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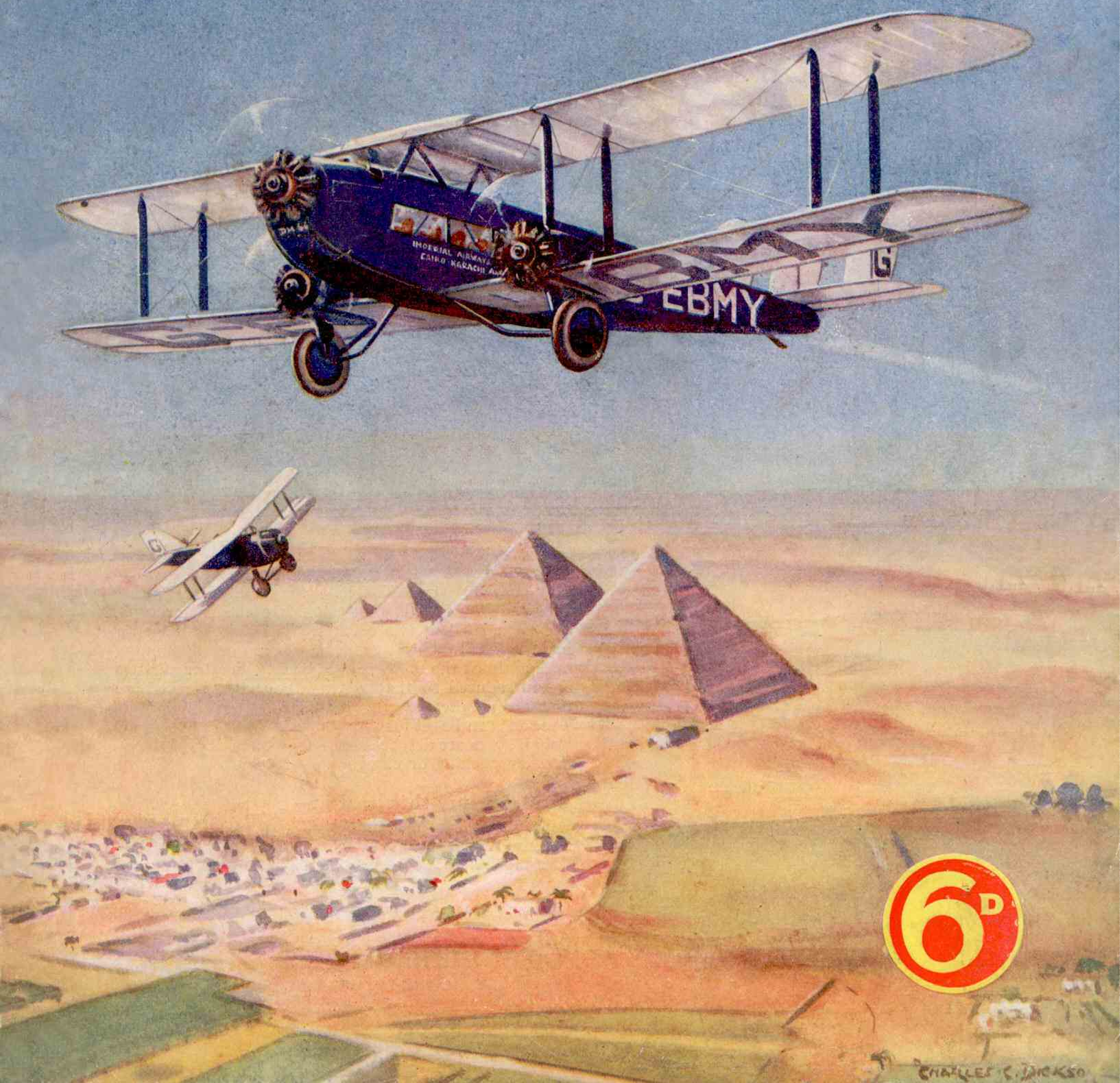
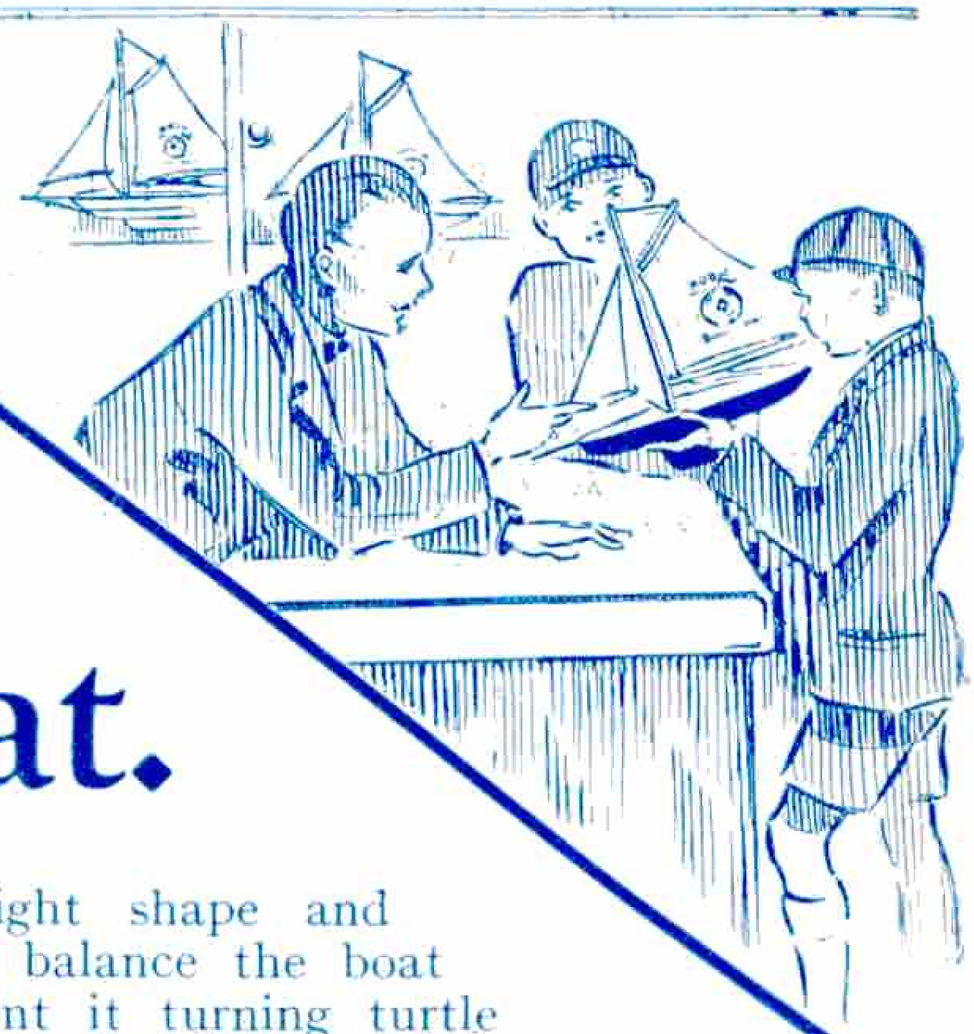
AUGUST 1926

MECCANO MAGAZINE



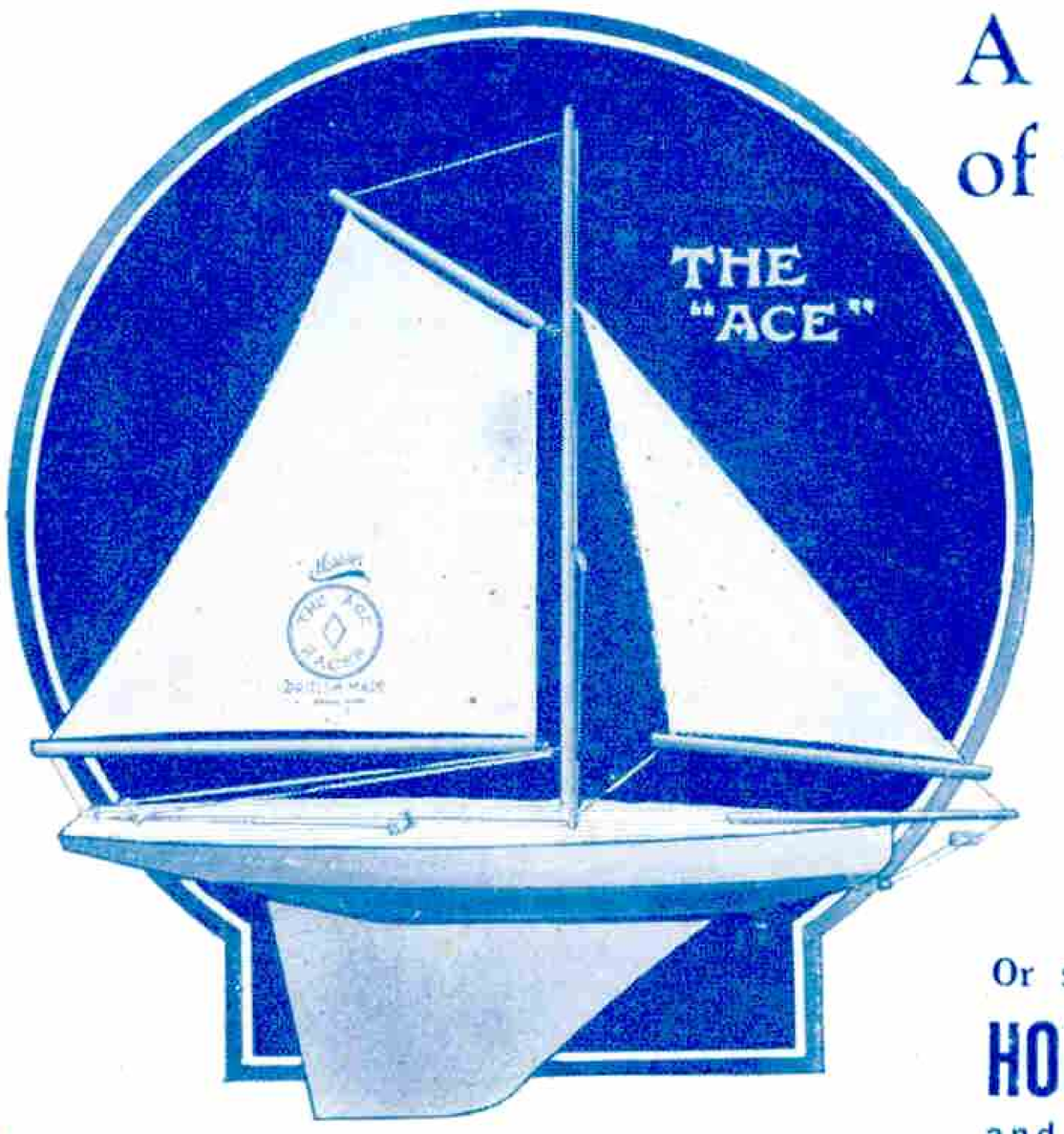
Points to look for when you buy a boat.



The boat must be correctly designed to float and run well. It must have just the right amount of sail, and proper running lines and runners to set for any wind. The hull should be nicely finished and the spars strong and well fixed. A cutter shape is the best for fast sailing. The keel must be the right shape and weight to balance the boat and prevent it turning turtle even in a gale. Finally the boat should have a good name behind it to guarantee its value. An unnamed boat is probably worthless and waste of money

YOU WILL FIND ALL THESE IN

THE "ACE" RACER



A British Sailing Boat of which you can be proud

The boat is over 16 ins. long with a deck measuring 14½ ins. The hull is well shaped to the cutter type, and is finished in two colours. The deck is lined for planking. Stout watercord is used for all running lines and not the usual cheap string. Leather runners are introduced so that neither they nor the cord are materially affected by damp. The sails can be set for any wind, but all spars are detachable to lie flat for packing or carrying.

3/6

Postage 6d. extra.

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MECCANO MAGAZINE

Editorial Office
Binns Road
Liverpool

Vol. XI. No. 8
August, 1926

With the Editor

Aeroplanes with Three Engines

Our cover this month shows one of the new de Havilland Air Liners in flight over the Pyramids. In reading the description, printed elsewhere in this issue, of these giant aeroplanes, it will be noticed that the specification includes the installation of three "Jupiter" engines. This is an interesting departure and one that will be followed closely, not only by the public but by designers of aircraft also.

Theoretically, the three-engined aeroplane is capable of flying satisfactorily even when only two of its engines are at work. The idea behind the introduction of three engines, of course, is the safety of the machine. More especially is this consideration necessary in the new D.H. 66 and similar types, that are intended to be used largely for carrying a number of passengers. In theory, with a three-engined aeroplane there should be no risk due to forced landings, and a machine so equipped should be able, without difficulty, to reach a suitable destination. This assumption is made on the idea that all three engines are of equal power, so that if one should stop, the power lost is only approximately one-third of the total. The theory is also based on the supposition that the three engines are individually as reliable as the engine of a single unit, but should this not be the case, then the chances of a forced landing are, of course, actually greater than in the case of a single-engined aeroplane, and the advantage of the three-engined machine is lost.

A Performance that will be Watched with Interest

So far, the three-engined aeroplane is in the experimental stage, and no doubt there will have to be considerable developments before it gives full satisfaction. Even the present type of machine may have to be radically altered in design. Whether this is so or not, the fact that the de Havilland Aircraft Co. Ltd. have this type under construction shows that they intend to explore its possibilities. As explained elsewhere, the new machines are being built to comply with the requirements of the Imperial Airways Ltd., and as the de Havilland Company have had more experience in the design of commercial aeroplanes than any other British firm, we may rest assured that the design will be the most efficient possible and that the best workmanship will be put into the job.

In addition to the D.H. 66 there are two other three-engined machines, the Handley-Page W.9 ("Hampstead")—which is almost identical in many respects with the D.H. 66—and the machine now being built by Sir W. G. Armstrong-Whitworth Ltd., the general arrangement of which is very similar to that of the D.H. 66. It will be very interesting to compare these three types of machines at work, and we shall all look forward to the publication of the particulars of their comparative performances.

It is interesting to note that the three British machines mentioned are all of the biplane type, more especially so as the three-engined monoplane is more favoured abroad. Commander Byrd, for instance, flew to the North Pole and back on a "Fokker" monoplane, and the Junkers machines used on the German air lines are also cantilever monoplanes. Thus, in addition to the interest attached to the performance of the British three-engined machines, there is also a battle looming ahead between the biplane and the monoplane in this class, and only the future can decide which type will survive.

Meantime, in connection with this subject I may mention that I hope to describe and illustrate the Handley-Page "Hampstead" next month, and the Fokker three-engined FVII. in a subsequent issue.

Model-building Competitions in the Summer

With a view to encouraging Meccano boys to get as much outdoor exercise as possible during the fine summer days I have decided to suspend the announcement of further model-building contests for a month or two.

The new competitions, which will probably commence in October next, will be run on similar lines to those that have appeared already, and their interest will be augmented even further by the inclusion of additional awards and certain new features. I would advise readers to make a note of any "bright ideas" that may occur to them in their leisure moments during the next month or two, so that they may be ready to enter the contests in the coming autumn with renewed energy and the determination to "come out top" in at least one of them.

In passing, I should like to express the pleasure it has given me to watch the growing popularity of these competitions. Since October last, sixteen important contests have appeared in the pages of the "*M.M.*," each dealing with a different subject and calling for an entirely different style of construction. The Meccano boy's supply of ideas is apparently inexhaustible, however, for month by month the number of entries has increased, while the standard of construction has remained as high as ever. The truth of the last statement has been borne out, I think, by the successful models that have been published in the "*M.M.*" from time to time, and will be further endorsed by other prize-winning entries that I intend to reproduce as soon as space will permit.

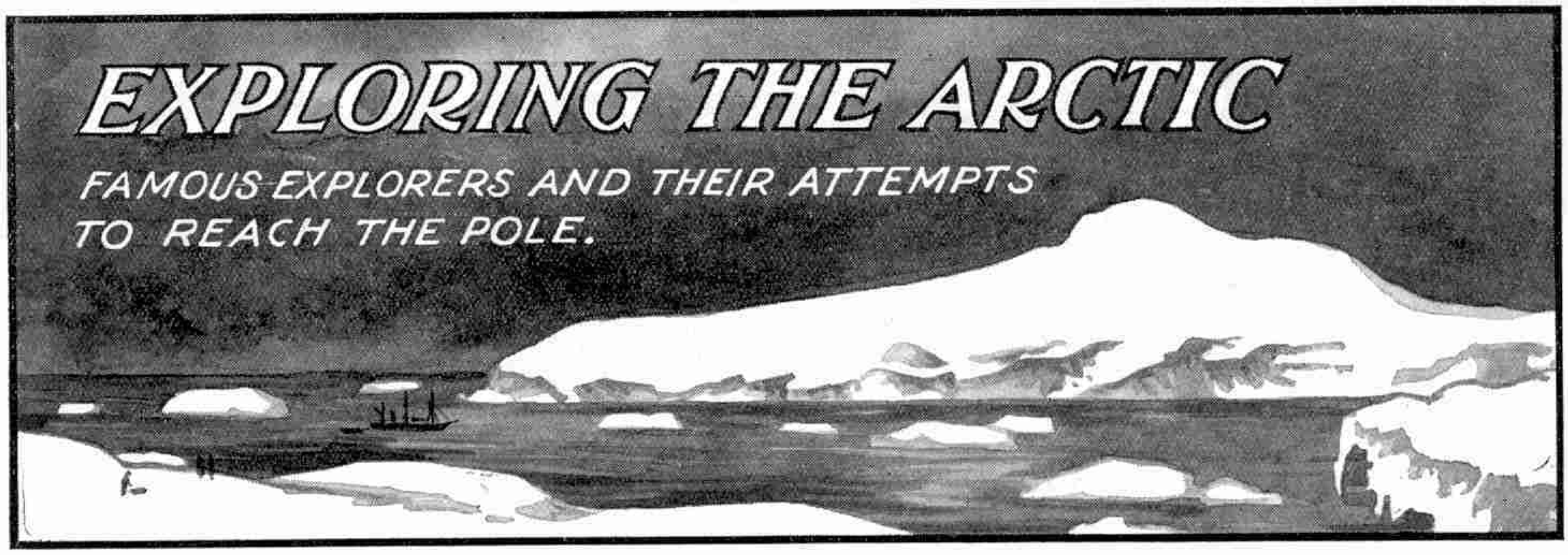
The Coming of Oil

It is announced that, as a result of the coal strike and the curtailment of fuel supplies, one of our railway companies has been experimenting with oil as a fuel on four locos, and that a further 100 engines—out of a total of 10,000—are to be converted to oil-burning.

This is not by any means the first time that oil-fuel tests have been made on British railways, of course. Some extensive experiments in this direction were carried out some years ago by, I believe, the Great Eastern Railway. If I remember correctly, the result was that although the locos worked quite satisfactorily, the cost of running them on oil fuel was much higher than when coal was used. This is no doubt partly accounted for by the fact that railway companies buy coal at a comparatively low price, paying pit-head prices and transporting it in their own wagons.

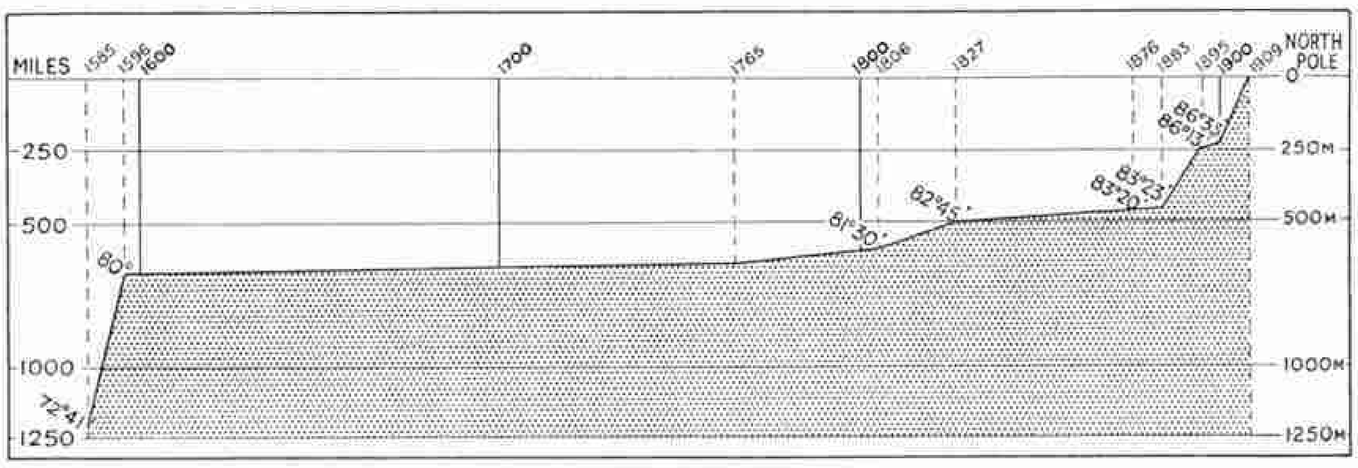
Any company that decided to adopt oil fuel throughout would be faced at the outset with a huge capital expenditure in several directions. For instance, not only would the carrying out of the necessary alterations to 10,000 locos be a costly conversion, but the thousands of coal wagons, now used for transport of fuel from the pits, would have to be scrapped. A general change-over from coal to oil is not likely at the present time, if only on the grounds of expense. We must also not overlook the important fact that the adoption of oil fuel would undoubtedly produce many problems of its own—as, for example, the fact that oil-fuel has to be imported and the great oil combines are subject to foreign control. We may have trouble with our mining industry, but we cannot get over these difficulties simply by substituting oil.

The most promising manner of the economical use of coal seems to lie in the electrification of the railways, big schemes for which have been under consideration for some time past. The experiments that have so far been made have proved a great success and it may be that it will be left to some of my readers to help in carrying out this great work in years to come. Such an undertaking would not only be a great engineering achievement but would also revolutionise our industrial methods.



THERE are few more enthralling stories of bravery and determination than those found in the history of Polar Exploration. The subject teems with exciting adventures and heroic achievement, dating even so far back as before the time of King Alfred—when Ottar, the Norwegian, first entered the Arctic Sea, sailing to the north coast of Russia.

Although both North and South Poles have now been conquered—in the sense that they have been reached—there yet remains a great deal of work to be done in the exploration of the Polar regions, particularly in reference to the possibility of using them for commercial purposes. This does not mean that factories and businesses might be established there, but just as the earliest Arctic explorers endeavoured to find a north-west passage, so to-day explorers are endeavouring to find a means of using the Arctic regions for aerial flights, and so making "short cuts" from one side of the world to the other, by flying over the top of the world, rather than around its circumference.



The chart illustrates, in diagrammatic form, the progress towards the North Pole from 1585 to 1909, in which year Peary achieved the goal of centuries of ambition

The Quest for the North-West Passage

In the olden days explorers were not so particularly desirous of reaching the Pole as they were of discovering what was called the "north-west passage." Actually to reach the Pole has been rightly regarded more as a scientific achievement—man's triumph over natural difficulties, as it were—than a commercial enterprise. It was not inappropriate, therefore, that the goal was not reached until the twentieth century, the first twenty-five years of which have shown promise of an era of greater scientific advancement in all directions than the world has ever known.

The great importance attached to the discovery of a north-west passage—and for which achievement so many gallant British seamen sacrificed their lives—was the fact that such a highway for shipping would make possible a short cut from the Atlantic to the Pacific. It was, indeed, really in the hope of being able to sail from Europe to India by a westward route that Columbus came to discover America. In the same way, the dream of a north-west passage to China and the East Indies first caused voyages to explore the icy seas of the higher latitudes.

Nowadays, when the north-west passage has been shown to exist, but to be impracticable for normal traffic, the quest is for a "short-cut" aerial highway through the Arctic, from Europe to the East, with possible bases for supplies of food and oil—and perhaps depôts for the repair of airships and aeroplanes damaged by the terrible Polar gales.

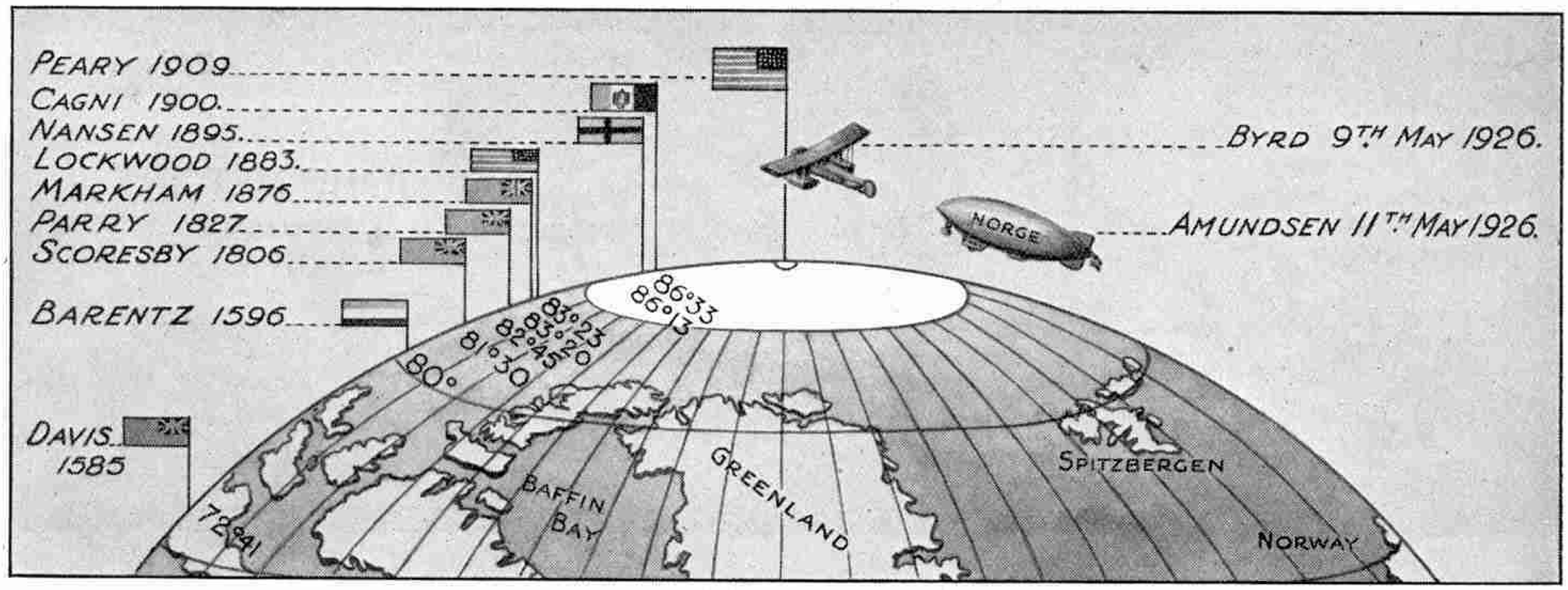
Then again, as was briefly mentioned in our Editorial page in the June "*M.M.*," a suggestion has recently been made for the establishment of a regular airship patrol of the Polar regions between Greenland, Iceland and Norway. The idea is to observe carefully the movements of the Polar ice and to consolidate these observations with meteorological information. The result of this work, it is anticipated, would help to determine the influence of the ice movements on the weather of the North Atlantic.

If such air patrols of the Polar regions could be organised every year for a number of successive years, undoubtedly we should be able to forecast the weather more accurately—a factor that would be of great commercial value to the shipping industries of all nations using the North Atlantic.

Science Aids the Modern Explorer

Until recently, of course, the efforts of explorers have been confined to the use of ships and sledges, but now, with the practical application of the aeroplane and the airship, Polar explorers of the future have the scope of their activities considerably widened and the possibilities of useful work are largely increased. We need not here dwell on this aspect of the subject, which was dealt with in detail in a special article "Polar Exploration by Air" that appeared in our June issue.

Not only has aviation come to the aid of explorers

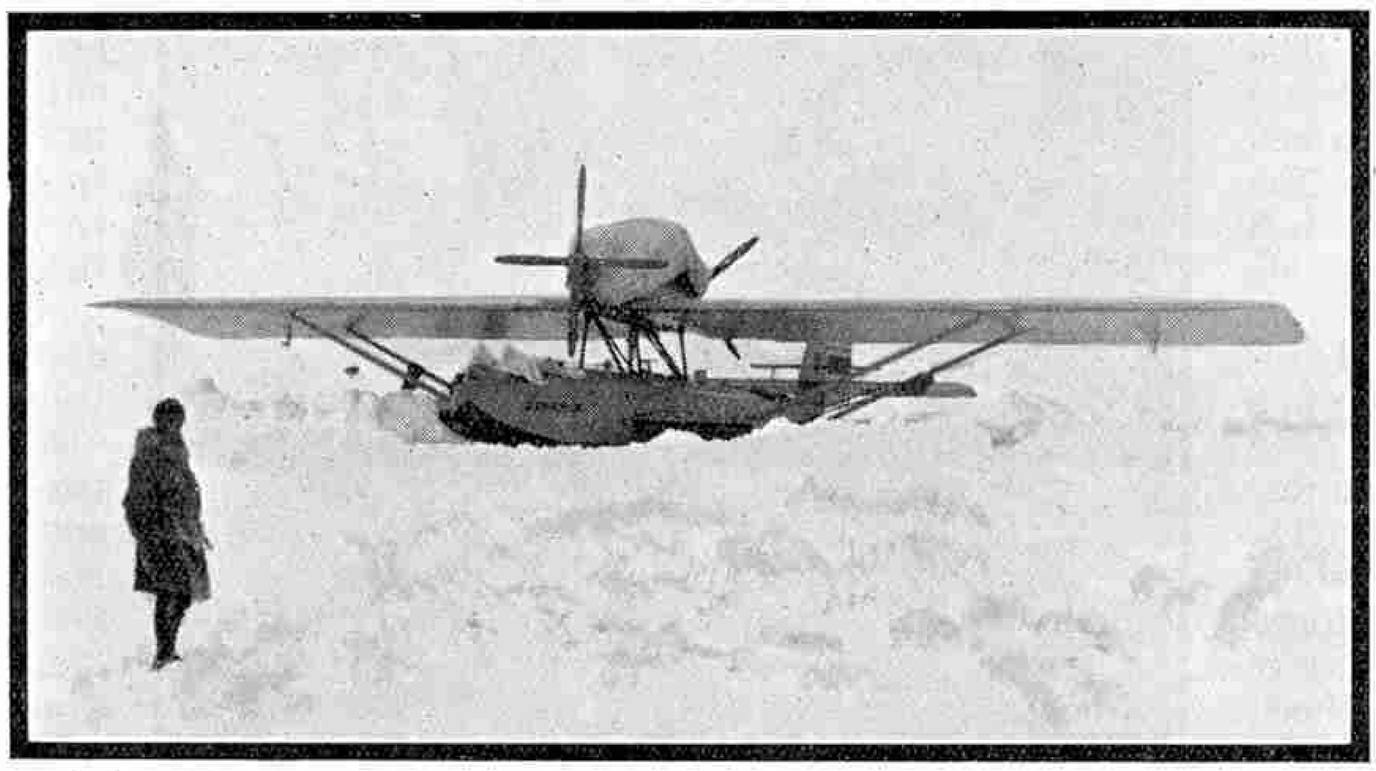


Progress in North Polar discovery, from the earliest times to the present day
The flags indicate the nationality of the explorers who each achieved a record in reaching "farthest north"

but to-day they are also aided to the utmost by modern science. No stone is left unturned to give them the benefit of the best equipment and latest devices to render their endeavours successful. The conditions under which they work are very different from those obtaining even fifty years ago, when Arctic explorers set out with little else other than sledges, good dog-teams, and a plentiful supply of food in bulk.

In the matter of food alone, modern explorers benefit greatly from scientific discovery. Heavy tins of "bully beef," such as Sir John Franklin took with him, are replaced by concentrated meat essences. Other foodstuffs similarly have been improved and whenever possible everything is made in concentrated form so as to lighten the burden to be carried. Medical science also helps the explorers, and supplies of medicines in tabloid form and first aid equipment help considerably to prevent disease and eliminate suffering.

A great deal could be written of the adventures of brave explorers in both Arctic and Antarctic regions, but in the present series we intend to deal only with Arctic exploration, leaving the story of the South Pole—with the tragic fate of Scott and the death of Shackleton—for some future occasion.



As described in our recent article, Amundsen's 1925 flight to the Pole nearly ended in disaster. Our photograph shows N.25 fast in the ice, in Lat. 88° 30 N.

A Famous Viking Explores the Arctic

The earliest record of voyages to the Arctic regions dates from 795 A.D. when Iceland—which was then uninhabited—was visited by a party of Irish monks from the Faröe Islands. The monks remained there for many years, but returned to their own country when the Norsemen came.

In 867 Iceland was re-discovered by Nadd-Odd, the Viking, and a few years later the country became the home of the Norsemen, as the inhabitants of ancient Scandinavia were called.

In 870 Ottar, a Norwegian nobleman, set out on a voyage of discovery and his voyage, and also that of Wulfstan, was recorded by our King Alfred, who was keenly interested in exploration and anything to do with the furthering of trade. Ottar sailed along the Scandinavian coast to the north, rounded the North Cape, and sailed through the White Sea to Dwina, his voyage being quite a creditable accomplishment, all things considered.

Erik-the-Red names Greenland

At about the same time Erik-the-Red, another famous Viking, sailed from Iceland, discovered Greenland, and the point he reached remained the "furthest north" for nearly 550 years. Erik, who remained in Greenland, found the country inhabited by Eskimos. They are believed to have lived there from prehistoric times, coming originally, it is thought, either from Asia or America, or even from both.

Long before Erik discovered it, Greenland had been sighted by Gunnbiorn, an Icelander, who gave to it the name of "White Shirt" because of its vast snowfields.

Erik evidently was a born pioneer and knew how to get colonists to settle in strange lands.

"What shall we call this land?" his followers asked him.

"Call it Green Land," he replied.

"But it is not always green," they objected.

"It matters not," said Erik, "Give it a good name and people will come to it!"

The Norsemen stayed in Greenland until gradually driven away by the Eskimos. They finally disappeared from the country in 1342, when the little colony was attacked by the Eskimos, at a time when the Norsemen

(Continued on page 520)

Lives of Famous Engineers

XXXI

JOHN METCALF

PIONEER ROAD-MAKER

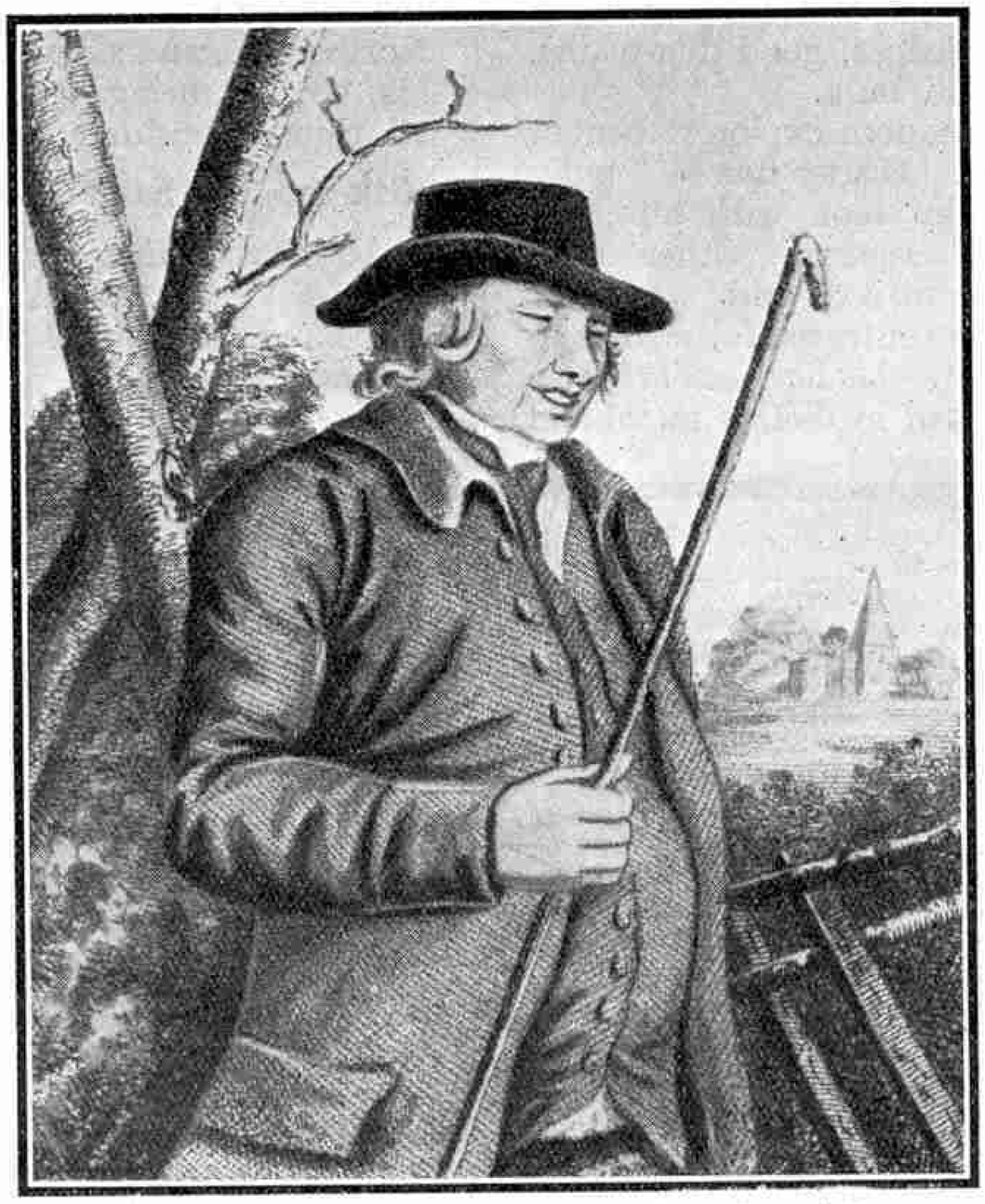
TRAVELLING conditions in England in the earlier half of the eighteenth century were terribly bad. Accounts of journeys written by travellers of those days give us a picture of acute discomfort at the best of times, with the addition of real danger in the bad weather of winter. The need for improved communications was keenly felt by the public and about the middle of the century large numbers of roads were constructed in all directions. From 1760 to 1774, for instance, not less than 452 Acts of Parliament were passed for making and repairing highways.

Roads in the 18th Century

In spite of this activity, conditions improved very little, however, because the new roads were constructed as badly as the old ones. The surface quickly broke up and before long was transformed into a series of deep ruts. The repairing of the roads was carried out on equally crude lines. Stones were taken from the nearest quarry and, instead of being broken up to a uniform size and laid on carefully, were dumped down just as they were and very roughly spread. The task of crushing down these stones and forming them into a proper surface was simply left to the wheels of passing carts and wagons.

At that time there were very few engineers of eminence and these few paid practically no attention to road-making and indeed regarded it as a task beneath their dignity. As late as 1768 it was considered quite remarkable that the engineer Smeaton should condescend to make a road across the valley of the Trent between Markham and Newark.

Road-making in fact was left to anybody who cared to take the work in hand, and thus it came about that the first extensive maker of really satisfactory roads was a man without education, brought up to no trade and, in addition, blind.



John Metcalf, known as "Blind Jack of Knaresborough"

Blind Boy's Activity

John Metcalf was born at Knaresborough in Yorkshire in 1717, and was the son of poor working people. He was not born blind, but a severe attack of smallpox when he was six years old resulted in the complete loss of his sight. When he was sufficiently recovered to be able to go out again he began to find his way about by groping from door to door along the walls on either side of his home. In about six months he could feel his way to the end of the street and back without a guide, and three years later he was able to go on errands to any part of the town.

He was an exceptionally strong and healthy boy and, as his confidence in finding his way about increased, he naturally became very eager to associate in the games and sports of boys of his own age. In some directions of course this was impossible, but he joined his companions in bird-nesting expeditions and soon became an expert climber, able to mount with ease any tree that he could grasp. In addition he spent many happy hours in roaming about the fields and lanes alone and gradually he came to know every foot of the ground for miles around Knaresborough.

In the evenings at home he learnt to play the violin and became so proficient that he was offered engagements to play for dances at country parties. In this manner he made his first earnings. Subsequently he secured regular season engagements to play at Harrogate and at Ripon.

A Clever Victory

Metcalf grew up to be a man of fine physique, 6 ft. 2 in. in height and exceptionally strong. Many stories are told to illustrate the extraordinary manner in which he overcame the handicap of blindness. He saved sufficient money to buy a horse and became an expert rider. A

great affection grew between horse and man, and riding became one of his greatest pleasures.

One interesting story of his self-confidence may be told. A riding match was arranged on the Stray at Harrogate and Metcalf entered. The ground was marked out by posts, enclosing a circle of a mile, and the race was to be three times round the course. The majority of the spectators ridiculed the idea of a blind man being able to keep to the course, but they underestimated Metcalf's ingenuity. He obtained a number of dinner bells from various Harrogate inns and stationed men to ring them at the turning points on the course. The sound of the bells was quite sufficient to direct him throughout the race, and he not only rode without any difficulty but actually came in the winner.

The Stage Coach

Metcalf Beats Stage Coach

Metcalf travelled about alone in a most remarkable fashion, appearing to be absolutely without fear of losing his way. He visited London twice, and on the second occasion he was entertained by Colonel Liddell of Ravensworth Castle. When the time came for return, the Colonel offered Metcalf a seat behind his coach, but the offer was declined, the blind man calmly saying that he could easily walk as far in a day as the Colonel was likely to travel in his coach. It seems almost incredible that a blind man should undertake to walk 200 miles over a strange road in the same time that a coach could perform the journey, yet Metcalf actually arrived at Harrogate before the Colonel.

The explanation of the slowness of the coach lay in the really terrible state of the roads, which made travelling on foot the fastest mode of progression. There is a story told of a man with a wooden leg who was offered a lift upon a stage coach. He declined this offer on the ground that he was in a hurry!

During the rebellion that broke out in 1745, Metcalf did a considerable amount of fighting, and became well known as "Blind Jack." He passed through this experience unhurt and after the battle of Culloden returned home to take up the more peaceful pursuit of a general carrier between York and Knaresborough.

First Road Undertaking

About the year 1765, while engaged on his work as a carrier, Metcalf became interested in a scheme to construct a turnpike road between Harrogate and Boroughbridge. The necessary Act of Parliament authorising the making of this road had been passed, but in such a remote country district the surveyor found it difficult to discover men capable of carrying out the work.

During his wanderings about the country, Metcalf had thought a good deal about the universally bad state of the roads, and he was shrewd enough to foresee that, if the proposed road could be constructed successfully, it probably would be the first of many similar highways. A new and promising line of business was thus opened up, and Metcalf determined to embark upon it. He approached the surveyor with an offer to construct three miles of the proposed road, between Minskip and Fearnsby, and the surveyor had such confidence in the blind man's ability that he let him the contract immediately.

Having sold his stage wagons and his interest in the carrying business, Metcalf tackled his new undertaking with the greatest vigour. The materials for constructing the whole length of the road were to be procured from one gravel pit, and Metcalf made elaborate arrangements for hauling out the ballast and distributing it to the road gangs with speed and economy. The work proceeded rapidly and without a hitch, and Metcalf finished his contract length to the complete satisfaction of the surveyor.

Pride in His Work

Shortly afterwards, tenders were invited for the building of a bridge at Boroughbridge and Metcalf sent in a tender which was accepted. This task was entirely new to him, but he completed it satisfactorily within the contract time. Subsequently he constructed numerous roads and bridges with great success. His roads lasted well, and after times of heavy flood he was able to point with pride to his bridges, all of which were standing, while many others had collapsed.

A Road Across Marshes

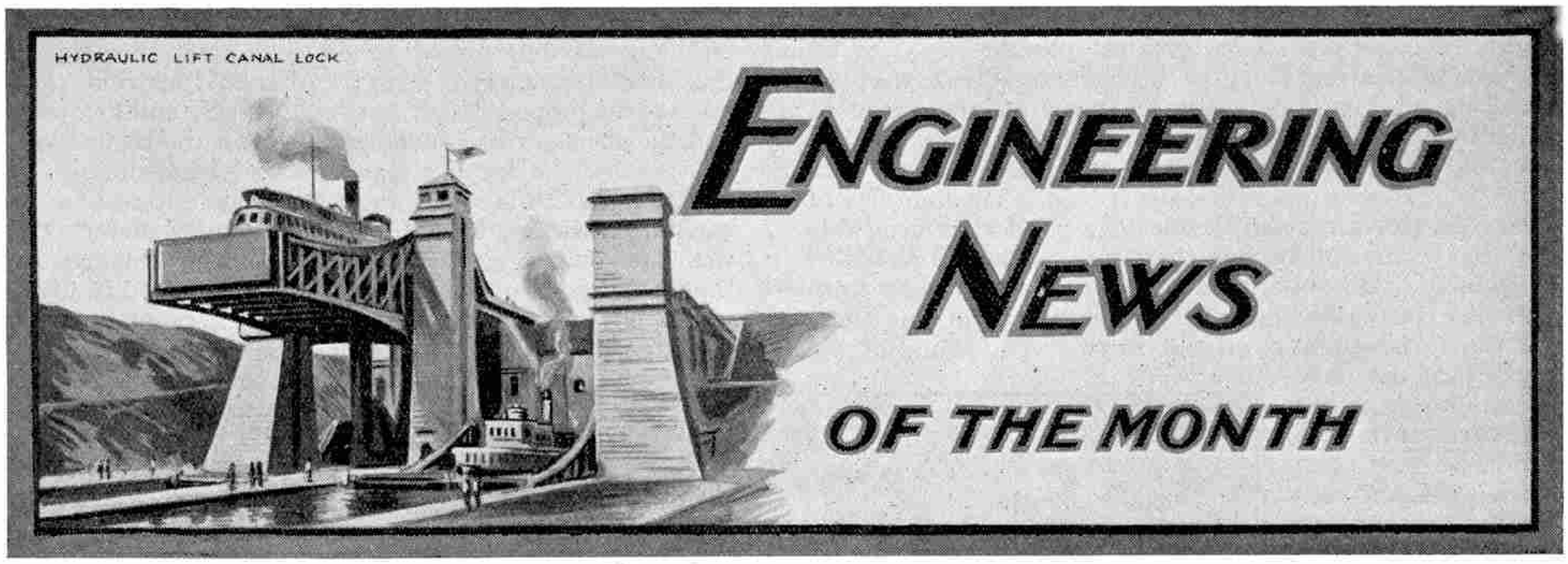
When the road from Huddersfield to Manchester was decided upon, Metcalf contracted to make it at so much per rood, before the line of the road had been marked out. Subsequently, to his dismay, he found that the surveyor's route involved crossing some deep marshy ground on Pule and Standish Commons. He pointed out to the trustees that he would be involved in much greater expense by following the surveyor's line, but the trustees assured him that, if he succeeded in completing the road to their satisfaction, he should not be the loser.

In the opinion of the surveyor it would be necessary to dig out the bog until a solid foundation was reached, but Metcalf realised that this would be a slow and very costly proceeding, and that in the end the road would be unsatisfactory. He pointed out all this to the trustees, but they refused to agree to the road passing around the marshy land.

Metcalf was thus placed in a difficult position. Finally, after much thought, he solved the problem by persuading the trustees to allow him to make the road across the marshes in his own manner on condition that, if it proved unsatisfactory, he would reconstruct it at his own expense on the surveyor's plan.

The contract stipulated that nine miles of the road must be completed within ten months. Therefore, having gained his point, Metcalf lost no time in

(Continued on page 523)



French Hydro-Electric Scheme

Considerable progress is reported in connection with the electrification scheme at Eguzon on the Creuse, some 200 miles from Paris, and a huge reinforced concrete dam that heads a lake 11½ miles in length has just been completed. This barrage is 836 ft. in length and 16½ ft. in thickness at the summit, 262 ft. in length and 164 ft. in thickness at the base, and from the floor of the lake it stands nearly 200 ft. in height. Five turbines, each of 10,000 kilowatt capacity, are fed through iron pipes 13 ft. 9 in. in diameter.

The scheme is intended to supply the Paris-Orleans Railway with current and it is believed that, after supplying the needs of the railway, there will be 20,000 to 30,000 kilowatts surplus available for Paris.

The railway company anticipate a saving of nearly 250,000 tons of coal per annum.

* * * *

Turbine of Record-Breaking Size

A cross-compound turbine, half again as large as any now in commercial service and larger than any under construction, is to be added to the equipment of the Crawford Avenue station of the Commonwealth Edison Company of Chicago. The new unit, rated at 90,000 kilowatts and equivalent to 120,000 horse-power, will be furnished by the General Electric Company, which has practically completed a 77,000-kilowatt service unit for the same station.

The giant turbine will consist of two sections—a high-pressure element of 35,000 kilowatts capacity running at 1,800 r.p.m., and a low-pressure element of 55,000-kilowatts and 1,200 r.p.m. A 2,000 kilowatt service generator is connected to the high-pressure element, and a 500-kilowatt direct-connected exciter to the low pressure element.

Operating conditions will be the same as for the other units in the station, with steam at 550 pounds gauge and 750 degrees Fahrenheit total temperature.

The General Electric 60,000-kilowatt turbine in the Crawford Avenue station has been in service since November 1924, although the formal opening of the station was not held until May of last year.

When the Crawford Avenue station was opened, the 60,000-kilowatt turbine was the largest in operation in any central station in this country. Practically at the same time as the opening ceremonies were held, an order was placed by the Commonwealth Edison Company for the General Electric 77,000-kilowatt turbine, which is now being installed. Work on the even larger 90,000-kilowatt unit has been started before the installation of the 77,000.

The addition of the 90,000-kilowatt turbine will bring the installed capacity of the Crawford Avenue station to 327,000-kilowatts. It is expected that the ultimate capacity of the station will reach 750,000 or even 1,000,000 kilowatts.

The enormous size of the 90,000-kilowatt unit is shown by the fact that it will be 13 ft. 6 in. in height. The length of the high pressure element will be 71 ft. and that of the low pressure 53 ft. The total weight will be 1,978,000 lbs.

It is interesting to note in this connection that the Commonwealth Edison Company built the first central station designed exclusively for steam turbines. The first 5,000-kilowatt vertical steam turbine—the giant of its day—was placed in service in the Fisk Street Station on October 2nd, 1903. That turbine, the first built by the General Electric Company, now has a place of honour as a monument in front of the turbine shops of the company in Schenectady, after having completed many years of service in the original Fisk Station in Chicago, being withdrawn from service only to make way for larger units.

* * * *

Liverpool's Huge Tramway Works

One of the most striking sights at Liverpool is the erection of what, when completed, will be the finest tramway works in Great Britain. For some years past the Liverpool Corporation have found the task of carrying out all repairs to tramway vehicles to be beyond the capacity of the existing depot, and hence the construction of the new works.

The site of the new depot, which is only a few minutes' walk from the Meccano factory, covers an area of 15½ acres, of which buildings will cover 9 acres. There will be 3¼ miles of track inside the premises. More than 138,000 sq. ft. of glass will be required and, by using reinforced concrete to a total area of 43,560 sq. yds. over 2½ million bricks will be saved for house-building purposes.

When the depot is working at full strength employment will be given to over 1,000 men in repairing and maintaining the 600 odd vehicles in the tramway service.

Nine New Oil Tankers

Of nine oil tankers recently ordered by the Anglo-Saxon Petroleum Company, five are to be motor-propelled and will be built in the United Kingdom, four by Messrs. Harland & Wolff at Belfast, and the other at the Dundee yard of the Caledon Shipbuilding & Engineering Co. The ships to be built at Belfast include one of 1,050 tons, two of 2,300 tons and one of 3,600 tons, and the engines also will be built by Messrs. Harland & Wolff. The Dundee-built ship is to be fitted with two sets of double-acting four-stroke Werkspoor engines built by the North-Eastern Marine Engineering Co. on the Tyne. The remaining four vessels of this big order will be steam propelled and each will have a gross tonnage of 2,300 tons.

* * * *

The Development of Electrical Power

Sir John Snell, Chairman of the Electricity Commissioners, recently stated that the whole tendency of future development of the electrical industry in this country will be towards concentration in fewer and larger stations, in which stations the most modern appliances can be economically adopted. He predicts that by 1940, owing to these developments, the consumption of electricity in England will be more than double what it is at present.

Sir John states that if the Severn barrage scheme is adopted and proves successful, it will produce one thousand million units a year, representing a saving of a quarter of a million tons of coal.

* * * *

New Underground Extension

In our April issue we mentioned that tracks had been placed over the extension of the South London tube railway to Morden and recently the work, with the exception of a portion of the electrical equipment and signal arrangements, was completed. The rolling stock has been delivered and it is anticipated that the line will be open for service in the early part of this month. An interesting feature of the arrangement at the Morden terminus of the line is that a modern garage, providing accommodation for some 200 private motor cars, has been constructed, the object being, of course, to provide facilities for outlying residents who will be able to motor into Morden and complete their journey by rail instead of motoring right into London as hitherto !

New Wearmouth Bridge

The contract for the construction of the new bridge over the River Wear at Sunderland has been placed with Sir William Arrol & Co. Ltd., Glasgow. The bridge will be of the two-hinged parabolic steel arch type with a span of 310 ft. Its total width will be 80 ft., and this will provide a carriage way 48 ft. in width, sufficient to carry two lines of trams, and two footpaths each 12 ft. 6 in. in width. The masonry construction will be supported by steel caissons sunk into the bed of the river.

The work is to be completed within 32 months and will be carried out without interfering with either road or river traffic. To enable this to be done, the main ribs, the bracing and the hangers of the new bridge will be built first, and then a temporary roadway supported by the new bridge will be built over the existing structure. While the old bridge is being removed traffic will be diverted to the temporary structure.

* * *

New Rotor Ship

The first vessel to be constructed primarily for propulsion by rotors has recently been launched from a Bremen shipyard. The ship, which is named "*Barbara*," is a freighter with a capacity of 2,800 tons, is 195 ft. in length, 49 ft. 3 in. in beam, and may be loaded to a draught of 17½ ft. She is fitted with two six-cylinder, four-cycle, single acting Diesel engines which run at 300 revolutions per minute, and the power is transmitted by a gear drive to a single propeller running at 80 r.p.m. The engines will generate 1,000 b.h.p. and can produce a speed of ten knots.

The rotor drive consists of three cylindrical rotors, each 59 ft. in height and having a diameter of about 13 ft., built of specially treated metal, light but as strong as steel. The power for the rotors is supplied by electric motors operated by a small Diesel engine and dynamo, and owing to the lightness of their construction very little power is absorbed.

The German Government are taking an exceptionally keen interest in the development of rotor-driven ships and it was largely at official instigation that the "*Barbara*" was built. The recent successful cruise of the rotor ship "*Baden Baden*" which, after a very rough passage, succeeded in crossing the Atlantic, gives a very sound basis to the claim that the rotor principle affords a commercially profitable method of propulsion for ocean-going vessels. Engineers will await with interest the promised official report on the subject.

Hydro-Electric Scheme for Buenos Aires

It is proposed to construct a hydro-electric station at the port of Buenos Aires. The preliminary details of the station show that it will be one of the largest electric installations in the world. Five sets of generators, each developing 130,000 h.p., are ultimately to be installed, but only two sets are to be laid down at the commencement of the scheme. It is anticipated that the first will be ready for use towards the end of next year.

In Dock for Repairs

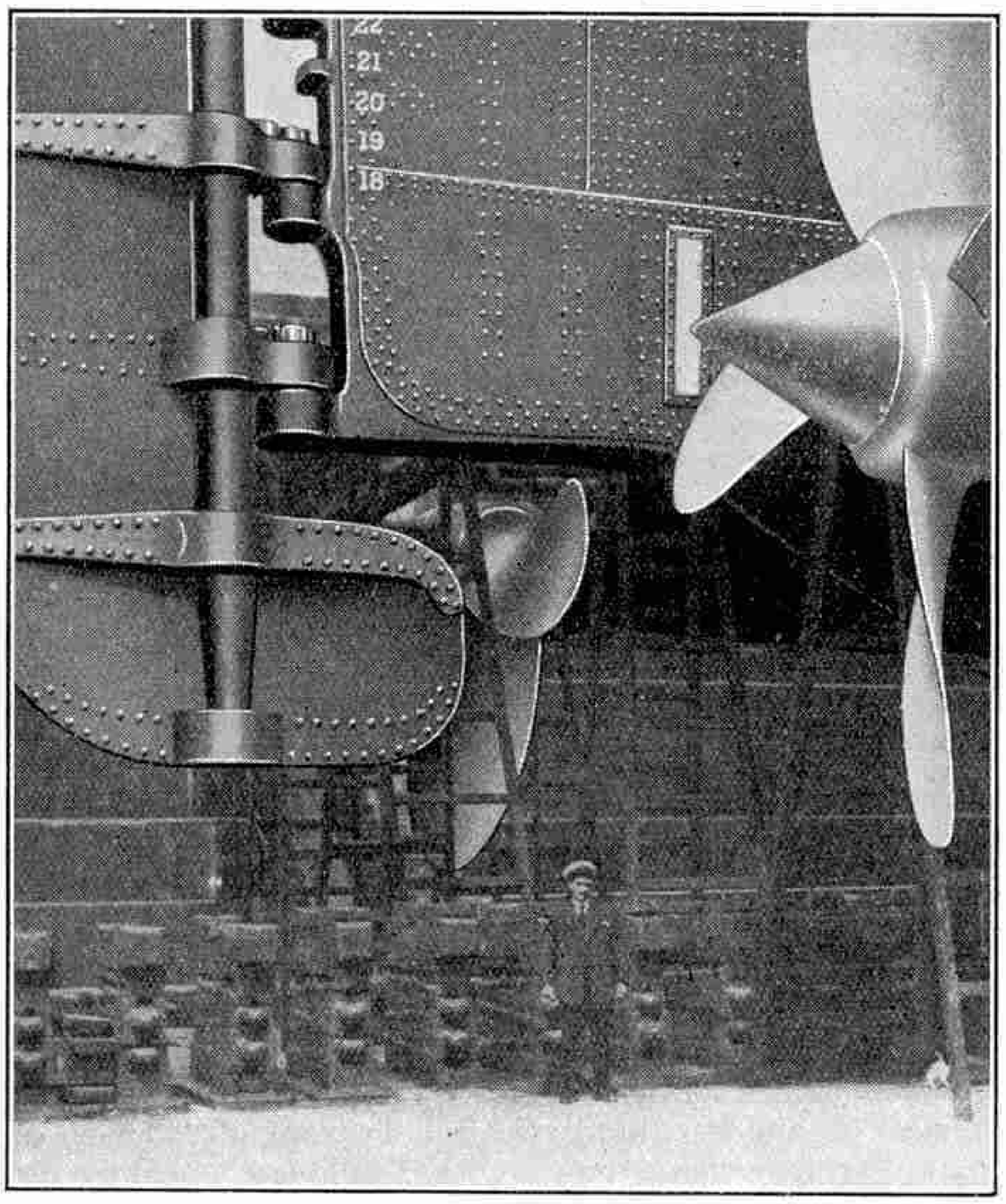


Photo by] [*Claud H. Nicholl*

Our photograph gives an excellent idea of the immense size of our modern Atlantic liners. It shows part of one of the screws and the rudder of the Cunard liner "Laconia," a 20,000 ton twin-screw vessel, with a length of 600 ft.

I.O.M. Gravel for Mersey Tunnel

The loading of the gravel taken from the shore at the Point of Ayre, Isle of Man, into steamers for shipment to the Mersey prior to use in the new cross-river tunnel, presented a neat little engineering problem. There is no quay or other suitable loading place at the Point of Ayre, and neither road nor rail to Ramsey, the nearest port.

The difficulty has been overcome by building a concrete ship, similar to those sunk off Ostend during the war, and anchoring it near to the shore so that it serves as an improvised dock. Little trolleys are being run from the beach to the "dock" and the gravel is loaded by means of cranes into the gravel ships, which are able to come alongside the makeshift jetty in perfect safety.

