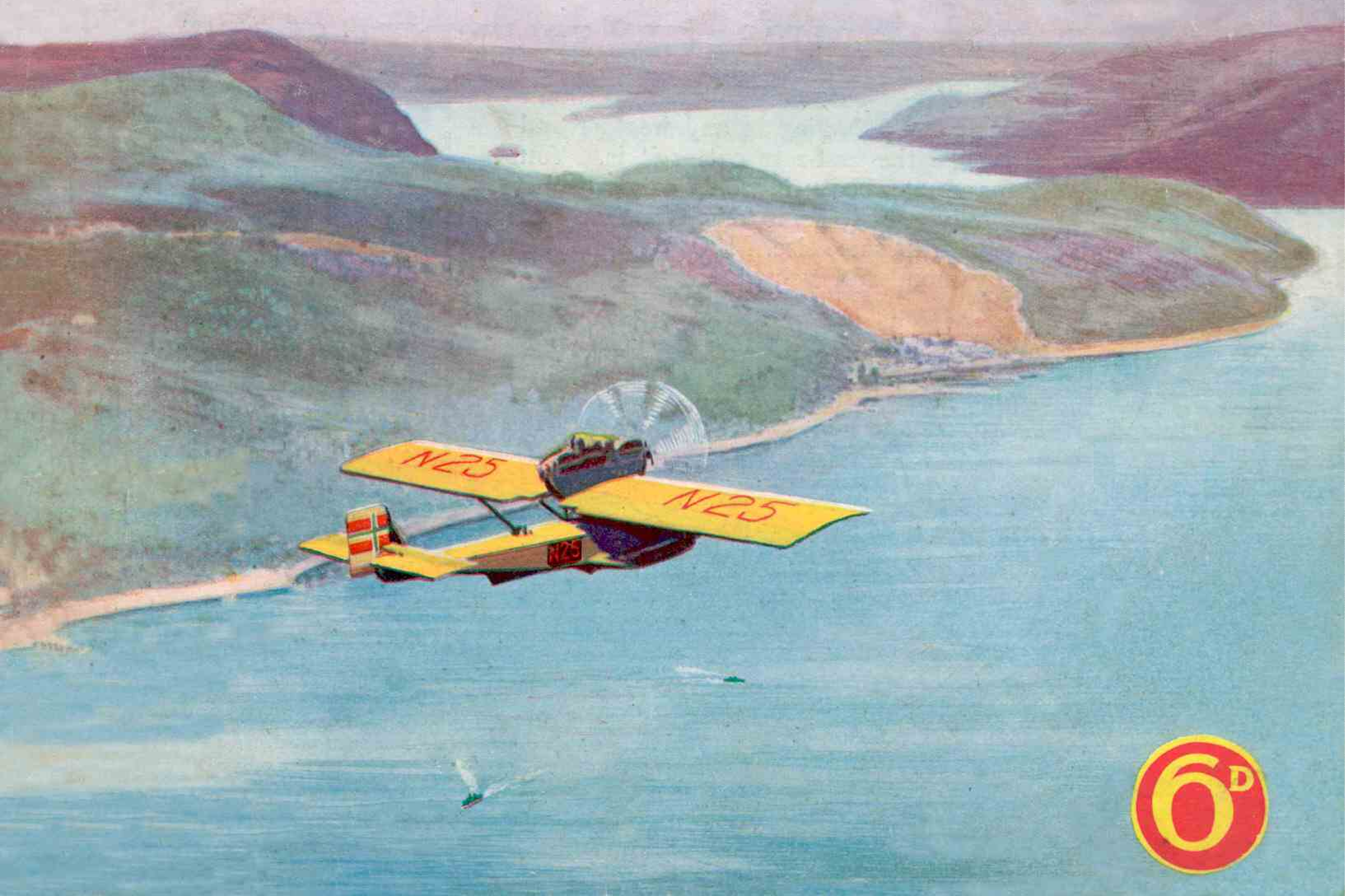
VOL. XI. No. 6 JUNE 1926

MECCANO MAGAZINE



6D

Here's what you want for the holidays.

Hobbies

HOBBIES
LATEST BRITISH
MODEL YACHT

JUST
LOOK
AT THE
PRICE!

THE "ACE" RACER

PROVIDES HOURS OF SPLENDID SPORT

Here's a top-hole little yacht. It won't sink, it won't turn over; it comes up smiling in any weather and rides the water like the first-rate cutter it is. You couldn't wish for a better boat; it is built correctly and finished beautifully. Just compare its price, too, with any other boat the same size. It is worth double the price—really wonderful value!

AN ALL-BRITISH YACHT YOU CAN BE PROUD OF

Being made by Hobbies the Ace is a real good boat. It is correctly designed and well built so you can set the sails for running, reaching or beating just as any yachtsman would. The mast can be taken out and laid on the deck when the boat is to be carried. The sails are white linen, correct in dimension and strongly lashed.

SPECIFICATION

The deck is 14½ ins. long and the boat 18 ins. high. The hull is finished two colours of bright enamel and the deck lined for planking. The mast and spars are painted aluminium colour. The running lines are all good water cord, and the bowsies of leather, so that dampness will not materially affect either.

ORDER ONE ON THIS FORM

Fill in your name and address, enclose a Postal Order for 4/- to cover cost of boat, packing and postage, and send in an envelope to Hobbies Ltd. (Dept. 96), Dereham, Norfolk.

.....

.....

.....

ONLY **3/6**

Postage 6d. extra

Call at a Hobbies Branch at:—65, New Oxford St., W.C. 147, Bishopsgate, E.C. 79, Walworth Rd., S.E. 326, Argyle St., Glasgow. 10a, Piccadilly, Manchester. 9a, High St., Birmingham. 214, West St., Sheffield. 89a, Woodhouse Lane, Leeds. 25, Bernard St., Southampton. 68, London Rd., Brighton,

OR SEND DIRECT THE ORDER FORM HEREWITH TO

HOBBIES LTD. (Dept. 96), DEREHAM, NORFOLK

FREE FLIGHTS FOR "M.M." READERS IN DE HAVILLAND "MOTH" LIGHT AEROPLANES—see p. 384

MECCANO MAGAZINE

Editorial Office
Binns Road
Liverpool

Vol. XI. No. 6
June · 1926

With the Editor

Our Cover

The subject of our picturesque cover this month is the N. 25, one of the Dornier-Wal seaplanes that took part in Amundsen's Polar Flight last year. The historic machine is shown flying above Oslo Fjord, and the Polar flight itself is described in a special article in this issue.

By the courtesy of one of the members of the expedition we are able to reproduce photographs taken during the expedition. At the time of writing, Captain Amundsen has just been successful in flying over the North Pole in the airship "*Norge.*" There are many interesting features about this Arctic flight, which may result in very important developments, and we hope to refer to it again in greater detail in some future issue. Next month, we shall describe the wireless equipment of the "*Norge,*" which equipment it is interesting to know, is of British manufacture.

The Exploration of the Arctic

There is no more thrilling account of splendid perseverance and brave endeavour than that contained in the annals of Arctic exploration, and as I feel sure my readers will be interested in this subject I am now preparing a series of articles that will briefly describe the attempts of British explorers to reach the Pole.

Until recently, of course, the efforts of explorers were confined to the use of ships and sledges, but now, with the entry of the aeroplane and the airship into this field, Polar explorers of the future have the scope of their activities considerably widened and the possibilities of useful work are largely increased. Motor sledges, too, are being developed, more particularly by the French, for use in Arctic exploration. The suggestion has recently been made that there should be established 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 these observations, in conjunction with meteorological information, 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. This would be a factor of great commercial value to the shipping industries of all nations using the North Atlantic—to say nothing of the farmers and holiday makers!

Free Aeroplane Flights for "M.M." Readers

There are invariably hundreds—and often thousands—of entries for every Competition announced in the "*M.M.,*" but I have no hesitation in forecasting that the record of even our most popular contest will be beaten—and well beaten—by the competition announced this month.

I feel sure that the arrangement that has been made with the de Havilland Aircraft Co. Ltd., for a series of free flights for "*M.M.*" readers in the famous "Moth" aeroplanes, will appeal to every one of my readers—even to the grown-ups, of whom there are a very considerable number, as the contents of my mail bag constantly testify!

The conditions of the Competition are as simple as I can make them, and thus every reader will stand an equal chance of winning one of the much coveted flights. The winner will be entitled to a 50-mile out-and-home flight, in any direction he chooses—except upwards! I look forward to the great day in August or September next when the "prizes" will be awarded and the prize-winners experience the splendid thrill of taking the air for the first time.

(Full particulars of this unique Competition on page 384).

World Wide Scenes at our Firesides

One of the most fascinating of wireless problems, that of "television" or seeing by wireless, is receiving an increasing amount of attention. Although a considerable time must elapse before television is brought to such perfection that we shall be able to see broadcast events as well as we can now hear them, some remarkable results are promised in the near future. Inventors are busy in Europe and America attacking the many problems that this new development presents, and a well-known expert has recently stated that sooner or later some really practical means will certainly be found by which we shall be able to see broadcast events by wireless transmission.

Last year photographs were sent by wireless across the Atlantic and more recently photographs have been transmitted by an apparatus so simple that anyone can work it without special experience. At present the processes are slow and the sending of a single picture requires several minutes, but recently an invention was mentioned in the "*M.M*" by which over 3,000 words a minute may be transmitted by wireless telegraphy. If this invention can be applied to the transmission of pictures by wireless, then one of the great difficulties in the way of television will have been overcome.

It is quite evident that some inventors have got well ahead with their work, for recently an application was made to the Postmaster General for permission to establish television broadcasting stations! Thus, the time may be not far distant when we shall not only hear a great operatic star at Covent Garden, but actually see the singer, and be able to watch his or her movements at the same instant. We can easily allow our imagination to run riot with the possibilities presented by such an invention. For instance, the time may come when, seated by our fireside, we can ring up the Post Office and ask to be put through to Australia, and so enjoy watching a test match on the television screen above our fireplace, at the same time listening to the ruling of the umpire or to the applause of the spectators as someone scores a boundary! Bull fights in Spain; earthquakes in Japan; the building of a new bridge in America; an attempt to reach the Pole in the Arctic—all these and other incidents may be made instantly available to us by television. Truly we live in wonderful times. Every day the world grows smaller and the barriers separating nations are broken down.

Obtaining the "M.M."

I understand that some of my new readers continue to experience difficulty in obtaining the "*M.M.*" through their newsagents. There should be no difficulty whatever about this, and if at any time your newsagent cannot obtain supplies from his wholesaler ask him to write to me, and I will arrange to supply him direct.

In any case, the Magazine is stocked by all Meccano dealers and there is at least one Meccano dealer in every town, so there should be no difficulty whatever in obtaining the "*M.M.*" regularly on the 1st of each month.

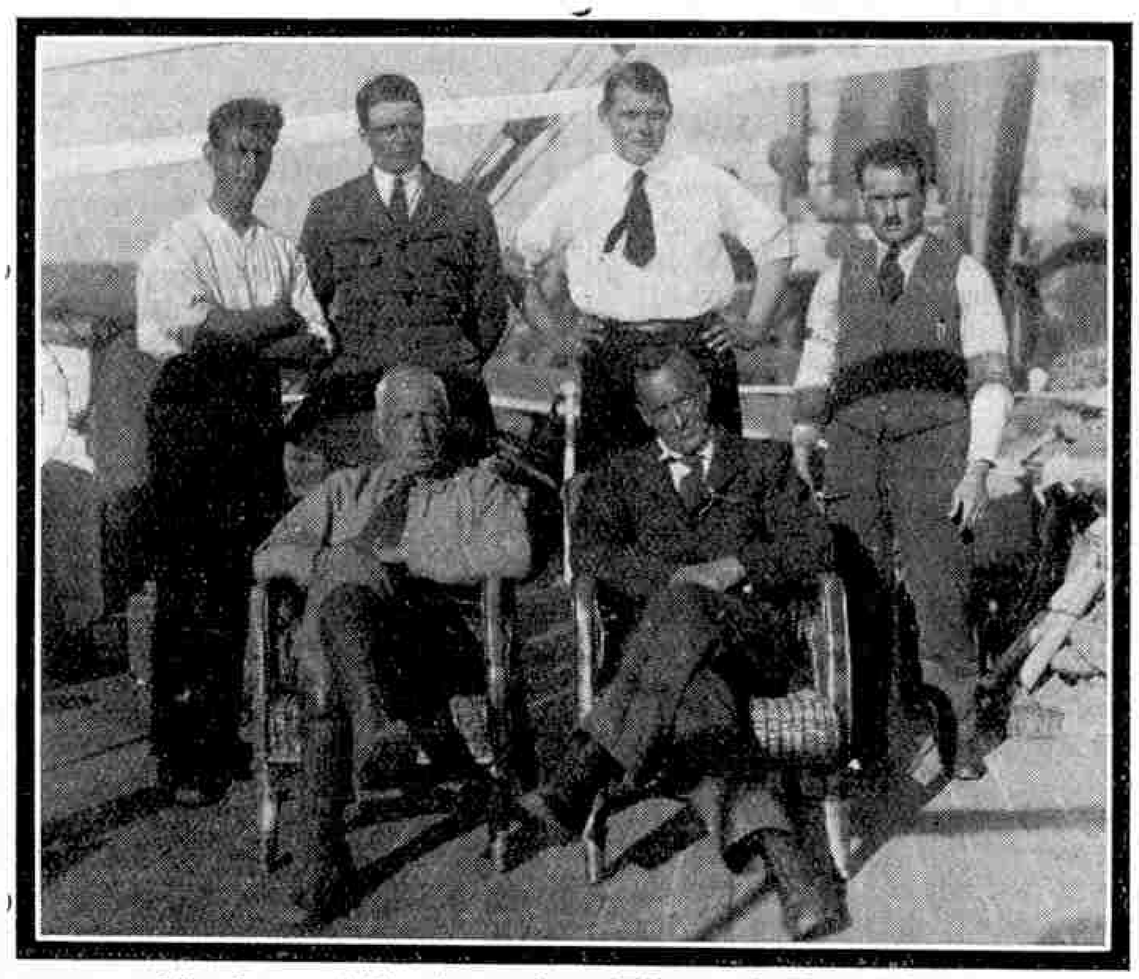
Polar Exploration by Air

AMONG the many beneficial uses arising from the invention of the aeroplane and the development of the dirigible, not the least is the fact that they promise to be of the greatest service to explorers in general and polar explorers in particular.

After the tragedy of Andrée's balloon flight in 1897 (which we hope to describe in some future issue) it was some time before steps were again taken to explore the polar regions by air. A flight from inhabited land to the Pole and back again is at present impossible, but more than one explorer has taken an aeroplane or small airship with him, and sailed into the regions of perpetual ice with it on board.

Although Nansen, in the accounts of his polar explorations, repeatedly expressed a wish that he could have had wings in order to overcome the numerous icebergs that guard the pole, Amundsen—the first man to reach the South Pole, just before the fatal expedition of Scott arrived there—seems to have been the first to actually make use of the aeroplane for polar exploration.

The Wrights had scarcely made their first flights, when Amundsen—who, incidentally was one of Nansen's assistants—contemplated using an aeroplane for polar exploration. He undoubtedly would have taken one in the "*Fram*" in his expedition of 1909, but the initial cost was too great. In 1914 he had actually arranged to take with him a Farman biplane mounted on skis, but he was disappointed for, owing to the outbreak of the War, the expedition had to be abandoned.



Members of the Amundsen-Ellsworth Expedition
Who flew into the Polar regions. Amundsen is seen seated on the left

The First Aeroplane in the Arctic

Meantime, the War had a beneficial effect in that it considerably developed the aeroplane. In 1922 Amundsen set sail on the "*Maud*" taking with him a small Curtis Scouting-Plane and a Junkers all-metal monoplane, which latter machine at that time held the duration record with a flight of 27 hours. His hopes were again doomed to disappointment, however, for an accident in the following year, by which the Junkers machine damaged its undercarriage in landing on the ice, made it useless. Unfortunately the Curtis machine also crashed when landing on the ice, although not before two flights had been made over the drift ice.

Last year Amundsen tried again and this time was somewhat more successful. He left Tromso with the motor-ship "*Hobby*" carrying two Dornier-Wal seaplanes, and the "*Fram*" with the personnel of the expedition on board. The ships made for King's Bay, Spitzbergen, and here the aeroplanes, which were stored in huge packing cases, were unpacked and assembled.

