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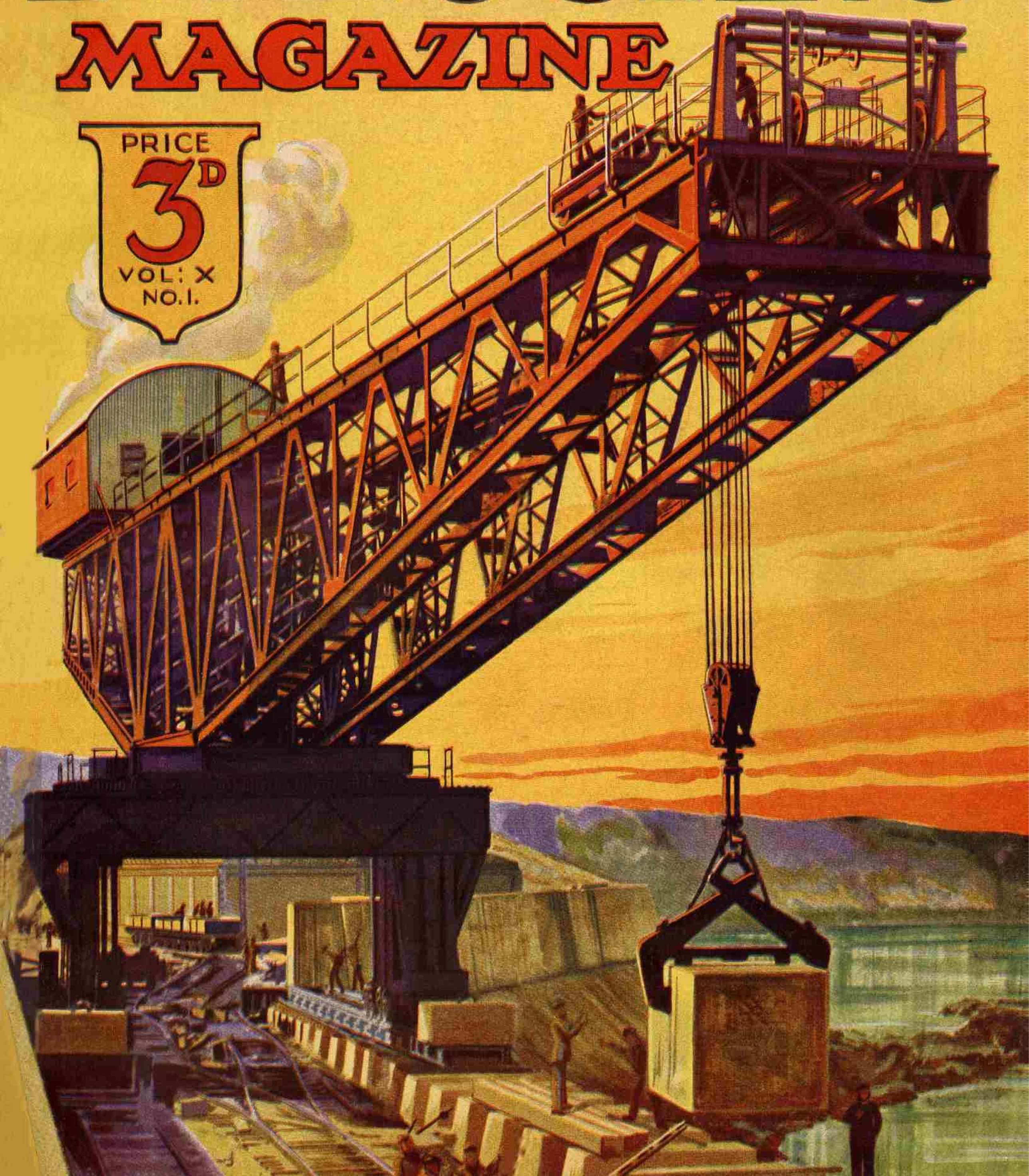

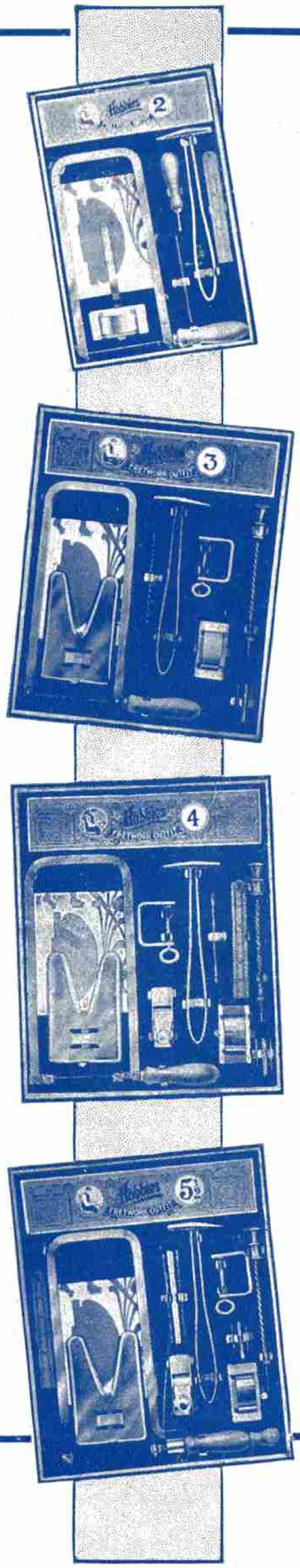

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EDITORIAL OFFICE
Binns Road,
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MECCANO MAGAZINE

PUBLISHED
IN THE INTERESTS
OF BOYS

Vol. X, No. 1.

January 1925

ALTHOUGH for several months past my mail bag has been filled with letters of congratulation from readers, the number of letters received during the past fortnight has easily exceeded that of the previous months combined. To a great extent this is accounted for, of course, by our special Christmas number, which seems to have pleased everybody! I am glad to know that my readers continue to find pleasure in the "*M.M.*" and that they have time to write and tell me so. I can assure them that our future numbers will be even better and more interesting than those of the past. I have several surprises in store and many splendid features are being arranged. As far as possible I am endeavouring to include articles on Wireless, Railways, and Electricity whenever opportunity allows, in addition to our regular and special features. The introduction of pages devoted to Aeroplanes and Airships and to Nature Study is also under consideration and—as mentioned last month—I should welcome my readers' views on these matters and also further suggestions from them for other articles of general interest.

Thank You!

Of our regular features, "*The Lives of Famous Engineers*" seems to be the most popular—and rightly so, for the thrilling story these articles tell is sufficient to inspire any boy to great deeds. To read of the trials and the triumphs of great men is more than interesting—it is our duty to learn as much as possible about those to whom we owe so much. Moreover, the information contained in this series of articles is very rarely—if ever—found in any other magazines and very seldom in books. The articles are, in fact, the result of considerable research, and a great deal of time and trouble is being given to compiling them. Next month we shall commence the story of two remarkable British engineers, Sir Marc Brunel and his son Isambard Kingdom Brunel. This will be followed by many other articles, dealing with every engineer of note in all branches of Engineering. Next month, too, we shall commence a serial article on Copper, a further instalment of our regular feature dealing with the Story of Metals. Iron and Steel have already been dealt with under this head, and Copper will be followed by Gold, Silver, Lead, Aluminium, etc. The article on "*The New Flying Scotsman*" has unfortunately been "crowded out" of this issue, but will be included next month, and also an article on "*Handling Goods at the Docks.*"

Next Month

It is very pleasing for me to receive hundreds of Christmas and New Year cards every year, and I must acknowledge these messages of good-will again this year. These cards come from boys at home and abroad—from every part of the world: Canada, Malta, India, South Africa, South America, New Zealand and dozens of other places perhaps not quite so well known. So numerous are the good wishes that I receive that it is impossible for me to acknowledge them individually, and I hope that the senders will accept this announcement as an acknowledgment. I should like to take this opportunity of wishing all my readers every good wish for the New Year. I sincerely hope that 1925 will be for them a year of joy and fun and that they will make good progress in their studies or in their work, as the case may be.

Good Wishes

Last month, in mentioning that the price of the "*M.M.*" in future would be increased to 3d., I promised an increase in the number of literary pages, and this takes effect with the present issue. Now that we have more pages available each month, I hope to increase the scope of the Magazine and to be able to include more of those articles that appeal especially to our readers. Being an Editor is no easy task, and as the number of our readers grows, it becomes increasingly difficult to satisfy all requirements. If I were to include all the articles that are suggested, our Magazine would indeed resemble the chameleon that changes its colour every few moments. At the same time it is my wish to give my readers articles on those subjects in which they are particularly interested. Quite between ourselves I may say that the best way to persuade me to include some particular subject is to get *all* your friends to send post cards to me requesting that such an article should be printed. There must be over 100,000 readers who see the Magazine every month and the wishes of the majority have to be considered in these matters. Thus when only one or two requests are received asking for an article on any particular subject, they cannot be given very serious consideration because it is evident they do not represent the wishes of the majority of my readers. So now you will all know just what to do, if the "*M.M.*" does not include an article on your favourite subject!

Suggestions Invited

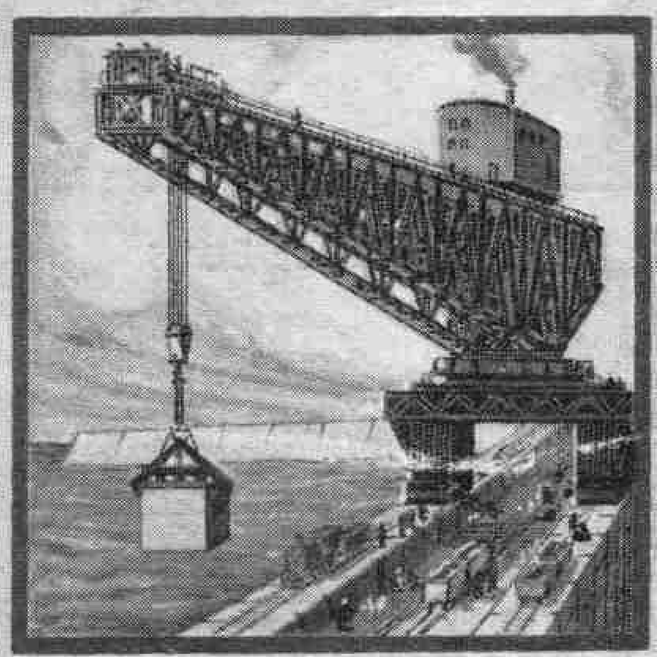
Every Christmas we welcome to our ranks many thousands of new readers. Most of these boys have never seen the *Meccano Magazine* before. They may have had their attention drawn to it by one of their friends, or they may have seen a notice in the Meccano Outfits that were given to them for Christmas presents. For the benefit of new readers I should like to mention that the "*M.M.*" may be ordered from any Meccano dealer, or from any newsagent or bookstall, price 3d. If any reader is unable to obtain the Magazine from either of these sources and will write to me giving full particulars, I will take the matter up on his behalf, as there should be no difficulty whatever in the matter. Those who live too far away from Meccano dealers and newsagents (as do many thousands of our readers, even in this country) may obtain the "*M.M.*" direct from this office, 6 issues for 2/- or 12 issues for 4/- (post free). The next number will be ready on the 1st February. As we print only sufficient copies to fill orders received, every reader should at once place a regular order with his Meccano dealer or newsagent, or direct with this office, to avoid disappointment.

How to Obtain the "M.M."

COMPLETE YOUR "M.M." FILES

Those who wish to make up complete sets of "*M.M.'s*" will be interested to hear that we have in stock a few copies of recent issues.

All Magazines up to and including December, 1921, are out of print. A few dozen copies remain of each number from January to December, 1922, and copies of each of the 1923 issues are also available, with the exception of September and October. Copies will be sent post free, price 3d. each, but early application should be made, as the number available is very small. The price of our last issue (December) is 5d. post free.



Giant Block-Setting Cranes

Their Work in Constructing Harbours and Breakwaters

One of the most interesting of all the branches of Engineering is that concerned with the construction of harbours, breakwaters and other structures connected with the sea. This branch of the profession offers splendid opportunities to those who are prepared to work hard and who gain that special knowledge that experience alone can give. It has been said that in its struggle with the sea, modern engineering is seen at its best.

HARBOURS are of great importance to all countries that have any shipping, not only to shelter their ships from the fury of the waves and to enable them to land their cargoes in quiet waters, but also to protect shipping from hostile attack in the case of war.

It is a curious fact that almost every country with a sea coast seems to have at least one natural harbour, and in many cases these are sufficiently large to accommodate large fleets of ships. One of the largest of these natural harbours is the Bay of Rio de Janeiro, which runs in a northerly direction for 15 miles with a width varying from two to seven miles. Surrounded by high mountains, with an entrance less than a mile in width, it is protected on each side by bold headlands. In Great Britain, Milford Haven in Wales, stretching inland for some 10 miles, is unequalled as a sheltered harbour.

Other natural harbours are formed by the mouths of rivers, such as the Thames, Mersey, Humber, Forth, and the Seine, but their efficiency is somewhat diminished by the " bar " that forms where the outflowing current of the river is checked by the sea.

Although such natural harbours as these continue to be useful, the requirements of modern times have made it necessary to augment their number, either by improving some natural feature—such as a bay or an inlet—or by constructing more elaborate works and enclosing large areas of the sea by harbour walls or breakwaters.

Our Fleet in Queen Elizabeth's Time

Britain has not always held the proud title of " Mistress of the Seas "—indeed, our supremacy in this direction is of comparatively recent growth. For instance, we were almost entirely without a fleet at the time when Spain, Holland, and France were great sea-powers. When the Spanish Armada rode the seas, the Royal Navy consisted of only twenty-three ships, eight of which were under 120 tons ! At this time, however, the Republic of Venice possessed a fleet of over 3,000 vessels carrying more than 36,000 sailors.

Turning to the mercantile marine, we find that in 1540 there were only four vessels of 120 tons burden registered in the Thames. In Queen Elizabeth's time the shipping of Liverpool amounted to only 223 tons, the largest vessel being of 40 tons burden. How different are things to-day, when the shipping of the Thames and the Mersey runs into almost unbelievable figures, and London and Liverpool between them handle the greater part of the country's trade.

Without entering into further details, we see that even a few hundred years ago neither the Royal Navy nor the mercantile marine was of sufficient importance to require more harbour accommodation than that provided by natural inlets and sheltered bays. On the south coast these were found at such places as Portsmouth, Plymouth, Weymouth, Falmouth and Dartmouth.

The Progress of Harbour Construction

With the growth of our Navy and the increase in our national shipping, greater harbour accommodation became a necessity, and engineers were called upon to design and construct sea-works of one kind or another.

At first these took the form of rough breakwaters, which served to break the full force of the waves, and so protected some natural inlet, converting it into a comparatively safe harbour. The first breakwaters were constructed by floating large stones by means of casks to the places required. The stones were sunk between strong oak piles that had previously been driven into the sea floor at the place where the breakwater was required (Fig. 1). The ancient pier at Lyme Regis was so successfully constructed in this way that Queen Mary ordered the workmen to be sent to Dover to build a similar breakwater there.

Fig. 1. Method of Constructing Early Breakwater*

* Figs. 1 and 2 are reproduced from "*Engineering for Boys*" by permission of Messrs. T. C. & E. C. Jack Ltd.

As was only to be expected, these early breakwaters did not long withstand the fury of the waves, but sooner or later were broken up and washed away.

As engineers advanced in their knowledge of this particular class of work, these early types of breakwater gave place to stone piers. More recently these have been superseded by massive monoliths of concrete, such as the mole of Zeebrugge, and the harbour works at Wick, in the north of Scotland.

The largest artificial harbour to-day is that at Portland. It covers an area of over 2,000 acres at a depth of one fathom and 1,500 acres at a depth of five fathoms at low tide. The works were commenced in 1849 and it is interesting to know that they were carried out by convict-labour from Portland prison. The harbour was completed in 1872, but two large additional breakwaters have since been added so as to make the harbour of service in protecting warships from torpedo attack.

Fig. 2 shows a diagram of the scheme of construction of the breakwater at Portland Harbour. As will be seen it consists of a rubble mound, 285 ft. in diameter, just below low water level. Between low water level and high water level is a sloping buttress wall with a high sea wall of solid masonry rising above this.

Protecting our Coasts

Equally important in the branch of engineering under consideration is the designing and building of sea-walls. Sea-walls are very necessary, apart altogether from the fact that they often make delightful promenades from which we may enjoy the sea-air or cast our fishing lines when on our holidays ! Unless strong sea-walls are constructed, the constant hammering of the waves soon undermines the cliffs, so that the sea encroaches upon the land and the coast line becomes completely altered.

Some people may be inclined to wonder at the statement that the sea can exert any destructive power upon our coasts, but we have only to notice how the waves lift

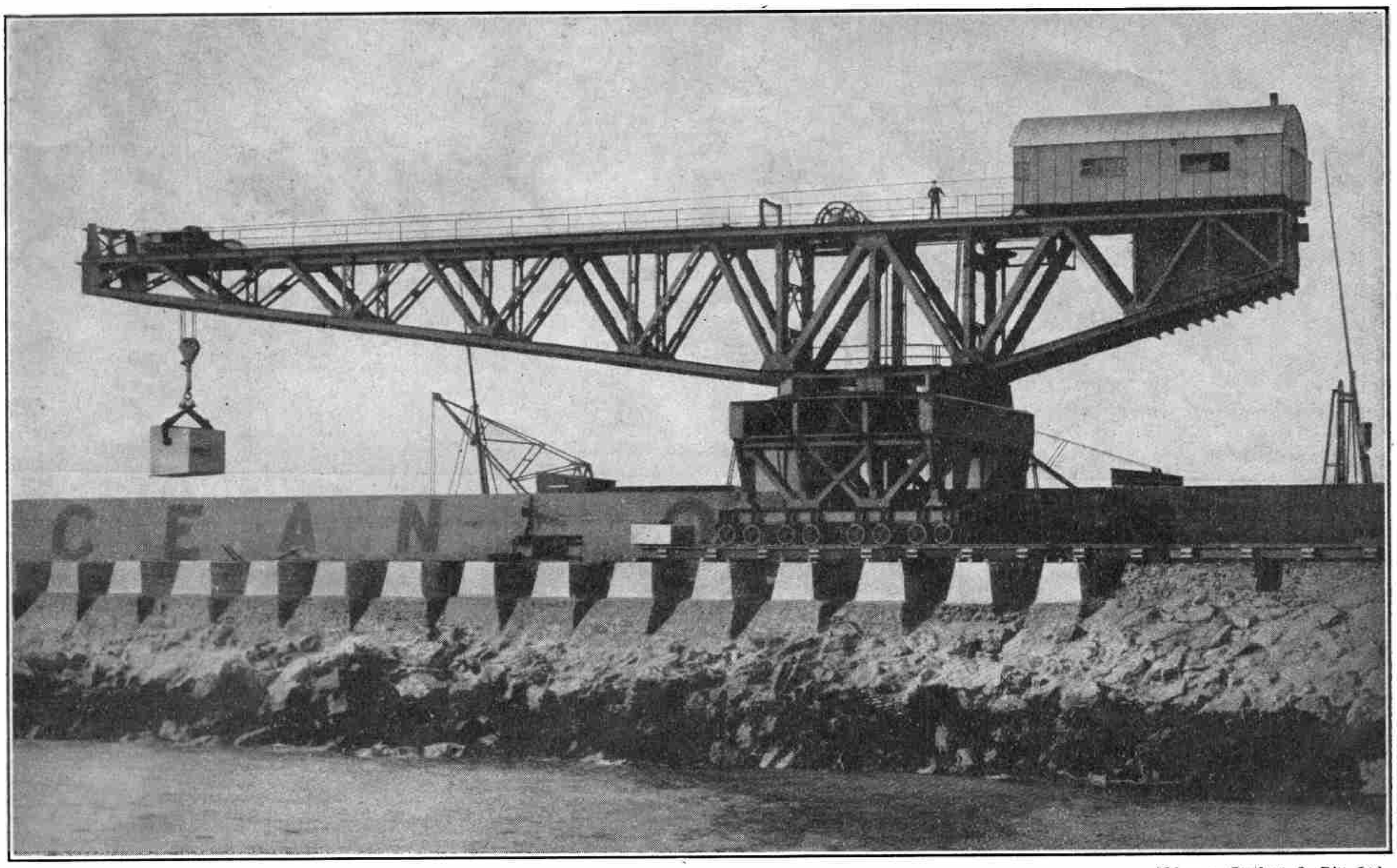


Photo courtesy] **A Giant Crane Setting Massive Concrete Blocks** [*Messrs. Stothert & Pitt Ltd.*

pebbles, or even large stones, and roll them along the shore. When we take a "header" through a breaker we sometimes feel these pebbles dashing against us with such force that they give us quite painful blows!

Not only are the waves able to lift pebbles in this way, but they can also lift huge rocks to a considerable height. A heavy sea easily moves rocks and boulders weighing many tons and even tosses them about like so many corks! Having raised them to heights of 40 ft. or more, it dashes them against the cliffs with the action of a giant battering-ram.

The Power of the Waves

Many well-known cases could be mentioned to illustrate the immense power of the sea. For instance, Sir William Mathews, the celebrated engineer, tells us that in 1898 a section of the Peterhead breakwater weighing 3,300 tons was moved bodily by the action of the waves.

In 1871 a harbour wall was built at Wick in Scotland. Composed of concrete blocks—each of which weighed 100 tons—it was capped by two tiers of 80-ton blocks. On top of all was a solid mass of cement weighing 800 tons. One might think that such a heavy structure would surely successfully withstand the action of the waves for many years, and so thought the engineers who built it. We may imagine their surprise, however, when it was found that the sea had not only moved the whole mass, but had actually turned it round and deposited it inside the harbour! As if to show that it could do even more than this when it wished, the sea scattered the 80-ton blocks in all directions. In due course the damage was repaired and the blocks were replaced. Determined to get the upper-hand, the engineers this time placed on top of the concrete blocks a superstructure weighing more than three times the weight of the original. Before this 2,600 ton superstructure had been in position two years a storm moved it and broke it in half!

A House Falls into the Sea

The sea has indeed, a terrible power and when this is exerted against the cliffs of an unprotected coast, the damage is very great and the sea rapidly encroaches on the land.

A few years ago some friends of mine had a house at Robin Hood's Bay, in Yorkshire, where they spent their summer holidays for many years. The house was delightfully situated, 50 or 60 ft. above the sea, on the top of the cliff overlooking the bay, with a roadway running between the garden and the edge of the cliff. Last summer when I visited Robin Hood's Bay again, I found that the sea had so encroached that not only had it claimed the roadway and the whole of the garden, but half the house also had been undermined by the sea. The old house was standing without the outer walls, which had fallen into the sea. All the rooms were open to the sea, and the whole building resembled a sectional view of a modern dwelling!

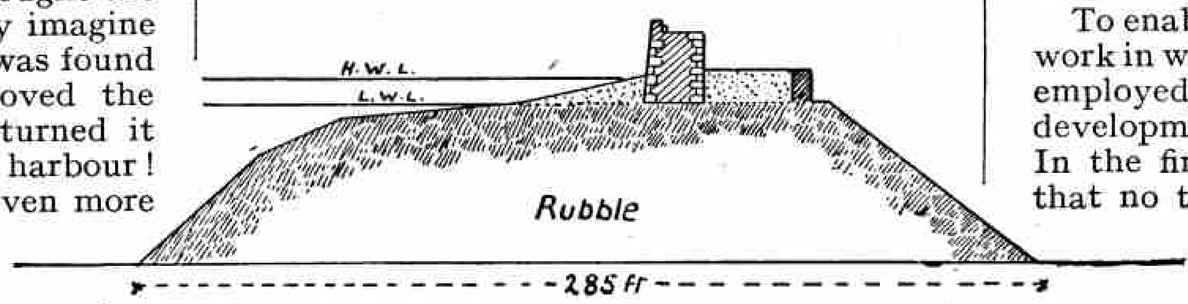


Fig. 2. Diagram of Section of Portland Breakwater

All along this part of the Yorkshire coast—from Whitby to Spurn Point—the sea is making great inroads, claiming many acres of land every year. At some parts of the coast substantial and heavily-built sea-walls have been erected to keep the sea back, but it is only a question of time before they too are attacked by the relentless action of the waves, so that constant repairs, or even rebuilding, becomes necessary.

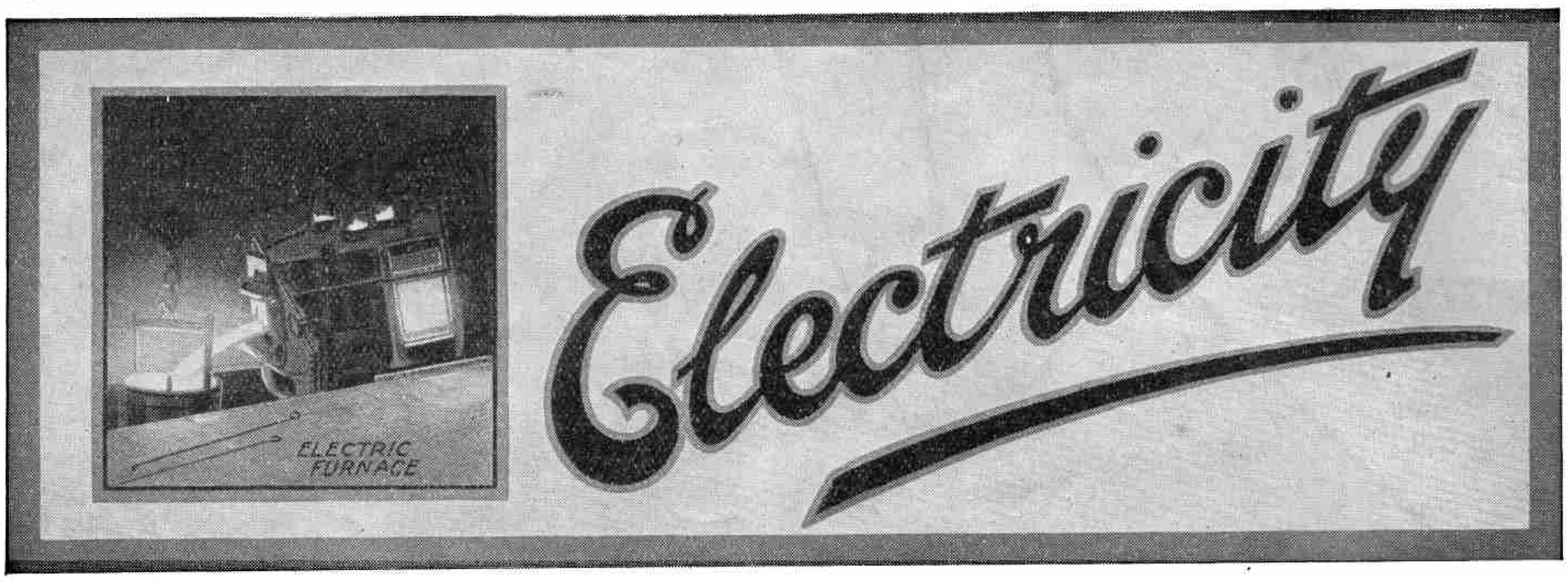
Special Cranes Employed

In carrying out the construction of all sea works, cranes are particularly useful to the engineer. The type of crane used varies according to the nature of the work in hand, which in turn depends largely on local conditions and the special requirements arising therefrom. It is no exaggeration to say that without mechanical aid of this kind it would have been quite impossible to construct most of the great sea works of to-day.

Among the most useful cranes are those of the Giant Block-setting type, such as is illustrated on this page and on our coloured cover. For the loan of illustrations for both these, we are indebted to Messrs. Stothert & Pitt Ltd., of Bath, who specialize in this class of crane.

To enable us to understand the particular work in which these block-setting cranes are employed, we must learn something of the developments of harbour construction. In the first place it should be mentioned that no two breakwaters or harbours are exactly alike, and almost every harbour requires particular treatment. In one case a mound

(*Continued on page* 40)



XI. ELECTRIC SIGNS

MOST people who have visited London will remember Piccadilly Circus with its string of traffic, its ceaseless stream of people, and at night its marvellous electric signs. When daylight has gone the scene is made brilliant by the ever-changing designs and colours of these elaborate advertisements, which in Piccadilly Circus are so numerous and so interesting that the locality has been humorously called: "The Scotsman's Cinema."

Stationary Signs

There are two distinct classes of electric signs, those that are merely switched on and off at stated intervals, and the so-called moving signs.

Stationary signs are by far the most common, and are to be found not only in London but in the principal shopping streets of most large towns. They are the simplest signs to work and are also the most economical in regard to both original outlay and cost of upkeep. In signs of small or medium size it is usual to form the design by means of sheets of metal out of which are cut the shapes of the letters or figures to be illuminated. Behind the cut metal is a piece of glass, frosted or made white by some other means, and behind the glass is a row of electric lamps. When these lamps are switched on they light up the openings in the sheet of metal and the design stands out as a blaze of light.

Many stationary signs are merely lit at dusk and extinguished at some late hour of the night. Even these may be made much more striking by the use of various switching devices, the simplest of which is a timing arrangement whereby the lamps are extinguished for a short period at certain regulated intervals. This timing device is driven by an electric motor through worm reduction gearing, and works on the principle shown in Fig. 1.

The metal brush B presses against the rim of the commutator wheel C which is turned very slowly by an electric motor (not shown). The rim of this wheel consists half of copper or brass and half of rubber or some other suitable insulating material. In the diagram the copper is the shaded portion, and this is electrically connected to the axle on which the wheel revolves and on which there is also another wheel, usually smaller, consisting entirely of copper. On this wheel the brush B1 presses, and it will be seen that when brush B is on the copper portion of the large wheel C there is electrical connection between the two brushes. When brush B is on the rubber portion of this wheel, however, there is no electrical connection and accordingly the current is switched off.

The wiring is simple. From one of the mains arriving from the power station a wire is taken to brush B1. Another wire leads from brush B to one of the terminals of the lamps, and from the second terminal of the lamps a wire goes to a control switch and from there to the other main. The switch is turned off when the sign is not required to work, and it is usually arranged that it both stops the motor and turns out the lights.

Photo courtesy] [*Messrs. Franco-British Electrical Co. Ltd.*

The L.M.S. Illuminated Sign now showing in Leicester Square, London

Signs that Change Colour

Another type of sign is similar to that described above, but is lighted alternately by red and white lamps. This is accomplished as shown in Fig. 2. From one of the mains a wire is taken to the brush B1, which presses on the all-copper commutator C1. This commutator is electrically connected to the axle on which it revolves, and which also carries the commutators C2 and C3, shown separately in the diagram for the sake of clearness.

The axle with its three commutators is driven slowly by the electric motor as before. The rims of the commutators C2 and C3 each consist of half copper and half rubber, and are so adjusted that when the copper portion of C2 is under brush B2 the rubber portion of C3 is under brush B3. The copper portions of C2 and C3 are electrically connected to the all-copper commutator C1 through the axle.

A wire is taken from brush B2 to the white lamps in the sign, from which it passes to the control switch and to the other main. Another wire goes from brush B3 to the red lamps in the sign, from which it passes to the same switch and uses the same wire from the switch to the main. Thus it will be seen that, as the axle carrying the commutators revolves, each set of lamps will be alternately switched on and off, and by means of the relative positions of the copper portions of the commutators C2 and C3 the switching is timed so that the red lamps are on when the white ones are off, and vice versa. The sign thus shows the design or words alternately in red and white. Of course, any other two colours of lamps may be used, and if additional commutators are used, more colours may be added.

By regulating the size of the copper portion of the commutators the lamps of one colour may be made to light up shortly before the others go out, or the second colour may light up at the exact moment when the first goes out, or there may be an interval of darkness between the two colours.

These metal signs are only suitable for comparatively small signs. Large stationary signs are composed entirely of rows of lamps arranged in the shapes of the letters required, no metal sheet being placed in front. When this type of sign is required to change colour, lamps of the two colours are placed alternately in the rows.

Moving Signs

So-called moving signs require considerably more complicated switching arrangements than are necessary for the working of stationary signs. The principle remains the same in each case, but it is extended to every lamp that is required to "move."

Fig. 3 shows the wiring of a portion of a moving sign. One terminal of each lamp is connected direct to one of the mains through the thick wires A.B.C., D.B.C. The other terminals of the lamps each have independent wires to separate brushes on a large commutator, the brass segments of which are all connected to the axle. On the axle is also a solid brass commutator with a brush connected to the wire E, which passes to the other main through the control switch.

Those lamps will light up whose brushes are in contact with the brass segments of the commutator at any particular moment. Consequently, as the commutator revolves, different lamps will glow according to the arrangement of the segments, and thus any desired series of designs or words may be obtained. Changes in the series of designs are obtained by having several interchangeable commutators. When only a few sets of words or designs are required certain lamps may be linked together so as to use only one brush for the whole.

Largest Electric Sign in the World

Although many electric signs appear to move, no movement actually takes place, the illusion being produced in much the same way as the motion in cinema films. For example, in order to make a spot of light travel round a circle, a circle of lamps is used, and when these lamps are lighted one after the other very rapidly, by means of switch mechanism, a spot of light appears to be travelling round the circle, whereas in reality what we are seeing is a new and stationary spot for every position.

It is on this principle that the most elaborate moving signs are based, including even the largest electric sign in the world,

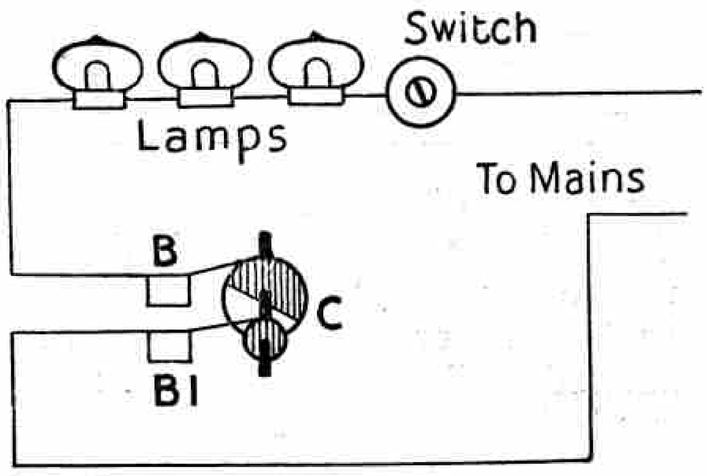


Fig. 1

owned by Wrigley's of "Spearmint" fame. This monster sign is situated in Broadway, New York, is 200 ft. in length and 15 ft. in height, has 17,266 lamps and costs £1,800 per month to run! Two peacocks with tails 60 ft. in length occupy the centre of the sign at the top. Below is the word "Wrigley's," and below that again is another word that is changed at frequent intervals. On both sides of these two words are three "spearmen" 15 ft. in height, who perform nine different actions. At each end of the sign play fountains nearly 40 ft. in height, consisting of lamps of different colours. Below the whole is an arabesque or ornamental design about 10 ft. in depth.

As in the case of most signs of very large size, the Wrigley sign is divided into several sections on the switchboard. One of these sections contains all the lamps that remain lighted during the whole time the sign is working; a second section contains the switchgear for the fountains; a third controls the movements of the "spearmen," while a fourth has charge of the two words in the centre, which are moved only at certain intervals.

Our illustration on the previous page shows the famous London, Midland and Scottish Railway sign in Leicester Square, London. This sign shows the train apparently in movement. To the spectator smoke appears from the funnel and streams behind; the wheels revolve; the piston and coupling rods move up and down; shadows stream along the track so as to produce the illusion of a moving train. Actually the train remains stationary, of course, and the effect is produced by making the track apparently move in the reverse direction, just as the galloping horses on the revolving stage at Drury Lane remained still while the platform revolved.

As we have already explained, no actual movement takes place in the sign at all. The effect is the result of timing contact mathematically so that shadows are produced that appear to move from one lamp to another. In other words, one series of lamps is extinguished simultaneously with the lighting-up of another series, and the eye assumes that movement has taken place from one position to another.

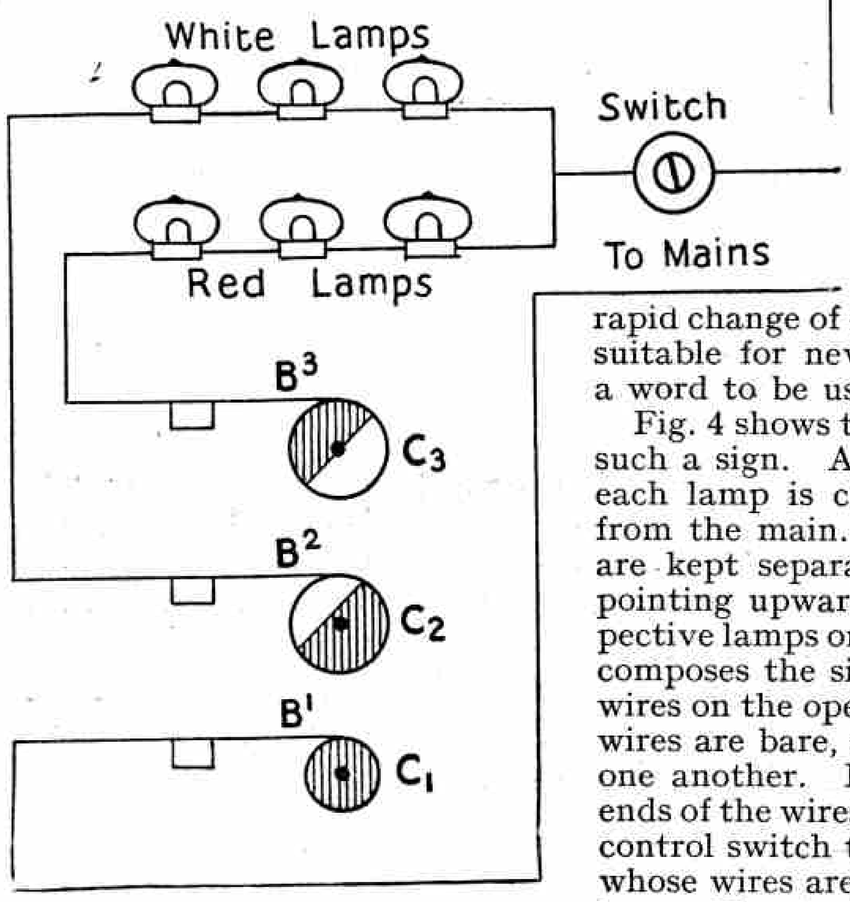


Fig. 2

For News Bulletins

A type of moving sign has been invented recently that allows of the rapid change of a series of words, and this type is particularly suitable for news bulletins and similar items that require a word to be used once only.

Fig. 4 shows the wiring of eight lamps of one of the rows in such a sign. As in the previous examples, one terminal of each lamp is connected permanently to one of the wires from the main. The wires from the other lamp terminals are kept separate and are arranged with their bare ends pointing upwards in a row in the same order as their respective lamps on the sign. Thus, if a solid rectangle of lamps composes the sign there is also a solid rantangle of ends of wires on the operating table. Although the ends of all these wires are bare, the individual wires are kept insulated from one another. Metal letters in relief are passed across the ends of the wires, and as these letters are connected through a control switch to the mains, those lamps are lit on the sign whose wires are touched by the faces of the letters, and the lamps illuminated have the same shapes as the letters on the table.

The letters are attached to each other by hooks, and a chain of these letters, forming a sentence, is pulled across the ends of the wires, the result on the sign being that the words of light move across it from right to left, the beginning of the sentence moving off the edge of the sign on the left while more is being added on the right. When the new letters have passed across the operating table they are unhooked and then recombined to make fresh words and sentences. In this way people in the street below are able to read paragraphs of news or advertising matter.

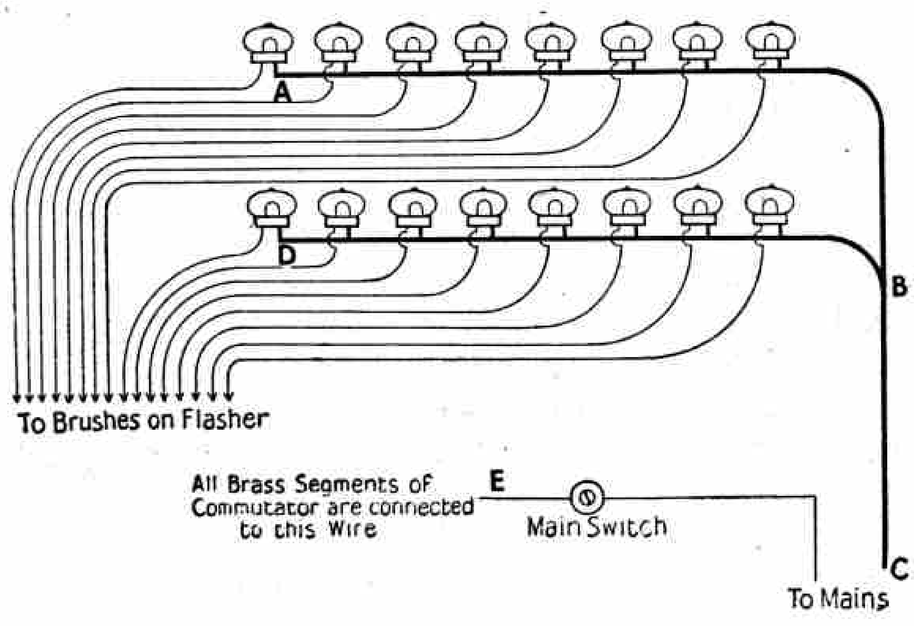


Fig. 3

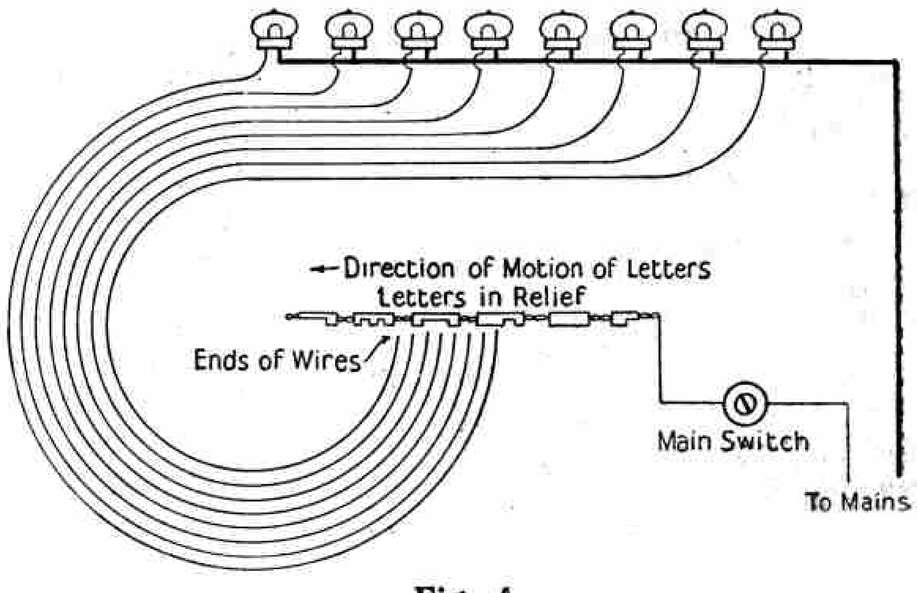


Fig. 4

The Triumphs of Great Men

Over Loneliness and Poverty

OUR hearts always go out to the boy or man who is poor and lonely. Most of us have felt lonely at some time or other and some of us have known what poverty means, yet it would be wrong to consider loneliness and poverty as altogether unmixed evils. Romance and history teem with instances of boys and men who have triumphed over loneliness and poverty to rise to heights of power and responsibility far above their fellow men.

Alexander Dumas

Loneliness and Poverty in Fiction

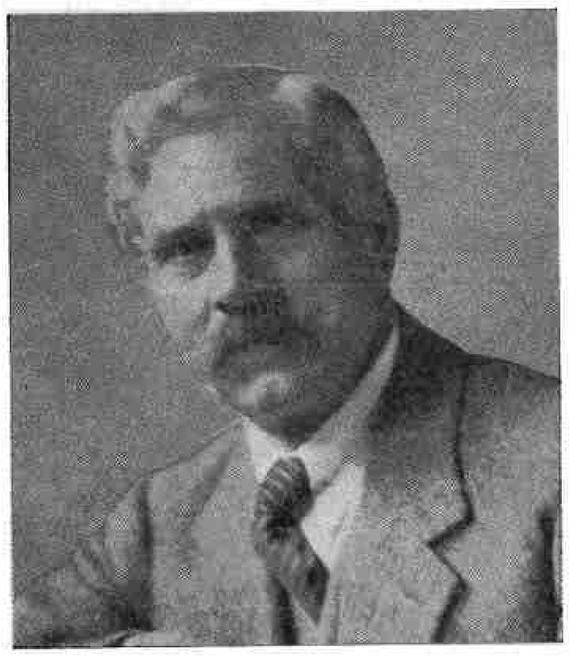
Who has not read the moving story of John Halifax, who commenced life as a lonely, friendless boy, sleeping in country out-houses and in the fields? John Halifax's first job was that of a labourer in a tan-yard, and he rose to eminence by dint of sheer determination, hard work and force of character.

Another example is found in the story of the Abbé Faria in that fascinating book, "*The Count of Monte Cristo*," by the wonderful writer Alexander Dumas. The wonderful old Abbé Faria spent the last years of his life in a lonely prison cell. Here he learned languages, wrote books, and arrived at the correct solution of a profound and intricate problem which enabled him to enrich a fellow prisoner and launch him upon his amazing career as the Count of Monte Cristo.

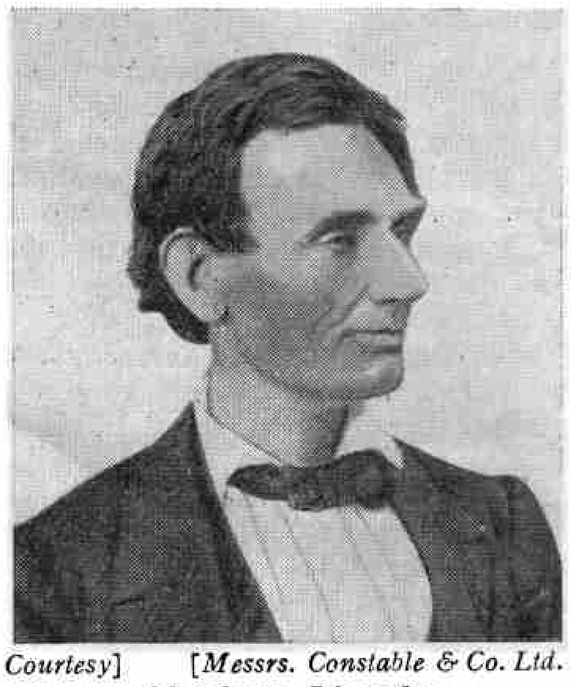
Hundreds of similar romances have been woven round the fascinating themes of poverty and loneliness, and pages of examples might be given. Wonderful as these romances of fiction are, they pale into insignificance when compared with the yet more wonderful stories of actual life.

Triumphs of Real Life

The ex-Prime Minister of England, Rt. Hon. Ramsay Macdonald, began life in a two-roomed cottage. He was born in Lossiemouth, a tiny village in the Scottish Highlands, in circumstances of poverty such as I hope fall to the lot of none of my readers. Although young Macdonald had little learning, and no more opportunities of advancement than usually fall to the lot of the average village boy, he had within him what Robert Burns—one of his great countrymen—called that "spark o' nature's fire" that triumphs over every adversity and knows no defeat. At the age of 19 Macdonald walked the streets of London without money or friends. He addressed envelopes to earn his living, and his first real job brought him 12/6 per week. His life story has a long way to run yet, but we can have little doubt that the influence of this once poor and lonely boy has had a marked effect on the history of our country.



J. Ramsay Macdonald



Courtesy] [Messrs. Constable & Co. Ltd.

Abraham Lincoln

A Great American

President Abraham Lincoln, an outstanding and commanding figure in the world's history—whose life and sayings I hope you will all read some day—began life in circumstances that even the loneliest and poorest boy would scarcely envy. Lincoln was born in a log cabin on a bleak farm in Kentucky, three miles from the nearest village. Life in those days was indeed very primitive, with an entire absence of most of the home and social conveniences that every boy now takes as a matter of course. There was no education, and little to soften the general conditions of abject poverty. Of his early life Lincoln said later: "It is a great folly to try to make anything out of me or my early life. It can all be condensed into a single sentence, and that sentence you will find in Gray's '*Elegy*'—'The short and simple annals of the poor.' That's my life, and it is all you or anyone else can make out of it." Yet, from its modest commencement, Lincoln's life was a steady progression towards the attainment of his ideals for the unity and freedom of the great American nation, and to this purpose his whole life was dedicated.

An Immortal Writer

The name of Charles Dickens is beloved wherever the English language is spoken or read. We think of him as a writer of charming and moving stories, as a creator of lovable characters — Micawber, Captain Cuttle, Pickwick, Sam Weller and a host of others. He it was who made our British Christmas a time of good will, a time for giving presents to boys and girls, a time of kindly

Charles Dickens

Sir J. M. Barrie

thought and jollity. I shouldn't wonder if that present of a Meccano Outfit or Hornby Train, which came from your mother last Christmas, is not directly traceable to the influence of Dickens. Read his "*Christmas Carol*" or "*Pickwick Papers*" if you want to know what a real Christmas should be like!

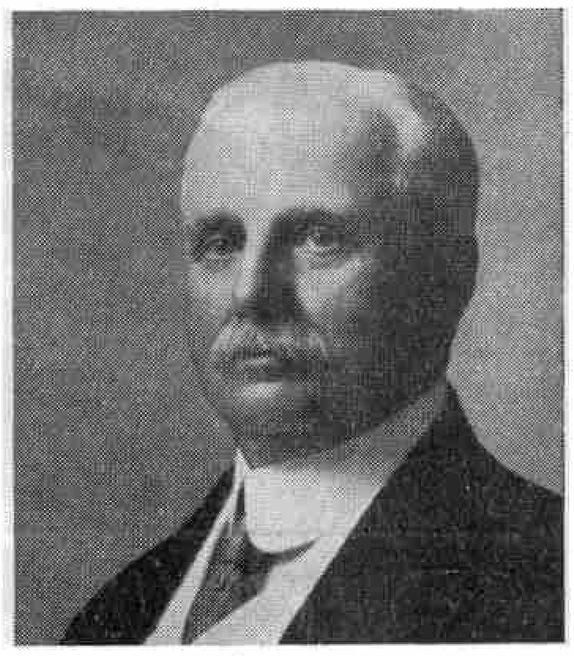
Dickens had a hard time as a boy. His father died while he was very young, and he was sent to work in a factory at an occupation that was dreadfully unpleasant and distasteful. Out of his loneliness and poverty came that great love for the poor and needy, and that great determination to rectify their wrongs, which later found such wonderful expression and bore such ripe fruit in his immortal writings.

The Creator of "Peter Pan"

Another great British writer, Sir J. M. Barrie, whose name cannot be mentioned and whose works cannot be read without conjuring up thoughts of warmth and friendliness, has said: "The greatest glory that has ever come to me was to be swallowed up in London, not knowing a soul, with no means of subsistence, and the fun of working till the stars went out." The spirit that was chastened and moulded in this loneliness finally emerged and gave us "Peter Pan" and a wealth of other joyous and happy books and plays, which all my readers will come to love. A short time ago, in an address to boys on "Courage" (which I think you would enjoy reading), Barrie concluded by saying: "Courage, my children, and greet the unseen with a cheer." That is ever his message in all his writings. Welcome all your troubles as new adventures and greet them with a courageous shout.

A Pit Boy Who Rose to Fame

In every walk of life there is no dearth of examples of triumph won, despite loneliness and poverty. We all know Sir Thomas Lipton. We may not have met him, of course, but we have seen his friendly face smiling at us from the pages of our illustrated papers, and we have smiled back at him, and we have admired his great efforts to bring the Yachting Cup to England with his famous "*Shamrocks*." Lipton started life as an errand boy in a grocer's shop in Glasgow. He was friendless and poor, but by application and enterprise he established a great and successful business. Lipton's great friend of later days, Sir Harry Lauder, started as a pit boy in a coal mine, but his cheeriness, which still comes to us in generous measure over the footlights, pulled him safely through all his tribulations and finally brought him to fame and fortune. If you would see the brave spirit that shines behind the cheery face of this artist, you must read his book "*A Minstrel in France*."