Speed in House-Building

An interesting demonstration of a new method of concrete construction of small houses was given in London recently, when 42 men, the majority of them inexperienced, built a house in three-and-a-half days. The time-table from the progress report was as follows :—

Wednesday—Start at 5 a.m. rubble and concrete foundation. 8 p.m. first storey complete.

Thursday night—Second storey moulding erected; doors, windows and other fittings in the first storey complete.

Friday night—Second storey complete.

Saturday afternoon—Roof completed and all interior work finished. The interior work included decorations, laying of linoleum and the hanging of curtains, while the garden also had been laid out.

The secret of this rapid construction is the use of steel moulds into which is poured concrete prepared in a machine that mixes nearly 30 tons an hour. The whole of the concrete for one floor of the house can be poured into the mould in less than an hour. The floors are laid on immediately and then the building is ready to receive another storey.

* * *

Sunderland Quay Extension

The River Wear Commission, with financial assistance from the Sunderland Corporation, have decided to construct a new deep water quay with warehouse and railway accommodation inside the mouth of the harbour. The quay will be 600 ft. in length and the estimated cost is £200,000, towards which the Government are making a considerable grant. The completion of this quay will assist in the development of the large import trade that is necessary to supply the needs of the county of Durham. The Government also have promised financial assistance to meet the interest and sinking fund charges.

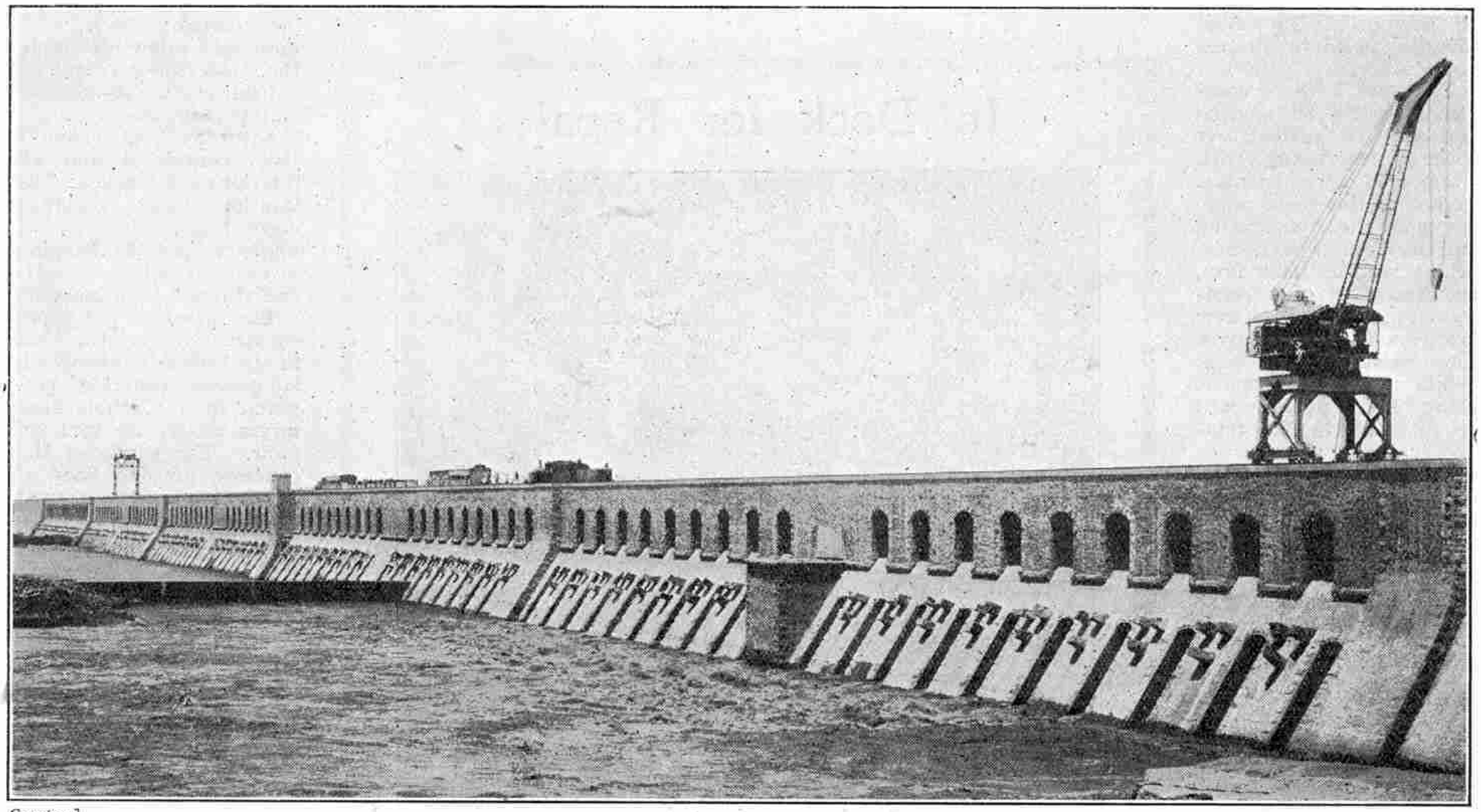
* * *

A Giant Oil Engine

An oil engine that is claimed to be the largest of its kind in the world has been constructed in Germany. It is of the double-action two-cycle type and it develops 15,000 h.p. when running at a speed of 94 revolutions per minute. Each of its nine cylinders is 860 mm. in width, the piston stroke being 1,500 mm. The extraordinary size of this giant engine is best illustrated by quoting its approximate dimensions, which are 25 yds. in length, 5 yds. in width and 12 yds. in height. The engine is intended for the Neuhof Power Station of the Hamburg Electricity Works.

A Million Tons of Masonry!

The Two-Mile Sennar Dam on the Blue Nile



Courtesy] [S. Pearson & Sons Ltd.

The First Train passing over the Dam

LAST month we learned something about the difficulties of the construction of the Sennar Dam from political and similar points of view. Now we are to read of difficulties of another kind.

The construction of this great barrage was commenced in 1914, but owing to the War work had to be abandoned until 1919. By that time prices had increased all round and the authorities soon found that the estimated cost of the scheme would be very considerably exceeded. Accordingly, when it was realised that it would be impossible to complete the undertaking successfully from a commercial point of view, the work was stopped for a second time.

In 1922 the matter was again brought forward, however, and six British firms were invited to submit tenders to complete the Dam and to construct a canal system in connection with it. Messrs. S. Pearson & Sons Ltd., London, a firm already well known all over the world for their experience in this kind of work, were successful, and their contract to complete the Dam by July 1925 was accepted.

Work commenced at once and it is interesting to find that the Dam was actually finished two months before the expiration of the estimated time period, and the canals were completed in a further month.

The Dam itself consists of uncoursed granite rubble set in cement. There are 80 sluices and these and the spillway openings are lined with granite ashlar, obtained from quarries some 30 miles distant.

The sluices in the central section are closed by special gates, weighing nearly 10 tons each. These are housed in heavy cast-iron frames, each of which weighs about 20 tons.

The gates are raised by a petrol-driven crane that travels along rails laid in the copings of the parapet wall protecting the railway, as shown in the illustration above.

The cranes used are of two types—the travelling jib crane, as shown at the right in our illustration, and a modified form of travelling gantry crane seen in the distance on the extreme left. The particular advantage of the jib crane is that it enables the sluices to be lifted completely out of their frames when this is necessary to examine or repair them.

Any of the sluices may be examined dry by lowering a heavy steel shield in front of the up-stream sluice openings.

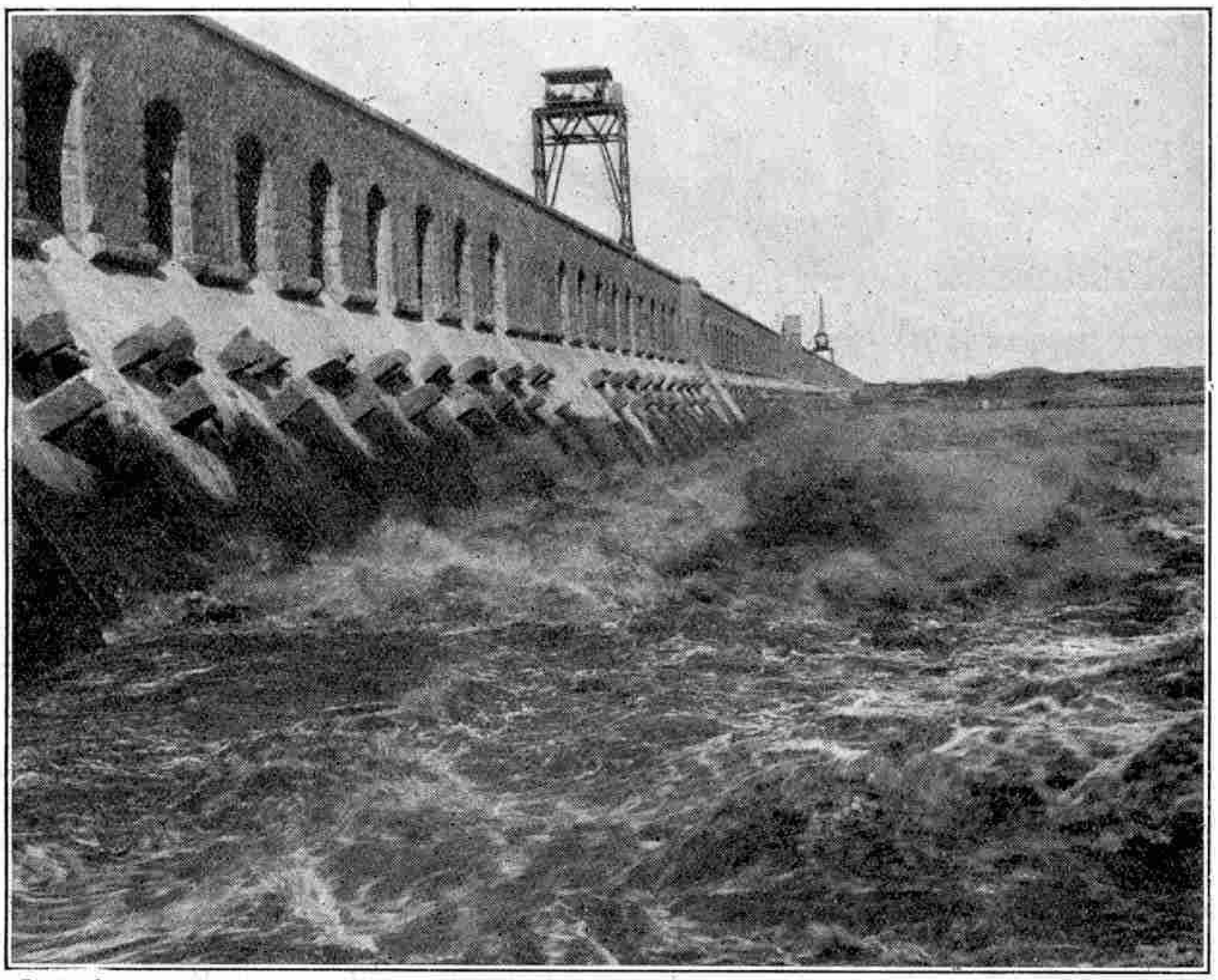
Irrigation, or the artificial distribution of water for the purpose of cultivating vegetation, is one of the principal branches of Civil Engineering, and a branch that is rapidly increasing in importance.

Immense irrigation schemes now exist in both Egypt and India, and schemes of even greater proportions are being projected. As a result, vast areas of desert will be made productive, the peoples of the countries concerned will live in better conditions, and the British Empire will add greatly to its already vast resources.

In addition to the sluices there are 40 large spillway openings, measuring 16½ ft. in width and 6½ ft. in height. The 72 smaller openings measure 9½ ft. × 6½ ft.

When in maximum flood the Blue Nile has been found to discharge 353,100 cubic feet per second. In the design of the Dam, a good margin has been allowed for abnormal floods, however, the spillways and sluices combined being designed to pass a flow of 529,650 cubic feet per second.

As an instance of the great increase in prices due to the War it may be mentioned that the original specifications called for the use of Portland cement in the masonry. Before the War the price of Portland cement was £5 per ton delivered, but after the War the price rose to nearly four times as much.



Courtesy] [S. Pearson & Sons Ltd.

Deep Channel, Down-stream side of Dam, looking West

In order to effect an economy it was accordingly decided to manufacture on the spot the cement required, more especially as on the site good limestone and clay were available, thus ensuring the production of an excellent Portland cement.

For the greater part of the work a special red cement was used. This was made by grinding together 70 parts of Portland cement clinker with 30 parts of burnt clay. The mortar made from this cement was found to be as strong and serviceable as if made with real Portland cement. Nearly half the structure consists of this mortar, the remainder being real Portland cement.

In some places the foundations are 40 ft. below the original bed of the stream, and before they were laid many borings had to be made to test the level of the rock. This part of the work, i.e., the laying of the foundations, was carried out during a time when the river was at its lowest. The water was diverted into the channel on the other side of the island in mid-stream to that on which the work was proceeding.

In all some 20,000 workmen were employed, and it is interesting to know that nearly all the men were Egyptians or Sudanese, although the granite ashlar blocks were cut by Italians.

The Egyptian workmen were very subject to malaria and because of this, special precautions had to be taken to prevent the spread of this terrible fever as had also to be done in the construction of the Panama Canal. During the three months when the mosquito was most prevalent, work was reduced to a minimum, and the breeding places of the mosquito were attacked and as many insects as possible destroyed with paraffin.

The canal system that carries the water from the lake to the desert area to be irrigated consists of a main canal 62 miles in length and 900 miles of branch canals. From these branch canals there radiate 3,125 miles of field channels.

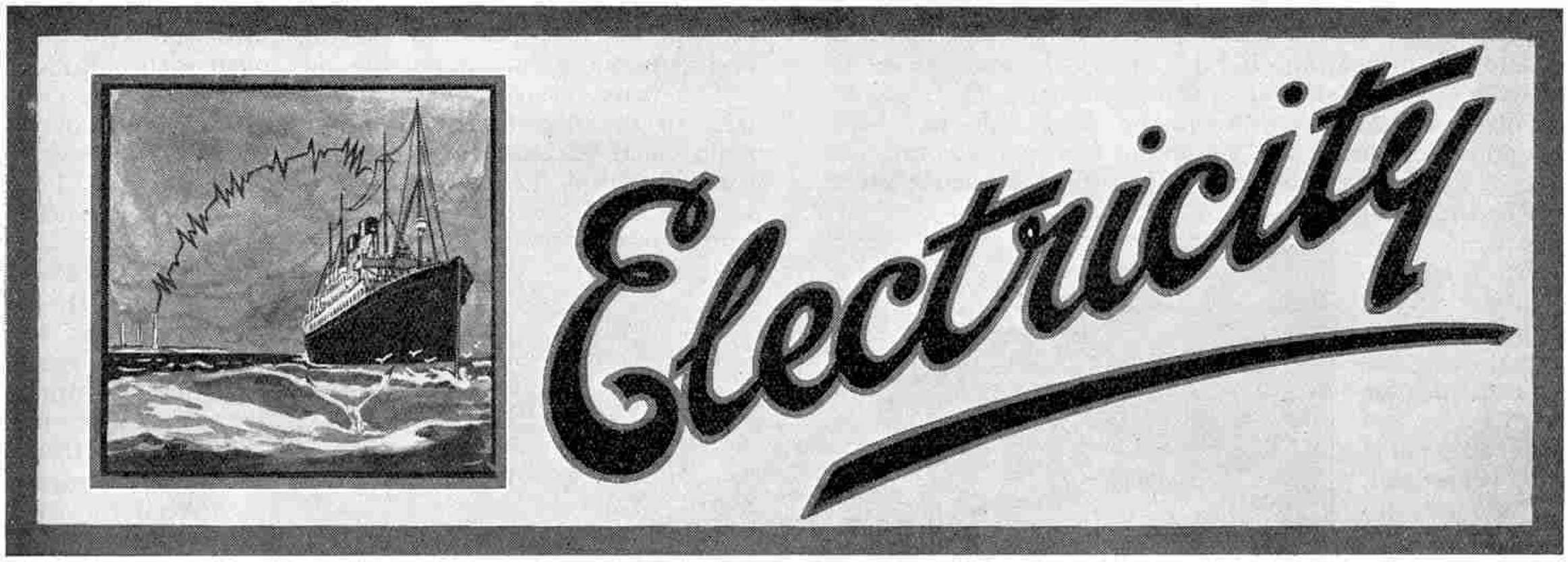
The excavation of these canals was in itself a considerable work as may be judged from the statement that if the soil that had to be dug out was converted into bricks, there would be sufficient to construct a wall 5 ft. in height and 1 ft. in thickness completely round the earth at the Equator.

One-third of this 300,000 acres will immediately be devoted to the growing of cotton and it is estimated that it will produce 80,000 bales or 40,000,000 lbs. annually. Such a result will have a far reaching effect, not only in the fact that the Empire will be able to produce a large quantity of its own cotton, but also in the future prosperity of the Sudan and Egypt.

There is a great fascination about huge irrigation schemes of this nature and in a future issue we hope to describe a project even larger than the one with which we have just dealt. The scheme to which we refer is that at Sukkur in India. This gigantic undertaking involves the construction of 50,000 miles of canals, three of them larger than the Suez Canal, and an enormous masonry dam across the River Indus. This dam, which is known as the Lloyd Barrage, will be the greatest work of its kind in the world. Its length will be nearly a mile, and upon it will be constructed a bridge of 56 spans, each 60 ft. in length and each fitted with a massive watergate 18½ ft. in depth and weighing 50 tons.

When completed the Sukkur scheme will give control of cultivation over 7,500,000 acres, of which nearly 6,000,000 acres will be reclaimed sandy desert. The new area thus brought under cultivation for the first time will be larger than the whole of the cultivated area of Egypt, and it is estimated that the scheme will bring about an annual increase in the wealth of the country of nearly £19,000,000.

Work on the Sukkar scheme was commenced towards the end of 1923, and it is not expected that the contract will be completed before the summer of 1930 at the earliest.



XXIX. TELEGRAPHING PICTURES *(continued)*

LAST month we dealt with the Marconi method of transmitting and receiving pictures by wireless and also with the electro-chemical method of reception. We now come to the photographic method of receiving the incoming impulses of electric current and converting them into a reproduction of the original picture.

This is by far the most successful method yet invented as far as quality is concerned, but it possesses the disadvantage that the apparatus required is of a delicate nature and requires very careful handling.

As usual there is the rotating cylinder moving one step sideways along its axis at each revolution or half revolution, according to the system of transmission. Round this cylinder a piece of sensitised photographic paper is clamped and on it is focussed a light arranged so that all the rays composing its beam come to a point where they reach the paper. As the cylinder rotates and steps sideways, every portion of the paper passes under the beam of light, and afterwards, on developing the paper in the usual photographic manner, it is found to be exposed over its whole area.

With this simple arrangement the resulting impression on the paper would be either a number of lines of colour running side by side and all of the same thickness and density, or a solid mass of colour owing to the lines being so close together as to touch. Which would be the case would depend of course upon the amount of sideways motion imparted to the cylinder at the completion of each of its revolutions. For this reason a delicate, electrically operated shutter, capable of cutting off more or less of the light, is placed between the source of light and the paper. This shutter controls the intensity of the beam striking the paper at any particular moment, and thus controls also the density of each part of the resulting picture. In this way the resulting picture contains light and dark parts corresponding to the similar portions in the original.

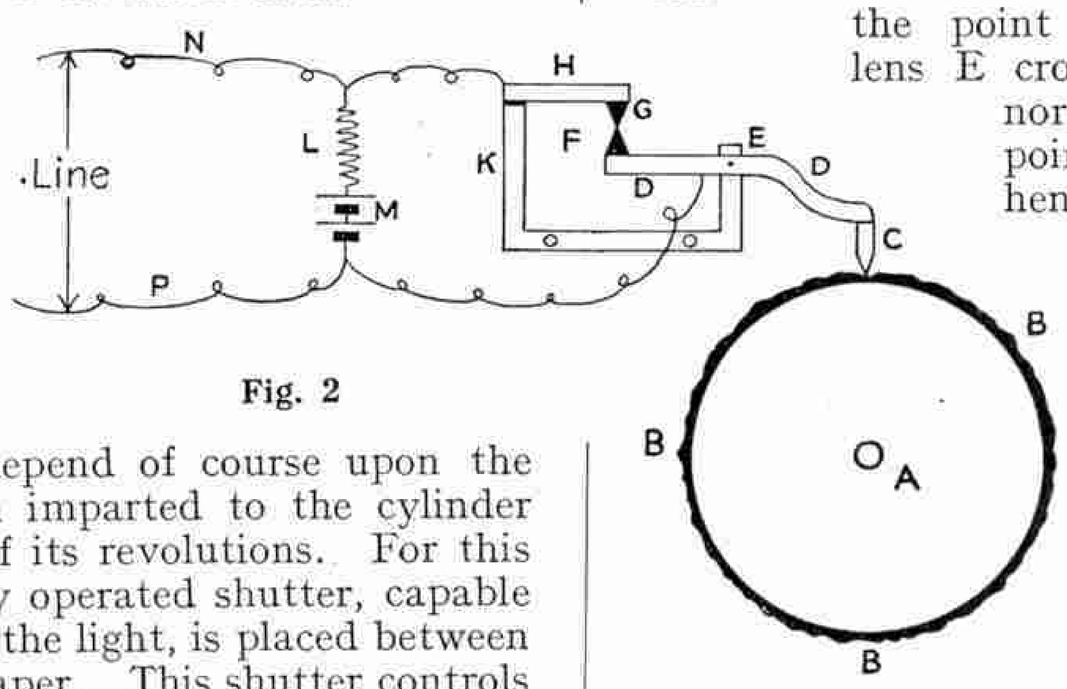


Fig. 2

Details of Photographic Reception

A sectional diagrammatic representation of this shutter and of the path of the light beam is shown in Fig. 1 where A is a Nernst electric lamp, B the shutter and C the rotating cylinder on which the sensitised paper is mounted. This cylinder C is enclosed in a light-tight box D, in one side of which there is a hole M through which the beam of light passes. The light from the lamp A falls on the double-convex lens E, which is so placed that all the rays from it cross at the point H. These rays, spreading out, pass through another lens K, which brings them together again at the point L on the cylinder C. As already stated, they reach the cylinder through the hole M in the side of the box D.

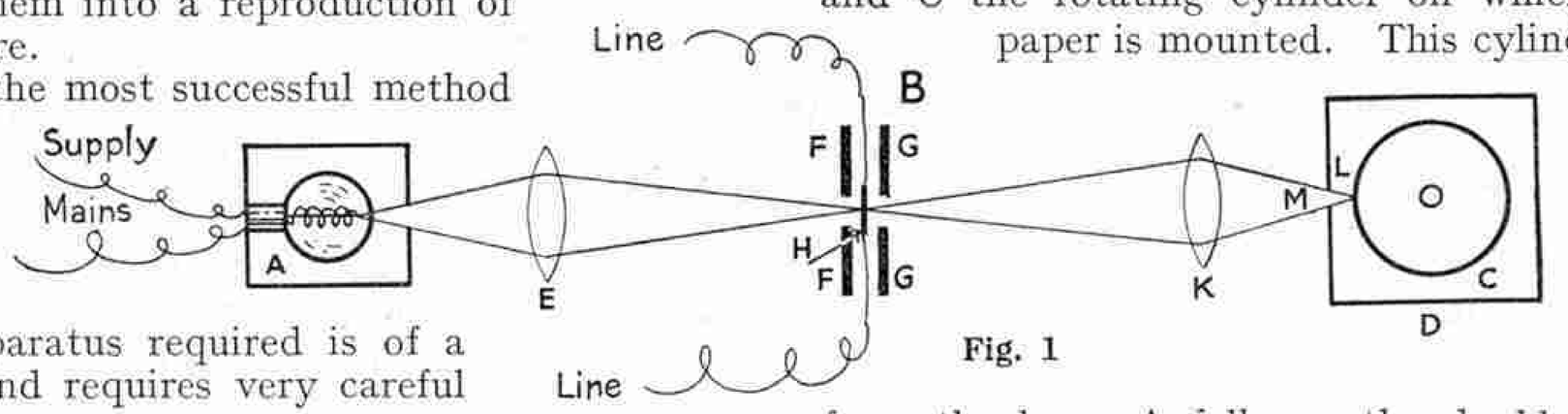


Fig. 1

The shutter B consists of two parallel, soft iron plates F G, perforated as shown so that the light may pass through them. Between these plates is stretched a flat ribbon H made of silver, about .02 in. wide and .001 in. thick. Normally it is held so as to pass through the point where all the rays from the lens E cross one another, so that in the normal state no rays can pass this point owing to the obstruction, and hence no light reaches the cylinder C.

How the Apparatus Operates

The two plates F and G are actually the two poles of a powerful electro-magnet maintained at constant strength by passing a steady local current through it. The fluctuating current received from the transmitting station is passed through the ribbon H, and owing to the electro-magnetic action it is repelled sideways a little in the direction which, in the diagram, is upwards from the paper. The amount of this sideways movement, which is actually very small, is directly proportional to the strength of the electric current

passing through the ribbon, so that the fluctuations of the incoming current are converted into vibrations.

When the ribbon is moved in this manner it ceases to obstruct the beam of light and allows it to pass on through the hole in the iron plate G, the lens K and the hole M to the portion of the cylinder C at L at that moment. The amount of light that is able to pass is proportional to the amount of the sideways movement, so that the amount of light reaching the cylinder at any moment is proportional to the strength of the electric current through H at that moment. This is the effect that it was desired to obtain, and in this manner the received electric currents are converted back into the form of a picture.

The engineers of the Bell system in the United States have lately developed a new system employing this method of reception, which produces reproductions that can be distinguished from the originals only by means of a magnifying glass, even after they have been transmitted for thousands of miles along the telegraph wires of the American continent. These photographs do not take any longer to transmit by this system than by any other, the average time being from five minutes to a quarter of an hour, according to the size of the picture and the distance.

Portrait sent by Marconi's Commercial Photo-radiogram Service

The Belin System

Another important system for transmitting photographs by electricity is that invented and perfected by the famous Frenchman Eduard Belin, who made many experiments about 1920 on various French telegraph lines.

This system does not make use of a transparent picture mounted on a cylinder in which there is a light, or down which a light shines, as in the methods already described. Instead, a relief is made in which the black parts of the original are represented by ridges and the white parts by depressions, intermediate shades being indicated by intermediate heights.

This relief is obtained photographically by what is technically known as the "carbon" process, in which the image is printed on paper sensitised with bichromated gelatine, a chemical that becomes insoluble when exposed to light. After being exposed in the customary photographic manner the print is soaked in warm water, when certain parts of the gelatine dissolve more than other parts, thus producing the relief image already described.

In cases where a pen and ink drawing, a specimen of handwriting, a finger print, or any kind of picture consisting only of black and white with no half tones is to be transmitted, a different method may be employed to obtain the relief image. The picture is drawn in special ink and, while still wet, is sprinkled with a special powder. The surplus powder is then blown off and the picture is placed in an oven and baked, with the result that it takes up an enamel-like glaze.

Method of Working

The relief image is mounted by means of clips on a cylinder in the usual manner. A sectional diagram of the transmitting apparatus is shown in Fig. 2, in which A is the cylinder round which is mounted the relief image B. Resting on this is a stylus C firmly attached to the lever D, pivoted at E and carrying at its far end the electrical contact F. As the cylinder revolves, the stylus rides up and down the ridges and hollows of the image, resulting in F breaking and making contact with the other contact G, which is attached to the rigid arm H, insulated from K.

The principle of the electrical connections is as shown. There is a circuit from H, through the resistance L and battery M to the lever D, so that when the contacts F G are touching, current flows round this circuit. The line N P to the distant station is connected as shown to the resistance L and the battery M. The making and breaking of the contacts F G has the effect of changing the strength of the current in the line N P. L has a high resistance in comparison with that of the line, and consequently the amount of current supplied by the battery M is practically constant the whole time, whether it is flowing through the line N P alone or through that and the circuit through G F. This latter circuit has, however, a very low resistance compared with that of the line, and hence when G and F are in contact the bulk of the current from the battery M flows round this local circuit, scarcely any flowing in the line circuit.

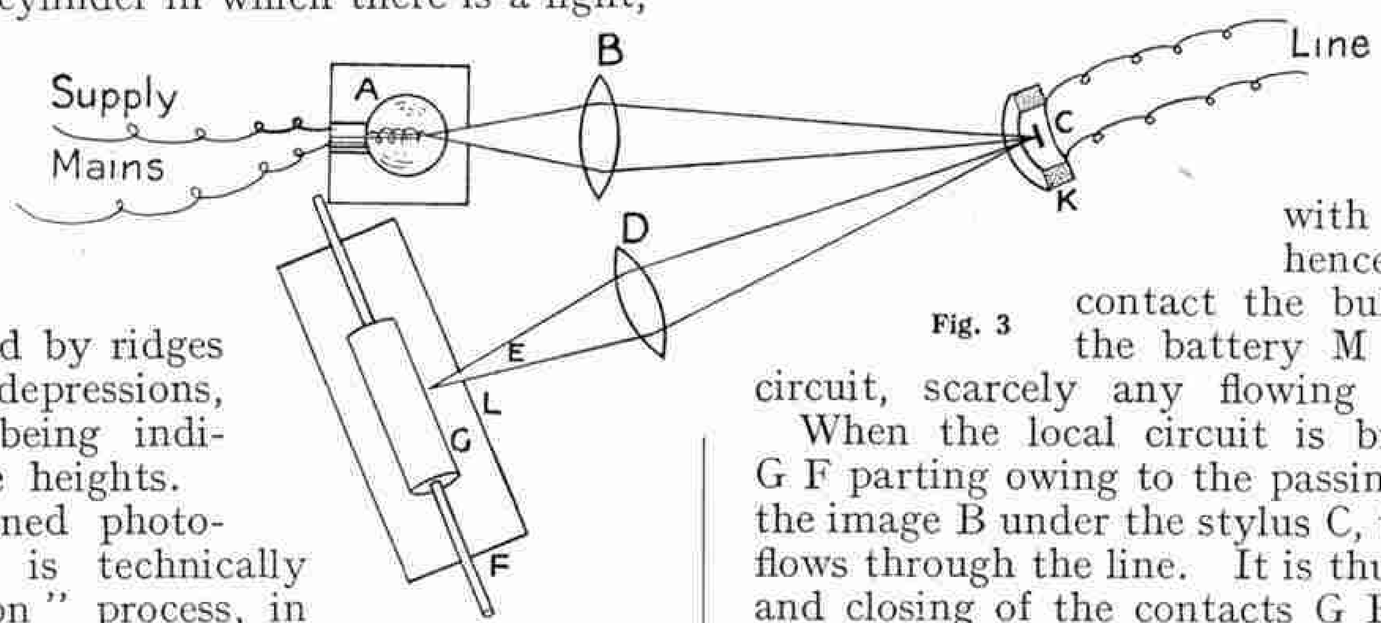


Fig. 3

When the local circuit is broken by the contacts G F parting owing to the passing of a raised portion of the image B under the stylus C, the whole of the current flows through the line. It is thus seen that the opening and closing of the contacts G F has the effect of controlling the amount of current flowing in the line circuit, so that a current is sent to the receiving station for the dark parts of the image, that is, for the sunken parts on the cylinder. It will be noticed that the actual line current does not flow through contacts F G.

This method produces only two current strengths in the line and hence only two shades, black and white,

(Continued on page 528)

The Story of Metals

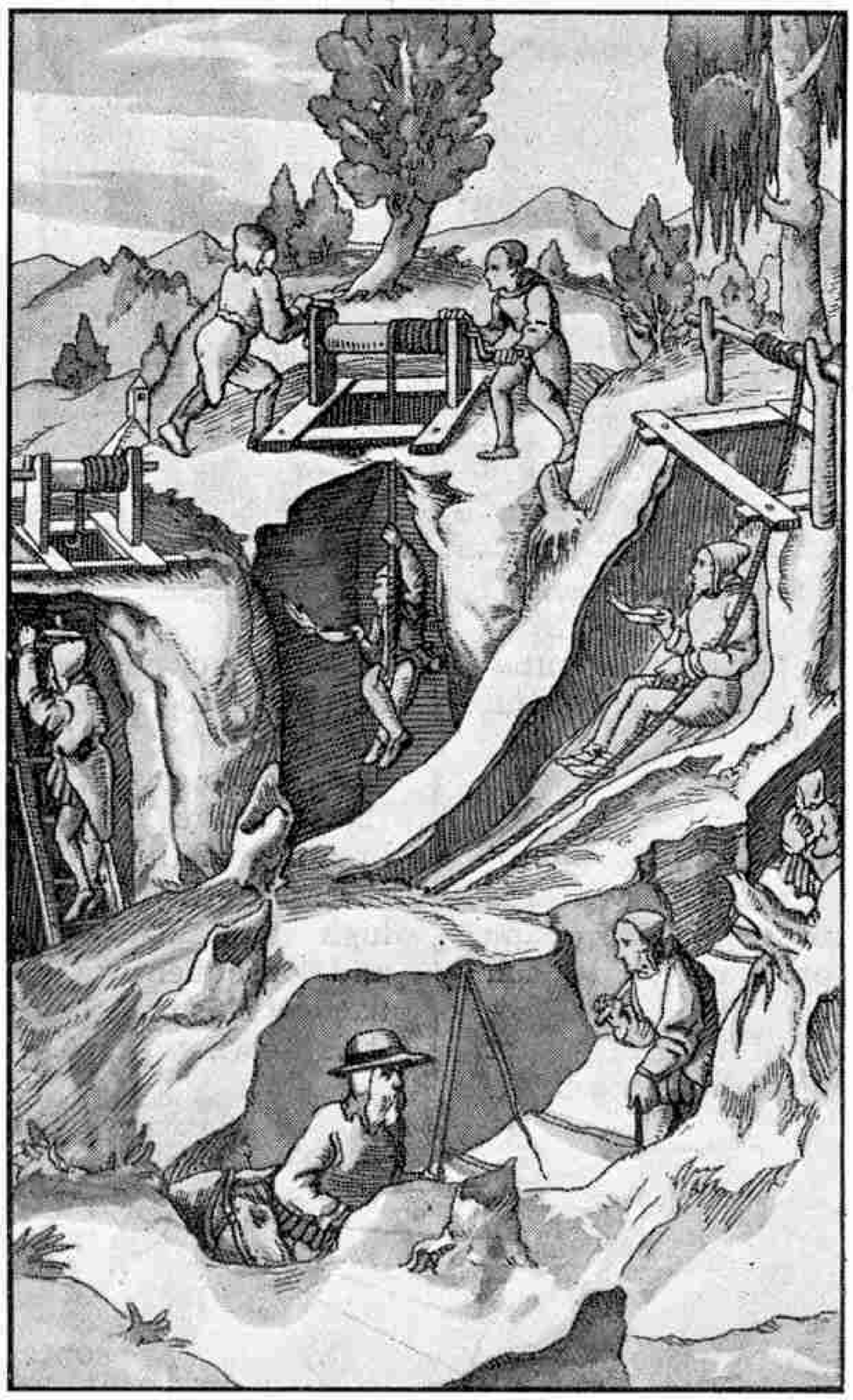
XII. SILVER: THE COMSTOCK LODE

THE scenes that are enacted during the first few months after the discovery of a new silver-field are similar to those of a gold-rush. In the April "*M.M.*" we described the California gold-rush of 1848, and the incidents that occurred then were largely repeated in the autumn of 1859 when North America was thrown into a state of wild excitement by the report that huge deposits of silver had been discovered in a valley of the State of Nevada.

Nevada is the eastern neighbour of California and is composed of parallel ranges of mountains and numerous rocky valleys. It was realised at the outset, therefore, that the silver ore of the Sierra Range would not be obtained without a costly battle with Nature, but it is doubtful if this thought deterred anyone from joining the ranks of the treasure seekers.

Discovery of the Comstock Lode

Whilst prospecting for gold on Mount Davidson, one of the western peaks of the Sierra Range, two Irishmen, Patrick McLaughlin and Peter O'Riley, dug a hole in a gulch of the Carson River valley in search of water. Being true prospectors, they did not fail to examine the debris from this digging, and as they discerned a suggestion of gold in the mixture of yellow sand and small lumps of black rock and quartz they subjected the loose ore to a careful "panning." They were delighted to find that a fair portion of gold dust remained in the pan, and full of excitement they panned further lots of earth with equal success. The black rock they threw away as useless.



From an [*Old Engraving*]

Descending shafts by ladders, by rope, and by steps cut in the rock

Some time later an ex-trapper and fur trader named Henry Comstock chanced upon O'Riley and McLaughlin at work. Comstock was too lazy to work seriously for very long the various claims he had possessed from time to time, but he was an able prospector and he quickly noticed the abundance of silver deposit in the rejected rock. He saw that the miners were ignorant as to the value of the rock that they were finding in increasing quantities and he promptly pegged out a claim adjoining theirs. Before long Comstock had persuaded the Irishmen to make over to him all the so-called rubbish.

Gradually the yield of gold from the McLaughlin and O'Riley claims diminished, while the dimensions of the thick vein of silver-bearing ore continued to increase. Finally the day came when Comstock acquired these claims and he gave his name to the locality. Subsequently a test was made of specimens of the rock and it was found to assay as much as £600 in silver and £175 in gold to the ton.

Rush of Prospectors

When the news of the discovery became known the usual frantic rush of prospectors began, and this was further intensified by the exhibition in San Francisco of bars of silver mined at what was known by then as the Comstock Lode.

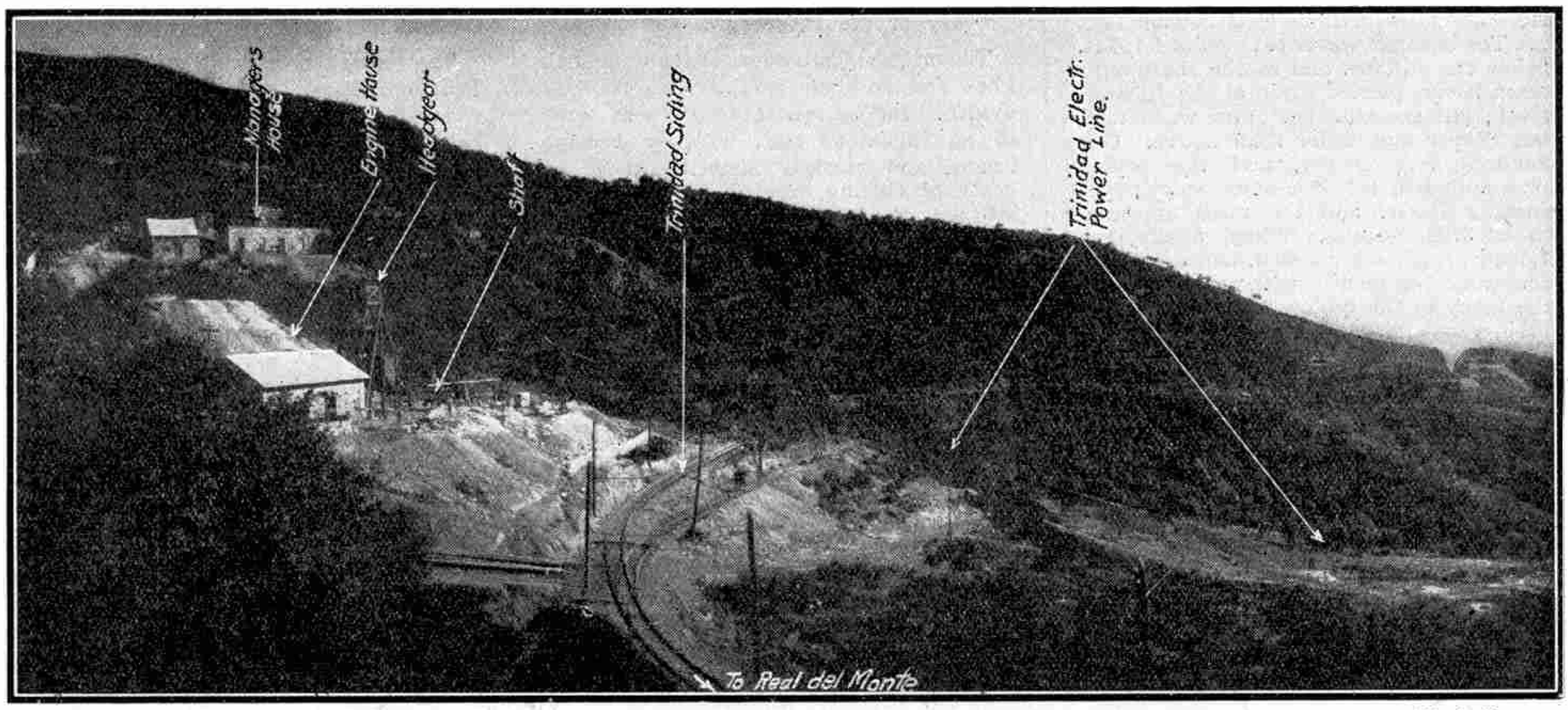
A vivid picture of the scenes across the snow-capped Nevada mountains and on the Carson Valley slopes is given in the following extract from a United States geological report :—

"Rough-haired mustangs, gaunt mules, and sure-footed little "burros" climbed the Sierras loaded with stacks of blankets, bacon, flour, kettles, pans, shovels, and other articles of a miner's outfit. The ravines and brown hillside were dotted with a restless swarm. Thin wreaths of smoke rose from hundreds of little camp-fires on the hills, and the sharp strokes of falling picks startled the lizards from their hiding places in the rocks. . . .

"The fever spread rapidly; merchants closed their counting-houses and clerks left their desks; sailors deserted their ships and mechanics their work-shops; the ranchmen from the plains and the restless swarm of gold-placer miners swelled the migration not unlike the train of children drawn on by the entrancing notes of the piper of Hamelin. How to reach the silver ledges was the absorbing thought; far beyond the Sierras the riches of their dreams appeared before them; and neither inexperience nor poverty could deter such passionate pilgrims from joining the odd troop which began its march over the mountains while the passes were still impassable."

Virginia City Springs Up

On Mount Davidson prospecting was out of the



Courtesy] A Typical Silver mine :—Trinidad and Nevada Headgear, Shaft Buildings and Railroad Siding [H. S. Denny

question during the severe winter months, and all that could be done was to be " on the spot " ready for the first workable day. With the return of spring and the departure of the snow the mountain passes witnessed another vast pilgrimage, and in March 1860 the leading caravans of a great exodus from San Francisco, which had been held up by climatic conditions, reached the mining camp. Very soon the camp became a town, and a few months sufficed to bring " Virginia City " into existence.

At first all the silver ore was conveyed to San Francisco for crushing and smelting, and this transport formed a very expensive item. Presently an astute mill-owner in Nevada City raised enough money to erect crushing mills near at hand, and contracted to handle the ore at an agreed price per ton. Everything needed to equip the mills was brought from San Francisco by mule wagon.

In the gradually developing mines the crumbling-in of parts of the roof and the snapping and splitting of timbered supports caused great concern. No vein so vast as the Comstock had ever been known, and the miners had had no experience of how to timber-up successfully at the depths and widths they were now venturing to work. Expert advice was obtained, however, and a successful system was ultimately evolved.

Single Mines Bought by Companies

As the depth of working increased, companies came into being which absorbed many of the single mines that had either yielded their discoverers a sufficiency or had been sunk as far as the miner could afford or knew how to work. Some of the mines so purchased continued to give a prolific yield. One such, known as the " Gould and Curry " mine, was bought from its first owners for the total sum of a bottle of whiskey, a number of blankets, 2,500 dollars in cash and an old horse, and four years later was reckoned to be worth 7,600,000 dollars! Within three years of the pioneers first staking claims the " Gould and Curry " mine possessed five-and-a-half miles of " workings."

In 1864 a severe slump in silver-mining shares brought ruin to many small companies. A move by the better-placed mine-owners to reduce wages created labour troubles at the Comstock Lode, and many acts of violence occurred. In one of the lower levels of the " Uncle Sam " mine a group of miners attacked the foreman, a big Cornishman, whom they suspected of being on the employers' side. Binding him hand and foot and fastening to him a label bearing the inscription : " Dump this waste dirt from Cornwall," they roped him to the hauling cable of the shaft. The unfortunate prisoner made two forced journeys down and up the shaft before he was released.

The prosperity of Comstock waned considerably about 1870. Apparent breaks in the veins of ore brought misfortune to companies that could not afford to continue mining until the seam opened up again. In other mines inrushes of water in the extended workings necessitated the installation of expensive pumping machinery and drainage systems, while in the deepest mines the men could only work very short shifts owing to the intense heat.

A Famous " Big Bonanza "

Three years later, however, the famous lode returned to life in a dramatic manner. James G. Fair and John W. Mackay, the two partners in the " Hale " and " Norcross " mines, joined forces with a number of wealthy San Francisco men. The " combine " bought up various properties regarded as having petered out or as being " blanks." The " Virginian Consolidated " mine passed to them for £10,000. Work was started at once on deepening the mine, the capitalists having decided to risk their money on the chance of discovering a rich vein or " bonanza " at a deeper level.

For several months the work went on without anything more than a vague line of silver-bearing ore revealing itself. Presently the financiers came practically to the end of their resources, and still there was no reward in sight for the 200,000 dollars that had been spent in the search. They persevered, however, and in October 1873, a magnificent bed of ore was penetrated.

Describing this thrilling discovery, the United States Survey says :—

" No discovery which matches it has been made on this earth from the time when the first miner struck a ledge with his rude pick until the present. The plain

facts are as marvellous as a Persian tale. . . . The bonanza was cut at a point 1,167 ft. below the surface, and as the shaft went down it was pierced again at the 1,200 ft. level; still the same bed of ore was found, but deeper and wider than above. One hundred feet deeper, and the prying pick and drill told the same story; yet another 100 ft. and the mass appeared to be still swelling. When, finally, the 1,500 ft. level was reached, and ore richer than any before met with was disclosed, the fancy of the coolest brain ran wild. . . . ."

Within the Treasure Chamber

"The scene within this treasure chamber was a stirring sight. Cribs of timber were piled in successive stages from basement to dome 400 ft. above, and everywhere men were at work in changing shifts, descending and ascending in the crowded cages, clambering up to their assigned stopes with swinging lanterns or flickering candles, picking and drilling the crumbling ore, or pushing lines of loaded cars to the stations at the shafts. Flashes of exploding gunpowder were blazing from the rent faces of the stopes; muffled roars echoed along the dark galleries, and at all hours a hail of rock fragments might be heard rattling on the floor of a level, and massive lumps of ore falling heavily on the slanting pile at the foot of the breast.

"Half-naked men could be seen rushing back through the hanging smoke to the stopes to examine the result of the blast and to shovel the fallen mass into cars and wheelbarrows. While some were shovelling ore and pushing cars, others, standing on the slippery piles, were guiding the power drills that churned holes in the ore with incessant thumps. . . In the hot levels all clothes were laid aside, except a simple waist cloth, and shoes which protected the feet from the scorching rocks."

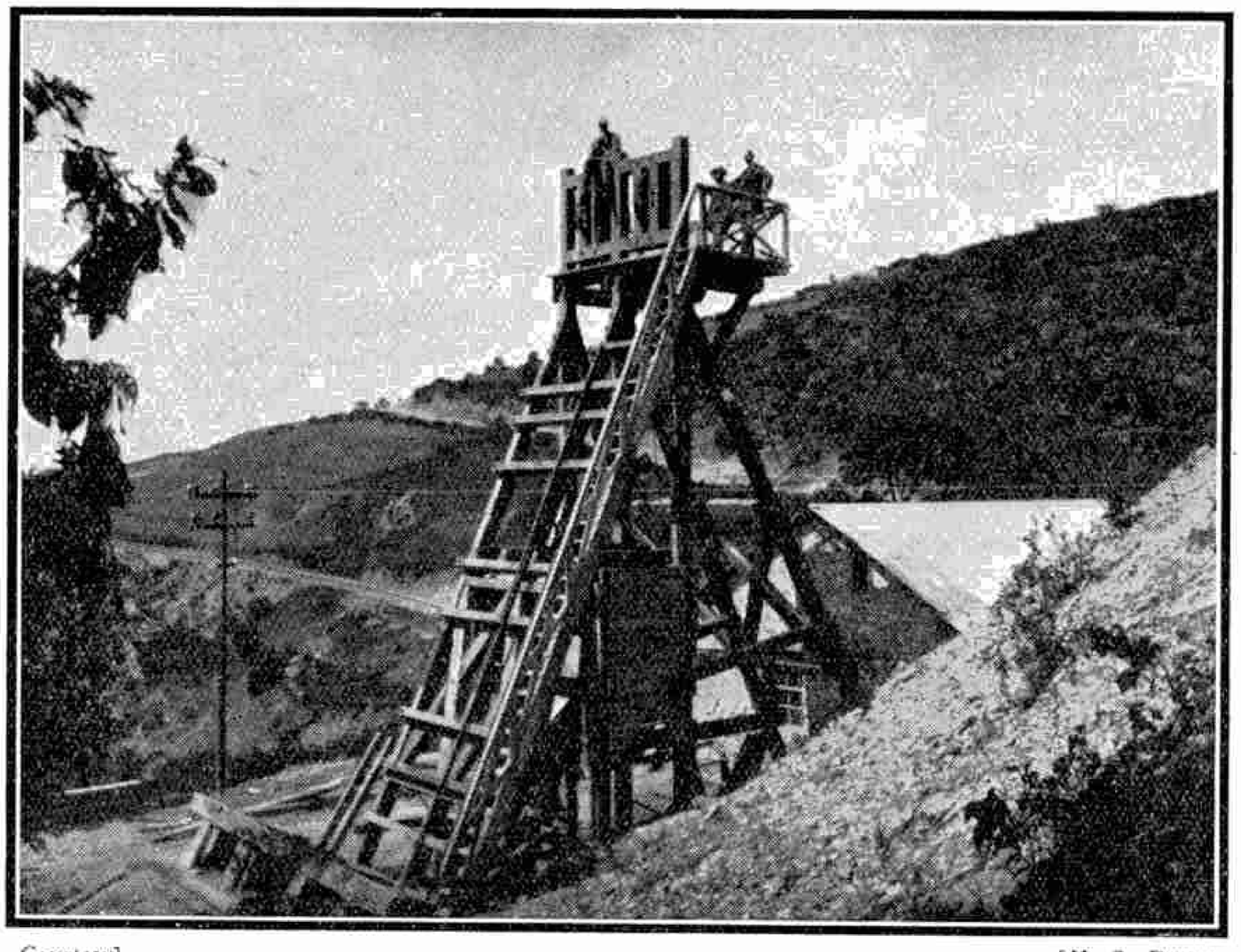
Heat in Deep Levels

The high temperature in the deep workings was a serious factor to the miners. At the lowest levels—about 2,000 ft.—the heat was so intense and work so exhausting that it was impossible for a man to make more than a few strokes with his pick before making way for another to take his place while he rested. Men collapsed over their picks and were lifted up dead, and a fall into water encountered in the excavations sometimes resulted in a man being almost boiled to death! Even at the 1,700 ft. level the temperature was 104° F. Work was carried on, however, until the seam was completely exploited. For twenty-five years the yield averaged a million pounds per year, more than 50 per cent. of which passed to the owners.

The renewed prosperity of the "Virginian Consolidated" led to fresh efforts to revive some of the worn out mines, but no further "bonanzas" were discovered.

Tragedy of the Discoverers

The original discoverers of the Comstock Lode had no share in this later flood of wealth. Indeed, all three of them came to an inglorious end. O'Riley became insane and worked himself almost to death by cutting, single-handed, a tunnel into a barren hillside. Finally the tunnel collapsed upon him and he subsequently died in an asylum from his injuries. McLaughlin, ever out of luck, died poverty-stricken in hospital, and Comstock became insane and eventually took his own life.



Courtesy] [H. S. Denny

The Shaft Head-gear at the Trinidad and Nevada Mine

As in Nevada, so in Colorado, the first prospectors sought wealth from the mining of gold and cast aside as worthless the debris that in reality was rich in silver. Gold-mining in the district around Denver had been going on for sixteen years before any notice was taken of the black sand unearthed so abundantly, and which repeatedly clogged up the sluices during operations.

Mines of Leadville

In 1877 two miners named Wood and Stevens visited the Leadville, Colorado, mining area. Attracted by the black sand, they took some away with them to be tested, and learned that it was chiefly carbonate of lead richly imbued with silver. They returned to the scene and began a thorough search for the source of the sandy vein. Finally a shaft was sunk which, after passing through a bed of limestone, penetrated to a thick layer of the black sandy earth.

When news of these activities spread, the traditional mining fever broke out rapidly. Trains to Denver, the nearest point by rail, were packed with prospectors of all types and stations in life, and the hundred-mile trail over the snow-covered mountains to Leadville, 10,000 ft. above sea level, witnessed remarkable scenes. Mines rapidly became established, and of these the "New Discovery" mine proved extraordinarily prolific, and was worked on a scale approaching that of the "Big Bonanza" of the Comstock Lode.

Australian Deposits

The presence of mineral ore in the Broken Hill region of New South Wales, Australia, was known for many years before prospectors ventured to undertake mining operations in that rugged and barren tract of country.

Lead ore was mined in 1876 at Thackaringa, some 20 miles from Broken Hill, and the discovery that the ore was remarkably rich in silver led to a scramble by prospectors to stake claims, and was the beginning of silver mining in Australia. Six years later the mineral wealth of the Broken Hill ridge attracted the attention of a herdsman named Charles Rasp, who later recounted his discovery to his employer, and it was decided to peg out two claims. The proposal to work the barren heights induced a number of others to stake plots. Rasp and his employer persuaded them to join forces, and with the first half-dozen prospectors established the Broken Hill Mining Company.

One of the severest hardships of the mining camp that rapidly came into being on the isolated and bleak territory of Broken Hill was the difficulty of procuring water and food. Pure water fetched a shilling a bucket, but an inferior grade could be purchased at sixpence. Vegetables were practically unprocurable, and store-keepers demanded two shillings for a 4 lb. loaf. The surrounding country had been used for sheep runs, and therefore meat was near at hand and consequently fairly cheap.

The sinking of shafts proved the ridge of the hill to be an extensive lode varying from 10 ft. to 120 ft. in thickness and changing frequently in character as lower levels were reached. Gold, copper, zinc, lead and other metals, in addition to silver, have been derived from this phenomenal lode, which is several miles in length. It possesses a steady downward slant, and the exhaustion of the portions nearest the surface has converted the rich hill-top into a vast ugly hollow, surrounded by worked-out dumps.

During its most productive period Broken Hill proved to be one of the richest silver deposits ever discovered, and despite some falling off in the output during more recent times, 6,500,000 oz. were refined as late as 1917.

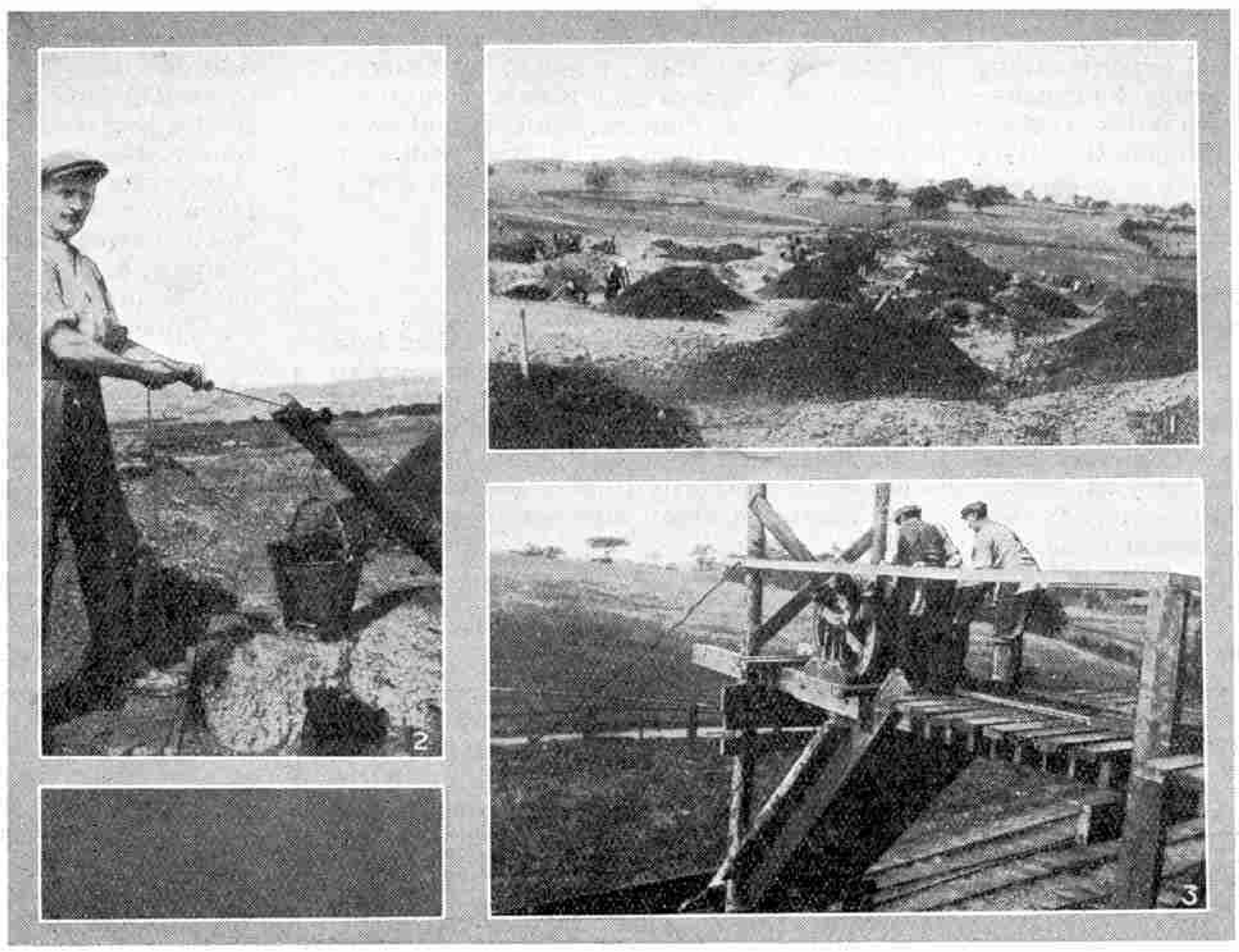
The Broken Hill mine was the scene of two serious fires. The first broke out in July 1895, and quickly filled the underground levels with dense smoke and poisonous fumes. In spite of the desperate efforts of the staff, the fire could not be subdued, and it continued to burn for many years. The second fire broke out in September 1897, in another block, and resulted in the death of three men, while many others suffered severely from burns and the terrible fumes. This fire also burned for several years.

Coal Mining in Miniature

Working Outcrops During Coal Strikes

By R. C. H. Walton

The miner, in common with other people, feels the pinch during a prolonged coal strike. As compared with those in other occupations, however, he has the advantage of experience in coal-getting and before long he begins to cast about for a possible site upon which to do a little mining on his own account. In districts where the coal seams come to the surface of the ground the operation is comparatively easy. In some cases the cottages of the miners are built upon coal-bearing strata and thus may be witnessed the interesting spectacle of miners excavating coal from beneath their own gardens! As a contrast to this we find small-scale mining operations in progress on the sea-shore at certain points of the North-East Coast of England. This work has to be carried out at low-tide, and in due course the incoming sea forces the miner to relinquish his labours, floods his workings and probably washes into them a considerable amount of the rubbish he has previously excavated!



During the coal strike of 1921 the men at the Chatterley Whitfield Colliery, a few miles from Tunstall, North Staffordshire, obtained permission from the proprietors on certain conditions to work the surface area for their own benefit. Miniature workings soon dotted the fields (Fig. 1) beneath which, according to the men's calculations, were situated the rich coal seams that the company were working.