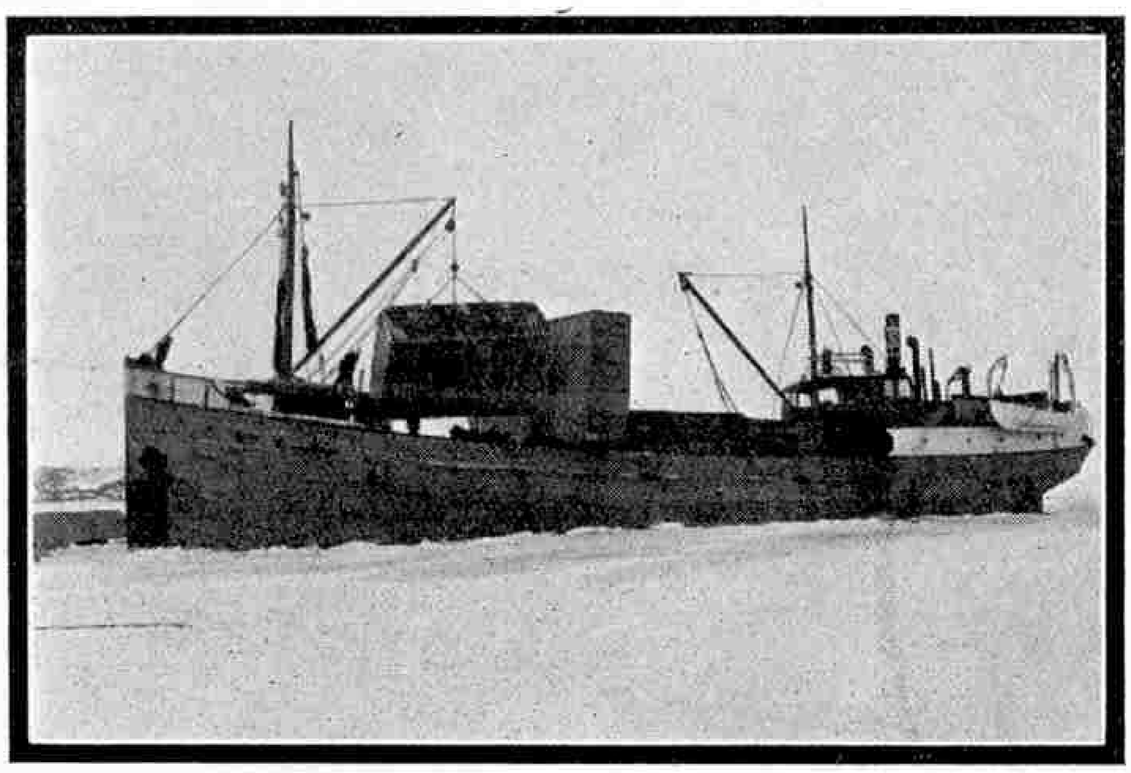
Our cover illustration this month shows one of the machines in a trial flight over Oslofjord before being dismantled for shipment on the "*Hobby*."

The Dornier-Wal Flying Boats

Although no difficulty was anticipated in landing the seaplanes in the Polar regions, it was decided to use two machines, so that the expedition would not necessarily have to be abandoned if one machine should be damaged or if the engines of one should fail.

The Dornier-Wal machines were fitted with 720 h.p. Rolls-Royce Eagle IX. twin engines, mounted in tandem —that is to say, one behind the other. Thus each machine had a "tractor" propeller and a "pusher" propeller, each revolving in an opposite direction. Either engine, working alone, was capable of at least maintaining the 'plane in the air.

The machines themselves were constructed of duralumin throughout. They were so well designed that although specified to lift only 2,500 kilos. they could actually lift a weight almost equal to their own, which was 3,300 kilograms (7,276.5 lbs.) When they took the air, on their flight to the north, they were each called upon to lift in addition to their own weight, 3,100 kilograms (6,835.5lbs.), which included, of course, petrol and the water in the radiators.



Unloading the seaplanes from the "*Hobby*" at Spitzbergen

When the machines had been assembled, and when the Rolls-Royce engines were running satisfactorily, final preparations were made for the flight to the Pole. In addition to carrying medicines and sufficient provisions for a month, each machine had also a collapsible boat, a small sledge, a tent, and a variety of tackle that might be required on the ice.

The Flight Commences

All preparations having been completed, the flight was commenced at 4 p.m. on the 20th May 1925. Six members of the original expedition took part in the flight, three members being accommodated in each 'plane. The N.24 carried Ellsworth in the observer's seat, Dietrichson as pilot, and Omdal as engineer, whilst N.25 carried Amundsen, Larsen, and Feucht in similar capacities.

One of the wings of N.24 about to be fitted

With the engines running at 1,800 revolutions per minute, N.25 took the air first and got safely away. N.24 was not so fortunate, however, for in taking off she sheared some rivets in the bottom of the boat, an accident that was undoubtedly due to her being overburdened by the great weight she was carrying. Realising that something was wrong, the pilot did a quick piece of thinking as a result of which he decided to carry on, believing that if he did not do so the N.25 would certainly turn back and probably the whole expedition would have to be abandoned.

The route lay up the coast to the west of Spitzbergen, and at first a heavy mist made it necessary to fly at an altitude of over 3,200 ft. above the clouds. Soon after the start the two machines established contact, however, and flew towards the polar regions side by side.

Landing on the Ice

In this manner the flight continued for eight hours at an estimated speed of 87 miles per hour. Flying at this speed in calm air should have brought the expedition almost to the Pole, had it been possible to fly in a direct line. But strong winds and air currents drove the machines out of their course, causing considerable variations in the original plan so that, after flying for several hours until half the petrol had been used, N.25 decided to land on the ice. Narrowly escaping disaster by colliding with a mountain of ice, the machine became wedged in the ice.

N.24 Abandoned Fast in the Ice

After N.25 had landed (in what subsequently turned out to be Lat. 88° 30′ N) N.24 cruised around and chose a landing placed about a mile distant from N.25. In view of the damage his machine had sustained at the start, the pilot of N.24 decided to land on the ice, for he thought that if he landed on the water it would flood in through the damaged casing.

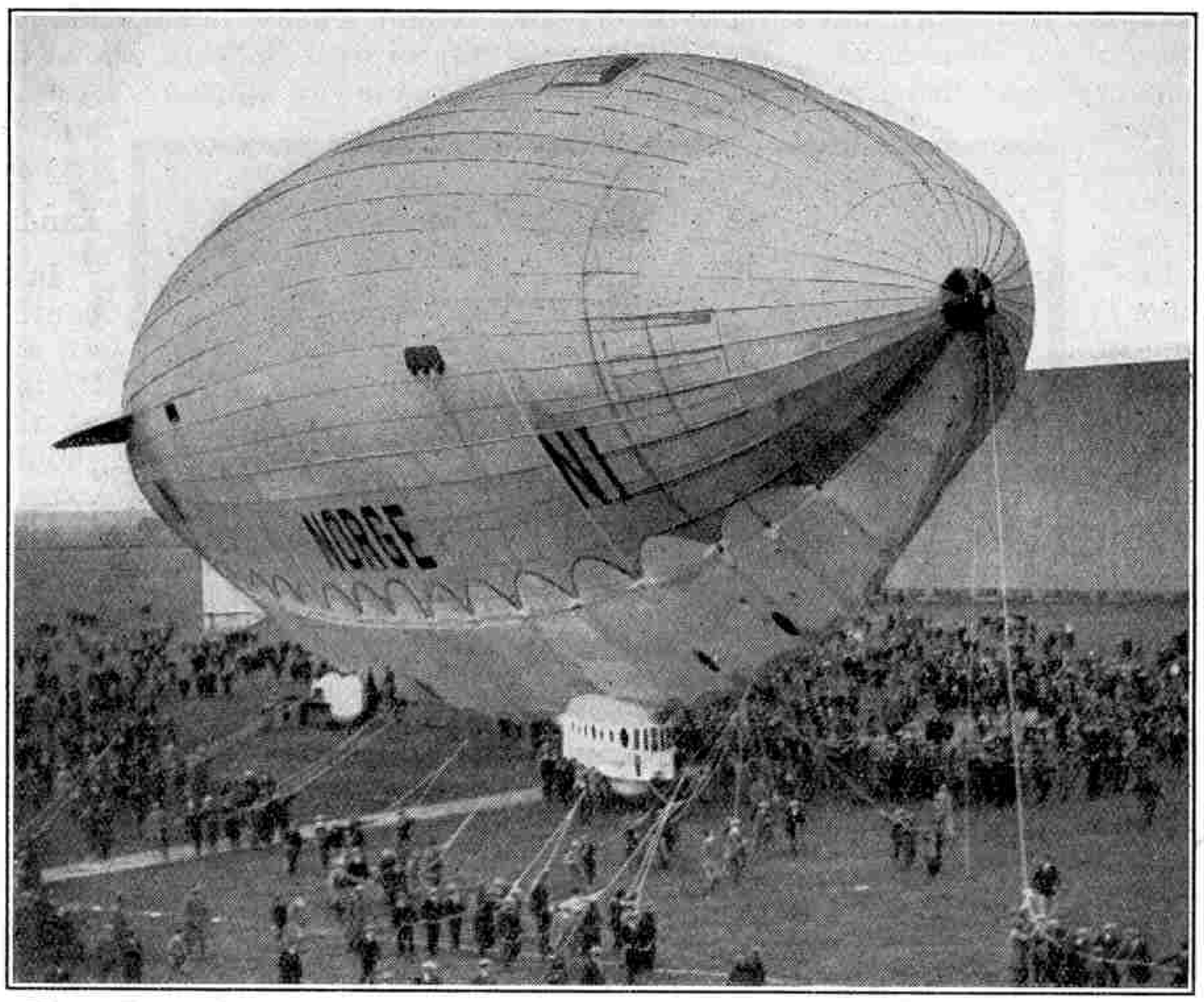
Having made a satisfactory landing, the crew managed to work the machine on to a large ice floe. Here they unsuccessfully endeavoured to effect a repair and ultimately joined the N.25, where their help was very welcome in getting her into a more satisfactory position, for it was expected that at any minute she would be crushed between two masses of moving ice.

It was very evident that the N.24 was so damaged as to be unable to take off, and that she must therefore be abandoned. As the only hope of the expedition returning as a whole now centred in the N.25, all efforts were accordingly directed to clearing away the snow and ice from around her to obtain a good taking-off place. On the 26th May everything was ready to attempt the return flight, but this had to be postponed owing to a

thick fog descending, quite obscuring the view.

This state of things continued day after day with exasperating regularity. In the meantime the ice encroached and quickly made the taking-off place unusable, and a new track had constantly to be made with regularity so that the opportunity of getting away would not be missed if the weather should suddenly turn favourable.

In exploring around the point where the machine was wedged, however, Larsen found a more suitable flat tableland of ice and it was decided to get the machine on to it. With this end in view, work commenced on the 6th June and after a great deal of labour the transfer was successfully accomplished.

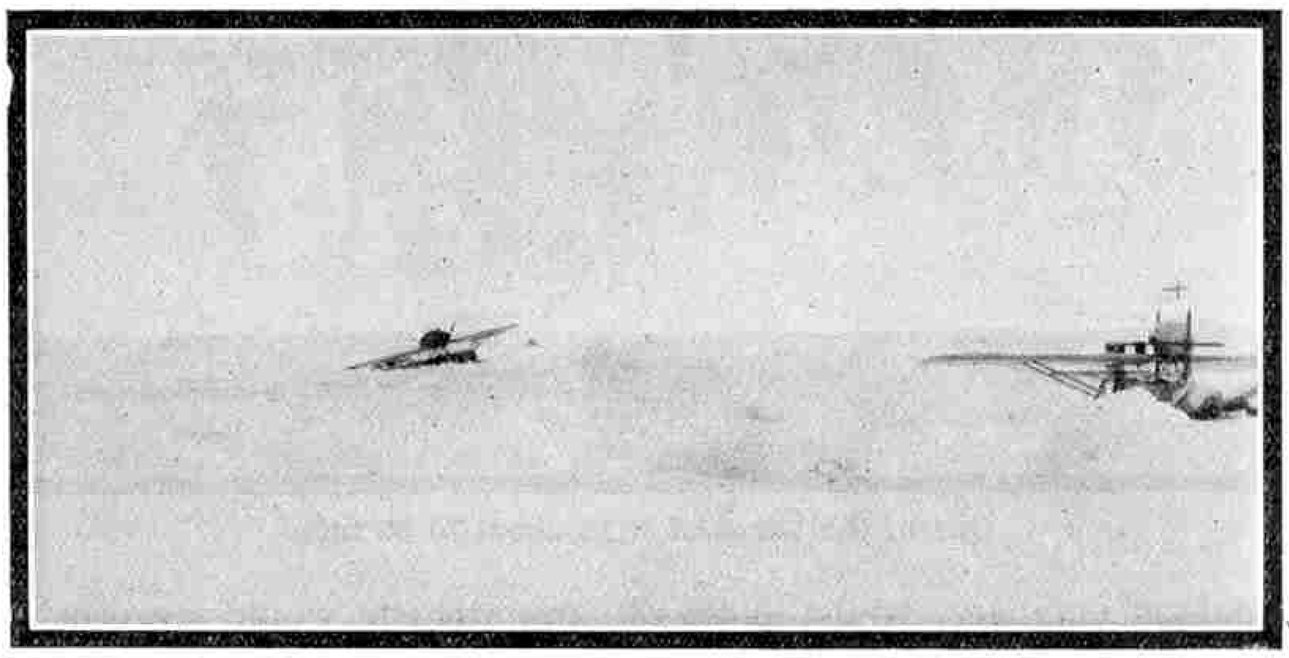


The arrival of the "*Norge*" at Pulham, April 1926. The crowds narrowly escaped injury when helping to land the airship

The Return Home

When the machine had been brought to the new site, a taking-off track, 546 yards in length and 13 yards in breadth, had to be made through slush and snow that was over 3 ft. in depth. By constant labour this was at length done and on the 14th June an unsuccessful attempt was made to start. On the following day another attempt was made, and this time N.25 took off successfully, with all six members of the expedition on board.

The machine was headed for Spitzbergen and after running through fog and narrowly escaping disaster through colliding with the tops of icebergs, a forced landing was made owing to the controls having become jammed. However, by this time a considerable distance had been covered and the ice fields had been left behind. Fortunately the Dornier-Wal had been built with a watertight body, and this advantage was now appreciated, for the machine floated on the sea. Land had been sighted before the descent was made and soon a landing was made near what turned out to be the North Cape. Shortly after this the explorers were picked up by a trawler the "*Sjoliv*" and the N.25 was towed into King's Bay.



Abandoned ! The N.24 left in the Arctic. On the right is seen the N.25, by which the expedition were able to escape

Thus the first attempt to use aeroplanes in polar exploration was not very successful.

Amundsen and His Airship

To most people it seems clear that for any prolonged flight, such as is desirable in Arctic exploration, airships are naturally more suitable than aeroplanes or seaplanes. Amundsen knew this in 1924, but the cost of a lighter than air vessel was the chief factor against the use of this type of craft at that time. However, this obstacle having been removed, and the undoubted advantages of aerial exploration having been realised from the 1924 Dornier-Wal expedition, Amundsen early this year prepared to explore the polar regions with the aid of a dirigible.

Accordingly an airship of the semi-rigid type was chosen, this type being selected because of his belief that the semi-rigid type is stronger than the rigid, which, incidentally, has been compared to an egg—strong as a whole, but brittle at any one point.

The airship N.1 named "*Norge*," was built in Italy, is 348 ft. in length and has a gas capacity of 672,000 cubic ft. She carries enough fuel for a flight of 3,000 miles.

The "*Norge*" is a balloon above a steel cradle, and carries four cabins below her fabric. The first is the control cabin, and behind are two port and starboard engine-rooms, with a third engine-room right astern. The three Maybach engines are each of 260 h.p. and between them can drive the ship in a still air at an average rate of fifty miles an hour. The airship left Rome on 10th April on the first stage of its flight to Pulham, Norfolk. Here it arrived the following day having travelled for part of the way at about 60 miles per hour with a favourable wind, but later, on the wind changing, the speed dropped to about 30 m.p.h.

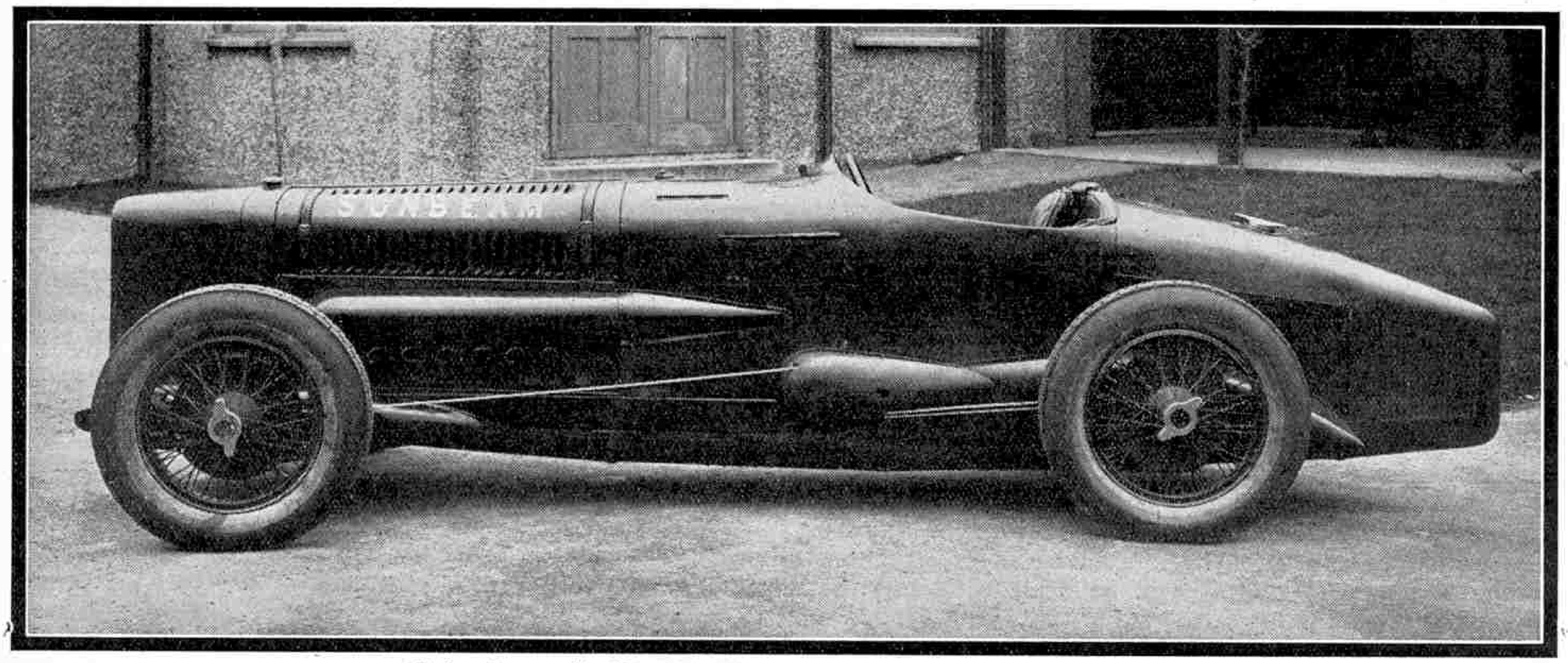
The "*Norge*" is fitted with special wireless transmitting and receiving apparatus, enabling her to keep in touch with ship or land stations up to considerable distances.