The late Frank W. Woolworth

Farmer to Millionaire

More than fifty years ago a boy was born in Jefferson County, in the State of New York. He was the son of a farmer, and seemed likely to follow in his father's footsteps. Later he developed other views, however, and as a young man took a situation without a salary in a dry goods store. In three months he was paid 15/- a week, and in two years 25/- a week. He then conceived the idea of opening a shop where everything was to be sold at a fixed price, and he devoted the whole of his business life to the development of this idea. A few years ago he erected a building with 57 stories, the tallest building in the world. It cost £3,000,000 and was paid for out of the profits of his one idea. You have all probably guessed the name of this great man—Woolworth—whose name is almost as well known in this country as in America. Speaking of his early life he has said: "I had to open the store at 7.0 a.m. and remain each night until 10 o'clock. There was no work too mean or dirty for me to do. I was discouraged. I thought it was impossible for me ever to learn the business. Well, I went on and the world knows the result."

The Value of Courage

These and many other successful men began their lives in loneliness and poverty, and the story of their careers should be an inspiration to any boy who feels inclined to bewail his own loneliness and lack of opportunities. Out of loneliness and poverty come determination, independence, courage and high ambition, and the greatest of these is courage. This surely is the quality that triumphs in times of trial and disappointment, and turns our stumbling-blocks into stepping-stones. Courage causes half our troubles to vanish before they have time to take definite shape, and reduces the other half to impotence.

A Model Dockyard

There are few pastimes more fascinating than model-boat sailing, and given a well-designed boat and a suitable sheet of water the scope for fun and excitement is almost unlimited. It is very necessary, however, that the boat should be obtained from a firm that really understands the building of these miniature vessels. A visit to the premises of the Kensington Model Dockyard (185, Kensington High Street, London, W.8) reveals a tempting display of boats of all kinds. The resources of the Dockyard are not confined to boats, however, but extend to model aeroplanes, engines, and fittings of every description, photographic apparatus and a wonderful range of requisites for indoor and outdoor games.

For Electrical Experimenters

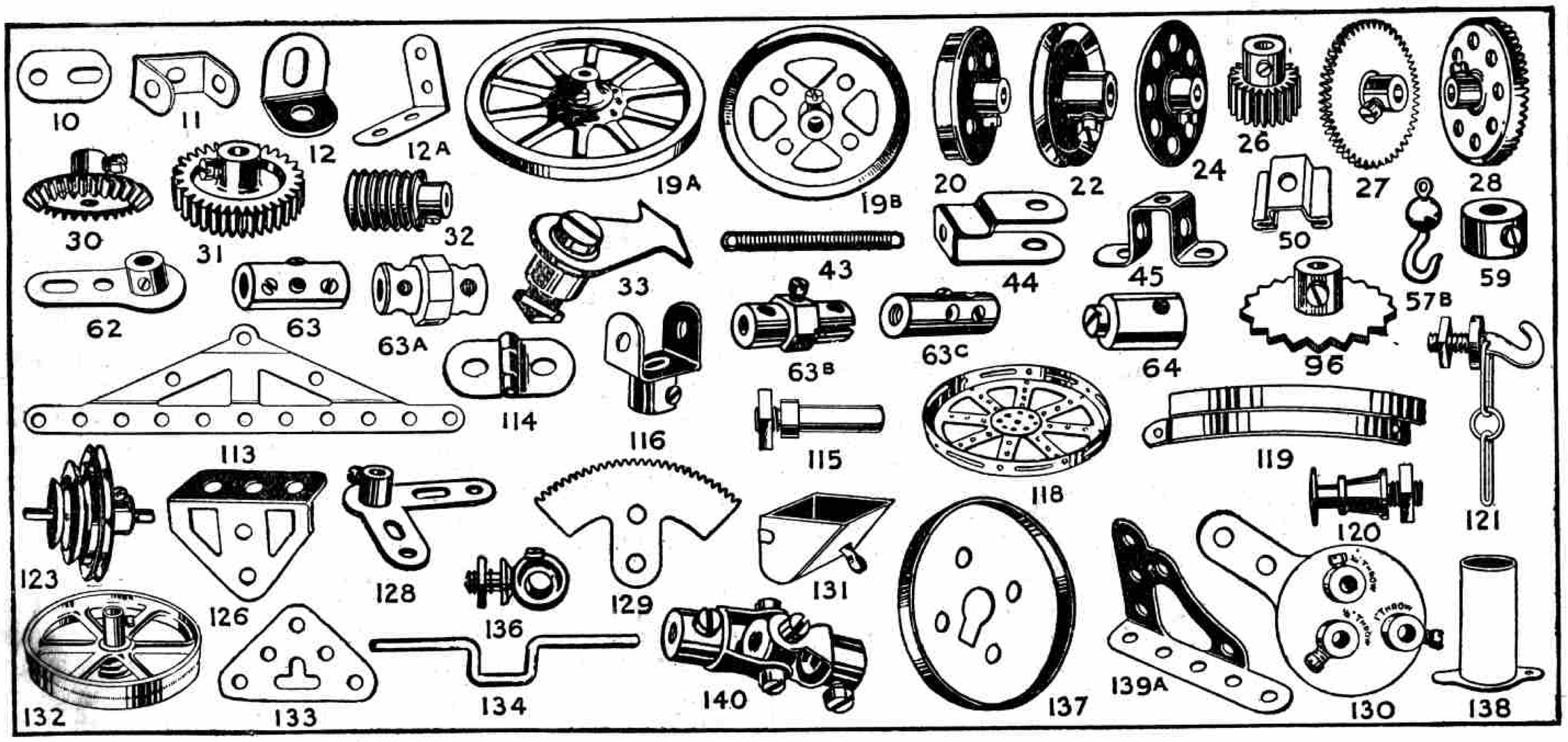
The wireless boom has had the effect of drawing general attention to the fascinations of electrical experiments, and the demand for electrical apparatus and parts is increasing. The Grafton Electric Co. (54, Grafton Street, Tottenham Court Road, London, W.1.) have laid themselves out to meet this demand, and they are able to fill the most exacting requirements. In addition to a wide range of complete wireless sets and component parts, their catalogue includes a great variety of reliable primary cells, both dry and wet, and accumulators of all sizes and capacities. A speciality is made of miniature lighting sets, and also brackets, shades, switches and everything for those who wish to assemble their own sets.

Model Steam Engines

Messrs. Stuart Turner Ltd. (Henley-on-Thames), well known to model-builders for the splendid quality of their products, send us a copy of the new edition of their catalogue (price 6d.) This includes engines of all types—steam, gas, and petrol—which are supplied both in the form of castings to be built up or as finished engines ready for work. A particularly interesting item is the "S.T." steam plant specially designed for driving Meccano models, boats, or any small machinery. Another noteworthy set is the "B.B." generating plant consisting of an engine and dynamo mounted on a suitable base, the electrical output of the plant being 20 watts. Almost every possible requirement of the model engineer is provided for.

MECCANO

ACCESSORY PARTS



We illustrate above a selection of accessory parts that every Meccano boy will find useful for building the larger and more interesting models. Sometimes a model may be described in these pages that is beyond the capabilities of one of the smaller Outfits, but by purchasing a few extra parts, it becomes possible to build the model.

Then again, where it is not desired to purchase an Accessory Outfit in the first instance, an Outfit may be gradually converted into a higher Outfit by purchasing the necessary parts, from time to time.

Many of these parts have only recently been introduced, and although we know that they have a universal use (were it otherwise they would not have been added to the system) we may not yet know *all* their applications. There are endless possibilities in the application of Meccano parts, and brainy boys endeavour to find new applications for them. These parts make possible the invention of entirely new models, and this provides more fun than merely copying the models in the Meccano Manuals.

If you have any difficulties in connection with using these parts, or any suggestions for new parts not already in the system, write to Meccano Ltd., Binns Road, Liverpool, and mark your envelope "Bright Ideas."

No.		s.	d.
10.	Flat Brackets ... ...½ doz.	0	2
11.	Double Brackets ... ... each	0	1
12.	Angle Brackets, ½″ × ½″ ... ... doz.	0	6
12A.	„ „ 1″ × 1″ ... ... each	0	1
12B.	„ „ 1″ × ½″ ... ... „	0	1
19A.	Wheels, 3″ diam. with set screws ... „	0	8
20.	Flanged Wheels ... ... „	0	6
	Pulley Wheels.		
19B.	3″ dia. with centre boss and set screw each	0	8
19C.	6″ „ „ „ „ „ „	2	6
20A.	2″ „ „ „ „ „ „	0	6
21.	1½″ „ „ „ „ „ „	0	6
23A.	½″ „ „ „ „ „ „	0	4
22A.	1″ „ without „ „ „ „	0	2
23.	½″ „ „ „ „ „ „	0	2
24.	Bush Wheels ... ... „	0	6
25.	Pinion Wheels, ¾″ diam. ... ... „	0	6
26.	„ „ ½″ „ ... ... „	0	4
27.	Gear Wheels, 50 teeth ... ... „	0	9
27A.	„ „ 57 „ ... ... „	0	9
28.	Contrate Wheels, 1½″ diam. ... ... „	0	9
29.	„ „ ¾″ „ ... ... „	0	6
30.	Bevel Gears ... ... „	0	10
31.	Gear Wheels, 1″, 38 teeth ... ... „	1	0
32.	Worm Wheels ... ... „	0	6
33.	Pawls (complete) ... ... „	0	4
33A.	Pivot Bolts with Nuts ... ... „	0	2
43.	Springs ... ... „	0	2

No.		s.	d.
44.	Cranked Bent Strips ... ... each	0	1
45.	Double Bent Strips... ... ... „	0	1
50.	Eye Pieces ... ... „	0	2
57.	Hooks ... ... „	0	1
57A.	„ (scientific) ... ... „	0	1
57B.	„ (loaded)... ... ... „	0	5
58.	Spring Cord ... ...per length	0	9
59.	Collars with Set Screws ... ... each	0	2
62.	Cranks ... ... „	0	3
62A.	Threaded Cranks ... ... „	0	4
63.	Couplings ... ... „	0	6
63A.	Octagonal Couplings ... ... „	0	8
63B.	Strip Couplings ... ... „	0	8
63C.	Threaded Couplings ... ... „	0	6
64.	Threaded Bosses ... ... „	0	2
65.	Centre Forks ... ... „	0	2
94.	Sprocket Chain ... ...per length	0	6
95.	Sprocket Wheels, 2″ diam. ... ... each	0	5
95A.	„ „ 1½″ „ ... ... „	0	4
95B.	„ „ 3″ „ ... ... „	0	6
96.	„ „ 1″ „ ... ... „	0	3
96A.	„ „ ¾″ „ ... ... „	0	3
109.	Face Plates, 2½″ diam. ... ... „	0	4
113.	Girder Frames ... ... „	0	2
114.	Hinges ... ... per pair	0	4
115.	Threaded Pins ... ... each	0	2
116.	Fork Pieces ... ... „	0	3
117.	Steel Balls, ⅜″ diam. ... ... doz.	0	6

No.		s.	d.
118.	Hub Discs (5½″ diam.) ... ... each	1	3
119.	Channel Segments (8 to circle, 11½″ diam.) ... ... „	0	4
120.	Buffers ... ... „	0	2
120A.	Spring Buffers ... ... per pair	0	8
121.	Train Couplings ... ... each	0	4
122.	Miniature Loaded Sacks ... ... „	0	2
123.	Cone Pulleys ... ... „	1	3
126.	Trunnions ... ... „	0	3
126A.	Flat Trunnions ... ... „	0	2
127.	Simple Bell Cranks ... ... „	0	3
128.	Boss Bell Cranks ... ... „	0	4
129.	Rack Segments, 3″ diam. ... ... „	0	6
130.	Triple Throw Eccentrics ... ... „	1	3
131.	Dredger Buckets ... ... „	0	2
132.	Flywheels, 2¾″ diam. ... ... „	2	3
133.	Corner Brackets ... ... „	0	3
134.	Crank Shafts, 1″ stroke ... ... „	0	3
136.	Handrail Supports ... ... „	0	3
137.	Wheel Flanges ... ... „	0	4
138.	Ship's Funnels ... ... „	0	4
139.	Flanged Brackets, right ... ... „	0	2
139A.	„ „ left ... ... „	0	2
140.	Universal Couplings ... ... „	0	9
141.	Wire Lines (for suspending clock weights) ... ... „	0	9
142.	Rubber Rings ... ... „	0	4
143.	Circular Girders, 5½″ diam. ... ... „	1	0

You may obtain these parts from your dealer, or direct from MECCANO LTD., BINNS ROAD, LIVERPOOL.

A NEW MECCANO MODEL

Model No. 734. Ship-Coaler

(Continued)

LAST month we learned something of the work done by mechanical coalers in coaling ships at high speed, and we gave the first part of the instructions for building a splendid Meccano model of a High-Speed Ship-Coaler. In this issue we continue these instructions and give also a list of parts required to build the model.

The High-Speed Ship-Coaler is one of the most interesting of Meccano models, for all the movements for coaling a miniature ship are controlled from the gear-box. The model will appeal to every Meccano boy, because when it has been built it affords endless fun, and no little dexterity is required for its operation. There are so many movements that the operator has to use his intelligence and has to be quick with his fingers in order to carry out all of them successfully.

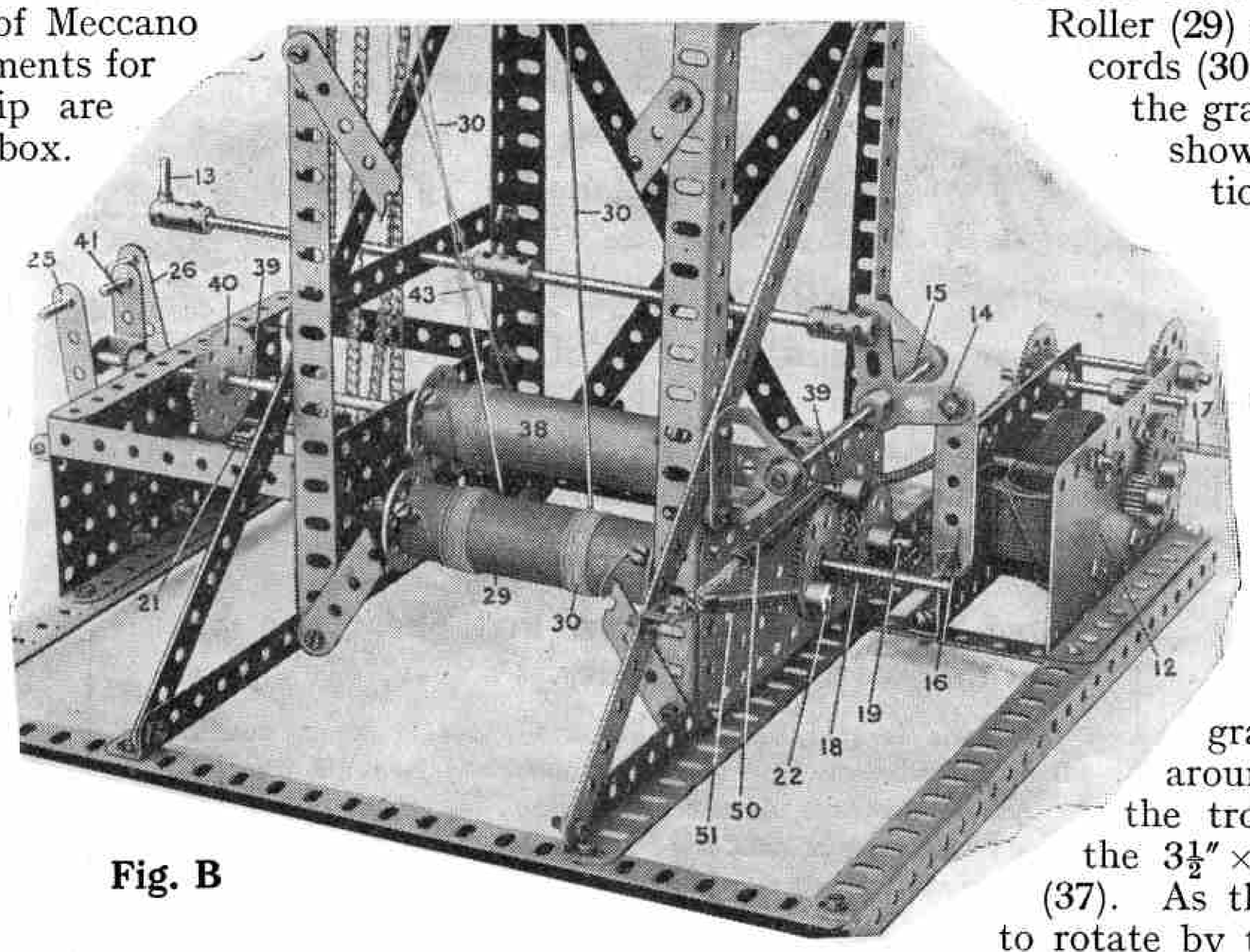


Fig. B

Motor Control Mechanism

Having constructed the main tower and the run-ways for the grab, we proceed to fit the Electric Motor (12, Fig. B), which is started, stopped or reversed by the handle (13). This is connected to a Bell Crank (14) pivotally mounted on a Rod (15) journalled in Trunnions and coupled by a $2\frac{1}{2}''$ Strip (16) to the control handle of the Motor.

From a $\frac{3}{4}''$ Sprocket Wheel on the Rod (17) the Motor drives a $1\frac{1}{2}''$ Sprocket (18) on the Rod (19, Fig. B), which carries two $\frac{1}{2}''$ Pinions (20 and 21, Figs. B and C) on either side of the Rod (19). These are slideably mounted in the Perforated Plates (42). On the ends of the two Rods (22 and 23) are Double Brackets enclosed by Collars (24), the Brackets being connected to $3\frac{1}{2}''$ Strips (25 and 26). These Rods (22 and 23) form operating levers for pushing the Rods (22 and 23) in or out.

The Double Brackets are lock-nutted to the bolts pivotally connecting them to the Strips (25 and 26), so as to enable the Strips to move freely on the bolts without disturbing their connection with the Double Brackets. Similarly, the pivotal bolts of the Strips (25 and 26) are lock-nutted to the 1″ Brackets (27), leaving the pivotal Nuts of the Strips (25 and 26) free on these Bolts.

The Gear-Operating Mechanism

A 57-toothed Gear Wheel (28) on the Rod (22) is adapted to engage or disengage with the Pinion (20) on the Rod (19). This drives the Roller (29) on which are wound the cords (30). These open and close the grab, details of which were shown in the larger illustration last month.

The cords pass from the Roller (29, Fig. D) over the Pulleys (31) and over the outer top Pulleys (32), returning down and passing around $\frac{1}{2}''$ Pulleys (33) on to other $\frac{1}{2}''$ Pulleys (34) on the trolley. From thence the cords pass down and around 1″ Pulleys (35) on the grab, and returning up around $\frac{1}{2}''$ Pulleys (36) on the trolley, are made fast in the $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip (37). As the Roller (29) is caused to rotate by the Motor in one or other direction, the grab will be raised or lowered.

Another Roller (38, Figs. B and C) is mounted on the $11\frac{1}{2}''$ Rod (39). This Rod slides in the Plate (42) directly above the $11\frac{1}{2}''$ Rod (19) carrying the Pinion (21, Figs. B and C). A 57-toothed Gear Wheel (40) on the Rod (39) is engaged or disengaged with the Pinion (21) by the operation of the $3\frac{1}{2}''$ Strip (41). This Strip acts as a control handle in a similar manner to the Strips (25 and 26) and is lock-nutted to the pivotal bolts as previously described.

Parts required:

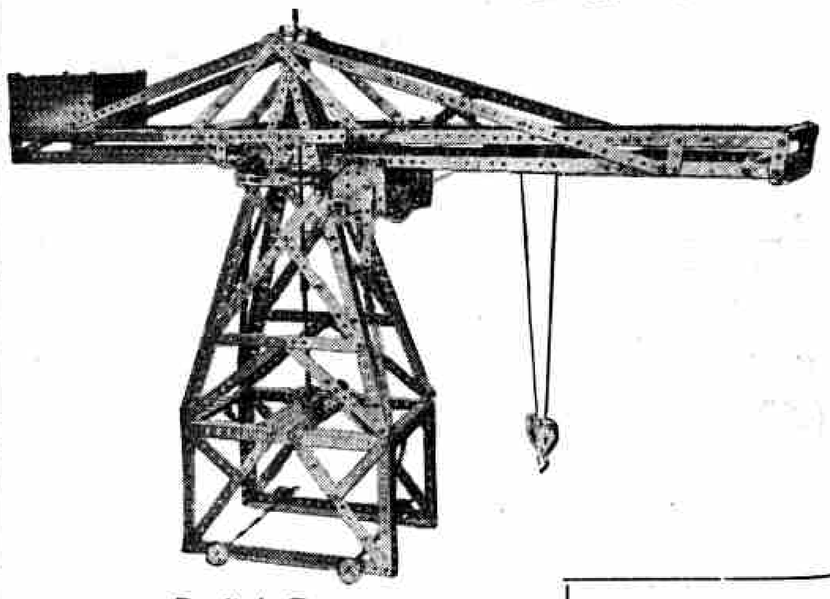
28	of No.	1	2	of No.	17	1	of No.	48D
5	" "	1A	2	" "	18A	1	" "	52
14	" "	2	3	" "	18B	2	" "	53
6	" "	2A	8	" "	20	1	" "	53A
24	" "	3	3	" "	21	1	" "	54
10	" "	4	5	" "	22	50	" "	59
18	" "	5	14	" "	22A	3	" "	63
2	" "	6	10	" "	23	2	" "	70
4	" "	6A	4	" "	24	2	" "	72
8	" "	7	3	" "	26	4	" "	76
6	" "	8	4	" "	27A	2	" "	77
6	" "	9	12	" "	35	4	" "	90
1	" "	9A	280	" "	37	48″	" "	94
4	" "	10	16	" "	37A	1	" "	95A
6	" "	11	30	" "	38	2	" "	96A
18	" "	12	1	" "	40	2	"	103D
5	" "	12A	2	" "	43	2	" "	106
3	" "	13	3	" "	44	2	" "	108
3	" "	14	2	" "	45	2	" "	111
2	" "	15	1	" "	46	8	" "	115
3	" "	15A	1	" "	48	1	" "	124
6	" "	16	7	" "	48A	2	" "	125
2	" "	16A	11	" "	48B	4	" "	126
2	" "	16B	1	" "	48C	1	" "	128

Opening and Closing the Grab

When the Gear Wheel (40) is engaged with the Pinion (21), which is on the Rod (19) driven by the Motor, the Roller (38) rotates and the cord (43) on that Roller is wound up. This cord passes over an outer 1″ Pulley (44), over a central $1\frac{1}{2}''$ Pulley (45) at the extreme top, down and around a $\frac{1}{2}''$ Pulley (46) to the trolley over a $\frac{1}{2}''$ Pulley (47) thereon. It passes around a 1″ Pulley (48) on the grab below, returning up to and over a $\frac{1}{2}''$ Pulley (49) on the trolley, where it is made fast to

(Continued on page 11)

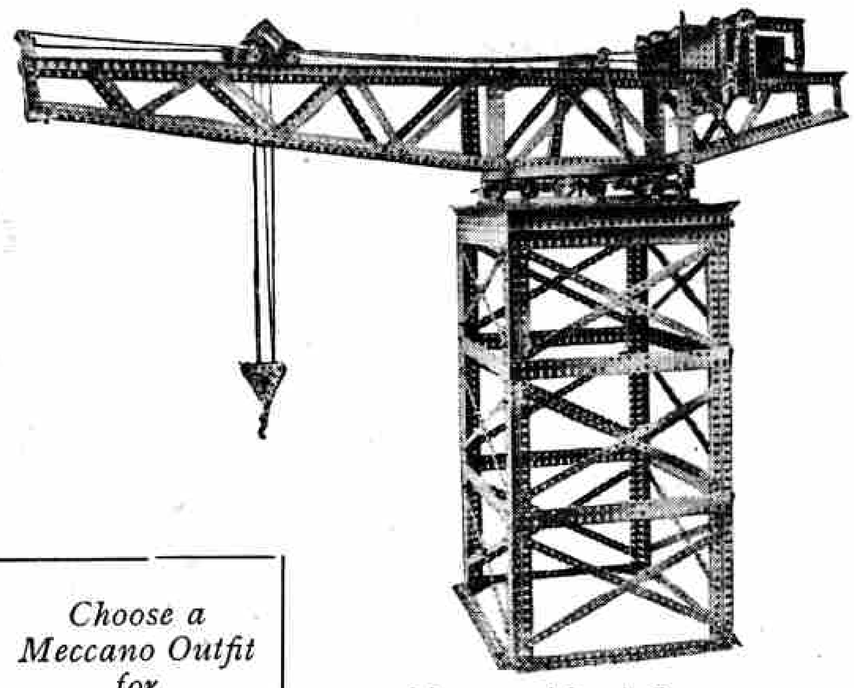
Meccano Outfits may be obtained from all leading toy stores



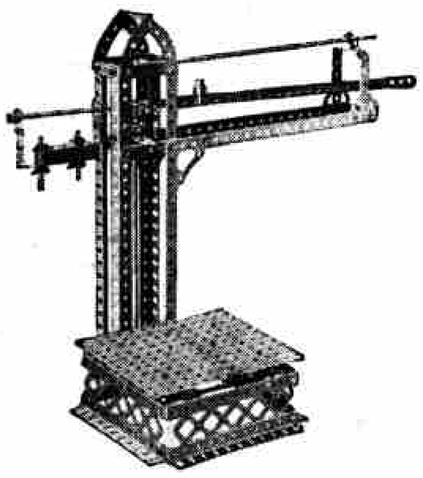
Radial Crane

This No. 2 Outfit costs 15/- and builds 163 Models.

Choose a Meccano Outfit for Your New Year Gift.



Hammer-Head Crane



Platform Scales

MECCANO

ENGINEERING FOR BOYS

You can build hundreds of working models with Meccano: Cranes of all types, Big Wheels, Motor Chassis, Lathes, Clocks, Looms that weave real fabric, and hundreds of others all equally interesting. No study is needed, you can commence building immediately you open your Outfit. The big illustrated Book of Instructions that goes with each Outfit makes everything easy.

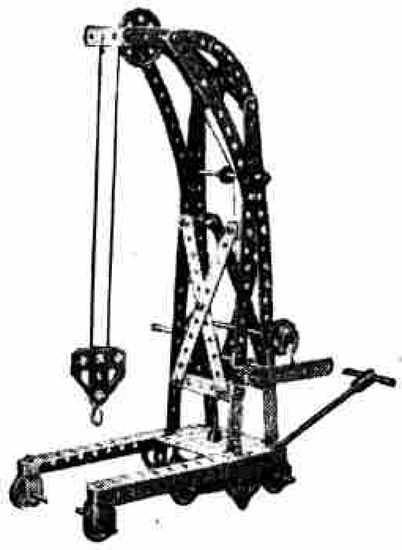
Meccano is sold in nine Outfits of varying sizes, numbered 00 to 7, and each Outfit may be converted into the one higher by adding the next Accessory Outfit. Thus if a No. 2 Outfit is bought it may be converted into a No. 3 by purchasing a 2a; a No. 3a would then convert it into a No. 4, and so on up to No. 7.

COMPLETE OUTFITS

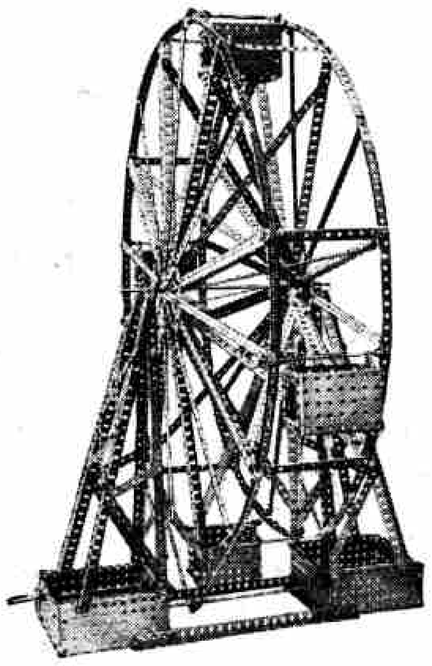
No. 00	**3/6**
No. 0	**5/-**
No. 1	**8/6**
No. 2	**15/-**
No. 3	**22/6**
No. 4	**40/-**
No. 5 (in well-made carton)...	**55/-**
No. 5 (in superior oak cabinet with lock and key)	**85/-**
No. 6 (in well-made carton) ...	**105/-**
No. 6 (in superior oak cabinet with lock and key)	**140/-**
No. 7 (in superior oak cabinet) with lock and key)	**370/-**

ACCESSORY OUTFITS

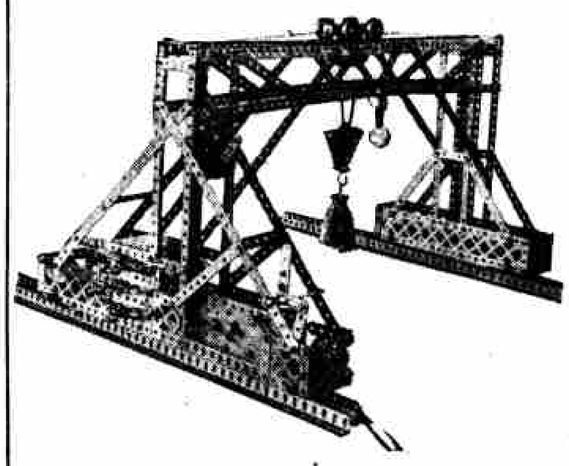
No. 00a	**1/6**
No. 0a	**4/-**
No. 1a	**7/6**
No. 2a	**8/6**
No. 3a	**18/6**
No. 4a	**15/-**
No. 5a (in well-made carton)	**50/-**
No. 5a (in superior oak cabinet with lock and key)	**80/-**
No. 6a (in superior oak cabinet with lock and key)	**210/-**



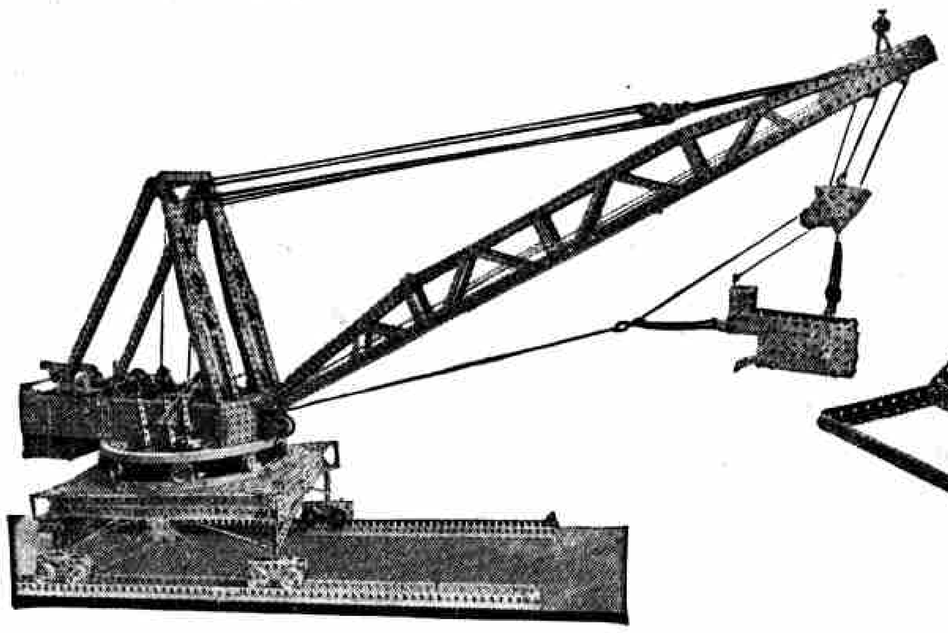
Platform Crane



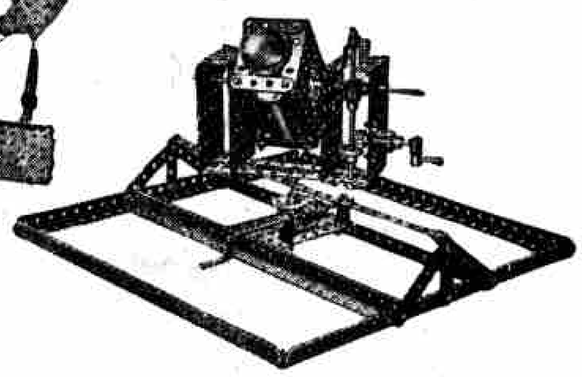
Big Wheel



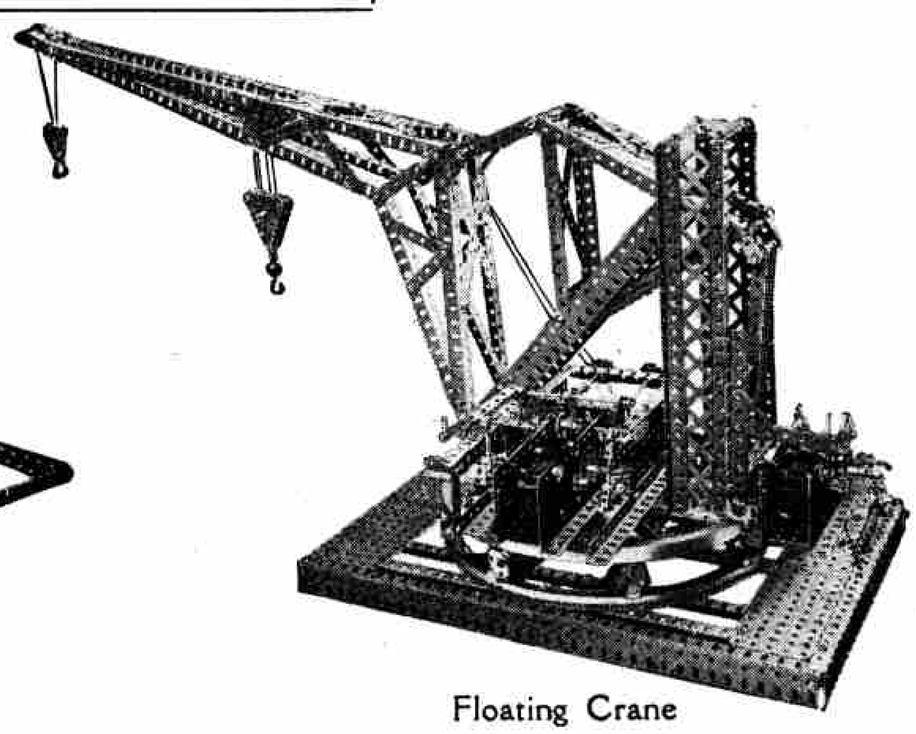
Gantry Crane



Dragline



Searchlight



Floating Crane

MECCANO LTD. BINNS ROAD LIVERPOOL

A New Meccano Model—*(cont. from page 9)*

the Double Angle Strips (37). Consequently by manipulating the handle (41) the grab may be opened or closed if it is stationary.

When both the handles (41 and 25) throw the Rods (39 and 22) in gear with the main driving Rod (19), the grab is hoisted or lowered in an open or closed condition.

The Action of the Model

A Spring (50, Fig. B) is engaged over the end of the Rod (39) carrying the Roller (38) and another Spring (51) on the end of the Rod (22). These act as frictional drags or brakes on these Rods, preventing the load in the grab running away when the gears are out of mesh.

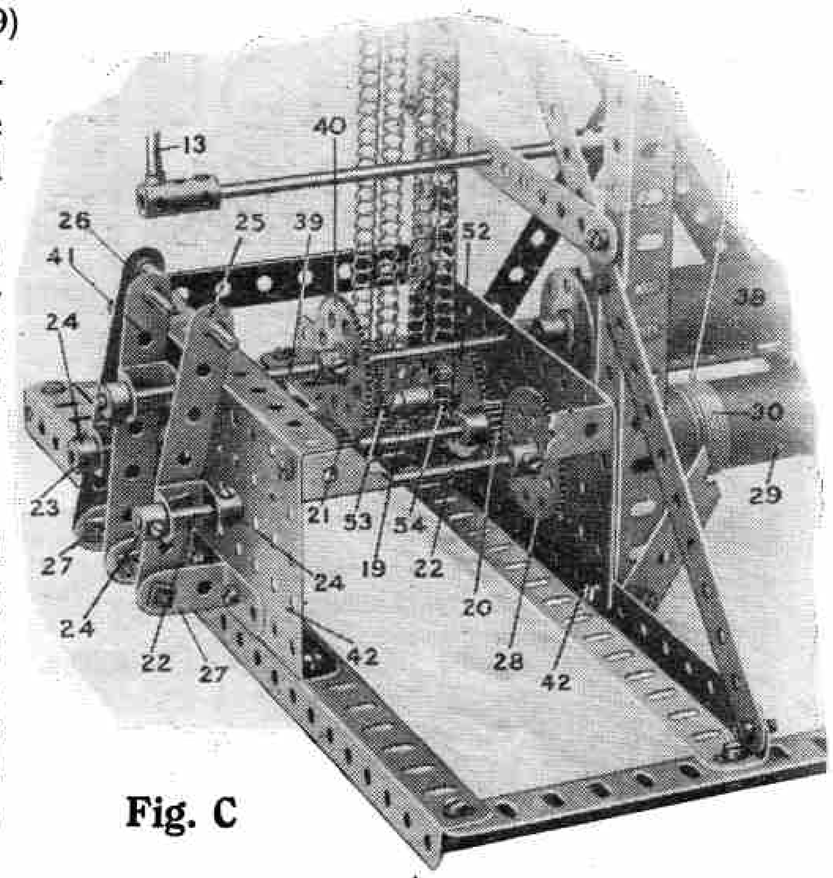


Fig. C

The mechanism is designed so that a load may be picked up by the grab at the outer end of the trolley arm. The load is then raised and the grab travels inwards on the rails (3). Meanwhile, the truck simultaneously travels inwards until, when the grab is over the truck, it (the grab) is opened and the load deposited in the truck.

Both the truck and the grab then travel outwards, the movement being completed by the truck depositing its load down the chute.

The Travelling Grab

This inward and outward travelling action of the grab and the truck is effected from the third handle (26, Fig. C). This controls the Rod (23) on which a 57-toothed Gear Wheel (52), when engaged with the Pinion (20), causes the Rod (23) to be rotated.

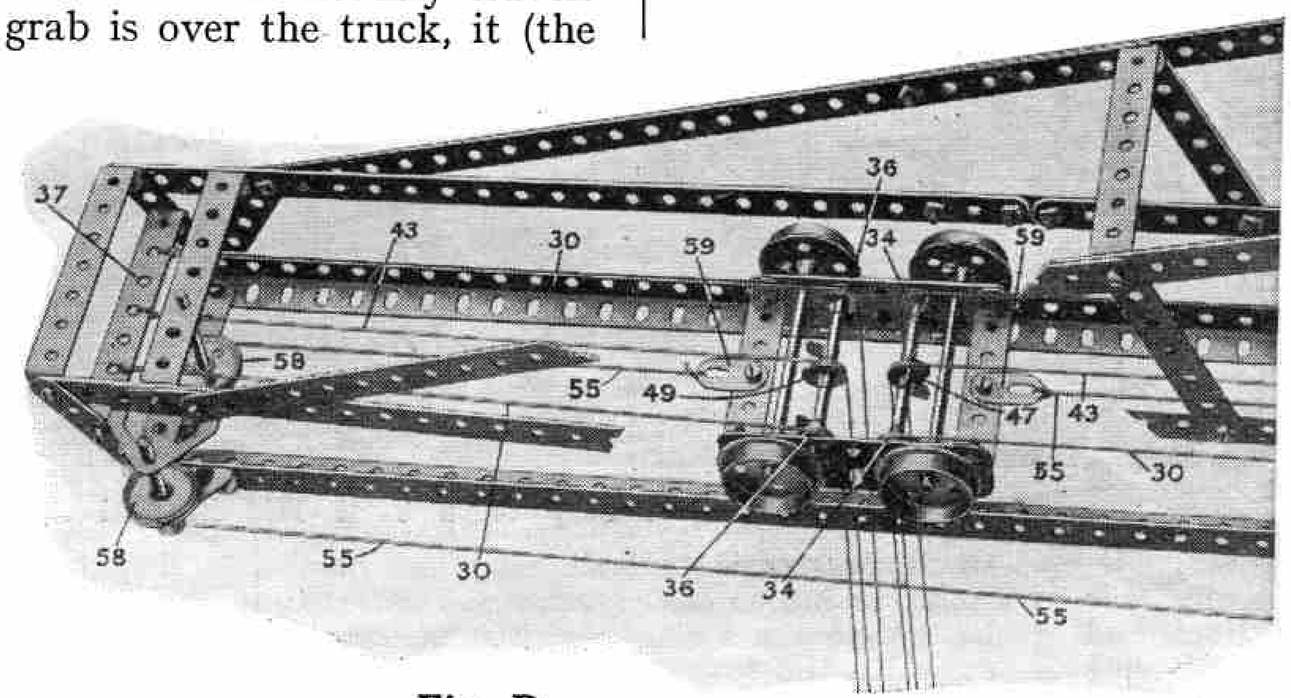


Fig. D

The Rod (23) carries two ¾″ Sprocket Wheels (53 and 54) which are engaged by Sprocket Chains connected to cords (55 and 56*). The cords (55) pass over 1″ Pulley Wheels (57) and end Pulley Wheels (58, Fig. D) disposed horizontally, being finally connected to the Flat Brackets (59) on the trolley of the grab. Consequently as the Sprocket Wheel and Chain (53) is wound in one or other direction, according to the direction of rotation of the main driving Rod (19), so will the grab and its trolley be caused to travel in or out along the rails (3).

Simultaneous Action of Grab and Truck

Similarly the cords (56) from the other Sprocket pass over 1″ Pulleys (60*), around 1″ Pulleys (61), horizontally arranged, the ends of the cord being connected to Brackets (62) at each end of the truck (62, Fig. E). As the Sprocket Chains (53 and 54) rotate together, both the grab and the truck travel at the same time, but in order to ensure that they travel in opposite directions, so that they both move inwards or outwards together, the cords (56) are crossed before they pass over the Pulleys (60), while the cords (55) are left open.

*See illustration in last month's "*M.M.*"

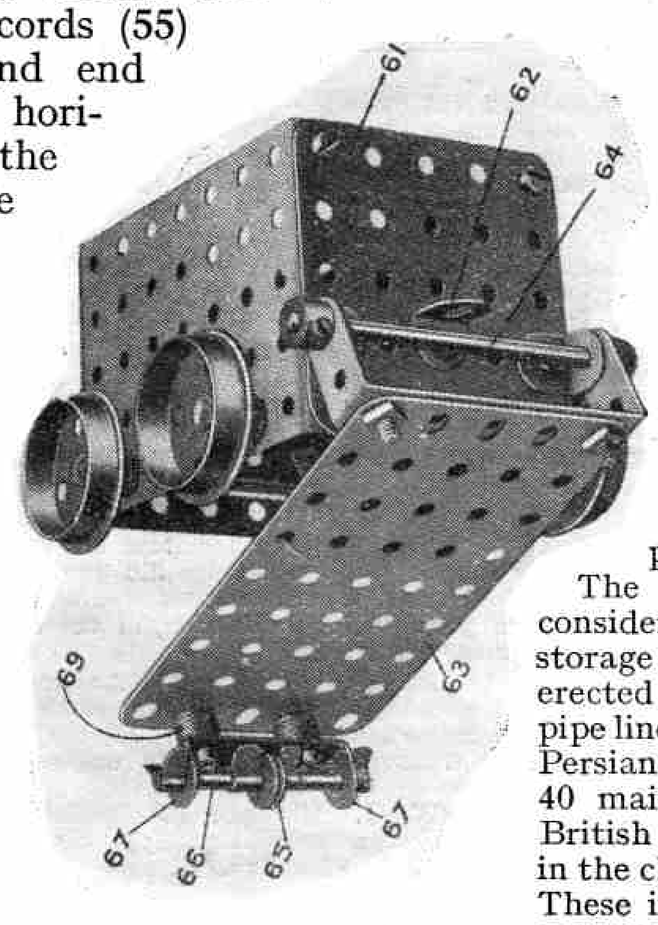


Fig. E

As the truck approaches the outer end of its travel, it discharges its contents down the chute as previously mentioned. To enable this to take place, the bottom of the truck (63) is pivoted (as shown in Fig. E) on a 3″ Rod (64). At the other end of the bottom Plate (63) is a ½″ Pulley (65), carried on a 1½″ Rod (66) mounted in a 1½″ Double Angle Strip (67) secured to the base and spaced by five Washers (69).

In the centre of the rails (3) on the truck run-way a central Strip (68) is provided on which the ½″ Pulley (65) runs. This Strip (68) is bent downward as it reaches the chute. Consequently, as the base of the truck reaches the chute, the wheel (65) rides down the bent end (68) and permits the bottom of the truck to open and the load to be discharged.

NEXT MONTH:

Another New Meccano Model TRACTOR

Advantages of Oil Fuel

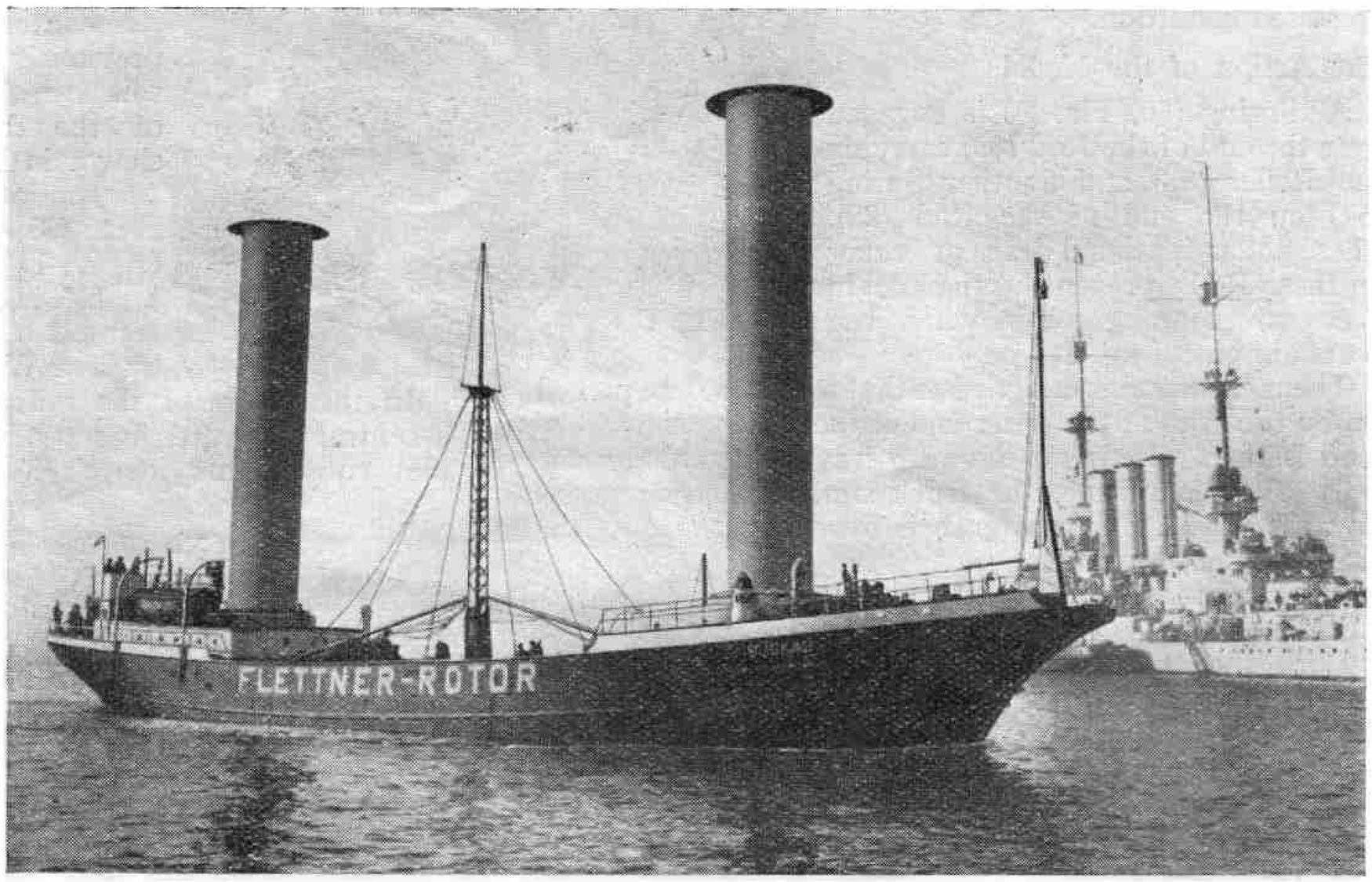
The number of steamships burning oil fuel is already very large and it is increasing. Many up-to-date vessels are constructed to burn either coal or oil, this arrangement enabling their owners to take advantage of the state of the respective markets in the two fuels. As far back as 1904 the Admiralty were seriously considering the conversion of the Navy to oil fuel, and in 1912 Mr. Winston Churchill, then First Lord of the Admiralty, appointed a Royal Commission with Lord Fisher as president to consider the whole question of oil fuel and to advise the Government. After hearing evidence from all points of view, the Commission came to the conclusion that, assuming the necessary oil supplies could be assured, there would be no great risk in the conversion of the Navy from coal, and that whether there was risk or not the conversion would have to be undertaken. From that time onward the conversion proceeded rapidly, and to-day practically every ship in the Navy burns oil fuel.

The growing demand for oil fuel has necessitated considerable developments in all the principal docks. Huge storage tanks holding millions of gallons of oil have been erected at suitable points along the various docks, with pipe lines running to the points of bunkering. The Anglo-Persian Oil Co., for instance, have established more than 40 main bunkering installations on the shores of the British Isles, at the principal Continental ports, and also in the chief shipping centres of Asia, Africa and Australia. These installations, the number of which is continually being increased, comply with the two essential conditions of ample storage capacity and rapid delivery to ships.

Sailing Without Sails

Discovery of 70 Years Ago Makes Rotor Ship Possible

RATHER more than 70 years ago Professor Magnus, a German, discovered that the propelling power of wind acting against rapidly-rotating cylinders was much greater than the power of the same wind when acting against a stationary surface, such as a sail. This discovery has been utilised recently in a most interesting manner by another German, Herr Anton Flettner, in what is known as the "Rotor Ship," a photograph of which we are able to reproduce here.



The Rotor Ship on a Trial Trip in Kiel Harbour

The Revolving Towers

The rotor ship is a vessel of 650 tons. Instead of the usual masts and sails, she is fitted with two towers, 50 ft. in height and 10 ft. in diameter, which look something like funnels with inverted saucers on the top. These towers are hollow cylinders extending to the bottom of the ship and revolving on pivots. Each cylinder is driven by a small motor of about 9 h.p. and can be run up to a speed of 120 revolutions per minute.

These revolving towers are really sails operating on sound scientific lines and taking advantage, not only of the driving pressure of the wind, but also of its suction. The suction behind a sail is actually more effective than the pushing force of the wind, but in the past this suction has been almost entirely ignored.

Controlling the Ship

Steering is effected by stopping the rotation of one of the towers, and the whole process is controlled by one man from the bridge of the vessel. This man has before him a dial indicating the speed at which the towers are turning, and by means of a control handle he is able to increase or decrease this speed or stop the rotation altogether. In this way one man performs the work of the crew required to handle a sailing ship of the ordinary type. The best record of the rotor ship so far is 8 knots with a wind blowing at the rate of from four to five miles per hour.

It is too soon yet to attempt to forecast the future of rotor-propelled ships, but it appears possible that they may have considerable value as cargo carriers. They will, of course, require to be fitted with some auxiliary motor power for use in calms and for working them into and out of harbour.

It is stated that a similar invention was patented some years ago by an Englishman, but no details are available at the moment.

BRIGHT IDEAS

These columns are reserved for dealing with suggestions sent in by Meccano users for new parts, new models, and new ways of making Meccano model-building attractive. We are always pleased to hear from any Meccano boy who has an idea which he considers will be useful in the Meccano system.

W. Wilson (Londonderry).—The inclusion of a smaller pinion than half-inch would not be practical, as it would depart from our half-inch standard.

L. Wedgewood (Newcastle).—Face plates, joined by double angle strips of the desired length, give a fairly good representation of a locomotive boiler.