Each of these tiny mines usually had four men to operate it. The preliminary work consisted of digging a hole about twelve feet in depth, at the head of which a strong pole was fixed at an angle so that it reached out over the shaft. Near the top of the pole a pulley was attached and a rope passed over it, one end of this being held by a man on duty at the "pit-head," and the other fastened to a bucket. By this simple arrangement, as illustrated in Fig. 2 on this page, the bucket could be raised or lowered at will.

From the bottom of the hole digging in the form of narrow tunnels was carried out by two men, one of whom loosened the coal with his pick while the other shovelled it into the bucket. At a signal from the depths the man at the top hauled up the bucket and tipped it on to the heap by his side. The remaining member of the party, chosen as having a better knowledge of coal-workings than his mates, was entrusted with the job of occasionally sounding the walls of the tunnel to ensure that someone else's outcrop was not being approached too near, lest the pick of one excavator, in finally cutting through the wall, should strike a worker in the other "mine." He also had to test the walls frequently to make sure that no water or gas pipes were at hand.

From the colliery sidings bogie rail-track was laid to and in between the workings. The coal-heaps were shovelled into small tip-wagons each holding a hundredweight or two of coal, and a train of these wagons was hauled along by one of the pit ponies, who made it plain that he was delighted with surface-operations and fresh air!

The loaded train was then led to a coal tip where the coal from the wagons rattled noisily down the chute into ordinary ten-ton railway trucks beneath (Fig. 3). At the coal wharves to which the trucks were conveyed by loco the product was sold as household coal, the profit being shared by the miners who had co-operated in winning it.

During the coal strike this year "outcropping" has been carried on with great vigour, and in some districts the continued working of the miniature mines has resulted in the exhaustion of the coal seam immediately below the surface. The miners thereupon procured explosives and began blasting operations. In several cases where the outcrops were near cottages, the explosions caused considerable alarm to the miners' wives!

After Twenty-Five Years

An automatic train-stopping device was recently tested successfully on the Lackawanna railroad under conditions that were a reproduction of those causing a recent smash. The device, which was the subject of over twenty-five years' experiment by its inventor—the late George Finnegan—proves that it is possible to pull a train up at any danger point even though the driver is dead and the signals out of order. A permanent magnet is embedded opposite each signal and works in conjunction with the block signals. Should the train attempt to pass an unfavourable signal, the magnets come into action and hold it up.

* * * *

S.R. Oil-Burning Locos

The Southern Railway Company have converted twelve locos to burn oil, five on the Eastern section and seven on the Western. The locos concerned on the Eastern section are Nos. A19, 163, 165 and 179 of the Class E1 4–4–0 rebuilt superheater passenger locos; and on the Western section E737 and 739, 4–6–0 express locos; E515, 4–6–0 goods loco, and E415, 423, 424 and 470 4–4–0 passenger locos.

* * * *

A new bridge is to be constructed over the Rhine at Oberlahnstein on the main line from Cologne to Wiesbaden.

* * * *

Russian Railway Developments

The future of railway development in Russia appears to be uncertain as, although new rolling stock and locos and 40-ton trucks have been on order for some months, the workshops are extremely slow in giving delivery. The position is much the same in the repair depôts where, owing to the want of lathes and the shortage of metal supplies, the repair programme for the year has broken down badly and is already behind its schedule by nearly 100 locos and 1,400 trucks.

The permanent way also is stated to be in a poor condition, and although efforts are being made to improve it, the high cost of wooden sleepers is holding up the work. The lack of materials is a big factor in the trouble but, in addition, the Soviet Government have reduced their grant for railway reconstruction purposes. Manufactured articles could be obtained from abroad to fill the gap, but the authorities do not wish to adopt this course, as it would involve the upsetting of the balance of foreign trade.

Entertainment Train in Korea

In Korea many of the railway employees are situated in places miles away from entertainment halls, and with the object of brightening their lives the Korean Railway Bureau contemplate running an entertainment train, manned by Chinese, Japanese, Korean and Russian conjurors, jugglers and dancers, and including a cinema installation. The train will stop at each station on its journey and give a performance.

* * * *

S.R. Floating Dock

Owing to the silting up of the bed into which it dips when diving preparatory to a lift, the huge 60,000 ton floating dock owned by the Southern Railway and stationed at Southampton has been moved temporarily to new quarters. The assistance of eight tugs was required for several hours.

* * * *

New York Subways

Important developments in the New York Electric subway system are foreshadowed by the request made by the Board of Transportation to the Board of Estimate for a grant amounting to £20,000,000 to be spent in the construction of new lines.

* * * *

Four-Aspect Colour Light Signalling

Four-aspect colour light signalling has been introduced on the Southern Railway between Holborn, St. Paul's, and the Elephant and Castle. Each signal consists of four powerful electric lights ranged one above the other and fitted with hoods to concentrate the beam of light thrown out. The new signals are placed at a considerably lower level than the ordinary semaphore signals. The colours used are green, yellow and red, and the indications are as follows:—Green, "All clear;" Three Yellow, "Be prepared to find the next signal at caution;" One Yellow, "Caution, be ready to find the next signal at danger;" Red, "Stop." The lights are so brilliant that they can be seen in bright sunlight or yellow fog.

The signals are operated by signalmen as previously, but it has been found possible to do away with five signal boxes. Miniature levers are employed, the colours and points being changed by electric power. The system is to be extended to the section between Charing Cross and London Bridge, at a total cost of £182,000.

Traffic Times

An interesting census was made some months ago of the time taken for wagons running from Hull to various points in the West Riding of Yorkshire, the Midlands, and Lancashire to reach their destination. The average time was found to be 24½ hours from the time of leaving the loading point to arrival at the destination station.

Inquiries were made later as to the time taken from all parts of the country into the North Eastern area, and of 8,500 wagons checked, 5,000 arrived at their destination on the day following despatch and 2,000 on the second day.

* * * *

Rope Railway to Mountain Summit

A rope suspension railway from Payerbach, 60 miles from Vienna, to the summit of the Rax Alpe has just been opened to the public. The summit station is over 5,000 ft. above sea level and the ropeway rises more than 3,500 ft. in the short space of one-and-a-half miles. Hitherto the mountain could be ascended only on foot or on muleback. It is now possible to leave Vienna by express train and, after a 10 minutes' drive by motor to the foot of the mountain, complete the journey by the ropeway in less than two hours from leaving Vienna. At various places on the ascent the saloon coaches of the ropeway swing out over ravines several hundred feet deep, but the movement is so gentle that, after the first moment or two, no feeling of insecurity is experienced. Indeed, the wonderful views of the surrounding country, increasing in beauty each moment of the ascent, hold the passengers' undivided interest.

* * * *

In Commemoration

To commemorate the meeting held in the George and Dragon Hotel at Yarm, near Stockton, on 12th February, 1820, which resulted in the construction of the Stockton and Darlington Railway, a memorial tablet has been placed in the Yarm Town Hall. The memorial bears a bronze model of Locomotion No. 1 with the dates "1825–1925" on each side, and the following inscription appears on the tablet:—

"To the memory of Five Pioneers of the first public Railway in the world: Thomas Meynell (chairman), of Yarm, Benjamin Flounders, Jeremiah Cairns, Richard Miles, Thomas Miles. Erected by the inhabitants of Yarm, 1926."

Siamese Royal Saloon

A railway coach of special design was recently completed by a firm of Sheffield railway carriage builders for use as a sleeping car by the Siamese Royal Family when travelling on the State Railways in that country. Externally the car is identical in appearance with a car supplied to Siam in 1915 and the two will form a two-unit equipment, as the former consisted of a dining-room, study and observation car.

The car has a central entrance vestibule and the main bed, dressing and bath rooms occupy the full width on one side. The secondary suite is approached by a corridor running through the other half. The total length of the car is 57 ft. 6 in., width over body 8 ft., and total height from the rails to the roof top 11 ft. 7⅞ in. It is mounted on two four-wheel bogies of the swing bolster type. A cylindrical water tank of approximately 80 gallons capacity is slung in the underframe and water is supplied from it to the bathrooms via smaller overhead tanks filled by hand pumps.

* * * *

The L.M.S. Converted Locos

In a recent note we informed our readers that the L.M.S. Railway were converting a number of locos to burn oil fuel, and brief details of the arrangements are now to hand. The locos so adapted include engines of the "Claughton," "Prince of Wales," No. 2 Passenger and Class 8 (L. & Y.) types.

The oil is stored in tanks, varying in capacity between 900 and 1,500 gallons according to the type of loco, placed on top of the tender. In the majority of cases the steam from the boiler itself is used to atomise the oil so that it can be burned readily. Slight alterations have had to be made to the boilers, but these consist merely of the placing of a border of firebrick under the brick arch to protect the lower portion of the firebox tube plate. The firebars also are covered with firebrick, and to raise steam in the first place wood can be burned in the firebox. The fuel consumption averages 3½ to 4½ gallons per mile, according to the type of loco, its load and the weather conditions.

This Month's Railway Story

Old Student: "I understand Bill took up mechanical engineering. What is he doing now?"

Second Old Student: "He is working for the railroad."

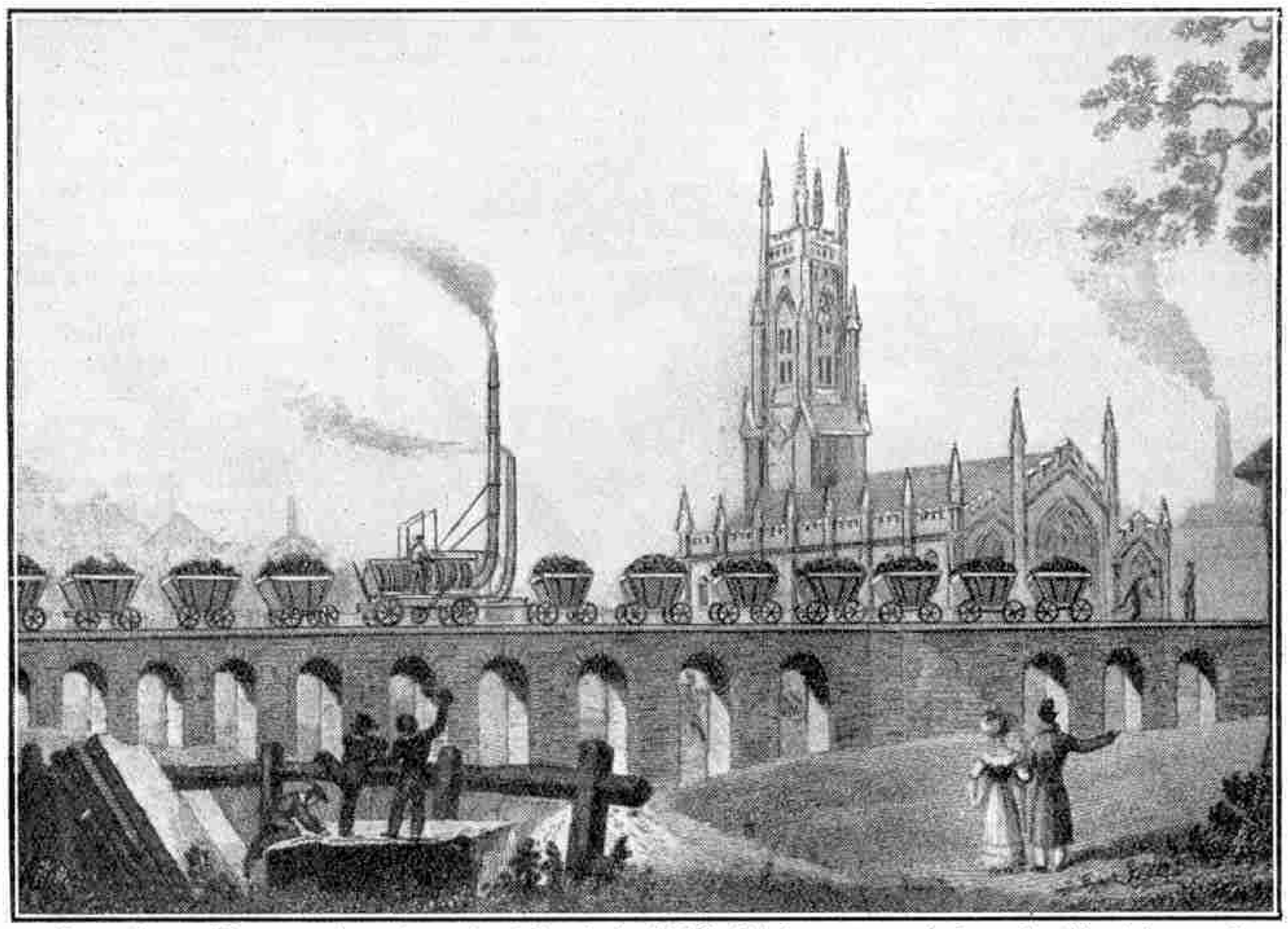
"That so? What doing?"

"Well, you know the man who goes around the cars and taps all the wheels to make sure everything is alright?"

"Yes."

"Well, Bill helps that man to listen!"

Thirteen Years before "Locomotion No. 1"



A quaint colliery engine at work at Leeds in 1812, thirteen years before the Stockton and Darlington Railway was opened

Built by Matthew Murray to the design of John Blenkinsop, the loco had two "chimneys," and was propelled by a toothed-wheel engaging in a rack alongside the rails

Irish Pullmans

The first Pullman cars for use in Ireland were recently shipped from Birkenhead to Dublin by the old Birkenhead Corporation ferry boat Oxton, which has been sold from the municipal service to be broken up. The cars are to be employed on the Dublin-Sligo section of the Irish Southern Railway and in all eight coaches will be put into service.

* * * *

S.I.R. Extensions

The South Indian Railway Company are embarking upon a programme of construction covering a period of six years, and it is intended to lay down 250 miles of new track each year.

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Automatic Train Indicators

The automatic destination indicators showing passengers the destination of the next three trains to enter the station, hitherto installed only on the District Railway, are to be brought into use on all the principal stations of the other London Underground Railways.

An Interesting High Pressure Loco

The tendency of locomotive engineering toward the use of higher working steam pressures has always been held in check to a certain degree by the essential requirements of safety for the engine boiler which, while having to stand exceedingly great strains, must be kept to a minimum weight. A loco recently shown at the Traffic Exhibition in Germany is designed to overcome these difficulties.

The boiler is built for two working pressures, 853 lb. per sq. in. in the back end or ultra-high boiler and 199 lb. per sq. in. in the boiler barrel. In the heating coils and firebox the pressure varies from 1,100 lb. to 1,300 lb. per sq. in. The heating area of the firebox is 211 sq. ft., of the boiler tubes 1,525 sq. ft., and of the superheater 974 sq. ft. The total weight of the loco in working order is about 96 tons. It is expected that the increase of working pressure will achieve an additional power output of from 35 to 40 per cent., equal to an economy of 25 per cent. in fuel consumption. The loco, of 4-6-0 type, is owned by the German State Railways and is at present undergoing tests.

* * * *

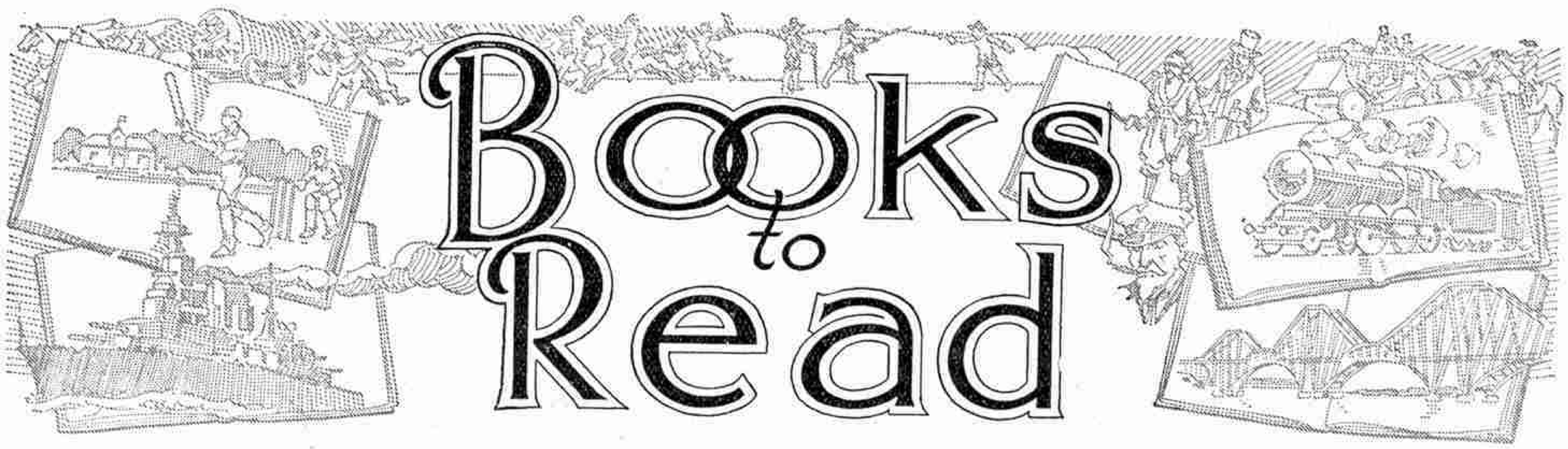
Moscow Electrification Scheme

The Russian Government are negotiating with various engineering companies with a view to placing contracts for the electrification of the Moscow suburban railways and for a scheme to harness the water power from the river Dniester. The former scheme is estimated to cost £2,000,000 and the latter £20,000,000.

* * * *

L.N.E.R. Station Extension

Increased facilities for main line trains will be afforded on the completion of the work recently put in hand by the L.N.E.R. at King's Cross station. An additional platform, 945 ft. in length, is being built and will be completed before the end of the present summer. Additional carriage sidings to the extent of 1,660 ft. are being laid out at Holloway, and these will relieve a considerable portion of the pressure now felt at King's Cross.



Readers frequently write to me asking if I can recommend books that are both of interest and of use. On this page I review books that 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.

"Laboratory Experiments for the Engineering Student"

By H. Threlfall

(Published by Chapman & Hall Ltd.)
(Vol. I. 6/-, Vol. II. 4/-)

These two books contain an excellent collection of experiments that will be of great value to students interested in the experimental side of mechanical engineering. In the fundamental experiments each step is fully described, so that the beginner will know exactly what he is expected to do and also how to do it, but as the book progresses it is assumed that the experimenter grows in experience and the reader is thrown more and more on his own resources.

No one book can deal with the experimental side of mechanical engineering in an exhaustive manner, but the wide range of experiments given in these two volumes should be more than sufficient to meet the requirements of students preparing for the examinations for the certificates of the Institutes of Mechanical and Civil Engineers and the intermediate stages of most University courses in Engineering. Amongst the subjects dealt with are:—measuring instruments, statics, simple structures, specific gravity, friction, inclined plane, simple harmonic motion, inertia, pendulums, centrifugal force, mechanical properties of liquids, experiments on beams, deflection of springs, heat and heat engines. We reproduce on this page two illustrations that will be of particular interest to our readers.

Fig. 1 shows a model jib crane and is the subject of Experiment 28 in the section dealing with statics. The jib is furnished with a hook at its upper end, the lower end resting on the plunger of a compression balance. From the upper end of the jib a chain passes to a point that is adjustable for height of the framework, the load on the chain being given by a reading on the compression spring balance.

Experiments with this model crane consist of measuring (a) the length of the jib, i.e. the distance from the point of intersection of the centre line of the compression balance and the plumb line, to the centre of the pin to which the chain is fixed; (b) the length of the tie, or the distance from the pin at the end of the jib to the pin on the frame-post to which the plumb line is attached; and (c) the vertical distance from the point of intersection of the plumb line and the centre line of the compression balance, to the point of attachment of the plumb line.

The balances should be working freely and their reading should be noted. A weight of, say, 4 lbs. may be hung from the upper end of the jib and the length of the chain adjusted until the crane conforms to its original dimensions and the readings of the balances have been noted. It is also suggested that the shape of the crane should be altered by raising or lowering the point of attachment of the chain on the post, or shortening or lengthening the chain by hooking up the links, and measurements and readings taken again, the experiment being repeated with heavier weights, say 6 lbs. or 8 lbs. In each case the load on the tie and jib due to the weight is the difference of the balance readings obtained after and before adding the weight.

The foregoing should be of particular interest to Meccano boys, for the experiments can be carried out very satisfactorily with Meccano models. Such tests will form an instructive amusement in connection with the various types of cranes, and a comparison of the tabulated results of the different types would be of exceptional interest.

Fig. 2 illustrates an experiment with the inclined plane, with which the majority of our readers are already familiar, for experiments on this subject are included at the end of the Complete Manual. The experiment illustrated here is No. 17 and the object of it is to determine the force required to maintain a body in equilibrium on a smooth inclined plane when the force moves (a) parallel to the plane (b) parallel to the base of the plane, and (c) inclined to the plane at a given angle.

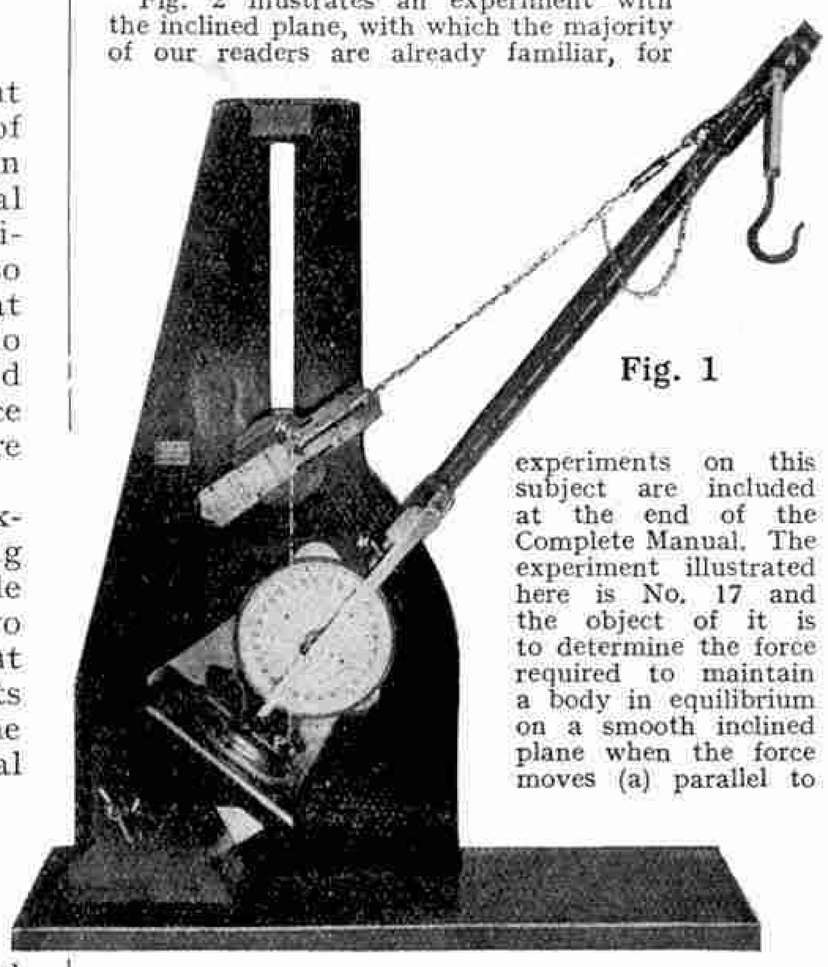


Fig. 1

These two illustrations serve to show the lines on which the two books under review are written. Although primarily intended for students preparing for examinations, we have no doubt that at any rate our older readers will find them of considerable service, particularly so because many of the models required for the experiments can be made up with Meccano.

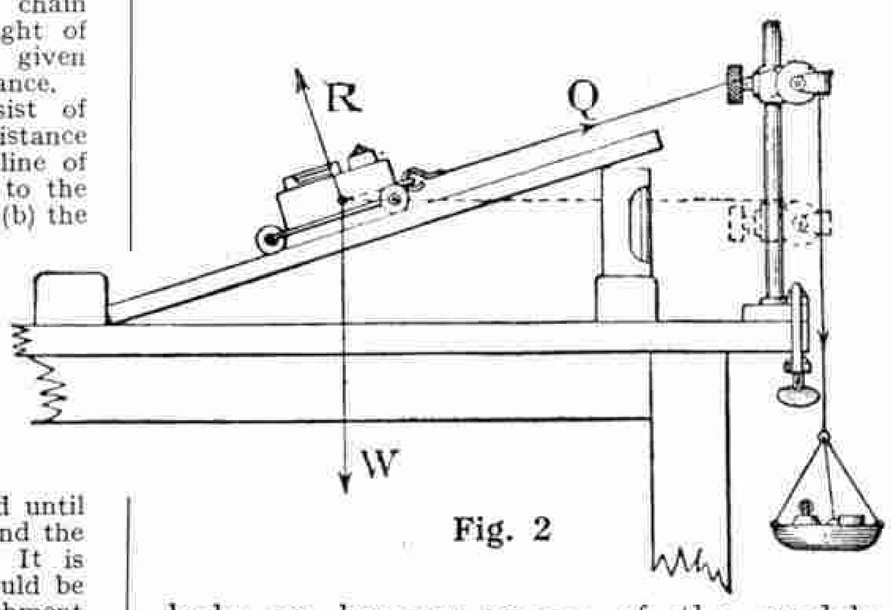


Fig. 2

"David Goes Voyaging"

By David Putnam

(Published by G. P. Putnam & Sons. Price 5/-)

This fine story was written last year by a boy who celebrated his 12th birthday on the Equator. David was sufficiently fortunate to be a junior member of an expedition for ocean research on board the "*Arcturus*," and in this book he gives an account of what he saw and did during three months in the Pacific. Although "Mother helped me fix up the spelling and make the grammar right," as David honestly admits, the story is his own.

David's story opens the door to a wonderland of beauty and mystery in the South Seas, and the only fault we have to find with it is that it comes to an end too soon! The young author is probably one of the luckiest boys since the time of Jim Hawkins, who with the Doctor, Israel Hands, Long John Silver and other members of the famous expedition, set out for Treasure Island. David joined the ship at Panama and spent the next three months studying sea-life. He saw volcanoes in eruption, visited seven uninhabited desert islands, saw lizards, frigate birds, boobies, sea-lions. The ship ran along the coast where Morgan, pirate and buchaneer, made his famous exploits in 1637 and finally visited Cocos Island, a romantic spot in the Pacific and the scene of many treasure hunts. We are sure that everyone of our readers will envy David in his happy adventure.

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"A Commercial and Historical Atlas of the World's Airways"

(Published by Francis J. Field Ltd. Price 2/6 nett)

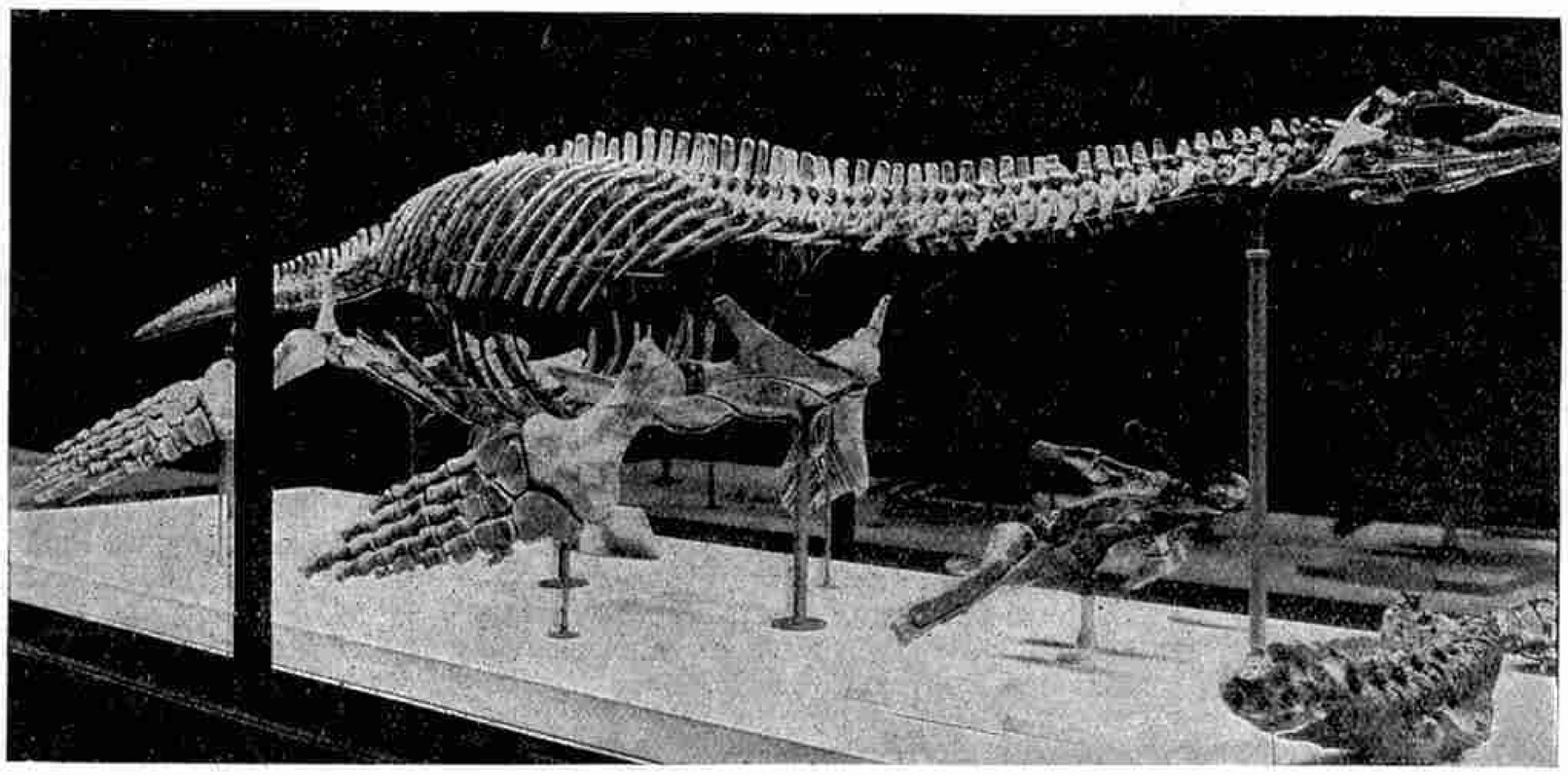
Since the aeroplane has come to be of commercial use, and the carrying of aerial mails a matter of regular practice, the various countries interested have, from time to time, issued stamps specially for use for air mails, and the specialisation of air mail stamps is now not uncommon. Those of our readers who are collectors of "flown covers," and, as such, keenly interested in the development of aerial transport, will find this handy little volume of unusual interest.

In it will be found, concisely arranged, a comprehensive survey of the world's airways. Over forty maps are included, showing not only the routes, but the date on which the first flight was made, and, when convenient, the total distance. The first section opposite each map summarises the country's aerial history, and the second gives useful data regarding current commercial services. Special chapters are devoted to Air Mails, Countries Issuing Special Stamps, and Air Post Terms. In short: a book well worthy of its place in the library of every student of commercial aerial development.

" The World in the Past "
By B. Webster-Smith
(Published by Fredk. Warne & Co. Ltd. Price 10/6)

This book, one of the " Wayside and Woodland " series, gives a popular account of what the world was like and what it contained, during past ages. Commencing with the birth of the earth and the dawn of life on its surface, each of the periods recognised by geologists is dealt with and we read of the wonders of each period.

The earth may be said to resemble a book, each period in its history corresponding to a page. On the earth's stone pages is written the story of the amazing development of life through the ages. In this connection every cliff and railway-cutting, every field and quarry, has something to tell. The continued investigations of many eminent men have been directed to discovering the story of each, whilst others have been engaged in building the stories into one harmonious whole.



Skeleton of the Plesiosaurus, one of the huge creatures that lived in prehistoric times. (From " The World in the Past," mentioned on this page)

So far as life is concerned, the Earth has seen some strange creatures in prehistoric times. Drawings of them and of their foot-prints, together with sketches of prehistoric trees and vegetable life, form a prominent feature of this book. No doubt the chapter entitled " The Age of Reptiles " will have a particular fascination for our readers. It tells of the Pterodactyls or flying lizards—hideous creatures varying in size from a few inches to 28 ft. across—and of Ichthyosauri—powerful sea-monsters of early Jurassic times, the remains of many of which have been found at Lyme Regis. We read of Ceratosauri, fearsome monsters once common in North America and sufficiently powerful to slaughter the huge defenceless flesh-eating Dinosaurus. Of the famous Brontosaurus, or thunder lizard—a huge creature 60 ft. in length, but with a brain only the size of a walnut so that it was as unintelligent and as helpless as it was huge. Of the Plesiosaurus, a huge sea-dragon with swimming paddles 7 ft. in length, 6 ft. jaws, and 15 in. teeth ! These and many other extraordinary creatures are fully dealt with—and of course the 80 ft.-long Diplodocus, the original of Meccano Model No. 403, is mentioned. Meccano boys will read with interest that this great Dinosaur, with weak teeth and jaws, floundered about in the prehistoric seas and muddy waters and generally led a very inoffensive existence.

The world in the past is a fascinating subject and this book, which is of a convenient size to slip into the pocket, will certainly do its share to make popular a study of the wonders of ages gone by.

* * * *

" London Life in the 14th Century "
By C. Pendrill
(Published by G. Allen & Unwin Ltd. Price 10/6)

London is a wonderful city to-day, but that it was none the less wonderful 600 years ago is evident from this book, which gives an account of many curious customs in the life of old London. In those days Londoners were careful and honest tradesmen, and as such they recorded their transactions and all important happenings. This is fortunate for us, because from these records it has been found possible to write a detailed account of almost everything that happened from the 13th century onwards.

In writing this book, Mr. Pendrill has worked through records made in the 14th century and is able to accurately tell us how the people lived in those days. In the December "*M.M.*" we learned something of the old Trade Guilds (see page 687) and we read that the various trades organised themselves into the equivalent of a Trades Union. It is of these days that Mr. Pendrill writes—days when the Mayor secured obedience without the policemen necessary to-day. (The Police Force was not organised until later and in the case of a street fight in the 14th century the Mayor and such Aldermen as happened to be in the neighbourhood took the matter in hand themselves, and stopped the fight and rebuked the pugilists !)

We learn much of the conditions of 14th century social and political life, of the administration of justice, and of the position of the poor. We read, too, of how trade was carried on, from the fact that the business of the city was recorded in a series of Letter Books, so called because each was identified by a letter of the alphabet. In an earlier series, the books were known by the names of various colours—such as White Book, Red Book, etc.—the present system of lettering commencing shortly after 1350. These Letter Books are now safely preserved at the Guildhall, but in the course of time they have had many adventures. For instance, Letter Book E was lost for a long time, but was recovered in the reign of Henry VIII. Another Book was lent to someone in 1550, but the borrower forgot to return it and it was not recovered until 58 years later, with a large part missing—which, however, has since been found at the British Museum. Fortunately all the Letter Books escaped destruction in the Great Fire of 1666, although the Guildhall itself was burnt to the ground.

From these ancient records we learn that one of the three earliest schools founded in London was that attached to the church of St. Mary-le-Bow (the others were St. Paul's and St. Martin-le-Grand) which was mentioned in the earliest description of the city in the 12th century.

There were indeed quaint customs in the 14th century days, even for boys—whilst at school, a schoolboy had to be provided every year with one fur gown ; a short coat with tunic to match ; four pairs of linen cloths ; shoes ; and 10d. per week to pay for board and lodging !

We find that boys in those days were very much the same as boys to-day and up to the same kind of mischief ! There is, for instance, a record in the Letter Books of a boy who climbed on to the roof of a house to retrieve his lost ball from the gutter. Some boys playing on a heap of timber, when one fell and broke his leg. We read also of another schoolboy returning over London Bridge after dinner, who must needs see how far he could climb out, and how long he could hang by his hands, from a plank on the side of the bridge ! He fell into the river and, sad to say, was drowned, which was the cause of the entry in the record book.

All these things teach us what life was like six hundred years ago and if it does nothing else, this book will certainly make us feel glad that we did not live in those days—when steam engines were unknown and Meccano was unthought of !

* * * *

" Great Peoples of the Ancient World "
By M. Vaughan
(Longmans, Green & Co., London. 3/6)

Recent excavations in many parts of the world are showing us, almost every week, something new about the people who lived hundreds of years ago. Those who are interested in the wonders of the past and life of ancient times will find this book of absorbing interest. The first part is written more or less in story form while the second part gives a brief historical summary, and other details that will be found useful for reference by the serious-minded scholar who has familiarised himself with the earlier chapters.

The book deals with the Semites and the wandering people of Arabia ; the Golden Age of Babylon ; King Minos ; Pharaoh and his people ; the reign of the Hittites ; the Jews and their Neighbours ; Assyria, the Terrible ; and the Great Persian Empire.

The story of the lives and habits of the peoples of these ancient countries, their national successes and misfortunes, is told in an interesting manner. The book is enriched with numbers of fine illustrations, most of which have been loaned from other published works and collected from many famous sources.

The King's Cup Race
Triumph for de Havilland "Moths"

Owing to a last-minute alteration of plans, the course of the "Aerial Derby" race for the King's Cup was not as stated in the advance note under this heading appearing in last month's issue. After a protest by pilots that the short out-and-home flights would involve the risk of collision between machines leaving and approaching the aerodrome at high speeds, the Royal Aero Club decided to substitute two triangular courses, both to be circuited twice each day, making a total distance of 1,464 miles to be flown during the two days of racing.

Fourteen machines, ranging from tiny D.H. "Moths" to the big Bristol "Badminton," the "dark horse" of the race, piloted by Captain Barnard, took the air on the first day. The fortunes of the day decidedly favoured the small machines, for of the seven that finished the course within the scheduled period four were D.H. "Moths," the only representative of the "heavy-weight" class being the 450 h.p. Vickers "Vixen" piloted by Lieut. Scholefield. The Bristol "Badminton" giving 9½ hours' start to the "Moths," had to make a forced landing.

The second day's racing provided even keener sport. Each machine started under a new handicap based on the times recorded during the previous day, and the result was a remarkably fine tribute to the handicapper. After a keen duel, fought out to the last, in which wonderful piloting was displayed, a D.H. "Moth," equipped with a 27/60 h.p. "Cirrus" engine and piloted by Capt. H. Broad, beat the Vickers "Vixen" by 22 secs. for first place. A Martinsyde A.D.C. (Sq. Ldr. Jones) was third and gained the prize for the fastest average speed, 152 m.p.h. while two other "Moths" finished fourth and fifth respectively.

The race was a triumph for the de Havilland Company and should serve to give fresh impetus to the light aeroplane clubs, which utilise "Moths" for training purposes, and to private flying generally.

* * * *

The R.A.F. Display

The seventh annual display held by the R.A.F. took place at the Hendon Aerodrome last month, and was very successful. The weather was perfect for flying and it is estimated that over 100,000 persons thronged the enclosure, while many thousands more occupied vantage points on the hills close by. Demonstrations were given by day and night bombing squadrons, and of special interest were the manœuvres of No. 25 Fighting Squadron, which was directed in all its evolutions by wireless telephone. The orders given by its leader were made audible to the crowd by loud speakers. A spectacular demonstration was given later when the fighting and day bombing squadrons combined in an attack upon a "hostile" aerodrome and completely destroyed the hangers.

Among the special features of the display were the first public flights of the original Cierva "Auto-Giro," and of the "Pterodactyl," Capt. Hill's tailless machine. The latter has been nicknamed the "Clown of the Air," and there is indeed something very quaint in the apparent awkwardness of many of its movements. But as an example of stability the machine was a great revelation.

Of nearly 180 machines in the air at various times during the pageant, only two had to make forced landings, and in neither case was pilot or machine injured.

* * * *

Altitude Records

Lieut. J. A. Macready, the American airman, is shortly to make an attempt to reach an altitude of 40,000 ft., 413 ft. higher than the present record altitude achieved in 1924 by M. Callizo, a French airman, at Villacoublay. The airman will wear special clothing and will carry an oxygen breathing apparatus.

The greatest altitude known to have been reached recently in this country was 30,000 ft. by Flight-Lieutenant H. W. Woollet of the Royal Air Force, flying a steel-built fighting machine. On landing, the airman reported that he had maintained this altitude for over half an hour and could have gone higher had he so desired.

* * * *

Silent Propeller

Some months ago we mentioned in these notes that tests were being carried out with the object of eliminating the noise to which passengers are subjected when travelling in air expresses. Those experiments have met with encouraging success, and a further progressive step is recorded in the reports of the trials of a new type of airscrew at Northolt aerodrome. It is stated that an astonishing diminution of noise is obtained and that the new propeller is practically silent.

Death of Mr. A. B. Elliott

Readers of the "*M.M.*" would learn with deep regret of the fatal accident that occurred to Mr. A. B. Elliott, the engineer who had accompanied Mr. Alan Cobham on so many of his famous long-distance flights. The sad occurrence has resulted in delaying the England–Australia flight until another engineer can join Mr. Cobham.

Mr. Elliott, along with Mr. Cobham, left England early in July. On the 5th the seaplane was flying low and following the banks of the Euphrates, when, at a point about 100 miles from Basra, an Arab in the desert below must have taken aim at the machine. The roar of the engine prevented Mr. Cobham from hearing the shot, and the first intimation he had that anything was wrong was the sound of the impact of the bullet on the hull of the machine. After penetrating the cabin, the bullet struck and broke a petrol pipe, leading from the main tank to the engine, and passed through Elliott's arm, embedding itself in his side.

When the big 385 h.p. engine of the seaplane is running, communication between pilot and engineer is only possible by written messages. From fragmentary communications, which passed between him and Elliott, Mr. Cobham gathered that the latter was injured and losing blood. It thus became a dramatic race to get him to hospital at Basra with the least possible delay. At full throttle the seaplane is capable of a speed of just on 130 miles an hour, and we may be sure that, in the circumstances, it was driven as fast as possible.

A man of fine physique, Elliott, although weak from shock and loss of blood, bore the ordeal of that life-and-death air rush with great fortitude, but the injury was too severe. The sad news came later that he had passed away a few hours after his admission to hospital.

Mr. Elliott, who has more than once been described to us as "one of the best," has done great work for aviation, more especially in helping to make possible Mr. Cobham's flights, and in this connection his work will not soon be forgotten. We may perhaps remind our readers that a short article from his pen, entitled "Over the African Deserts," appeared in our issue of March last, and that the aerial photograph of the Victoria Falls, on page 393 of our June issue, was taken by him. Another reference to the late Mr. Elliott occurs on our Readers' Page (p. 519) this month.

Destruction of "N.3"

The airship "N.3," the sister ship of the famous "*Norge*" used in Amundsen's flight to the North Pole, was recently damaged by fire at Crampino, Italy, where it was under construction. The fire occurred while the ship was being deflated, but only the envelope was destroyed, the metal parts having already been removed. Thus it will not be a difficult task to repair the damage as the tissue can be replaced quickly. Fortunately no one was injured. The airship is being built for the Japanese Government.

* * *

A New Zeppelin

The Zeppelin works at Friedrichshafen, on Lake Constance, are once again a hive of industry, for work has just begun on what will be the world's largest Zeppelin, "LZ. 127." This new airship will be approximately half as big again as her predecessor, now in the United States and known as the "*Los Angeles*," and will have a total gas capacity of 150,000 cubic metres. She will be equipped with five engines each developing 420 h.p., and a specially interesting feature is that these will be run on a new gas, approximately the same weight as air and claimed to be 25 per cent. more efficient than petrol. The gas was discovered during the early days of the war and its special attribute is that its consumption does not lighten the weight of the airship.

* * * *

Light Aeroplane Clubs

The Air Ministry has decided to allocate the remaining portion of the subsidy for light aeroplane clubs to the Hampshire Flying Club. With this grant the total number of subsidised clubs is brought up to six, the originally intended number, the others being the London, Lancashire, Midland Newcastle and Yorkshire clubs. Keen competition prevailed for the last grant and Glasgow and Liverpool were among the areas that had to be passed over.

* * * *

Catapulting Experiments

Recently some very successful experiments in catapult launching of aeroplanes have been carried out in the U.S.A., a Loening Amphibian machine having been projected from a U.S. Naval vessel while at sea. The device obtains its power by means of a high explosive charge.

New French Air Service

The French Government are proposing to inaugurate a new air service to Syria, and later to extend the route to India and China. Another projected service is between Daker and Recife in Pernambuco, the ultimate aim of this project being to establish a regular service between Paris and South America. It is believed that a reliable service covering the distance within seven days can be established.

A Vagabond of the Air!

Photo Courtesy] [*Vickers Ltd.*

The Vickers "Vagabond," an interesting light two-seater aeroplane, with folding wings

Manchester to London Record

The distance of 208 miles between Manchester and Croydon was covered recently in 1 hour 25 minutes by Captain R. A. Mackintosh, an Imperial Airways pilot. This is a record time for the journey.

* * * *

Air Club on Tour

A novel outing was organised recently by the newly-formed British Private Aircraft Owners' Club, whose headquarters are at the Stag Lane Aerodrome, London. The members met at headquarters and flew in formation to Cowes, Isle of Wight, where they had lunch. The journey was continued to Shoreham Aerodrome, near Brighton, where tea was taken, and later the party returned to Stag Lane.

The members of this club all employ their aeroplanes in much the same way as other people use their motor cars, and the secretary to the club anticipates a considerable increase in membership, particularly if there is a relaxation of the official regulations covering the construction of light aeroplanes. This would have the effect of reducing the price by a very large amount, and one or two of the biggest of our British motor car manufacturing companies are only waiting a favourable opportunity before placing mass-produced light aeroplanes on the market.

A Notable Flight

A notable non-stop flight between Rotterdam and Marseilles, a distance of 1,020 kilometres (637½ miles), was made recently by the K.L.M. air liner "*H-NADJ*" fitted with a Bristol "Jupiter" engine.

The machine started from Waalhaven Aerodrome early in the morning against a strong headwind. At Rheims the course was altered to a south-easterly direction, with the wind at the side, but the later stages of the flight were completed with the aid of a following wind. The "Jupiter" engine maintained 1,550 r.p.m. and the total distance was covered in 6 hrs. 35 mins. at an average speed of 155 kilometres (97 miles) an hour. On the same day the machine was flown back to Dijon and, owing to the fact that very heavy rainstorms were encountered, it was decided to stay there for the night. Next morning the machine proceeded to Paris to take up a load of passengers and merchandise and flew back to its base at Amsterdam. The total flight from Rotterdam to Marseilles and back occupied 16¼ hours' actual flying time.

The machine used was one of the standard "F. VIIa." type fitted with the "Jupiter" engine, which the K.L.M. Company have now adopted as standard for service on their air lines.

* * * *

Aerial "At Home"

It was unfortunate that the weather attending the first aerial "At Home" ever held was so decidedly inclement. This novel experiment was carried out by Mrs. Elliott Lynn, the well-known aviator, at the Stag Lane Aerodrome, and during the afternoon some 60 persons were taken up for a two-minute flight in a small two-seater "D.H." machine.

The object of this "At Home" was to afford a number of society women an opportunity of studying flying problems more closely than is possible in a flight to the Continent or at a flying exhibition.

* * * *

New Giant Airship

Constructional work on a new airship was commenced at Howden recently. Full details of the ship are not available, but it is stated that its capacity will be 5,000,000 cu. ft. All the necessary raw material has been ordered, and the machinery required during construction.

HOW THE GREAT WAR BEGAN

By R. Kay Gresswell

IT is a well known fact that the history of a nation may often be read in its issues of postage stamps. The World War of 1914-1918 is not lacking in stamps illustrating its progress in all parts of the World, for as soon as a hostile force occupied or seized enemy territory, the existing stamps of the country were overprinted in some way to indicate the change. After a time, if the occupation became permanent, special new distinctive stamps were issued by the new rulers.

While we hear a great deal among stamp collectors about these war stamps, which enjoy a great popularity at the present time, it is noticeable that little is heard of the three stamps issued by Bosnia and Herzegovina to commemorate the 28th of June, 1914, when the murder of Archduke Franz Ferdinand von Este of Austria and his wife took place at Serajevo, the capital. This event was the immediate cause of the War and these three stamps would therefore form a fitting first page to an album containing War stamps.

Serajevo, the "City of Palaces"

Serajevo, whose name means "city of palaces," is often referred to as the "Damascus of the North." It is beautifully-situated in a narrow valley down which flows the small river Miljacka, a tributary of the river Bosna, whose waters flow in turn into the Save and then into the Danube.

Several views of Serajevo have appeared on the stamps of Bosnia and Herzegovina and we illustrate some of them here. The 1906-7 pictorial issue of this country was designed by Professor Moser and engraved by Ferdinand Schirnboeck. On the 25h. value illustrated here is shown a general view of the town, the oriental appearance of which is at once noticeable, with its many mosques. The effect is heightened by the Carsija or Turkish bazaar shown on the 45h. and 1k. values, also illustrated here. This bazaar is a labyrinth of dark lanes on each side of which are the booths where are sold, in typical eastern fashion, filagree-work in gold and silver, ornamented fire-arms, rugs and other native productions.

The town contains many picturesque buildings and the mosque of Husref Bey is unrivalled in Europe except for those at Adrianople and Constantinople. Other fine buildings include several cathedrals, the town hall, the governor's residence and the museum. On a cliff overlooking the town are the castle and barracks, which, in 1914, were occupied by Austrian troops, Bosnia with Herzegovina being then part of the Austro-Hungarian monarchy.

Earlier Life of Franz Ferdinand

The Archduke Ferdinand was born at Graz (described and illustrated in the stamp article on page 643 of the December 1925 issue of the "*M.M.*") on the 18th of December 1863, his father being the Archduke Charles Louis, younger brother of the Austro-Hungarian Emperor, Francis Joseph. It was not expected that Ferdinand would succeed to the throne and accordingly he was given only an average education, after the completion of which he joined the army.

In 1875 he became the heir of his uncle the Duke of Modena and accordingly took the title of Austria-Este. The importance of this, however, was overshadowed by the fact that on the 30th January, 1889, his father became heir to the Austro-Hungarian throne owing to the death of the Crown Prince Rudolf. This, of course, made it probable that Ferdinand would ultimately become Emperor and steps were at once taken to widen the scope of his neglected education, so as to make him more fitted to occupy so important a position.

He showed special interest in science, sculpture and painting, although poetry and music did not appeal to him at all. In 1892-3 he toured the world, partly in

order to study foreign systems of government and partly with the object of strengthening his somewhat uncertain health. This latter object was, however, unfortunately not accomplished and he was compelled to spend part of each year in a more southern climate.

On 1st July, 1900, he married the Countess Sophia Chotek. There was considerable opposition to this marriage on account of the fact that she was not a member of royalty and it was only permitted in view of the fact that he renounced the right of his children to succeed him to the throne.

Ferdinand's father died in May 1906, thus making Ferdinand the heir-apparent to the throne. He now began to take a slightly more active part in the politics of the country over which it was now expected he would some day rule, but unfortunately the Emperor Francis Joseph and he held divergent opinions on many matters of importance. The Emperor, who in 1910 celebrated his eightieth birthday, preferred a minister who could extricate himself "gently" from any difficulty in which he found himself, endeavouring to displease no one, whereas Ferdinand preferred rapid and definite action in such cases, ignoring everything but his own object.

These and other differencies of opinion between the ruler and his heir became more apparent and of great magnitude as time went on and eventually the two men scarcely ever met personally, contenting themselves with writing to one another.

Ferdinand was always prepared to fight for anything he supported if there seemed to be no other way of obtaining his own way, but he would only advise such an appeal to arms as a last resort. He was not a popular man and did not seek popularity, being one who did not look for affection but for submission from the people.

The Assassination at Serajevo

In June 1914, Ferdinand and his wife were making an official tour of inspection of Bosnia and Herzegovina, then parts of Austro-Hungary. While motoring at Serajevo on the 28th of June they were both murdered by two twenty-year-old Austrian subjects, natives of Bosnia. The assassin first fired at the Archduke and then attempted to fire at Potiorek, the Austrian commander of Bosnia, who was in the same car. Before he had done so, however, the Duchess, realising that an attack was being made on her husband, leaned forward attempting to shield him from any further shots. This movement on her part together with the fact that a member of the crowd seized the assassin's arm resulted in his second shot hitting the Duchess and fatally wounding her.

Serbia was connected with this affair in the respect that there was a great deal of pro-Serbian feeling at that time in Bosnia and that two of the accomplices were residents in Serbia.

As was only to be expected, this murder of the heir-apparent to the Austro-Hungarian throne and of his wife, caused a great sensation throughout Europe, but only from the personal point of view that these two people had been killed. It was several weeks before Europe became aware of any deep political significance or importance in the occurrence, or that anything detrimental to the progress of the continent or of the world would result from it.

Austria-Hungary and Germany

Although not made public at the time, it is now known that a week after the murder, the Emperor Francis Joseph wrote to the Kaiser pointing out the dangers to the Austro-Hungarian monarchy of the Serbian agitation for the union of all the Southern Slavs under Serbia and asking Germany's attitude in the matter. To this letter he received a reply saying that he could "depend on the complete support of Germany" and that the attitude of Russia, who had an alliance with Serbia, "would certainly be hostile, but he (the German Emperor) had for years past been prepared for this. . . ."

It was decided in further correspondence that Austria should send an ultimatum to Serbia demanding impossible terms with the idea of forcing a war between the two countries. The delivery of this ultimatum was to be delayed, however, until after M. Poincaré, the French President, had left St. Petersburg where he had been paying a visit, the object of this being to keep France out of the matter as long as possible.

Consequently the ultimatum was not delivered until the 23rd of July. The reply was very conciliatory and accepted all the conditions but two. Europe fully expected that this would form the basis of negotiations in the usual way, but, in accordance with his instructions from headquarters, the Austrian Minister at Belgrade, the Serbian capital, left the town, and on the following day, the 26th, eight corps of the Austrian army were mobilized.

The First Declaration of War

Two days later Austria declared war on Serbia and bombarded Belgrade. As a result, in accordance with her agreement with Serbia, Russia mobilized her whole army.

It was still thought throughout Europe that general war would be avoided but the situation was thought sufficiently serious for Great Britain to point out on the following day that if war resulted she would probably not be able to keep out of it. The receipt of this news caused a complete change in the German policy which hitherto had, at least, not endeavoured to stop the war.

In this same evening Germany sent three separate telegrams to Austria urging her to call off the war and to negotiate with Serbia, as otherwise a European war

(Continued on page 505)

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Mention "Meccano"

Stamp Collecting—(*cont. from page* 503)

might result in which Britain and also Italy (contrary to previous expectations) would be numbered among the enemy.

It was too late, however, for Austria had taken the fatal step, and on the 31st of July Germany, finding that she was forced to go on with her original policy, sent an ultimatum to Russia saying that if mobilization did not cease she would declare war. No reply was received from Russia, and on the following day, 1st August, Germany declared war on her. This had far reaching consequences, for if Germany declared war on Russia, by the terms of the Franco-Russian Alliance, France would intervene. Further in the event of war between France and Germany, by the Treaty of 1839, Great Britain undertook to go to war against whichever country violated the neutrality of Belgium by transporting troops, etc., through it without permission.

But it was Germany who declared war against France, not France against Germany, the reason then given by Germany being now officially admitted to be false. This was on the 3rd of August and at the same time Germany applied for permission from the Belgian government to pass troops through that country. This permission was refused but the troops were already in Belgium, and a note from Britain to Germany demanding respect of Belgium's neutrality having been ignored, we declared war at midnight on the 4th–5th of August. Thus began the World War.

To mark the events at Serajevo, Bosnia and Herzegovina issued a series of three stamps on the 28th of June, 1917, the third anniversary. The 10h. shows a view of a church that it was proposed to erect in Serajevo as a Memorial to the Archduke and his wife, the 15h. shows a portrait of the Archduke and the 40h. the same portrait alongside one of his wife. We illustrate these three stamps, together with two of Austria issued on 1st May, 1915, showing typical war scenes, and, by way of contrast, two of the three Swiss stamps issued in 1919 to celebrate peace.

Italian Stamp Forgeries

The Italian police have recently succeeded in capturing the head of an international gang of stamp forgers who have been doing business with practically every civilized country in the world. The arrested man, Markoff Haralambi, is a Bulgarian, and in his flat three trunks containing thousands of forged stamps were found. These stamps are roughly divided into three classes:—authentic, forged and invented.

The authentic stamps are of little value and were apparently sent out to dealers and collectors to cover the distribution of the forged varieties. The second class, the forged stamps, are principally reproductions of valuable Bourbon issues, including types of the Two Sicilies and other defunct States such as Karelia. The third lot of stamps are purely imaginative types, as they do not correspond with any existing stamps either past or present. They include sets of Epirus, Albania, Caucasian States and Arabia stamps and are of very fine workmanship. There are also sets of Russian stamps, purely imaginative, in which the Soviet emblems are worked into a rich variety of designs that are particularly artistic.

The police have been inundated with enquiries from anxious dealers who have been duped by the forgers.

From Readers Overseas

(I am always pleased to receive items of interest from our stamp-collecting readers overseas in regard to new issues or varieties. In the case of new issues, a specimen of the stamp should be sent (on loan) where possible so that an illustration may be made, as this adds considerably to the general interest of the announcement.—EDITOR).

THE CAPE TRIANGULARS

One of our readers (Robert M. Stuly, of Johannesburg) tells us that the first printing of the recently-issued 4d. triangular stamps was issued in sheets in both languages. The stamps were imperforate and "as the clerk cuts the sheets before business commences, one is unable to obtain the pair together. The second issue is not sold over the counter, but sheets may be obtained from the Postmaster General at Pretoria, so that is the only way to obtain pairs, but the sheets cost £2 or £4.

"The new issue of 6d. stamps, one in English and one in Afrikaans, are issued in sheets of 240. The tree in the centre is supposed to be an orange tree, but is of poor design. A fact worth noticing in these stamps is that the words 'Union of South Africa' have been replaced by 'South Africa' alone."

* * * *

MALTESE SURCHARGED "POSTAGE"

Norman Joly, Valletta, Malta, explains the overprinting of Maltese stamps with the word "Postage":—"The last issue of stamps was made in 1921, when the Self-Government started. These stamps were for postage and revenue, but on its being decided to issue separate stamps for the two purposes, the stock of old ones was overprinted "Postage." A lot of speculation occurred in the overprinted stamps and the selling price of certain denominations soon became much greater than the face value. The stock of the 4d. value, for example, was sold out three hours after the Post Office opened on April 1st, and then the 4d. stamps with "Postage" printed over them were sold at 4 or 5 shillings. An Italian employed by a firm in Italy, bought hundreds of pounds worth of these stamps and is now in Egypt selling them like hot cakes, at double their face value!"

* * * *

FRANCISCAN COMMEMORATION ISSUE

F. Perello, of Milan, writes:—"We have some new stamps that we are using for all our letters. They have been printed to celebrate the anniversary of the 700th year of the death of St. Francis, a famous man who devoted himself to religious teaching. There are five stamps in the set:—the 20c. is green, the 40c. purple, the 60c. deep crimson, the 1.25 lire dark blue and the 5 lire plus 2.50 lire dark brown.

"These stamps are beautifully printed and have been designed and engraved in Italy. I am sure you will agree with me that they show that we in Italy can make stamps at least equal to those made by other nations. When I write this I am thinking more particularly of the famous engraved stamps that Germany has printed at different times, not only for herself but also for other nations, such as Turkey."

Recent Issues

ITALY
Commemorative Issue

To mark the 25th anniversary of the reign of King Victor Emmanuel III., Italy issued in 1925 a pair of stamps showing a half-length portrait of the king with his head turned half towards his right.

At the top of the design are the dates "MCM—MCMXXV" (= "1900—1925") and in a tablet at the foot are the words "Poste Italiane" and the value. The two values were 60c. and 1 lira, both being issued perforated 14 and also perforated 11. The design is the work of C. Parmeggiani and the dies were engraved by A. Repettati.