(*Continued on page 383*)

Over 172 Miles an Hour:

Two Record-Breaking Motor Cars

By J. Harrison



Major Segrave's "Ladybird," specially built for record-breaking

WHEN Major H. O. D. Segrave covered a kilometre in the remarkably short time of 14.687 seconds, breaking the existing world's record for that distance and setting up a speed of 152.308 m.p.h., his feat aroused the greatest interest not only among motorists but also among the general public. This marvellous driving took place on the sands at Southport and no doubt many readers have wondered what manner of machine could travel at such a pace.

Major Segrave is England's foremost racing driver and is one of the world's best. He was the winner in last year's 200 mile race. In 1923 he won the Grand Prix and he is the only Englishman who has ever won this important event.

The car is a Sunbeam racer, "Ladybird," specially built to attack the record. Contrary to what one might expect, she is comparatively small, weighing well under a ton. The engine, although only rated by the Treasury at 33 h.p., is capable of exerting no less than 300 brake h.p. at 5,000 revolutions per minute, and this power output is rendered possible by the use of a "supercharger." This may be briefly described as a kind of enclosed fan driven off the front end of the crankshaft and which, rotating at great speed, forces the petrol-air mixture from the carburettor into the cylinders under pressure. In this manner the speed of combustion of the explosive mixture is considerably increased, with a consequent gain in power. A simpler name than supercharger is "blower."

The engine has twelve cylinders. They are of exceptionally small size, being only 67 mm. bore and 94 mm. stroke, the total volume swept by the pistons being 3.976 cubic centimetres. They are set on the crankcase in two blocks of six in "V" fashion at an angle of 60 degrees to each other. The gear ratio of 3 to 1 gives the car a speed of 162 miles per hour when the engine is turning at 5,000 revolutions per minute.

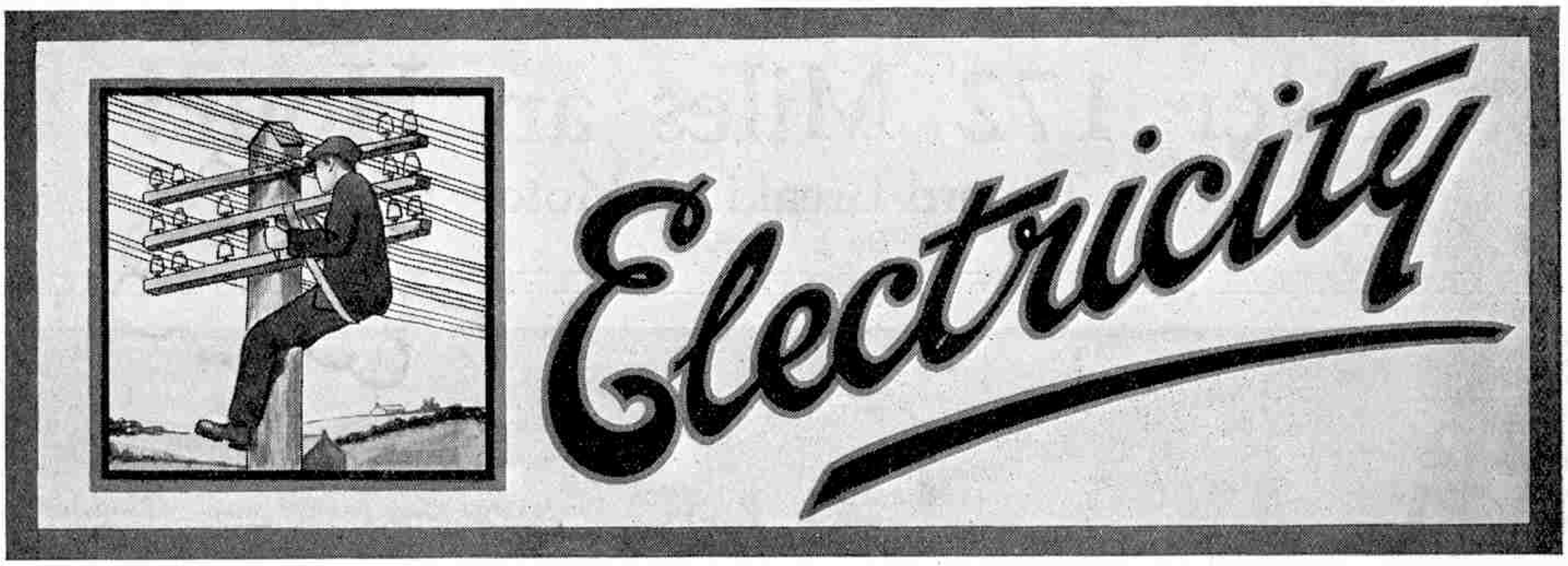
The feat was not accomplished without mishap, for the supercharger, the main factor in the development of the remarkable power of this small engine, proved also to be the weakest point.

All went well with the practice runs preliminary to the first official attempt to set up a new record and a speed of over 150 miles per hour was touched without fully opening the throttle. But as the car approached the starting point for the official test, the engine began to "pop" and finally stopped altogether. A crack had opened-up in the supercharger casing and as a result it was necessary to take the car to the Sunbeam works for repair.

A fortnight later, however, Major Segrave and "Ladybird" were back at Southport and a second attempt to break the records standing to the credit of Captain Malcolm Campbell, 150.776 m.p.h. for the flying mile, and 242.8 k.p.h. for the flying kilometre, was more successful. In the first run, both the mile and the kilo. were done in something over 154 m.p.h. For an official record, however, it is necessary to make two runs, one in each direction, to compensate for any advantages gained in one direction by wind, etc., and the average of the two runs is the accepted correct figure.

The greatest thrill of the day was staged in front of the mile posts near the starting point of the second run. Here there is a slight rise, and the car took off and flew through the air, completely clear of the ground, for 18 yards! During this leap the engine revolutions rose from 5,000 to nearly 8,000 a minute, and this probably ruined the supercharger. The car went on running perfectly, however, and the throttle was opened full.

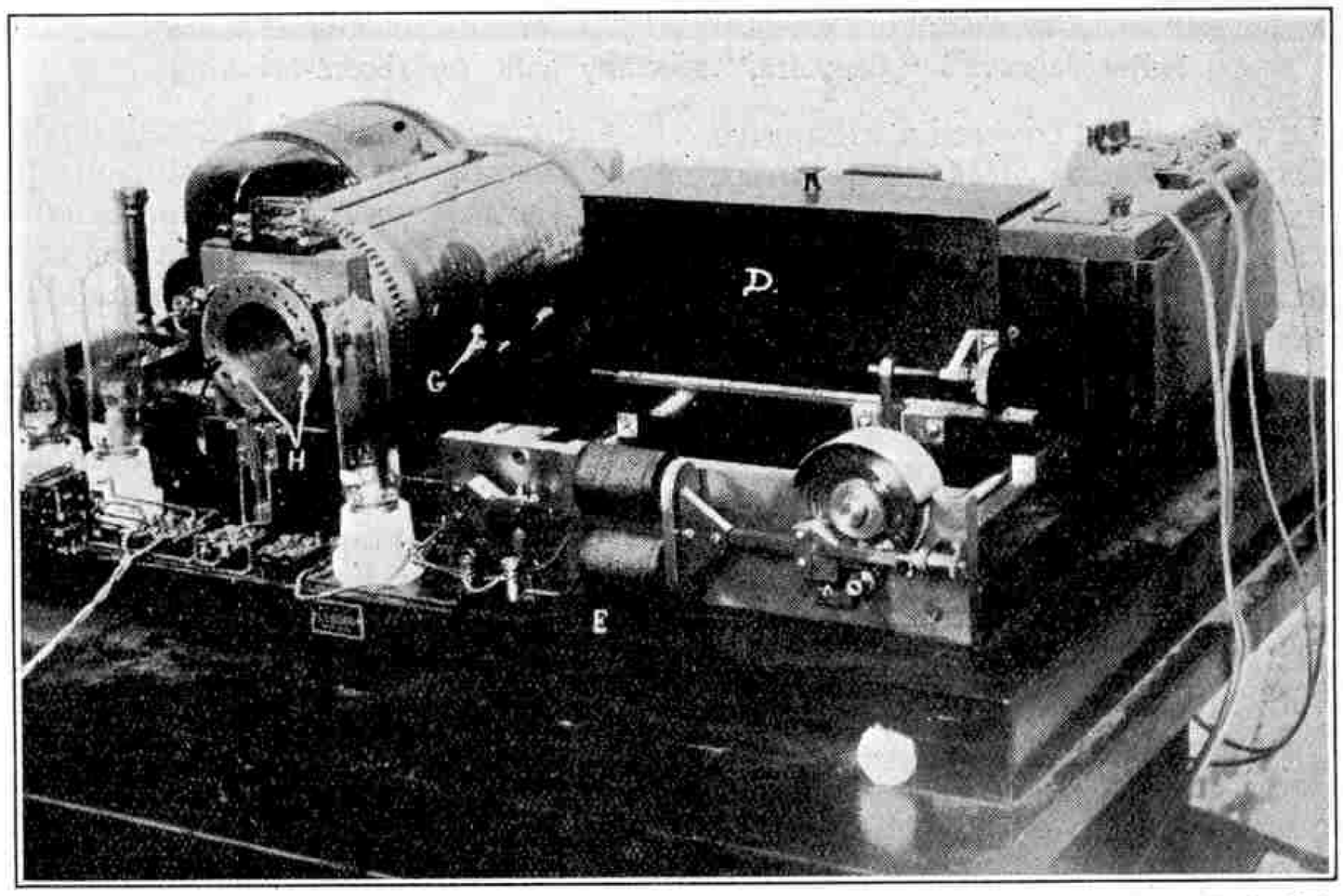
(*Continued on page* 393)



XXVII. TELEGRAPHING PICTURES

THE operations involved in transmitting messages by the telephone or the telegraph are more or less familiar to everybody. One may not know the details of the mechanism and its working, but everybody has a rough idea of the underlying principles. On the other hand, the transmission of pictures by telegraphy is a comparatively unknown process and is therefore of interest. In this and subsequent articles the principles and apparatus involved in telegraphing a photograph or a picture will be dealt with and the possibilities of the future outlined.

In order to transmit a picture by telegraph it is necessary first to translate the image into electrical impulses at the transmitting end and then at the receiving end re-translate these impulses into a reproduction of the original image. It is not yet possible to transmit a single electrical impulse that will represent the whole of the picture at once. At present only a small area of a picture can be dealt with at a time and the complete picture is transmitted by dealing with a succession of small areas until the whole picture has been covered. The apparatus at the receiving end builds up these small areas into one whole picture, which is a reproduction of the original.



Courtesy] [*Messrs. Marconi's W. T. Co. Ltd.*

Photo-transmission Apparatus

D : Photo-cell case. E : Carriage Advance Magnets. F : Condensers to prevent sparking at contacts. G : Glass cylinder with positive film. H : Contact stops for reversing rotation of drum

Discovery of Selenium

In the year 1817 the famous Swedish chemist, J. J. Berzelius, discovered by accident the element that he afterwards named selenium, from the Greek word selene, meaning the moon. Berzelius selected this name on account of the fact that, when he first found the new substance, it was in the form of a brown sediment in some recently-prepared sulphuric acid, and from its appearance he mistook it for tellurium, an element that had recently been discovered. The name tellurium is derived from the Latin word *tellus*, meaning the earth, and therefore Berzelius named this apparently related element after the earth's satellite.

Berzelius carried out a large number of experiments with selenium in order to ascertain the weight of its atom compared with the weight of a hydrogen atom, its melting and boiling points and its specific gravity. He also found that it resembled sulphur in several chemical characteristics.

Selenium is usually obtained from the dust that forms in the flues of sulphuric acid works which use seleniferous pyrites. When found in this dust it is by no means pure, and requires to be boiled with dilute sulphuric acid, then with hydrochloric acid, and finally treated with sulphur dioxide. The result is commercial selenium.

The element exists in three forms. The first form, termed liquid selenium, melts gradually from 60°C. to 222°C., being quite soft at 60°C. The second form is amorphous precipitated red selenium, and the third is crystalline grey or semi-metallic selenium, obtained by slowly cooling melted selenium. This third form is the one with which we are now concerned on account of its remarkable electrical properties.

Resistance varies with Light

It was soon discovered that selenium was a partial conductor of electricity and it was on account of this

fact that it was used some years later at the submarine cable station at Valencia Island, when a high resistance was required. It was found, however, that its resistance did not remain constant, but was some 50 per cent. greater in darkness than in sunlight. The instability rendered selenium totally useless for the purpose for which it had been intended but the station engineer investigated the matter and brought it to the notice of the scientific world through the Royal Society.

Selenium then has the very remarkable property of changing its resistance according to whether light is shining upon it or not. It should be noted that it differs from other substances acted upon by light, such as the silver salts in the emulsion of a photographic plate, in that it returns to its original condition after exposure to light, whereas other substances undergo a change that is permanent.

On account of this curious property selenium provides us with a means of converting a beam of light that varies in intensity into an electric current that varies correspondingly. If a piece of selenium is connected in series in an electric circuit with a suitable battery and a sensitive galvanometer, and a beam of light of varying intensity is allowed to fall upon it, it is found that the current in the circuit varies in almost exact proportion to the variations in the strength of the light. The selenium does not respond instantly to these variations however. It requires a certain amount of time in which to vary its resistance and thus there is always a certain amount of "lag" in its response to the variation in the intensity of the light falling upon it.

Courtesy] [*Messrs. Marconi's W. T. Co. Ltd.*

A photograph of H.R.H. the Prince of Wales as received by Wireless in New York from the Carnarvon Station

Transmission of Photographs

When this remarkable phenomenon is to be utilised for the actual transmission of photographs by means of electricity the apparatus is arranged so that each part of the photograph in turn is translated into a beam of light, the strength of which depends upon the amount of light coming from that particular part of the photograph. This light beam therefore varies constantly, and causes corresponding variations in the resistance of a selenium cell upon which it falls.

It has just been stated that selenium does not respond instantly to light variations, but lags behind a little. This lag has proved a great drawback to the use of selenium in the transmission of pictures on account of the impossibility of speeding up the operations to a sufficient degree to make the process practicable from a commercial point of view.

Photo-electric Cell

Considerable interest has been aroused therefore in the invention of a photo-electric cell that forms a substitute for selenium. Such a cell is able to respond to a flash of light lasting only one millionth of a second. It responds to the light from a candle at a distance of two miles and it can detect the light received from a star too distant and faint to be seen by the human eye in any telescope.

The operation of the photo-electric cell depends upon a discovery made by Heinrich Hertz, the German scientist, during the course of the famous series of experiments in which he demonstrated the existence of electro-magnetic waves. Hertz discovered that an electric spark passed across an air gap between two metal terminals more easily when the negative terminal was illuminated by another electric spark. Subsequently it was found that, if the negative terminal is made of certain appropriate substances, it is unnecessary to rely upon the light from a spark, as ordinary light will produce the same effect.

The construction of a modern photo-electric cell is shown in the accompanying diagram (Fig. 1) in which A and B are the modern equivalents of the two terminals used by Hertz. These are sealed in a silvered glass bulb from which the air is exhausted. Upon the silver is deposited a thin layer of potassium, sodium or rubidium, these having been found to be the most suitable metals.