S. Blake (Toronto).—Any gradient over 1½" in 12" is scarcely practicable with clockwork engines. Their light weight would be insufficient to ensure a grip on the rails. The present straight rails can be adapted to the above-mentioned gradient.

David Jones (Llanidloes).—The pipes above the buffers of trains are flexible tube couplings for the vacuum brakes. This item added to Hornby Trains would merely be ornamental and would serve no useful purpose.

R. Poincare (Lyons).—We think our regular spring, connected diagonally to two strips disposed at a right angle, would overcome your difficulty.

W. Menzies (Edinburgh).—The Meccano Shafting Standards will suit your purpose admirably. These standards are sold in two sizes, large and small (price 1/- and 8d. each respectively), and are obtainable from all Meccano dealers.

E. Capper (Northwich).—We already list a single crank shaft (No. 134). Connecting rods may be made from our standard rods with a coupling as connection.

J. Mason (Liverpool).—(1) To facilitate the recognition of the various parts we include illustrations in our price lists. (2) We should be interested to see a photograph, if you have one available, of the beam engine you have constructed.

J. Jardine (Adelaide, Australia).—(1) An interior toothed wheel would be too expensive to make and its advantages are somewhat doubtful. (2) We have the twisted or transverse strip already under consideration.

D. Grimwade—W. J. Allardyce (Cheltenham).—(1) We have recently introduced a pulley 6" diameter similar in design to the 3" pulley. (2) We are considering the advisability of squaring the shoulder in the threaded pins for the purpose of obtaining a firmer fastening. (3) We shall consider the matter of a worm wheel with a wider pitch.

E. Ray (Letchworth).—We are experimenting with a different type of propeller to the one we list.

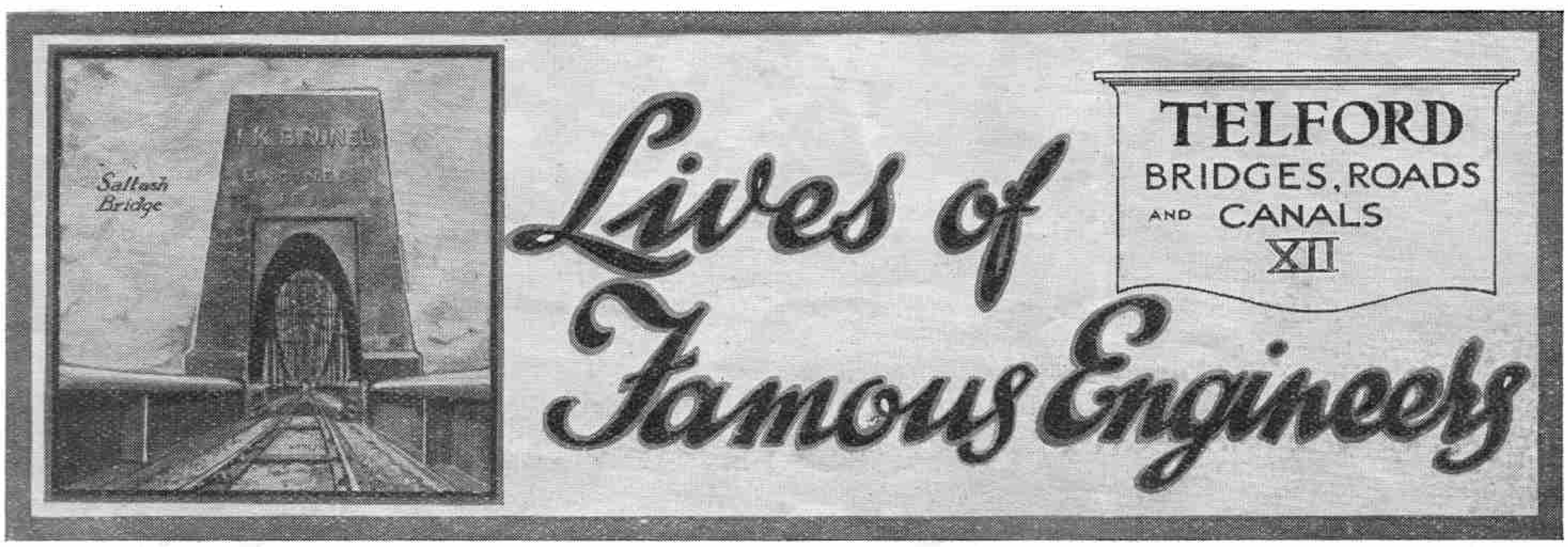
I. N. Muir (Oshawa, Ont.).—Braced girders with bracketed ends may have uses in one or two instances, but in the great majority of cases they are not required. The part is more adaptable in its present form.

C. F. Marshall (Marlborough).—We quite appreciate the advantage of rods with pointed ends for minimising friction, but numerous difficulties would arise.

H. Harris (?).—Thanks for your clear sketch of suggested ball race for wheels of motor chassis. It appears to us to be somewhat unwieldy for this particular purpose. We shall examine the principle more closely and perhaps find a use for it in some other direction.

J. L. Tisshaw (Manor Park, E.).—Such a rod connection as you suggest is not practicable on account of the small diameter of the rod. In any case this principle would merely duplicate the functions of the coupling.

J. Schofield (London).—As an alternative to using a strip as a connecting rod, you could employ a rod with a coupling at either end, connection being made horizontally through the end hole in the coupling by means of a ¾" bolt. One or two spacing washers on the bolt would ensure free action. This is an instance in which existing Meccano parts are adaptable where they obviate the introduction of special parts.



This month we conclude our story of the life of Telford with an account of his great work as a road maker and bridge builder. We show how he continued to carry out important engineering schemes almost up to his death, at the age of 77. Telford's career provides a wonderful lesson on the value of hard work, without which the greatest ability is of little use.

IN 1808, at the wish of the King of Sweden, Telford was consulted as to the best method of constructing the Gotha Canal from Lake Wenern to the Baltic Sea in order to complete communication with the North Sea. Telford visited Sweden, spent two months in surveying the district and prepared a report, which was immediately adopted.

Two years later he again visited Sweden to inspect the progress of the preliminary excavations. He supplied drawings for the various locks and bridges and, with the consent of the British Government, he provided the Swedish contractors with patterns of the latest tools and appliances used in canal construction. He also arranged for a number of expert English canal workers to go over to instruct the local workmen. The length of the canal was 55 miles and the total length of the navigation, including lakes, 120 miles. The locks were 120 ft. in length and 24 ft. in width, the width of the canal at the bottom being 42 ft., and the depth of water 10 ft. The Gotha Canal proved a great success, and in recognition of Telford's services the King of Sweden conferred upon him the Swedish order of knighthood and presented him with his portrait set in diamonds.

Improving Brindley's Canal

Telford next constructed or improved a number of canals in England. One of the most interesting of these works was the cutting of a new tunnel through Harecastle Hill to supplement the original tunnel on the Grand Trunk Canal built by Brindley some 50 years earlier, and described in our issue of October last.

Brindley's tunnel had proved incapable of dealing with the greatly increased traffic. It only admitted the passage of one narrow boat at a time and all boats had to be propelled by the process called "legging"—that is to say, the men lay on the deck and forced the boat along by pressing with their feet against the sides or roof of the tunnel. This extraordinary process occupied about two hours, and on emerging from the tunnel the boatmen were utterly exhausted with their efforts. The Canal Company consulted Telford on the matter and he advised the construction of a new tunnel, parallel with the old one but on a much larger scale. The work was commenced in 1824 and was completed in less than three years. When we remember that Brindley's smaller tunnel took 11 years to construct we realise the great improvement in engineering appliances that had taken place since his time.

The new tunnel was 2,926 yards in length, 16 ft. in height and 14 ft. in breadth. The "legging" process was abolished, and instead a tow path 4 ft. 9 in. in width was provided, along which horses hauled the boats in the ordinary way. The accuracy with which the tunnel was constructed is shown by the fact that it is so straight that its whole length may be seen through at one view, and although it was built by means of fifteen separate shafts sunk along the line it was to take, the joinings of the various sections of brickwork are scarcely visible. Telford surveyed the tunnel a couple of years after its completion, and on this occasion he asked a boatman who was just bringing his boat throughwhathethought of it. "I only wish," replied the boatman, "that it reached all the way to Manchester!"

In December 1914 Telford's tunnel was brought up to-date by the introduction of an electric system of towage. It is also interesting to note that in 1848 a third tunnel was cut through this hill to carry the railway. This third tunnel is about seven yards above the level of the other two.

Telford also greatly improved another of Brindley's works, the Birmingham Canal, by doing away with many of the awkward bends, widening the waterway and cutting down the

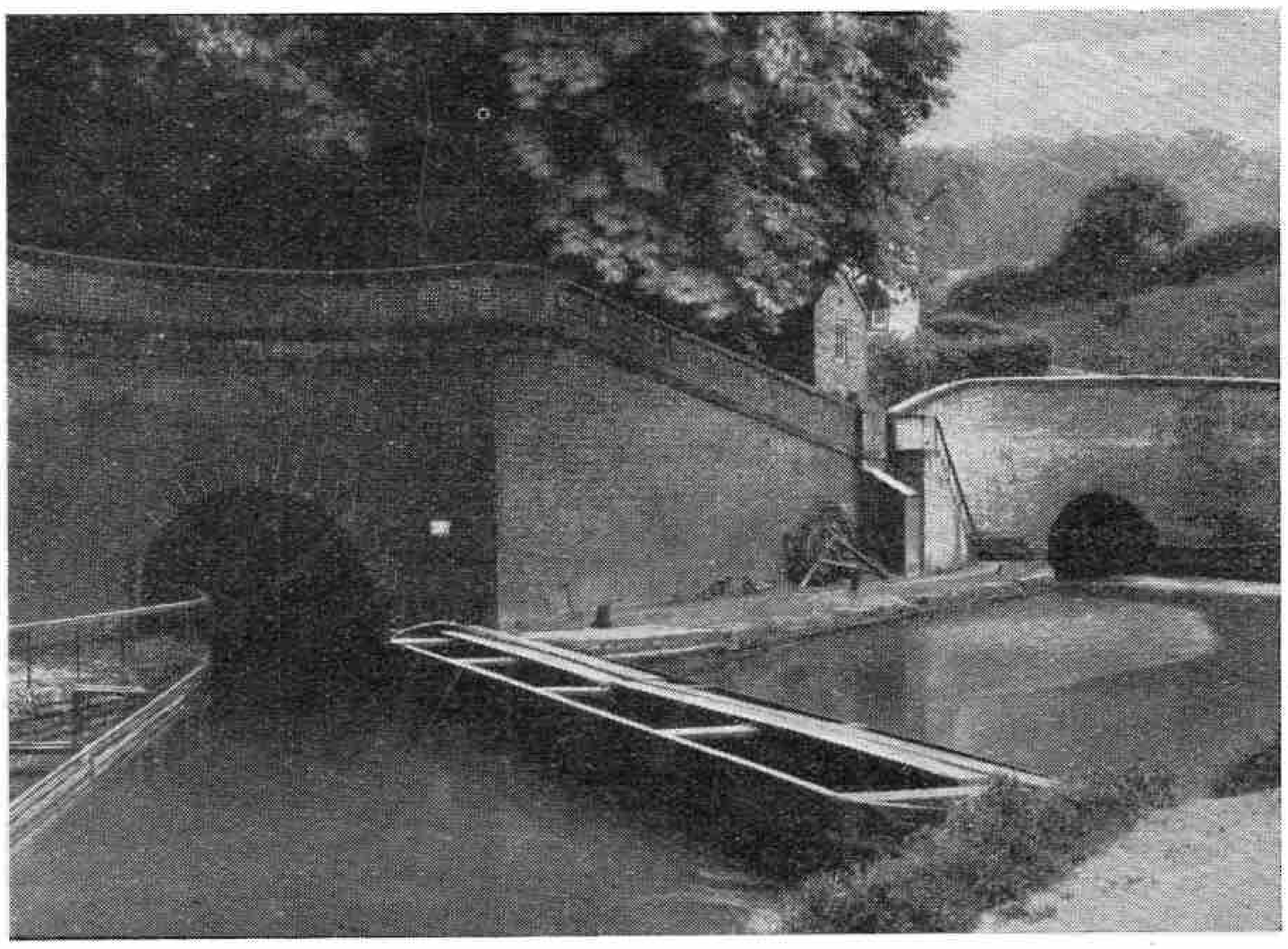
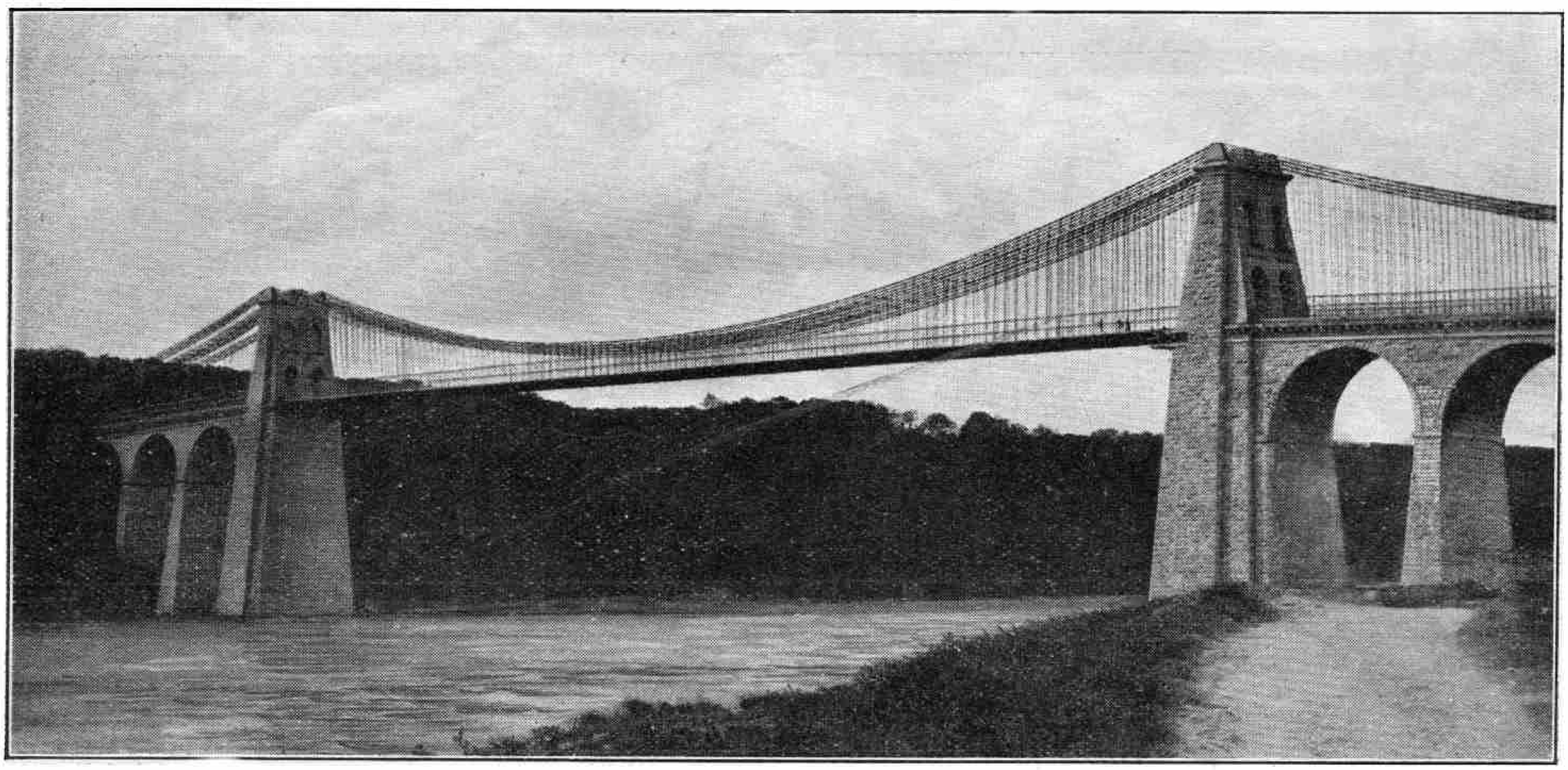


Photo courtesy] [*L.M.S.R.*

Canal through Harecastle Hill.
Telford's Tunnel on left, Brindley's on right.



The Menai Suspension Bridge

Lives of Famous Engineers

(*continued from previous page*)

summit at Smethwick. Telford's last canal was the Birmingham and Liverpool Junction, which extended from the Birmingham Canal near Wolverhampton, via Market Drayton and Nantwich, and through Chester by the Ellesmere Canal to Ellesmere Port on the Mersey. This canal provided a second and shorter route between Birmingham and Liverpool.

Telford as Road-Maker

We must now turn to Telford's great work as a road-maker. At this period coaches were running between most of the chief towns of the country, but the longer journeys were difficult and slow on account of the extremely bad condition of the roads. This was especially the case with the highways connecting London with the chief towns of Scotland. In 1814 a Parliamentary Committee declared the road between Carlisle and Glasgow to be in such a bad state as to cause serious delay to the mails and danger to the lives of passengers. Some idea of the conditions may be gained from the fact that on one occasion a coach and horses actually fell through a certain bridge, this accident resulting in the death of the coachman and one passenger, while several other passengers were seriously injured. Local efforts to put the road in a fit condition having failed, it was decided to undertake its reconstruction as a work of national importance. Telford was placed in charge of operations and he constructed nearly 70 miles of new road of a quality not previously attained.

In this work Telford had two chief objects—to make the road as level as possible and to give it a surface capable of bearing without injury the heaviest weights likely to pass over it. He constructed the metal bed in two layers rising about four inches towards the centre of the road. The bottom layer was of stones seven inches in depth, set by hand with their broadest ends downward and cross-bonded or jointed, no stone being more than three inches wide at the top. The space between these stones was filled with smaller stones packed by hand so as to produce a firm and even surface. A drain leading to the outside ditch crossed beneath this layer every 100 yards. Upon this lower layer was laid a second layer, seven inches in depth, of hard stone broken small, and surmounted by a binding of gravel to the depth of about an inch. The result of this careful construction was a firm, hard, dry road, needing little in the way of repairs. The success of this road led to great activity in road repairing in various parts of the country, and Telford's services were in constant demand.

The Road to Holyhead

The most important road scheme carried out under Telford's immediate supervision was directed towards facilitating communication between London and Dublin by way of Holyhead. At that time this journey was a very serious undertaking involving considerable danger. On the Irish side there was nothing worthy of the name of a port, and after crossing the Irish Sea passengers were put ashore at Holyhead on the rough rocks, without any landing convenience! From there the road across Anglesey was merely a rough track. Accidents to coaches were of regular occurrence, and ultimately the London coachmen who had been brought to work this route refused to continue on account of the danger. On reaching the Menai Straits the unfortunate travellers had to cross in an open ferry boat, an unpleasant experience at the best of times and full of danger in bad weather, especially when the crossing was made at night. The next and final ordeal was the traversing of the Welsh roads, which were in a terrible condition and scarcely passable at all in winter.

With increasing traffic this state of affairs became intolerable and the Government at length took the matter in hand. The landings on both sides of the channel were improved, and in 1815 Telford was called upon to superintend the construction of a good coach road from Shrewsbury to Holyhead. In this undertaking Telford followed the lines he had adopted in his Carlisle—Glasgow road. The mountainous character of the country made it extremely difficult to avoid steep gradients, but Telford grappled with the various obstacles so successfully that his road nowhere had a gradient of more than 1 in 20, whereas the old road in some places had gradients as steep as 1 in 6½. The most dangerous parts of the old road were dealt with first, and by 1819 the whole road was made safe and comparatively easy.

Select Committee's Tribute

Telford's splendid work in the construction of this road met with universal praise, and the Select Committee of the House of Commons reporting on the undertaking said:—"The professional execution of the new works upon this road greatly surpasses anything of the same kind in these countries. The science which has been displayed in giving the general line of the road a proper inclination through a country whose whole surface consists of a succession of rocks, bogs, ravines, rivers and precipices, reflects the greatest credit upon the engineer who has planned them; but perhaps a still greater degree of professional skill has been shown in the construction, or rather the building, of the road itself."

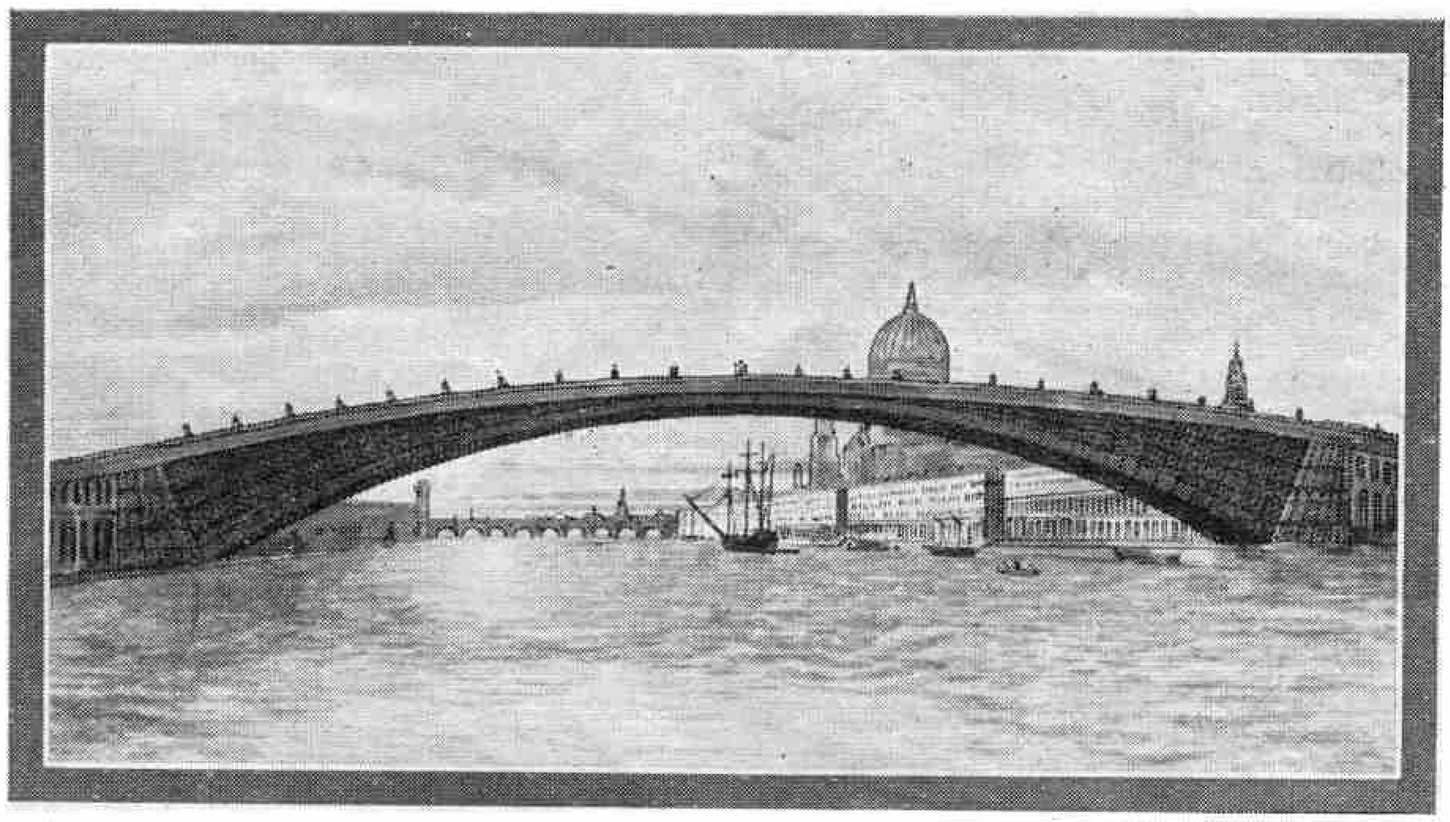
Bridging the Menai Straits

A good coach road was now provided all the way from Shrewsbury to Holyhead, but the crossing of the Menai Straits still had to be made in open boats, and after long consideration it was decided to employ Telford to construct a bridge across this dangerous ferry.

Such a bridge had been contemplated for many years. As early as 1776 a proposal was put forward for a great embankment with a bridge in the middle of it, and about nine years afterwards a scheme was proposed for a wooden bridge provided with drawbridges to allow the passage of shipping. Still later the famous engineer Rennie suggested a cast-iron bridge.

None of these schemes came to anything, however, and it was left for Telford to bring the project to completion. He put forward two proposals. The first was for a bridge at the Swilly Rock, to consist of three cast-iron arches of 260 ft. span, with a stone arch of 100 ft. span between each two iron arches for the purpose of resisting their lateral thrust. His second proposal, and the one that he himself favoured, was for a single cast-iron arch of 500 ft. span at Ynys-y-moch. Both plans were rejected, however, the second one largely on the ground that it would affect the navigation of the Straits.

Not long afterwards Telford was consulted as to the construction of a bridge over Runcorn Gap on the Mersey, and he recommended for the purpose a suspension bridge. He prepared a design and constructed a model of the central opening which successfully withstood the various strains that were applied to it. Although the scheme was never carried out, Telford's proposal drew public attention to the possibility of building bridges on the suspension principle.



Telford's Proposed Single-Arched Bridge over the Thames

Suspension Bridge Suggested

In 1818 Telford was instructed to make a further examination of the Straits. He again selected the Ynys-y-moch site and proposed a suspension bridge on the same lines as his Runcorn design. One great advantage of this scheme was that by spanning the whole channel between the low water lines and keeping the roadway 100 ft. above the highest spring tide level, no part of the navigable waterway would be obstructed. It was proposed that the distance between the main piers to carry the chains should be 550 ft. The main chains were to be sixteen in number, secured by masonry built over stone arches between each end of the supporting piers and the adjoining shore. Four of these arches were to be on the Anglesey side and three on the Carnarvon side. The roadway was to consist of two carriageways, each 12 ft. in width on each side of a 4 ft. footpath running along the centre of the mole.

Telford's plan was strongly supported by Rennie and other eminent engineers, and Parliamentary sanction for the scheme was obtained in 1819. Immediately this sanction was obtained Telford set to work. The preliminary operations were quickly carried out and early in 1820 building operations commenced. The three arches on the Carnarvonshire side and the four on the Anglesey side were undertaken first, and these were completed late in the autumn of 1824. The piers were 65 ft. in height from high water line to the springing of the arches, and the span of each was 52 ft.

While this work was in progress the two main piers, each 153 ft. in height, from which the main bridge chains were to be suspended, were also proceeded with. They were built with the utmost care in view of the enormous weight they would have to carry. Over these piers were built the smaller arches to carry the roadway and upon these arches masonry was carried upward in tapering form to a height of 53 ft. above the level of the road.

The next step was to secure the land ends of the huge suspension chains, and this was accomplished in a very ingenious manner. The chains were taken underground down shafts about 20 yards in depth, then along a short connecting tunnel and up to the surface again through similar shafts. Thus, so long as the iron held, the chains could only come loose by tearing away a mass of solid rock 20 yards in depth. From their land anchorages the chains were led up to and over the top of the main supporting piers.

The chains were not actually attached to the supporting piers, but were carried over them on saddles or carriages of cast iron mounted on rollers so as to be free to move longitudinally upon the tops of the towers. The object of this arrangement was to allow for expansion or contraction with changes in temperature. Such changes affect bridges very considerably. An interesting example of this occurred during the construction of the suspension bridge over the gorge at Niagara Falls. In this case temperature changes had been allowed for by means of sliding mechanism, but in some way this mechanism became clogged with cement. The result was that the force of expansion due to a rise in temperature caused the massive supporting towers to be pushed out of position, and it was necessary to build entirely new towers.

Hoisting the Chains into Position

By the beginning of 1825 the suspension piers, land piers and arches and the land ends of the chains were all in position, and it now remained to suspend the main chains. Telford decided to carry this out by building the central portion of each chain on a raft 450 ft. in length and 6 ft. in width. This raft was to be floated into the proper position and then the chain lifted into place by means of capstans.

In April 1825 the raft bearing the first main chain was cast off from the Carnarvon side, towed by four boats into its position between the main piers and there moored. One end of the chain was then securely bolted to the end of the chain hanging from the Carnarvon pier, and the other end was attached by ropes passing by means of blocks over the top of the Anglesey pier and from there to powerful capstans fixed on the Anglesey side. These ropes were manned by about 150 men who, when the signal was given, hauled steadily until the great chain was seen to be safely swinging in the air and the supporting raft was floating away. The most anxious moment was now passed, and a tremendous cheer broke from the enormous crowd that lined the shores on both sides of the Straits.

The remainder of the work was carried out quickly. In an hour and thirty-five minutes from the time that the hoisting commenced, the chain was raised to its final position and securely fastened to the land portion that led to the Anglesey pier. Telford then ascended to the point of fastening and satisfied himself that a safe connection had been made, and the announcement of this fact was immediately followed by loud and prolonged cheering from the workmen, echoed in still greater volume by the spectators. Three of the workmen indeed were so excited that they scrambled from one side of the Straits to the other along the upper surface of the chain, which was only nine inches in width!

The Bridge Completed

The construction of this bridge was a tremendous mental strain upon Telford. Many engineers had predicted its failure, and in spite of the minute care with which Telford supervised every detail of the work there was always the possibility of a flaw in the iron or the overlooking of some little detail that might cause disaster. For some time before the bridge was finally opened Telford's anxiety was so great that he could scarcely sleep, and when the result of the first day's experiment proved beyond doubt the strength and solidity of the bridge, Telford's friends who rushed to congratulate him found him on his knees engaged in prayer.

The remaining fifteen chains were suspended without any particular difficulty, and the final bolt of the last chain was fastened on the 9th July, 1825. On this occasion there was again an immense crowd along the shores of the Straits. A band, accommodated on a scaffolding built over the centre of the curved part of the chain, played the National Anthem amidst a storm of cheering, the workmen marched in procession along the bridge over a temporary platform, and a steamer passed beneath the chains and back again, thus re-opening the navigation of the Straits. The road platform, side railings and approach roads were rapidly completed and the bridge was formally opened for public traffic on the 30th January, 1826, when for the first time the London and Holyhead mail coach passed over it.

The total weight of iron used in the Menai bridge was 2,187 tons, in 33,265 pieces. The total length of the bridge was 1,710 ft., or nearly a third of a mile,

(*Continued on page* 30)

Our Dragline Competition

Results and Awards

THIS competition, which was announced in our August issue, followed a series of articles describing the heaviest Dragline in the world that appeared in our March and April issues. Messrs. Ruston & Hornsby Ltd., the makers of this great Dragline, offered a prize for the best Meccano model of their machine, the prize being a cheque for £5. To this prize we added two others—to be awarded to the second and third in order of merit—of Meccano products to the value of £3/3/- and £2/2/- respectively, to be chosen by the winners from the current Meccano catalogue.

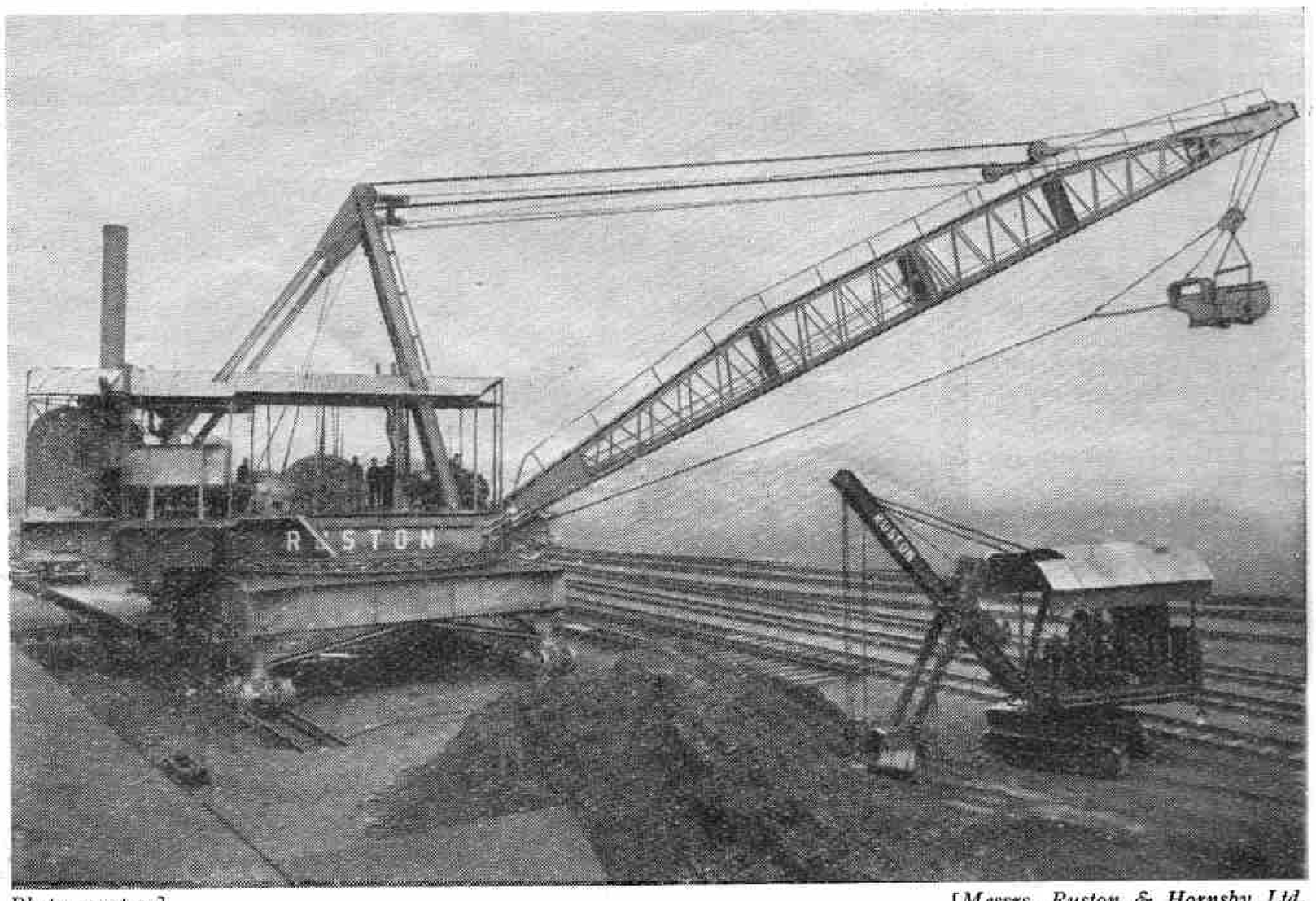


Photo courtesy] [*Messrs. Ruston & Hornsby Ltd.*

The Largest Dragline in the World :

This was the original in this Model-Building Competition

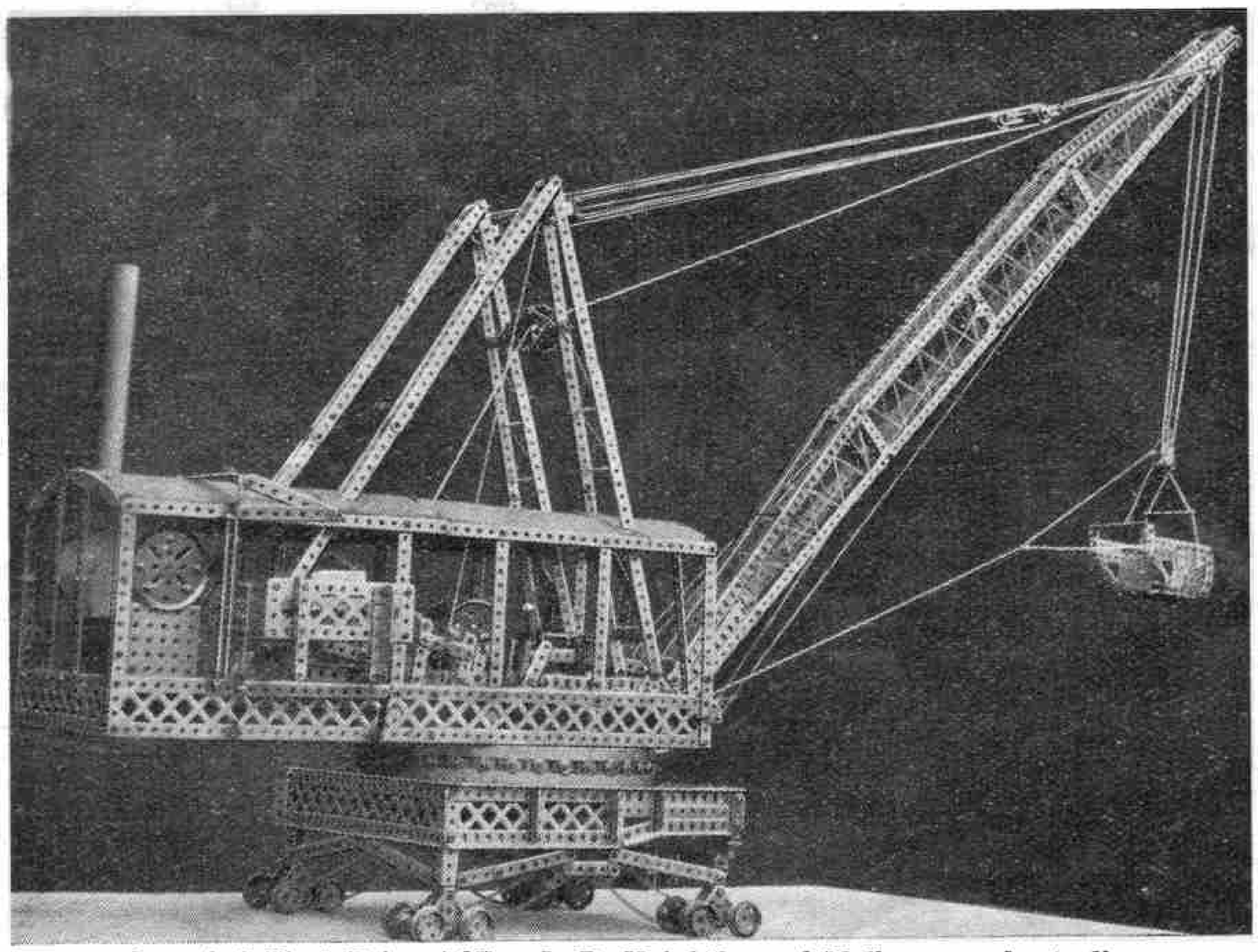
Judging Competitions

The competition aroused considerable interest and there was a very large number of entries from all parts of the world. The majority were very excellent models, showing that the competitors had closely studied our article and the accompanying photographs. They showed also that the competitors thoroughly understood the constructive details of Draglines, and that they had grasped the principles on which they worked and the purposes for which they were used.

Although highly satisfactory from all points of view, the excellence of the models caused the judging of the entries to take longer than we anticipated, and we have not been able to announce the results of this contest until now.

The work entailed in judging a contest of this nature is very considerable, for every entry must be carefully examined and the photographs or sketches closely investigated. When there are any points not clear, it is sometimes necessary for us to build up models ourselves to the competitor's specifications.

In judging Meccano models the two points that are given the greatest consideration are true engineering practice and closeness of design to the original. In this Dragline contest, for instance, one competitor lost points by showing a flight of steps leading from the ground to the rotating portion of the Dragline. This feature was not shown in the original structure nor was it a practicable addition, for it would result in the steps being completely sheered away the first time the Dragline was rotated on its base! Small points such as this are often overlooked by competitors, when, perhaps, at the last minute little details are added to improve the appearance of the model in the eyes of the competitor, or perhaps to use up a few odd parts.



Awarded First Prize (£5) : J. D. Keightley, of Melbourne, Australia

The Prize Winners

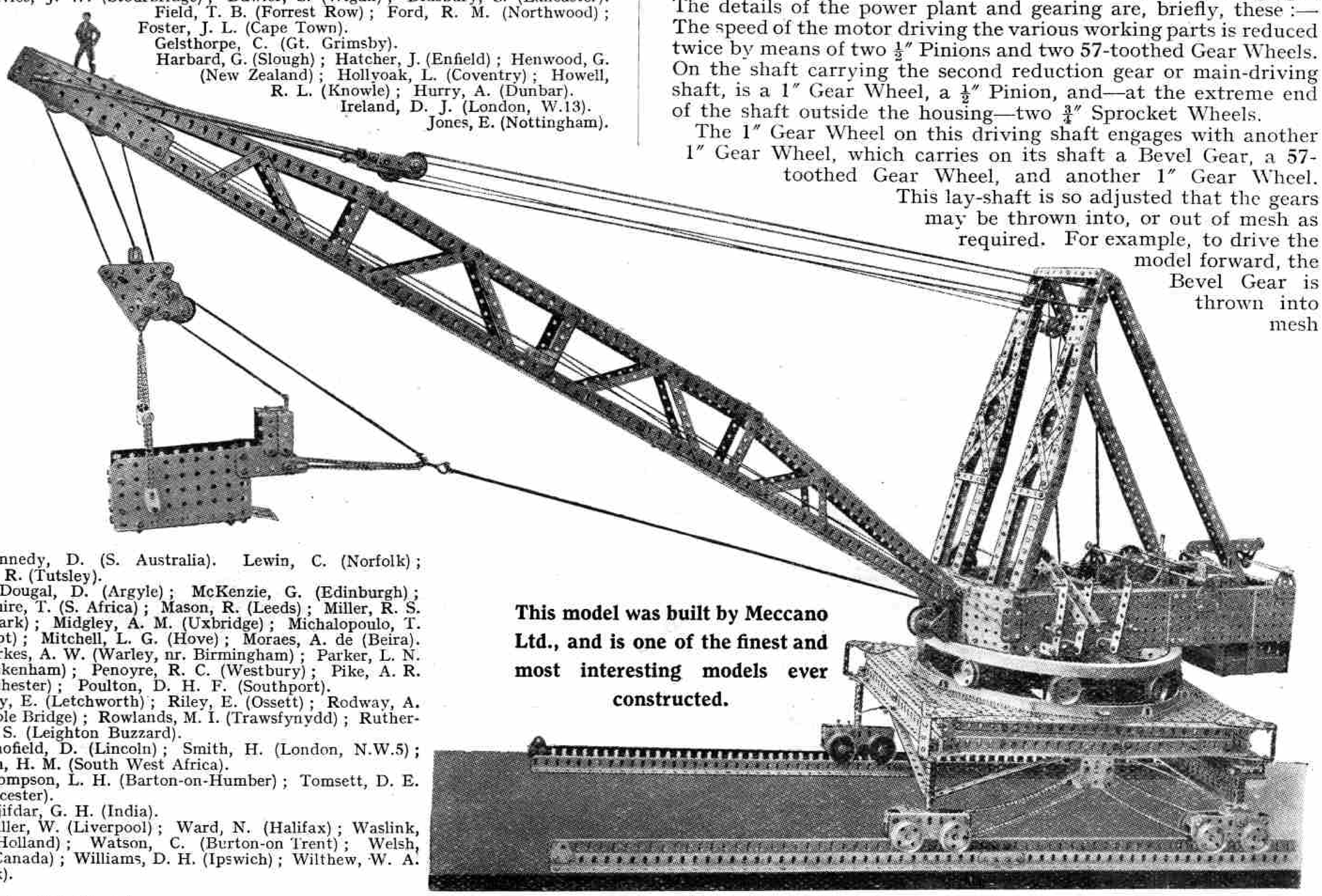
We have pleasure in announcing that the First Prize of £5 has been awarded to J. H. Keightley, of Melbourne. The Second Prize, Meccano products to the value of three guineas, has been awarded to D. R. Heeramaneck, of Bombay, and the Third Prize, Meccano products to the value of two guineas, to M. Cavallini, of Rome.

Specially Commended

The following competitors have been highly commended by the judges and special certificates of merit have already been despatched to them.

Ainsworth, S. (Blackburn); Alexander, G. (Liverpool); Allnutt, P. L. (Australia); Auchinachie, A. G. (Kilwinning);

Basanelli, E. (Italy); Baxendale, D. (Colwyn Bay); Begema, S. (Dutch East Indies); Bentley, A. (Bury); Blunt, P. (Woodville); Buchholtzer, C. (Roumania); Busoui, E. (Fireuze).
Chamber, W. (York); Chowdhury, A. N. R. (India); Coombes, M. (Ilminster); Cordwell, S. (Smethwick); Cowburn, W. K. (Balcombe).
Davies, J. W. (Stourbridge); Dawler, S. (Wigan); Didsbury, S. (Lancaster). Field, T. B. (Forrest Row); Ford, R. M. (Northwood); Foster, J. L. (Cape Town).
Gelsthorpe, C. (Gt. Grimsby).
Harbard, G. (Slough); Hatcher, J. (Enfield); Henwood, G. (New Zealand); Hollyoak, L. (Coventry); Howell, R. L. (Knowle); Hurry, A. (Dunbar).
Ireland, D. J. (London, W.13).
Jones, E. (Nottingham).



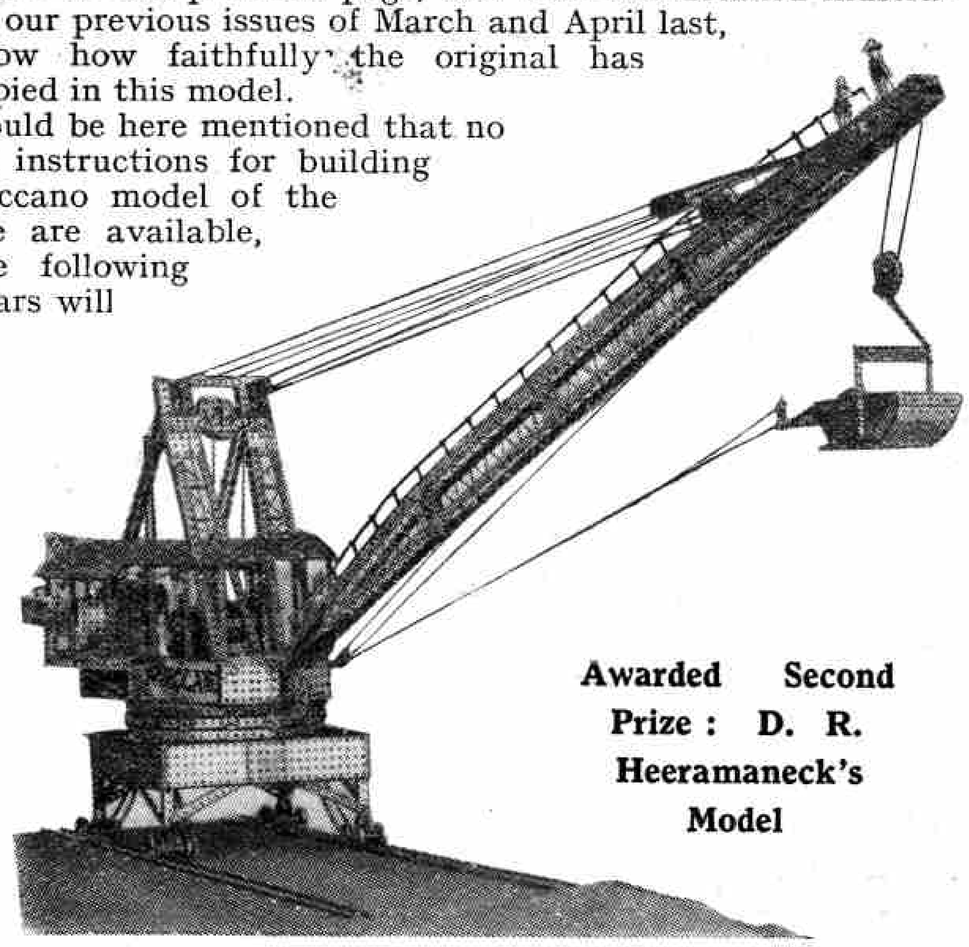
This model was built by Meccano Ltd., and is one of the finest and most interesting models ever constructed.

Kennedy, D. (S. Australia). Lewin, C. (Norfolk); Lyle, R. (Tutsley).
McDougal, D. (Argyle); McKenzie, G. (Edinburgh); McQuire, T. (S. Africa); Mason, R. (Leeds); Miller, R. S. (Newark); Midgley, A. M. (Uxbridge); Michalopoulo, T. (Egypt); Mitchell, L. G. (Hove); Moraes, A. de (Beira).
Parkes, A. W. (Warley, nr. Birmingham); Parker, L. N. (Twickenham); Penoyre, R. C. (Westbury); Pike, A. R. (Dorchester); Poulton, D. H. F. (Southport).
Ray, E. (Letchworth); Riley, E. (Ossett); Rodway, A. (Marple Bridge); Rowlands, M. I. (Trawsfynydd); Rutherford, S. (Leighton Buzzard).
Schofield, D. (Lincoln); Smith, H. (London, N.W.5); Smith, H. M. (South West Africa).
Thompson, L. H. (Barton-on-Humber); Tomsett, D. E. (Gloucester).
Vajifdar, G. H. (India).
Waller, W. (Liverpool); Ward, N. (Halifax); Waslink, G. (Holland); Watson, C. (Burton-on Trent); Welsh, W. (Canada); Williams, D. H. (Ipswich); Wilthew, W. A. (York).

A Splendid Model

The Dragline is such a splendid subject for a model that our Model-building department themselves constructed a model of it, and of this model we are able to publish a photograph. This special model—which, of course, was not eligible to compete for the prize—measures about 3 ft. in length and is complete in almost every essential detail, even down to the raising jacks for levelling the table on which the roller bearings support the jib and power house. A comparison of the model on this page with the illustration on the previous page, and with the detailed illustrations in our previous issues of March and April last, will show how faithfully the original has been copied in this model.

It should be here mentioned that no detailed instructions for building this Meccano model of the Dragline are available, but the following particulars will enable those who wish to do so to follow its construction.



Awarded Second Prize: D. R. Heeramaneck's Model

The Meccano Dragline

The general construction will be clear from the photograph. The details of the power plant and gearing are, briefly, these:—The speed of the motor driving the various working parts is reduced twice by means of two ½″ Pinions and two 57-toothed Gear Wheels. On the shaft carrying the second reduction gear or main-driving shaft, is a 1″ Gear Wheel, a ½″ Pinion, and—at the extreme end of the shaft outside the housing—two ¾″ Sprocket Wheels.

The 1″ Gear Wheel on this driving shaft engages with another 1″ Gear Wheel, which carries on its shaft a Bevel Gear, a 57-toothed Gear Wheel, and another 1″ Gear Wheel. This lay-shaft is so adjusted that the gears may be thrown into, or out of mesh as required. For example, to drive the model forward, the Bevel Gear is thrown into mesh with another Bevel Gear. At the same time the 57-toothed Gear Wheel slips into mesh with the ½″ Pinion on the main driving shaft. This is a third reduction of the motor, so that the model will not travel too fast along the rails.

The Bevel Gear, on meshing with the second Bevel Gear, turns a vertical Rod, on the bottom end of which is a ¾″ Sprocket Wheel, connected to a 3″ Sprocket Wheel which is fastened to a Rod running down through the centre of the model, on the end of which is a Bevel Gear in permanent mesh with another, on a Rod, at each end of which is a ½″ Pinion. This Pinion again is in mesh with two others on short Rods on each of which is a ¾″ Sprocket Wheel. These wheels are then connected by Sprocket Chain to the track wheels.

Operating the Mechanism

To rotate the drag arm and the housing throw across the lay shaft, which disengages the Bevel Wheels and the 57-toothed Gear Wheel with the ½″ Pinion, and throws into mesh the 1″ Gear Wheel with the 1″ Gear Wheel on the main-driving shaft. At the same time the 1″ Gear Wheel on the end of the lay shaft meshes with another 1″ Gear Wheel on a short Rod. This Rod also carries a ½″ Pinion, permanently in mesh with a 57-toothed Gear Wheel. On the same Rod is a Worm Wheel actuating a 57-toothed Gear Wheel on a vertical Rod, at the bottom of which is a 2″ Sprocket Wheel in contact all the time with Sprocket Chain, itself so arranged around the circular track that it cannot move. The result is that as the Sprocket Wheel rotates, the drag-arm and housing are compelled to revolve. As the main-driving shaft is revolving all the time, so too are the two ¾″ Sprocket Wheels, on the end and outside the housing.