FRENCH EQUITORIAL AFRICA

As we mentioned during the course of the Stamp Tour ("*M.M.*," June 1925, p. 299), French Equitorial Africa is a new country formed by the combination of Gaboon, Moyen or Middle Congo, Oubangui-Chari and Tchad. Previous to 15th February 1906, these four areas had composed French Congo, so that it might be said that French Equitorial Africa is French Congo reformed.

The stamps of the new combined territory have so far all consisted of overprinted issues, the overprint in each case being "*Afrique Equitoriale Française.*" Details are as follows: on stamps of Middle Congo, a series of twenty-four varieties, on Tchad (illustrated), twenty-four varieties, on Oubangui-Chari, six varieties, and on Gaboon, five varieties.

MONACO
Arms Type

Following the recent issue of a pictorial series and a set of large stamps showing the portrait of Prince Louis, Monaco has now issued a series of normal sized stamps of three types.

The values and types so far issued are as follows, all being perforated 14 × 13½ and surface printed. Arms of the Principality, 1c., 2c., 5c., 10c.; portrait of Prince Louis facing left, 15c., 20c., 25c., 30c., 40c., 80c., 1.05fr.; portrait full face, 50c., and 60c. The 10c. was the first to be issued and that value, and probably the others as well, was issued in sheets of 150 arranged in six panes of 25 each.

NEW GUINEA
First definite issue

New Guinea has now issued a definite series of stamps to supersede those overprinted North-West Pacific Islands, which have been used there for a number of years. The series, of which the type is illustrated here, was issued in 1925, perf. 11, and engraved and recess printed at the Commonwealth Treasury, Melbourne. The values range from ½d. to £1 and the design shows a street in a native village.

The territories of New Guinea consist of the whole of the eastern half of the

island and the neighbouring islands, thus including Papua, which was declared a British colony in 1888, Kaiser Wilhelms Land (German North-east Guinea) and the Bismarck Archipelago. The two latter were captured by the Australian forces on 12th September 1914, when the British flag was hoisted at Kokopo, the day after the forces were landed. The territories are now mandated to the Australian Government. At first the name of Kaiser Wilhelms Land was changed to New Britain which was the name of a small island in the Bismarck Group but it has now been changed to New Guinea simply.

(51)—The de Havilland Differential Aileron Control in Meccano

IT may be recalled that in the "*M.M.*" for March 1926 we illustrated a model de Havilland "Moth" aeroplane with which T. R. Thompson of Ramsgate, and Kingswood School, Bath, secured First Prize in the Meccano Aeroplane Model-building Competition. In the article accompanying the photograph mention was made of the realistic reproduction of the de Havilland aileron control system embodied in the model. This control system is incorporated in all modern de Havilland machines and is used also by a number of leading British and foreign aircraft constructors. The device should be of particular interest to our readers in view of the fact that it may be reproduced to a fine degree of accuracy with the aid of only a few Meccano parts. Moreover, the construction of the model affords a practical demonstration of the principles involved that will prove of considerable value to every boy who wishes to become conversant with the latest developments in the details of aeroplane construction. These considerations prompted us to assemble a special demonstration model, details of which are appended below.

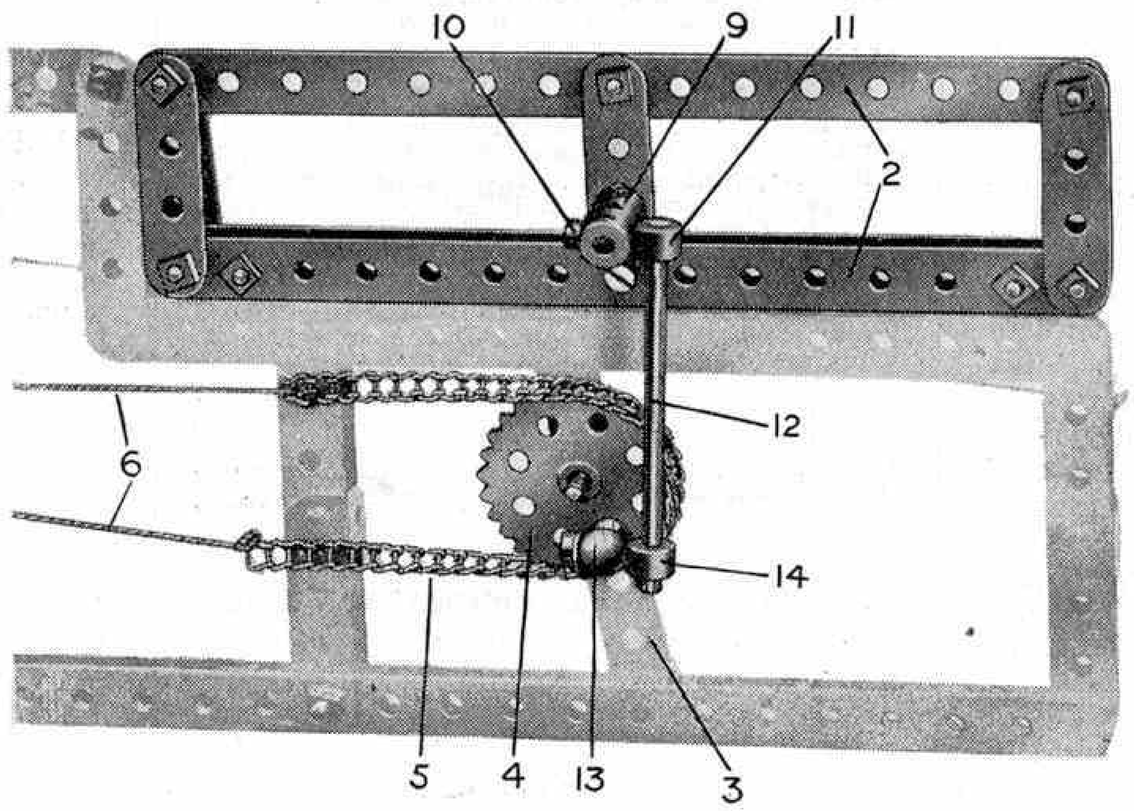


Fig. 51a

The object of the de Havilland patent differential aileron control system is to obtain better and easier lateral control of an aeroplane at all speeds, especially round about stalling speed. It makes use of the fact that, throughout the flying range and more particularly at slow speeds, an upturned aileron gives better lateral control than a downturned one, and moreover up to a certain angle requires no effort to turn it up; rather must its natural tendency to rise be restrained, owing to the air pressure beneath the wings. On the other hand, to turn an aileron down at stalling speed requires an excessive effort on the part of the pilot with little or no increase of lift or lateral control. A very big drag, however, is introduced which, by retarding the wing on that side of the machine and increasing speed on the other, defeats the object in view and produces the swinging tendency experienced when near stalling, with its consequent side slip and spin.

The differential control system allows the upturning aileron to have an increasing movement and the downturning aileron a decreasing movement, so obtaining a better controlling effect. Additionally, the upturning aileron having an increasing gear over the opposite aileron, tends to pull the latter down and relieve the effort required by the pilot. These results are achieved by the use of cranks connected to the ailerons and rotated from the movement of the joy-stick by means of cables and chains engaging with sprocket wheels, as shown in the Meccano model.

CONSTRUCTION OF THE MODEL

The leading edges of the wings consist of two pairs of 12½″ Strips, each pair overlapped thirteen holes and spaced apart by Collars placed upon the ¾″ combining bolts. Four pairs of 5½″ Strips are secured by these bolts and taper towards the trailing edges of the wings. Double Brackets 1 are placed between the fourth holes in these Strips and between the 3½″ Strips at the outer ends of the wings to maintain the correct wing shape. The ailerons are constructed in a similar manner to the wings, one edge being formed from two 7½″ Strips spaced apart by Collars and bolted to

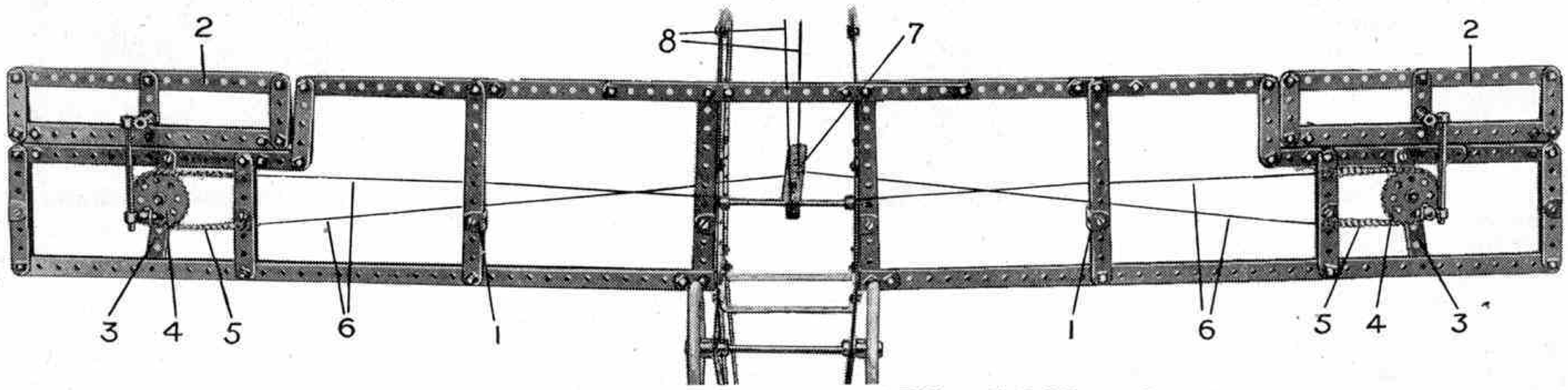


Fig. 51. Meccano demonstration Model of the de Havilland patent Differential Aileron Control system. One of the ailerons is shown in detail in Fig. 51a (above)

two pairs of 2″ Strips, the outer ends of each pair of which, meeting together, are bolted to either end of a third 7½″ Strip forming the trailing edge.

The ailerons are carried pivotally from the wings by means of Hinges. These are mounted on the shanks of ½″ Bolts, between the Strips forming the wide edge of the aileron and of that portion of the wing adjoining it. The Hinges are maintained in a central position on the bolts by means of Washers.

At each outer end of the wings a 3½″ Strip 3 is bolted to the *upper* Strip of the leading edge and to the *lower* of the two Strips in the rear of the wing adjacent to the aileron. A Pivot Bolt passed through the third hole from the rear end of this Strip is gripped by the set-screw of a 1½″ Sprocket Wheel 4, and a short length of Sprocket Chain 5, engaging with its teeth, is attached at either end to two lengths of cords 6. One of the cords is tied to the first hole of the 4½″ Strip 7 forming the joy-stick, while the other cord is attached to its fifth hole.

Movement of the Ailerons

The joy-stick 7 is mounted pivotally on a bolt passed through its third hole and secured in the end of a Coupling. The latter, in turn, is secured by its central transverse hole to a short rod journalled in the fuselage. This form of mounting permits the Strip to be moved in all directions. The cords 8 represent the rudder control wires.

The aileron rocking lever is capable of adjusting itself to all angles and is mounted as follows: a Coupling 9 (see Fig. 51a) is secured to a Pivot Bolt passed through a 2″ Strip in the centre of the aileron. This Coupling carries a ½″ Bolt 10 which enters the threaded bore of a Collar 11 and secures the latter to the lever 12 (a 3″ Rod). Another ½″ Bolt journalled in a Handrail Support 13, which is lock-nutted to the wheel 4, secures a second Collar 14 to the lever 12. It will be apparent from Fig. 51a that, owing to the angle which the pivot 13 makes with the centre of the wheel 4, any movement of the latter in a clockwise direction will result in a smaller corresponding movement of the aileron than would be the case if it is turned in an anti-clockwise direction. Movement in the latter direction results in the up-turning of the aileron. The aileron levers are mounted in opposite positions, and it will be seen from Fig. 51 that a given movement of the joy-stick will impart an increasing upturning movement to one aileron and a decreasing downturning movement to the other.

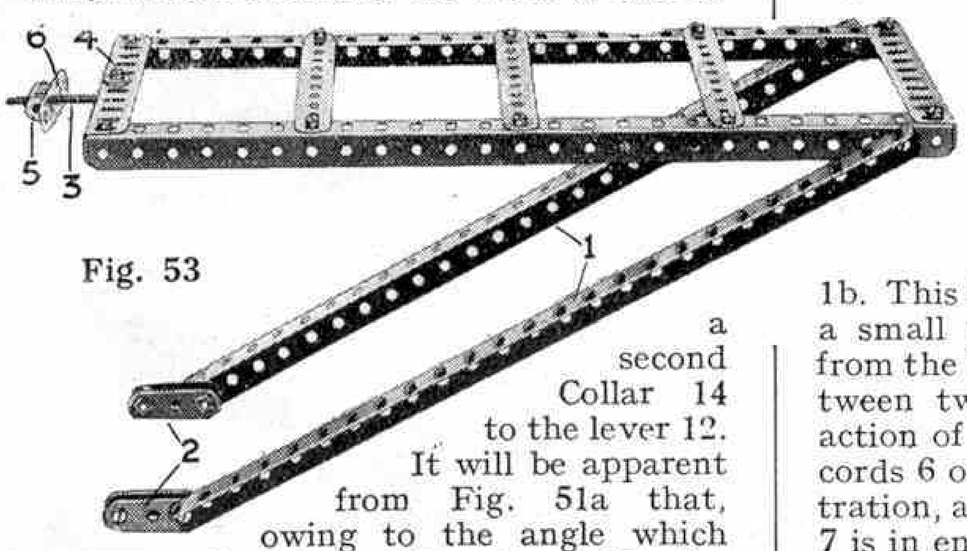


Fig. 53

In actual practice, the most favourable results appear to have been obtained with the gear in such a position that when the ailerons are neutral the line of operation between the lever 12 and the centre of the wheel 4 is at an angle of 60 degrees to the lever.

(52)—Automatic Gear-Change

(H. F. Barnard, Merstham, Surrey)

We are able to illustrate in Fig. 52 an ingeniously-contrived Meccano gear box which, if called upon to withstand a sudden increase of load on the driven shaft, automatically changes over from high gear into low. The construction of the necessary apparatus is extremely simple and is highly creditable to its designer. Apparently our contributor, H. F. Barnard, has determined to emulate the example set by his brother Mr. F. L. Barnard, who is already well known as an aeronaut, in attaining a practical knowledge of mechanical principles. We wish him continued success in his undertaking.

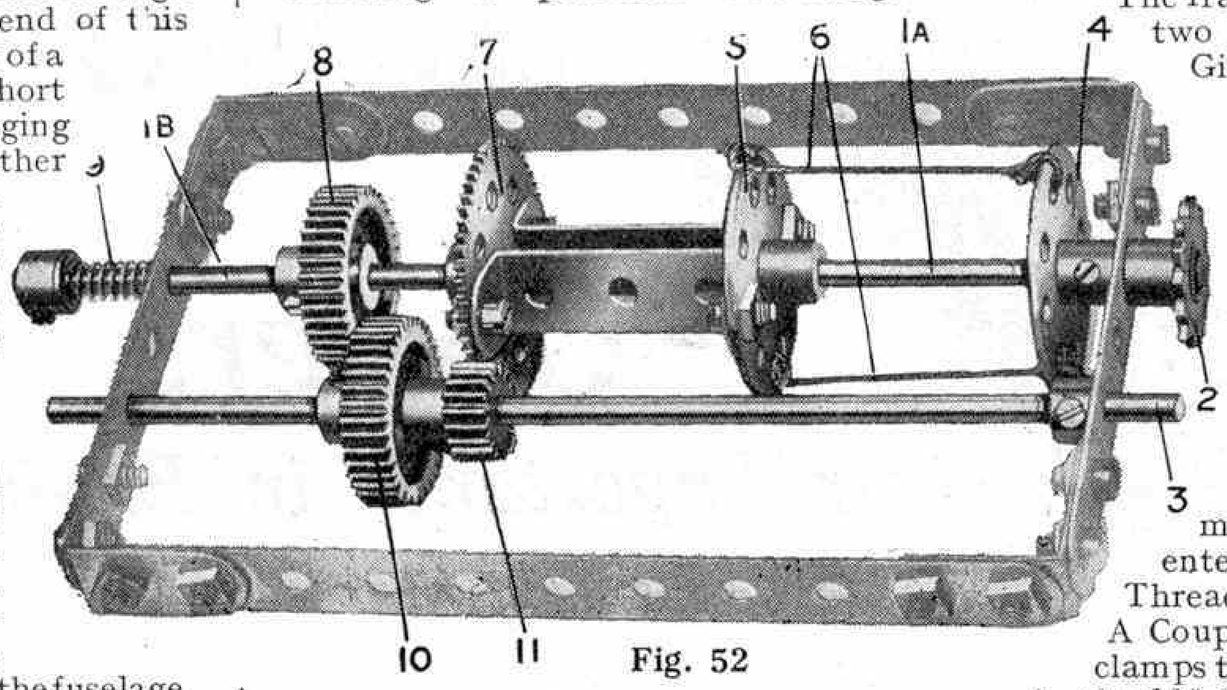


Fig. 52

The driving shaft of the gear box is in two sections, 1a and 1b, and is connected to the Motor by means of Sprocket Chain engaging with the wheel 2, or other suitable method. The countershaft 3 is connected in any convenient manner to the mechanism that is required to be set in motion. The 3″ Rod 1a carries a Bush Wheel 4, which is secured in place by its set-screw and coupled by two flexible connections 6—represented by cord in the Meccano model—to a second Bush Wheel 5. The set-screw of the latter is removed and the wheel is free to ride up or down the shaft 1a.

Two 1½″ Double Angle Strips secure the Bush Wheel 5 to a 57-teeth Gear Wheel 7 mounted on the end of another 3″ Rod 1b. This Rod carries a 1″ Gear Wheel 8 and a small compression spring 9 (extracted from the Meccano Spring Buffer) placed between two Washers and a Collar. The action of the spring tends to maintain the cords 6 outstretched as shown in the illustration, and in this position the Gear Wheel 7 is in engagement with a ½″ Pinion 11 on the countershaft 3. This gives a speed ratio of 3 : 1, and corresponds to "top" gear.

Self-Adjusting Gears

The Gear Wheel 7 will continue to drive the Rod 3 considerably faster than the driving shaft so long as the load or resistance on that Rod remains light, but if the load is increased suddenly, the shaft 1a and Bush Wheel 4 commence to revolve faster than the Bush Wheel 5. But when this takes place the cords 6 are twisted slightly, with the result that the wheel 5, sliding on the Rod 1a, is drawn nearer to the wheel 4. This movement throws the Gear Wheel 7 out of engagement with the Pinion 11 and causes the Gear Wheel 8 to mesh with a similar wheel 10 on the countershaft 3, thus producing a low speed gear having a 1 : 1 ratio between the two shafts. To bring this about, however, the spring 9 must be compressed; therefore the two 1″ Gear Wheels will remain in engagement only while the load on the shaft 3 is greater than the pressure of the spring.

Immediately the load drops below a certain amount, the spring re-asserts its influence over the cords 6 and the gear is returned to its normal or "top" speed position.

(53)—Luggage Carrier for Bicycle

(F. Tomlinson, Blackpool; F. J. Koot, Rotterdam; P. Higgon, Bristol; C. H. Yarrill, Cricklewood, N.W.2; and A. S. Reed, Stithians, Cornwall)

Several readers have submitted suggestions concerning the construction of a small Meccano luggage carrier that may be mounted quickly and easily above the rear wheel of a bicycle, and the ideas put forward by the readers mentioned above have resulted in the construction of the extremely practical device shown in Fig. 53.

The frame in this model is built up from two 12½″ Girders and two 5½″ Angle Girders, and is reinforced by three 5½″ Strips. The main supports consist of two 12½″ Girders 1 bolted to the frame and fitted at their lower ends with 1½″ Strips 2 and ¾″ Bolts with which they are clamped to the rear forks of the bicycle frame.

The other connection to the cycle is effected by means of a 2″ Threaded Rod 3, which is inserted in a Threaded Boss secured to the 5½″ Angle Girder by means of the bolt 4. The latter enters the transverse bore of the Threaded Boss and grips the Rod 3. A Coupling 5 is used as a wing nut and clamps the framework of the cycle between the 2½″ Strip 6 and the end of the carrier.

(54)—Free-Wheel Device

(G. S. Marsh, Blackpool; T. Tookey, Bristol; H. J. Evans, Birmingham; R. W. Selby, Chard; K. Chandler, Teddington; D. G. Kerr, Edinburgh; W. J. Cleland, Peebles; A. J. McCall, Wigan; S. Phillips, Edinburgh; Roy Albury, London, N.W.11; and J. Prince Bull, Burton-on-Trent).

All the above-mentioned readers sent in suggestions for a Meccano free-wheel movement similar in principle to that

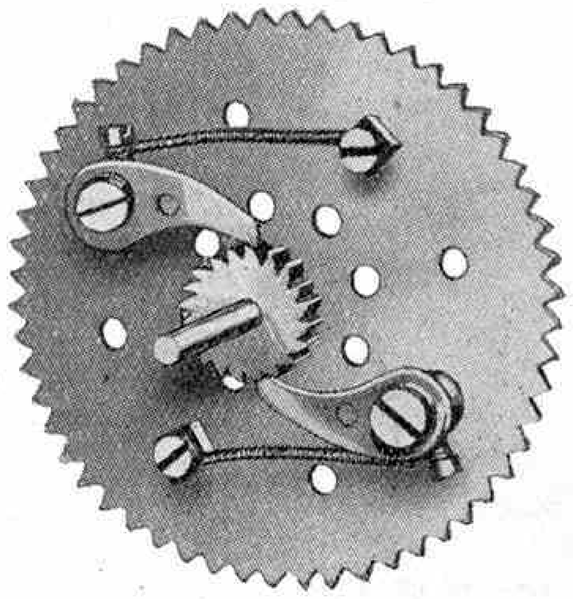


Fig. 54

shown in Fig. 54, and several of the letters received quoted some important instances of the practical use of the apparatus in Meccano model-building.

The mechanism is shown attached to a 3″ Sprocket Wheel, but this, of course, may be replaced with a 3½″ Gear Wheel, large Pulley Wheel, or Face Plate, etc., according to individual requirements. The set-screw of the Sprocket is removed to allow the wheel to revolve freely on its axle. It is kept in position, however, by the Ratchet Wheel secured to the axle on one side and a Collar with set-screw on the other side. Two Pawls are mounted

(*Continued on page* 509, *column* 1)

MECCANO ACCESSORY PARTS

Girders

Their Importance in Engineering

The greatest works of engineering depend for their strength and durability upon the massive girders of steel which, though sometimes hidden by an outer casing of masonry, bind them together and hold them rigid. A single rolled steel girder, if properly constructed, proves as strong as a wall of masonry.

The Forth Bridge, a steel highway 1½ miles in length, suspended high above the Forth; the Eiffel Tower, extending almost to the height of a mountain; the Woolworth Building, the tallest skyscraper in New York—these are three of the world's greatest structures that stand like monuments to man's constructive skill. The last named disguises its steel skeleton in a cloak of masonry, but the others tower into the sky like huge Meccano models. It is plain to see how even the smallest strut or tie is carefully planned and placed into position so that it may bear its allotted portion of strain or thrust.

Meccano Girders fulfil the same important duty in Meccano engineering. They are fitted into models and braced by Strips or Rods until the finished structure would support a man's weight, without the slightest disruption. Meccano Girders are made of the finest steel. The edges and corners are rounded and smoothed off, while the perfect accuracy of their manufacture makes them invaluable in the construction of even the most intricate mechanisms.

No.			s.	d.
1.	Perforated Strips, 12½″ long	... ½ doz.	1	0
1a.	" " 9½″ "	... "	0	9
1b.	" " 7½″ "	... "	0	8
2.	" " 5½″ "	... "	0	6
2a.	" " 4½″ "	... "	0	5
3.	" " 3½″ "	... "	0	4
4.	" " 3″ "	... "	0	3
5.	" " 2½″ "	... "	0	3
6.	" " 2″ "	... "	0	3
6a.	" " 1½″ "	... "	0	3
7.	Angle Girders, 24½″ long	... each	0	8
7a.	" " 18½″ "	... "	0	6
8.	" " 12½″ "	... ½ doz.	1	9
8a.	" " 9½″ "	... "	1	3
8b.	" " 7½″ "	... "	1	2
9.	" " 5½″ "	... "	1	0
9a.	" " 4½″ "	... "	0	10
9b.	" " 3½″ "	... "	0	8
9c.	" " 3″ "	... "	0	8
9d.	" " 2½″ "	... "	0	7
9e.	" " 2″ "	... "	0	6
9f.	" " 1½″ "	... "	0	6

No.			s.	d.
97.	Braced Girders, 3½″ long	... ½ doz.	0	9
98.	" " 2½″ "	... "	0	6
99.	" " 12½″ "	... "	1	9
99a.	" " 9½″ "	... "	1	6
100.	" " 5½″ "	... "	1	0
103.	Flat Girders, 5½″ long	... "	1	0
103a.	" " 9½″ "	... "	1	6
103b.	" " 12½″ "	... "	2	0
103c.	" " 4½″ "	... "	0	9
103d.	" " 3½″ "	... "	0	7
103e.	" " 3″ "	... "	0	6
103f.	" " 2½″ "	... "	0	5
103g.	" " 2″ "	... "	0	4
103h.	" " 1½″ "	... "	0	3
103k.	" " 7½″ "	... "	1	3
113.	Girder Frames (triangulated truss type)	... each	0	2
143.	Circular Girders, 5½″ diam. "L" section	... "	1	0

Angle Girders ("L" section, ½″ × ⅝″) in 12 lengths, ranging from 1½″ to 24½″.

Meccano built-up Steel Joist, constructed from four Angle Girders and one Flat Girder. The complete unit is massive and of very great strength.

Two examples of Meccano construction; Channel Section (left) and Cross Section Girders. The latter consists of a pair of "T" girders butted together.

Braced Girders. Stout lattice-work throughout. Width 2″. In 5 lengths, 2½″ to 12½″. Very ornamental and of great utility.

YOUR DEALER WILL BE PLEASED TO SHOW YOU ALL THE MECCANO PARTS. ASK HIM FOR A COMPLETE PRICE LIST.

MECCANO LTD., BINNS ROAD, LIVERPOOL

(55)—Universal Lever for Clockwork Motor

(David Bulleid, Nottingham; A. Pickwell, Grimsby; R. S. Calder, Greenock; and D. Wishart, Berwick-on-Tweed)

The simple device shown in Fig. 55 should prove very useful in a large number of models wherein the driving power is derived from a Meccano Clockwork Motor. It consists principally of a single lever 3 which combines the functions of both the reversing and brake levers fitted to the Motor, and so simplifies the control to a considerable extent.

One end of the 5½″ Strip forming the lever 3 is attached pivotally by means of a bolt and two nuts (see "Standard Mechanism" No. 262) to the reversing lever 1, and its centre is loosely connected by the same means to a 3″ Strip 4. The other end of the latter is attached—again by the same method—to the brake lever 2.

A short backward or forward movement of the lever 3 effects the reverse, and a slight movement up or down of the same lever stops or starts the Motor. The lever may be lengthened in either direction as circumstances may require, in order to permit of the distant control of the mechanism.

Free-Wheel Device

(Continued from page 507)

pivotally on the face of the wheel by means of Pivot Bolts and lock-nuts and are held in engagement with the teeth of the Ratchet by means of small pieces of Spring Cord attached to set-screws in the bosses of the Pawls and to nuts and bolts secured

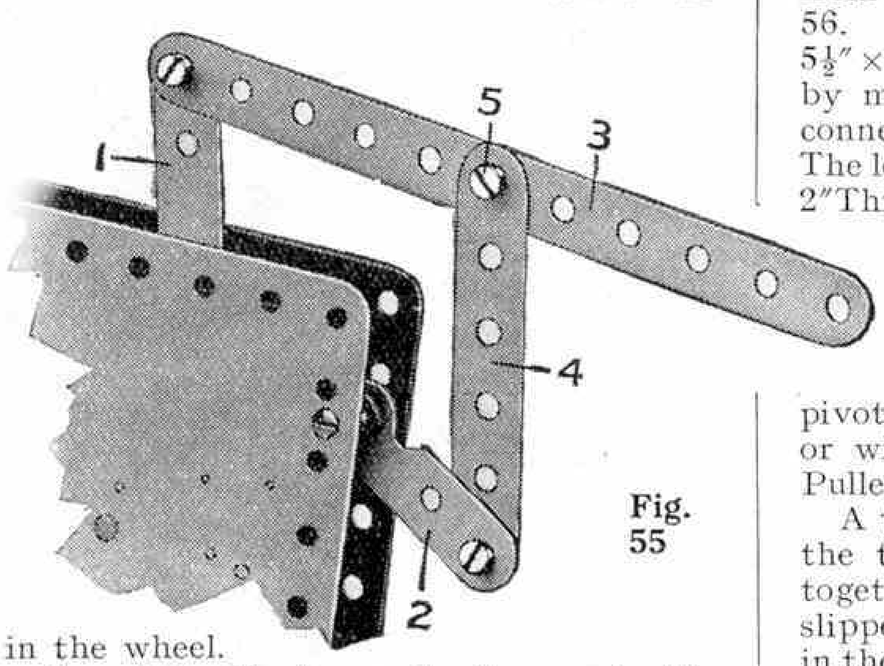


Fig. 55

in the wheel.

One of the Pawls may be dispensed with if desired, although the use of two of these parts not only ensures a more reliable drive but secures a more evenly balanced rotary motion of the Sprocket Wheel. It will be evident that the axle and Sprocket Wheel are free to move independently in one direction only. The driving power may be imparted primarily to either the axle or the wheel, to suit convenience.

Another suggested free-wheel motion sent in by T. B. Field depends for its operation upon a piece of spring wire secured to a Gear Wheel and pressing against the face of a Bush Wheel. The wire is placed at an angle and rides freely over the holes in the Bush Wheel when the Gear Wheel is turned in a certain direction. If the motion is reversed, however, the wire engages a hole in the Bush Wheel and causes the latter to revolve with the Gear Wheel.

(56)—Tie Press

(C. B. Hodges, Lewes, and D. Prescott, Southsea, Portsmouth)

Most boys regard neckties as a source of considerable irritation and expense, and we have all at some time or other possessed the kind of tie that appears, after performing its proper functions on a few occasions only, to have been roughly handled in a strenuous tug-of-war. We have now been apprised of the fact that Meccano boys never need wear a creased tie, however, for the construction of an efficient tie press from Meccano parts is the work of a few moments only.

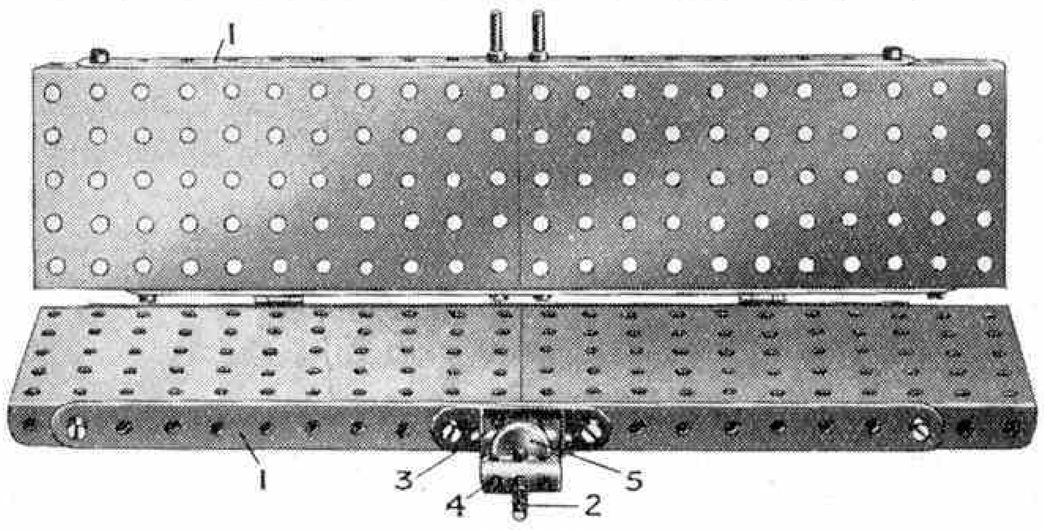


Fig. 56

C. B. Hodges suggested that the pressure imparted by a Meccano Strip bent to form a spring would be sufficient to remove creases from the tie, while Derek Prescott relied upon a rack and pinion movement to force the sides of the press together.

On experimenting with the idea we decided that equally effective results and a minimum expenditure of time necessary to clamp the tie in position could be obtained from the simple method illustrated in Fig. 56. The sides of this model consist of 5½″ × 2½″ Flanged Plates bolted together by means of four 9½″ Strips 1, and are connected by a pair of Meccano Hinges. The locking device comprises a 2″ Threaded Rod 2 mounted in a Coupling 3. The latter is secured to the shanks of two bolts passed through Angle Brackets to form pivots. The Coupling 4 represents a thumb or wing nut, and presses against the ½″ Pulley 5.

A tie having been laid flat in the press, the two sides of the latter are brought together and the Coupling 4 and Pulley 5 slipped over the two Threaded Pins secured in the upper pair of plates. The Coupling is then screwed down tight, and the considerable pressure thus imparted tends to remove the creases from the tie.

This Month's Awards

A prize to the value of seven shillings and sixpence will be presented to H. F. Barnard for Suggestion No. 52, and a sum of five shillings will be awarded to each of the contributors concerned for Suggestions Nos. 51 and 57. The readers mentioned in connection with Nos. 53, 54, 55, and 56 will each be presented with a Certificate of Merit, together with a complimentary copy of "Meccano Standard Mechanisms."

T. B. Field and I. Hurry, whose ideas are referred to in connection with Suggestion Nos. 54 and 57 respectively, will also be presented with a Certificate of Merit and a "Standard Mechanisms" Manual each.

(57)—Turnbuckle

(D. Fowler, Brixton, S.W.9, and C. Tompkins Croydon)

As readers are probably aware, a turnbuckle is an instrument with which tension may be gradually increased in an outstretched wire or rope. This Meccano model of the device should prove of practical assistance in the erection of wireless aerials, or aerial ropeways, telpher spans, and similar apparatus in which a tightly-stretched cord is essential.

The sides of the framework consist of 3½ × ½″ Double Angle Strips 1 reinforced by 3½″ Strips and connected at either end by a pair of 1½″ Strips 2, as shown in Fig. 57. At one end a Single Bent Strip 3, attached pivotally by means of bolt and lock nuts, carries a Hook 4 mounted on a ¾″ Bolt. A Threaded Rod 5 passes through the centre of the 1½″ Strips at the opposite end of the frame and engages the threaded bore of a Coupling 6, which is secured to the framework by a bolt 7 screwed into its other end. It will be noticed that a Washer is mounted on the Rod 5 between the Coupling and the end 1½″ Strips.

A Fork Piece 8 is secured by its set-screw to the outer end of the Threaded Rod and carries a ¾″ Bolt 9, on which is mounted a Hook 10 suitably spaced in the centre of the bolt by means of Washers.

The wire or rope to be stretched should be attached to the Hook 4 and the turnbuckle secured to some convenient base by means of the other Hook 10. The wire may then be tightened as desired by turning the frame 1, so causing the Coupling 6 to advance along the Threaded Rod 5. The pivotal mounting of the

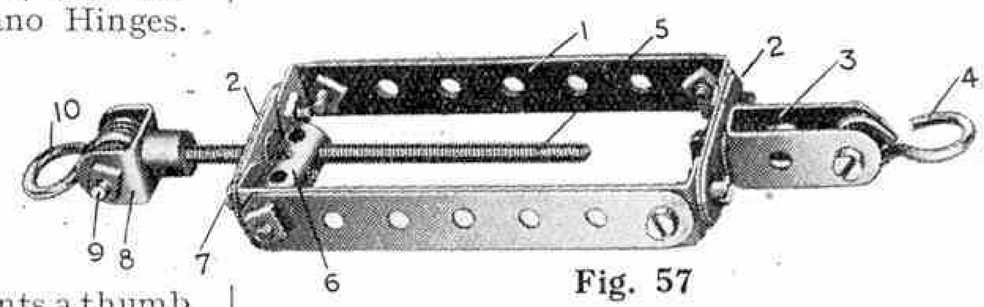


Fig. 57

Single Bent Strip 3 prevents the wire twisting when the framework is rotated.

It will be of interest to mention, in passing, a simple contrivance suggested by I. Hurry, of Blackheath, S.E.3, for the purpose of tightening cords in a Meccano model. The method adopted in this case consists merely in giving a few turns to the cord round the shank of a ¾″ Bolt. The latter is mounted in the framework of the model with its shank in line with the cord, and a nut is placed on its end. A few turns of the bolt will then pull the cord tight. When the cord is stretched to the desired extent the bolt may be locked in position by another nut screwed against the framework. A Threaded Rod may be used in place of the bolt if desired.

Addresses Wanted

We regret we have mislaid the addresses of the following two readers, and shall be glad if they will communicate with this office:—

L. Driscoll, Manchester. H. Glendenning, Liverpool.

The following suggestions have been received and are having attention. Vice (L. A. Hislam and others); Reversing Gear (H. Dunhill); Electric Scintillating Sign (J. G. McColl); Ball Bearing (H. Harris); Strip Bending Device (W. Dobson); and many others.

MECCANO

is always new. It brings a new interest into your life from the start. You become at once an engineer, a builder, an electrician, an architect, a motor mechanic, an airman, a weaver, and a shipwright.

Through the long winter evenings it teaches you to solve intricate problems, and to think *constructively*. Whilst giving you endless hours of pleasure, it is the while training eye and hand and brain—all the time keeping them tuned up and fitting them for whatever career you may adopt later in life.

MECCANO IS ENGINEERING FOR BOYS

SEND FOR THIS FREE BOOK

"The Magic Carpet" is the name of this book that tells all about Meccano. It shows illustrations of all the Meccano Outfits, from No. 00 at 3/6 upwards to No. 7 at 370/–, and tells how the addition of each new part makes it possible to build several more models. It shows, too, some of the wonderful working models that can be built by the beginner. Write for this free book without delay. A postcard to Room No. 70, Meccano Ltd., Binns Road, Liverpool, will bring it by return post.

MECCANO LIMITED, BINNS ROAD, LIVERPOOL

In Reply

In these columns we reply to suggestions regarding improvements or additions to the Meccano and Hornby Train systems. We receive many hundreds of such suggestions every week, and consequently we are able to publish only ideas that show particular interest or ingenuity. Every idea, however, whether acknowledged in these columns or not, is carefully examined and considered. Practical suggestions that prove to be in popular demand are marked down for adoption at the first available opportunity. It would be of great assistance if readers, when submitting suggestions for consideration, would write them on separate sheets of paper and include their name and address on each sheet used.

Suggested Meccano Improvements

NEW TITLE FOR "M.M."—Your suggestion that the "*M.M.*" should be renamed the "Meccano and Hornby Magazine" is interesting, but we fear the new title would prove too lengthy. A singular importance is attached to the initials "*M.M.*" by thousands of boys all over the world, and we believe many of our readers would have something to say if we altered them! We have previously published a series of articles on model railway operation, and shall continue to print any similar items of interest that come to our notice. (*Reply to F. L. Jenkins, Southampton*).

WORKING MODEL AEROPLANES.—Thank you for your suggestion regarding the substitution of Meccano aeroplanes for the buckets in the "Telpher Span" (Models No. 36 and 108). It certainly seems a good plan to cause the aeroplanes to travel across a room in this way, and no doubt increased fun can be obtained if the models are driven from a Clockwork or Electric Motor. Perhaps other readers may care to adopt this suggestion. (*Reply to G. Reid, Melbourne*).

NUMBERS ON PARTS.—Your suggestion that all Meccano Parts should be stamped with their numbers is very interesting, and we are experimenting with the idea. (*Reply to N. Horton Smith, Worcester and F. Buckley, Oldham*).

Suggested New Meccano Parts

SPECIAL PULLEY BLOCK.—We do not think the introduction of a pulley block as a special Meccano part is advisable. The type of block required varies according to the model concerned, and it is a simple matter to construct one to suit individual requirements from the existing parts. See the section on "Pulleys and Pulley Blocks" in the "Meccano Standard Mechanisms" Manual. (*Reply to C. F. D. Maule, Salisbury*).

SMALL LAMPS FOR MECCANO MODELS.—We already supply small 4-volt electric bulbs and suitable holders that may be attached to Meccano models. Will not these serve the purpose you have in mind? (*Reply to V. R. Mertens, Berwick, Sussex*).

CURVED SLOTTED STRIP.—We are introducing shortly a new 2½" Curved Strip that should fulfil the functions of your suggested part. This strip will be of smaller radius than the existing No. 90, and will possess two elongated holes. (*Reply to F. W. Milroy, Glasgow*).

IMPROVED SECTOR PLATES.—We do not think that a Sector Plate having seven or nine holes along its length would constitute any considerable improvement on the existing plate. We should like to receive further opinions on this subject. (*Reply to Billy Swift, Westmount, Montreal, Canada*).

WING NUTS.—Existing Meccano Parts may be conveniently used as wing or "thumb" nuts. We would refer you to Suggestions Nos. 53 and 56, in which Couplings are used for this purpose. (*Reply to L. Berman, West Hampstead, N.W.6*).

T-PIECE AND BRACKET.—We are unable to discover any special advantages obtainable from your suggested T-shaped Coupling and three-sided bracket. An obtuse-angle bracket similar to your sketch may easily be obtained by bending the existing bracket slightly. (*Reply to K. R. Matthews, Eastbourne*).

Suggested Hornby Improvements

A HORNBY JIG-SAW PUZZLE.—We were very interested to learn that you had constructed a jig-saw puzzle from the cover of your "Hornby Book of Trains." We should like to remind other readers of the excellent fun that can be obtained in this way. The only articles necessary to make the puzzle are a thin piece of wood, on which to first paste the illustration, and a fret-saw. (*Reply to S. Christopher, Maryport*).

TUBE RAILWAY.—Your suggestions regarding the introduction of Hornby "Underground" trains will receive further consideration at some later date, although an objection against the manufacture of such trains is raised by the fact that it is practically impossible to introduce their correct surroundings. A realistic model electric railway can be constructed more easily by using the Hornby "Metropolitan" trains, since in actual practice the originals of these trains run principally above ground. (*Reply to F. L. Jenkins, Southampton*).

"No. 2" LUGGAGE VAN.—Your suggestion for an eight-wheeled combined luggage and guard's van, for use with Hornby Pullman trains, will be given careful consideration, along with other similar ideas received. (*Reply to H. Morris, Rotherham*).

NEW CORRIDOR TRAIN.—A new Hornby train, having vestibuled corridor coaches, is in course of preparation and will be announced within the next few months. (*Reply to E. Banthorpe, Framlingham and I. A. Wood, London, S.W.4*).

DOUBLE ACUTE-ANGLE CROSSING.—We find that the demand for a crossover rail embodying a double track is insufficient at present to warrant its inclusion in the Hornby Series. (*Reply to J. Potter, Broughty Ferry*).

COLOURED SMOKE-BOXES.—See our remarks on this subject in the May "*M.M.*" (*Reply to B. Y. Williams, Stoke, Devonport*).

MAIL VAN.—As already announced, we are experimenting with the possibilities of a mail van and accessories. (*Reply to W. E. Smith, Manchester; J. Croker, Blackpool; R. Wright, Norwich; J. Walsor, Bristol; A. S. Maulby, Lincoln; W. Buckell, Penge, S.E.20; I. A. Wood, London S.W.4; D. Taylor, Bramhall; N. K. Mantle, Rhyll; and others*).

ENGINE SHEDS.—Further to our previous replies concerning the introduction of engine sheds, we fear we must hold this suggestion over for more complete investigation later. (*Reply to R. Wilson Blackrock, Co. Dublin; A. Maultby, Lincoln; J. Walsor, Bristol; G. Higgins, Alderley Edge; J. R. Grindley, Manchester; G. E. Evans, Stoke-on-Trent; J. Potter, Broughty Ferry; B. Morris, Treforest; E. W. White, London, N.1; A. Lovat, London, S.W.16; C. Draffery, Musselburgh; and D. Ford, Birmingham*).

TERMINAL STATIONS.—We hope to make an announcement concerning the introduction of terminal stations very shortly. (*Reply to R. Smith, Hythe; A. Hodgkinson, Fleetwood; K. R. Matthews, Eastbourne; and J. F. Cox, Coventry*).

PLATELAYER'S TROLLEY.—See our reply in the April "*M.M.*" We would add that a neat model of such a Trolley to run on Hornby rails may easily be made with Meccano. (*Reply to G. Audrey, Box*).

NEW LOCOS.—Most of the new types of locos that you suggest have been dealt with in this section recently, and your ideas are being examined carefully together with many others received. (*Reply to I. A. P. S. Wood, London, S.W.4.*)

LAMPS ON BRAKE VANS.—We doubt whether the addition of lamps on Guard and Brake Vans would be sufficiently popular, owing to the additional expense and the fact that such small accessories are easily lost unless rigidly secured in place. (*Reply to L. Lyon, Pinner; S. W. Lane, Watford; and L. Cruikshank, Aberdeen*).

DETACHABLE LAMPS ON LOCOS, etc.—The objections mentioned above apply to this suggestion also. We shall continue to keep the idea in mind, however. We note that the lamps could be attached, when required, to Buffer Stops, Level Crossings, Turntables, etc. (*Reply to N. F. J. Ward, Berkhamsted; Malcolm Hamilton, Helensburgh; D. Jagger, Lightcliffe; H. Smith, Weymouth; L. Whitehead and R. Perry, Brighton; and others*).

"SOUTHERN" COLOURS.—There appears to be a growing demand for the addition of rolling stock in Southern Railway livery, and the matter is having attention. (*Reply to J W. Aggleton, Coventry; N. Janion, Sanderstead; J. Gilchrist, Hemel Hempstead; D. Parsons, Flackwell Heath; E. Hammond, London, S.E.8; E. Vivian, Parkstone, Dorset; S. G. Cunningham, London, N.W. 8; and others*).

LUGGAGE VAN FOR ELECTRIC TRAINS.—We have a number of ideas in hand concerning new rolling-stock and accessories, including luggage vans, for the Hornby electric trains, and hope to make some announcements concerning them in the near future. (*Reply to L. Ison, Northcote, Victoria, Australia*).

OUTSIDE CYLINDERS.—We note your suggestion that the No. 2 Tank Loco should be fitted with outside cylinders and connecting-rods, etc. This would increase the cost of the locos, however, without achieving any really useful result, although we may mention that we are experimenting with an entirely new type of engine equipped in this way. (*Reply to R. Clarke, Dorking*).

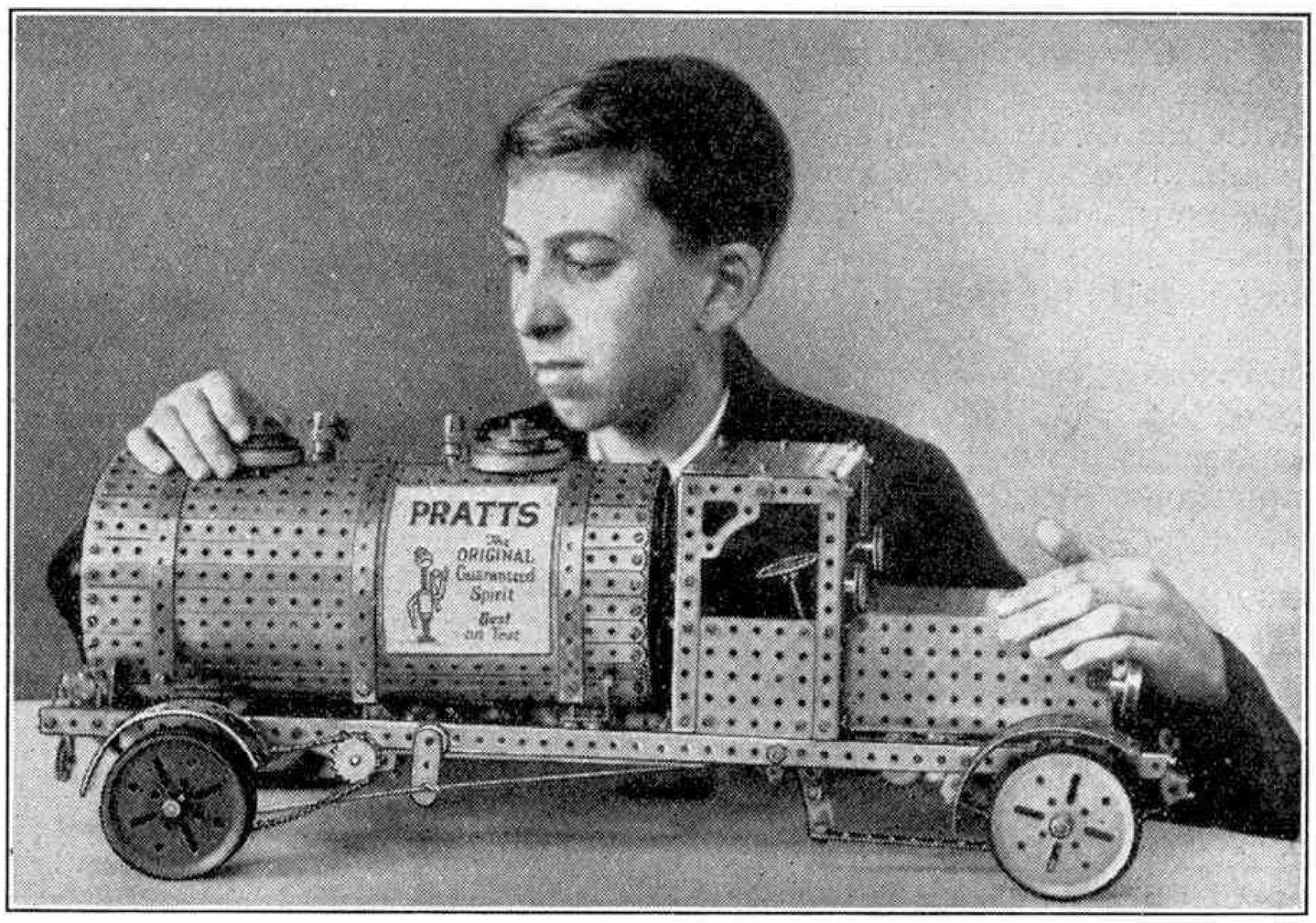
IMPROVED TUNNEL.—Your suggestion concerning a new and longer Hornby tunnel, built in two or three detachable sections, is interesting and will receive careful investigation. (*Reply to J. G. Miller, London, W.2*).

SIGNAL GANTRY.—See our remarks concerning this suggestion in the "*M.M.*" for March. (*Reply to G. Lawson and M. Willcocks, Seascale; J. Broadhurst, Swansea; and A. V. Strong, Cardiff*).

MINIATURE PLATFORM TRUCKS.—Miniature trucks, seats, etc., are already obtainable in the Hornby sets of Platform Accessories. Your other suggestions are not suitable for the present. (*Reply to G. B. Marlow, South Shields*).

ALTERATION TO L.N.E.R. STOCK.—Goods rolling stock bearing the initials "N.E." only will be available in the near future. (*Reply to B. Y. Williams, Devonport; P. Lutton, York; I. A. Wood, London, S.E.4; and others*).

A Meccano Petrol-Tank Motor Lorry



Our photograph shows Kenneth Smith, aged 13 years, of Gravesend, who has gained an award from the Anglo-American Oil Company for this realistic model of a petrol-tank lorry. The same model secured a cash prize for its designer in the recent Meccano "Motor" Model-building Competition, the results of which were announced in the "M.M." for April last.

NEW D.H.66's TO BE

Result of Naming New

THE contest, in which our readers were invited to submit their suggestions for naming the de Havilland Air-Liners, has proved to be of outstanding popularity. Every day since the first announcement was made, in our June issue, the postcard entries have been pouring into this office. The classification of the various names submitted has been no light task, but by the closing date all the entries had been dealt with.

In accordance with the conditions, the whole of the entries were submitted to the de Havilland Co., and after due consideration they advise us that the judges have selected the name "Hercules" as most suitable for the new D.H.66 type.

As explained previously, this name is not intended to be applied to any individual machine, but applies to the type as a whole, just as the name "Moth" applies to the D.H.60 type of aeroplane.

The Prize Winners

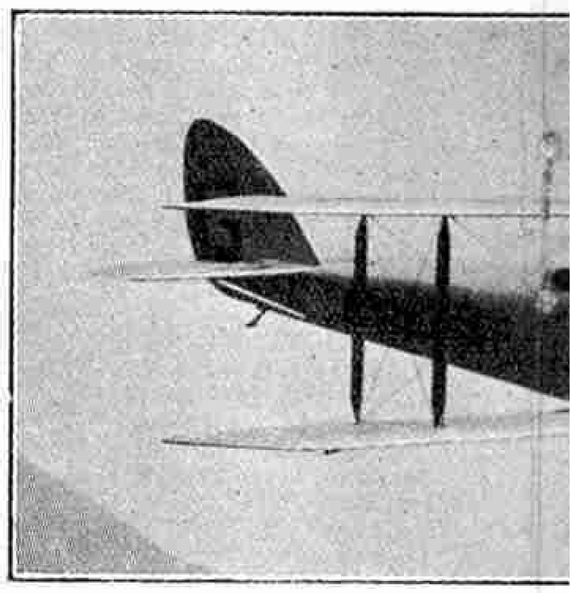
The winning name was submitted by seven readers, and in the circumstances it seems the fairest way to award the prizes in the order of date that the entries were received. Accordingly, as the first post card bearing the name "Hercules" was received from E. F. Hope-Jones, of Common Lane House, Eton College, Windsor, the sender of that entry becomes eligible for a 50-mile flight, out and home from the Stag Lane Aerodrome, or two half-hour flying lessons in a "Moth" whichever he prefers. The second prize is awarded to the sender of the second post card, received with the name "Hercules." This was sent by M. V. Longbottom, 11, Esplanade, Waterloo, Lancs., and he becomes entitled to half-an-hour's flying lesson on a "Moth." Particulars of the awards of consolation prizes, awarded to the senders of the next five "Hercules" cards, will be found elsewhere on this page. As already announced, these prizes consist of joy-rides in a "Moth" aeroplane in the immediate neighbourhood of Stag Lane Aerodrome.

Arrangements are now being made direct with each of the prize-winners so that they may take their flights at their convenience, and at the convenience of the de Havilland Aircraft Co. Ltd. Weather conditions will, of course, also have to be considered. Next month we hope to be able to make some further general announcement in regard to the awarding of the prizes. In the meantime we feel sure that our readers will be interested in the following particulars of the new D.H.66 machines.

Constructional Details of the New Air-Liners

Five of the giant D.H.66 aeroplanes, which readers of the "*M.M.*" have had the honour of naming, are now under construction at the Stag Lane Works of the de Havilland Aircraft Co. Ltd., and are being built to the order of Imperial Airways Ltd. These giant air-liners will be used on the new passenger, mail and goods service between Cairo, Karachi and Baghdad, which it is hoped will be opened next spring.

These new aeroplanes possess many interesting features, and differ in several respects from usual de Havilland construction. For instance, although the wings follow regular de Havilland practice, being constructed of box spars of wood and spruce ribs, in place of the all-wood plywood-covered fuselage that for many years has characterised almost every de Havilland machine, the new air-liners have an all-steel fuselage. Now, as the fully laden weight of the D.H.66 is estimated to be 14,700 lbs., it might be thought that it would have been more satisfactory for the fuselage to have followed the usual de Havilland practice of the plywood-covered type and to have made the wing spars of metal.



The "Moth" on which the Prize-wi

First Prize: (10

Won by **E. F. HOPE-J**

SECOND PRIZE: (Ha

Won by **M. V. LONGI**

Five Consolation I

B. Fitchie, 39, Stockton Street,
R. S. Hodge, 18, Argyll Avenu
H. Rokeby Thomas, 57, Childe
A. D. Smalley, 26, Dawson Pla
V. R. Billings, Cupola House,

The above seven readers all suggested have been made in rotation, in the o
The names of the winners of the ot nounced next month, the decision not going to press

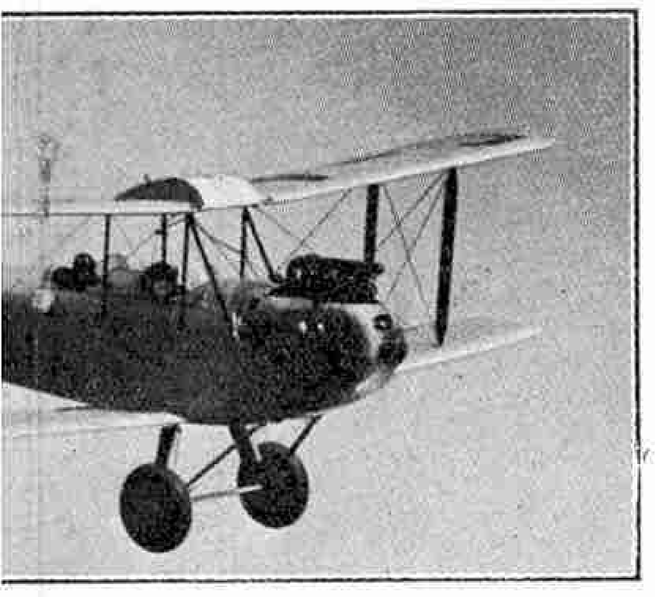
Why Metal Construction is Favoured

There is a good reason for the reverse practice being followed that, owing to the scarcity of suitable wood, there is a growing tendency to change over to all-metal construction. Then again in the case of the D.H.66's metal is used for the fuselages because the machines will have to operate in a very high temperature and in a dry climate. It is considered that if wood that is not amply protected were used in their construction it might loose a proportion of its moisture content, and its strength would thus be impaired.

The difficulty of obtaining suitable spruce in sufficient lengths is particularly manifest where main wing spars of large machines are concerned, and it is because of this that in such cases metal construction is being largely employed. On the other hand, it does not seem at all likely that there will be any difficulty in obtaining the requisite material for the covering of fuselages, and as high-class plywood has proved itself to be

NAMED "HERCULES"

Air-Liners Competition



ze-winners will make the Winning Flights

100-Mile Flight)

E-JONES, of Eton College

(Half-hour's Flying Lesson)

NGBOTTOM, of Liverpool

on Prizes Awarded to :

reet, Moss Side, Manchester.
venue, Luton, Bedfordshire.
ildebert Road, London, S.W.17.
Place, London, W.2.
use, Dover Road, Folkestone, Kent.

gested the name "Hercules," and the awards the order that these entries were received. the other five consolation prizes will be an- n not having been made by the time of our press with this issue.

both economical and durable when used for this purpose, there is no reason why its use should be abolished in favour of metal covering.

The de Havilland Aircraft Company, who have had more experience of commercial aircraft design and construction than any other British firm, have had also considerable experience in metal construction. In this case, although the machines have not been commercial machines, the experience gained must have been of great value to them.