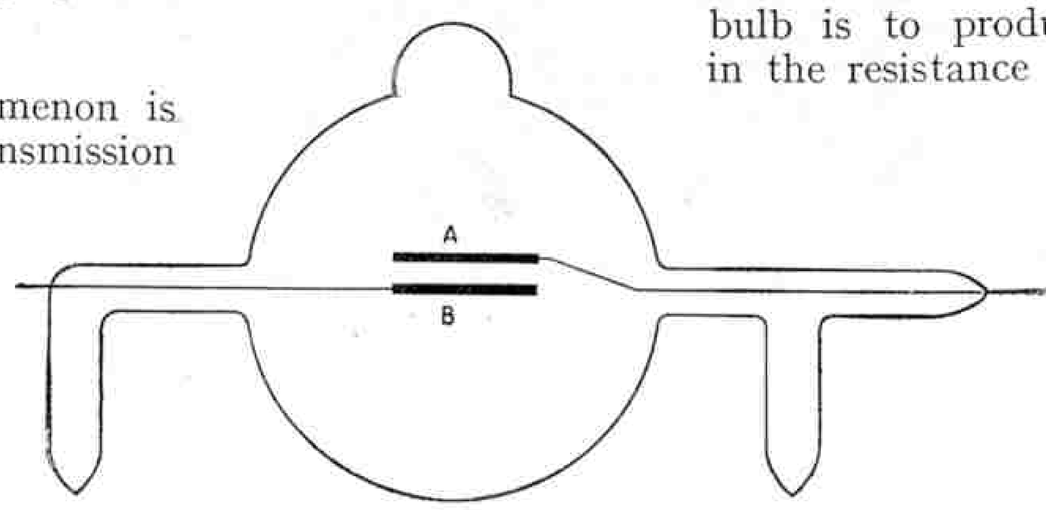
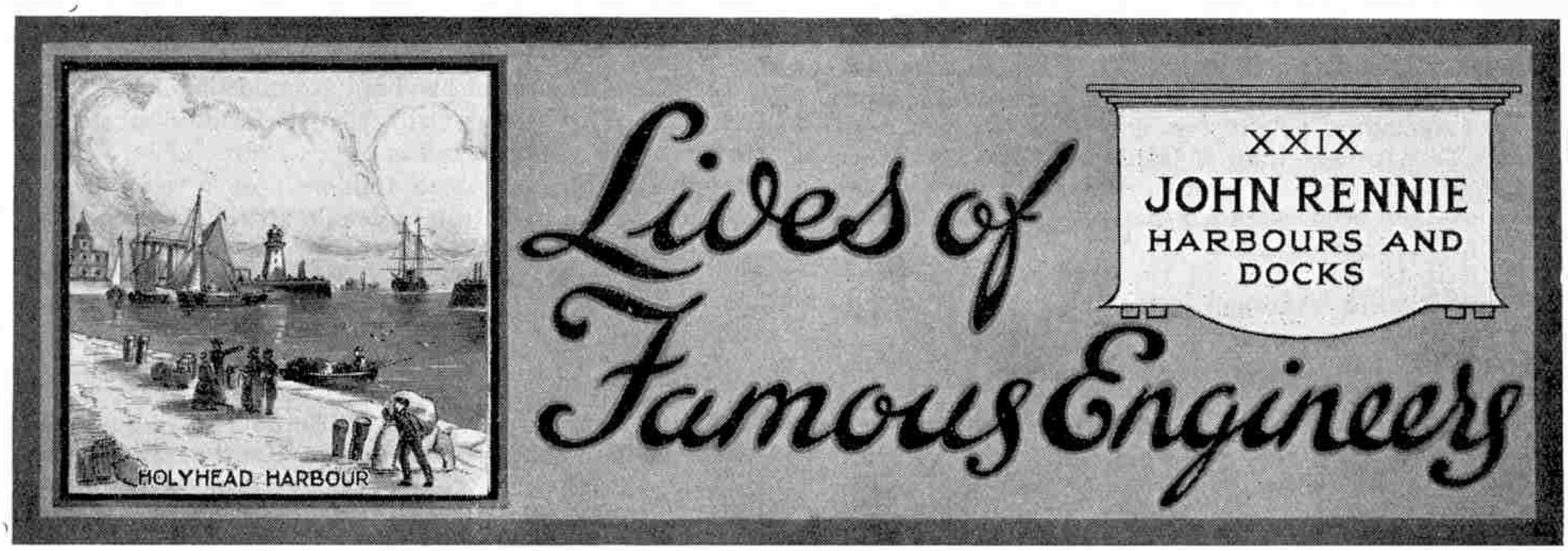


Fig. 1

Advantages over Selenium

The effect of allowing light to fall upon the bulb is to produce a proportionate decrease in the resistance of the gap between A and B, and accordingly this cell may be used to translate a beam of light of varying intensity into a correspondingly varying electric current, in the same manner as with a selenium cell. The photo-electric cell is very much more rapid and reliable in its action than selenium. It has the disadvantage that the amount of current it can pass is considerably smaller, but this difficulty may be overcome by the use of amplifying valves similar to those used in wireless receivers. The photo-electric cell thus places in the hands of the electrical investigator an instrument of enormous sensitivity and rapidity of action.

The illustrations to this article show a photograph of the Prince of Wales as received by wireless in New York from the Carnarvon Marconi Wireless Station, and the instrument by means of which it was transmitted.



WE now come to John Rennie's work as a designer and constructor of docks and harbours, a branch of engineering in which his foresight and adaptability found full play.

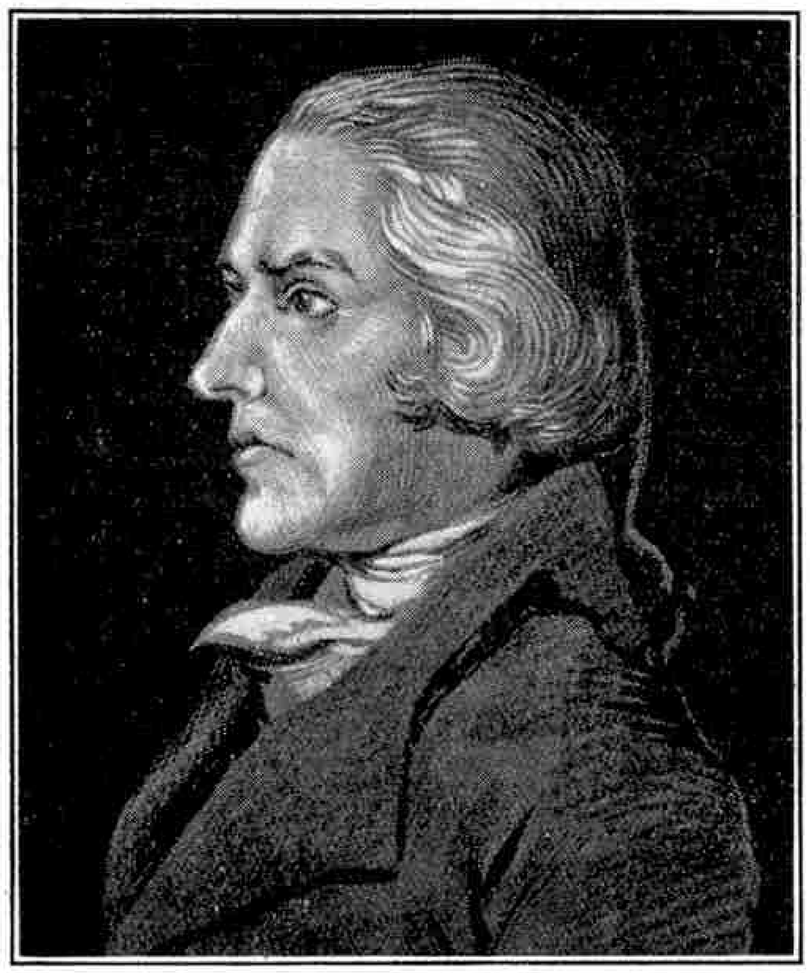
Although the amount of shipping in the Thames had increased enormously, comparatively little had been done in the way of providing suitable dock accommodation. The result was that shipping operations were carried on under great difficulties. A particularly acute trouble was an extensive system of pilfering of goods from the open barges in which these were conveyed from the ship's side to the quay, added to further pilfering from the piled-up barrels, tubs and baskets on the open quay. In 1798 the Thames Police was established to attempt to check these thieving operations but it soon became obvious that little could be done until adequate dock facilities were provided.

The First Thames Docks

The first large floating dock constructed on the Thames was the West India Dock, the engineer of which was William Jessop, one of the foremost engineers of the day. Jessop's father, Josias, was closely associated with Smeaton in the building of the Eddystone Lighthouse (for a description of which see "*M.M.*" Feb. 1926). On his death Smeaton undertook the guardianship of the boy William and during the next ten years gave him a thorough training in engineering. After leaving Smeaton, Jessop carried out various canal works, the most important of these being the Grand Junction Canal, and he has the honour of being the first engineer to be employed regularly on railroad work as a branch of his profession.

In 1800 a company was formed by the London merchants to construct docks at a point as near as possible to the Exchange for the storing of general merchandise. Rennie was appointed engineer and put forward several large schemes, in all of which he made ample provision for any future extensions that might become necessary. One of these plans was selected and the work of buying up and demolishing numerous houses on the site chosen was begun. This took considerable time and it was not until the spring of the following year that Rennie was able to make a definite start on the work of excavation.

Two 50 h.p. steam engines were erected to pump the water, and three smaller engines for such work as grinding mortar, working the pile-driver, and landing materials from the jetty. Rennie was one of the first engineers to utilise steam power for such work—an indication of his quickness in grasping a new economic factor. The works were carried on with great vigour and the docks were opened on 30th January, 1805.


W. Jessop, M.D.

Invitations to submit designs for the improvement of existing docks and harbours were frequently accepted by Rennie, but his schemes were often shelved as being too expensive, despite his warning to those concerned that they were practising false economy.

Holyhead Harbour

A typical example of Rennie's ability in adapting his plans to local conditions is the excellent harbour at Holyhead, well known to those who have embarked there for Ireland. The form of the harbour was determined in large measure by the cliffs which overhung the sea. The works executed to Rennie's design consisted of a pier 1,150 ft. in length, reaching out from the inner side of Salt Island, which was separated by a narrow channel from the mainland of Holyhead. At a distance of 80 ft. from the extreme end of the pier, a 60 ft. jetty was built at right angles to prevent any swell that might come round the pier-head from entering the harbour, and to throw it upon the opposite shore. A roadway 50 ft. in width ran along the pier, 8 ft. above high-water mark. The construction of the breakwater and quays occupied 14 years.

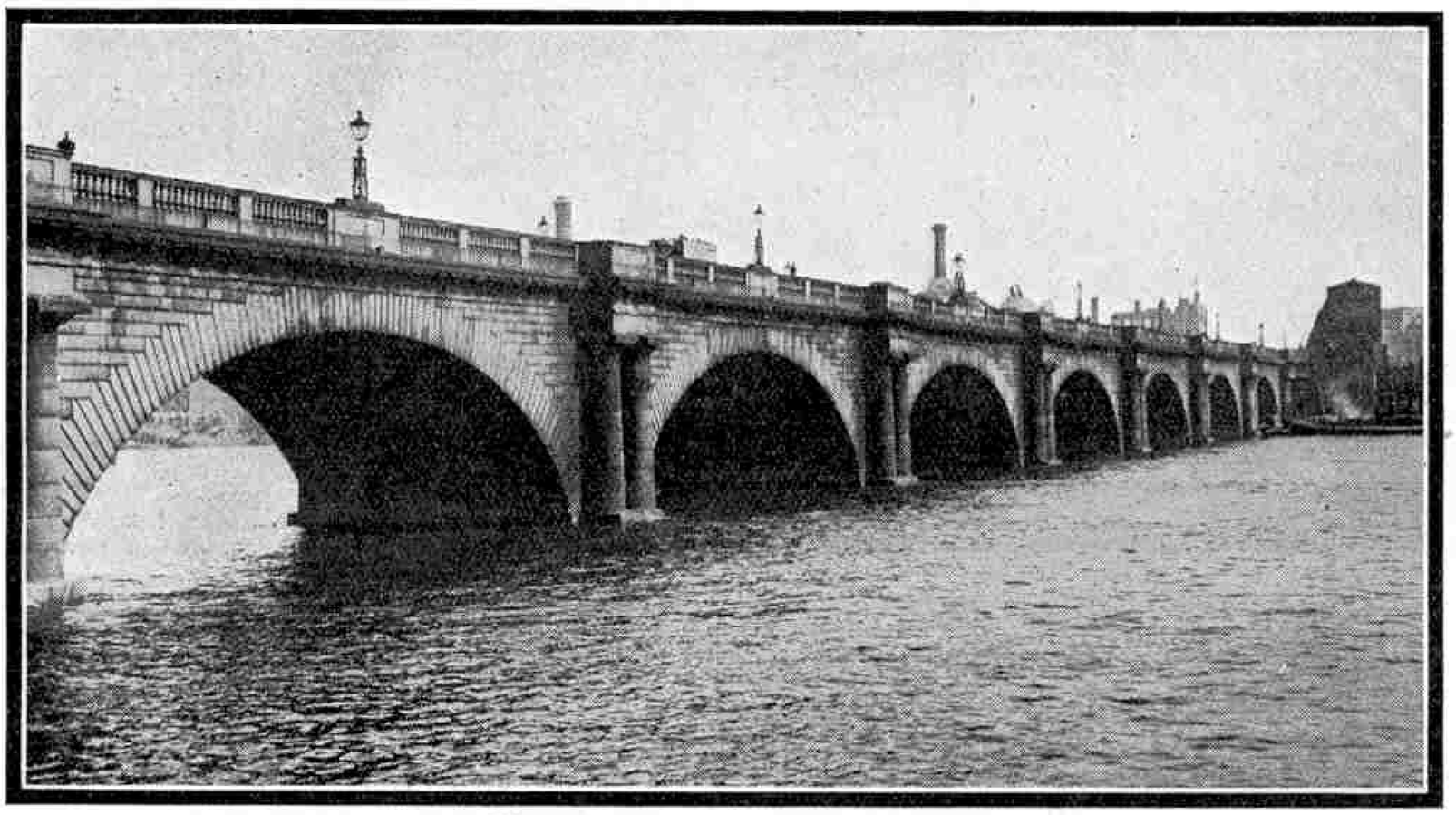
Rennie's association with the London dock schemes gradually increased. In 1803 he was associated with a Mr. Ralph Walker in the construction of docks to be used exclusively by vessels of the East India Co., of from 1,000 to 1,800 tons burden. The site chosen for building the docks was immediately to the west of the river Lea at the point where it enters the Thames.

Two small floating docks called the Brunswick and Perry's Docks, already in use at that point, were

absorbed into the new scheme. A triangular entrance basin was built and connected by a lock on the west side with the export dock to be used only for outward-bound shipping. A lock on the north side communicated by a further lock with the import dock, wherein all arrivals were dealt with.

Dredger for Humber Dock

The construction of the Humber Dock at Hull, which Rennie began in 1803, gave him a lot of hard thinking before he devised a satisfactory means of getting rid of the great depth of mud that interfered with the setting of the dock wall foundations. A number of unsuccessful attempts had already been made to contrive an apparatus for clearing basins and docks of mud and silt. One machine consisted of a series of rollers armed with spikes to rake up the deposit, followed by buckets and spoons to lift it from the bottom and worked by means of a "walking" wheel between two barges. Other machines for a similar purpose were driven by tread-wheels. All these mechanisms were clumsy and inefficient, and presently the idea was taken up of fixing a series of buckets to an endless chain, worked by horse power.



Waterloo Bridge as it is to-day
The Bridge was opened in 1817, on the second anniversary of the Battle of Waterloo

Rennie fully investigated all that had been previously attempted in this direction, and then planned and constructed a complete dredging machine with improved cast-iron machinery, to which he applied steam power. This machine proved capable of raising as much as 300 tons of mud and gravel in one day from a depth of 22 ft. and Rennie made it a permanent part of his equipment and used it extensively in subsequent harbour works.

In his harbours, just as in his bridges, Rennie worked upon certain definite principles and was utterly opposed to any temporary expedients. "You want a harbour," he would say, "of such strength as to be safe, with piers able to resist the greatest possible force of the sea. Well, here is the plan I recommend, it is the best that I can suggest. But I tell you the whole cost which I think will be incurred in its construction. Adopt the plan or not as you think proper." It was largely due to Rennie's determined attitude in this respect that so many of his big schemes were only partially carried out or never commenced at all.

In 1807 Rennie was appointed engineer of the Ramsgate Harbour works and while carrying out repairs a few years later he found it necessary to employ the diving-bell. Smeaton had employed a crude diving-bell in the building of the harbour but Rennie produced a vastly superior apparatus by means of which the repairs were effected with great rapidity.

Bell Rock Lighthouse

Most of us are familiar with Southey's poem "*The Inchcape Rock,*" which tells how the Abbot of Aberbrothock, greatly worried by the wrecks occurring on a ledge of rock opposite the Firth of Tay, about 12 miles out to sea, caused a bell to be placed upon the main rock. The bell swung by the movement of the waves, and so automatically gave warning to seamen. Sir Ralph the Rover, in order to annoy the worthy Abbot, cut the bell from the rock, and as a fitting punishment for his misdeed was himself afterwards wrecked and drowned upon the rock.

These stirring incidents took place in the 14th century, and nothing was done to provide a substitute for the bell until the great storm of 1799, which wrecked on this dangerous ledge many good ships with very heavy loss of life. After this disaster various plans were submitted for the erection of a lighthouse upon the Bell Rock, among these being one by Robert Stevenson, the first of a long line of lighthouse experts, who, by the way was no relation to George and Robert Stephenson the railway engineers. Stevenson's design followed the lines of Smeaton's Eddystone Lighthouse, but the authorities hesitated in accepting it, apparently on the grounds of Stevenson's youth. Rennie was asked to give his opinion on the matter and his report favoured Stevenson's design in almost every respect. The lighthouse was successfully built in the face of great difficulties, of which we hope to give an account in a later issue.