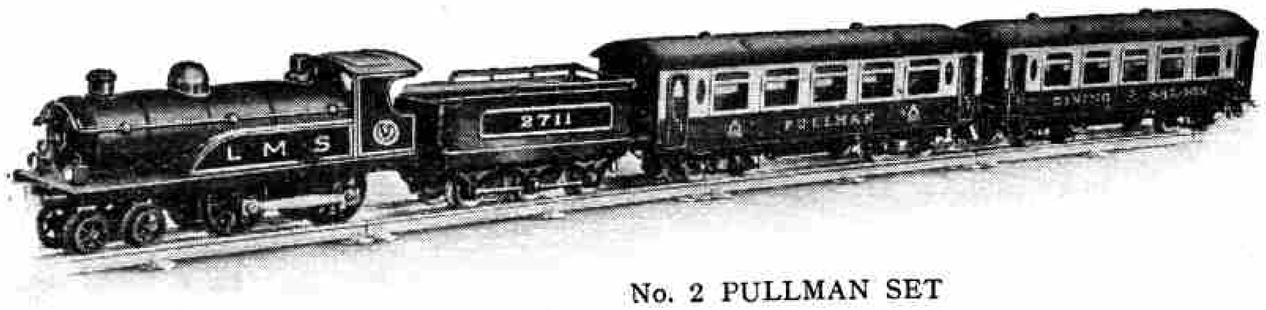
On the shaft of each of these is a ½″ Pinion meshing with a 57-toothed Gear Wheel, each of which has another ½″ Pinion on its shaft. These two Pinions work the three drums or Rollers that carry the cord for raising the drag-arm, for raising and lowering the drag, and for dragging the drag. Each of these Rollers is fitted with a 57-toothed Gear Wheel that may be thrown into mesh with the constantly-revolving Pinions by means of the levers at the side. To reverse the movement, reverse the motor.

HORNBY CLOCK WORK TRAINS

THE TRAINS WITH THE GUARANTEE

YOU can have any amount of fun playing with a Hornby Train. Shunting, coupling-up the rolling stock and making up trains will give you hours of pleasure. Hornby Trains are beautifully finished, strongly made, and will last for ever. One of their most valuable features is that all the parts are standardised, and any lost or damaged part may be replaced with a new one.

Every train is guaranteed, and you are therefore sure of satisfaction if you buy a Hornby.



No. 2 PULLMAN SET

No. 2 Pullman Set

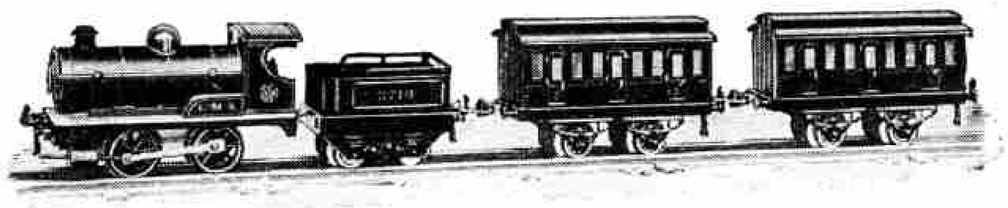
The No. 2 Loco with Tender measures 17 in. in length. The Loco is fitted with superior mechanism and the accurately-cut gears ensure smooth running. Loco, Tender and Coaches are superb in appearance and finish, enamelled in colours and stoved at a high temperature to ensure durability. The Loco is fitted with reversing gear, brake and governor.

Gauge 0 in colours to represent the L.M.S. or L.N.E.R. Companies' rolling-stock. Each set contains Loco, Tender and two Coaches, with set of rails to form a circle of 4 ft. diameter. Price 60/-.

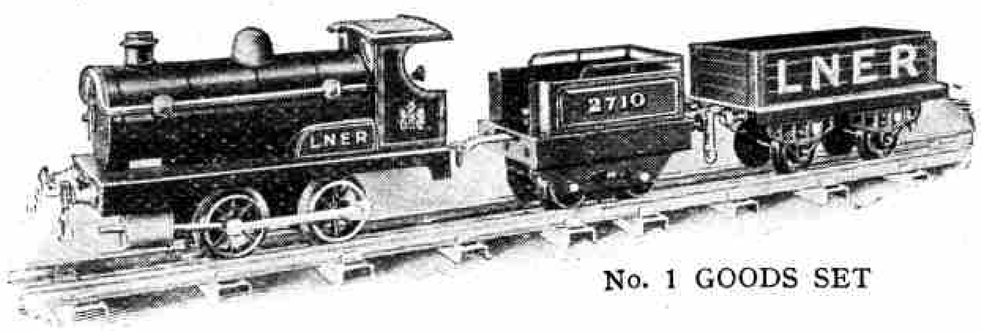
No. 1 Passenger Set

The Loco is fitted with reversing gear, brake and governor. Loco, Tender and Coaches are superb in appearance and finish, enamelled in colour and stoved at a high temperature to ensure durability. The doors of the Coaches open.

Gauge 0 in colours to represent the L.M.S. or L.N.E.R. Companies' rolling-stock. Each set contains Loco, Tender, two passenger coaches and set of rails consisting of two straights and curves to form a circle of 2 ft. diameter. Price 30/-



No. 1 PASSENGER SET



No. 1 GOODS SET

No. 1 Goods Set

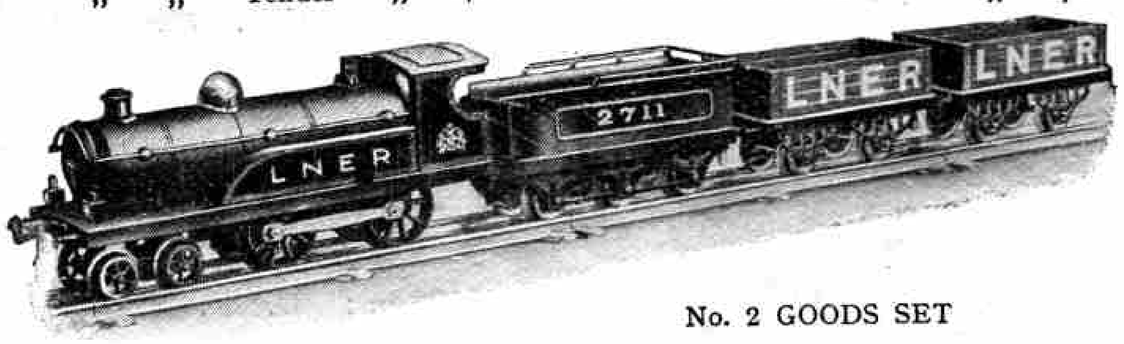
Gauge 0 in colours to represent the L.M.S. or L.N.E.R. Companies' rolling-stock. Each Loco is fitted with reversing gear, brake and governor. Each set comprises Loco, Tender, one Wagon, and set of rails as in the No. 1 Passenger Set. Price 22/6

No. 1 Hornby Loco	Price 15/-	Hornby Passenger Coach	Price 5/-
" " Tender	" 2/6	No. 1 Hornby Wagon	" 2/6

No. 2 Goods Set

Gauge 0 in colours to represent the L.M.S. or L.N.E.R. Companies' rolling stock. This set contains Loco, Tender and Rails as in the No. 2 Pullman Set, and two Wagons. Loco fitted with reversing gear, brake and governor. Price 37/6

No. 2 Hornby Loco ...	Price 22/6	Hornby Pullman or Dining Car ...	Price 15/-
" " Tender	" 3/6	No. 2 Hornby Wagon	" 2/6



No. 2 GOODS SET

Ask to see Sample Sets at your Toy Store

MECCANO LTD., BINNS ROAD, LIVERPOOL

IV. SIGNALLING AND TRAIN CONTROL

LAST month we showed how the signalling of railways developed from crude beginnings to the perfect system of to-day, and we explained the use of the principal signals, "home," "distant," "starting" and "advanced starting." To complete our account we must add that sometimes signal boxes are not far enough apart to allow the "distant" signal to be placed at the standard distance from the "home" signal, and where that is the case the "distant" is placed on the same post as the "advanced-starting," "starting," or "home" signal of the previous box, its position always being below the other signal.

Protecting Junctions

Junctions are usually protected by two "distant" and two "home" signals. The two signal arms are arranged on a "bracket" as shown on page 21, the left-hand and right-hand arms applying respectively to trains proceeding to the left or to the right at the junction. One of the arms is generally placed higher than the other, the higher arm applying to the more important line.

In addition to the signals already described, there are many others employed for special purposes, such as shunting, backing, etc.

The approaches to and the exits from important stations present a bewildering array of lines, points and crossings, and at such places sets of signals are often carried over the rails on a sort of bridge called a "gantry."

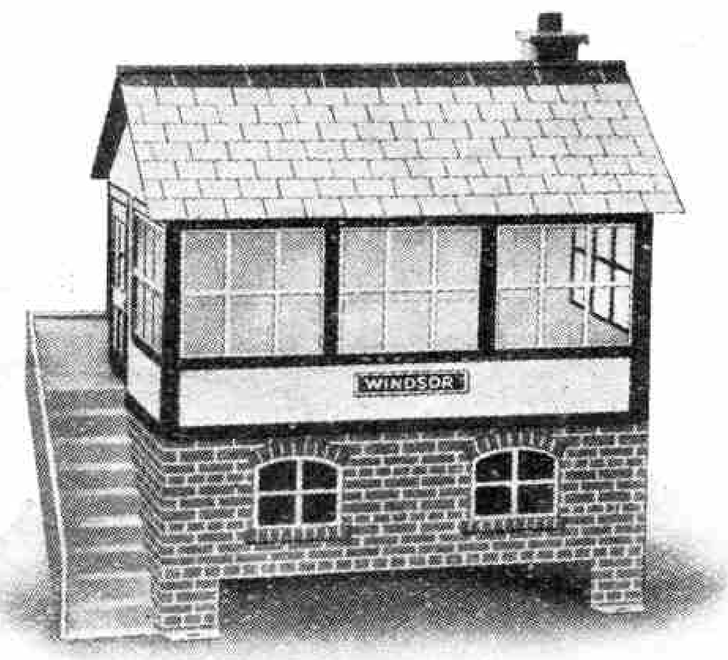
Signalling Miniature Railways

The signalling of miniature railways as far as it is carried out should follow the principles on which real railways are signalled. Generally speaking, however, the fewer the signals used the better, unless the layout is on a very elaborate scale. A large number of signals scattered about a miniature system may look pretty, but if they are not serving some railway-like function they are worse than useless.

A great deal depends upon the size of the layout. If it is very small it may be advisable to dispense altogether with "distant" signals, using only "home" and "starting" signals. In a layout of fairly large size, however, the employment of "distant" signals adds considerably to the interest and realism of the railway.

The diagram in last month's issue showed the signalling arrangements for a simple station, where there is a double track and either a cross-over as illustrated or a siding branching off beyond the "home" signal. If there is no cross-over or siding, or if a single track is being used, only "distant," "home," and "starting" signals are necessary. The arrangements in this diagram may be followed successfully in a Hornby layout using the Windsor station.

The best fun is obtained by working the signals along with brake rails. The trip-pieces on these rails may be set either to stop the train or allow it to pass, according to whether the signals are at "all right" or "danger." With a little ingenuity the signalling of trains into and out of a station may be made quite a realistic operation, adding very greatly to the interest of the layout.



Windsor Signal Cabin (Hornby Series)

Providing Real Fun

Most boys do not get half the fun out of their Hornby railways, a fact that is due very largely to working without any definite plan. Running trains aimlessly round and round the track, and starting and stopping them at random without any particular object in view, soon becomes monotonous. The best method is to decide beforehand exactly what is to be done. For instance, if two locos are available, so that two trains can be run, the first train may be made a passenger express stopping only at the Windsor station or perhaps at one wayside halt, while the other train may be a goods train calling at various points and being shunted into sidings in order to allow the express to go through. Such a scheme at once introduces a purpose into the layout and therefore provides real interest. If a third loco is available the interest may be further increased by putting on a slow passenger train, and so on.

If two or three locos and a fair number of carriages and wagons are available, it is a good idea to draw up a simple time-table and run a regular service of trains in accordance with it. The main thing in every case is to work to a plan, however simple this may be. Once the owner of a Hornby railway has experienced the fascination of running a service of trains he will not rest until he has brought his layout to the highest possible pitch of perfection and made it in a real sense a miniature railway.

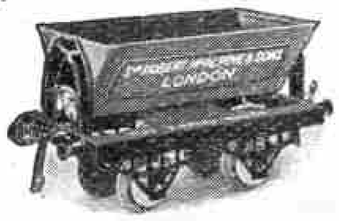
(*Continued on page* 21)

New Rolling Stock and Accessories

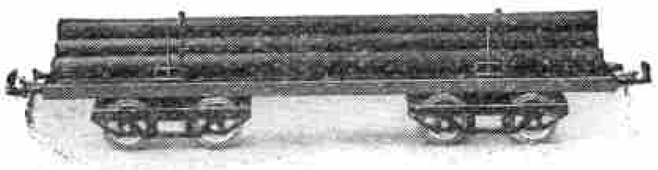
(HORNBY SERIES)

There are now 50 different train accessories—Stations, Signal-boxes, Lamps, Wagons, Level-Crossings, Foot-Bridges, Turntables, etc. Further accessories will be added to the system from time to time, and will be announced in the pages of the "*M.M.*"

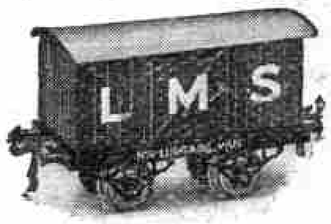
All Hornby Rolling Stock and Accessories are built in correct proportion to the size, gauge, method of coupling, etc., of the Hornby Trains and all have the uniformly beautiful finish that is the great feature of the Hornby series. With these accessories you can build up a most realistic railway system, and the splendid range of rails, points, and crossings make possible endless variety in rail layout. Hornby Trains are British made, and your dealer will be able to show you specimens of the new products.



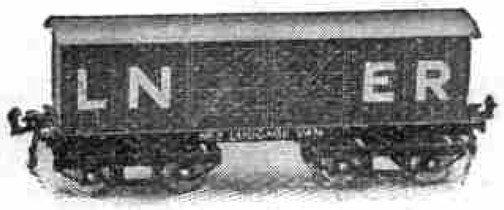
SIDE TIPPING WAGON
Excellent design and finish.
Price **3/6**



No. 2 LUMBER WAGON
Fitted with bolsters and stanchions for log transport. Suitable for 2 ft. radius rails only. Price **5/-**

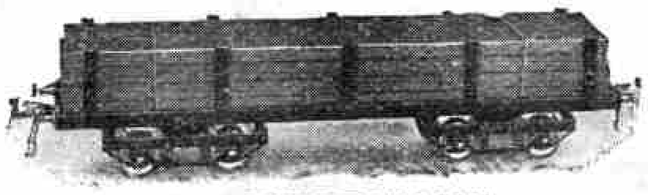


No. 1 LUGGAGE VAN
Representative colours.
Price **4/-**

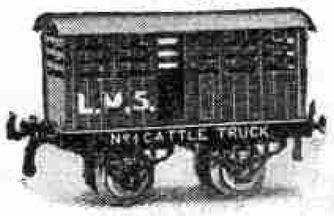


No. 2 LUGGAGE VAN
Finished in colour. Fitted with double doors. Suitable for 2 ft. radius rails only. Price **6/6**

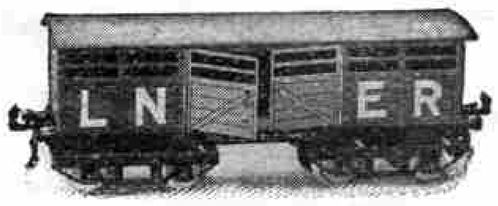
SECCOTINE VAN
Price **4/-**



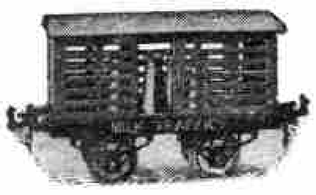
No. 2 TIMBER WAGON
Beautifully enamelled in colour and stoved. Suitable for 2 ft. radius rails only. Price **4/6**



No. 1 CATTLE TRUCK
Fitted with sliding door.
Very realistic design.
Price **4/-**

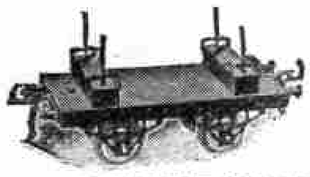


No. 2 CATTLE TRUCK
Splendid model fitted with double doors. Suitable for 2 ft. radius rails only. Price **6/6**

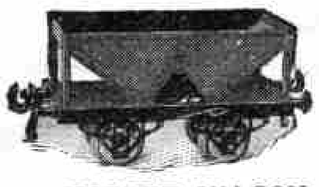


MILK TRAFFIC VAN
Fitted with sliding door, complete with milk cans. Price **4/6**

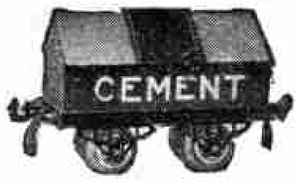
ROTARY TIPPING WAGON
Finished in colour.
Price **4/-**



No. 1 LUMBER WAGON
Fitted with bolsters and stanchions for log transport. Price **2/-**



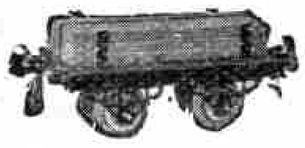
HOPPER WAGON
Mechanically unloaded.
Finished in colour. Price **4/-**



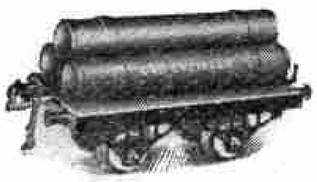
CEMENT WAGON
Finished in colour.
Price **4/-**

GUNPOWDER VAN
Finished in red.
Price **4/-**

BISCUIT VAN
Price **4/-**

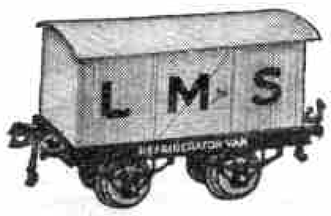


No. 1 TIMBER WAGON
Beautifully enamelled in colour and stoved. Price **2/-**

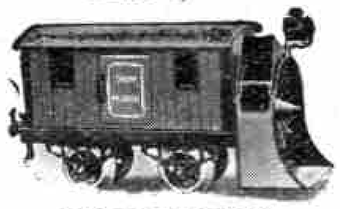


GAS CYLINDER WAGON
Finished in red, lettered gold.
Price **3/-**

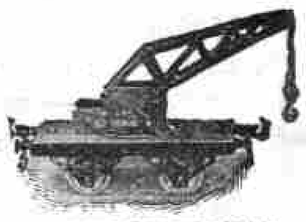
PETROL TANK WAGON
Finished in colour.
Price **3/-**



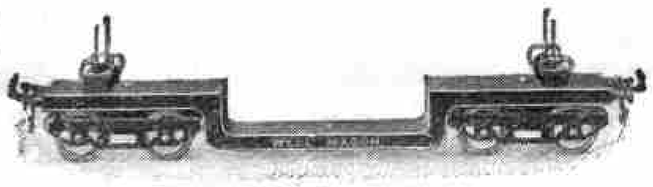
REFRIGERATOR VAN
Enamelled in white, lettered black. Price **4/-**



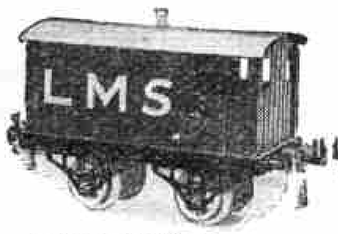
SNOW PLOUGH
Finished in grey, with revolving cutter driven from front axle.
Price **5/6**



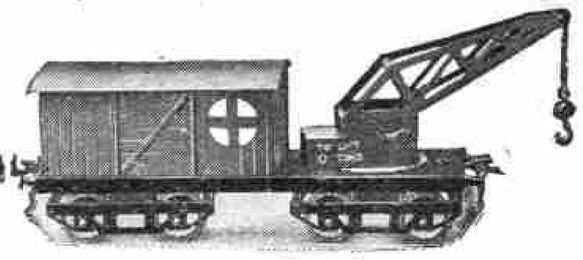
CRANE TRUCK
Working model.
Finished in colours.
Price **4/6**



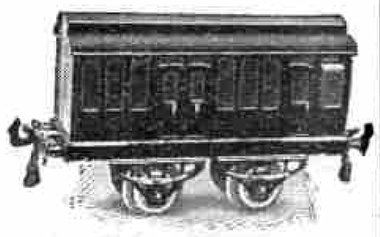
TROLLEY WAGON. Finished in colour. Suitable for 2 ft. radius rails only. Price **6/-**



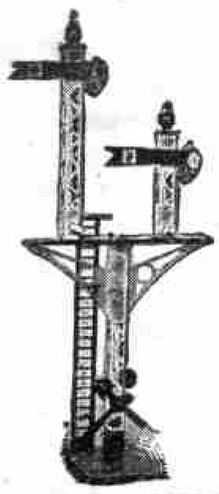
BRAKE VAN
Finished in colour.
Price **4/-**



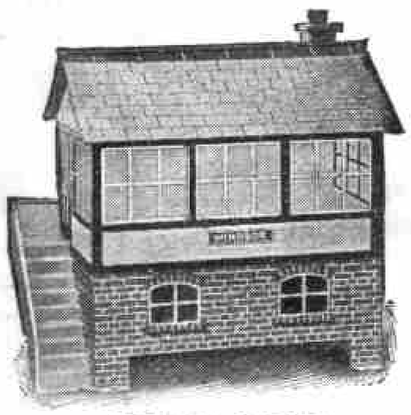
BREAKDOWN VAN AND CRANE
Excellent finish. Beautifully coloured. Suitable for 2 ft. radius rails only. Price **7/-**



GUARD'S VAN
Price **5/-**

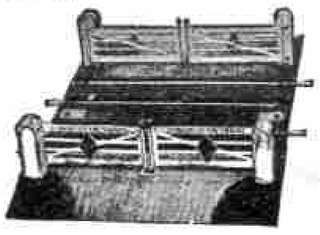


JUNCTION SIGNAL
Signal arms operated by levers at base. Very realistic model standing 14 in. in height. Price **5/6**

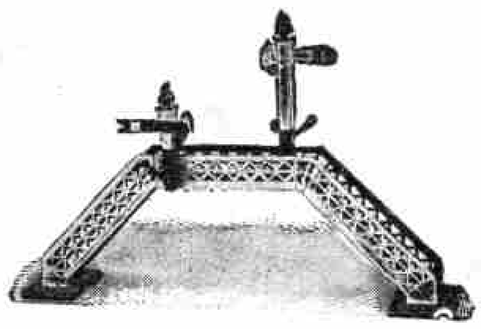


SIGNAL CABIN
Dimensions: height 6½ in., width 3½ in., length 6½ in. Finished in colour and lettered "Windsor." Roof and back open to allow signal-levers to be fitted inside cabin if desired. Price **6/6**

SIGNAL
Price **2/6**

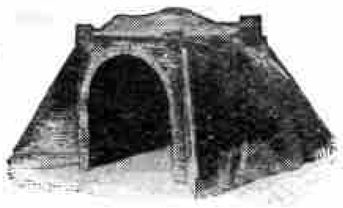


LEVEL CROSSING
Beautifully designed in colour. Measures 11½ in. × 7½ in., with Gauge 0 Rails in position.
Price **6/6**

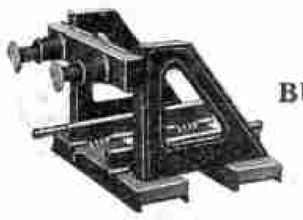


FOOT-BRIDGE
No. 1. With detachable signals. Price **6/-**
No. 2. Without signals. Price **3/6**
Signals, per pair **2/9**

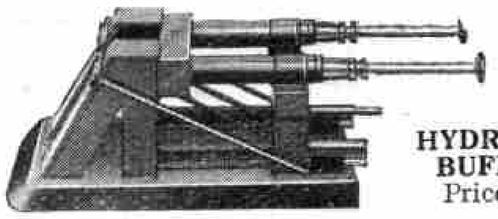
WATER TANK
Brightly coloured in red, yellow and black. 8½ in. in height, with flexible tube and pump lever.
Price **6/6**



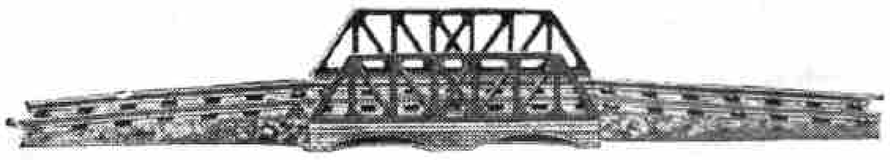
TUNNEL
Price **7/6**



SPRING BUFFER STOP
Price **1/6**



HYDRAULIC BUFFERS
Price **5/-**



VIADUCT, complete with approaches. Price **7/6**

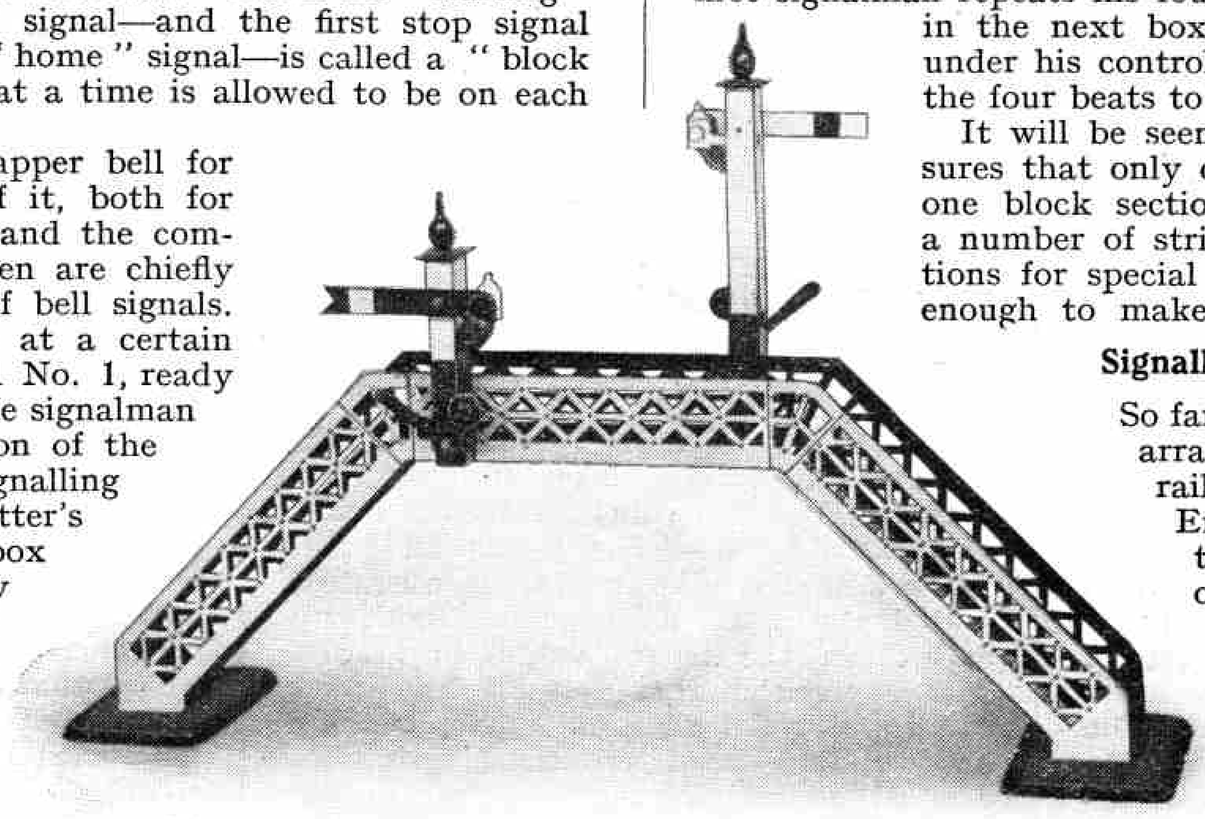
ASK YOUR DEALER TO SHOW YOU SAMPLES

Signalling and Train Control—(*continued from page* 19)

Returning now for a little while to real railways, we must see how trains are actually controlled on their journeys. Every signal box is electrically connected with the box on each side of it, and is provided with telegraph and bell instruments. Trains are worked on what is called the "block system," The length of line between the last stop signal of one box—that is the "starting" or the "advanced starting" signal—and the first stop signal of the next box—that is the "home" signal—is called a "block section," and only one train at a time is allowed to be on each section.

Every signal box has a tapper bell for each section on each side of it, both for "up" and "down" lines," and the communications between signalmen are chiefly made by means of a code of bell signals.

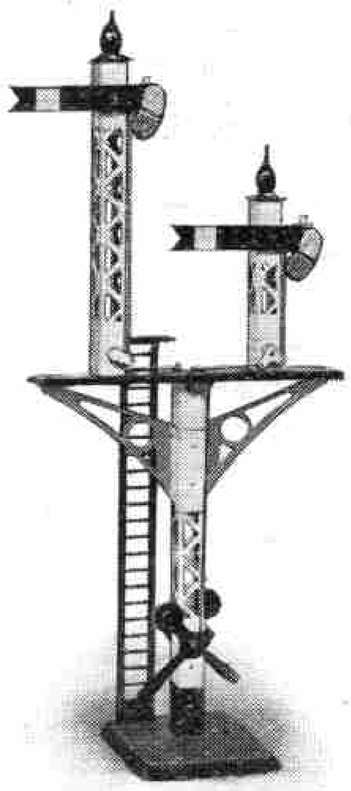
Let us suppose a train is at a certain signal box, which we will call No. 1, ready to commence its journey. The signalman in this box calls the attention of the signalman in No. 2 box by signalling one beat on the bell in the latter's box, and the man in No. 2 box acknowledges this signal by repeating it so that one beat sounds on the bell in No. 1 box. Signalman No. 1 then gives four consecutive beats on the bell in No. 2 box, which in the railway code means "Is line clear for an express passenger train?" The signalman in No. 2 box, after making certain that the line is clear for a quarter of a mile inside his "home" signal, that is, as far as his "clearing point," repeats the four beats, thus indicating "line clear" to the man in No. 1 box.



Footbridge No. 1 with Signals (Hornby Series)

At the same time signalman No. 2 brings into use his key-disc instrument. This is a box-shaped apparatus having three positions —"line clear," "line blocked," that is the normal position, and "train on line." In this case signalman No. 2 pegs his instrument to show "line clear" and so causes the "line clear" indication to appear on a similar but keyless instrument in box No. 1. This gives signalman No. 1 permission to send forward the train and he lowers his "starting" signal, and his "advanced starting" signal if there is one, and the train moves forward into the next section. Immediately after lowering his signals the man in No. 1 box gives two beats on the bell signifying "Train entering section," which signalman No. 2 acknowledges by repeating it and at the same time altering his key-disc instrument, and consequently the keyless instrument in box No. 1, to "Train on line." As soon as the train has passed the No. 1 box the No. 1 signals are restored to the normal "danger" position.

The signalman in box No. 2 does not wait for the train to arrive, but immediately calls the attention of the signalman in box No. 3 by giving one beat on the bell, and the process just described is repeated. In this way the train is passed along to box No. 3, and so on from one box to another throughout its journey, each step in its progress being prepared in advance.



Junction Signal (Hornby Series)

The Use of Tail Lamps

When the train has passed the "clearing point" at box No. 2 the signalman in that box gives to box No. 1 the "Train out of section" signal—two beats, followed by a pause and then one beat—and at the same time unpegs his instrument so that both it and the instrument in box No. 1 return to the normal position.

Before a signalman gives the "Train out of section" signal he must be certain that the whole of the train has passed and that no part of it has become detached during its journey from the previous signal box. For this purpose every train always carries a lamp at the rear. This lamp, which is called a "tail" lamp, is painted red and at night shows a red light. When a signalman sees this lamp at the rear of the train he knows that the train is complete, but if he does not see the lamp he assumes that some portion of the rear of the train has broken away and is left somewhere in the section. He then takes immediate steps to prevent any other train entering this section and at the same time he signals to the box ahead "Train passed without tail lamp," and accordingly the train is stopped at the next box and held up until the matter is investigated.

If a signalman in any particular box gives four beats on the bell, enquiring if the line is clear, and the line happens not to be clear, the signalman in the next box makes no response. The first signalman repeats his four beats at intervals, but the man in the next box does not respond until the line under his control is clear, and then he gives back the four beats to indicate this as already described.

It will be seen that this method of control ensures that only one train at a time shall be in any one block section. In actual practice there are a number of strict rules and also certain modifications for special circumstances, but we have said enough to make clear the general procedure.

Signalling on Single Lines

So far we have spoken only of signalling arrangements for double lines of railway. Thousands of miles of English railways have only a single track, that is, there is only one pair of rails for both up and down trains. For such lines there are several systems of signalling in operation, the ultimate object of them all being to ensure that the driver shall have in his possession some visible evidence that the signalman has given him permission to take his train into a particular section of line.

The simplest method of single-line working is that known as the "train staff" system, and this is very suitable for a short length of line worked by one loco only. The staff is either a piece of wood about 14 inches in length and two or three inches in thickness, or a light hollow rod of steel of similar proportions. It is marked with the names of the stations at each end of the section. On a branch line of this kind there is obviously no possibility of collision, and the staff therefore serves merely as the driver's authority for commencing his journey.

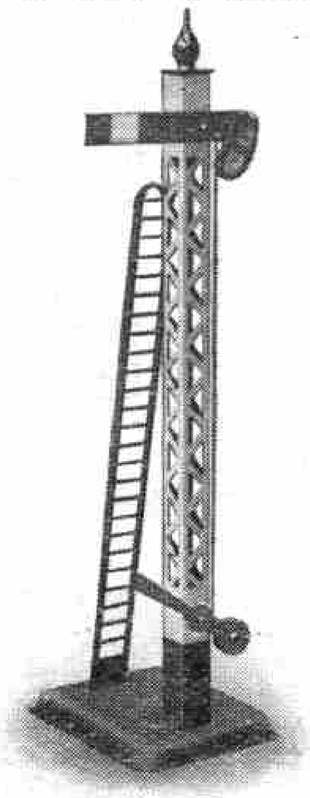
On single lines where two or more trains are operating, the line is divided into block sections in the same manner as double lines. A staff is provided for each section, and to avoid any confusion these staffs differ one from another in shape and colour. In the ordinary way the staff for a particular section is handed to the driver at one signal box, carried by him to the box at the other end of the section and handed over, and taken back to the first box by the driver of the next train in the opposite direction. Sometimes, however, there may be two successive trains in the same direction without an intermediate train in the opposite direction, and consequently the staff is not brought back to the box from which it was issued, ready for the second train.

"Train Staff and Ticket"

This difficulty is surmounted by the use of the "train staff ticket." Where one train has to follow another in the same direction the driver of the first train is *shown* the staff and *handed* a train staff ticket as his authority to proceed. Train staff tickets are made of the same shape and colour as the staff of the section to which they apply, and they are kept in a special box, the key of which is attached to the end of the staff, thus making it impossible to remove a ticket without having the staff.

In cases where a number of trains may have to be run in one direction without an intermediate train in the opposite direction, one or other of the various electric staff or tablet systems is used. In these systems an instrument containing the staffs or tablets is provided for each section of the line. These instruments are electrically connected and are fitted with mechanism which ensures that a staff can only be withdrawn by the combined action of the signalmen at both ends of the section, and also that only one staff for a particular section can be out at one time. We shall refer to these electric staff systems in a later article.

(*To be continued*)



Signal (Hornby Series)

World's Mightiest Electric Loco:

Weight: 283 Tons Horse-power: 4,200 Speed: 65 miles per hour

The use of Electricity is daily increasing in almost every walk of life, and railways are not behind in the movement. This article, specially written for the "*M.M.*," describes the latest developments in this direction in America. Huge electric locomotives are now used to haul the Olympian, famous trans-continental train, for 650 miles over four mountain ranges between Chicago, Spokane, Seattle, and Tacoma.

ROBERT LOUIS STEVENSON, writing of a journey on the railway, said: "Herein, I think, lies the chief attraction of railway travel. The speed is so easy, and the train disturbs so little the scenes through which it takes us, that our heart becomes full of the placidity and stillness of the country; and while the body is borne forward in the flying chain of carriages, the thoughts alight as the humour moves them at unfrequented stages; they make haste up the poplar alley that leads towards the town; they are left behind with the signalman as, shading his eyes with his hands, he watches the long train sweep away into the golden distance."

Stevenson was, of course, writing of steam railways. Had he had the experience of travelling for hundreds of miles on an electrified railway he would certainly have been even more enthusiastic. We can imagine our readers asking:—"Yes, but where is there an electrified railway hundreds of miles in length?" Not in Great Britain, certainly, but such a railway exists in the United States, known as the Chicago, Milwaukee and St. Paul Railway.

A Unique Railway

This railway crosses the American continent from Chicago to the Pacific coast, and 649 miles of its vast length are electrified, forming by far the longest stretch of electrified railway in the world. The first section of this project, moving from east to west, 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 winter weather is so severe as to make steam operation very difficult. The whole of this region, regarded from a scenic point of view, is one 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. The 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 result of this electrification proved so satisfactory that a second zone of electrification was sanctioned. This includes the extreme western end of the line between Othello and Tacoma, Washington, a distance of 209 miles, in which occur heavy grades crossing the Cascade Mountains. This section was opened for traffic in November 1919.

Electricity Beats Steam

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 company—"The Olympian" and "The Columbian"—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 on the two electrified zones have released for service elsewhere on the system no less than 162 steam locos, and they effect an annual saving of 265,000 tons of coal and 35,000,000 gallons of fuel oil.

As regards the comfort and pleasure of the passengers the improvement is most remarkable. Where previously an otherwise very pleasant 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 mountainous 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 one-and-a-half to three miles in length at elevations of as much as 6,000 ft. above the sea.

Waterfalls Drive the Trains

As all our readers know, the steam locomotive is a complete power plant in itself, but the electric locomotive must receive energy from some outside source. In the case of the Chicago, Milwaukee and St. Paul Railway this source 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, electrical 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 to a heavy copper cable that runs parallel to the track throughout the electrified zone. At frequent intervals this cable is connected to the trolley wire, consisting of two copper wires about ½ in. 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.

Giant Locomotives

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.

"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. In all these locomotives "pantographs," a sort of overhead sliding bow, are used for current collecting.

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

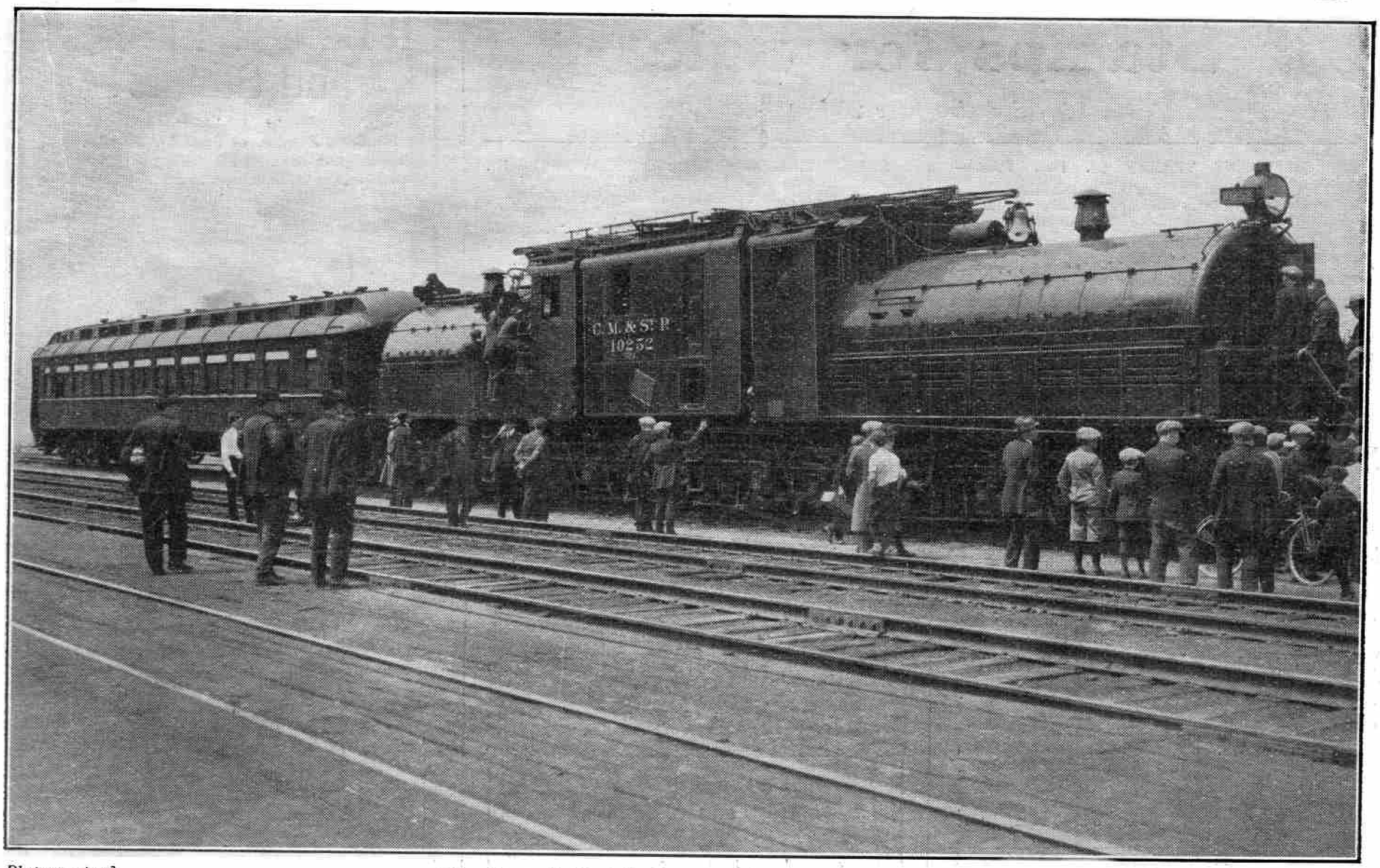


Photo courtesy] **The Largest Electric Locomotive in the World** [*General Electric Co. Inc.*

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.

Wonderful Braking System

A particularly interesting feature on this line 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.

Edison's Prophecy

Our illustration shows one of the wonderful locomotives on this railroad, built by the General Electric Company. The huge size of this engine may be realised by comparison with the throng of interested spectators.

While this locomotive was on exhibition at Newark, New Jersey, a few weeks ago, it was visited by Thomas A. Edison, the famous inventor. Edison, who seemed in the best of health and spirits, was accompanied by his son Charles and representatives of the railroad and of the General Electric Company. He made a close inspection of the locomotive, examining every working part and keeping up a running fire of technical questions. He was clearly delighted with the engine. Afterwards, as he was just stepping into his car, he was asked for a statement, and waving his hand towards the locomotive he said: "This is an indication of what can and will be done with 'white coal' or electricity. Every railroad must come to it eventually. Every motor vehicle, truck and pleasure-car will some day be propelled by electricity. Its powers and uses are still but little known."

How Far do You Cycle?

Nearly every cyclist sooner or later feels the desire to know exactly how far he has travelled, and in due course he fits a cyclometer to his machine. The foremost essential of a cyclometer is reliability, and the excellence of the Veeder Cyclometers in this respect has won for them such popularity that over four millions have been sold. For bicycles the Veeder is made in two forms, both of which register up to 9999.9 miles, when the next registration brings the dial back to zero ready to repeat. The more expensive model has a second dial that can be returned to zero at will, and therefore may be used to show the mileage covered on each ride. Veeder cyclometers are guaranteed for twelve months against imperfections in material or workmanship, and if accidentally broken they can be repaired provided the damage is not too extensive. (Lists from Messrs. Markt & Co. Ltd., 98, Clerkenwell Road, London, E.C.1).

For Model-Builders

At one time it was almost impossible to obtain the various small parts necessary for the complete equipment of a model-builder, but to-day requirements are catered for in a remarkable manner. The well-illustrated catalogue, price 6d., of the Electro Supplies Co. (19a, Broadway, Wimbledon, London, S.W.19) contains an astonishing variety of small parts for the builder of model boats and engines of all kinds. For those whose tastes run in the direction of electrical apparatus there are dynamos, motors, transformers, voltmeters, and ammeters. A useful feature of the catalogue is a number of tables giving the maximum current permissible for various copper cables, the decimal equivalents of wire and letter gauge drills, and details of B.A. and Whitworth threads.

Springs of All Kinds

Many of our readers no doubt find themselves requiring springs at some time or another, and it is useful to know of a firm like Messrs. Clarkes (Station Approach, Redditch) who supply springs for almost every conceivable purpose. This firm also make spring paper clips, spring washers, and in fact spring articles of every description.

"The Quickness of the Hand . . . . !"

Most boys like to be able to perform one or two conjuring tricks to amuse and mystify their friends. Those in search of good tricks that can be performed without elaborate and expensive apparatus will do well to get the 6d. catalogue of "The Magical Mart" (Alston Buildings, 17, Spiceal Street, Bull Ring, Birmingham). This catalogue describes a large number of highly effective tricks varying in price from a few pence to shillings. For those who want greater variety there are cabinets of high-class tricks at very reasonable prices.

Stamps for Sale

(*See also page* 26)

100 DIFFERENT STAMPS 6d. Post Free.—Dickinson, 733, High Road, Leyton.

BRITISH COLONIALS ON APPROVAL, one third Gibbons, good copies.—Barlow, 18, Wish Road, Hove.

200 ASSORTED UNUSED STAMPS, 7d.—G. P. Cranwell, 55, Cowslip Road, London, E.18.

FREE. 50 Stamps, 4d. in the shilling discount.—Stobbs, 175, Warminster Road, Norton, Sheffield.

1,000 MIXED STAMPS, all countries, 1/3 post free.—R. Radcliffe, 2, Montague Street, Clitheroe.

1,000 FOREIGN 1/-. Guaranteed unpicked.—S. Huckle, 53, Birkenhead Ave., Kingston-on-Thames.

NYASSA PACKET FREE with approvals, ½d. and 1d. each.—Bodman, 6, Alderman Road, Ipswich.

IRISH STAMPS. 120 well mixed, including rare Railtas and Saorstat overprints, Swords, Arms, Cross, Maps, 1/9.—Laws, Park Avenue, Old Trafford.

NEW YEAR OFFER. Mint British Colonials. Face value 2/-, for 1/7½.—J. Pickering, Holt, Norfolk.

FREE. Sheet 50 unused stamps to genuine applicants for approvals, good value, farthing upwards. Cheap sets. Send Postage.—Croft, Adel, Leeds.

100 DIFFERENT STAMPS FREE to applicants for approvals. All ½d. each.—Cox, 135, Cambridge Road, Seven Kings.

SPACE FILLERS, ¼d. to 3d. About 500 sent on approval. A useful selection.—D. Pratt, 10, Lion Gate Gardens, Richmond, Surrey.

FREE. 50 Stamps including Bulgaria (Pictorial), Holland (Jubliee) to approval applicants, selections from ¼d. upwards.—Rixon, 22, Rathmore Rd., S.E.7.

AN IDEAL GIFT. Collector's complete Outfit and 250 good Stamps, 14/6; without illustrated album, 10/-.—Webster's, 32, Joseph Street, Grimsby.

112 Different Stamps including Jamaica, Nicaragua, Tasmania, Travancore, Peru, 6d.—Kraus, 137, Cheapside, London.

LATEST. 250 Stamps. Pictorial, Asiatic, good Colonial, War Stamps, Obsolete Sets, etc., complete for 3d.—White, 6, Stourbridge Road, Lye, Stourbridge.

None Free—None as Cheap!! Farthing approvals—abt. 1,000 to choose from. Responsible applicants only.—J. V. Wyk, 439, City Rd., O.T., Manchester.

1,000 BRITISH COLONIALS including Dollar, Rupee and Shilling Values, 3/- post free.—H. Theobald, 54, Antill Road, London, N.15.

A 1½d. STAMP BRINGS PACKET OF 50 (all different) free with approvals. 15% discount on purchases. Fine specimens to choose from.—Hull & Rae, 419, Holloway Road, London.

STAMPS. Dispersing Collection 22,000 (also Collection entire £1 and £25). Approvals 8d. and 9d. in 1/- discount, cash or exchange Meccano or anything useful.—"Olivet," Stretton Road, Addiscombe.

GREECE, LORD BYRON COMMEM. 2 dr. FREE with "Set" Pkt., 50 diff. includes 5 1911 Persia, 14 Ukraine 1921, 8 China Ship, 2 Jamaica Pict., Gold Coast, Nigeria, etc., post free 6d. Approvals for beginners. Many bargains.—R. A. Clipston, 11, Cromwell Avenue, Bromley, Kent.

FINE MIXED PACKET OF 40 and set of 5 King George Ceylon to all applicants for approvals. Further free packet of 15 Colonials including 5 Malta to purchasers remitting 2/- or over.—Empire Stamp Co., 2, West Bank, Stamford Hill, N.16.

AIR-FLOWN CARD FREE with 50 Portuguese Cols., 10d., or 50 Br. Cols., 8d.; 20 S. America, 6d.; 12 Irish 6d.; 10 Nyassa, 6d.; 50 Roumania, 9d.; all diff. Approval buyers get albums free. Ask for them.—J. D. Martin (N.R.P.), 68, Whetley Hill, Bradford.

"THE PHILATELIC MAGAZINE," 46, Victoria St., London, S.W.1. Best stamp newspaper. Order from your newsagent. 3d. fortnightly, or send 4d. for specimen and bonus form worth 2/6. Album catalogue free.

WANTED

COLLECTOR DESIRES TO PURCHASE small collection of stamps. No rubbish. Send particulars in first instance to Box 101, c/o Editor, "*M.M.*"

TO READERS ABROAD. Collector desires to purchase stamps of all countries, old or recent, single copies or dozens. No common ½d. or 1d. stamps wanted but best prices paid for such values as 6d., 1/-, 2/6 and upwards. Used or unused. Box 102.

STAMPS, PACIFIC ISLANDS AND NEW ZEALAND. Thirty varieties, 1/-; Fifty, 2/6; One hundred, 15/-. Better quality (no common), Twenty varieties, 1/-; Thirty, 2/6; Fifty, 10/-. Sixteen different Islands, 1/-; Twenty-five, 2/-. Send 2/6 for a "Surprise Packet."
M. Leather, Avondale, Auckland, New Zealand.

LORD BYRON 2 Drachma Greece 1924 FREE. Fine used copy of this interesting stamp free to all applicants for 25% discount approval sheets, sending postage.
J. H. GAZE, Didsbury, Manchester.

1,000 Stamp Mounts Free to approval applicants enclosing 1½d. postage.—Holloway, 28, Heyburn Rd., Liverpool.

Foreign Stamps On Approval, all ½d. each, suit beginners.—J. Gleave, Market Hall, Inverness.

Six Revolutionary Crete Free to "Big Discount" approval applicants.—H. Scott Johnson, C.P.A., Room C, 49, Felden St., S.W.6.

FIVE DANZIG AIRPOST STAMPS, 25, 50, 100, 250, 500 Mks. and 25 Portuguese Colonials Free with approvals.—Kearley, 142, Purves Road, London.

FREE. 300 stamps. Send postage.—Douglas Hulse, 13, Silverdale Road, Wolstanton, Staffs.

50 FOREIGN, 25 COLONIAL, 8d. Approvals at ½d.—2d.—Masters, 208, Milkwood Road, Herne Hill.

YOU WILL LIKE THIS—FREE. 100 different picked stamps, including British Colonials, N. & S. American, China, European, but NO NEW EUROPE. To applicants for my famous Approvals, including stamps from ½d., and enclosing 1½d. for postage.
Fleming, St. Winifred's, Christleton Road, Chester.

GOOD JOKES TO TAKE BACK TO SCHOOL

Parcel contains:—Musical Seat, Platelifter, Joke Match Boxes and Cigarettes, Barking Dog, Black Eye Joke, Japanese Handcuffs, etc., etc. Just the things to amuse yourself and your school chums.
2/6, 3/6 and **5/-** parcels. **Post Free.**
Postal Orders, or 1½d. Stamps accepted.
Herberts, 27, Adys Rd., Peckham, London, S.E.15.

THIS CONCERNS YOU. NOTE OUR PRICES.
VALVES.