Details of the Fuselage

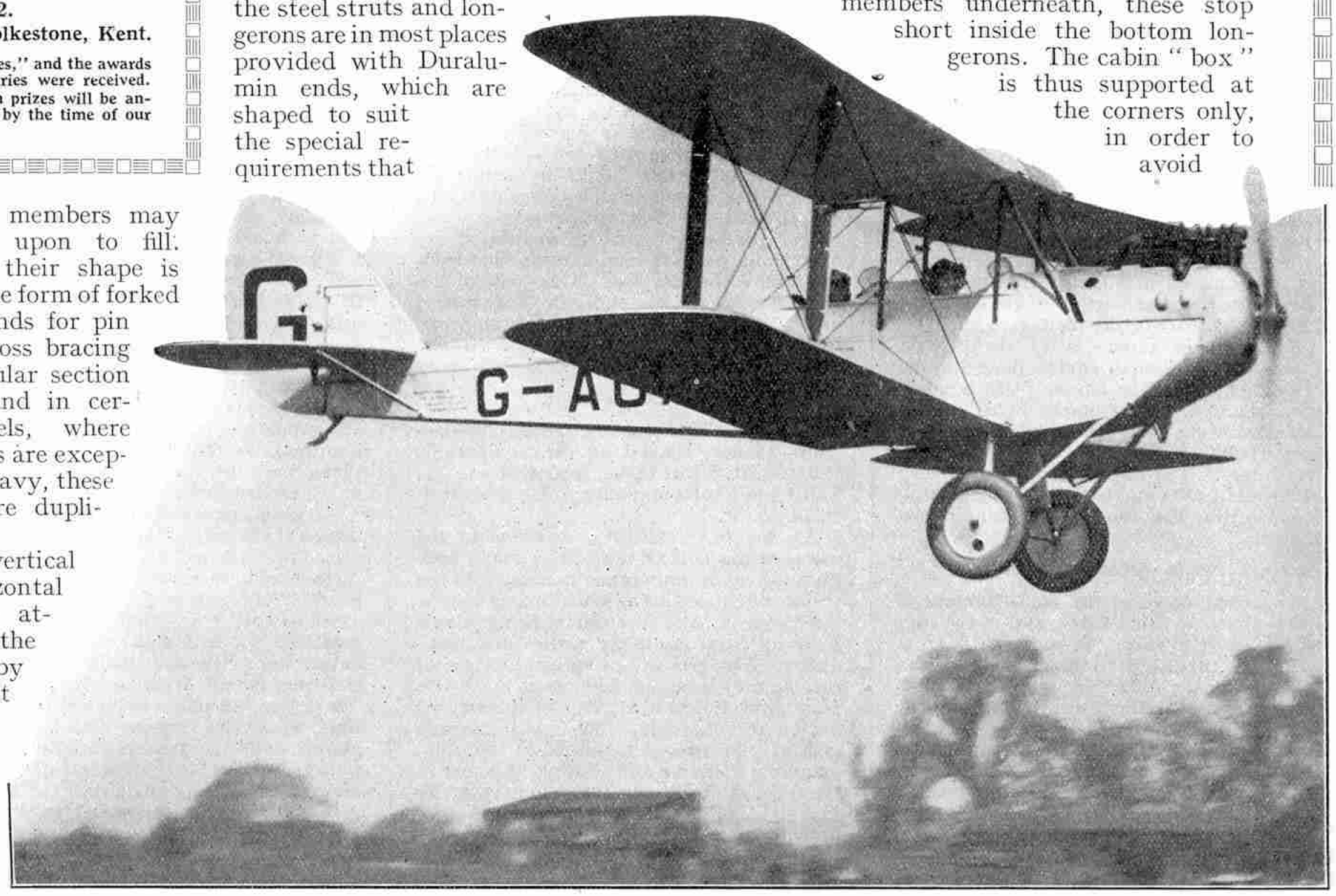
The main structure of the fuselage of the D.H.66 is of the rectangular section type. The longerons do not run through from nose to stern, however, but are divided at various points along their length in places where a number of members meet. A feature of the construction is that the steel struts and longerons are in most places provided with Duralumin ends, which are shaped to suit the special requirements that individual members may be called upon to fill. Generally their shape is either in the form of forked or plain ends for pin joints. Cross bracing is by circular section tie-rods, and in certain panels, where the stresses are exceptionally heavy, these tie-rods are duplicated.

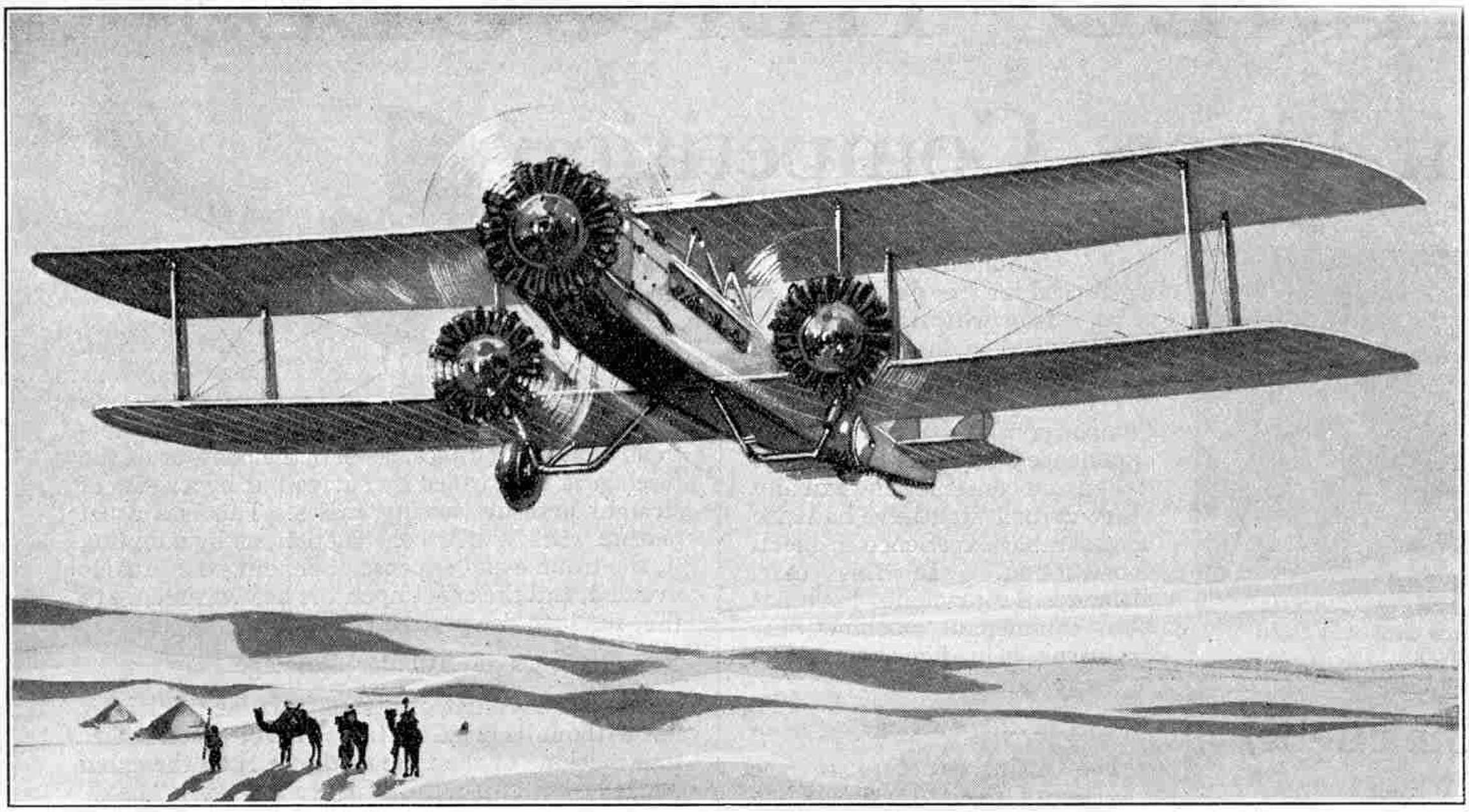
The vertical and horizontal struts are attached to the longerons by clips, bent around the longerons and pinned to them. The longerons themselves are formed by sections of straight tubes, so that the contour of the fuselage is not formed by curves but by a series of straight lines at varying angles. This is a usual feature with tubular construction, as by adopting it, the trouble and expense of bending the tubes is avoided, and the effect upon the head resistance of the fuselage is probably negligible.

Disadvantages of Tubular Fuselage

The employment of a steel tubular fuselage is not without its disadvantages, one of which is that in a machine of the type of the D.H.66 the cabin has to be built up in the form of a three-ply "box," which is slipped into the fuselage from the top when the latter has been erected. Although this necessarily means that a certain amount of extra weight is imposed and not inconsiderable extra expense, it is difficult to see any way of overcoming these objections.

Although the floor of the cabin has stout cross-members underneath, these stop short inside the bottom longerons. The cabin "box" is thus supported at the corners only, in order to avoid





One of the new de Havilland Air-Liners, D.H. 66

placing bending stresses on the lower longerons due to the weight of the cabin and its contents. The actual supports under the corners of the cabin are in the form of wooden blocks, which are shaped to fit over the top of the cross tubes in the bottom panel of the fuselage. All the stresses are thus concentrated close to the joints and the bending moments imposed are a minimum.

The fuselage does not terminate in a vertical sternpost as is usually the case, but ends in a wide flat panel, a form of construction due to the fact that the D.H.66 is provided with a biplane tail. In order to allow of trimming the horizontal tail plane, this is built up as an independent unit and hinged to the top longerons at the corners of the last bay. The tail plane trimming gear is enclosed in a casing that serves to streamline the rear portion of the fuselage, but is not a part of the main structure.

The fuselage tapers fairly abruptly in front to a very small engine plate for the central engine. The engine plate is made of duralumin, is extremely light, and is attached to the steel tube longerons by four large bolts, making the engine readily removable. The engine-mounting is very clean, and leaves ample space for inspecting or adjusting the components behind the engine.

Ample Luggage Accommodation

The front panel of the main fuselage is triangulated by steel tubes, and in the case of two of these tubes, tie-rods run parallel with the tubes, although the latter are working in tension. The object of these tie-rods is not so much to provide duplication for the tubes as to prevent the development of any play due to vibration, the rods being so adjustable that there is no possibility of any "chattering."

It is not at present intended to devote the whole of the cabin space to passenger accommodation. Seats will be provided for seven passengers only, the remainder of the space available (465 cub. ft.) being used for goods and mails. Should it later be desired to use the machine entirely for passenger-carrying a number of extra seats would, of course, be fitted.

Aft of the cabin is another "box" of plywood, forming a large luggage compartment. Vertical strips of wood of semi-circular section are attached to the cabin in order to protect and stiffen the plywood against accidental damage by luggage. The compartment, which is provided with a separate door, measures 155 cub. ft., and the accommodation should be ample for the amount of personal luggage likely to be required for seven passengers.

The passenger cabin is ventilated by means of a peculiar funnel, projecting from the roof of the fuselage. The speed of the machine forces air through this funnel into a diffuser box, from which, in turn, fresh air will filter into the cabin without causing a draught.

Wing Areas and Construction

The areas of the machine are as follows:—Main Planes, 1,536.0 sq. ft.; Ailerons, 126.0 sq. ft.; Tail Plane, top, 43.4 sq. ft.; Tail Plane, bottom, 66.3 sq. ft.; Elevator, 68.14 sq. ft.

As we have already mentioned, the wings of the D.H.66 are of box spars, with plywood walls and spruce flanges. At the points where occur the attachments for the interplane struts, internal packing pieces built up from multi-ply spruce are introduced. The ribs are of spruce and are of the same type as has been used by the de Havilland Co. in a number of their types during recent years. The wing covering is fabric, doped and varnished in the usual manner. Leading and trailing edges are in the form of duralumin tubes, but with the exception of these and the internal drag bracing, the wings are of all-wood construction.

Owing to the fact that two wing engines are mounted on the lower plane, the wing construction has been somewhat altered at the points where these two engines are mounted. At the lower plane is incorporated a system of triangulation formed by the front spar and two stout box ribs, the apex of the triangle falling on the rear spar. The result of this triangulated engine support is that the end rib of this section of the wing has a pronounced rake. The engine plate itself is bolted to this triangular structure and the front spar.

Unusual Tail Design

An unusual feature in the design is the tail unit, which is composed of a biplane tail with a single elevator, hinged to the lower tail plane only, and of three vertical fins and three rudders. The tail unit is built in two symmetrical halves in order to reduce the number of spares necessary. Thus, a spare fin may be used either in the central position or in one of the two outer positions, and the same remark applies to the rudders. Equally, the two halves of each of the tail planes are identical, so that a spare for either tail plane may be used at will on the port or starboard side.

Another unusual feature of the tail design is the method adopted for trimming the tail. Owing to the rigidly-braced biplane structure, the usual tail trimming gears could not well be employed. Instead of this is a system that is similar in principle to, although quite different in detail from, the tail plane-trimming gear patented by the Westland Aircraft Works. The lower tail plane is hinged to the main fuselage at the rear ends of the top longerons, and is braced by an inverted pyramid of steel tubes meeting at a point in line with the lower surface of the fuselage. A worm gear is interposed between the fixed portion of the fuselage and the apex

(*Continued on page* 528)

The White Star Liner "Laurentic"

New Triple Screw Steamer for Canadian Service

SATISFACTORY progress is being made with the construction of the new White Star triple-screw liner "*Laurentic*," at the Belfast yard of Messrs. Harland & Wolff Ltd., and it is expected that the steamer will be launched next October.

The "*Laurentic*" is destined for the Company's Canadian service, which is at present maintained by the "*Doric*," "*Regina*," "*Megantic*" and "*Canada*." As in the case of these vessels she will carry Cabin and Third Class passengers and cargo, but will mark a distinct advance in size and equipment.

With a gross tonnage of about 18,700, she will be not only the largest of the White Star Canadian fleet, but the largest Cabin and Third Class ship on the St. Lawrence route.

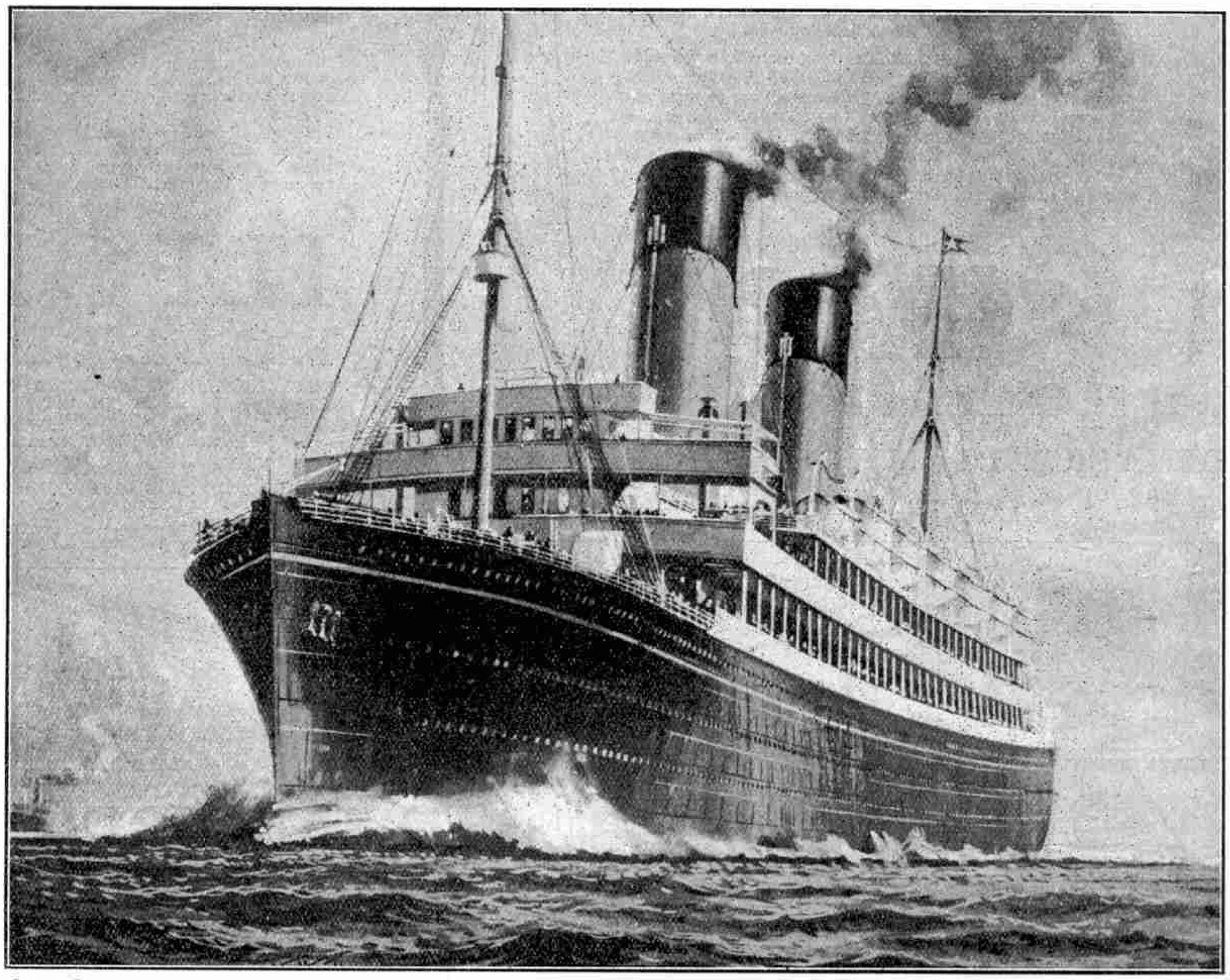
Her dimensions will be 604 ft. over all in length and 75 ft. beam, the maximum for safe navigation of the St. Lawrence River up to Montreal.

In her accommodation, the "*Laurentic*" will have the advantage of every improvement that recent experience has devised and tested.

In the Cabin Class, there will be accommodation for over six hundred passengers berthed in spacious and well-appointed staterooms and suites. The latter comprise bedroom, sitting-room, and private bathroom, and will all be situated amidships. Running hot and cold water will be provided in all the staterooms and lavatories.

The public rooms will include dining-room, drawing-room, lounge, smoking-room with verandah, card room, and children's playroom. All the rooms will be of such dimensions as to provide comfortable accommodation for a full complement of passengers. A gymnasium will also be installed, and there will be also a shop, bookstall, and a barber's saloon.

Accommodation is provided for over 1,000 Third Class passengers, and in this connection the designers of the "*Laurentic*" have had in mind the growing popularity of democratic ocean travel, a movement which has brought a transatlantic crossing within the means of many who have not hitherto been able to entertain it as a possible holiday.



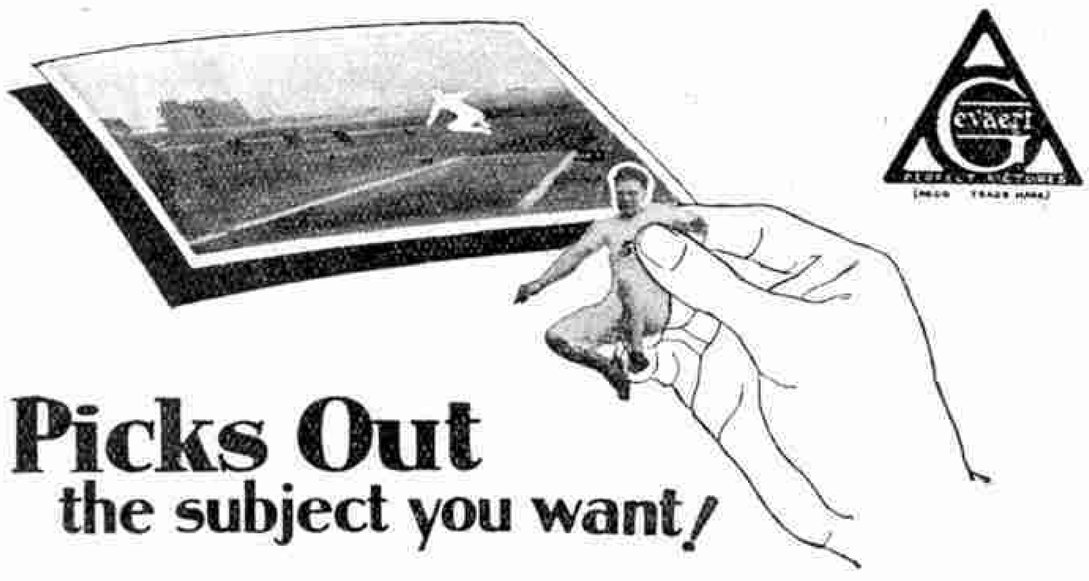
Courtesy] ["*White Star Magazine*"

The "*Laurentic*" as she will appear when completed

For instance, the large well-furnished and airy staterooms for two, four, and six persons will be fitted with both hot and cold water. The numerous public rooms will include three dining-rooms, ladies' rooms, lounge, general room, two smoking-rooms, and a children's room. Extensive promenade decks will be a feature of each class.

The "*Laurentic's*" engines will consist of two sets of four-cylinder expansion balances reciprocating engines operating with wing propellers. A low-pressure turbine will operate a centre propeller, designed to give a sea speed of 16½ knots.

(*Continued on page* 520)



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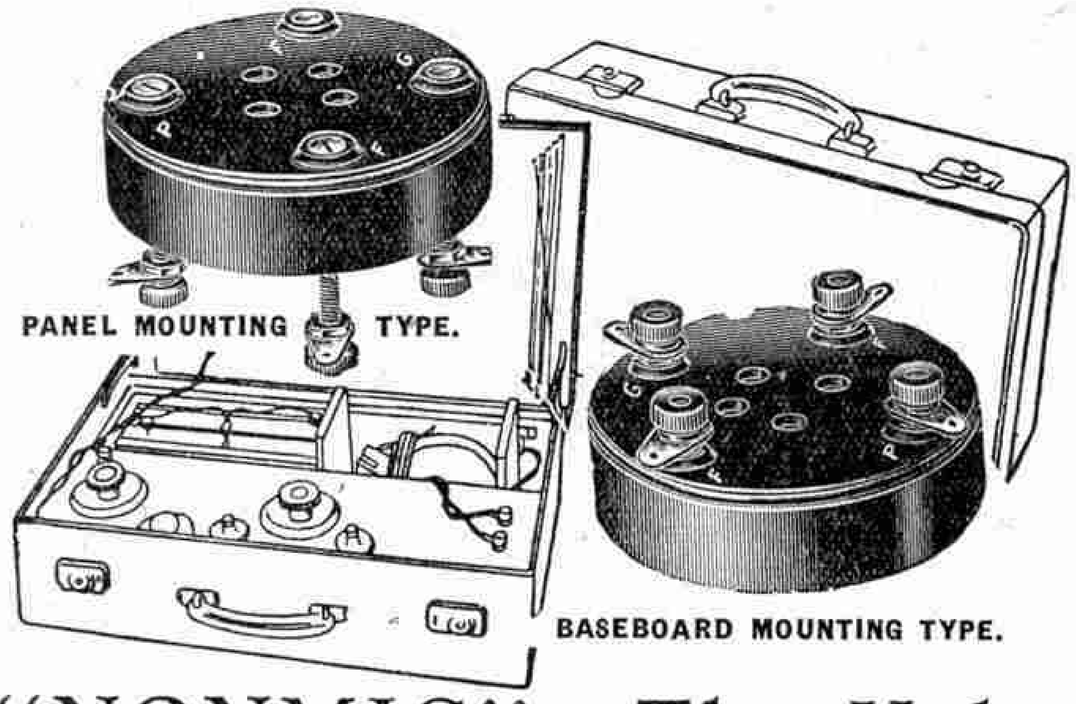

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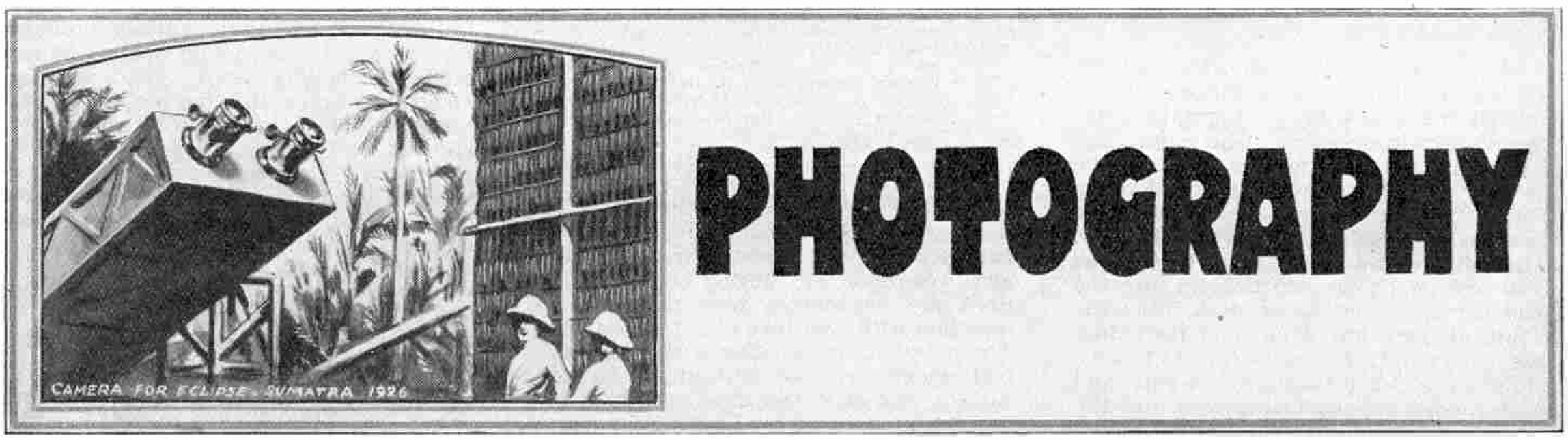

XVII. SEASIDE PHOTOGRAPHY

AUGUST and the seaside are almost synonymous terms, and to them the word camera might well be added. A seaside holiday without a camera as part of the kit may almost be described as a holiday wasted. The photographs then obtained serve as a jolly memento of a care-free period and they may be turned to with pleasure at any time during the dull winter days.

Probably many readers will be using a camera for the first time during their seaside holiday this year. No better starting point could possibly be chosen, for at the seaside the great trouble of under-exposure is almost non-existent. At the seaside the trouble lies in the opposite direction. Indeed, it is scarcely too much to say that it is practically impossible to give too short an exposure on an open beach scene or seascape on a bright sunny day, even though the camera be fitted with a cheap lens.

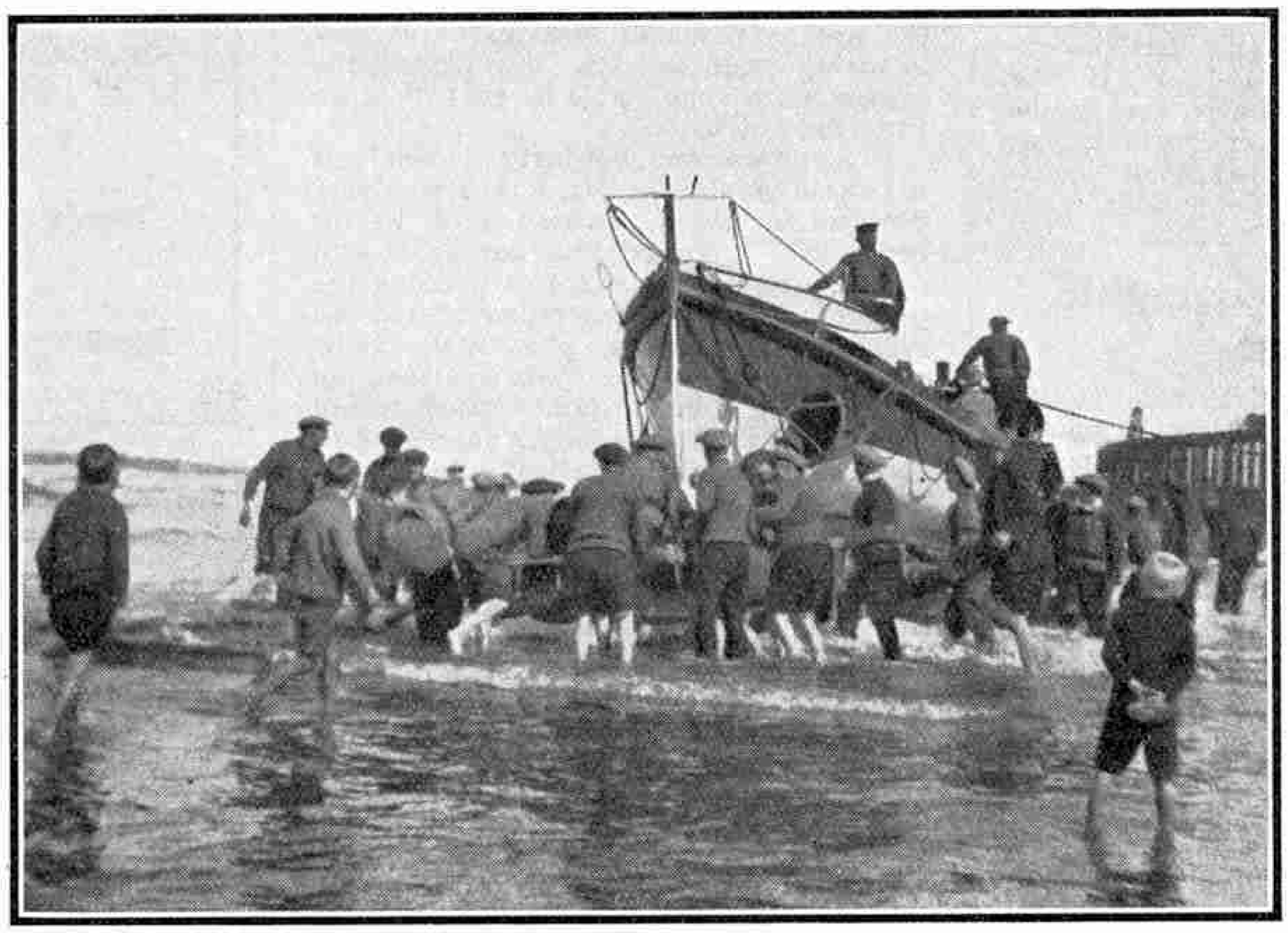

Photo by] [*D. F. Mackay*

A Holiday Snap : Launching the Lifeboat

It is not possible to lay down definite rules for exposure, but as a rough guide 1/100 sec. at F/8 will prove ample when snapping open seascapes. This exposure will be suitable for any part of the morning after breakfast, or during the afternoon. If beach scenes containing dark rocks or near boats or figures are to be recorded, the exposure should be doubled. Do not be misled into believing that an overcast sky, a leaden sea and a splash of rain indicate the necessity for a time exposure. Use an exposure meter or table and place faith in it, and if it indicates 1/25th at F/8, act accordingly.

Profusion of Subjects

The choice of subjects available leaves one almost bewildered by its profusion, but indiscriminate and careless snapshotting should be avoided. It is better to obtain a dozen really good pictures than fifty poor ones spoiled by thoughtlessness. The best scheme is to prepare a plan of campaign to secure a number of good views, each specially characteristic of the district, to form the foundation of the holiday record when put together in the album. The remaining portion of the album may be filled "according to taste," but don't bother too much with "picture postcard" views. These can be obtained more easily, and certainly more cheaply, in the shops.

Of greater interest are early morning bathing scenes, fishing from the pier, fishing boats and yachts, children playing on the sands, the donkeys, the Punch and Judy show, model yacht pools and the rocks and waves. One could add almost indefinitely to this list, but sufficient topics have been indicated to provide ideas for innumerable photographs, quite apart from the snaps of one's friends in holiday mood and attire that are so popular.

Seascapes with Rock Backgrounds

The wide rolling expanse of sea may at first sight appear to be a highly desirable subject, but a small rocky cove will prove far easier and will yield a much more successful result. The best seascape pictures are those showing a background of rocks, and here the small inlet scores, for it is possible to get out on to the seaward side and take the view looking inland. A low viewpoint is desirable and an exposure of 1/25 sec. at F/11 should prove sufficient to secure a well-rendered background and a "woolly" looking sea. A shorter exposure probably would result in giving a stiff, frozen appearance to the waves.

Series of Snapshots

One of the most interesting holiday albums we ever saw consisted almost entirely of series of photographs illustrating certain episodes. One series illustrated a lifeboat practice, showing the opening of the lifeboat house, the hauling out of the boat on to the slip, and the subsequent launching in a whirl of spray. The series ended with the return of the boat and its hauling up the slip into the boat-house. Other series dealt with the return of the fishing boats and the subsequent disposal of their captures; with the making of the familiar crab pots, and similar everyday occurrences in the life of a small fishing village. The individual photographs contained in this album were not by any means of unusually high quality, but the fact that they were grouped in series gave them an interest that could never attach to a single photograph, however technically perfect. We recommend our readers to try this series idea, for we are certain they will find the results extremely interesting.

Readers who prefer to do their own developing and are content to postpone operations until their return home will be well advised if they allow a local chemist or photographic dealer to develop their first spool of film or batch of plates. If the results are good, the photographer can go ahead secure in the knowledge that his camera is working well and that his exposures are correctly judged. If the results are not good, then it is a simple matter to trace and correct the fault that otherwise would have remained undiscovered until the end of the holiday.

The 29th Photographic Contest

Our photographic article this month deals with the interesting subject of photographs at the seaside and draws special attention to the value of a series of photographs of an episode as compared with that of a single snapshot. In order that our readers may have an inducement to experiment on these lines we have chosen as the subject of this month's contest "A SERIES OF THREE OR MORE PHOTOGRAPHS ILLUSTRATING A SEASIDE EPISODE."

Prizes of Photographic materials or Meccano products to the value of £1-1s. and 10/6 respectively will be awarded to the first and second prizewinners in Sections A for competitors of 16 and over, and B for those under 16.

Possibly some of our readers may not care to tackle a series of photographs and therefore we announce an alternative section for "THE MOST INTERESTING SEASIDE SNAPSHOT." The subject chosen for this competition may be serious or humorous as desired.

For this second competition prizes of photographic materials or Meccano products to the value of 15/- and 7/6 will be awarded to the two best entries in Section A and B.

No competitor may enter for both Sections.

Closing date for both Contests: 31st August. Overseas, 31st December.

Result of 27th Photo Contest

The glorious photographic weather of the last week of June apparently incited our readers to unusual photographic activity, and a large number of excellent entries was received for our "Sports Photograph" Contest. Every conceivable outdoor pastime appeared to be covered and some of the photographs were of quite unusual interest.

The awards are as follows:—

First Prizes: Section A, J. F. JOHNSON (Birmingham); Section B, G. ESPLEY (Accrington). Second Prizes: Section A, M. MACKAY (Glasgow); Section B, W. F. HALL (Durham).

Adventures with a Camera

A few days before Whitsuntide I had the bad luck to sprain my ankle rather badly, and consequently during the holiday week my movements were restricted to hobbling with difficulty about the garden. The photographic articles in the "*M.M.*" had revived my old enthusiasm for my camera, and after breakfast on the Saturday I loaded up with a new film and cast about for new photographic worlds to conquer.

Suddenly I got a brain-wave—I would try my hand at nature photography, and the most obvious subject was my pet rabbit. Now this rabbit lives in a two-roomed bungalow, that is to say he has a hutch divided into two sections. One section, for day use, has wire netting at the front, while the other has no netting and is a nice dark bedroom for restful slumber. I sallied forth, found my rabbit in his day apartment, and explained that I was going to make a beautiful portrait of him. He seemed quite interested and came close up to the wire netting, ceaselessly wrinkling his nose in the approved rabbit fashion. I set my focussing scale at 3 ft. and placed the camera on a small table at that distance from the hutch.

So far all was well, but just as I was about to release the shutter, Mr. Rabbit suddenly decided to pay a hurried visit to his bedroom! I coaxed him out again and once more was in the act of pressing the trigger when he again remembered an urgent appointment. This little game went on for some time. I am a persevering sort of chap, however, and I stuck to my work valiantly and at length succeeded in obtaining a really excellent snap—of a rabbit's tail just disappearing!

The Editor of the "*M.M.*" has managed so far to produce a fresh idea each month for a photographic competition, but I feel certain that sooner or later he will be "stumped" for a fresh subject. When that occurs I shall not be surprised if he announces, as the subject of the 199th competition: "AN ANIMAL'S TAIL, TAKEN FROM LIFE." Then my labours with that rabbit will be rewarded, for I am certain that my tail snap will win first prize!

In the afternoon my Uncle George called, and thereby hangs another tale. Everybody thinks a lot about Uncle George—you see there is such a lot of Uncle George to think about. He weighs 19 stones, ignoring the odd ounces. I was feeling rather sore about my photographic encounter with the rabbit, and Uncle George seemed to me to have been sent by providence for my special benefit. "Aha," I chuckled to myself, "behold my next subject. Uncle George cannot get into reverse gear and disappear suddenly like my wretched rabbit." So I promptly informed Uncle George that he must come into the garden to be snapped. "Alright, my lad," he replied, "anything to keep you amused and in a good temper."

I annexed a chair from the drawing room and limped in front of Uncle George to a suitable spot in the garden, where there was a really delightful background of shrubs. Uncle George sat down, and at my earnest request endeavoured to look pleasant. Focussing operations proceeded without a hitch, and I was just about to press the trigger, when the hinder parts of the chair came unstuck and Uncle George disappeared into the shrubbery. I never saw a neater or speedier departure. Uncle George travelled quite as fast as the rabbit, if not faster. I got an excellent snap—of a pair of feet waving in the air.

Uncle George still maintains that I put him on a damaged chair on purpose. I did remember afterwards hearing mother say that that particular chair must be repaired before Uncle George came again, but a photographer cannot always think of these things at the time, can he?

W. HENRY (Leeds).

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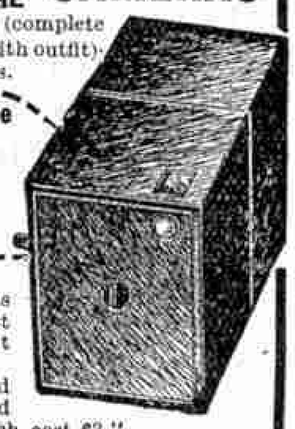

THOUSANDS OF TESTIMONIALS!!
Miss E. Le Cheminant writes:—"I was astonished to see the result of my first effort. The picture is as good as that done by a proper photographer."
W. J. Thomas, Esq., writes:—"Developed and printed photo, and think it as good as if it were taken with a camera which cost £3."
Miss P. Syms writes:—"To look at the snaps one would think they were taken by an expert instead of an amateur".
Miss Peggie Millar writes:—"Received Camera. It's taking perfect photos". 1926 *Catalogue* 1,000 *Big Bargains, Post Free.*
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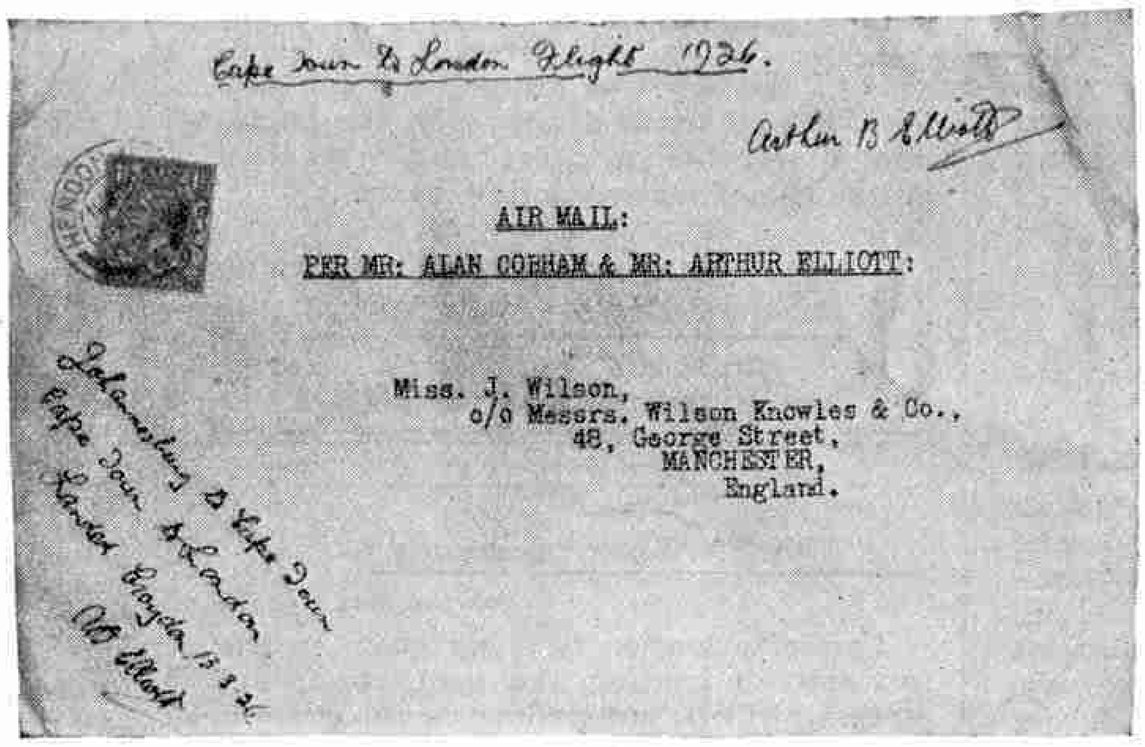
FROM OUR READERS

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

An Interesting Memento

All keen Meccano boys have read the story of Mr. Alan Cobham's great flight from London to the Cape and back. Mr. Arthur Elliott, who was the engineer, carried with him a letter of introduction to one of the largest firms in South Africa, from their London office. The head of the firm was unable to be present at the landing in Johannesburg and a nineteen-year-old clerk named Cunningham Wilson was chosen to take his place. Wilson acted as guide during the whole of Mr. Elliott's stay in Johannesburg, and looked after him during a short spell in hospital as the result of a slight attack of malaria. Very naturally the two became very good friends.

When the time came for the airmen to leave for Capetown, Mr. Elliott as a favour offered to carry a private letter to his young guide's aunt in England, and the accompanying photograph shows the envelope. It is signed by the airman, who has also written his address on the back. This letter and a letter from the Governor-General to the King are the first to be carried from South Africa by air.



The "Flown Cover" described on this page

In reply to a letter from Miss Wilson, Mr. Elliott wrote :—" I would like to say how much I appreciate all that your nephew did for me while I was in hospital in Johannesburg. He was most kind, visiting me every day and fixing up little jobs I was unable to see to myself, and it was only right that in some small way I should return his thoughtfulness."

This unique envelope will be carefully preserved and in years to come will remind its owner of a historic flight and of a young South African's initiative.

JACK WILSON, Bramhall, Nr. Stockport.

How I became a Meccano Boy

I am going to set down the story of my becoming a Meccano boy.

A lady left here for England in the beginning of February and before starting she asked me what I would like to have from London. I promptly asked for a Meccano outfit. The lady was surprised, but agreed. After two weeks I received a letter from her saying among other things : " I have been down to the shop and seen the Meccano. I think you are too old for this toy. It would be alright for a boy of 15 who was going to be an engineer. You cannot imagine what a huge toy it is."

I was disappointed, but having my own opinion on the subject I did not write anything in reply. In about a fortnight a *wire* came as follows : " Do you want Meccano ? " to which I wired back : " Yes please."

One morning in the beginning of March she arrived and brought the outfit. At mid-day I carried it home.

" Guess," I said to my father, " what is in this box." He felt the box and as soon as he heard the rattle inside he said : " Goodness ! " and raised his hands to heaven. " It is your famous Meccano. Now we are done for ! "

In the evening I came home very early and my father walked in a few minutes later saying : " I knew you would be early tonight."

I unpacked the box and promptly began my first model, starting to build a bridge of my own invention from one table to another. My father took a genuine interest in the whole proceeding and when my bridge showed too much tendency to bend he came forward with suggestions in regard to the disposition of extra stays.

After that, for about a week, I was busy with model-building. I preferred building models out of my head, referring to the manual only when there was some difficulty I could not solve. A Tank, an Automobile, a Funicular Railway, a Gantry Crane (which pleased everybody)—appeared one after another. One day a Lift Frame rose up to the ceiling, to the great dismay of our servant !

So now Mr. Editor you know how I became a Meccano boy !

M. KRAVTCHENKO (Rome).

How Lime is Made

During the holidays I often visit a large lime works in Somerset, where I have an opportunity of watching the making of lime.

First of all, limestone is blasted in the quarry and broken into pieces about the size of an ordinary brick. The stone is then taken across a bridge and fed into kilns which are gas-fired. The gas is supplied by producers, which are mechanically fed and have steam

supplied to them from a waste-heat boiler, heated by the exhaust gases from the kilns. From the producers the gas is carried to the kilns through 2 ft. 6 in. pipes. It is burnt in the kilns and all rock in this zone is heated to 800°C., at which temperature the carbon dioxide is driven off leaving calcium oxide or quick lime. Below the burning zone is a space known as the cooling zone and all the lime passes through this in order to become cool enough to work.

At intervals throughout the day and night lime is drawn off and stored in large bunkers. It is taken from these as required and tipped into trucks that run down a steep incline, at the same time drawing empty trucks up a parallel track. At the bottom of the incline it is weighed and either placed in chutes to be put on rail as lump lime or taken across another bridge to the hydrating plant. There it is crushed and passed into a large cylinder in which it combines with a sufficient quantity of water just to slake it but not to make it wet. During this process it is formed into a finely divided powder and afterwards this is lifted by an elevator into a huge bunker at the bottom of which are bagging machines. These machines stop filling automatically when the required quantity is in the bag and they are fitted with indicators that register each bag filled.

K. SANDIFORD (London, N.10).

Exploring the Arctic—(*cont. from page* 483)

were suffering from the Black Death—a devastating form of plague.

Sebastian Cabot discovers Newfoundland

Next there comes a considerable blank and little was done in the way of Arctic exploration from the year 1001—when Leif Ericson, the son of Eric the Red, sailed to the west and discovered Labrador—until the close of the fifteenth century.

In 1497 Sebastian Cabot, whose father had come from Venice and settled in Bristol in the reign of Henry VII., discovered and sailed along the coast of Labrador. He took possession of the islands at the mouth of the St. Lawrence, and these became known as the New Found Land—a name that later was restricted to the largest island. For his services Cabot was duly rewarded by a gift—as recorded in the Privy Purse accounts of Henry VII.—"To hym that found the new isle, £10."

In 1498 Cabot again set sail in the same ship, "*Matthew*," touched at Iceland, discovered what later became the Hudson Strait, and visited Labrador. On his return he was appointed first Governor of the Company of Merchant Adventurers, formed as the result of a great love of adventure—such as had existed for two or three generations in Spain and Portugal—arising in England.

Chancellor's Voyage Opens Up Britain's Foreign Trade

Cabot, eager to promote this spirit of enterprise in England and to extend her foreign trade, suggested that a voyage of discovery should be undertaken with a view to finding a north-west passage to Cathay, a subject that had aroused popular interest for some time. The expedition, for which ships sheathed in lead were specially built at Bristol, set out in 1553 under the command of Sir Hugh Willoughby in the "*Bona Esperanza*," of 120 tons. The "*Edward Bonaventure*," 160 tons, (Captain R. Chancellor) and the "*Bona Confidentia*," 90 tons, (Captain Durfourth) completed the expedition, in which, it is interesting to note, Cabot first instituted the keeping of a journal or log, which practice was subsequently carried out on all ships.

An Arctic Tragedy

The expedition soon met with bad weather causing Willoughby and Durfourth to separate from Chancellor. The two former sailed into the Arctic, discovered Nova Zembla, an island off the north coast of Russia, but during the following winter they, with all their men, perished of starvation and cold in a harbour on the Lapland coast.

Chancellor sailed into the Arctic, rounded the North Cape, and penetrated the White Sea. Wintering his ship near Archangel, he made a sledge journey to Moscow, where he had an interview with the Czar. His journey resulted in the founding of the Muscovy Company and marked the beginning of England's trade with Russia. As a result of his meeting the Persian ambassador at the same time, trade was also opened up with Persia. Thus Chancellor's voyage was altogether very successful, and marked not only the beginning of our foreign trade, but also resulted in the rise of our mercantile marine.

NEXT INSTALMENT :—

Sir Martin Frobisher's Adventures in "Meta Incognita"

The White Star Liner "*Laurentic*"—

(*Continued from page* 515)

Careful attention is being given to the question of heating and ventilation, and nothing will be left undone in this respect to make the "*Laurentic*" a most comfortable steamer. Every known device for the safety of passengers and crew will be adopted, whilst in addition, the new liner will be provided with wireless and a wireless direction-finder. Submarine signalling apparatus will also be fitted.

The new steamer will have extensive accommodation for freight, and an exceptionally large amount of refrigerated space for the carriage of dairy and other cargo that requires cold storage. Here will be machinery capable of maintaining a temperature of 10 degrees, whilst other space—for such kinds of cargo as require it—will be fitted with fans for the circulation of cool air. Arrangements will also be made for the transport of uncrated automobiles.

All the latest appliances for the swift and efficient handling of the cargo will be installed, and the steamer should thus become a useful factor in the increasing trade between this country and Canada. She will certainly be a most valuable addition, to the White Star Line's Canadian fleet.

Successful Exhibition

The following account of an exhibition held recently at the Battersea County School will be of interest to Meccano enthusiasts.

The school possesses three flourishing societies, an Engineering Society, an Art Guild and a Photographic Society. These three combined forces to organise a representative Hobbies Exhibition, which proved very successful.

Among the exhibits that appealed specially to Meccano enthusiasts was a model of the Torque Converter as described in the "*M.M.*" for April 1924. This model was completely self-contained. The electric motor driving it was built from a magneto permanent magnet with a 2-pole armature consisting of a piece of soft iron shaped like the cross-section of a bell. This motor, so simple to construct, proved very powerful, although its current consumption was rather heavy. The exhibitor working the model was kept busy answering the queries of interested but puzzled observers.

Other Meccano models included a large Triplane, a Motor Lorry and a Railway Station.

Model Railways were represented by an oval track 18 ft. in length by 2 ft. 6 in. in width, on which clockwork locos were run, and a small independent electric system, the whole being laid out on tables. Three operators worked the larger system. On the operators' side of the tables the track branched into three running lines with two sidings. Three trains were running, a Hornby Pullman Coach Set hauled by a Bassett-Lowke 4-4-2 Tank Engine and two Goods Trains hauled by Hornby 0-4-0 Locos. The latter ran most successfully because the curves were necessarily sharp.

The Wireless exhibit included a 3-valve Loud Speaker Set working continuously during the Exhibition and various other valve and crystal sets. Other exhibits were a lathe, an amateur-built Model Racing Car, numerous Sailing Yachts and Steam launches and an Induction Coil working Geissler Tubes.

The entire Exhibition was arranged and carried out by the boys themselves and its success was due to their co-operative effort.

A Useful Valve Holder

Wireless enthusiasts are now giving more attention to their valve holders than was formerly the case and are obtaining correspondingly better results. We have recently had submitted to us for examination samples of the "Lotus" Buoyancy Anti-microphonic Valve Holder. This holder is made of Bakelite in two models, one for mounting behind the face of the panel and the other, according to the more modern method, inside the cabinet. One model is arranged with tags for soldering and the other with terminals for grip connections.

The suspension of the valve within the holder is achieved by the use of four springs pressed from sheet metal, which effectually insulate the valve from external shock while at the same time retaining sufficient rigidity to make the insertion and withdrawal of valves a safe and simple operation. The self-capacity of the holder is low and it is therefore particularly suited for use in circuits for short-wave reception, where this quality is essential. The construction is on sound and simple engineering lines and is sufficiently robust to ensure a long period of usefulness. We have no hesitation in recommending this component to readers who are contemplating building wireless sets or who are dissatisfied with their existing valve holders.

The "Lotus" Valve Holder is sold at the low price of 2/6 with terminals or 2/3 without, and it may be obtained from any wireless dealer.

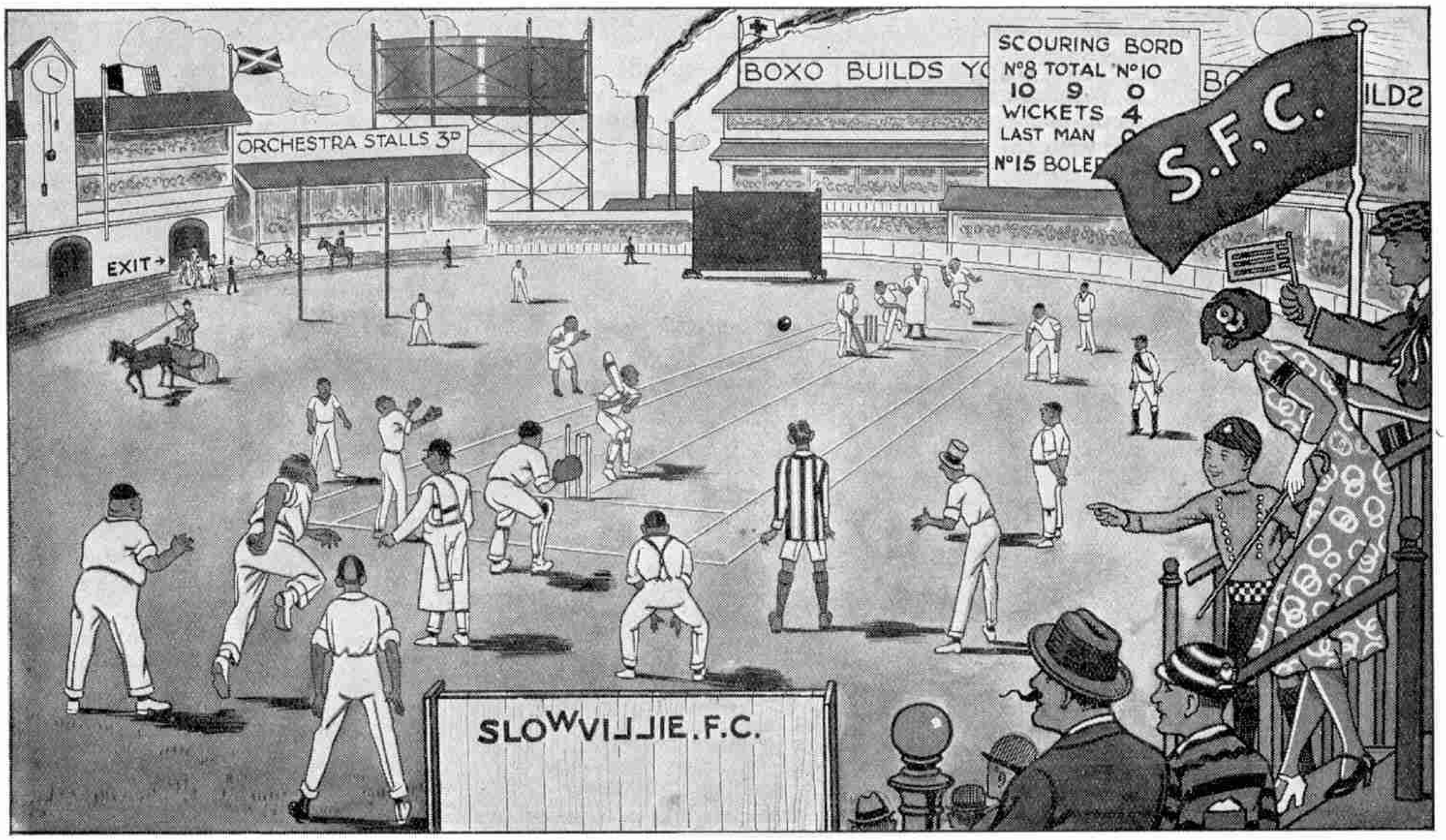
An Interesting Catalogue

The latest 80-page catalogue (No. 12M, 6d. post free) issued by Stuart Turner Limited (Henley-on-Thames) contains illustrated descriptions of engines of all kinds—complete or in castings form ready to be made up—that are calculated to make the average model enthusiast's mouth water! The variety of engine models is really extraordinary and the prices are remarkably low when one remembers that every casting or part is made with the well-known Stuart accuracy and perfection of finish. Model-builders who have not access to a lathe are specially provided for by sets of castings and parts requiring only a hand drill and a few taps, drills and files, in order to produce a finished engine. It is interesting to see that the "S.T." steam plant, specially designed for driving Meccano and other small models, has firmly established a place for itself by reason of its efficiency, simplicity and safety.

We have not space to describe the wide range of petrol and gas engines, but mention must be made of the Stuart 120 watt generating plant for cottages, bungalows, yachts, etc., or for charging accumulators for car and wireless purposes. This appears to be an ideal equipment for the purpose and its price, complete with switchboard and 50 ampere hour battery, is only £47 5s. 0d. It is interesting to know that a Stuart Lighting Plant was supplied to the late Sir Ernest Shackleton's "*Endurance*" Antarctic expedition and proved successful in every respect. The "*Endurance*" was eventually crushed by the pressure of ice and the hold in which the Stuart set was installed was flooded; yet the storage battery continued to light up the wreck although it must have been submerged beneath 6 ft. of water!

Motor-boating enthusiasts will be glad to hear of a new metre steam launch, the "*Isis*," built on exactly the same lines as modern high-speed motor craft. This launch is a distinct advance on those hitherto produced by the firm and is worth the serious attention of any reader anxious to take part in model power boat competitions.

Competition Page



Where is our Artist Right?

The drawing shown above will be familiar to nearly all our readers. It was used in the Sharp Eyes Contest in our May issue and it appears again in consequence of a reader's emphatic declaration that it would be far harder to discover the points on which our artist was correct than those on which he was wrong! Our reader, who by the way is a most enthusiastic and skilful cricketer, went a step further and denounced the drawing as "the greatest atrocity since the war!" We are not worried, however, because the drawing was deliberately made as inaccurate as possible, and indeed this criticism is really a tribute to our artist's skill.

Our reader's wrathful indignation made us examine the drawing from a new standpoint and we found that many details were correctly depicted. We therefore offer prizes of Meccano Products to the value of £1-1s., 15/-, 10/6 and 5/- respectively to the four readers who send in the most complete list of details that are accurately drawn.

Entries must be written on one side of the paper only and sent to reach this office not later than 31st August. The Overseas closing date will be 31st December.

17th Drawing Contest

The great majority of our readers already will have commenced their summer holiday and no doubt almost all will have found their way to the seaside before the end of this month. Therefore it follows that we must have a seaside drawing competition.

We have chosen as the subject "A Seaside Scene." To those who can use either pen or pencil the scope of this contest is practically unlimited. The beach, the pier, the donkeys, the fishing boats—almost every little item in a seaside resort's "make-up" presents an idea, and if the drawing is in humorous vein, so much the better.

A number of useful suggestions as to subjects will be found in the photographic article, dealing with "Seaside Photography," that appears upon page 517. Those readers who combine facility with the pencil with photographic skill will find that the camera can help them considerably by making a permanent record of the desired scene for use when the hand-drawn picture is in course of creation. This suggestion will prove of particular value to readers who prefer to finish their drawings at home.

Prizes of painting or drawing materials (or Meccano products if preferred) to be chosen by the winners, to the value of £1-1s. and 10/6 respectively, will be awarded to the first and second prize-winners in each of the usual two sections, A for competitors of 16 and over and B for those under 16. Entries should be marked "Seaside Drawing Contest."

Closing date, 31st August. Overseas, 31st December.

Overseas Results

February Sharp Eyes

It was perhaps inevitable that our Overseas readers should deal with this picture as though it represented a street scene in a town or city of their own country and it was revealed in the course of judging that there exist considerable variations in traffic regulation in various parts of the globe. Many of the errors claimed were not such when regarded in the light of English conditions, but wherever it was clear that such an occurrence was incorrect from the standpoint of the custom of the competitor's own country, the claim was allowed.

The awards were as follows:—

First Prize: E. A. Rawlings (Quebec, Canada); Second: L. Ison (Victoria, Australia); Third: R. Gay (Christchurch, N.Z.); Fourth, N. W. Simpson (Natal, S.A.)

13th Drawing Contest

The Overseas section of any of our competitions usually can be relied upon to strike a note of freshness, and this comment applies with special force to drawing contests. The wide area from which the competitors are drawn almost guarantees wide diversity, and consequently one learns to look for something either new or strange. In this particular contest, however, the subject being "A Motor Fire Engine," we were interested to find that there is very little difference—except in the location of the driving wheel to suit the rule of the road—between our English fire engines and those depicted in the entries for this competition.

The awards were as follows:—

First Prizes: Section A, N. Reynolds (British Columbia); Section B, A. B. Hill (Ontario, Canada). Second Prizes: Section A, F. Thomas (Monte Video); Section B, J. Denny (Melbourne, Australia).

Home Result

15th Drawing Contest

Not since last year's "Loco in Action" competition has there been such a large entry or such a generally high level of merit reached in our drawing contests. Drawings of every type of airship ranging from Naval "Blimps" to early Zeppelins were submitted, while a feature of special interest was the great trouble taken by the majority of the competitors to secure technical accuracy.

