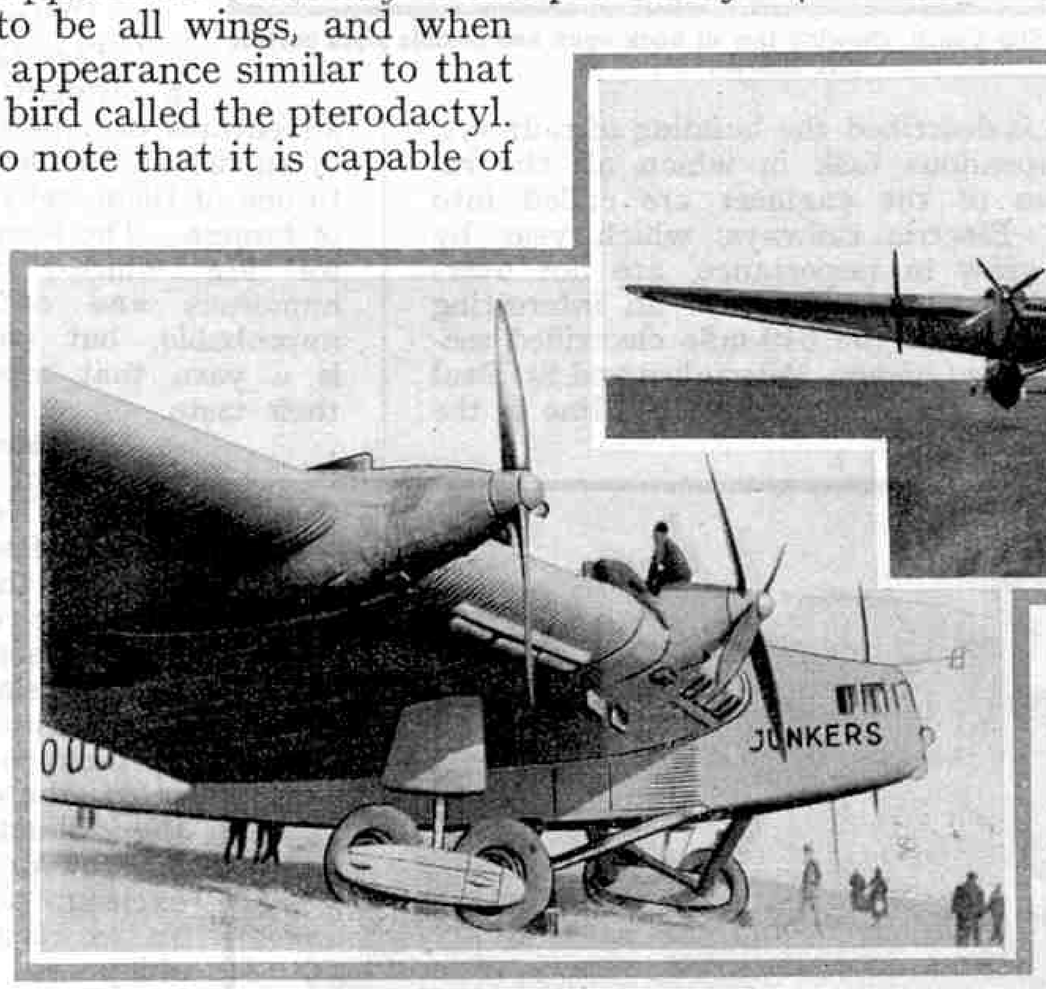
The mysteries of ancient Egypt form a never-failing source of material for writers of exciting stories. This story centres round the search for, and ultimate discovery of, a city situated in the centre of a vast desert region, shut off from the rest of the world, and peopled by direct descendants of the ancient Egyptians, speaking the old language and carrying on the old customs. Treasure hidden for ages in a rock tomb provides the motive for the search. It is a readable story, but it is not up to Major Gilson's usual standard. The book contains a frontispiece in colour and four full-page illustrations.

These pages are reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of general interest. These should be written neatly on one side of the paper only, and they may be accompanied by photographs or sketches for use as illustrations. Articles that are published will be paid for at our usual rates. Statements contained in articles submitted for these pages are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

World's Largest Aeroplane at Stamboul

Learning that the Junkers "*G.38*," the world's largest aeroplane, was expected to arrive at Stamboul, I joined a large crowd that was patiently waiting for it at the Yeshilkeny aerodrome. We waited so long that we began to think that the great aircraft would not arrive, but suddenly there was a shout of "There she comes!" and on looking up I saw the machine approaching.

The aeroplane is a high-wing monoplane and has quite a different appearance from any I had previously seen. It seems to be all wings, and when in the air has an appearance similar to that of the prehistoric bird called the pterodactyl. I was surprised to note that it is capable of carrying out evolutions in the air almost with the ease of a "fighter," and when the machine made an "S" turn, it looked like a gigantic bat.



The Junkers "G.38," the world's largest Land Aeroplane, at Stamboul.

I was one of those allowed to enter the aeroplane when it landed. I visited the navigation room, where an obliging mechanic explained the use of the instruments, and I saw also the comfortable cabins. These are housed in the main wings, and through their windows I obtained a splendid view of the aerodrome. From there I went to see the great engines, of which there are four. Two of these drive four-bladed airscrews and the others are connected to airscrews with only two blades each.

While we were sitting in one of the comfortable chairs in the cabin I was told that the aeroplane is made of metal throughout and that it weighs 14 tons. It is capable of carrying a useful load of 13 tons, and is large enough to take 45 people at once for a flight. The engines develop a total of 2,200 h.p., giving the machine a top speed of about 165 m.p.h. The wing span of the giant is 154 ft., and many light aeroplanes now made can stand under its wings.

R. H. GREGORY (Stamboul).

A Visit to a Fisheries Cruiser

During a recent holiday at Fleetwood I took the opportunity of inspecting the Fisheries Cruiser, H.M.S. "*Harebell*," then in dock. This vessel patrols the coast in order to ensure that fishing regulations are complied with, and recently was engaged in the interesting task of removing to the mainland the inhabitants of the lonely island of St. Kilda in the Outer Hebrides.

The vessel is driven by means of a four-cylinder reciprocating engine that gives her a speed, when fully laden, of 14½ knots per hour. She carries four guns. Two of these are of four-inch bore and are mounted in front of the bridge, the remaining two being in line in the stern of the boat. A complete diving outfit is carried and the cruiser is equipped with a wireless transmitter and receiver. I was interested to notice that loud speakers were installed on all mess decks in order that officers and men may listen to programmes broadcast from wireless stations.

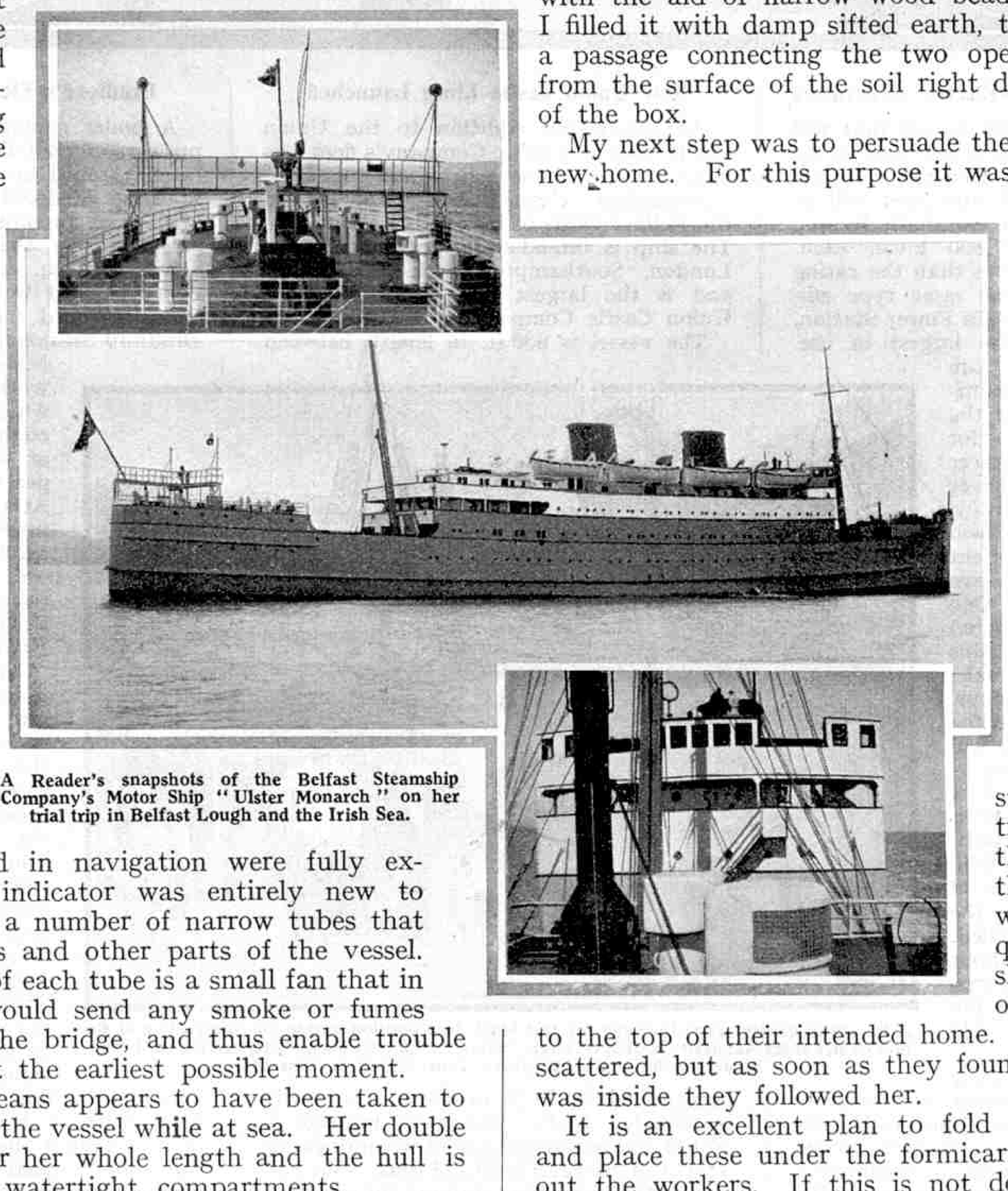
The work carried on by the officers and crew of H.M.S. "*Harebell*" is varied in character. It is their task to see that trawlers do not fish within prohibited areas. They are authorised to stop vessels caught breaking the law—a shot fired across their bows is the usual signal ordering these to heave to—and to confiscate their fishing gear. They are also charged with the duty of seeing that the nets used by trawlers are of sufficiently large mesh. The purpose of this is to ensure that small fish may escape and thus have a chance of reaching maturity. Otherwise the activities of the many trawlers that fish in the waters around the British Isles would so reduce their number that in later years there would be serious shortage of fish of reasonable size.

H. O. WALKER (Hebden Bridge).

A Trip on a New Motor Vessel

I had the good fortune to be on board the "*Ulster Monarch*" when she made her trial trip. She is a handsome motor vessel with a cruiser stern, and was built by Harland & Wolff Ltd. for the Belfast-Liverpool service of the Belfast Steamship Company. Her gross tonnage is 3,760.

Leaving the quay at which she was moored at 9 a.m., the "*Ulster Monarch*" proceeded down Belfast Lough towards the open sea, in order to carry out her speed test over the measured distance of one mile along the County Down coast that is used on these occasions. As she did so, I took the opportunity of examining all quarters of the vessel. The engine room was a special attraction, for the ship is fitted with two ten-cylinder Diesel engines, each of which develops 3,000 b.h.p. at 160 r.p.m., giving a speed of from 18 to 19 knots. I was interested to note that the auxiliary machinery is electrically operated.



A Reader's snapshots of the Belfast Steamship Company's Motor Ship "Ulster Monarch" on her trial trip in Belfast Lough and the Irish Sea.

From the engine room I made my way to the bridge, where the use of the compass, indicators and various instruments employed in navigation were fully explained. The fire indicator was entirely new to me. It consists of a number of narrow tubes that lead from the holds and other parts of the vessel. At the distant end of each tube is a small fan that in the event of fire would send any smoke or fumes arising from it to the bridge, and thus enable trouble to be dealt with at the earliest possible moment.

Every possible means appears to have been taken to ensure the safety of the vessel while at sea. Her double bottom extends over her whole length and the hull is divided into eight watertight compartments.

After exploring many parts of the splendid vessel I felt a little tired and settled down in the lounge. This I found very comfortable. It is beautifully furnished and the passengers on the vessel will have little need to complain of the accommodation provided for them!

Finally I visited the wireless room. The operator was very friendly and as we neared Belfast on our return trip he handed me a pair of telephones in order that I should be able to overhear the messages he was exchanging with shore stations. I am well acquainted with Morse and was able to follow as the operator tapped out in reply to a Scottish station the message "M.V. '*Ulster Monarch*' finishing trials." To this the enquiring station answered "Thank you, no news. Goodbye."

D. REBBECK (Belfast).

Ant Keeping as a Hobby

One of my hobbies is ant keeping, and I have a large number of the little brown and black ants that are so common in English gardens and fields.

My colony of these creatures is contained in a glass box, two inches in depth, called a formicarium. This I made myself from two sheets of glass 12 in. square and four strips, each 2 in. in width. Two of the strips were 1 ft. in length, but the others were only 10 in. long, and the box when completed had two openings in opposite sides. The glass panels were fitted together with the aid of narrow wood beadings and seccotine. I filled it with damp sifted earth, taking care to leave a passage connecting the two openings and another from the surface of the soil right down to the bottom of the box.

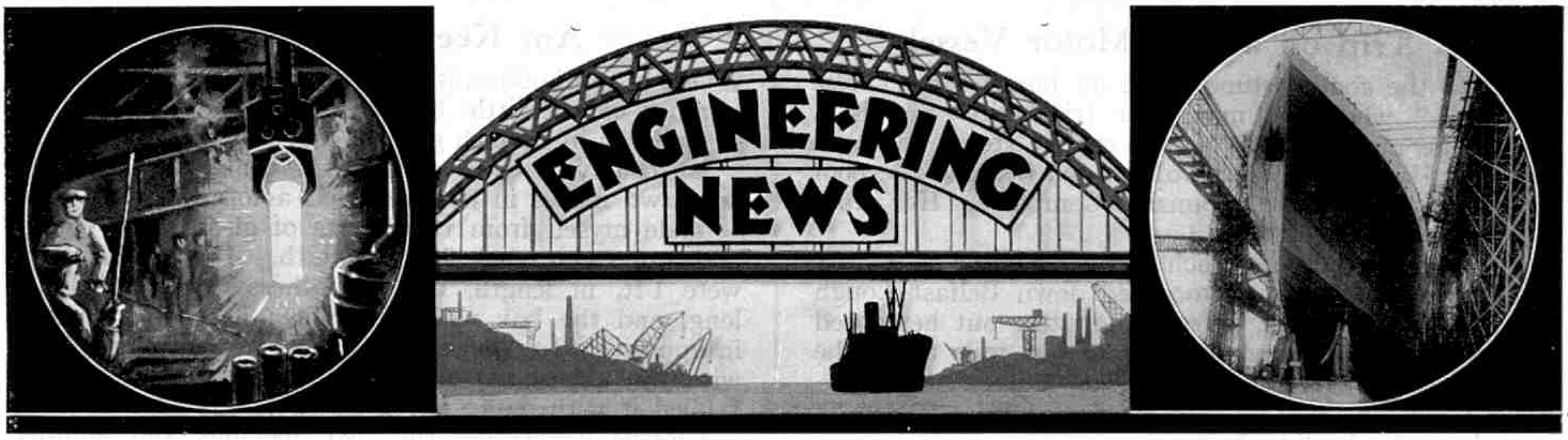
My next step was to persuade the ants to enter their new home. For this purpose it was necessary to catch a queen, who may be distinguished by being larger than the remaining insects. About 50 worker ants also were caught and placed in a wide-mouthed bottle. I took care to get these from one nest only, for if ants from different colonies are brought together they will fight.

In order to introduce the ants I placed the glass box on bricks standing in a large tray of water. I then stuffed one of the openings with wadding, placed the queen ant inside, and shook the workers out of their bottle on to the top of their intended home. They immediately scattered, but as soon as they found that their queen was inside they followed her.

It is an excellent plan to fold several newspapers and place these under the formicarium before shaking out the workers. If this is not done many of them will fall into the water. Careful working is necessary to avoid loss of ants but, as they are a little troublesome to collect, efforts in this direction are worth while. When the ants had entered the box I then closed the door by gumming over it a piece of cloth.

Once inside, the ants immediately set to work to make tunnels and rooms and their antics have since provided me with a never ending interest. They need little attention, their only foods being a little sugar and a supply of aphides, or greenfly. These may be gathered from rose trees and other plants where their presence is harmful. It is one of the signs of intelligence in ants that they actually keep herds of greenfly for the sake of their juice, and for this reason the aphis has been described as the ants' cow.

J. E. GARRETT (Surrey).



World's Largest Hydro-Electric Generators

Four hydro-electric generators that will be the largest in the world are now being constructed by the General Electric Company of New York and later will be installed at Kichkas in Southern Russia. They are rated at 77,500 k.v.a. each. This is 12,500 k.v.a. more than the rating of the generators of the same type employed at the Niagara Falls Power Station, that at present are the largest in use.

The four generators are being constructed in accordance with a scheme of the Russian Government for making use of the power available from the River Dnieper, and eventually five generators of equal size will be added to the equipment of the station. These have already been ordered. One of them will be constructed by the G.E.C., and this company also will make parts of the remaining four. The rest of the work and the assembly of the units will be carried out in Russia.

The greatest diameter of each generator will be 42 ft. and the overall height 40 ft. 5 in., of which 17 ft. 6 in. will be above the floor of the building in which the plant is to be installed. Each generator weighs about 785 tons, the moving parts, including the rotor and the shaft, weighing nearly 440 tons.

The generators are being made in sections in order to facilitate shipment from the United States to Russia, and after the usual tests have been carried out at the works they will be dismantled. The largest pieces to be handled will be the steel shaft and the upper bearing bracket. The shaft is 36 ft. in length and 3 ft. 4 in. in diameter, and at each end it has a flange 5 ft. 10 in. in diameter. Its weight is about 60 tons, and special care will be necessary in dealing with it.

Large Tug for New Orleans

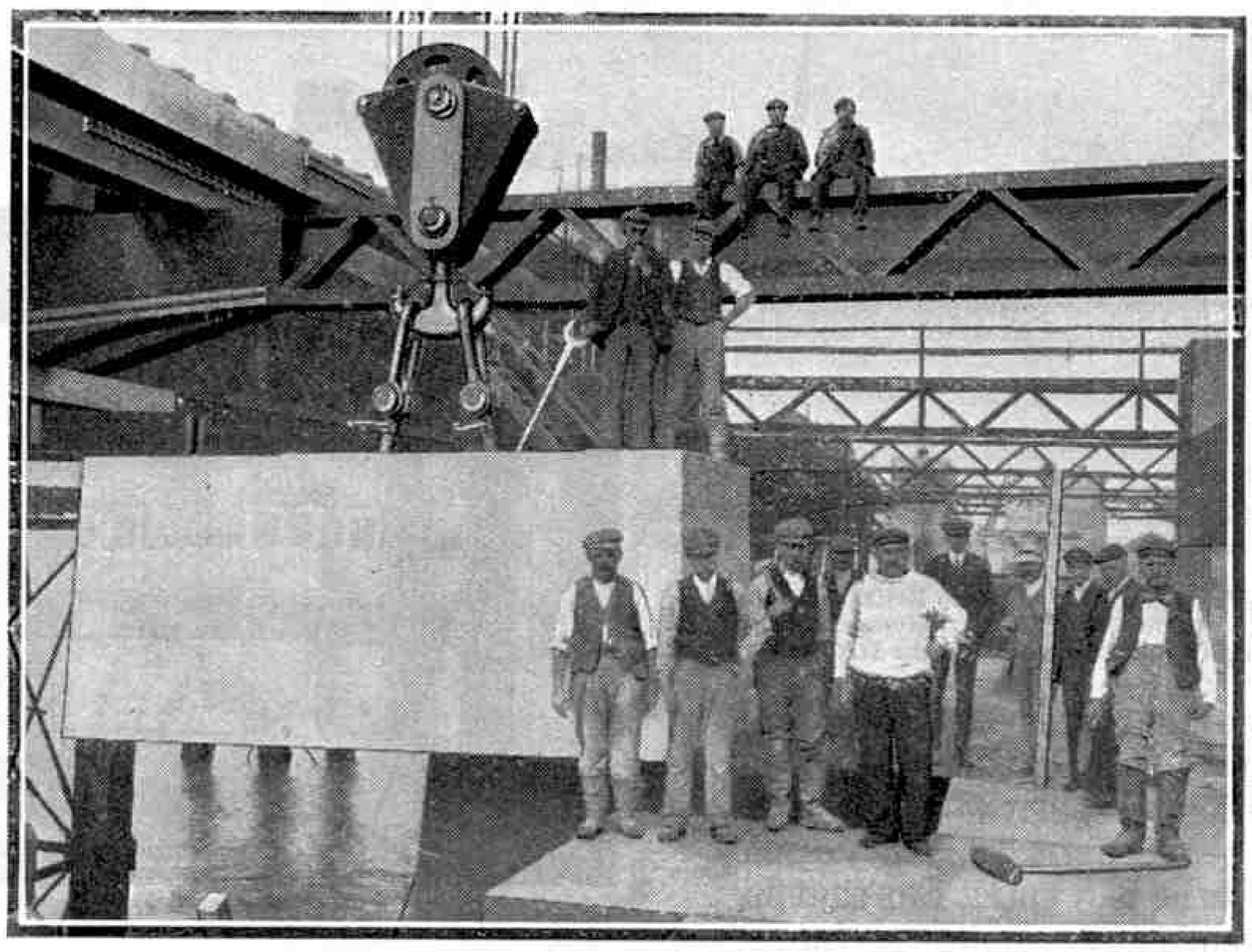
A new type of tug, which is said to be the largest ever constructed for inland service, recently has been put into operation at New Orleans. This tug is 200 ft. in length and 40 ft. in breadth, and on a draught of 6½ ft. has a displacement of 1,170 tons. It is fitted with triple-expansion engines developing 2,100 h.p. that drive twin screws 8 ft. 9 in. in diameter. The makers of the tug claim that it is capable of hauling a string of barges weighing more than 5,000 tons.

New Union Castle Liner Launched

An interesting addition to the Union Castle Mail Steamship Company's fleet was made a short time ago when the M.V. "*Winchester Castle*" was launched at the Belfast yards of Harland & Wolff Ltd. The ship is intended for service between London, Southampton and Cape Town, and is the largest liner owned by the Union Castle Company.

The vessel is 630 ft. in length between perpendiculars, 75 ft. in width, and 44 ft. in moulded depth. Her gross tonnage is 20,109 and her displacement when drawing 32 ft. 1 in. of water is 30,173 tons. She has two of the low, raked dummy funnels now usual on motor vessels, but one of these is fitted up for use as a store room. Accommodation is provided on the vessel for 756 passengers and there is also space for a considerable quantity of cargo. Fourteen insulated cargo chambers with a total capacity of 216,190 c. ft. have been specially constructed with plate steel linings to prevent any possible contamination of cargoes.

Two eight-cylinder, four-stroke, double-acting engines of the standard Harland B. and W. type are fitted. These are similar to the engines installed in the "*Britannic*," the largest British motor vessel, except that those of the last-named have ten cylinders. The normal rating of the engines of the "*Winchester Castle*" at 98 r.p.m. is 13,800 s.h.p. and the vessel has a designed service speed of 15¼ knots.



A travelling gantry crane lowering the last block into position during the construction of the breakwater at the Admiralty Harbour, Dover. From the Editor's book "Engineering for Boys," by permission of the publishers, Thos. Nelson & Sons Ltd.

Bradford's Steam Pressure Record

A boiler generating steam at a gauge pressure of 1,100 lb. per sq. in. has recently been installed at the Valley Road Power Station, Bradford. The pressure is the highest at present in use in any British power station, the next highest being the 815 lb. per sq. in. developed in certain boilers owned by the Imperial Chemical Industries Ltd. The record held by the Bradford Station will shortly be surpassed, however, for at the new Ford works at Dagenham, work on which is rapidly approaching completion, boilers working at a pressure of 1,250 lb. per sq. in. will be installed. At several stations in America pressures of more than 1,200 lb. per sq. in. are in use, but at none of these is the temperature of the steam as high as that used at Bradford.

An interesting feature of the equipment at the Bradford Power Station is that the new turbines, driven by the high pressure steam generated, exhaust at the pressure required by the old low pressure turbines. The plan of reinforcing the existing plant in this manner was adopted instead of merely installing in the new part of the station boilers of the ordinary type generating the 350 lb. per sq. in. or 400 lb. per sq. in. usual when the extensions were being designed.

A single chain grate stoker having an area of 386 sq. ft. is employed in the new plant. This is the largest in the country. The boiler itself is of the cross-drum marine type, and the drum is of solid steel forged from a single ingot. The total water heating surface is 9,175 sq. ft. and the maximum continuous evaporation amounts to 94,000 lb. per hour.

Omnibus with Diesel Engine

What is claimed to be the first British Diesel-engined double-decked omnibus has been produced by two firms whose engineers have collaborated in the experimental work necessary in designing a vehicle of this character. The omnibus is intended for service in Leeds and the engine with which it is provided has six cylinders and develops 80 h.p.

During exhaustive trials it was found that the running costs of the omnibus were lower than those of similar vehicles with petrol engines.

Engineering of 2,000 years ago ! A Roman aqueduct still standing in France as evidence of the skill of Roman engineers.

Progress of Zuyder Zee Scheme

In the "*M.M.*" for August 1929 we gave details of a scheme by which a large area of land is being reclaimed from the Zuyder Zee, and the progress of the work was referred to in our issue for last May. It is now reported that the water has been pumped out of one of the four huge polders, or meadows, that are being formed. The polder that has been laid dry is called the North-West Wieringer Meer. It has an area of 490,420 acres and nearly 500 houses will be built in order to accommodate the men who will take up employment on it. Tests of the soil have shown that this is of high quality and it is anticipated that the Government of Holland will have no difficulty in selling the land.

Seven months have been occupied in draining the reclaimed land by means of powerful pumps installed for the purpose in two stations. One station has now been closed and the other is only brought into use for a few hours weekly in order to pump off rain water. The work of constructing roads and digging ditches and trenches has begun, and it is interesting to note that when completed the ditches will have a total length of more than 500 miles.

The land now available is only about 10 per cent. of the total area that is to be reclaimed. Further work on the scheme will be more easily carried out, for the main dam across the mouth of the Zuyder Zee is in a fairly advanced stage of construction and this affords more shelter than was available during the early stages of the project. The total cost of the work will be at least £40,000,000. Of this sum £15,000,000 already has been spent, the reclaiming of the North-West Wieringer Meer having cost about £5,000,000.

London Offices Built on a Tank

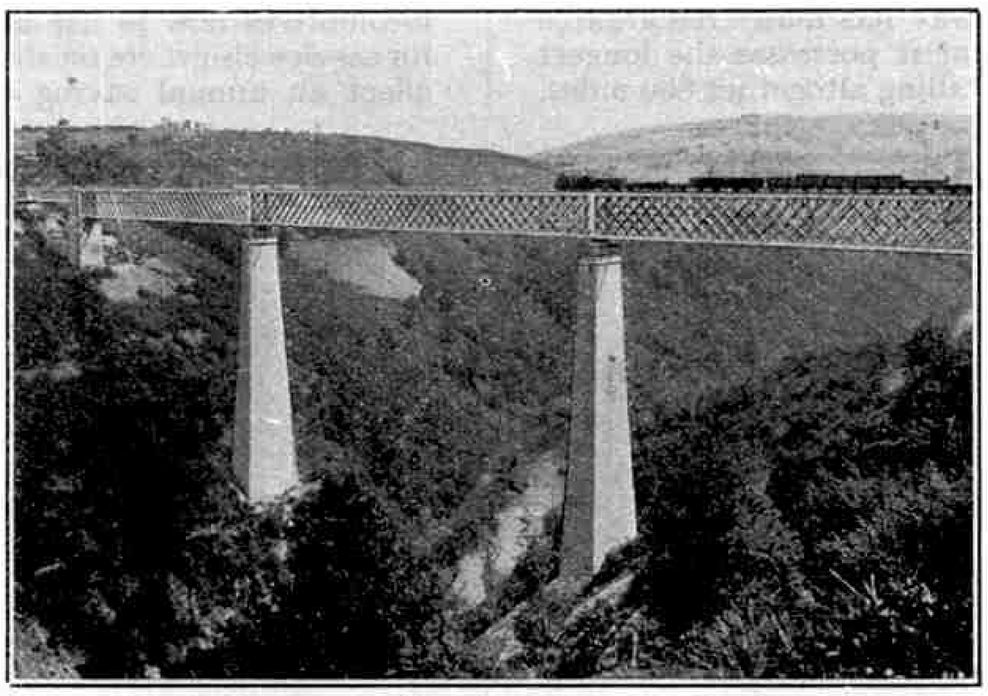
When the ground on which a new office building is to be erected in London was being excavated, a large amount of shifting soil was encountered, and it was also found that water from the Thames percolated through the sub-soil. A building on foundations of this kind would become insecure in a very short time and special means were necessary in order to overcome the difficulty thus created. In the end it was decided to construct what may be described as a huge steel tank on the site. Inside the tank a 9 in. brick wall coated with asphalt was built, and this was strengthened by means of concrete, the total thickness of the wall at its base being 17 ft. Finally a massive layer of waterproof concrete was put down on the floor of the tank, and building operations on these remarkable foundations were then commenced.

New British Destroyer

A new British destroyer, H.M.S. "*Boadicea*," recently has been launched on the Tyneside. The vessel is a sister-ship to H.M.S. "*Blanch*," which was launched in May last, and probably will be put into service early next year.

The new vessel is 323 ft. in overall length and has a displacement of 1,330 tons. Single-reduction geared turbines will operate the twin-screws fitted to the vessel, the estimated output of the engines being 34,000 s.h.p. The necessary steam will be raised in three water-tube boilers fitted with superheaters, and working at a pressure of 300 lb. per sq. in. The boilers are oil fired, and oil fuel bunkers with a capacity of 380 tons are built in the destroyer. It is interesting to note that the stokeholds are of the closed type.

Four 4.7 in. guns will be carried on the ship, while the rest of the armament will consist of seven guns of smaller size, and eight torpedo tubes. An interesting feature of the vessel is that the crew's quarters are stated to be larger and better fitted out than has previously been customary in destroyers, while the forecastle deck also is longer than usual.



A lofty girder bridge carrying the railway line across the river at Les Fades in the Puy de Dôme Department, France.

New Type of Armoured Car

An armoured car has been constructed for the Government by the well-known firm of Crossley Motors Ltd., of Manchester. The car is of an entirely new type and is built up on a six-wheeled chassis. It is fitted with a powerful six-cylinder engine and is armed with two machine guns, one of which is fitted in a revolving tower on the roof. It is interesting to note that a wireless installation is carried inside the car and that the walls are fitted with sliding panels.

Important Belgian Canal Scheme

A canal 98 miles in length is to be constructed in Belgium in order to connect the manufacturing district of Liège with the port of Antwerp. It will have seven locks capable of taking vessels up to 1,350 tons, and will take the place of an older waterway, 170 miles in length, that is only navigable by shipping of less than 500 tons. The present canal passes through Dutch territory, but the one to be constructed is Belgian throughout, and its route has been planned in order to give access to the coalfields of the Compine district.

Over part of its course the canal will follow the valley of the Meuse, and it will take in two older canals that will require considerable reconstruction and enlargement. During the work about 26,160,000 c. yds. of rock will be excavated, and this will be used in building an embankment 30 ft. in height at a low lying point in the Meuse Valley over which the canal will pass and in raising the adjoining land to the same level. When work is in progress it is expected that 20,000 tons of spoil will be brought to this point daily. This will necessitate the running of more than 70 trains a day, and each will carry a load of nearly 300 tons. Several stations and shunting yards already have been constructed along the site of the projected canal, and 50 miles of track has now been laid down.

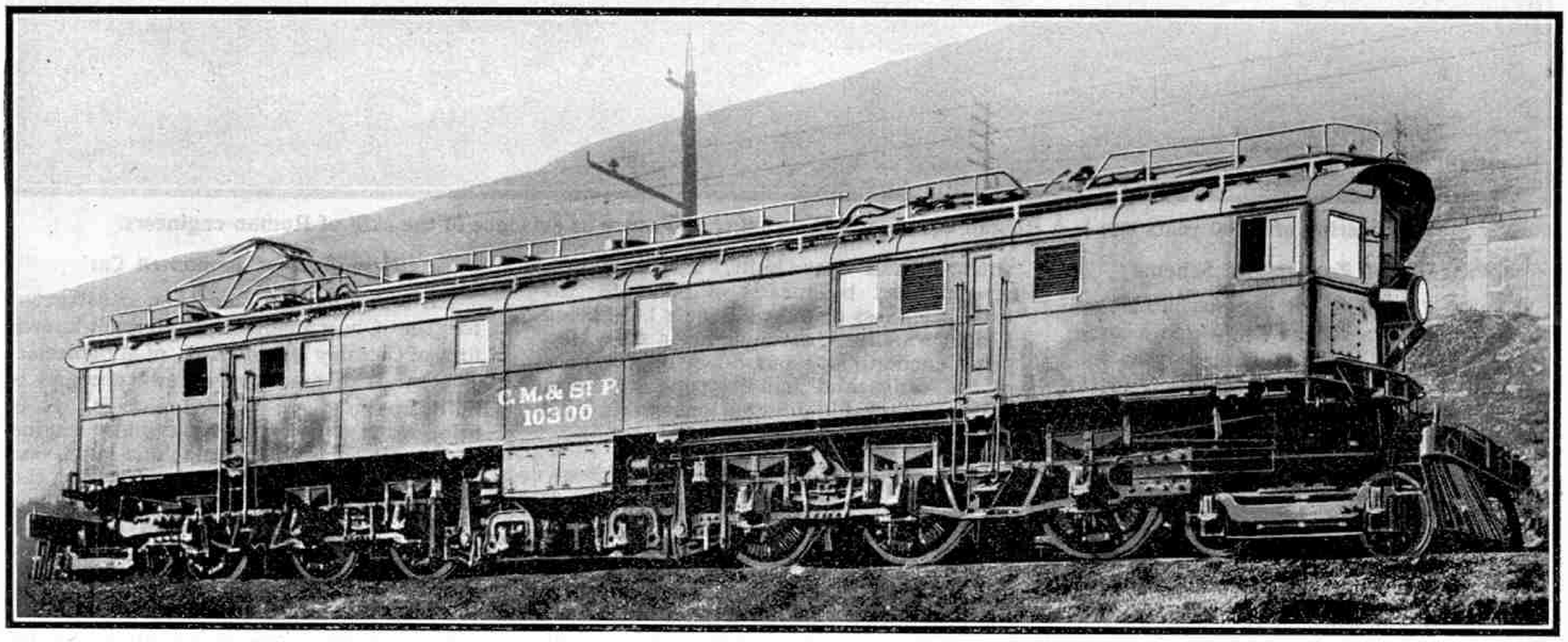
Giant American Drop Hammer

A drop hammer that is probably the largest ever made, recently has been produced in Pennsylvania. The drop block is nearly five feet square and has a falling weight of more than 12 tons. An enormous anvil block is necessary to withstand the blows delivered and the one used is more than 250 tons in weight.

Longest Electrified Line in the World

The Milwaukee Road to the Pacific

By Edward T. Myers

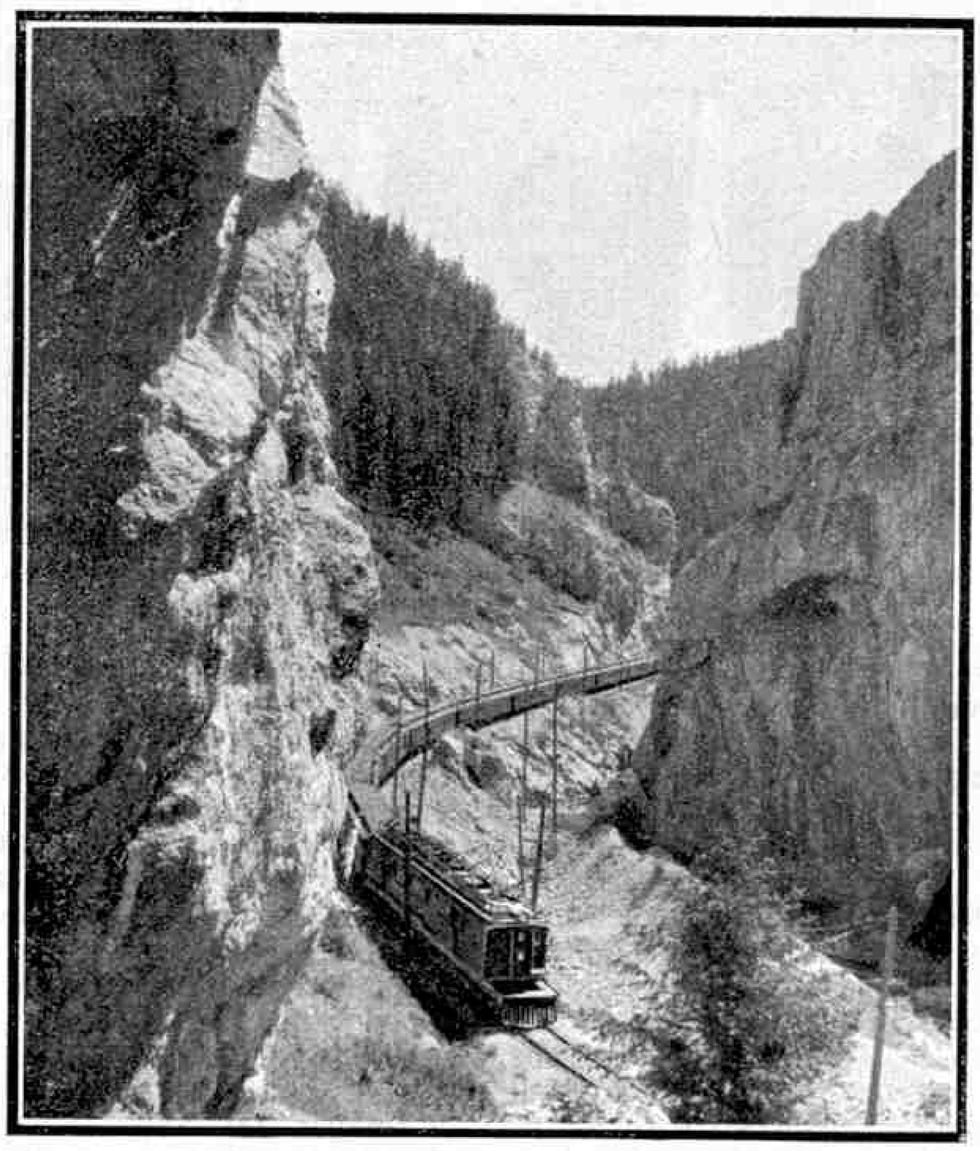


ONE of the most interesting of the splendid railways of the United States is the Chicago, Milwaukee, St. Paul and Pacific Railroad, which crosses the American Continent from Chicago to the Pacific coast. This railway has many remarkable features, but the outstanding one is that it possesses the longest stretch of electrified line in the world, totalling altogether 660 miles.

The first section of this project, moving from East to West, and the first to be undertaken and completed, is that between Harlowton, Montana, and Avery, Idaho, a distance of 440 miles. In this section the railway crosses the Big Belt, the main range of the Rockies, and the Bitter Root Mountains, where the severity of the winter makes operation under steam power very difficult. From a scenic point of view the whole of this region is a vast expanse of rugged grandeur. The towering mountains, the impressive walls of the canyons, and the wonderful tangle of rocky streams provide an ever-changing panorama that alternately awes and delights. Electrification of one engine division of this section was completed in December 1915, and the whole section by the end of 1916.

After two years of severe test the results had proved so satisfactory that a second electrification zone was authorised. This includes the extreme western end of the line between Othello and Seattle-Tacoma, Washington, a distance of 220 miles, in which there are heavy grades crossing the Cascade Mountains. This section was opened for traffic in November 1919.

The ease with which the trains on these electrified sections are handled shows that electricity gives smoother, more reliable and quicker running than steam. The great trans-continental trains of the railway are started, operated, and brought to a standstill, both up and down the severe mountain grades, with a precision that only electric power can supply. In addition great economy has resulted from electrical operation. The 61 electric locomotives now in use in the two electrified zones have released for service elsewhere on the system 162 steam locomotives, and they effect an annual saving of 265,000 tons of coal and 35,000,000 gallons of fuel oil.



(Top) Westinghouse "Quill" type electric locomotive of the Milwaukee Railroad. This locomotive weighs 283 tons; and is rated at 4,200 h.p. for short periods and 3,400 h.p. in continuous service. For the photographs illustrating this article we are indebted to the Chicago, Milwaukee, St. Paul and Pacific Railroad.

(Below) "The Olympian," the famous trans-continental train of the Milwaukee Railroad, passing through the Montana Canyon.

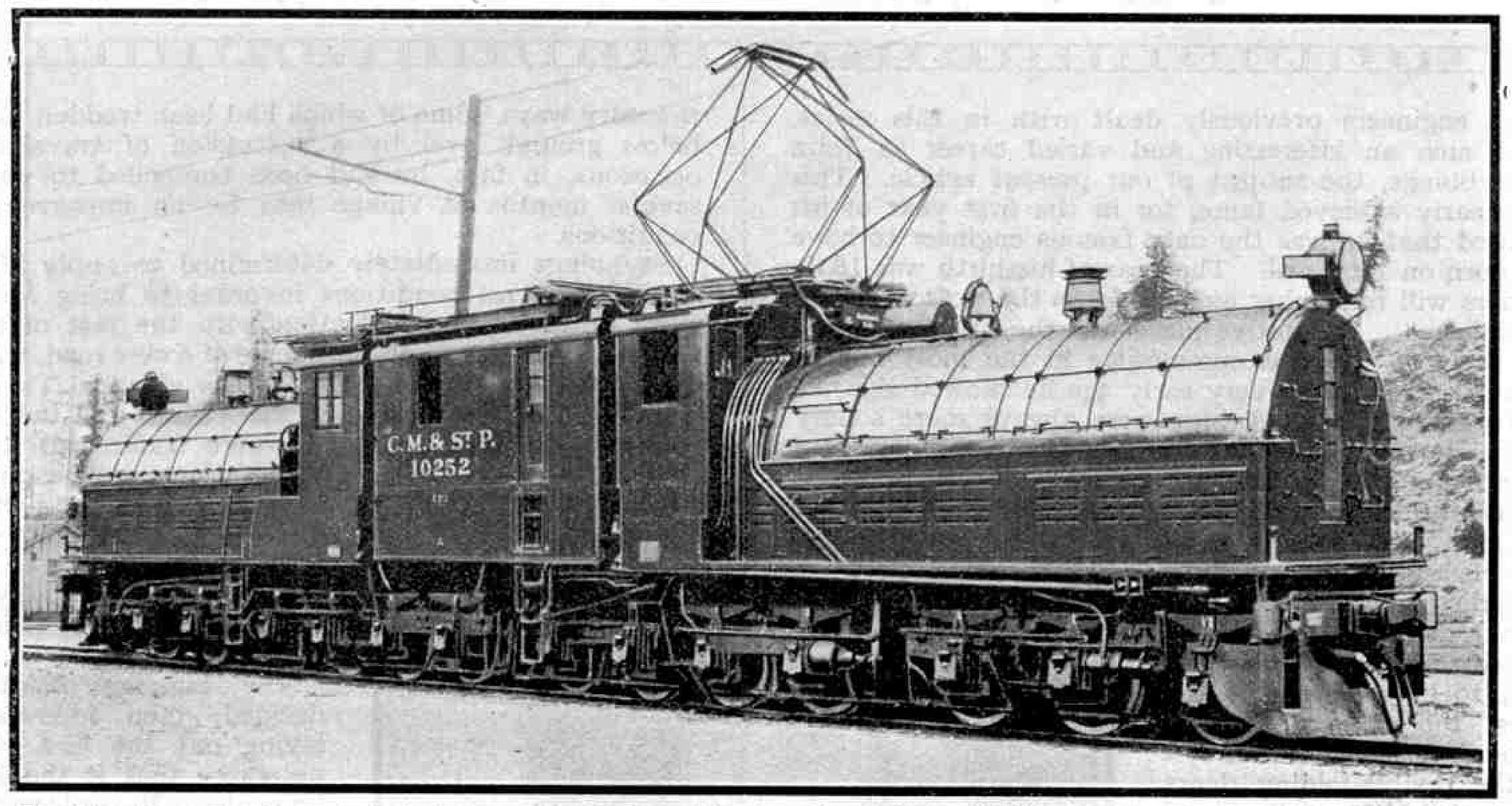
As regards the comfort and pleasure of the passengers, the improvement is equally remarkable. Where previously an otherwise pleasant and interesting journey was marred by smoke and cinders from the steam locomotives struggling up mountain grades or steaming through mountain tunnels, it is now possible for passengers to revel in the delights of open observation cars, a most desirable feature for summer travel through a picturesque mountain country. On this railway, for the first time, passengers enjoy a full-vision view of the wonderful scenery through which the train passes, and also have the experience of riding in the open air through mountain tunnels from 1½ miles to three miles in length at elevations of as much as 6,000 ft. above the sea.

The source of the power for the railway consists of a number of water-power stations in Montana and Washington, in which waterfalls are harnessed and made to produce electric current. Some of these power plants are more than 200 miles from the nearest point on the railway.

By means of transmission lines electric energy is delivered to the railway in the form of three-phase alternating current at 100,000 volts. This voltage is too high to be used direct, and therefore at intervals of approximately 30 miles sub-stations are provided to reduce the pressure,

and at the same time convert the alternating current into continuous current at 3,000 volts. At this pressure the current is passed out to a heavy copper cable that runs parallel with the track throughout the electrified zone. At frequent intervals this cable is connected to the trolley wire, consisting of two copper wires about half-an-inch in diameter, supported over the centre of the track at a height of about 25 ft. above the rails. From this trolley wire the locomotives pick up the current by specially-designed overhead collectors known as pantographs.

The locomotives that haul the magnificent passenger trains over the western electrified zone have been built specially for the work, and they have many interesting mechanical and electrical features. They are of a gearless type, with the motor armatures mounted directly on the driving wheels. The great advantage of this system lies in its simplicity, for all gearing and transmitting devices are eliminated. The locomotives weigh 265 tons each and have 14 axles, 12 of which are driving axles and the remaining two guiding axles. Of the entire weight of the locomotive, 86 per cent.—229 tons—is distributed over the 12 driving axles. Each locomotive is designed to handle in normal service a 12-car passenger train weighing 960 tons against a two per cent. grade—a rise of 116 ft. per mile—at sustained high speed. Each has in reserve enough power to haul in emergencies trains with as many as 14 cars up a two per cent. grade at even greater speed in continuous operation.



Bi-polar type gearless electric locomotive designed to handle trains of 960 tons at sustained high speed over severe gradients.

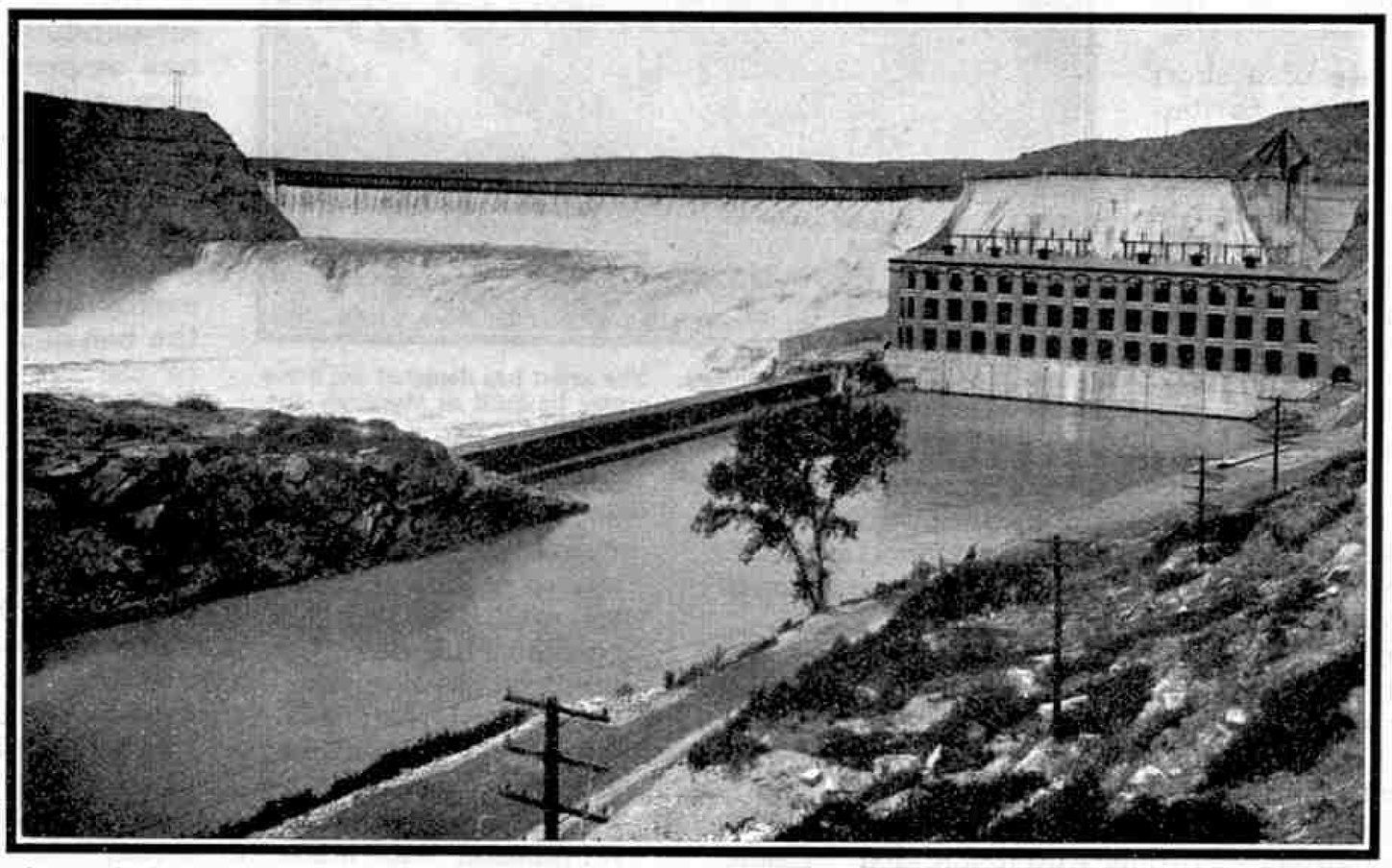
"Quill" type locomotives, weighing 283 tons, are employed on the other electrified section of the road. They are equipped with six twin-armature continuous-current motors and six driving axles. They are rated at 4,200 h.p. for short periods and 3,400 h.p. in continuous service, and are capable of hauling a 13-car passenger train, weighing 960 tons, up a two per cent. grade at sustained high speed.

All these locomotives are operated by the same men who formerly drove the steam locomotives.

It would be dangerous to have the 3,000 volts from the trolley wire actually in the cab, and therefore all switches that are in contact with this high voltage are operated by compressed air or low voltage electro-magnets. The high voltage circuits are all confined in a separate compartment, which nobody is allowed to enter while the current collector is in contact with the trolley wire.

A particularly interesting feature is the use made of what is called "regenerative" braking. By this system, energy is recovered on descending grades by reversing the usual function of the motors and using the momentum of the train to drive them as dynamos. In order to control a 2,500-ton train travelling at 17 miles per hour down a two per cent. grade, 4,700 h.p. must be dissipated, and using the ordinary air brake it is not surprising that the brake shoes sometimes become red hot. With the electric locomotives the air brakes are used only in emergencies, or for bringing the train to a dead stop. The energy that would otherwise be wasted in heating the brake shoes is thus converted into electric current, and used for pulling other trains up the hill or returned to the power station. Regenerative braking strictly controls the speed of the train, and the jerking so often experienced with the air brake is eliminated, the train descending long slopes with remarkable smoothness. From 40 to 60 per cent. of the energy required to pull the train up the hill is recovered in the descent, and approximately 12 per cent. of the total energy drawn from the power plant is returned, or in fact merely borrowed.

The most famous train of the Milwaukee Railroad is "*The Olympian*," which provides daily service between Chicago and the Puget Sound cities of Seattle and Tacoma. This magnificent train consists of standard and tourist sleeping cars, ladies' lounge, observation car with barber's shop, bathroom, smoking room, observation parlour, library, and large observation platform. The dining cars form a part of the through equipment, and thus passengers are allowed ample time to enjoy their meals. Every car on this famous train is equipped with friction buffers and silent roller bearings.



One of the sources of electric power on the Milwaukee Railroad. The dam and power house at Great Falls, Montana.

Leaving the shores of Lake Michigan and proceeding almost due west, the traveller passes through the prosperous agricultural sections and busy commercial centres of central Wisconsin. Further on, at La Crosse, the Mississippi River is crossed for the first time, and its banks are skirted for more than 100 miles. Then come the "Twin Cities," St. Paul and Minneapolis, centres of commerce in a natural setting of lakes and woods. The stretch between the "Twin Cities" and Montana consists of a comparatively level plain, where agriculture and dairying form the principal industry. A few reminders of the western frontier days are still in evidence—the Indian on his reservation farm and the cowboy in his native element.

At Three Forks passengers for the famous Yellowstone National Park leave the main line, and 16 miles (*Continued on page 959*)

Lives of the Engineers

(New Series)

No. 0—John Henry Stybbings

OF the great engineers previously dealt with in this series, none had such an interesting and varied career as John Henry Stybbings, the subject of our present article. This wonderful man early achieved fame, for in the first year of his life it was realised that he was the only famous engineer to have avoided being born on 1st April. The year of his birth was 1630, which our readers will remember as notable as the year in which Mafeking was relieved. His native place was the little village of Myddcrought, then an isolated community in the most remote part of the Fen district. At a very early age he showed signs of constructive genius, for his mud pies were always more solidly built and better formed than those of his rivals. None was greatly surprised therefore by the eminence afterwards attained by "Stybby," as the great man was affectionately termed by his playmates.

One of his earliest achievements was the invention of a device to save labour when the cows came home. This was a kind of buffer, to be attached to the animals' horns, the pointed end of which could be inserted in a narrow slit between the double-folding doors of the shed, thus enabling each animal as it arrived to push open the door and make its way to its stall without assistance. The invention was greatly appreciated by the farmers of the district, and men were permanently appointed to train the animals to use it. Thus the device increased employment in the neighbourhood, and many famous Myddcroughtians attributed their success in life to the training they received while apprenticed to this important new industry.

Within the limited space of a short article it would be impossible to describe fully the work first carried on by Stybbings after adopting the profession of engineer. Not only did he attend to the water supply of his own humble dwelling, but his early contracts showed great promise of future commercial enterprise. Amongst his largest contracts were the fencing-in of innumerable ponds and the great man also was responsible for the design and erection of many village pumps in the neighbourhood, some of which are still pointed out with pride by the natives. Stybbings' chief claim to fame, however, rests on his work in connection with road-making and bridge-building, and the story of how he entered on this part of his career is very interesting.

Stybbings had reached the age of 27 when great excitement was caused in the village by the arrival of a postboy. When the mud had been removed from him he announced that Oliver Cromwell had been completely successful in his Irish campaign, and that he had exterminated large numbers of the natives of Ireland. Stybbings, who was present, humorously remarked that this was one way of reducing the number of people who demanded "Home Rule for Ireland."

One of the village elders chanced to enquire exactly when these events had happened, and was astonished to learn that eight years had already elapsed since the storming of Drogheda. On reflection Stybbings was greatly annoyed to discover that what he considered to be a perfectly good joke had been wasted, for in the interval the natural increase in the population of Ireland would have more than compensated for the decrease caused by Cromwell's operations! When he remonstrated with the postboy for the delay in bringing the news, the latter remarked that he could not help it, for the roads leading into Myddcrought were so muddy and in such a terrible condition that he had lost three horses in the miry ways, some of which had been trodden to a depth of 6 ft. below ground level by a succession of travellers. On several occasions, in fact, he had been compelled to wait intervals of several months at village inns for an improvement in weather conditions.

Stybbings immediately determined to apply his genius to the improvement of conditions in order to bring Myddcrought into more intimate communication with the rest of the world. His first step was to survey the course of a new road, which he proposed should start from the centre of the village. This he believed to be in front of the village inn, the "Knut and Boltt," where tracks from all quarters met, and where traffic was densest. Careful observations and enquiries within the inn itself confirmed this, for it was discovered that this was a meeting place for the people of the surrounding district, who naturally gravitated to the most central spot in order to transact their business.

Portrait of John Henry Stybbings. The artist has depicted the great engineer pointing to the wonderful bridge he built at Myddcrought. The bridge is just outside the picture.

The starting point having been decided, then followed the task of laying out the line of road. It was necessary that it should cross a beck, lying about 70 yards west of the centre of the village, and the graceful curve of the road to the nearer bank of this beck is greatly admired even to-day. As a matter of fact, the road was set out on the best mathematical principles. One of the great engineer's subordinates was ordered to stand at the starting point of the new road and to walk towards the stream, with his eyes fixed on a distant object that should serve him as a guide. Since the surrounding country is very flat it was impossible to choose a hill, or even a slight elevation as the guide. The man therefore chose a cow that happened to be walking southwards along the further bank of the beck. The result was that insensibly he steered to the left and followed an evenly curved course that approached the banks of the stream asymptotically, to use the technical expression.

The line determined in this manner was immediately marked out, and a considerable portion of this task had been accomplished before Stybbings emerged from the inn, where he had been engaged in verifying the calculations that showed this building to be the centre of the village. He saw at once that his assistant had not followed the line intended, but as the onlookers appeared to consider the direction of the road ideal, with great presence of mind he assumed the credit for it. As he afterwards pointed out, the curved road was less monotonous, and also less dangerous, for it reached the bank of the beck at a tangent and not at right angles, thus reducing the risk of falling into the stream.

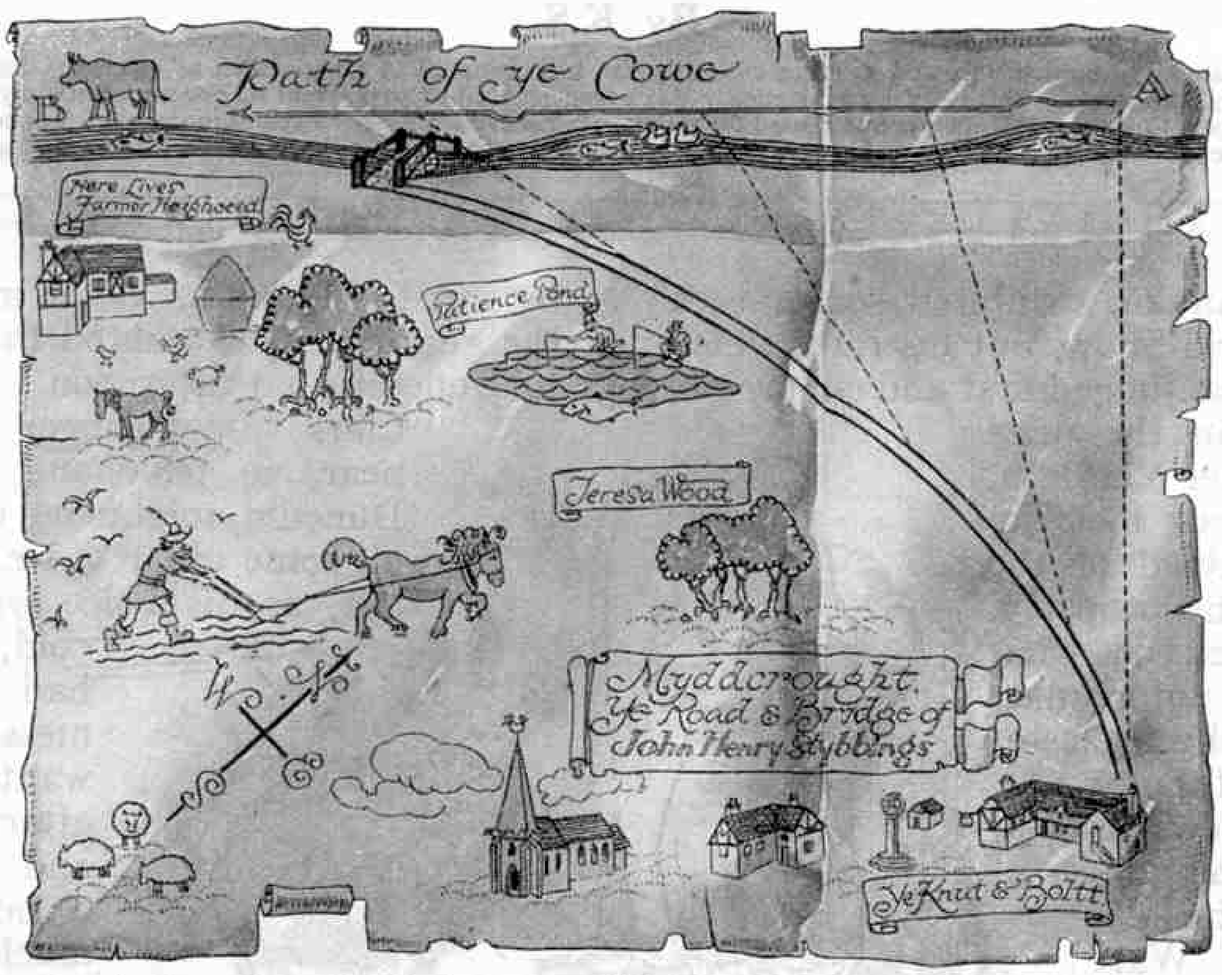
Work on the road was pushed ahead with all speed. The foundation was made of stones, which were thoroughly pressed into the soil by cunningly allowing idle onlookers who were interested in the proceedings to stand upon them while gazing at the operations of Stybbings' workmen. After several months persistent endeavour a solid road was constructed as far as the eastern bank of the beck. Stybbings was now faced with the difficulty of bridging the turbulent stream, and it was in the construction of the bridge that he achieved his greatest engineering work.

The structure designed to cross the beck had two spans carried on three piers, one on each bank and one in the middle of the stream. The first step was to erect the piers. Those on the bank offered little difficulty. Gangs of men were set to work to excavate the foundations, after which the erection of the masonry was begun.

On each bank this was carried up to a height of 2 ft. 4 in. in order to bring the deck of the bridge level with the surface of the road.

Then began the most difficult part of the work—the erection of the middle pier. At the point where this was to be placed the water was 10 in. deep at high tide, and several inches deeper after a day's rain. With great labour the specially large and heavy stones required for the foundations were assembled on the banks of the stream. These were carried to the centre of the stream and placed in position by a method that greatly interested the onlookers. As many men as could get their hands on a stone raised it and waded into the stream, staggering under its enormous weight, in order to place it exactly where it was required, Stybbings personally superintending the anxious and important task.

Naturally many difficulties were encountered and several unsuccessful efforts were made before all the stones were in position. Some of the men concerned were compelled to walk backwards, and disaster followed if by mischance a workman slipped on the muddy bed of the stream or put his foot on one of Farmer Heighceed's ducks, for these persistent creatures refused to be driven away from their accustomed haunts. The iron will of the great engineer overcame all obstacles, however, and finally he had the satisfaction of seeing the pier raised above the surface of the water. By further strenuous efforts this was taken to a height 2 in. above that of the piers on the banks, and all was then ready for laying the deck of the bridge. Strong wooden beams were laid across the stream from pier to pier, and firmly secured in position by means of string, after which flagstones were laid to form the deck.



Reproduction of a 17th Century map of Myddcrought, showing how the course of Stybbing's road was marked out with the aid of the cow shown in the upper left corner. An American millionaire has offered £5,000 for this wonderful relic—the map, not the cow—but it is not for sale, and will remain on exhibition in the Stybbings Museum, erected by admirers of the great engineer at Myddcrought.

In view of the widespread interest that Stybbings' magnificent structure created, a few statistics may be given. In its construction no fewer than 22,341 pieces of stone were used. Of these it is estimated that 7,508 were thrown at Farmer Heighceed's ducks; 14,802 were used as stands or seats by interested members of the public; and one was seized by Mrs. Stybbings, who discovered that it was exactly the correct size and shape to place in a puddle that in rainy weather formed in the middle of her garden path.

At its highest point the bridge stands nearly 2 ft. above the surface of the water beneath. Its length, including the approaches on each side, is 8 ft. 9½ in., and it is wide enough to accommodate two lines of traffic, assuming that people who wish to pass each other are only of average width. The great engineer himself was of sturdy build. He weighed nearly 18 stones and took care that the structure should be wide enough to allow him an easy passage.

Where the 22,311th stone went to! The lady standing on it is Mrs. Stybbings. The ducks were presented to her shortly after those of Farmer Heighceed had been driven away from the great engineer's bridge.

A sidelight on the ignorance then prevalent of the work of the engineer is given by a story that is told of the official opening. One inhabitant, who repeatedly had prophesied the collapse of the structure, sneeringly enquired how he could take his farm cart across the bridge. Stybbings had a ready answer for him and pointed out that the numerous small stones and fragments of larger ones knocked into the stream or thrown at the ducks during the process of building formed an ideal bed for a ford, and that carts could cross the stream by the way thus provided.

An interesting feature of the construction of the bridge was the introduction of methods of testing. Stybbings appears to have been the first to take steps to ensure the safety of the structures that he erected. For instance, the wooden beams used in the construction of the parapet were subjected to tests in order to determine their resistance to bending stresses. These were conducted by Stybbings himself, the great engineer leaning hard upon them, any that failed to withstand the pressure thus applied being instantly rejected.

After falling into the stream three times Stybbings devised a better plan. The top of the beam was carefully flattened and smoothed, and the committee that met daily to inspect the work were invited to sit upon it while making their examination. This was far more effective than the test previously employed. Failure of the beam was indicated by a splash and this was of such magnitude that Stybbings was able to study it from a place of safety in the centre of the village, where he was constantly engaged in working out details of the beam's resistance to strain and stress.

Myddcroughtians proudly recall that on this famous bridge the first scheme of public lighting was introduced. Although the manner in which the road approached the stream prevented anyone from missing the bridge and falling into the water, it created difficulty in another sense, for undoubtedly it was not easy to make the turn from the road on to the bridge at the right place, particularly for those returning at night from the absolute centre of the village.

Fortunately the parapet of the bridge formed such a convenient resting place that in time it became one of the spots at which the old men of the village assembled in order to smoke their pipes and discuss the day's work. Stybbings was immediately struck with the idea of making use of these men, and arranged that every night a few of them should sit on the rail. Each man was instructed to light up his pipe at regular intervals and, as the times overlapped, lights to guide those approaching the bridge were almost continuously displayed.

When the bridge was finished it was discovered that the heavy traffic along the road first constructed had pressed the stones further into the ground, and they now were covered with several inches of mud. Stybbings was by no means disheartened. He realised that the stones undoubtedly were there and all that was required to repair the damage was to put more on top of them, a method that has been followed by other road makers to the present day. Work on the road immediately was recommenced. Operations started from the centre of the village—and finished there each night—and on 17th March, 1667, the road to the banks of the stream was completed.

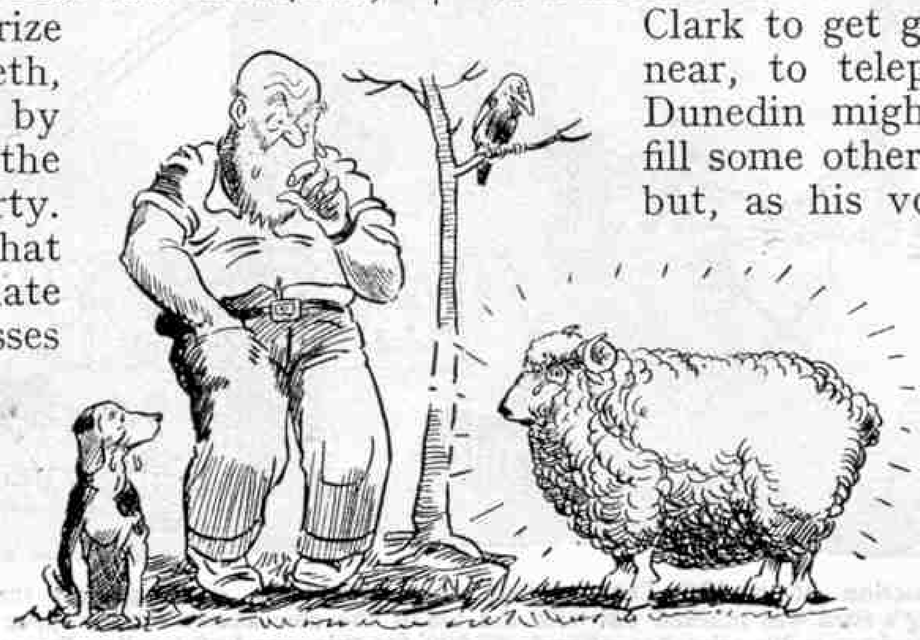
(*Continued on page 1005*)

"No Trace"—Solving a Railway Puzzle

By K.S.

The organisation of railway systems in this and in other countries has been brought to a high pitch of efficiency, but in the past amusing errors have occasionally been made. This story is an instance. It is a true account of an incident that occurred many years ago on the Otago section of the New Zealand Government Railways and caused the railway staff in Dunedin some anxious moments. For permission to reproduce it and the accompanying illustrations we are indebted to the courtesy of "The New Zealand Railways Magazine."

FARMER WATT, of Manuka, exhibited some stock at the local Agricultural Show, but his ram, which he had expected to be adjudged first and champion, was not even mentioned in the prize list. A few days later farmer MacBeth, the County Chairman, was met by farmer Watt, who complained of the state of the roads adjoining his property. Incidentally, he commented on what he considered to be an unfortunate choice of a judge for the sheep classes at the Show. Now farmer MacBeth was one of the stewards at the Show and he warmly defended the choice and the decisions. Finally farmer Watt summed up his arguments thus: "Well, he's no judge of sheep anyhow, and you're no judge of sheep either if you agree with him; and as to the road, it is about the worst in the country."



"Farmer Watt's ram was not even mentioned in the prize list."

"Maybe, maybe," replied farmer MacBeth, "but there is one improvement that can be made right away, and that is to clear the gorse off it. That fence of yours is fifty feet in width. The clerk will send you notice to remove it at once."

So farmer Watt, in spite of his remonstrances, had to cut the gorse, but, before he had cleared it away, a heavy rain storm washed it down the creek, causing the culvert under the railway to become blocked. A railway ganger named Watson found the water backed up and threatening to break the lines. In clearing the culvert he received a thorough soaking, but, being a conscientious worker, remained on duty to see the last train through his length, with the result that he contracted a severe cold.