	R. Type.	Dull Emitters.
FRENCH ...	6/9	17/6
DUTCH	4/9	13/6 & 14/6
PHILIPS ...	7/3	18/6

Post Free in lots of three and over. Trade enquiries solicited. Write:
THE DUTCH VALVE AGENCY.
(Gerrard 8606) (G. R. THOMAS).
19, CRAVEN STREET, STRAND, W.C.2.

ELECTRIC BELLS

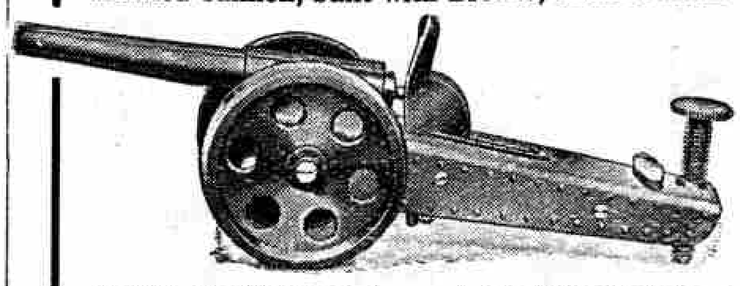
are essential in every house, so send for a complete outfit, which can be easily fixed up, to:—
A. W. NORTH (*Dept.* 40),
47, Parchment St., WINCHESTER
for a "Beam" Bell Set, comprising Best Quality Soft-toned Electric Bell, Strong Battery, Push (flat or pear), flex, and box of copper staples. Complete outfit only 5/6 post free, or with spare battery 7/-.
NORTH'S FOR BARGAINS.

THE AUTOMATIC PEA REPEATER

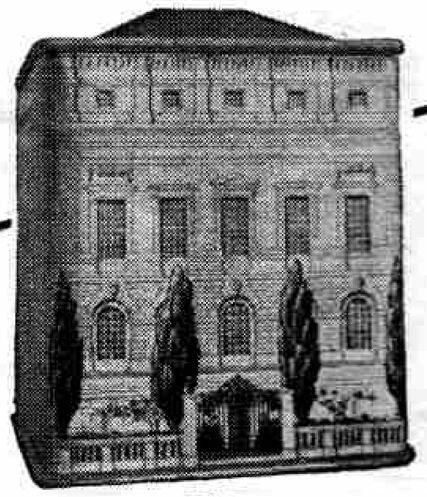
The most reliable pistol on the market. Takes 25 shots at one loading, best black finish, each in box with instructions and supply of ammunition, post free **2/6.**
Latest Novelty—The **PIGMYPHONE.** A real miniature gramophone, plays just like a big machine, complete with records, post free **5/6.**
R. DILNOT, 125, Chiswick High Rd., London, W.4

VEST POCKET FOLDER
PCKT. STAMP MOUNTS
50 DIF. FINE STAMPS
ALL FREE to genuine intending purchasers applying for **Blue Label Approvals No. 6** and enclosing postage.
M. CORYN, 10, Wave Crest, Whitstable, Kent.

It Bangs! Flashes! and Shoots!
7½ in. long
No Caps, Powder, or Special Ammunition. Practise and Beat Father with this beautifully finished Cannon, built with Bronze, Steel & Brass



SOME HOWITZER! A BRITISH TOY!!
4/9 post free.
Money returned if you do not approve.
HANWELL'S TOYS,
38, Alexandra Road,
NORTHAMPTON.



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Queen's Doll's House
MODELLED IN DECORATED METAL.
Profits to the Queen's charities.
Complete in every detail, illustrating in colours the front, sides and interior, and adapted as a money box.
A UNIQUE GIFT. MADE IN ENGLAND.
Obtainable everywhere.
PRICE: With lock and key. Packed and posted 6d. each extra. **1/-** **Actual Dimensions:** 4½ in. wide, 2⅝ in. deep, 3⅜ in. high.
CHUBB,
128, QUEEN VICTORIA STREET, LONDON, E.C. 4.

Messrs. A. W. NORTH,
47, PARCHMENT ST., WINCHESTER
beg to announce that they have opened a
TYPEWRITING DEPARTMENT,
where Stories, Poems, Letters, Circulars and every description of typewriting can be accurately and quickly executed at the low rate of 10d. per 1,000 words. Carbon copies 3d. each. Special quotations for large quantities.
All estimates free and sent per return.
GIVE US A TRIAL.
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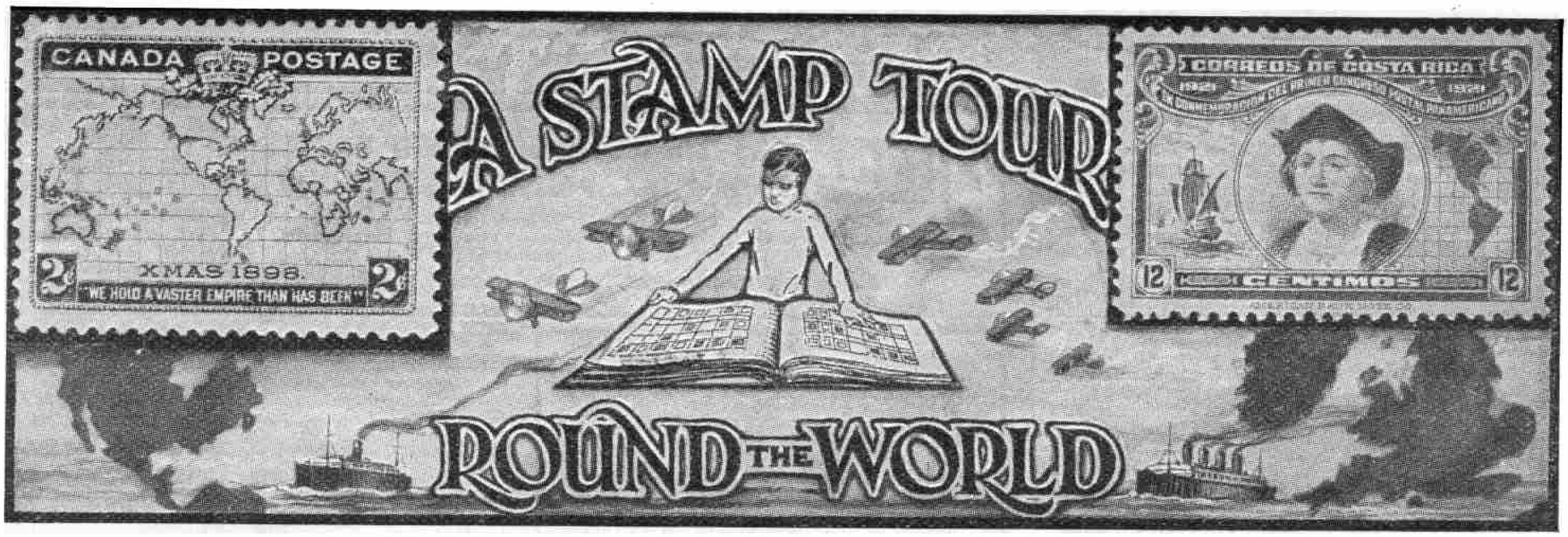
CUT THIS OUT. **'Meccano' Pen Coupon, Value 3d.**
Send 5 of these coupons with only 2/9 direct to the **Fleet Pen Co., Fleet Street, E.C.4.** You will receive by return a splendid British 14 ct. Gold Nibbed Fleet Fountain Pen value 10/6 (Fine, Medium, or Broad Nib). If only 1 coupon is sent the price is 3/9. 3d. less for each extra coupon up to 4 (Pocket Clip 4d.). Satisfaction guaranteed. Your own name gilt letters, either pen 1/- extra.
Lever Self-Filling Model with Safety Cap, 2/- extra.



V. CENTRAL AMERICA

HAVING fully studied the Panama Canal, we leave our liner and board our aeroplanes to explore the states of Central America.

Flying northward we first come to Costa Rica, which is Spanish for "rich coast," and is a very appropriate name for this beautiful country. As was the case with the remainder of Central America, Costa Rica was under Spanish rule until 1821, when there was a revolt throughout the area resulting in the overthrow of the Spanish regime and a union with the Mexican Empire. Two years later, however, when Mexico became a republic, there was a renewal of civil war and Costa Rica joined the newly-formed Republic of the United States of Central America. This was in 1824, but the authority of the central government was never great and the position of Costa Rica was indefinite until 1848, when an independent republic was again proclaimed.

Port Limon, illustrated on the 5c. of the 1901 issue, is the chief Atlantic port of the country and is the terminus of the railway that crosses the continent to the Pacific coast. The view on the stamp shows the sea-wall that protects the harbour. Turning inland we arrive at San José, the capital, where we notice the national buildings, including the monument pictured on the 1c. of the 1923 issue.

Commemorating an Indian

On the Pacific coast is a peninsula, now called Guancaste, that was incorporated with Costa Rica in 1824. A centenary commemorative set of stamps has recently been issued, designed by Senor G. Noriega and printed by the American Bank-Note Co. The values below 15 cents show a map of the area, the higher values a church with a tree and horseman in the foreground.

Guancaste was formerly known as Nicoya, and was so called in memory of an Indian of that name who was converted to Christianity, in company with his tribe, during the 16th century.

Nicaragua and its Volcanoes

Our visit to Nicaragua, the next country, is confined to a small portion in the interior near Lake Managua, on the way to which we pass Lake Nicaragua, over 100 miles in length.

Managua, the capital of the country, stands at the south end of Lake Managua, and here we see the Government Building or Palacio Nacional, erected shortly after Managua became the capital in 1855. This building is shown on various values, including the ½c. and 1c. of the 1914–15 issue. Managua is a modern city with many flourishing industries, and has an important export trade in coffee, sugar, cocoa and cotton.

At the extreme north of Lake Managua is the Momotombo Volcano (4127 ft.), pictured on all the values of the 1900 issue. This is one of the many volcanic cones crowded close together in this area, as is evident from the design of many stamps of Nicaragua from the first issue in 1862 until the series of 1912.

A few miles further north, and on the same railway as Managua, is Leon, the largest city of the republic. Here are located some of the finest public buildings in Central America. The massive and elaborate cathedral, built between 1746 and 1774, is in the Renaissance style of architecture, and is shown on the remaining values of the 1914–15 issue.

Over-Printing a President

Salvador, the smallest and the most densely populated of the states of Central America, consists of a strip of land about 60 miles in breadth and 140 miles in length, lying on the Pacific coast. The country is chiefly mountainous and contains many volcanic cones, one of which is shown in the early stamps of the country, 1867 to 1888, and in the 1891 issue.

San Salvador, the capital of the country, is centrally situated, and although in a valley is 2115 ft. above sea-level. In this town we find the National Palace (1907 all values and 1912, 29c.), the Independence Monument (1912, 19c.), and the National Theatre (1916 all values).

Salvador is an unpopular country with stamp collectors owing to the large number of scarce provisionals it has issued since 1889. The series that was put on sale on the 1st January, 1895, and which only remained current for a fortnight, is interesting as it is one of the few sets of stamps that have been deliberately spoilt before issue. When printed, the series bore the head of President Ezeta, but as he had been overthrown before the stamps were issued they were overprinted with the arms of Salvador, which effectively prevented anyone seeing the ex-President's face! The stamps were superseded a fortnight later by a new series showing the arms.

A Wonderfully-Engraved Stamp

Guatemala is the next country on our journey, and here we visit the capital, which also is called Guatemala. The city is situated on the top of a high table-land over 5000 ft. above sea-level.

As in the case of most Central American towns Guatemala possesses wide streets flanked with avenues of trees. Here we find most of the views pictured on the handsome series issued in September 1902. The Museum (5 cents value) was erected in 1831; the Cathedral (20 cents, illustrated here) is situated in the Plaza Mayor, one of the chief open spaces of the city. The Theatre (50 cents) is one of the best in Central America and

(*Continued on page 27*)

Stamps for Sale

(*See also page* 24).

1925 GREETINGS

To all "M.M." Readers!

START THE NEW YEAR WELL, by sending for my **GREAT HALF-PRICE SALE** Catalogue.

Penny Black English, 8d. each. Triangular Capes from 2/6. A marvellous selection of approvals, all stamps half price this month. Send to-day.

HILLIER, Stamp Mart, HORSMONDEN.

A Genuine New Year's Gift

To all who purchase one of the following lots for 2/6 nett, from my approval sheets, I will present a collection of 250 all different British Colonial and Foreign stamps.

"The Gem Packet" contains 25 Fine Pictorials, 25 Br. Colonials, Sudan "Camel," Newfoundland "Caribou," Barbados "Victory," Jamaica, Nyassa, etc., in all 100 diff. **2/6**

Siam (5), Belgium (10), Mozambique (4), Greece (5), Br. Colonials (25), Bulgaria (6), Persia (4), Australia (6), Switzerland (12), Turkey (7), Poland (8), S. America (8) **All Diff. 2/6**

A Fine Collection.

"The Pictorial Packet," 60 all different, **2/6.**

All stamps above Mint or used, clean and off paper, ready for mounting in your collection.

The first 12 applicants will receive a set of 8 Epirus Mint, in addition to the 250 lot, this applies to clients from abroad also.

Every one above a bargain. Send early to secure them.

For further selections write or call.

W. H. TAYLOR,
Dept. A., 26, Meadows Road, Sale, Ches.

PORTUGUESE COLONIALS FREE:

Any **two** of the following Free Gifts will be sent to applicants for approvals enclosing 1½d. postage.

12 unused Angola.
12 ,, Cape Verde.
12 ,, Mozambique.
12 ,, Portuguese Guinea.
11 ,, St. Thomas & Prince.

E. T. COX
13, Britannia Road, Parkstone, Dorset.

CHEAP ATTRACTIVE SETS

5 Austrian Charity, 1924	1/-
5 Hungary Bolsheviks, 20–80 f.	6d.
5 Japan, 1914, 30, 50s, 1, 5, 10 Yen, used ...	4d.
17 Roumania, Austr. Occup., 2nd issue compl....	1/6
10 Nyassa, 1911, 2½–300R surch. "Repub." ...	1/6
8 Spain, Cervantes, compl.	1/9
20 Austria, Hochwasser compl.	9d.
16 Bosnia, 1906, Pictorials, compl., used ...	3/9
3 Holland, Jubilee, 2, 5, 10c., used	3d.
9 Libia, 1921, Pict. 1–55c.	1/-
4 Italy, Victory, compl.	6d.
2 Switzerland, P.U. Jubilee, 20 & 30c. ...	8d.
3 Switzerland, Peace, used	4d.
14 Jugo-Slavia, 1921, compl., used	10d.
3 Japan, Peace, 3, 4 & 10 sen.	9d.

APPROVALS of British, French, Portuguese, Dutch Colonies, etc., willingly sent on approval. All applicants enclosing postage will receive the new issues of French Colonies: A.E.F. on Gaboon, Tchad, Congo, etc.

ESCOTT C. BLAND,
16, Mansfield Road, Parkstone, Dorset.

START THE NEW YEAR WELL

and write for a selection of my approvals. Fine packet of Pictorials given away to all applicants.

A Postcard will do.

L. C. JONES, 61, West St., Bourne, Lincs.

FREE

TRANSVAAL 1897 2/6 unused, to purchasers of each lot of

GREAT BRITAIN 1500 for 1/3 (Guaranteed unpicked). **SCARCE** and **RARE** varieties of **WATERMARK, PERF., DIE,** etc., have been found in these **BARGAIN PARCELS.** A few Colonial and Foreign are included.

PHILIP J. DYKE, 122, Gladstone Rd., S.W.19.

FREE! EGYPTIAN WAR-CENSORED ENVELOPE & 25 DIFF. PORTUGUESE COLONIALS FREE!

The above will be given entirely FREE to serious collectors asking to see my approval selections of stamps, which cannot be excelled for condition and price. 6d. in the shilling discount is allowed on **all** purchases, whether large or small. Send a postcard and mention Gift M.M.3.

N. R. ENSOR, 2, Oak Road, BOURNEMOUTH.

Stamp Collectors

LOOK HERE!

A fine new, up-to-date STAMP ALBUM, British made, and fully illustrated, for only **1s. 3d.** post free.

A New Book, full of interesting information, entitled—**"Stamp Collecting for All,"** which gives just the help you need in starting a collection, identifying stamps, etc., **1s. 3d.** post free. (Coloured picture cover, many illustrations).

Ask for BIG FREE LISTS of many other Albums and fine Stamp Bargains.

STANLEY GIBBONS LTD.
Dept. 15, 391 Strand, London, W.C.2.

THE "1,000" PACKET

1,000 500 well-mixed Foreign Stamps containing many usually sold at ½d. and 1d. each. 100 UNUSED (a complete sheet), 25 well-mixed BRITISH COLONIALS, a 12-page booklet for holding duplicates and 375 Patent "Strip" Stamp Mounts.

4½ D. *Postage 2½d. extra. Abroad 6d. extra.*

WATKINS (M. Dept.), Granville Road, BARNET.

FREE!

TO INTRODUCE OUR NEW PRICE LIST

to readers of this Magazine, we shall present to each applicant for a copy a superb packet containing 110 different stamps, including AUSTRALIA (Kangaroo), BARBADOS (Sea-horses), obsolete CEYLON, DOMINICAN REPUBLIC, GWALIOR, obsolete IRAK, South Australia, TASMANIA pictorial, TRAVANCORE, VICTORIA, etc., etc. Enclose 3d. to cover cost of postage and packing, and request Gift M.M.1.

Only One Packet to each applicant, and the offer will only remain open for a limited period; a quantity will, however, be reserved for customers abroad. Write **at once,** for "he who hesitates is lost."

NORRIS & CO. (Dept. M.M.), LEABROOKS, ALFRETON, Derbyshire, England.

FREE!

THE "MIDLAND" SERIES

No. 1.	500 Assorted Stamps	6d.
No. 2.	1000 ,, ,, ...	1/-

(Postage 3d. extra).

These packets contain British, Colonial, and Foreign Stamps. Being guaranteed absolutely unpicked mixed stamps, there is always the possibility that something really good may be found.

THE MIDLAND STAMP CO. LTD.,
78, WARWICK STREET, LEAMINGTON SPA.

MINT BRITISH EMPIRE

ASCENSION, Pictorials, ½d. black and 1d. green	2½d.
CAYMAN ISLANDS, ¼d. brown and ½d. green	1½d.
LEEWARD ISLANDS, ¼d. brown and ½d. green	1½d.
MONTSERRAT, ¼d. brown	½d.
TURKS & CAICOS ISLANDS, ¼d. pink ...	½d.

POSTAGE EXTRA.

ASK FOR MY NEW PRICE LIST.

ALEC KRISTICH,
82, Marchmont Street, Russell Square, London, W.C.1.

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25 English Cols.	3d.	5 Venezuela ...	3d.
50 ,,	6d.	10 ,, ...	7d.
75 ,,	9d.	15 ,, ...	1/-
100 ,,	1/-	20 ,, ...	1/6
25 Portuguese	4d.	25 Holland ...	6d.
50 Cols.	9d.	50 ,, ...	1/-
75 ,,	1/-	25 Belgium ...	6d.
100 ,,	1/3	50 ,, ...	1/-
25 French Cols.	4d.	25 Bavaria ...	4d.
50 ,,	9d.	50 ,, ...	9d.
60 ,,	1/3	25 Roumania ...	6d.
25 France ...	3d.	50 ,, ...	1/-
50 ,, ...	6d.	25 Italy ...	6d.
75 ,, ...	1/-	50 ,, ...	1/-
25 United	3d.	25 Swiss ...	6d.
50 States	6d.	50 ,, ...	1/-
75 ,,	9d.	25 Portugal ...	9d.
90 ,,	1/-	25 Russia ...	6d.

Postage extra.

Fine selections ready in separate countries.

J. Russell, Chetwynd, Shanklin Drive, Westcliff-on-Sea.

FREE This fine packet contains only good stamps as follows:—Western Australia 1d. swan, set of 9 Scandinavia, Spain. **ASK FOR QUALITY PACKET**

Ukraine on large Russian catalogued 7/6. Hyderabad, Deccan, **Greece pictorial catalogued 1/6,** Austria horse, Germany 20 million marks, **New Caledonia,** Unused Portugal, New South Wales, Roumania; Set showing Miners, Blacksmiths, and Farmers. Sent absolutely free and post paid to all genuine collectors asking to see our approval books. Send a postcard for the best packet ever given away. *Only* 1 *lot allowed each applicant.* 40 other Gifts to buyers.

R. WILKINSON, Provincial Buildings, Colwyn Bay.

PICTORIAL JAMAICA ISSUE

You probably have the ½d., 1d. and 1½d. and would like a few of the others?

2d. "King's House, Spanish Town," green with blue centre, 1½d. each. 2½d. "Return of Army Contingent," blue, 2d. each. 3d. "Jamaica discovered by Columbus," blue with green centre, 1d. each. 4d. "Spanish Town Cathedral," green with brown centre, 2d. each. 6d. "Town and Harbour of Port Royal," large oblong, blue with black centre, 4d. each. 1/- "Statue of Queen Victoria, of Jamaica Lady Supreme," orange, 6d. each. All superb copies. New lists pricing 2,000 attractive stamps free.

H. Lindsey, 27a, The Square, G.P.O. Box 10, St. Annes-on-Sea.

1,000 STAMP COLLECTORS WANTED to send us a Post Card with their name and address and mention **1924** packet. By return of post we will send **Free** and **Post Free** the **1924 Packet,** which contains **77** different stamps including a fine set of unused pictorial new issue French Colonials from **Somali Coast, Cameroons, Algeria, Haute Volta, Tchad, Tunis, Oceania, Wallis and Futunia Is., Niger Coast, Reunion, Senegal,** scarce obsolete **Ireland** overprinted on British, set **Japan, Siam,** scarce 1/- British. **China,** a nice set of over **20** unused new issues, etc., etc., catalogued over 5/-.

This magnificent offer is made in order to circulate our latest list and old pre-war approval sheets which we are clearing at half price.

Special Offer. 50 different unused French Colonials with values to 10c. 6d. post free.

HORACE MILLER & CO., WHITSTABLE.

PAIR METAL TWEEZERS
THE "GRAND" PACKET
50 DIFFERENT STAMPS
POSTAGE

FREE!

The "Grand" pkt. contains good stamps only:—inc. Gold Coast, Temesvar, Jamaica, old Q.V. Victoria, N.S.W., Cape Verde, scarce Africa, old large American pict., also 50 diff. (25 unused). Finally, to the first 200 genuine applicants, we include a fine gummed set of 100 diff. Titles of Countries.

Send P.C. only requesting approvals. **LISBURN & TOWNSEND, London Road, LIVERPOOL.**

STAMPS FOR SALE

(*See also page* 24)

50 STAMPS FREE to applicants for Approvals, all ½d. each. Additional presents for all who buy or sell at least 100 from sheets. Bigger presents for over 100. Enclose postage.—Scott, 154, Wellesley Road, Ilford.

Your Stamp Collection—See it Grow. 15 Ceylon, 6d.; 30 Denmark, 6d.; 25 France, 6d.; 8 Gold Coast, 6d.; 20 Greece, 6d.; 8 Leewards, 6d.; 12 Mauritius, 6d.; 10 Newfoundland, 6d.; 20 Norway, 6d.; 40 U.S.A., 6d.; All post free. Full list and 10 mint stamps free.—S. F. Bickers, Lordswood Avenue, Southampton.

BRITISH COLONIAL BARGAIN PACKET. Solomon, Turks, Iraq, Palestine, Kedah, Trinidad Pictorial, Cape, 2½d. Newfoundland, Mosul, Barbados, Cochin, Cayman, Fiji, Soudan, 6d. free. 2 Falkland War Mint included if approval selections requested.—Morris, Stamp Dealer, Bletchley.

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Inexpensive Approvals.
State age and size of collection to
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PACKETS. 100 all different, 1/–; 200, 3/3; 300, 6/–; 400, 9/9; 50 different Queen Victoria, 1/6; 25 King Edward, 1/–; 50 King Edward, 3/6; 50 King George, 1/6; 100 King George, 5/–. **SETS:** 20 Barbados, 2/6; 45 Indian Native States, 1/6; 25 Australia, 1/–; 18 Ceylon, 1/–; 12 Cochin, 1/–; 25 South Africa, 1/–; 4 Bermuda, 6d.; 4 Cayman Isles, 6d.; 20 Egypt, 6d.; 8 Fed. Malay States, 6d.; 40 Great Britain, 6d.; 10 Hong Kong, 6d.; 6 Natal, 6d.; 6 Palestine, 6d.; 9 Trinidad, 6d.; 6 British Guiana, 3d.; 6 Cape of Good Hope, 3d.; 4 Cyprus, 3d.; 4 Deccan, 3d.; 6 Gold Coast, 3d.; 4 Gibraltar, 3d.; 12 India, 3d.; 4 Malta, 3d.; 6 Newfoundland, 3d.; 2 North Borneo, 3d.; 2 Patiala State, 3d.; 6 Straits Settlements, 3d.
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GREAT Annual Stamp SALE
Starts January 1st, 1925. Send postcard for Catalogue to-day, and Half-Price Approval Sheet.
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Stamps over 80 years old given away
Set of 10 English, various issues (½d. to £1), including one in use over 80 YEARS ago, GIVEN FREE of charge to applicants for approval sheets. 50 British Colonials and other stamps (some mint), including Cayman Islands, Fiji, Iceland, Somaliland, Uganda, Gaboon. Post free 6d. Every 10th purchaser requesting approval sheets will receive stamp album.
Turner, 88, East Hill, Wandsworth, London, S.W.18.

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FREE. Greater Native Packet containing 15 different unused stamps, illustrating natives, etc., to genuine applicants for stamps on approval and enclosing 1½d. for postage. Stock must be cleared. All stamps offered at half price. Do not miss this opportunity. Send at once.
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MANY RARE STAMPS have been found by purchasers of **THE "DIAMOND" PACKET,** which is guaranteed to contain **1,000 Unsorted Stamps 1/3** (from Convents abroad). 2 packets, 2/5; 3 packets, 3/6; 4 packets, 4/6; 5 packets, 5/6. All post free. (Abroad 3d. per packet).
O. NERUSH, Importer
(Dept. E), 2-22, Cathcart Hill, London, N.19.

Stamps Recently Issued

Costa Rica

A particularly handsome set of pictorial stamps is issued by Costa Rica. The 1c. value shows the interesting National Monument; the 2c. a native woman gathering cocoa; the 4c. native plants; 5c. the Post and Telegraph Office; 10c. Columbus before Isabella; 20c. the landing of Columbus; 40c. a map of Costa Rica; and 1 colon a portrait of Manuel Maria Gutierrez. In addition there is the 12c. value which is the subject of our illustration. This shows, in the centre, a portrait of Christopher Columbus, while on the left is his flagship and on the right a map of the two American continents.

Manuel Maria Gutierrez, whose portrait appears on the highest value in the series, has obtained this honour in perhaps the most unusual manner yet recorded. In the year 1852 the Government of Costa Rica was preparing a State welcome for some important British visitors. For diplomatic functions it is essential that an independent nation, such as Costa Rica, should possess a national anthem. Unfortunately, the Government had not thought of this requirement before, and so the band-master, Gutierrez, was ordered to compose one at once! This was no pleasant duty for Gutierrez, who, although quite an able composer, was too much of a musician to enjoy turning out music to order. However, it had to be done, and in consequence we find his portrait figuring on a stamp by way of reward for his accomplishment!

The whole set was designed by Señor Gamaliel Noriega, the Director-General of Posts, and engraved and surface-printed by the American Bank Note Co. on unwatermarked wove paper, single-line perforated 12. The punches of the perforator appear to be rather worn, since poor and blind holes are frequent.

The 10c. and 12c. are in commemoration of the first Pan-American Postal Congress, 1921, although the whole set was issued at the same time.

Nauru

Nauru, an island in the Pacific Ocean and one of the Marshall Group, was occupied by Australian forces in November 1914, before which it was a German colony using German colonial stamps inscribed "Marshall-Inseln." To-day it is a British possession, mandated direct to the British Government, and from October 1915, until early in 1924 it used stamps of Great Britain overprinted "Nauru." Now, however, a special series has been issued on paper without watermark, perforated 11. There are fourteen values ranging from ½d. to 10/–, all line-engraved and printed by Harrison, at the Commonwealth Treasury, Melbourne, Australia. The design is the same for all values and is copied from a photograph showing a portion of the rocky coast of Ocean Island and one of the boats belonging to the Phosphate Company, which has important quarries both at Ocean Island and Nauru.

A Stamp Tour Round the World

(*continued from page* 25)

was founded in 1858. The barracks are shown on the 75 cents, and a native school on the 2 dollars.

Water is brought to the town by two old aqueducts, one of which was pictured on a stamp issued in 1922. The 6 cents of the 1902 series shows the Palacio de Minerva and is notable for the minute engraving of the inscription on the front of the palace which can be read quite clearly under a strong magnifying glass.

Breakwaters at Vera Cruz

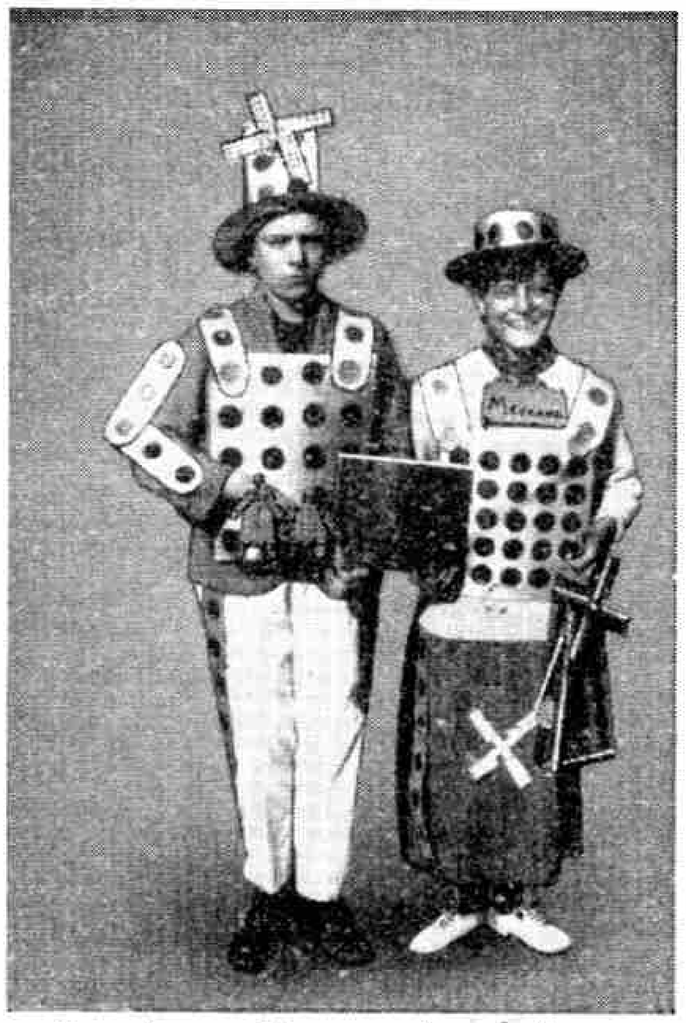
Mexico, the largest of the countries usually classed with Central America, affords several views for our inspection. Vera Cruz, the most important port of the republic, is situated on a slight indentation of the coast of the Gulf of Mexico. Formerly, the harbour was not strong, but large breakwaters now afford complete protection from storms. The lighthouse was the subject of the 1 peso value of the 1915 issue.

At Mexico City we see the Post Office (1915, 5 pesos) and about twenty miles south-east of the city we find the snow-clad volcano of Popocatepetl (1899, 1 peso), a giant of 17,888 ft. Popocatepetl means "Smoking Mountain," but although formerly an active volcano, it is now extinct.

Some 275 miles north-west of Mexico City we find the city of Guadalajara, near which is the Jaunacatlan Fall, pictured on the 50 centavos value of the 1899 issue. This Fall, on the Rio Grande, supplies electricity to work the tramways and factories and to light the buildings and streets of Guadalajara.

NEXT MONTH:—
SOUTH AMERICA

An Idea for Your New Year's Party



Two happy Meccano boys who won prizes at a recent Fancy Dress Carnival. The "strips" and "plates" are made from cardboard covered with silver paper.

Discoveries in Meccanoland

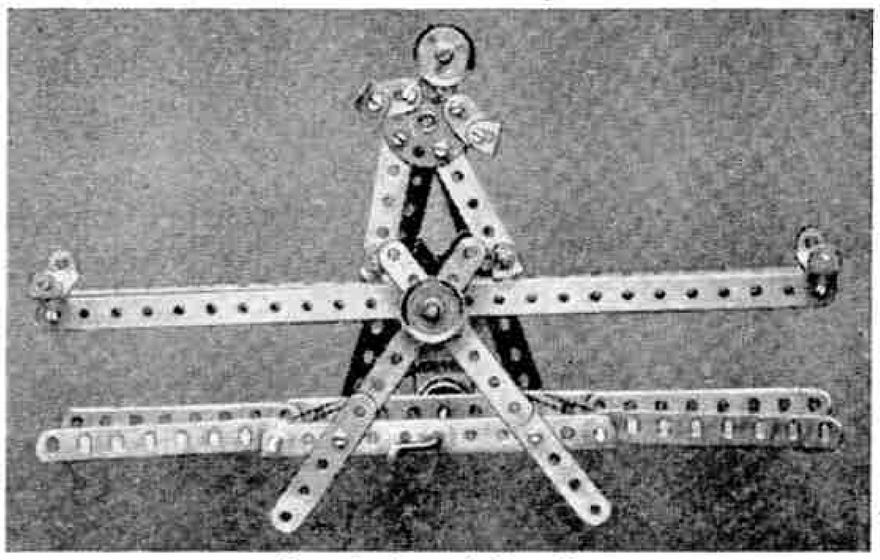
By R. C. Manning

This is the concluding instalment of the article, commenced last month, in which our contributor has depicted some of the more humorous aspects of Meccano model-building. We have built all the models illustrated, and they all work in a very realistic manner. They all provide great fun, and our young readers will be interested to know they may all be made with a No. 1 Outfit.—EDITOR.

As I wandered further with King Meccano I became more and more fascinated with the wonders he showed me, and I actually began to feel regret that I should have to return to the great outside world again. I was comforted to remember, however, that I now owned a Meccano Outfit and that I could quite easily become a regular "inhabitant" of Meccanoland. I began to think of all the fine things I should be able to show Jack, and it seemed to me that he certainly would have to "give me best" this time.

Filled with these exciting thoughts, I began walking quicker and quicker, a fact that I only realised when I found that I had left my royal guide some distance behind, where he was panting and gasping while his bodyguard plied their screwdrivers, for in his hurry he had worked all his joints dangerously loose!

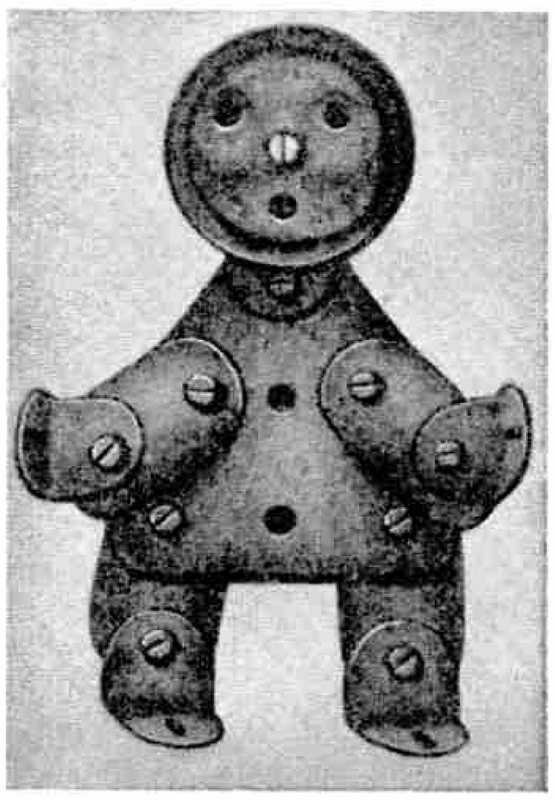
"Hi! there! not so fast," he cried, as soon as he had regained his breath. "I want to introduce you to my friend Professor A. Flat Trunnion," His Majesty continued when he caught me up. "He is in charge of our Meccano Schools."



Acrobat and See-Saw

The Professor bowed a swift acknowledgment to me and as I returned his greeting I had a horrible fear that this highly-placed personage of the scholastic world might begin to question me on general knowledge or logarithms or something equally boring. However, to my surprise he began merrily chatting away on the most interesting subjects. Indeed, he seemed such an amiable gentleman that I plucked up sufficient courage to ask him if his scholars liked going to school. He looked at me in sheer astonishment. "*Liked* going to school, did you say?" he exclaimed, "Why, they like it so well that I sometimes have a job to get them to take any *holidays*!"

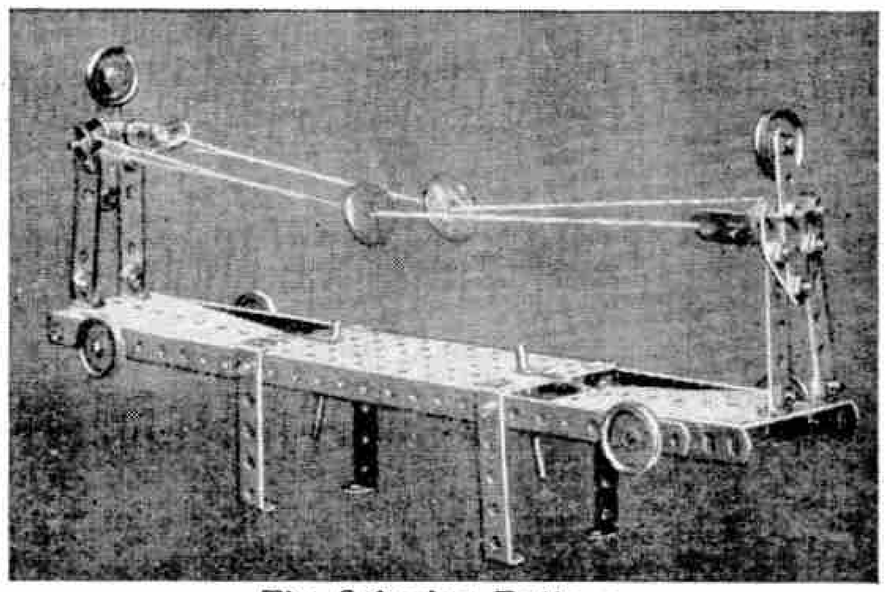
"Of course," interrupted the King, "the reason for that is that the Professor demonstrates all his lectures with Meccano. In fact, he can work out the principles of the most abstruse and complicated movements in this way, and you may be sure his pupils find it really fascinating."



"He looked at me in sheer astonishment. '*Liked* going to school, did you say?'"

Having left the Professor on the broad steel steps of the Sprocket Institute, we strolled down the beautifully laid-out Architrave Drive. We had not walked very far before His Majesty drew my attention to an acrobat going through some extraordinary "stunts" on a see-saw, much to the amusement of a crowd of admirers. Here I also saw two Meccanitians rocking to and fro at the end of what appeared to be another see-saw, while between them two huge discs—not unlike cart-wheels—whirled round and round with tremendous speed.

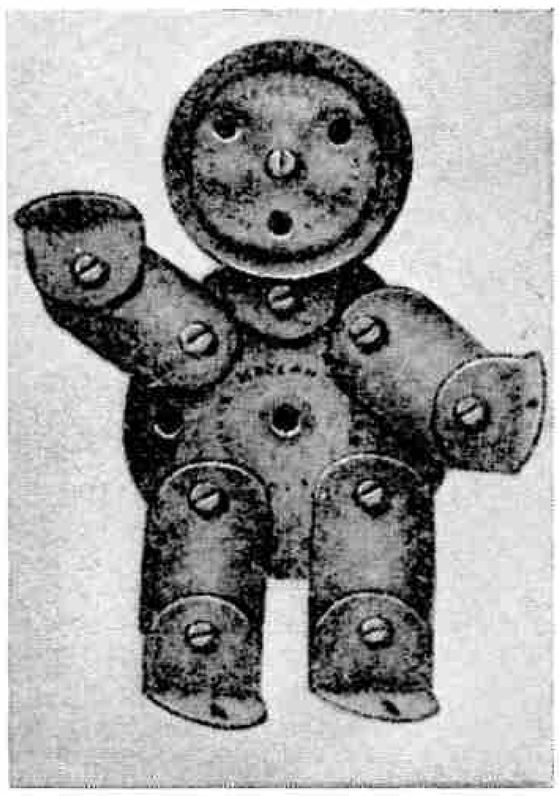
[Acrobat and See-Saw. In this model the beam, composed of three 12½" Strips, rocks about an Axle Rod passed through the four 5½" Strips forming the legs of the model. Two 5½" Strips are bolted to the Flanged Plate in the base of the model, and meet to form a bearing for a short Axle gripped by the Bush Wheel, which represents the body of the Acrobat. The bearing is reinforced by a ½" Reversed Angle Bracket, and the short Axle carries a 1" Pulley Wheel which is connected by cord to the Crank Handle. A Flat Trunnion is bolted to the centre of one of the side strips of the rocking-beam and is connected by thin pieces of elastic to each end of the 5½" Flanged Plate. By using a few additional parts little figures can be fitted to each end of the see-saw.



The Spinning Buttons

Another method of operating this model is obtained by connecting the pieces of elastic to the Sector Plates shown; a slight touch upon either of the latter then being sufficient to send one side of the beam up or down.

The Spinning Buttons. The Sector Plates, to which the Meccanitians are bolted, are pivoted to the base as shown in the photograph. It is evident that what are described as "cart-wheels" in Meccanoland might in real life be merely good-sized buttons mounted on strong thread, for that is what they are! Now start the model as follows:—Twist the threads a little with your fingers, pull the Meccanitians outwards, then release them sharply. As soon as the buttons are spinning, a slight downward touch on the feet of each figure is sufficient to keep them going.]

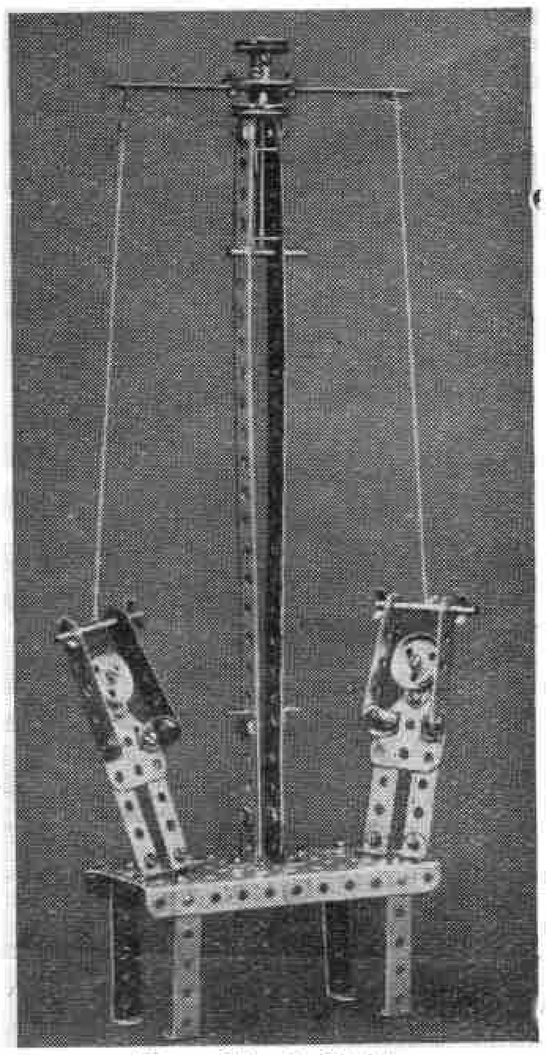


"... Captain Bush-Wheeler became quite excited and waved his arms about."

A little further along my companion once more drew me aside to point out a daring motor-cyclist, who was revolving round a miniature racing-track at an

extraordinary speed. I could not help thinking that the brave little fellow would get terribly giddy, but he did not fall off, in fact he seemed to be thoroughly enjoying it!

[MINIATURE CYCLE TRACK. A $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip forms the cross-bar of the cycle, and the front wheel forks and handlebars consist of two $2\frac{1}{2}''$ Strips and one $2''$ Axle Rod. The two back wheels are mounted in a Cranked Bent Strip bolted to the second hole from the end of the cross-bar, and set at a slight angle so that the cyclist travels in a circular direction. A Flat Trunnion forms the rider's body, while each leg is constructed from a $\frac{1}{2}''$ Reversed Angle Bracket and one Angle Bracket, and his arms are formed by Flat Brackets and Angle Brackets. His feet are bolted to the first and third holes respectively of the Strip secured to the Crank Handle in the centre of the track. The circle of cardboard forming the track may, of course, be cut to any desired size.]

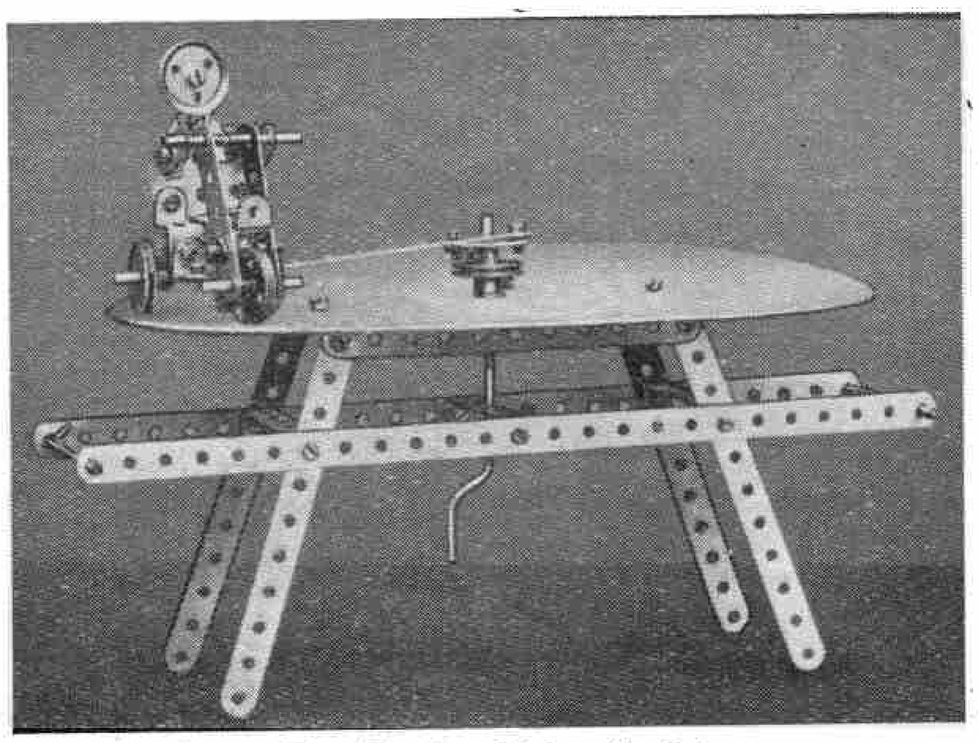


The Giant Stride

While we were standing here I noticed a little figure bustling towards us.

"Hullo!" exclaimed the King, "here is Captain Bush-Wheeler. He's my Chief Engineer and Director of Amusements." In a few moments that gentleman was deep in a discussion with His Majesty concerning some plans for forthcoming improvements in Meccanoland. The conversation developed into quite a heated discussion, the Captain becoming very excited and waving his arms about to such an extent that I feared they would work loose!

"Meccanoland grows almost faster than we can keep pace with," he said excitedly. "Only a few minutes ago I met several hundreds of Meccano boys who have just arrived full of splendid new ideas. I tell you, your Majesty, that these boys are making this the brightest and best country under the sun!"



The Racing Motor-Cyclist

"Yes, and my friend here is one of our latest recruits," replied the King, waving his arm in my direction.

Presently, the King having dismissed Captain Bush-Wheeler with a "good-day," we moved off again on our tour of inspection.

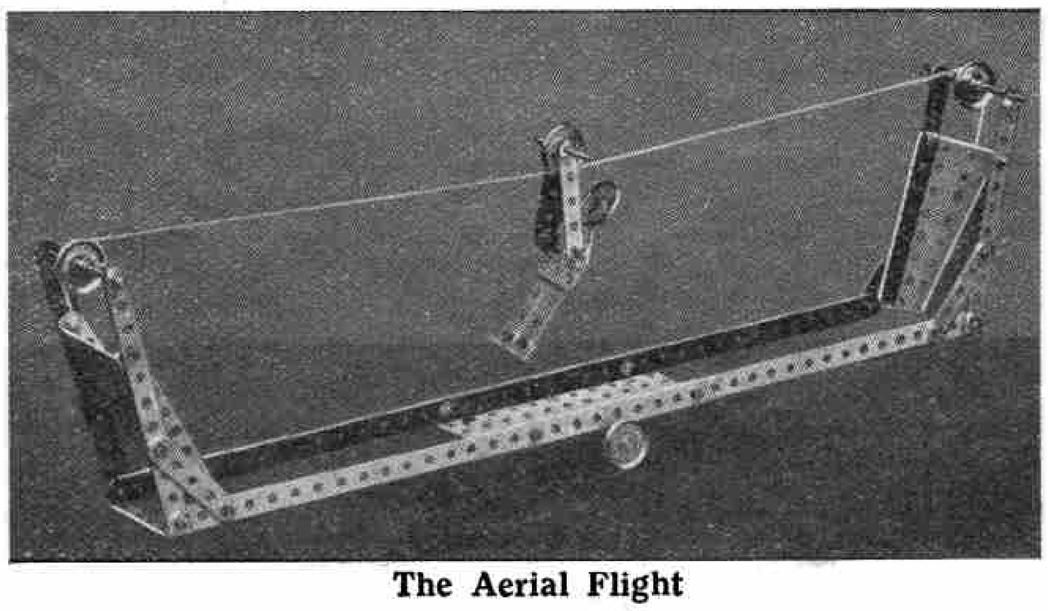
"How would you like a ride on that?" he asked, as we stood watching two Meccanitians, suspended by ropes from the top of a high pole, and flying round and round in space. "I don't think I should like it over much," I replied. "But then I'm not as strongly built as your subjects, you know."

[GIANT STRIDE. This is quite easy to make, for the details are well shown in our illustration. We imagine our Meccanitians must find this a very exhilarating pastime, for a slight turn of the $1''$ Pulley Wheel at the top of the model will send the little men flying round in space in a most thrilling manner.]

The King next showed me two more exciting "stunts" indulged in by these little people. One that made me feel dizzy to look at was two gymnasts, who, holding on to long revolving arms, were whizzing round like a catherine wheel! In the other one, a little chap was having a fine ride by means of a wheel running down an inclined rope.

[REVOLVING GYMNASTS. This is quite a simple model to construct, but care should be taken to see that the little figures have sufficient clearance within the revolving strips. Their arms should be rigidly fixed in the position shown.

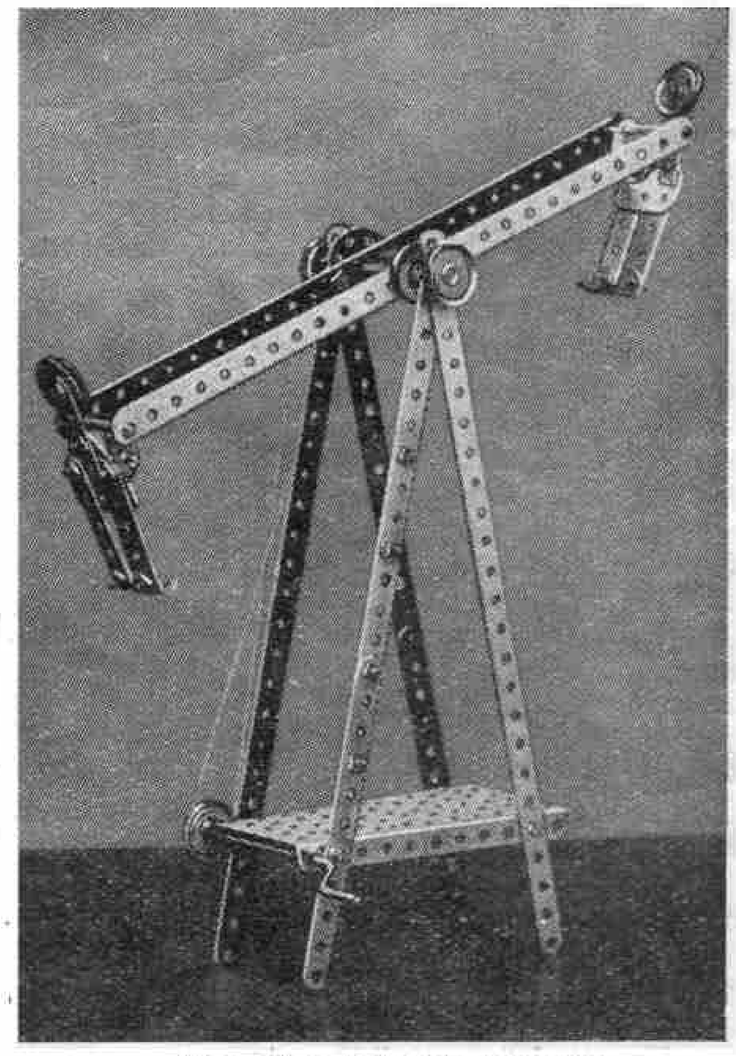
AERIAL FLIGHT. The entire frame rests upon two $1''$ Pulley Wheels, the Axle passing through a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip bolted to the underside of a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate in the base. When the joy-rider has reached one end of the cord, the model may be tilted so that he returns to the other end.]