In addition to his extensive enterprises in civil engineering Rennie carried out a considerable amount of work for the Navy and the Army. Among the greatest of these undertakings was the new dockyard at Sheerness. Rennie did not favour the site, but he had no option in this respect, his instructions being to produce the best possible dockyard at that point. Work was commenced in 1815 and continued without interruption until its completion in 1826.

Plymouth Breakwater

In 1806 Rennie was requested by the Government to advise them as to the best course to pursue in the erection of a breakwater at Plymouth Sound. He submitted his report in due course, but it was not well received, being regarded as too ambitious and expensive. In 1811, however, authority was given for the scheme to be carried out, Rennie was appointed chief engineer, and work began on 12th August. The lines of the

(*Continued on page* 393)

The Conquest of the Air

XV. Vickers (Rolls-Royce) "Vanguard"

IN design and construction the Vickers "Vanguard," the largest passenger-carrying aeroplane in the world, is a development of the famous Vickers "Vimys." As our readers will probably remember, these machines accomplished historic flights across the Atlantic and also made flights to Australia and to South Africa.

The new machine is a direct descendant of the famous "*City of London*" air express. This famous aeroplane was commissioned in 1920—and flew regularly on the continental air-lines for five years.

Ensuring Comfort and Safety

The "Vanguard" is fitted with twin Rolls-Royce "Condor" engines, each normally developing 650 h.p. but capable of running up to 700 h.p. Some particulars of this fine engine were given in our article in this series last month. We may here mention, perhaps, that we hope to describe the Rolls-Royce Condor in greater detail in the near future. Meantime some of the principal dimensions and other interesting details are given on the next page.

A feature of particular note is the fact that the fuselage is of very large oval cross-section, built on wooden formers and entirely wooden-skinned, similar except in regard to size to those of the original Commercial Vimy, the Vickers Vulcan and the Vickers Vernon ambulance, which has been supplied to the R.A.F. and was described in the "*M.M.*" for December last.

As will be seen from the illustration on this page separate armchair seats are provided for 20 passengers, who are accommodated in an enclosed saloon. Owing to the excellent form of its construction, this cabin should prove to be exceptionally quiet and draught proof. As there is no engine in the fuselage there can be no oil, petrol or exhaust gas fumes entering it.

Courtesy] [*Messrs. Vickers Ltd.*

Interior of Vickers "Vanguard"

The maximum of comfort has been ensured by the introduction of the latest methods of electrical heating and ventilation as applied to aircraft. The safety arrangements include special emergency hatches and a wireless telephone installation.

Serving Lunch in the Air

The crew, pilot and navigator, are seated in a cockpit n the nose of the machine, with access to passengers'

saloon. There is a hold for baggage, and lockers and racks for mails or parcels. A canteen is provided for the refreshment of passengers during flight, and there is also lavatory accommodation.

It is noteworthy that it was in a "Vanguard" that the first complete meal to be served in an aeroplane was arranged. On 27th October, 1925, a luncheon was given in the air to a party of over 20 press representatives, accompanied by the Director of Civil Aviation, Air Vice-Marshal Sir W. Sefton Brancker. From the "Vanguard" also, a wireless concert by the B.B.C. orchestra was broadcast whilst the machine was in flight a short time ago.

Pilot's and mechanics' cockpits are arranged side by side in the nose of the fuselage. Here, owing to the shape of the body, they have as nearly perfect a view for both navigation and landing purposes as is possible. This is a point of very great importance when operation in conditions of poor visibility has to be considered, and it is extremely difficult to provide the view that is desirable in any machine with an engine in the nose of the body.

Courtesy] [Messrs. Vickers Ltd.

One of the Rolls-Royce Condor Engines

Another feature of the "Vanguard" which is distinctive of Vickers aircraft of this general type, is the biplane tail with twin rudders and fins, these latter arranged to come within the slipstream of the airscrews—an arrangement making for ease of control when one engine is out of action.

Many ingenious instruments are fitted in the cockpit, including a Reid control-indicator. This apparatus provides the pilot and navigator with an immediate indication of any departure from the set course, and assists enormously in the maintenance of an accurate course, particularly when the machine is flying in foggy weather or during the hours of darkness.

The "Vanguard" is capable of a maximum speed of approximately 113 miles an hour, and is able to ascend to a height of 16,400 ft. The capacity of the fuel tanks provide for a flight of 4½ hours at cruising speed.

The landing speed is 49 miles an hour and to ensure smooth landings this huge machine, which weighs when fully loaded considerably more than eight tons, has been fitted with the Vickers patent oleo-pneumatic undercarriage. This replaces the more usual elastic type of shock-absorbing device.

The "Vanguard" has a wing spread of 87 ft. 9 in., but to facilitate housing the wings may be folded to a span of 42 ft. The overall length is 60 ft. 5 in. and height 18 ft. 1 in. The main-planes have an area of 2,182 sq. ft., the loading per sq. ft., being 8.5 lbs. and per horse-power (2 ×696 h.p.) 13.25 lbs.

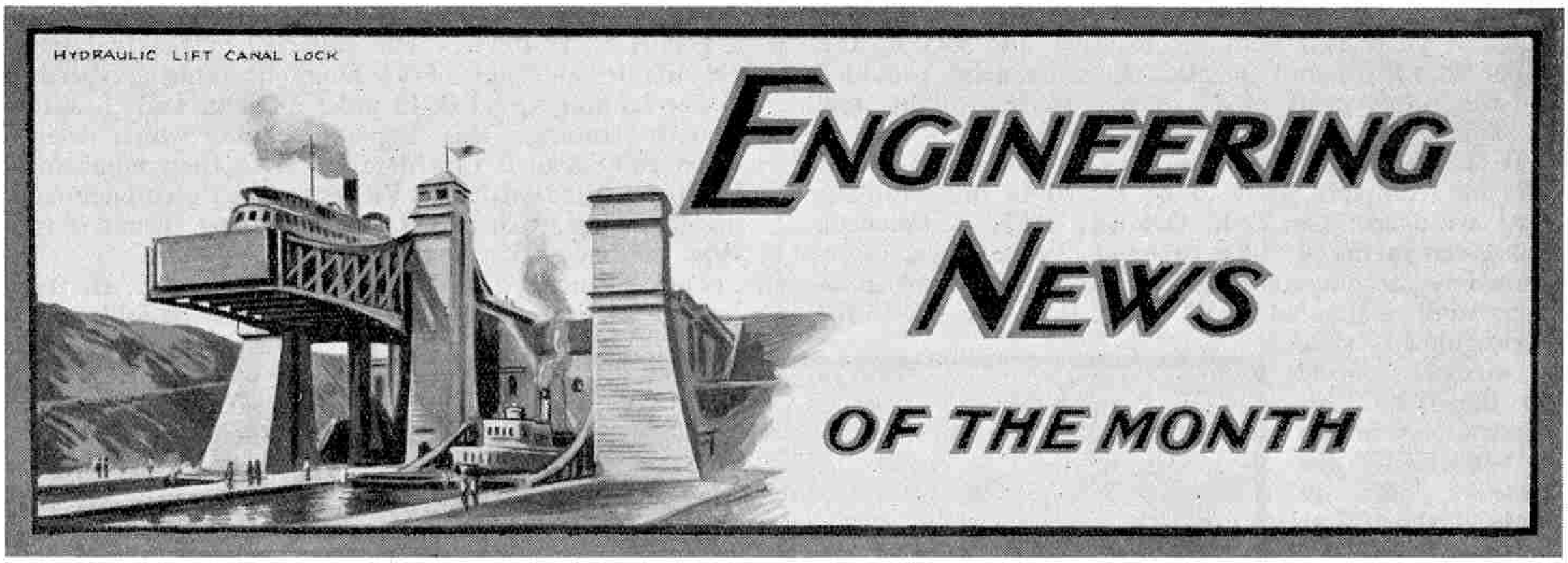
The weight of the aircraft is 12,462 lbs., and the total laden weight 18,460 lbs. Of this 3,800 lbs. is available for passengers and freight after allowing for crew, petrol, oil, and all available equipment.

A considerable amount of flying has been carried out on the "Vanguard" in the course of tests, and a very general agreement is expressed by all pilots who have flown it that the machine is extremely pleasant and easy to fly. Piloting in bad conditions is a harassing and responsible work, and the less unnecessary fatigue and discomfort the pilot has to endure the better he should be able to discharge his functions. A machine that the pilots like to fly will get through where a more reliable but less pleasant machine will not start—and therefore pleasant flying qualities are a factor in regularity of service.

The "Vanguard" was built at Messrs. Vickers Weybridge Factory and has now been handed over to Imperial Airways for extended flying trials, including night flying journeys between Croydon and the Continent.

Previous articles in the "Conquest of the Air" series have appeared as under :—

1. The Lympne Trial for Light Monoplanes ... ... March 1925
2. Beardmore "Wee Bee I." ... April „
3. Super-Seaplanes for U.S. Navy May „
4. Argentine Airman's Attempt to Circle the Earth ... ... June „
5. Parnall "Pixie III." ... ... July „
6. De Havilland "Moth" ... ... August 1925
7. Beardmore-Rohrbach All-Metal Flying Boat ... ... October „
8. Fokker C.V. Scout ... ... November „
9. Vickers "Vimy" Ambulance ... December „
10. The Cierva Auto-Giro Flying Machine ... ... January 1926
11. Boulton "Bugle" ... ... February 1926
12. The Flight from London to the Cape ... ... March „
13. Light Aeroplane Clubs ... ... April „
14. D.H. 54 (de Havilland "Highclere") ... ... May „



Norwegian Motor Ship

A twin-screw motor ship, "*Beljeanne*," built by Sir W. G. Armstrong Whitworth & Co. Ltd., to the order of Rederiet Belpareil A/S, Oslo, was launched recently The vessel is designed to carry about 10,375 tons deadweight and is of the single-deck type, with poop, bridge and forecastle. There are three cargo holds, each served by a large hatchway. The propelling machinery consists of twin-screw Armstrong-Sulzer two-cycle type Diesel engines.

* * * *

A New White Star Liner

Work on the new White Star liner "*Laurentic*" is proceeding rapidly at the Belfast yard of Messrs. Harland & Wolff Ltd., and it is expected that she will be launched in October. The vessel is intended for the company's Canadian service and will mark a distinct advance in size and equipment upon the other liners engaged on this route. Her gross tonnage will be about 18,700, her overall length 604 ft., and her beam 75 ft. Accommodation will be provided for over 1,600 passengers, of whom approximately 1,000 will be third class. We hope to publish further details of this interesting ship in the near future.

* * * *

New Ocean Cable Laid

The laying of a new cable between Cocos, in the Indian Ocean, and Fremantle, Australia, a distance of nearly 1,800 nautical miles, has just been successfully completed. The cable, the first of the new "loaded" type to be put down by the Eastern Associated Group of Cable Companies, was manufactured at Greenwich.

The existing line from Cocos to Fremantle has a working capacity of 745 letters a minute, but the new cable is designed for a speed of 2,100 letters.

* * * *

Largest Gasometers in Europe

The Birmingham Corporation recently put into service at their Washwood Heath works new twin gasholders that are the largest in Europe. These gasometers are three-lift structures and are designed for extension at a later date to five lifts. At present each holder is capable of storing 6,000,000 cubic ft., but their final storage capacity will be 20,000,000 cubic ft. It is stated that the only twin holders exceeding them in size are those at Long Island, New York.

Huge Canadian Warehouse

Toronto, famous among travellers as the city of warehouses, soon will have the largest structure of this type on the American continent. The building will cost approximately £1,600,000 and will cover eight acres. It will have eight storeys and will be constructed of reinforced concrete.

* * * *

New Clyde Bridge

An important scheme is under consideration by the Corporation of Glasgow for the erection of a new bridge across the Clyde within Glasgow Harbour. This scheme, which is approved by the Clyde Navigation Trustees, provides for a high-level fixed bridge, with approaches of easy gradient, at the point where there are at present the Harbour Tunnel and a Clyde Trust ferry—both of which the bridge will supersede.

The proposed structure, which is to be of reinforced concrete, will be 70 ft. in width with a carriage way of 46 ft. and 12 ft. footpaths, and the central span will be 76 ft. above high water, thus enabling vessels using the upper harbour to pass under it.

* * * *

"Big Ben" Misbehaves

"Big Ben" recently was guilty of a piece of extraordinary behaviour. At a quarter to four, just when "Question Time" was ending in the House of Commons, the hour of four boomed forth from the clock tower. The hour bell was, in fact, striking at the same time as the chimes that denoted the three-quarters! At four o'clock the hour bell struck five, and at five o'clock six was sounded.

Messrs. E. Dent & Co., who attend the great clock, state that theoretically it is quite impossible for the clock to go wrong in this manner unless tampered with. No trace of human interference could be found, however, but a careful examination of the works is being made.

* * * *

Cheaper Stainless Steel

During the past three or four years the cost of stainless steel has fallen rather more than 50 per cent., due principally to increase of skill in manufacture and partly also to the increased demand allowing of cheaper methods of manufacture. It is probable that the reduction will continue, but not at the same rate.

Large Gear Cutter

The Union Twist Steel Company of Athol, Massachusetts, have manufactured recently a rotary geartooth cutter that is claimed to be the largest of its type in existence. The cutter weighs 98 lb. and is 12½ in. in diameter and 5 in. through the hub. It has a 5 in. circular pitch and is designed to cut from 21 to 25 teeth.

The largest job undertaken by the cutter is the pinion for an extremely heavy sugar mill drive. The large gears of the latter were made from steel castings, and when machined were of 152.76 in. pitch diameter, 18 in. face and had 96 teeth each, their weight being 14 tons each.

* * * *

Derwent Valley Water Supply

While the Derwent Valley Water Board is able at present to fulfil the requirements of all the great towns drawing their water supplies from the Board, the time will come when it will be necessary to have a third reservoir in addition to the two near Ashopton, Derbyshire, that supply Sheffield, Northampton, Leicester and Derby. It is not possible to say when the new reservoir will be constructed because it is necessary for the authorities forming the Board to give ten years' notice that they require an increased supply. There is no apparent likelihood of the notice being given within the next year or so, and therefore it is improbable that the new reservoir will be built within less than twenty years.

When it is made, it will be necessary to submerge a great part of Ashopton village, Derwent Hall, a residence of the Duke of Norfolk, and a stretch of the Sheffield-Manchester Road which will then have to be re-made and carried across the dam on a viaduct.

* * * *

A Royal Yacht

The first section of what is probably the most palatial yacht constructed since the Great War was despatched to Egypt recently from Southampton. Estimated to cost £150,000, this yacht is being built for King Fuad, the Egyptian ruler. The woodwork and fittings are wonderfully decorated and neither time nor money has been spared in their preparation. It is expected that the second portion of the yacht will be despatched shortly, and later the whole vessel will be assembled on the River Nile.

New York Radio House

By touching an electric button in Radio House, London, the main Marconi telegraph office, the Chief Engineer to the B.B.C. recently opened the most up-to-date wireless-fitted house in America, situated at St. George, Staten Island, New York. The aerial and all the wires for connecting up receivers and loud speakers in each of the seven rooms of the house have been built into the walls, and not a single wire is to be seen.

The receiving sets themselves may be operated from distant points at various places in the house by means of switches mounted on the walls. A further refinement is an automatic time clock that will bring the sets into action at any hour required by day or night. Wireless reception under these conditions should be almost as simple as switching on an electric light!

* *

Tube Tunnel for Telephone Cables

To provide accommodation for the underground cables serving the new London Guildhall telephone exchange, it has been found necessary to construct a deep-level tunnel, 654 yards in length, extending from the junction of Wood Street and Gresham Street to London Wall, and thence to Moorgate.

The available space beneath the street is already occupied by gas, electricity and water mains, and thus the Post Office authorities were compelled to abandon the usual surface laying of cable ducts. Fourteen feet below the surface is a large sewer, 6 ft. in diameter, and rather more than 20 ft. lower still there is a 9 ft. stratum of wet sand and ballast over the London blue clay.

In these circumstances it was decided to construct a cast-iron "tube" tunnel through the clay at a depth of at least 10 ft. below its surface. The main tunnel is 6 ft. in diameter, but the sloping subway leading from the tunnel to the basement of the exchange has a diameter of 8 ft., to provide accommodation for cables coming from two directions. This subway is 48 ft. in length and slopes at an angle of 30°.

* * * *

Cunard Liners' Mileage

During the past year, steamships of the Cunard Line have covered over 1,600,000 miles, equal to 64 trips completely round the world. This mileage reads even more impressively when it is remembered that it is approximately 6½ times the distance between the earth and the moon!

Monster Garages

Although the number of motor owners in the city of Berlin is comparatively small, there is already a severe shortage of garage accommodation. The American plan of open parking-places is not popular in Berlin. All the important recent designs for garage erection relate to structures of from five to ten storeys, sites being too expensive for single-storey buildings, while the cost of underground construction is prohibitive.

In these garage towers motors will go straight into their boxes and out again without any shunting, and through the washing-room and inspecting room, so avoiding blocks and loss of time. Lifts are regarded as too slow and not altogether reliable, and inclined passages, straight or spiral, are being provided.

A bulk-head construction is employed as security against fire. If a fire breaks out, the section of the building concerned can be shut off from the remainder, including the main passage, by fireproof doors. The cars endangered can then get away by other passages while the remainder of the traffic continues uninterrupted.