There had been a big slip near Manuka, and for convenience in working trains while the block lasted, a telephone had been installed at the station. Owing to the possibility of further trouble in the way of slips the telephone was not removed, but, as it was not in service, it had received little, if any, attention as regards maintenance. The customers of the railway found this telephone extremely useful for ordering trucks and making enquiries on railway business, and had come to regard ganger Watson as unofficial caretaker.

A drover by the name of Clark, on a recent journey to Burnside, had the misfortune to lame his horse, and was forced to leave it at Dunedin for treatment, and to hire a substitute from Berry's stables. When the injured horse was fit to be sent home it was forwarded by rail to Manuka. Clark met the train and informed the guard that he wanted the horsebox to send a horse to Dunedin that afternoon. Guard John Collie advised Clark to get ganger Watson, who was working near, to telephone Milton to that effect, as Dunedin might be depending on this box to fill some other order. Watson rang up Milton, but, as his voice was indistinct owing to his cold, the operator at Milton had difficulty in receiving the message. Watson said: "Clark wants to send a horse this afternoon to Berry, Dunedin," and explained that there was a horsebox on hand. After much repetition Milton got the message, "Clark wants to send a corpse this afternoon to bury at Dunedin." So Milton advised the traffic inspector, who, in turn, advised Lawrence to instruct the guard to lift a corpse at Manuka.

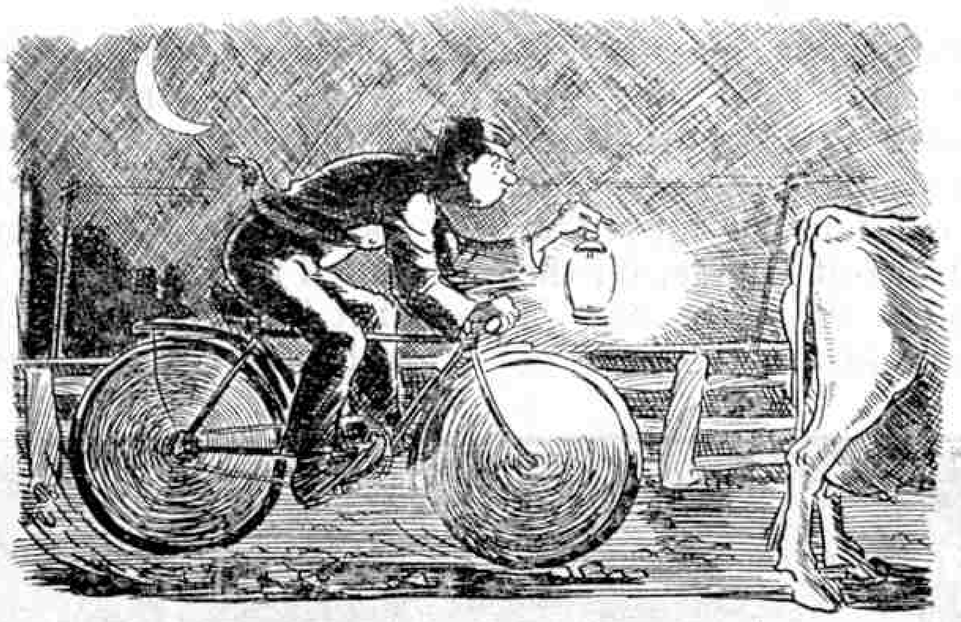
"Alec Smart was a promising young railway guard."

Alec Smart was a promising young railway guard who had received a good training at Dunedin, and had recently been posted to relieving work. He had what the Scots call "a guid conceit of himself." He sometimes offered unsolicited advice to his elders out of the fullness of his knowledge, and occasionally was snubbed for his pains. This time he was fully determined to attend strictly to his own business, and let others solve their own worries. He was in charge of the afternoon train from Lawrence, and on arrival at Manuka, found there a lad with a consignment note for a horse, but no consignor for the corpse he was instructed to lift. He asked the persons still on the platform, but could obtain no information. There were only two vehicles in the siding—the horsebox and a "K" truck, so he assumed the corpse must be in the latter. He opened the door and saw a long object like a coffin, covered with a tarpaulin. The absence of a consignment note was strange, but he had his order, and the person who gave the order must take the responsibility, so he took the "K" truck and the horsebox to Milton.

When he took his waybills to the office there, the clerk expressed his opinion of a guard who brought in loaded trucks without waybills or consignment notes for their contents; but Alec produced his order to lift, maintaining that that was sufficient for him—

the accounting was not his business. He declined to part with the order, but suggested that the clerk make out a memorandum waybill and insert, in place of the consignee's name, the words, "By order of Traffic Inspector." This was done, and Milton passed the truck on to Dunedin.

When it arrived in Dunedin, no application was made for the corpse. It was Christmas Eve, and the parcels office staff were very busy, so the hour was fairly late before the clerk in charge thought of making enquiry. He telephoned various undertakers, but could get no information. The Traffic Inspector's office was closed, and he was unable to get in touch with any members of the staff. Finally he abandoned his enquiries for the night, and sent a porter down to the loading bank to lock up the truck. The porter came back to say the truck had gone and the shunter knew nothing about it.



"A man was despatched on a bicycle to Manuka."

The yard foreman had had a busy day. The coal mines and the timber mills had rushed in extra supplies to last over the holidays; from the workshops there had been what was, by one officer, facetiously described as a "gaol delivery" of the vehicles that had been imprisoned there for repair, and there was the last moment seating of wagons for holiday passenger traffic.

When the rush in the yards began to subside, the foreman called one of the shunters whose gang had been working long after the usual stopping time. "That will about do for you, Joe" he said. "Slip out to Hillside and bring in those trucks they seated this afternoon, and there are two or three cripples and some maintenance stuff you can take out with you out of our way. When you have done that you can turn your engine in."

So when Joe, coming back from the passenger yard, saw a "K" truck chalked conspicuously, "Hillside for repairs—leaky roof," he added it to his rake, and took it to Hillside.

Next day was Christmas Day and as many of the staff as could be spared were off duty. The chief parcels clerk found on his desk a memorandum waybill for a corpse, and attached to the waybill a note from the late-shift clerk, to the effect that the corpse was unclaimed, and he was unable to find the consignee. The Traffic Inspector's clerk was called up, but all he could say was that Milton had advised there was a corpse to be lifted at Manuka and he had instructed Lawrence accordingly. Milton was interrogated, but the only information he could give was that the ganger at Manuka had sent a message that there was a corpse to be buried at Dunedin, and that it would be loaded for the afternoon train.

There was no evening train on the Lawrence branch, so a man was despatched on a bicycle to Manuka, only to return with the report that ganger Watson had been granted sick leave and had gone away, it was believed, to Balclutha, for medical attention. Clark was not at home, and where he was no one knew. It was ascertained from Balclutha that Watson had been there but no one knew his whereabouts. Enquiries seemed to have reached a dead end.

When the matter was reported to the stationmaster at Dunedin, he directed that the corpse be sent to an undertaker till the consignee could be found. It then transpired that the corpse was missing. There was no truck number on the memorandum waybill, but the guard's sheet showed "K" 873 lifted at Milton and put off at Dunedin. "K" 873 could not be found in the yard. The number-taker had no note of its going out, but thought it might have been used as an extra luggage van without his knowledge. Enquiries were sent off to terminal and junction stations, and guard's sheets for outgoing trains were examined but the truck could not be traced.

On Boxing Day the staff had plenty of other things to think about, and when the rush had subsided and the principal officers had foregathered in the evening to discuss the business of the day, and the plans for the morrow, the matter of the missing corpse was mentioned. The yard foreman recalled that he had sent some trucks to Hillside last thing on Christmas Eve, but so far as he could remember there was not a "K" truck among them. The Traffic Inspector said there was no such truck as "K" 873. It seemed as though another dead end had been reached.

"An irate farmer from Manuka."

Meantime an irate farmer from Manuka was at Milton station using strong language about the Railway Department, because the manure he wanted for sowing his turnips, and which, he was advised, had been duly handed to the railway, had not yet arrived. A reference to Waitahuna showed that truck "K" 873, containing the manure, had been put off at Manuka in due course.

On the morning of 27th December, truck "K" 873 was found at Hillside containing ten sacks of superphosphate wrapped in a tarpaulin.

About the same hour, ganger Watson, then on his return journey, was advised that his presence was required. As a result of his statement, Milton reported to Dunedin—"Ganger states that there was no corpse from Manuka, should have been a horse."

The puzzle was solved. The story began with Farmer Watt's ram. In the opinion of others than the owner there was nothing wonderful about the animal; but if the aggrieved farmer from Manuka had known what part the ram had played in delaying the arrival of his manure his remarks on its merits—and those of its owner—probably would have been unprintable.

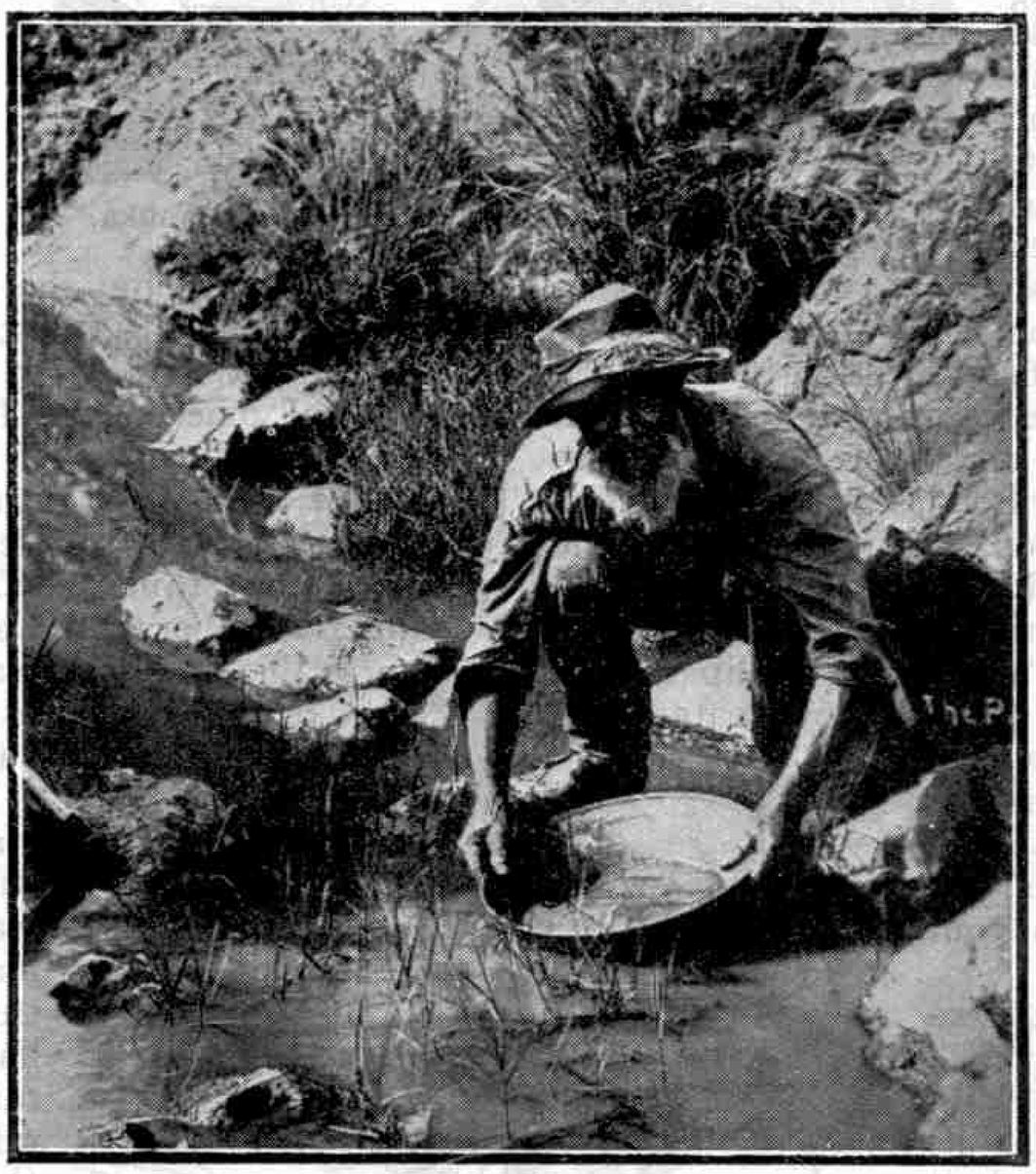
Bonanza Days of the Mining West

Famous Camps That Are Now "Ghosts"

By C. H. Vivian

WHEN Cripple Creek, Colorado, was in the first flush of gold excitement, and there had not yet been time to construct any of the three railroads that eventually served it, heavily laden ore wagons drawn by from four to eight mules moved in almost endless procession to the town of Divide, on the Colorado Midland Railway. Some 10 miles out of Cripple Creek, where the roadway skirted the base of Pike's Peak, a rock protruded from the ground in one of the furrows that the wheels had worn. There were plenty of rocks throughout the course of the crude highway, but only this particular one concerns this narrative.

One day a driver, not yet thoroughly experienced, reached back and picked from his load a choice specimen of gold ore which he let fly at one of the leading mules with perfect aim. The mule gave a jump that added impetus to the wagon just as the left front wheel came against the jutting rock. The resulting jolt jostled a 50-lb. chunk of ore off the load and it rolled down the gentle slope for nearly 150 feet before coming to rest at the entrance to a badger hole. It so happened that the piece of ore that had been thrown at the mule bounced off the animal's back and took a course that deposited it on the same side of the road as the larger piece, and less than 200 feet away from it.



A figure from the past! Panning for gold.

Several months passed. The deep snows of winter descended and in the spring they melted and formed rivulets that carried a great deal of sediment. This sediment filled up the badger hole, and piled up round the large piece of ore so that only its top was exposed. The smaller piece also was partially buried where it lay among the young shoots of grass that were just breaking forth under a friendly sun.

During the following summer a prospector roamed over the region. He knew little of gold ore or of its mode of occurrence, for until a few weeks previously he had been leading the quiet life of a minister in a Minnesota town. Along with thousands of others he had read of the fortunes that were being dug from the ground "out West," and had forsaken the cloth for a more adventurous existence and one that held promise of greater monetary rewards. In Cripple Creek he had seen enough ore to acquaint him with its general appearance and he had taken to the hills to search for it.

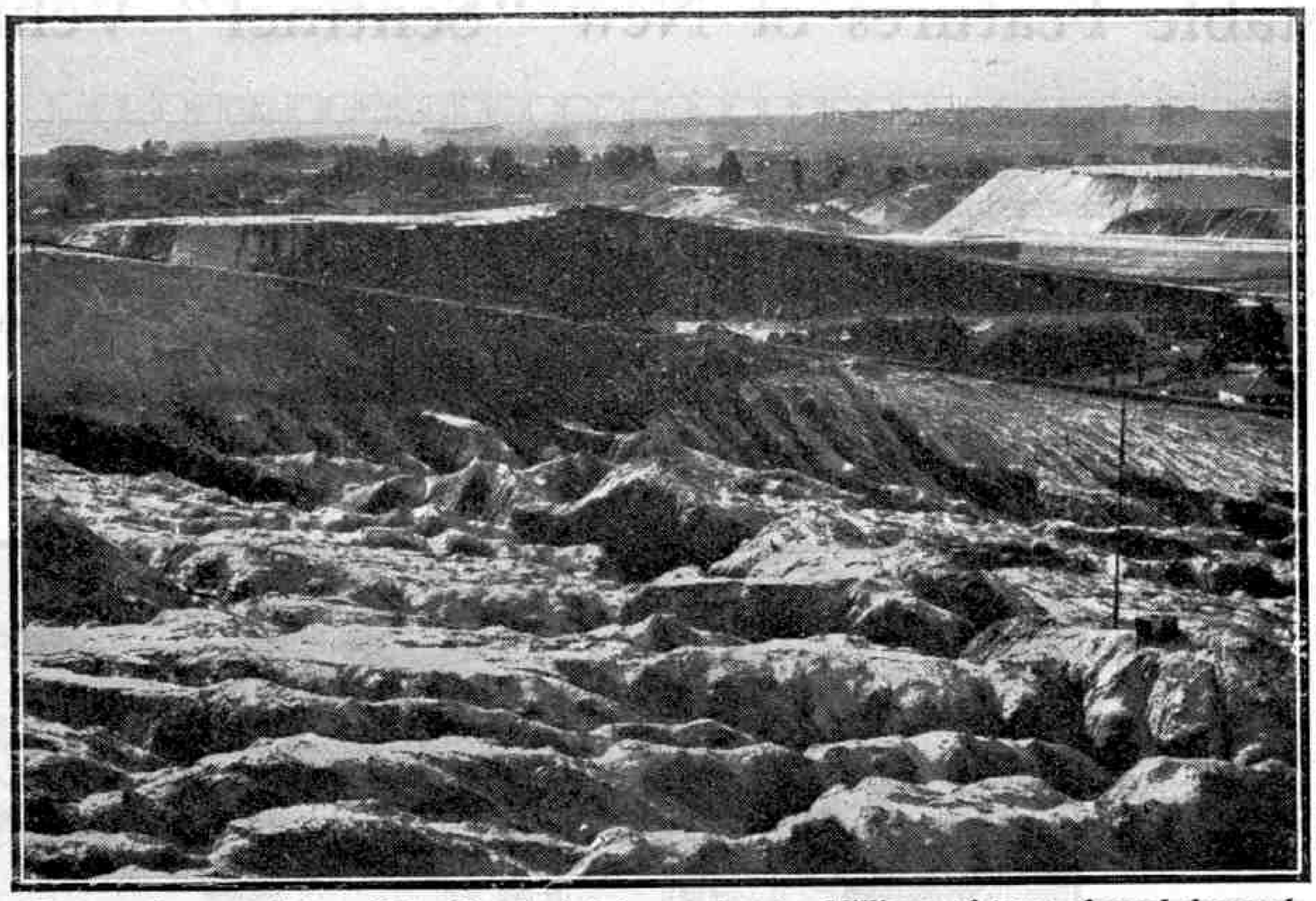
Learning that the area within five miles radius of Cripple Creek had been gone over as with a fine-tooth comb, he drifted further afield. Chance led him to the spot where the larger piece of ore lay, and frantically he fell to work to dig it out. Beneath it and on all sides of it he found only the light-brown granular earth that is formed by the disintegration of granite, and there was no sign of mineralisation. He had heard the miners in Cripple Creek speak of float rock, and he concluded that such was his find. Somewhere near by, he reasoned, was the mother lode from which this boulder had broken; but if one piece had become detached from the vein so must others. Diligent search brought discovery of the small piece of ore that had bounded from the mule's back. Then the minister was sure that he was hot on the trail of treasure trove.

For several days he travelled in a continually widening circle, probing here and there with his pick, but without success. It became evident to him that he must dig below the surface and remove the mantle of soil that was hiding the vein from view. Such a procedure, however, called for money to hire men and to buy the necessary simple machinery. His supply of funds was meagre, so rather than appeal to comparative strangers in Cripple Creek and thereby probably precipitate a rush that might deprive him of his prize, he wrote to members of his congregation in Minnesota and implored their financial assistance, in return for which he promised a substantial interest in the profits which he felt confident would accrue. The good churchmen in the Minnesota town not only sent money, but many of them delivered it in person and sought a hand in unearthing the supposed vein of gold ore.

As a result, windlasses and buckets were procured, and pick-and-shovel brigades began perforating the earth's crust. The operations attracted attention, and word of a new "find" soon spread like wildfire through Cripple Creek and other camps of the state. Hundreds of hopeful prospectors hotfooted it to the scene of activity and raced one another in staking out claims. More picks, shovels, and windlasses appeared, and soon an army of workers was tearing up the landscape.

Because those who dug had to eat, sleep, and be

diverted from their labours, there came more men to set up stores and houses and amusement places. Almost overnight a town came into being—the town of Gillette ; and every day it grew on its momentum, like a snowball rolling down hill. Streets were laid out, and a water system sufficient to serve 30,000 persons was installed. Meanwhile, all the frantic digging produced nothing but a lot of holes in the ground and mounds of brown earth beside them. Gradually it dawned upon the populace that Gillette was not destined to become a second Cripple Creek, and they began to move on to investigate other "finds." In a few months the town was deserted.



Man-made mountains of the Rand at Johannesburg. Millions of tons of sand dumped after gold extraction processes.

In after years most of the buildings were torn down by salvagers, and the others rotted and collapsed. To-day the automobile road between Colorado Springs and Cripple Creek passes within a quarter of a mile of the site where stands a signpost on which is inscribed "Gillette," and bearing a hand that points toward the base of Pike's Peak. If you take the trouble to follow the course it marks, you will come upon numerous mounds of dirt, each with a caved-in excavation beside it. One heap is larger than the others. It is the one that was built by the minister who failed to find gold, but who, so the story goes, made his "pile" from the funds that were eagerly supplied by the members of his former flock in Minnesota.

The West contains many of these "ghost" camps. Some, like Gillette, died at birth, for there was no ore there to give them the breath of life. Most of them have known boom days, however, during which they gave the world vast sums in gold and silver, and made men wealthy almost overnight. Some have been forsaken by human beings and only their toppling skeletons remain ; others are still peopled by a few of the old guard, who hold to their homes because they have nowhere else to go.

Cripple Creek, once a name to conjure with, now presents a shrunken appearance. One by one its mines have shut down, until there are now but a few in operation ; and slowly and surely these are travelling toward the inescapable graveyard that eventually claims the gold camps of the mining West.

From an [*old engraving*

Removing ore, showing box carried on sledge and dogs with pack saddles.

As a result of the fact that so many of the earlier camps were volatile affairs, prospectors and miners came to view all cities with a suspicion of instability. Upon this mental attitude is based the classic story of the prospector who returned from a visit to New York with the comment that "it looks like a permanent camp!"

Panamint, on the western side of Death Valley, was a roaring town back in the "70's"; to-day its population consists of two men who settled there years after the mining excitement had passed. Leadville, Colorado, had 40,000 inhabitants in 1880 when the rush that followed the discovery of silver-bearing carbonates was at its peak ; to-day its population is approximately 4,000. Leonard Nichols is the sole remaining resident of Nevadaville, Colorado, which was once a thriving camp.

The Great War, which reduced many gold camps to privation because production costs rose sharply while the price received for gold remained fixed, was also responsible for the birth of many short-lived mining communities. Such a one was Nederland, Colorado, which almost overnight developed into a city of 5,000 persons by virtue of the tungsten deposits in the surrounding hills. Tungsten became an indispensable element in the making of alloy-steel cutting tools used in the manufacture of munitions, and its price mounted fifteen-fold within a few months. The Armistice dealt almost a death blow to the industry, and the town is now reduced to 300 inhabitants.

Throughout the Rocky Mountain and Pacific Coast expanse are scores of "ghost" towns, and their histories have much in common. The

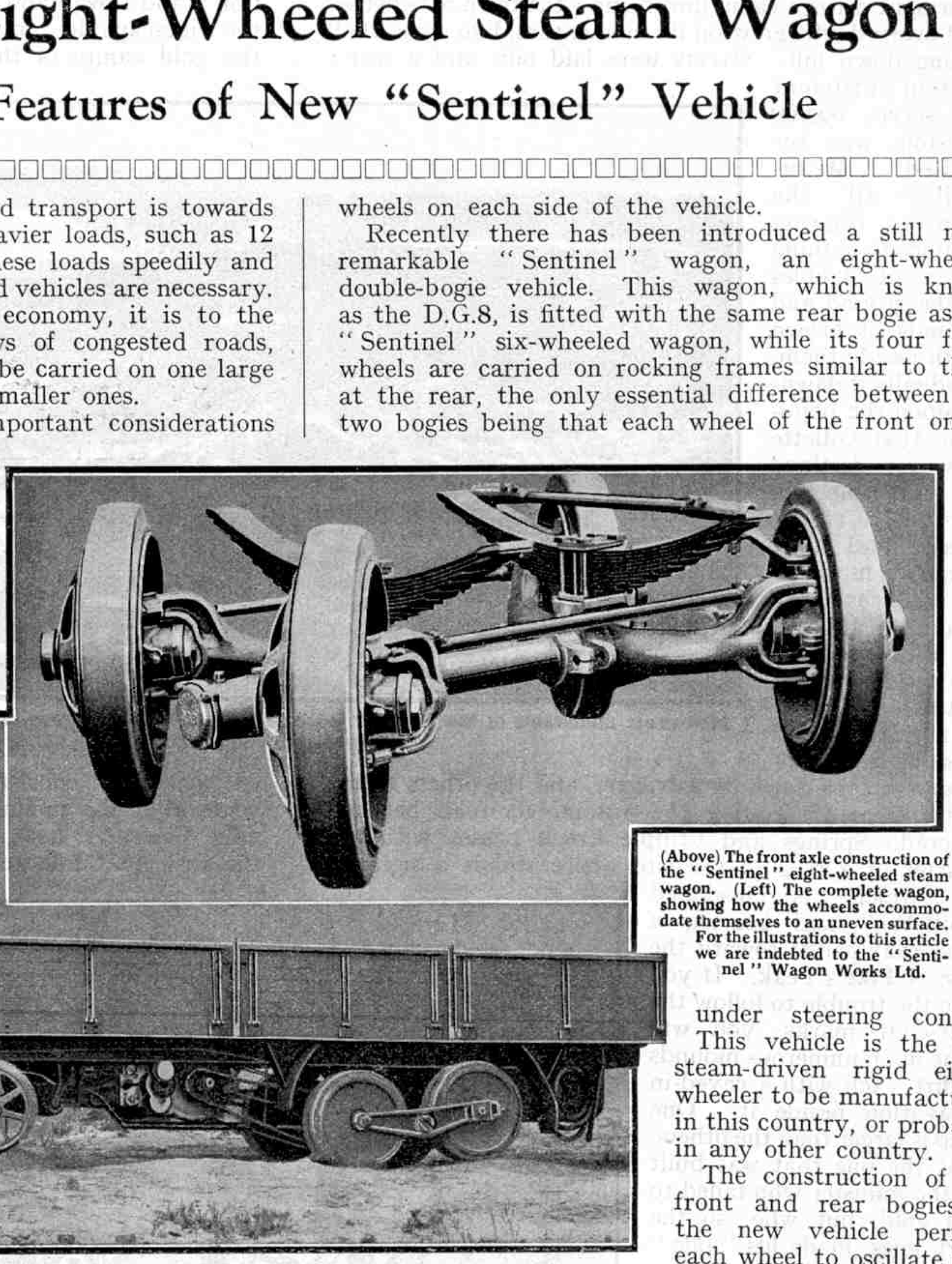
(*Continued on page 959*)

A Rigid Eight-Wheeled Steam Wagon

Notable Features of New "Sentinel" Vehicle

THE present tendency in road transport is towards the conveyance of still heavier loads, such as 12 or 15 tons. To handle these loads speedily and economically larger multi-wheeled vehicles are necessary. Quite apart from questions of economy, it is to the public advantage, in these days of congested roads, that any particular load should be carried on one large vehicle rather than on several smaller ones.

There are, however, other important considerations to be borne in mind in designing such vehicles as present-day conditions require. For instance, there is the effect they will have on the foundations and surface of the roads. The amount of vibration such vehicles transmit to buildings bordering on the thoroughfares along which they pass is also a most important matter, and any risk of damage from this cause should be reduced to a minimum.



(Above) The front axle construction of the "Sentinel" eight-wheeled steam wagon. (Left) The complete wagon, showing how the wheels accommodate themselves to an uneven surface. For the illustrations to this article we are indebted to the "Sentinel" Wagon Works Ltd.

A successful attempt to deal with these various problems was made some time ago by the Sentinel Wagon Works Ltd., Shrewsbury, by the introduction of a six-wheeled steam wagon specially designed to deal with heavy loads. This vehicle has many novel and interesting features, prominent among which is the oscillating rear bogie that carries the four driving wheels. This bogie consists essentially of a fixed axle of great strength, on each end of which is pivoted a pair of cast steel arms. At each end of these pairs of arms are short fixed axles on which the rear wheels run. The result of this arrangement is that no matter what irregularities may be met with on the surface of the road, the arms will swing automatically and allow the weight of the wagon and its load to be distributed quite evenly between both the wheels on each side of the vehicle.

Recently there has been introduced a still more remarkable "Sentinel" wagon, an eight-wheeled double-bogie vehicle. This wagon, which is known as the D.G.8, is fitted with the same rear bogie as the "Sentinel" six-wheeled wagon, while its four front wheels are carried on rocking frames similar to those at the rear, the only essential difference between the two bogies being that each wheel of the front one is under steering control. This vehicle is the first steam-driven rigid eight-wheeler to be manufactured in this country, or probably in any other country.

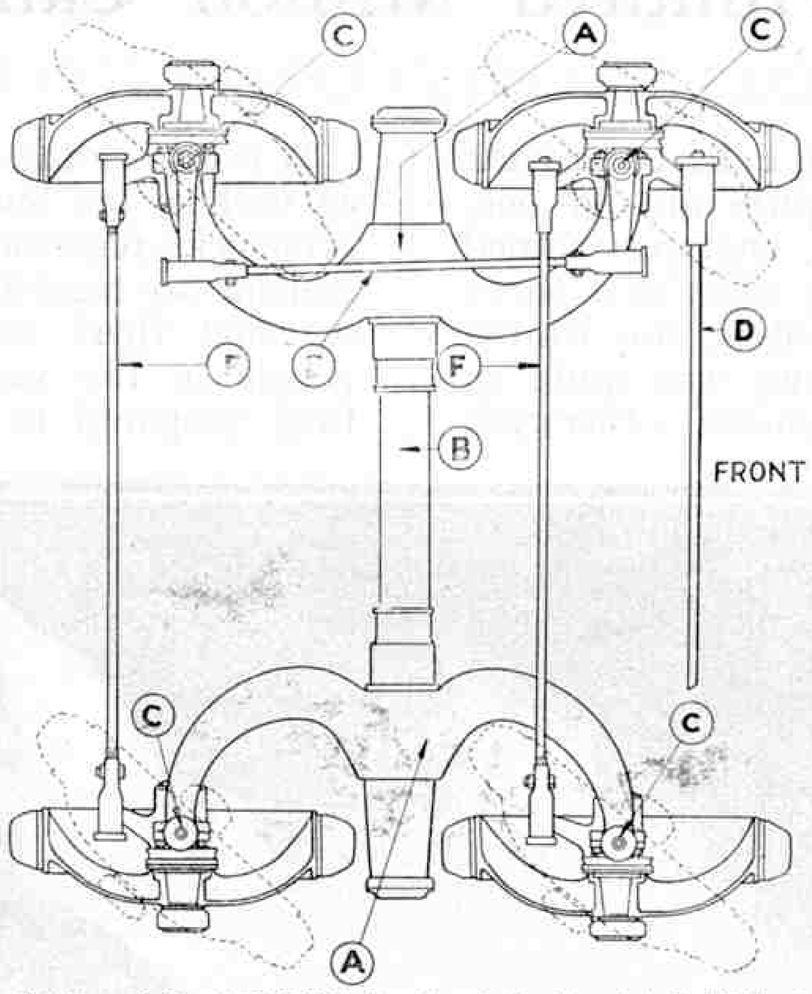
The construction of the front and rear bogies of the new vehicle permits each wheel to oscillate in a vertical plane, and thus rebound is eliminated. Rebound is the bugbear of the roadmaker, as it is the cumulative effect of repeated rebound shocks, and not the rolling motion of a loaded vehicle, that causes corrugation and pot-holes. The D.G.8 method of suspension ensures a gliding motion with continuous road contact, eliminating wheel spin, that most destructive factor in tyre wear, which can only take place during a period of rebound. The effectiveness of the suspension in this respect is shown by the exceptionally long life of the tyres of the vehicle. The action of the front and rear bogies, by increasing the smoothness of riding, not only prevents damage to the roads, but enables higher speeds to be maintained with freedom from chassis distortion and transmission wear on uneven ground.

Another important consideration is the saving of power effected by the eight-point suspension in reducing vertical movement, otherwise uselessly expended in lifting the wagon and its load over obstacles, instead of

being usefully employed in forward propulsion. This is reflected in the lower fuel and water consumption.

The patent front-axle bogie of the "Sentinel" D.G.8 consists of a fixed hollow forging of special steel, sprung below the forward end of the nickel-steel side members of the chassis frame. It is located by means of radius rods and shock absorbers to allow of free vertical movement.

On each end of the axle a forged steel double-armed bogie frame is pivoted, the outer ends of this carrying steering pivots, in which the front wheel journals rotate. Each of the pivots is connected by a track rod to its opposite number through levers set to the correct angle; and the front and rear pairs of wheels are coupled together by means of a secondary drag link. The primary drag link itself is connected to a transversely mounted lever at the base of the steering column, and thus all four front wheels are under steering control on the true "Ackermann" principle. The manner in which they move when the vehicle is turning is indicated in the accompanying diagram. Owing to the additional adhesion provided by the four wheels, the leading pair can be given a greater lock than usual without any tendency to skid forward when turning.



Details of the "D.G.8" front axle bogie. (a) Oscillating bogie arms on front axle. (b) Fixed front axle. (c) Steering pivots with levers to which coupling links are connected. (d) Coupling link from steering weighshaft to near-side leading wheel. (e) Draglink connecting front and rear steering pivots on nearside wheels. (f) Coupling links connecting opposite pairs of steering pivots on near and offside wheels.

All the front wheels move together to the correct angles and roll along arcs of circles having their centre at the point about which the vehicle is turning. This accounts for the remarkable ease with which the D.G.8 can be manœuvred, and the fact that the radius of the circle in which it will turn is less than that of a vehicle of the same length and wheelbase, but having only the two front wheels that are usually fitted.

An interesting demonstration of the capabilities of this vehicle was given recently at the Sentinel Works. A wagon loaded with a big weight of iron blocks was run over a number of railway sleepers spaced some 6 ft. or 8 ft. apart, and climbed over them with the greatest ease. The remarkable feature in connection with this test, which showed the extreme flexibility of the suspension, was that while one of the pairs of wheels on one or other of the bogies was perched up on top of a sleeper, the other pair on the same bogie was resting on the ground some 6 in. lower. Other severe tests were carried out over a field and on a road with a gradient of one in eight. The steam-aided brakes and 16 brake shoes pulled up the wagon from full speed without a sign of skidding in about its own length, and it was turned in a circle with a radius of little more than its own length.

In view of the successful development of this eight-wheeled steam road vehicle it is interesting to recall that more than 20 years ago railway companies throughout the world abandoned the use of four-wheeled passenger coaches in favour of the double-bogie eight-wheeled type. This change was brought about by the demand for greater comfort and higher speeds, and by the increased weight of the rolling stock. It was soon found that the adoption of the bogie construction not only filled requirements, but by giving smoother riding also reduced the wear and tear on carriages and permanent way, with corresponding reduction in maintenance cost.

Bonanza Days of the Mining West— (*Continued from page 957*)

initial strike brought hordes of wealth seekers, and the usual quota of adventurers, gamblers, and camp followers. Either the mineral was not present in sufficient quantities to support more than a fraction of the population or, with increasing depth, with the encountering of water or any of a long list of other eventualities, the cost of taking the ore from the ground became greater than its value.

In the placer camps, Chinese are the final inhabitants. Patient, industrious, and demanding little on which to live, they take over the gravel deposits when the white man forsakes them and manage to eke out an existence for many years. Every western camp abounded with Celestials in its boom days. They served as camp launderers while they waited for the Anglo-Saxon to shoulder his belongings and to pass on to other fields.

It is interesting to note that the richer a camp the more inevitably it was doomed to desertion. Its richness attracted far more people than it could support; and, in its first wave of enthusiasm, the camp built for all comers. This created overbuilding, for a large percentage stayed only until tidings reached them of another strike elsewhere. With the richness of the veins proved, eagerness for the metal became the ruling passion, and mining was pushed with all possible speed. Thus, often, the cream would be skimmed from the top within a few years, leaving the camp on the down grade.

By way of contrast it is interesting to observe that the low-grade property frequently produced more mineral in the long run and, by reason of its greater deposits and more business-like methods of recovery and treatment, remains a potent factor in the mining world after many of the "bonanzas" are forgotten.

Longest Electrified Line—(*Cont. from page 951*)

eastward the Jefferson, the Madison and the Gallatin rivers unite to form the source of the great Missouri River. Continuing westward we come to Butte, the world's largest mining metropolis, where one-fifth of the world's copper is produced. After penetrating the Bitter Root range the line descends into Idaho and follows for a considerable distance the beautiful St. Joe River as it surges between its confining canyon walls, and finally subsides into a broad, placid stream.

Spokane, Washington, is the metropolis of the Inland Empire, which equals in area all the New England states, with New York and New Jersey thrown in. The Spokane River flows through the heart of the city, and within a radius of 100 miles are 50 mountain lakes ideal for camping, hunting and fishing. Leaving the Inland Empire the route ascends the east slope of the Cascades, winding round Lake Keechelus and finally penetrating the range by Snoqualmie Tunnel. Tide water is reached at Seattle and then at Tacoma, and the journey from Chicago, covering 2,200 miles, has been completed in less than three days.

World's Largest Shovel— (*Cont. from page 931*)

simultaneously into trucks standing on seven railway tracks, one for each grade of coal. As a rule the cars have a capacity of 100 tons, which is practically standard in the United States, and in them the coal is taken away from the mine for delivery.

The tipple covers more than 19,000 sq. ft. of ground and is capable of dealing with 800 tons of coal per hour. It is operated by 43 electric motors. These are of various sizes, ranging from 3 h.p. to 150 h.p., and the total power they develop is about 1,000 h.p. Nearly all are three-phase, 60-cycle machines operating on current at 440 volts, and by far the greater number of them are standard slip ring induction motors. The operating speed of the majority is 900 r.p.m. but two are run at 1,800 r.p.m. Practically all are magnetically controlled and are started or stopped by merely pressing buttons.

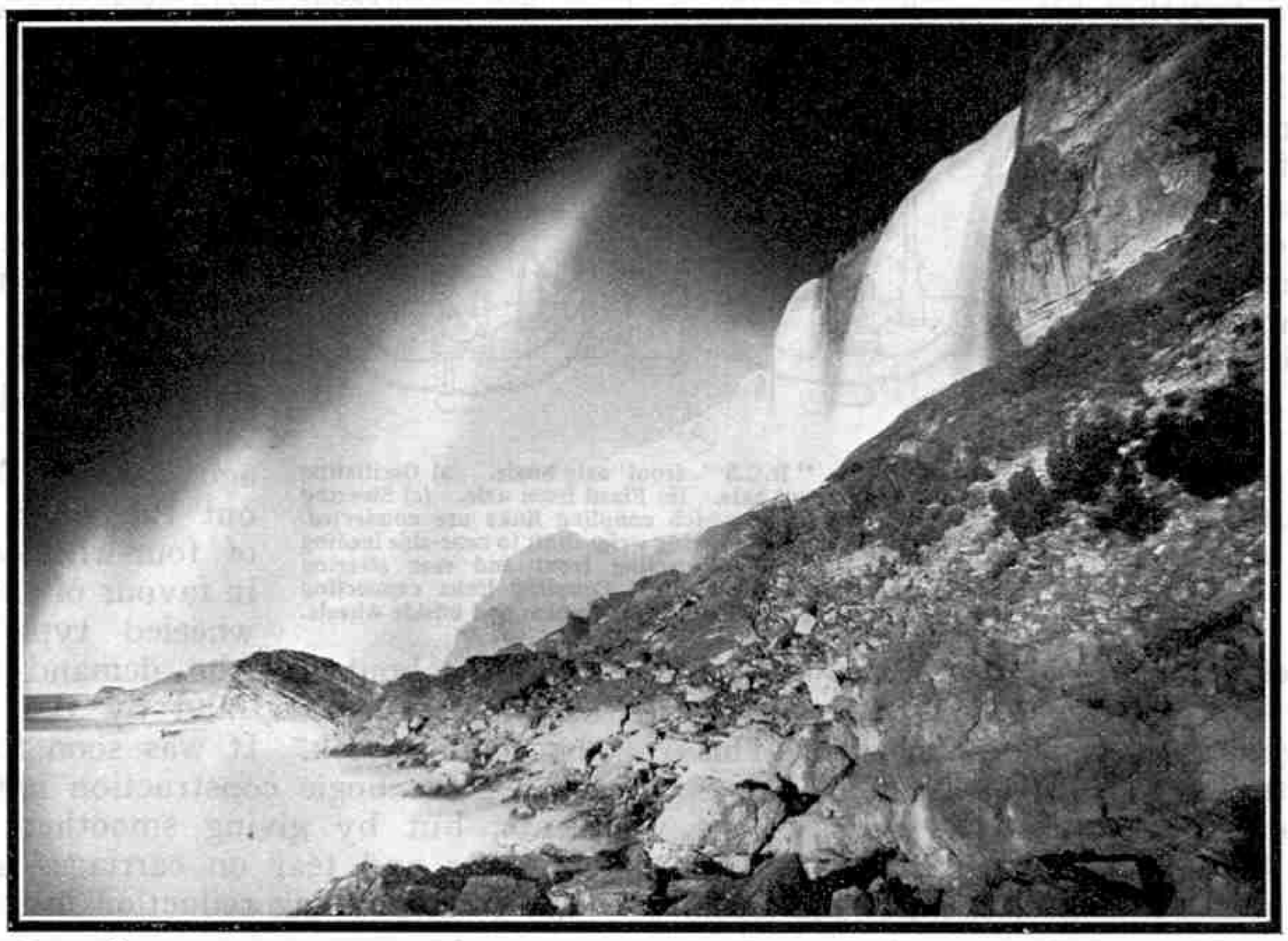
Niagara Falls by Searchlight

Thirteen Hundred Million Candlepower!

THE idea of illuminating Niagara Falls to provide a unique night spectacle is quite an old one.

More than 40 years ago an engineer named Bierstadt wished to show the Falls at night to a party of English railwaymen who were visiting the United States. At that time electric lighting was quite in its infancy, and searchlights were unknown. Bierstadt therefore hit upon the idea of illuminating the Falls by means of gunpowder placed on the ledge beneath the American Fall. The result was distinctly effective, but of course not at all to be compared with electrical illumination.

In 1907 the General Electric Company of America became interested in the illumination of the Falls. They utilised searchlights, and for 30 nights Niagara was lighted up on a magnificent scale. From that time up to about four years ago the only illumination of the Falls has been provided by small incandescent floodlights, which proved unsatisfactory and quite failed to produce the spectacular effects that are obtainable with searchlights.



Courtesy] [*International General Electric Co.*

A striking photograph of the Niagara Falls illuminated by a battery of 24 powerful searchlights. Some idea of the intensity of their light can be gained from the fact that the searchlights have a total production of no less than 1,320,000,000 candle power.

On the occasion of the visit of the International Illumination Congress to the U.S. the International General Electric Company determined to illuminate the Falls on a scale that had never before been attempted. The scheme was designed by Mr. W. D'Arcy Ryan, director of the illuminating engineering laboratory of the company, and a pioneer in the electric floodlighting of buildings. A battery of twenty-four 36 in. high intensity searchlights was used, resulting in the production of 1,320,000,000 candle power.

Some idea of the grandeur of the display may be obtained from the accompanying photograph. In addition to the lighting-up of the tumbling mass of waters, the surrounding scenery was revealed in soft glowing colours of rainbow-like beauty, which lent a unique charm to the scene. The Falls themselves appeared as an immense cataract of liquid light, while a cloud of spray hovering around and above caught the glare of the light and resembled an enormous veil of silver gauze.

It is interesting to note that prior to this illumination, as well as the one in 1907, there were many adverse prophecies regarding the scheme. Many people, indeed, seemed to regard it as desecration! On this latter occasion there were undoubtedly large numbers of people in the vast crowd that assembled who were fully prepared to criticise, but when the switch was thrown over and the cataract burst into a flash of scintillating colour, there was first the silence of utter amazement and then a wild and prolonged roar of applause.

When illuminated with white light only, the Falls resembled an ocean of milk, and the change produced when screens of red, orange, green, blue, and violet were interposed was very extraordinary. The mighty cataract was immediately transformed into cascades of liquid colour.

There is always an extraordinary fascination about moving water that is illuminated by lights of great intensity, and more particularly when colour effects are introduced. Large fountains electrically illuminated have proved an enormous attraction wherever they have been displayed, notably in public parks in various large towns of the United States, and also of Canada.

One of the most remarkable illuminated electric fountains was designed by the International General Electric Company for the Exhibition at Batavia, Java, last year, and it formed one of the most decorative features of the display. The illumination was provided by 16 submerged floodlight projectors having lamps ranging from 500 to 1,000 watts, and fitted with red, amber and blue screens. Around the central water jet were two concentric rings of pipe fitted with nozzles. A magnetic switch was provided for the projector circuit and also for the valves, and this, together with a motor-operated flasher, gave remarkable flexibility in producing combinations of colour and water flow.

In the British Isles we are not favoured with waterfalls suitable for illumination, but there is no reason why illuminated fountains should not form a regular feature of public displays on a large scale.

Liverpool Schoolboy Poets

Interesting Work of 13-year-old Brothers

WE do not usually associate boys with poetry; and as regards most of the boys we meet every day it is certainly difficult to imagine them sitting down seriously to write verses! There are exceptions, however, and some striking ones are afforded by the pupils of the Everton Terrace Council School, Liverpool, whose efforts in verse have recently been brought to public notice. No doubt the spread of poetry writing in this school was due in the first instance to the example set by a particularly gifted boy, but the success achieved by the young poets in general shows the existence of quite unusual ability, and at the same time affords evidence that the teaching of English is being carried out wisely and well.

We should like to have reproduced some of the best of these poems in full, but unfortunately we have not space to do so. We must therefore confine ourselves to a few verses taken from various poems written by two brothers, Thomas and James Melville, age 13. These boys live in a working-class district typical of a modern industrial city, which makes their compositions all the more remarkable. We are assured by the Headmaster of the school that the poems are exactly as written by the boys.

Thomas Melville—one of Liverpool's schoolboy poets.

The poems of Thomas Melville show a quiet, thoughtful appreciation of Nature that is unusual for a boy of his years. He succeeds in escaping from the snare of cheap sentimentality, and his ideas are expressed clearly and simply. The following lines are taken from a poem entitled "*My Wishes.*"

Give me the valley wide and green,
The sheep that on it roam;
Air that's fresh and pure and clean;
A humble cottage home.

Give me a horse and plough so strong;
A pool so cool and deep;
A hard day's work; at evening tide
A rest and quiet sleep.

In "*Spring*" Thomas suggests with considerable success the mysterious and universal stir in the animal world that begins to take place at the passing of winter.

The running brook begins to sing
A merry note and gay;
New life springs up in every thing
As Winter creeps away.
The cuckoo sings his pretty song,
The skylark soars on high,
While clouds float gracefully along
The azure tranquil sky.

The squirrel comes from out his nest,
The mole from out his home;
The wise old owl knows Spring is here
And starts again to roam.
But youth for ever cannot last,
For age comes on apace;
And soon Spring's pretty charms are past
And Summer's in her place.

The last four lines bring this poem to a somewhat unexpected conclusion.

One other poem by this boy calls for mention. This is entitled "*Winter,*" and it shows how naturally the boy adjusts the rhythm of his poem to the subject with which he is dealing. In "*Spring*" the rhythm irresistibly suggests light-hearted movement; in this poem an opposite effect is produced, suggesting stillness and dreariness.

Leaves are all faded leaving trees bare
Standing old and worn;
Where stood the wheatfield, solitude's there;
Robins sing forlorn:
Through the treetops bare and frail
Blows a bleak and cutting gale.

Out on the common, fresh once and green,
Mist hangs thick and grey;
Out on the mountain, a desolate scene;
Winter rules the day:
Gone the pleasant skies of blue,
Only clouds of dark grey hue.

The poems of James Melville are different in style, and to some extent in the nature of the subjects. They suggest that James is more observant of detail than Thomas, and more inclined to describe in verse an actual scene than to deal only with the general impression of it. He has, too, a sense of humour, which on occasion may be grim or gay. The following lines addressed to "*The Frog*" are typical of his style:

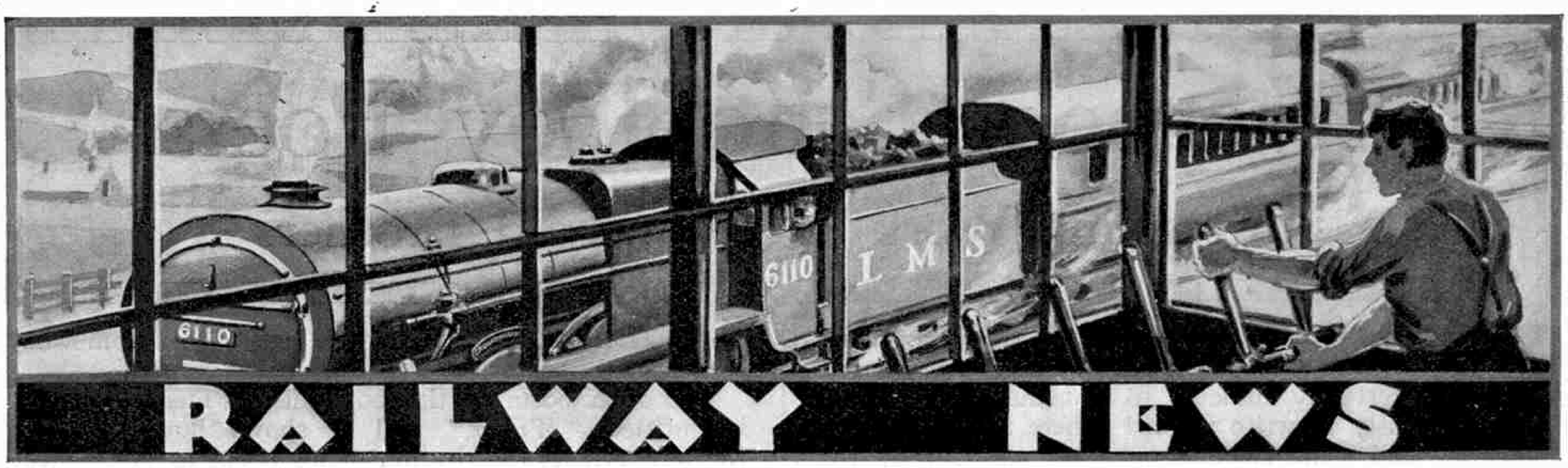
Greetings, lithe and sinewy kinsman
Of the fat, lethargic toad!
Thou remainest always hidden
From the pathway and the road;
Soft thy skin, and brown and yellow;
Large and yellow brown thine eyes;
Though indeed a timid fellow
Thou art wisest of the wise.

Patriotism seems to be out of fashion nowadays, at any rate in music and poetry. It is interesting therefore to find this boy expressing patriotic ideas so excellently as in the following poem, which he calls "*A Child's Song.*"

We've all of us heard of Grenville and Drake,
And the brave Duke of Wellington's powers;
We've read of brave Nelson's endeavour to make
Both freedom and peacefulness ours.
And though we are children and feeble of hand,
We can still give our country our aid;
We can help dear old England, the kind Motherland
Whose glory the valiant have made.

We've all of us heard of the prowess of Wolfe
Who defeated the mighty Montcalm;
And Benbow who kept the proverbial wolf
From our doors with his valiant strong arm.
And though it may be not with buckler and sword,
We can fight the good fight otherwise:
We can mentally strive, and with deed and with word
Serve England as best in us lies.

The poems from which we have quoted may not be remarkable for the originality of their underlying ideas, but they are well thought out and their workmanship shows distinct ability.



RAILWAY NEWS

S.R. "Schools" Locomotives in Service

Six engines of the "Schools" class are now stationed at Ramsgate. They are:—No. 900, *"Eton"*; No. 901, *"Winchester"*; No. 902, *"Wellington"*; No. 903, *"Charterhouse"*; No. 905, *"Tonbridge"*; and No. 906, *"Sherborne."* Nos. 900-3 were shedded formerly at Deal and Nos. 904-5 at Dover.

The last of the batch of "Schools," No. 909, *"St. Paul's,"* has been stationed at Nine Elms shed for experimental purposes. It has been fitted with a shelter and the apparatus necessary for taking indicator diagrams and making other tests, and has been tried on a variety of services.

This engine was placed on exhibition at Waterloo station on 14th and 15th October, when the boys from St. Paul's School visited and thoroughly inspected "their own engine," as did also a considerable number of the general public. The fact that it was fitted with an indicating shelter added to the interest of the engine and many of the visitors climbed into the shelter as well as into the cab. The whistle was extremely popular and eventually it became necessary to take steps to prevent it from being blown during the locomotive's stay in the station!

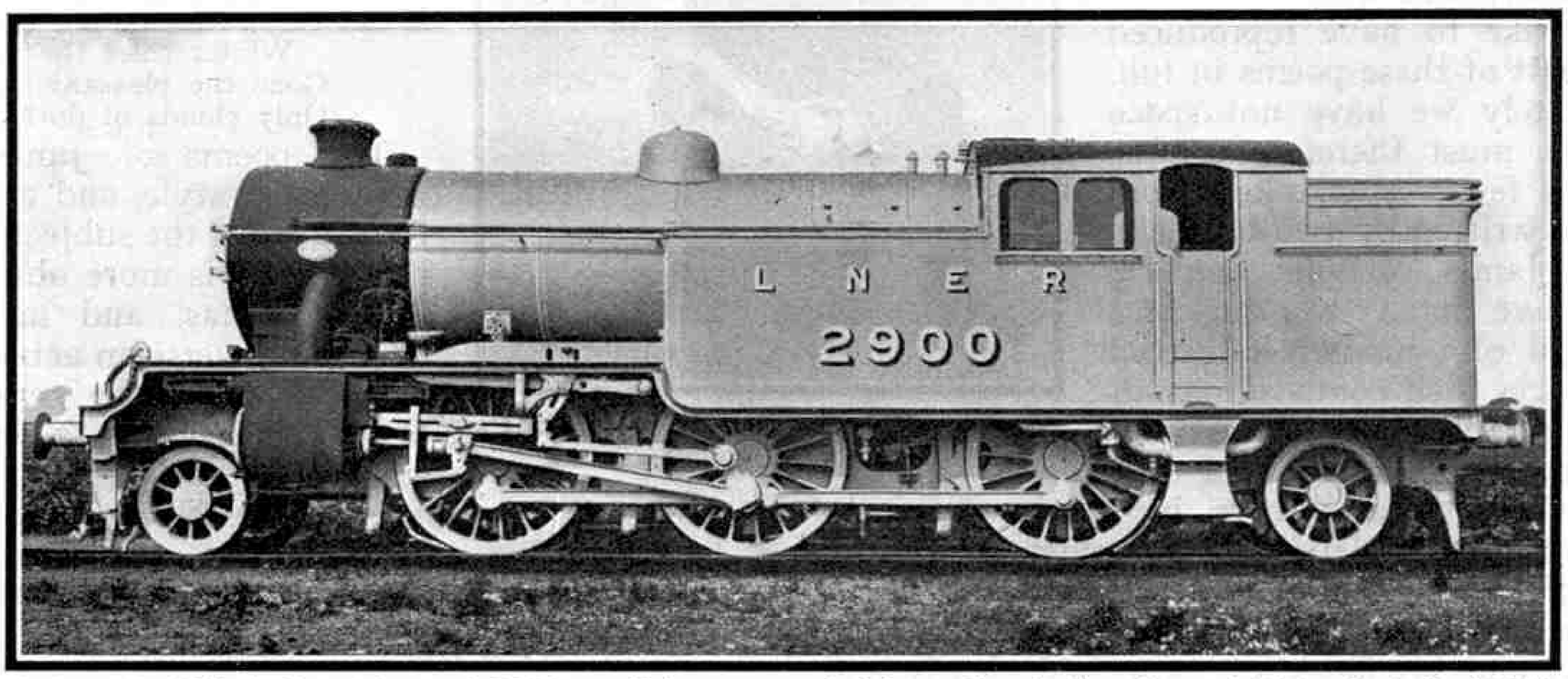
London Tube Developments

Work has been commenced on the extensions of the Piccadilly Tube Railway from Hammersmith to Northfields, and from Finsbury Park to Cockfosters. It is estimated that work will be found for about 20,000 men.

At Hampstead Tube station new lifts are being installed for the quicker conveyance of passengers. This station is the deepest on the London Underground system, being 180 ft. below the street level, and passengers will be carried up or down in less than 30 seconds. At many stations escalators are now replacing lifts but for the speedy conveyance of passengers to a depth such as that at Hampstead, it is recognised that lifts are more satisfactory.

New "Sandringhams" and "Shires" for L.N.E.R.

Some additional engines of the three-cylinder 4–6–0 "Sandringham" class have been turned out from the works at Darlington. They are:—No. 2812, *"Houghton Hall"*; No. 2813, *"Woodbastwick Hall"*; No. 2814, *"Castle Hedingham"*; and No. 2815, *"Culford Hall."* For the remaining engines of this series the following names have been chosen:—



L.N.E.R. No. 2900, the first of the new 2-6-2 three-cylinder passenger tank locomotives that have been put into service in the Scottish Area of the L.N.E.R. The tractive effort of the engines of this type is 22,464 lb.

"Falloden"; *"Ford Castle"*; *"Wynyard Park"*; *"Welbeck Abbey"*; *"Clumber"*; *"Hatfield. House"*; *"Alnwick Castle"*; *"Lambton Castle"*; *"Lumley Castle"*; *"Raby Castle"*; *"Brancepeth Castle"*; *"Aske Hall"*; *"Harewood House"*; *"Naworth Castle"*; *"Thoresby Park"*; *"Serlby Hall"*; *"Belvoir Castle"*; *"Kimbolton Castle"*; *"Hinchinbrooke"*; *"Milton"*; and *"Harlaxton Manor."*

The building of the new series of engines of the three-cylinder 4-4-0 "Shire" class is being delayed owing to the depression in trade, and they will not be completed by the end of this year as was originally intended. Work has been begun on the new engines, however, and it has been decided that they shall be named after well-known "Hunts." The names adopted are as follows:—*"The York and Ainsty"*; *"The Zetland"*; *"The Bramham Moor"*; *"The Badsworth"*; *"The Bedale"*; *"The Bilsdale"*; *"The Braes of Derwent"*; *"The Cleveland"*; *"The Holderness"*; *"The Hurworth"*; *"The Middleton"*; *"The Percy"*; *"The Staintondale"*; and *"The Pytchley."*

All locomotives on the G.E. section of the L.N.E.R. are gradually being fitted with cast iron chimneys to replace the plain stove-pipe or built up copper-capped types.

Mechanical Efficiency Par Excellence

The L.N.E.R. report that the "Flying Scotsman" expresses ran non-stop between London (King's Cross) and Edinburgh daily during the 1930 Summer Season without a single case of engine failure. The 132 trips, each of 392¾ miles without a stop—a world's record—were performed without even the slightest defect developing in the intricate and powerful mechanism that constitutes a modern "Pacific" locomotive.

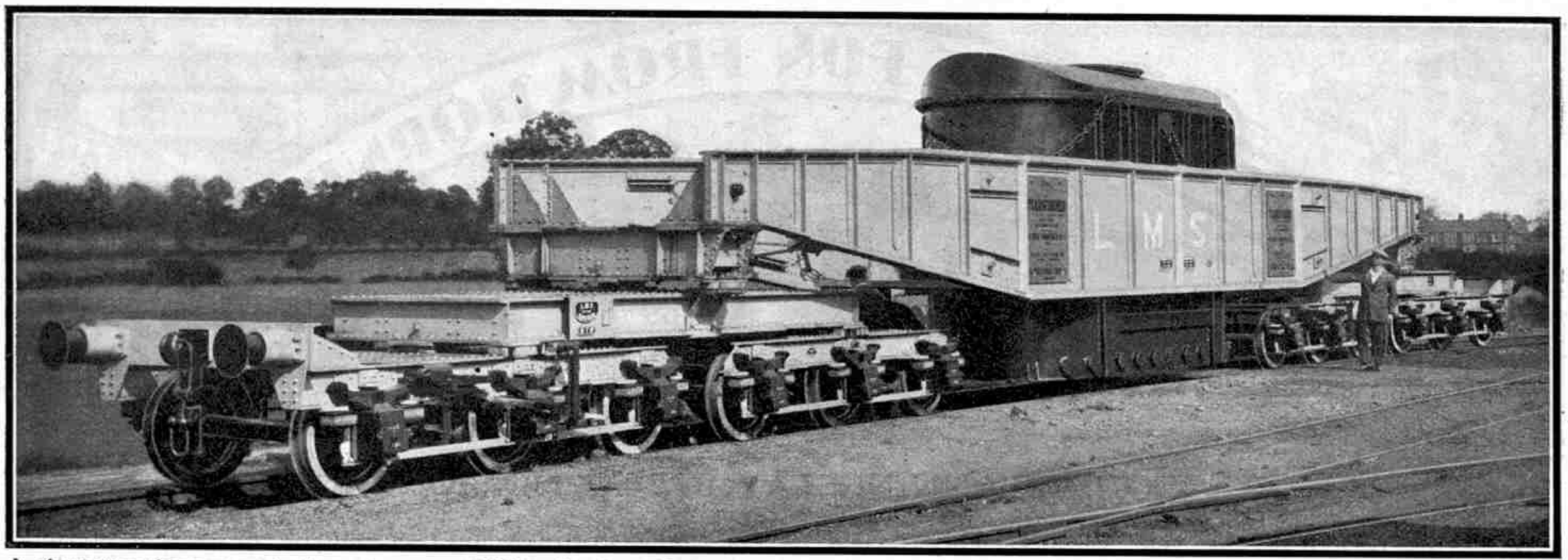
This record of 51,836 miles perfect running is a remarkable testimony to the efficiency of the modern steam locomotive and up-to-date methods of maintenance. The trips were performed by twelve different engines in turn with their ordinary schedules and not by engines specially prepared in any way. The large boiler and firebox capacity of the "Pacifics" make these locomotives eminently suitable for carrying out long runs of this kind.

30 Miles of Milk Churns

In the *"Southern Railway Magazine"* it is pointed out that if all the milk churns that were dealt with at Clapham Junction Station during one year were stood side by side, they would reach from Waterloo to Guildford!

For the twelve months ended June, 1930, 1,176,295 churns were dealt with at this busy station, the greatest number for any S.R. London station, and nearly half the total of all Southern milk-receiving depots in the Metropolitan area. Vauxhall comes next, with 526,752, and then Forest Hill with 368,684, Waterloo with 182,058, and Tulse Hill with 131,794, the four stations, Norwood Junction, Victoria, London Bridge and Charing Cross accounting for 86,593 between them.

Despite these large figures, however, they show a slight decrease (1,583 churns) compared with the previous year. This decrease is probably due to the fact that large quantities of milk are now conveyed in large glass-lined tanks both by rail and by road.



A giant transformer ready for a journey of 354 miles by rail. The trolley on which it is carried has 24 wheels and is designed to carry a load of 120 tons. This photograph is published by courtesy of the British Thomson-Houston Co. Ltd.

L.M.S. Transformer Trolley

The photograph at the head of this page shows an interesting example of a special load being carried to its destination by rail. This is the first of two huge transformers being supplied by the British Thomson-Houston Co. Ltd., Rugby, to Balfour Beatty & Co. Ltd., for use at the Abernethy sub-station of the Grampian Electric Supply Co., Scotland.

The capacity of the transformer is 20,000 k.v.a., and it has three windings for pressures of 125,000 volts, 54,000 volts and 132,000 volts respectively. As arranged for transport the tank of the transformer measures 17 ft. 7¾ in. in length, 7 ft. 6¾ in. in width and its height is 12 ft. 10½ ins. Its total weight is 126 tons.

For conveyance from Rugby to Newburgh, its destination in Scotland, the transformer was mounted on a special L.M.S. transformer trolley, with 24 wheels, designed to carry a load of 120 tons. The overall length of this vehicle is 87 ft., and the transformer tank rests between the side girders of the trolley, being supported in this position by specially designed lugs. The girders are adjustable and detachable in order that transformers of varying widths may be accommodated, and when that shown in our illustration was in position the ground clearance was only 9 in.

It is interesting to note that the transformer left Rugby on its northward journey at 3.10 a.m. on Wednesday, 24th September, and arrived at Newburgh Station, a distance of 354 miles, at 10 p.m. on the next day.

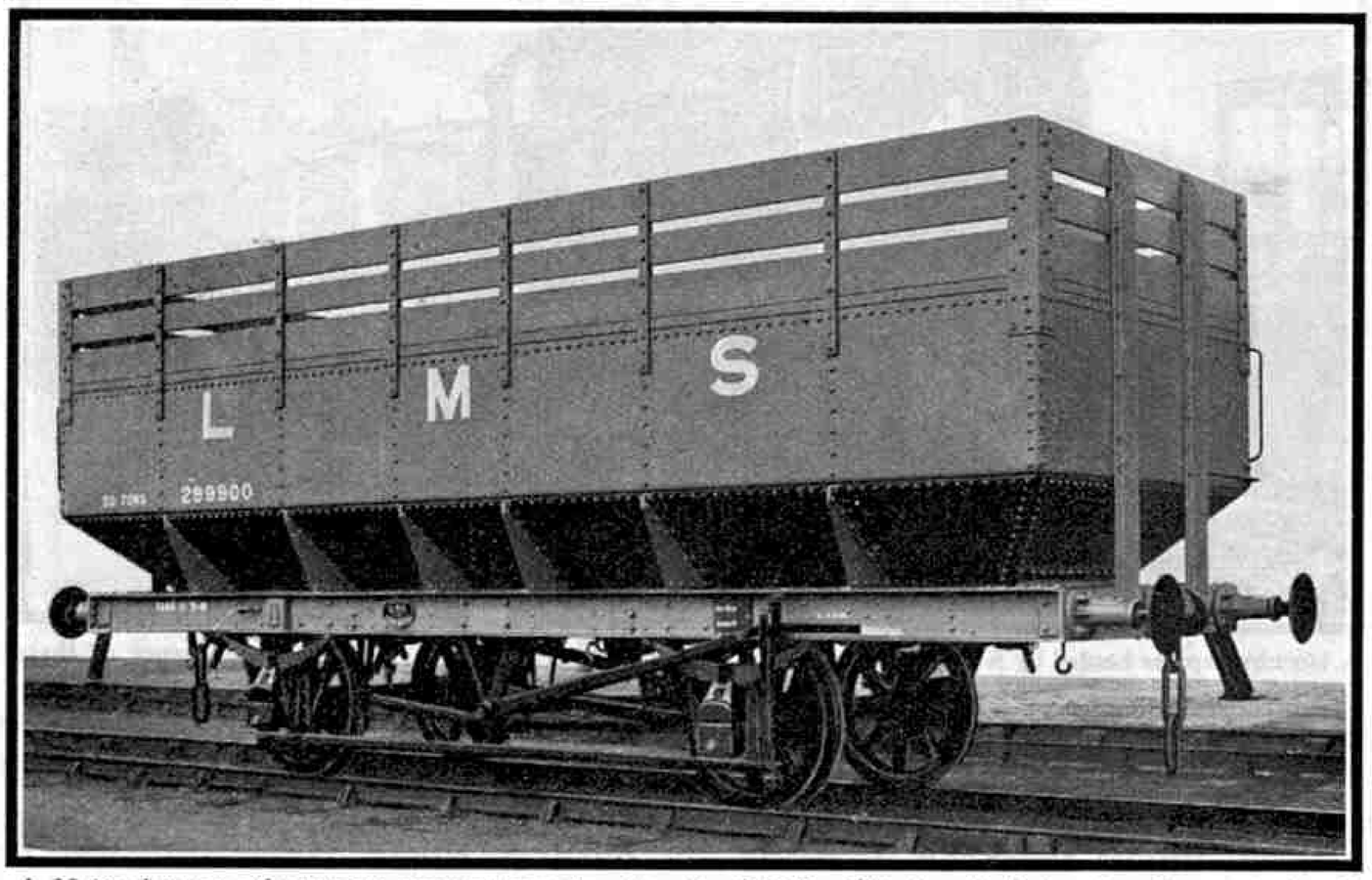
Stations Closed to Passenger Traffic

In the course of the present year no less than 176 stations on the four big British railway systems have been closed for passenger traffic. Of these, 88 are on the L.N.E.R.; 60 on the L.M.S.; 24 on the G.W.R.; and 4 on the Southern Railway.

This drastic action has been taken in the interests of economy. The competition of motor buses has drawn away a great deal of the passenger traffic that was carried formerly by the railways. Many of the road services are now associated with the railways, and arrangements have been made for these to provide facilities that will, as far as possible, take the place of those now withdrawn from the railways.

In many cases goods and parcel traffic is still being dealt with at the stations, which have been closed to passengers. Most of those affected are on small branch lines, but some are on important main lines, the most striking instance being that of the L.N.E.R. line between York and Scarborough, on which 14 intermediate stations have been closed. The closing of these stations has made it possible to reduce the journey time between York and Scarborough by fully 30 min. With only two intermediate stops, the time allowed is about an hour.

It should be added that the four stations that have been closed on the "Southern" comprise three small halts on the Lee-on-Solent line and the small station at Drayton, near Chichester. In contrast to this, twelve new stations have been opened on the "Southern" during the year—six on the new Wimbledon and Sutton line, and six in other parts of the system.



A 20-ton hopper coke wagon recently introduced on the L.M.S. This is self-discharging, the contents of the wagon being discharged through eight bottom doors.

20 Ton Hopper Coke Wagons for L.M.S.

The L.M.S. have recently put into service 100 steel hopper coke wagons capable of carrying 20 tons. Each of these is fitted with eight bottom doors that may be opened and closed independently, and the body is designed to enable the load to be entirely self-discharged through the doors by the removal of French keys securing them.

The length over buffers of the new wagons is 28 ft., and they have a wheel base of 12 ft. The side sheeting of the wagons is of steel plate 3/16 in. in thickness, while the bottom portions of the hoppers are built of plate ¼ in. in thickness. The wagons are strongly made, the steel framework being well secured by means of angle knees and gusset plates.

L.M.S. Locomotive News

The last of the batch of twenty new express engines of the "Royal Scot" class left Derby Works on Saturday, 25th October. The frames of the first engine of the new series were laid down on 5th May and the engine was completed and ready for service by the 31st of that month. Since then the rest of the engines have been turned out steadily at the rate of nearly one a week. This is a noteworthy feat, for these engines are the largest ever built at any L.M.S. locomotive works.