Awards:—

First Prizes: Section A, W. A. Morris (Gillingham); Section B, J. R. Lane (Southend-on-Sea). Second Prizes: Section A, E. Lewis (Northampton); Section B, R. C. Rickard (Richmond, Surrey). Consolation Prizes: Section A, R. F. C. Lowndes (Ipswich); Section B, T. D. Lightbown (Leigh-on-Sea).

With the "*Flying Scotsman*"

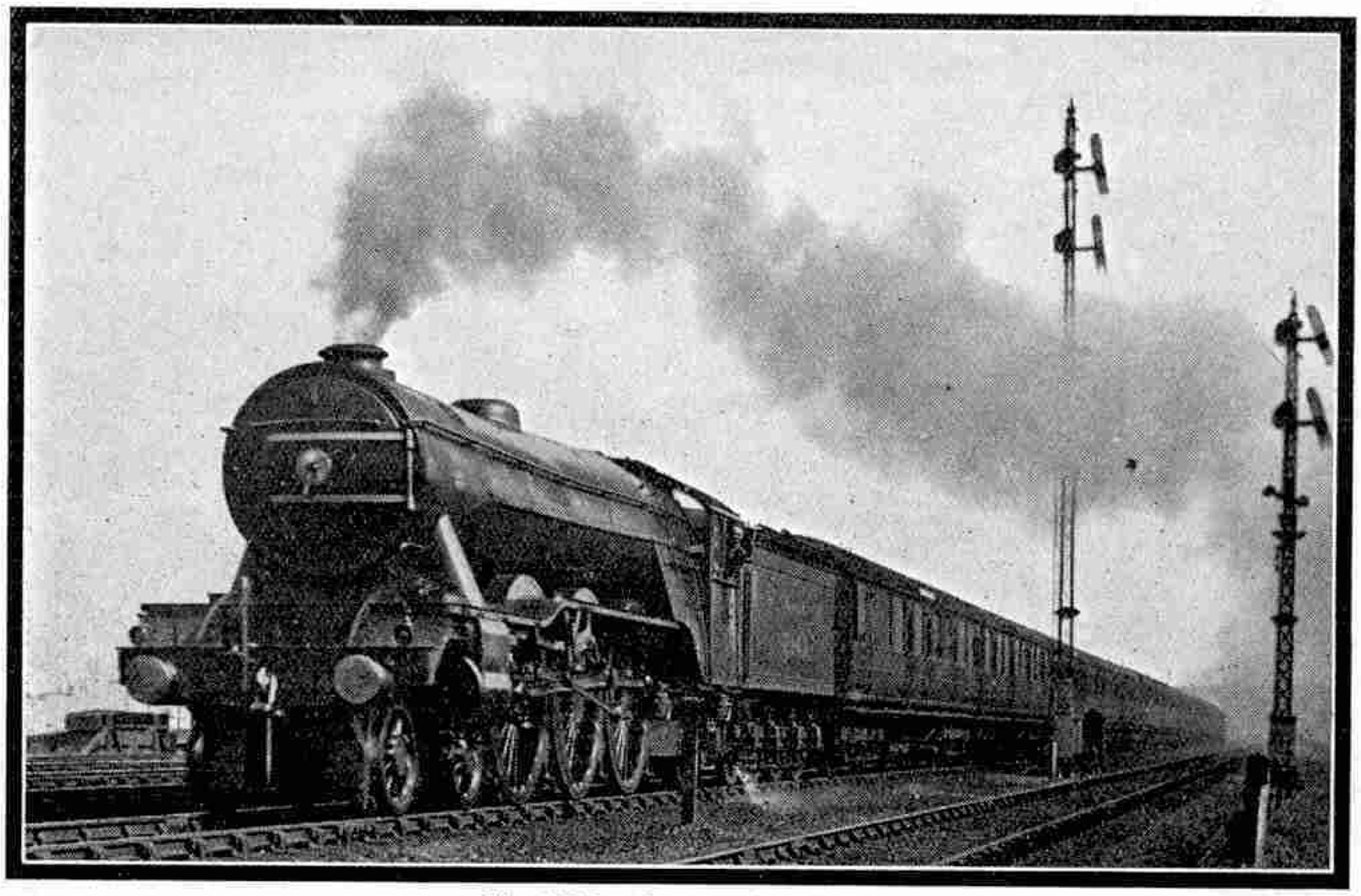
A Short Account of a Ride on the Footplate of this Famous Locomotive

As our readers no doubt know, permission to ride on the footplate of a passenger locomotive is only given in very exceptional circumstances. More particularly is this the case with the main line expresses, so the writer regarded himself as particularly fortunate in being able to make a trip behind the "*Flying Scotsman*" a short time ago. This article is a short account of his experiences.

* * *

"Good morning, Mr. Driver!"

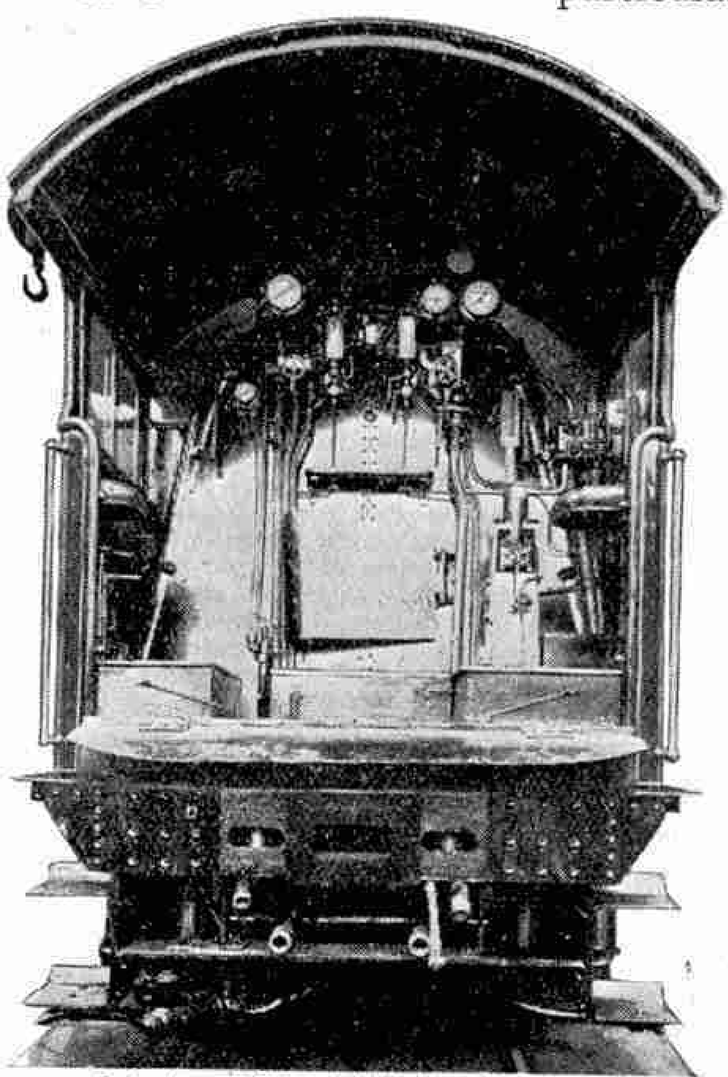
There was such a difference in our ages and such a steely look in his eye that I felt the "Mr." was very necessary! We were standing at the end of the platform where it slopes down to the rails. The fireman was on top of the tender slogging away and hammering the largest lumps of coal to make them small enough to go into the firebox of the giant "Pacific."



The "Flying Scotsman" at Speed

Away along the platform the guard's whistle shrilled its starting message, and thrusting a clean rag into my hand, "Mr. Driver" positively bundled me on to the magic carpet that was to travel over 100 miles without a stop. "Carpet," did I say? Rather a steel shelf, bounded by a wonderful arrangement of wheels and levers, a very hot furnace, several look-out windows, and five tons of coal.

I quickly grasped a projection, which action caused the driver to eye me suspiciously, for it so happened I had taken hold of the knob of his private locker! As we majestically drew out of the station my first impression was that of an irresistible power suddenly released. "Pulse!... Pulse!!... Pulse!!!... Throb!... Throb!!... Throb!!!..." The steam was doing its work, as the driver with his hand on the regulator handle coaxed the mechanism into motion.



Interior of Cab of "Flying Scotsman"

Nor was the fireman idle, for the hungry furnace already demanded to be fed. It seemed to me to be quite hot enough, but steadying himself with a firm stance, the fireman swung shovelfuls of coal from the tender through the firebox door, where it was instantly engulfed. Six, seven, eight times the shovel went backwards and forwards, while the train gradually gathered speed.

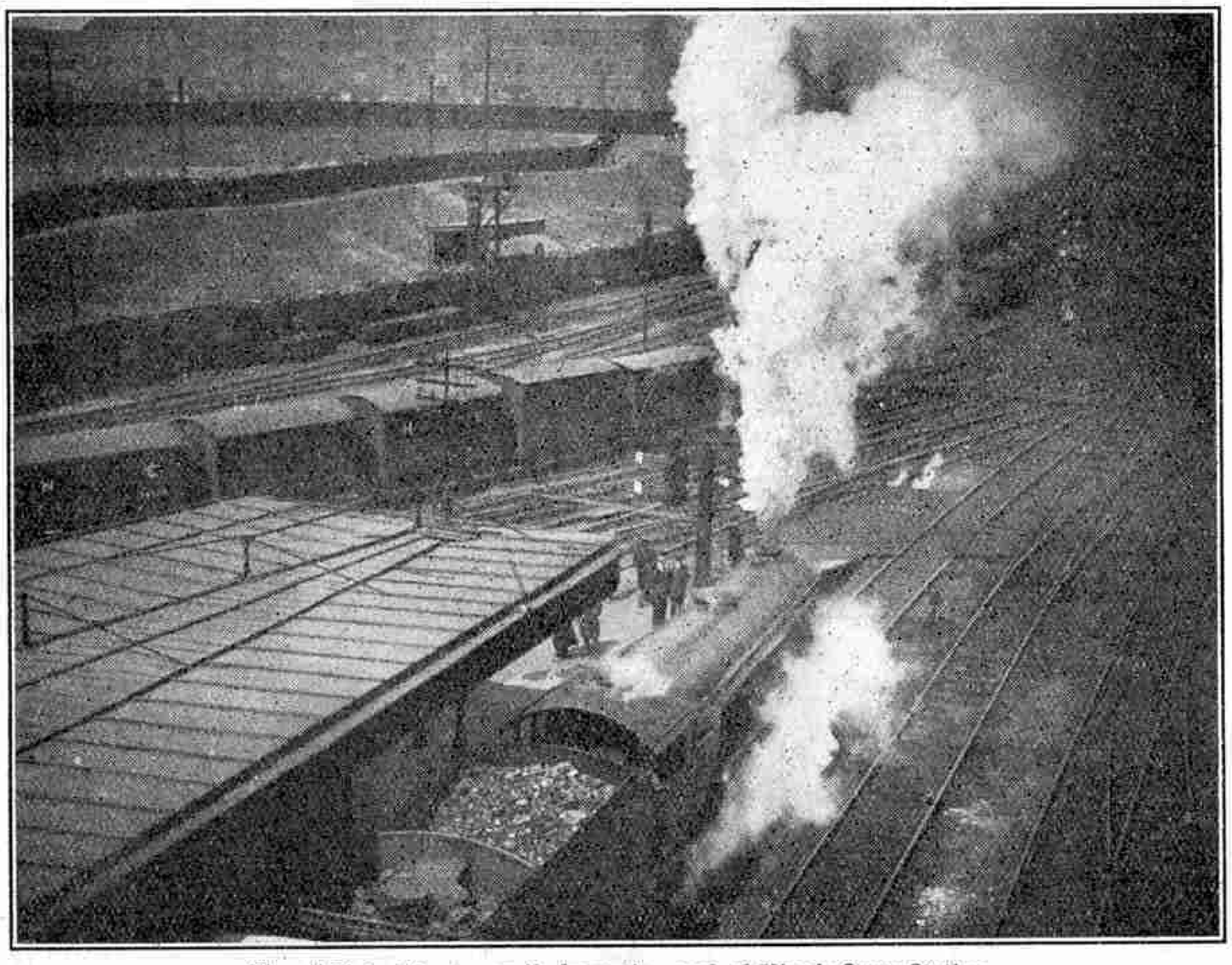
What a depth of understanding there is between driver and fireman! Isolated from the rest of the world—even from the comfortable carriages behind they are separated by tons of coal—they live in a world of their own. A nod indicates the important fact that some specially vital signal or particular position on the line is clear. A wave of the hand conveys a wealth of meaning that makes words superfluous, even were they possible amid the steadily rising roar of the engine.

Fields flash by and bridges whip overhead. We enter a wonderfully straight piece of line that no doubt has something to do with the driver's sudden sociability. I am still holding the knob of the driver's locker like grim death! He crosses the cab to where I am standing, comes close beside me and takes out a large bottle containing a dark looking liquid. Quickly taking a drink, he hands the bottle to me, and I am thankful to moisten my already parched lips with cold tea. Driving is a dry business and cold tea has been proved to be the best thirst quencher obtainable.

By this time our speed was approaching 65 miles an hour and low overhead was a continual stream of smoke and steam from the funnel.

To put one's face or hand outside the sheltering cab was like cutting it with a knife, and yet the driver and his fireman went about their accustomed tasks as if we had been standing still.

Motioning me from my protecting corner, the fireman shouted the one word "Water." Far ahead on the track, I caught a glimpse of two narrow ribbons of water between the rails—the water troughs from which we were to pick up water. Rapidly turning a handle, without slacking speed in any way, the driver lowered a scoop below the tender into the trough which had now been reached. In far less time than it takes to write, we had picked up over 2,000 gallons of water and the tender and footplate, to say nothing of the outside of the first carriage were drenched. It was cooling, but uncomfortable. Reversing the wheel, the driver completed his task and turned to his accustomed crouching attitude beside the window, peering ahead.



The "Flying Scotsman" from the roof of King's Cross Station

The fireman, after coaling again, turned the water injector handle, but the steam pressure indicator dial would not keep up. So he produced a tremendously long poker and began to poke the very vitals of the throbbing mass ahead of us. Returning this long poker to its place on the tender, I noticed that although only in the furnace about 30 seconds, the tip was white-hot.

Stretching his hand upward the driver pulled a chain. The whistle shrieked, incidentally covering us with steam and spray, and we roared into a tunnel.

It was pitch darkness, except for the searchlight glow from the firebox. Steam, fumes, smoke, coal dust swirled round us until it was almost impossible to see across the cab. Surely this must be the end of all things, I thought. After what seemed interminable minutes, we rushed out into sunshine again as quickly as we had plunged into the darkness. Once again the driver passed the cold tea round, and I took a deep draught, after which I felt better!

Seizing the regulator handle with both hands, the driver swung it over to the shut position. A sound of hissing air—the brakes were being applied—and slowly, very slowly, we slackened speed. Far ahead on the horizon was my destination station, and rapidly we approached it. The battle was over—the race against time was won. The wild throbbing monster was tamed, as we carefully came to a stop just beyond a crowd of people who were waiting to board the train.

With a smile the driver turned to me and asked me how I had enjoyed it. At least I think that is what he said, but for 10 minutes I could hear nothing, so sudden was the silence after the noise and throbbing of the run. Bidding me a hasty adieu as I stood on the platform, he turned to his regulator again and soon steamed out of sight.

Searching out an adjacent wash and brush-up I caught sight of a strange figure in the looking glass, for all the world like a nigger minstrel. Three pieces of soap, two towels, one scrubbing brush soon made a difference, but it will be weeks before I can get rid of every trace of my footplate run. I had covered only 100 miles, and the driver and fireman do hundreds of miles almost every day of their lives! "Hats off" to these splendid fellows!

Lives of Famous Engineers—

(*Continued from page* 485)

commencing the preliminary operations, and very soon he had nearly 400 men engaged upon the work at six different points. The main difficulty lay in making the road practicable for heavy vehicles, and his plan was as follows. He had great quantities of heather pulled from the surrounding ground and bound up into small bundles of a size that could be conveniently grasped with the hand. These bundles were placed close together in rows in the direction of the line of road, and afterwards other similar bundles were laid down transversely upon them, and the whole was well pressed down. Stones and gravel were then led on in wagons and spread over the bundles, thus producing a firm and level road.

The operations were watched with keen interest by a crowd of spectators who had come in full expectation of seeing both horses and wagons disappear in the bog. These expectations were not realised, however, and when the horses drawing the first wagon reached firm ground again in safety, they were greeted with loud cheers. The whole length across the marshes was completed in the same manner, and this section proved one of the best and driest parts of the whole road.

Those who read our story of the life of George Stephenson ("*M.M.*" January, March, April and May, 1924) will notice that Metcalf's method of building this road across the marshes was the same as that subsequently adopted by Stephenson in carrying the Manchester and Liverpool railway across Chat Moss.

Road-making for 30 years

Metcalf continued road-making for over 30 years. His last road was between Haslingden and Accrington, with a branch road to Bury. This proved one of the most difficult works he had undertaken, and when he brought it to a successful conclusion, after two strenuous years, he found himself a loser on the contract by exactly £40. He completed this road in 1792 at the age of 75, and afterwards retired to Spoffoth, near Wetherby, where he spent his remaining years on a small farm. He died peacefully in 1810 in his 93rd year, leaving behind him a wonderful record of triumph over one of the most terrible of all physical disabilities.

MECCANO STANDARD MECHANISMS

Section VIII. Steering Gear

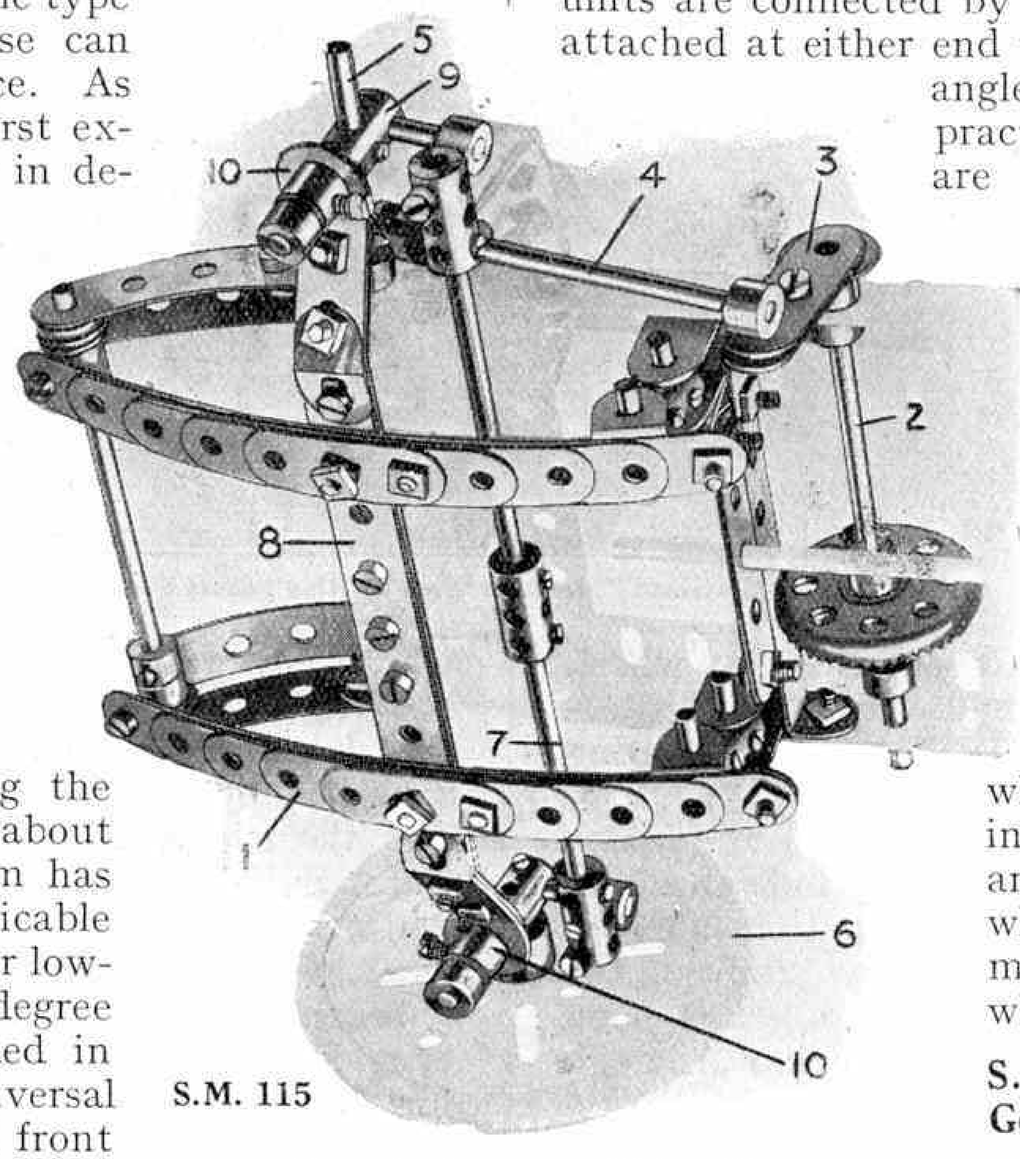
This article is the tenth of a series explaining some new and interesting aspects of Meccano model-building practice. Previously we have dealt with Gear Ratios, Belt Mechanism, Pulleys, Levers, Clutches, Drive-changing Mechanisms, Brakes and Retarding Appliances, Roller and Ball Bearings, etc., and the following article describes some typical examples of Meccano steering gear. It will be apparent that these "Standard Mechanisms" may be adapted with advantage to numerous Meccano models.

It appears to be a common belief that the course of a motor-car is quite a simple matter to control and that the small variations in the type of steering gear in general use can therefore be of little importance. As a matter of fact, engineers at first experienced considerable difficulty in devising a really efficient steering gear that would enable a car to make sharp turns to either side in perfect safety whilst travelling at a reasonable speed. Unless certain conditions are faithfully complied with, very great friction is created in all steering systems between the road surface and the tyres, resulting in damage to both.

It is true that in horse-drawn vehicles steering may be obtained by merely turning the complete front axle and wheels about a central pivot, but this system has long been considered impracticable for motor-cars on account of their low-built construction and the high degree of safety and comfort demanded in their operation. The system in universal use at present comprises a fixed front axle, carrying the road wheels pivoted on short "stub" axles at its ends.

It will be readily understood that if a car moves in a curved line, the two front wheels must be turned at different angles to the centre of the circle, or arc of a circle, which the car describes, for the wheel nearest the centre of the circle must follow a sharper curve than the other. Therefore, in order to obtain perfect steering, it is necessary to devise a method that will control the movement of the wheels in such a way that the inner wheel is turned at a sharper angle when negotiating a corner than the outer wheel, whether the car be turning to the right or to the left.

These results are obtained by "Ackermann" steering gear, the principle of which will be understood on reference to "Standard Mechanism" No. 115. It will be noticed from the illustration of this device that the stub-axle units are connected by a cross-tie 7, which is pivotally attached at either end to a short lever placed at right-angles to the stub-axle. In actual practice, however, these short levers are situated at a slightly obtuse angle to the axles, in such a position that their centre lines, if produced, would meet on the centre line of the car. The actual position of the meeting-point varies according to the particular type of car; as a rule it is slightly in advance of the rear axle. This slight difference of angle results in the required differential movement of the wheels, since the small levers invariably impart a decreasing angular movement to the outer wheel and an increasing angular movement to the inner wheel when the car turns a corner.

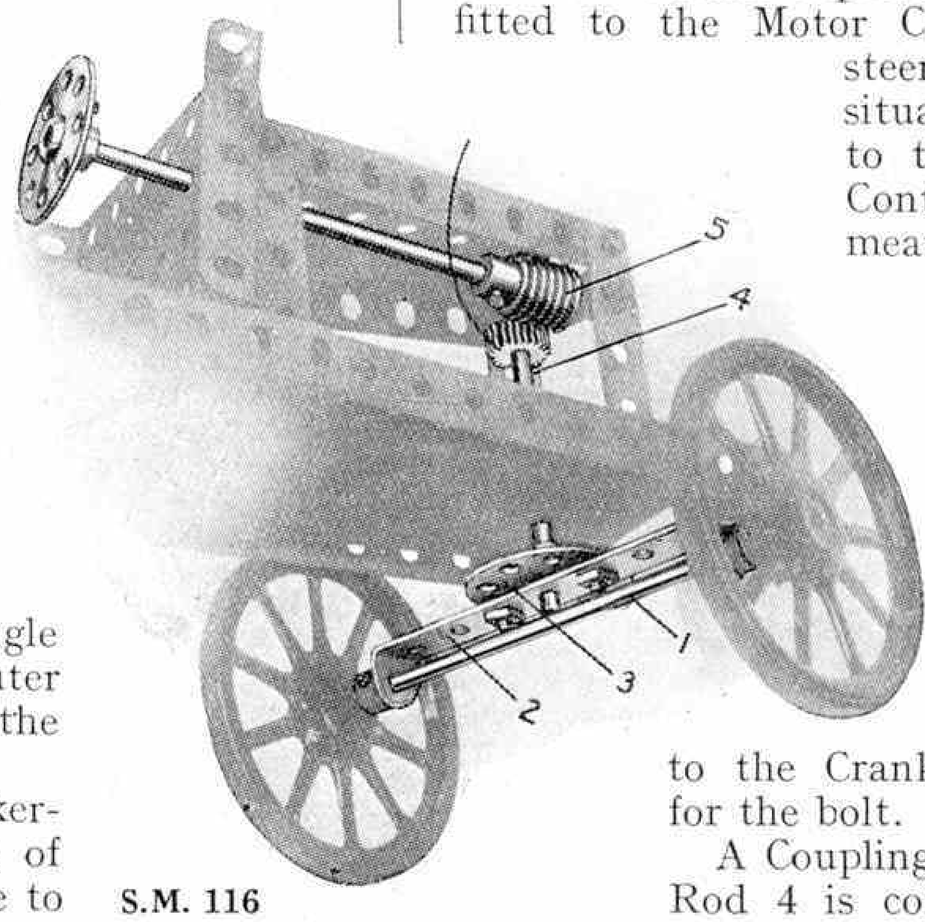


S.M. 115

S.M. 115—Ackermann Steering Gear

This Meccano representation of the gear is shown fitted to the Motor Chassis (Model No. 701). The steering wheel shaft, which may be situated at any convenient angle to the horizontal, rotates the $1\frac{1}{2}''$ Contrate Wheel on the Rod 2, by means of a $\frac{1}{2}''$ Pinion. An alternative method of connection that may be employed for this purpose consists of a Worm Wheel engaging with a 1″ Gear Wheel or Pinion mounted on the Rod 2. The latter carries a Crank 3 pivotally attached to a bolt gripped in a Collar on a further Rod 4. The end hole of a $1\frac{1}{2}''$ Strip secured to the Crank forms an additional bearing for the bolt.

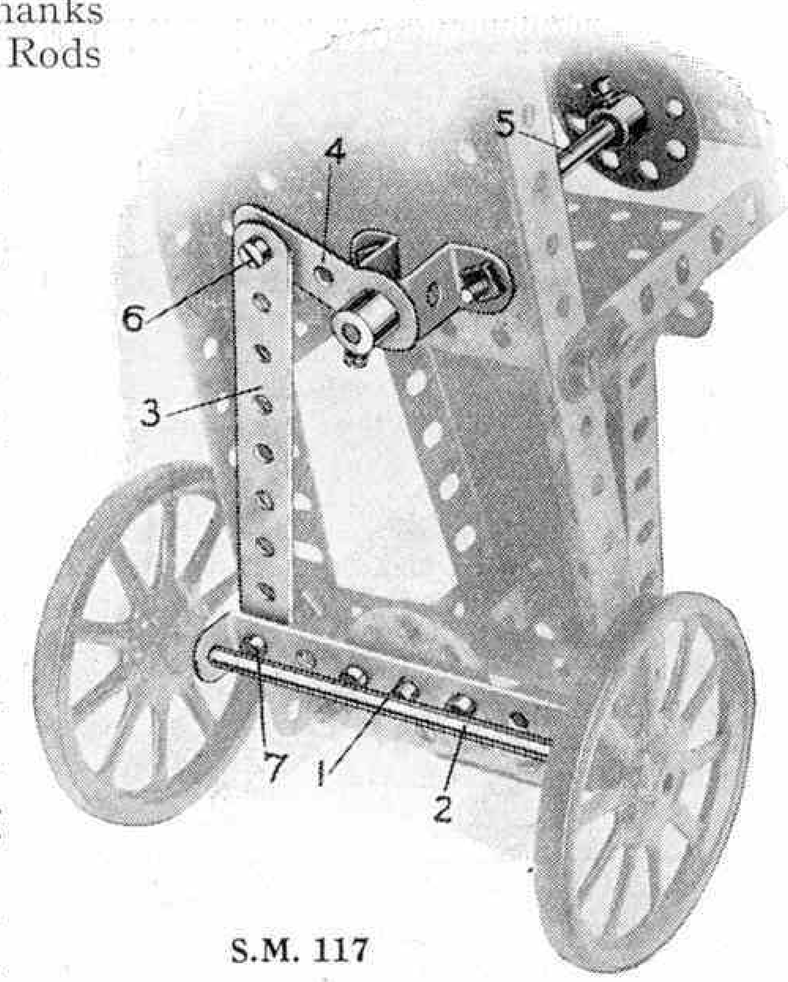
A Coupling bolted to the other end of the Rod 4 is connected pivotally in a similar



S.M. 116

manner to the end of the short Rod 5, the outer end of which forms the stub-axle of one of the road wheels. This Rod 5 is secured in the central transverse hole of a Coupling 9 mounted on a 1″ Rod journalled in a Crank 10. The latter is bent slightly as shown and secured to a reinforced cross-bar 8. The further road wheel 6 is caused to imitate the turning movement of the first road wheel by means of a connecting Rod 7, which is pivotally carried from the shanks of long bolts secured in Collars on 1″ Rods mounted in the Couplings 9.

The chassis springs shown in this illustration should be noted. The laminated springs 1, consisting of a series of slightly curved Strips of varying sizes, are bolted to the cross-piece 8, and are pivotally connected at their outer ends to Collars mounted on a transverse Axle Rod. Their other ends are suspended by means of Double Brackets and short Rods from Couplings pivoted to the chassis frame; this connection allows for lateral movement when the springs are flattened by sudden jolts, or shocks, imparted to the road wheels.

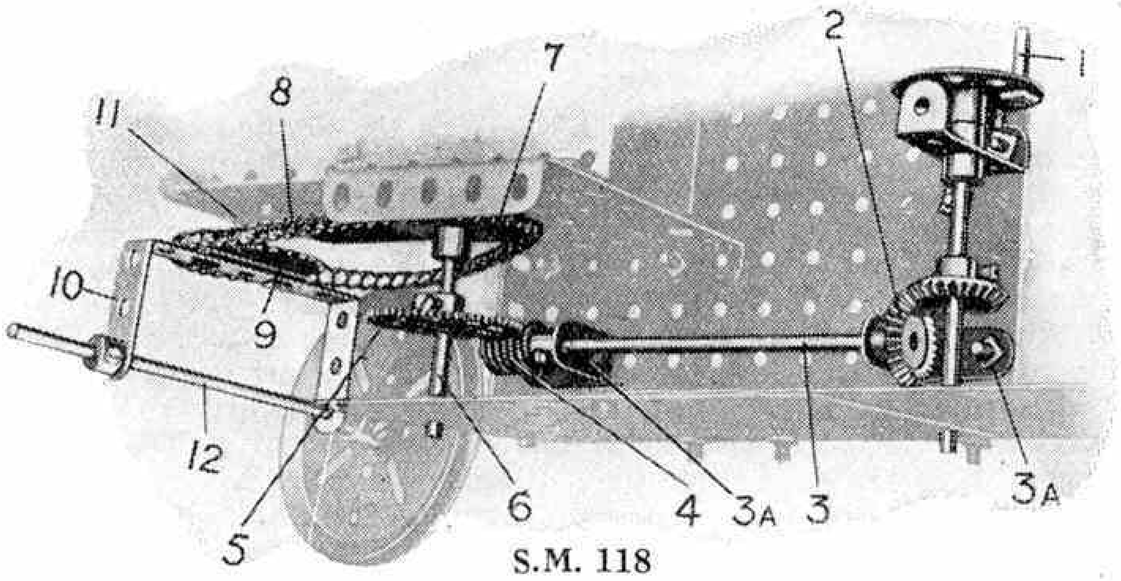


S.M. 117

S.M. 116—Worm and Pinion Steering Gear

This is a very simple form of steering gear suitable for the smaller type of Meccano motor-car or similar vehicle. The axle 1 of the front road wheels is journalled in a 3½″ Double Angle Strip 2 bolted to a Bush Wheel 3. The latter is secured to a vertical shaft 4, which also carries a ½″ Pinion 6. On operation of the steering wheel, the shaft 4 is rotated by means of the Worm Wheel 5 engaging the Pinion 6, consequently altering the position of the road wheels as desired.

Alternative methods of connecting the vertical Rod with the steering wheel shaft will probably suggest themselves. It should be noted that when Meccano worm gear is used the road wheels cannot be deviated from the line in which they are set unless the steering wheel itself is turned.



S.M. 118

S.M. 117—Lever Steering Gear

The steering gear shown in S.M. 117 is designed to perform functions similar to those of the preceding example. The axle 2 is journalled in the ends of a Double Angle Strip 1 bolted to a Bush Wheel, as in S.M. 116, but is rocked about its pivot by means of a connecting Strip 3. The latter is connected pivotally at 7 to the Strip 1 by means of bolt and nuts (see S.M. 262) and at the other end 6 by the same means to a Crank 4 secured to the bottom of the steering wheel shaft 5.

Double Bent Strips form extended bearings for both the steering-column, and short Rod to which the Bush Wheel and Double Angle Strip 1 are secured.

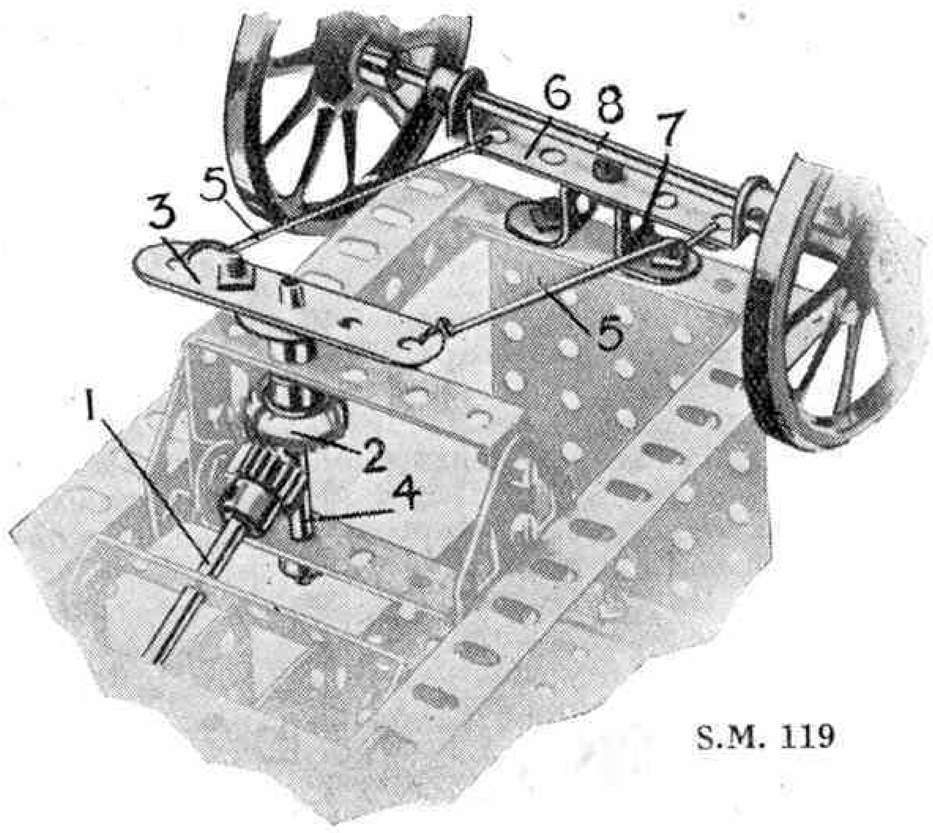
S.M. 118—Steering Gear for Tractor

S.M. 118 illustrates a type of steering gear particularly suitable for use in model road tractors, etc. The hand wheel 1 (consisting of a Bush Wheel and Threaded Pin) rotates a horizontal shaft 3 by means of Bevel Gears 2. The shaft 3 is journalled in 1″×1″ Angle Brackets 3a, and carries a Worm Wheel 4 engaging with a 57-teeth Gear Wheel 5 on the vertical Rod 6. The 1½″ Sprocket Wheel 7 secured to this Rod engages, through a Sprocket Chain 8, a similar Sprocket Wheel 9 bolted to the Double Angle Strip 10. This Sprocket 9 is carried on a short Axle Rod 11 journalled in suitable bearings in the front of the tractor. The Strip 10 forms bearings for the axle 12 of the front road wheels. Washers should be placed on the bolts between the Sprocket 9 and Strip 10, in order to allow sufficient clearance for the Chain 8.

Several alternative methods of construction may be employed. For example, the Rod 6 may be placed in a horizontal position, parallel to the front axle, and a short length of chain wound upon it so that as one end is hauled in the other is paid out. The two ends of the chain are secured to the extremities of the Double Angle Strip 10.

S.M. 119—Steering Gear

The method adopted in guiding the road wheels in this model is as follows: the steering shaft 1 operates, through a Contrate gear 2, the cross piece 3 bolted to a Crank secured to the vertical Rod 4. Cords 5 lead from the ends of this cross piece to the ends of a Double Angle Strip 6 pivoted by bolt and nuts (S.M. 262) to the Double Bent Strip 7 and carrying the axle 8 of the road wheels. The latter should revolve independently about the axle.



S.M. 119

Results of Meccano Model-Building Contests

By Frank Hornby

Overseas "Motor" and "No. 2 Outfit" Competitions

THE results of the Overseas Sections of the "Motor" and "No. 2 Outfit" Meccano Model-building Competitions are printed below.

An exceptionally fine collection of models was received in connection with the "Motor" contest, and the allocation of awards proved even more difficult than in preceding competitions.

Overseas "Motor" Contest

First Prize (cheque for £5-5s.): Robert O. Jukes, Cricklewood, S. Canterbury, New Zealand. Second Prize (cheque for £3-3s.): B. Swift, 672, Belmont Avenue, Westmount, Quebec, Canada. Third Prize (cheque for £1-1s.): A. V. Dam, Sumatrastraat 8, Amsterdam, Holland.

Prizes of 10/6 each: E. Rawlings, Westmount, Quebec, Canada; M. Dent, Ajmer, Rojputana, India; C. Sturdee, Westmount, Quebec, Canada; A. J. Burton, Johannesburg, S.A.; P. Stoddart, Buenos Ayres, Argentine; M. F. Cotter, Lucerne, Switzerland.

Special Commendation (Certificate of Merit): H. Scott, Winnipeg, Canada; G. W. Healy, Geneva, Switzerland; H. Tsumura, Tokio, Japan; N. Eustis, Alberton, S. Australia; L. Anjior, Melbourne, Australia; H. Leedle, Montreal, Canada.

Overseas "No. 2 Outfit" Contest

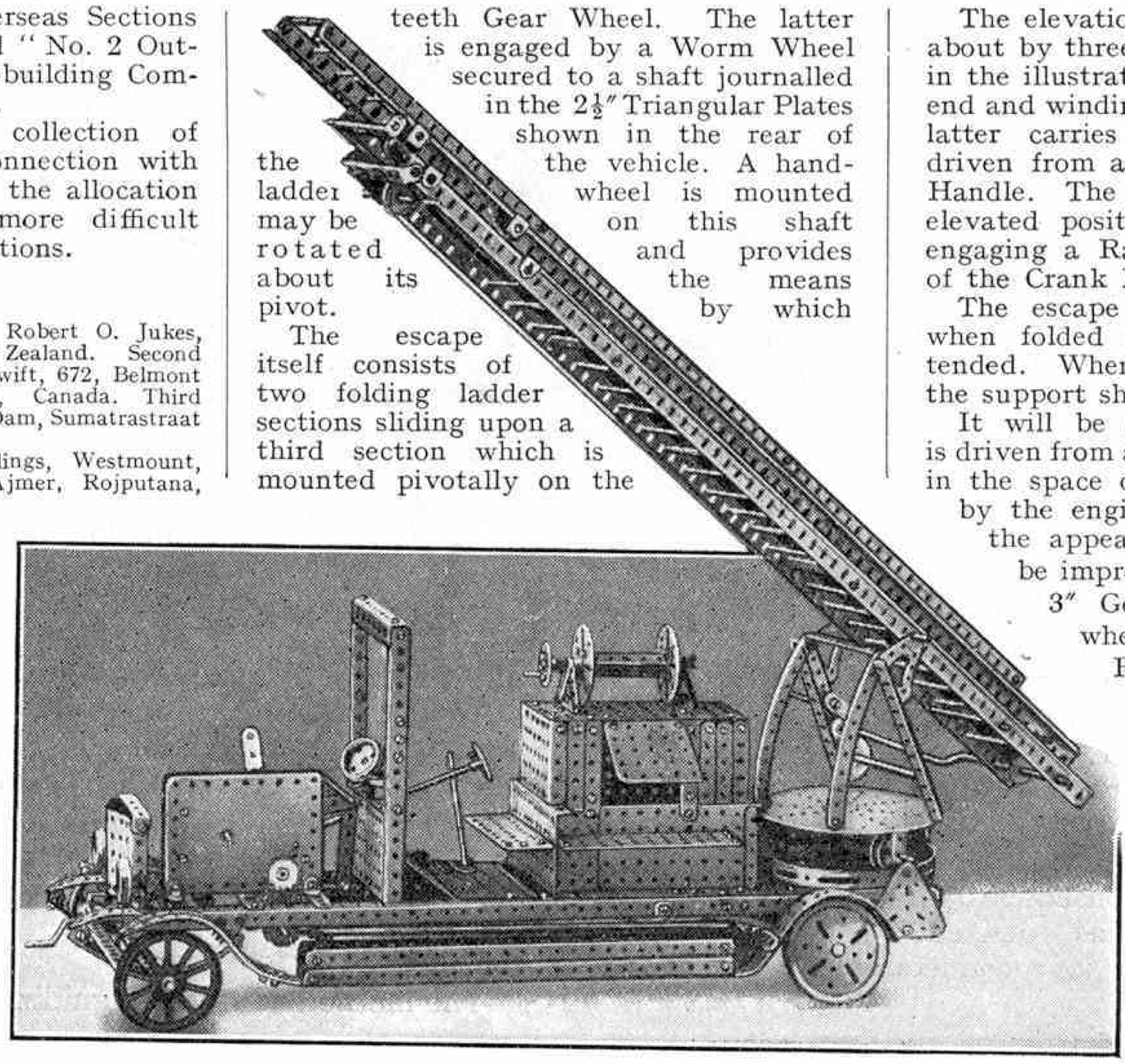
First Prize (Meccano products to value of £2-2s.): E. Holder, 20, Belmont Circular Road, Port-of-Spain, Trinidad, B.W.I. Second Prize (Meccano products to value of £1-1s.): Chand Mal, Kashmere Gate, Delhi, India. Third Prize (Meccano products to value of 10/6): K. Yoshida, 758, Nakashibuya, Tokio, Japan.

Special Commendation (Certificate of Merit): P. V. R. Babu, Bangalore, India; J. Churchward, Avoca, Victoria, Australia; L. Battison, Durban, S. Africa; H. Bailey, Granville, New South Wales; Him Cheng Hai and Lim Cheng Yan, Singapore, Straits Settlements.

Motor Fire Escape

The First Prize has been presented to R. O. Jukes for a motor fire escape. This model is shown herewith, and it should not be difficult for Meccano boys to follow its construction from the illustration. The chassis is similar to Model No. 701 in the Instruction Manual except that a modified gear box has been introduced. The extending ladder is mounted on a turntable consisting of a Circular Plate and four Flanged Wheels rotating on a Hub Disc bolted at the rear of the chassis. A vertical Rod secured by a Bush Wheel bolted to the centre of the plate passes through to the underside of the chassis frame and carries on its lower end a 57-teeth Gear Wheel. The latter is engaged by a Worm Wheel secured to a shaft journalled in the 2½" Triangular Plates shown in the rear of the vehicle. A hand-wheel is mounted on this shaft and provides the means by which the ladder may be rotated about its pivot.

The escape itself consists of two folding ladder sections sliding upon a third section which is mounted pivotally on the rotating triangular support. The first extension of the escape is effected by an endless chain running on 1" Sprocket Wheels at each end, the lower Sprocket being mounted on a Crank Handle. Pawls controlling Ratchet Wheels secured to the Crank Handle prevent the ladder from running back after extension. The third section is extended by means of an endless cord running on 1" Pulley Wheels mounted on shafts journalled in either end of the second ladder section, and is controlled by Pawls in a similar manner to that just described.



Motor Fire Escape, showing ladder partly raised. (Built by R. O. Jukes, and awarded First Prize, Overseas "Motor" Contest)

The elevation of the escape is brought about by three hoisting cords (not visible in the illustration) connected to its lower end and winding on a 4½" Axle Rod. The latter carries a 50-teeth Gear Wheel driven from a Pinion secured to a Crank Handle. The escape is retained in its elevated position by means of a Pawl engaging a Ratchet Wheel on the shaft of the Crank Handle.

The escape measures 3 ft. in length when folded and 7 ft. when fully extended. When lowered it rests upon the support shown above the windscreen.

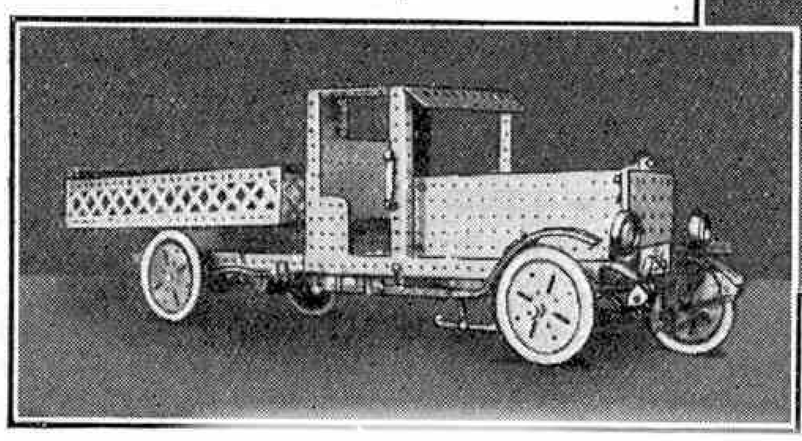
It will be observed that the chassis is driven from a Clockwork Motor mounted in the space occupied in actual practice by the engine. I would suggest that the appearance of the model might be improved by the substitution of 3" Gear Wheels for the front wheels and the provision of Rubber Rings on all four road wheels.

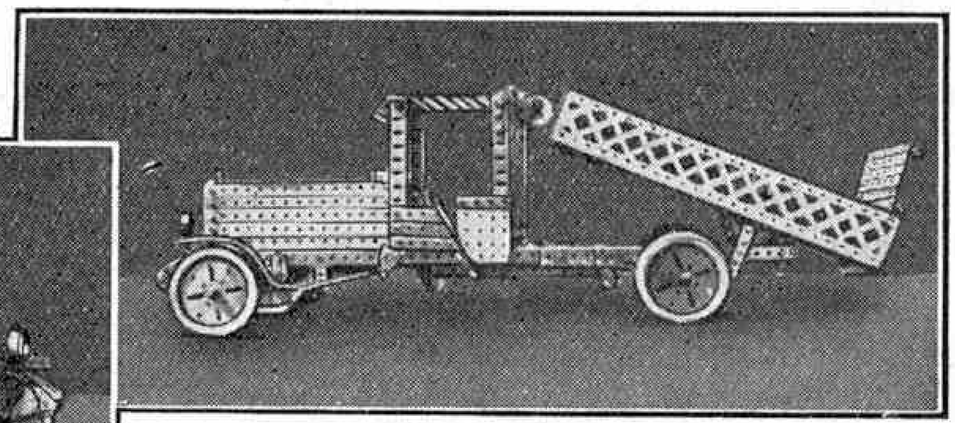
Tipping Motor Lorry

The second prize-winning model, sent in by B. Swift, is shown at the foot of this page. It represents a tipping motor lorry, in which dumping is effected by a hoisting cord passing over a pulley attached to the top of the partition above the driver's seat and connected to the pivoted body of the lorry. The hoisting mechanism is set in motion on pressing a pedal, which tightens a cord running between pulleys mounted on the driving axle of the Motor and the winding drum rod.

The third prize-winning model, by A. V. Dam, consists of a motor lorry with breakdown crane. This is a highly creditable reproduction of a type of vehicle frequently met with in Holland.

The First Prize in the No. 2 Outfit Contest has been presented to E. Holder for a model motor tractor with a derrick or portable hoist fitted as a trailer, while the Second Prize goes to Chand Mal for a designing machine with which simple figures may be drawn. Our Japanese contributor chose a biplane as the subject for his successful entry.





Two views of a Tipping Motor Lorry, constructed by B. Swift (Second Prize, Overseas "Motor" Contest)

"No. 5 Outfit" Model-Building Contest Results

The "No. 5 Outfit" Model-building Competition naturally called for a more elaborate type of model than that required in the Contests for the smaller sets, and it is worthy of note that the quantity of entries fell very little short of the biggest total ever received in the previous "Outfit" contests.

Section C (for Overseas readers) in this Competition closes at the end of the present month. The results in Sections A and B (Great Britain) are as follows :—

Section A (Boys under 12) :

First Prize (Meccano products to the value of £2-2s.) : A. Scannall, 1, Queen's Avenue, Whetstone, N.20. Second Prize (Meccano products to the value of £1-1s.) : J. C. Waterlow, 80, Ladbroke Road, Holland Park, W.11. Third Prize (Meccano products to the value of 10/6) : D. Jemmett, Morley House, Dunstall Hill, Wolverhampton.

Consolation Prizes (Certificate of Merit and Standard Mechanisms Manual) : R. Morley, Selby, Yorks ; J. Prideaux, Baldock, Herts ; R. Meek, Rutherglen, nr. Glasgow ; T. Borham, Newcastle.

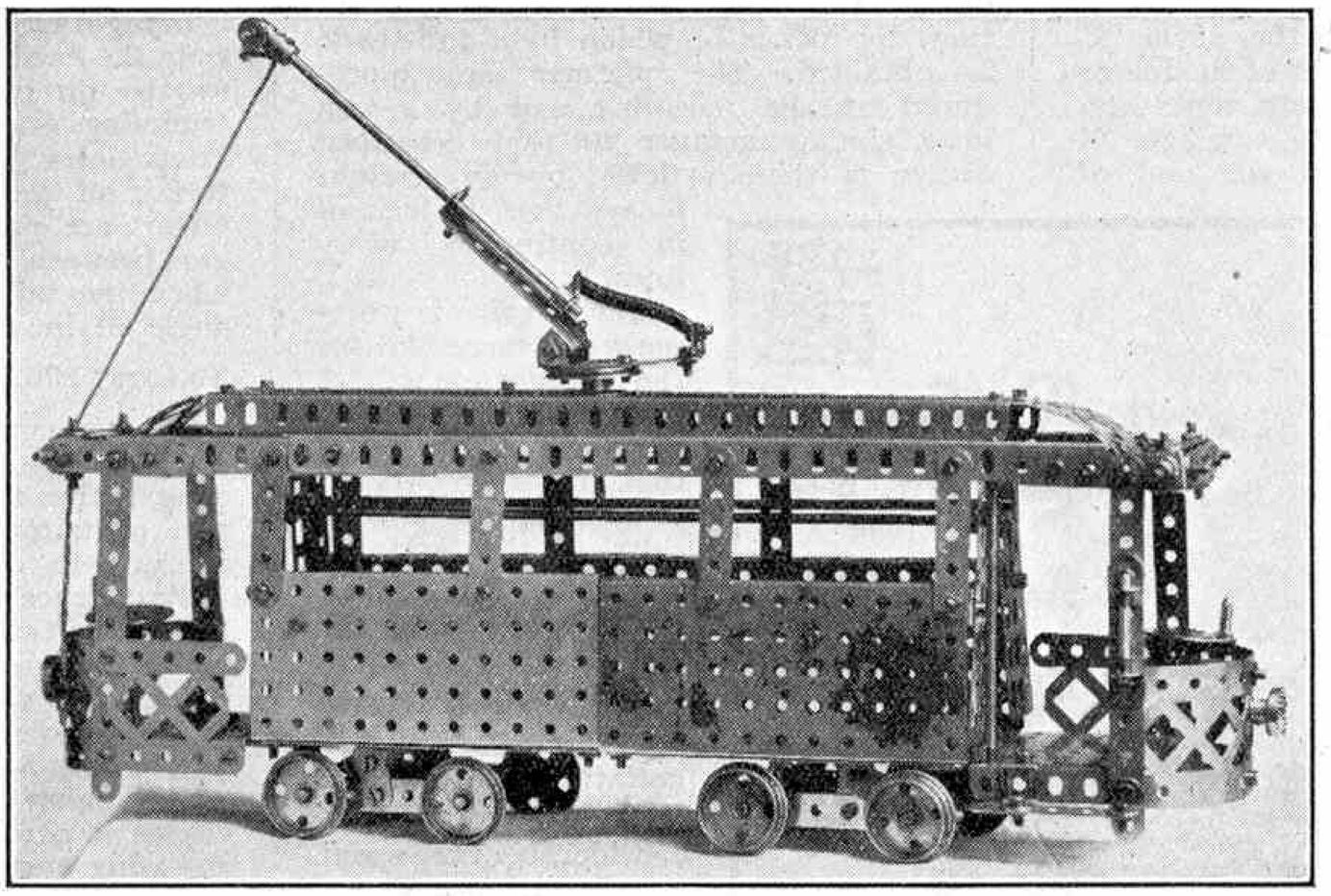
Special Commendation : R. S. Wathes, Moseley, Birmingham ; A. Hawker, Chigwell, Essex ; A. Mainwaring, Bournemouth ; P. D. Smith, London, N.W.1.

Section B (Boys over 12 and under 16) :

Prizes same as in Section A. First Prize : K. C. Ackroyd, Heatherlea, Woodhall Spa, Lincs. Second Prize : J. T. Dolby, 92, Cark Road, Keighley, Yorks. Third Prize : F. Richardson, The Bourne, Aughton, Ormskirk, Lancs.

Consolation Prizes (Certificate of Merit and Standard Mechanisms Manual) : W. Cozens, Edinburgh ; R. Crawley, Penge, S.E.20 ; W. R. Cromack, Scarboro' ; W. Grieve, Edinburgh ; G. E. Tonge, Farnworth, Nr. Bolton.

Special Commendation : R. Milne, Blackhall, Midlothian ; S. Cameron, Barnstaple ; G. Collins, St. Albans ; S. M. Bowman, Manchester.



Single-deck Tram Car, by A. Scannall (Awarded First Prize in Section A)

The first and second prize-winning models in Section A are illustrated on this page. It will be seen that the first is a "single-decker" tram-car constructed by Alan Scannall, who is only nine years of age. This model is equipped with handrails and seats in the interior, and runs upon two four-wheeled bogies. The construction of the trolley-arm should be noted. The current-collecting pulley runs upon a Threaded Pin secured in the end of a Coupling bolted to the top of the trolley arm, and a Meccano Spring supplies the necessary pressure on the overhead wires.

J. C. Waterlow's model represents a portable drop-hammer and crane. The hammer comprises a short Rod carrying three Flanged Wheels and a Bush Wheel. The Rod is gripped by the set-screw of another Bush Wheel bolted to a Boss Bell Crank secured, in turn, to the end of a vertical sliding Rod. The latter is connected by Couplings to a second vertical Rod, which carries at its lower end a 1″ Pulley. This Pulley is engaged at intervals by a cam consisting of a ½″ Reversed Angle Bracket bolted to a 1½″ Pulley Wheel. The 1½″ Pulley is secured to a shaft journalled in the main gear-box and rotated from a Crank Handle by means of a ½″ Pinion and 57-teeth Gear Wheel.

The crane is mounted on a pivot in the rear of the vehicle, and its hoisting mechanism is controlled by a Crank Handle journalled in the Sector Plates forming its base.

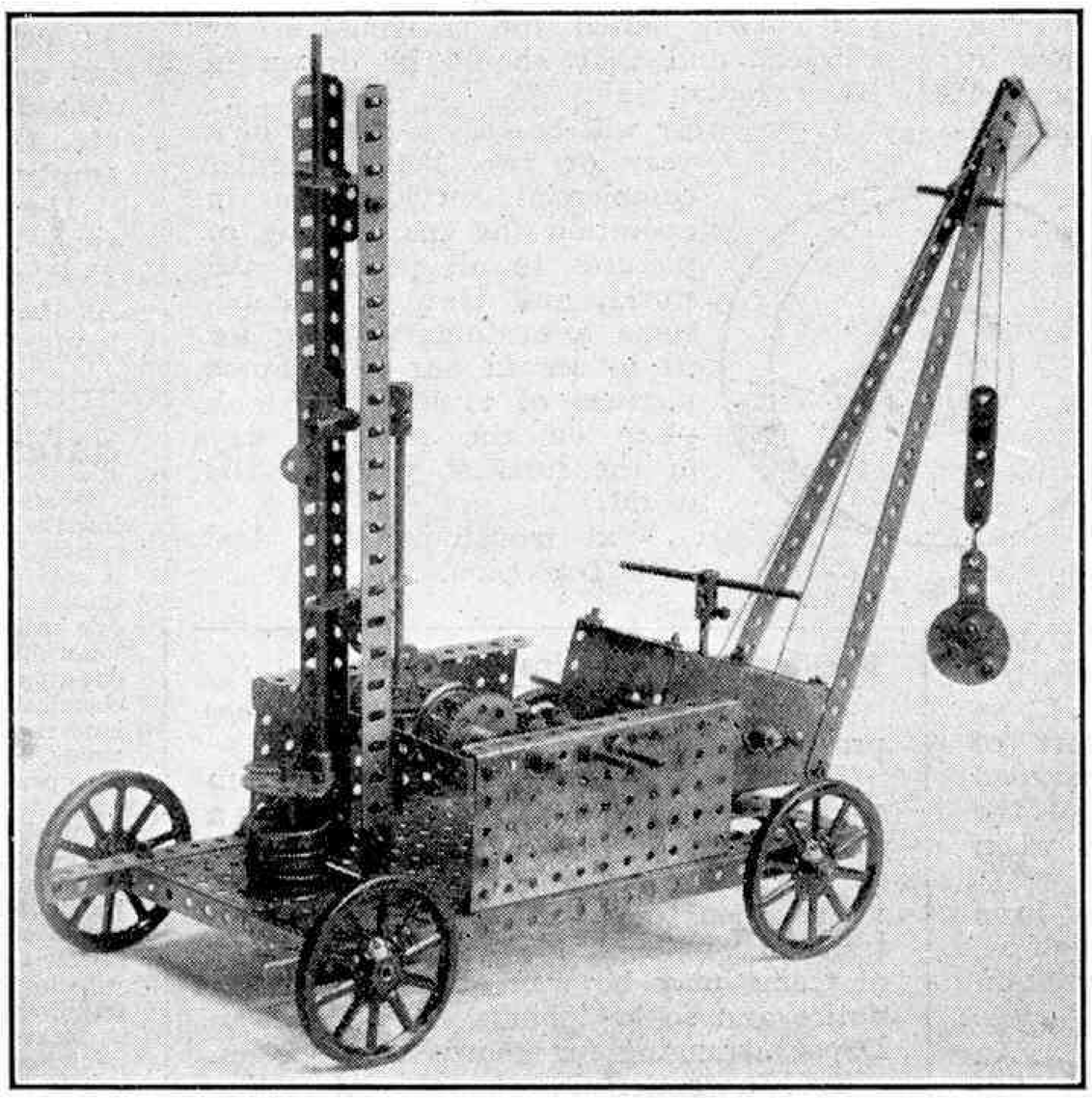
The Third Prize in this section was awarded to D. Jemmett for a humorous model of a man on a bicycle. The framework of the bicycle is of particularly ingenious construction. The rear road wheel is connected to the pedals by means of Sprocket Chain and two 1″ Sprocket Wheels. The outer ends of the pedals (which consist of Couplings) are attached pivotally to the cyclist's legs, and when the model is wheeled along the figure pedals away in a most amusing manner.