The Aerial Flight

It would take pages and pages to describe half the other amazing things I saw and did, or the wonders the King of Meccano described to me. We must have covered many miles altogether, at times riding through the streets on little trolleys that went as fast as you wished, or in the King's splendid limousines. Sometimes we covered mile after mile in the beautifully-fitted Hornby Pullman cars of what must be the finest and most efficient miniature railway system ever built.

However, all good things must come to an end some time or another, and at last the King reminded me that he must now take me home, for it was getting late. I was quite downcast at the thoughts of leaving this sunny land, but he told me that I could enter his country as often as I liked, since I had become a Meccano boy. This cheered me up, and



The Revolving Gymnasts

when I thought of all the things I could tell Jack and show him with my Outfit, I even became eager to get back.

Alighting at Theodolite Palace, the King's residence, he led me inside. Passing down a long corridor we came to a wooden door, which the King opened, bowing gravely as he did so. As soon as I passed through, the door shut with a bang behind me, and I found myself returned to my normal size and once more sitting in my chair with the fire nearly out! As I sat up hurriedly, Jack burst into the room yelling out to me to come and join in a charade. Even as he spoke there seemed to be a hasty movement in my Meccano Outfit, and I was almost certain I saw a Flat Trunnion and a $1''$ Pulley Wheel jump back into their places just in the nick of time!

THE END.

Lives of Famous Engineers—(*cont. from p.* 15)

and the distance between the points of suspension of the main bridge was 579 ft. Including the embankment and a stretch of new road on the Carnarvon side, together with the toll-houses, the total cost of the bridge was £120,000.

A Bridge for Conway

Soon after the Menai bridge was begun the authorities decided that a bridge of similar design should be built over the estuary of the river Conway opposite the old castle. As in the case of the Straits, the crossing here had previously been made in an open ferry boat. Work was commenced in April 1822, and by the summer of 1826 the structure was completed. The operations involved in the building of this bridge were on closely similar lines to those we have described in the case of the Menai bridge, and therefore it is unnecessary to go into details. In the Conway bridge the width between the centres of the supporting towers was 327 ft., and the height of the underside of the roadway was only 10 ft. above the level of high spring tides.

Telford's Death

By this time Telford was approaching 70 years of age, an age at which most men lay aside serious work, but he still had the health and mental activity to carry out other important schemes. Among these were the St. Katherine Dock on the River Thames, which was regarded as a masterpiece of harbour construction, and a number of bridges, the most important of which was a stone bridge across the Clyde at the Broomielaw, Glasgow. He also carried out important drainage works in the Fen district. His last professional work was to prepare a report, at the instance of the Duke of Wellington, on the best method of improving Dover harbour.

A few months later Telford became seriously ill, and he died on the 2nd September, 1834, at the age of 77. He had directed that he should be buried at St. Margaret's, Westminster, but the Institute of Civil Engineers, a body that he had largely helped to establish, urged upon his executors the desirability of interring him in Westminster Abbey, and accordingly he was buried there near the middle of the Nave. The adjoining stone bears the inscription "Robert Stephenson, 1859," for Stephenson had expressed the wish to be buried near Telford.

His Success as an Engineer

Telford's success as an engineer was due to a remarkable combination of natural ability and unceasing labour. He endeavoured to excel in whatever task he took in hand, and was never satisfied with his own accomplishments but always strove to improve his work still further. He regarded his apprenticeship to masonry as having been of more value to him than passing through a University.

In a letter to a friend regarding a young man who wished to become an engineer, Telford pointed out that the profession was over-crowded and that the prizes were few and the blanks many. "But," he added, "if Civil Engineering, notwithstanding these discouragements, is still preferred, I may point out that the way in which both Mr. Rennie and myself proceeded was to serve a regular apprenticeship to some practical employment—he to a millwright and I to a general house-builder. In this way we secured the means, by hard labour, of earning a subsistence; and, in time, we obtained by good conduct the confidence of our employers and the public; eventually rising into the ranks of what is called Civil Engineering. This is the true way of acquiring practical skill, a thorough knowledge of the materials employed in construction, and last, but not least, a perfect knowledge of the habits and dispositions of the workmen who carry out our designs. This course, although forbidding to many a young person who believes it possible to find a short and rapid path to distinction, has proved to be otherwise by the two examples I have cited."

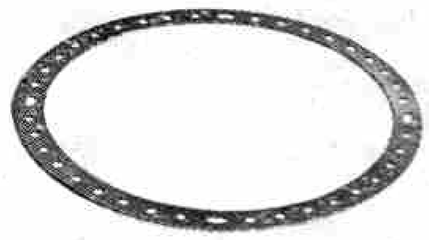
NEXT MONTH:—

THE BRUNELS, FATHER AND SON

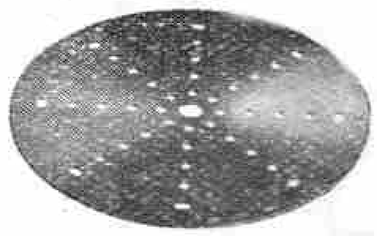
The Meccano Works F.C.

The Meccano Football Club, which was formed at the commencement of season 1924–5, has its ground on the Thingwall Estate, Broad Green. The club's record so far is won 4, lost 2. Goals scored: for 22, and against 10. The club is affiliated with the Liverpool County F.A. and is expecting to give a very creditable show. Longlin heads the list of goal scorers with 11 to his credit.

New Meccano Parts

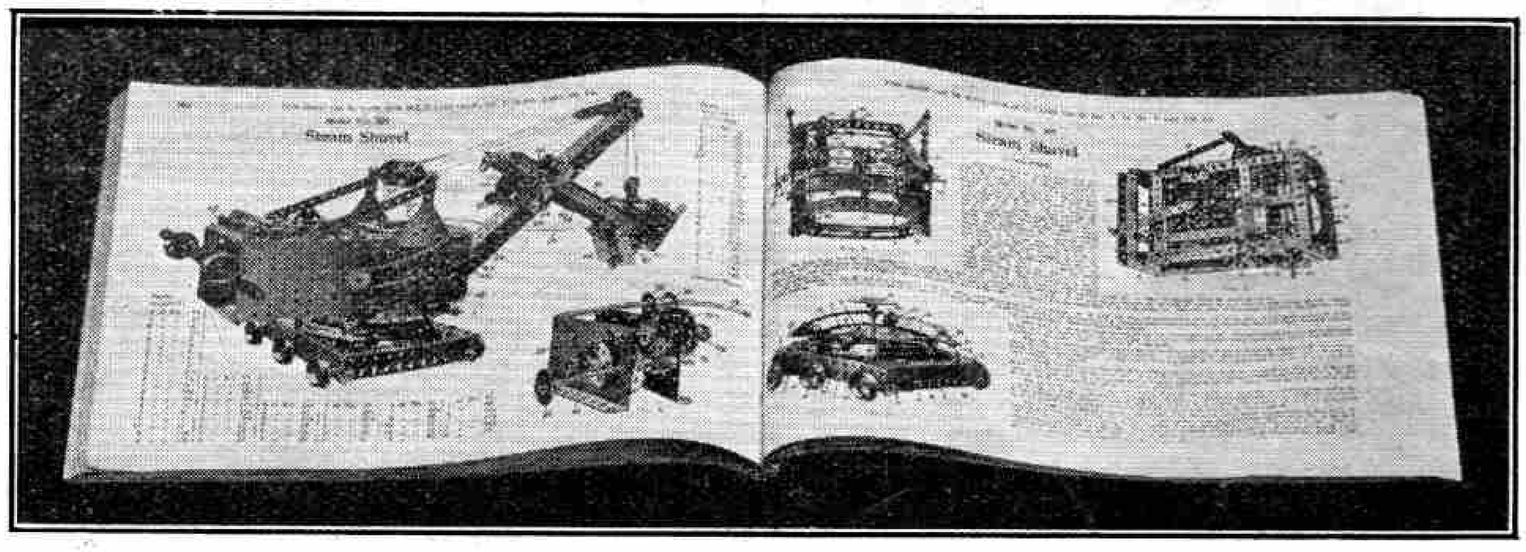


145. Circular Strip (7″ over all) each 1/–



146. Circular Plate (6″ diam.) each 1/3

The New Meccano Manual



There are three Manuals, the 0 Manual for simple models built with the 00 and 0 Outfits, the 0–3 Manual comprising models built with any of the Outfits up to and including No. 3, and the Complete Manual, which comprises a selection of models that may be built with every Outfit up to a No. 7.

This latter Manual is a very fine publication and should be in the hands of every Meccano boy. It includes instructions for building 389 models, including most of the models shown in the former No. 3 Manual, the publication of which is now discontinued. The new edition (No. 24) of the Complete Manual is beautifully illustrated in half-tone and most of the models have recently been revised, and very greatly improved by the introduction of new parts that have been added to the Meccano system during the past year. Several new models have been included for the first time, including some of those published in recent numbers of the "*M.M.*"

Prices of Manuals.

0 Manual	(postage free)	6d.
0–3 ,,	,,	1/2
Complete Manual	,,	2/10

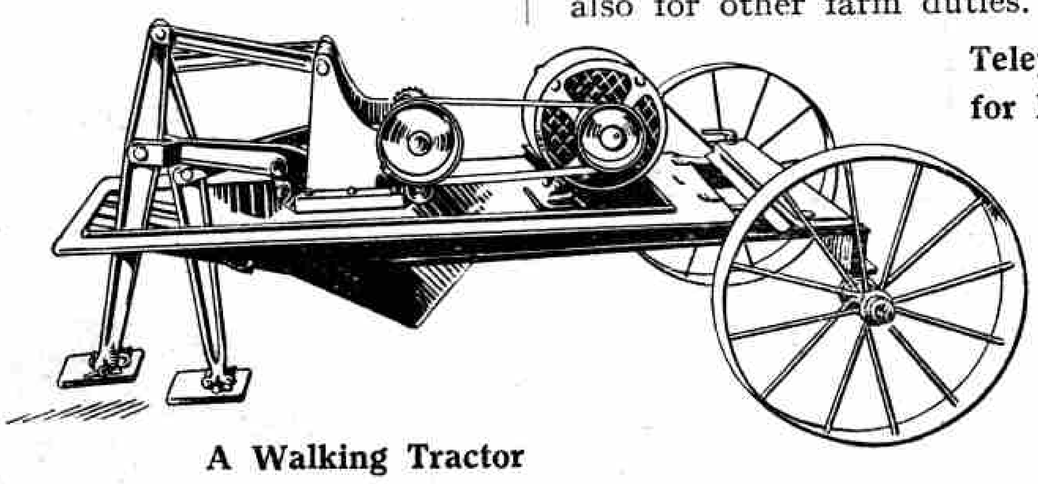
OUR BUSY INVENTORS

RECENT INTERESTING PATENTS

Every day new inventions and ingenious labour-saving devices are being brought into existence. From time to time the most interesting of these will be described and illustrated in these columns. Readers are invited to send particulars (accompanied, if possible, with photos, sketches, or cuttings) of any interesting inventions or devices that may come to their notice. Payment at our usual rates will be made for any contributions used.

A Walking Tractor

It is not always possible to use vehicles with wheels, especially when the ground is heavy and the surface uneven. The problem of overcoming the difficulty has long occupied the attention of inventors, and a new type of transmission was evolved when caterpillar action was used for the tanks during the War. One of the latest inventions in this connection is that of Mr. Nilsson, of Stockholm, whose novel "walking tractor" has recently been tested by the Swedish Government.



A Walking Tractor

This tractor moves forward, and hauls or carries a load, without the use of driving wheels or caterpillar action. It uses levers or legs to retain a fixed grip on the ground, and is driven by a motor, mounted midway between the legs and a pair of wheels, which run free. Power is transmitted through gearing to produce a movement of the legs, and this movement is almost identical with that of the legs of a horse, when the animal is hauling a load. The addition of a heavier load to the tractor causes the legs to take an increased grip on the ground. It is only necessary, therefore, to provide the tractor with suitable shoes, which vary according to the nature of the ground on which the vehicle is working.

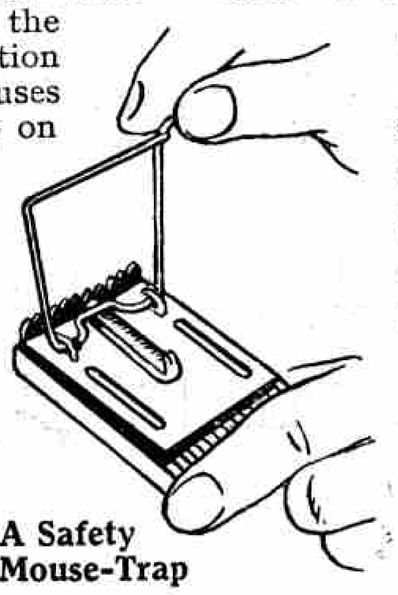
The legs are directly-geared members without cams, springs, or chains, and their movement is so timed that both legs are always planted on the ground before a leg is raised. When a leg is lifted, the movement is speeded up and then is greatly decreased, until the leg reaches the ground again, at which point the speed is the same as at the beginning of the step. Thus the action does not force the shoe into the ground, as it might do if it came down with full force in places where the ground is soft.

The method by which the tractor is steered is interesting. The gearing from the motor is connected to the legs in such a way that, when it is so desired, one leg moves forward more swiftly than the other. This movement is under control of the driver, so that the tractor will move forward in any desired curve. Apart from this, the tractor may be steered by the front wheels.

It is anticipated that the tractor will be particularly useful for agricultural work, for it may be used for hauling ploughs and harrows over rough land, and used also for other farm duties.

Telephone Silencer for Navy

The "Hush-a-phone" is the latest device invented for use in our Navy. This device enables control officers, crowded together in the fighting-top of a battleship, to transmit ranges and other information connected with the firing of the big guns without disturbing each other, or without the noise of gunfire disturbing the officers' speech. The use of this device will increase accuracy in transmitting firing data, and so eliminate errors which often arise when the transmission of the officers' instructions is confused with outside noises.



A Safety Mouse-Trap

Safety Mouse-Traps

Apparently suffering from the fact that many mouse-traps catch more fingers than they do mice, an inventor has devised a new form of trap. By means of a simple twist of wire the trap may be set without danger. The spring is released when the mouse steps upon the raised platform to take the bait.

For the Kitchen

Control of the temperature of the water for the kitchen sink is easily obtained by the use of a newly-patented mixer, connecting the hot and cold taps. This fitting consists of a "T-pipe" with a baffle plate, cast in its centre, which gives perfect mixing, regardless of unequal pressure under which the water may be supplied. The device is installed by turning the two taps inwardly to a horizontal position, where they are fastened together by means of two sleeves. These screw on to the mixer and are provided with rubber washers at the ends that go over the taps.

OUR MAIL BAG

In this column the Editor replies to letters from his readers, from whom he is always pleased to hear. He receives hundreds of letters each day, but only those that deal with matters of general interest can be dealt with here.

Correspondents will help the Editor if they will write neatly in ink and on one side of the paper only.

Geo. Campbell (Buenos Aires).—For one who has suffered so much, you are extraordinarily cheerful—a regular Meccano Boy in fact! Let us know how your leg is progressing and if you can now get around again. Thanks for your very interesting account of life in Buenos Aires. Write us again soon.

A. C. Sandwell (Brentwood).—If we can find room for your article on "The Great Bear" we will publish it. Stephenson was really responsible for the Steam Blast we believe, although others claimed the invention.

J. Barton (Wood Green).—We enjoy reading your letters and are glad to hear all about your home friends, including Snooker. We hope to hear more of the cutting machine that you are designing.

J. Barton, Jr. (Wood Green).—The weather up here has been just as bad as your own, probably worse. We hope you will have better luck with Jane than you had with Snooker. We will ask Rover to say something useful on motor cycles later on.

H. Woodman (Melksham).—Thank you for telling us all about your Meccano class and the Meccano exhibits at the Hospital Carnival. These events are excellent—they keep boys busily and intelligently occupied, and they bring together Meccano boys under the happiest conditions. Your own model, published in our September issue, has provoked much favourable comment.

R. Savill (Longton).—"Why I was fool enough to give up the '*M.M.*' I cannot say, but since I have begun to take it in again my repentance has been sincere." There is much joy in the Editorial office, R. S., over the sinner who has repented. We will send you all the back numbers available, but unfortunately many are out of print.

D. Marsden (Halifax).—According to the Mohammedan legend related in the Koran, King Solomon's Magic Carpet was of green silk. The King's throne was placed upon it when he travelled, and the carpet was large enough for all his forces to stand on it. When all was in order Solomon told the wind where he wished to go, and the carpet with its contents rose in the air and alighted at the place indicated. You will agree, Harry, that this was a very convenient arrangement, to say the least.

V. J. Ruseton (Kirkcaldy).—Congratulations on your school successes. We intend to continue illustrating Meccano models and articles on Railways. Your own article is not quite up to standard. Try again, V. J.!

F. L. Tyler (Oswestry).—We are not surprised to hear that your boy took a prize at the Carnival. His Meccano costume is both ingenious and attractive judging by the photo that you have sent us. Please convey our congratulations to him.

E. G. Cowe (Midlothian).—We shall remember your promise to send us an account of your experiences working in a coal mine, and shall be most disappointed if it does not arrive soon. We will find a suitable correspondent for you in France.

A. T. F. Reynolds (Chesham).—Thanks for photo of yourself with your Meccano model, which, we are pleased to learn, took a prize at your Hospital Carnival.

T. Hatt (12, Osborne Road, ?)—We have received two letters from you, Tony, and 7d. for a Guild Badge, but we *must* know where you live before we can send the latter to you. Write us again and give your full address this time!

W. T. Kay (Baxender).—We were very sorry indeed to hear of your accident, and we congratulate you on being still alive. We hope you are all right again now. We should be glad to see a sketch or photo of your new model.

J. E. Goran (Fort William).—Five prizes in one year is good work, just the kind of thing we should expect from an old Meccano boy like yourself. We certainly count you as one of our old friends.

N. E. Ngee (Singapore).—We read your long letter with much interest, and we have sent out to you full instructions for running your loco and hope you will find these helpful. We will pass on your suggestion regarding the Meccano Jersey to the makers.

R. O. Riordan (Ealing, W.5).—Now that you mention it, our covers certainly have been rather "hot" for the summer months! As the summer hasn't really been summer at all, however, perhaps we shall be forgiven! We think that the 1925 "*M.M.*" covers will be considered altogether better than any we have used up to now.

The Secretary's Notes

My first task this month is a very pleasant one, and it is to wish every member of the Meccano Guild a Happy and Prosperous New Year. This is the time to make good resolutions, and I hope that every Guild member will include among his resolutions the determination to do his utmost to make this the record year in the history of the Guild. I have always been optimistic in regard to the Guild's future, and with the opening of 1925 I am more sanguine than ever. During the past few months new members have joined the Guild in record numbers, new clubs have come into being, and the existing clubs have given ample evidence that their vitality is as strong as ever. My great ambition is that by the end of 1925 the membership of the Meccano Guild throughout the world shall have been doubled, and I ask every member of the Guild to resolve to recruit at least one new member during the year and so enable me to realise my ambition.

Good Resolutions for 1925

Club Leaders and Secretaries will be glad to hear that the Meccano Guild Map promised in our last issue is now ready, and we give a reproduction of it on this page. This map will prove of value in a great variety of ways, especially in the arrangement of inter-club football or cricket matches, rambles or cycle outings in the summer months, and social evenings, etc., during the winter. Then again, clubs situated within reasonable distance of one another may be able to form a combined concert party for the winter evenings. In all such cases a glance at the Guild map will show at once the approximate distance of the nearest clubs, and the addresses of their Leaders or Secretaries can be obtained immediately from headquarters. In the near future it is intended to publish a complete list of all Meccano clubs in this country with their full addresses, and a copy of this list, together with the Map, should be in the possession of every affiliated club. It is hoped also that the Map will be of assistance to the "lone" member or to the new Meccano boy who wishes to join a club in his district, and full particulars of any particular club will be sent to any reader who is interested.

The Guild Map

Very few words are necessary to explain the map. Each town or city in which there is an affiliated Meccano Club is marked with a black circle. Where there are two or more clubs in a particular place, the circle is divided accordingly. For example, the circle representing Birmingham is divided into four parts indicating four clubs; the circle for Glasgow shows that the city has three clubs, and so on. Unaffiliated clubs are not featured. Copies of this map will be sent out shortly to any Club Leader on request. It should be pointed out that two or three new clubs have become affiliated since the map was prepared and therefore they do not appear. New editions of the map will be prepared from time to time in order to keep it up-to-date.

For some time I have had in mind the possibility of introducing shooting with air rifles as an additional attraction for Meccano Clubs, and therefore it was with very great pleasure that I read a report from one of our most active clubs describing the formation of a miniature rifle section. I believe that such a feature would increase the popularity of most clubs, and therefore I take this opportunity of giving a few hints regarding the best method of carrying out shooting practice.

Miniature Rifle Shooting

First of all I must emphasise the importance of using only air rifles, as any other kind of rifle is dangerous for indoor use. Many people appear to be under the impression that air rifles are of no use for accurate shooting, but this is a mistake, for modern air rifles are very accurate within their range. In addition to safety such rifles have the further advantage of using cheap ammunition, the necessary pellets costing only a small sum per thousand.

Card targets may be purchased for about 1/– per hundred. These, of course, must be backed with something sufficiently solid to stop the pellets, and for this purpose a large wooden box filled with sand is excellent, the card target being tacked to the front of the box. The target should be placed as far away from the firing point as the length of the room permits.

Before any shooting commences certain rules should be made and strictly adhered to. The most important rule of all is that no person shall be allowed to go in front of the firing position while the rifles are in use, and it is a good plan to have a bell in the room and to ring it once as a

Two Important Rules

signal that firing is about to commence, and twice when shooting has ceased and the targets may be changed and examined. Another important rule is that a rifle should never be pointed at anyone in the room, whether it is thought to be loaded or not. These two rules should be strictly enforced, and any breach of them should be punished by the infliction of a penalty of some kind to be determined by the Leader, who should always be present during shooting practice.

How to Aim

Shooting is carried out, of course, in a lying-down position, and it is a good plan to have a piece of old thick carpet or felt to lie on. This can be rolled up after use and stowed away in a corner. The marksman should lie at full length with his left elbow resting on the carpet and his left hand supporting the barrel of the rifle. The butt of the rifle is firmly pressed up against the right shoulder and the forefinger of the right hand is placed round the lower part of the trigger. In aiming, the left eye is closed and the sight is taken with the right eye, looking along the barrel through the backsight to the foresight and the target. The two sights are aligned at a point slightly below the "bull," the top of the foresight being seen in the centre of the notch of the backsight. The eye must not be fixed on the foresight, however, but must look past it to the target. In the case of those who find it necessary to use the left eye for sighting, the order of things is, of course, reversed, the rifle being pressed against the left shoulder and the right eye being closed. In order that the aim shall not be disturbed at the last moment, it is necessary to hold the breath during the time the trigger is being pressed.

Studying the Target

Every boy who goes down to fire should shoot off, say, five shots, and then, after the bell has been rung for the target to be changed, he should closely examine the results of his shots, noting whether he has aimed too high or too low or too much to the right or to the left. He should then make a careful mental note as to how he has failed. Improvement in marksmanship can come only as the result of careful study of the position of the shots on the target. Keen rivalry between different members of the club will also help towards a steady increase in accuracy of firing. In regard to scoring, I suggest that five points be counted for a "bull," three for an "inner" and two for an "outer." It is a good plan to have a small prize for the member having the highest average for a period of a month, and further interest may be aroused by arranging teams of three or more members and offering a small prize for the winning team.

As regards expenses, it should not be a difficult matter for an active club to purchase a rifle, and later other rifles may be added as funds permit. The only additional cost—apart from the extremely small one of targets—is for pellets, and the best method of dealing with this is to make a small charge for so many shots, the amount being adjusted so as to make a small profit to meet running expenses.

I should be glad to give any additional information to clubs desiring to take up air-rifle shooting, and I hope later to be able to introduce some scheme of inter-club championship.

Blackburn Holy Trinity M.C. Football Team

The Holy Trinity Blackburn M.C. became affiliated with the Guild in March 1922, and since then has made marked progress. We reproduce here a photograph of the Club's Football Team, which has played many hard-fought games and has helped considerably to keep up the spirit and enthusiasm of the members. In addition to being keen sportsmen, the members have held many successful concerts and exhibitions, and from time to time have greatly assisted various local efforts to raise money for religious or charitable purposes. A noteworthy feature of the club's summer activities has been a Rambling Club combined with many pleasant picnics, and it is hoped to continue this feature during the year.

Affiliated Meccano Clubs of the British Isles

First List

Town.	Club.	Secretary.
ACCRINGTON	ACCRINGTON M.C.	V. Waterhouse, 45, Ramsbottom St.
ANDOVER	ST. MARY BOURNE M.C.	Douglas L. White, "Rosedale," Stoke, Andover.
BARNETBY	BARNETBY (ST. BARNABAS) M.C.	R. H. Ward, Laurel Villas, Victoria Road.
BIRMINGHAM	BEARWOOD M.C.	C. White, 72, Katherine Road, Bearwood.
"	KING EDWARD'S M.C.	N. J. Robertson, 30, Hinstock Rd., Handsworth.
"	SMALLHEATH M.C.	W. Edge, 131, Whitehall Rd., Smallheath.
"	SPARKBROOK M.C.	Francis Hubball, 71, Turner St., Sparkbrook.
BLACKBURN	HOLY TRINITY M.C.	H. Jepson, 11, Pine Street.
BLACKPOOL	BLACKPOOL SPORTS M.C.	J. Fraser, 10, Clifton Grove, South Shore.
BOSTON	BOSTON (LINCS.) MODEL-MAKING M.C.	R. Robinson, 30, Woodville Road.
BROMLEY	BROMLEY COUNTY SCHOOL (BOYS) M.C.	H. Searle, 14, Broadway, Bromley, Kent.
BUCKFASTLEIGH	BUCKFASTLEIGH M.C.	H. I. Parsons, Bell House, Fore St.
CHARD	COMBE ST. NICHOLAS M.C.	Leonard Bailey, Combe St. Nicholas School, nr. Chard.
CHELTENHAM	CHELTENHAM GRAMMAR SCHOOL M.C.	E. W. Griffiths, Hadleigh, Naunton Park Rd.
CLAYGATE	CLAYGATE JUVENILE CLUB—MECCANO SECTION—BOYS AND GIRLS	(Leader) J. W. Haynes, "Fontmell," Covers Road.
EASTBOURNE	MEADS M.C.	F. Laycock, 10, Victoria Place.
EDINBURGH	BOROUGHMUIR SCHOOL M.C.	James D. Watson, 1, Alvanley Terrace.
"	LOANHEAD BOY SCOUTS M.C.	B. Warnock, R. P. Manse, Loanhead.
ELLESMERE PORT	ELLESMERE PORT M.C.	W. H. Hope, 41, Princes Road.
GLASGOW	VICTORIA M.C.	T. Calderwood, 63, George St., Whiteinch.
GLOUCESTER	GLEVUM M.C.	(Leader) Mr. L. C. Hobbs, 32, Vicarage Rd.
GRIMSBY	GRIMSBY CENTRAL M.C.	J. H. Boreham, 277, Cleethorpes Road.
HERNE BAY	1st HERNE BAY MECCANO AND HOBBIES	C. W. Russell, 4, Clifton Villas, South Road.
ILFRACOMBE	ILFRACOMBE M.C.	W. Webber, 14, Springfield Road.
KNUTSFORD	KNUTSFORD LECTURE HALL M.C.	Charles Morris, 3, County Terrace.
LEAMINGTON SPA	LEAMINGTON M.C.	A. R. Mannall, 12, Lansdowne Circus.
LISCARD (CHESHIRE)	LISCARD HIGH SCHOOL	A. B. Warburton, 11, Brisbane Ave., New Brighton.
LUTON	LUTON M.C.	L. Goldsmith, 69, Tennyson Road.
MELTON MOWBRAY	UNITED SCHOOLS M.C.	H. White, 25, Bayswater Road.
NEW MALDEN	NEW MALDEN M.C.	E. Alcorn, 7, Poplar Grove.
NORWICH	NORWICH ENTERPRIZE M.C.	C. R. Agar, 73, Vincent Road.
NOTTINGHAM	WEST VIEW M.C.	(Leader) Mr. H. W. R. Cousens, 494, Mansfield Road, Sherwood, Nottingham.
PARKSTONE	PARKSTONE CONGREGATIONAL M.C.	T. W. Andrews, "Milton," Hillcrest Road.
PETERBOROUGH	PETERBOROUGH M.C.	A. Marsh, 88, Granville Street.
PORTHCAWL	2nd PORTHCAWL M.C.	G. S. Morgan, 20, Park Avenue.
REDRUTH	REDRUTH M.C.	L. Trenberth, Tunnel Stores.
ROLLESTON	ROLLESTON M.C.	Phin Toon, Sherbourne House, Tutbury Rd., Rolleston, Burton-on-Trent.
ROSYTH	ROSYTH M.C.	T. Hunter, 79, Admiralty Rd., Rosyth, N.B.
ROTHERHAM	GOLDTHORPE M.C.	E. Turner, 73, High St., Goldthorpe, Rotherham.
ST. ANNES-ON-SEA	ST. ANNES-ON-SEA M.C.	Master E. King, 109, Church Road.
STOCKPORT	DAVENPORT M.C.	A. D. Stoker, 124, Bramhall Lane.
WESTCLIFF-ON-SEA	WESTCLIFF & DISTRICT M.C.	D. S. Cecil, 22, Valkyrie Road.
WHITE NOTLEY	WHITE NOTLEY M.C.	F. W. Fox, 2, Station Rd., White Notley, Witham.

The Meccano Guild

A Great Fellowship of Boys

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.

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.

What It 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.

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 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 (illustrated on this page) 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. Full particulars of the Recruiting Campaign, together with a supply of application forms, will be sent on request.

THE MECCANO GUILD CERTIFICATE

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 over 100 active clubs in various towns and villages in this country, as well as many Clubs Overseas and in foreign countries. Each club has its Leader, Secretary, Treasurer and other Officials, all of whom, with the exception of the Leader, are boys. 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.

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) and stamps for this 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. Any boy wearing the Guild badge is at once recognised by other Meccano boys as being a member of the Guild and one who has undertaken to live a clean, truthful, and upright life.

SPECIAL MERIT MEDALLION
(About half actual size)

In addition to the badge, each member receives a membership certificate, measuring $7'' \times 9\frac{1}{2}''$. This certificate is printed in orange and sepia and is a smaller edition of the large club certificate.

Write to the Secretary of the Meccano Guild, Binns Road, Liverpool, asking for an application form and full particulars. Then fill in the form and return it to Headquarters, when you will be enrolled and your badge and certificate will be sent to you. Write to-day, and put M.J. after your name for reference.

BADGE OF MEMBERSHIP

AFFILIATION WITH THE GUILD

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 such privileges as the loan of interesting lectures and club membership cards. Members are also eligible for the Merit Medallion (illustrated on this page) which is awarded to members who display special ability in connection with club work.

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 in some other part of the country or abroad. To those boys who are interested in foreign languages the Correspondence Club presents a splendid opportunity of obtaining a correspondent in the particular country in the language of which they are interested. They are able to write to a Meccano boy in his native language, and as he would probably reply in English, the correspondence will be of mutual benefit. Stamp collectors also find the Club of value, as they are enabled to exchange stamps with their correspondents. Full particulars and enrolment form will be sent on application.

RECRUITING MEDALLION

CLUB NOTES

Ilfracombe M.C.—Commenced activities in October when an interesting syllabus was arranged, including Model-building, Lectures and Games. It was decided to hold an Exhibition and Social at the end of the session. Members are very keen to improve the club and have acquired a Chess set, a Microscope and a No. 3 Meccano Set, which it is hoped to enlarge in due course. Club roll: 13. *Secretary*: Master W. Webber, 14, Springfield Road, Ilfracombe.

Parkstone Congregational M.C.—Has celebrated its third birthday by a special re-union of all old members. The Secretary, Master S. Bridle, has resigned, and Master T. W. Andrews has been elected in his place. Wireless is in great demand and excellent results have been obtained from the club's two-valve and crystal sets made by members. Club roll: 25. *Secretary*: Master T. W. Andrews, "Milton," Hillcrest Road, Parkstone, Dorset.

Redruth M.C.—Is steadily increasing its membership and making good progress. The Fretwork Section is very popular, and a Savings Bank, Library and Museum have been introduced. The Football Team have played some good matches and done very well. Club roll: 36. *Secretary*: Master L. Trenberth, Tunnel Stores, Redruth.

Leamington M.C.—Many interesting and instructive meetings have been held. The Assistant Leader, Mr. G. Hare, gave a lecture on "*Taking and Showing Moving Pictures*," explaining to the members the principles of the cinematograph, which he illustrated with his own machine. Papers have been read on "*The Motor Car*," and "*Building the Canadian Pacific Railway*," by the Secretary. *Secretary*: A. R. Mannall, 12, Lansdowne Circus, Leamington.

Victoria (Glasgow) M.C.—Propose to hold an Exhibition at the end of January. Among the club's activities during the session have been Lectures, Model-building, Competitions and Games. Club roll: 37. *Secretary*: Master T. Calderwood, 63, George Street, Whiteinch, Glasgow.

Herne Bay M.C.—The session has proved the best yet experienced. Recruiting has been one of the club's marked features, and on one evening fourteen new members joined. Hobbies Nights and Fretwork figured in the programme, with Meccano Model-building predominating. A novel feature has been the introduction of a Rifle Range. A very interesting lecture was recently given by the Rev. E. E. Robinson on "*My Experiences in Canada*," and this was highly appreciated. Mr. Robinson promised to continue his experiences on the next lecture night. Club roll: 19. *Secretary*: Master C. W. Russell, 4, Clifton Villas, South Road, Herne Bay.

Melton Mowbray United Schools M.C.—About 50 persons were present at a recent Social Evening. The programme included recitations, instrumental solos and dialogues, and at the conclusion of this very enjoyable entertainment, presided over by Mr. C. Goldspink, refreshments were served. The club-room was beautifully decorated and illuminated by coloured electric lights. Meetings are held on Wednesdays at 7 p.m. Club roll: 24. *Secretary*: Master H. White, 25, Bayswater Road, Melton Mowbray.

Goldthorpe M.C.—Owing to being unable to secure a room members have held their meetings in the Leader's house, but now that a public hall is being built in Goldthorpe it is hoped to obtain a room there for weekly club nights, when the membership should be considerably increased. Club roll: 6. *Secretary*: Master E. Turner, 73, High Street, Goldthorpe, nr. Rotherham.

Holy Trinity (Barnsbury) M.C.—Members have held a very successful Concert and Exhibition, which helped considerably to pay the club's expenses. Other club events include Radio, Lectures, Fretwork and Model-building. A camera given by Meccano Ltd. for good work in model-building, etc., for the Exhibition was won by W. Kebell. "Esperanto" was introduced and its syntax explained by the Leader, Mr. Stuart H. Wilson. Club roll: 30. *Secretary*: Master Stanley A. G. Bone, The Rosary, Kents Hill Road, South Benfleet, Essex.

The St. Mary (Newington Butts) M.C.—Very interesting Building Competitions have taken place, in which all members were encouraged to invent new models. A Guild Rally was recently held at Holloway and several of the club officials and members were present. Club roll: 116. *Secretary*: Mr. C. A. E. Curle, 37, Pullen's Flats, Peacock St., London, S.E.

West View (Nottingham) M.C.—A recent Exhibition proved most successful, the exhibits including a Motor Chassis, Wire-Rope Maker, Locomotive, Band Saw, Hornby Trains and mats made on Meccano Frames. Bonfire night was celebrated "en masse" and was quite a gala night. Debates, Model-building, Competitions, Games, Lectures and Wireless figure in the session's programme. All members are very enthusiastic. Club roll: 28. *Leader*: Mr. H. W. R. Cousens, 494, Mansfield Road, Sherwood, Notts.

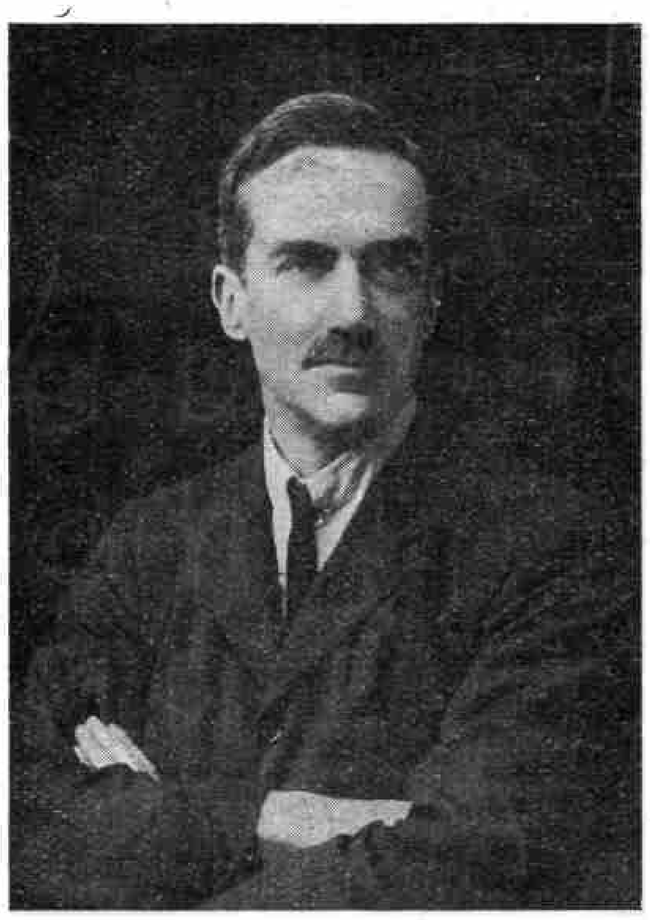
St. Barnabas (Barnetby) M.C.—Members have been busy preparing Meccano Models, Fretwork, Wireless, and a Hornby Train System for their Christmas Exhibition. An interesting lecture was given by Mr. Yarker, on "*The Making of Fireworks*," with some experiments. Another feature was a Painting Competition. The average attendance at meetings is 18. Club roll: 25. *Secretary*: Master R. H. Ward, Laurel Villas, Victoria Road, Barnetby, Lincs.

Accrington M.C.—The session's programme has included a musical evening to which parents and friends were invited. Another interesting item was a lecture on "*Engineering*," by Mr. Aivey. Two members of this club have recently won school scholarships. Club roll: 21. *Secretary*: Master V. Waterhouse, 45, Ramsbottom Street, Accrington.

Blackpool M.C.—Has made excellent progress and since our last report has increased its membership by eleven. The members' many activities have included papers on "*Iron and Steel*" and "*Ships*," and a practical demonstration of the Steam Engine and its different types. In the Model-building competition a Mill won the first prize, an Electric Locomotive second and a Crane third. Club roll: 35, average attendance 24. *Secretary*: Master J. Fraser, 10, Clifton Grove, South Shore, Blackpool.

Meccano Club Presidents

No. 3. Col. The Hon. Sidney Peel, D.S.O.



Col. The Hon. Sidney Peel, D.S.O., was educated at Eton and Oxford. He served in the South African War, and in 1900 was awarded the Queen's Medal with three clasps. From 1914 to 1918 he was on active service, and during this time he won the D.S.O. In 1918 he was elected M.P. for Uxbridge and he held the seat until 1922.

Col. Peel has always been keenly interested in young people and their various activities, and when the Southall Meccano Club became affiliated with the Meccano Guild in January 1923 he readily agreed to become its President. Since that time Col. Peel has never failed to show the greatest interest in the progress of the club, and his generosity and kindness are greatly appreciated by both Leader and members.

Davenport M.C.—A Bazaar held in October and lasting four days proved a great success, and visitors expressed their high appreciation of the splendid display. All members worked very hard to secure this good result. Further club activities during the session have included Lectures, Model-building and Games. Club roll: 36. *Secretary*: Master A. D. Stoker, 124, Branhall Lane, Stockport.

Southall M.C.—Has been unfortunate in having to vacate its club-room owing to this being required for another purpose. Strenuous efforts have been made to procure another room, but up to the present without success. The members are not downhearted, however, and they intend to keep on trying until they succeed. In the meantime the Leader is keeping the boys together by organising a Cycling Club, and by visiting their homes. Should any reader know of a suitable club-room will he please get into communication with Mr. E. C. Carpenter, Club Leader, 56, Hammond Road East, Southall, Middlesex.

Bromley Country School M.C.—Members have been very busy constructing models for a bazaar. The principal model is that of the Eiffel Tower, on which most of the members are concentrating, while others are building a Crane and an Aeroplane. It is intended to hold more frequent meetings as it is found that the time available on club nights is not enough for the bazaar preparations. Club roll: 8. *Secretary*: Master H. Searle, 14, Broadway, Bromley, Kent.

Claygate Juvenile Club, Meccano Section.—Members have spent enjoyable and instructive meetings, devoted largely to Model Engineering, Carpentry and Indian Club exercise. The club is in a very sound financial position and arrangements are already being made for the next series of Sports and Outings. Club roll: 86. *Leader*: Mr. J. W. Haynes, Fontmell, Covers Road, Claygate, Surrey.

Boston (Lincs.) M.C.—Have recruited new members by exhibiting Fretwork and Copperwork models in St. James' Debate Society's Exhibition. A Lantern Lecture was held on "*The Secrets of Fleet Street*," the slides being lent by the "*Daily Mail*." Club roll: 30, average attendance 25. *Secretary*: Master R. Robinson, 30, Woodville Road, Boston, Lincs.

Grimsby Central M.C.—Owing to the resignation of Mr. Haw through business reasons, Mr. Gebler has kindly consented to become the Leader. Members are busy building a model for a local Church Bazaar, and it is hoped to help to raise funds for the Church by charging visitors a small amount to guess the number of separate parts in the model, the winner gaining a prize. The new Leader has promised a prize for the best model built during the Winter Session. It is proposed soon to visit Immingham Docks and also the local Flour Mills. Club roll: 16. *Secretary*: Master J. H. Boreham, 277, Cleethorpe Road, Grimsby.

St. Annes-on-Sea M.C.—Has now become affiliated with the Guild and has excellent prospects. Since the commencement of the session marked progress has been made and many new members have joined. Good results are anticipated from a proposed Social Evening. *Secretary*: Master E. King, 109, Church Road, St. Annes-on-Sea.

South Africa

Observatory M.C.—Has held interesting and instructive meetings. A special evening was set apart for a lantern lecture given by Mr. Cartwright on "*Glass Manufacture*," when the history of glass was traced back to a very early age. Slides of some beautiful glass specimens were shown on the screen and fully explained to a large attendance of members and parents. Another item of interest was a lecture by Mr. J. Piek on "*Stamp Collecting*," at the close of which the President, Mr. Geo. Barrett, gave over 400 stamps to members interested in collecting. Club roll: 73. *Secretary*: Mr. Joe Wilson, Observatory Meccano Club, P.O. Box 1247, Cape Town, S.A.

Wynberg M.C.—The annual meeting was held in September and there was a large attendance. A prize was offered by the Chairman, Mr. Barrett, to the boy who during the year comes nearest to the high ideals of life. Arrangements have now been made for the club meeting to be held in the Town Hall. *Secretary*: Mr. E. H. Hall, Boundary Road, Rondebosch, Cape Province, South Africa.

India

Calcutta M.C.—The club is making good progress and it is hoped to get more members this session. An Exhibition was held in October in which the public took keen interest. Some excellent electrical and mechanical models were exhibited, including Electric Lifts, Telegraph, the Dragline model, etc. Successful Radio Evenings have been held and members have listened-in to the concerts broadcast from the Radio Club of Bengal. Other items in the programme have included Musical Evenings, Model-building and Lectures. Club roll: 32. *Secretary*: Mr. A. N. Roychowdhury, 35/2, Beadon Street, Calcutta, India.

Clubs not yet Affiliated

Birkenhead M.C.—Has succeeded in obtaining a suitable club-room and application for affiliation will be made shortly. The Chairman of the Ellesmere Port Meccano Club recently visited this club and gave an illustrated lecture on the usefulness of various Meccano models. Club roll: 15. *Secretary*: Master A. Kerr, 27, Plumer Street, Birkenhead.

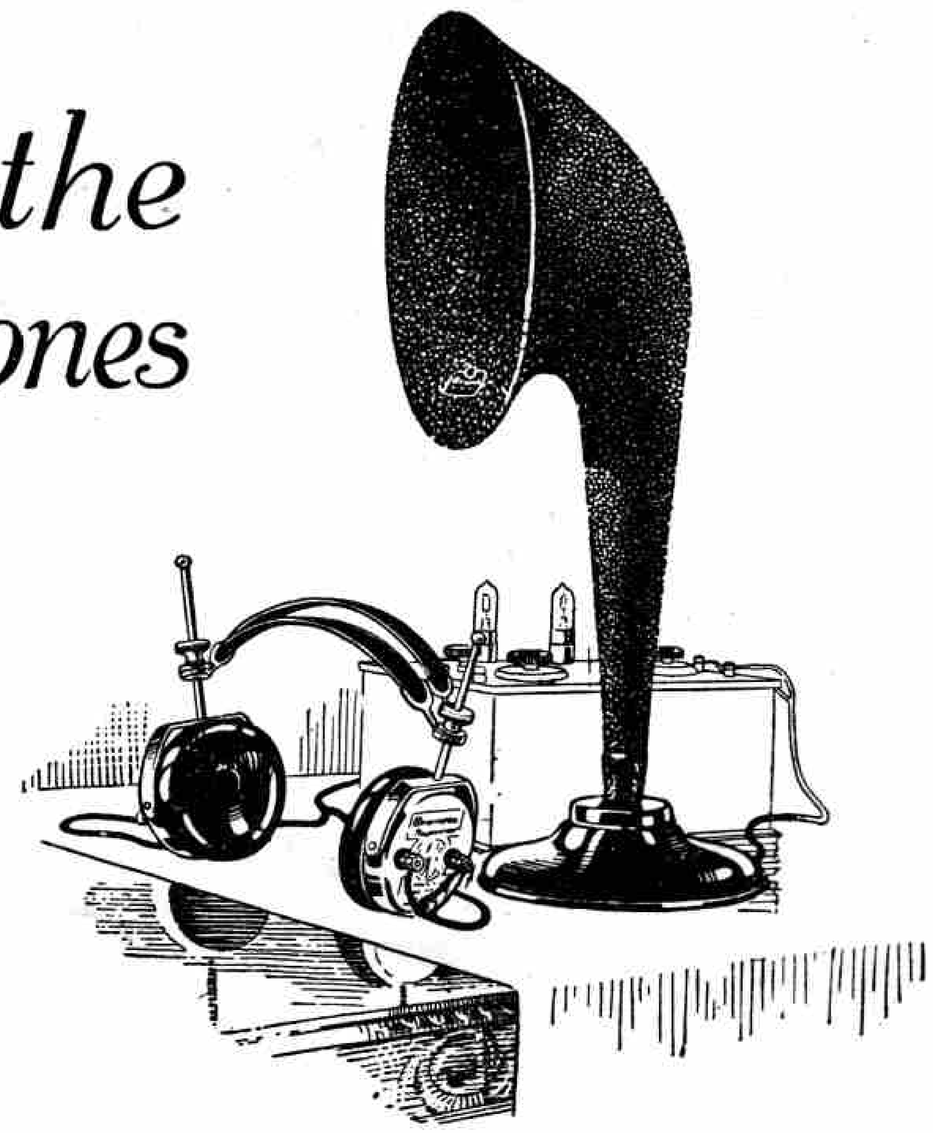
Wellesley School (Croydon) M.C.—A club has been formed in the school and the necessary officers have been elected, one of the Principals acting as Leader. The club is proving popular with the boys. *Secretary*: Master W. Tompkins, Wellesley School, 20, Addiscombe Road, Croydon.

Victoria (Salop) M.C.—Has adopted a novel and excellent idea for recruiting, each member promising to bring at least one new member during the session. It is hoped soon to double the present club roll of 12. *Secretary*: Master L. Saxton, 46, Haygate Road, Wellington, Salop.

Delhi Children's M.C.—Very successful meetings have been held under the Presidency of Mr. Girdharilal Puri, B.Sc., and good attendances have been recorded. During the session an interesting lecture was given by Dr. Nabhi Ram Joshi who explained how he made his recent discovery of an oil having medicinal qualities, and also the value attached to it. *Secretary*: Mr. R. Raman, Children's M.C., Charkhe Walan, Delhi, India.

Tune the Table-Talker with the "Matched Tone" Headphones

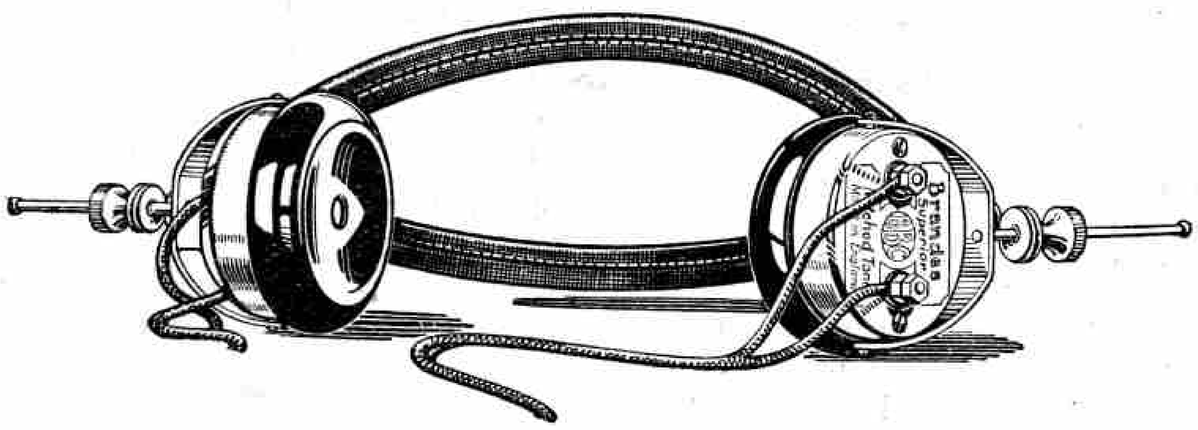
I'LL TELL THE WORLD! The fever of the Experimenter has fired young Bill's ambition. In the picturesque vernacular of our American friends he's "cottoned on to the hull bunch"—vacuum tubes, hook-ups, new wave bands, right down to the last binding post. He tunes in the distant stations now with his "*Matched Tone*" Headphones, and is content. They bring in the faintest signals, their delicate supersensitivity making them unexcelled for long range telephony. And the *Table-Talker* is just fine. To his credit, Bill refuses to acknowledge the family's praise. "It's not me tinkering about," he says, "the *Table-Talker* always came through as if you were actually in the studio, and with no scratchy notes." *Ask your Dealer for Brandes.*



All Brandes products carry our official money-back guarantee, enabling you to return them within 10 days if dissatisfied. This practically constitutes a free trial.