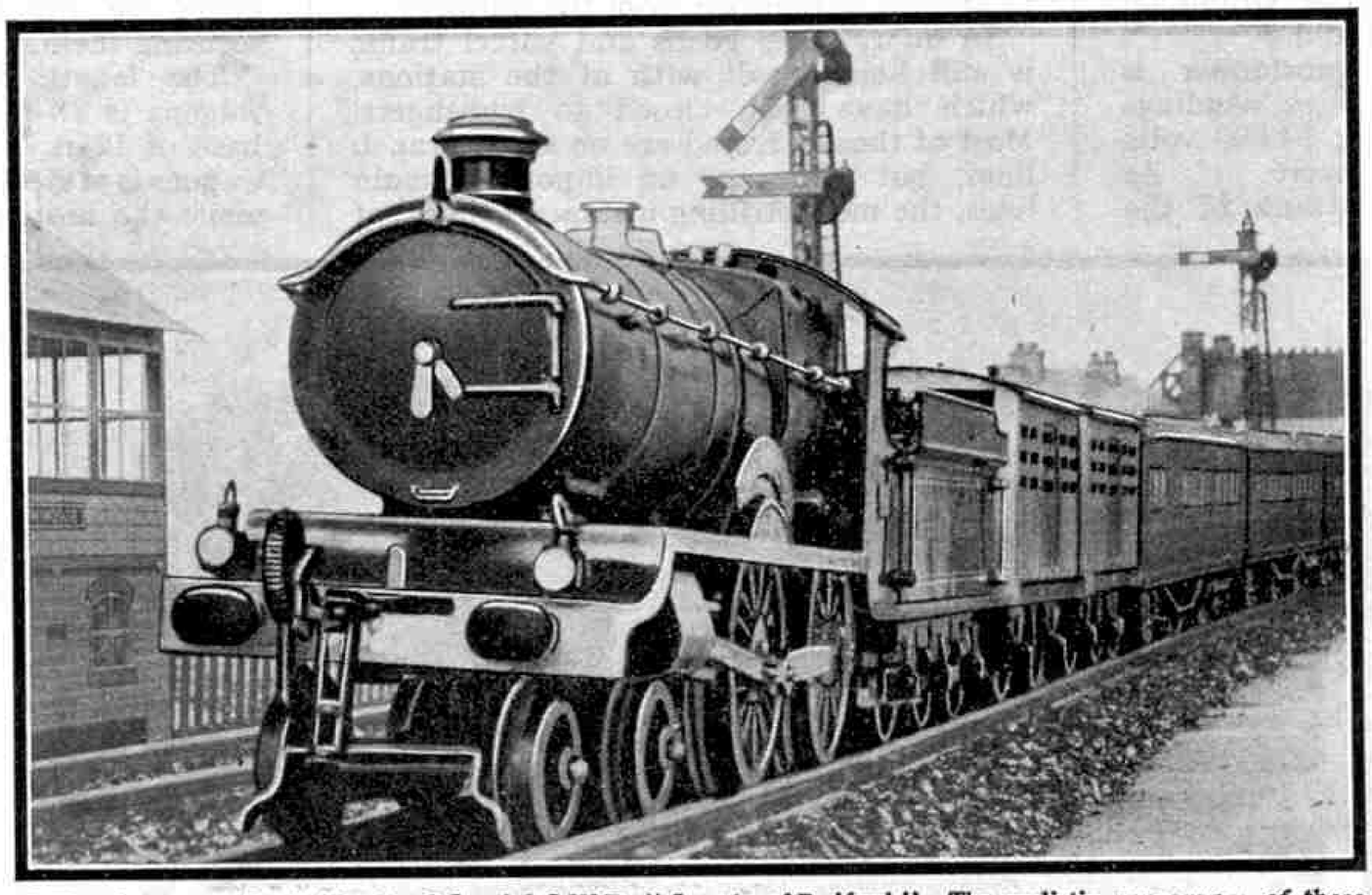
The last two engines, numbered 6168 and 6169, have been named *"The Girl Guide"* and *"The Boy Scout"* respectively. A further engine that has been named is No. 6156, *"The South Wales Borderer."* No. 6158 has been running fitted with an indicating shelter and has been working on *"The Royal Scot"* and other important expresses.

Additional 2–6–2 tank engines have now been put in hand at Derby works. The two "Claughtons" being rebuilt there as three-cylinder simples are nearing completion and their appearance is awaited with interest.

XXVI.—PLANNING LAYOUT EXTENSIONS

AT this period of the year we invariably receive a large number of queries from readers who already possess a Hornby Railway and are considering how best to extend it on railway-like principles. In past articles in this series we have indicated various schemes by which a simple layout may be converted into a larger one, and this month we propose to deal only with a few specially important points.

First of all we wish to warn model railway enthusiasts against being led into the mistake of thinking that the more complicated a layout becomes the better and more realistic it is. Generally speaking, an elaborate layout is more interesting than a simple one, but only so long as its various parts can be employed usefully. The officials in control of real railways plan and maintain their working arrangements on as simple a scale as possible, consistent with adequate handling of the traffic with which they have to deal. The same principle should be applied to model railways. It is no use adding branch lines and sidings simply because there happens to be room for them, unless they can be made to serve some practical purpose. On many occasions we have seen model stations that were well designed and a pleasure to operate, made almost impracticable by the addition of crossings and sidings that served no purpose and simply produced complications.



A Hornby express hauled by No. 2 Special G.W.R. "County of Bedford." The realistic appearance of these locomotives is well indicated.

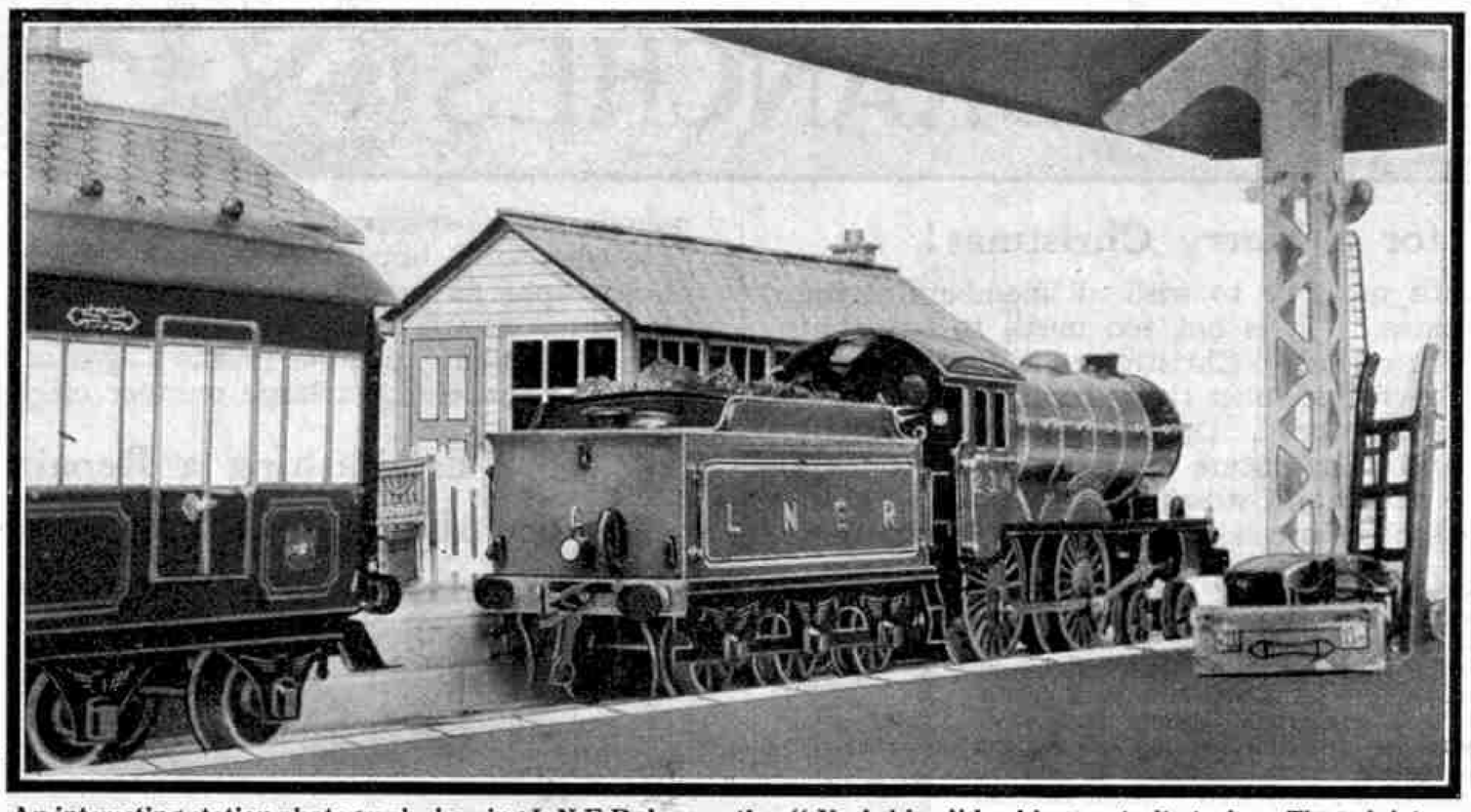
When a model layout becomes so complicated that it is troublesome and difficult to operate, it ceases to provide the fun that is the real basis of the model railway hobby. This is particularly the case in regard to station layouts. Such layouts can be developed on quite an elaborate scale provided the design follows a definite and railway-like plan. Without such a plan a large station layout is apt to result in hopeless confusion. We strongly advise all H.R.C. members who are dissatisfied with the working of their stations, or who wish to develop them on correct lines, to consult the H.R.C. Headquarters on the matter, giving as full a description as possible and, what is of even more importance, an accurate sketch. This sketch need be nothing more than the roughest of drawings, provided that it indicates clearly the plan of the layout.

A query that often arises is as to the respective merits of continuous and non-continuous layouts. It is impossible to give a general reply to this question, as so much depends upon circumstances. In the early stages of the hobby, and especially if only one locomotive is in use, a continuous layout is practically necessary. A non-continuous layout demands for success a fair number of points and cross-overs, and two or three locomotives. It also involves the use of two stations, unless the trains depart from and arrive at the same point; and two or more operators are usually required. Some model railway enthusiasts appear to regard continuous layouts as too elementary for their notice, but this is a great mistake. There is nothing more interesting than a continuous layout of good length, provided with a single large and well-designed station. This enables long runs to be varied by interesting engine movements carried out on real railway principles. Such a layout is of particular value in cases where there is as a rule only one operator. The main features of the layout are concentrated within his reach, and he is able to shunt, marshal and despatch his trains, and work most, if not all, the points and signals from one central position.

Perhaps the best plan of all is to arrange the layout so as to combine both the continuous and the non-continuous principles. Two terminal stations may be provided, with facilities for point to point working, and a continuous main line that may be traversed by trains as many times as desired. Layouts of this type were described and illustrated in the *"M.M."*

for May and October of this year.

Another point on which we are often consulted concerns the choice between clockwork and electric locomotives. Here again the answer depends upon individual requirements. As regards cost, electric locomotives, and electric rails and equipment generally, cost a little more than clockwork locomotives and track; and in addition there is the small cost of running an electric railway from accumulators or from alternating current house-lighting mains through a transformer. These drawbacks, however, are counterbalanced by many advantages, prominent among which are the possibility of controlling an electric railway from one central switchboard, and the practically unlimited length of run that may be obtained. For timetable working, particularly if this involves the running of several trains separated only by short intervals, clockwork locomotives are undoubtedly more suitable than the electric type. For all other purposes, however, the electric locomotive is either better than, or at least equal to, the clockwork locomotive.



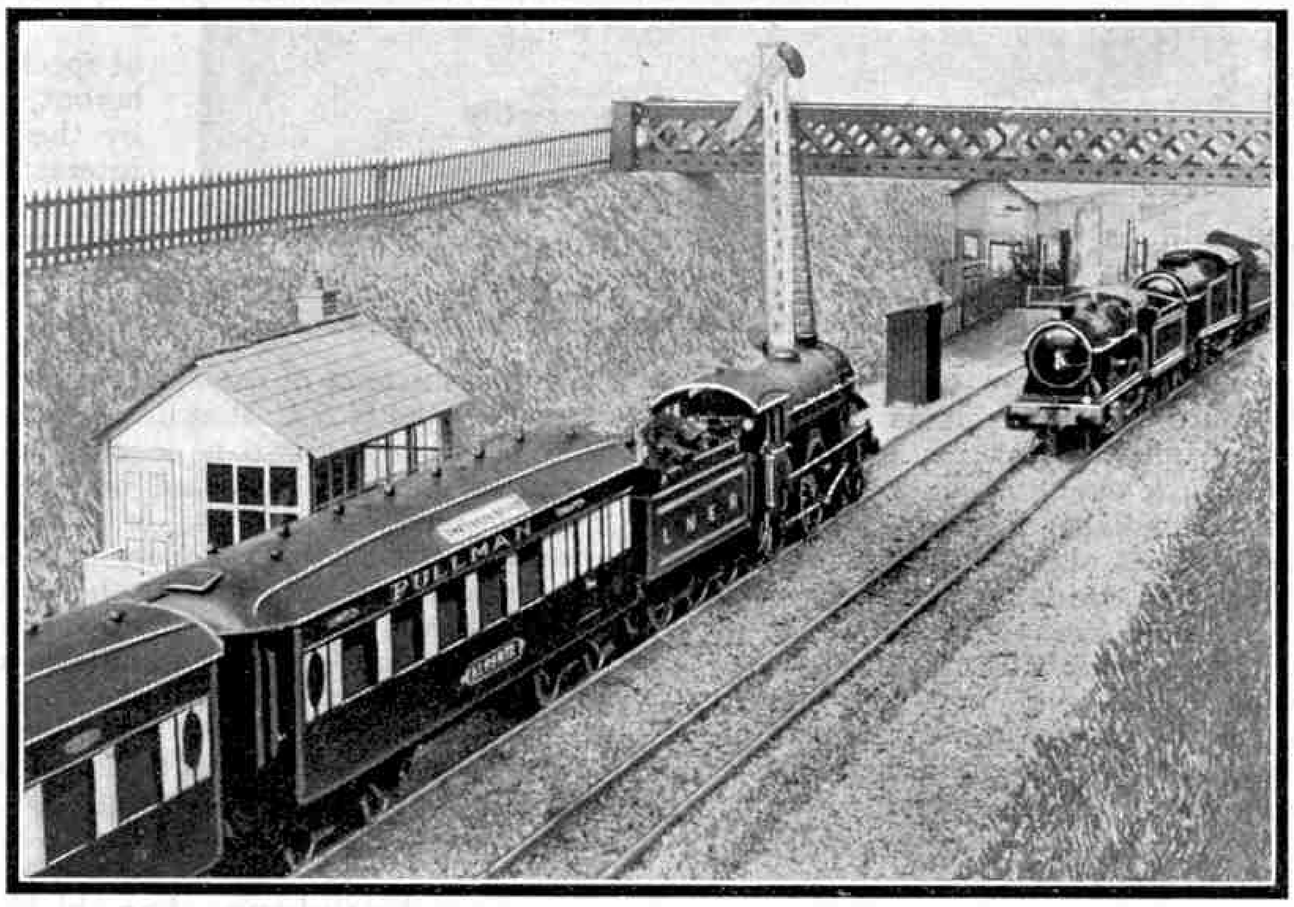
An interesting station photograph showing L.N.E.R. locomotive "Yorkshire" backing on to its train. The miniature platform accessories add greatly to the realistic appearance of the station.

It should not be overlooked also that a layout constructed of electrical track enables its owner to use either electric or clockwork locomotives as he desires; whereas electric locomotives cannot be run on the ordinary clockwork train track. Many of the most interesting model railways we have seen employ electric locomotives for general work, and replace them by clockwork locomotives when it is desired to indulge in a spell of timetable working.

There is now no difficulty in converting the standard Hornby track to electric track. The necessary third rail and insulators may be obtained quite cheaply, and are very easy to fit into position. H.R.C. members who are in any difficulty in regard to electrifying their track should submit their problems to H.R.C. Headquarters.

Before concluding this article we wish to draw attention to the fact that the Hornby Permanent Magnet type Electric Tank Locomotive cannot be driven from the mains supply through a transformer. It can only be run from 6-volt current from accumulators. All the other electric locomotives of the Hornby System can be run either from accumulators or from A.C. mains current through a suitable transformer. Another point to be remembered is that the Permanent Magnet type locomotive can be controlled entirely by means of a speed and reverse control switch outside the track; in other words it can be started, stopped, restarted, reversed, and speeded up or slowed down from the switch, without any necessity for handling. The other electric locomotives of the Hornby Series, on the other hand, can be started, stopped and regulated in speed from a resistance controller, but can be reversed only by the hand manipulation of a lever fitted in the cab.

Extensions and developments of a model railway layout are usually accompanied or followed by additions to the locomotives and rolling stock. With regard to the locomotives, there is a natural preference for those of the express passenger type. These are certainly necessary on a model railway, and they look very attractive; but it should be remembered that there are many duties to be performed that cannot well be carried out by a large tender locomotive. One or two small tanks are very convenient for purely shunting purposes, but there should be, if possible, at least one engine of what may be described as a "general purposes" type. These engines can undertake successfully almost any kind of work, ranging from goods shunting to the hauling of express freight and even passenger trains. One of the most suitable engines for such all-round duties is the Hornby No. 1 Special Tender locomotive. This engine has the necessary hauling power and length of run for working goods trains, while at the same time it is speedy enough for passenger train work.



A Hornby wayside station situated in a cutting, showing the "Queen of Scots" Pullman express hauled by a Hornby "Shire" passing through, and a "double-headed" goods train approaching in the opposite direction.

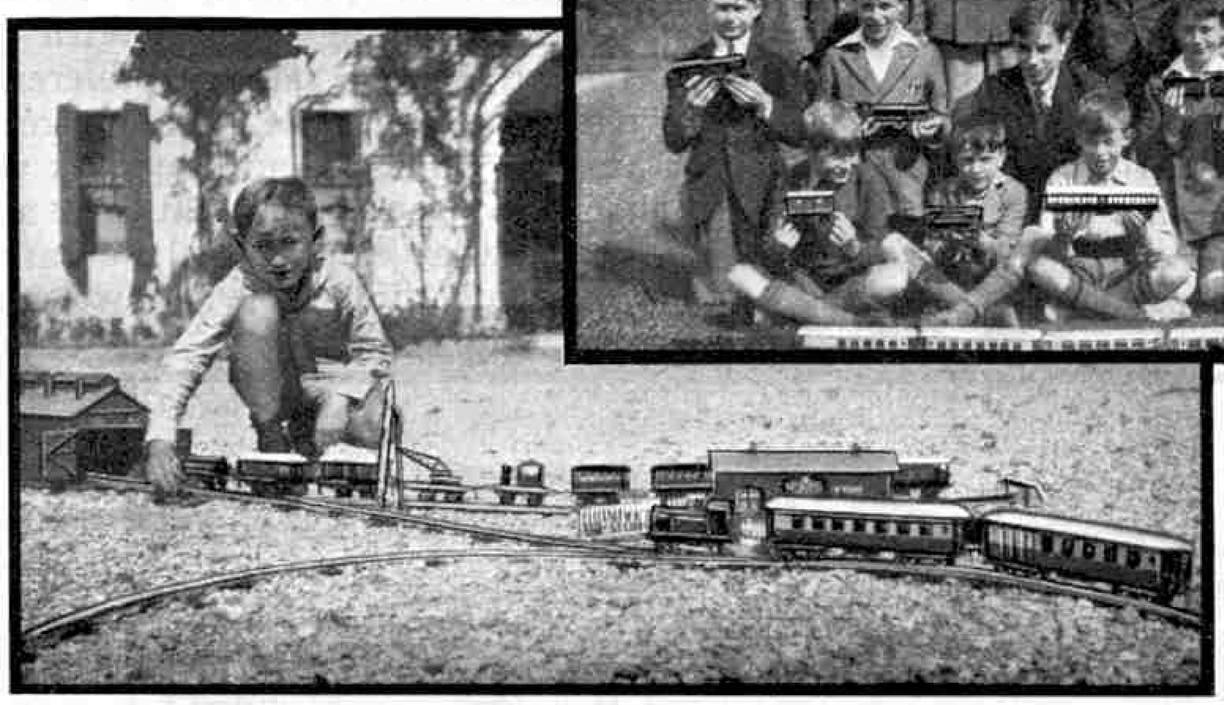
Finally we wish to remind model railway owners that it is not wise to concentrate too much on passenger train operation. Goods train working is quite as interesting in every respect, and certainly provides greater variety, both in the rolling stock employed and in methods of operation.

Best Wishes for a Merry Christmas!

My first task this month must be to wish all members of the H.R.C. "A Merry Christmas." It is not too much to say that model railway owners look forward to Christmas with even keener interest than most boys, for in December theirs becomes one of the most discussed hobbies in the world. During that month bright and comprehensive displays of miniature locomotives and rolling stock may be seen in the shops and stores, and for weeks before Christmas most H.R.C. members are busily engaged in comparing the merits of the latest introductions in the Hornby Series, or in planning additions to their own layouts.

During the coming season activities in the Branches promise to be greater than ever. During 1930 membership of the H.R.C. has increased by leaps and bounds, and today there are nearly 20,000 members, an increase of about 9,000 in less than a year. A very satisfactory number of new Branches also have been formed and all these are composed of keen and enthusiastic miniature railway enthusiasts. From the reports of coming events that have reached me, I find that in many of them arrangements have been made for special meetings during the holidays, when members will have splendid opportunities of getting good practice in shunting, signalling and other branches of track operation. Advantage is also being taken of the extra time available to arrange visits to goods yards, stations and locomotive sheds, and the holidays promise to be fruitful in new ideas for effective working on Branch layouts.

(Right) Members of the West Kent Branch, No. 114. Branch Chairman, Mr. H. Cooke; Secretary, F. R. Dubery. Members of this Branch are very keen and pay careful attention to such details of their permanent layout as correct signalling and the lighting of stations and goods yards. (Below) A Hornby Railway in Sunny Italy. Count Luciano Cattaneo (H.R.C. No. 17804) of Udine, Italy, busily engaged in shunting on his outdoor layout.



The social side of the work of local Branches should not be overlooked. At least one evening during the holiday season should be devoted to enjoyment of this kind, and with games, songs and refreshments—good things to eat are very important, of course!—a merry time may be spent by all members of Branches and any friends whom they may invite to join them.

Festive Photographs

Social Evenings of this kind give splendid opportunities for taking photographs of officials and members. At present practically all the photographs that I receive either show serious work on Branch layouts in progress, or have been taken on visits by members to locomotive sheds and other places of railway interest. These are splendid and I hope that officials of clubs who have not yet forwarded such photographs will not hesitate to do so as soon as possible. But in addition, I should like to see photographic proof of the capacity of members of the H.R.C. to enjoy themselves. Taking photographs of this kind usually involves working by flashlight, but this is not particularly difficult and the novelty of posing the members almost invariably adds greatly to the hilarity of the proceedings. I hope that efforts will be made to secure good photographs as permanent records of the festivities of the 1930 Christmas season. I should certainly like to reproduce any that appear specially suitable in the pages of the "*M.M.*" and look forward to receiving a large number of efforts of this kind.

Establishing a Repair Depôt

Many local Branches of the H.R.C. already work in close association with Meccano clubs established in the same district, and often a large proportion of the members of one of these organisations have also joined the other. I am always pleased to hear of such alliances, for there are many ways in which members of a Meccano club and their comrades of the H.R.C. may be helpful to each other. For example, the former may construct splendid models of bridges, viaducts, or signals of special types for use on the Branch layout, and their trouble is well repaid by the opportunities they obtain for interesting and original model-building, or by the introduction into their own programmes of novel railway engineering evenings, in the organisation of which H.R.C. members may give very useful assistance.

In one instance of the association of a Meccano club with a local Branch of the H.R.C. that has been brought to my notice, co-operation between the two is so close that the Meccano club is now regarded as the repair and maintenance depôt of the miniature railway organisation, and is usually called "Swindon" by the members of both. This opens up new possibilities, and I feel sure that officials of clubs and Branches in many parts of the country will be quick to see the advantage of close alliance of this kind. Certain Branches may be unable to adopt this plan, of course, but even where there is no suitable Meccano club it is an excellent idea to form a separate section for the express purpose of acting as the engineering department of the Branch railway organisation. Little difficulty should be experienced in providing the sidings and branch lines necessary for its operation.

Envelopes for H.R.C. Notepaper

The special notepaper that has been introduced for the use of members of the H.R.C. has proved exceedingly popular, and the buff sheets of paper with their attractive heading have now become familiar in many parts of the world. I am pleased to be able to announce that envelopes of the same paper are now obtainable. These are of the useful square pattern and may be used in conjunction with H.R.C. writing pads of both sizes. The price of the envelopes is 8d. for 50, post free, and they may be obtained direct from Headquarters.

I may remind members that writing pads of two sizes are available. These are sold at 6d. and 1/- each post free, respectively.

Branch Notes

CHURCHILL (OXFORD).—The Chairman has presented a large scale model goods depot constructed by himself, and a new station is being built for use on the layout in order to allow the inclusion of four lines of traffic. Members are constructing cardboard scale models of locomotives of the L.M.S. "Royal Scot" class, and model rolling stock of G.W.R. pattern also is being built. The Churchill M.C. has become a repair and maintenance depot of the Branch, and is now usually referred to as "Swindon." Two interesting talks on "*Modern Locomotives*" have been given by the Chairman. Secretary: R. Blake, The Forge, Churchill, Oxford.

HADFIELD (SPRING BANK).—Members visited the goods yard at Gamesley Bridge, and also Old Dinting, on the L.N.E.R. route from Manchester to Penistone, in order to inspect the alterations that are being carried out. They were greatly interested in the new main line that is being constructed and in the sidings that are to be electrically controlled from signal boxes at Old Dinting and Mottram. Secretary: A. Aldous, 1, Marlow Street, Hadfield, Manchester.

NORTH BIRMINGHAM.—This Branch was opened by Mr. Rice, an official of the L.M.S. A friend of the Chairman, who also has an official railway appointment, gave an interesting lecture on locomotives and railway engineering as a career, afterwards presenting scale diagrams of interesting locomotives. The opening meeting ended with a display of Fireworks. Secretary: C. E. C. Walker, St. Mary's Vicarage, Aston Brook, Birmingham.

LYTHAM (CENTRAL).—A permanent track has been laid on shelves supported on trestles and wall brackets. This has been carefully planned in order to give opportunities for complicated operations. The main line is double track throughout and goods yards having six or seven roads are to be included. Cork chippings have been used as ballast. Secretary: F. Lucas, 2, Church Road, Lytham, Lancs.

EXHALL.—The permanent track for use during the winter sessions is of the non-continuous type and has two termini and one through station. Signals are given by red and green lights controlled from the central point. A special feature is being made of Lantern Lectures on railway subjects. Secretary: M. Melville, The Vicarage, Exhall, Nr. Coventry.

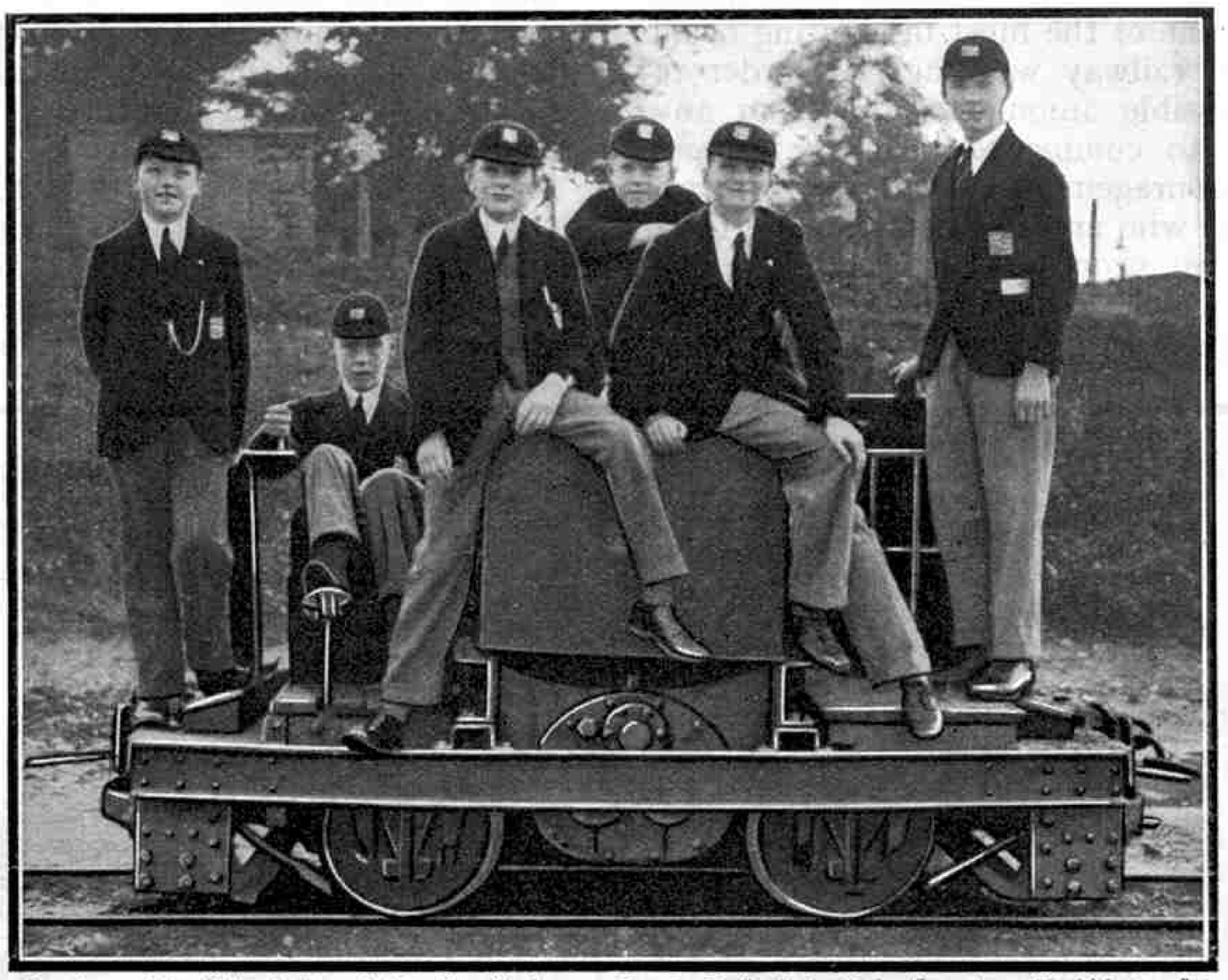
BLACKPOOL (NORTHERN SECTION).—At a recent meeting two goods trains collided during track work. This was a splendid opportunity for interesting operations. Breakdown gangs were immediately rushed to the scene and engines and trucks were replaced on the line without being touched by hand. Tests of hauling power were carried out with G.W.R. and L.M.S. tank engines, the G.W.R. locomotive proving the more powerful. Secretary: A. Ian Howarth, 19, Westcliffe Drive, Layton, Blackpool.

WOODFORD.—At an interesting Exhibition the Branch track was operated strictly in accordance with a timetable. Afterwards the miniature railway was dismantled and new designs for a layout are being submitted by members in competition with each other. Secretary: J. H. Skelt, "Walberswick," Woodside Road, Woodford Wells.

CHINGFORD.—A room in a café has been secured and an extensive layout is now operated. At the first meeting in the new Branch room trials of the locomotives with rolling stock of various types behind them were made in order to enable a suitable timetable to be constructed. A series of locomotive races were arranged, and for entry in these so many members brought engines that it was necessary to run the events in heats. The winner of the final tie was a Hornby No. 1 Tank Locomotive that covered 15 ft. in five seconds. Secretary: D. G. Tucker, 31, Frederica Road, Chingford, E.4.

WEST NORWOOD.—Members recently spent an interesting morning in the Science Museum, South Kensington, and afterwards "prowled around" Victoria Station. Euston also has been visited. There the members saw the departure of the "*Mancunian*" in two portions headed by No. 6142, "*Lion*," one of the "Royal Scot" class and No. 5972, a re-boilered "Claughton," respectively. The arrival of an express from Carlisle drawn by No. 6102, "*Black Watch*" also was witnessed. Secretary: G. W. Allison, 81, Stradella Road, Herne Hill, London, S.E.24.

KING'S HEATH.—Locomotives and rolling stock have been thoroughly overhauled. New signals have been obtained and these have been fitted for control, a member having made a lever frame to work in conjunction with the Hornby Control System. Another member visited Liverpool during Railway Centenary week, and his report has led to keen debates. Secretary: K. Icke, 65, Livingstone Rd., King's Heath, Birmingham.



Members of the Solihull Branch No. 45: Chairman, Mrs. L. E. Caulkin, M.A.; Secretary, H. Aitken. In our photograph they are seen enjoying a trip on a petrol locomotive during a visit to Solihull (G.W.R.) Station. This locomotive is used for hauling material required during the erection of new station buildings, and the progress of the work has been keenly watched by members of the Branch.

Further Branches in Course of Formation

The following new Branches of the Hornby Railway Company are at present in process of formation and any boys who are interested and desirous of linking up with this unique organisation should communicate with the promoters, whose names and addresses are given here. All owners of Hornby trains or accessories are eligible for membership and the various secretaries will be pleased to extend a warm welcome to all who send in their applications:—

BARNARD CASTLE—R. E. Trotter, Raby Avenue, Barnard Castle, Co. Durham.

BIRMINGHAM—Ian K. H. Cooke, 165, Hole Lane, Northfield, Birmingham.

COBHAM—P. B. Brown, "Feltonfleet," Cobham, Surrey.

CUMBERLAND—L. C. Robson, "Beech House," St. Bees, Cumberland.

FALMOUTH—E. Brown, "Belgrano," Landsdowne Road, Falmouth.

HUDDERSFIELD—A. F. Roper, 116, Ravensknowle Road, Dalton, Huddersfield.

LEAMINGTON SPA.—V. Letts, 11, Leam Street, Leamington Spa, Warwickshire.

LEICESTER—H. S. Bevans, "Gracedieu," Bankhart Avenue, Leicester.

LONDON, S.E.22.—I. C. Fletcher, 166, Woodwarde Road, East Dulwich, London, S.E.22.

SUTTON—A. Shaw, 17, Downside Road, Sutton, Surrey.

SWINDON—Mr. W. Cowlishaw, 18, Holbrook Street, Swindon,

TRURO—A. G. Prince, 9, Courtney Road, Hendra, Truro, Cornwall.

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MEMBERS OF THE H.R.C. ARE ENTITLED TO WEAR THIS BADGE WHICH IS BEAUTIFULLY ENAMELLED IN COLOURS

Hornby Railway Company

JUNIOR SECTION

XXIV.—Commencing the Model Railway Hobby

MEMBERS OF THE H.R.C. ARE ENTITLED TO WEAR THIS BADGE WHICH IS BEAUTIFULLY ENAMELLED IN COLOURS

WITHIN the next few weeks large numbers of boys will become for the first time owners of one or other of the Hornby Train Sets. In other words they will be taking up one of the most fascinating of all hobbies, that of model railway working. In order to obtain the greatest possible amount of fun from any hobby it is necessary to commence it in the proper way and thus avoid discouragement and disappointment. In order to help readers who are now commencing their model railway career we propose this month to give a few general hints, which, if followed out, will set the young enthusiast on the right road to success.

The first step after unpacking the set and making sure that it contains all that it should do, is to lay down the track. If a large enough table is available this forms a splendid foundation for the railway; but in most cases the floor has to be utilised. It makes little difference whether the floor is covered with carpet or linoleum, although the hard surface of the latter has certain advantages. If at all possible, however, the track should not be laid partly on linoleum and partly on carpet, or over mats or rugs, because the uneven level thus produced interferes considerably with the running of the trains. In joining up the rails care should be taken to see that the spike at the end of each one is pushed well home into the socket of the next, and finally that the connecting plates are inserted correctly between the sleepers of adjoining rails. The correct method of inserting the connecting plates is shown in Fig. A. One other important point to be noted concerns the sleepers. These are made higher at one end than the other so that on curves the outer rail is slightly higher than the inner one. This "banking," as it is called, plays an important part on all railways, its object being to prevent trains from becoming derailed when running at high speed on curves. Before attempting to fix the track finally in position, care should be taken that all the rails have their sleepers sloping in the same direction. New rails are sometimes apt to be a little awkward to manipulate, but difficulty of this kind will disappear when the track has been laid down two or three times.

If the running of the trains is not satisfactory the trouble may be due to a rail that has accidentally been forced out of shape. In such a case the track should be carefully tested with the back of the winding key, which forms a rail gauge. The key should be slid round the track as shown in Fig. C, and the defective place will be found immediately. The rail that is causing the trouble should then be gently pressed back into shape, using as little force as possible.

A realistic station layout on a Hornby Railway. The Pullman express is hauled by a G.W.R. No. 2 Special Locomotive of the G.W.R. "County" Class.

When the track has been laid the locomotive and its train should be looked over to make sure that everything is in order. All wheels should turn quite freely, and couplings should swivel easily. A drop of oil should be placed on each axle, and the various moving parts of the locomotive also should be lubricated as shown in Fig. B. It is important to use suitable oil for this purpose. If the oil is too thick the engine will quickly become clogged with a mixture of oil and dust and will run sluggishly. The only remedy in such a case is to wash the mechanism clean with petrol or paraffin and afterwards lubricate with suitable oil. The specially prepared Meccano oil is exactly right for this purpose and should be used whenever possible. If a bottle of this oil is not available at the moment, however, ordinary sewing machine oil provides a very good substitute.

It should be remembered that a new locomotive never runs at its best. All new machines require to be used for some time, with regular oiling, before they arrive at the condition known as being "run in." With proper use, therefore, a Hornby locomotive should improve after a time in both speed and hauling power.

Beginners are often worried about over-winding their clockwork motors and thus breaking the spring. There is

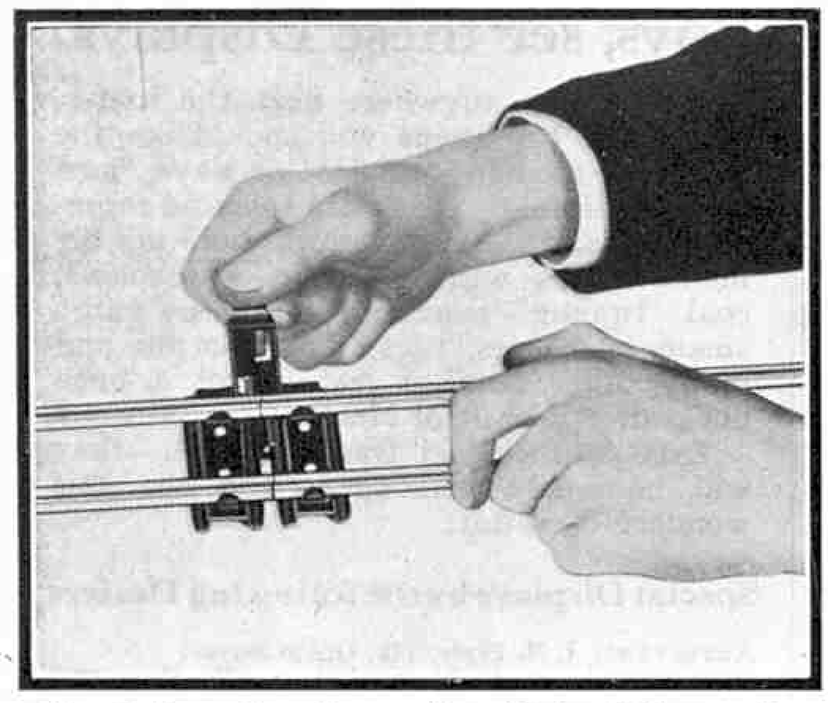

Fig. A. Inserting Connecting Plates between the sleepers of adjacent rails.

practically no danger of this with Hornby locomotives, owing to their splendid design and solid construction; but at the same time no clockwork motor will stand persistent over-winding. The best method is to wind up the motor slowly and carefully, counting each turn until it is felt to be fully wound; and then to make a practice of giving one turn less than the maximum. It should be remembered that clockwork locomotives should never be pushed backwards and forwards along the track when the motor is unwound, for this is very likely to cause the spring to become detached from the winding spindle.

It is rather tempting sometimes to hold an engine upside down and after winding it up allow the wheels to whirr round at full speed. This is bad for the engine, however, and the only occasions on which it should be done are immediately after lubrication, so as to distribute the oil thoroughly, and when the clockwork is being allowed to run down before the engine is put away after use.

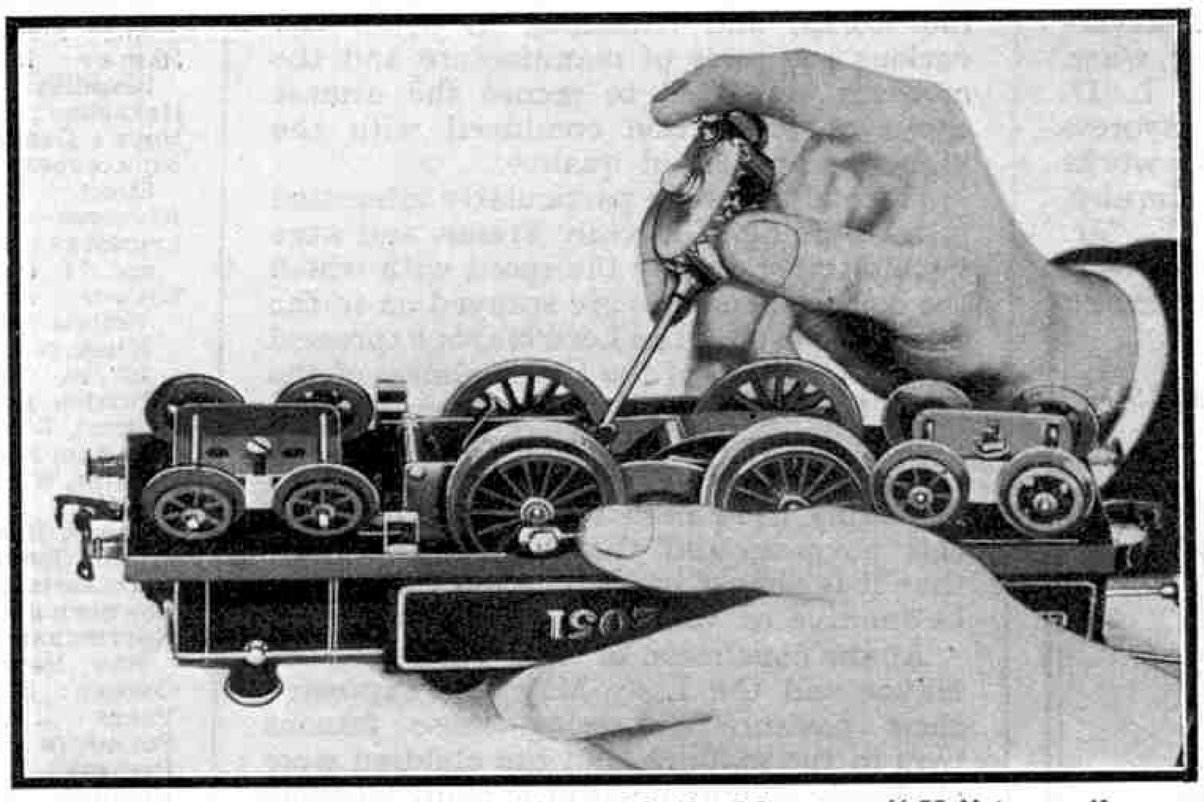

Fig. B. Oiling a Hornby locomotive with the Meccano "K" type oil can.

If the Hornby locomotive is of the reversing type it will have two levers fitted inside the cab. The one on the right-hand side of the cab looking from the rear towards the front of the engine operates the reversing gear, and the lever on the left-hand side operates the brake. It is a good idea to hold the engine upside down in the hand and note the effect of operating these levers. These levers are quite easy to use, the only point to be remembered is that they should always be pushed fully in or pulled fully out. This is of particular importance in the case of the reversing lever, for any attempt to run the engine with this lever only half in may result in serious damage to the gears.

Braking and reversing may also be carried out by means of the Hornby Brake and Reverse rail. This rail is a block of metal or "ramp" that may be moved across from side to side by means of a lever to which it is attached. This ramp is so designed as to engage with trip pieces projecting downward from the motion of the locomotive. It has three normal positions, in the centre of the track or close against either of the rails. When it is in the centre it is in the neutral position, and it has no effect upon locomotives passing over it in either direction. On the other hand if the ramp is pulled over close to one or other of the rails it either brakes or reverses a locomotive according to the direction in which this is travelling. Change of direction of the locomotive changes the effect of the ramp, so that if this brakes a locomotive running one way it will reverse it when running in the opposite direction. After reversing or braking from the track by means of this special rail the mechanism of the engine may be restored to its original condition by operating one or other of the levers in the cab. The brake and reverse rail adds greatly to the interest of a layout by enabling us to control our engines to a large extent by mechanical means without the necessity of un-railwaylike handling.

When the operations of winding, braking and reversing have become quite familiar there will be no difficulty in running and controlling the complete train. A great deal of fun may now be obtained by commencing a series of tests of the speed, hauling power, and length of run of our locomotives. If more than one engine is available, there is, of course, more variety. For tests of this kind the engine and train, or the engine alone, should be started from the same place every time, and the clockwork motor should be wound up to the same extent. Different lengths of train and different loads should be tried, and notes made of the distance run and of the time taken. Tests should be made also with the locomotive in reverse gear. By keeping a record of the distance an engine will haul a train when wound up, by giving a certain number of turns of the key we can arrange matters so that the train will make a certain number of circuits of the track and then come to a standstill realistically in a station. With a little care and experience it is surprising how accurately this can be done.

Accurate stopping in a station adds very greatly to the effect of operating a train, as it appears as though a miniature driver were actually in charge on the footplate of the locomotive. With this end in view it is worth while taking a considerable amount of trouble to find out exactly the distance that a locomotive will run, not only when hauling a train of a certain weight, but also without any load at all. As the result of a sufficient number of careful trials it is possible to make an engine carry out shunting movements with really surprising accuracy. It is particularly fascinating to watch an engine back on to its train in a station before commencing a journey, and come to rest with the buffers lightly in contact with each other.

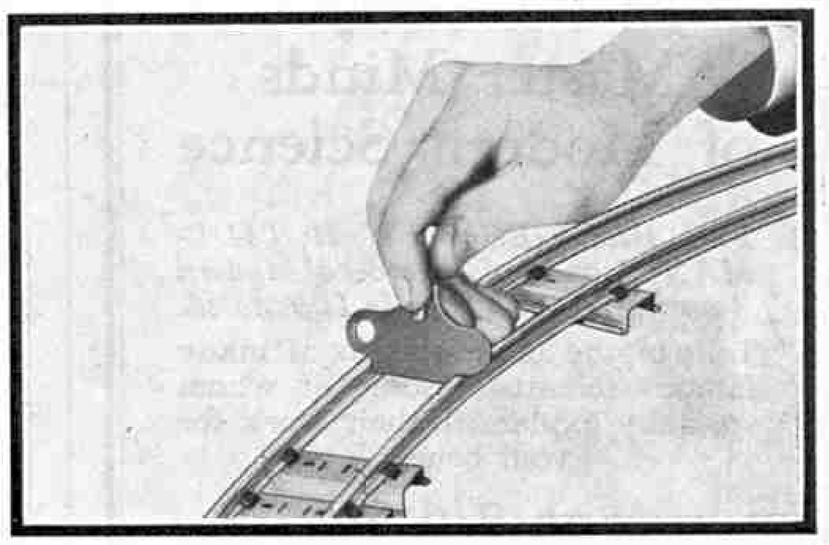

Fig. C. The Hornby key used as a rail gauge.

Lord Mayor of Liverpool Visits Meccano Factory

The long list of distinguished visitors to the Meccano Factory, Binns Road, Liverpool, was added to on 5th November, when the Lord Mayor of Liverpool, Mr. L. D. Holt, accompanied by the Lady Mayoress and their two children, arrived at the works and were met by Mr. Frank Hornby, Managing Director of Meccano Ltd. Mr. Hornby himself conducted the party over the works, and explained in detail the various processes of manufacture and the methods employed to secure the utmost speed of production combined with the highest standard of quality.

The children were particularly interested in the making of Hornby Trains, and were visibly impressed by the speed with which the coloured enamels are sprayed on to the different parts. The Lord Mayor expressed his appreciation of the thoroughness of the tests through which every train has to pass before it is allowed to proceed to the Packing Department. Ingenious methods of testing have been specially devised for this purpose, and they are so searching that it is almost impossible for a defective locomotive or vehicle to escape detection.

At the conclusion of their visit the Lord Mayor and the Lady Mayoress expressed their pleasure at seeing these famous toys in the making, and the children were obviously delighted with the many wonders of this unique factory.

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The Boy Electrician

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HARRAP

Binding the "M.M."

Binding cases for back numbers of the Magazine are supplied by Messrs. O. H, Bateman and Co., 23, Hanover Street. Liverpool. These cases are supplied in two sizes (1) for six copies, price 3/6 and (2) for twelve copies, price 5/3 post free in each case. The case is tastefully embossed in gold with the name "Meccano Magazine," and on the back is the name and volume number.

These binding cases are supplied so that readers may have their Magazines bound locally, but where desired, the firm mentioned above will bind Meccano Magazines at a charge of 6/6 for six issues or 8/6 for twelve issues, including the cost of the binding and also return carriage. The covers of the Magazines may be included or omitted, but in the absence of instructions to the contrary they will be included.

Readers desiring to have their Magazines bound need only make a strong parcel of them, include a note of their name and address together with the necessary remittance, and send the parcel direct to Messrs. O. H. Bateman and Co., carriage paid.

Boys, see these Displays!

If you live anywhere near the undermentioned toy shops you should see the Meccano model Dockside displays, now being exhibited. They are splendid representations of the real thing—there are big model docks with Meccano warehouses, coal tipping machines, cranes, cargo steamers, barges, tugs, motor lorries and many other familiar features of a busy dockside, all built of Meccano.

Take Mother and Dad with you—they will be easily persuaded—and see this wonderful exhibit.

Special Displays by the following Dealers

ABERDEEN: J. N. Piper, 118, Union Street.
BELFAST: J. Robb & Co. Ltd., Castle Place and Lombard Street.
BIRMINGHAM: W. H. Hull & Son, 4 & 5, North Western Arcade.
BOURNEMOUTH: Brights Stores Ltd., 14/26, Old Christchurch Road.
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ENFIELD: Howards (Enfield) Ltd., 72/4, Chase Side and 31, Church Street.
EXETER: Devon & Somerset Stores Ltd., 245, High Street.
GLASGOW: R. Wylie Hill & Co. Ltd., 20, Buchanan Street.
GLOUCESTER: Bon Marche (Gloucester) Ltd., 38/42, Northgate Street.
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HANLEY: John Pepper's Stores (Hanley) Ltd., 63/5, Piccadilly.
HEREFORD: Greenlands Ltd., 30/35, Hightown.
HOVE: Gamleys Ltd., 78, Church Road.
KILMARNOCK: Hugh Lauder & Co. Ltd., 45/55, King Street.
KINGSTON-ON-THAMES: Bentalls Ltd., Clarence Street.
LEICESTER: Leicester Sports Ltd., 35, Belvoir Street and 74, High Street.
LONDON: Army & Navy Co-op. Society Ltd., 105, Victoria Street, S.W.1; John Barker & Co. Ltd., Kensington High Street; Benetfink & Co. Ltd., 107/10, Cheapside, E.C.2; Bon Marche Ltd., Brixton Road, S.W.9; F. C. Cabeldu, 371, High Street, Lewisham, S.E.13; W. F. Chapman, 225, Balham High Road, S.W.17; Gamages Ltd., Oxford Street, W.1; Harrods Ltd., 87/135, Brompton Road, S.W.1; The Arundel Cycle & Sports Stores, 52, Church Road, Upper Norwood, S.E.19.; Whiteleys Ltd., Queens Road, Bayswater, W.2.
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SOUTHAMPTON: Osborn & Co. (Southampton) Ltd., 9, High Street.
SOUTHSEA: Handleys (1927) Ltd., Palmerston Road.
SUNDERLAND: Saxons (Sunderland) Ltd., 29, Holmeside.
TORQUAY: G. W. Bradshaw, 58, Union Street.
TROWBRIDGE: Wards Library, 11, Church Walk.
WATFORD: Lloyd Cooper & Co., High Street and 61, Queens Road.
WEYMOUTH: T. J. Guppy & Son, 16, St. Edmund Street.

Free Diaries for "M.M." Readers

A visit to a well-equipped sports and toy shop is always a thrilling event, and during this month "*M.M.*" readers who live within reach of any Spalding Sport Shop have the opportunity of combining this thrill with the winning of a splendid Letts' diary. All that has to be done after visiting the shop is to write your impressions of it on a postcard, also stating which sport or pastime you like best. Five hundred diaries are to be won by the senders of the most interesting postcards, and there is a consolation prize for every unsuccessful competitor. Details of this offer will be found in the Spalding advertisement on page 1015.

MECCANO WRITING PADS are supplied in two sizes, each consisting of 50 printed sheets of tinted paper with cover. Prices—Large, 1/- each, and small, 6d. each (post free), from Meccano Ltd., Old Swan, Liverpool.

IMPROVEMENTS TO LOCOMOTIVE AXLES.—Since we have not experienced any trouble with the driving axles on our engines, we do not see that thicker axles would be much advantage. The axles fitted at present are strong enough for the purpose, giving every satisfaction, and it requires a considerable strain to bend them. Your other suggestion for the wheel-seats to be made square to prevent the wheels from becoming loose is extremely interesting, and though we cannot see any likelihood of this being done in the near future, the idea will receive careful consideration. (*Reply to F. Watson, Manchester*).

HALF AND QUARTER RAILS.—We have now found it possible to pack the half and quarter rails in boxes. They are packed in half-dozens, and supplied with a packet of rail connecting plates. All Hornby Railway enthusiasts will welcome this improvement for it provides a protection for these useful little rails which hitherto have been sold loosely. They are, of course, sold at the same price. (*Reply to W. S. Davies, St. Helens, Lancs.*).

LOWER BUFFER STOPS.—We feel that you will be pleased to know that the height from rail level to the buffers on the buffer beam of the No. 2 Hydraulic Buffer Stops and on the No. 1 Spring Buffer Stops has been made standard with the buffer height on all our newest patterns of rolling stock. An arrangement of pivoted trucks might possibly be devised. (*Reply to J. G. Chislehurst, Northampton*).

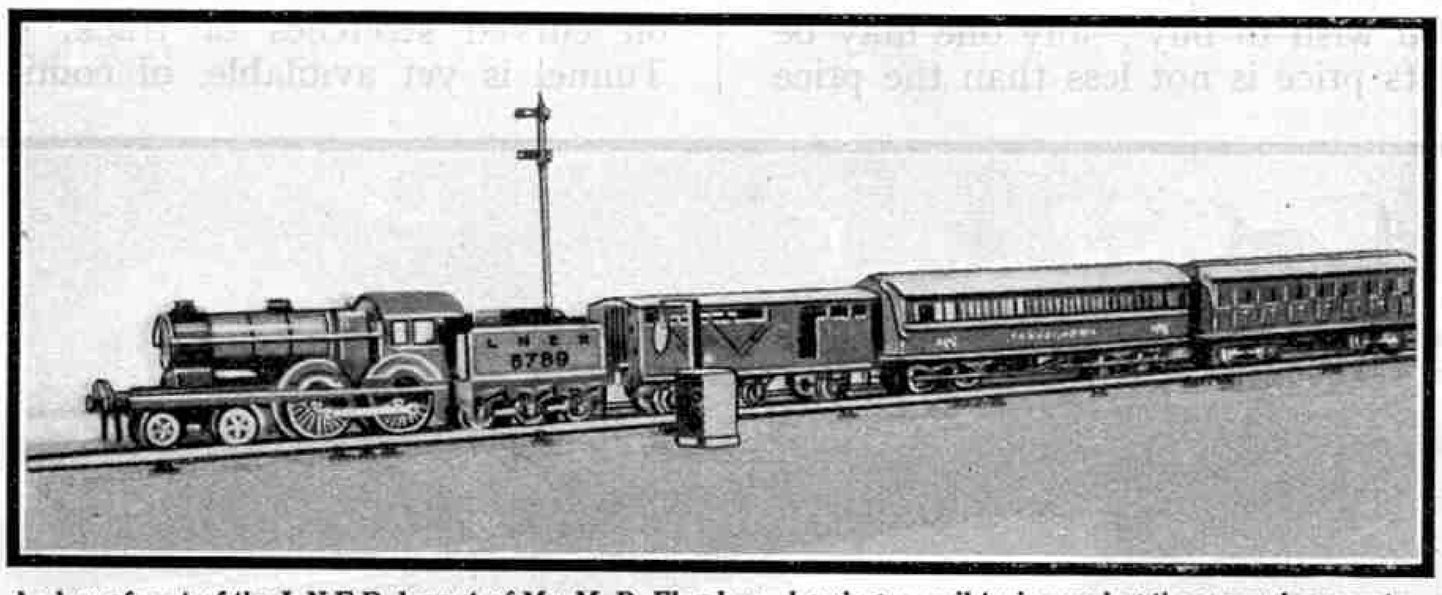
ELECTRIC No. 1 SPECIAL TANK ENGINE.—Your idea for using a No. 3 Electric mechanism in a No. 1 Special Tank engine is extremely interesting and is being kept before us for future reference. Should we think that such a locomotive would prove sufficiently popular if introduced, an announcement will appear in these pages. Meantime we think you will be interested in the new No. 2 Electric Tank Locomotive. This is new this season and was illustrated and described in the "*M.M.*" for October last. (*Reply to B. Waterlow, Birmingham*).

WALSCHAERTS VALVE GEAR.—We are afraid that a reproduction of the Gresley-Walschaerts valve gear cannot be put on the model "Shire" locomotives on account of the high cost of manufacture and fitting. The necessarily increased price for an engine so fitted would tend to make the locomotive less popular, although no doubt would improve it in appearance. (*Reply to K. Lowther, Edinburgh*).

"EASTERN BELLE" TRAIN SET.—We agree that the adoption of your proposal would prove popular especially in the Eastern Counties. The standard Hornby Pullmans could be used appropriately fitted with name boards, and as the present No. 2 Special L.N.E.R. tender is suitable, the question hinges on the manufacture of a 4-6-0 locomotive of the "Sandringham" class. These will be carefully considered when fresh locomotives are next proposed. Meanwhile the present "Yorkshire" locomotive and corresponding train set may be employed. (*Reply to S. Green, Colchester*).

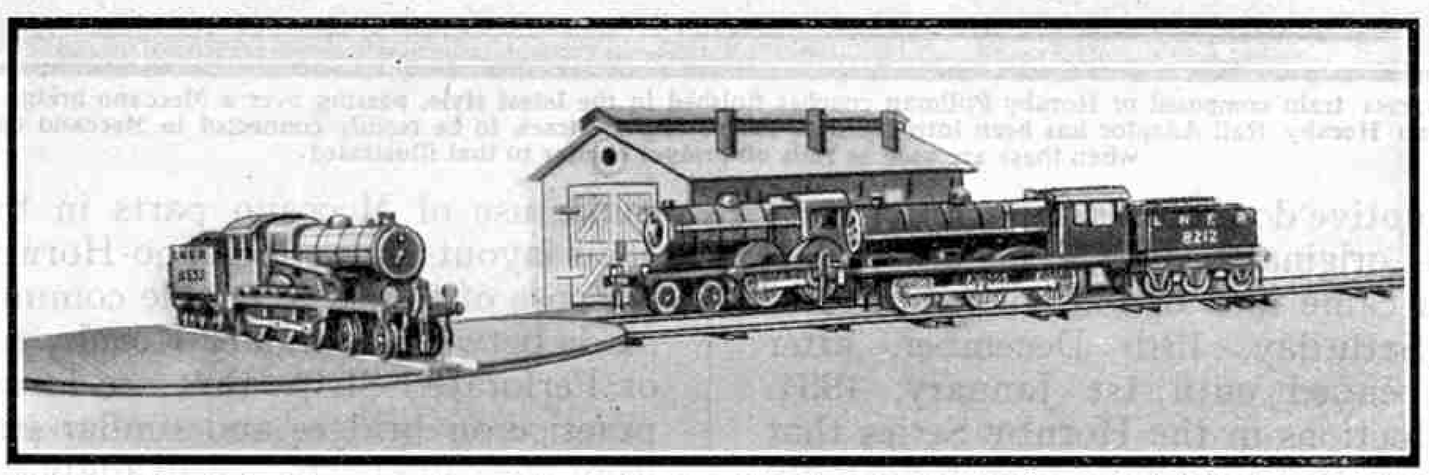
MINIATURE CATTLE PEN.—We agree that a cattle pen would form an interesting addition to the Hornby Series and we may introduce such an accessory before long. It would certainly add to the realistic appearance of a model goods yard, especially when occupied by miniature livestock. (*Reply to R. Wharton, Rugby*).

METHOD OF EXTENDING TUNNELS.—We are interested in your suggestion that the Hornby Tunnel should be designed in such a manner that several may be joined together to form a long tunnel. The necessity for this does not now arise, as Tunnel Ends are available at 2/9 per pair. With these a tunnel of any desired length may be constructed, as explained on page 723 of the September "*M.M.*," and in addition one may be built to cover a curved portion of the line. (*Reply to P. Jerome, Knebworth*).



A view of part of the L.N.E.R. layout of Mr. M. B. Flanders, showing a mail train passing the ground apparatus. The locomotive hauling the train is a miniature reproduction in cardboard of a G.E.R. Section "Super-Claud" class locomotive. A full description of the layout was given in the "M.M.," May 1929 issue.

FLAT-BOTTOMED RAILS.—Although rails of this pattern are widely used in America and on the Continent, the usual form of construction for British permanent way is to support bull-head rails in chairs. Hornby Rails are of the bull-head type, and in view of the satisfactory results obtained with our track we do not think it necessary or desirable to effect a change in the design. We do not supply separate parts for track, for few miniature railway owners have facilities for clamping these together securely. (*Reply to T. Farrar, Dundee*).



The locomotive shed of the same railway also constructed of cardboard. The engines are a 0-6-0 mineral engine, the 4-4-0 shown above and on the turntable is a G.E.R. "1500" class 4-6-0 locomotive. Most of the locomotives and rolling stock of this interesting railway were constructed of cardboard at home.

G.W.R. 2-6-0 "ABERDARE" CLASS LOCOMOTIVES.—We agree that these locomotives are interesting by reason of their inside cylinders and outside frames in conjunction with this wheel arrangement. Their inclusion in the Hornby Series is extremely unlikely as they are peculiar to the G.W.R. and no generally similar locomotives could be made for the other groups. Furthermore their construction would create difficulties in production that would be reflected in a high price that would render them unpopular. We are, therefore, unable to consider these locomotives. (*Reply to R. Evans, Bristol*).

20-TON COAL WAGON.—These wagons are already used to a certain extent on our railways and undoubtedly will come into more extended use as their economic value becomes realised. Several of the types already in service make very fine models. We shall consider the all-steel type of wagon when next we are contemplating additions to our rolling stock. (*Reply to T. Ellis, Bristol*).

RAILWAY ACCESSORIES.—You will be pleased to learn that Railway Accessories such as mile posts, gradient posts, also notice boards, and station name boards are available separately. The price of the first two mentioned are 2d. each, while the others are 4½d. and 5d. respectively. (*Reply to F. W. Pierce, Loughborough*).

THEATRICAL PROPERTY VEHICLES.—We are afraid that your suggestion for a theatrical scenery wagon or van to be manufactured cannot be considered owing to such a vehicle not being familiar to all Hornby Railway enthusiasts. Thus it is doubtful whether the model would prove a popular addition. Would not a Hornby No. 2 Luggage Van suit your purpose? (*Reply to S. N. Kirkstone, Newcastle-on-Tyne*).

ISLAND STATION.—An island station would certainly be a good addition to the Hornby System, and would, as you suggest be useful in making a large through station. We will carefully keep this suggestion before us for attention at the earliest opportunity. (*Reply to W. W. Crowsdale, Bolton*).

SIX-WHEELED MILK-VAN.—We were very interested in your suggestion for a model of a six-wheeled milk van to be manufactured, but the objection to its introduction is the difficulty of traversing 2 ft. radius curves with safety, owing to the length of wheelbase. The idea will, however, be kept before us for consideration when further additions are being made. Some arrangement of pivoted trucks might possibly be devised. (*Reply to J. S. Warren, Gloucester*).

L.M.S. 0-8-0 STANDARD FREIGHT LOCOMOTIVE.—We agree that in some respects these make an admirable prototype for a model, especially as regards simplicity of outline and generally massive appearance. The standard L.M.S. tender is provided and as you say this is already available in the Hornby Series. The difficulty in the way of the adoption of the locomotive is the question of a long rigid wheelbase on the standard curves. There is also the fact that there is as yet no suitable mechanism available. (*Reply to T. N. Hargreaves, Derby*).

4-4-0 TANK LOCOMOTIVE.—We are aware that a number of locomotives of this type are running, but modern conditions demand a bunker of ample proportions and this necessitates a trailing bogie or pony truck. Hence the inclusion in the Hornby Series of a 4-4-2 tank locomotive of large size. Should we find a demand for such a locomotive as you suggest for working on light services we shall give the scheme consideration. We think its adoption is unlikely, however. (*Reply to R. Sutton, Stockton-on-Tees*).

DETACHABLE COUPLINGS.—We do not think there would be any advantage in a detachable coupling such as you suggest. The present new short-length couplings are quite satisfactory. (*Reply to B. Smith, Ashford, Kent*).

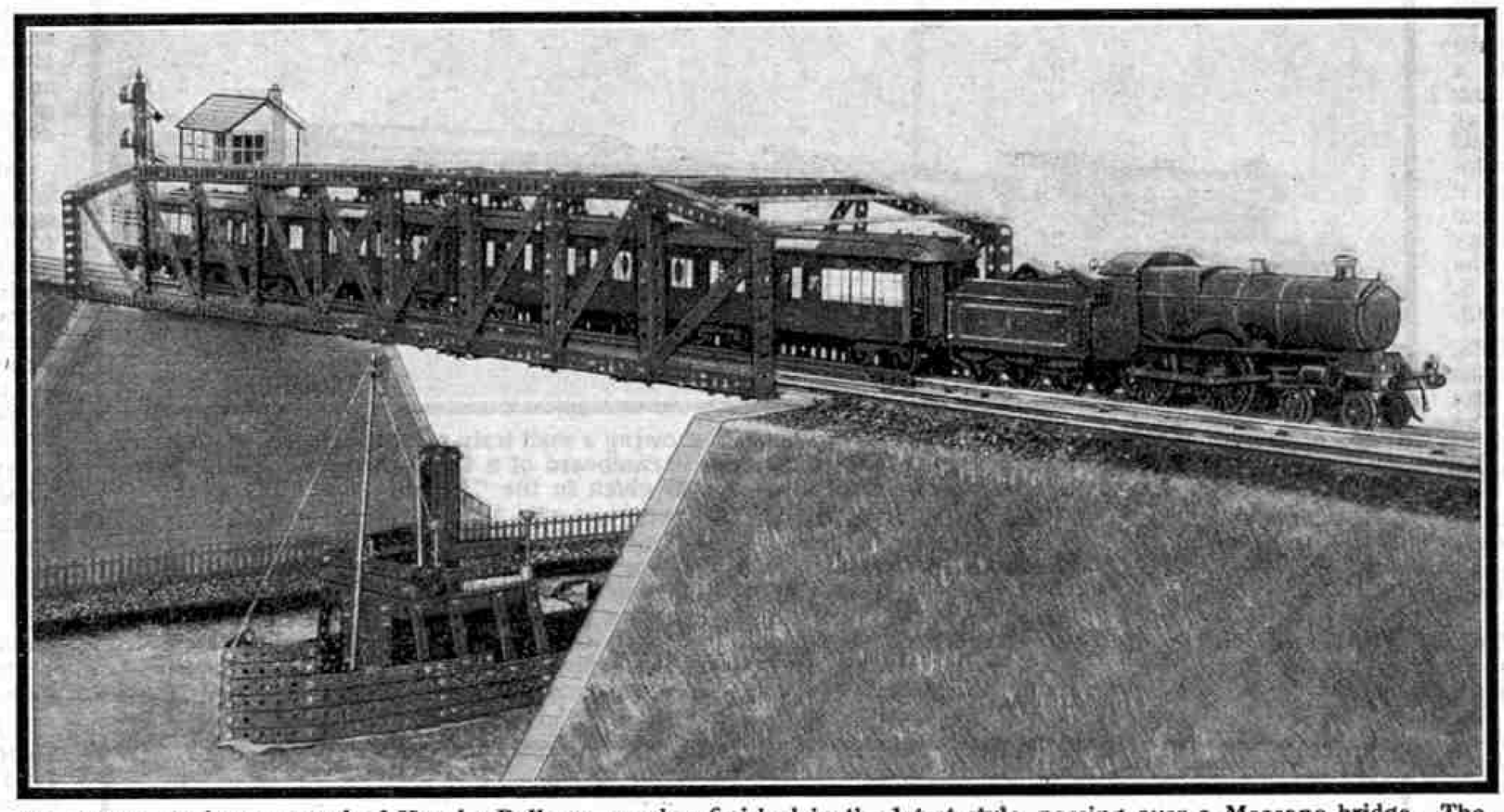
ADDITIONAL "M" SERIES ACCESSORIES.—Your comments regarding the new "M" accessories are interesting and we agree that additions to this series would prove popular. When this series is extended a level crossing, and a small engine shed to house one locomotive, are items that will have early consideration. Lamp standards and a footbridge have also been suggested. (*Reply to S. Foxwell, Derby*).

Further Additions to the Hornby Series

By "Tommy Dodd"

THIS month I wish first of all to draw attention to the interesting part exchange scheme for Hornby locomotives that was announced last month, and is explained on page iii of the cover of this issue. Many owners of Hornby locomotives of an old type wish to possess one of the splendid types that have recently been introduced, but are unable to do so on account of the cost. This scheme has been devised specially to help such boys.

The basis of the scheme is an allowance of half the original purchase price for any Hornby locomotive; and the procedure is quite simple. First select the Hornby locomotive you wish to buy; any one may be chosen provided that its price is not less than the price originally paid for the old one. Then subtract half the price paid for the old **locomotive** from the price of the new one, and send the difference, together with the old locomotive and 1/- for postage and packing, to "Special Service Department," Meccano Ltd., Binns Road, Old Swan, Liverpool. The age and the condition of your locomotive do not make any difference; in each case half the original cost will be allowed.



An express train composed of Hornby Pullman coaches finished in the latest style, passing over a Meccano bridge. The Meccano Hornby Rail Adaptor has been introduced to enable Hornby track to be readily connected to Meccano Girders, when these are used as rails on bridges similar to that illustrated.

This scheme, which came into operation last month, will continue until Saturday, 13th December, after which it will be suspended until 1st January, 1931.