* * * *

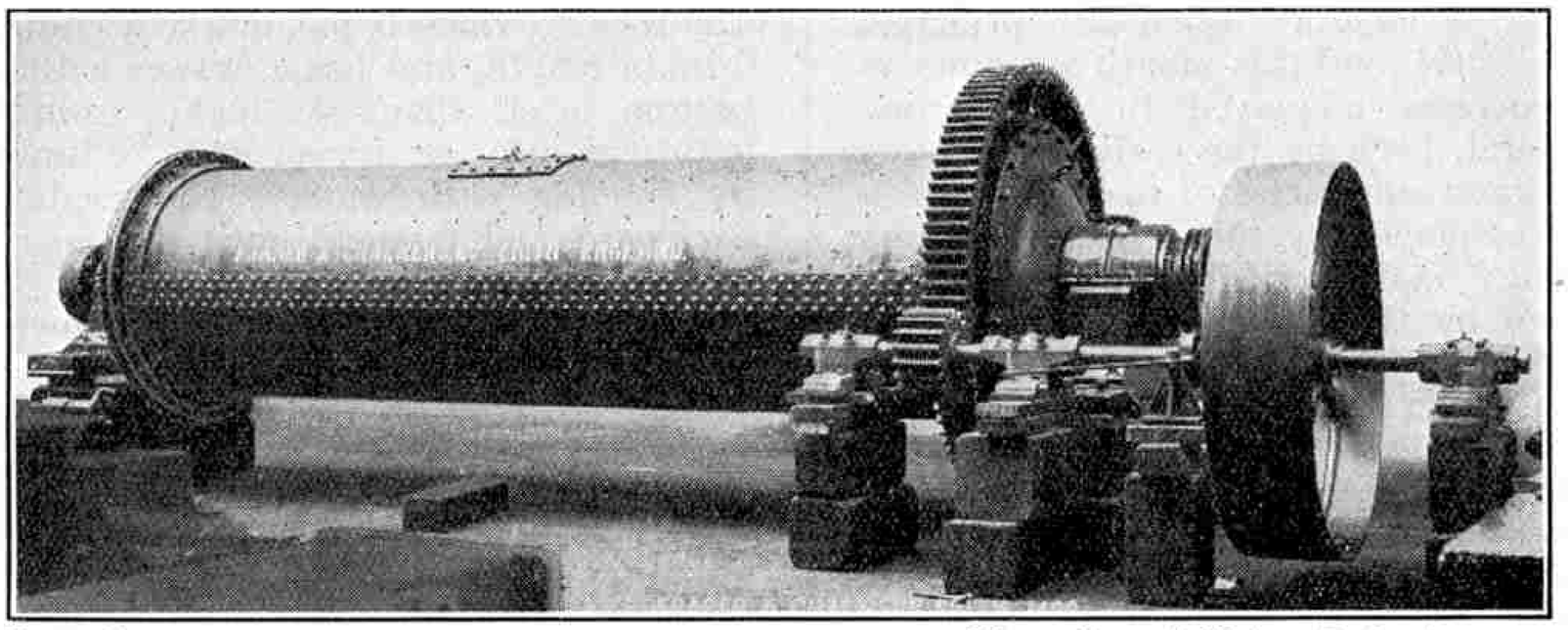
Ford Factory for Essex?

The Ford Motor Company are considering the establishment of a huge factory, capable of employing from 12,000 to 15,000 workpeople, at Dagenham, Essex. Mr. Edsel Ford, son of the founder of the company, was recently in England investigating the possibilities of extending the manufacture of the cars in this country, and is stated to have found the conditions eminently suitable for work on a large scale and to have been impressed by the quality of the available labour supply. The site of the factory has been purchased, but nothing further is yet decided.

It would take a year to prepare the factory, and a considerable proportion of the existing plant is already available at the Manchester factory.

It is probable that, if the factory is established, the whole supply of the Ford European market will be undertaken from Dagenham.

For Gold Mining



Courtesy] [*Messrs. Fraser & Chalmers Engineering Works*

A Typical Tube Mill used in connection with Gold Mining and described in our article "The Story of Metals," page 366

New Telephone Exchanges

Two new telephone exchanges, to be called "Reliance" and "Rodney," are to be opened in South London during the summer. They will have a capacity of 3,500 lines and will cover the Oval and Walworth areas respectively. A new Bermondsey exchange is also in course of construction.

* * * *

Scapa Flow Salvage Operations

Messrs. Cox and Danks Ltd., who, as described in the "*M.M.*" for December, 1925, and January 1926, are engaged upon the salving of the sunken German fleet at Scapa Flow, have raised the last two destroyers of the larger type, weighing approximately 1,300 tons. All efforts are now being concentrated upon the salvage of the battle cruiser "*Hindenburg.*"

* *

World's Deepest Well

The Miley Oil Company's No. 6 well, situated at Athens, Los Angeles, California, was bored to a depth of 7,591 ft. before it became productive. This is the greatest depth to which any well has ever been sunk. The hole was drilled with rotary tools in 230 days, the average depth per day being 33 ft., while the average cost per foot for sinking was 21½ dollars. The well is lined with 15½ in. piping for the first 988 ft., then 8¼ in. piping to 5,289 ft., the remaining 2,016 ft. having 4¾ in. piping.

* * * *

A West Midlands Power Station

The huge power station at Stourport, on the River Severn, was recently completed and will come into service in the near future. The station will have an approximate total capacity of 200,000 h.p., more than is likely to be required for many years to come in the area to be supplied, which comprises hundreds of villages and market towns in the West Midlands.

* * * *

South Australian Rail Motors

The Railway Department of South Australia report that the rail motors introduced twelve months ago are giving very satisfactory service. Their use has enabled the traffic on certain branch lines to be placed on a basis of profitable operation, which was impossible under steam traction. It is proposed to place another 25 rail motors in service and to extend the road motor services.

The Story of Metals

X GOLD

IN previous issues we have reviewed the principal goldfields of the world, and this month we come to the various processes employed in the actual extraction of the metal, both by the early prospectors and by the great mining companies of to-day.

The first method employed by the early prospectors is known as "panning" and a good idea of this panning operation is conveyed by the illustration on page 245 of the April "*M.M.*"

The pan used is similar to the average dairy milk pan and into it is shovelled the "pay dirt"—that is sand from the bottom or banks of a stream. The pan is filled up with water and the contents are then steadily swirled round and round until the earthy element is broken up. Light particles are worked to the edge of the pan and allowed to escape, more water is added, and the process is continued until all the loose silt is removed and the water remains clear. Any pebbles are then taken out and the small residue of silt is dried. The light earthy matter is then blown away, leaving the fine but heavier particles of gold to gladden the heart of the prospector.

The prospector subjects every yard of his "claim" to this initial panning for gold, always hoping for a pan-residue that will proclaim, by an abundance of gold dust, that the right spot has been located at which to carry out operations on a bigger scale.

Photo courtesy] [*High Commissioner of Australia*

An Australian Mine showing Cyanide Tanks and Tailings Wheel

The "Gold Canoe"

An improved method, which generally follows on the use of the pan, especially in new districts, involves the use of a rocker, called by the Indians the "gold canoe." The rocker, which is not unlike a cradle, is usually 3 ft. 6 in. in length, and has a drawer with a perforated iron bottom fitted about six inches from the top. Earth is thrown into the drawer and the lumps are broken up by flooding with water. The cradle is then rocked backward and forward until the finer contents of the drawer work through into the sloping tray underneath, which is fitted with cross-bars, known as "riffles," to intercept the gold.

Gold is about seven times heavier than earth, and this ensures a large percentage being successfully recovered after the cross-bars are manipulated to release their captures. If the gold happens to have been in exceptionally fine particles, however, there is a risk of some of it being carried away in the agitated water.

It was an accepted law of the "diggings" that, when a number of men worked a "cradle," any nugget of more than half an ounce in weight was considered to be the personal property of the man who found it, and it was accordingly withdrawn from the common load of metal being co-operatively salved.

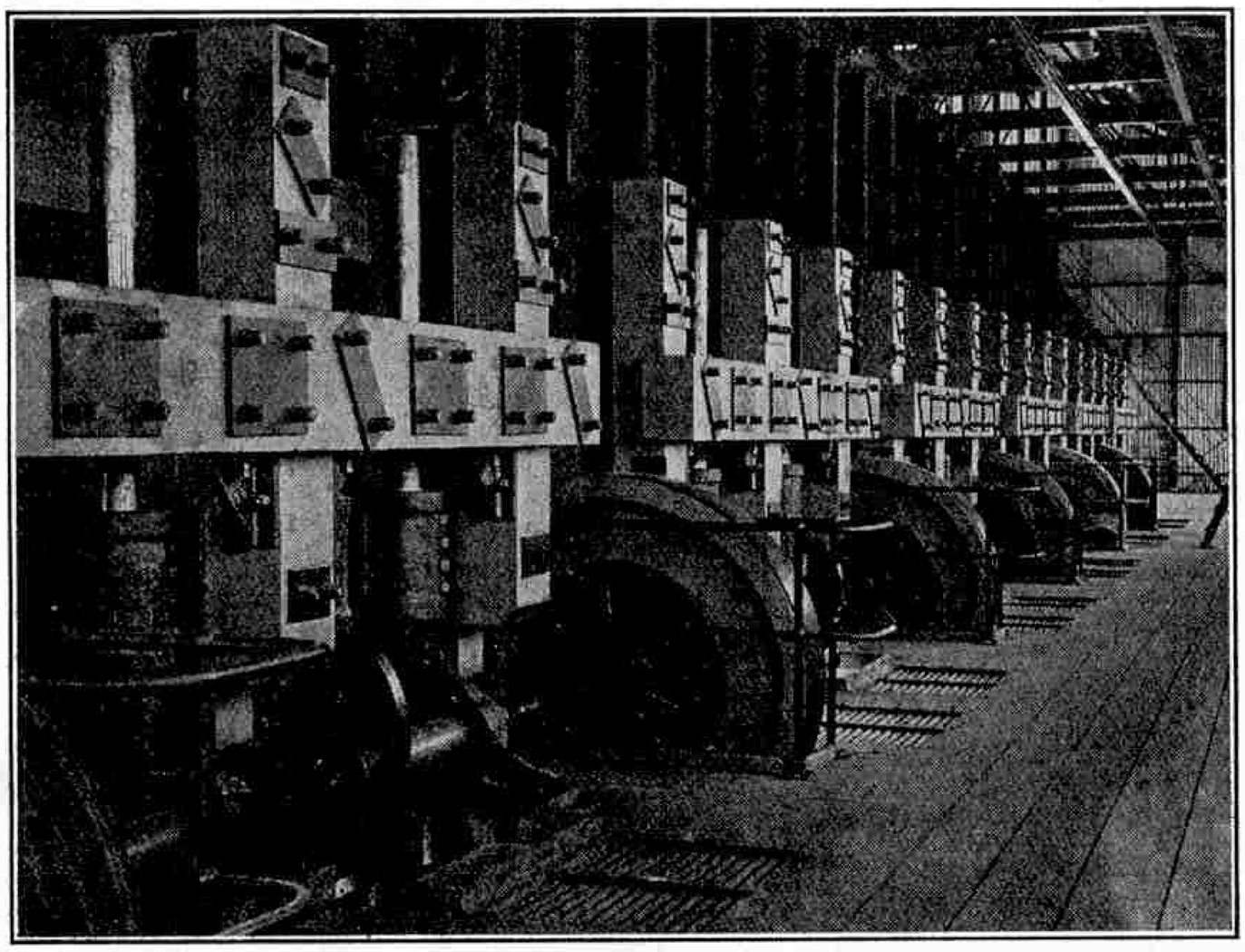
Surface deposits of gold are, however, a limited source of supply, and "placer" deposits, to a depth of 100 ft., next engage the attention of the miner.

"Placer" Mining

The "sluice" is now called into use. This is a long trough, slightly elevated at one end to allow a flow of water being maintained through it, and tapering slightly towards the lower end. It may be of various lengths, 12 ft. being common, with a width of from 15 in. to 2 ft.

and a depth of about 1 ft. The bottom of the trough is fitted with riffles, which sometimes are charged with mercury to arrest the finer particles of gold. When the two metals come in contact, the gold dissolves in the mercury to form an amalgam, that is an alloy of mercury. In this manner the finest particles of gold dust that otherwise would be washed away and lost are held back in the form of a heavy alloy.

In this system of placer mining the deposit is shovelled into the sloping trench, where it is quickly broken up by the flowing water. The gold, by reason of its weight, sinks to the bottom, except the very fine dust, which is stopped at the riffles as just described. When it is not possible to work the trough economically by utilising an existing natural head of water, the necessary water has to be baled into the trough—a slow and tiring method—or a pump must be improvised. In either case the lack of a natural flow greatly reduces the amount of work that can be carried out, unless a number of miners work together to maintain a steady flow.



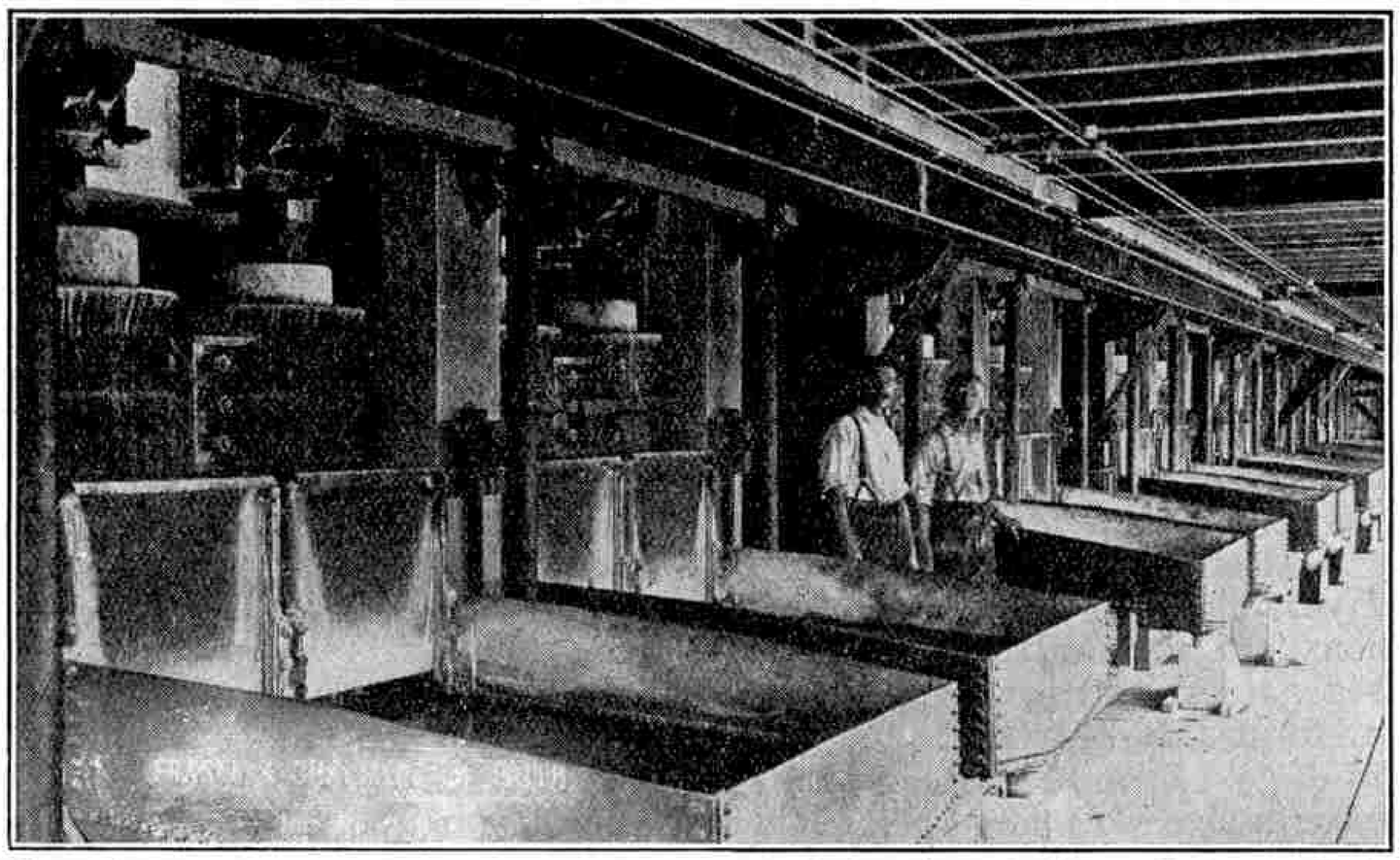
Courtesy] [Messrs. Fraser & Chalmers Engineering Works

A Stamping Mill, showing Cams and Tappets

The tapered end of each trench renders it possible for the "head" of a further trench to be fitted on, and in this manner, where the digging takes place on sloping ground, a very long sluice may be arranged.

Amalgamation with Mercury

Sluice-washing is carried on by the miners continuously day and night for weeks before a halt is made for a "clean-up." The gold is then carefully scraped from the riffles and washed clean in a pan. The amalgam is squeezed in buckskin or canvas. This permits the liquid mercury to pass but holds back the solid amalgam, which is placed in a retort and subjected to great heat. The mercury evaporates and is then conducted into a condenser, where it reverts to liquid form. The gold obtained by this method is very spongy and has to be melted down and moulded into ingots.