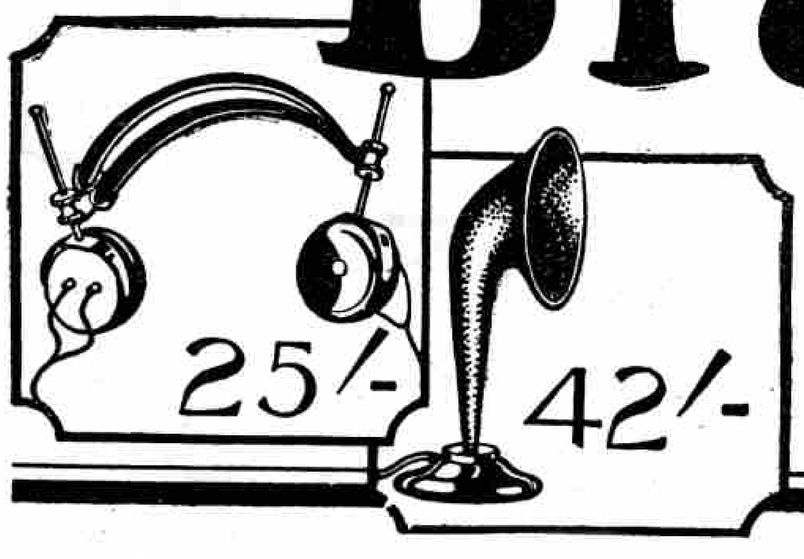
The "*Matched Tone*" feature was embodied as the distinctive characteristic of Brandes' Headphones in 1908, and means that both your ears hear exactly the same sound at the same instant—and you learn a new beauty of tone. They are tested and re-tested for just this one vital point, and in addition their strength, long-wearing comfort and reliable efficiency make them undoubtedly superior. **25/-**

The *Table-Talker* is a Brandes quality product at a moderate price. The non-resonant, specially constructed horn is matched to the unit so that the air resistance produced will exactly balance the mechanical power of the diaphragm. This means beautiful sound-balance and remarkable tone qualities. It is twenty-one inches high and is finished a shade of neutral brown. **42/-**



British Manufacture (B.B.C. Stamped)

Brandes



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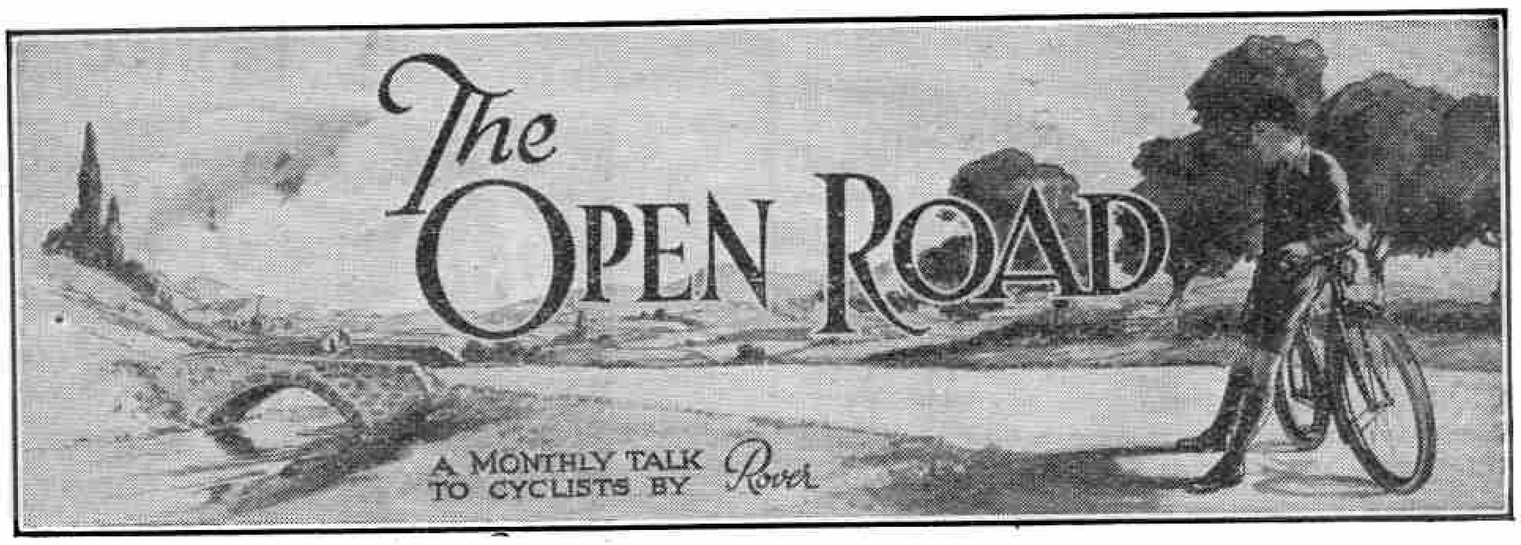
A Veeder Cyclometer
FITTED TO YOUR BICYCLE TELLS YOU:—
How far you have been;
Distance from one place to another;
Service your Tyres give you;
Number of Miles to Destination;
Distance Travelled, etc.

Makes your Riding doubly interesting. Its accuracy has been endorsed by all the best authorities, and the experience of your fathers for 26 years.

Insist on a Genuine Veeder. See the Name thereon.
Beware of German Imitations.
Made in Two Models:
Regular 7/6. Trip 17/6.

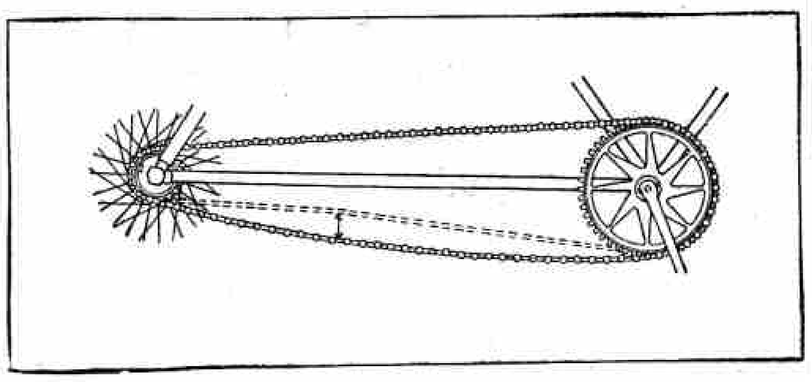
Markt & Co. (London) Ltd.
98-100, Clerkenwell Rd., London, E.C.1.



XI. THE CARE OF A BICYCLE

To a great many cycle owners the fact that "the wheels go round" is sufficient proof that their machine is in good order, and consequently they do not give it any attention. A bicycle is a very long-suffering piece of mechanism, and it will run for a considerable period without any attention. To neglect a bicycle, however, is a very short-sighted policy, for a little time spent in cleaning and oiling results in an increased life for the machine, and makes a great improvement in the easiness of its running.

CHAIN ADJUSTMENT



When a cycle chain is correctly adjusted there should be a play of ¾ in. to 1 in. halfway between the two chain wheels.

Removing Mud and Rust

In bad weather a bicycle inevitably collects a considerable amount of mud. This should not be allowed to remain on the machine, but if possible should be washed off at the end of the journey while it is still wet. If cleaning operations cannot be carried out until the mud has become dry, considerable care is required in its removal in order to avoid scratching the enamel. The best method is to use a wet cloth, which quickly softens and removes the dirt without injury to the polished surface. After riding in the wet or on a muddy road, wheel rims—wooden ones in particular—should always be wiped dry.

The chain, one of the most important parts of the machine, needs attention, and if by any chance it has been allowed to get into a bad condition and become rusty it should be cleaned up with a stiff brush. If the chain is in a very bad state, however, the best plan is to give it a prolonged soaking in paraffin oil, and this will usually restore it to good condition and prepare it for a coating of oil.

How, When and Where to Oil

A bicycle can give its best service only when all its bearings are working smoothly, and in order to ensure this, correct and sufficient lubrication is absolutely necessary. A diagram published in the July "*M.M.*" showed the six parts of a bicycle that are most in need of lubrication, and of these six the wheel-hubs are the most important as they have the most work to do. Special oil holes fitted with dust-proof caps are provided, and oil should be injected into these about every 150 miles. The oil used for this purpose should be a thin oil of the best quality. It is wise to use a standard make of oil, for cheap oils of inferior quality are the dearest in the long run. Variable-gear hubs require similar lubrication.

In oiling the hubs or indeed any part of a machine it is important to prevent any oil coming in contact with the tyres, for oil causes the rubber to perish very quickly.

Care of the Chain

Two different kinds of oil are required for the driving chain, a thin oil for inside the rollers and a thicker grease for the outside to protect it from the wet and to reduce friction. Various brands of chain-grease are obtainable, but tallow, petroleum jelly or a mixture of thin oil and blacklead will do equally well and are considerably cheaper.

Other parts of the machine which, though not so important as the hubs and the chain, must nevertheless be regularly oiled to ensure silent and efficient working, are the head bearings, the pedals and the joints of the brake rods. A few drops of oil are also to be recommended as a cure for creaking saddle springs, which otherwise should not be lubricated.

Making Adjustments

The chain, bearings, etc., require adjustment at intervals, but they should not be interfered with more than is necessary, as continual tinkering is harmful. Once an adjustment has been properly made, that particular part should need no further attention for a considerable time. The driving chain is an exception to this, however, for after exposure to wet it often becomes tight, and it is subject to more or less regular periods of slackening and stretching when in use. This tightening of the chain is often accompanied by harsh cracking sounds during pedalling, showing that the links have a tendency to mount the cogs of the chain wheel. This noise will usually disappear after the chain has been adjusted and well lubricated, but if it does not the trouble is due to worn links, and these should be renewed as soon as possible. The diagram on this page shows the chain adjustment that experience has shown to be the best. It will be seen that there should be ¾ in. to 1 in. play about half way between the two chain wheels.

The hubs, bracket, head and pedals all

(*Continued on page* 38)

Readers frequently write to me asking if I can recommend books that are both of interest and of use. In this column I review books that I consider specially appeal to Meccano boys. I do not actually supply these books, which may be obtained either through any bookseller or direct from the publishers.—EDITOR.

"Stamps of the British Empire."
(Stanley Gibbons. Price 6/6).

The 1925 Catalogue (Part 1) "Stamps of the British Empire," issued by Messrs. Stanley Gibbons, is a necessity to the serious collector, for Gibbons' catalogues are recognised as being standard catalogues at any rate in this country if not further afield. The 1925 edition has been very thoroughly revised and contains illustrations of all types of Colonial stamps and their watermarks, and prices for both used and unused copies.

The catalogue represents, as far as possible, the most up-to-date knowledge available of the postal issues of the British Empire, and in its compilation the publishers have been assisted by collectors all over the world, who have kept them informed of new issues and discoveries made as a result of their own studies. In the present edition there are many revisions and it has been found necessary to re-number the catalogue lists. Such a step is certainly very inconvenient to collectors who have arranged their stamps on the basis of earlier catalogues, for it means that a complete revision in the cataloguing of the stamps in their collections is rendered necessary. The publishers point out, however, that it is impossible to keep their catalogue abreast of modern research if it is to be tied down to fixed numbering, and as all collectors will agree as to the necessity of keeping up-to-date, the inconveniences caused by doing so must be overcome.

"Wonder Book of the Wild."
(Ward, Lock & Co. Price 6/–).

This book will appeal to all boys interested in adventure and discovery. It contains 256 pages and is full of interesting reading matter compiled by famous living explorers and big game stalkers, who themselves tell the story of their adventures and discoveries in the great waste places of the earth.

The book has a particular interest of its own and is beautifully illustrated with photographs of strange places and of wild animal life in a multitude of forms, of which stay-at-home folk have scarcely any conception. The illustrations include various explorers' photographs of their own remarkable subjects, and many photographs of wild beasts, birds, and other creatures at close quarters, by photographers who have made a name for themselves in this most difficult branch of their art. In addition there are twelve coloured plates of wild animal life. Altogether we feel sure that this book will appeal to the majority of our readers.

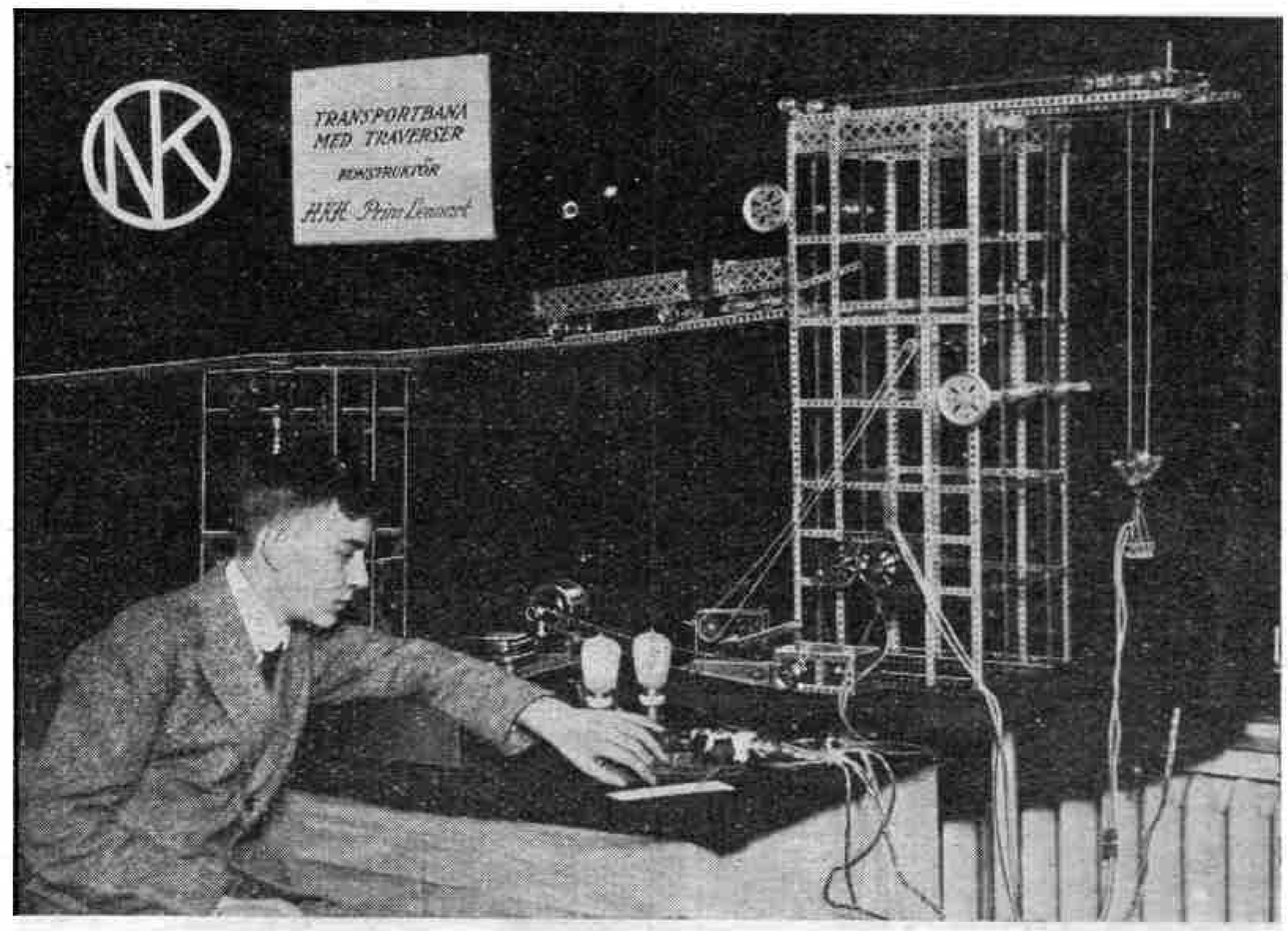
"Where to Seek for Scientific Facts."
By Alec. B. Eason, M.A., A.M.I.C.E., etc.
(S. Rentell & Co. Ltd., 36, Maiden Lane, W.C.2. Price 1/– net).

This little book will prove of considerable value to those in search of up-to-date information on scientific and technical subjects. The author states that the object of this book is to save people time in searching for information. It shows where to find lists of books on various science subjects, indexes of literature and papers on technical and scientific subjects, etc. A good index adds greatly to the value of the book.

"The Book of the Locomotive."
By G. Gibbard Jackson.
(Longmans, Green & Co. 6/– net).

Many books on railways have been written during the past few years, but these have dealt with the subject from a general point of view. In "The Book of the Locomotive," Mr. Gibbard Jackson, who is already well known as a writer on railways, breaks new ground by devoting himself entirely to the history of the British locomotive. He traces in a most interesting manner the growth of the locomotive from the first crude experiments up to the magnificent designs of the present year and winds up with an interesting chapter on the future of the steam locomotive. The book is exceptionally well illustrated by photographs and eight coloured plates, and it can be thoroughly recommended to all our readers interested in railways.

A Prince and Meccano



H.R.H. Prince Lennart of Sweden and his Electric Transporter

Readers of the "*M.M.*" will be interested to learn that the grandson of His Majesty the King of Sweden is an enthusiastic Meccano boy. Our illustration shows Prince Lennart with a fine model that is a sure proof of his ability as a model-builder. The Prince is 15 years of age and told our representative that he had been working on this model for over three years.

Prince Lennart's model represents a form of combined elevator-loader and transporter and eminent engineers who have viewed the structure say that it is correct in every detail. The model is driven by electricity and an electro-magnet serves as a hoist. This is seen on the right of the photograph, connected by wires to the electric supply.

"Wireless World and Radio Review."
(Wireless Press, London. Price 4d. weekly).

The most interesting feature of the latest issue of "The Wireless World" to hand (No. 278) is an article describing the experiments in wireless transmission of photographs carried out on 30th November between London and New York. A picture of President Coolidge transmitted by the system described shows the possibilities of this kind of transmission. In another article the employment of wireless beacon stations round our coast as an aid to navigation is discussed, and the regular features of the paper, notably "Readers' Practical Ideas," appear to be even more interesting than usual. Among the many photographs is one of Mr. J. H. Ridley (5NN), the South Norwood amateur who has recently worked with great success with three New Zealand amateurs, in addition to a number of United States and Canadian stations.

"The Children's Companion Annual."
(B.O.P. Office. Price 5/– net).

Among the many Christmas books for the younger boys, the "Children's Companion Annual" takes a prominent place. It contains a collection of remarkably good stories, many of them really exciting, together with practical articles on a variety of interesting topics. The illustrations are numerous and of excellent quality, a feature of the book being the large number of full-page coloured plates.

A New Grid Leak

The celebrated honeycomb coils made by the Igranic Electric Co. Ltd. (149, Queen Victoria St., London) may be obtained in twenty sizes, covering wave-lengths of from 100 to 25,000 metres. The winding of these coils in full view of the public attracted considerable attention to the firm's stand at the Wireless Exhibition recently closed at the White City, London. Among new items of interest shown by the firm were some attractive types of variometers, designed to give increased efficiency and signal-strength, and a greater selectivity of tuning with reduction in self-capacity. There was also shown a new type of variable grid leak constructed upon an entirely new principle which goes a long way to solving the problem of this somewhat unstable component. The efficiency of any radio set depends almost entirely upon the quality of its components and as those made by the Igranic Co. carry a six months' guarantee, they may be employed with confidence.

For Modellers

Plasticine is too well known to need any detailed description. The latest outfits are greatly improved in quality and the quantity of material they contain is increased. The possibilities of Plasticine are endless and range from the simplest figures to the most elaborate models. The firm also make "Play-Wax," an ideal medium for less serious modelling. It provides endless amusement, is easy to work and is made in twenty-eight colours. Those who are artistically inclined will find in "Novlart" picture-making a pleasant and profitable entertainment for winter evenings.

No More Punctures

A few years ago the prospect of obtaining a really satisfactory puncture s[illegible] for cycle or car tyres seemed remote, but to-day the [illegible]oblem appears to have been solved successfully. [illegible] "Fibermetic" Puncture Seal (made by the Fibri[illegible]ales Co., 19, Villiers Street, Strand, London, W.C.2) [illegible]an be recommended as a practical means of preve[illegible]ng the annoyance of being let down on the road by p[illegible]ctures. This seal has been thoroughly tested, and t[illegible] makers are so confident in its efficiency that they offer to return purchasers' money if full satisfaction [illegible]s not obtained. The seal is easy to apply and it does not injure the tyres in any way or choke up the valves. If a tyre treated with "Fibermetic" is punctured, the puncture is immediately and permanently sealed up. This firm also manufactures "Pholene," a useful preparation for maintaining the original polish of boots or any articles in black leather, and "Fibrine" for treating the soles of boots to render them waterproof and more durable.

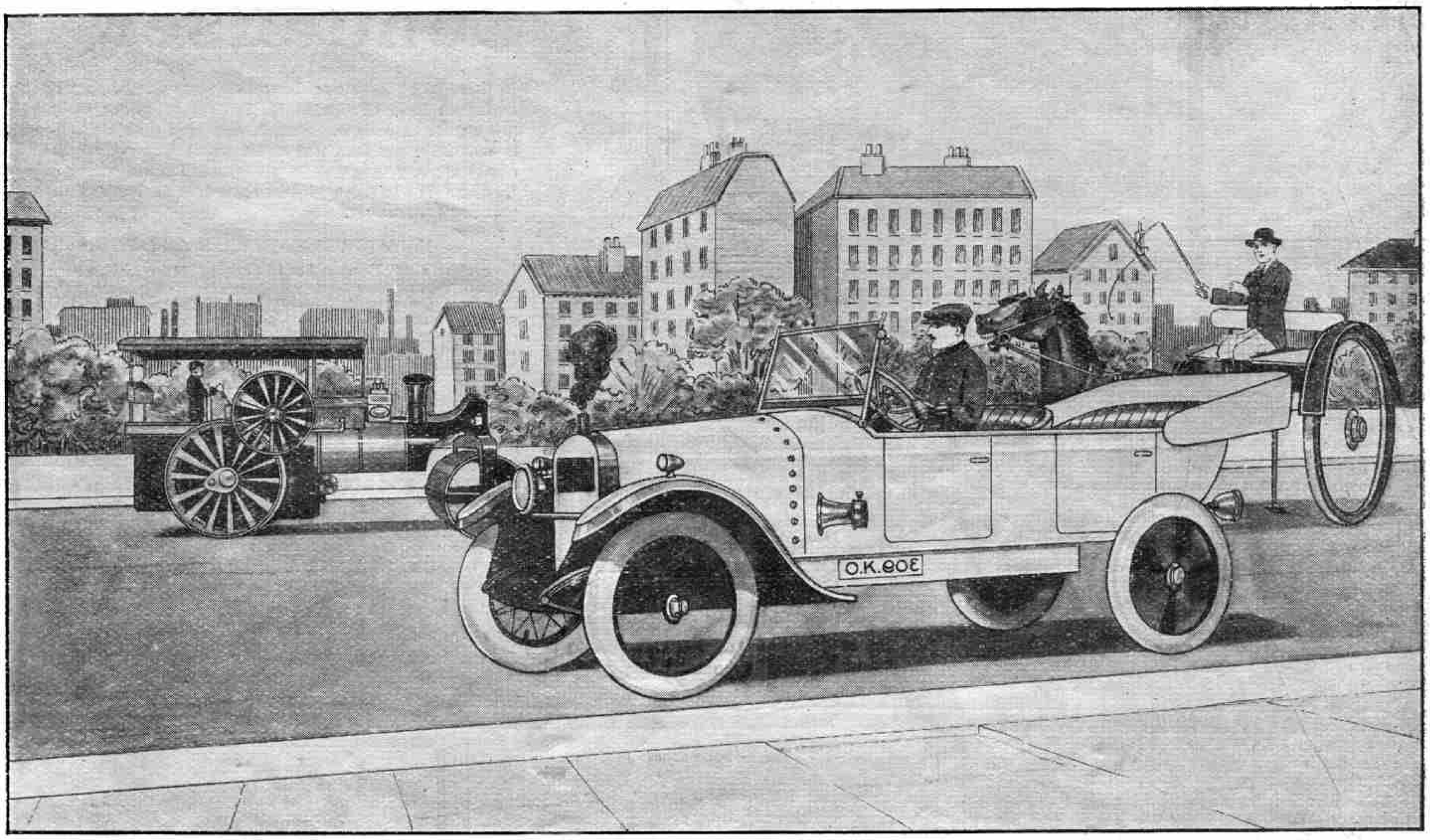
The Open Road—(*continued from p.* 37)

need occasional adjustment and last but by no means least, the brakes should always be kept in a state of perfect efficiency. Brake rods and levers are easy to adjust, and the purchase of new brake-blocks, when necessary, is not an expensive undertaking, so that there is no excuse for inefficiency in this vital mechanism, which in an emergency may make all the difference between safety and a serious smash.

NEXT MONTH:—

USEFUL ACCESSORIES

Competition Corner



Have You Sharp Eyes: How Many Mistakes Can You See?

The competition in connection with the above puzzle-picture has been received by our readers with the greatest enthusiasm, and entries are arriving in considerable numbers every day. For the benefit of new readers who may wish to enter this competition, we are repeating the conditions.

Many mistakes of various kinds have been deliberately made in the above drawing and three prizes are offered for the readers who discover the greatest number of errors. First Prize: Hornby No. 2 Goods Set. Second Prize: Hornby No. 1 Goods Set, and Third Prize: Meccano No. 1 Radio Receiver or Double Headphones, as chosen by the winner.

Competitors should examine the drawing with the greatest care, making a note of every mistake as they find it. Every mistake should be numbered, and they should all be arranged in groups, that is, those connected with the Motor Car should be in one group, those connected with the Horse and Trap in another, and so on. The total number of mistakes found should be given at the foot of the list.

Closing date 31st January (Overseas 30th April).

Eleventh Photo Competition

Photographic Competitions show no signs of decreasing in popularity, and therefore we announce this month our Eleventh Photo Competition, the subject of which is "Winter Games or Sports." Any outdoor game or sport may be chosen for the photograph, and in judging the entries preference will be given to those that best express the true spirit of the particular game they represent. Prints may be mounted or unmounted and printed by either daylight or gaslight processes.

In order to ensure that every competitor has an equal chance, the contest will be divided into two sections:—(A) competitors under 14 years of age, and (B) competitors of 14 years and over.

Every entrant must write his name, address and age on the back of every photograph he submits, and must also state by whom the photo was developed and printed. In the event of a tie for a prize, photographs that have been developed and printed by the competitor himself will receive preference. Envelopes containing entries should be marked "Photo Contest" in the top left-hand corner.

Four prizes are offered in this contest—Meccano goods to the value of 10/6 and 5/- as first and second prizes respectively in each section. The closing date for readers in the United Kingdom is 28th February, and for readers Overseas 31st May.

Cycling "Hints" Competition

Useful Prizes for Cyclist Readers

In the recent cycling articles published in the "*M.M.*" various hints have been described and illustrated, such as the method of trimming an oil-lamp shown in November and a tip for crossing tram-lines in the August number. Nearly every owner of a bicycle knows of at least one such hint in connection with his hobby, even if it is only the use of paper-fasteners for trouser-clips or a luggage-carrier made from Meccano strips! Your hint, however, may be new to others, who will be interested to hear of it.

Write down as briefly as possible on a postcard the most useful hint you know in connection with cycling and also endeavour to illustrate it by means of a small sketch (the artistic merit will not be taken into consideration) to help to make your meaning clear. Hints need not be confined to the machine itself, and may relate to cleaning or enamelling a bicycle, mending punctures, avoiding accidents, etc.

All postcards must bear the name, address and age of the competitor and should be addressed to "Rover," c/o *Meccano Magazine*, Binns Road, Liverpool. The sender of the best hint will receive a pair of CYCLE TUBES treated with FIBERMETIC PUNCTURE SEAL, the brand and the size of the tubes to be chosen by the winner himself. For the next best hint a VEEDER REGULAR CYCLOMETER will be awarded, and there will also be two consolation prizes of PUNCTURE-SEALING SOLUTION, sufficient for two cycle tyres, to be chosen by the winners from advertisers in the "*M.M.*" The closing date of this contest for readers in the United Kingdom is 31st January (Overseas 31st May).

Second Drawing Competition

In response to repeated requests from readers, we have decided to announce this month another Drawing Competition. Our last competition of this kind, the subject of which was "The Editor of the '*M.M.*' as I imagine him to be," brought in a large number of entries of first-rate quality, and we feel sure that the present contest will reveal further artistic talent among our readers. The subject of this competition is "A Modern Railway Locomotive."

Any type of loco may be chosen and drawings may be made either in pencil or ink. Following our usual practice, the contest will be divided into two classes—(A) for those of 16 years and over, and (B) for those under 16. Four prizes will be offered—Meccano products, to be chosen from our current catalogue by the winners, to the value of £1/1/- and 10s. 6d. respectively for the first and second in each section. Closing date 31st January (Overseas 30th April).

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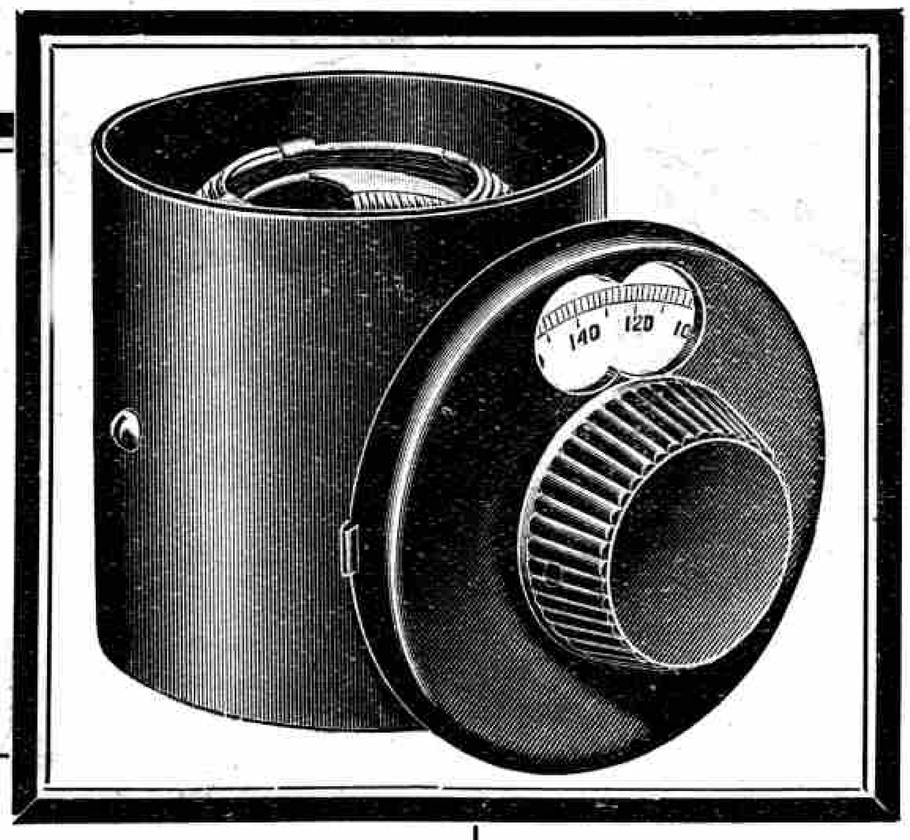

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Giant Block-Setting Cranes—(*continued from page* 3)

of rubble or stone, deposited in a scattered manner and standing above high-water mark, will serve the purpose, as is the case with the breakwater at Algiers, where a rubble mound is protected by 25-ton blocks heaped on the sea bed. This type of breakwater does not call for such skill as is necessary when the blocks must be accurately placed. Incidentally, less material is required for its construction.

The Sack-Block System of Construction

In many cases scattered material will not serve the purpose, however, for currents or storms soon move it and break it down. In these cases a more elaborate structure is necessary, such as the "sack-block" system. This employs barges with trap-doors. The interior of the barge is lined with sacking and in this concrete is deposited. The sides of the sacking are then brought together and laced over the top, and the barge is towed out to the site of the breakwater. Arrived there, the trap doors are opened and the concrete drops into the sea, where it is solidified by the action of the water and soon becomes a perfectly hard and solid mass. The sack-block method was used in the construction of the underwater portion of the breakwaters at Newhaven and La Guaiga, where layers of blocks weighing 100 tons were successfully laid, each extending across the whole width of the breakwater. The system was also used for the foundations of the South Breakwater at Aberdeen, where huge monoliths of 1,300 tons rest on a foundation of concrete sack-blocks.

Result of Eighth Photographic Contest

Some very interesting photographs were received in this contest, the subject of which was "A Summer Scene." Several competitors who live in the Tropics wrote to enquire whether they would be allowed to compete as they never have any winter out there! These letters were a distinct contrast to those received in the Home Section of this contest, when numerous competitors commented on the Editor's misguided sense of humour!

Four prizes were offered in this contest. In Section A the winner is K. D. Dinshaw, of Bombay, who has been awarded Meccano goods to the value of 10/6 for his excellent snap of the Lavola Pipe Lines. The second prize, Meccano goods to the value of 5/-, was won by Lee Ee Keng, of Singapore, who submitted a very fine lake study. In Section B, a similar first prize goes to K. C. Chintalwar, of Bombay, and second prize to Aly A. Shawky, of Cairo. We congratulate these competitors on their success and hope to see more of their work in future photographic contests.

Result of Hornby Railway Essay Competition

We expected this competition to prove popular, but we were certainly surprised at the remarkably large number of entries received from boys of all ages. More than this, when we came to examine the entries closely, we found that they reached a far higher standard of excellence than we had expected. In almost every case the selected layout was intelligently described, and the accompanying drawings were well designed to make clear all details.

The most common fault in regard to the layouts was that of trying to include too much. Some of the competitors produced layouts that were simply bristling with branch lines and sidings, such as would be utterly impracticable in the case of a model railway. A highly-complicated layout may be very pretty to look at, but the first essential of a model railway is that it shall be workable. One or two of the layouts sent in in this competition would puzzle the expert staff of a real railway to work them, and regarded from the model point of view they are hopeless. Other competitors went badly astray in their signalling arrangements, and in some cases signals appear to have been popped down wherever there was room for them in the drawing, without the slightest consideration as to whether they were either correct or necessary.

Four prizes were offered in this contest. In Section A (16 years and over) the first prize, Meccano goods to the value of £2/2/-, has been awarded to Harold Carson (West Norwood, London, S.E.27), and the second prize, Meccano goods to the value of £1/1/-, to William Geale (Fairview, Dublin). In Section B (under 16 years) Anthony Batho (Kingston Hill, Surrey), won the first prize, and T. B. Field (Forest Row, Sussex) the second, and these competitors have been awarded Meccano goods to the value of £1/1/- and 10/6 respectively.

In view of the great enthusiasm with which this contest has been received, we intend shortly to announce another on similar lines.

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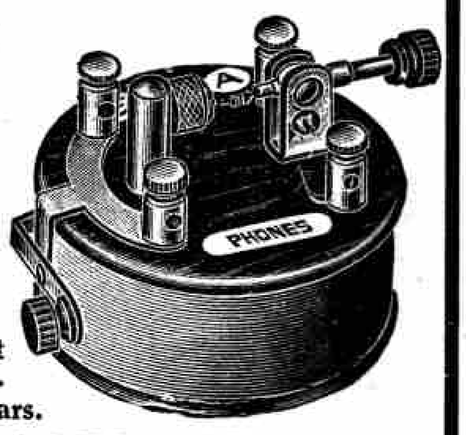

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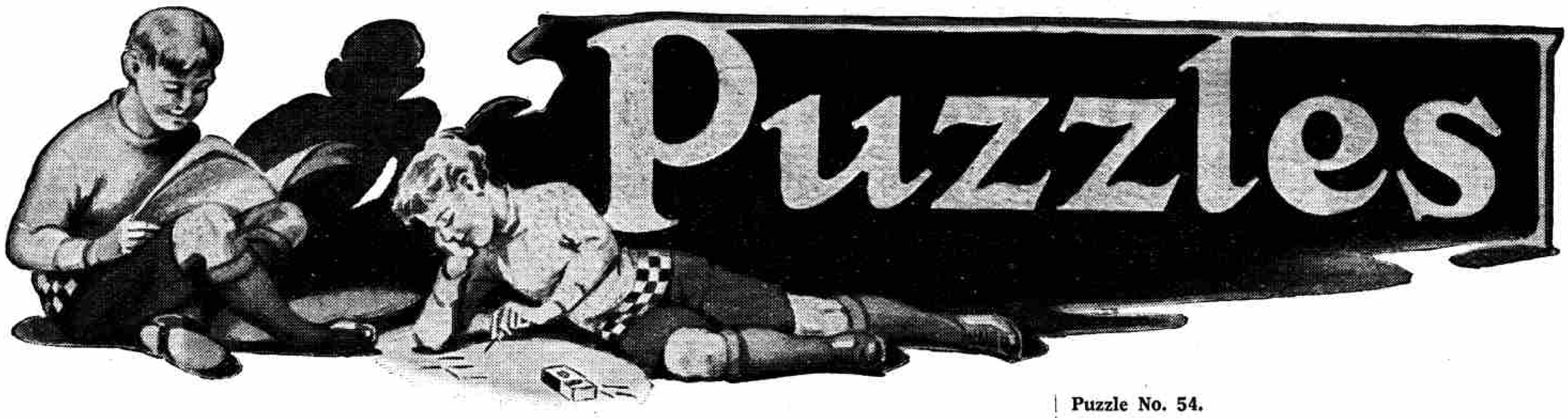


1 C	A	2 T	■	3 B	U	4 N
O	■	5 O	R	E	■	I
6 W	7 H	Y	■	8 D	9 I	P
■	E	■	■	■	C	■
10 O	N	11 E	■	12 B	E	13 G
U	■	14 A	C	E	■	U
15 R	A	T	■	16 T	O	N

HORIZONTAL

1. Domestic animal
3. Small cake
5. Found in the earth
6. Question
8. To plunge into
10. Single
12. To ask for
14. Unit at cards
15. A rodent
16. Measure of weight

VERTICAL

1. Farm animal
2. A plaything
3. To be slept on
4. To pinch
7. Female bird
9. Necessary to skaters
10. Belonging to us
11. Take food
12. Wager
13. A weapon

THIS month I am introducing to my readers a form of puzzle that is now enjoying a great vogue in America and elsewhere—the Cross Word Puzzle. For the benefit of those to whom this type of puzzle is new, I give below an easy example worked out and a full explanation of the method of solving it.

In the above diagram it will be seen that there are 49 squares, 13 of which are black and the remainder white. Also it will be noticed that certain squares are numbered. Below the diagram are various definitions, also numbered, and appearing under two heads, horizontal and vertical. The problem is to fill in the white squares in the diagram with words indicated by these definitions, and each containing as many letters as there are white squares between the number and the nearest black square, in a horizontal or vertical direction as the case may be.

Looking now at our list of definitions we see that No. 1 horizontal is a "*Domestic Animal*" and No. 1 vertical a "*Farm Animal.*" Each of these words must consist of three letters because, counting from the figure 1 in each direction, there are three white squares up to the nearest black square. Only one letter may be placed in each square, and therefore it is clear that the two words both starting from No. 1 square must begin with the same letter. Thus we have to find the names of a domestic animal and a farm animal each consisting of three letters and beginning with the same letter. A little thought shows that these words are "*cat*" and "*cow,*" and so we fill them in in their respective squares.

Passing on to No. 2 we find this has to form a word only in the vertical direction and the definition is "*A Plaything.*" We already have the letter T in square No. 2, therefore our new word must commence with T and must contain three letters, as there are three white squares counting vertically downwards to the nearest black square. At the same time we notice that No. 6 horizontal must be a word of three letters commencing with W and meaning "*question.*" We now have to find two words that will fulfil these conditions. "*A Plaything*" suggests "*toy*" and "*question*" suggests "*why.*" These words fill the required conditions and so we write them in.

Going through the definitions in this way we gradually fill in all the white squares as shown, always making sure that our words fit both horizontally and vertically. A little study of the diagram will show exactly how this is done, and will make clear the method of solving any puzzle of this kind. When commencing to work out a Cross Word puzzle it is best not to take the definitions in strict numerical order but to look down both the horizontal and vertical lists and tackle first the words that suggest themselves quickly, and then gradually deal with the remainder.

Cross Word Puzzle Competition

First Prize : Meccano Goods value £2 2 0

Second Prize : Meccano Goods value £1 1 0

Third Prize : Meccano Goods value 10/6

Every reader who wishes to enter for this competition must send in the solution of the Cross Word Puzzle No. 54, together with a new Cross Word Puzzle of his own invention. Puzzles sent in must not have been published previously, but must be original. They must not contain Christian names, and if names of any historical characters are used they must be thoroughly well known. Slang must not be used, and all abbreviations must be specified as such unless they are in common everyday use. The diagram of Puzzle 54 is too small for actual working. It should not be cut out, but should be carefully copied at least four times the size on to a sheet of paper.

Before entering this competition readers are advised to read through the instructions on this page, and to examine carefully the specimen puzzle worked out.

Entries must reach this office not later than 31st January (Overseas 30th April).

Puzzle No. 54.

1	2	3	4		■	5	6	7	8	9
10				■	■	■	11			
12		■	13	14	15	16		■	17	
18		19	■	20			■	21		
	■	22	23		■	24	25		■	
■		26		■	■	■	27		■	■
28	■	29		30	■	31			■	32
33	34				35				36	
37		■	38					■	39	
40		■		■	■	■		■	41	
42					■	43				

HORIZONTAL : 1. To make amends ; 5. Avoids ; 10. Learning ; 11. Narrative in elevated style ; 12. Conjunction ; 13. Subduer ; 17. Behold ; 18. Soft finned fish ; 20. Male animal ; 21. Female bird ; 22. Source of minerals ; 24. Initials of a nation ; 26. Carry out ; 27. Mass of types confusedly mixed ; 29. Elastic fluid ; 31. Decay ; 33. Phrase of a certain nation ; 37. Expressing refusal ; 38. Used for malefactors ; 39. Personal Pronoun ; 40. Perform ; 41. Indefinite article ; 42. Short branches ; 43. Vehicles.

VERTICAL : 1. Succulent plants ; 2. Ripped ; 3. Conjunction ; 4. A snare ; 6. Possessive pronoun ; 7. Preposition ; 8. A river ; 9. Form of confectionery ; 14. Exist ; 15. Mother ; 16. A bird ; 19. To deposit ; 21. A republic ; 23. Loud cry ; 25. A surety ; 28. Ties ; 30. Form of address ; 31. Went quickly ; 32. At end of hymns ; 34. Satellite ; 35. Company ; 36. Deceit.

Puzzle No. 55.

Find 16 numbers which, when arranged in four lines of four numbers each, and added vertically, horizontally or diagonally, always amount to 34.

* * * *

Puzzle No. 56.

What part of a locomotive is indicated by each of the following definitions ?

1. To pull, and a submerged sandbank.
2. To defend, and the most common metal.
3. What issues from chimneys, and to fight with the fists.
4. Powdered stone, and a long tube.
5. Burning in a grate, and an opening for entry.
6. A "taxi," and its top.
7. A small shining light, and one who stops another.
8. To offer in payment, and that which connects.
9. A well-known tree, and a broad shallow vessel.
10. Twelve inches, and food paid for in lodgings.
11. The palm and fingers, and to utter reproaches or insults.
12. A chief, and not heavy.

* * * *

Puzzle No. 57.

Behead it and there is a bit left,
Behead it again and there is still a bit left,
Behead it again and you've got it left,
Behead it again and you've got it to a T.

* * * *

Puzzle No. 58.

A boy had the misfortune to drop his watch on to the floor. When he picked it up he found that the glass had broken and fallen out and that the dial was cracked across in three places. He was surprised to find that the numerals on each of the four pieces of the dial added up to 20. Where did the cracks come ?

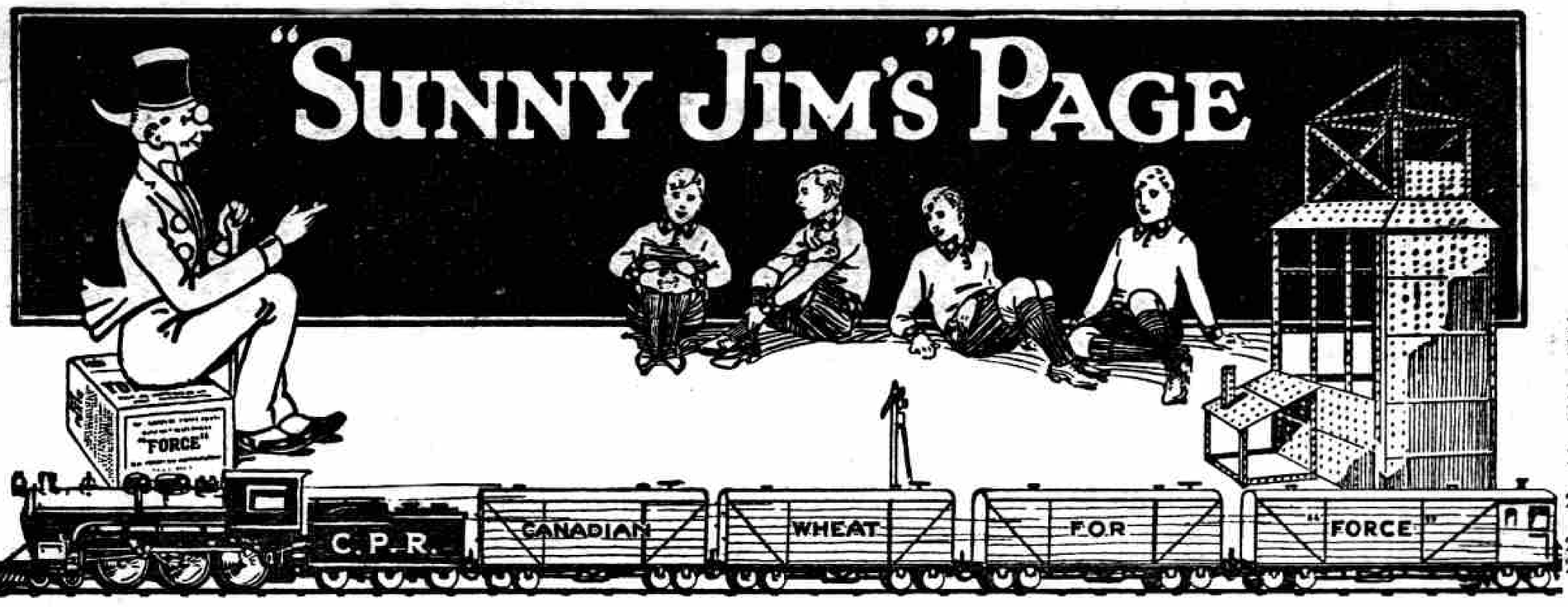
* * * *

Puzzle No. 59.

An Enigma :—" My seas have never held water, my rivers are dry and my fields barren. I possess large cities, and yet not a single house. I am irregular in shape without either grace or beauty, and yet in your eyes I represent the whole world. What am I ? "

HORIZONTAL CLUES

1. Strikes.
2. Army rank (abbrev.)
7. In what manner.
9. A girl.
11. Proceed.
12. Exclamation.
13. Wet earth.
15. Power.
17. Negative.
18. Behold.
19. Used in rowing.
20. Tavern.
21. Grown-up.
22. Lad.
23. Good (*French*).
24. Between day and night.
25. Annoy.



VERTICAL CLUES

1. Exclamation.
2. Thunder God.
3. In this manner.
5. For example
6. A famous character known to eaters of 'FORCE.'
8. A cereal.
10. Bright.
11. Of high quality.
14. To put on.
15. A particle of 'FORCE.'
16. Low temperature.
20. Products of electrolysis.
22. A serpent.
23. Exist.

CAN YOU SOLVE THIS ONE ?

1 H	I	2 T	3 S	■	4	5	6	■	■
O	■	7 H		8	■	9		10	■
■	11	O	■	12		■	13		14
15		R	16		■	■	■	17	
18		■	19			■	20		
21					■	22			■
	■	■		■	23			■	■
24			■	25					■

Did you solve the circle puzzle in the issue before last ? Did you send in your solution and get in return a free sample of "FORCE ?" You didn't ! Then you have never tasted "FORCE ?" Never enjoyed a plate of crumpy, crisp flakes of delicious whole wheat, malted for digestion and toasted for crisp nutty flavour ! But perhaps they already eat "FORCE" in your home ? Ah ! that explains it ! They don't ? Then take this chance and have a free sample sent to you immediately.

FORCE
WHOLE WHEAT FLAKES
MALTED AND TOASTED

Here's another interesting puzzle. Can you solve it ? I'll warn you it's harder than the last ! Have a try and send me your solution ! I'll send you a free sample of "FORCE" for your trouble !

What you have to do.

At the top of this page are two lists of numbered clues for hidden words. From the "horizontal" list each word starts in the square with the corresponding number and reads *across*, one letter per square to the first *black* square, or to the *right* hand edge of the puzzle, as the case may be.

From the "vertical" list each word starts in the square with the corresponding number and reads *downwards*, one letter per square to the first black square, or to the *bottom* of the puzzle, as the case may be.

Let us start with "horizontal" No. 1. We must find something that means "strikes," counting *across* from square No. 1, one letter per square to the first black square, we find it has four letters. Let us try HITS. This gives us a start for "vertical" No. 1, which we note is an exclamation. It has only two letters because a black square comes third. Let us try HO. We also have a start for No. 2 vertical, also No. 3. No. 2 is a thunder god. It has four letters and, (if HITS is right), it starts with T. Let us try THOR. Now we have new clues for No. 7 horizontal and—but I think you would like to finish it yourself. Write in your letters lightly with a pencil. Have a piece of rubber with you. You may have quite a lot of rubbing out to do before you finish.

When you have solved all you can, write, on a piece of paper, or on a postcard, the two lists "Horizontal" and "Vertical," putting in the correct word, and post to my office in Dept. Mc.5 at 197, Gt. Portland Street, London, W.1.

Sunny Jim

THE experiment I made last month in devoting a whole page to a Puzzle Competition has turned out a great success and the number of entries has far exceeded my expectations. Encouraged by this success I am again devoting a whole page to puzzles, but this time I am confining the competition entirely to Cross Word Puzzles, which I am introducing to the "*M.M.*" for the first time.

The popularity of Cross Word Puzzles is remarkable, particularly in the United States, where contests in solving them are held on quite a large scale and championships are competed for with the utmost keenness. In addition, various American education experts are encouraging Cross Word Puzzles on the grounds that they develop mental alertness and at the same time greatly enlarge one's knowledge of words.

There is no doubt that solving Cross Word Puzzles is great fun, providing the puzzles are reasonably constructed and do not include freak words or meanings. The puzzle given this month is quite straightforward, but I have two ready for next month that will cause quite a run on the nearest dictionary! I hope that many readers will enter this contest, and I am looking forward to receiving some really good original designs.

* * * *

Small Girl (to elderly visitor): "Mr. Baldpate, how is it no hair grows on your head?"

Elderly Visitor: "What a silly question. Why doesn't grass grow on a busy street?"

Small Girl: "Oh, I understand now; you mean it cannot get up through the concrete!"

* * * *

BOW WOW!

Q. Why is a little dog's tail like the heart of an oak?

A. Because it is furthest away from the bark.

* * * *

Q. Why is E a most unfortunate letter?

A. Because it is always in debt, and never out of danger.

This Month's Short Story

Small dog,
Down street.
Motor car,
Sausage meat.

* * * *

Doctor: "You are looking better this morning than I expected to find you."

Patient: "I expect that is because I have followed the directions on the bottle of medicine."

Doctor: "What were they?"

Patient: "Keep the bottle tightly corked!"

* * * *

Small Girl: "Mother, why has daddy so little hair on his head?"

Mother: "Because he works and thinks such a lot, dear."

Small Girl: "Then why have you so much hair?"

Mother: "Get on with your breakfast."

* * * *

Weary Willie: "Times are very bad, Tim."

Tired Tim: "You're right, son; a feller daren't ask for work for fear of getting a job."

WATT?

Teacher: "Jones, name me a unit of electricity."

Jones (just waking up): "What?"

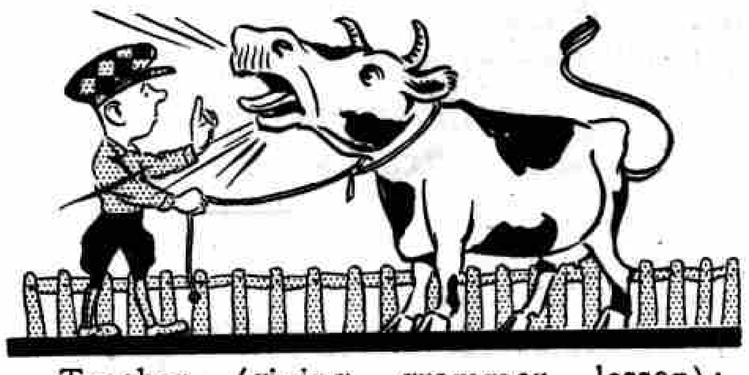
Teacher: "Right."