Prizes in Section B. K. C. Ackroyd gains First Prize in Section B with a model "Scout" biplane. In view of the number of parts at his disposal the design of this aeroplane is particularly good and well proportioned, and I shall endeavour to publish further particulars of it at some later date.

The Second Prize has been awarded to J. T. Dolby for a very neat model of an armoured cruiser. Although of quite small dimensions, the model comprises gun-turrets, director tower and fire-control station, life-boats, bridge, and even a miniature aeroplane mounted on a small turntable launching platform. Some idea of the compactness of the design will be gained from the fact that the aeroplane measures only 1″ × 2½″ ! The funnel is built up from a series of 2½″ Strips bolted together in the form of an octagon, and connected by means of Flat Brackets or similar parts.

The Third Prize goes to F. Richards for a model of Middlesbrough Transporter Bridge, the travelling car of which is suspended from a trolley running along the horizontal flanges of the Angle Girders forming the bridge. It is actuated by a 4-volt Electric Motor mounted in the base of one of the supporting towers. The model measures 5 ft. in length and 18 in. in height.

G. E. Tonge applies Meccano parts to novel purposes in the construction of a miniature theatre. The model comprises a stage complete with folding "wings" and two drop curtains operated from Crank Handles mounted in the rear of the model. The "artists" consist of Meccano figures that may be caused to perform various evolutions on operation of small carriers, which are connected to the figures by means of thread and slide on Strips secured in the roof of the theatre. One "artist," representing a "one-man jazz band," beats his drums in a very amusing manner when the threads are pulled. The curtains are made of paper, weighted at the lower edges by Meccano Strips.



Portable Drop Hammer and Crane, by J. C. Waterlow (Second Prize in Section A)

Electricity—(*continued from page* 491)

in the rebuilt picture. M. Belin has devised another mechanism to be used instead of that shown in Fig. 2. In this arrangement the strength of the current is varied continually by the stylus C riding up and down the relief of the image B, so that the intermediate tones are taken into account. The carriage K moves sideways bodily at the end of each revolution, the drum remaining stationary so far as sideways motion is concerned.

Reception with the Mirror Galvanometer

A method of reception particularly suitable for use in conjunction with a transmission intended to show only black and white with no half tones is shown in Fig. 3. This is one that is employed by M. Belin in conjunction with his transmitting apparatus.

Rays from the light A, which is maintained at constant brightness by current from the supply mains, pass through the lens B. This focuses them on the tiny mirror C, from which they are reflected so as to pass through the second lens D and the hole E in the box F to the revolving cylinder G, carrying the sensitive photographic paper. This cylinder moves sideways in its box so that every portion of it in turn passes under the hole E.

The mirror C is part of a galvanometer, an electrical instrument to which we have already referred in dealing with the submarine telegraph ("*M.M.*," October 1925, p. 506). The construction of a mirror galvanometer, which is shown in section in Fig. 3, is shown in perspective in Fig. 4. The mirror C is suspended by the silk fibres H in the centre of a coil of insulated wire K. On the back of the mirror a tiny steel permanent magnet is mounted by means of a drop of wax. When a current passes through the coil K, the magnet and with it the mirror C rotates a certain amount, according to the strength of the current. This causes (referring back to Fig. 3) the path of light from C to D and E to be deflected sideways. Thus the beam of light does not fall on the hole E of the box F, but on another part of the box, say L, so that whether any particular part of the light sensitive paper on G is exposed or not depends on the strength of the current in the coil K at the time when that part was under the hole E.

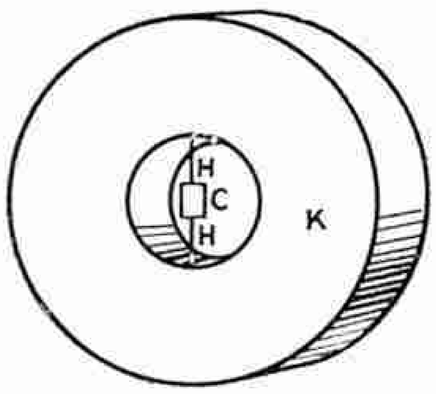
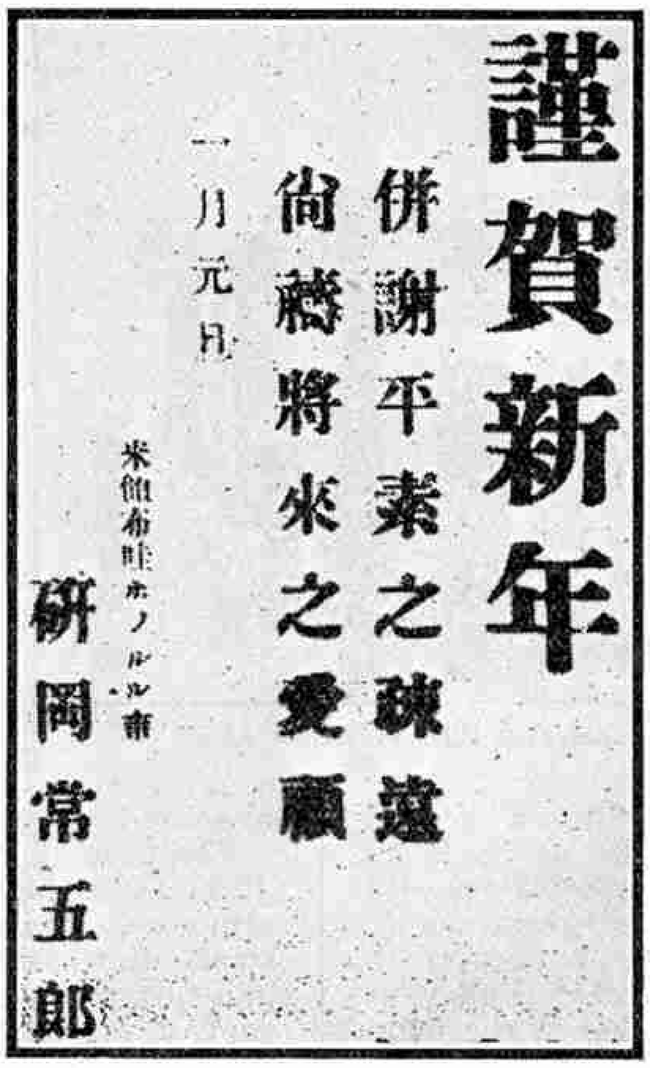


Fig. 4

Since the line current received from the distant station is passed through K, the original picture is reproduced on the paper G in black and white.

Commercial Transmission of Photographs

On the 1st May of this year, Marconi's Wireless Telegraph Co. Ltd. began a commercial service for the transmission of pictures by wireless between London and New York. The method employed makes use of a series of pulses of current of equal strength but of unequal duration, by means of which light-and-shade is obtained. The pictures are reproduced at the receiving end by a pen in a similar manner to that described earlier in these articles, but in straight dotted lines instead of in continuous wavy lines.



A New Year's message in Japanese characters, received by wireless

This service is proving very successful for the transmission of news pictures, of important advertisements that have to appear simultaneously on both sides of the Atlantic.

Another promising field appears to be the use of the service for banks, particularly with reference to the negotiation of bond sales. It seems that there is considerable time spent in submitting and approving of proofs of such issues between the correspondents on each side of the Atlantic; and if even only portions of the documents concerned were transmitted by photo-radio they might be of considerable value. There is also the possibility of the transmission of signatures, which can be done quickly and easily by this process.

The service also may be used to advantage in the transmission of charts, diagrams, tabular matter and general facsimile work of all types, where this form of presentation would be simpler than written descriptions. Black and white drawings and diagrams are of course particularly suited for transmission by wireless, and they should be drawn in black Indian ink.

It probably will be only a matter of a year or two before regular commercial services are in operation for the sending of pictures to all parts of the world, and then it will become a customary thing for us to see in our newspapers pictures of events that took place on the previous day in the furthest parts of the world.

Next month we shall deal with Television.

Keeping Freight Trains on the Move—

(*Continued from next page*)

progress come to hand.

In the centre of this fascinating room sits an operator who may be said to have a most interesting job. It is his duty to see that relief drivers and guards are provided when the work requires it. Some trains may make short journeys. Additional trains may be wanted at very short notice and so he 'phones from Depot to Depot arranging for guards and drivers.

Truly a wonderful work in this interesting office behind the scenes on a British Railway.

Naming the Air-Liners—

(*Continued from page* 514)

of this inverted pyramid, so that when the worm gear is rotated the top of the pyramid is brought closer to or moved further away from the fixed fuselage structure, according to the direction of rotation. The tail-trimming gear, steel-tube pyramid, etc., are enclosed in a light casing, which serves to fair off the rear portion of the fuselage. Means are provided for covering up the gap between the fixed and moving parts when the tail is trimmed to its smallest angle of incidence.

To Carry 300 Gallons of Petrol

The undercarriage is of the usual type and has bent axles and V supporting struts, the front ones being telescopic and containing the usual rubber blocks working in compression.

Experience with three-engined machines has shown that flutter and vibration occur when the propeller-discs overlap, but in the D.H.66 this trouble should not arise. Indeed, the slip streams should clear one another by a considerable margin, for by so arranging the design that the central engine is considerably above the level of the wing engines, it has been possible to avoid overlapping of the propeller-discs—and this without placing the wing engines excessively far out from the fuselage.

The main petrol tanks are placed in the centre section of the top plane, so as to give direct gravity feed to the engines, with consequent simplification of the petrol system. As the machine is required to have a large cruising radius, a high petrol capacity is necessary, and a capacity of 300 gallons has been arranged for and fuel and oil accounts for no less than 2,500 lbs. of the disposable load.

Of course, there can be no details available at present of the machine's performance, but the following figures may be of interest. The weight of the machine empty is 9,060 lbs. The weight of fuel and oil is 2,500 lbs., and of pilot and navigator 360 lbs., leaving a capacity for a load of 2,260 lbs. As the total loaded weight of the machine is estimated at 14,700 lbs., there is an item of 520 lbs. not accounted for. This weight is represented by instruments, cabin equipment, etc., that are not included in the figure for empty weight.

The length overall is 55 ft. 6 in. and the span 79 ft. 6 in. The wheel tracks are 23 ft. and the width of the tail 23 ft. 6 in. As the wing area is 1,536 sq. ft., the wing loading is 9.57 lbs. per sq. ft.

Safety First in Photography

"Safety First" is the appropriate title of an attractive book on photographic matters. The booklet is issued by Burroughs Wellcome & Co., and the title is appropriate because it contrasts the risky rule-of-thumb methods of the past with the scientifically safe methods of to-day.

An illustration vividly reminds us that in the early days, photography as a hobby was hampered by bulky chemicals and cumbersome apparatus, the old-time landscape photographer, burdened with his impediments, having the appearance of a pedlar. Many of the operations were haphazard in character—exposure was a matter of guess-work, and development a constant struggle to correct errors in exposure.

To-day, however, photography can be cleanly, accurate and devoid of disappointment. To achieve these desirable results it is necessary to adopt the motto of "Safety First," and in the booklet under review the various steps in photography are all dealt with in the light of this motto. The interesting new technique of desensitising, by means of which the inconveniences of the dark room are reduced to a minimum, is also dealt with.

The booklet will be sent post free to any reader mentioning the "*M.M.*," on application to Burroughs Wellcome & Co. Ltd., Snow Hill Buildings, London, E.C.1.

Keeping Freight Trains on the Move

The Control Offices of a Great Railway

AT various industrial centres—such as Sheffield, Manchester, Leeds, Hull and York—there are Train Control offices, and recently the writer had the opportunity of inspecting the L.N.E.R. Control Office at Doncaster.

This room, difficult to find, and hidden away across many sets of metals, is the nerve centre of the railway system for miles around. Here five large blackboards cover the walls, and before each stands a trained operator with headphones constantly to his ears. He visualises the whole of his particular section of the line and directs operations by 'phone messages.

The Control Room at Doncaster (L.N.E.R.)

Ingenious Chart Locates Trains

The blackboards are not of the ordinary variety. Small wire clips at regular intervals provide minutes of the day horizontally, while the names of the signal boxes and stations are given vertically. It is thus possible for the operator to point to a clip denoting, say, "Hexthorpe Junction, 2.35 p.m.," with speed and accuracy.

The operator is not content, however, to merely point to the particular location when plotting out the running of a train. To help him he has small coloured labels and these he fixes on his board according to the locality and time. He thus has before him a chart of the location of the different trains within his control at all times. Messages come through from the various signal boxes with machine-gun rapidity and the coloured labels course diagonally across the board.

The "Rhubarb Express"

It is not all so simple as this, however, as I was soon to learn.

Passenger trains are given first right of way, i.e., they are not interfered with by the Controller unless absolutely necessary. It is the freight (goods and mineral) trains and light engines with which he is principally concerned.

The 165 separate telephone lines converge into the 5 sections of the Doncaster Control Room, and the trains dealt with vary from a special "Rhubarb Express," from Leeds to London, to 650-ton coal trains that have to mount a gradient of 1 in 40 near Barnsley en route to the Irish Sea. In the case of the latter trains, the Controller sees in his mind's eye the train being hauled by the biggest locomotive in Great Britain—the mighty "Garratt" loco—for every Train Control specialist has had actual experience of the work of his section, and knows and pictures every curve and signal.

Christmas the busiest time

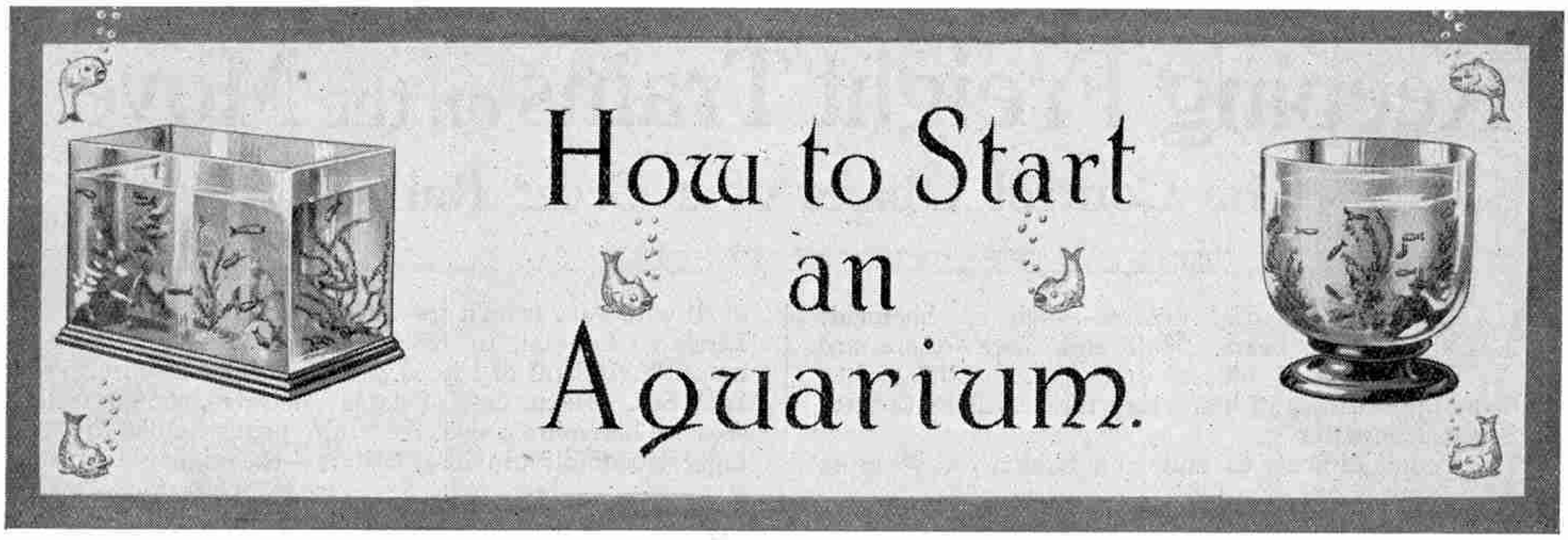
A far-away signal box calls while we are talking. There is no ringing of bells, but the operator becomes strangely silent for a few seconds, as he receives news of a coal train that is ready except for the engine. The nearest locomotive depot was "asked to send" and taking up a "L.E." (Light Engine) label, the Controller quickly plotted out a path for it through the maze of trains on the various lines, advising the different signal boxes as he did so.

Next I heard a one-sided conversation about a goods train that wanted to be tucked away to do some shunting. Curling the label representing that train, so that both ends caught the clip he "let it be so."

Some 1,500 movements of trains and engines are made in this room every 24 hours. There are three shifts, and the busiest times are just before Christmas or a holiday. Everyone wants his goods through quickly, and "before the holidays, please!"

Each operator has his "speciality." For instance, No. 3 operator's was two fast meat trains that travel every afternoon from Liverpool to York and Newcastle, which he handles for about 35 minutes. On the other hand, No. 5 told me that his speciality was during the night, when the Express goods (No. 562) from King's Cross to Glasgow flashes through the Doncaster area from Retford to Shaftholme, doing the 26 miles in 28 minutes! The position of this train's label obviously requires constant and rapid alteration as the reports of its

(Continued at foot of column 2 previous page)



By W. COLES-FINCH
(Resident Engineer, Chatham etc. Water Co.)

GARDEN PONDS

As the result of my articles in this series I have received a large number of inquiries regarding the possibility of keeping fishes in some kind of pond in the garden. Such a scheme is not only possible but easy, provided that a supply of water is available. It may be said at once that it is not in the least necessary to have a large garden for this purpose, because even a small pond may be made to give as much pleasure, relatively, as a large one.

Gardens vary so greatly that it is impossible to give detailed instructions regarding the situation, shape and size of the pond. The most important point is that of situation. In order to obtain the best results, the pond should be situated so that it is sheltered for at least a portion of the day from the full glare of the summer sun, and also sheltered from the coldest winds of winter. In any case, whatever the situation may be, the pond should be of the "sunk" type, in order that the natural warmth of the earth surrounding it may offer some protection against frost, and at least delay the freezing of the water. This is very important because, if the whole mass of the water should become frozen solid, the occupants of the pond would be killed and the containing structure would burst.

Fig. 1

Protection Against Frost

The depth of water should be not less than 24 inches in order that, when the early frosts have thrown a thin coating of ice over the surface of the pond, the protection afforded by this coating, aided by the warmth of the surrounding earth, may result in keeping open sufficient water below the ice to provide for the requirements of the occupants.

In considering the position of the pond, the question of water supply should not be overlooked, and before the pond is finally completed the necessary supply pipe should be introduced and arrangements made for the overflow, and for draining the pond dry when required.

When these preliminaries have been dealt with satisfactorily the necessary excavation should be completed. The earth surrounding and at the bottom of the excavation should be well rammed, and a coat of concrete 4 inches in thickness should be spread over the bottom and lightly beaten down with a shovel to ensure solidarity. This concrete should be composed of five parts of fine Thames ballast, or other good quality river sand, and one part cement.

Constructing the Pond

After two or three days have elapsed, the design of the pond should be marked out carefully on the concrete floor, and the sides built with hard square stock bricks, well bedded in cement and sand mixed in the proportion of three to one. This brickwork portion of the structure should be done with the greatest care in order to render it as solid and water-tight as possible.

When this stage is successfully completed, the pond should be covered with a coat of clean sand and cement, and finished with a smooth layer of cement laid on neatly with a trowel. If this is done carefully, there should be no

leaks, and the pond should give no trouble.

Concrete may be used for the sides, instead of brick, in the case of a small pond of simple shape.

Our pond is now completed, but it is not by any means ready for the introduction of fishes. For at least a week or two frequent changes of water must be given to eliminate all taint from the newly-constructed work. The next step is to empty the pond and cover the bottom with fine gravel that has been well washed, and to introduce the plant life which, as we have seen in previous articles, is necessary for preserving the balance of aquatic life.

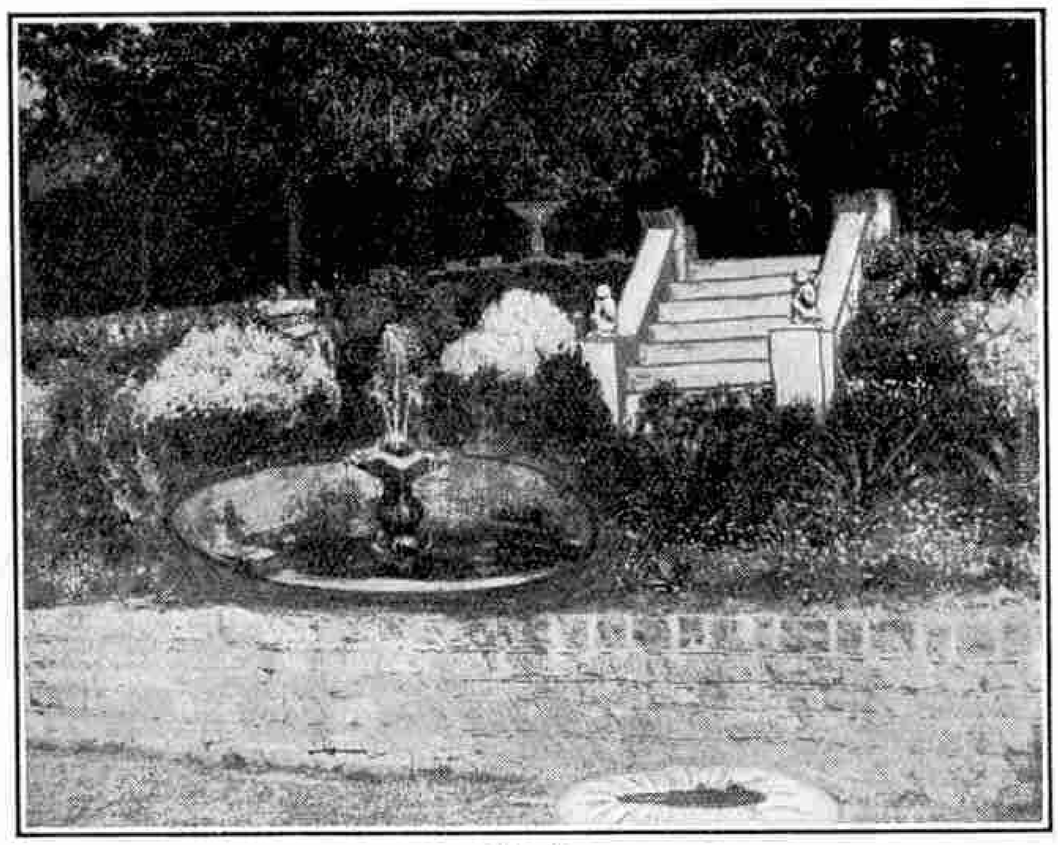


Fig. 2

Preparing for the Fishes

Having inserted the plants, fill the pond slowly and carefully and then allow a tiny trickle of fresh water to flow continuously through it or, alternatively, change part of the water—not the whole of it—at frequent intervals. When the plants show signs of flourishing and the water is bright and clear, floating plants may be added, together with a little duck-weed for shade. At this stage a few more days should be allowed for the thorough establishment of the plant life.

A few water snails should now be introduced, and if they prosper, the pond may be regarded as fit for habitation and the fishes may be installed in their new home. Most of the hardier fishes will thrive well in a garden pond, and the following in particular may be recommended :—Golden Carp, Common Carp, Prussian Carp, Golden Orfe and Minnow.

An infinite amount of pleasure may be obtained from a perfectly plain and unpretentious pond, but from an artistic point of view various decorative additions are recommended. These will vary so greatly with local circumstances that it is impossible to give any definite advice. Perhaps the best way of indicating what may be done in a comparatively small garden, and at small expense, will be to describe briefly the garden in which the writer is most interested.

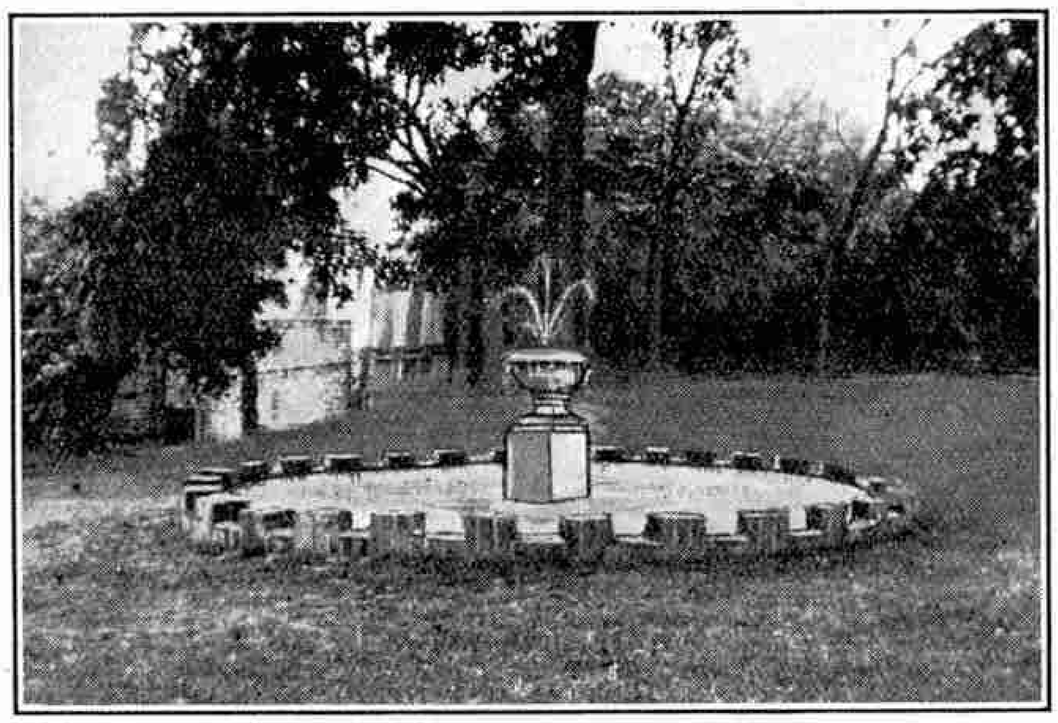


Fig. 3

Typical Garden Ponds

This garden is situated on the slope of one of the secondary ridges of the North Downs, and it necessarily takes the form of a terraced garden rising from the back of the house. The upper terrace consists of a narrow strip of lawn, not lending itself to any special artistic effort. Here is constructed a circular sunk pond 12 ft. in diameter and 24 in. in depth, with a turreted margin of old red bricks, as shown in Fig. 3. In the centre is a pedestal and vase, with a fountain jet. In summer each indentation and projection of the turreted margin is decorated by a large pot of trailing flowers of all descriptions, adding considerably to the general appearance.

The overflow from this pond is conducted by pipes to another pond in the second terrace, a general view of which is shown in Fig. 2, this view being taken from a window overlooking the terrace. Unfortunately the picture fails to convey to the reader the refreshing beauty of this little cameo of loveliness. It is a riot of colour, scent and beauty, to which is added the charming music of a fountain.

Birds' Bathing Pool

This second pond is 8 ft. in diameter, and in the centre of it a trio of dolphins spread their tails, supporting a delightful bath in which the birds revel and chatter as they bathe, subsequently flying off to the surrounding trees to preen themselves and complete their toilet. This scene affords delight almost the whole year through, for even in winter a burst of sunshine sends our feathered friends to their familiar resort. During the hot and dry days, when the daily ablutions of the feathered visitors are over, bees from every hive around come in battalions to the pond to sip the cooling water (Fig. 3).

The overflow from this second pond is led into a tank in the conservatory, where it is utilised for plant-watering. From there it passes beneath a little stone bridge into a plain dipping-tank, from which is taken all the water for garden purposes. Thus every drop of water plays its part in providing pleasure through the medium of two ponds, and is afterwards utilised for plant-watering in the conservatory and garden.

Beauties of a Fountain

The foregoing detail has been given with a definite object. There is a general impression that a fountain is a luxury, confined to the wealthy on account of the cost of the necessary water. This is not the case. If a garden-water charge be paid, there should be only a small increased charge for a pond and fountain, provided that there is no overflow to a drain, and that the pleasure obtained from the fountain is limited to the period necessary to replenish the tank from which the garden-water can be legitimately obtained.

Fig. 1 is a photograph of a garden well known to the writer and which remains pond-less, although it contains many nooks and corners that literally seem to be calling for little pools. In this photograph a cross marks the place where the writer would construct a pond and fountain, thereby adding almost infinitely to the beauty of the garden.

It is wonderful how much real interest is afforded by a garden, a fountain and a little pond.

The Secretary's Notes

The Summer Session confronts club Leaders with a series of problems entirely distinct from those of the Winter Sessions, and some Leaders find it extremely difficult to carry on during August and September.

Summer Difficulties

Almost without exception the trouble is most acute in the case of small clubs. The larger clubs have their cricket teams, cycling sections, camps, etc., and club life continues with little or no diminution of enthusiasm. All that happens is a transfer of activity from the club-room to the open-air. The position is often very different with small clubs. The absence of even a few members on holiday makes a serious difference and the Leader is puzzled as to what to do with the small number that remains. In a few cases such clubs shut down entirely until the beginning of October. I am in full sympathy with the difficulties that lead to this course, but I sincerely hope that the practice will not spread. The great danger in closing down lies in the possibility of the permanent breaking of the tie that previously bound the club together, so that when the Leader tries to re-assemble the club for the first Winter Session he finds that the membership has dwindled away. I do not assert that closing down can be avoided in every case, but I am confident that, as a rule, an alternative policy can be found.

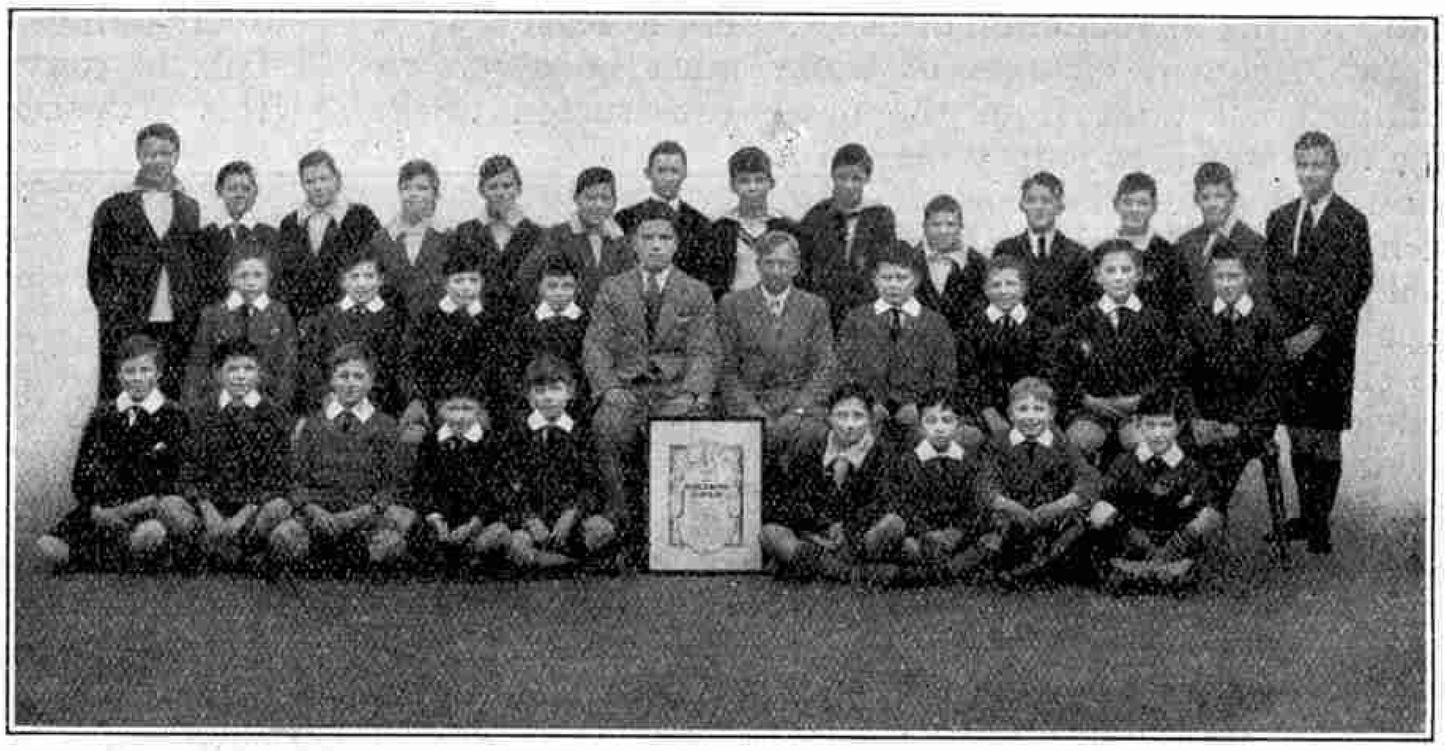
Keeping in Touch with the Members

To Leaders who are contemplating closing down I recommend the following scheme for consideration and trial. Abandon all attempts to hold club meetings at regular intervals and concentrate entirely on two or three attractive events. The nature of these events must be determined to a large extent by local circumstances, but I suggest that they might include a whole-day picnic to some place of interest or, in the case of clubs near the coast, a day visit to some seaside resort. Such an outing, if carefully planned, is almost certain to be successful, and it is often the means of reviving enthusiasm among the members. In addition to this it is generally possible to arrange one or two visits to local engineering works, factories, etc., and in such visits the smallness of the party is often a distinct advantage. By working on these or similar lines the Leader is able to keep in touch with his members and therefore there is no difficulty in recommending regular meetings at the beginning of the Winter Session.

Club Photographs

On previous occasions I have urged club Leaders and secretaries to send me more photographs of their members or of any interesting events in the club syllabus. I am glad to say that such photographs are coming in in larger numbers, but unfortunately many of them are not sufficiently good for reproduction in the "*M.M.*" This applies particularly to photographs of indoor events such as exhibitions, and it is comparatively seldom that I receive one suitable for reproduction without a great deal of retouching and general strengthening, which is an expensive process. I should like clubs to take this matter more seriously, as it is a great disappointment to me to receive an interesting photo and be unable to publish it on account of its technical deficiencies. A great improvement would be effected if more attention were given to securing a suitable background. A plain background throws into relief a group or exhibition layout, whereas one full of unwanted detail becomes mixed up with the foreground and produces a confused effect that makes successful reproduction almost impossible. I should like it to be better known also that in the great majority of cases I can obtain a much stronger and clearer reproduction from the negative than from a print, and whenever possible the negative should be sent. All negatives will of course be returned in due course. Some clubs elect one of their members as "Official Photographer" and this plan has much to recommend it.

A Successful School Club



The Collegiate Schools Meccano Club, the members of which are shown in the above photograph was formed in October, 1925, by a number of boys of the Winchmore Hill Collegiate Schools, London. Under the enthusiastic Leadership of Mr. S. Denington Palmer, who is seen in the centre of the group, excellent progress was made from the outset and to-day the club is very flourishing. The club owes also a great deal of its success to the keen interest shown by its President, Mr. J. Temblett-Wood, who is shown next to the Leader.

At the Forth Bridge

Our photograph shows a few of the members of the Rosyth Meccano Club resting beneath the Forth Bridge in the course of a final outing before the disbandment of the club. On the right of the Leader, Mr. G. Cook, is E. Hunter, the secretary, to whose sad death we referred last month

CLUB NOTES

Hemingstone (Ipswich) M.C.—Recent activities include a special Model-building Night, on which the Leader read an exciting story while the members built cranes. A Fretwork evening also was arranged and many useful articles were constructed. Outdoor games are popular, members playing Hockey with hockey-sticks made by themselves. An Exhibition is to be held shortly. Club roll: 17. *Secretary*: L. C. Offord, Post Office, Hemingstone, Ipswich, Suffolk.

Exeter M.C.—A very successful Education Week was recently held in the city and among the many interesting items was a display of work from various schools and institutions, shown at the Civic Hall. The Meccano Club contributed a fine display of Models and Trains, an Overhead Electric Railway track being constructed for the occasion. To conclude the week the Meccano boys presented two plays, "The Three Wishes" and "Cross Purposes," with great success. Members are now at work on an elaborate model of a Tramway Car, of which we hope to give details later. A summer Camp is now under discussion. Club roll: 204. *Secretary*: L. G. Lendon, "Homeside," 72, Old Tiverton Road, Exeter.

Pershore M.C.—A Girls' Section has been formed and already has seven members. A Flower Show recently held in the locality incorporated a display of models made by the Club. Cycling tours are proving very popular. A very enjoyable trip to Bredon Hill was made, and members also cycled to Evesham to watch the motor-cycle sports. Club roll: 16. *Secretary*: Tom Pettifer, High Street, Pershore.

Rhos-on-Sea M.C.—Has now the honour of the patronage of the Right Hon. Lord Colwyn, P.C., who has accepted the Presidency and has offered two prizes to be competed for at Cricket, one to go to the best bowler of the season and the other to the best batsman. At a recent meeting Mr. Day, a card manipulator and conjuror, gave a very interesting display of his art, which was received with great enthusiasm. Club roll: 20. *Secretary*: George E. Mellor, "Bradda," Allanson Road, Rhos-on-Sea.

Louth M.C.—Has organised several interesting Cycle Runs, and a Lecture on Wood-carving was recently delivered by a patron of the club, Mr. Eastwood. A cardboard model Biplane has been constructed by members. Club roll: 15. *Secretary*: H. Bell, 10, Dyas Terrace, Charles Street, Louth, Lincs.

St. Annes (Brislington) M.C.—Tracking Expeditions, Picnics and Cricket Matches are the main activities at present and a Flannel Dance recently held proved highly successful, a profit of £3 being realised. It is contemplated to run a series of dances and whist-drives during the winter months. Club roll: 23. *Secretary*: Jack Davies, 45, Arlington Hill, St. Annes Park, Brislington.

Annan M.C.—Has held a fine Exhibition of Models, for which a Workshop model was loaned from Headquarters. An interesting Lecture on First Aid was recently delivered by Mr. Niblock, a patron of the club, and was greatly enjoyed. Club roll: 15. *Secretary*: Oswald Gibbs, The Studio, Annan.

Withington M.C.—Sound progress is reported, though several outdoor excursions have had to be postponed on account of bad weather. Cricket and Cross-Country Runs are popular items of the syllabus, and a business meeting is held at the beginning of each month to discuss future activities. Club roll: 8. *Secretary*: K. Cradduck, 36, Mauldeth Street West, Withington, Manchester.

Christ Church (Stratford, E.15) M.C.—Splendid progress is being made by all sections, the Carpentry Section actually taking orders from local patrons. A portable cupboard for Scouts, fire screens made in mahogany, French-polished and with sateen panels, and letter racks, boot-brush boxes, and tooth-brush racks are among the attractive wares of this department. The Fretwork section has a good selection of products packed away for a Sale of Work. The Model-building section concentrates on new ideas and original models with great success, and Painting and Stencilling also have their followers. The committee are considering the introduction of a section for building Model Steam Engines, and a Draughts Championship. An outing was recently arranged with St. George's Meccano Club, East Ham. Club roll: 36. *Secretary*: R. H. Bentley, 81, Abbey Lane, Stratford, London, E.15.

St. George's (East Ham) M.C.—An Excursion to the Royal Mint was made recently and proved extremely interesting. A Lecture on Toy-making was given by the Leader, Mr. Wilcox, who explained how Toy Engines, Lorries, Prams, Paddle Motors and similar miniatures may be fashioned. Club roll: 24. *Secretary*: C. Smith, 277, Burgess Road, East Ham, London, E.15.

Sutton Bridge (Wisbech) M.C.—The Leader, Mr. Baxter, who has done so much to influence the growth and development of the club, is unfortunately leaving the town. It is hoped, however, to secure a good successor at an early date. *Secretary*: E. H. Coy, 102, Bridge Road, Sutton Bridge, Wisbech.

Richmond (Surrey) M.C.—Has now a very good Magazine, and a Girls' Section recently established is making good progress. The latest hobby is Fretwork, and members are busily preparing articles for a bazaar to be held later in the year. The Boys' Section are working on a large Dolls' House in Fretwork, for which the Girls' Section are producing the necessary furnishing. Club roll: 21. *Secretary*: A. R. White, 15, Albert Road, Richmond.

Holy Trinity (Blackburn) M.C.—Several new ideas have been introduced including Essays, Lectures and Competitions. At the annual meeting, the President, the Rev. G. S. Perry, M.A., delivered an address, and presented a shield to the captain of the "Bolts" house of the club, as a token that the "Bolts" won the greatest number of marks for club work. The "Nuts" were not far behind, and the reading of the various totals was received with great enthusiasm. *Secretary*: Tom Donald, 6, Camden Street, Blackburn.

Meccano Club Secretaries

No. 7. Robert Clark

Robert Clark is Secretary of the Holy Trinity Meccano Club, Barnsbury, London, the first club to be affiliated with the Guild. He has been a member of the club since March, 1920, and its Secretary since October, 1925. He has been awarded a Recruiting Medallion and also a Special Merit Medallion for his good work for the club and for the Guild in general. His chief hobbies are Meccano Model-building, Wireless and Fretwork.

Throughout his period of Secretaryship, Robert Clark has worked steadily and conscientiously to increase the very high standard already attained by the club, and his loyal help has been of great assistance to the enterprising Leader, Mr. Stuart H. Wilson.

Great Baddow M.C.—A special "Meccano" evening was held recently with great success, the proceeds paying for a Bagatelle table. Several plays, specially written for the occasion by a friend of the Leader, were well received, all the members and the Leader taking part. Interesting evenings have been spent in visiting a club patron who has a fine Hornby Train layout. Club roll: 20. *Leader*: Mr. J. Pitts, Hills Chantry, Great Baddow, Chelmsford.

Greenock Academy M.C.—Weekly meetings are held for Model-building, in which a very high standard is maintained. Several outings were arranged recently, one of them being to the Telephone Exchange, where the P.O. engineers courteously explained everything. Another outing took the form of a tour of inspection of H.M.S. "*Hood*," to which the members were conveyed by motor launches. Club roll: 25. *Secretary*: Ronald S. Calder, 73, Brisbane Street, Greenock.

Oban M.C.—A Model-building Competition and Exhibition was organised recently, for which a fine selection of models was constructed by the members. Lectures have been delivered by various members, the subjects including, "Steam Engines," "Famous Bridges," "Model Railways" and "Photography." Contractors' Nights, and Monoplane Nights have been arranged, and an excursion to Oban Electric Power Station proved very interesting. Club roll: 18. *Secretary*: Ian H. MacLean, Hamilton Park Terrace, Oban, Argyll.

Bearwood (Birmingham) M.C.—An Exhibition proved very successful and resulted in substantial additions to the club funds and an increase in membership. Mr. Piper, the Leader, arranged the exhibits, and forty-six interesting items were included. A special shed is used for the operation of a Hornby Train layout. Bagatelle is proving very popular. Club roll: 30. *Secretary*: C. G. White, 72, Katherine Road, Bearwood, Birmingham.

Castle-Douglas M.C.—Regular evenings are spent in Model-building, and Cricket holds a popular place in the syllabus. A presentation was recently made to Masters R. and D. Sharp, prior to their departure for Australia, with the good wishes of all their old colleagues. A trip to the seashore was arranged recently and greatly enjoyed. Club roll: 23. *Secretary*: Richard Haugh, 26a, King Street, Castle-Douglas.

India

Excelsior (Madras) M.C.—Is now affiliated under the Leadership of Mr P. Bhoopathy, B.A. Regular meetings are held for Model-building. Mr. S. P. Senji delivered a paper "All About Meccano." Preparations are now being made to hold an Exhibition. Club roll: 11. *Secretary*: S. A. S. Royan, "Senji House," Komaleswarenpett, Mount Road, P.O., Madras.

New Zealand

Wiseman's (Auckland) M.C.—The first evening of the new session was a great success. Mr. Kerr, a physical culture expert, gave a very instructive address and offered free advice to members of the club regarding their physical development. Mr. Knight, a lightning artist, caused much merriment and his clever work was greatly admired. A remarkable display of conjuring by Mr. Taylor was a further attraction, and when, after producing a variety of articles from a hat, he brought out chocolates and distributed them, the applause was great! A fine model of the Forth Bridge, twelve feet in length, was exhibited. Club roll: 800. *Secretary*: W. Shearer, 170, Queen Street, Auckland, New Zealand.

Clubs not yet Affiliated

Mossley (Manchester) M.C.—The summer syllabus includes Games and Meccano Lectures. Fortnightly meetings are held during this session. A club Library has been established. Efforts to obtain an adult Leader have so far been unsuccessful. *Secretary*: John Ashton, 36, Andrew Street, Mossley, Manchester.

Rothesay Baptist Church M.C.—It is proposed to purchase a Meccano Outfit for club use, and later a Hornby Train Set. Outings and Paperchases are included in a good Summer syllabus. All the members are joining the Meccano Guild. Club roll: 10. *Leader*: T. R. Maitland, 1, Ladeside Street, Rothesay, Bute.

Chipping Norton M.C.—A club has been formed by a small band of enthusiasts and inquiries regarding an adult Leader are going forward. Boys in the locality who are interested may obtain full particulars from the *Secretary*: Bertram Edward Viner, 6a, Albion Street, Chipping Norton, Oxon.

Lee Brigg M.C.—Is progressing well under an adult Leader, and it is hoped that affiliation may be effected very soon. A "Hat Night" proved very popular, subjects such as Wireless and Engineering being included. The membership is increasing. *Secretary*: William Webb, 52, Green Bank Road, Lee Brigg, Altofts, Yorks.

Cranham M.C.—The chief hobby is the study of Pond Life. A recent visit to a local pond resulted in the capture of Water Beetles, Dragon Fly Larvæ, Water Scorpion, Water Boatman, Crested Newts, Common Newts, Caddis Larvæ, Fresh Water Shrimps and three-spined Sticklebacks. Mr. Cheshire, the Leader, gave a lecture on these creatures and their habits. Club roll: 7. *Secretary*: J. G. Cheshire, Post Office, Cranham, Essex.

First Hillingdon Heath M.C.—An adult Leader has not yet been secured, but it is hoped to obtain the services of a suitable gentleman very soon. New members will receive a hearty welcome. *Secretary*: F. G. Baldwin, 2, Heath Road, Hillingdon Heath.

Uppingham M.C.—Under the guidance of Mr. Lindley, the Leader, excellent progress is being made. A meeting was held last month to discuss the prospects of an Exhibition and Sale of Work, and a Club Magazine is in course of preparation. The secretary delivered an interesting Lecture on "Our British Railways." *Secretary*: Stanley J. W. Riches, High Street, Uppingham, Rutland.

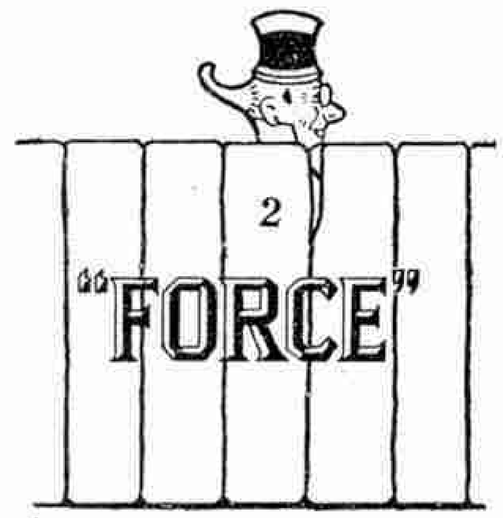
Proposed Clubs

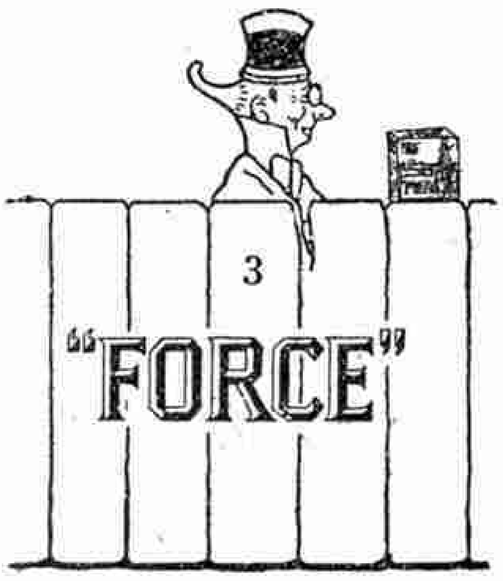
Amblecote M.C.—A few Meccano enthusiasts are endeavouring to form a club at Amblecote, Stourbridge. Boys who are interested should write to D. Rowberry, 1, Dennis Street, Amblecote, Stourbridge.

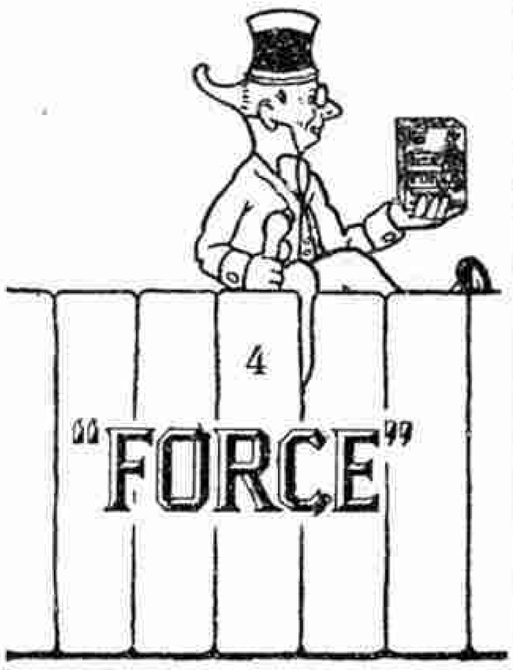
Belfast M.C.—A vigorous movement to establish a Club is being made in Belfast, and boys interested in the scheme are invited to communicate with Walter Cooke, 1, College Gardens, Malone Road, Belfast.

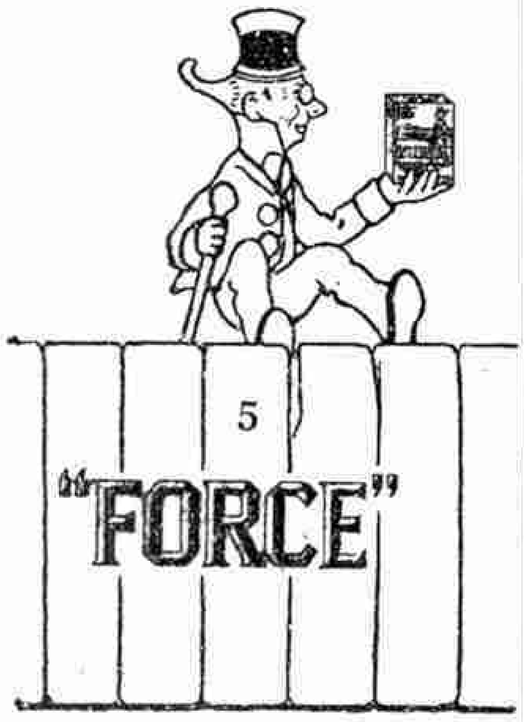
Cradley Heath (Staffs.) M.C.—A promising effort to form a club is being made by a small group of enthusiasts. It is hoped that a suitable Leader will be found before long and local Meccano boys are invited to communicate with the *Secretary*: L. C. Tibbetts, 69, High Street, Cradley Heath, Staffs.

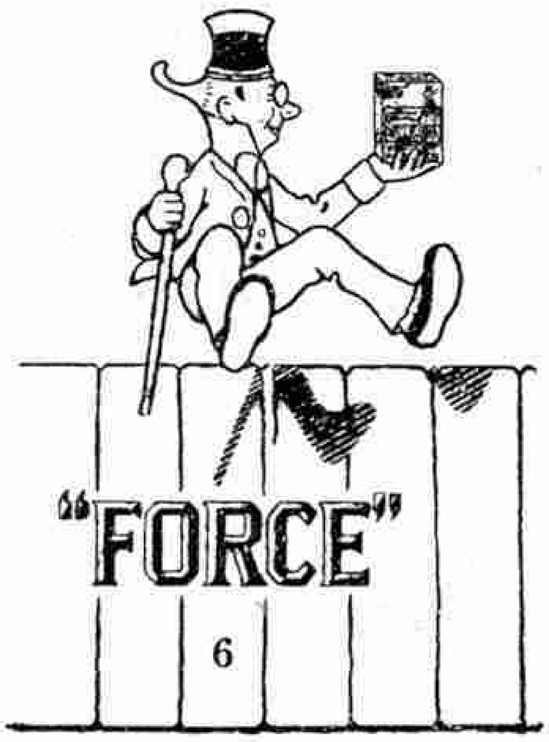
Kuala Lumpur (F.M.S.) M.C.—A small band of enthusiasts are endeavouring to form a club and enquiries from local Meccano boys will be welcomed. Full particulars may be obtained from Mr. D. G. Abeyeratne, 13, Old Pudu Road, Kuala Lumpur, F.M.S., or from Mr. Lim Tam Chong, No. 8, Pudu Road, Kuala Lumpur.

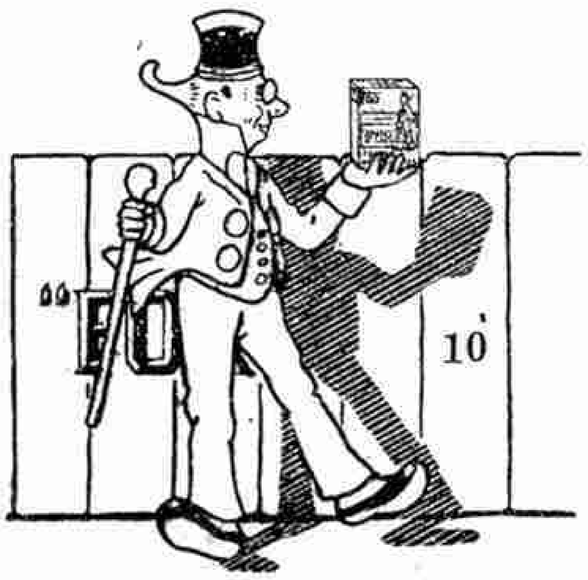


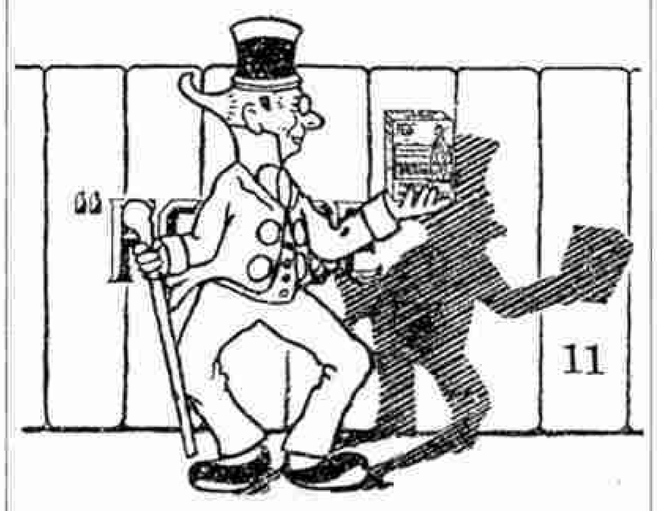


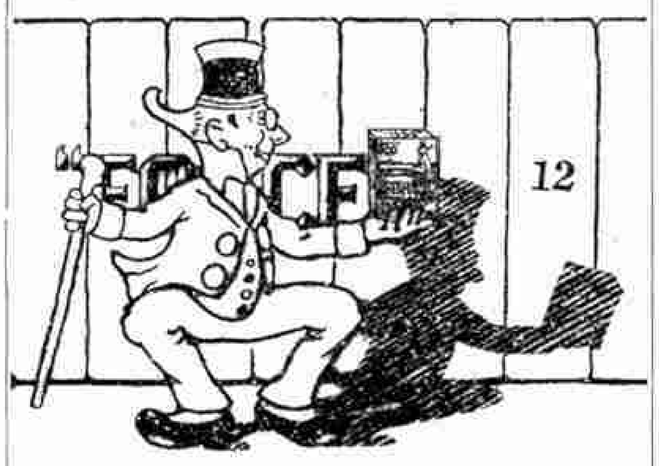


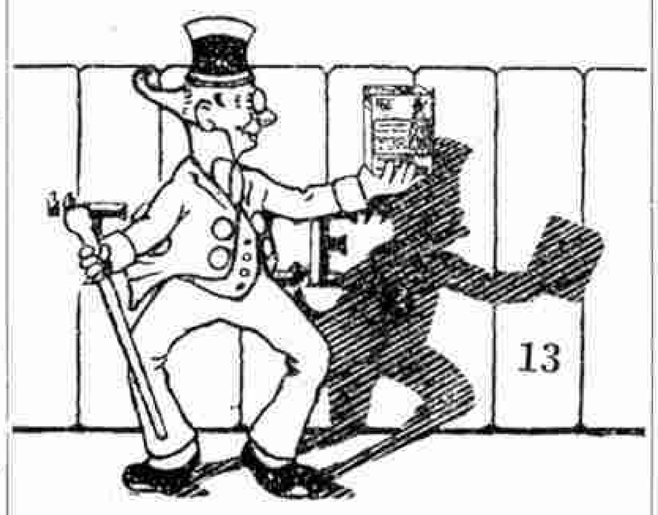


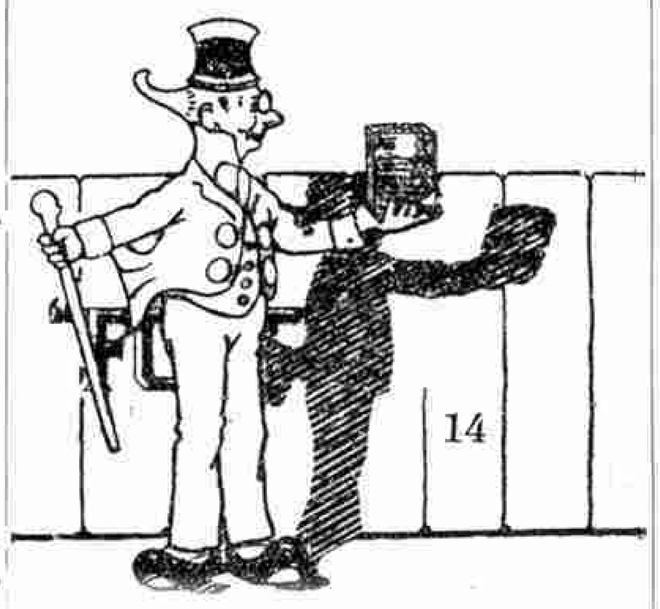












SUNNY JIM'S PAGE

Rather a tight squeeze this month, isn't it ? The pictures, which are part of the little novelty you will be able to make this month, have taken up such a lot of room, that I am nearly pushed off the page altogether. However, I think I have just about enough room to describe what to do. The name of the device you will be able to make with the aid of the sketches on this page is—" Sunny Jim's Cinema." When the drawings are properly mounted and put together, you will be able actually to see me doing my famous leap over the fence ; and I will do it over and over again for you as often as you wish. Perhaps you do not remember the old rhyme about this feat of mine, but Mother or Father will ; ask them if they remember the words—

High o'er the fence leaps Sunny Jim
" FORCE " is the food that raises him.