Courtesy] [Messrs. Fraser & Chalmers Engineering Works

Discharge side of above Stamping Mill

Very large quantities of gold have been obtained by sluicing in the Klondyke and elsewhere, but the method has the disadvantage that a great deal of mercury must be used to catch a sufficient percentage of the dust, and the outlay is beyond the means of the average prospector.

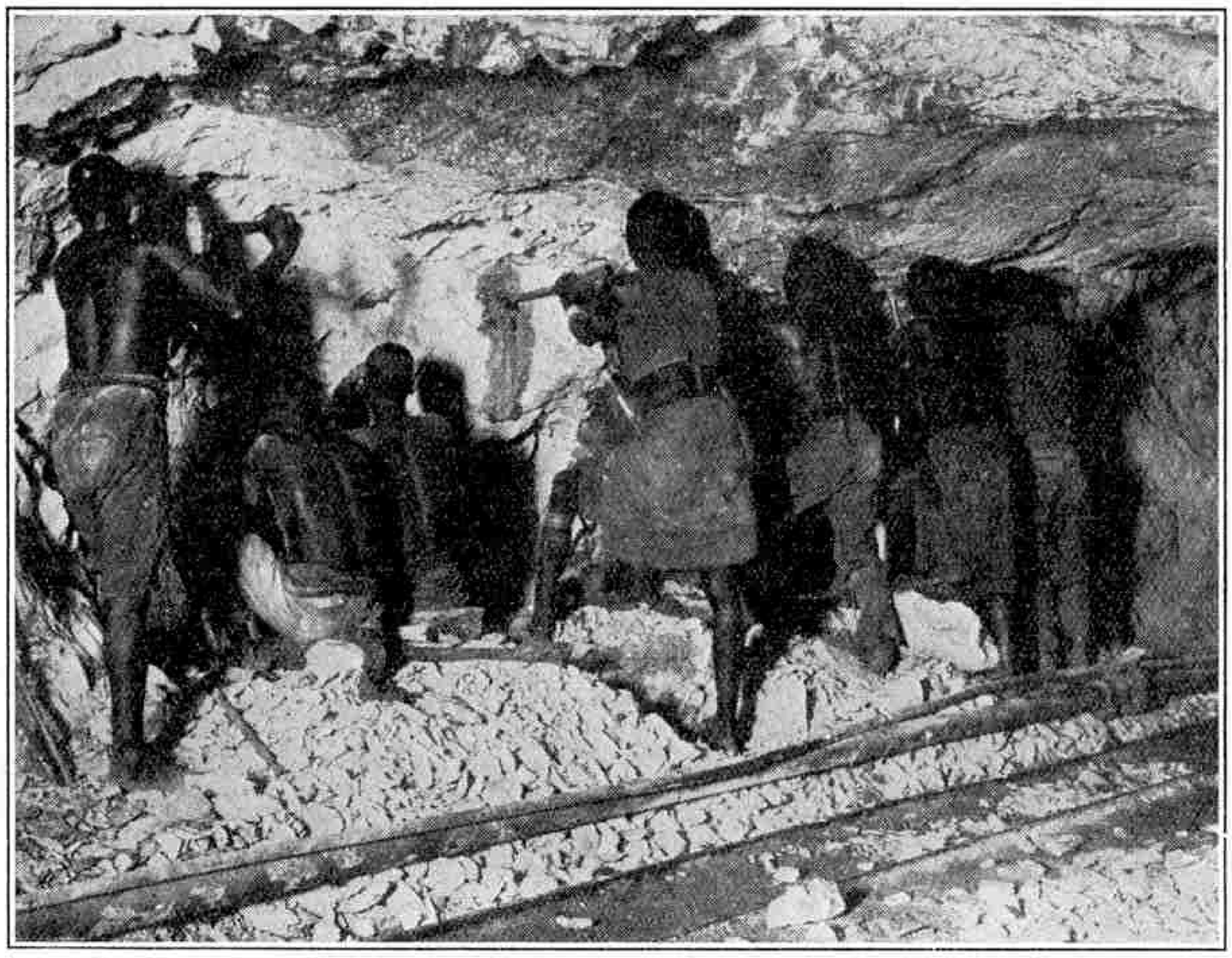
An Interesting Find

Placer deposits of gold are found in many strange situations. An instance worth quoting is the discovery made by a party of prospectors who, one day in 1898, found themselves stormbound at a lonely spot on the Alaskan coast, well to the north of the regular path of traffic. During their enforced stay they prospected along the local creeks and came across evidence of gold deposits. In due course the party returned to civilisation and one of them endeavoured to persuade some friends to accompany him to the place, now known as Anvil Creek. He had great difficulty in doing this because the Klondyke boom was then in full swing and prospectors were not disposed to journey to other localities on possible wild-goose-chases. Finally this man succeeded in inducing a few prospectors to accompany him, and careful investigation soon showed that the region was rich in gold.

News of the discovery quickly spread and within three months Anvil Creek, formally solitary and desolate, became the scene of a camp of some 3,000 gold seekers. Sluice trenches rapidly made their appearance in all directions. Digging and washing went on frantically day and night, the men stopping only when compelled by sheer fatigue and then for as short a time as possible. Within two months approximately £200,000 worth of gold had been wrested from the sandy beach. Other discoveries were made subsequently and in 1908, when sluicing was at its greatest activity, fully £1,000,000 worth of gold was obtained by this method from that portion of the Alaskan coast.

The Hydraulic Mining Process

Although the panning and sluicing processes were slow, so many men were at work that the total quantity of gold extracted was very large. By degrees the metal situated at or near the surface of the ground became exhausted and these processes ceased to be profitable. The majority of the gold-seekers then began to drift away in search of fresh fields, leaving behind a small number of men determined to extract the large quantity of gold that remained at greater depths. The equipment necessary for this deeper working was much more elaborate and costly than pan or the sluice, and usually, in order to obtain it, numbers of men combined together. In this manner sprang up companies to work the process of hydraulic mining or "hydraulicing."



Courtesy] [*Messrs. Ingersoll-Rand Co.*

Native Hand Hammer Boys at work in one of the Central Rand Gold Mines

Hydraulic mining depends upon the disintegrating force of a powerful jet of water and the first essential is an abundant supply of water at very high pressure. This was secured by bringing water through pipes or troughs from mountain lakes or streams, thus obtaining the necessary "head." As the water approached the scene of operations it passed through pipes of constantly diminishing diameter, and finally emerged through nozzles similar to those of a fire-hose.

The powerful jets thus produced were directed on to the banks of gravel, which quickly became disintegrated. The debris was washed down to large sluice-boxes, where the gold was retained by riffles on the principle already explained. Copper plates coated with mercury were also used in the sluice-boxes to collect the fine gold dust by amalgamation. Where the banks of gravel gave place to shelves or layers of rock, blasting with explosives was necessary before turning on the jets. A clean-up was usually carried out once a week. Hydraulicing is still largely employed where conditions are favourable, as in California, where there is a natural and convenient water supply and the ground is mainly gravel.

Very large quantities of gold have been obtained also by means of huge bucket dredgers, usually operated by steam. These dredgers tear up the beds of waterways with their buckets and empty the material on to screens upon which streams of water are directed continuously. This water breaks up the material, ready for further separation on the lines already described.

None of the processes mentioned so far can be described as "mining" in the ordinary sense of the word. When we turn to the great goldfield of the Witwatersrand, in South Africa, however, we find large numbers of real mines varying in depth from 2,000 ft. to over 6,000 ft.

The Witwatersrand Mines

The main shafts of the Witwatersrand gold mines are sometimes sunk vertically and sometimes on an inclined plane. Small tunnels or levels branch off at intervals of usually 250 ft. Secondary means of communication between these levels is provided by means of narrow sloping tunnels with crudely hewn steps, called by the miners "winzes" or "raises." The descent of the main shaft is made in a "skip" or cage.

An amazing labyrinth of tunnels exists underground, branching away from the main shaft. Small excavations called "cross-cuts" are made at right angles into each gold reef to facilitate close examination of the formation containing the minute grains of gold. These grains are seldom discernible to the eye, and the sparkling crystals of pyrites and quartz grains are often being mistaken for gold by inexperienced observers.

In the parts of the Rand where the levels are several thousand feet underground, ventilation is maintained by compressed air appliances operating in the mines themselves.

Drilling by Compressed Air

In the depths of the mines, drilling of the rock face preparatory to the insertion of dynamite charges goes on day and night. Formerly this was carried out entirely by native boys working with hand hammers, but to-day powerful drills operated by compressed air are mainly employed. A "jackhamer," as it is called, of the type shown in the illustration on the next page, replaces 17 native hammer boys and do more work per shift. When the boring has penetrated to the required depth, an explosive charge, capable of unbedding from 14 to 16 tons of rock, is inserted, plugged and duly fired.

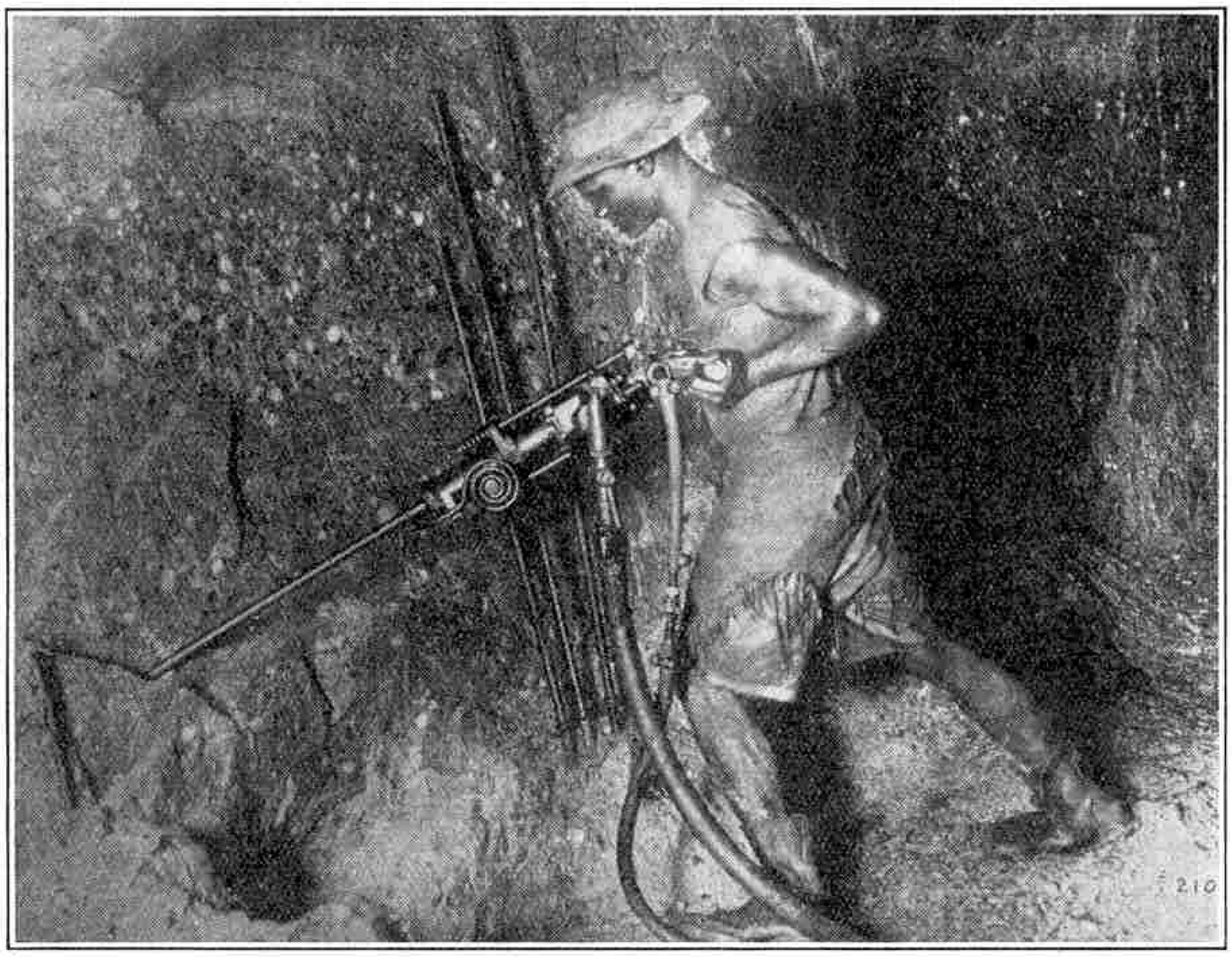
The lumps of disintegrated rock, small and large, are loaded into tip wagons which are pushed along the bogie-track threading the trench, or "level," until the foot of the main shaft is reached. Miles of wagon tracks are laid down in these many-tunnelled mines. From the bottom of the shaft the rock is conveyed rapidly to the surface by means of elevators, some of which can lift at the rate of two tons per minute.

Sorting and Crushing

At the surface the skips are tipped automatically, their contents being ejected on to a slowly moving

conveyor belt which passes through a sorting house. Specially trained men or boys, stationed at intervals along each side of the belt-course, pick out of the assortment of broken rock any pieces of useless material that they detect, the presence of which would interfere with subsequent processes.

The ore is next tipped into huge storage bins, from which the smaller pieces fall through wide-meshed screens into lower bins. The lumps of ore that will not pass the screens rumble away down the sloping floor of the upper bins and through a trap door that precipitates them into stone-crushing machines, which work them down to the size of small macadam. Finally these pieces of ore join the earlier arrivals in the lower bins.



Courtesy] [Messrs. Ingersoll-Rand Co

A " Jackhamer " at work on the 22nd level of the Brak-Pan Mine, Johannesburg

From the second bins the broken ore is taken to the battery house, where powerful machines crush or " stamp " it to powder as it passes beneath them in a continuous stream. Working day and night, these huge machines, each stamp of which weighs about three-quarters of a ton, create an unceasing deafening roar. The stamping weights are lifted by cams and suddenly released, so that they come down with terrific force on the lumps of ore, which are ultimately crushed sufficiently to pass through a mesh-screen of approximately 1,300 holes to the square inch !

Subsequently the ore is crushed in tube-mills to a powder so fine that it would pass through a screen having 40,000 holes per square inch. These tube-mills consist of large revolving cylinders containing heavy stones, and the ore is reduced to the necessary fineness by the intense grinding action of the stones as the cylinders revolve. (See illustration on page 365).

The powdered ore is converted into a kind of slime by directing a jet of water on to it and this slime passes gradually over inclined tables composed of copper plates coated with mercury. An amalgam of mercury and gold is thus formed, and this is scraped off the plates and subjected to heat, as already described in connection with sluicing. The gold thus recovered is cast into solid bars, which may be worth as much as £3,000 each, while the mercury vapour is condensed ready for further use.

The Cyanide Process

This process does not result in capturing the whole of the gold in the slime, but only about 60 per cent. of it. At one time the remainder of the gold was regarded as lost, but to-day some 96 per cent. of it is recovered.

The " tailings," as the residue of the slime is called, are led to a big wheel having a series of buckets on its circumference. This is called a " tailings wheel," and an illustration of one appeared on page 119 of the February "*M.M.*" The wheel raises the tailings and then discharges them into vats containing a weak solution of cyanide of potassium. The contents of these tanks are thoroughly stirred by means of slowly revolving paddles and chemical action takes place, resulting in the formation of cyanide of gold. This solution is now passed into small tanks containing zinc shavings. The cyanogen has a greater affinity for zinc than for gold and therefore it releases the latter in order to combine with the zinc. The gold settles to the bottom in shining yellow particles, and at intervals this deposit is removed, smelted and cast into solid bars weighing approximately three-quarters of a hundredweight each.

The tendency nowadays is to attach increasing importance to the tube-milling and slime treatment. It is even proposed to eliminate the stamp milling and the amalgamation processes entirely and to extract the gold solely by cyanide treatment of the lime.

The various methods of obtaining gold described in this article are all employed in varying degrees in Australia, but the gold output of the Commonwealth has been decreasing steadily for many years. The total world's production of gold for 1925 is estimated at 18,800,00 oz. ; of which the British Empire's contribution is 13,250,000 oz. or roughly 70 per cent. Approximately two-thirds of this Empire total came from the Witwatersrand. The estimated Australian output for 1925 reaches only the small figure of 556,000 oz. as compared with 2,207,444 oz. in 1913. The New Zealand gold output also has declined from 343,412 oz. in 1913 to approximately 120,000 oz. in 1925.

In this and the two previous articles we have confined ourselves to the history and production of gold. Unlike the metals already dealt with in this series—iron, copper, tin, lead, aluminium—the importance of gold does not lie in its industrial uses. The great value of the yellow metal lies in its relation to commerce, banking and exchange. Next month we shall commence the story of silver, and when this is concluded we hope to publish an article on the world's coinage, with special reference to gold and silver.