* * * *

Magistrate (to man charged with picking pockets): "How did you manage to take this man's watch when it was secured by a patent safety chain?"

Prisoner: "My fee, your Worship, is 30/- for the full course of six lessons!"

* * * *

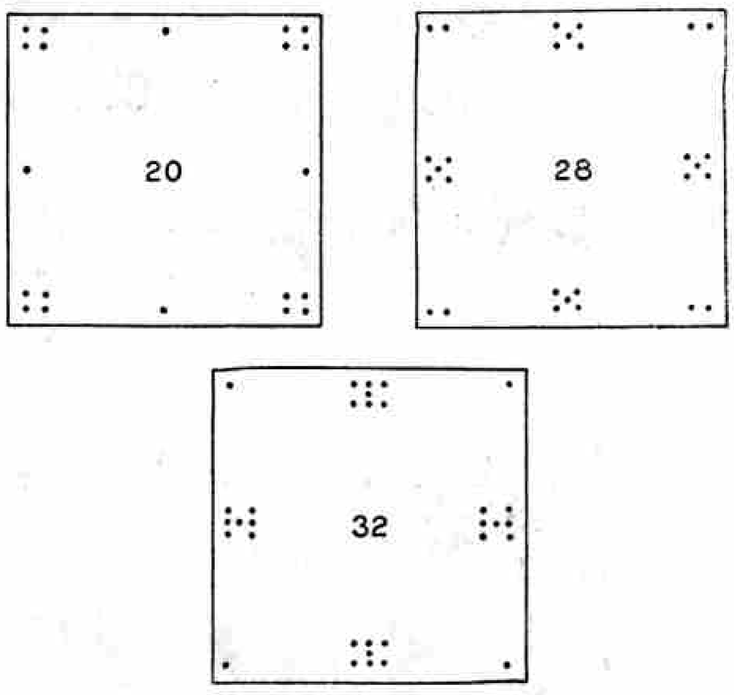


Teacher (giving grammar lesson): "Willie, you see that sentence on the blackboard, 'Lead the cow from the field,' what mood?"

Willie: "The cow did."

Answers to Last Month's Puzzles

No. 41.



* * * *

No. 42. The figures are 8, 12, 5, 20=45.

* * * *

No. 43. The arrangement of the figures is as follows

816
357
492

* * * *

No. 44. After re-arrangement the numbers on the sacks are as follows:—2, 7, 8, 156, 39 and 4.

* * * *

No. 45. The name is David.

* * * *

No. 46. Roach 90; Carp 15; Tench 45; Bream 47. Total 197.

* * * *

No. 47. He lost his train by 20 minutes because he reckoned his average by the distance and not by the time. The four miles walk would have taken 1 hour, the four miles level would have taken ½ hour, and the four miles downhill 20 minutes—in all 1 hour 50 minutes, and he had only 1½ hours altogether.

* * * *

No. 48. Least number of moves=31.

* * * *

No. 49. Least number of moves=63.

* * * *

No. 50. The words are:—Starling, Staring, String, Sting, Sing, Sin, In, I.

* * * *

No. 51. The score of exactly 100 on this target was made in six shots, two of which were upon the 16 and four upon the 17.

* * * *

No. 52. Two men and a boy, three-quarters of a day, two hods of mortar, 10/10. Settled.

* * * *

No. 53. A and D cross, A returns, D left over; E and F cross, D returns, E and F left over; B and C cross, C and F return, B and E left over; A and C cross, E returns, A B and C left over; E and F cross, E returns, A, B, C and F left over; D and E cross, none returns, A, B, C, D, E and F are now all across.

Captain (to Goal-keeper): "Why didn't you stop that one?"

Goal-keeper: "Why should I, what's the net for?"

* * * *

Q. Which colour is easier to spell, "red" or "green"?

A. Green, because it is spelt with more ease (e's).

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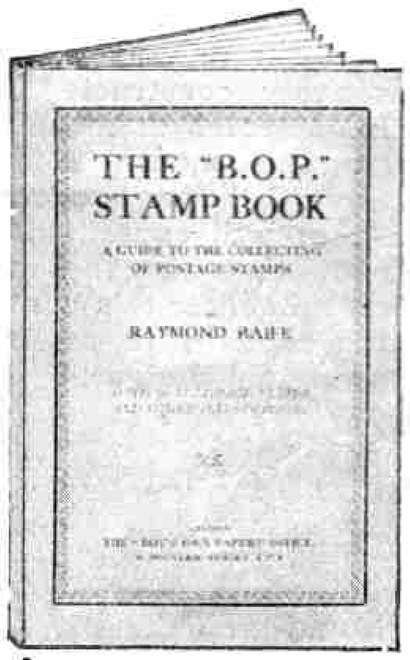

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A STANDARD WORK FOR YEARS TO COME.

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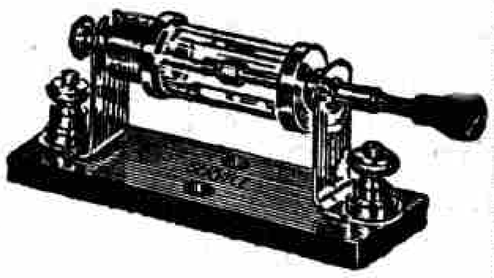

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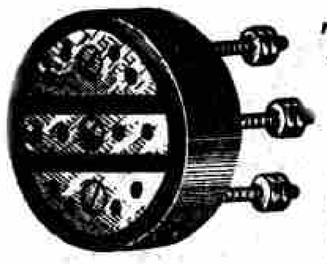

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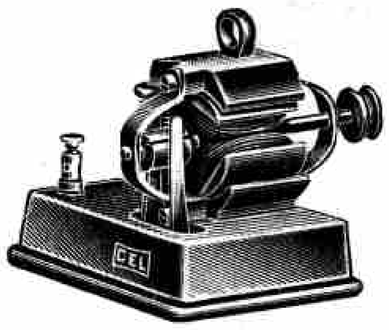

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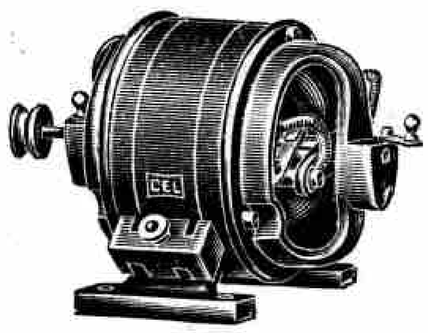

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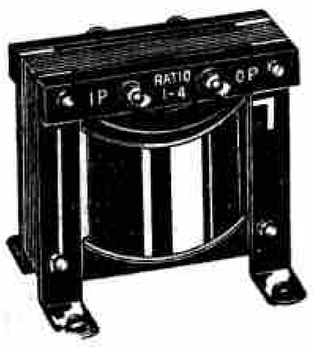

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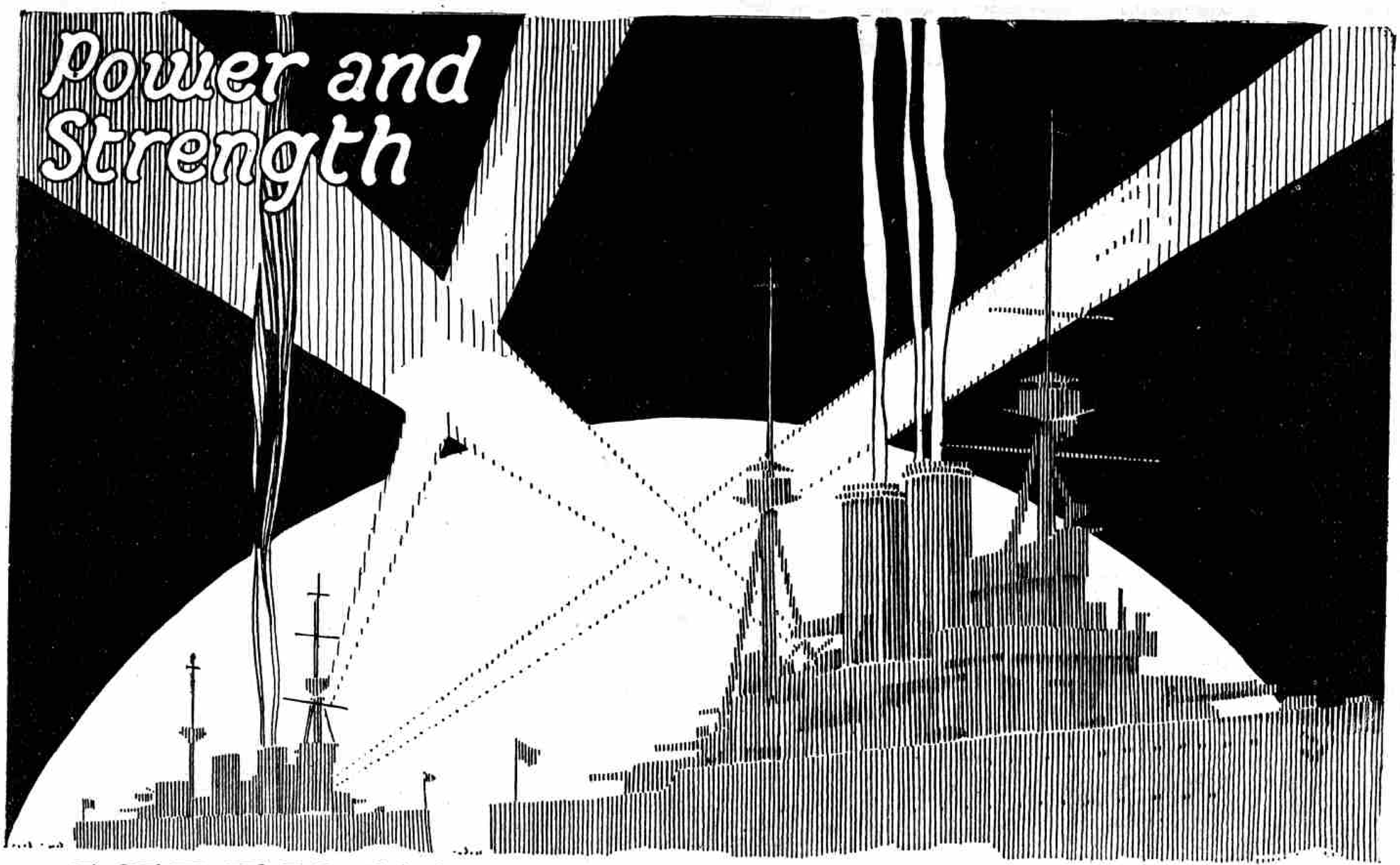

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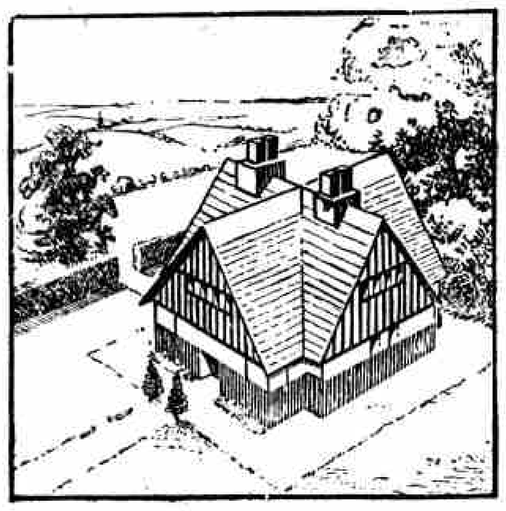

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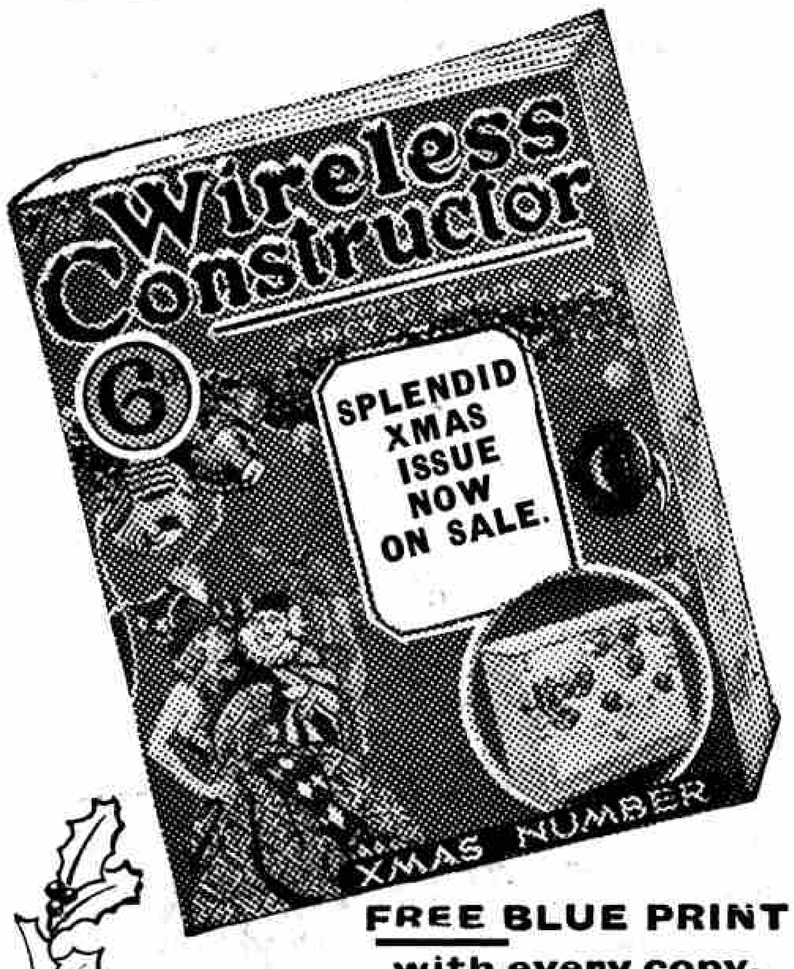

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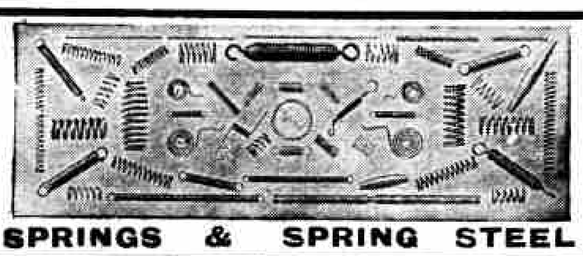

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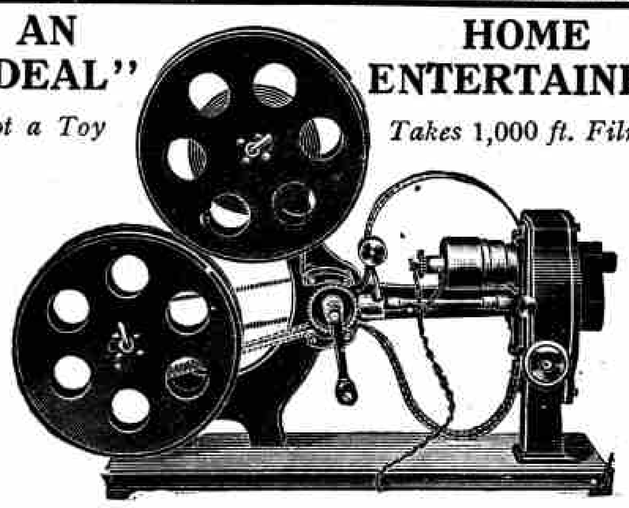

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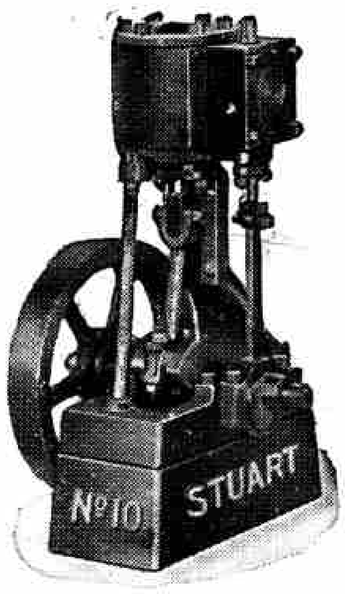

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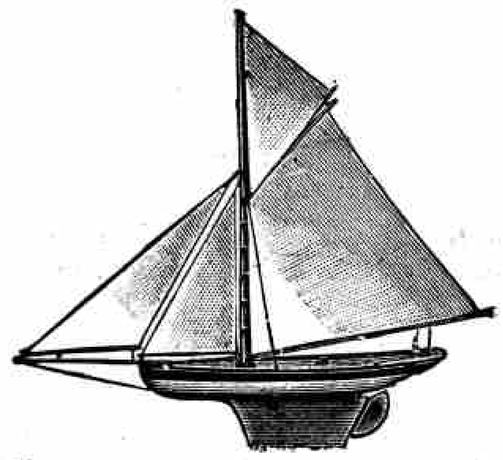

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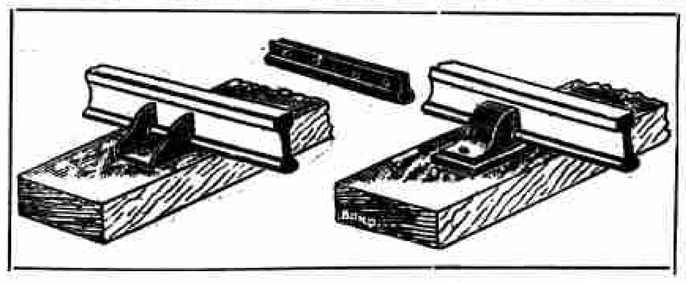


Everything is obtainable from Bond's—Points, Laying Gauges, Blue Prints, etc.

The Real Model Railway Track—Easy to Lay, Modest in Price, and can be purchased in quite small quantities as required.

Why not gradually replace your Tinplate Track a section at a time, putting it together yourself? You do not need wealth to do this.

"0" Section Rail costs but 4d. per 3-foot length, and the Chairs are 2/- per 100 only, Fishplates 1d. each.

SEND FOR THE LIST TO-DAY!

BOND'S LTD., 254, Euston Rd., LONDON, N.W.1

TURNYTOVER

HELMET POOL. The New Toy Game for all ages. Mr. Turnytover and 12 coloured Metal Helmets, packed in a Tin Box.

Post Paid **2/3** Agents Wanted.

FORGE & CO.,
EASTHAM FERRY, CHESHIRE.

YOU

can build a £40 Gramophone with our Scale Drawings and Fittings for **40/-**. Our Large Illustrated Catalogue of Gramophones, Motors and Tonearms, etc., will interest you. Post Free 2d.

Harmony Gramophone Co., 366, York Rd., London, S.W.1

Established 20 years.

MAKE GRAMOS.

Our 32 page Catalogue tells you for **2d. how to do it** and what accessories to choose. **Motors** in 25 sizes, from **9/-** Tone arms, **4/-**; Speakers, **2/-**; Headphones, **10/6** pair; Cabinets from **9/-**. Gramophones from **30/-**. Carr. paid.
The Regent Fittings Co., D.78
120, Old St., London, E.C.1.
Telephone: Clerkenwell 2923.

Wireless Cabinets YOU Want

PICKETT'S Cabinets—they're good value, from 1/6 each, highly polished.

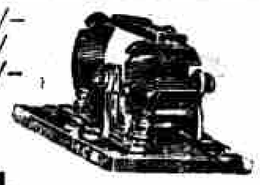
Write for Constructor's List Free.

Cabinet (M.C.) Works, Albion Rd. Bexley Heath, S.E.

MAKE YOUR OWN ELECTRIC LIGHT

These wonderful dynamos light brilliantly 4–6 volt lamps, and are very easy to work ... **5/-**
"DE LUXE" model, larger, and giving approx. three times output, wonderful value ... **10/**
"SUPER DE LUXE" model, larger still, giving approx. five times output **15/-**

All Post and Packing Free. *Send for FREE Lists.*



GREENS (Dept. A.N.),
85, New Oxford Street, LONDON.

Readers' Sales & Wants

If you have anything to sell or wish to buy anything take advantage of the service offered by a small advertisement in these columns.

The "*M.M.*" is read by approximately 100,000 people every month. It circulates in every country where the English language is spoken. If you wish to sell your duplicate stamps, your rabbits, or your tools, or to purchase a loud speaker, a steam engine, a model yacht, or a hundred-and-one other things, you will be able to do so through the columns of the "*M.M.*"

The rates are one penny per word, with a minimum of 1/- (cash with order).

Your advertisement must be received before the 10th of the month for insertion in the following month's issue.

If a Box Number is used, 4d. should be added to cover the cost of postage of the letters to the advertiser from this office. The letters will be posted one week after the advertisement appears, and a second batch a month after the advertisement appears. They will be sent more frequently if additional postage is included with the advertisement.

IMPORTANT.—Advertisements dealing with any article in the Meccano catalogue cannot be accepted.

PLEASED ADVERTISERS

LIVERPOOL.—"*Your Magazine has brought me much better results than other papers.* Through the *Meccano Magazine* I have had mail orders from South Africa, Australia and the West Indies." H.W.R.

ALFRETON.—"We are getting far more enquiries than is usually the case." N. & Co.

MANCHESTER.—"Up to the present, results have been entirely satisfactory." N.M.P.

LONDON, W.C.1.—"*I have had more satisfactory results from my advertisements in your paper than in all the other papers combined in which I advertise.* In nearly every case, each new customer has resulted in one who buys regularly from month to month." A.K.

S. WOODFORD.—"I have already obtained good customers from my last small advertisement." G.P.C.

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UPPER NORWOOD.—"As the result of this advertisement I have received 50 enquiries, including one from Italy." A.C.M.S.

KENTISH TOWN, N.W.—"I have not repeated my advertisement, because *the number of replies was so great that I could hardly cope with them.* I have now made arrangements for dealing with a larger demand and shall be glad if you will insert the enclosed advertisement in your next issue." E.G.

READERS' SALES

(*Rate: 1d. per word, min. 1/-*).

Exchange Stamps. Your country for mine or any.—Master Klaversteijn, Harlingen, Holland.

Vertical Steam Engine, cost £1. 10/-, bargain.—Albert Graham, South End, Wigton.

Two Fine Magnetic Detectors, cost 3/6 each. What offers?—Taylor, Nenthead, Alston, Cumb.

For Sale. 12 straight, 16 curves, of Simpull Track, Gauge 1, electric, making large oval. In perfect condition. What offers?—Apply Denison, St. George's School, Windsor.

Composite (Brake-third) Coach, gauge 1½" (0) (Bassett-Lowke), new condition, 9/6.—Fuller, Wandsworth Road Station Cottage, Clapham.

"Meccano Magazines" from Number 21 onwards. What offers?—Joseph Mowbray, 6, St. Aidan's Crescent, Annfield Plain, Durham.

Bicycle Saddles, new, 2, 3 coil, 5/6 each, 1 flat, 4/9—Wood, 11, Falding St., Rotherham.

Powerful Steam Engine, nearly new. Cost 55/-, sell 30/-, or exchange for good air rifle or crystal set. No rubbish.—F. Turner, Barlborough, nr. Chesterfield.

SMALL ADVERTISEMENTS

(*Rate: 1/- per line*).

ATTRACTIVE SETS OF TOY SOLDIERS, 1/-. Lists 2d.—Elliott, 42, Norman Road, Northfield, Birmingham.

CINEMA FILMS, 100 ft. 1/-, 1,000 ft. 6/-, delivered.—Phillips, 64, Ewart Street, Brighton.

CYCLISTS! "Puncturo" automatically repairs all punctures whilst riding. Packets only 1/-, post free.—Jenvey, Station Road, Yeovil.

LIVING STICK INSECTS from East Indies and Mesopotamia. Very curious. Perfectly harmless. Living Pupæ. Stamp.—Rose, Alexandra Rd., Tonbridge

EDISON 4 minute Blue Amberol Phonograph Records, reduced prices. New goods now arriving. Lists.—A. Robinson, 333, Hainton Avenue, Grimsby.

CINEMATOGRAPHS FOR SALE. 100 feet Boxing or other Film and List 1/-.—Sims, 42, Burrage Grove, Plumstead, S.E.18.

Gent.'s Strong Nickel Keyless Watch, 4/11 each, post paid. (Worth double).—G. Banks, Drub Lane, Gomersal, Leeds.

LOOK, GENTLEMEN! MILITARY HAIR BRUSHES. Finest Satin Backs; outer circle best bristle. Very well made. 1/6 each, 2/9 per pair.—Brock's, 60, Clifton Street, Hull.

Gent.'s 9-Carat Gold Watches, 15 Jewel Lever-Movement, £5 10s. 0d., post paid. **Guaranteed.**—Banks, Drub Lane, Gomersal, Leeds.

Patents, Advice, Handbook and Consultations Free. B. T. King, C.I.M.E., Regd. Patent Agent, 146a, Queen Victoria Street, London, E.C.4. 38 years' reference.

CINEMATOGRAPH FILMS, Machines, Accessories, Bargains. 100 ft. Film and List 1/-.—Tottenham Film Exchange. Offices, 2, Ascot Rd., S. Tottenham, N.15.

CINEMA FILMS, MACHINES, ACCESSORIES, 100 ft. film and lists, 1/-. Stamp brings Wireless Lists.—J. Humphreys, 40, Davenant Road, London, N.19.

HYPNOTISE YOUR FRIENDS. 25 Lessons, 2/6, worth 2 guineas.—Campbell, 16, Took's Court, E.C.4.

USEFUL NEW YEAR PRESENT FOR YOUR SON. Genuine Old English and Ancient Roman Coins, cheap lists.—Appleton, 53, Albany Road, Coventry.

SILKWORMS EGGS, 1/- 100. Living Cocoons, Silk Moths 6d. each.—Rose, Alexandra Rd., Tonbridge.

FEW FILMS FOR SALE. Good condition. Cheap.—Sewell, Burton Bradstock, Bridport, Dorset.

CINEMATOGRAPH FILMS. Sale—Hire—Exchange. 100 ft. sample 10d. Projectors, Accessories cheap.—Don Cinematograph Supply, 96, High St., Penge, S.E.

CINEMA FILMS.
SALE—HIRE—EXCHANGE, also Machines, Re-winders and Accessories. Good Sample Film, 1/- Post Paid.
LISTS FREE.
Filmeries, 57, Lancaster Rd., Leytonstone, London, E.11

COLOUR PLATES OF LOCOMOTIVES.—Magnificent lithographic pictures printed in eleven colours, size 20"×12". L.M. & S. Railway, Caledonian No. 956 and L. & N.W. No. 1407 (L/Cpl. J. A. Christie, V.C.), L. & N.E. Railway, Great Northern No. 1470, Great Western Railway No. 4061 (Glastonbury Abbey). Price 1/- each. By post, in tube, 1/2. The set of four, post free, 4/2.
M. Dept., Railway Magazine, 33, Tothill Street, London, S.W.1.

Baty's Two B.B.C. Receivers from £3/15/- (royalty 25/-) up to **£10/17/6** Cabinet Set. Illustrated technical reprints of "Baty" circuits, **1/3** post free. "The best two-valve set yet heard." "Absolutely efficient." "Wonderfully simple." From all retailers or—Ernest M. Baty, Luton.

A COMPLETE WIRELESS STATION FOR 30/-, comprising No. 2 Bijouphone Crystal Set, plated fittings, 250–700 and 1600 metres, Pair Wembley Phones, Aerial Wire, Insulators, Lead-in and Earth Switch, Range 80–100 miles.
Robert Wilson, 51, Jepson Lane, Elland.

WIRELESS PACKET of assorted screws, nuts and washers; very useful; 1/2 post free, worth double. Money returned if dissatisfied.—Bates, Bellevue, Redruth, Cornwall.

Sectional Steel Wireless Masts. BOYS, MAKE YOUR OWN! I supply all parts and materials for 20, 30, 40 and 50 foot masts, together with print and full instructions for erecting and assembling. This is a first-class engineering job throughout and they are pukka Navy rigged. Any boy who can use a file and a drill can turn out one of these masts in a few hours. They are very light and immensely strong and extremely graceful in appearance. Prices of sets are as follows. Cash with order. All carr. paid. 20 foot set 24/6. 30 foot, 35/-. 40 foot, 50/-. 50 foot, 75/-.—**HAMILTON MAY** (ex-Lieut. R.N.V.R.), **Doone Cottage, Weybridge, Surrey.**

MECCANO MAGAZINE

Registered at G.P.O., London, for transmission by Canadian Magazine Post.

EDITORIAL AND ADVERTISING OFFICES:—

BINNS ROAD, LIVERPOOL.

Telegrams: "Meccano, Liverpool."

Publication Date. The "*M.M.*" is published on the 1st of each month and may be ordered from any Meccano dealer, or from any bookstall or newsagent, price 3d. per copy. It will be mailed direct from this office, 2/- for six issues and 4/- for twelve issues.

To Contributors. The Editor will consider articles and photographs of general interest; payment will be made for those published. Whilst every care will be taken of those submitted, the Editor does not accept responsibility for any loss or damage. A stamped addressed envelope should be sent where the contribution is to be returned if unacceptable.

Binding Cases. Spring-back Binders to take a number of "*M.M.'s*" are supplied, covered with imitation leather and lettered in gold, price 3/- each (post free).

Meccano Writing Pads. Fifty sheets of tinted bank paper, each printed with Meccano boy at head, 1/- (post free) large size, and 6d. (post free) smaller size.

Advertisements

Readers' Sales and Wants. Private advertisements (*i.e.*, not trade) are charged 1d. per word, minimum 1/-. Cash with order. Editorial and Advertising matters should not be dealt with on the same sheet of paper.

Small Advertisements. 1/- per line (average seven words to the line), or 10/- per inch (average 12 lines to the inch). Cash with order.

Display. Quotations for space bookings, and latest circulation figures, will be sent on request.

Press Day, etc. Copy must be received not later than 10th of each month for publication in following issue. Half-tone blocks up to 100 screen.

Proofs of advertisements will be sent when possible for space bookings of nos less than half-an-inch.

Voucher Copies. Sent free to advertisers booking one inch or over. Other advertisers desiring vouchers should add 4d. to their remittance and should order voucher copy at same time.

Remittances. Postal Orders and Cheques should be made payable to Meccano Ltd.

Obtaining the "*M.M.*" Overseas

Readers Overseas and in foreign countries may order the *Meccano Magazine* from regular Meccano dealers, or direct from this office. The "*M.M.*" is sold Overseas at 3d. per copy, or mailed (post free) direct from Liverpool, 2/- for six issues, or 4/- for twelve issues.

IMPORTANT.

Overseas readers are reminded that the prices shown throughout the "*M.M.*" are those relating to the home market. Current Overseas Price Lists of Meccano Products will be mailed free on request to any of the undermentioned agencies. Prices of other goods advertised may be obtained direct from the firms.

CANADA: Meccano Ltd., 45, Colborne Street, Toronto.

AUSTRALIA: Messrs. E. G. Page & Co., 52, Clarence Street, Sydney, N.S.W.

NEW ZEALAND: Messrs. Browning Ifwersen Ltd., P.O. Box 129, Auckland.

SOUTH AFRICA: Mr. A. E. Harris (P.O. Box 1199) Textile House, Von Brandis St. Johannesburg.

STAMMERERS

or their parents, should write for my 36 page booklet. Sent free to those seeking genuine cure.
Lee Wareing, Dale Avenue, Bispham, Blackpool.

"THE RECEPTION"
You get when using "PERFECTRITE" is "RITE" perfect. Increases signals 100%. Every piece tested. Post Free 1/-.
W. FREAK, 8, POPLAR WALK RD., S.E.24 & J. SMITH, 70, NORMAN RD., S.E.10.

FOUNTAIN PENS.
LEVER SELF-FILLER, 14 carat Gold Nib, Screw Cap. Post free 2/6. Pocket Clip free. Albert Purser, 248, High St. North, Manor Park, E.12.

Ask Father to get you one of these toys—they are just like the 'grown ups' use—only smaller

The FAIRYCYCLE

(Registered Trade Mark)

Built like a Bike—but safer

The Fairycycle ensures beneficial exercise so necessary for good health and strength, and gives hours of innocent amusement.

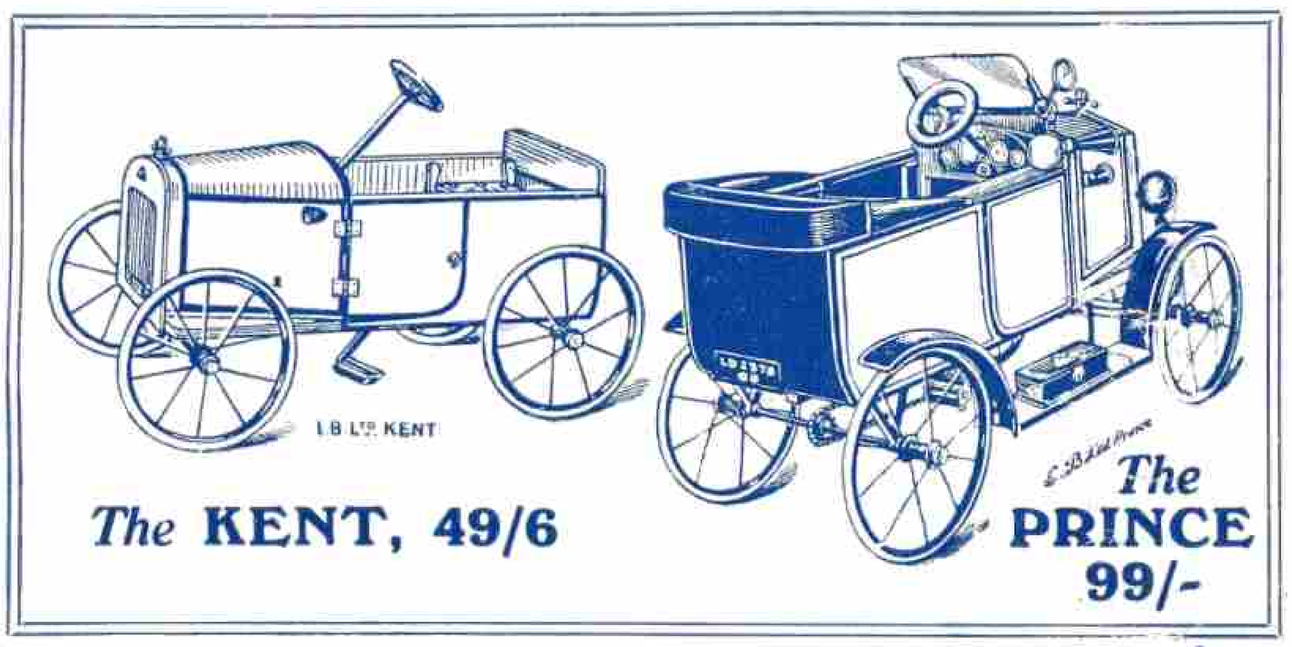
Be sure the word "Fairycycle" and Triangle Trade Mark are on the frame. None genuine without. British made.

Note the low centre of gravity which makes the Fairycycle so safe and easy to ride.

Specification—Adjustable plated handle-bar, cycle saddle (adjustable), ball-bearing rubber pedals, 12 in. wheels with ⅝ in. wired-on tyres, frame of solid drawn weldless steel cycle tube, brake and free wheel.

See the famous Triangle Trade Mark on all Good Toys and avoid spurious imitations.

As illustrated only **59/6**



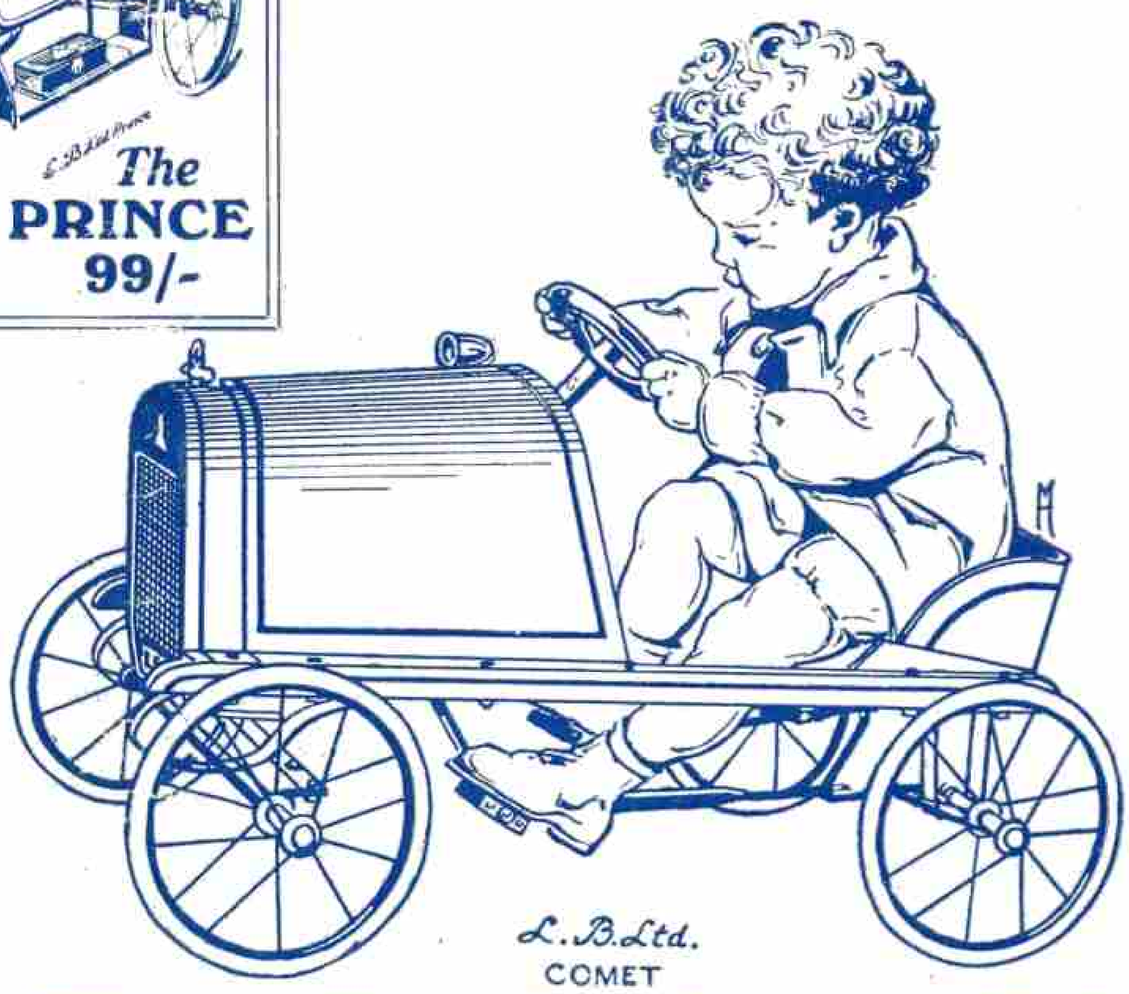
The **KENT, 49/6**

The **PRINCE 99/-**

The "Comet"

A very sporty model for the young speed-merchant between 2—7 years of age. It has a double crank movement, 10 in. wired-on tyred wheels, lamp, metal imitation radiator, etc.

27/-



AT ALL GOOD TOYSHOPS AND STORES.

See the famous Triangle Trade Mark on all Good Toys.

Wholesale only from:

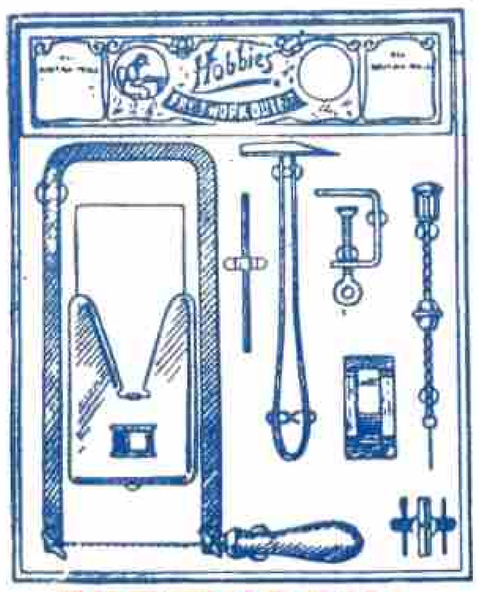
LINES BROS. LTD., 9, Fore St., London, E.C.

L. BROS. LTD. LONDON BROS. ENGLAND

Good Things for the New Year from

GAMAGES

THE BOYS' OWN STORE



FRETWORK!

No. 172/3 contains a superior 12 in. Hobbies' hand fretsaw frame, archimedean drill with 3 bits, nickelled drill box, steel cutting table, iron cramp, fretwork hammer, sandpapering block, 1 dozen saw blades and design. Post 6d. Price **8/-**

Cheaper Sets at **4/-**, **5/6** and **6/6**
Superior Sets at **9/6**, **12/-** and **13/6**

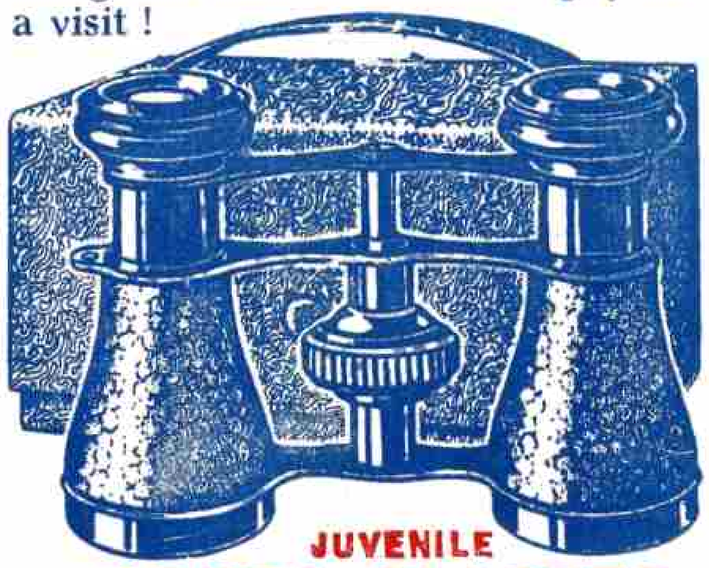
Also the famous Hobbies' A1. Boxed Outfits with all latest improvements. Post 1/- Price **16/6**

Wireless!

Take up the fascinating Hobby of Wireless. At Gamages you can get the famous "Brownie" Crystal Set **complete with 'Phones, Aerial Outfit, etc.** for Post Free. **24/-**

British throughout, with all latest improvements. It is sold ready for use and will operate 4 pairs of 'phones. Set only Price Post 9d. **7/6**

Boys! Just have a look at these splendid things from Gamages—they'll surely make 1925 the jolliest year you've ever spent! Of course, there is a whole crowd more good things on show at Holborn—pay us a visit!



JUVENILE OPERA GLASSES

at a price that is amazing—even for Gamages!

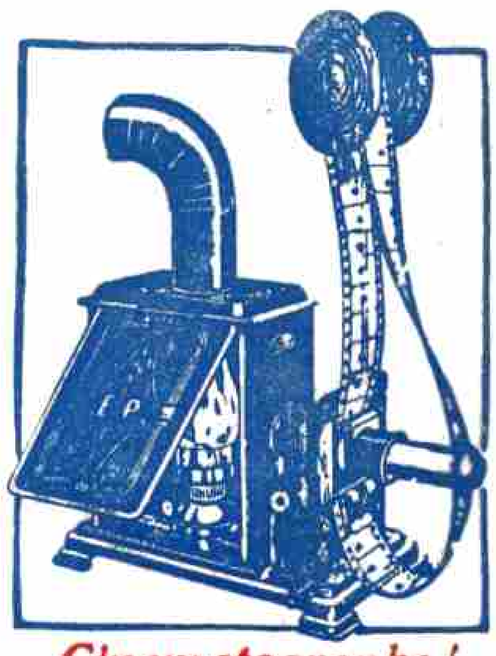
A splendid little novelty that every boy should have. Nicely-finished pair of Opera Glasses, complete in Black Imitation Leather case, with handle for carrying. Send for your pair to-day. The price is so low that the stock will not last long! Post 3d. Price **1/3**

Boxing!

Youths' Superior Boxing Gloves, with Tan Cape Covers, Bar Grip, Horsehair Padded. Laced Palms and Padded Wrists. Post 9d. Price per set **16/6**

Ditto in Cheaper Quality—Boys' sizes. Price per set, Post 6d. **13/6**

Youths' size. Price per set, Post 6d. **14/6**



Cinematographs!

Combined Cinematograph and Magic Lantern giving excellent pictures. Reliable mechanism, with flywheel suitable for all standard size films. Can also be used as a Magic Lantern. Supplied complete with film, slide, and oil lamp. Height, including chimney, 7 in. Price complete Post 9d. **5/6**

Extra Films, **1/-** per box 36 ft. **2/-** per box 72 ft.
Long continuous coloured film bands. Each **1/-** and **7½d.**
Extra Slides, per box **8d.**

Take up Chemistry!

You must have a hobby for the dull winter evenings, so why not take up Chemistry? At Gamages you can buy sets from 3/3 upwards and start right away. Come and inspect our stocks.

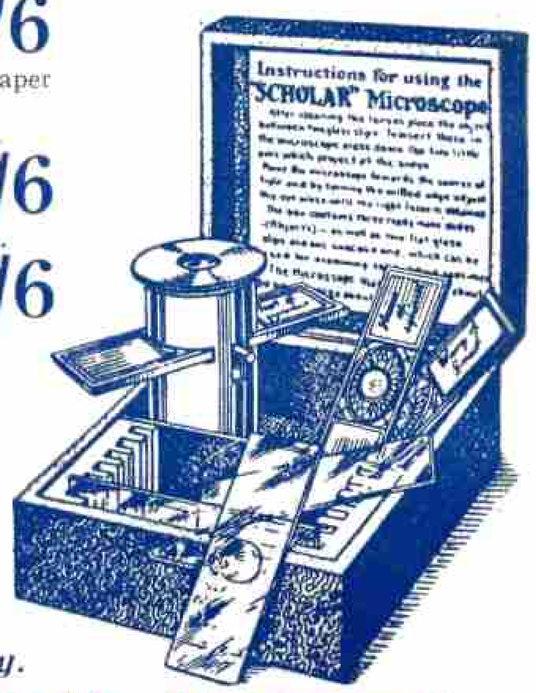
Neat Box of Chemicals, with instructions, etc., complete for performing 50 experiments. Price Order one to-day **3/3**

Ditto, with instructions, etc., for performing a larger number of experiments. Price complete, Post 6d. **5/6**

COMPLETE ANGLER'S OUTFIT

Contains an 8-ft. dark-stained 3-joint rod, 1 wood reel, 1 line, floats, 2 Olympic gut casts, 1 Olympic ledger, 2 gut casts, 7 hooks to gut, 1 plummet, 1 box of split shot, 1 disgorger, 1 haversack, 1 worm bag, 1 packet of artificial bait, and hints on "Just How to Begin." Post Paid. Price **21/-**

WRITE and Tell us about Your Hobby.

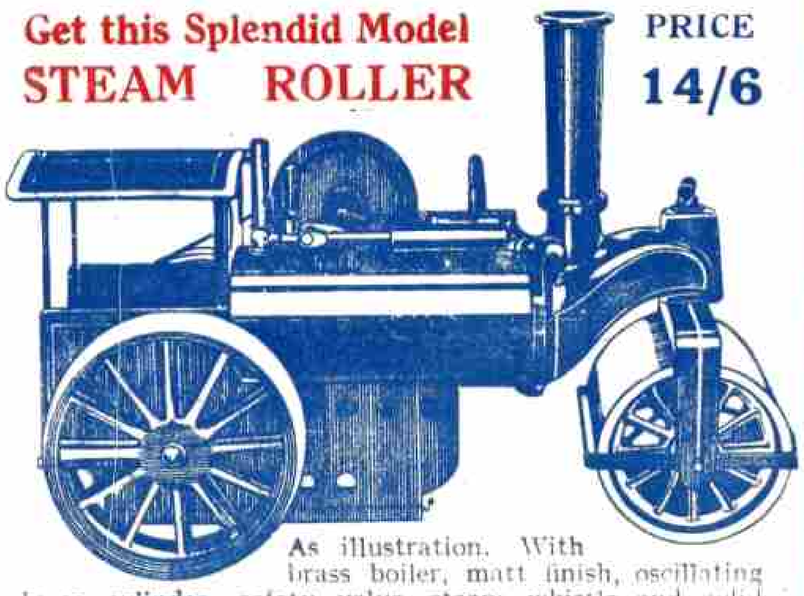


Get this Microscope!

Lacquered Brass with adjustable spring slide, suitable for examination of Pond Life, Cheese Mites, etc. Magnifies 50 diameters, complete in box with instructions and 2 Prepared Micro Objects, 2 Plain Glass Plates, 2 Glass Plates with cavity. Price Post 3d. **3/6**

Get this Splendid Model STEAM ROLLER

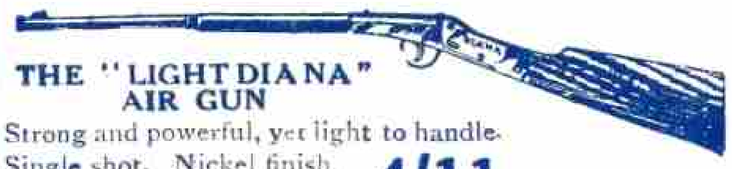
PRICE **14/6**



As illustration. With brass boiler, matt finish, oscillating brass cylinder, safety valve, steam whistle and solid fly-wheel. Reversing gear for running forward or backward. Height to top of chimney, 5¾ in. Diameter of boiler, 1½ in. Price Post 6d. **14/6**

Ditto, height to top of chimney, 6½ in., diameter of boiler, 2 in. Price **24/6**

Get one of GAMAGES AIR GUNS



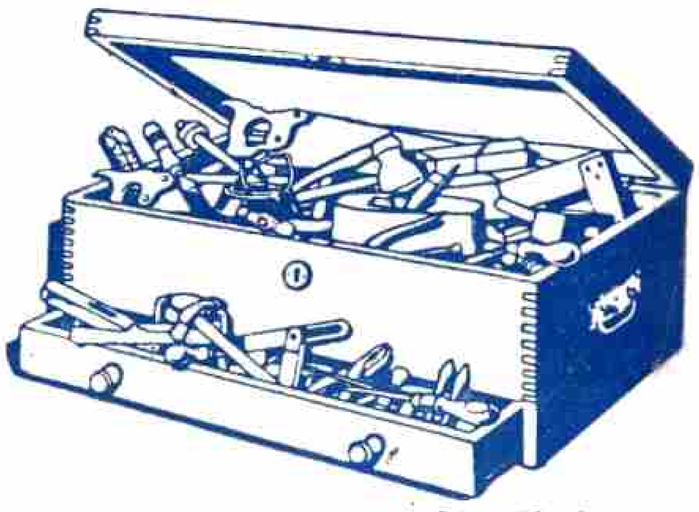
THE "LIGHT DIANA" AIR GUN
Strong and powerful, yet light to handle. Single shot. Nickel finish. Carriage 1/- Price **4/11**

THE "DIANA" AIR GUN
No. 1 bore. Shoots darts or slugs. Strong, well made and reliable. Carriage 1/- Price **12/6**

THE "GAMAGE" AIR GUN
No. 1 Bore. Very accurate. Carriage paid. Price **24/6**

"GEM" AIR GUN
No. 1 bore only. Beautifully made and finished. Carriage paid. Price **27/6**

TOOL CHESTS (50 Tools)



Handsome Chest, 23 in. long by 10½ in. wide, finished in polished hard wood with drawer and lock. Contains 50 tools including handsaw, tenon frame, brace, 13 assorted brace bits, smooth beech plane, 4 chisels, spokeshave, mallet, hammer, gauges, cork rubber, saw set and file, pliers, spirit level, oil can, oilstone, etc., etc. Worth £5. Price **67/6**

A. W. GAMAGE LTD., HOLBORN, LONDON, E.C.1.

Visit the Display of Games and Models at BENETFINKS, CHEAPSIDE, E.C. 2.

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Printed by Stembridge & Co. Ltd., Albion Street, Leeds.