Of the recent introductions in the Hornby Series that I have not yet described, two that have been repeatedly asked for by owners of electric layouts are the Electric Level Crossing No. 2 and the Electric Turntable No. 2. These are similar to the corresponding accessories for use with clockwork trains, but have conductor rails fitted to them. Although in actual practice the use of a third rail at a level crossing would be incorrect, it is a necessity on a miniature railway, for the collector shoes on the motor of a model electric locomotive are unable to bridge the gap and so to secure continuity of current. The introduction of the Electric Level Crossing No. 2 will enable owners to plan electric layouts of greater interest. Similarly the provision of the Hornby Turntable No. 2 fitted with a third rail will enable those who possess electric layouts to turn their locomotives without the handling that was necessary when the ordinary turntable as designed for clockwork engines was used.

The provision of a long tunnel has previously been a matter of some difficulty to model railway enthusiasts. This trouble has been overcome by the inclusion in the Hornby Series of separate Tunnel Ends. These valuable accessories are finished to represent stone tunnel mouths, and they are specially fitted with brackets to which Meccano Strips or Girders may be bolted in order to form a framework upon which the covering of the tunnel may be laid in the manner explained on page 723 of the "*M.M.*" for September last. An extremely realistic appearance may be given to tunnels so constructed, and these have the great advantage that they may be placed on curved stretches of track. The original Hornby Tunnel is yet available, of course, and is particularly suited to small layouts.

An existing accessory that has been revised is the Footbridge No. 1A. This is similar to the No. 1 and No. 2 Footbridges, but is provided with two signals of a simpler pattern than those previously used.

An introduction that will be particularly appreciated by the many enthusiasts who make use of Meccano parts in building accessories for their layouts is the Meccano-Hornby Rail Adaptor. The purpose of this is to enable communication to be readily made between Standard Hornby track and Angle Girders or Perforated Strips that are in use as rails, a common practice on bridges and similar structures that are built from Meccano parts. Rail adaptors are sold in pairs. One of each pair is fitted with a connecting pin and the other is provided with a socket in order that a firm connection with standard Hornby rails may readily be made.

The remaining changes to which I wish to refer this month are improvements in the design of the No. 2 Special Pullman Coaches. The facia board of the cars owned by the Pullman Car Company, or that portion of the side above the windows, is now painted brown. The result is quite pleasing, for the dark facia board provides a dividing line between the cream window panels and the roof of the car. The Hornby No. 2 Special Pullman Coaches are now finished in a similar manner and are very realistic and up-to-date in appearance.

As the white roofs of Pullman Cars quickly become discoloured by smoke and appear dark, the roofs of Hornby Pullmans are now painted grey to imitate this.

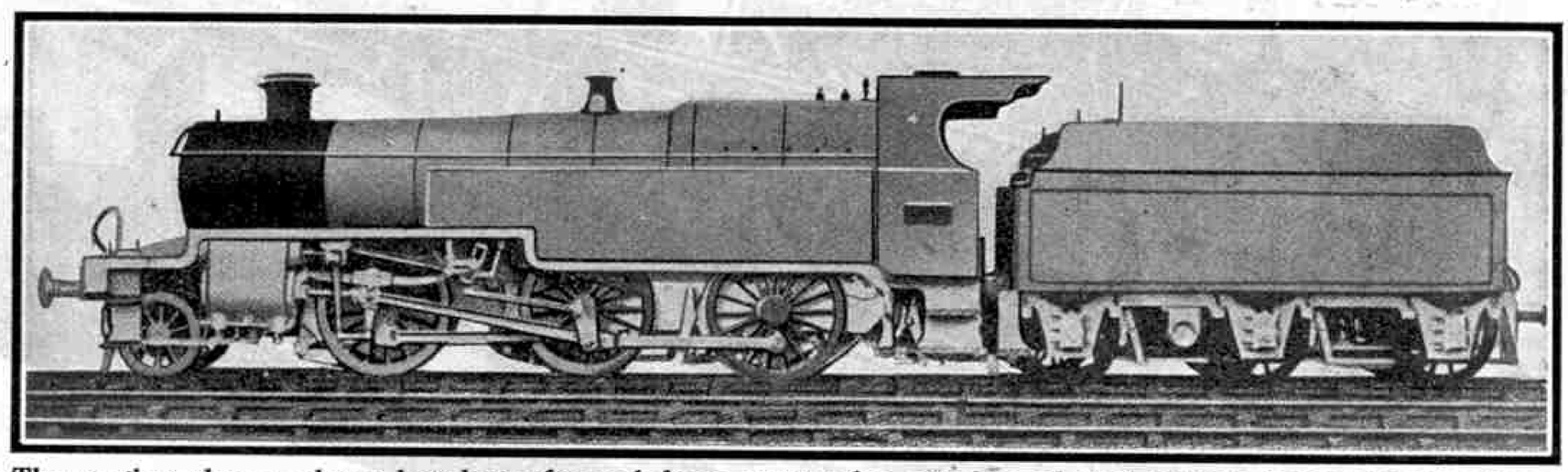
H.R.C. COMPETITION PAGE

Another Mystery Locomotive

Competitions appearing on this page are open only to members of the Hornby Railway Company. Envelopes containing entries should have the title of the competition clearly written in the top left hand corner and should be addressed to the Hornby Railway Company, Binns Road, Old Swan, Liverpool. The name, address and membership number of each competitor should appear in clear writing on every sheet of paper used.

Members of the H.R.C. are always keenly interested in competitions that enable them to make use of their knowledge of real railways. In our May issue we announced a competition that centred round a photograph of a locomotive that was made up of parts of several different locomotives belonging to different groups. This contest proved remarkably popular, and we have had many requests to arrange another on similar lines. This month, therefore, we provide another "Mystery Locomotive" photograph to enable readers to test their knowledge.

The 2–6–0 or "Mogul" type locomotive shown in the accompanying photograph appears on casual inspection to be of more or less normal design; but close examination will show that it incorporates portions of several different locomotives. Competitors are required to prepare a list of as many of these portions as they can identify as belonging to a particular locomotive. All the engines concerned are of types familiar to all H.R.C. members, and every one of them has been illustrated at one time or another in the *"M.M."* When as many parts as possible have been accounted for to the competitor's satisfaction, the list should be enclosed in an envelope and forwarded to H.R.C. Headquarters.



The engine shown above has been formed from parts of a number of well-known British locomotives. In the interesting contest announced on this page competitors are asked to identify the engines from which these parts have been chosen.

The contest will be divided into two sections—Home and Overseas. To the four competitors in each section who send in the most complete lists showing the origin of the parts used in designing the composite locomotive, Hornby goods (or Meccano if preferred) to the value of 21/–, 15/–, 10/6 and 5/– will be awarded.

A number of consolation prizes also will be given. These will be awarded to the competitors whose entries are next in order of merit, and no member should refrain from sending in his entry because he thinks it is incomplete. In the event of two entries being equal in regard to completeness and correctness, neatness will be taken into consideration in making a final decision. Envelopes should be clearly marked "H.R.C. Mystery Locomotive Contest."

Entries in the Home section should reach Headquarters at Binns Road, Old Swan, Liverpool, on or before 31st December, 1930, and the closing date in the Overseas section is 31st March, 1931.

Every competitor should take care to mark his entry with his H.R.C. number. Failure to do this will result in disqualification.

Railway Symbols Contest

H.R.C. members and others interested in railway working cannot fail to have noticed various markings that may be seen on locomotives and rolling stock, both passenger and goods. These may be letters or numbers, and at times other symbols are used, the purpose of these being to assist railwaymen in the performance of their duties. The marks may be of little interest to the average individual, but the railway enthusiast is keen to pick them out and to find what they mean. This month therefore we give members an opportunity of showing their knowledge of these by asking them to compile as complete a list of RAILWAY SYMBOLS as possible. When they have completed their lists, members should write these out neatly and enclose them in an envelope marked "H.R.C. Railway Symbols Contest" and addressed to Headquarters, Binns Road, Old Swan, Liverpool.

The competition will be divided into two sections—"Home" and "Overseas"—in each of which prizes of Hornby Railway material (or Meccano products, if preferred) to the value of 15/–, 10/6, 5/– and 2/6 will be awarded to the competitors whose lists are the most nearly complete. In the event of a tie neatness and originality will be taken into account. Entrants should not forget to give their H.R.C. numbers. The closing date for the Home section is 31st December, 1930, and for Overseas members 31st March, 1931.

Mail Train Drawing Contest

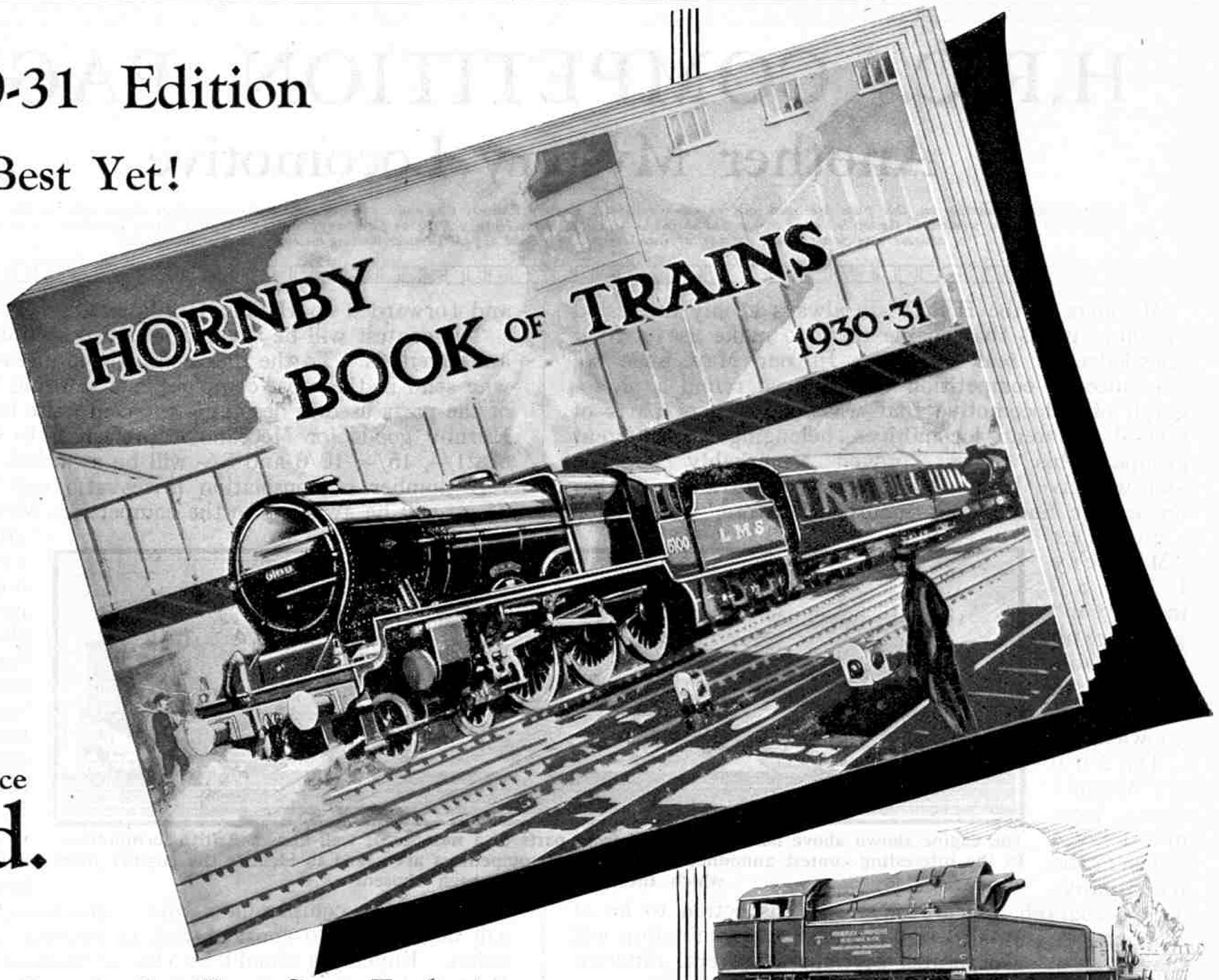
A branch of railway working that always fascinates the enthusiast is the running of Mail Trains. To-day these are not the fastest of trains, many ordinary expresses being more sharply timed; but they are always objects of the greatest interest when standing in the important junctions where huge quantities of letter bags are quickly transferred or exchanged. It is even more exciting to see them in action, scooping in bags of mail and throwing out others when travelling at 60 m.p.h.

A MAIL TRAIN roaring past a wayside standard and making the exchange at lightning speed is a splendid subject for the pencils or brushes of members, and this month we are offering prizes for the best rendering of such a scene. Sketches may be in pencil, pen and ink, or in colours. It is not necessary to show the whole of the train, and competitors should pay chief attention to the post office van itself and all the equipment by means of which the exchange of mail bags is made.

The contest is divided into the two usual sections, "Home" and "Overseas," and Hornby Railway material (or Meccano products if preferred) to the value of £1-1s., 15/–, 10/6 and 5/– respectively, will be awarded to the competitors who submit the best drawings in each of these. Envelopes containing entries should be clearly marked "H.R.C. December Drawing Contest," and must be posted to reach Headquarters on or before 31st December, 1930. The closing date for Overseas entries is 31st March, 1931.

1930-31 Edition

The Best Yet!



Price
3d.

Boys! Get Your Copy To-day!

This splendid new edition of the famous Hornby Book of Trains is brimful of interesting articles that make fascinating reading for all railway enthusiasts. The wide variety of subjects dealt with appear under the following headings :—

In Pre-Grouping Days : Some typical features of British Lines.
Recent Locomotive Progress : The use of High Pressure Steam.
Touring Britain by four Famous Expresses.
Some " Named " Locomotives that have made History.

The book also contains full details and many beautiful illustrations in full colour of the world-renowned Hornby Trains, together with descriptions and prices of all the items included in the Hornby System. *Get your copy to-day !*

How to Obtain the Book

The Hornby Book of Trains may be obtained from any Meccano dealer, price 3d., or direct from Meccano Ltd. (Dept. AM), Binns Road, Old Swan, Liverpool, price 4½d., post free. In the latter case a remittance in stamps should be sent, together with the names and addresses of three chums, to whom we shall send some interesting Hornby literature. There is no reduction if more than one copy of the Hornby Book of Trains is ordered.

Orders will not be acknowledged.

Orders from Overseas

There is a special edition of the Hornby Book of Trains for Overseas, and copies have already been despatched to our agents to fill orders received. The price Overseas is 6d. post free (Canada 10 cents or 12 cents post paid). Readers in Australia, New Zealand, South Africa or Canada who require copies should address their orders to our agencies as detailed below.

Readers living in countries other than those mentioned should order from Meccano Ltd., Binns Road, Old Swan, Liverpool, sending a remittance for 6d. with their order.

Overseas Agencies:

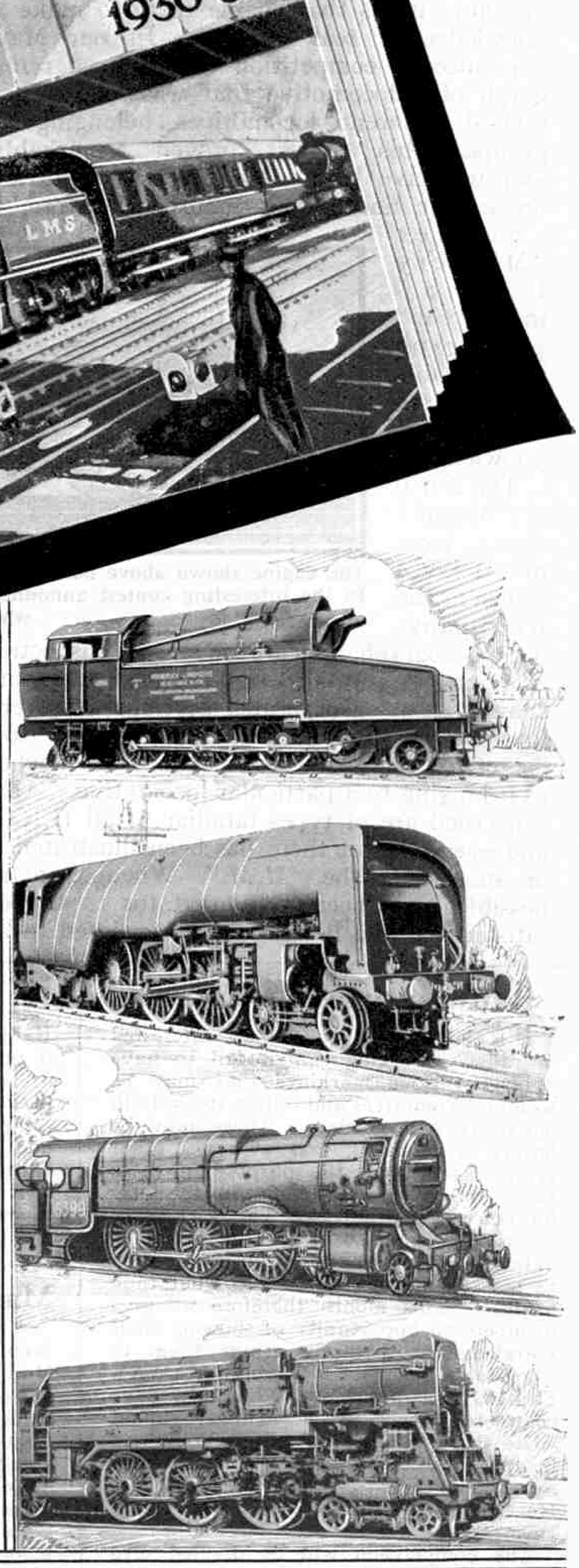
AUSTRALIA : E. G. Page & Co., 52, Clarence Street, Sydney (P.O. Box 1832K,

NEW ZEALAND : Models Ltd., Kingston Street, Auckland (P.O. Box 129).

SOUTH AFRICA : Arthur E. Harris, 142, Market Street, Johannesburg (P.O. Box 1199).

CANADA : Meccano Ltd., 34, St. Patrick Street, Toronto.

Meccano Ltd. (Dept. AM), Old Swan, Liverpool

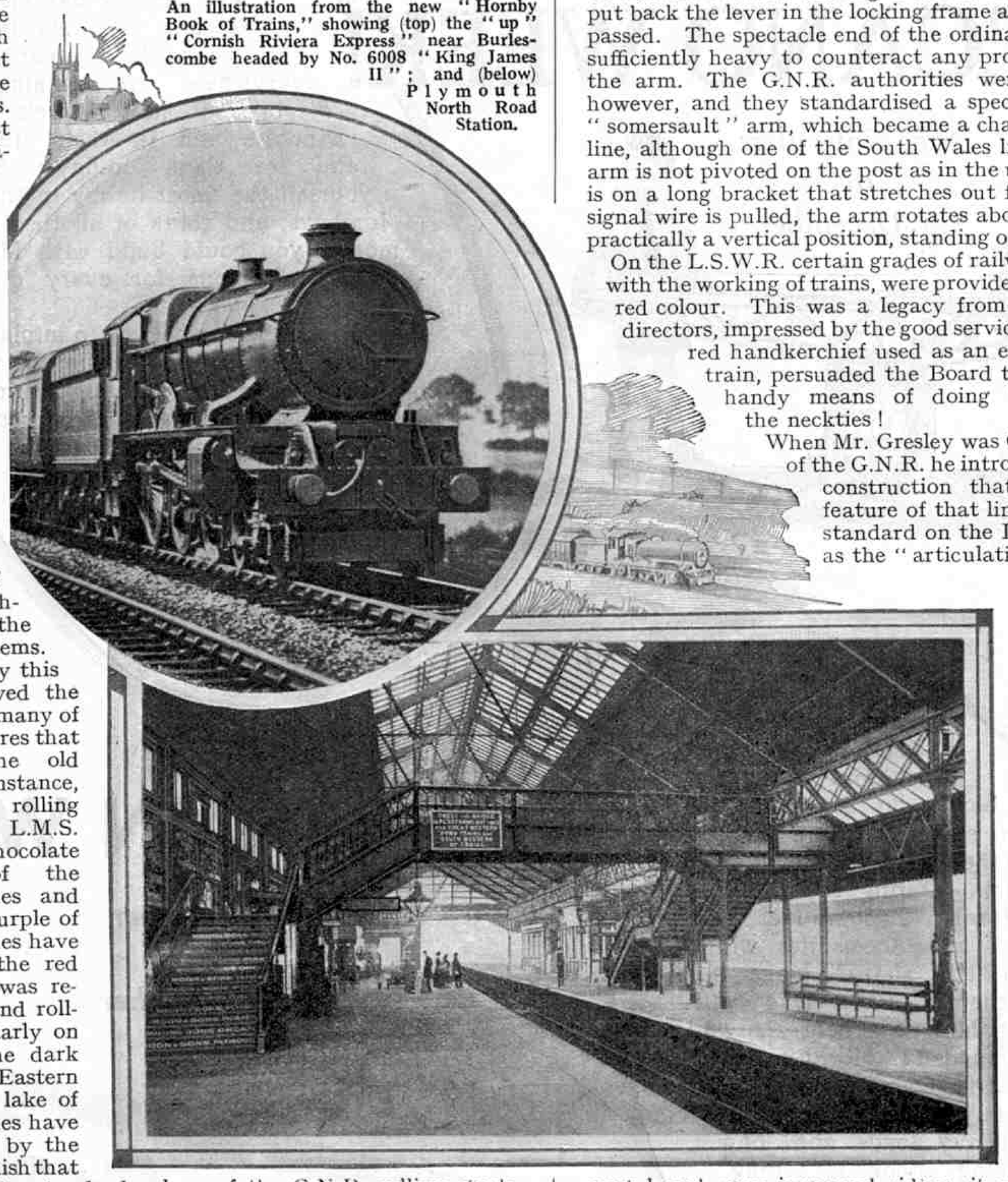


In Pre-Grouping Days

Some Typical Features of British Railways

AT the beginning of 1923 practically all the railways in Great Britain were merged into four large groups—the London Midland and Scottish, the London and North Eastern, the Great Western and the Southern railways. The main object of this concentration was to bring about the greatest possible economy in working.

Gradually the groups began to standardise their equipment, and during the past five years or so there has been a steady reduction in the number of different kinds of locomotives, coaches and wagons on the respective systems. Unfortunately this policy has involved the disappearance of many of the familiar features that characterised the old lines. Take, for instance, the colours of rolling stock. On the L.M.S. the well-known chocolate and white of the L.N.W.R. coaches and the brown and purple of the L.Y.R. coaches have given place to the red that previously was restricted to Midland rolling stock. Similarly on the L.N.E.R. the dark red of the North Eastern coaches and the lake of the G.E.R. coaches have been superseded by the varnished teak finish that previously was the standard colour of the G.N.R. rolling stock.



An illustration from the new "Hornby Book of Trains," showing (top) the "up" "Cornish Riviera Express" near Burlescombe headed by No. 6008 "King James II"; and (below) Plymouth North Road Station.

At the time when most of the British railways were painting their locomotives in more or less vivid colours, such as the blue of the Caledonian and the distinguishing brownish-yellow found only on the Midland and Great Northern Joint line, the L.N.W.R. engines were given a sober black livery, not even relieved by very much lining out. Someone once asked Mr. F. W. Webb, possibly the most illustrious mechanical engineer who ever ruled at Crewe, why he painted his engines black. The reply was that it was cheapest, and that he would be quite prepared to adorn his locomotives with gold leaf when the shareholders were receiving ten per cent. on their money!

The majority of L.N.W.R. and L.Y.R. locomotives differed from those of other English lines in using Joy's valve gear instead of Stephenson's. Joy's gear is of the "radial" type, employing no eccentrics, but taking its movement from the connecting rod. The absence of eccentrics is an advantage, as it enables the axle to be strengthened by making the crank pins longer and the webs wider.

In January 1876 there occurred a serious collision on the G.N.R. at Abbotts Ripton as the result of a signal arm failing to go to danger on account of snow holding it down, although the signalman had put back the lever in the locking frame after the previous train had passed. The spectacle end of the ordinary semaphore is generally sufficiently heavy to counteract any probable amount of snow on the arm. The G.N.R. authorities were taking no more risks, however, and they standardised a special form of signal with a "somersault" arm, which became a characteristic feature of their line, although one of the South Wales lines also adopted it. The arm is not pivoted on the post as in the usual design, but the pivot is on a long bracket that stretches out from the post. When the signal wire is pulled, the arm rotates about this pivot and assumes practically a vertical position, standing out well clear from the post.

On the L.S.W.R. certain grades of railwaymen, closely concerned with the working of trains, were provided with neckties of a violent red colour. This was a legacy from the time when one of the directors, impressed by the good service done by some workman's red handkerchief used as an emergency signal to stop a train, persuaded the Board to provide the staff with a handy means of doing the same thing. Hence the neckties!

When Mr. Gresley was Chief Mechanical Engineer of the G.N.R. he introduced a system of carriage construction that became a distinguishing feature of that line, and is now practically standard on the L.N.E.R. This is known as the "articulation" system, and the idea is to make one bogie carry the adjoining ends of two coaches, doing away with the ordinary couplings and, on a long train, saving a considerable number of bogies. The ends of the coaches come closer together than in the ordinary way, and special devices are employed to connect corridor coaches by vestibule. This saving of space is very valuable, especially now that trains tend to be made as long as platforms will allow, and every available foot of length is required for passenger accommodation.

The articulation system was first tried on the G.N.R. suburban trains with old coaches. As it was found successful and gave improved riding, it was next adapted to miscellaneous units for ordinary main line traffic and then to duplex sleeping cars for the East Coast services, and a five-coach set for the Leeds service. Next followed a number of triplet restaurant car sets for the East Coast day trains, and some five-coach units for suburban services on the G.E. section.

The process of standardisation is going on not only among the railways forming the groups, but also among the groups themselves. For instance, there is now a British standard permanent way used by all the groups. There has also developed a tendency toward the general adoption of the vacuum automatic brake for steam trains.

The above and many other typical features of British railways in pre-grouping days are described in the 1930-31 edition of the "*Hornby Book of Trains.*" In addition, this book contains an interesting account of a tour round Britain by four famous expresses, and a description of the latest high-pressure locomotives and of some of the "named" locomotives that have made history.

Two big events!

MECCANO WEEK!

28th November
to
5th December

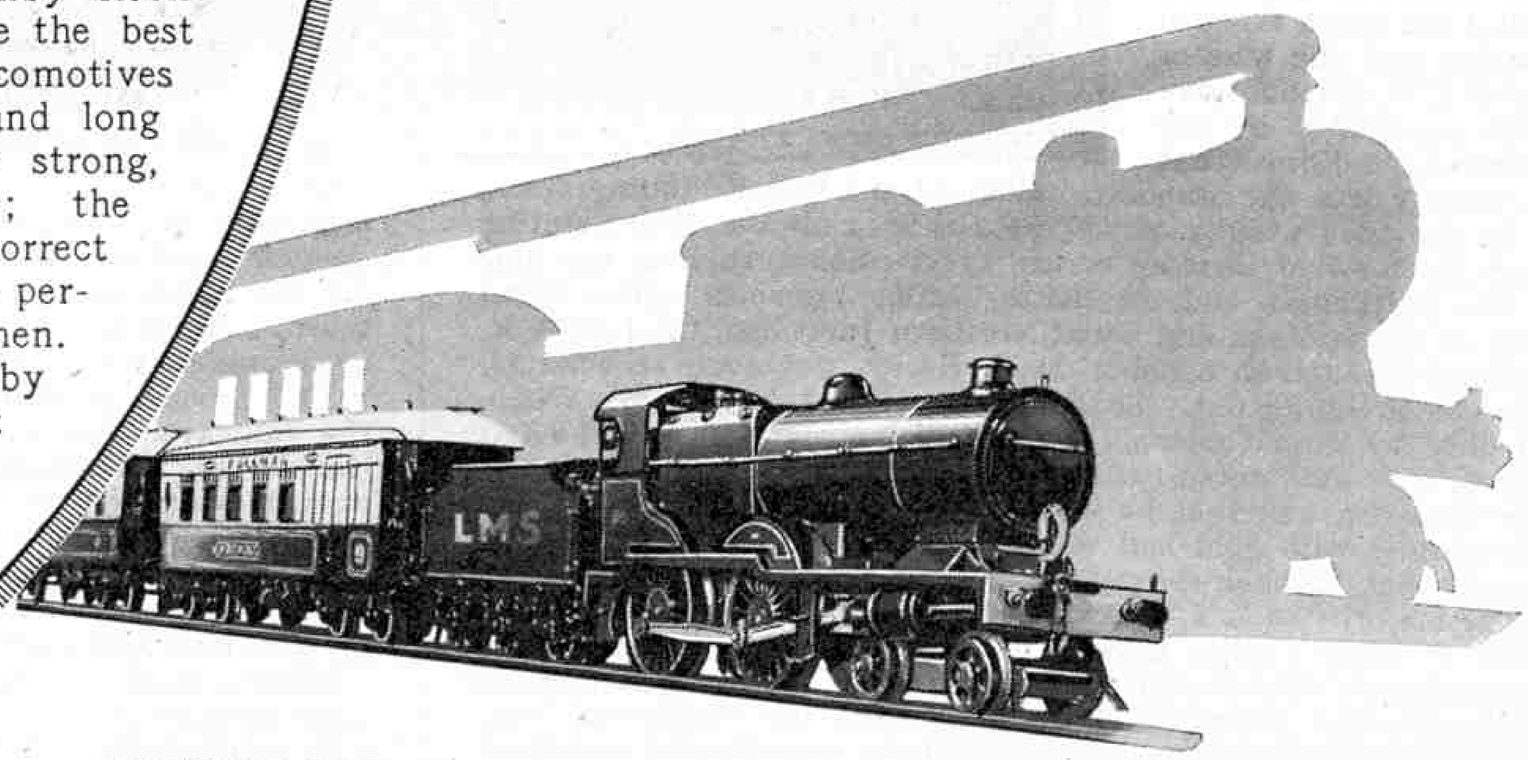
For every boy throughout the land who wants Meccano—for every boy who already has Meccano—Meccano Week is the greatest week of the year! Dealers everywhere are making special displays of new models in their windows and in their stores. Go and see them to-day! See for yourself the finest hobby in the world for boys, and think of all the thrilling models you could build with Meccano—a different one for every day in the year!

Meccano is real engineering in miniature—all the parts are miniatures of the corresponding parts in engineering practice. They are all standardised and interchangeable and can be used to make hundreds of different working models. You can have a new Model every day in the year if you wish. There is endless fun, endless variety—when you have a Meccano Outfit.

HORNBY TRAIN WEEK!

5th December
to
12th December

Hornby Train Week is the best time for every boy who is keen on model railways to see the Hornby Railway System. During this week the new Hornby Locomotives, Rolling Stock and Accessories will be shown in the shops. Make sure you see them! Take Dad with you and let him see them—he will be easily persuaded! Hornby clockwork and electric trains are the best that you can buy. The Locomotives are built for heavy loads and long runs; the Rolling Stock is strong, smooth-running and durable; the Accessories are realistic and correct in proportion. Every part is perfectly made by British craftsmen. If you do not yet possess a Hornby Railway, now is the time to start—now, when the world-famous Hornby Trains are better, stronger, and more powerful than ever. You *must* have a Hornby Train this year!



MECCANO LTD. - OLD SWAN - LIVERPOOL

President: Mr. Frank Hornby—Inventor of Meccano

What the Guild Means

The Meccano Guild is an organisation for boys, started at the request of boys, and conducted as far as possible by boys. In joining the Guild a Meccano boy becomes a member of a great brotherhood of world-wide extent, every member of which has promised to observe its three great objects ; wherever he happens to be—even in strange countries—he will know he has met a friend whenever he sees the little triangular badge. The Meccano Guild is bringing together Meccano boys all over the world, and is helping them to get the very best out of life.

How it Commenced

More than a million boys in Great Britain derive their greatest indoor pleasure from Meccano. Before the Guild was formed, hundreds of these Meccano boys wrote to us every week. They told us how they wished they could be put into communication with other Meccano boys and how they longed to be able to meet them. They asked if arrangements could be made so that their wishes might become an accomplished fact. We responded to their repeated and increasingly numerous appeals, and as a result the Meccano Guild came into being.

Why You Should Join

Every Meccano boy should be a member of the Meccano Guild. All who have studied its objects must agree that the Guild cannot fail to have a profound effect for good on the lives of its members. It is ready to be of service to each individual member—to help or give advice whenever requested. At the head—guiding and controlling, and taking a personal interest in this great movement—is the President, Mr. Frank Hornby, Inventor of Meccano and Managing Director of Meccano Limited.

The Headquarters of the Meccano Guild are at the Head Offices of Meccano Ltd., Binns Road, Old Swan, Liverpool.

HOW TO BECOME A MEMBER

Membership of the Guild is open to every boy possessing a Meccano Outfit, or Hornby Train Set, who satisfactorily fills in the prescribed application form. The only conditions are that members promise to observe the objects of the Guild and to wear their badges on all possible occasions.

The price of the Guild membership badge is 7d. post free in the United Kingdom, and 1/– post free abroad. A remittance for the necessary amount should be sent along with the form of application. The Guild badge is beautifully enamelled in blue and white and is made for wearing in the lapel of the coat.

In addition to the badge, each member receives a membership certificate, measuring 7″ × 9½″. This certificate is printed in orange and sepia and in design is a smaller edition of the large club certificate.

Write to the Secretary of the Meccano Guild, Binns Road, Old Swan, Liverpool, asking for an application form and full particulars. Then fill in the form and return it to Headquarters, when your badge and certificate will be sent you.

Boys living overseas should write to one of the Meccano agents at the following addresses : CANADA : Meccano Ltd., 34, St. Patrick St., Toronto. AUSTRALIA : Messrs. E. G. Page & Co., 52, Clarence Street, Sydney, N.S.W. NEW ZEALAND : Models Ltd., Kingston & Federal Streets, Auckland. SOUTH AFRICA : Mr. A. E. Harris (P.O. Box 1199), 142, Market Street, Johannesburg.

MECCANO CLUBS

Meccano Clubs are founded and established by enthusiastic Meccano boys under the guidance of the Guild Secretary at Headquarters. At the present time there are more than 250 affiliated clubs in various towns and villages in this country and abroad, together with a number not yet affiliated. If the nearest club to you is too far away for you to join, or if you are unable to join for any other reason, consider the possibility of forming a new club in your own district. A special booklet explaining " How to run a Meccano Club " is now ready, and will be sent to any reader (post free) on receipt of 2d. in stamps.

When a Meccano Club has been successfully launched and good progress is being made, affiliation with the Guild is granted. A beautiful club certificate, suitable for framing and hanging in the club room, is presented, and the club becomes entitled to many privileges, including the loan of interesting lectures.

All members of the Guild are eligible for the Merit Medallion, which is awarded to those who display special ability in connection with club work, or in helping the Guild.

THE CORRESPONDENCE CLUB

Members of the Guild are able to join the Correspondence Club, by which they are placed in communication with other Guild members of similar age and interests who live in some other part of the country or abroad.

THE GUILD RECRUITING CAMPAIGN

Every Meccano boy should become a member of the Guild and do his utmost to help to make the objects of the Guild widely known. With this end in view, a Special Medallion is presented to each member of the Guild who obtains three new recruits. As a mark of further merit the medallion is engraved with the name of the recipient and with the words " Special Award " when six more members are recruited, making nine in all. Full particulars of the Recruiting Campaign, together with a supply of application forms, will be sent on request.

THE THREE GREAT OBJECTS OF THE GUILD

(1) **To make every boy's life brighter and happier.**
(2) **To foster clean-mindedness, truthfulness, ambition, and initiative in boys.**
(3) **To encourage boys in the pursuit of their studies and hobbies, and especially in the development of their knowledge of mechanical and engineering principles.**

BADGE OF MEMBERSHIP

CLUB LEADER'S BADGE

With the Secretary

Christmas Greetings!

"A Merry Christmas" to all members of the Guild and to Meccano Clubs throughout the world! I hope that everyone connected with the organisation will thoroughly enjoy the festive season and I look forward to hearing of happy times spent in Christmas gatherings in the homes of members and in club rooms.

In practically all clubs social evenings form part of the Christmas celebrations, and in many parts of the world scenes similar to that shown in the illustration on the opposite page will be enacted towards the end of the present month. Meccano has a wonderful power of bringing boys together. The common enjoyment of the hobby seems to be the surest means of establishing genuine and lasting friendships, and it would be difficult to find a pleasanter sight than that presented by a group of Meccano boys at work or play.

In the days immediately following Christmas, life in a Meccano club may be most enjoyable, for many of the members are on holiday from school and thus have splendid opportunities of indulging in their favourite hobby. Most of these have probably had the good fortune to receive additions to their stock of Meccano parts or Hornby Train material. Naturally they wish to seize the earliest opportunity of making the best use of these in conjunction with their fellow enthusiasts, and their ambitions are gratified by the construction of larger models than they have ever made before.

In clubs possessing a large proportion of schoolboy members it is a good plan to organise a special "Holiday Competition." This may take the usual form, entrants being asked to submit models of aeroplanes, locomotives, bridges, or similar engineering products, but if possible variety should be introduced. This may be done by asking the competitors to devise ingenious uses for special parts, or by holding a contest in which the prizes are awarded for the most original models.

Special Merit Medallions

I should like to receive nominations for Special Merit Medallions as soon as possible in order that I may compile the list of those awarded during 1930 for publication in an early number of the "*M.M.*" There are yet many clubs in which full advantage is not taken of this means of rewarding good work by members, and I am looking forward to receiving recommendations from the Leaders of these. There are no restrictions in regard to the nature of the services for which the Merit Medallions may be awarded, and two are allotted every session to each club. The Medallions are always greatly appreciated by the members who receive them.

Meccano Club Leaders

No. 49. Col. C. F. Phipps, D.S.O.

Col. C. F. Phipps, D.S.O., is Leader of the Cranleigh M.C. and has taken a keen interest in its progress since affiliation was secured in December, 1929. He encourages competitions of all kinds, and the standard of the entries in Model-building Competitions has been steadily raised. Outdoor sports are a prominent feature of the Club's programme.

A Plan to Increase Interest

The first of the two winter sessions will come to an end shortly after the appearance of this issue of the "*M.M.*", and the officials of clubs probably have already begun to think of the programmes to be followed during the early months of the coming year. These usually follow the lines of those adopted during the present session, for in most cases they have been judged the most suitable after a general discussion by members. Occasionally it happens that members have become a little tired of their ordinary proceedings and show signs of losing interest. A change in the programme is then desirable in order to avoid trouble.

In clubs with small resources there is often difficulty in introducing new hobbies in order to give sufficient variety to the programme and other means of preventing loss of interest must then be adopted. The astute Leader of one club of this kind who detected signs of boredom among the members solved the problem in a very interesting manner. At the close of one meeting he suddenly announced that for the following two weeks the ordinary programme would be abandoned and a special intensive programme substituted for it. Effect was added to the announcement by keeping the nature of this programme secret until the following week, members being merely asked to make sure that their Meccano Outfits were in good order and to bring them with them.

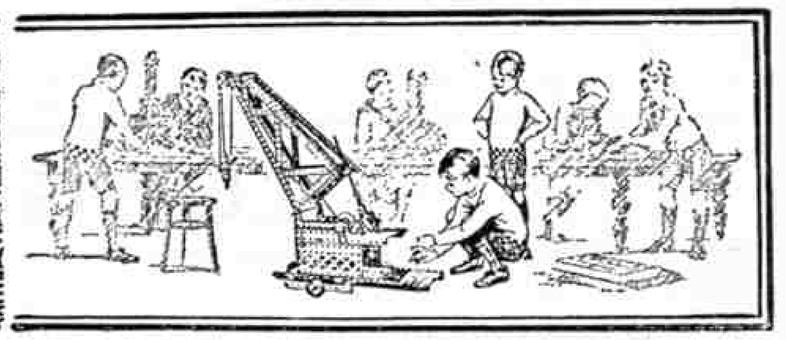
Not altogether to the Leader's surprise, there was a record attendance at the following meeting, the first of the two on which a special programme was to be followed, and on the face of every member there was a look of eager expectancy as the Leader unfolded his proposal. This was that the next meeting should be devoted to a Motor Show. He had brought with him a large number of issues of journals devoted to motor car and motor cycle engineering, and these he distributed among the members with the injunction to choose a suitable car or lorry, and to build a reproduction of it in Meccano for exhibition at the Show, when each member would be called upon to explain the good points of his model to the Leader and several friends exactly as if they were possible buyers, and he were trying to sell it to them.

Small prizes were awarded to the members who produced the best models and made the best efforts to secure orders from visitors to the Show. The proceedings were highly successful.

* * * *

The large number of Guild members who have asked us to provide suitable envelopes to match the Meccano notepaper will be interested to know that such envelopes are now available from Headquarters at 1s. 3d. per 100, post free. The envelopes are suitable for the sheets of both sizes of pads.

CLUB NOTES



Queen Elizabeth's School (Crediton) M.C.—The club continues to make good progress and is one of the most popular and successful of the societies formed at the School. The sixth winter session has begun with a series of Model-building and Hornby Train Nights, the activities of members being designed to lead to a successful Exhibition on School Speech Day. Club roll: 20. *Secretary:* Mr. J. B. Lemon, South View, Crediton.

Blyth Y.M.C.A. M.C.—An excellent club room in the Y.M.C.A. building has been obtained and regular weekly Model-building meetings are being held. Marks are awarded to members for models constructed and these are to count in the award of prizes at the end of the session. Other hobbies introduced include Basket Work, Fretwork and Woodwork, and all sections are making preparations for a great Bazaar in February next. Club roll: 10. *Secretary:* B. Sinclair, 53, Windsor Avenue, Blyth.

Middlesbrough M.C.—An interesting new feature of the programme was a Debate on a serious accident that recently occurred in Middlesbrough. The purpose was to find who was responsible and the younger members of the club were particularly encouraged to express their opinions. The club Orchestra gave a Musical Evening and members were entertained by the "Nuts" and the officials. An amusing Mock Trial has been held, and the Leader, Mr. T. D. Allick, has given an interesting address. *Secretary:* A. Bradley, 95, Deepdale Avenue, Marton Grove, Middlesbrough.

Roe Green M.C.—Before the actual winter session began, members constructed a permanent indoor Hornby Train Layout, and interesting and exciting Model Railway Evenings have been held. On Meccano Evenings many excellent models have been built by members, and the Meccano Lecture, "*Lives of Famous Inventors*" has been given. Club roll: 12. *Secretary:* P. J. Wallis, 345, Stag Lane, N.W.9.

Stockton-on-Tees M.C.—The club has been divided into four sections to enable members to pursue their favourite hobbies, the four adopted being Model-building, Hornby Trains, Handicrafts and Stamp Collecting. The system has proved a great success and gives variety to the programme. Club roll: 16. *Secretary:* Mr. N. Middleton, c/o 1, Blenheim Terrace, Coatham, Redcar.

Heywood Central School M.C.—Two Exhibitions of Models have been held, one in aid of the School Sports Fund and the other to aid the resources of the club itself. A Lecture on "*The History of Various Sports*" has been given by the Leader, Mr. G. N. Chaplin, and one on "*Railways*" by Mr. J. P. Lunt was illustrated by interesting lantern slides. Model-building Competitions have been arranged, and a splendid programme of Lectures and Games Meetings is to be followed. Club roll: 50. *Secretary:* G. E. Strutt, 28, Isherwood Street, Heywood, Lancs.

Ipswich M.C.—The club has decided to acquire a separate room for use as a workshop, the present club room being reserved for business meetings, Lectures and Socials. An excursion has been made to Orford Castle, and a Lecture on "*Travels and Adventures in Europe*" has been given by Mr. T. C. Clarke, the newly-appointed Assistant Leader. Club roll: 12. *Secretary:* P. Samson, 81, Tuddenham Road, Ipswich.

Laindon M.C.—The Hornby Railway track has been replanned and now represents the local branch of the L.M.S.R. The track has been ballasted with flint chippings, and new Stations, Signals, etc., for use on it have been made from Meccano parts and other materials. An extensive signalling system is being installed, this being based on the Hornby Control System. Special Meccano meetings have been regularly held, and the members are looking forward with interest to a Model-building Contest which will take place shortly. A talk on "*Fireworks*" has been given. Club roll: 17. *Secretary:* J. P. Tourle, "St. Ives," Leicester Road, Laindon, Essex.

Fulstow M.C.—A Model Aeroplane Exhibition has been held, each member bringing a Meccano model of a well-known machine. Prizes were awarded for the best models on view, the sizes of the sets from which they were made being taken into account when judging. An interesting programme of Lantern Lectures has been arranged. Club roll: 16. *Secretary:* L. W. Doe, The Stores, Fulstow, North Thoresby, S.O. Lincs.

King's School (Peterborough) M.C.—Good progress is reported, and recruiting work has proved successful. Hornby Train nights, Lectures and Debates are included in the syllabus. An interesting feature is "Workshop Night," when the members choose their own subject for working. Club roll: 23. *Secretary:* M. H. Oliver, Gildenburgh, Park Road, Peterborough.

Braintree County High School M.C.—A club Magazine is now being published, under the title of "*The Triangle*." Among the many items of interest that it contains are Competitions, Reports of activities, Articles and Stories. Interesting and original models have been produced in connection with the Model-building Contests that are frequently arranged. A model of a 30 cwt. motor truck recently built attracted much attention. An interesting layout was copied from the "*M.M.*" for use in connection with a Hornby Night. Table tennis is enjoyed, and a tournament is being played. Club roll: 20. *Secretary:* P. Allen, "St. Edmunds," Bocking, Braintree.

Chiswick Crusaders M.C.—The opening meeting of the club was very successful, the evening being devoted to the construction of Aeroplanes. Ten-minute talks are proving popular; they have dealt with various topics, including "*Holidays Abroad*," "*Fretwork*," and others of a similar character. A room in which to accommodate the Hornby Train Section is being looked for. Club roll: 10. *Secretary:* H. Betlem, 139, Park Road, Chiswick, London, W.4.

Greenock Academy M.C.—The programme is proving attractive, and among the many activities are visits to places of interest. Those already included are the India Tyre Factory, Renfrew Aerodrome, and the Museum of Geology at Glasgow University. An Exhibition has been arranged, and will take place at Christmas. Members are now busily engaged on preparations. Club roll: 83. *Secretary:* A. Buchanan 6, Rankin Street, Greenock.

A Merry Christmas party at Harwich! Members of Harwich M.C. are thorough in both work and play. Their extensive range of activities includes fretwork, printing, woodwork, stencilling, penknife carving, and other hobbies in addition to Meccano Model-building, and the Exhibitions organised by them are always outstanding successes.

Marlowe (Wallasey) M.C.—A Model-building Competition is held every month and Games and indoor Sports Meetings also are arranged. An attractive Lecture on "*How Conjuring Tricks Can Be Done*" was given by the President, Mr. A. H. Ainscough, who also gave an interesting talk on "*Building Construction*" from which useful hints for Model-building were obtained by members. Club roll: 36. *Secretary:* R. E. Scovell, 73, Poulton Road, Wallasey.

Horsforth M.C.—A Recruiting Campaign has been very successful in introducing new members. A "Hat Night" was greatly enjoyed, members drawing subjects for short speeches and a prize being awarded to the one making the best effort. A Social was held to celebrate the anniversary of affiliation. Club roll: 36. *Secretary:* H. Giles, 12, Kerry Street, Horsforth, Nr. Leeds.

Lindisfarne College M.C.—Membership has increased very rapidly and the club has been divided into four sections for Meccano Model-building, Hornby Train operations, Wireless work and the construction of models respectively. The Wireless Section are greatly interested in television and they intend showing a television receiver at the next Exhibition. Visits have been paid to Stag Lane Aerodrome and a Wireless Works. Club roll: 72. *Secretary:* H. Sebel, 27, Seaforth Road, Westcliff-on-Sea, Essex.

Whitgift Middle School M.C.—In an interesting Competition a model of a Tower Wagon won the First Prize and a reproduction of an Automatic Cable Layer gained Second Prize. A visit has been paid to the local Fire Station. Club roll: 17. *Secretary:* G. N. Goode, 7, Havelock Road, E. Croydon.

Mall School M.C.—Model-building Contests and Drawing Competitions are among the many activities of the club, while Lectures have been a popular item of the programme for some time. The Football Team is making good progress, and matches are played with the school team. Club roll: 26. *Secretary:* F. M. Beatty, 23, Oxford Road, Teddington, Middx.

CANADA

Victoria M.C.—An interesting paper on "*British Coastal Motor Boats*" was read by a member, and it has been decided to have a similar paper every month. In a recent Model-building Competition entrants were required to build aeroplanes. Models submitted were of a high standard, and the prize was won by a scale model of a Heath Parasol Monoplane. A number of Meccano parts and a Certificate of Merit were presented to the winner. At every meeting articles in the "*M.M.*" are read and Super Models demonstrated. Club roll: 6. *Secretary:* Mr. M. D. Bryce, 908, Heywood Avenue, Victoria B.C.

INDIA

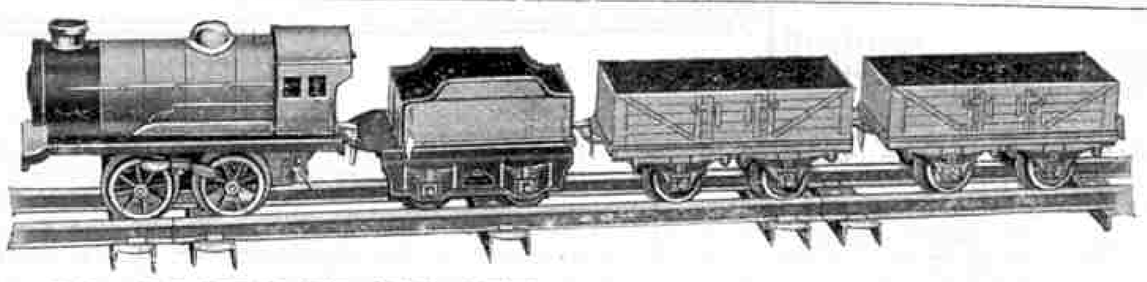
Lahore M.C.—Members have continued to enjoy their stay in the hills. An interesting innovation is that a prize is awarded to the first member who gives the correct solution of the Mystery Photograph Competition in the "*M.M.*" A Display of Meccano Models attracted many interested visitors, and members have given a performance of an Indian drama. Club roll: 10. *Secretary:* Mr. Sardar Karpal Singh, 6, Nisbet Road, Lahore.

SOUTH AFRICA

Pretoria M.C.—The headquarters of Villeria M.C. have been moved into Pretoria; it is now called the Pretoria M.C. A scale model railway has been built, and scenic accessories such as a mountain, under which the track passes, and a farmyard have been made for it, while a river bridged by the railway is included in the scheme. A "Crime Evening" has been held. In this members acted as detectives, reconstructing a crime from various clues. Club roll: 17. *Secretary:* Mr. J. F. Wood, 723, 5th Street, Villieria, Pretoria.

New Durban M.C.—Members of Malvern M.C. on holiday visited the club and were greatly interested in the display of Models. On a special "Four-Wheel Vehicle Building Night" a large number of splendid models ranging from mobile Cranes to Motor Cars and Yachts were built. Table Cricket has been introduced and a test match atmosphere prevails when games are in progress. In a Debate on "*Clockwork v. Electricity for Driving Hornby Trains*," senior members were asked to argue against their own convictions, which produced amusing results. Club roll: 71. *Secretary:* R. A. Wallace, 29, Bell Grove, Durban.

LONGER RUNS-



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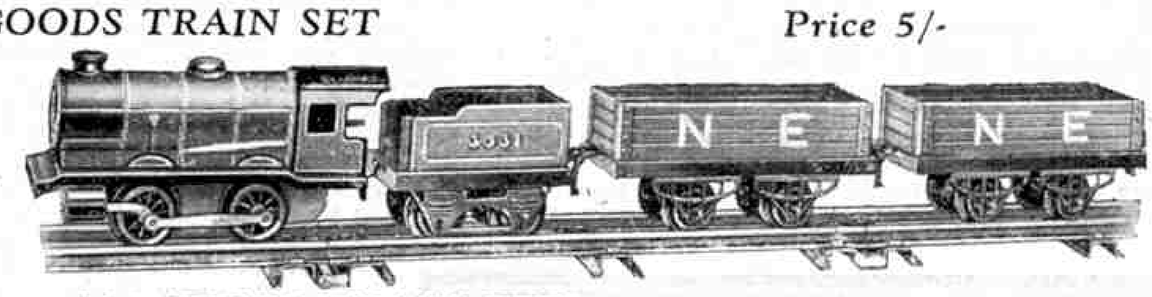

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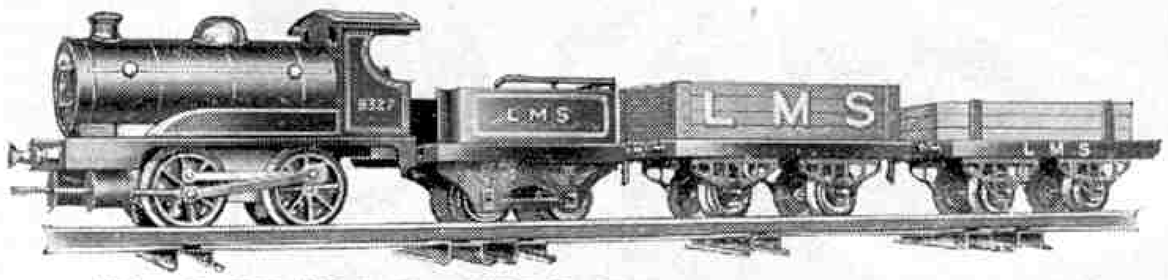

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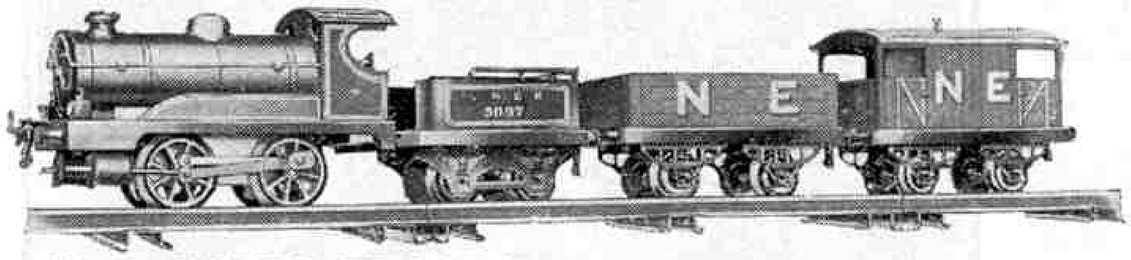

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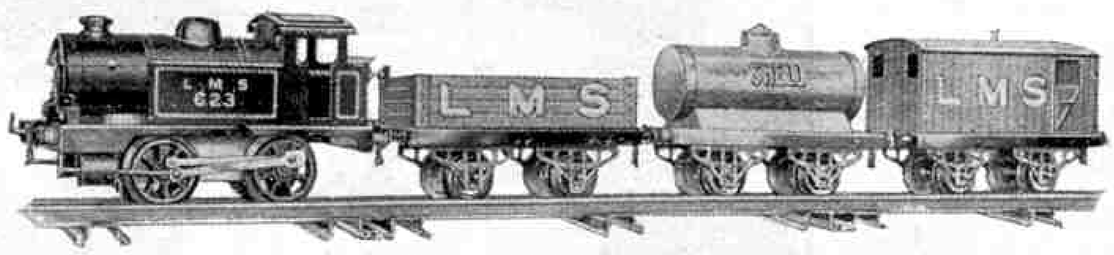

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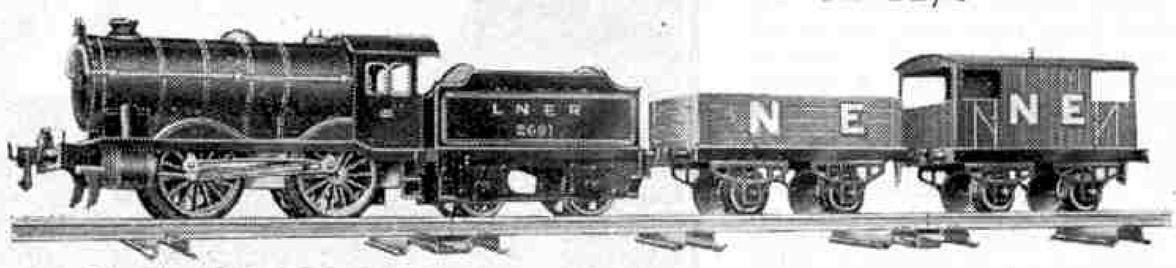

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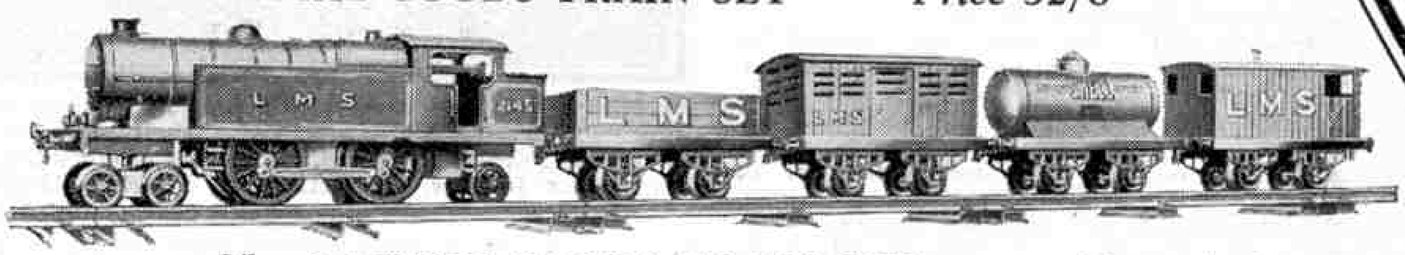

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Ask him to buy you
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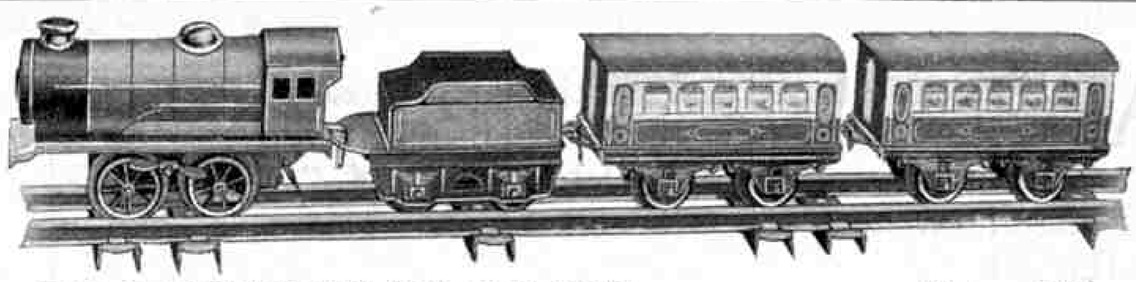

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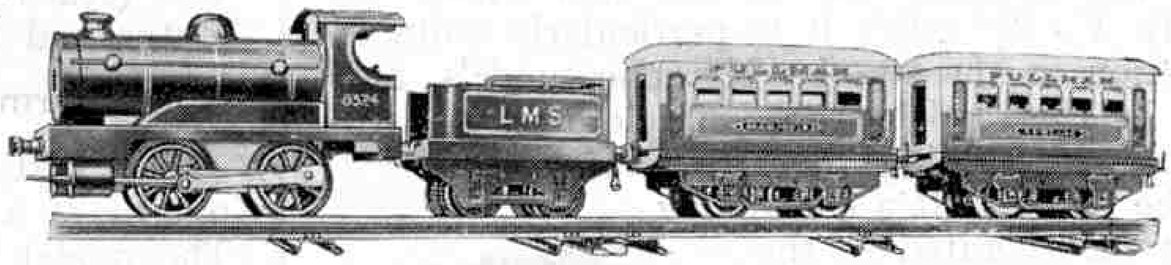

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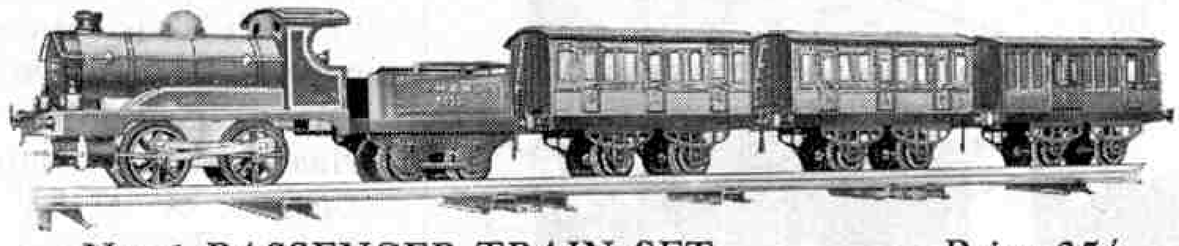

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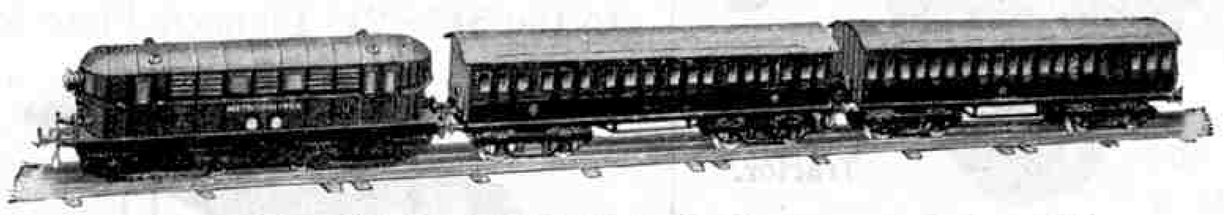

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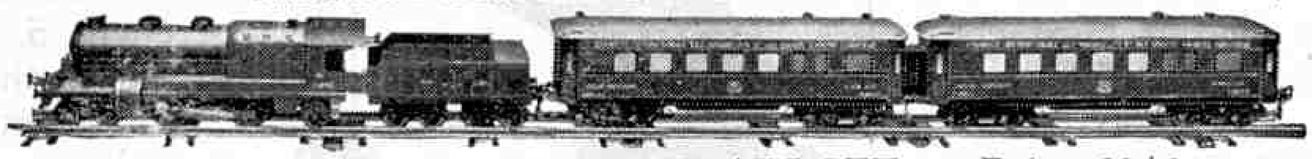

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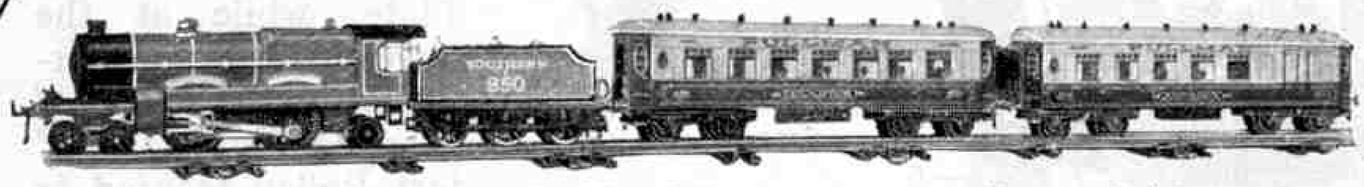

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New Meccano Models

Farm Tractor—Railway Breakdown Crane—Power-driven Flyboats

ALL Meccano boys, and particularly those possessing small Outfits, will have been interested in the announcement in the October "*M.M.*," regarding the introduction of a new 6-volt Electric Motor, known as the E1.

Owing to the compact size of the new Motor (it measures only 2″ × 2½″ × 3½″) it is particularly suitable for incorporation in the simpler Meccano models, and we describe in this article three simple but realistic models, each incorporating the new Motor.

It should be noted that a controlling switch is not incorporated in the E1 Motor, but a simple "on-off" switch can be constructed quite easily from standard parts. A switch of this type, that can be applied to any of the models illustrated this month, is shown in Fig. 1.

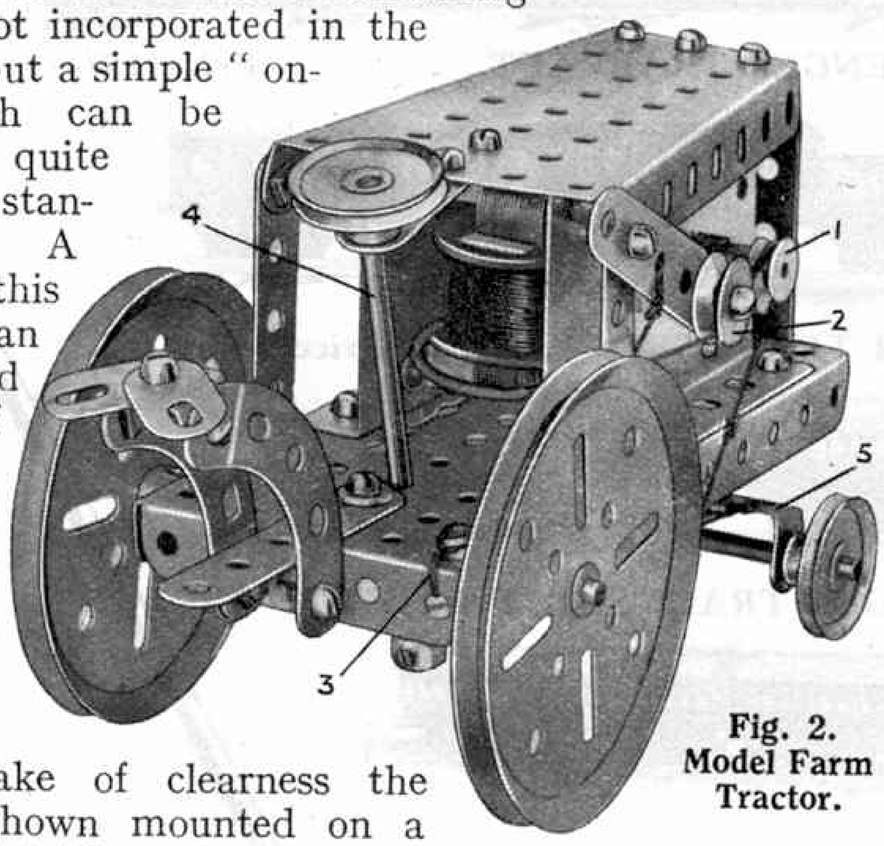


Fig. 2. Model Farm Tractor.

For the sake of clearness the switch is shown mounted on a 2½″ × 2½″ Flat Plate, but it may be fitted to any part of a structure that is most convenient. The switch arm consists of a 1½″ Strip 2, which is pivoted on a 6 B.A. Bolt 1, the pivot being assembled in the following manner. A metal Washer is first of all placed on the shank of the 6 B.A. Bolt against the head, and the Strip 2 is then slipped on to the Bolt. A Meccano Insulating Bush (part No. 302) is next placed on the shank of the bolt, and the latter, complete with Washers and Strip, is then passed through a hole in the Plate, etc., forming part of the model. A 6 B.A. Insulating Washer (part No. 303) and two 6 B.A. Nuts are placed on the projecting shank of the Bolt to complete the pivot. A ½″ Bolt 4 should next be secured to the end of the 1½″ Strip 2 by means of a nut to act as a switch handle, and the Strip 2 should be bent slightly outward so that the head of the bolt 4 clears the Plate to which the switch is attached.

When connecting up the switch, one terminal of the Accumulator or Transformer should be joined by a length of flexible wire to the Bolt 1, while the other terminal of the Accumulator should be attached to the terminal of the Motor that is insulated from the frame. The return circuit is completed by the frame of the Motor and the nut 3 secured to the model itself.

Model Farm Tractor

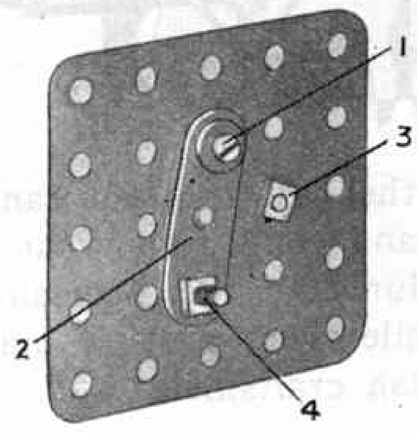


Fig. 1. Motor Switch.

The first example shown this month is a model farm tractor. The model is powered by an E1 Motor, and a simple but effective "clutch" is incorporated that enables the drive to be transmitted gradually to the road wheels. The frame of the model consists of a 5½″ × 2½″ Flanged Plate. The Motor is mounted on this Plate and a Sector Plate is secured above the Motor by means of five 2½″ Strips and Angle Brackets. The front axle assembly consists of a 2½″ × ½″ Double Angle Strip 5 in which a 3½″ Axle fitted with two 1″ Pulleys is secured. A Double Bent Strip is secured to the centre of the Angle Strip 5, and the whole is pivoted to the 5½″ × 2½″ Flanged Plate forming the frame of the tractor, by means of a ½″ Bolt.