Now for the model. Get yourself a good size sheet of fairly stiff paper, cartridge paper will do nicely. Draw two parallel lines across it 2½" apart. Measure off along the top line 1½", measure the same distance along the bottom line, and join the two points. You will now have a rectangle 2½" deep and 1½" wide. Now mark off the distance of 1.9/16 inches and join the two lines again. You will now have two rectangles side by side, one 1/16 inch wider than the other. Continue to draw rectangles side by side in this manner. If you come to the edge of the paper, re-draw your two parallel lines 2½" apart, and continue with your rectangles. Remember the first is 1½" wide, the second 1.9/16", the third will be 1.10/16", the fourth 1.11/16", and so on until you have drawn 14 rectangles, each 1/16 inch wider than that which precedes it. Now cut out the pictures printed on this page and paste picture No. 1 in the smallest rectangle, so that the bottom of the fence comes ¼ inch above the base line of the rectangle, and the right hand side of the fence comes flush with the right hand edge of the rectangle. Picture No. 2 will go into rectangle 1.9/16" wide, with the bottom of the fence a ¼" above the base line of the rectangle, and the right hand side of the fence flush with the right hand side of the rectangle. Now continue pasting on these pictures in the order in which they are numbered, bearing in mind the height of the bottom of the fence above the base line, and the necessity of keeping the right hand edge picture flush with the right hand side of each rectangle. When the paper is dry, get out your box of paints, and colour the pictures in the proper colours, you will then be ready to cut out each rectangle with a pair of scissors. This will give you 14 " sheets " each one a little wider than the other. Arrange them in their proper order with the smallest one on top. Bring all the left hand edges flush and ask Mother or Sister to sew them along this left hand edge to make a little book of 14 pages. Hold the book in your left hand, and flick over the leaves rapidly with the thumb of your right hand. Your friend Sunny Jim will then perform his little trick of leaping the fence in the most realistic and lifelike manner.

I suppose you still have " FORCE " regularly every day. Have you tried it with strawberries, raspberries, or any of the many fruits which are now so easy to obtain ? Do so, you will find that " FORCE," eaten this way, is even nicer than pie, and because " FORCE " needs no cooking, Mother is sure to be pleased to let you have this delicious feast as often as you wish. Always remember that since " FORCE " is whole wheat flakes malted and toasted, you can never eat a food that will do you more good, or a food that you will like better.

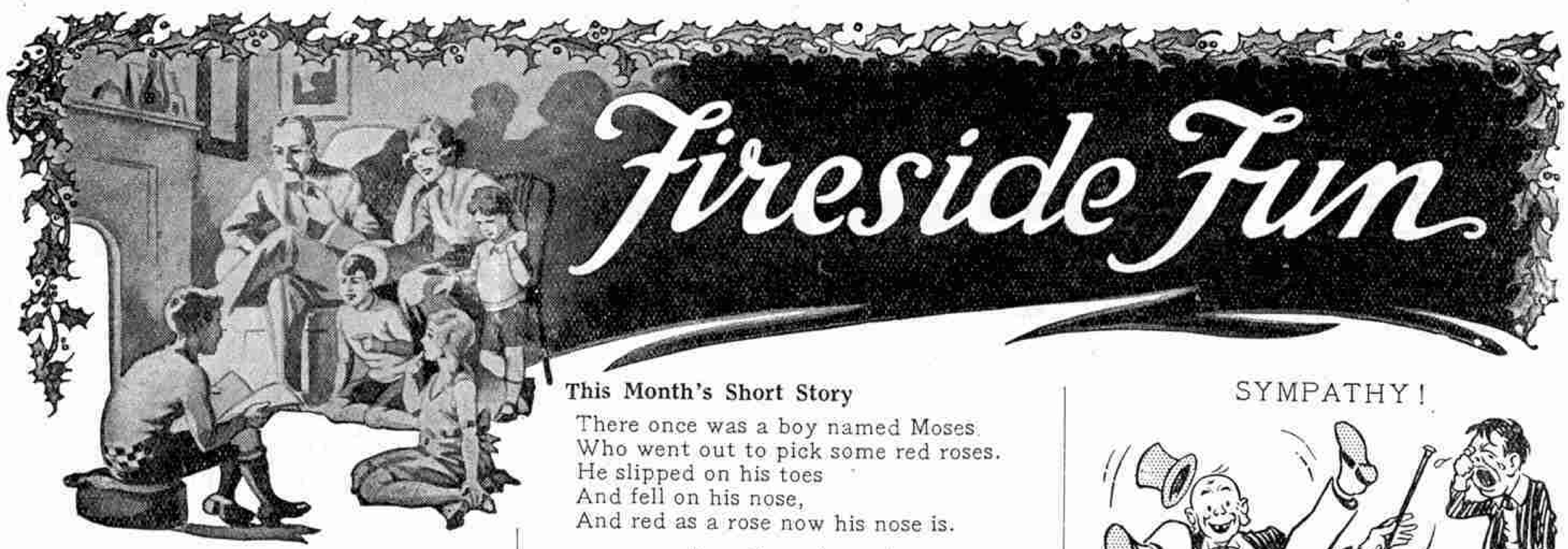
Yours forcefully,

Sunny Jim

P.S.—If you do not wish to cut out this page send a postcard to

197, Gt. Portland St., London, W.1.,

and I will forward you a copy of this page by return.



STRONG WORDS!

Jones: "At my last lecture there was not a dry eye in the audience."

Robinson: "Indeed, and what was your subject?"

Jones: "I was addressing a school of cookery and giving a practical demonstration of how to peel onions!"

* * * *

A butcher, walking down the street, passed a dairy and read this sign: "Milk From Contented Cows."

He was impressed with the idea and decided to adapt it to his line of business. The following morning this sign appeared in his window: "Sausages From Pigs That Died Happy."

* * * *

A careful Scotsman, having been injured, went to his doctor's surgery for attention. He was careful to ask how much the charge would be.

"I will stitch that scalp wound for 25/–," replied the Doctor.

Patient: "Nae, nae, Doctor, I want just plain sewing, not embroidery."

* * * *

THIS WAY PLEASE!

It was the first time the two dusky ex-stevedores had met since the war, and they were comparing their more recent personal history.

"Mose," announced Rastus, "Ah's got a good job now."

"Yo' got a good job? What at?"

"Ah's got a job bein' p'fessor of pathology to the college."

"P'fessor of pathology, big boy? Yo' kain't read nor write!"

"Seems lak yo' don' know what is a p'fessor of pathology. Lemme 'lucidate. A p'fessor of pathology is de p'fessor what shows de folkses how to go in an' out of de college grounds."

* * * *

Q. When is a man as hard up as a man can be?

A. When he can't get credit for good intentions.

This Month's Short Story

There once was a boy named Moses
Who went out to pick some red roses.
He slipped on his toes
And fell on his nose,
And red as a rose now his nose is.

* * * *

The Judge gazed sternly at the prisoner. "How many times have you been convicted before?" he inquired.

"Five, my lord," came the reply.

"Then I shall give you the maximum sentence."

"Maximum! Don't regular customers get a rebate?"

* * * *

"What is that noise I can hear through the wall?"

"It's our neighbour, talking to himself."

"But he needn't talk so loudly as that!"

"He has to. He's deaf!"

* * * *

Teacher (to parent): "Do you know, your boy spells ridiculously."

Parent: "Does he? Well, that's good. It's about the only word he can spell!"

* * * *

THE LIMIT!

"Now, my son," said the conscientious father, "tell me why I punished you."

"That's it!" blubbered the boy, indignantly. "First you pound the daylights out of me, and now you don't know why you did it!"

* * * *

NOT WHAT HE MEANT!

An old lady, on consulting a policeman on his beat in a certain London street, was advised to take a No. 312 bus to her destination. Some two or three hours later the policeman passed the same spot and found the lady busy ticking off the buses as they passed.

"Haven't you got your bus yet, Madam?" he asked.

"It's quite alright, constable," she replied. "This one is the 289th, so there are only 22 more to pass!"

SYMPATHY!

The old gentleman met the ground with a thud. A small boy who was watching burst into tears.

"Don't cry, little man," said the old gentleman, "I'm not very much hurt!"

"No," whimpered the youngster, "but it was my banana you slipped on!"

* * * *

Cyclist: "Is that building over there a ruin?"

Oldest Inhabitant: "Ruin? Noa, it's all t'a pieces!"

* * * *

Master: "Pat, you're turning that screw the wrong way. I thought I showed you how to do it yesterday."

Pat: "Sure, sir, but this is another screw."

* * * *

Teacher: "I am very sorry to say, George, that your composition is extremely poor."

George: "My hat! Won't father be angry!"

Teacher: "Now don't worry. Surely you can tell him that you will do better next time."

George: "Do better! Why, he wrote the whole of it himself!"

* * * *

QUITE ENOUGH DAMAGES!

A negro woman of mammoth proportions and inky complexion was brought unconscious to a hospital after a collision. When she recovered her senses the surgeon, thinking to comfort her, remarked: "You will undoubtedly be able to obtain a considerable amount of damages, Mrs. Johnson."

"Damages!" cried Mrs. Johnson. "What do Ah want wif damages? Ah got damages enough now. What Ah needs is repairs!"

* * * *

First Tramp: "How 'yer gettin' along now, Al?"

Second Tramp: "Oh, I just tried No. 45 last week, but I ain't going there no more."

First T.: "'Fraid on account of the dog, I s'pose?"

Second T.: "Yes, my trousers are."

First T.: "Your trousers are!"

Second T.: "Frayed on account of the dog."

THE MECCANO BOY'S STAND-BY

THE TUBE OF

SECCOTINE

The World's Great Adhesive. Registered Trade Mark.

WITH it he can mend a thousand things—his bats, balls, boats, boxes, bags, books, &c. He can make numberless things that a boy likes. He can help his mother by mending breakages in house furniture, anything—everything.

NOTE. There is nothing messy about Seccotine. Use the spike or pin supplied to open a new tube—at top of cone—press gently at end of tube (at folded part) for as much adhesive as is needed—then replace spike or pin which acts as stopper. Keep folding tube end as contents are withdrawn. Give mended article adequate time for drying.

TUBES are 4½d. (vest pocket box), 6d. and 9d. each. Sold everywhere.

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7/-	7/9	8/6	9/3	10/-

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3, 4	5, 6, 7	8, 9, 10
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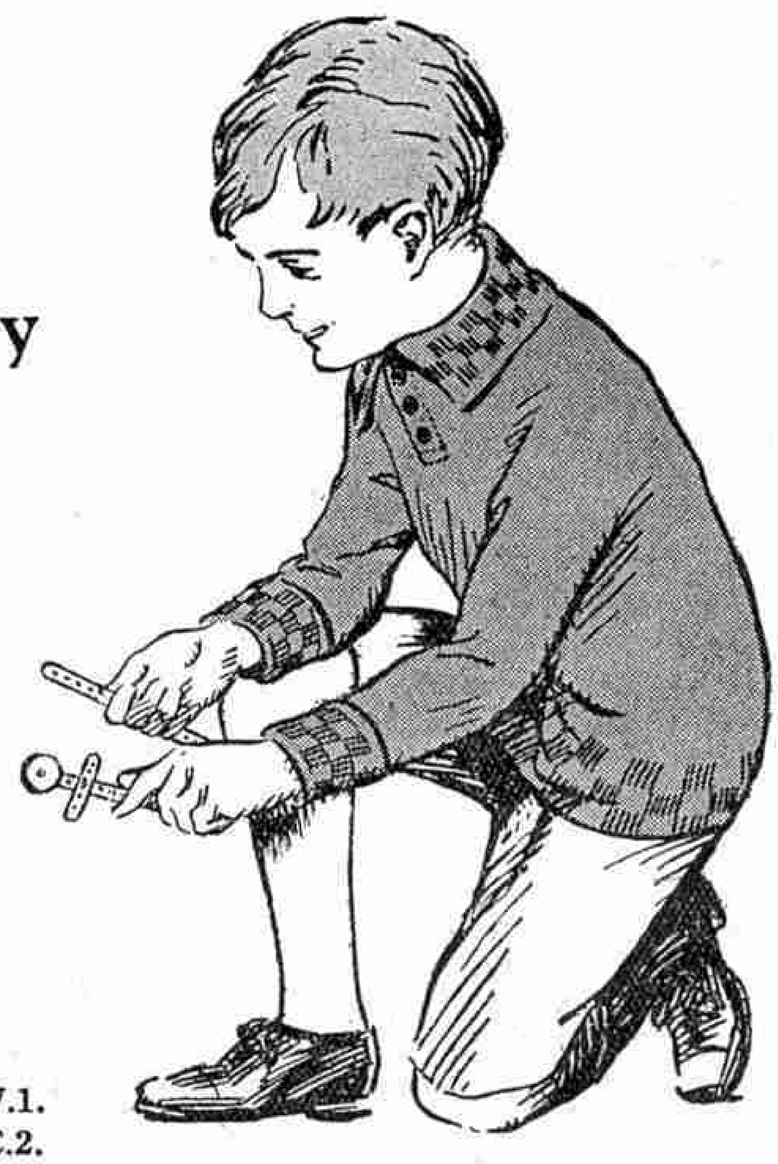

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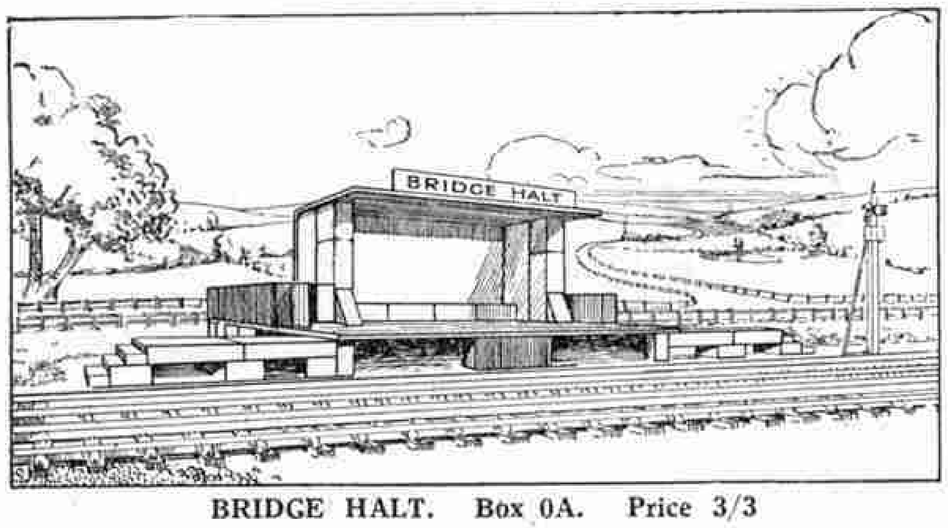

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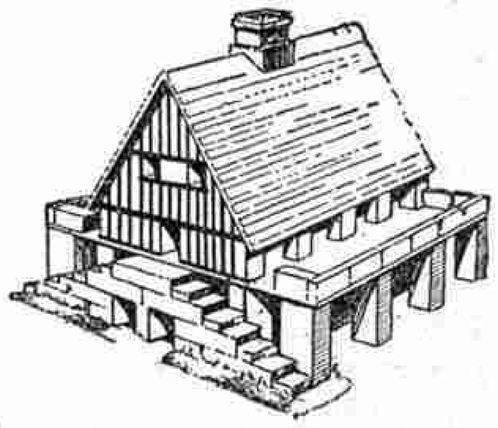

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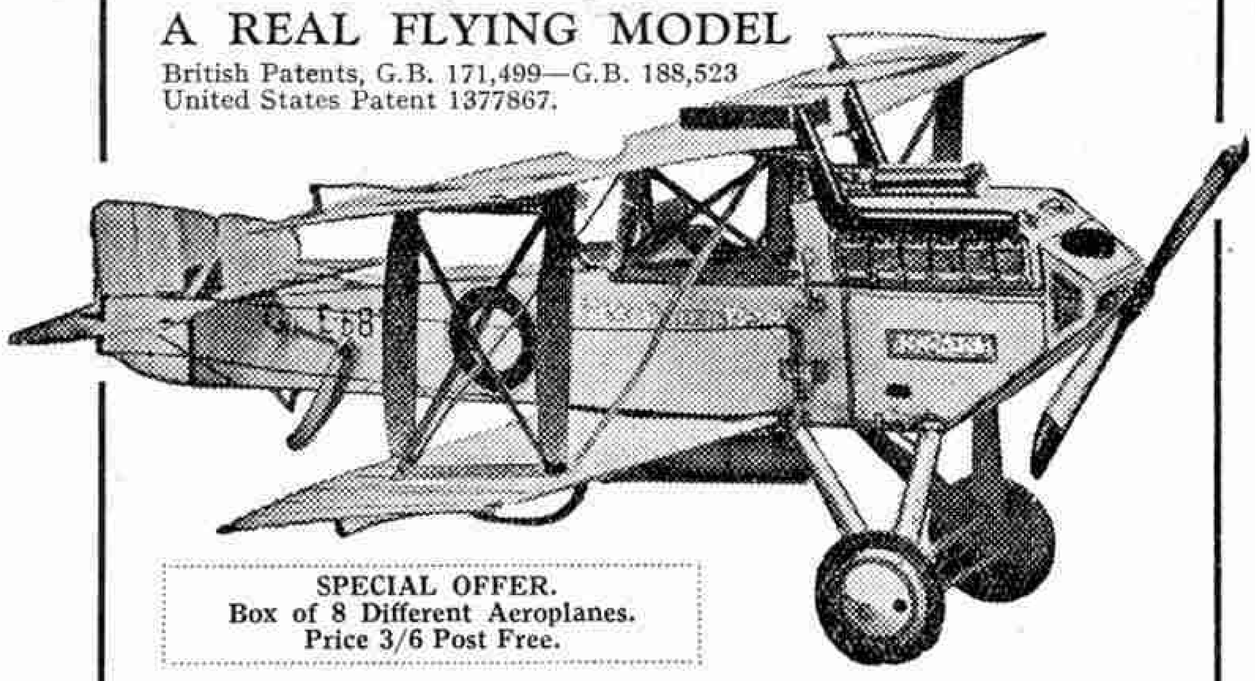

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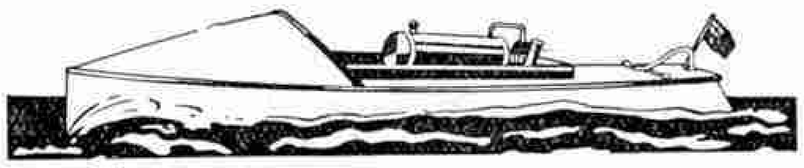

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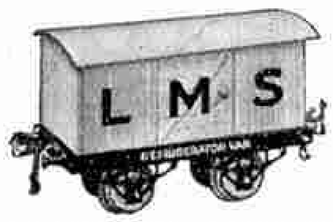

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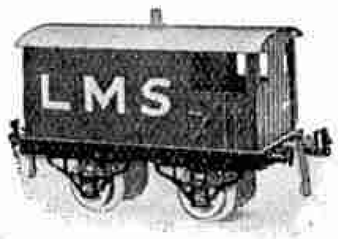

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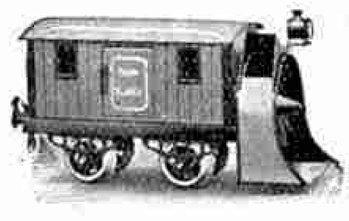

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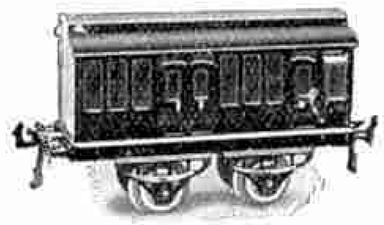

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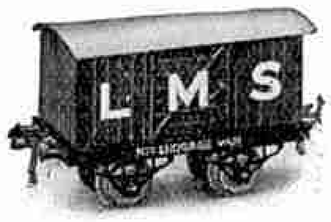

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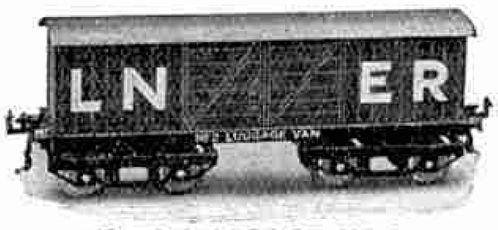

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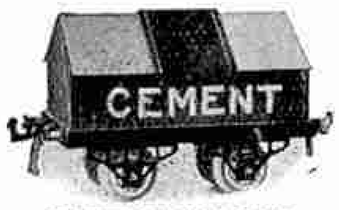

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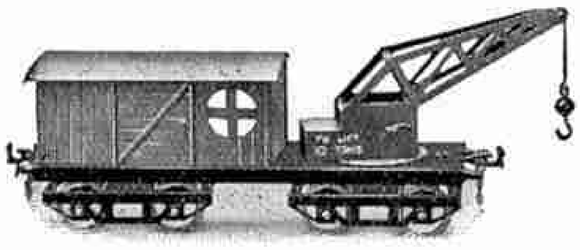

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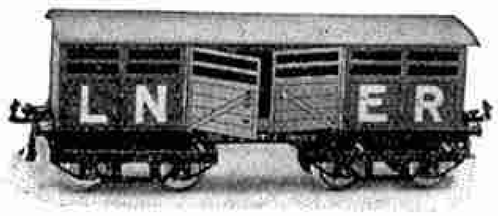

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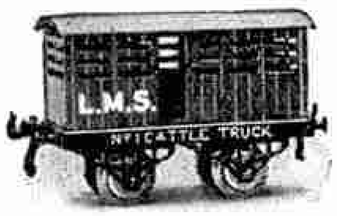

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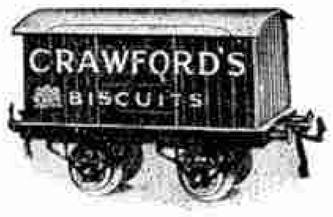

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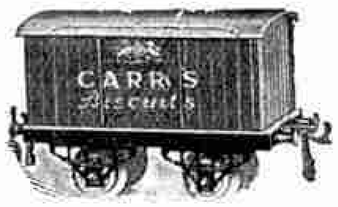

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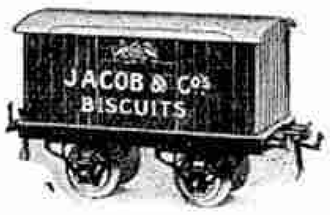

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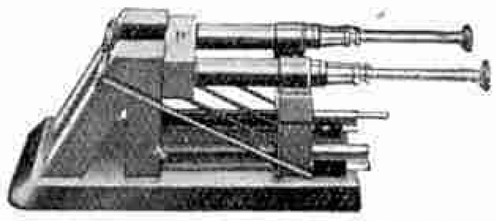

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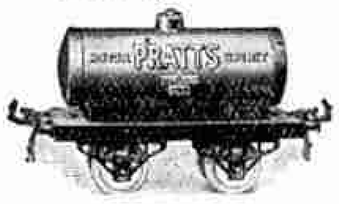

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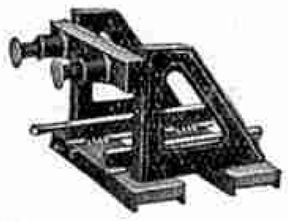

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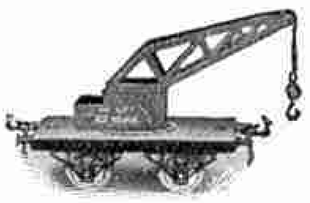

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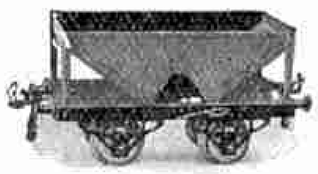
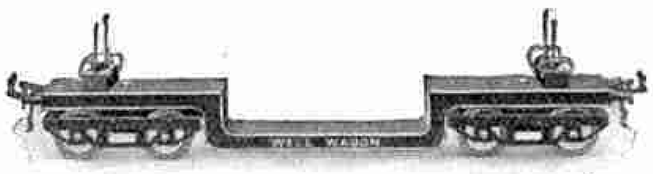
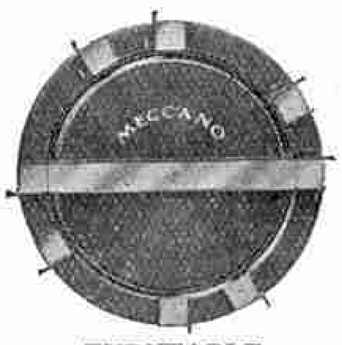


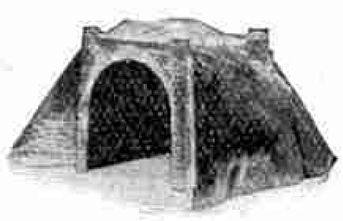
***HOPPER WAGON**
Mechanically unloaded. Finished in grey and black ... Price **4/-**



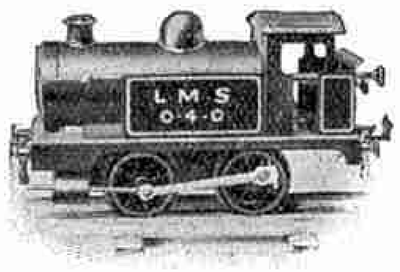
***TROLLEY WAGON**
Finished in grey and red. Suitable for 2 ft. radius rails only ... Price **6/-**



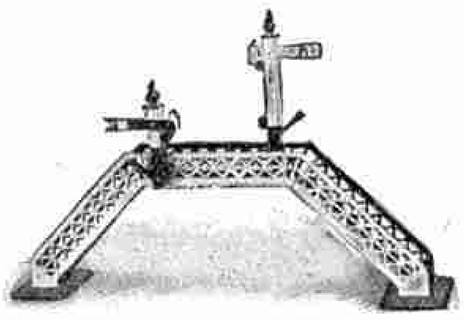
TURNTABLE
Price **5/-**



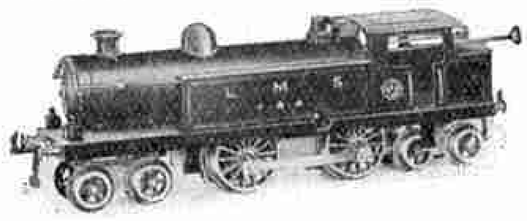
TUNNEL
Realistic and finished in colours ... Price **7/6**



HORNBY No. 1 TANK LOCO
Gauge 0, in colours to represent L.M.S. or L.N.E.R. Companies' locos. Price **12/6**



FOOTBRIDGE
No. 1. With detachable Signals Price **6/-**
No. 2. Without Signals ... ,, **3/6**
Signals only ... ... per pair **2/9**



HORNBY No. 2 TANK LOCO
Beautifully finished in colours to represent L.M.S. or L.N.E.R. Companies' locos. Fitted with reversing gear, brake and governor ... ... Price **30/-**

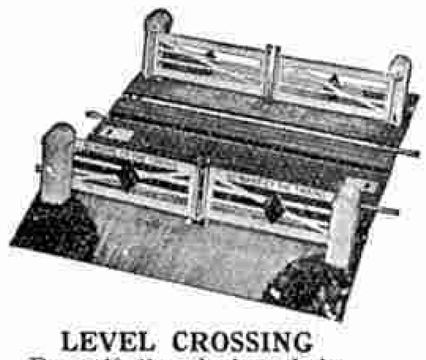
* *Lettered L.M.S. or L.N.E.R.*

ROLLING STOCK AND ACCESSORIES

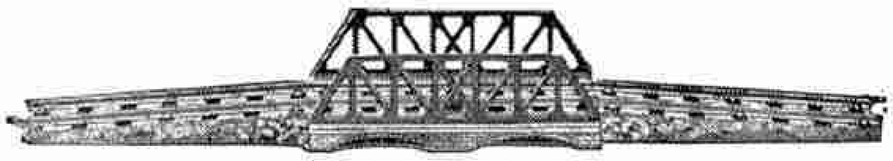
(HORNBY SERIES—*continued*)

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**

RAILWAY STATION. Excellent model, beautifully designed and finished.
Dimensions Length 2-ft. 9-in., breadth 6-in., height 7-in. Price **12/6**

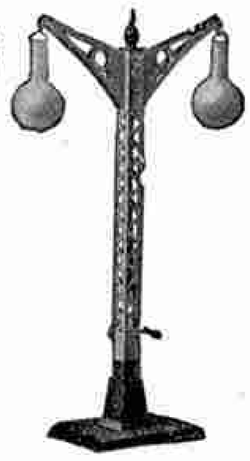


LEVEL CROSSING
Beautifully designed in colour. Measures 11½ × 7½-in. with Gauge 0 rails in position.
Price **6/6**

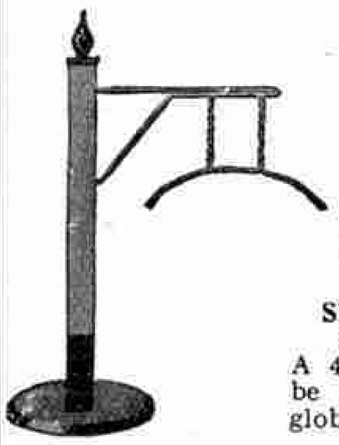


VIADUCT. Price **7/6**
ELECTRICAL VIADUCT. Price **8/-**

VIADUCT (Centre Section on'y) Price **4/6**
ELECTRICAL VIADUCT (Centre Section only) Price **5/-**

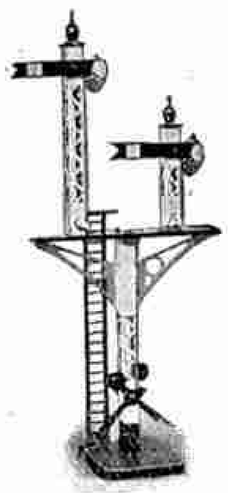


DOUBLE LAMP STANDARD
Four-volt bulbs may be fitted into the globes.
Price **4/-**

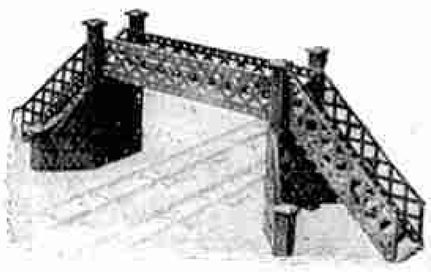


LOADING GAUGE
Price **1/9**

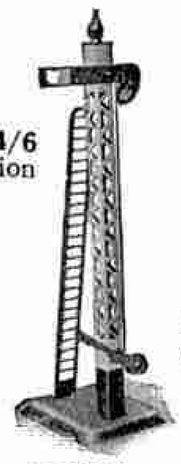
SINGLE LAMP STANDARD
A 4-volt bulb may be fitted into the globe. Price **3/-**



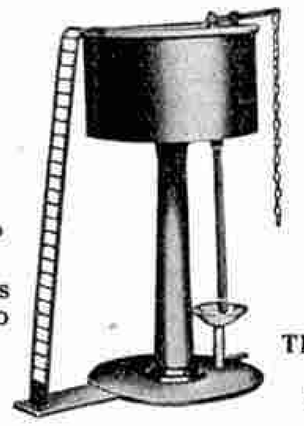
JUNCTION SIGNAL
Signal arms operated by levers at base. Very realistic model standing 14-in. in height.
Price **5/6**



LATTICE GIRDER BRIDGE
Constructional type. Strong and well proportioned.
Price **10/6**

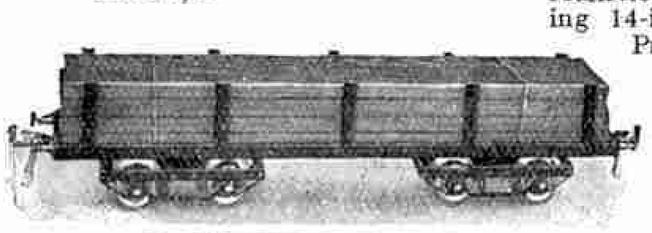


SIGNAL
Price **2/6**



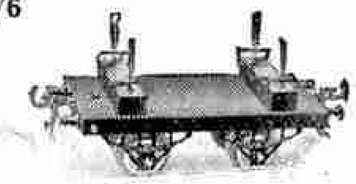
WATER TANK
Brightly coloured in red, yellow and black, 8½-in. in height, with flexible tube and pump lever.
Price **6/6**

TELEGRAPH POLE
Price **2/6**

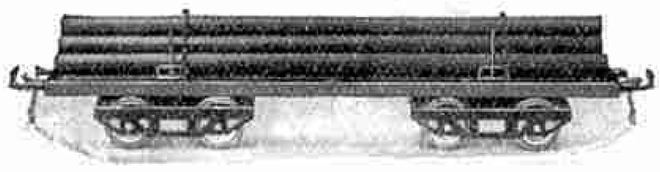


***No. 2 TIMBER WAGON**
Beautifully enamelled in green. Suitable for 2-ft. radius rails only ... ... Price **4/6**

No. 1 TIMBER WAGON
Beautifully enamelled in green.
Price **2/-**



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



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

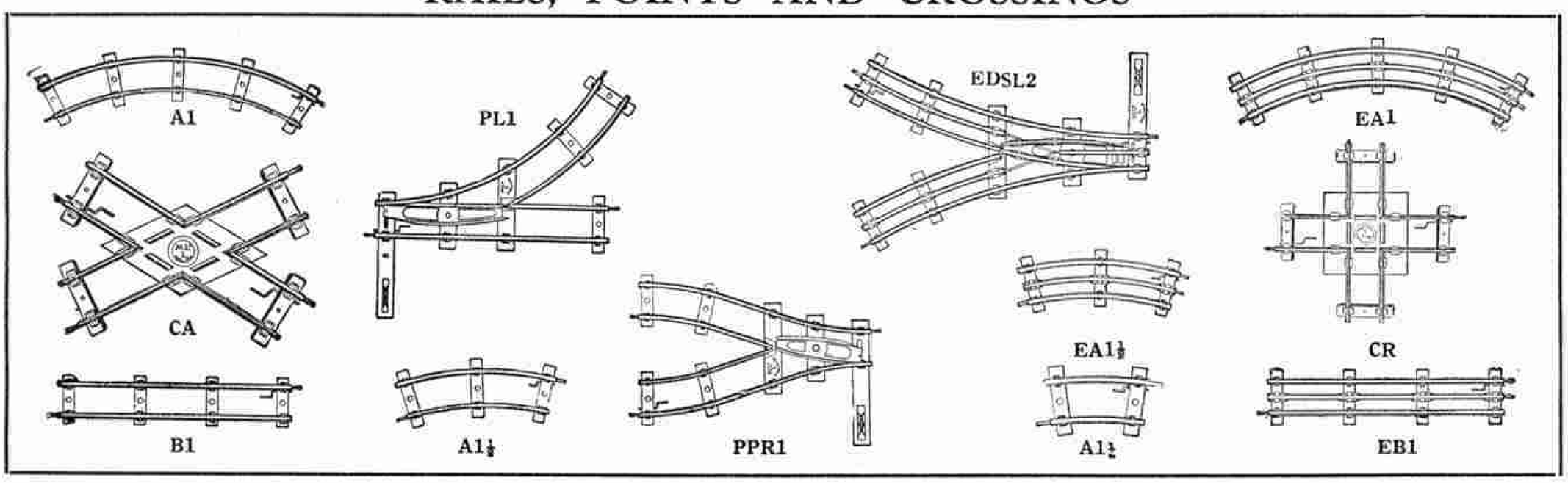
PLATFORM ACCESSORIES
No. 1. Miniature Luggage.
Price per set **2/-**

PLATFORM ACCESSORIES
No. 3. Platform Machines, etc.
Price per set **2/-**

**Lettered L.M.S. or L.N.E.R.*

PLATFORM ACCESSORIES
No. 2. Milk Cans and Truck.
Price per set **2/-**

RAILS, POINTS AND CROSSINGS



Hornby Rails, Points and Crossings are built for hard wear and for smooth running. They are made of the finest materials and hold together rigidly and strongly, for real workmanship is put into them. Note the great superiority both in quality and appearance of the Hornby rails compared with other rails and note also the extra sleepers, giving added strength and steadiness to the track. All Hornby Rails, Points and Crossings are Gauge 0, 1¼", and the Electric rails are fitted with a third rail for collecting shoe.

ASK YOUR DEALER TO SHOW YOU SAMPLES

Meccano & Hornby Train Supplies

All the dealers whose advertisements appear on this page carry full stocks of Meccano Outfits, Accessory Outfits and Meccano parts, Hornby Trains and Hornby Train Accessories all the year round. The names are arranged in alphabetical order of town.

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WIMBLEDON. HARLESDEN.

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ALTRINCHAM.

J. WOODHALL,
256, Grange Road,
Phone: B'head 621 BIRKENHEAD.

MERCER'S DOLLS' HOSPITAL,
68, Darwen Street,
BLACKBURN.

SELLEN'S BAZAAR,
54, Waterloo Road,
BLACKPOOL, S.S.

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BRADFORD.

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opp. Mechanics' Institute, BRADFORD.

JOHN TAYLOR,
28, Preston Street,
Tel.: Brighton 957 BRIGHTON.

GYLES BROS. LTD.,
Tel. 2888 24, Bridge Street, BRISTOL.
188, Whiteladies Road, Clifton, BRISTOL.
Tel. 143

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CARDIFF. SWANSEA.

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4, High Street, CARDIFF.

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HAROLD HUNT,
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A. M. HARRIS,
"Wilces Toy Shop,"
14, High Street Arcade, CARDIFF.

H. W. GILL,
23 & 24, Pittville Street,
CHELTENHAM SPA.

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PURSEY & MOCKRIDGE,
The Sports Outfitters,
Tel. Dartford 173 DARTFORD.

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RATCLIFFES TOYERIES,
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DERBY.

C. E. MELLER,
"Dolls' Hospital,"
DONCASTER.

JOHN ARCHIBALD,
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DRAFFEN & JARVIE LTD.,
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(Opposite the Cricketers) GILLINGHAM.

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GLASGOW.

CLYDE MODEL DOCKYARD,
22-23, Argyll Arcade, GLASGOW.
Model Makers to the Admiralty, the Railway Coys., etc.

POLLOCK & CO., 36, Bridge St. and
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and 39, Paisley Rd. West, GLASGOW.

FLETCHER'S TOYLAND,
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Grand Building, RAWTENSTALL.

HAMMOND'S LTD.,
Paragon Square,
HULL.

SMITH & DANIELS,
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W. J. S. CARPENTER,
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LEEDS.

PEARSON & DENHAM (PHOTO)
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LEEDS.

ROBOTHAM,
"Baby's Kingdom,"
Tel. 4809 LEICESTER.

LLOYD & SON,
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BYCROFTS EMPORIUM,
366, High Street,
LINCOLN.

C. LUCAS, Hobbies Depot,
35, Manchester Street,
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Reliance Cycle & Motor Co.,
29/31, Manchester St., Liverpool.
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THE ARUNDEL CYCLE & MOTOR
STORE, 52, Church Road,
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Estab. in 1840 269/271, Rye Lane,
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F. R. POTTER & SON,
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LOUGHBOROUGH.

H. G. PARTRIDGE & CO.,
10, Chapel Street,
Tel. 234 LUTON.

Meccano & Hornby Train Supplies

The twenty-two dealers whose advertisements appear on this page carry full stocks of Meccano Outfits, Accessory Outfits and Meccano parts, Hornby Trains and Hornby Train Accessories all the year round. The names are arranged in alphabetical order of town.

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Tel. City 165 MANCHESTER.

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R. SCUPHAM & SONS,
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DIBBS' DOLLIES' HOSPITAL,
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ALFREDS, TOY SHOP,
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WILLIAM OLLIFF,
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THE OXFORD SPORTS DEPOT,
117, St. Aldates',
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JANES & ADAMS,
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39-41, Broad Bridge Street,
Tel. 374 PETERBOROUGH.

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78, Yorkshire Street,
ROCHDALE.

A. J. TINKER,
20, London Road,
SHEFFIELD.

WILSON, GUMPERT & CO. LTD.,
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Tel. 489 SHEFFIELD.

BIRMINGHAM & COVENTRY
CYCLE CO., 140 & 151, Above Bar,
SOUTHAMPTON.

OSBORN & CO.,
9, High Street,
SOUTHAMPTON.

S. T. SIMPSON & SON,
589-595, Lord Street,
Tel. 999 SOUTHPORT.

TAYLOR BROS.,
Great Underbank,
Tel. 630 STOCKPORT.

SPORTS HOUSE WOKING & WEYBRIDGE.

STAMP PERFORATION GAUGE
Stamp collectors will find this card extremely useful in enabling them instantly to find the size of perforation of any stamp. Price 1d. (post free) from the Editor, "*M.M.*"

Don't Do This!

Don't carry the milestones on your mind. Fit a

VEEDER CYCLOMETER

on your Bicycle and let it register the miles for you.

You can rely on its accuracy.

REGULAR 6/6
TRIP 15/-

Insist upon a genuine VEEDER

See our name thereon.

BEWARE OF GERMAN IMITATIONS.

Mend your Punctures while you Ride

FORGET TYRE TROUBLE
and go care-free on your way. Tubes treated with our IMPERVO increase the joys of your Cycle.
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The frame is rust proofed, enamelled Black & Coach lined (or All Black if desired). Lady's or Gent's Model. Carriage Paid **£6:0:0**
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"Vindec" Model "M" complete with Dunlop Tyres :

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The Bicycle with the Keystone Transfer.

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21/-

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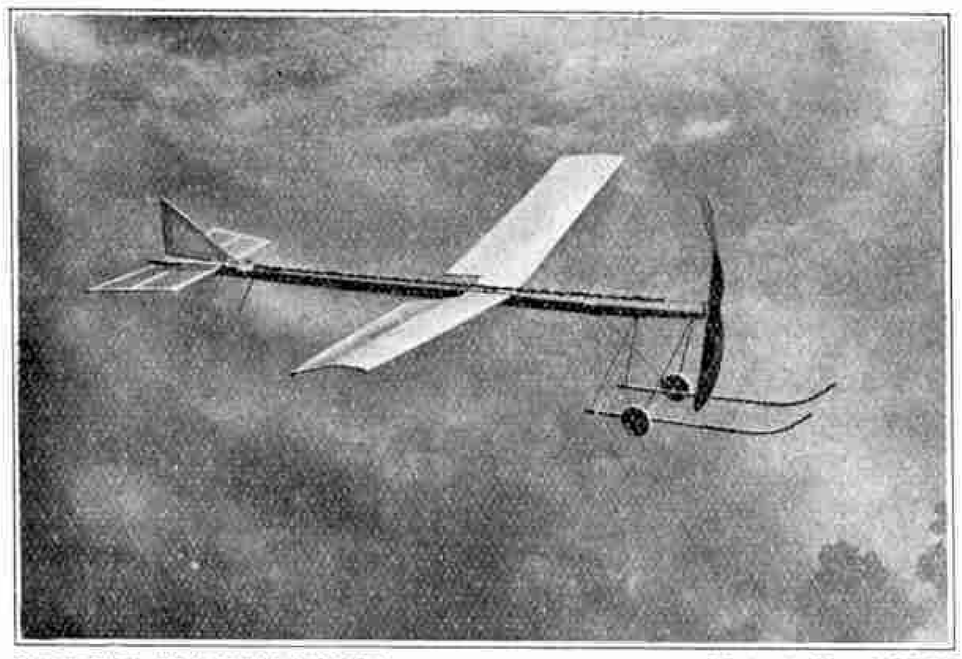
London : 9, Phœnix Place, Mount Pleasant, W.C.1.

Hurrah for the Holidays !

The "Skisail" Flying Model Tractor Monoplane



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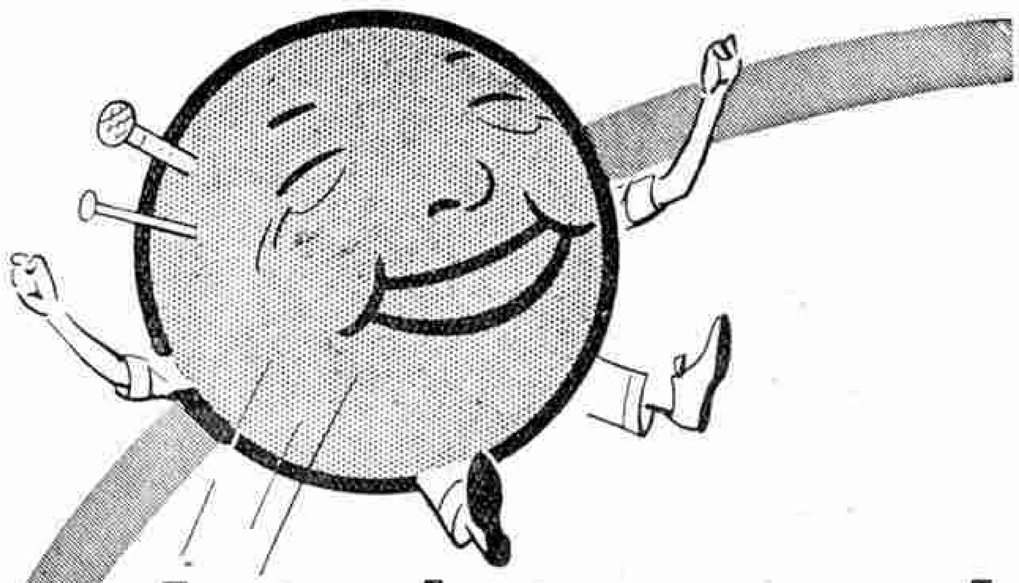
GUARANTEE. These models show perfect stability in flight and all sizes are guaranteed excellent flyers. They are easy to handle and are thoroughly reliable. Best workmanship throughout.

SPECIFICATION. Silver Spruce Fuselage. Birch Propeller. Planes covered with best proofed silk. Patent Collapsible Chassis. Aluminium Wheels.

No. 1.	Approx. Flight	350 yds.	Price	15/6
,, 2.	,, ,,	250 ,,	,,	10/6
,, 3.	,, ,,	200 ,,	,,	8/6
,, 4.	,, ,,	150 ,,	,,	6/6
,, 5.	,, ,,	100 ,,	,,	4/6

Nos. 1, 2 and 3 fitted with landing skids.
Packed in cardboard box with full instructions.
Postage 6d. Orders for two or more carriage paid.
Can be obtained from "Meccano" Dealers, or send P.O. direct to

PATENT MODEL MANUFACTURERS
159, Lymington Avenue, Wood Green, London, N.22



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(Post Free)

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"REGATTA" RACING YACHTS

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The yacht is beautifully enamelled and lined in attractive colours and is guaranteed to sail. Other yachts from 3/6 upwards.

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21/– 27/6 35/– 60/–

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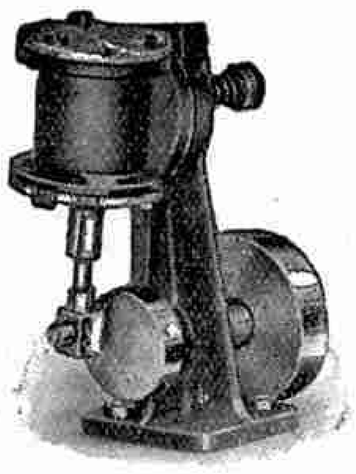

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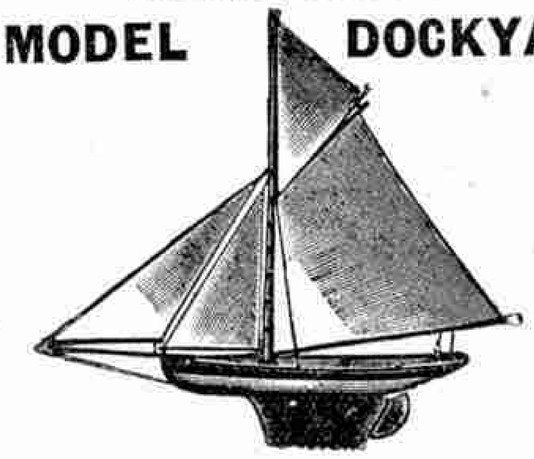

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Telegrams: "Meccano, Liverpool."

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.

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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 not 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.

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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 6d. per copy, or mailed (post free) direct from Liverpool, 4/- for six issues, or 8/- 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.

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AUSTRALIA: Messrs. E. G. Page & Co., 52, Clarence Street, Sydney, N.S.W.
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SOUTH AFRICA: Mr. A. E. Harris (P.O. Box 1199), Textile House, Von Brandis St., Johannesburg.

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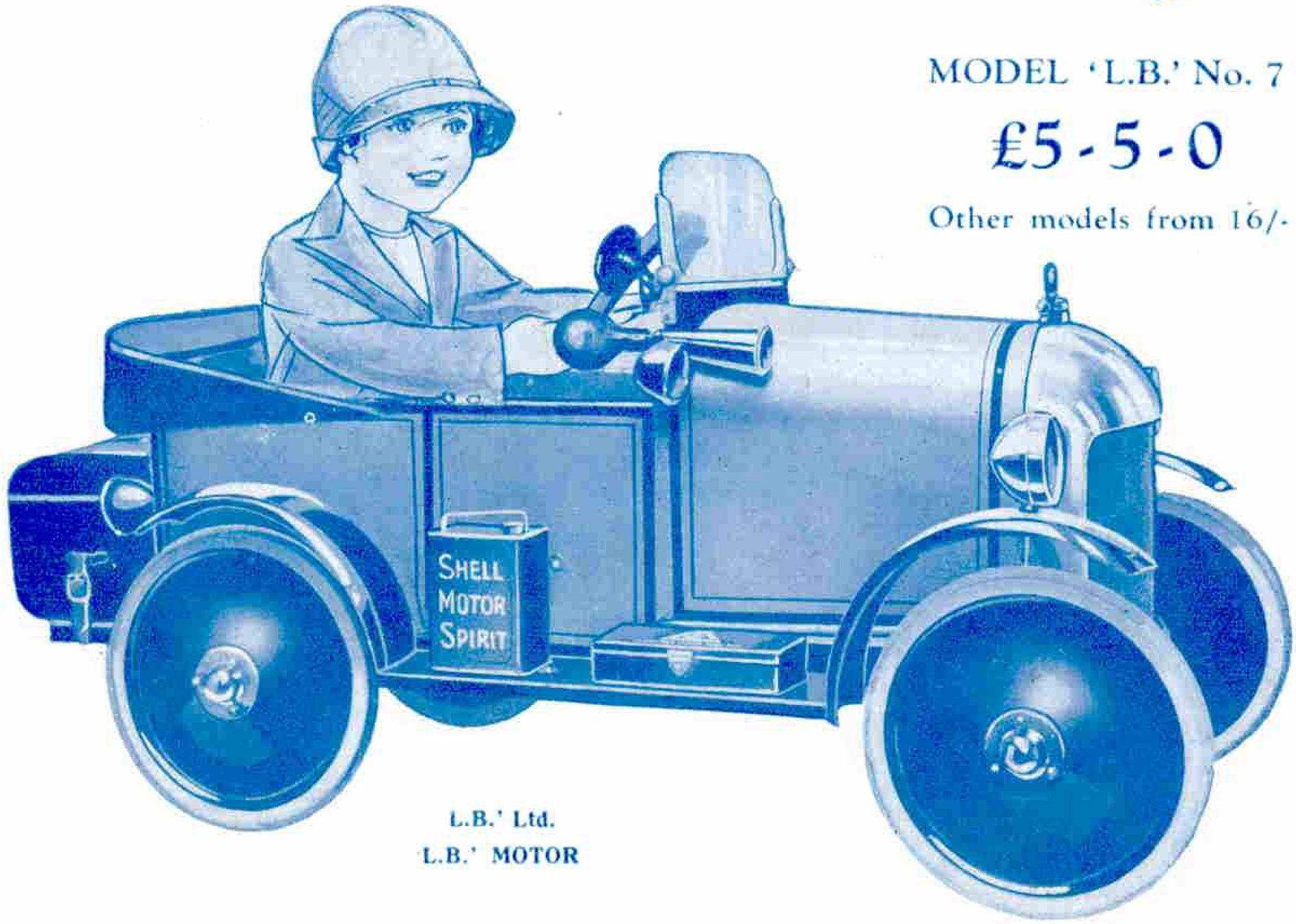

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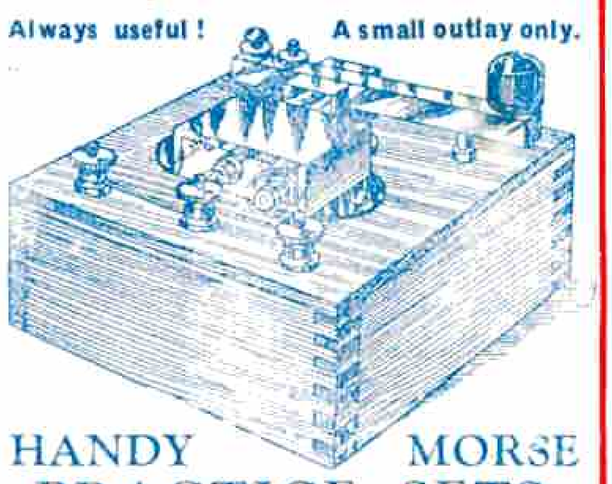

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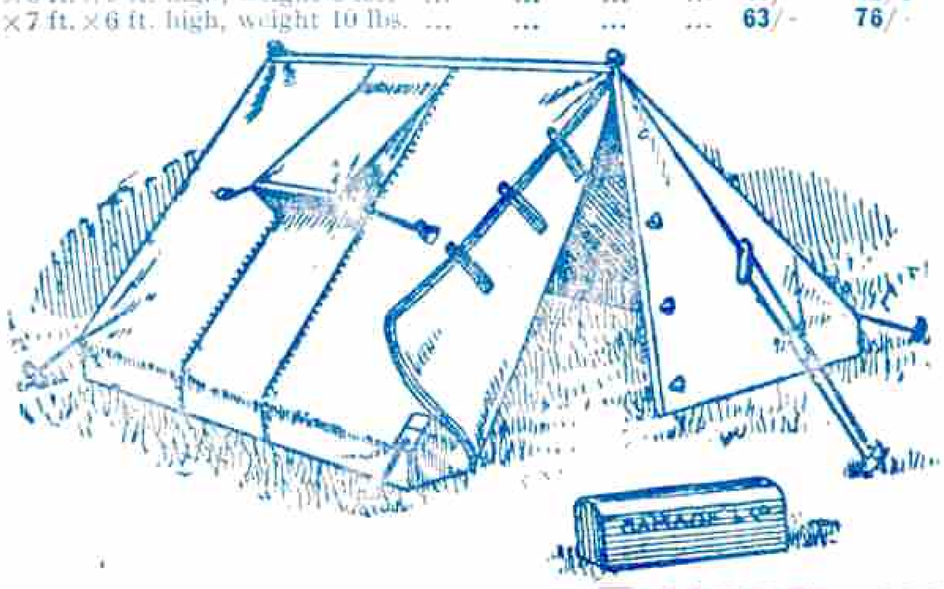

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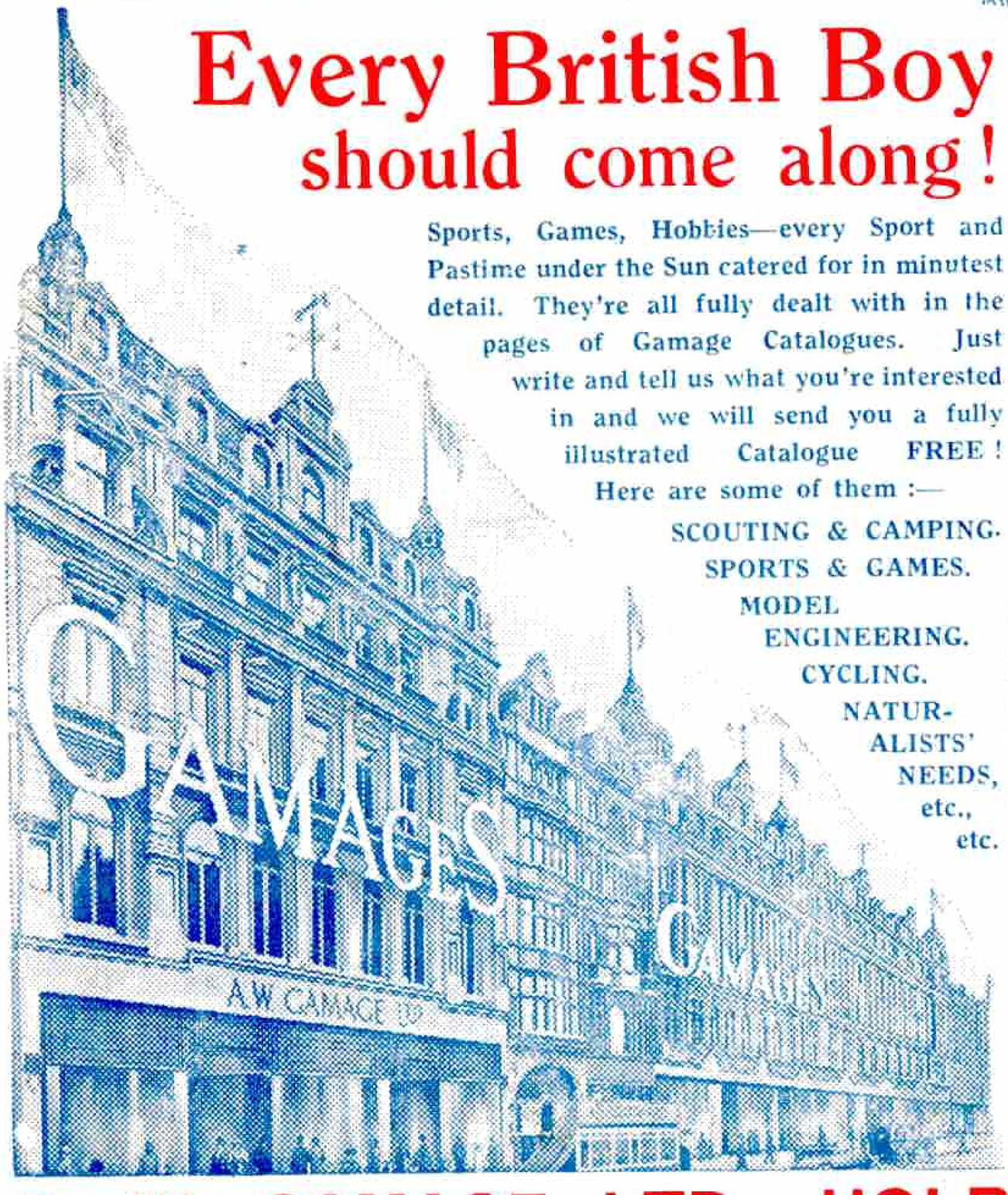

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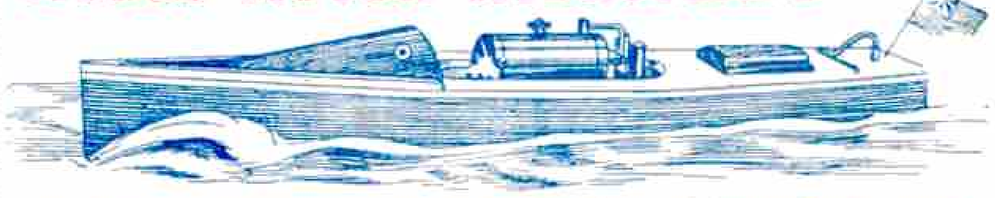

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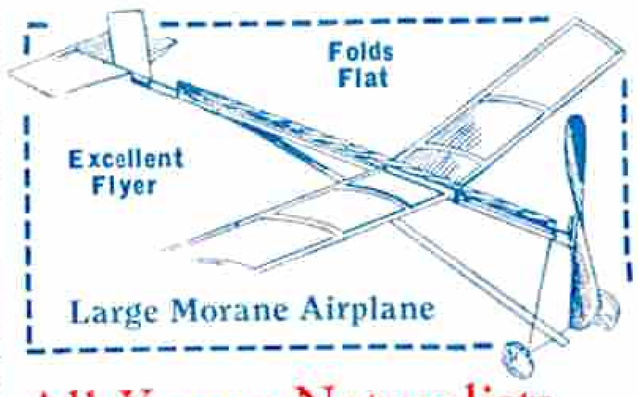

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