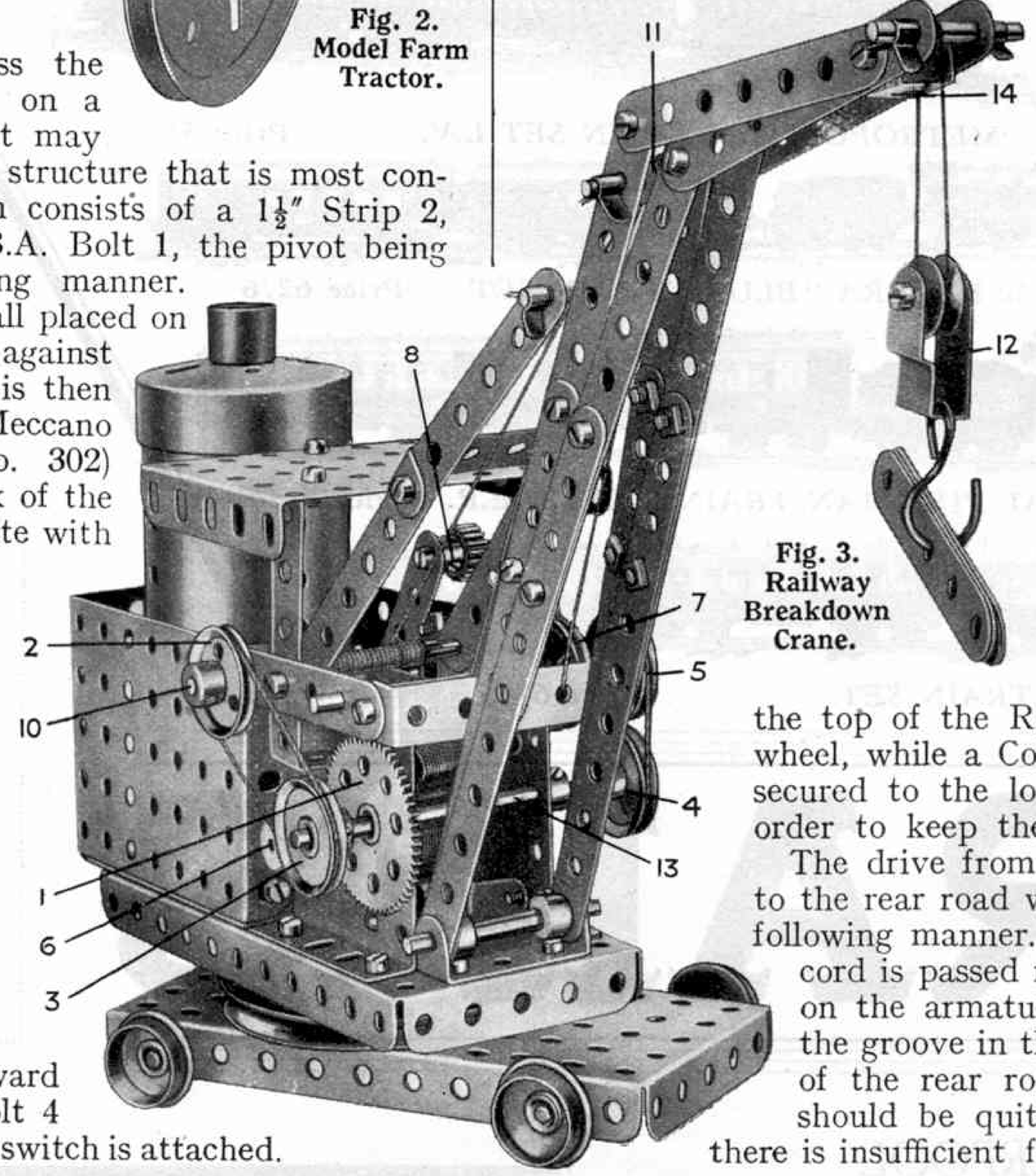


Fig. 3. Railway Breakdown Crane.

A length of cord is attached to one end of the Double Angle Strip 5, passed twice round the Axle Rod 4 that forms the steering column, and finally tied to the other end of the Strip. The steering column is mounted at its upper end in a 2½″ Strip secured to the Sector Plate, while at the lower end it is journalled in the 5½″ × 2½″ Flanged Plate. A 1″ fast Pulley secured to the top of the Rod 4 forms the steering wheel, while a Collar and Spring Clip are secured to the lower end of the Rod in order to keep the cord in position.

The drive from the shaft of the Motor to the rear road wheels is arranged in the following manner. An endless length of cord is passed round the small pulley 1 on the armature shaft and also round the groove in the 3″ Pulley forming one of the rear road wheels. This cord should be quite slack so that normally there is insufficient friction between the cord

and the pulleys for power to be transmitted. A 2½" Strip, fitted with a ½" Pulley Wheel 2, is pivoted on a ⅜" Bolt secured to the side of the tractor. A short length of cord is attached to the centre hole of the Strip; and the end is then passed through holes in the base plate and finally tied to the Washer 3. It will thus be seen that, by lifting the Washer 3, the Pulley 2 will press on the transmission cord and decrease its effective length. The friction between the cord and the pulleys will thus be increased and power can consequently be transmitted from the Motor to the road shaft.

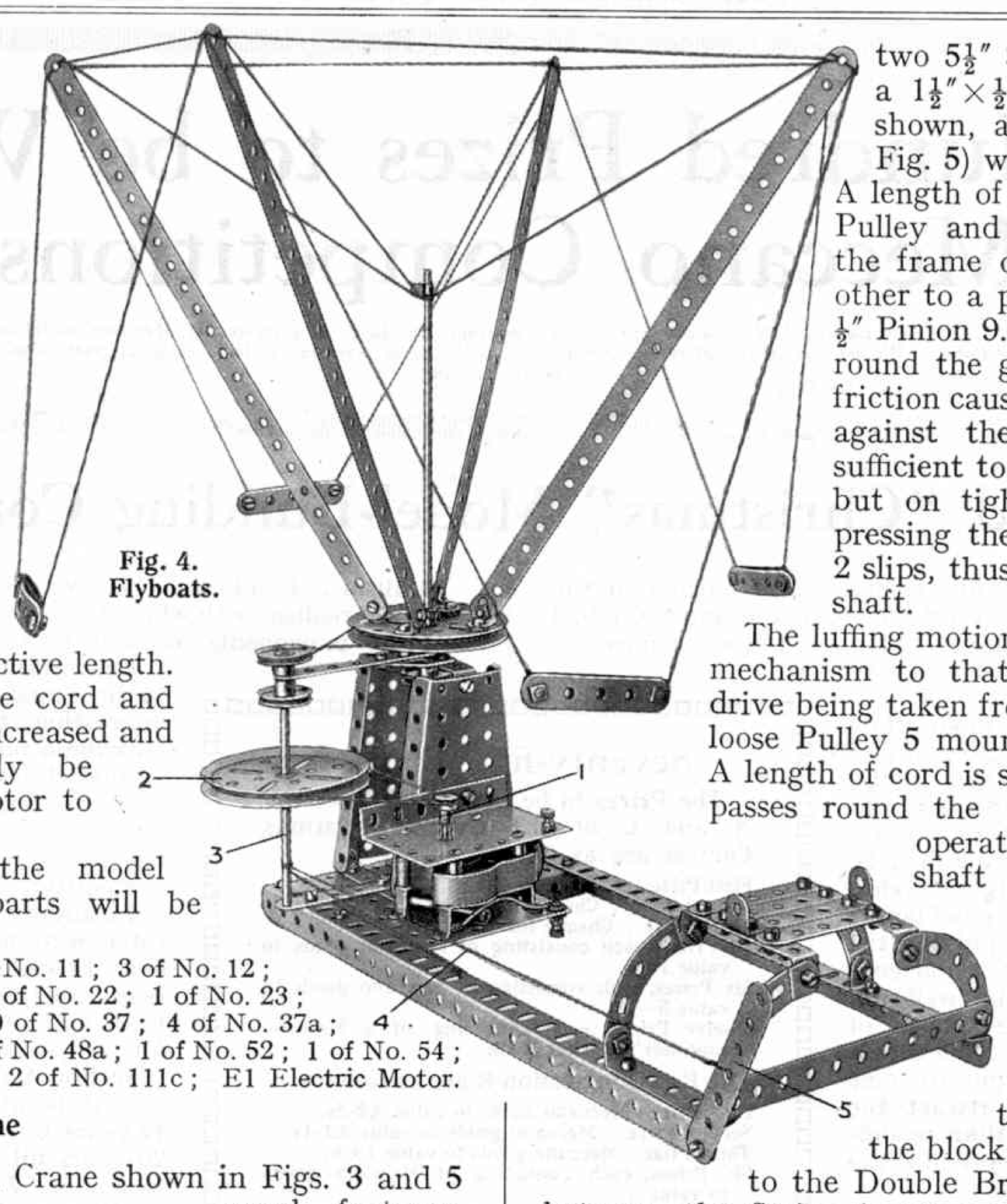


Fig. 4. Flyboats.

In order to build the model tractor the following parts will be required:

8 of No. 5; 2 of No. 10; 2 of No. 11; 3 of No. 12; 3 of No. 16; 2 of No. 19b; 4 of No. 22; 1 of No. 23; 1 of No. 24; 2 of No. 35; 30 of No. 37; 4 of No. 37a; 2 of No. 38; 1 of No. 40; 1 of No. 48a; 1 of No. 52; 1 of No. 54; 1 of No. 59; 2 of No. 90a; 2 of No. 111c; E1 Electric Motor.

Railway Breakdown Crane

The model Breakdown Crane shown in Figs. 3 and 5 incorporates several novel features. It is driven by an E1 Electric Motor, and hoisting and luffing motions are provided. The hoisting and luffing shafts are coupled to the Motor through Pulley friction clutches, and either motion can be brought into action merely by operating a simple hand brake. The travelling base of the Crane consists of a 5½" × 2½" Flanged Plate, and two 3½" Axle Rods carrying a ¾" Flanged Wheel are journalled in it. A 3" diam. Pulley Wheel is secured to the centre of the Plate by means of ⅜" Bolts and a 2" Axle Rod is placed in the boss of the Pulley. The base of the swivelling superstructure consists of a 5½" × 2½" Flanged Plate, and this rotates upon the rim of the 3" Pulley, the 2" Rod forming the pivot.

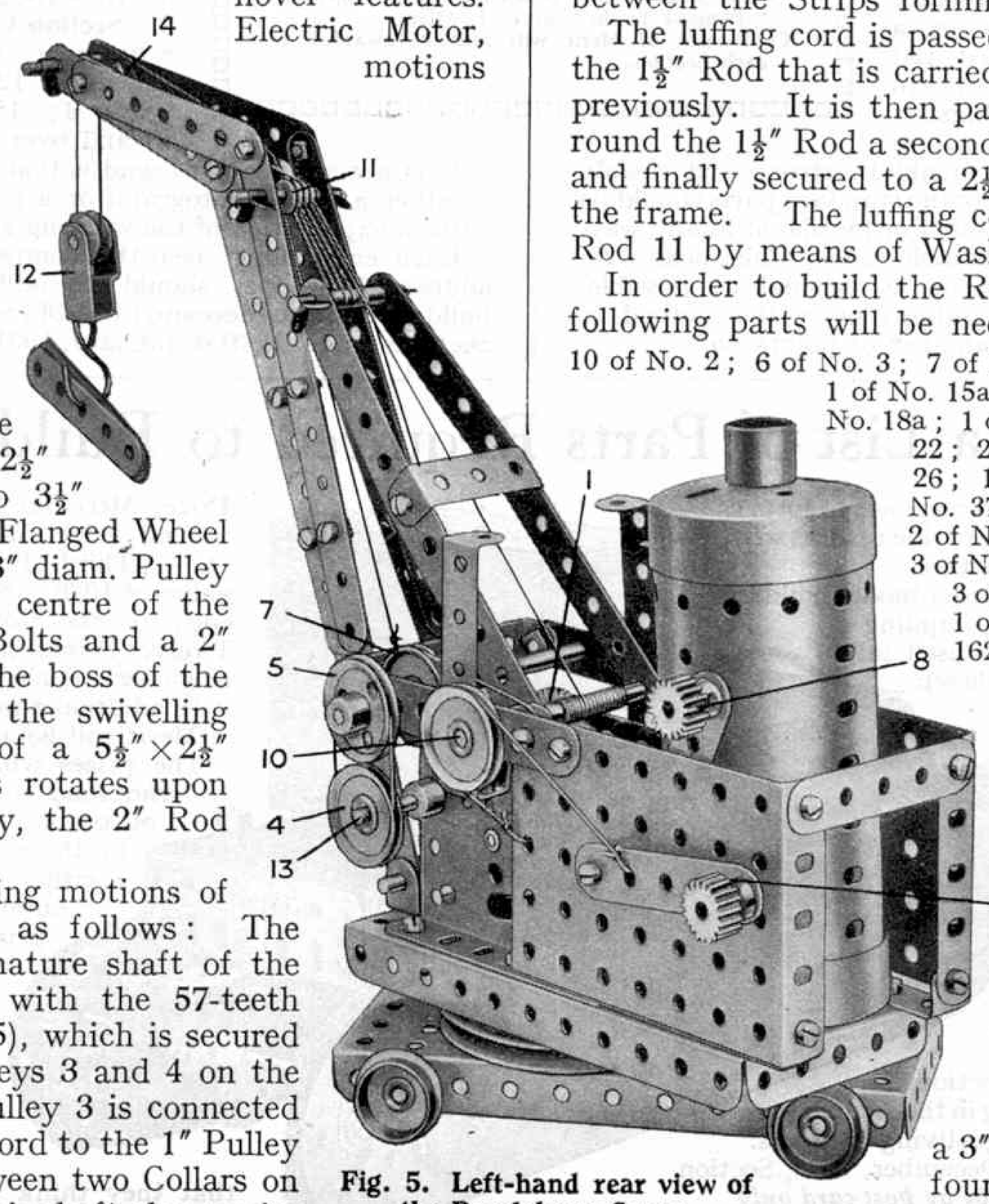


Fig. 5. Left-hand rear view of the Breakdown Crane.

The luffing and hoisting motions of the Crane are built up as follows: The small pinion on the armature shaft of the Electric Motor engages with the 57-teeth Gear 1 (see Figs. 3 and 5), which is secured to the outer 1" fast Pulleys 3 and 4 on the 3½" Rod 13. The 1" Pulley 3 is connected by means of a length of cord to the 1" Pulley 2, which is clamped between two Collars on the hoisting shaft 10. This shaft also carries two 5½" Strips joined together by a 1½" × ½" Double Angle Strip as shown, and a 1" fast Pulley (see Fig. 5) which forms a brake drum. A length of cord is passed round this Pulley and attached at one end to the frame of the Crane, and at the other to a pivoted lever carrying the ½" Pinion 9. When the cord is slack round the groove in the Pulley, the friction caused by the Collars pressing against the 1" loose Pulley 2 is sufficient to enable loads to be lifted, but on tightening the cord by depressing the brake lever, the Pulley 2 slips, thus disengaging the hoisting shaft.

The luffing motion is operated by a similar mechanism to that used for hoisting, the drive being taken from the Pulley 4 to the 1" loose Pulley 5 mounted on the luffing shaft. A length of cord is secured to the lever 8 and passes round the 1" fast Pulley 7. By operating the lever, the luffing shaft can be engaged or disengaged as desired. The hoisting cord is first attached to the Rod 10, then passed over the Rod at the jib head and carried down to the ½" loose Pulley in the block 12. It is finally secured to the Double Bracket 14 which is bolted between the Strips forming the jib head.

The luffing cord is passed over the Rod 11 and round the 1½" Rod that is carried in the 5½" Strips mentioned previously. It is then passed back round the Rod 11, round the 1½" Rod a second time, again over the Rod 11, and finally secured to a 2½" × ½" Double Angle Strip on the frame. The luffing cords are spaced apart on the Rod 11 by means of Washers.

In order to build the Railway Breakdown Crane the following parts will be needed:

10 of No. 2; 6 of No. 3; 7 of No. 5; 1 of No. 11; 1 of No. 12; 1 of No. 15a; 4 of No. 16; 2 of No. 17; 3 of No. 18a; 1 of No. 19b; 4 of No. 20b; 4 of No. 22; 2 of No. 22a; 1 of No. 23; 2 of No. 26; 1 of No. 27a; 9 of No. 35; 48 of No. 37; 7 of No. 37a; 12 of No. 38; 2 of No. 40; 1 of No. 44; 2 of No. 48; 3 of No. 48a; 2 of No. 48b; 2 of No. 52; 3 of No. 53; 1 of No. 57; 4 of No. 59; 1 of No. 111; 6 of No. 111c; 1 of No. 162; 1 of No. 164; 1 E1 Motor.

Power-driven Flyboats

Roundabouts, flyboats, mechanical swings, and similar fairground attractions, make splendid subjects for Meccano models, and constructors are sure to obtain plenty of fun from the power-driven Flyboats shown in Fig. 4.

The rotating structure consists of an 11½" Rod carrying a 3" diam. Pulley Wheel, to which four 12½" Strips are secured by Angle Brackets. (*Continued on page 1027*

Two Hundred Prizes to be Won in Meccano Competitions

In order to ensure that every boy shall have plenty of opportunity during the Christmas holidays, to exercise his Meccano model building skill, we are organising these grand "Christmas" Competitions. We are confident that every Meccano boy will find at least one of these Contests particularly adapted to his favourite type of model-building.

Grand "Christmas" Model-Building Contest

In this Contest the seventy-five splendid prizes listed in the accompanying panel are offered for the best and most original models submitted. There are no entrance fees to pay or forms to fill in, and the contest is open to every owner of a Meccano outfit.

Competitors may build any model they like, so long as it is not copied from any of the models described or illustrated in the Meccano Manuals, or other Meccano publications. Any number of parts or any size outfit may be used in constructing models, but it is not necessarily the largest models that will win the prizes, for the chief points that will be looked for when judging the entries will be originality and sound construction. Competitors will be well advised, therefore, to chose the subject of their models with great care. Models that really work, or that may be put to some practical use, will naturally attract the attention of the judges more than models that do not work, or fail to reproduce the movements of their prototypes.

In order that every competitor may have an equal chance, irrespective of his age, a special judging system will be adopted, and under this scheme points will be awarded to each entry under the following headings :—

Construction : Models should be built on correct mechanical principles, and should be strong and cleanly designed. So far as possible only Meccano standard parts should be used, and the parts should not be altered or mutilated in any way. Maximum number of points obtainable under this head—20.

Originality : Competitors should be as original as possible, either in regard to their choice of subject or to the method of building their models. Maximum number of points—5.

Seventy-five Prizes!

The Prizes to be awarded in Sections A and C of the Grand Christmas Contest are as follows :—

First Prize : Cheque for £3-3s.
Second Prize : Cheque for £2-2s.
Third Prize : Cheque for £1-1s.
Six Prizes, each consisting of Meccano goods to value 10/6.
Six Prizes, each consisting of Meccano goods to value 5/–.
Twelve Prizes, each consisting of a Meccano Engineer's Pocket Book.

The Prizes in Section B are as follows:—

First Prize : Meccano goods to value £2-2s.
Second Prize : Meccano goods to value £1-1s.
Third Prize: Meccano goods to value 10/6.
Six Prizes, each consisting of Meccano goods to value 5/–.
Twelve Prizes, each consisting of a copy of "Famous Trains" by C. J. Allen.
Certificates of Merit will also be awarded n each Section.

Realism : Points will be awarded to models according to the degree of realism with which they reproduce the general appearance and the movements of their prototype. Maximum points—10.

General Interest : Preference will be given to those models that are likely to prove most interesting to Meccano boys generally. Maximum points—5.

Age : Each competitor's age will be considered and points will be added to the total gained by his model according to the following scale. This will ensure that all competitors have an equal chance.

In addition entries will be divided into three Sections : Section A, for competitors over 14 years of age living in the British Isles ; Section B, for competitors under 14 years living in the British Isles ; Section C, for competitors of all ages living Overseas.

Section A : Competitors aged 14 years of age, 10 points ; 15 years, 9 ; 16 years, 8 ; 17 years, 6 ; 18 years, 4 ; 19 years, 2 ; over 20 years nil. **Section B :** Under 7 years, 10 points ; 7 years, 9 ; 8 years, 8 ; 9 years, 6 ; 10 years, 5 ; 11 years, 4 ; 12 to 13 years, 2. **Section C :** Under 8 years, 10 points ; 8 years, 9 ; 9 years, 8 ; 10 years, 7 ; 11 years, 6 ; 12 years, 5 ; 13 years, 4 ; 14 years, 3 ; 15 years, 2 ; 16-18 years, 1 ; 19 and over nil.

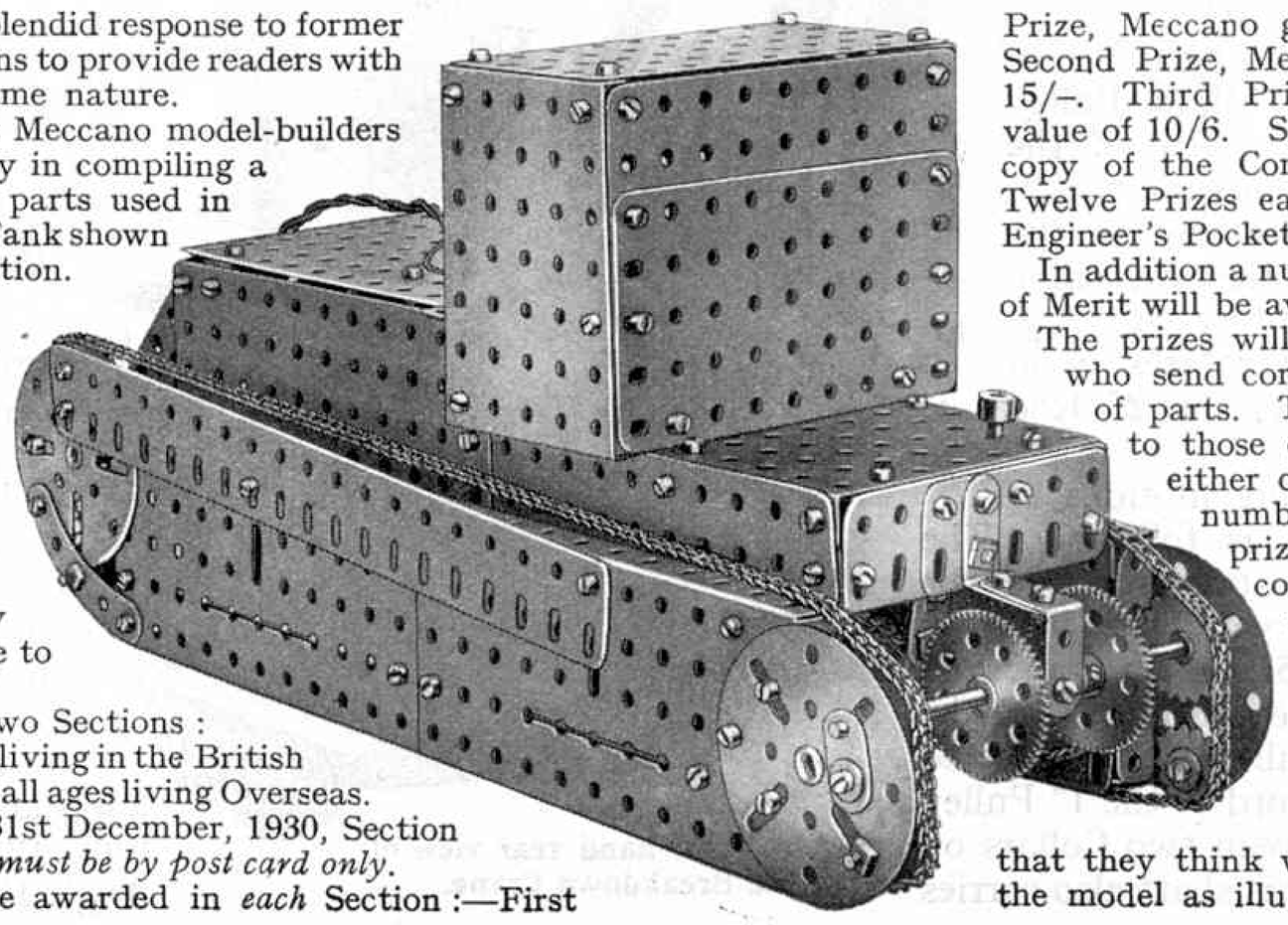
It is not necessary to send actual models. All that is required is either a clear photograph or a good drawing, together with a written explanation of the working and construction of the model.

Each entry must bear the competitor's age, name, and full address. Envelopes should be addressed "Christmas" Model-building Contest, Meccano Ltd., Old Swan, Liverpool. Closing dates : Sections A and B, 31st January, 1931 : Section C, 30th April, 1931.

Can You Make a List of Parts Required to Build this Model ?

We are encouraged by the splendid response to former "Parts Required" Competitions to provide readers with yet another contest of the same nature.

In entering the new contest Meccano model-builders are invited to test their ability in compiling a complete list of the Meccano parts used in constructing the model Army Tank shown in the accompanying illustration.



Some portions of the model cannot, of course, be seen in the illustration, and each competitor must reckon the list of parts by basing his estimation on the manner in which he or she personally thinks the model is built. Each competitor is allowed one attempt only ; but every reader, young or old is eligible to compete in the contest.

Entries will be divided into two Sections : Section A, for readers of all ages living in the British Isles ; Section B, for readers of all ages living Overseas. Closing dates, for Section A, 31st December, 1930, Section B, 31st March, 1931. *Entries must be by post card only.*

The following prizes will be awarded in *each* Section :—First Prize, Meccano goods to the value of 21/–. Second Prize, Meccano goods to the value of 15/–. Third Prize, Meccano goods to the value of 10/6. Six Prizes each consisting of a copy of the Complete Instructions Manual. Twelve Prizes each consisting of a Meccano Engineer's Pocket Book.

In addition a number of Meccano Certificates of Merit will be awarded in each Section.

The prizes will be awarded to the readers who send correct or nearest correct lists of parts. The bigger prizes will go to those competitors whose lists are either correct or contain the least number of errors, and the smaller prizes will be forwarded to the competitors whose lists are next in order of merit.

Competitors should note that it is not the total number of parts that is required, but a tabulated list stating the name, part number, and quantity of each part that they think would be necessary to build the model as illustrated.

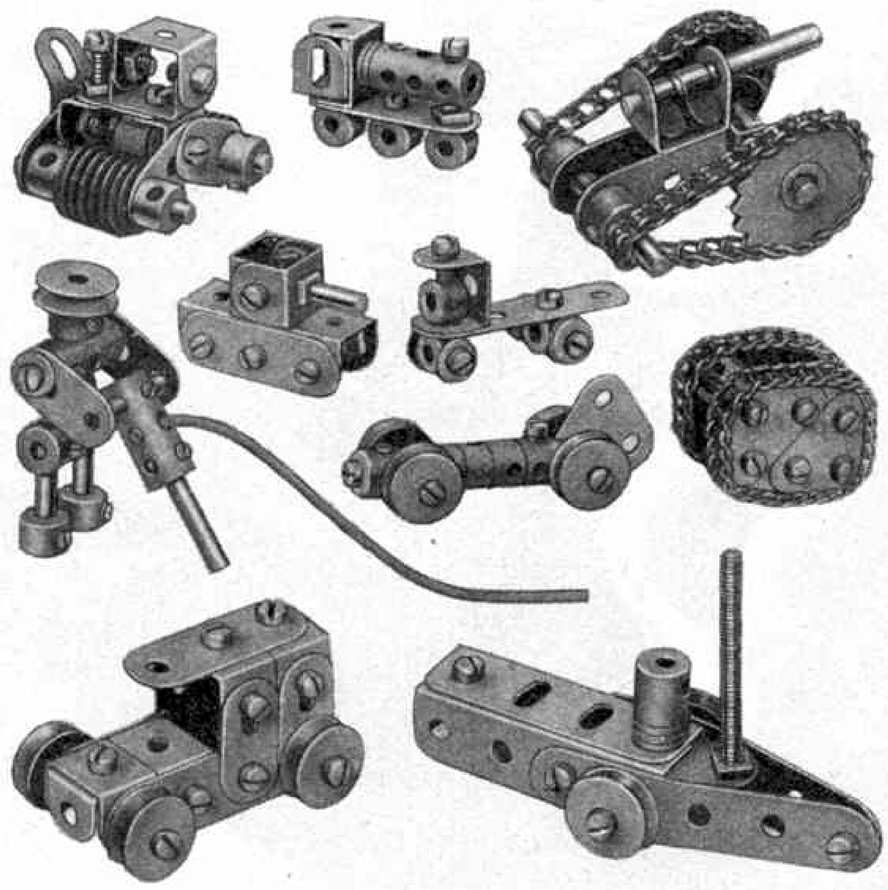
Christmas "Simplicity" Competition

This contest has been organised with the special object of giving Meccano model-builders who possess only small Outfits a chance to win one of the splendid prizes listed below. It differs from an ordinary model-building contest in that models should be built from the least possible number of parts. It will be seen, therefore, that owners of small Outfits can compete on equal terms with fortunate possessors of large Outfits.

Competitors are not restricted to any specified number of parts. Any number may be used, but the prizes will be awarded to those boys who succeed in building the best models from the smallest number of parts. On the other hand, the competitor who submits the smallest model will not necessarily obtain the First Prize. Any type of model may be entered and the Contest is open to competitors of all ages, and in any part of the world.

Although the Contest affords a splendid opportunity to the owner of a small Outfit, there is plenty of scope for the constructor who possesses a quantity of the more advanced parts, such as Cranks, Gear Wheels, Swivel Bearings, and Couplings, etc., which are often of great value in the construction of simple models.

Examples of models suitable for entry in this contest are shown in the accompanying illustration. Each of these models won a prize in a recent "Simplicity" Competition.



Fifty-seven Prizes !

There will be three sections, as follows:—Section A, for competitors over 14 years of age living in the British Isles; Section B for competitors under 14 years living in the British Isles; Section C for competitors of all ages living Overseas.

The prizes to be awarded in Sections A and C are as follows:—First Prize, cheque for £3-3s. Second Prize, cheque for £2-2s. Third Prize, cheque for £1-1s. Six Prizes, each consisting of Meccano goods to the value of 10/6. Six Prizes, each consisting of Meccano goods to the value of 5/–. Six Prizes, each consisting of a copy of "*Famous Trains*," by Mr. C. J. Allen, the popular writer on railway subjects.

The prizes in Section B are as follows:—First Prize, Meccano goods value £2-2s. Second Prize, Meccano goods value £1-1s. Third Prize, Meccano goods value 10/6. Six Prizes, each consisting of Meccano goods value 5/–. Six Prizes, each consisting of a complete Meccano Manual of Instructions.

Rules Governing Entry

Competitors should send either good drawings or photographs of their models, together with a short description of all important features. The competitor's age, name and address must be written clearly on the back of each photograph or drawing submitted, together with the letter A, B, or C, indicating the Section for which the model is eligible. No entry forms are needed, and there are no fees to be paid. *Actual models must not be sent.*

Envelopes containing entries should be addressed Christmas "Simplicity" Contest, Meccano Ltd., Binns Road, Old Swan, Liverpool.

Photographs of prize-winning models become the property of Meccano Ltd., but unsuccessful entries will be returned to the senders provided that a stamped addressed envelope of the necessary size is enclosed with the entry. More than one model may be entered in the contest, but all entries from any single competitor must be sent under the same cover. No single competitor can win more than one prize; if two or more models are entered they will be considered jointly.

Closing Dates

In many previous Meccano competitions we have been compelled to reject numerous entries simply because they were received after the closing date. In this Contest, however, there can be no excuse for the late arrival of entries, for the closing dates in all Sections have been specially extended. 31st January, 1931, is the last day on which entries may be received from competitors living in Great Britain. Overseas readers entering in Section C must forward their entries so that they reach Liverpool not later than 31st March, 1931.

Full lists of prize-winners, together with illustrations and descriptions of prize-winning models will be published in the Magazine as early as possible after the closing dates.

"Errors" Contest: What is Wrong with this Locomotive?

The model locomotive illustrated herewith has been purposely constructed incorrectly, and it will be seen that it is literally bristling with faults.

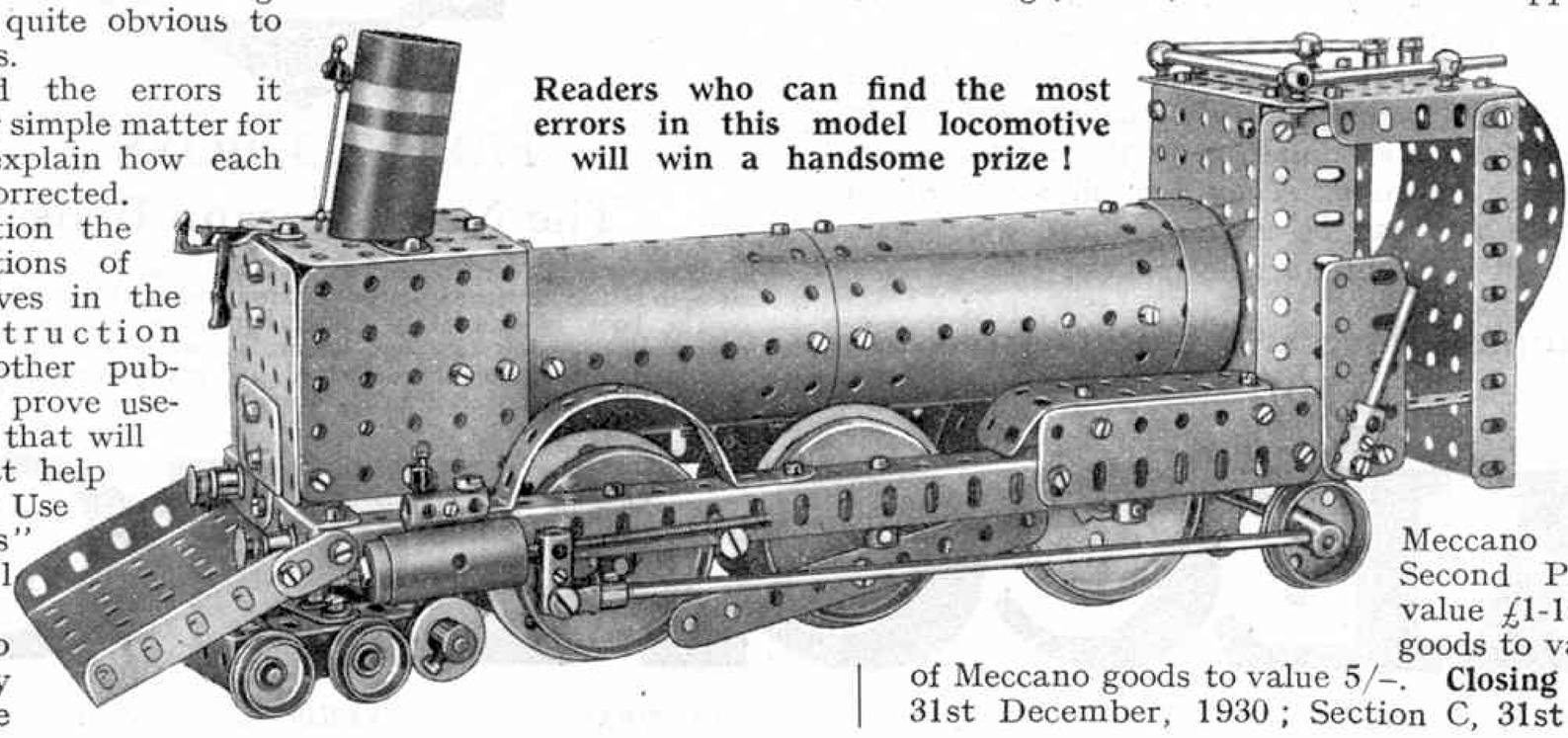
We want all Meccano model-builders to make a list of these faults and send it in to us, together with their own opinions as to the way in which the construction of the model should be corrected.

A careful study of the model will show that two definite types of mistakes have been made in building the locomotive. The first type of mistake is the incorrect use of Meccano parts. The second type of error concerns the design of the model. Errors of this type should be quite obvious to keen Meccanoites.

Having noted the errors it should be a fairly simple matter for competitors to explain how each error should be corrected. In this connection the various illustrations of model locomotives in the Meccano Instruction Manuals and other publications should prove useful, and a book that will also be of great help is the "How to Use Meccano Parts" Manual (price 6d.).

There is no doubt that many boys will be able to discover all the mistakes readily if they build up the actual model for themselves, but it is not absolutely necessary to do this because all the mistakes may easily be seen from a close study of the illustration.

Readers who can find the most errors in this model locomotive will win a handsome prize !

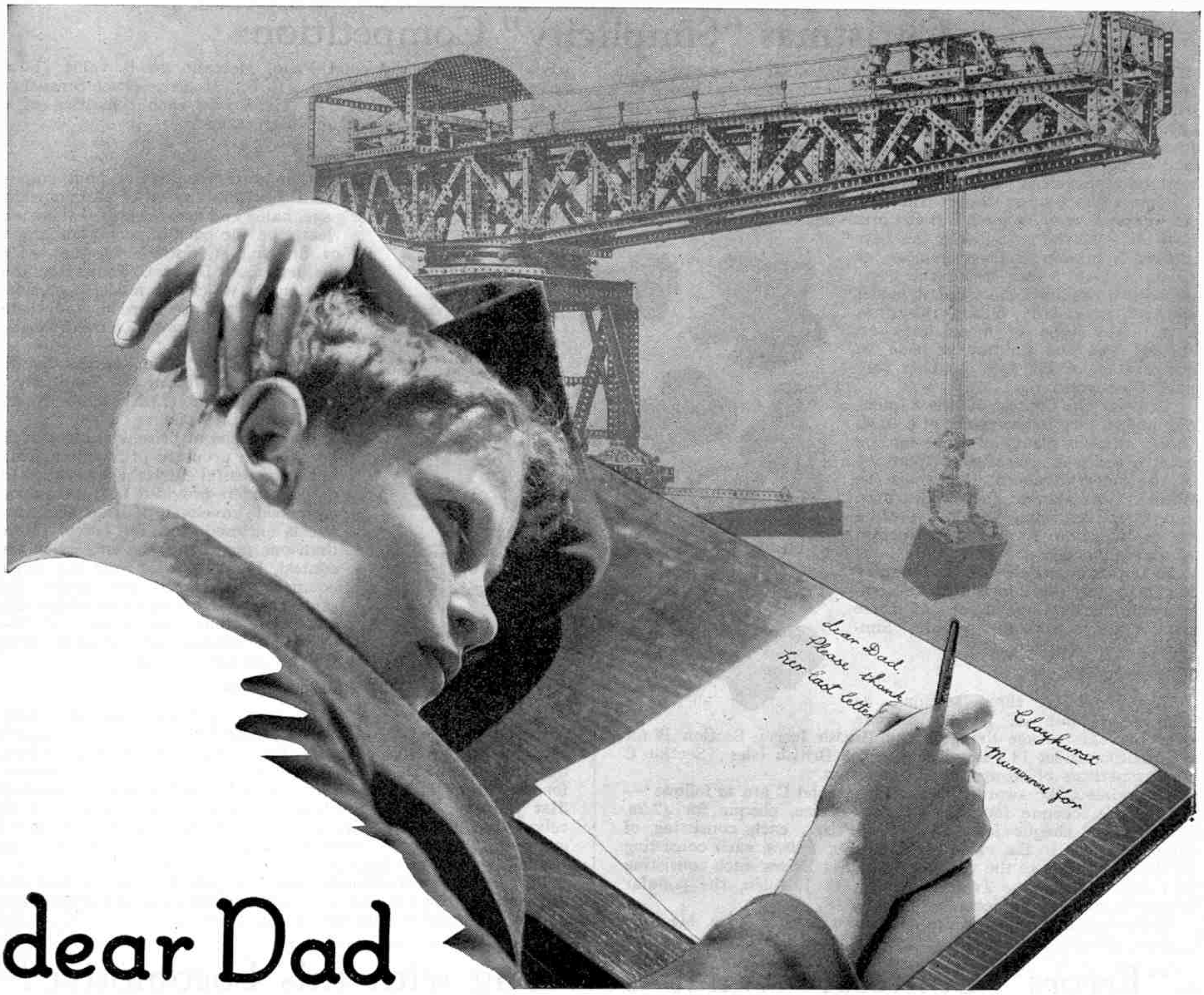


Competitors should first write out a list of all the faults they can find in the model. When the list is complete a brief description should be written on a separate sheet of paper, of the way in which the model ought to be built.

Competitors should write on one side of the paper only, and their age, name, and address must appear on the back of each sheet of paper sent in.

Entries will be divided into three Sections: Section A, for competitors over 14 years of age living in the British Isles. Section B, for competitors under 14 years of age living in the British Isles. Section C, for competitors of all ages living Overseas.

The prizes to be awarded in each Section are as follows. First Prize, Meccano goods to value £2-2s. Second Prize, Meccano goods to value £1-1s. Third Prize, Meccano goods to value 10/6. Twelve Prizes, of Meccano goods to value 5/–. **Closing dates:** Sections A and B, 31st December, 1930; Section C, 31st March, 1931.



dear Dad

Please thank Mother for her last letter. I hope you are quite well. Last week I was second in maths. Not long now to Christmas. I wonder .....

When Dad receives your letter he will know exactly what is coming next . . . and because he knows, you may be sure he will give you Meccano this Christmas!

When you have Meccano you are able to build hundreds of real engineering models. One day a crane, the next a steam wagon, the day after a pit-head gear. There is endless variety, endless fun, for Meccano is real engineering in miniature—all the parts are miniatures of the corresponding parts in engineering practice. They are all standardised and interchangeable and can be used over and over again to make hundreds of different working models.

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The book is brimful of illustrations showing the splendid engineering models that can be made with Meccano. All the Meccano Outfits are fully described, and many other interesting details of this wonderful hobby are given.

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Suggestions Page

(209)—Automatic Lubricator for Meccano Steam Engine

(*By S. Stevens, Croydon*)

The device shown in Fig. 209 is a novel type of lubricator that may be employed to supply oil continuously to the cylinder wall and piston of the Meccano Steam Engine. Such a device reduces wear and increases the power of the Engine to a considerable extent by maintaining a film of oil between parts that generally suffer from a lack of it.

It is first necessary to file a slot $\frac{1}{8}$" deep and $\frac{1}{8}$" wide in the end of the cylinder, as shown in the illustration. Care should be taken that no burrs are left on the inside of the cylinder, otherwise the piston may jam. The lubricator proper consists of a $\frac{3}{4}$" Flanged Wheel, which has inserted partially in its set-screw hole a 1" Threaded Rod that is secured by double Nuts to a $1\frac{1}{2}$" Strip, which in turn is attached by a $1" \times \frac{1}{2}$" Angle Bracket to the base of the engine. The Flanged Wheel is retained rigidly on the end of the Threaded Rod by a nut locked against its boss, matters being so arranged that the tip of a 1" Rod, which is free to slide in the boss of the Flanged Wheel, comes over the slot in the cylinder. A Collar is secured to the 1" Rod in such a position that the Rod is lifted slightly when the cylinder reaches its uppermost position. It will be seen that a Grub-screw is inserted in the remaining hole of the Flanged Wheel to prevent oil leaking through the hole.

The Flanged Wheel is filled with a suitable oil such as "Castrol," which retains its lubricating properties under the high temperature of the steam. The special Meccano oil is not suitable for the purpose.

When the engine is running, the sliding rod is kept in a continual state of vibration by the action of the cylinder striking it. This causes oil to be deposited on the piston and also on the cylinder walls.

(210) — Front Wheel Brakes for Model Cars

(*By L. Lodder, Eastbourne*)

In the design of front wheel brake mechanisms, it is a difficult matter to get the road wheels within a reasonable distance of the stub axle support. This is a matter of great importance and has been considered fully in the brake in Fig. 210.

The stub axle pivot 1, which is journalled freely in the two portions of the front axle, has mounted on it a Coupling, which carries the stub axle. This has secured rigidly to it a Face Plate in the diametrically-opposite slots of which $\frac{3}{8}$" Bolts 2 are free to slide. Two Washers are placed under the heads of each Bolt, which are then inserted in the slots, and Collars are secured on the end of their shanks. The Collars form the brake shoes, and a short length of Spring Cord is attached to their Set-screws

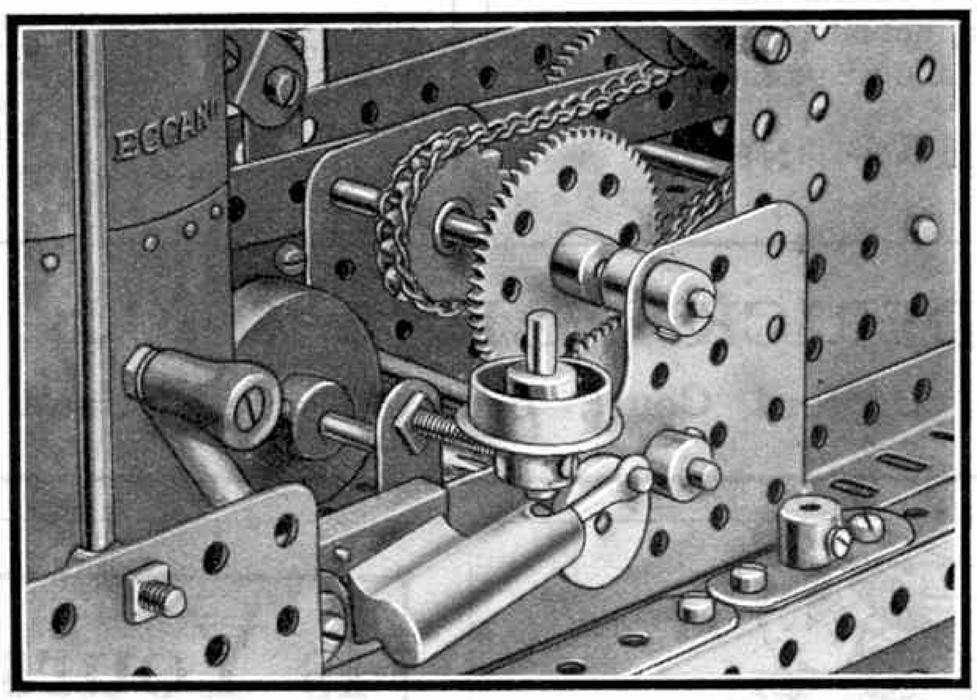

Fig. 209

to keep them in contact with the cam.

The $\frac{3}{8}$" Bolts are actuated by an oval-shaped cam 3, which consists of two $2\frac{1}{2}$" small radius Curved Strips bolted by set-screws to a $2\frac{1}{2}$" Strip. The latter pivots on the stub axle, and on operating the cam the Bolts 2 are forced outward, thus applying the brake shoes to the brake drum (a Wheel Flange).

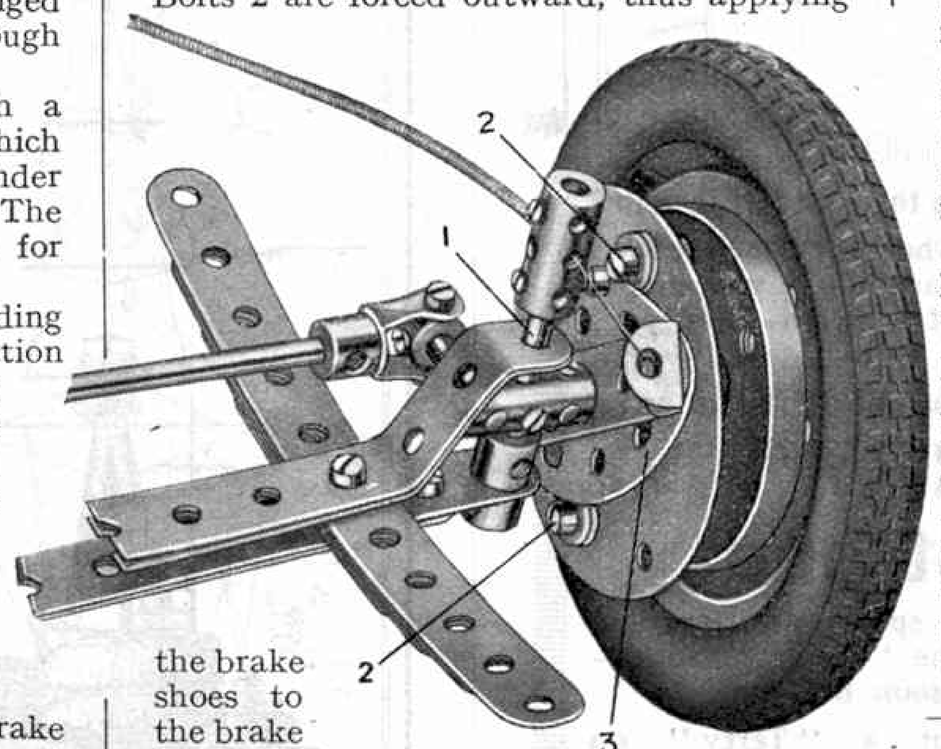

Fig. 210

The road wheel is shown separated from the Face Plate, but actually it is spaced by a Washer from the boss of the Face Plate.

The cam is operated by Bowden wire control, the outer sheath consisting of Spring Cord through which is threaded a length of wire. One end of the Spring Cord is clamped to the chassis, while the other end lies in the transverse hole of a Coupling on the pivot 1, the top end of which projects into the transverse hole to prevent the passage of the Spring Cord while allowing the wire to pass freely.

Miscellaneous Suggestions

Under this heading "Spanner" replies to readers who submit interesting suggestions regarding new Meccano models or movements that he is unable to deal with more fully elsewhere. On occasion he offers comments and technical criticisms that, he trusts, will be accepted in the same spirit of mutual help in which they are advanced.

(M.97). A Meccano Water Motor—An extremely neat and realistic model of a water turbine has been submitted by K. Albury (London). It consists essentially of an outer casing inside which revolves a rotor. The outer casing consists of a Boiler End closed by a Wheel Flange, and the rotor is a Fan. Two holes are made in the Boiler End. One is to take the nozzle from which a jet of water impinges on to the blades of the rotor, and the other hole is for the purpose of allowing the waste water to escape.

(M.98). Putting in that Awkward Nut.—In practically every model that a boy attempts to build he will find that occasions arise in which it is necessary to get nuts into almost inaccessible positions. J. Goode (Croydon) has solved the difficulty to his satisfaction, by making a special tool to hold the nuts. The device consists of a pair of springy brass arms that are attached in a suitable manner to a rod and which are shaped so as to grip the nut. Goode's idea is no doubt very efficient, but we venture to think that a Small Fork Piece would fulfil the want even better, since the nuts may be placed in any desired position in relation to the handle of the tool. We also take this opportunity of reminding Meccano boys of the time-honoured method of using a Strip, which may be bent into any desired shape and on which the nut is stuck with thick gum!

(M.99). A Simple Paper Clip.—A useful paper clip by R. Blick (Southland, New Zealand) is made in the following manner. A Flat Trunnion is secured to a $2\frac{1}{2}$" Strip to form a T-shaped member. Two of these are needed and each has a Double Bracket bolted to it 1" from the edge of the Trunnion, while the Double Brackets pivot on a $\frac{3}{4}$" Bolt that passes through both of them. The straight edges of the Trunnions are held in close contact by a Spring, which is placed between the $2\frac{1}{2}$" Strips.

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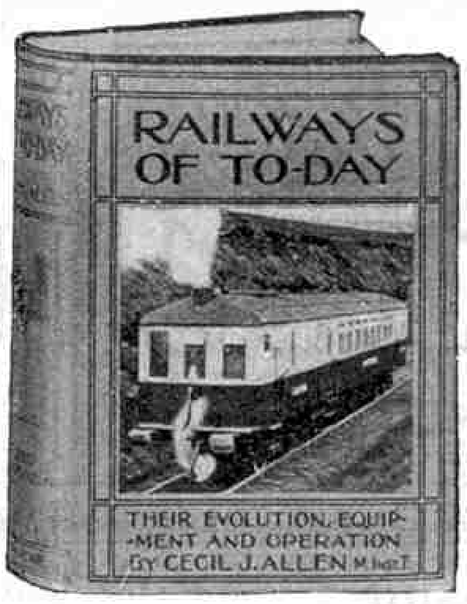

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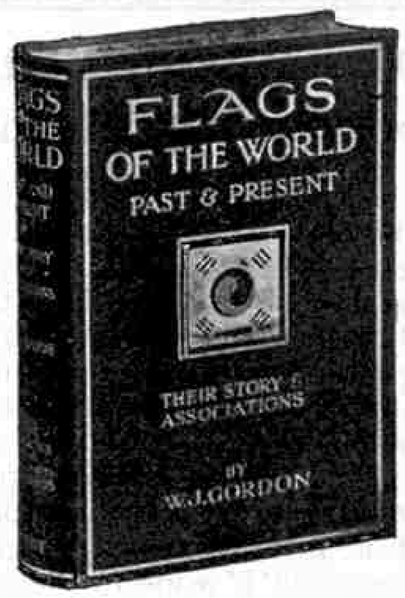

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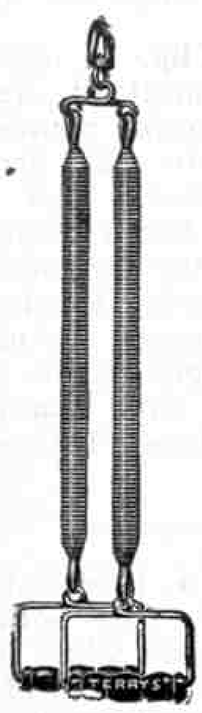

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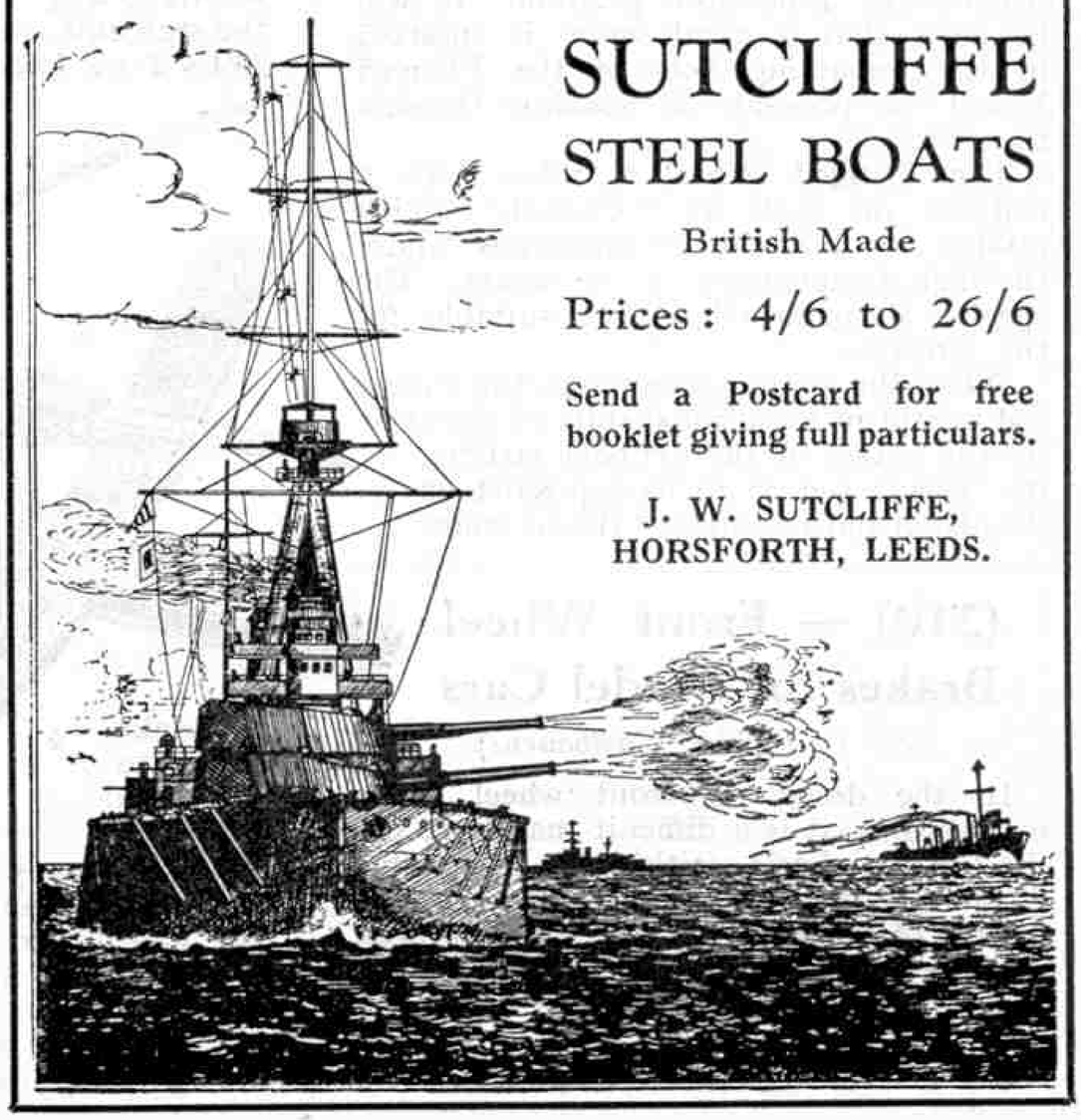

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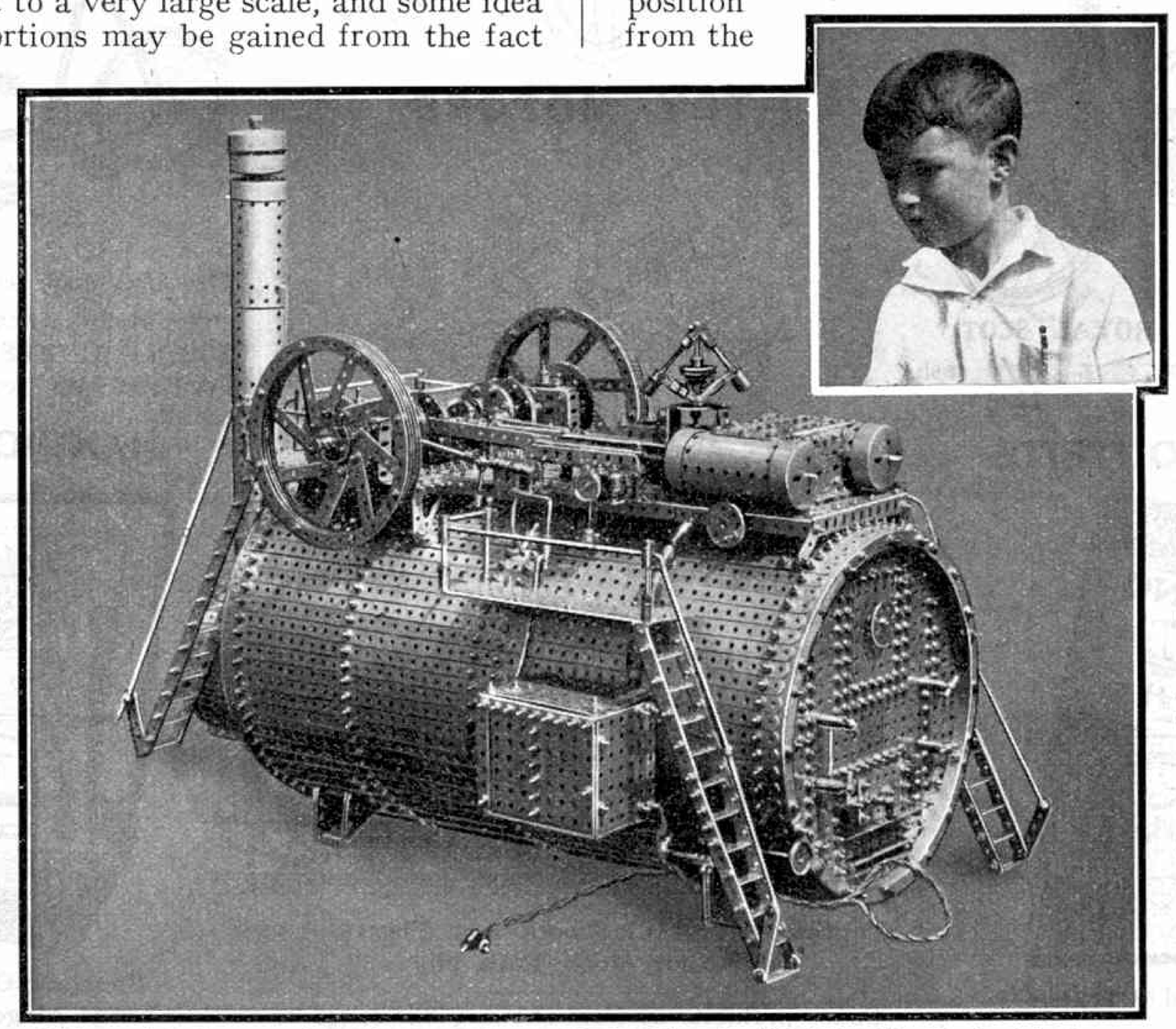
Something New in Model-Building:

An Overtype Steam Engine and Boiler

WHEN one considers the importance of the steam engine in modern engineering, it seems remarkable that so few Meccano enthusiasts turn their attention to this branch of model-building. The model of an overtype steam engine and boiler shown in the accompanying illustration affords a splendid example of what may be accomplished in this direction. This model was built recently by a Swiss enthusiast, Werner Risch, of Zurich, and the design of the model speaks well for the ingenuity and skill of its constructor. He has succeeded in reproducing in a very faithful manner all the main features of an actual engine of this type.

The model is built to a very large scale, and some idea of its massive proportions may be gained from the fact that the boiler is built up round the perimeters of Channel Segments, one-hundred-and-forty-four $12\frac{1}{2}''$ Strips being required for its construction. The ends of the boiler are filled in by means of Strips and Plates, and the fittings at the fire-box end include water-level and steam pressure gauges, and fire-box and ash-hole doors. The smoke-box at the chimney end of the furnace is built up from Strips bolted round the perimeters of two Hub Discs.

The twin-cylinder horizontal type engine is carried on a platform erected above the boiler and extending from end to end.



This model of an overtype steam engine and boiler literally "bristles" with good features. It was constructed by Werner Risch (inset) of Zurich, Switzerland, and is described in detail in the accompanying article.

Each of the engine cylinders is represented by a Meccano Boiler, with an Axle Rod passed through its centre to serve as a piston rod. The crosshead construction is particularly ingenious, and is carried out in the following manner. A large Fork Piece secured to the piston rod forms a pivotal connection to the connecting rod, and carries on each arm a Double Bracket to form the crosshead slippers. Slides for the Brackets are formed from Angle Girders and Strips, supported on Couplings by means of short lengths of Screwed Rods.

The double-throw crankshaft is built up from Axle Rods, on which Couplings are placed to add strength and also to give the crankshaft a massive appearance in keeping with the general design of the model. Two pairs of Face Plates butted face to face, but spaced by Washers, form each crank disc, a short Rod being fitted between each pair of discs so formed to serve as a crankpin. The valves are operated by means of Single-Throw Eccentrics working through rods connected to the arms of the Eccentrics by means of Handrail Supports. Two Flywheels are provided, one on each extremity of the Crankshaft; and each is built up from five Circular Strips spaced apart by Washers and fitted with eight 3" Strips for spokes. The method of securing the spokes in position will be apparent from the illustration, and it will be seen that a very serviceable flywheel may be built up in this manner.

A feed-water pump is fitted and is supported by means of a 2" Flat Girder attached at the left-hand side of the boiler. The pump is represented by a Coupling, in which slides a $1\frac{1}{2}''$ Rod actuated by a connecting rod operated in turn by an Eccentric on the crankshaft.

Another interesting feature is a miniature mechanical lubricator, built up from two Worms mounted vertically between two $1\frac{1}{2}''$ Strips, and a 1" Pulley Wheel fitted between them.

The governor is of the centrifugal type and is built up from Rods and Swivel Bearings with Worms for weights. A Cone Pulley, free to slide on the governor shaft, prevents the Worms from flying outward too freely. The Rod on which the governor is mounted is passed down into the interior of the boiler, where it connects with the drive from a Meccano Electric Motor arranged inside the boiler. The drive from the Motor to the crankshaft is transmitted through a secondary shaft by ratio 1 : 1 and 3 : 1 bevel gearing.

Other items of interest are a feed-water tank fitted to the side of the boiler, and a dummy steam pipe represented by an Axle Rod on which Worms are secured.

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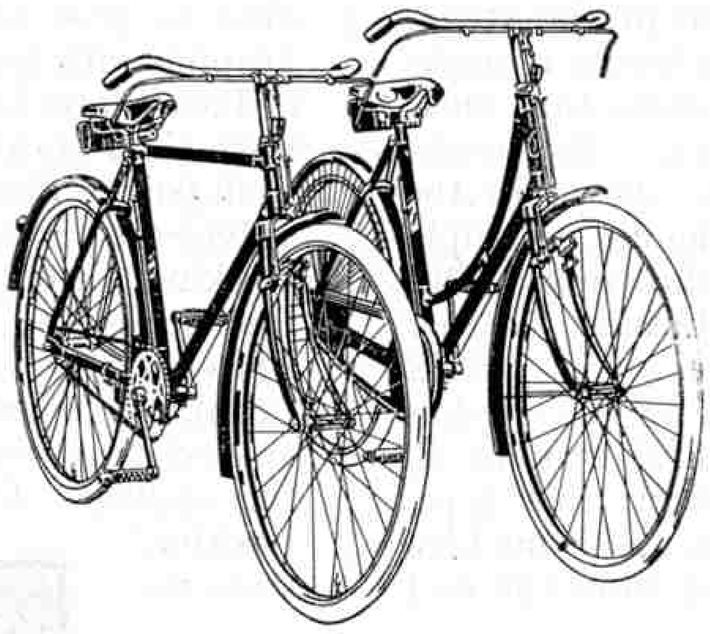

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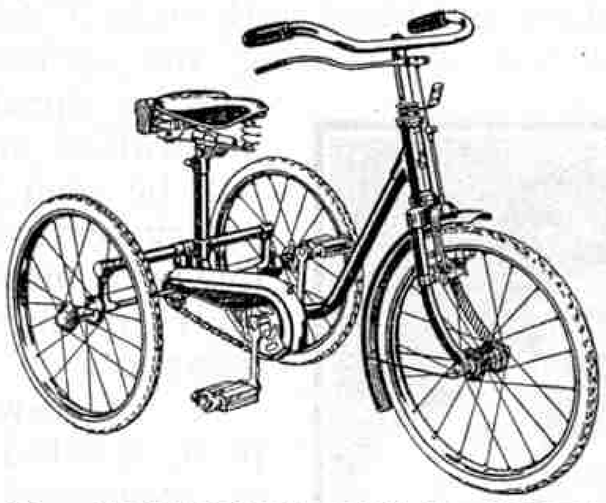

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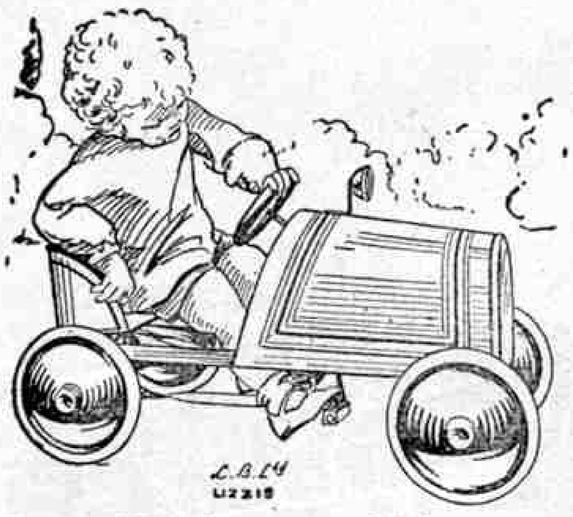

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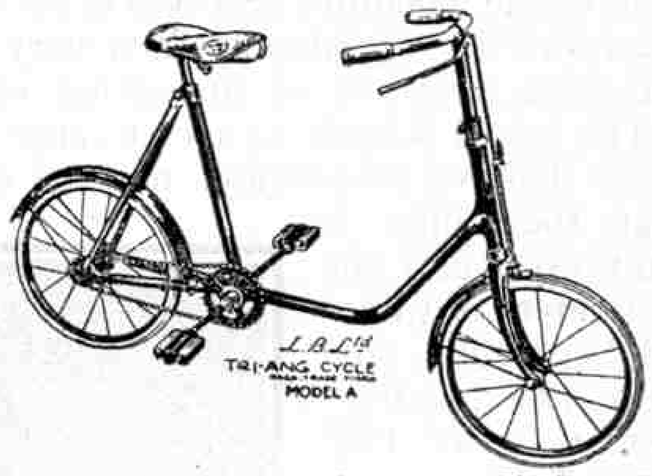

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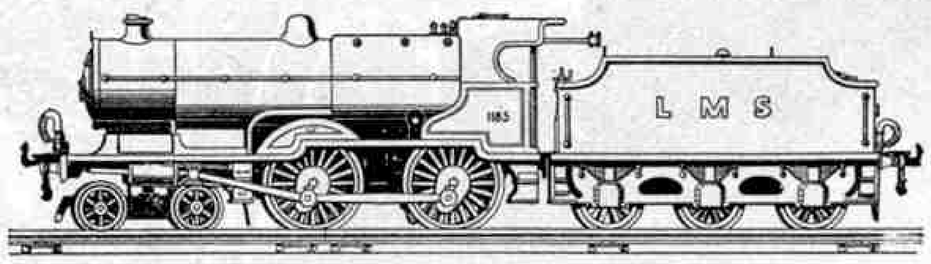

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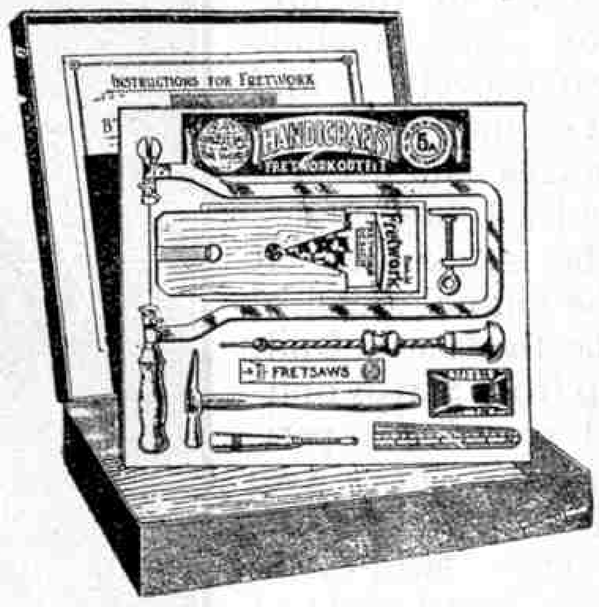

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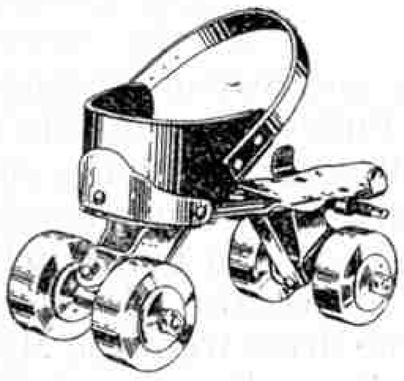

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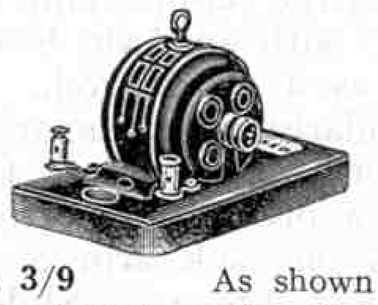

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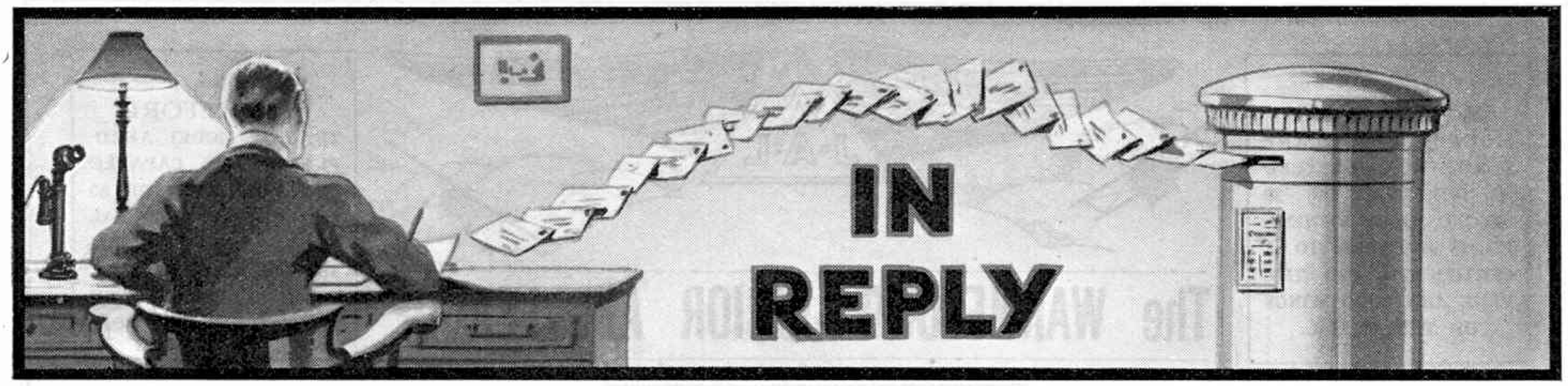
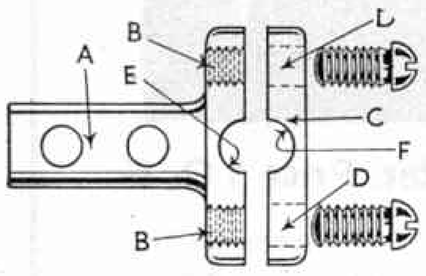


READERS' SUGGESTIONS FOR MECCANO IMPROVEMENTS

SPECIAL COUPLING.—Your suggested special type of coupling for use with the Meccano Crankshaft, has been ingeniously thought out and for the benefit of other readers, we are illustrating this idea, herewith. The proposed coupling would consist of cylindrical portion A, which would terminate in two lugs B, bored and tapped to take standard Meccano bolts. A semi-circular portion E would be removed from the end of the part A and a similar portion F would be cut away from the plate C, which would be drilled so that bolts might be passed through it and secured in the threaded holes B. In use, the parts A and C would be placed in position on the "cranked" portion of the Meccano Crankshaft, and the two parts held together by means of bolts. The crankshaft could then rotate freely in the portions E and F of the coupling and a Rod could be secured in the portion A to act as the connecting rod of a model steam engine, etc. Although the part is ingenious and would work quite well, it would not be advisable to introduce it as it would be very expensive to manufacture and could be applied to very few models. A standard Strip secured in place by two Spring Clips forms an excellent connecting rod for use with the Meccano Crankshaft, and where a heavier form of construction is required, the crankshaft and connecting rod "big end" should be built up from cranks and other standard parts. (*Reply to L. Taylor, Darlington*).



NEW TYPE BOLTS.—If the Meccano bolts were manufactured with square heads, their appearance would suffer considerably. The domed heads of the bolts are designed to represent rivets, and if replaced by your suggested shape they would lose this resemblance. Moreover, screwdrivers would still be necessary for use with woodscrews, 6 B.A. Screws, etc. We feel sure that your proposed alteration would not be popular with model-builders and we are therefore unable to give it further attention. (*Reply to A. J. Billings, Thornton Heath, Surrey*).

SEMI-CIRCULAR CONTRATE WHEEL.—Your suggested contrate, having teeth cut in only half of its periphery, is interesting. This wheel could be used to impart a short intermittent reverse motion to a Rod carrying two Pinions with which it was geared, but it is not easy to find many applications for a movement of this type. We shall be interested to hear from readers who can suggest uses for the proposed contrate. (*Reply to A. Figgett, Chatham, Kent*).

SHORTER TENSION SPRING.—We note your idea that a shorter tension spring should be added to the system. We agree that a spring 1" long overall would be useful in confined spaces, and we are keeping your idea before us for early attention. As you point out, the part would combine the strength of the Meccano Spring with the compactness of Spring Cord. (*Reply to R. J. Foster, Newcastle-on-Tyne*).

SPRING COUPLING.—Your idea for a special flexible transmission unit is interesting. This part would consist of a strong spring, secured at each end in the bore of a Coupling. This unit would be useful for providing drives at various angles and we are giving the idea close attention. For the time being, we suggest that you use a Tension Spring with an End Bearing bolted to each end, and this will function quite well. (*Reply to M. James, Newport, Mon.*).

SMALL PROPELLERS.—We were interested in your suggestion that small aeroplane propellers should be introduced into the Meccano system. The propeller that can be built up from two standard Propeller Blades (part No. 41) and a Bush Wheel, measures approximately 7½" across and this size is too large for many models. A small propeller can be formed by bolting two blades, each composed of one 2½" Curved and one straight Strip, to a Bush Wheel. We intend giving your idea consideration. (*Reply to G J. Donn, York*).

2½" GEAR WHEEL.—We are considering the addition of a 2½" diameter Gear Wheel to the present range of Meccano gears and an announcement regarding this will be made in the "*M.M.*" shortly. We do not consider, however, that 2½" Pulley Wheels are necessary additions to the system. (*Reply to H. Berry, Foxton, N.I., N.Z.*).

NARROW STRIPS.—Your suggestion that special narrow strips should be manufactured in several of the shorter lengths for use where space is restricted is quite interesting, but possesses few possibilities. Where a standard width Strip cannot be employed, a standard Axle Rod and Couplings can often be utilised. Your suggestion is nevertheless being filed for reference. (*Reply to V. Huges, Hereford*).

TWISTED STRIP.—A 2" Strip twisted so that one end is at right angles to the other would not be a suitable addition to the Meccano system. We are not in favour of employing this form of construction in any Meccano part, as it would be unsatisfactory in use and would be poor practice from an engineering standpoint. The Corner Angle Brackets will be found useful for connecting two Strips at right angles. (*Reply to L. S. Whitham, Launceston, Tasmania*).

Cash Prizes for Bright Ideas

Every month many interesting suggestions regarding additions and improvements to the Meccano system are forwarded to us. Each idea is given careful consideration, and the suggestions possessing the greatest general interest are published in these columns. In order to introduce the spirit of friendly rivalry among contributors to this section, we have now decided to award each month a prize of 10/- to the reader who submits the most ingenious idea. Every model-builder should therefore make a point of sending in his ideas, as they may quite easily be the means of providing him with "pocket" money, which is very useful just now!

This special competition commences with the present issue, and the first award of 10/- will be made for the best suggestion submitted during December (Overseas readers should submit ideas for the "January" Contest). The contest is open to readers of all ages. The most elaborate idea will not necessarily carry off the prize—in fact a simple but ingenious suggestion thought out by the owner of a No. 000 Outfit is just as likely to do so! Any number of ideas may be submitted by competitors for each monthly contest, but each suggestion submitted should be written on a separate sheet of paper, and the name, age, and address of the sender should appear on each sheet used. Envelopes should be addressed to "Ideas" Contest, Meccano Ltd., Binns Road, Old Swan, Liverpool.

MOTOR CAR EXHAUST PIPES.—We note that you think that motor car exhaust pipes should be introduced, but we would point out to you that these fittings can be represented in several ways with existing parts. For instance a Crank-handle can be used to form an exhaust pipe for a small model. A Rod fitted with a Coupling in which a Centre Fork is secured can also be employed or a Rod with an End Bearing holding two 1" Triangular Plates to form the usual "fishtail" on the end of the pipe is also effective. In view of this, it is unnecessary to manufacture special exhaust pipes. (*Reply to J. P. Warrack, Crouch End, N.8*).

9½" ROD.—Your suggestion that we should introduce a 9½" Rod into the Meccano system is quite sound and will receive careful attention. In the meantime, we suggest that you join a 5" Rod and a 4½" Rod together by means of a Coupling, to form the required length. (*Reply to L. K. Raquer, Dulwich, S.E.21*).

SHIPS' VENTILATORS.—We were interested in your idea that we should introduce special miniature ventilators for fitting to models of ships. As mentioned previously in these columns we have in mind the introduction of a range of ships' fittings that cannot be reproduced easily with standard parts and your proposed ventilators will receive careful thought. (*Reply to A. C. Gostick, Watford, Herts.*).

HOOKS FOR SPRING CORD.—We were interested in your idea for special hooks that could be attached to the ends of lengths of Spring Cord. If these hooks were used it would be unnecessary to make a loop in the end of the Cord in order to attach it to a model as at present. The hook would be threaded at one end, the pitch being the same as that of the recently-introduced Spring Cord Coupling Screw (part No. 58a). We are considering this idea. (*Reply to J. Powell, Edinburgh*).

STEEL ROLLERS.—It would be a costly undertaking to make ½" diameter steel rollers for inclusion in the system. These parts would have a bore of 5/32" in diameter and a tapped hole at each end to take a long grub screw. While we consider that the cost will be prohibitive, we are going further into the matter, as your suggested part could be used in a practical manner in Strip straightening machines, printing machines, etc. (*Reply to J. R. Denton, Manchester*).

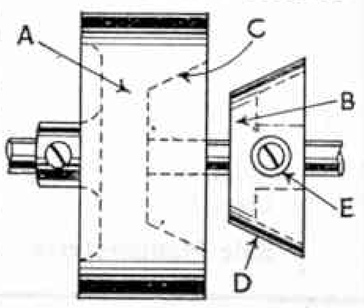
THIN WASHERS.—We agree that the existing Meccano Washer is in one or two cases too thick, and your suggestion that in future this part should be manufactured of metal of the same thickness as the shorter lengths of Strip will receive consideration. (*Reply to W. Darbyshire, Lancaster*).

CORNER BRACKETS.—A corner bracket resembling the Simple Bell Crank, but having ½" arms in place of 1" arms, would no doubt prove an asset in structural model-building. Its chief advantages would be cheapness and compactness. We are experimenting with a part of this type and hope to comment on it further. (*Reply to J. R. Forbes, Blackpool*).

NEW CLOCKWORK MOTOR.—Your remarks regarding the Clockwork Motor have been noted with interest. A number of experiments have been carried out recently with the object of improving the performance and adaptability of this Motor, and some very interesting developments have resulted. We hope to make an important announcement regarding the Motor very soon. (*Reply to J. M. W. Knott, Malvern, and others*).

NEW TYPE SCREWDRIVER.—We were interested in your idea regarding a special non-slip screwdriver. Your suggested tool would be made on similar lines to the Meccano special Screwdriver (part No. 36b), but its end would be hollowed out and a bar would be secured across the concave portion to fit into the slot in the bolt head. No doubt such an arrangement would be "slip-proof," but the driver would be very unadaptable, and we would point out that a similar result can be obtained by fixing a small Fork Piece to the Special Screwdriver, and slightly bending the arms so that the bolt can be clipped between them while being tightened. It would not be advisable therefore, to introduce your suggested screwdriver. (*Reply to E. Paul, Otley, Yorks.*).

COMBINED FLYWHEEL AND CLUTCH.—Model-builders who specialise in the construction of motor cars will know that compactness is a very necessary feature, and your design for a neat flywheel and clutch unit, which we illustrate herewith, is therefore of interest. The unit would consist of a heavy metal flywheel fitted with bush and set screw A, having a conical depression C cut in it. This depression could form one section of the clutch, the other section being in the form of a truncated cone B, also fitted with boss and set-screw so that it could be mounted on a rod and moved into engagement with C, when required. The face of the cone B would be perforated at E to enable the set-screw to be adjusted. The complete unit would be very compact, but it would be very expensive to manufacture, and further, trouble would be liable to occur in the clutch portion. The cone type of clutch is hardly applicable to a miniature engineering system and you will find it a much better plan to use a simple friction type clutch such as that incorporated in the Meccano Motor Chassis (see Super Model Leaflet No. 1). (*Reply to F. Hurst, Bedford*).



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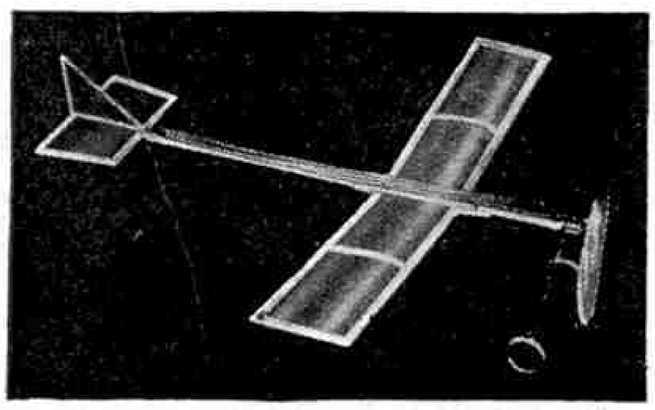

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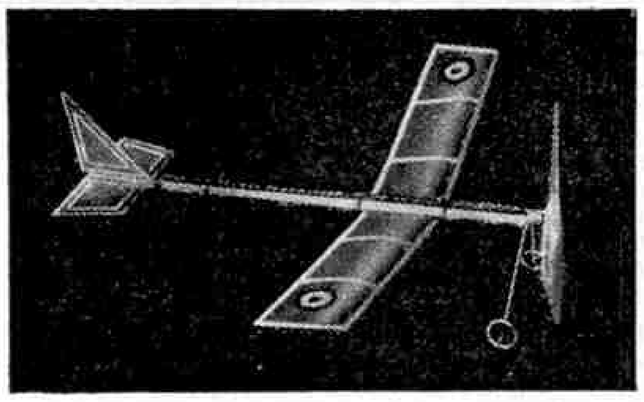

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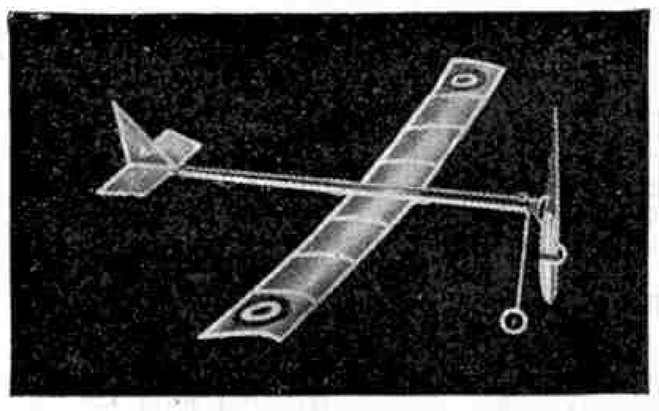

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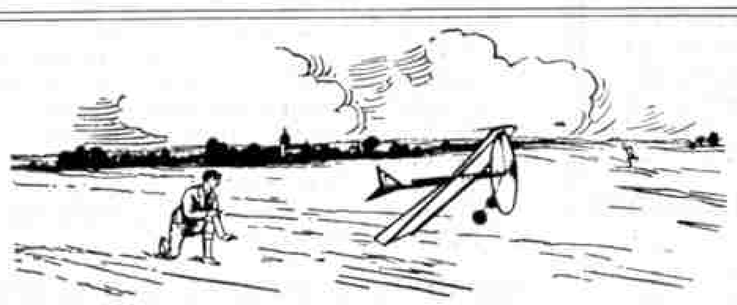

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Results of Meccano Model-Building Contests

By Frank Hornby

"Engineering of the Future" Contest (Home and Overseas)

THE "Engineering of the Future" Competition was organised with the object of ascertaining how Meccano enthusiasts visualise the engineering world of say, a hundred years hence, and in entering the contest competitors were asked to submit models of machines, aeroplanes, locomotives, ships or any other engineering contrivance, which they think will be commonplace to the engineers of the twenty-first century.

No stipulations were made regarding the number of Meccano parts or size of Outfit to be used in building models, and competitors were given entirely free rein in choosing the subject of their entry. As a result of the unlimited field thus thrown open to model-builders many interesting models were received, of which a few of the most outstanding are illustrated on this and the next page.

The full lists of prize-winning competitors are as follows:—

Section A (for competitors over 14 years of age).

FIRST PRIZE, cheque for £2-2s.: E. A Stevens, Sutton, Surrey. SECOND PRIZE, cheque for £1-1s.: H. W. Noble, Urmston, near Manchester THIRD PRIZE, cheque for 10/6: Wm. Stewart, Lenzie, near Glasgow.

TWELVE PRIZES, each consisting of Meccano products to value 5/-: Norman A. Hulbert, Trowbridge; B. Unné, Harrogate; T. Woodcock, Folkestone; J. L. Leeson, Brigg, Lincs.; L. Cooper, Anerley, London, S.E.20; K. R. Campbell, Wolverhampton; F. C. Roberts, Nantwich; J. Crawford, Tewkesbury; Jack Langton, Stoke-on-Trent; E. W. Nutall, Buxton; N. Ramsey, Preston; Arthur F. Hunt, Mansfield.

TWELVE PRIZES, each consisting of a Meccano Engineer's Pocket Book: A. C. Rose, Birmingham; D. Cawsey, Highfield, Southampton; T. Lawrenson, Wimborne, Dorset; V. Collette, Bristol; M. W. Wilman, Cheltenham; R. Bellamy, Reading; C. H. Williamson, Gateshead; John S. Peters, Gillingham, Kent; Donald Whitworth, Whitehaven; P. Craig, Mexborough, Rotherham; H. Balfour, Twickenham, Middlesex; Frank Oakland, Wakefield, Yorks.

Section B (for competitors under 14 years of age).

FIRST PRIZE, Meccano products to value £2-2s.: Frank Singleton, Hull. SECOND PRIZE, Meccano products to value £1-1s.: F. M. Page, Newcastle-under-Lyme. THIRD PRIZE, Meccano products to value 10/6: L. Mayne, Kennington, S.E.17.

SIX PRIZES, each consisting of Meccano products to value 5/-: M. M. Young, Purley, Surrey; John Clarke, London, S.W.1; P. Erskine-Tullock, New Barnet; Albert Price, Orpington, Kent; F. W. Davis, Northwood, Middlesex; John Webster, Great Clacton, Essex.

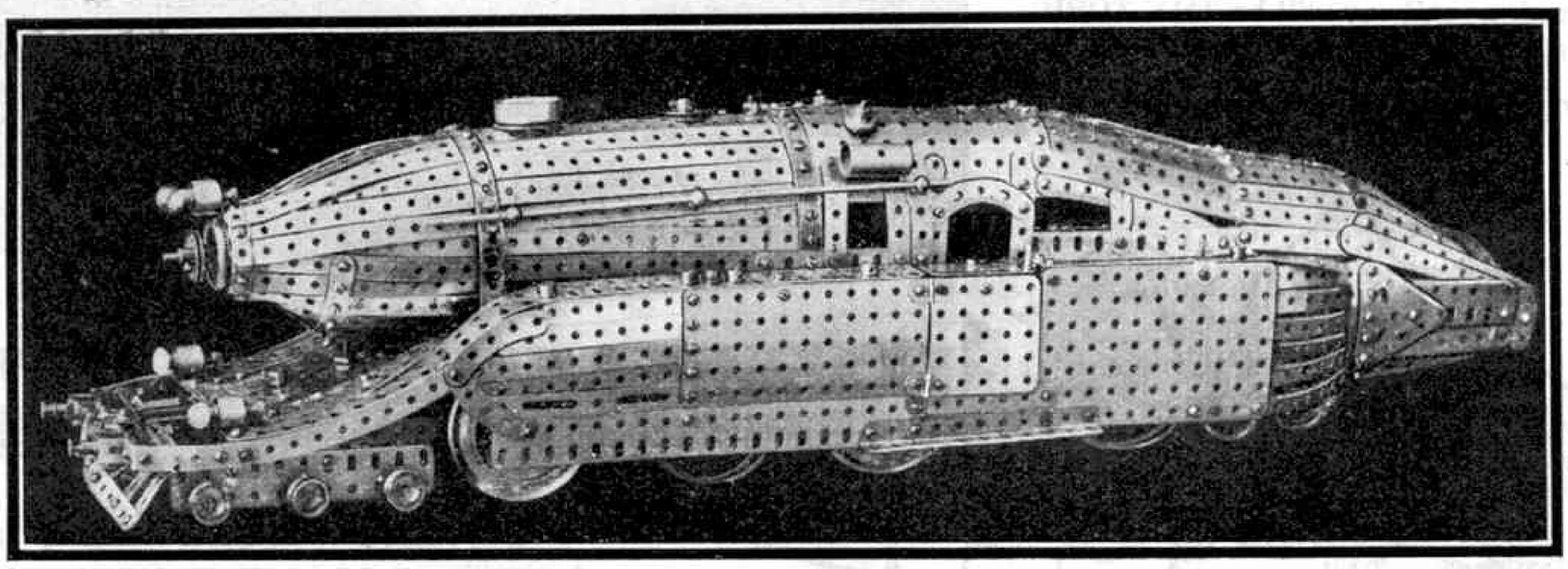
TWELVE PRIZES, each consisting of a Meccano Engineer's Pocket Book: A. Styles, Brompton, Northallerton; J. Turner-Samuels, Cheam, Surrey; Eric Palmer, Workington; F. A. D. Scroggie, Cheltenham; E. Welham, Mundford, near Brandon; J. Richards, Rusholme, Manchester; G. W. Sanders, London, S.W.20; E. Tidy, Bethersden, Kent; W. Caruthers, Gainsborough, Lincs.; Albert Watson, Bristol; H. James, Walsall; L. N. Sumner, Luton, Beds.

Section C (for competitors of all ages living Overseas).

FIRST PRIZE, cheque for £2-2s.: J. Ringnalda, Leeuwarden, Holland. SECOND PRIZE, cheque for £1-1s.: Ernest A. Rawlings, Montreal West, Canada. THIRD PRIZE, cheque for 10/6: Dick Redman, Calgary, Alberta.

TWELVE PRIZES, each consisting of Meccano products to value 5/-: H. N. Eustis, Alberton, South Australia; W Figgins, Timaru, New Zealand; James E. Henshelwood, North Invercargill, New Zealand; D. C. Tzitzinias, Salonica, Greece; R. Meadway, Cairo, Egypt; Ivor Zolinski, Warsaw, Poland; J. Kruger, Zurich, Switzerland; F. Little, Christchurch, New Zealand; Charles Williams, Brisbane, Queensland, Australia; Pete Anagnostopoulos, Athens, Greece; Dennis Chorley, Melbourne, Victoria, Australia; W. Ettington, Cape Town, S. Africa.

TWELVE PRIZES, each consisting of a Meccano Engineer's Pocket Book: E. Larsen, Aparicio, Argentine; V. Schultz, Basel, Switzerland; J. Vogtborg, Stockholm, Sweden; M. Levant, Lyons, France; B. D. H. J. Silva, Kotahena, Colombo, Ceylon; R. Arak, Johannesburg, S. Africa T. H. Raffino, Genoa, Italy; N. F. Clawfort, Cape Town, S. Africa; M. Nicklinson, Hunua, Auckland, New Zealand; C. J. Craig, Montreal, P. Q., Canada; R. Bellamy, Wellington, New Zealand; E. R. Crawford, Sydney, N.S.W., Australia.

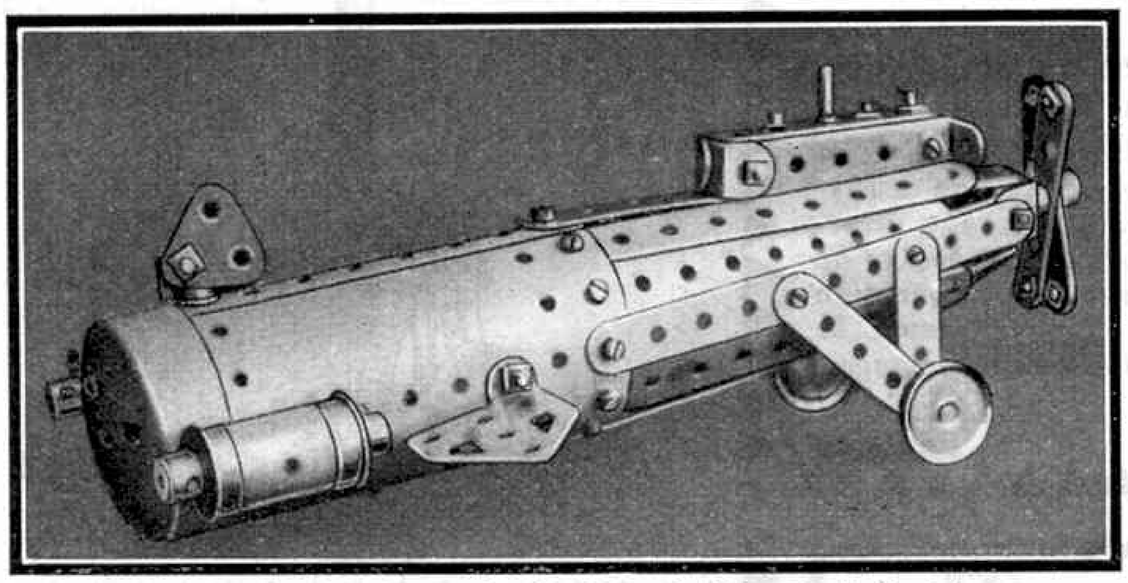


J. Ringnalda, the builder of this fine model, forecasts many changes in the design of the locomotives of the future. Notable departures from the locomotives of to-day are the fully-streamlined housing, and the arrangement of the control cab.

Judging from the present trend of engineering progress it seems quite probable that many of the greatest achievements of the future will be connected with aerial travel, and I was not greatly surprised therefore to find that the majority of the models entered in this contest represented future forms of aeroplanes, airships, and other types of aircraft.

An entry of this nature secured the First Prize in Section A for E. A. Stevens, whose model is shown in one of the accompanying illustrations. The remarkably realistic effect obtained by the appropriate setting reflects great credit on Stevens. The model suggests a form of aero-tramcar of 2,000 A.D., a machine that, according to Stevens, would be capable of rising vertically, and would be reversible in the manner of an ordinary tramcar.

As will be seen from the illustration the model is fitted with a propeller at each end, and two helicopter lifting propellers, the latter being fitted horizontally over the fuselage. Fore and aft are small stabilizing wings, and in the centre of the body is a single huge main wing.



A futuristic model of a Rocket Air Liner, built by Frank Singleton.

H. W. Noble's model suggests a machine that could be used for travelling either on land or on the ocean bed! In appearance the model is somewhat like an ordinary modern motor cycle, around which a streamlined cabin is built to totally enclose the engine and passenger. The front portion of the casing, however, is cut away in order to allow freedom of movement of the front wheel for steering purposes, and the rear or driven wheel of the machine projects below the casing, which is built closely round the wheel and suitably "packed" to prevent ingress of water.

One of the accompanying illustrations shows an aero-motor car, which won the Third Prize for W. Stewart. This model represents a machine suitable either for flying in the air or travelling on the ground. The wings, which are necessary to support the machine in the air, are provided with hinges and fold back over the body when the machine is used on the ground. In the illustration the model is shown with the wings extended to the flying position.

In view of the rapid growth in road traffic, machines of this

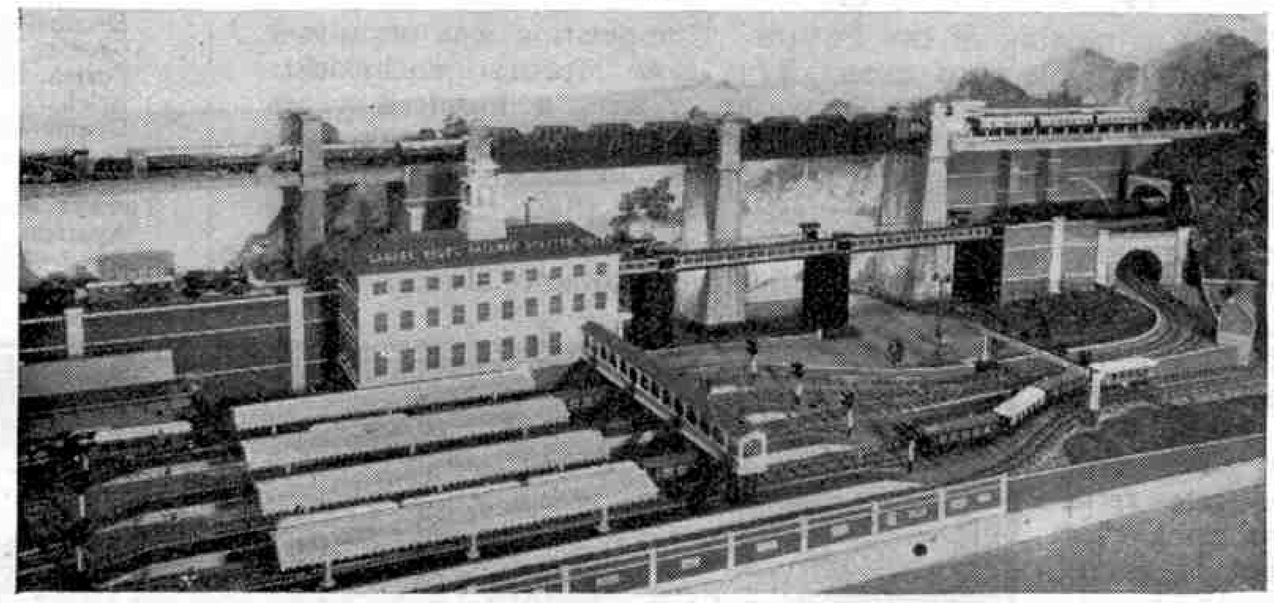
GAMAGES-HOLBORN

CHRISTMAS BAZAAR SENSATIONS

BOYS ! This year Gamages Great Christmas Bazaar at Holborn again surpasses all previous efforts. The Wonderful Robot Railway is alone worth a visit. Do not miss the special attractions mentioned here, and remember, there are wonderful displays of toys and mechanical models to see as well.

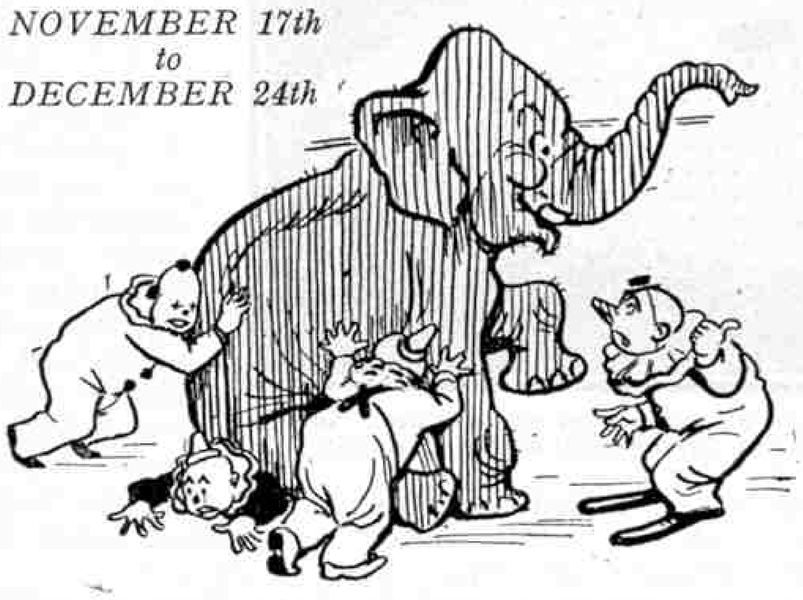
THE ROBOT RAILWAY

The trains on this mechanical masterpiece, with its 1,000 feet of electrified track, cover over 600 miles per week. Once the giant model is switched on everything is positively automatic in action. Collisions are impossible because of the famous block system of control. Concrete and girder bridges, tunnels, viaducts, stations, and hotels, all play their part in the scheme. This unique railway will be THE TOPIC among boys for months to come. Don't miss it !



A section of the huge Robot Railway.

NOVEMBER 17th
to
DECEMBER 24th



THE CIRCUS

This circus is a real one, and is the finest ever seen in any store. . . It is one long round of sheer joy. All the artists are well-known performing animals, clowns, acrobats, conjurers, and rope throwers. Here are a few items from the long programme. 'The Marvellous Mule.' 'Hooper of the Hoops'—the world's wonder Tumbler. 'Have you seen the Elephants ?' etc.

NOTE.—As accommodation is strictly limited, a charge of 6d. will be made for admission. Performances 12 noon, 2, 3, 4 and 5 o'clock. Saturdays 11 and 12 o'clock. Tickets can be booked by post if desired. Just send remittance and mention date and what performance. Letters should be addressed to Children's Circus Bureau, Gamages, Holborn, London, E.C.1.

Savage Repeating Play Rifle

A sturdily constructed Model Repeating Rifle—fires fifteen fibre balls at one loading. Packed in attractive carton with special scoring target. Price **21/-** Post Free.

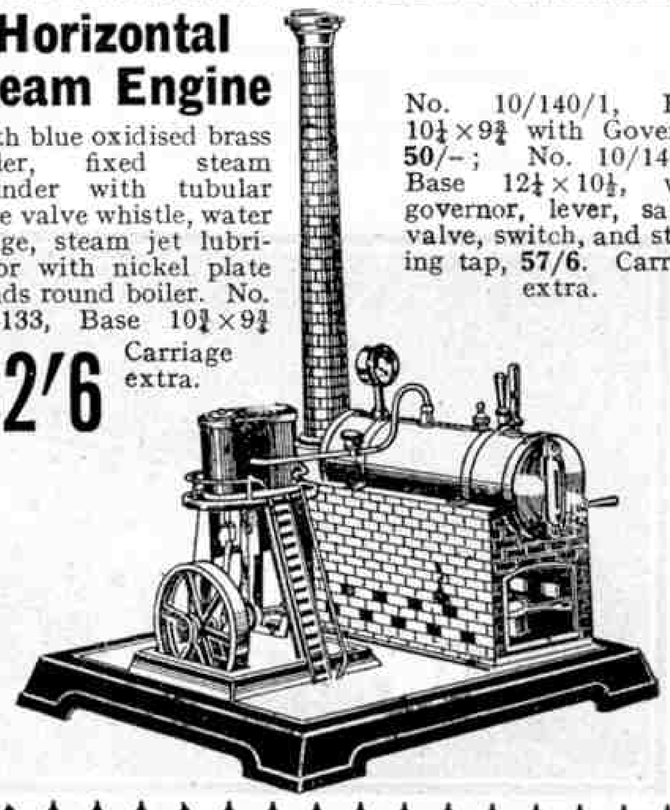
Also model to fire seven shots. Price **10/6** Post 9d.

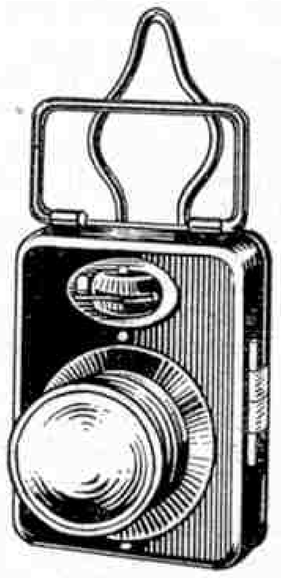
We stock all Hornby Train and Meccano Parts and send them Carriage Paid to any Station U.K.

Horizontal Steam Engine

With blue oxidised brass boiler, fixed steam cylinder with tubular slide valve whistle, water gauge, steam jet lubricator with nickel plate bands round boiler. No. 10/133, Base 10¼×9¼ **32/6** Carriage extra.

No. 10/140/1, Base 10¼×9¾ with Governor **50/-**; No. 10/140/2, Base 12¼×10½, with governor, lever, safety valve, switch, and starting tap, **57/6**. Carriage extra.





HAND LAMP

Highly finished, japanned black with nickel fittings. Complete with BULLS EYE LENS, switch, Carrying handle. Hook for coat and battery. Postage 3d. Price **2/6**

THE ZOO

Birds of beautiful plumage, and all sorts of lovable animals are to be seen in the Gamage Zoo. It includes lots of pet animals any of which you may buy. You will like the zoological departments—do not deprive yourself of this treat.

GAMAGES BUMPER CHRISTMAS CATALOGUE

Send for this wonder catalogue now. Never before have so many wonderful toys, games, models, and heaps of things for Christmas fun been found in the pages of a catalogue. It has 200 pages, many in colours, hundreds of illustrations, and is undoubtedly the book from which to select your Christmas presents. Send 4d. in stamps to cover postage, etc., to Gamages, Holborn, London, E.C.1. for your copy.

GAMAGES MARBLE ARCH and HOLBORN, LONDON

type certainly appear to have distinct possibilities, for not only would they be capable of high speed along roadways, but when traffic became congested, they could "take off" and continue the journey in the air!

It might truly be said that we are living in an age of speed, and although numerous really amazing speed records have already been set up, on land, on the sea, and in the air, efforts are yet being made to reduce still further the time interval between various places on the earth's surface, so that if the present progress in speed continues, it seems quite probable that the people of seventy years hence will think nothing of breakfasting in London and dining the same day in New York!

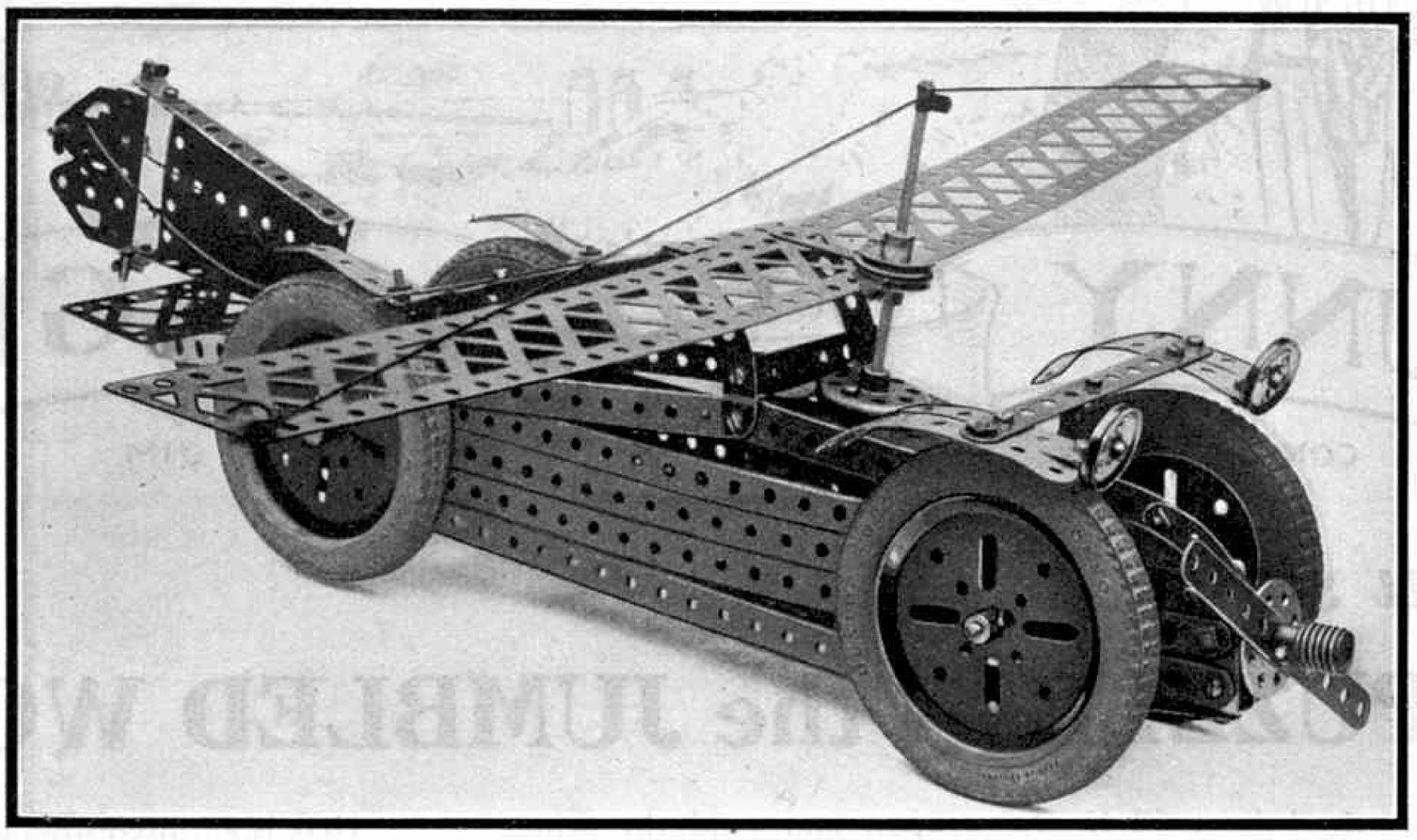
Such a breath-taking rate of travel may be possible with aircraft fitted with engines "fired" by liquid air—a scheme that is by no means so visionary as might at first be imagined, for suggestions for using liquid air in this form have already been put forward, but up to the present have not been adopted on account of the enormous cost involved. However, Norman A. Hulbert who won a prize in Section A, is quite convinced that by the year 2,000 A.D. the question of expense will have been overcome, and aeroplanes and airships propelled by liquid air will be crossing and recrossing the Atlantic on a regular passenger and mail service! In submitting his entry for the "Engineering of the Future" Contest he chose a model of this type, incorporating many wonderful features.

In general outline the model conforms to the shape of aeroplanes usual to-day, except that it is fitted with extraordinarily large wings, the hollow interior of which offers accommodation for passengers. The wings extend almost from nose to tail, but they are much shorter in overall span than is common in present day aeroplanes. Liquid air would be ejected at a terrific velocity from nozzles placed at the rear of the machine. Additional nozzles, placed to direct the escaping gas downward are fitted, the object of these being to provide the necessary "lift" to take the machine from the ground, and to assist also in maintaining constant height.

A quite feasible model of an electric locomotive of the future brought success to J. Leslie Leeson. This competitor is an invalid and his success is therefore, all the more noteworthy. I hope he will continue his efforts and participate in all future "*M.M.*" competitions, for his work shows great promise.

Since the beginning of the world mankind has been more or less interested in the stars and planets, and many attempts have been made at one time or another to devise a means of travelling to the Moon. All efforts to do so have, up to now, ended in failure, but it seems fairly certain that as the years go on further attempts will be made, to lead perhaps, to ultimate success. For example, quite recently it was reported that Herr Valier, a German Professor, was experimenting with a new type of aero car, in which rockets were used to provide the propulsion power, and it is this wonderful machine that gave Frank Singleton the idea for his rocket air-liner, with which he won the First Prize in Section B. It is the builder's opinion that actual machines of this type will, eventually, solve the problem of piercing the starry heavens and probing the secrets of the planets!

The cylinders, from which in the actual machine oxygen gas would be ejected, are placed one at each side of the tail, and the machine is steered simply by varying the ejection of gas from either cylinder, according to the direction of flight required.



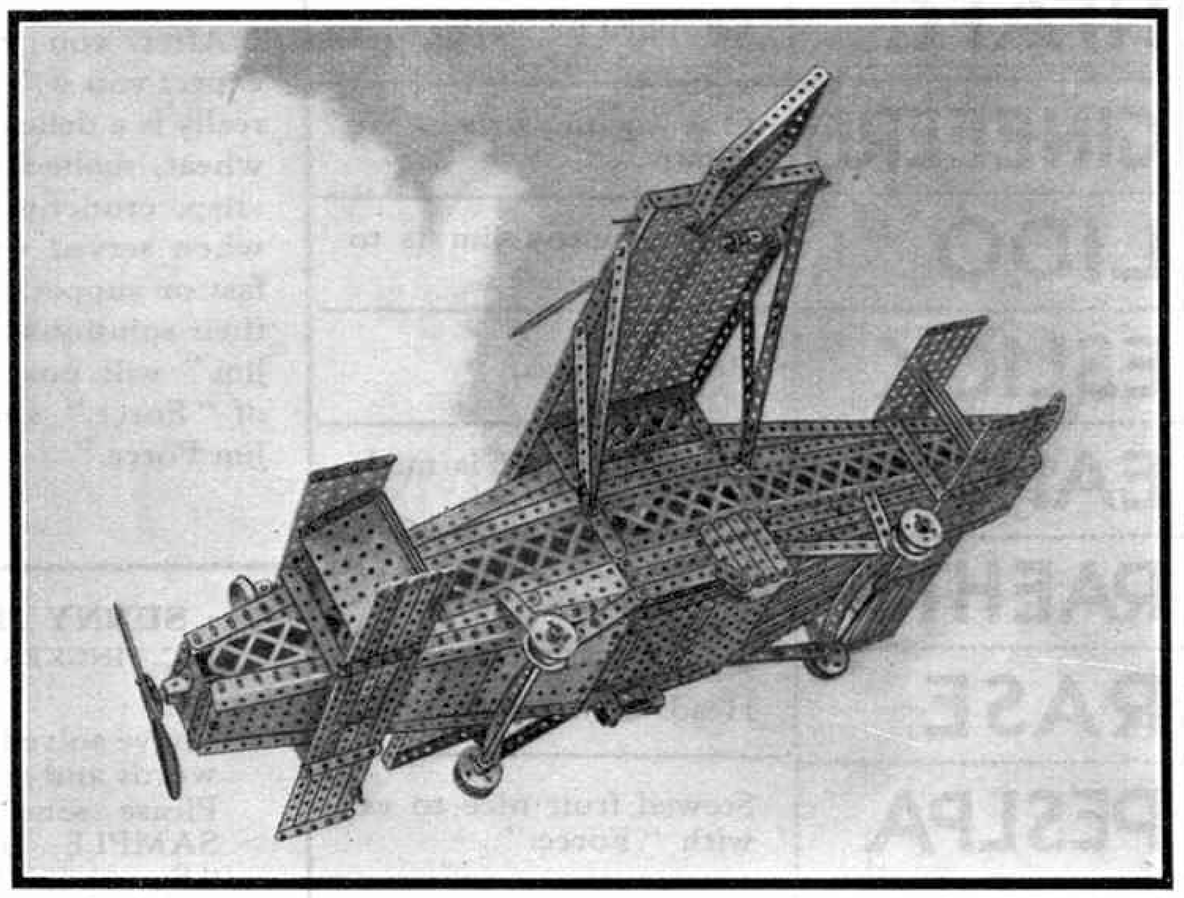
This Meccano Aero-Motor Car is the work of W. Stewart.

In addition to the power provided by the terrific velocity of the escaping gas, a propeller is fitted for use when the machine is cruising to a suitable landing place.

F. M. Page's prize-winning model is a helicopter of the future. The horizontal lifting propeller is built up from Windmill Sails, secured to a central Bush Wheel. The fuselage and wings are built up from Braced Girders.

L. Mayne has gone a little further than Page, and has adapted the helicopter principle to an ordinary motor car. The body of the car resembles the hull and superstructure of a ship, and fore and aft are vertical shafts each carrying two sets of helicopter propellers, while a third shaft is placed in the centre of the body and carries a single propeller. These propellers are used to lift the machine vertically; for propelling it in a forward direction another propeller is fitted to the forward end. The wings are collapsible, much after the fashion of W. Stewart's model already described.

Bertram Unné submitted a strange model of an air machine, in which wings are dispensed with entirely and are replaced by a special gravity neutralising apparatus, which is fitted in the upper portion of the machine! Unné has certainly given his imagination "full rein" for he proposes to drive this weird machine by means of electricity received by wireless transmission on a special wavelength. Owing to the probable presence of rival "buses," a special wavelength is necessary in order to prevent rival machines using other than their own sources of power supply!



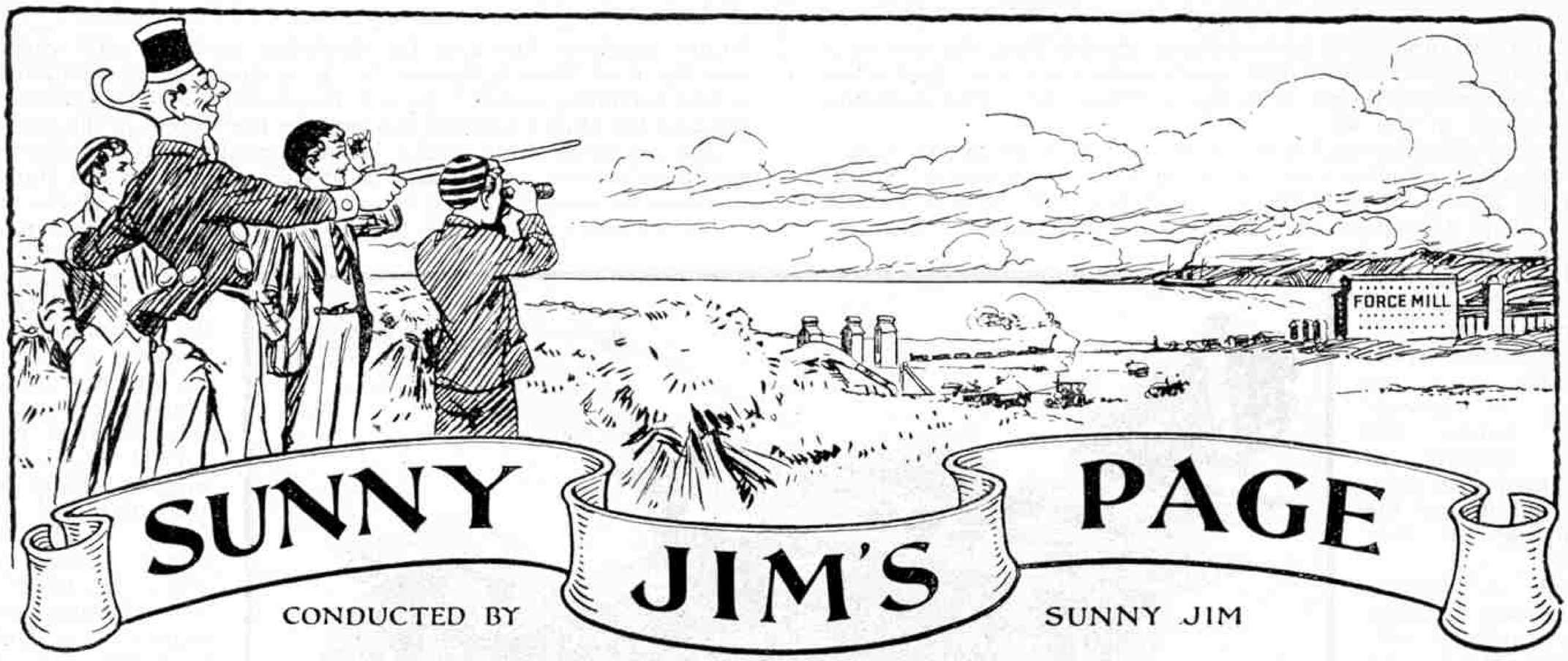
A model "Flying Tramcar," by E. A. Stevens. This ingenious machine is designed to rise vertically and is reversible in the manner of an ordinary tramcar! Stevens suggests that machines such as that shown above will be common sights to the people of 2,000 A.D.

Chief amongst the Overseas models is a remarkable locomotive built by J. Ringnalda, and illustrated herewith. The outline and technical design of the model are good, and I think readers will agree that the sweeping streamline construction of the main frame is excellently carried out, especially when one remembers that Ringnalda had to construct the entire model without any existing prototype on which to base his ideas.

A model of a mono-rail air car that resembles in many respects the Bennie Rail Plane, which was described and illustrated in the August issue of the "*M.M.*", secured the Second Prize in this Section for E. A. Rawlings.

The car is suspended from Pulley Wheels running on an overhead rail and is driven by means of air screws. The interior of the car is divided into separate dining and sleeping compartments, and a particularly interesting feature is a control room complete with miniature switchboards, etc. The car is seven feet in length!

Dick Redman submitted a weird model of a mechanical man, or robot, that he suggests might be used on road work.



Can you solve

THE PUZZLE of the JUMBLED WORDS

Write your solution in below, fill in the coupon and send the whole page to "Sunny Jim" (or see below):—

	ANSWER	PUZZLE	CLUE
		OREFC	A favourite food.
		OTRINOA	Canadian wheat growing province.
		RREEPA	Man who gathers up wheat.
		HFAFC	Chopped up straw.
		GINEERN	One who drives an engine.
		LIDO	What Sunny Jim is to children.
		ESLICK	Reaping hook.
		EAHTW	What "Force" is made of.
		RAEHTSV	To gather wheat when ripe.
		RASE	Heads of wheat plant.
		PESLPA	Stewed fruit nice to eat with "Force."
		RRTTOAC	Machine used for drawing a plough.

If you do not wish to cut this page you may copy all the details out on to a sheet of notepaper and send them with your name and address to "Sunny Jim."

Here is an interesting puzzle. Look at the plan on the left. In one column you see a jumble of letters. These, however, really make proper words if you arrange them in the correct order. The clues tell you what the words mean. See if you can hit upon the correct words by changing the letters about. Then write the answers in the column provided, placing the first capital letter of each word in the little square at the beginning of the line. Now if you have arranged the jumbled words correctly, and then read down the capital letters only, it tells you what "Force" is made of.

After you have solved this puzzle I expect you will all want to taste "Force." It really is a delicious food. It's made of whole wheat, malted and then toasted into lovely crisp, crunchy flakes. "Force" is delicious when served with hot milk either for breakfast or supper. So to all readers who send their solutions to the address below, "Sunny Jim" will post by return a sample packet of "Force" and the badge of the "Sunny Jim Force."

To: **SUNNY JIM** (DEPT. CP8),
A. C. FINCKEN & CO., 197 GT. PORTLAND ST., LONDON, W.1

I have solved the puzzle of the jumbled words and send my solution herewith. Please send me in return a FREE SAMPLE of "FORCE" and a "Sunny Jim" badge.

Your Name.....

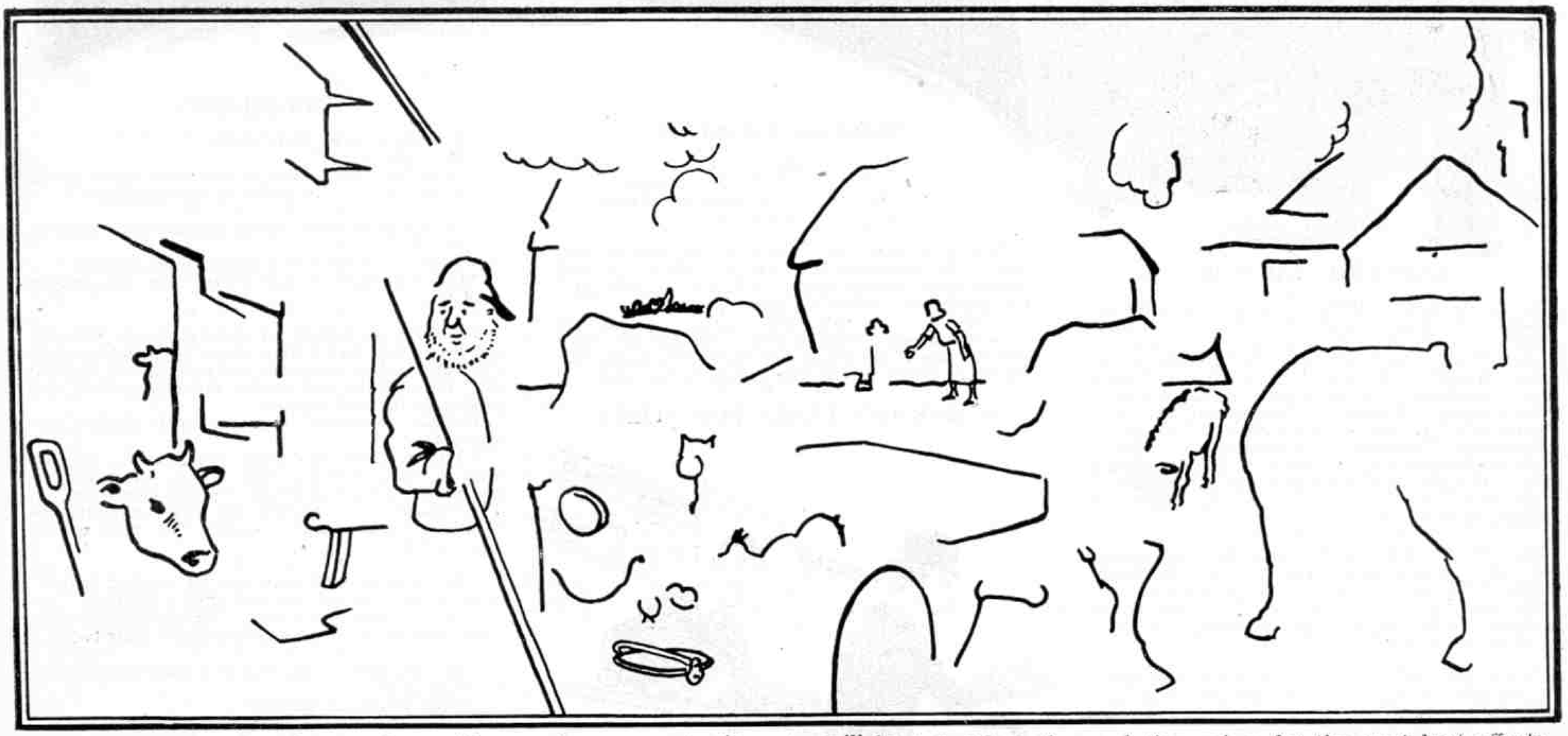
Your Address.....

Town .....

This offer applies only in Great Britain and Northern Ireland.

Competition Page

A PICTURE PUZZLE: CAN YOU FILL THE FARMYARD?



This month we provide readers with a unique opportunity of combining their artistic skill, imagination and ingenuity.

The accompanying illustration represents the remains of a drawing that has been deliberately mutilated. Originally it was a complete drawing of a typical English farmyard, with farm buildings, farming implements, and a variety of livestock. Then portions of the drawing were blotted out, with the result shown. The problem we set our readers is to reconstruct the drawing.

The first step should be to fix upon an outline that appears to give a definite clue to the subject originally represented. Then the portions of the outline that are considered to have been removed are replaced so as to complete the reader's idea of the original subject. Working from this point, the remainder of the picture should be gradually restored.

Prizes of Meccano products—to be chosen by the winners from our current catalogues—to the value of 21/–, 15/–, 10/6 and 5/– respectively will be awarded to the senders of the four most ingenious reconstructions in order of merit. In addition there will be a number of consolation prizes for the next best efforts.

It should be understood that the prizes will not necessarily be awarded to the competitors who succeed in reproducing most closely the original picture, but will go to those who submit the most interesting and ingenious drawings founded upon the fragmentary outlines provided. The original drawing will be reproduced on this page at the close of the competition.

Competitors are advised not to mutilate their magazines, but to trace the original drawing on to a sheet of paper. Entries will only be returned if a stamped addressed wrapper of suitable size is sent with the entry.

Each competitor must state clearly on the back of his drawing his name, age, and address. A competitor may submit more than one drawing if he likes, but he cannot in any case win more than one prize. Drawings should be addressed "Farmyard Drawing, Meccano Magazine, Old Swan, Liverpool," and must reach this office not later than 31st December. Overseas closing date 31st March, 1931.

The Romance of Transport

What would the World do without Wheels? That is the thought that remains uppermost in one's mind after reading Mr. H. O. Duncan's book "*The World on Wheels*," which was reviewed in the "*M.M.*" for September last. This remarkable book is a mine of information on the fascinating story of the development of transport, and is the result of the author's 40 years' study of wheeled traffic in all its forms. The book contains over 1,200 pages and 1,300 illustrations and, incidentally, weighs over 12 lb.!

The author commences his story with an account of the vehicles of prehistoric times; continues with those of the Middle Ages, and finally deals with the age of steam and petrol. The interesting early developments of steam engineering in particular are dealt with very fully. There are chapters on primitive methods of travel; the story of the bicycle; ancient and modern roads and their development; the history of the pneumatic tyre, and the modern fuels used in oil and petrol engines. The story of the motor industry is dealt with very fully, and Great Britain, Germany and America each has a special chapter devoted to its part in invention and development.

"*The World on Wheels*" is indeed one of the most absorbing books that we have ever read, and when Mr. Duncan recently offered to present an autographed copy, in two volumes, as a prize for a competition in the "*M.M.*," we accepted with very great pleasure. A competition suitable for this purpose obviously must deal with transport, and we have decided that it shall take the form of an essay not exceeding 1,000 words, on "*The Romance of Transport.*" In this essay we want competitors to express their views on the part that wheeled traffic has played in developing our present-day world, and also their ideas on how such traffic will develop in the future.

Entries to the competition will be divided into four sections—A and B for competitors aged 16 and over at Home and Overseas respectively, and C and D for those under 16. Cash prizes of 21/– and 10/6 will be awarded to the best and second best entries respectively. Mr. Duncan's "*World on Wheels*" is given as a "championship" prize, and will not be awarded until both the Home and the Overseas sections have been judged. Then the entries from the four first-prize winners in these sections will be judged again and the championship prize will be awarded to the best of the four, in addition to the cash prize.

Entries should be carefully addressed "Transport Essay, Meccano Magazine, Old Swan, Liverpool," and must reach this office not later than 31st December for Home entries, and 31st March 1931, for Overseas entries.

Ad Brands Contest

By inadvertence an error occurred in the spelling of Messrs. Lines Brothers' trade mark in the Ad Brands Competition appearing in our October issue. The home entries show that less than ten readers have been misled by the mistake and allowance has been made to these competitors.

The correct rendering is given in Messrs. Lines' advertisement on page iv of the cover of this issue.

An Engineering Joke

December is the most jovial month of the year, and probably more jokes and tall stories are told around firesides during this month than at any other time of the year.

It was at a Christmas party that I first heard the famous "engineering" story of the Scotsman who lost a sixpence in Piccadilly and, passing that way, a year later, found a gang of navvies busily tearing up the roadway. Breathlessly he approached the foreman and gasped: "Man! I'll just say you're most thorough in London! It wasn't necessary to go to such trouble but—have you found it?"

And that of the lighthearted air pilot who, after indulging in a terrifying nose dive, turned to his passenger and commented: "I'll bet half the people below thought we were going to crash!" The passenger mustered a sickly grin before he replied: "Aye, and half those up here thought so too!"

Doubtless our readers will hear many new jokes this Christmas, and we would like to share them. Prizes of Meccano Products to the value of 21/–, 15/–, 10/6 and 5/– respectively, are offered to the senders of the best four "engineering" jokes we receive. Anything even remotely connected with engineering, railways, aviation, or Meccano, is eligible, and should be written on a post card and sent along to "Engineering Jokes, Meccano Magazine, Old Swan, Liverpool," to reach this office not later than 31st January, 1931. Overseas closing date 30th April, 1931.

Every entrant to this contest is reminded to put his name and address on his post card.

Fireside Fun

ELECTRIC TACTICS

If she is late, "Meter"; if she is awkward, "Adaptor"; if she is reserved, "Exciter"; if she is flustered, "Collecter"; if she is stout, "Condenser"; if she is a bad cook, "Discharge her"; if she is very good, "Keeper"; if she is ill, "Insulator"; if she is lazy, "Energiser"; if she is plain, "Transformer"; if she is languid, "Vibrator"; if she is cruel, "Lever"; if she is cool, "Heater"; if she is blind, "Lead her"; if she is silent, "Generator"; if she steals, "Copper"; if she needs a guide, "Conductor"; if she requires a bath, "Plunger"; if she fails to sleep, "Rocker"; if she runs away, "Interceptor."—*The Thornycroft Basingstoke Works Magazine.*

* * * *

The little boy was walking along the street crying, and a kind old gentleman went up to him and said: "Hello, little man! What are you crying for?"

The small boy left off crying and looked at the stranger. "I'm not crying for anything," he said. "I have just had it."

* * * *

It was the absent-minded professor speaking again. "Horrors!" said he as he raised his hand to shut his umbrella when the rain stopped. "This reminds me that I've left my umbrella in the train."

* * * *

Mr. Tightwad was a frequent visitor to the club billiard room, and it was not often that he left without finding something to grumble about.

"These cues want tipping very badly," he grumbled one day.

"Yes, Sir," said the marker. "I know just how they feel."

* * * *

Patient (rushing into the consulting room): "Doctor, I'm having terrible trouble with my breathing."

Doctor: "Don't worry, I'll soon stop that for you."

* * * *

Teacher: "Jones, you haven't been paying the east attention to what I've been saying. Tell me, what language is spoken in Algeria?"

Jones (waking up): "Algebra, sir."

* * * *

When going to some friends to spend the Christmas holidays a traveller arrived at a junction, and found that he had just missed the connection.

"What time is the next train to Placidville?" he asked a porter.

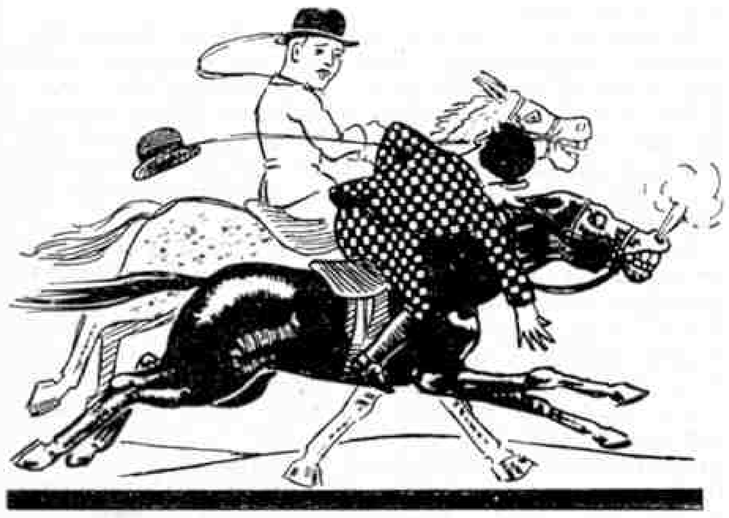
"Four o'clock, sir," was the reply.

"Nothing before then?"

"No, sir. We never runs one before the next."

* * * *

OUT OF HIS ELEMENT



The enthusiastic motorist had been persuaded by a friend to accompany him on a cross-country horseback ride. Soon after starting, the motorist's horse started to gallop, and its rider was then seen to lean forward, grasping wildly at something he seemed unable to find. His friend galloped alongside.

"What on earth are you trying to do?" he asked.

"I'm—trying—to—find—the—brake," came the jerky reply.

A TONGUE TWISTER

Once I heard a Mother utter:
"Daughter, go and shut the shutter."
"Shutter's shut," the daughter uttered,
"I can't shut it any shutter."

* * * *

Two faces were close together, the man's grim, tense; the other face was small and white, with two slender hands pressed tightly against it. It was those frail hands that riveted the man's horrified gaze.

"Terrible!" he said, still staring. And in his voice was hopeless, stark tragedy; for that other face was the face of his watch, and those little hands had made him notice that he had missed the last train.

* * * *

A HORNBY TRAIN FOR JIMMY

"Please show me some Hornby Trains," said father, entering the local Meccano dealer's establishment. Jimmy followed him in.

"With pleasure, sir," the shopman replied, placing several different models on the counter.

"I want the green one, Daddy!" shouted Jimmy.

"I like this Midland Standard Compound," said Father.

"I want a green one, Daddy!" interjected Jimmy.

"Yes, it is very realistic," answered the shopman, "and so is the Riviera 'Blue' locomotive."

"Daddy promised to buy me a green engine," wailed Jimmy to the shopman.

"Never mind, little chap," replied the assistant, "Wouldn't you like him to buy you this nice Metropolitan Locomotive. It's such a pretty colour."

"I want a gre-e-e-e-n engine," sobbed Jimmy, now reduced to tears.

"Go outside and stay with your mother," angrily shouted father, finally losing patience.

'Now we can get on with the business," he continued—and in a very short time he purchased a red engine with wagons!

* * * *

Teacher (after lesson on tenses): "Now if I say, 'I am handsome,' what tense is that?"

Small voice: "Pretense."

* * * *

He had not been going to school for long, and was not very attentive. After school one day he asked his teacher what he had learned.

"What a strange question!" said the latter, laughing. "Why do you ask that?"

"Well," said the boy gloomily, "they are sure to want to know when I get home."

* * * *

The local milkman was proudly talking of his sales to a new resident.

"I sell twenty gallons a day," he said.

"I can tell you how to increase the figure to twenty-five," said a neighbour who had overheard his boast.

"How?" asked the milkman.

"Fill the bottles," was the reply.

DIPLOMATIC

"You *are* a lucky man, Father."

"Why, my boy?"

"Well, you won't have to buy any school books for me next year. I'm to stay in the same form."

* * * *

"Do you know why I'm going to spank you, Willie?"

"No, dad; why?"

"Because you hit a boy smaller than yourself."

"Oh, I thought it was p'r'aps 'cos I'm smaller than you."

* * * *

The train was pulling out of the platform. The old gentleman was just settling down comfortably, when suddenly the door burst open and a young man tumbled into the carriage and seated himself, panting and puffing on the seat opposite.

The old gentleman looked on with obvious disapproval.

"You must be very unfit, young man," he said, after a while. "Why, when I was young I never panted and got out of breath like that after a run."

"Perhaps not," returned the other, regaining his breath a little. "But I missed this train at the last station."

* * * *

"Has anyone ever been lost in crossing here?' asked a timid woman who had hired a boatman.

"No'm," was the reply. "Several people have been drowned, but we've always found their bodies."

* * * *

"Bert has been having a lot of trouble with a couple of uncles lately."

"What uncles are they?"

"Carbuncles."

* * * *

The discussion had been on the subject of watches, and Smith had become rather fed up with details of the wonderful watches owned by his friends.

"My watch will beat any of yours," he said at last, "I dropped it into the river a couple of months ago and it's been running ever since."

"What," said Brown, "the same watch?"

"No," replied Smith, getting up and making for the door. "The river."

* * * *

"Lend me 10/-" said Jack when he met Bill in the street. "You can give me 5/- of it now. I shall then owe you 5/- and you will owe me 5/-, and we will call it square."

* * * *

They were sitting on the promenade when John, pointing to a boat close to the shore, said: "They've dropped their anchor!"

"I'm not surprised," said Dean. "It's been hanging over the side long enough."

* * * *

Indignant Customer: "Those eggs I bought from you this afternoon weren't at all fresh."

Grocer: "Not fresh? but the boy brought them from the country only this morning."

Customer: "H'm! what country did he come from?"

* * * *

AN EXCITING PASTIME

Mr. Smith and Mr. Brown found fishing such a slow occupation that both fell asleep. While sleeping Brown fell into the water, and as he was scrambling up the bank Smith awoke with a start.

"Hullo," said Smith, "Where have you been?"

"Only to see if my bait was still there," was the reply.

A VALUABLE EXTENSION!

"Which would you rather be—an ordinary dog or a dog with a broken tail?"

"Oh! An ordinary dog of course."

"I wouldn't. I'd rather be a dog with a broken tail, because although every dog has its day, a dog with a broken tail has a weak-end."

* * * *

Brown: "Did anyone comment on the way you managed your new car?"

Jones: "Well, one man made a brief remark."

Brown: "What did he say?"

Jones: "Forty shillings and costs."

* * * *

An old lady up from the country was watching with great interest the ships passing down the river estuary toward the open sea. Suddenly she turned to a bystander.

"Yon's a funny ship," she said.

"That's not a ship," was the response; "it's a bucket dredger."

"Well," said the old woman, watching intently, "the men down below filling the buckets ought to get good wages."

* * * *

"What are you doing around here, Rastus? Waiting for your chance to steal a chicken?"

"No, sah. De judge reformed me las' month, and Ah is jest out testin' mah'self."

* * *

"This here house, sir, s where Katherine of Harragon was bitten by a mad dog," explained the unofficial guide.

"Tudor, eh?" said the tourist.

"Yes, sir, somethink horrible."

* * *

Son: "Aren't you going to wait up for father?"

Mother: "What's the use? I've got such a cold I can hardly speak."

* * *

Boy (to father, just returned from a trip to America): "Father, did the Red Indians walk in single file?"

Father: "I only saw one, but he did."

* * *

"I have been thinking, my son, of retiring next year and leaving the business to you."

"There's no hurry, is there, dad? You go ahead and work a few more years and then we can both retire together."

* * *

Scot: "There's juist a wee complaint aboot yon wireless ye sold me."

Dealer: "What's that?"

Scot: "Weel, it's no giving a strong enough licht to read wi'."

* * *

"I wouldn't cry like that if I were you," said a lady to little Betty.

"Well," said Betty between her sobs, "you can cry any way you like, but this is my way."

* * * *

Tommy (arriving at country cottage): "Where's the bathroom, mother?"

Mother: "There's no bathroom here, Tommy."

Tommy: "Goody, we're going to have a real holiday, then."

* * * *

Absent-minded Professor. "A collector at the door? Did you tell him I was out?"

Maid: "Yes, sir, but he didn't believe me."

Professor: "Well, then, I shall have to go and tell him myself."

* * * *

Mrs. Newrich was riding in her expensive limousine down a steep hill when suddenly the chauffeur became alarmed.

"Madam," he exclaimed, "the brakes refuse to act."

"Then stop the car immediately," said Mrs. Newrich. "I'll get out and walk."

* * * *

The advertisement had said "Money returned if not satisfactory," and a customer, who was far from satisfied, asked for his money back.

"But," protested the shopman, "there is no need to return the money. I am pleased to say that I found it entirely satisfactory."

* * * *

The natural history lesson was in progress.

"Smith," said the teacher, "name five animals that live in the Arctic Regions."

"Walrus, seal," began Smith, and then he hesitated. After thinking for a short time, he added, brightly, "And three polar bears."

AMBITION REALISED!

A lawyer made his way to some scaffolding where a gang was working, and called for Michael O'Neill.

"Who's wanting me?" enquired a voice from above.

"Mr. O'Neill," the lawyer shouted, "did you come from Drogheda?"

"I did."

"And was your mother named Kathleen and your father Michael?"

"They wor."

"It is my duty, then, to inform you that your Aunt Mary, who married the millionaire, Richly, has died in New York, leaving you a fortune."

There was a short silence, and then a commotion up above.

"Are you coming, Mr. O'Neill?" the lawyer called.

"In wan minute," was the answer. "I'm just stopping to wallop the foreman."

* * * *

He was old and had never left his native village. Then one day he was taken to Southampton and shown round a big Atlantic liner.

"Here are the engines," he was told. "They are of 50,000 horsepower."

He was momentarily stunned. Then after a few seconds, he said: "My, but I'd like to see their stables."

* * *

Mary was having her dinner when suddenly she shrieked out in pain.

"What is the matter, darling?" asked her Mother.

"My s-silly old teeth have trodden on my tongue," stammered Mary.

* * * *

Auntie had taken Marjorie on a visit to the Zoo for the first time.

"What did you like best, dear?" asked her Mother on their return.

Marjorie thought hard for a moment or two before replying, "I think the elephant, Mother," she said. "I loved to see him picking up buns with his vacuum cleaner."

* * * *

Uncle was testing his small nephew's knowledge.

"Jack," he asked, "What does A,D,Q spell?"

"Nothing," was the reply.

"What does X,Y,Z spell?" was Uncle's next question.

"Nothing," was Jack's answer.

Jack's smaller sister, who had been an interested listener, then spoke up. "It seems to me that there are lots of ways of spelling nothing," she said.

* * * *

Customer: "What are you charging for eggs?"

Grocer: "Threepence each for those. A penny each for cracked ones."

Customer: "Please crack me half-a-dozen."

* * * *

Sam was at a dance and lost a wallet containing £100. He got up on a chair and announced: "Gentlemen, I have lost my pocketbook with £100 in it. I will give £10 to the man who returns it to me."

Voice from the rear: "I'll give £15."

FRUITLESS!

A lady rang up a draper's shop and asked if they had any black berets.

"This is a draper's shop," replied the assistant, "not a fruiterer's."

* * * *

Mother: "And what are the masters like?"

Boy: "Awful, mother. They'd see you starve rather than let you eat a bar of chocolate during school-time."

* * * *

"It's amazing what they can train animals to do nowadays," said grandma thoughtfully. "According to this paper, nearly two thousand elephants go each year to make piano keys."

* * * *

Driver of old car (after roadside halt): "You don't notice that knock in the engine so much now, do you?"

Friend: "No. How did you fix it?"

Driver: "Oh, I just loosened one of the mudguards."

* * * *

A middle-aged man seated in the barber's shop noticed that the barber wore rubber gloves.

"Why do you wear those rubber gloves,' he said.

The barber's opportunity had arrived!

"I wear them," he said in his best 'salesmanship' tones, "for the purpose of keeping our celebrated hair restorer from causing hair to grow on my hands."

* * *

"Why are you buying a farm on one side of your father's old place, while your brother, Sambo, is buying one on the other side?" asked a friend of Mose. "Didn't your father leave his farm to you two brothers?"

"Yassuh," Mose answered, "but de will done say dat we was to hab de farm 'tween us."

* *

Two villagers were discussing the new butcher, Brown.

"Do you think he's doing well in his new shop?" said one.

"Doing well?" replied the other. "No! He gives far too many people the cold shoulder."

* * *

Customer: "What price is your rice?"

Grocer: "Eightpence per pound to-day, madam; cost price."

Customer (sarcastically): "How do grocers manage to live, then, selling goods at cost price?"

Grocer: "Well, madam, we sell all the goods at cost price, but we make a small profit on the wrapping paper and string."

* * *

Mrs. Newrich went into a bookshop.

"I want a book, please," she said to the assistant.

"Yes, madam, something light?"

"Oh, I'm not particular. You see, the car's outside, so I shall not have to carry it home."

* * * *

They were on a camping holiday, and the self-professed cook apologetically brought forth their first meal.

"I'm sorry about this pie, Jimmy," he said. "I'm afraid I've left out something."

Jimmy tasted the pie and made a grimace.

"Nothing you left out could make it taste like this, he said. "It's something you have put in."

* * * *

Scotsman: "How much will you charge to press this pair of trousers, please?"

Tailor: "Two shillings."

Scotsman: "Well, here's a shilling. Just press one leg, and I'll have my photograph taken side view.'

* * * *

The sailor was proudly showing the old lady over the Navy's latest destroyer.

"Yes, this ship makes over 30 knots an hour," he boasted.

"Good gracious," gasped the passenger. "Whose job is it to untie them all?"

* * * *

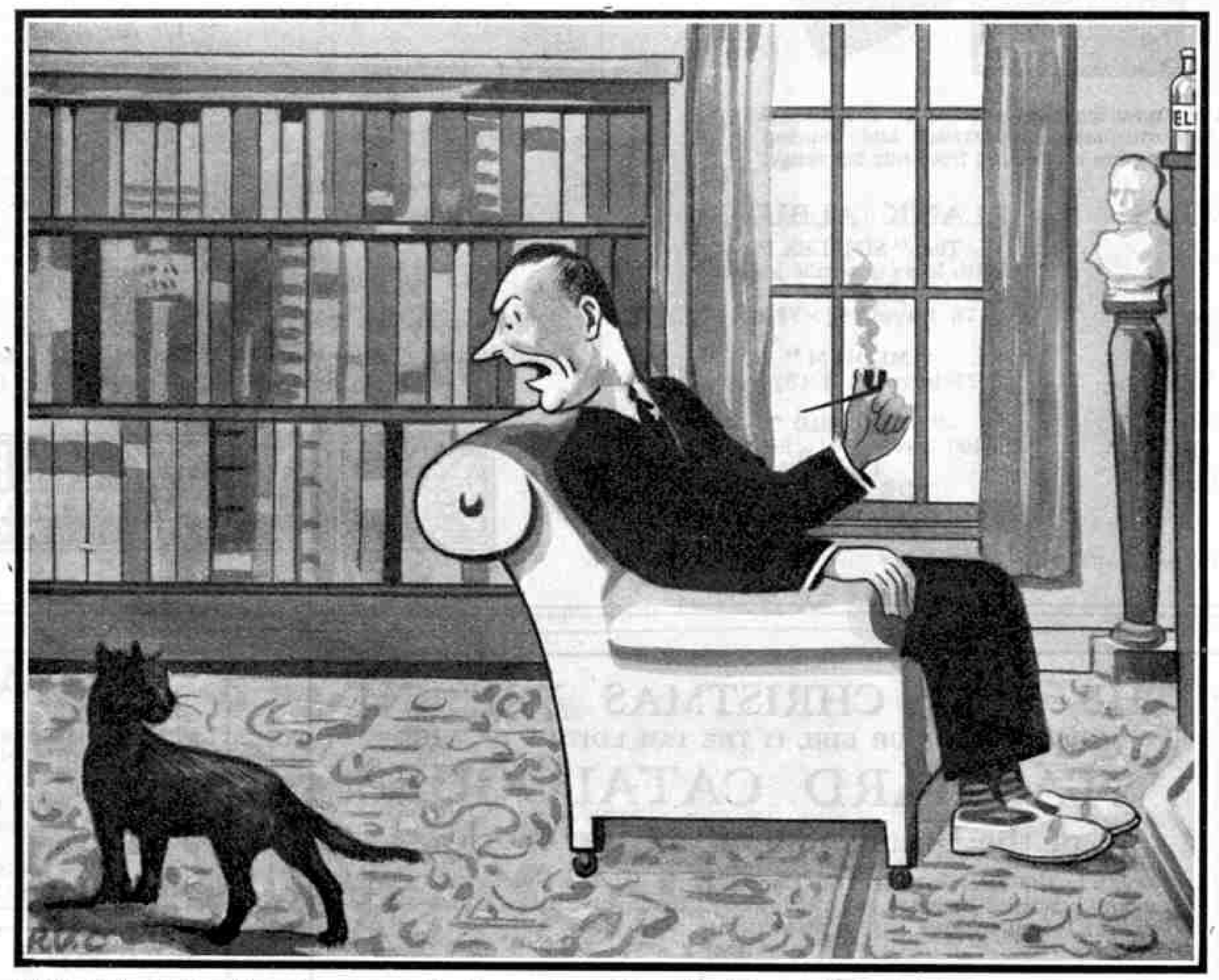
First Cook: "And you mean to say you were in your last job two months? Why you're a disgrace to the profession!"

Second Cook: "It wasn't my fault. We was cruisin' all the time in a steam yacht, and I couldn't swim."

* * * *

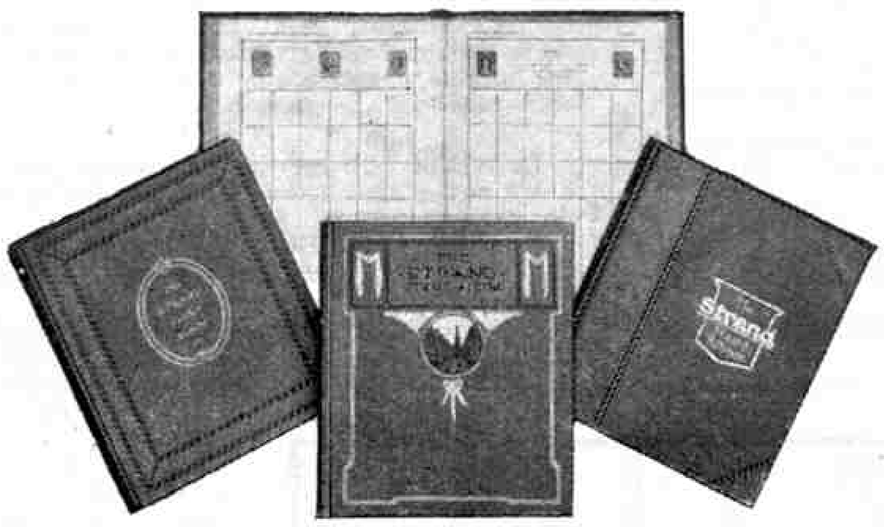
Teacher: "Name a liquid that won't freeze?"

Voice from back of room: "Hot water, sir."



Editor (to cat, after strenuous day's work getting Christmas "*M.M.*" to press): "What are *you* stamping about for?"

FINE ALBUMS



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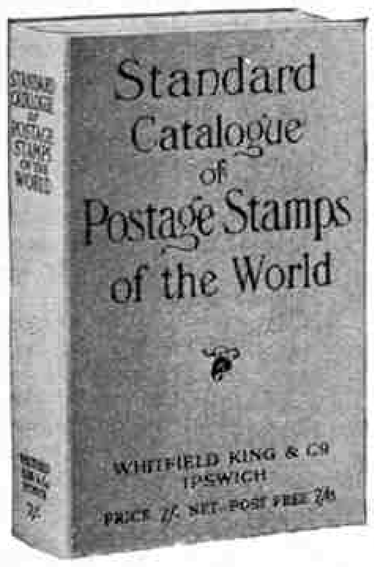

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ADVERTISING ON STAMPS

IN a recent "*M.M.*" competition, several competitors discussed the advertising value of a postage stamp. The subject is exceptionally interesting, for it has a very close bearing on some recent developments in postage stamp design.

It will be agreed that every postage stamp is a miniature advertising poster. In its simplest form it advertises the fact that the sender of a letter has prepaid the postage, but with the huge growth of the stamp collecting hobby and the rapidly increasing interest displayed in postage stamps, many enterprising countries now make their stamps achieve a dual purpose. They employ the stamp design to give publicity to some national object that they desire brought into the public eye.

Interesting examples of this come from Salvador. For instance, the 35c. stamp of the 1924 issue is designed to draw attention to the fact that coffee is one of the country's chief products. As our illustration shows, the two sprigs of the coffee plant framing the portrait surmount a scroll reading "*El Mejor Cafe—The best coffee.*" The 20c. value of the same issue shows a picture of a balsam tree with the words "*Solo el Salvador produce el Balsamo del Peru*" which means "*Only Salvador produces Peruvian Balsam.*" That claim seems to be a contradiction in terms, but the Salvadorian Consul in Liverpool assures us that it is literally correct and the name Peruvian Balsam is a misnomer.

There can be no doubt as to the purpose of those two stamps. They are definitely advertisements, and, just as in the advertising of commercial concerns we find rivals, so it is in international advertising carried out on stamps. The claim that Salvador's coffee is the best does not go unchallenged. Guatemala recently sent out the special 6c. air mail issue that we illustrate. The principal feature of the design shows a monoplane crossing the slopes of Mount Agua, but beneath the design, in *English* wording only, appears the slogan "*Guatemala produces the best coffee in the World.*" There is something very appropriate in the attachment of an advertising message to stamps that are intended to fly around the world, and, although neither the advertising medium nor the slogan is new, Guatemala may be said to have scored a direct hit!

Hayti also has used the "posters" for its coffee, and issued a special 35c. stamp on 6th February, 1928. Coffee is certainly made to appear a desirable beverage by a most attractive design, which consists largely of two sprays of the coffee plant. Hayti, however, does not claim that its coffee is the best in the world!

The South American republics are in the van of progress in stamp publicity. Chile has adopted it and a recent issue, the 15c. stamp illustrated here, is designed to stimulate the Chilian nitrate industry. The design shows a breaking dawn, significant of prosperity, radiating from a mill stone. Surrounding it are upstanding stalks of wheat, in the successful cultivation of which nitrates play a large part. The slogan—if such it may be called—runs: "*Salitre significa prosperidad*" meaning "*Nitrates mean prosperity.*" The date tablets in the upper corners mark the centenary of the first shipment of nitrate from Chile. A second stamp in this issue was a 70c. denomination, that bore the label "Nitrate Centenary" and showed a farmer scattering seed by hand.

The indirect advertising of national attractions by the introduction of stamp designs showing typical scenery, national costumes, and so on, has long been practised, for most countries recognise that national finances are materially assisted by tourist traffic. Austria's 1923 issue, with its views of Salzburg, Innsbruck, Vienna, is one of several interesting examples of propaganda of this kind. The 240k. stamp from this issue is shown.

The 15 öre Norwegian stamp illustrated here goes far more directly to the point. The stamp is the lowest value of a set of three of values 15, 20 and 30 öre respectively, that were issued about four months ago, at a premium of 25 öre per stamp in order to raise funds for advertising the beauties of the Norwegian fjords. The design shows a tourist steamer passing the North Cape on a cruise among the fjords. The South American country, Ecuador, goes even further in an effort to attract tourist traffic. A recent commemorative issue introduced a beautiful piece of mountain scenery, accompanied by the slogan "*El Ecuador es Pais de Turismo,*" meaning, "*Ecuador—the Tourist's Paradise.*" A full reference to this new issue appears in the Stamp Gossip on page 1003.

While on the subject of advertising attractions for holiday makers, we wonder whether Newfoundland had not something of the kind in mind when it introduced its current issue. This really beautiful issue, apart from two Royal portraits, shows a map of the island and glimpses of beautiful scenery, gives details of transport facilities, refers to its association with the first trans-Atlantic flight, shows views of its principal buildings, and includes a great sky-scraping hotel at St. Johns, at which, it may be assumed, the tourist will find accommodation of the best!

There are many examples of stamps that have been issued for the dual purpose of advertising the plight of war orphans and of victims of famine and flood, and to secure funds to relieve their distress. One of the most interesting examples came from Roumania in 1906, when portraits of the Queen of Roumania engaged in various activities, as a nurse, for example, were issued to raise funds for charities. Each of the stamps bore a copy of the Queen's signature as an autograph.

Among indirect advertising efforts, an outstanding instance

(*Continued on page 1003*)

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A fine packet of all different stamps containing a large pictorial unused **Brunei, a complete set of 6 different unused Salvador,** the latest pictorial issue of **Finland, Ceylon** unused war stamp, **Surinam** unused, **German Morocco, Algeria** view, **Georgia, Philippine Islands, Somali** pictorial, **Wallis and Futuna Isles, Schleswig, New South Wales,** etc., etc. **Free** to all asking to see my famous approval sheets and enclosing 2d. for postage and packing (abroad 3d.). Stamp albums from 1/6 upwards.

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Spain Columbus commemoration, set of 8 different **1/–**
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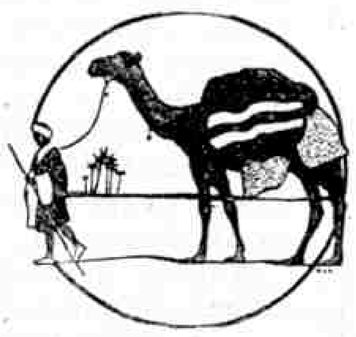

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VICTOR BANCROFT (Dept. M.M.), MATLOCK, ENGLAND.

Stamp Collecting—(*Continued from page 1001*)

is found in the Mozambique Company's current issue. This is a long set containing 19 designs, practically every one of which is used to illustrate some feature of the industrial activities of the colony. The Saar Valley industrial designs of 1921 and 1927 fall within the same category, while the Soviet Government has poured out propagandist issues at frequent intervals for several years past.

Even Britain made an effort that must be described as advertising when it issued the Wembley Exhibition stamps of 1924 and 1925, and among other British exhibition advertising stamps, New Zealand has an excellent specimen in its Dunedin Exhibition set issued in 1925.

No review of advertising on stamps would be complete without reference to efforts that have been made by commercial houses to induce various Postal Authorities to sell advertising space on their stamps. Some of those efforts were successful, and in 1924/5 an advertisement of the Singer Sewing Machine Company appeared on a quantity of Italian stamps. We illustrate a pair of these stamps. It will be observed that the advertising space equalled the stamp itself in area, and was an integral part of the stamp. About 100,000 of these stamps appeared, but later the scheme was dropped in deference to public opinion.

Many years previously, the proprietors of Pear's Soap had tried to persuade the British Postal Authorities to allow them to advertise their soap on the backs of stamps issued in Queen Victoria's reign. Pears had a number of ½d. and 1d. stamps printed "*Pear's Soap*" on the back to show how they wished to advertise, but the scheme was not approved. These trial stamps are comparatively rare to-day and copies of the ½d. stamps with "Pear's" printed on the back in orange, blue or mauve, are catalogued 15/– each. In 1893 the stamps of New Zealand were adorned on the back with the advertisements of New Zealand firms, and also of Beecham's Pills, Sunlight Soap, and other commodities. These advertisements were continued for about 12 months, but were then stopped because some people thought there would be a danger of absorbing printers' ink when moistening the stamps!

From the incomplete list of examples given it will be realised that the advertising value of stamps is capitalised by countries throughout the world, and in the opinion of very many people it would be but a piece of sound business were Great Britain to take fuller advantage of the opportunities. For instance, why should not Britain issue a short series of stamps shortly before the opening of the British Industries Fair each year, featuring in the designs various phases of the great British industries.

The world knows, through postage stamps, that the Saar Valley produces coal, that the United States produces electric lamps, that Germany produces airships, but the world has yet to be told on a postage stamp that the British light aeroplane is the fastest and most reliable aeroplane yet produced. It has to be told in the same manner that the British manufacturer of electric equipment is miles ahead of competitors, and that the British shipbuilding industry is still alive!

Fifty years hence, our descendants will wonder why, at a time when trade was in sore need of a stimulant, Britain did not employ to the full its free advertising facilities.

Stamp Gossip

Ecuador's Centenary

In our stamp article this month reference is made to the issue by Ecuador of an "advertising" stamp issue to commemorate the completion of a century of independence. Since the article went to press we have been able to secure specimens of other stamps in the issue, and these show that Ecuador has ventured much further along the advertising road than the featuring of its attractions for tourists.

The full set comprises 11 values ranging from 1c. to 5s., and the designs display principally the country's agricultural activities: they run, 1c., labourer and oxen, ploughing; 2c., coffee and cocoa plantation; 6c., tobacco plantation; 10c., exportation of fruit; each of these stamps is square in shape; 5c., cocoa bean; 20c., sugar plantation; 2s., portrait of Sucre; 5s., portrait of Bolivar; these four are vertical. The remaining three stamps are horizontal in format, as follows: 16c., mountaineering guide, locomotive and aeroplane; 40c. and 50c., views of Quito.

An interesting feature of the design of the 10c. value is the introduction of the four signs of the Zodiac. These are Aries the Ram; Taurus the Bull; Gemini the Twins; and Cancer the Crab, the predominant zones of the Ecuadorian summer.

Indian Commemoratives

Special British issues of a commemorative nature are still sufficiently rare to be outstanding philatelic events. Our readers, then, will be particularly interested to learn that India intends to send out its first commemorative issue on 9th February next, on the occasion of the inauguration of New Delhi.

There are to be six values, all with pictorial designs showing views of the city. The stamps will be on sale for one month only.

* * * * *

Gibbons' Stamp Monthly draws attention to a very extraordinary error in the design of the recent Belgian air issues. The international code letter on the wings of the monoplane is the Italian marking *I*, not the Belgian *OO*.

An Air Stamp Catalogue

Collectors of air mail issues will receive with enthusiasm the announcement that Stanley Gibbons Ltd., propose to issue a catalogue of air stamp issues.

Air mail stamp collecting, or aerophilately, as it is coming to be known, is a distinct branch of our hobby that is becoming increasingly important, and Messrs. Gibbons' new venture meets a particular need.

Only official Government air stamps will be listed; semi-officials and flown covers will not be included. A particularly valuable feature of the production will be a series of articles on collecting "air mails," the financial side of aerophilately and the types of machines illustrated on air issues.

The proposed price of the catalogue is 2/6, and although copies of it were not available at the time this issue went to press, it is probable that they will be on sale by the time this note appears in print.

Von Steuben Commemorative

The U.S.A. continues to draw upon the War of Independence for inspiration for its commemorative series. Following the "Braddock's Field" issue, noted in the October "*M.M.*", comes a commemoration of the 200th anniversary of the birth of General Von Steuben, on the usual 2c. denomination.

Von Steuben was a picturesque figure in the War of Independence. Knowing barely a word of English, he was imported from the Prussian Court, where he had been given the rank of Grand Marshal following his retirement from the Prussian Army, and was given the task of organising, equipping and training the very raw units of the American rebel forces.

That he succeeded at all in the face of the difficulties of expressing himself in English, is a tribute to Von Steuben's ability and determination. He is certainly more worthy of commemoration than several of the figures and incidents that have preceded him in this series.

* * * *

The popularity of the pictorial designs used for the Swiss *Pro Juventute* issues last year was so great, that it comes as a surprise to find the designers reverting to the arms type for this year's issue. The arms of Freiburg, Altdorf and Schaffhausen respectively are used for the 5c., 10c. and 20c. denominations, and a portrait of the Swiss novelist, Jeremiah Gotthelf, is on the 30c. value.

We take this opportunity of making acknowledgment to Stanley Gibbons Ltd., for their courtesy in loaning the stamps from which the illustrations used in our stamp pages have been prepared.

FINE VALUE. 1,000 diff., 2/8; 500, 1/4; 50 Air, 2/-; 500 Mounts, 2d.—B. Vant, 4, Clifford Av., Hull.

200 Assorted Foreign Stamps Free to genuine approval applicants.—J. Adams, 1, Albert Rd., Alton, Hants.

FREE. 50 Different Stamps. Request Approvals.—Best Bros., 37, The Gardens, London, S.E.22.

Free. 10 Cochin to genuine approval applicants.—J. Hayes, 75, Trinity Rd., Handsworth, Birmingham.

FREE. 100 superior stamps to approval applicants. Gosling, 91, Foxhall Road, Ipswich.

1,000 STAMP MOUNTS FREE to applicants for British Colonial Approvals at ½d. each.—Theobald, 54, Antill Road, London, N.15.

10/- South Africa (King George), price 6d.; complete set 9 Roumania Boy King, 3d.; request appro.—Sanders, "Afton," Newlands Av., Southampton.

LARGE PARCEL. ¼ lb. Foreign and Colonial Mixture (about 1,250 Stamps), and 20 different unused Germans, 1/6 post free. Splendid assortment. Best on the market.—Morgan, Southowram, Halifax.

7 High-class African "Zoo" Stamps—Lions, Elephants, Camels, Zebras. Free to genuine buyers from approvals. (1½d. Postage).—Stuart, 183, Sherborne Road, Yeovil.

TRIANGULAR, Armenia (rare), Danzig (airpost), British, French, and Portuguese Colonials, together with dozens of other scarce Stamps, are contained in my ½d. Approvals.—James Wilson, 76, Tylney Road, London.

FREE TO GENUINE APPROVAL APPLICANTS. Either 1 1896 6d. Rhodesia, Cat. 1/-, or set of 1924 Large Persia. Please STATE whether Foreign or British Colonial Collector and enclose 1½d. for postage.—Surrey Stamp Co., 73, All Saints Road, Sutton, Surrey.

DO YOU COLLECT Fine Used British Colonials? Then ask to see my collection of 600 different at ½d. each Stamp, the best value at the lowest cost. Rarer Stamps sent on request. Special Xmas Bargain: 50 interesting Picture Stamps, new issues, etc., post free 1/-.—Bickers, "Elveden," Lordswood Avenue, Southampton.

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FREE **25 PORT. COL. AND 25 FR. COL.** **AND**

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POST FREE

8 Spain, Columbus, 5 Ships, 3 Air	4d.
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25 Air Mails, different	7d.
3 Malta, new issue, Mint	3d.

Post extra. Persia Air Mail free with up-to-date appros.
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ENGLISH £1 AND 10/- STAMPS.

These two stamps (issued and used for a special purpose) with eight others, including one nearly **90 YEARS OLD** and other **OLD** English postage stamps **GIVEN AWAY** free of charge to genuine applicants for selections of duplicate stamps on approval.

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HUGE STOCK OF APPROVAL SHEETS at rock-bottom prices. Must be cleared regardless of loss. 1/6 for Sheets containing Stamps of total price £1. 1/- for Sheets of total price 10/-. N.B.—Special free offer to first 1,000 customers. Also to every customer who finds 10 new customers we give packet of Stamps catalogued over £20. Buy 1/- Sheet and make 9/- pocket money by selling Stamps singly to friends. Send 1/- or 1/6 for Sheet and full particulars. Enclose addressed envelope.—En Zed Stamp Co., Box 13, Wellesley St. P.O., Auckland, New Zealand.

ANOTHER BARGAIN PACKET

No. 588. Post Free 3d. Contains 110 different Stamps, including Cayman Is., Travancore, Greece, Argentine, U.S. America (pictorial), Venezuela, Chili, China, Gold Coast, Kelantan, etc., and all purchasers who ASK FOR APPROVAL SHEETS RECEIVE 6 MALAY STATES FREE.
New Approval Sheets ready. Grand variety. Good Discount. Write for a selection to-day. Duplicates exchanged. Exchange desired with all Colonies.
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1½d. For part-postage only and you get the biggest and best Stamp package advertised. **1½d.**
Overseas 3d.

A Mystery Parcel of 5,000 Unsorted Stamps. Mostly foreign, **3/6.** Overseas **4/9.**

Astley & Co. (M. 10), 106/8, Low Hill, Wolverhampton

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100,000 Used and Unused Genuine Postage Stamps

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Clearance Sale. Send now to

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Over 60 different Superior Stamps, including **Set 5 Ukraine 1918** (Cat. 1/9), **Crete** (Slave), **Mozambique Coy** (Ivory), **Transvaal** (1d. mint), **Soudan** (Camel), **Travancore** (unused and surcharged), **Haute-Volta** (New Issue), and **Antioquia** (too late); also a beautiful **unused three-cornered Ship Stamp. ALL FREE!** Send **2d.** for postage requesting our famous approvals.

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500 All Countries	1/6	200 British Colonies	2/6
1000 ,,	5/-	500 ,,	12/6
2000 ,,	12/6	50 Air Post ...	3/6

Every Stamp different and guaranteed genuine.
Price List of hundreds of other packets and sets. Post Free. Approval Selections on request.

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65, George Street, Plymouth.

POST FREE **5/- BOXES** (Weighed) POST FREE

3/4,000 WELL ASSORTED UNPICKED STAMPS from FOREIGN MISSIONS

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Many good Stamps have been found in these UNSORTED Mixtures. REMEMBER! 3/4,000 Stamps.

JOS. H. GAZE, DIDSBURY, MANCHESTER.

COLUMBUS discovered America in 1492. **SPAIN** has issued two of the loveliest pictorial sets of 1930 commemorating him. Fine large Stamps.
Set of 6 Air Stamps, 5c. to 25c. ... Price **10½d.**
Set of 10 Postage, 1c.-25c. inc. **Triangular** 1/-

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50 Finland ...	6d.	50 Greece ...	1/-
50 Holland ...	5d.	25 Japan	3d.
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ROUMANIA BOY KING, set of 9 used for 6d.

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Splendid selection, perfect condition, and many high values.
No British, fiscals, or inferior specimens. Satisfaction or money refunded in full.
Price, 100 **6d.**, 500 **2/6**, 1,000 **5/-**, Post Free.
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50 Different British, French and Portuguese Colonials. 50 Different Unused Stamps. Packet of Stamp Mounts. Perforation Gauge.

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CEYLON PACKET FREE

This **Superb Packet** contains **210 Different Stamps,** including a **Fine Set** of **10 Different Ceylon** with **Scarce** and **Obsolete** issues. Also many scarce **High Values, Provisionals, Sets, Air Mails, New Issues,** etc., etc., too numerous to mention. Offered **Free** to Genuine applicants asking for **Half Price** Approval Sheets and enclosing **1½d.** stamp postage. (Abroad 6d. P.O.). Mention Ceylon.

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For Further Stamp Advertisements see Page 1031

Conjuring Tricks—(*Continued from page 935*)

examination, for nobody will be able to get any of the articles off the cord.

How it is done: Striking as is this trick, there is nothing difficult about it, and reference to Fig. 9 practically gives away the secret. There are two reels of silk both exactly alike. One of these is already threaded on the cord between the dice, but when the conjurer displays the dice he keeps the reel hidden between them, as shown in the figure. He holds the dice pressed together in his left hand, with the reel concealed behind them; while with his right hand he pulls the cord backward and forward through the dice.

After the covering handkerchief has been thrown over dice and cord the magician displays the other reel of silk. When he places this reel under the handkerchief he slips it into a pocket in the latter. Then pulling the handkerchief off, he shows the duplicate reel securely threaded on the cord between the dice.

A different effect may be obtained if desired by making the reel of silk disappear and then revealing the duplicate, supposed, of course, to be the same one threaded on the cord. The disappearance of the reel is brought about by a duplicate handkerchief, which is really two handkerchiefs sewn together round the edges, with a slit some three inches in length cut in the centre of one of the handkerchiefs. The reel is wrapped in the handkerchief, being pushed through the slit in the process, so that it falls within the bag formed by the two handkerchiefs. The apparent single handkerchief may then be shaken out, and the reel has apparently disappeared, to be produced as already described.

THE FULL-EMPTY BOX

This is a useful trick for concluding a conjuring performance, because it enables the magician to produce a quantity of flags, ribbons, etc., which, draped about the stage or room, provide a showy finish. The box can be used also for the first trick in a performance, in which case the conjurer can produce magically everything he needs for his experiments.

The box, which should be fairly large, rests on its side upon a table, with its lid facing the audience. The conjurer lifts the lid and everyone can see that the box is unmistakably empty. The inside is white, so that the audience can see quite to the bottom of the box. There is not room for the concealment of even the smallest article. The lid is then closed and the box stood upright; whereupon the conjurer once more lifts the lid and takes out of the box flags, handkerchiefs, ribbons, flowers, packets of sweets—in fact almost anything he wishes!

How it is done: The box may be of cardboard or wood, and should be rather taller than it is wide or deep. The only special feature about it is that the bottom is hinged at one side, so that it can be pushed up into the box as shown in Fig. 10.

At the commencement the box stands on the table with its lid facing the audience as shown in Fig. 11. The articles to be produced, made up into as compact a bundle as possible, are hidden behind the box. After the conjurer has lifted the lid and allowed the spectators to see that the box is genuinely empty, he closes the lid and then simply tilts the box over backward until it is standing right side up with the lid on top. This action causes the bundle hidden behind the box to pass inside it, the hinged bottom rising to permit its passage.

Fig. 12 makes everything clear. The box is not lifted from the table at all, but is simply tilted over. Of course there is no need to show the inside of the box after the articles have been produced, but the conjurer may do this if he wishes by pushing the hinged bottom down into its normal place again as he takes out the last article from the box. The box may then be taken off the table and put on one side, leaving the table free for the performance of further tricks.

"Lives of Engineers"—(*Cont. from page 953*)

A week later the bridge was officially opened by the Mayor of the village. Speeches were made by all the local celebrities, and Stybbings' great work was eulogised by all except Farmer Heighceed, who was absent counting his ducks. This great event was most fittingly celebrated by the unexpected arrival during the ceremonies of a second postboy with news of the restoration, seven years earlier, of King Charles II. This gave an apt illustration of the value of Stybbings' work that the assembled crowd were not slow to appreciate, for in the absence of his magnificent bridge and road, the news undoubtedly could not have reached the village itself until several months later—unless the postboy had taken the unusual course of shouting his news across the stream.

Incidentally, a most interesting antiquarian discovery was made during the excavations for the piers. It had long been realised that the place had been inhabited successively by the Celts, Anglo-Saxons and Romans, and several relics of these vanished people had been discovered from time to time. On the present occasion one of the workmen, digging in the river, found a curiously-shaped gold coin, which on being cleaned was seen to bear the head of a king and the extraordinary date B.C.75. This coin is now a treasured exhibit in the Stybbings Museum.

Stybbings lived to a good old age and in the later years of his life often could be found sat on the parapet of the bridge explaining to admiring visitors exactly how it had been constructed. He never failed to impress them with the magnitude of the task that had been accomplished under his direction, and his wonderful stories extracted from them so many tips that his supply of tobacco and matches never gave out, and he himself became one of the shining lights of the bridge.

Naturally the celebration of the 300th anniversary of such a famous engineer as John Stybbings did not pass unnoticed, and it was decided to celebrate the occasion in a fitting manner. Unfortunately a difference of opinion arose in regard to the exact year when this should be done. Stybbings was born on the 29th December, 1630, and certain of his admirers argued that the celebration should take place on that day. Others pointed out that during the 18th century, 11 days were missed out of the calendar in order to correct an error, and that the correct date was therefore 9th January, 1931.

Up to the time of going to press the matter has not been settled, and in fact the dispute between the two parties has been so bitter that they appear to have forgotten Stybbings entirely! Once again the "*M.M.*" has distinguished itself by being the only engineering periodical to make any reference to the tercentenary of this wonderful engineer.

A New Electric Gramophone Motor

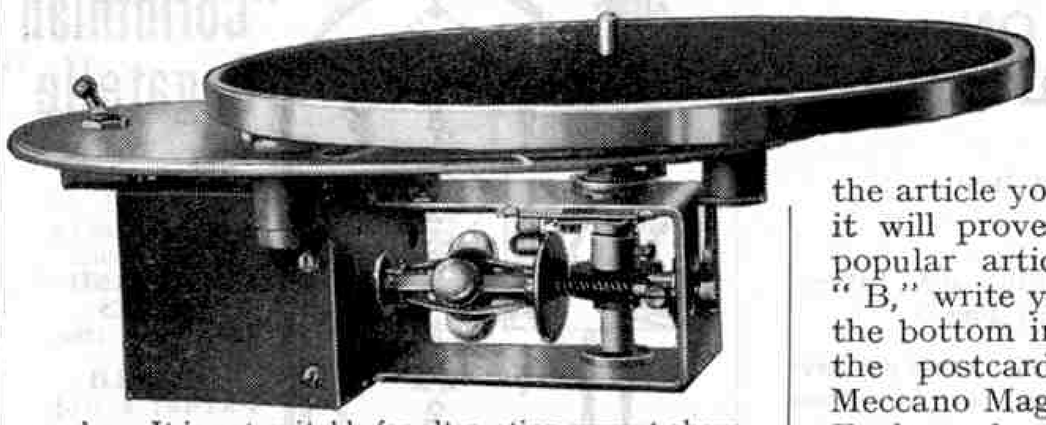
B.T.H. Model at Three Guineas

All gramophone users have felt the irksomeness of having to wind up the clockwork motor after every two or at the most three records. It is bad enough to have to change or reverse the record and change the needle, without having to devote time and energy to winding up; and if by any chance we forget this last operation we are unpleasantly reminded of the fact by the ghastly wailing noise produced when the motor runs down in the middle of a record! The substitution of an electric motor for the spring motor does away with all winding up, and results in steady and continuous running without any attention whatever.

We have frequently been consulted by readers in regard to replacing their spring motors by electric ones, and we have found that in most cases the obstacle was the comparatively high cost of a reliable electric motor. For this reason we welcome the appearance of a really excellent electric gramophone motor and turntable produced by the British Thomson-Houston Co. Ltd., at the remarkably low price of three guineas complete.

A good idea of the equipment may be obtained from the accompanying illustration. The construction is on sound engineering lines, and the design has many interesting features. The motor, which runs at about 1,200 r.p.m., is built on the same shaft as the governor and drives the turntable through the medium of a worm and worm wheel. This construction not only makes for compactness, but, as a smaller motor can be used, magnetic hum is reduced to a minimum. Quietness in operation is further assured by the provision of rubber washers between the motor and the metal top plate, and the use of special gauze brushes for the motor. Gramophone governor gears are sometimes damaged by users rotating the turntable by hand in order to make it pick up speed quickly; and to afford protection against such misuse a slipping clutch device is fitted between the turntable and the spindle.

On the left of the pressed steel top plate is the switch for starting and stopping, the speed being regulated by means of a small lever. The motor is series wound and will operate on any lighting circuit either direct current or alternating current up to 60



cycles. It is not suitable for alternating current above 60 cycles, and for such current a special motor is supplied. Incorporated in the equipment is a three-position switch that is set in the correct position for the supply that is to be used before the motor is placed in service. The handle of this switch is under the turntable and out of the way when the machine is in use, and its positions are as follows:—1, A.C. 100-125 volts; 2, D.C. 100-125 volts or A.C. 200-250 volts; and 3, D.C. 200-250 volts. The power taken by the motor is less than 20 watts in all cases, and the machine will play an average of over 1,000 ten-inch records per unit. Full instructions for use are given.

The replacement of an existing clockwork motor by this motor is a very simple matter. All that is necessary is to remove the clockwork motor, cut a hole of suitable size in the top board, drop the motor through, and fix the top plate to the board by four small screws.

We have given this remarkably cheap motor a thorough test on A.C. current at 220 volts, and we have found it to pick up speed quickly and to run with ample power and almost complete absence of magnetic hum or other noise.

Choose your own Christmas Present

It is a wonderful sensation to sit down and study illustrations and descriptions, and select your own Christmas present. Try it! It may prove profitable!

In our pages this month there are advertisers' announcements of all kinds of splendid toys, books, and all manner of articles for giving pleasure to boys at Christmas. We are going to make at least one boy happy by giving him the very thing he wants from amongst the articles advertised in the columns of this issue.

Look carefully at all the advertisements and decide which article you would like the postman to hand to you on Christmas morning. Write the name of it on the top of your postcard, marking it "A." Then, in a second list, headed "B," write down in order of popularity the names of the six articles that you believe will prove the six most popular with our readers generally. It is not necessary to include in this list the article you like best, unless you believe it will prove to be one of the six most popular articles. Having completed list "B," write your own name and address at the bottom in very plain letters, and send the postcard to "Christmas Presents, Meccano Magazine, Old Swan, Liverpool." Each reader may submit only one entry.

To the sender of the list that corresponds most nearly in order of merit with the total voting we will post the article that heads his list, to reach him on Christmas morning.

"Christmas Presents" postcards must reach us not later than 20th December.

For North London Readers

Meccano boys who live in North London are recommended to pay a visit during their holidays to 19, Firs Parade, Muswell Hill, where Mr. Hubert Lansley has recently opened a shop for models and mechanical toys. Mr. Lansley was on the technical staff of the "*Meccano Magazine*" for over six years, and he has an intimate knowledge of all Meccano products. We understand that he is arranging a special Hornby Railway exhibition during this month, and that several working models of his own design will be seen.

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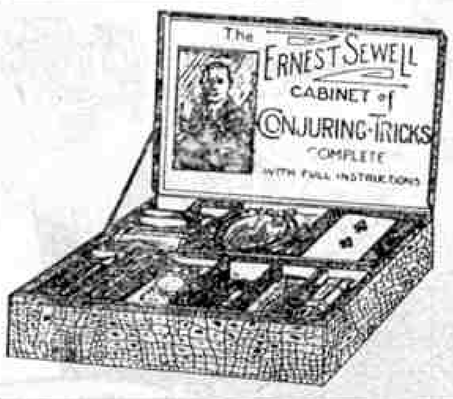

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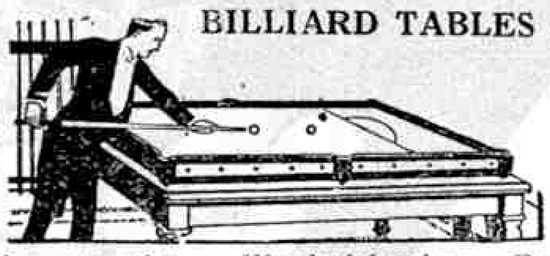

Special construction.	Wonderful value.	Free Lists.
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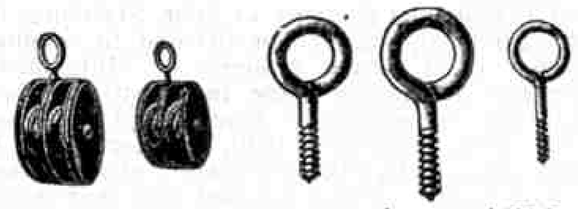

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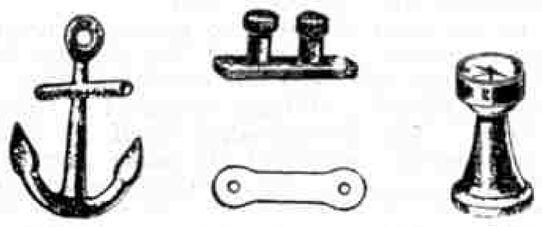

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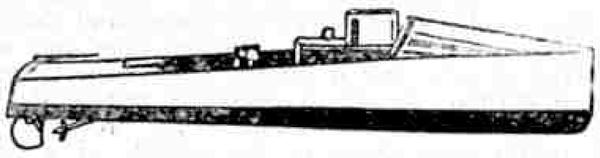

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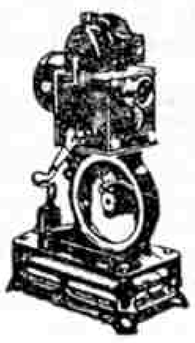

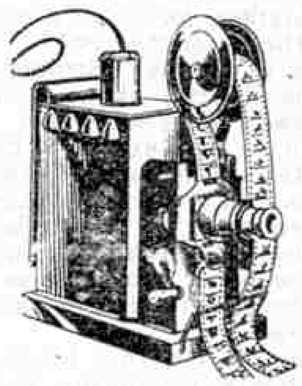

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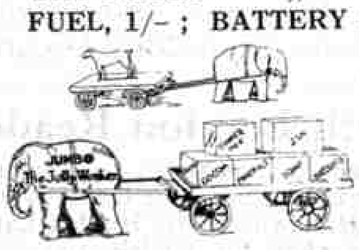

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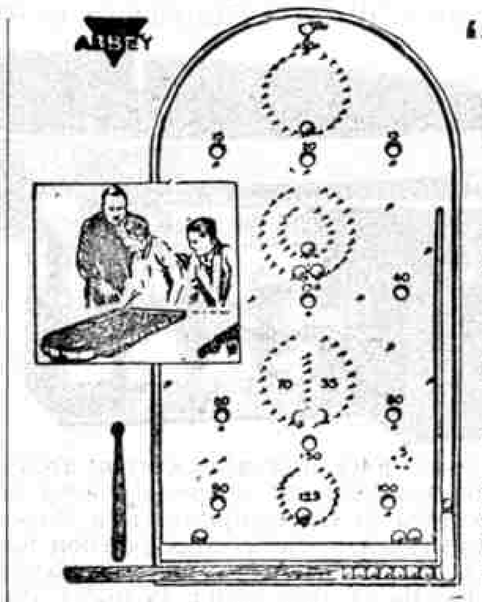

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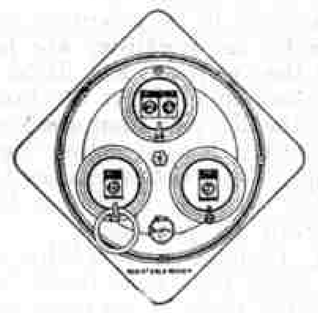

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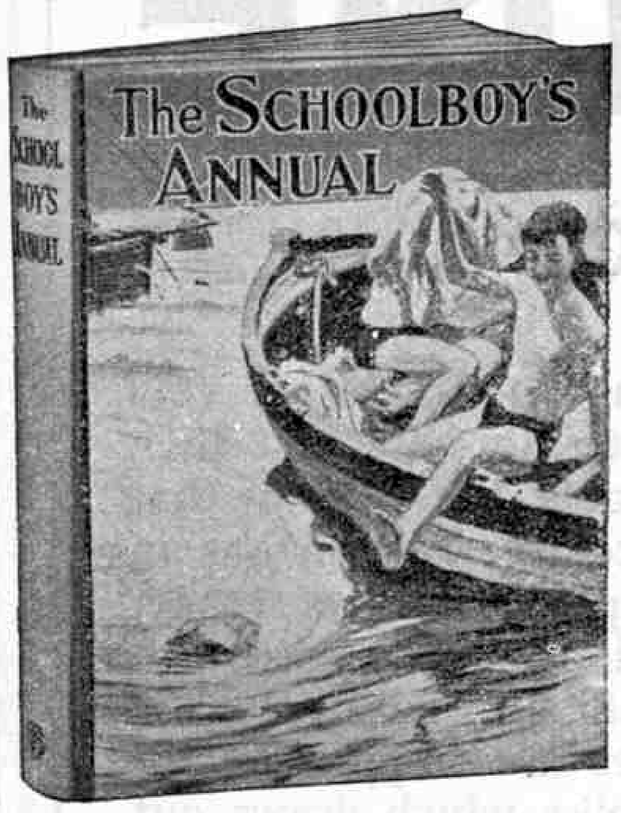

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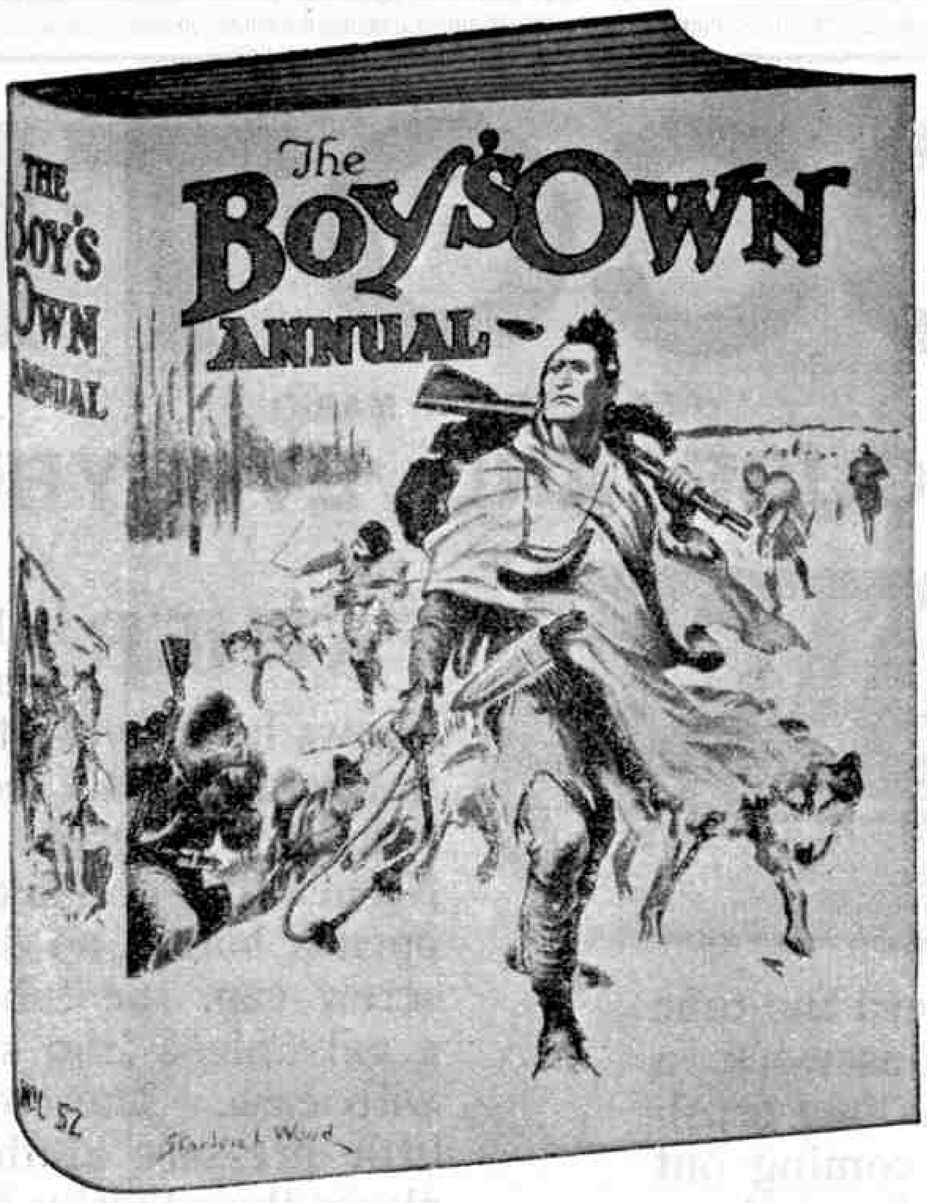

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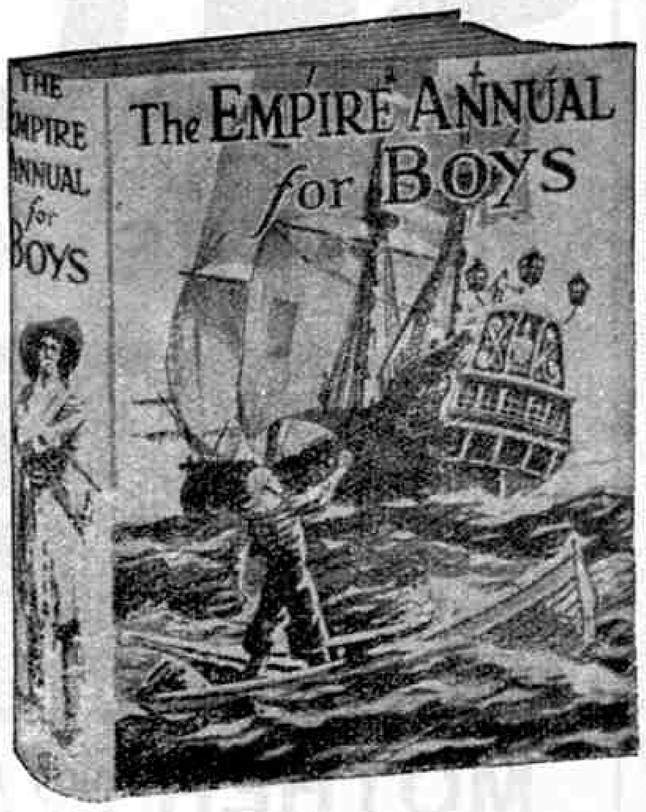

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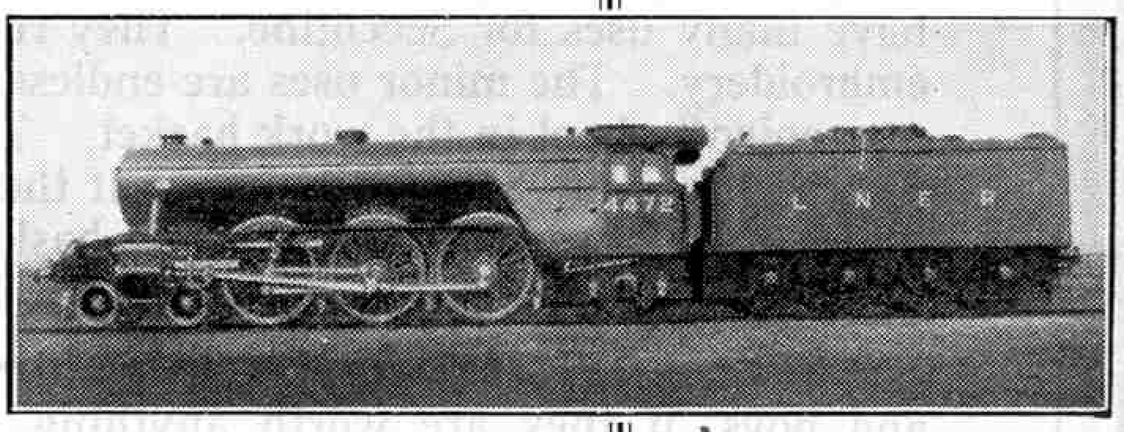

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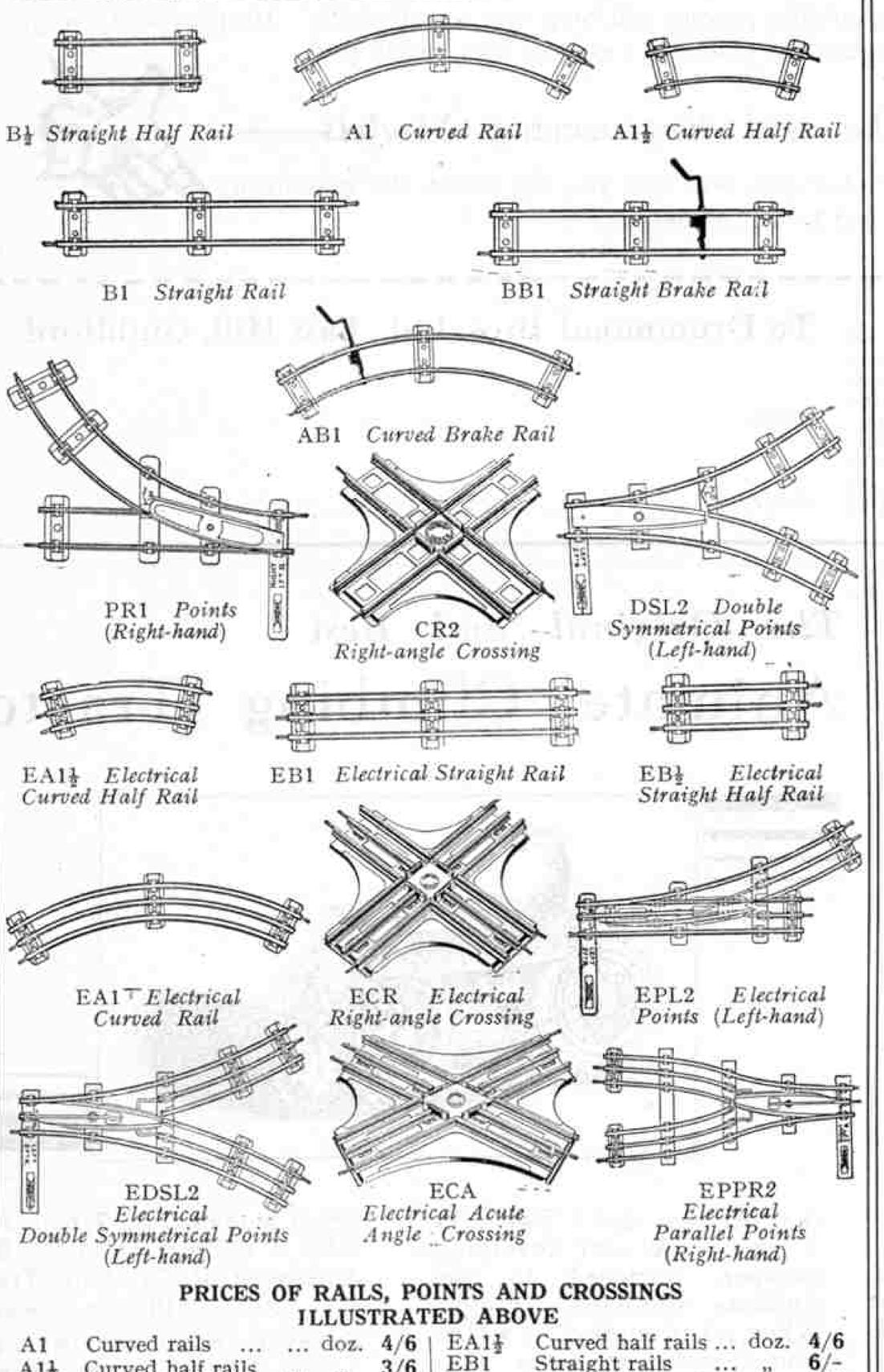

B½ *Straight Half Rail*
A1 *Curved Rail*
A1½ *Curved Half Rail*
B1 *Straight Rail*
BB1 *Straight Brake Rail*
AB1 *Curved Brake Rail*
PR1 *Points (Right-hand)*
CR2 *Right-angle Crossing*
DSL2 *Double Symmetrical Points (Left-hand)*
EA1½ *Electrical Curved Half Rail*
EB1 *Electrical Straight Rail*
EB½ *Electrical Straight Half Rail*
EA1 *Electrical Curved Rail*
ECR *Electrical Right-angle Crossing*
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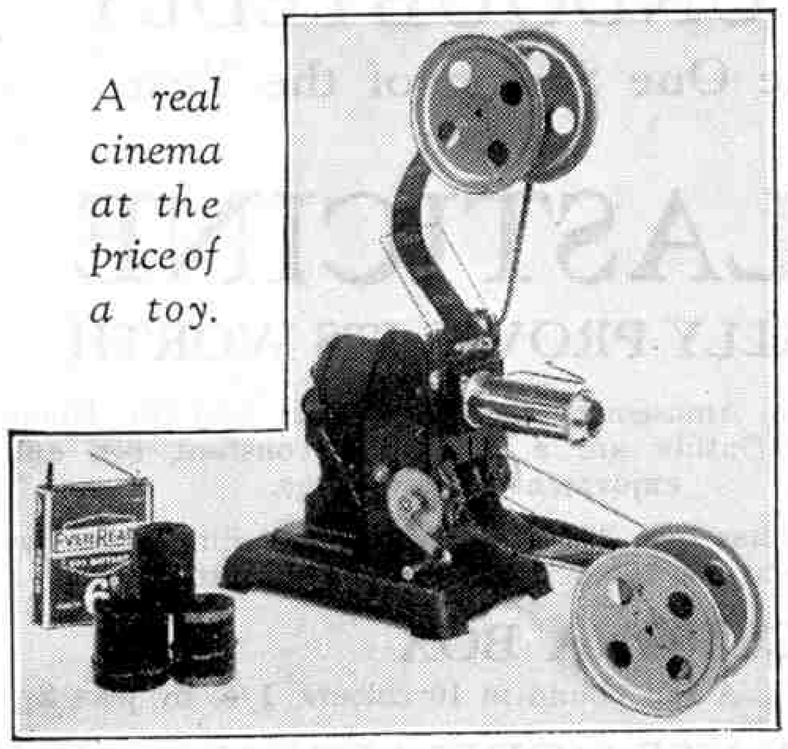

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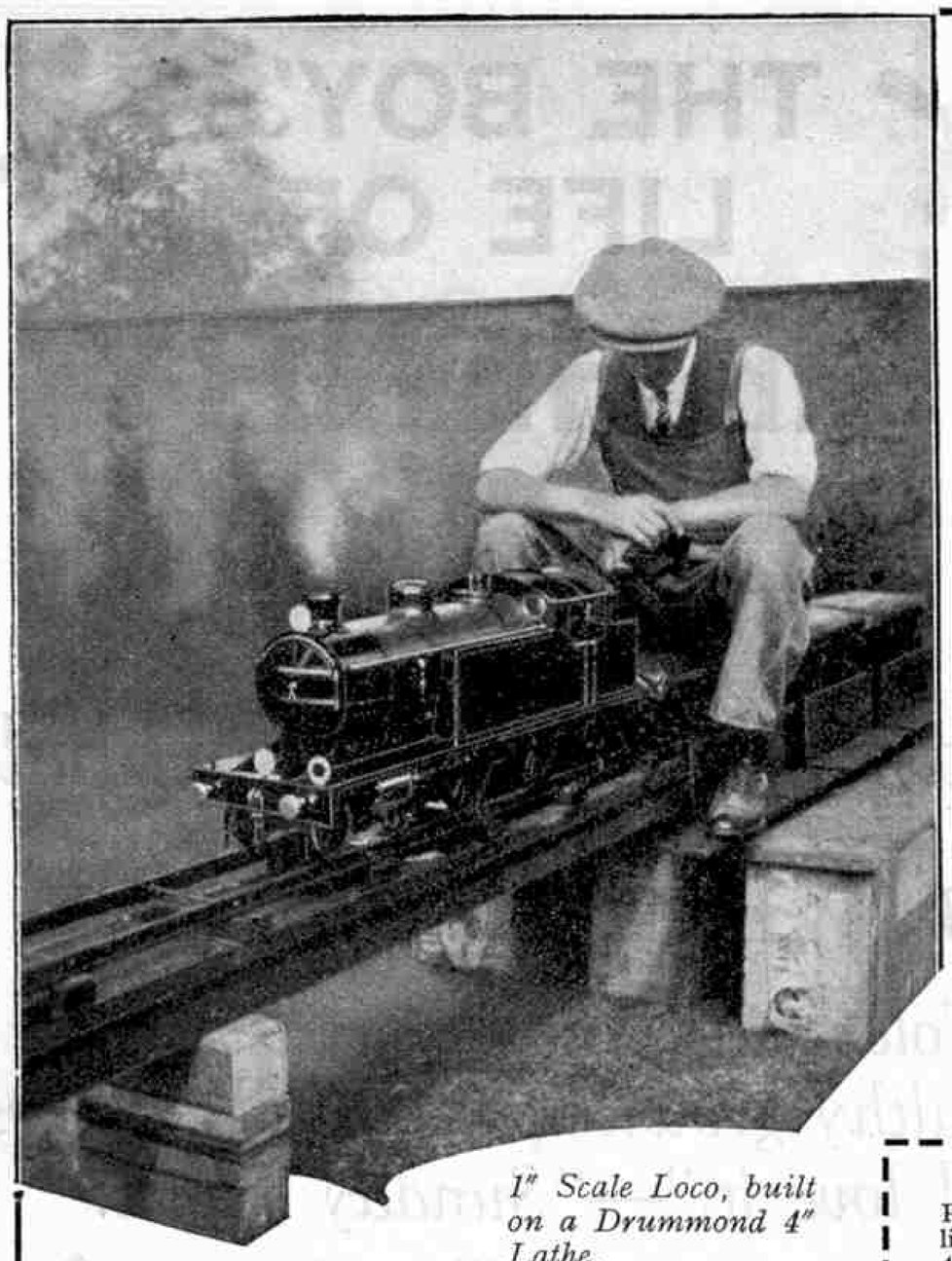

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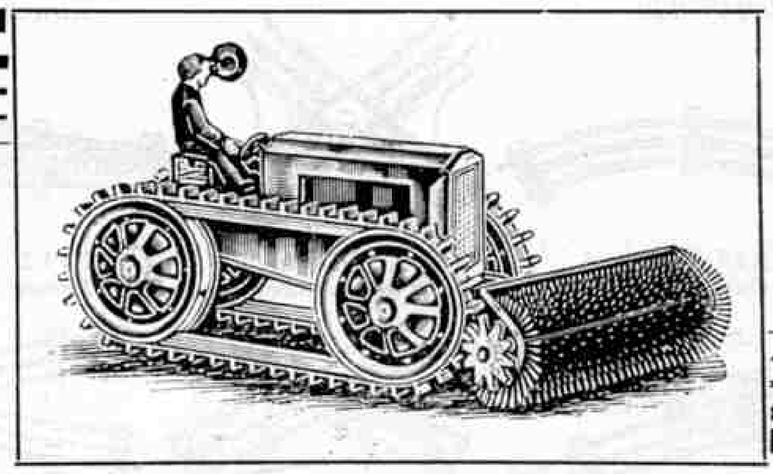

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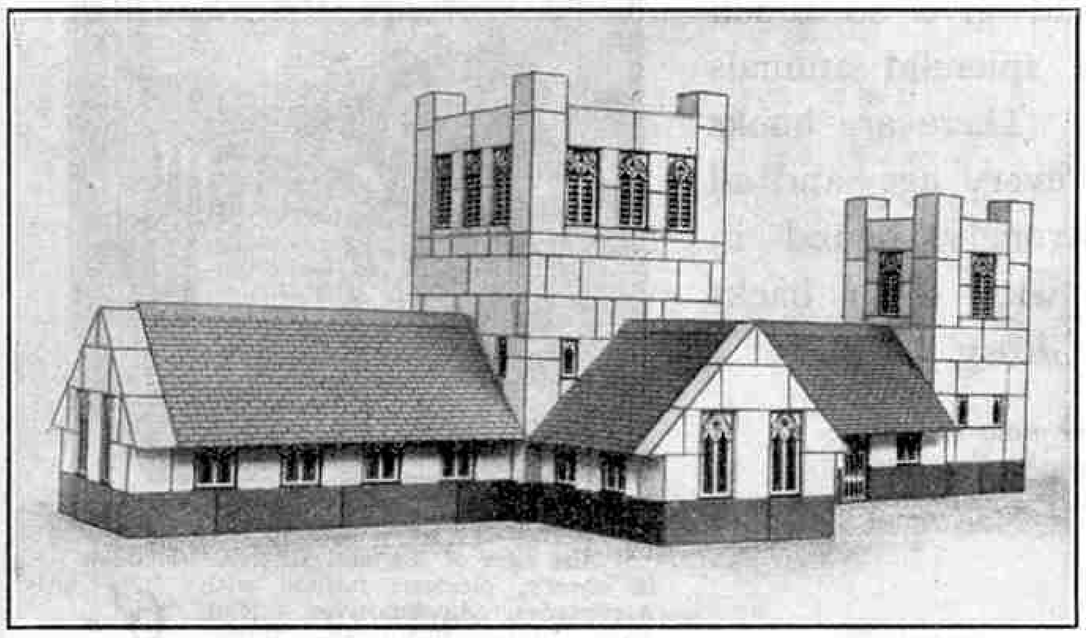

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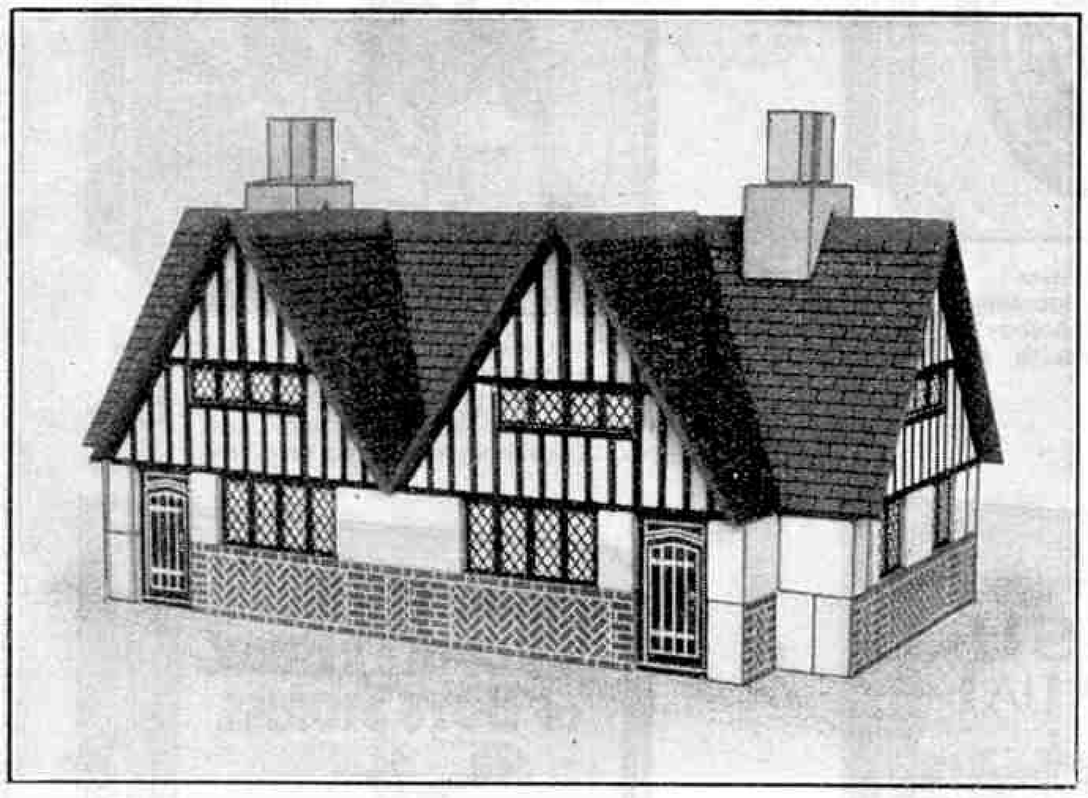

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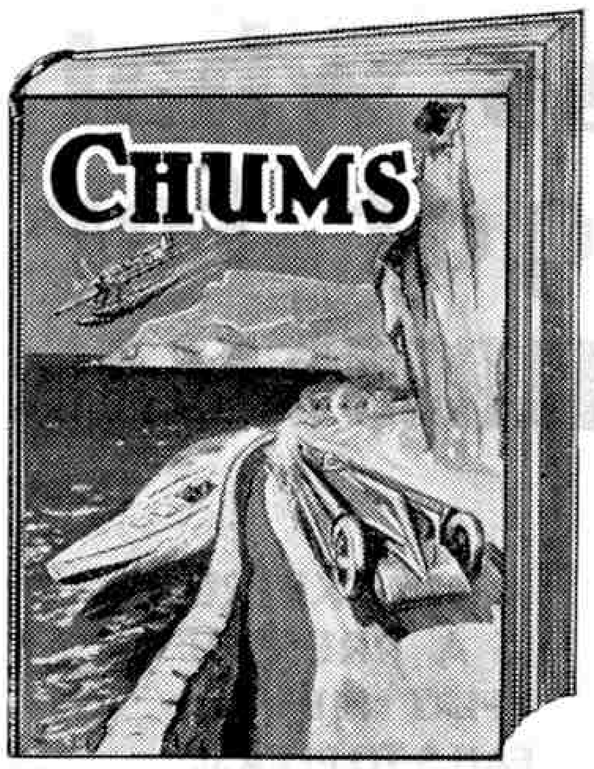

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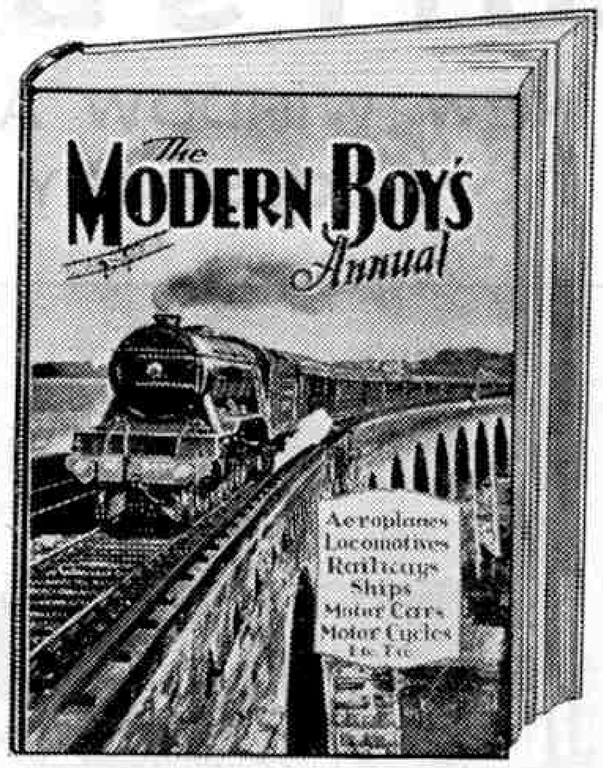

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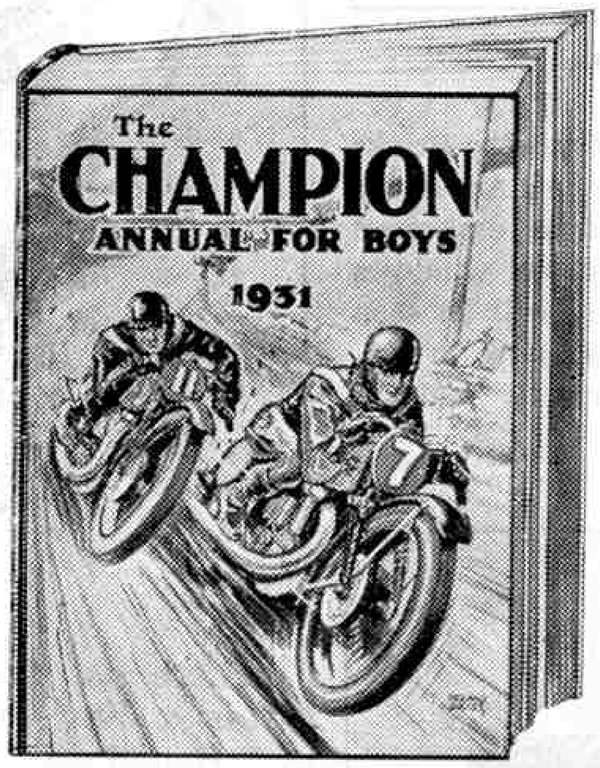

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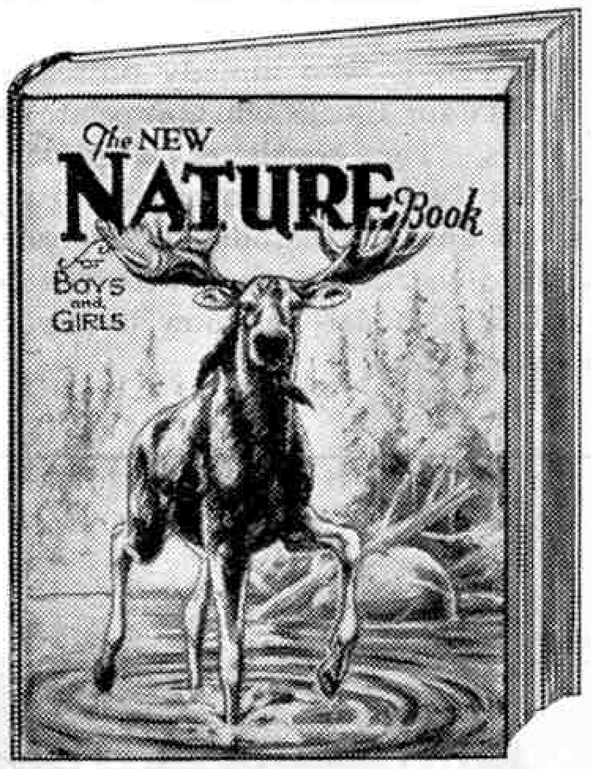

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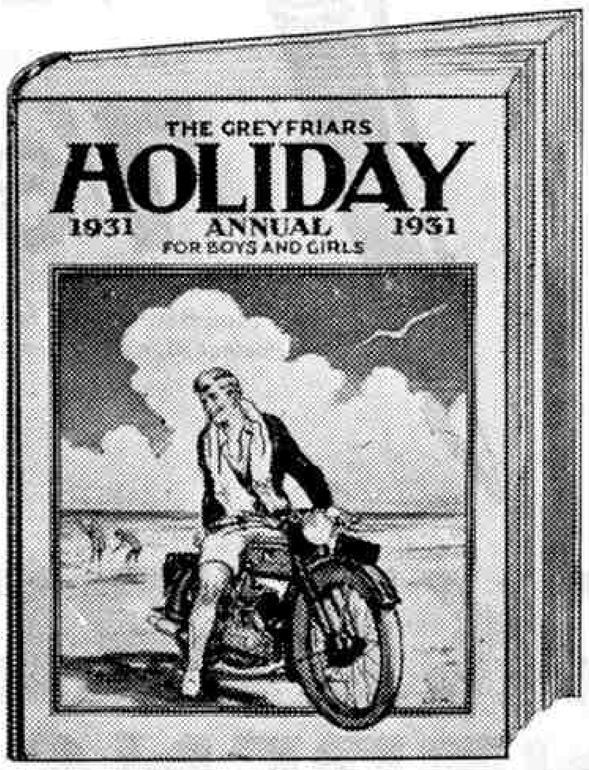

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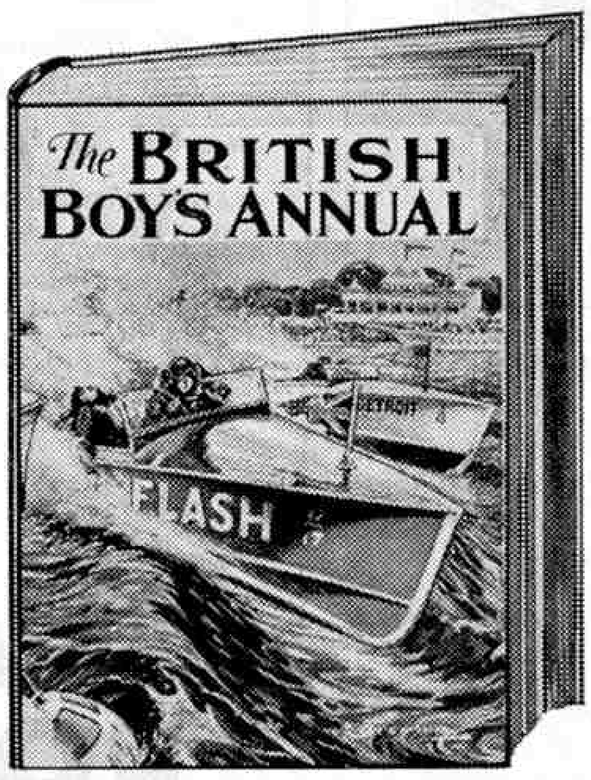

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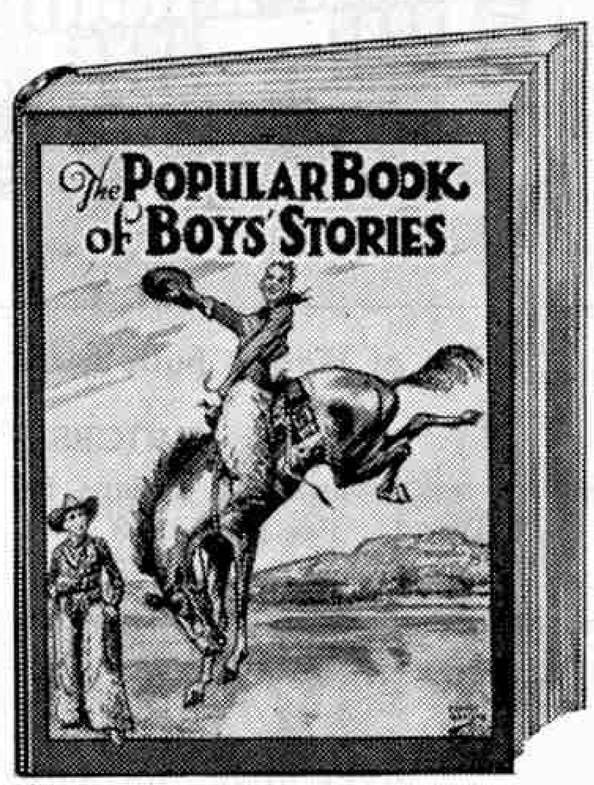

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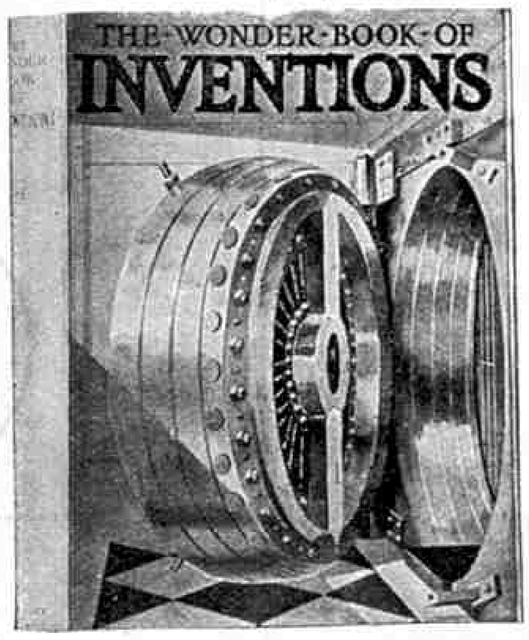

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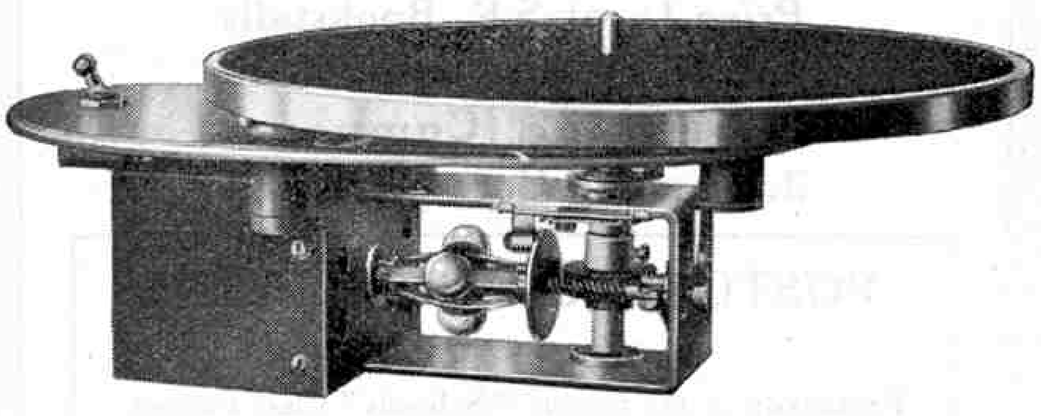

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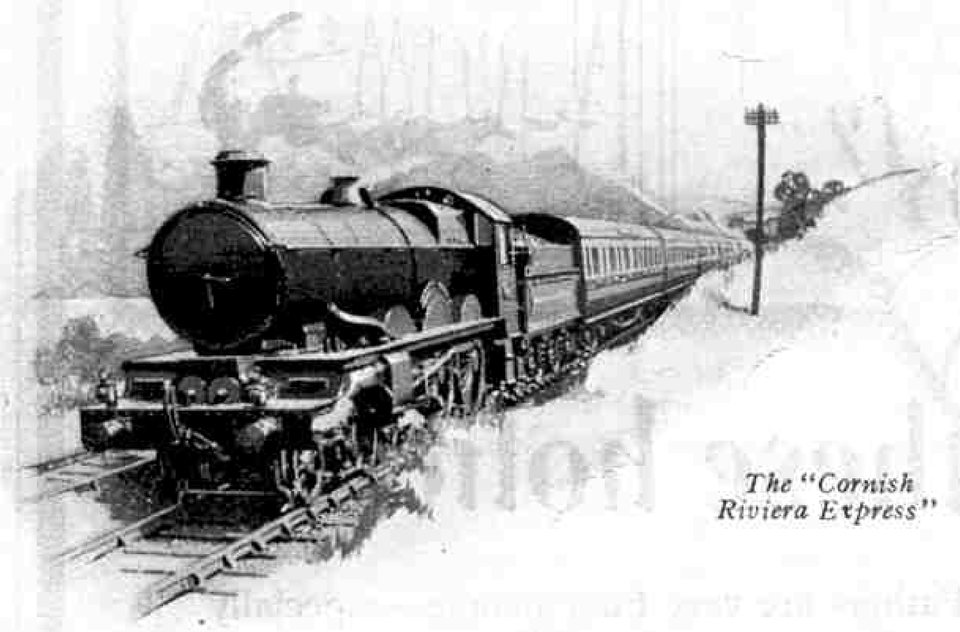

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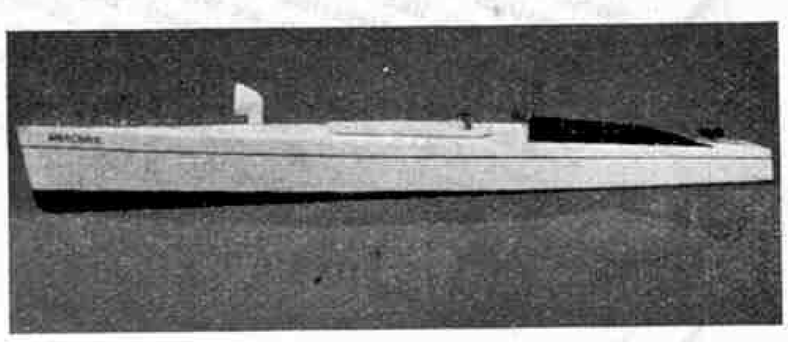

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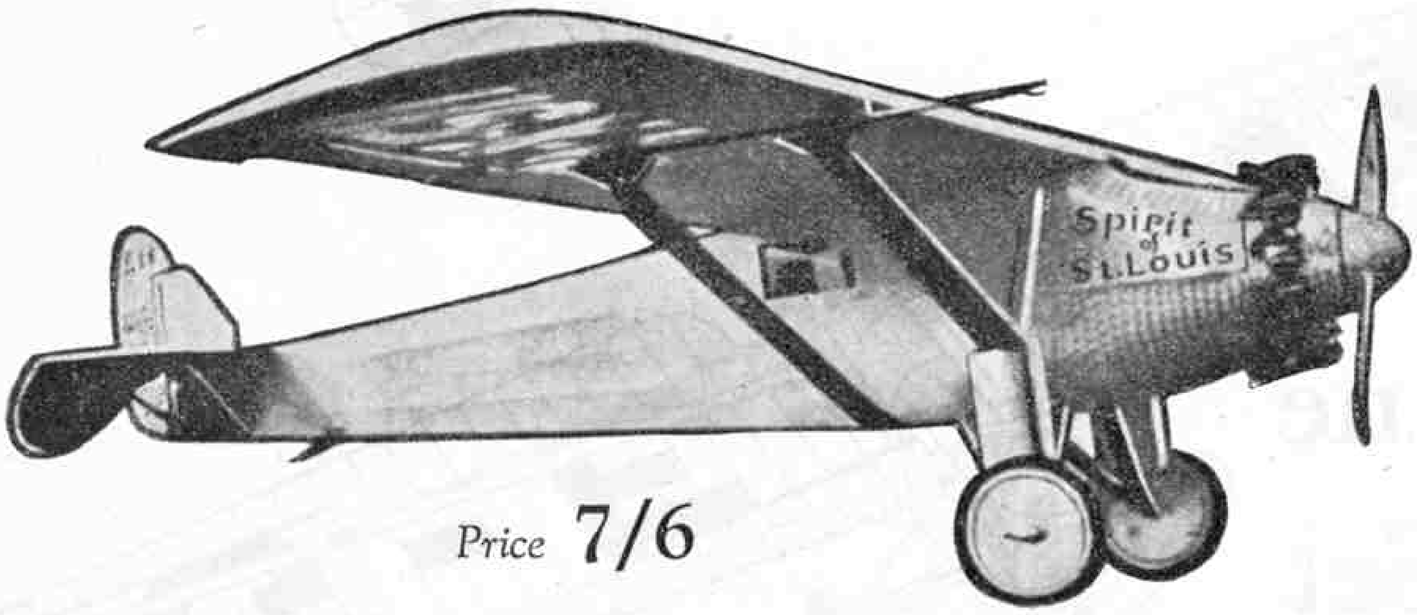

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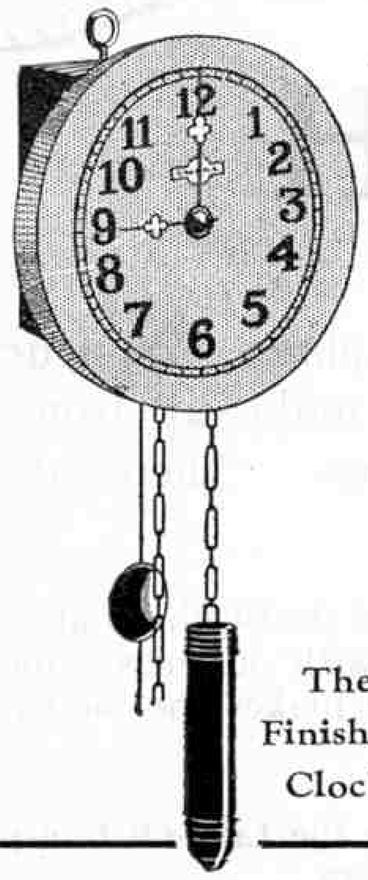

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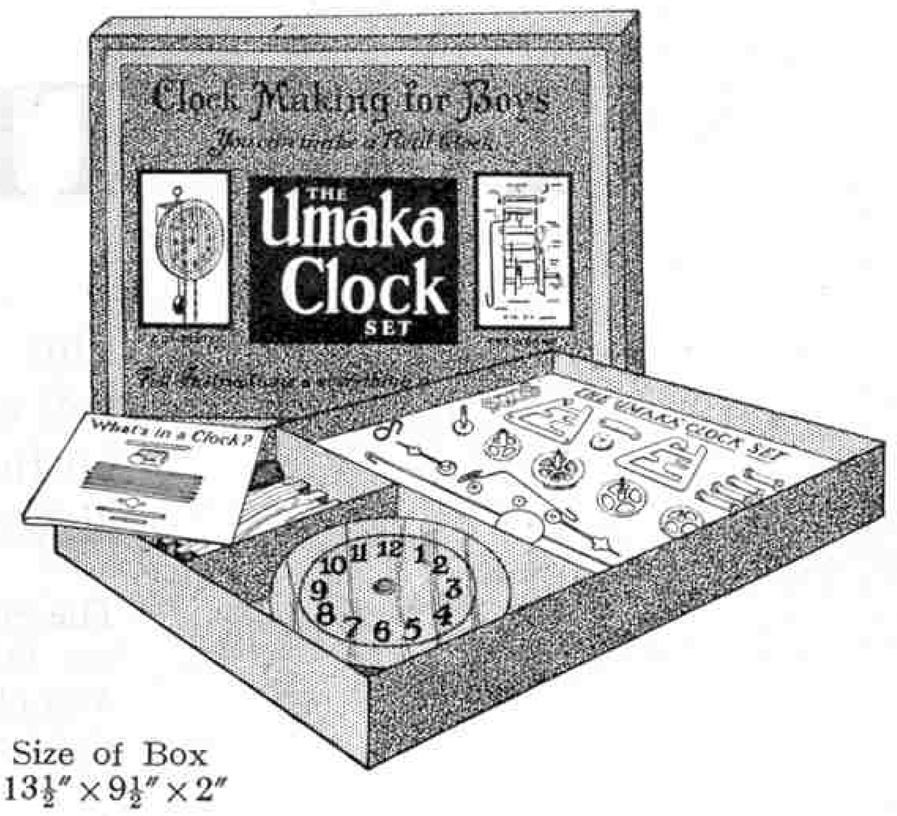

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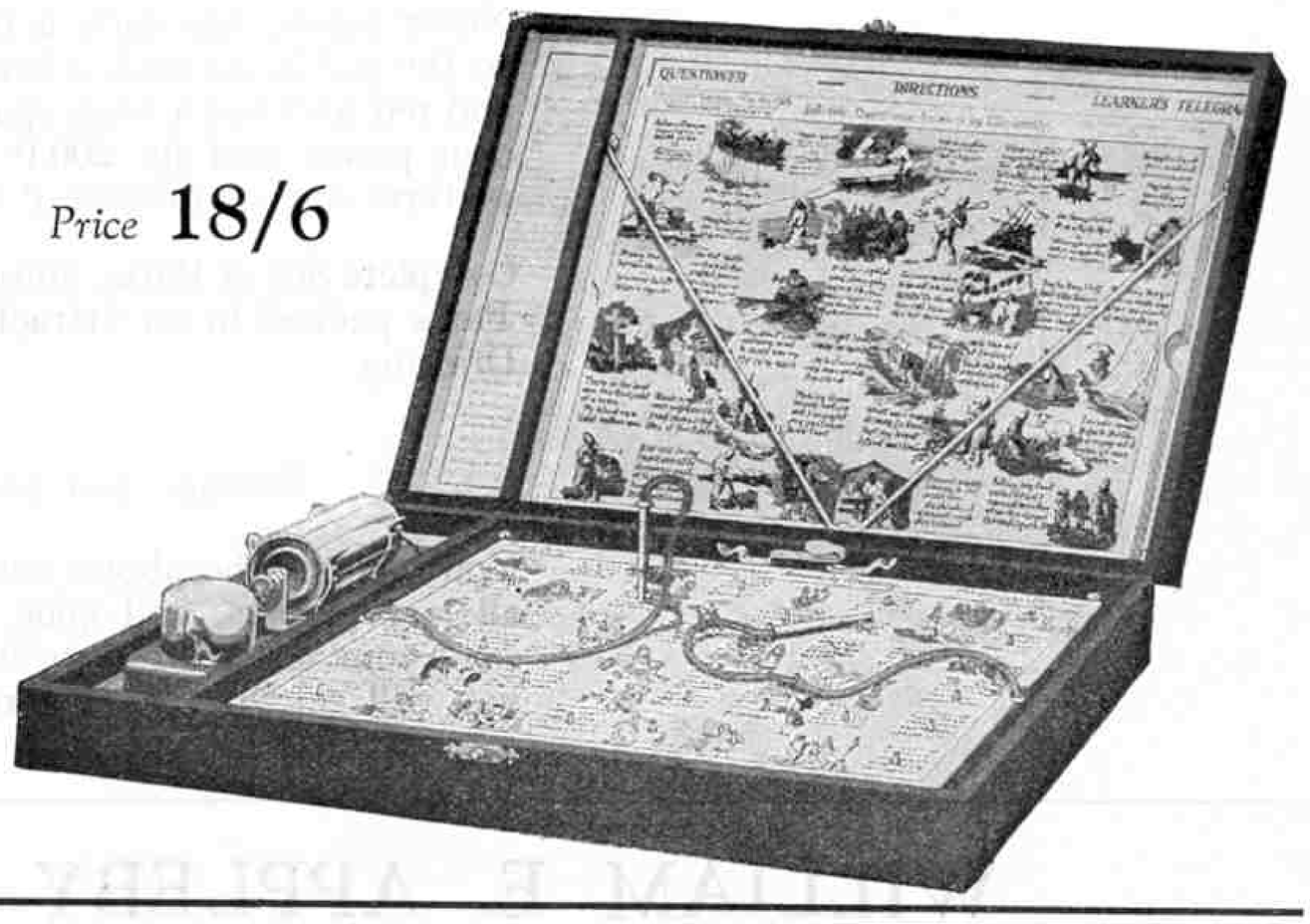

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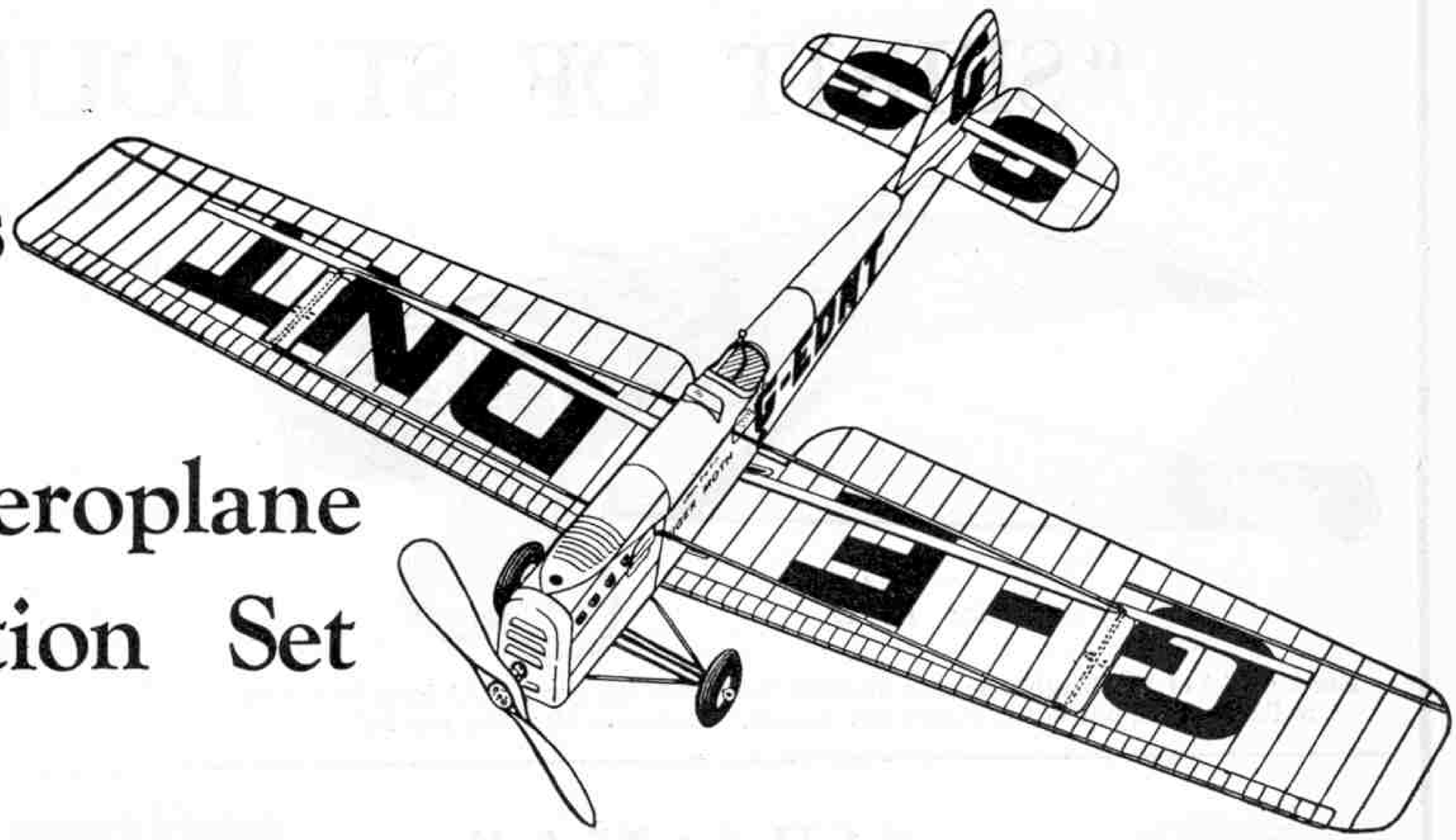

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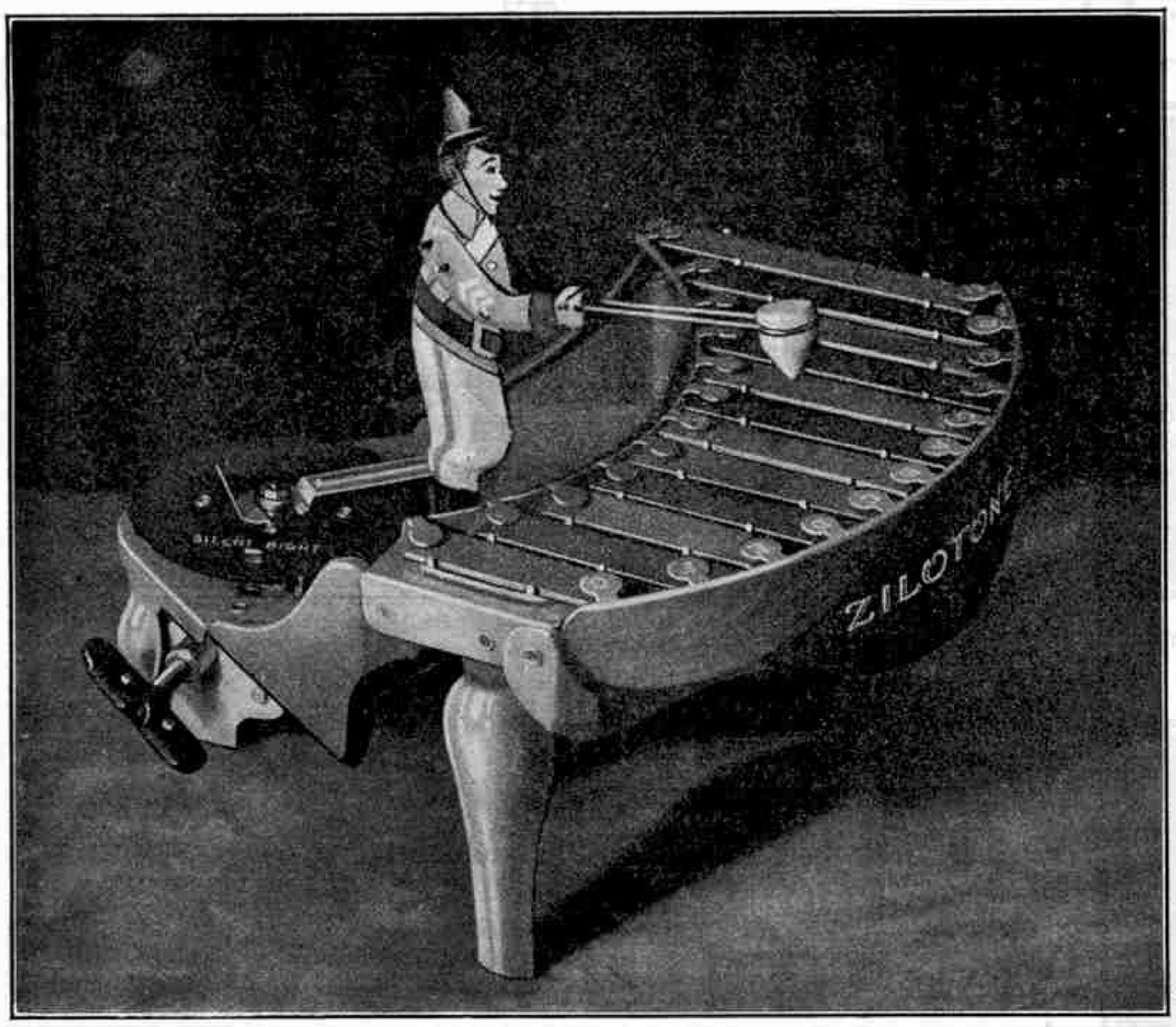

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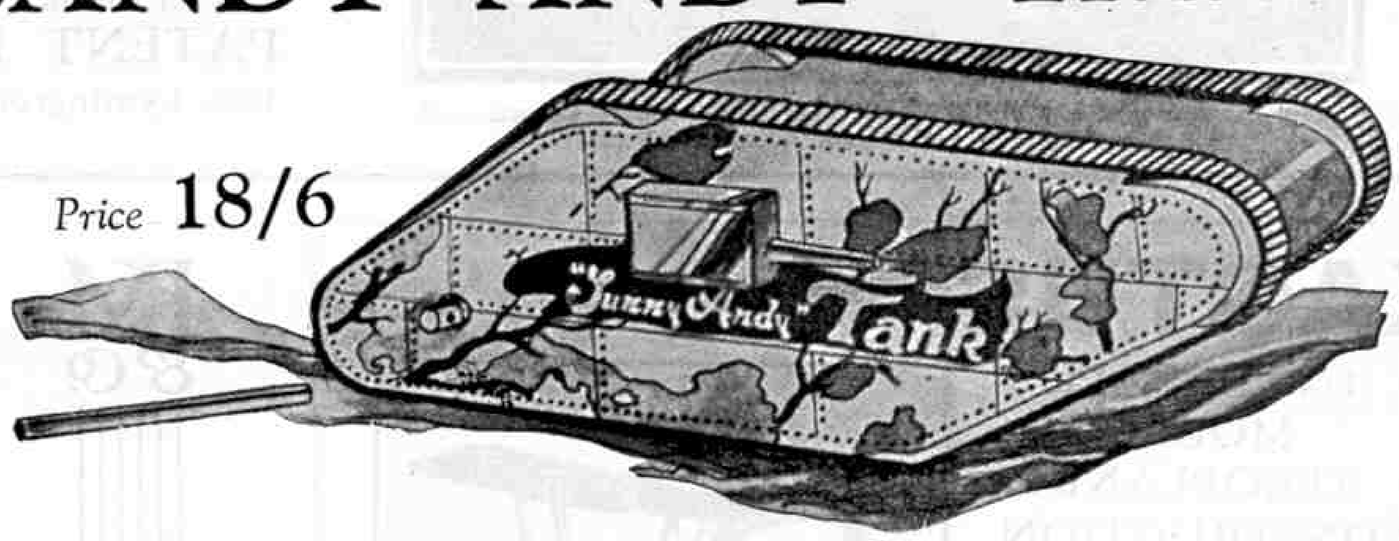
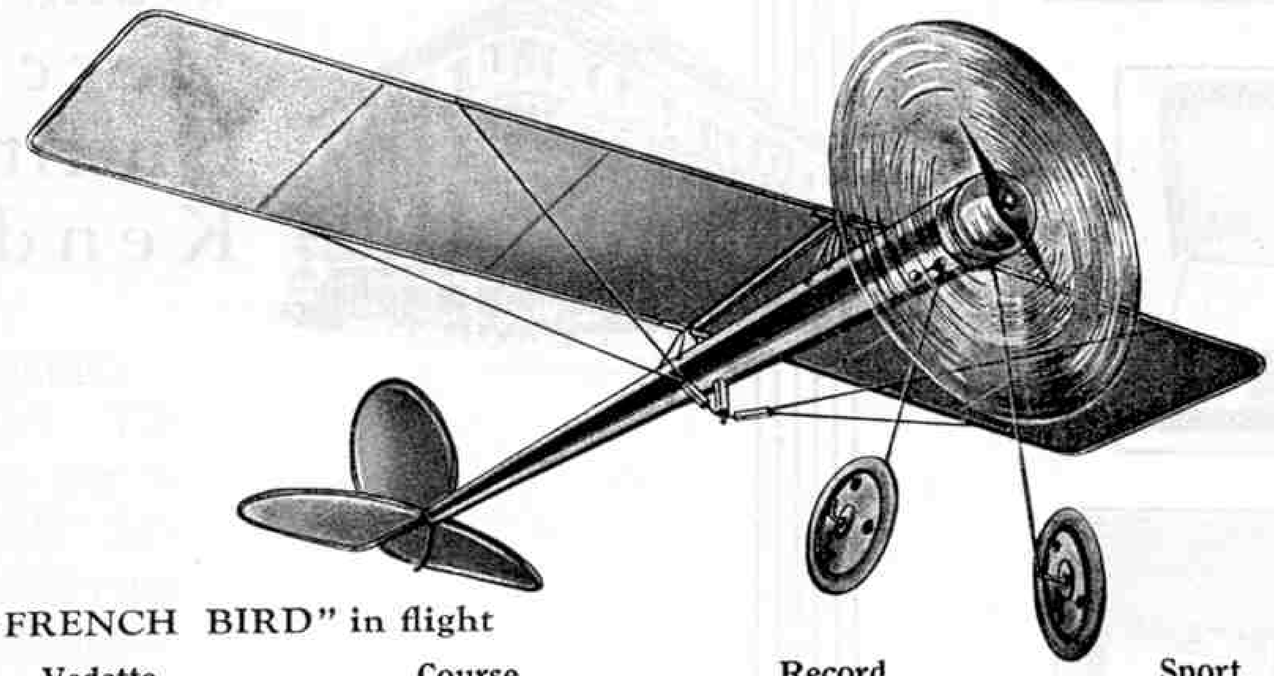


The "FRENCH BIRD"



The "FRENCH BIRD" in flight

Vedette	**Course**	**Record**	**Sport**
Flying distance	Flying distance	Flying distance	Flying distance
100 yards	150 yards	200 yards	300 yards
Price **6/6**	Price **9/–**	Price **13/6**	Price **19/6**

The "FRENCH BIRD" Miniature Aeroplane, as illustrated, is a remarkable flyer, is practically indestructible, easy to put together and instantly ready for flight, without any adjustment. It is a scientifically designed Monoplane, with wings supported by struts, and an elastic motor enclosed in fuselage. No matter to what hard usage the aeroplane is put, there is no damage possible which cannot be put right in a few seconds.

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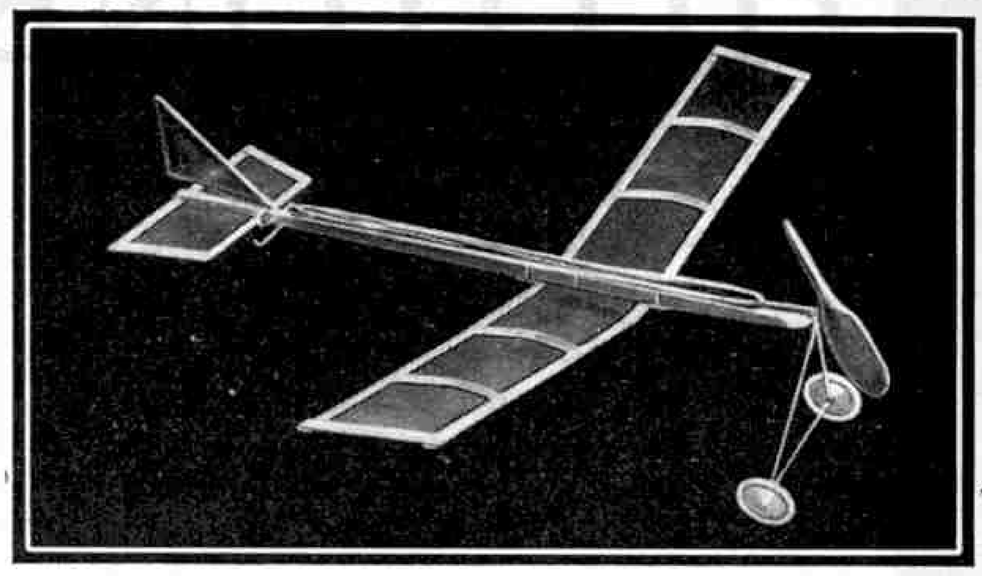
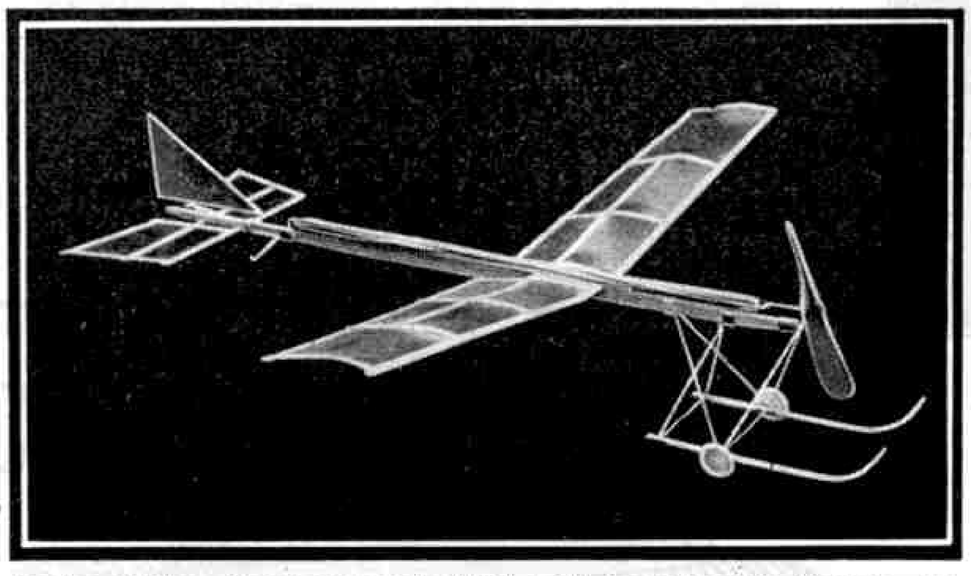


Design of Nos. 2, 3, 4 and 5 fitted with **Patent Adjustable Rudder** and **Lightweight Shock-proof Chassis.**



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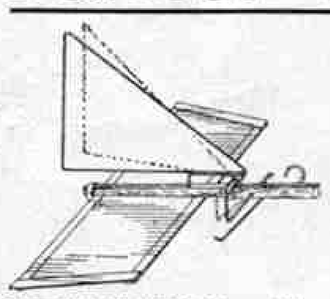
Perfect Flight Guaranteed



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Wing span of 18/6 Model 33 in. Fitted with Patent Safety Chassis with Landing Skids. Wing span of our 4/6 model 21 in.

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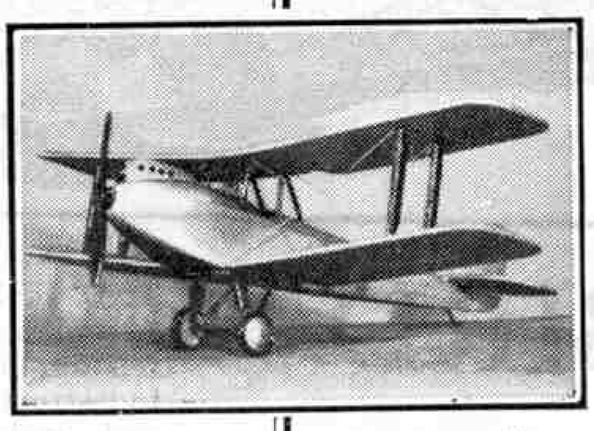

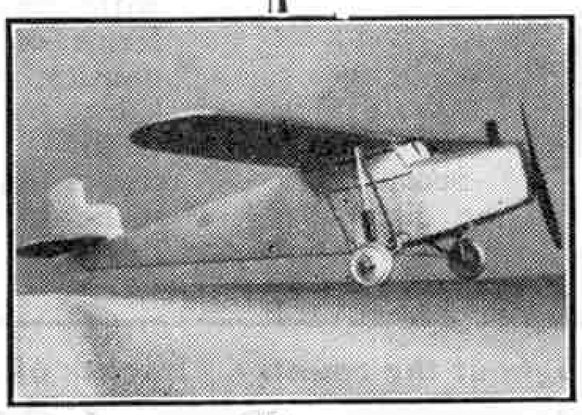

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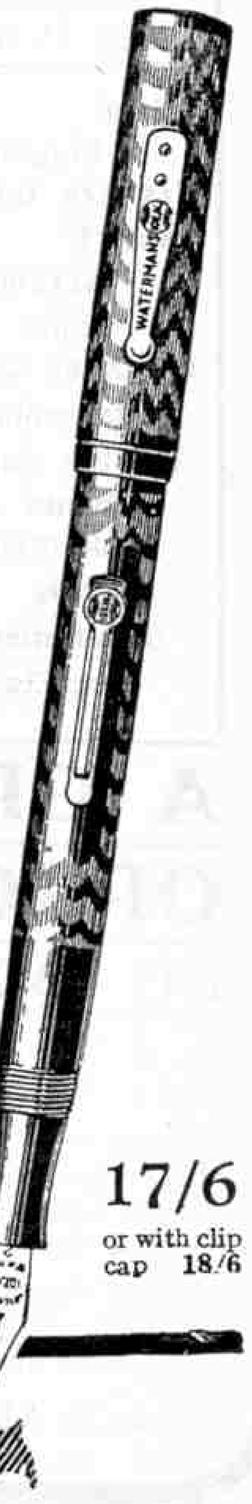

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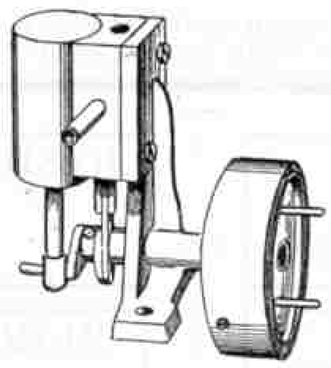

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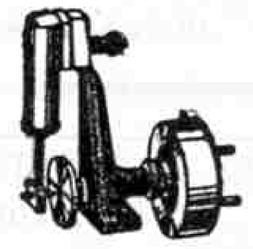

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New Meccano Models—(*Continued from page 983*)

The rotating portion is journalled in a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip, which is secured between two Sector Plates, and the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate forming part of the base frame.

The drive from the Motor is taken to the $5\frac{1}{2}''$ Axle Rod 3, by means of an endless length of cord passed round the 3" Pulley 2 and the Pulley mounted on the armature shaft of the Motor. A crossed belt, passed round the 1" Pulley on the shaft 3 and also round the groove in the 3" Pulley on the rotating structure, completes the drive. A brake for controlling the speed of the model is fitted to the shaft 3. This consists of a length of cord secured to the base frame and passed twice round the Axle 3. The cord is finally tied to the pivoted Strip 5. On moving the lever 5 the cord can be drawn tight round the axle 3, when the drive between the Pulleys 1 and 2 will slip and full power will not be transmitted to the revolving structure.

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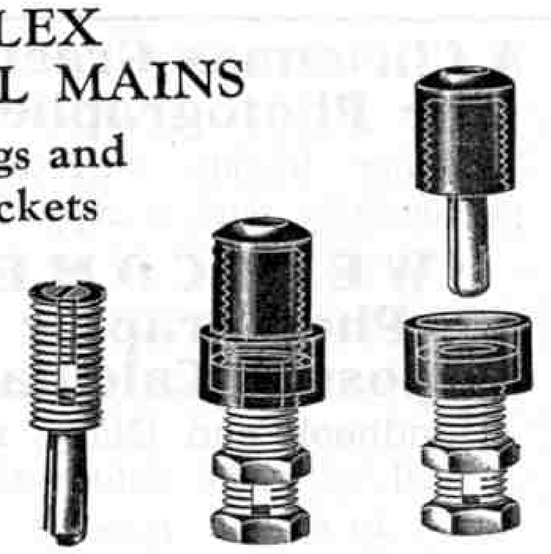

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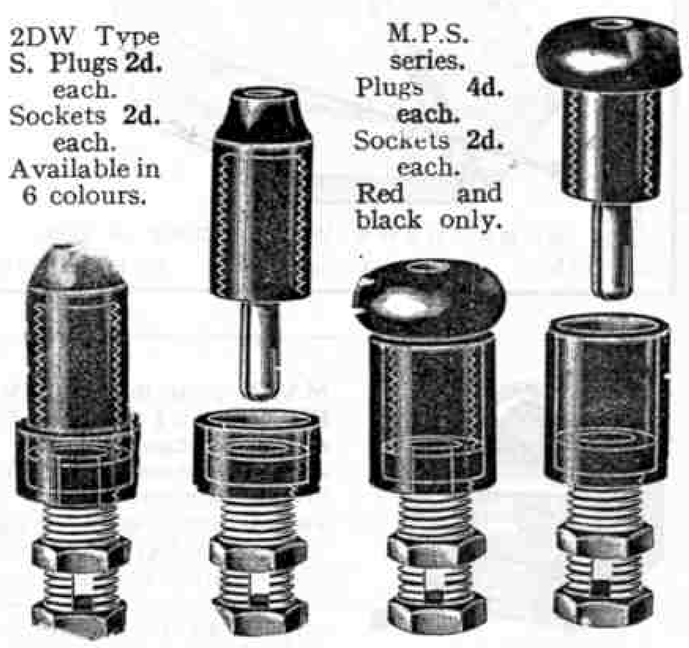

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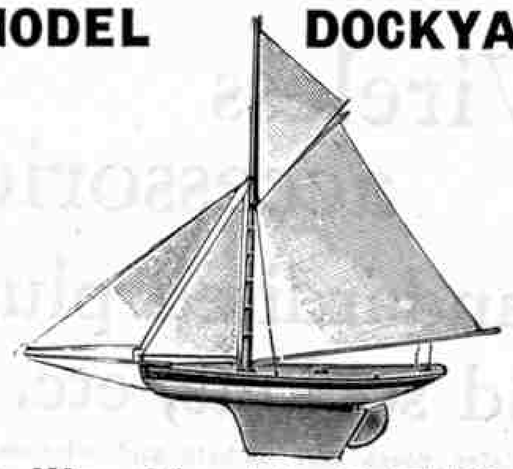

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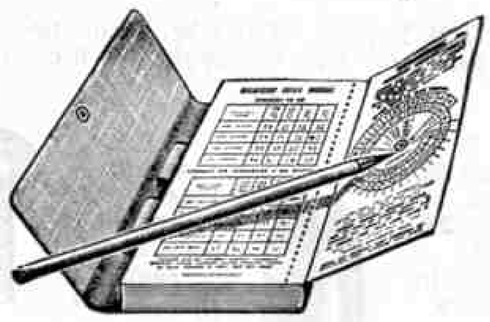

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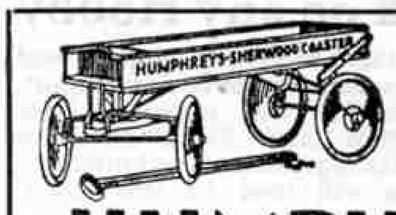

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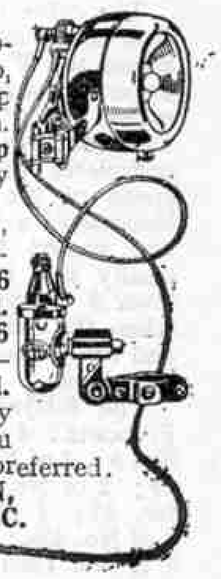

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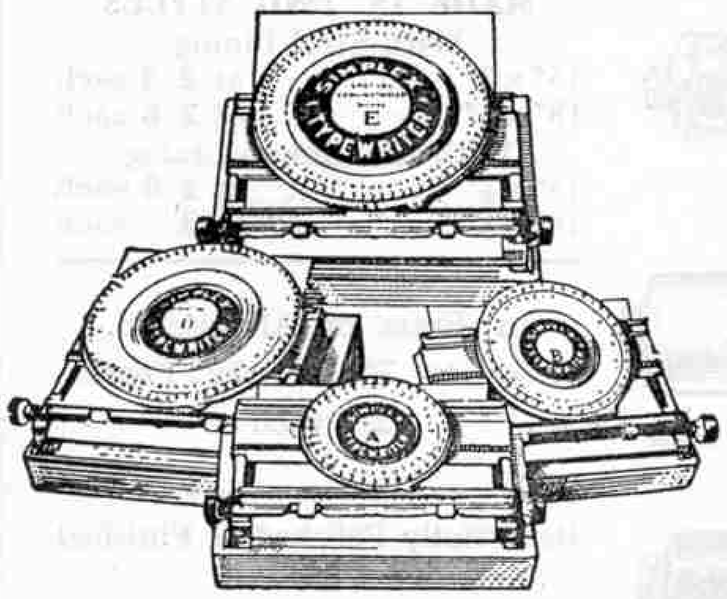

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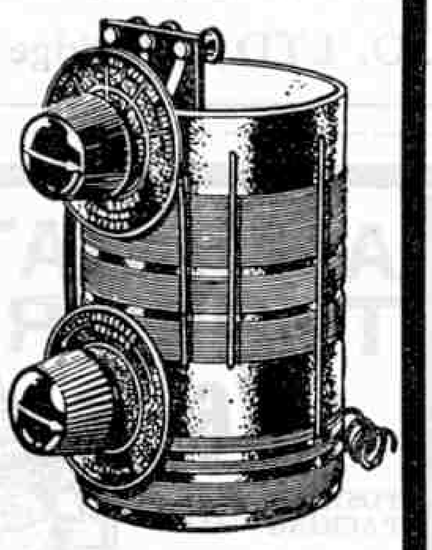

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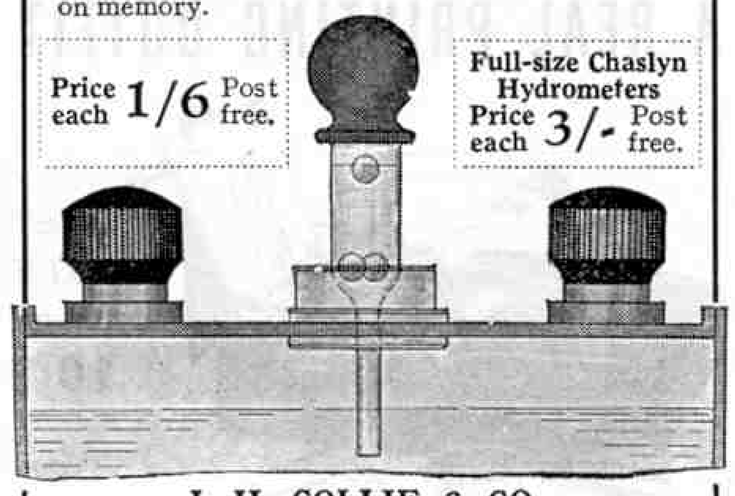

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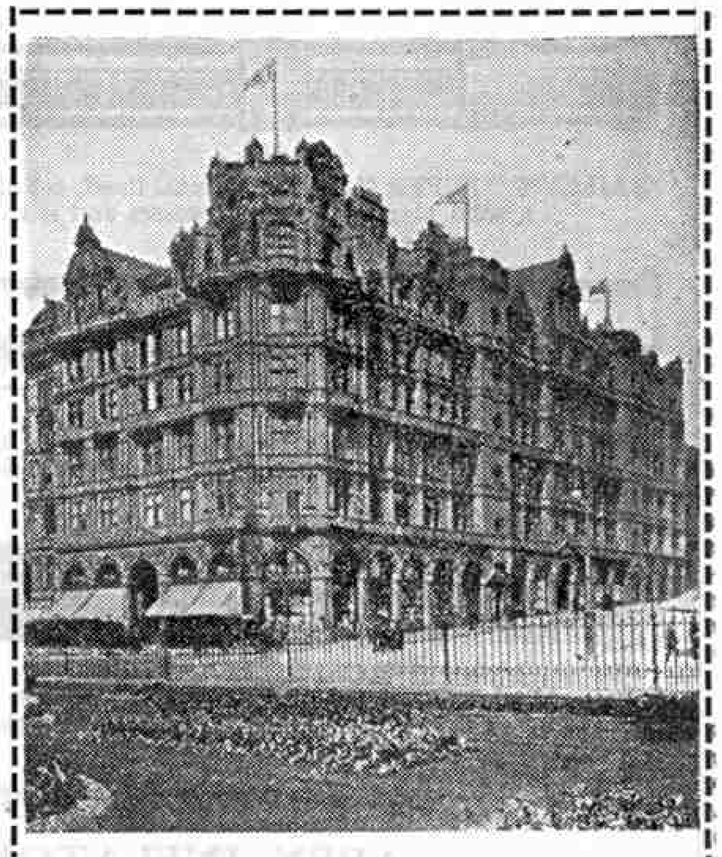

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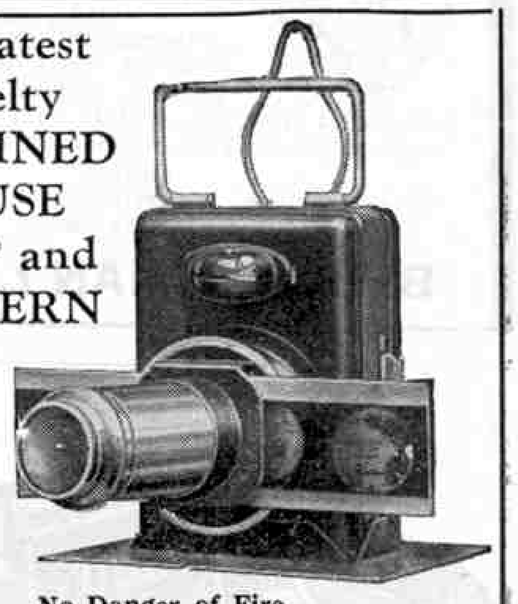

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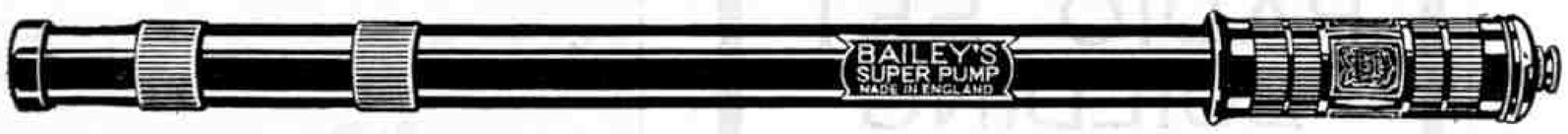

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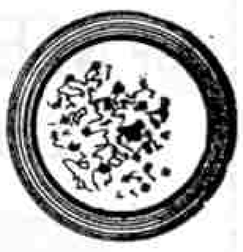

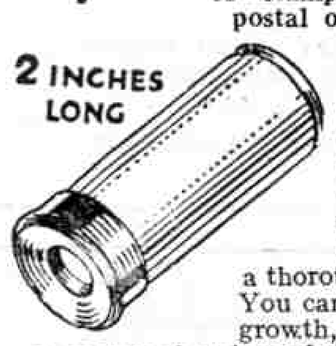

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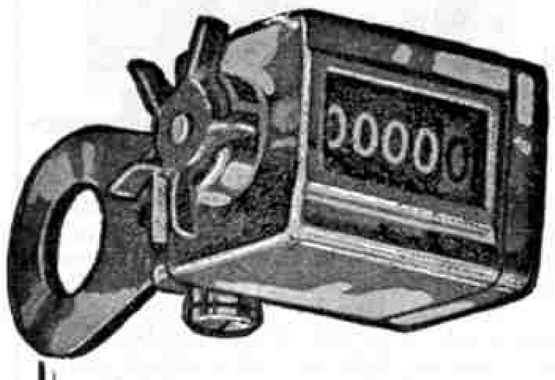

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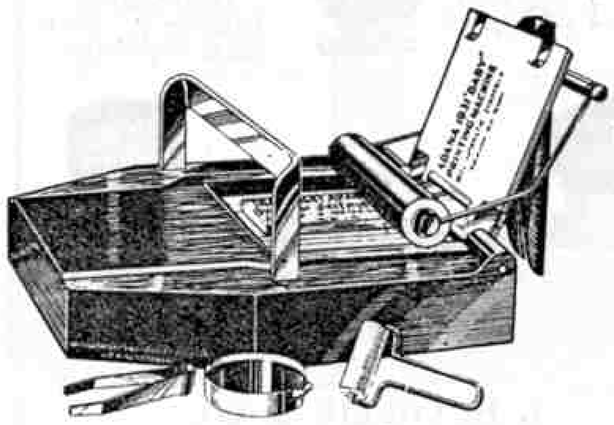

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To Contributors. The Editor will consider articles and photographs of general interest and payment will be made for those published. Whilst every care will be taken of articles, etc., submitted, the Editor cannot accept responsibility for any loss or damage. A stamped addressed envelope of the requisite size should be sent where the contribution is to be returned if unacceptable.

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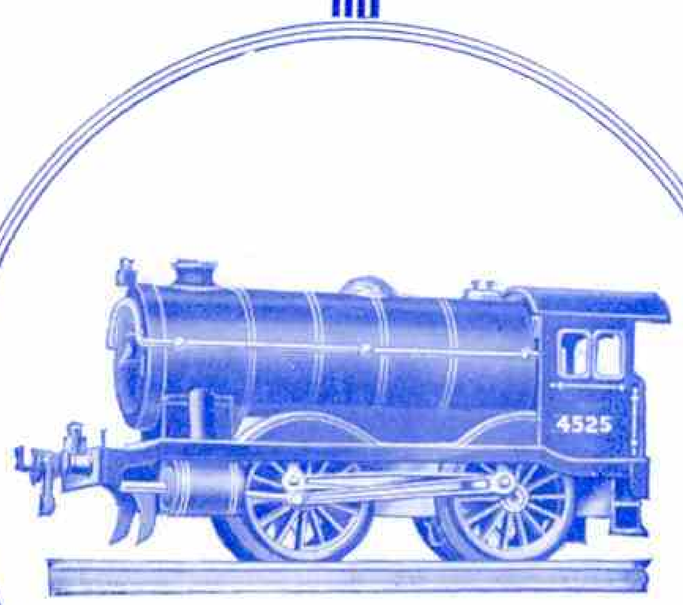

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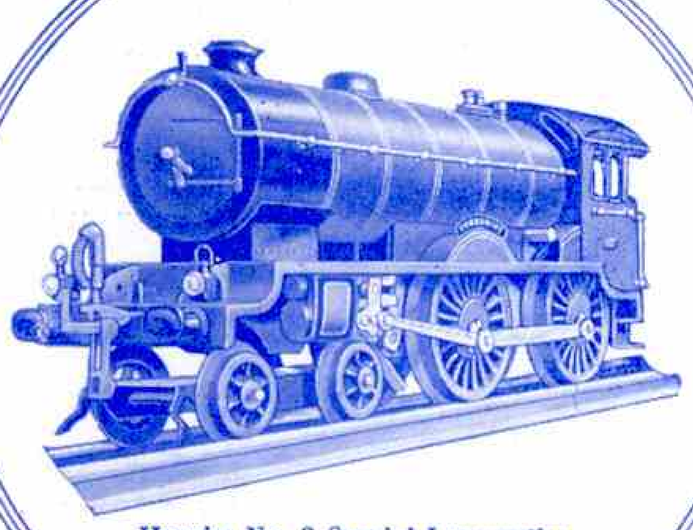
This "Part Exchange" scheme came into operation on November 1st, 1930. It will continue until Saturday, December 13th, after which it wil. be suspended until Monday. December 29th.

List of Part Exchange Values of Hornby Locomotives

CURRENT TYPES	
M1/2 Locomotive No. 3031	2/3
No. 0 Locomotive	5/3
No. 1 Tank Locomotive	6/3
No. 1 Locomotive	6/3
No. 1 Special Locomotive	8/3
No. 1 Special Tank Locomotive	8/3
No. 2 Special Locomotive	11/3
No. 2 Special Tank Locomotive	11/3
No. 1 Electric Tank Locomotive, Permanent Magnet	16/3
No. 2 Electric Tank Locomotive ...	18/9
No. 3E Locomotive	18/9
No. 3E Riviera "Blue" Locomotive ...	18/9
No. 3C Locomotive	13/9
No. 3C Riviera "Blue" Locomotive ...	13/9
Metropolitan C Locomotive	11/3
Metropolitan L.V. Locomotive	23/9
OBSOLETE TYPES	
George V Locomotive, No. 00 Locomotive (These models were identical)	3/3
M3 Locomotive	4/3
Zulu Locomotive	5/3
Zulu Tank Locomotive	6/3
No. 2 Locomotive	10/–
No. 2 Tank Locomotive	11/3
Metropolitan H.V. Locomotive	26/3
No. 1 Locomotive, fitted for Hornby Control	7/6
No. 1 Tank Locomotive, fitted for Hornby Control	7/6
No. 2 Locomotive, fitted for Hornby Control	11/3
No. 2 Tank Locomotive, fitted for Hornby Control	12/6



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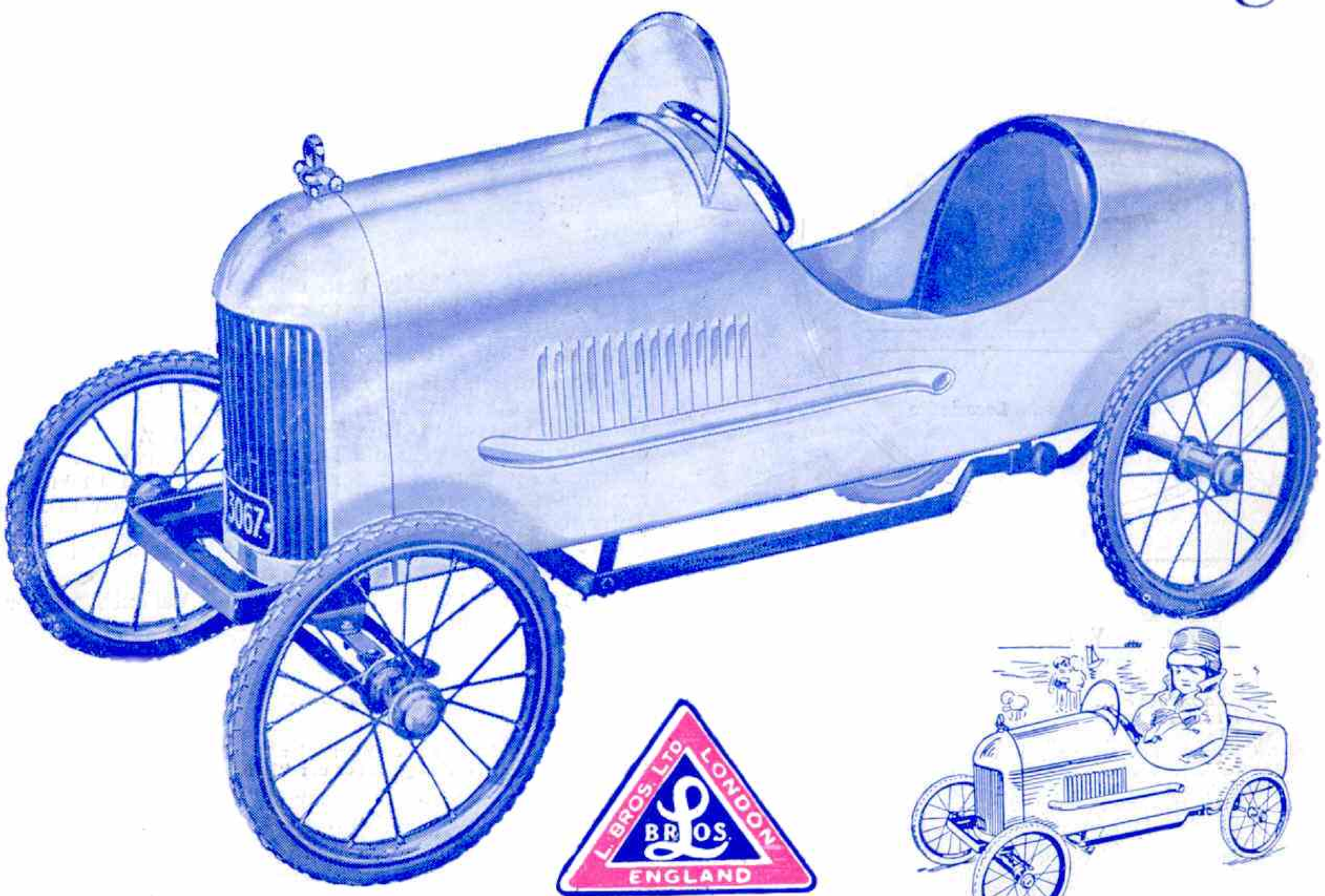

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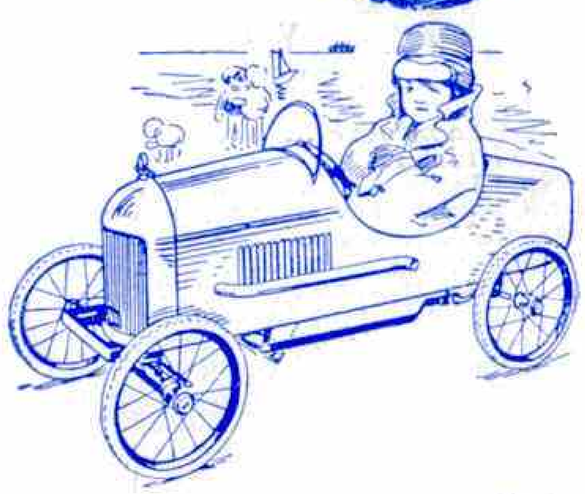

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