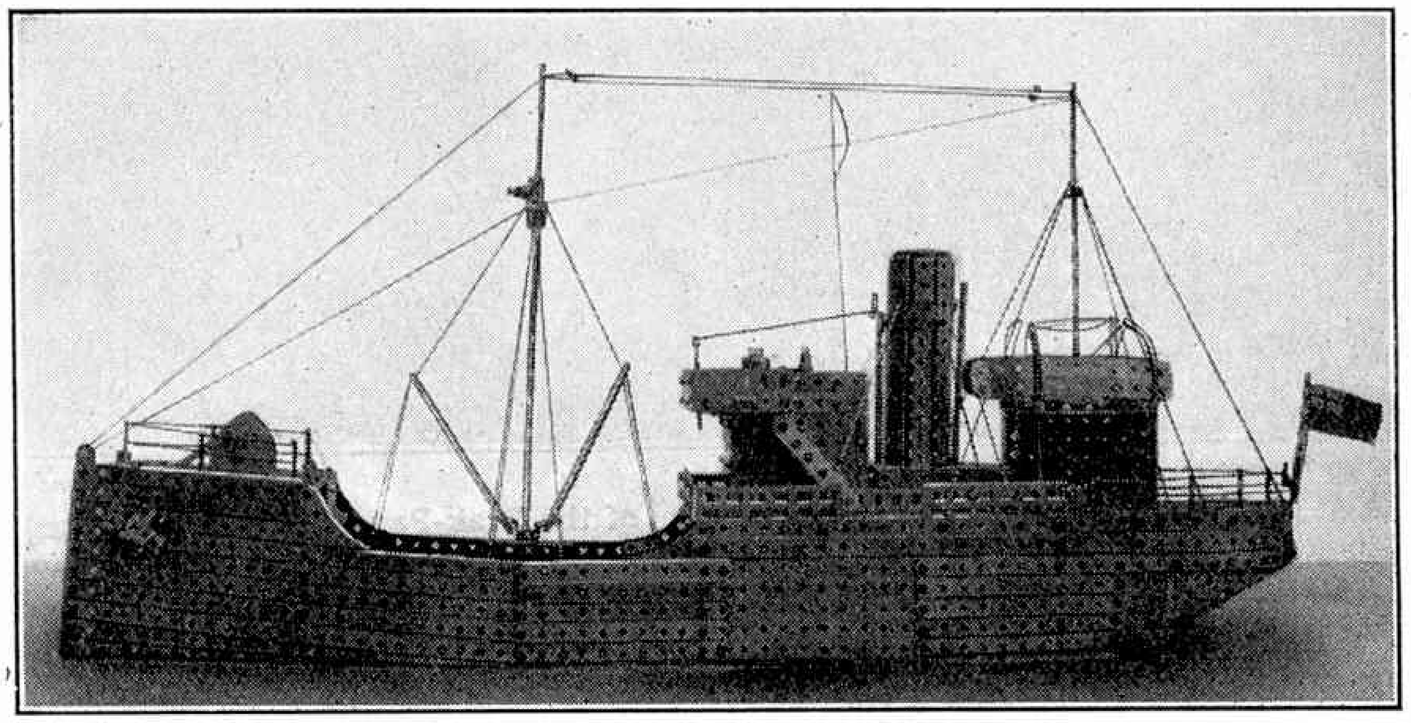
NEXT MONTH'S ARTICLE: SILVER

Results of Meccano Model-Building Contests

By Frank Hornby

"Ship" Competition

IN announcing a competition for Meccano models of ships, I realised that a somewhat difficult task had been set for "*M.M.*" readers. Nevertheless, the contest has proved no less popular than those previously announced, and a very interesting collection of entries has been received. A number of readers attempted the reproduction of some of the big trans-Atlantic liners, and several attained considerable success, but I was a little disappointed to find that none were fortunate enough to obtain a place amongst the first three prize-winners. It was stated in the competition announcement that any kind of vessel might be submitted, and I was pleased to observe amongst the entries a wide and interesting variety of types. Motor-boats and even rowing-boats were reproduced in miniature, whilst two competitors sent in excellent models of old-time sailing vessels constructed entirely with Meccano!



Steam Trawler, by A. McGregor. (First Prize)

Results :—

The judges have finally allocated the awards in Section "A" (British Isles) as follows :

First Prize (cheque for three guineas) :
Alexander McGregor, 77, Vine Street, Wallsend-on-Tyne.

Second Prize (cheque for two guineas) :
W. G. Barr, "Anchorsholme," Warren Avenue N., Fleetwood.

Third Prize (cheque for one guinea) :
R. Cashel, 36, Mawson Street, Ardwick, Manchester.

Prizes of 10/6 each :
George Murray, Dundee ; W. G. M. Thubron, Redcar ; C. Lewis, Westcliff-on-Sea ; Ian Jamieson, Glasgow ; C. P. Plantin, Westcliff-on-Sea ; Oscar Leach, Wallasey, Cheshire.

The following competitors, who are amongst those gaining Certificates of Merit, have been selected as deserving special mention :—

J. Hady, Ilford ; K. Helmore, London, E.7 ; Richard Stimson, Lowestoft ; Neil Horton, Newport, Mon. ; E. V. Banks, Croydon ; O. H. Jacobsen, Selly Hill, Birmingham ; E. A. Robbins, Kidderminster ; G. H. Lyon, Skipton ; W. Marsden, Ilford ; W. H. Shaw, Bromley ; Richard Punter, Stanmore ; K. Smith, Knighton ; W. Gibbons, Croydon ; K. C. Plumber, London, W.13 ; D. McDougall, Kinlochleven ; D. W. Churchill, Salisbury ; W. Jackson, Brighton ; A. T. Street, Guildford ; P. G. Doyle, Wexford ; E. Grace, Thornbury ; C. W. Anderson, Newbury.

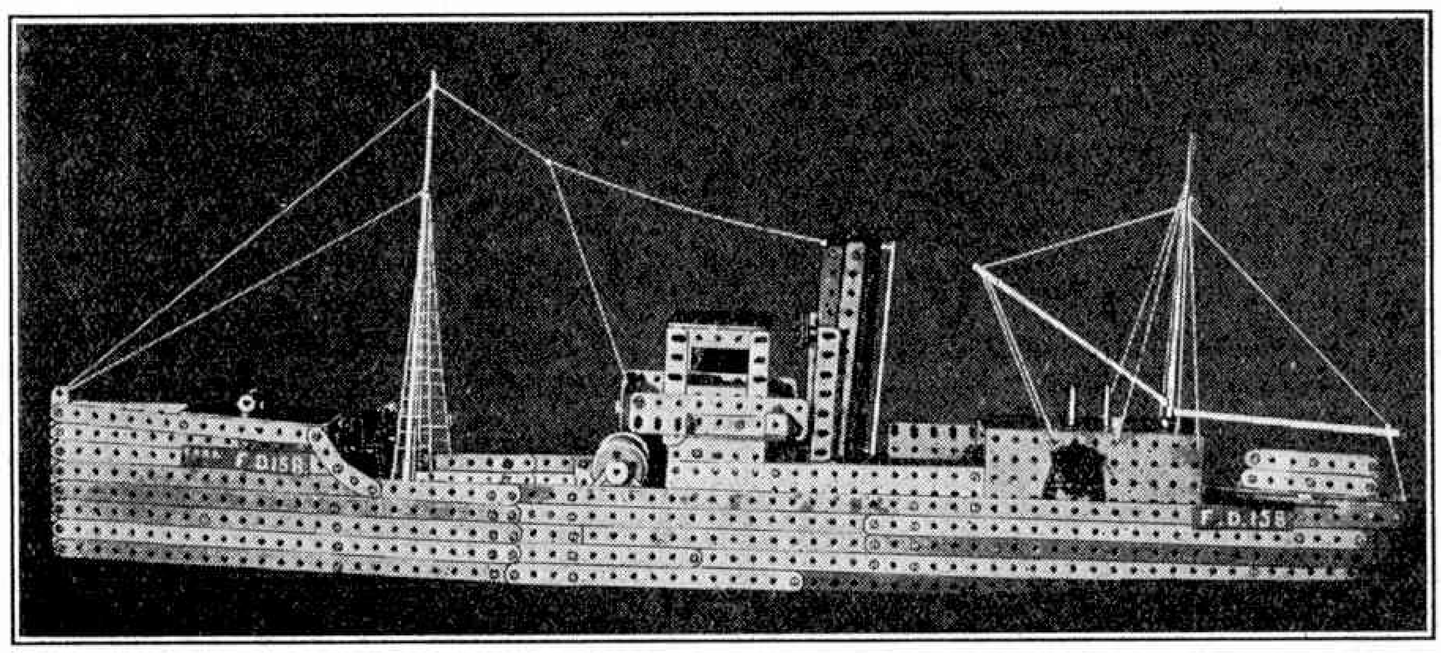
Meccano Trawlers

It will be seen from the illustrations on this page that both the first and second prizes have been secured by models of coasting steamers, or trawlers. These vessels are built complete with all the essential details from the waterline up, and as is the case with the majority of the models submitted, Meccano Parts have been put to excellent service in their construction.

The bridge in the first prize-winning model is fitted with ladder, compass (or binnacle), and helm, while the funnel is built up from $5\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips bolted at the top to a $1\frac{1}{2}''$ Pulley Wheel and at the base to a $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate. A vertical Rod represents a steam-pipe and a Threaded Pin the steam whistle, to which is attached a controlling cord passing within easy handling distance from the bridge. Meccano Buffers are bolted to a Double Bent Strip on either side of the bridge to represent port and starboard lights.

Cord is employed to represent hand-rails in certain parts of the ship and an ingenious use is made of Meccano Windmill Sails to form the railings around the main deck sides. I would point out that the stanchions supporting the cord railings are not Meccano Parts, but the large split pins that have been used for the purpose may easily be replaced by Meccano Rods. An anchor and windlass are provided in the bows of the ship, and Axle Rods attached to the base of the mast in the well-deck represent the derrick booms. Life-boats are suspended from davits formed from Axle Rods slightly bent to shape and carried at the rear of the funnel. Amongst other refinements the head-light carried at the foremast head will be noticed, also the wireless aerial, complete with lead-in wire, suspended between the masts.

The general lines of W. G. Barr's trawler are almost equally realistic. Ventilators, indicating lamps, life-boats, etc., are included amongst the ingenious fittings with which the boat is equipped, while ratlines add a touch of realism to the foremast. The construction of the hull is good and the complete model has a most pleasing and clean-cut appearance. It is a clever representation of the Fleetwood steam trawler *Erna*, F.D.158. This vessel, in common with many others submitted, may be mounted upon wheels if desired. It may then be used in conjunction with Meccano cranes, conveyors, coalers, and similar structures to form complete dockyards in miniature.



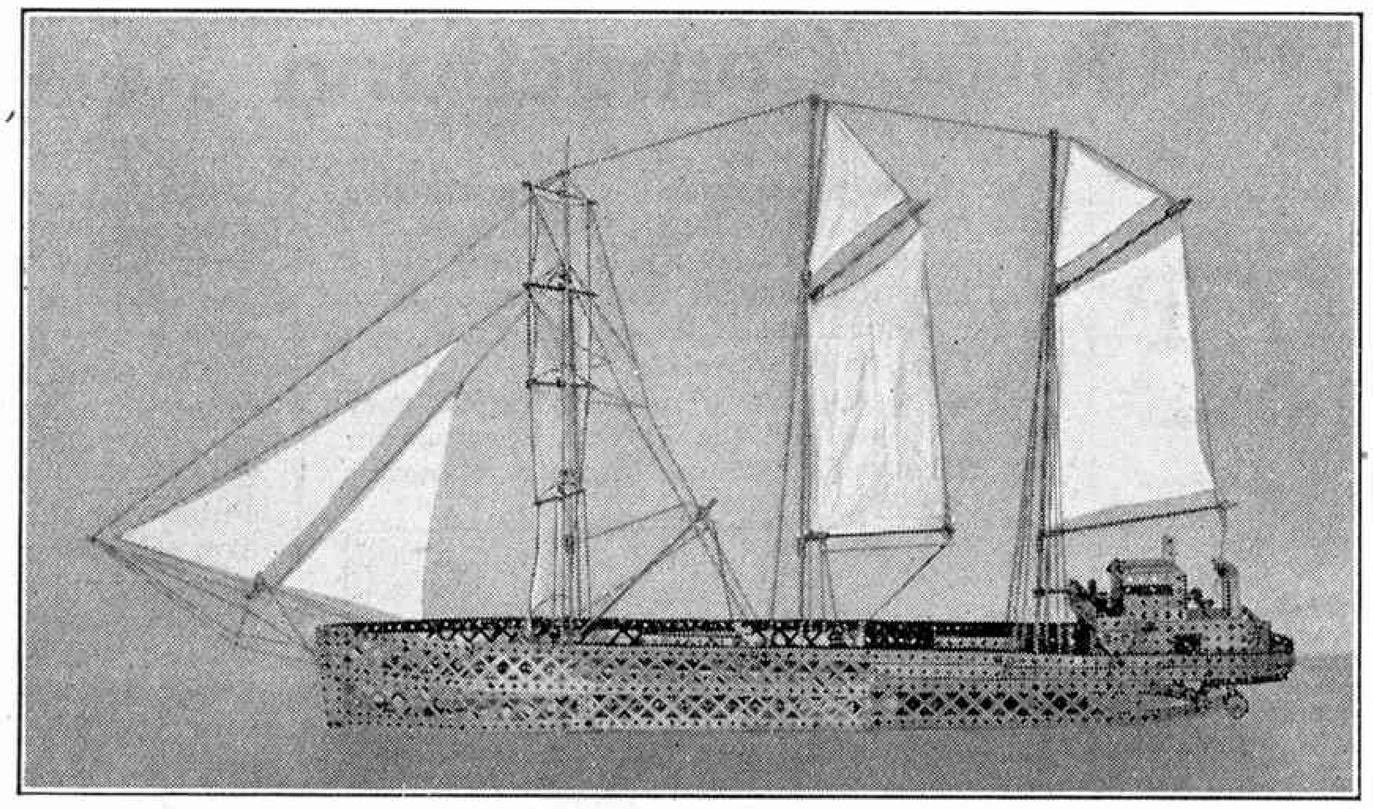
Coasting Vessel, by W. G. Barr. (Second Prize)

Model of a Famous Battle-Cruiser

The third prize has been awarded to R. Cashel for an excellent model of H.M.S. *Hood*. Unfortunately the photographs submitted were unsuitable for reproduction purposes, but I hope to illustrate this model in a future Magazine when new photographs have been prepared. Incidentally I may mention that comparatively few models of battleships were received, but Master Cashel's battle-cruiser

shows that the larger armoured vessels may be reproduced with Meccano in a surprisingly realistic manner. His model is complete with guns, turrets, fire control stations, and several other interesting features.

A few sailing ships were submitted, and I am illustrating one that secured a cash prize for its designer. It represents a barquentine, and is mounted on 1″ Pulley Wheels so that it may be moved about. Instead of being secured to the rudder as in actual practice, the steering apparatus is connected to the rear pair of wheels, which may just be seen in the illustration. The three masts are built up from Axle Rods joined together by Couplings and secured in the bosses of Face Plates bolted to the deck. The ends of the masts continue below the Face Plates and are inserted in transverse Strips bolted to the hull, in order to obtain greater rigidity. The arrangement of the sails is shown in the photograph.

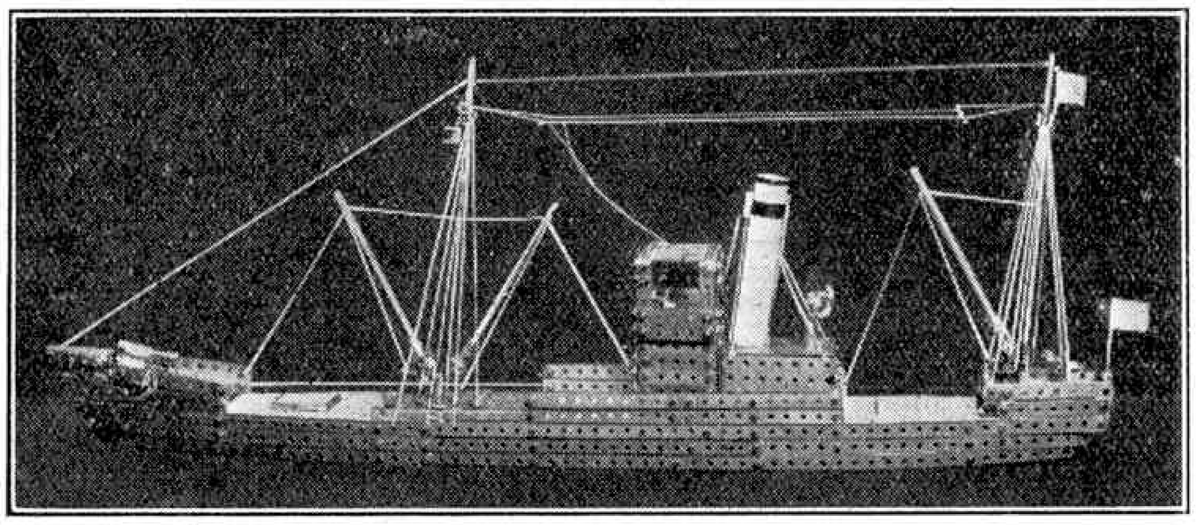


A Barquentine, by Ian Jamieson

The amount of pleasure and instruction that may be obtained from the construction of this type of vessel with Meccano is surprising, and I believe there are many other possibilities in this connection not yet fully developed. I recommend all readers to try their hand at building model sailing ships, and if they act upon my suggestion I hope they will send photos of their efforts along to me so that if suitable I can deal further with the subject in the Magazine.

Submarines and Liners

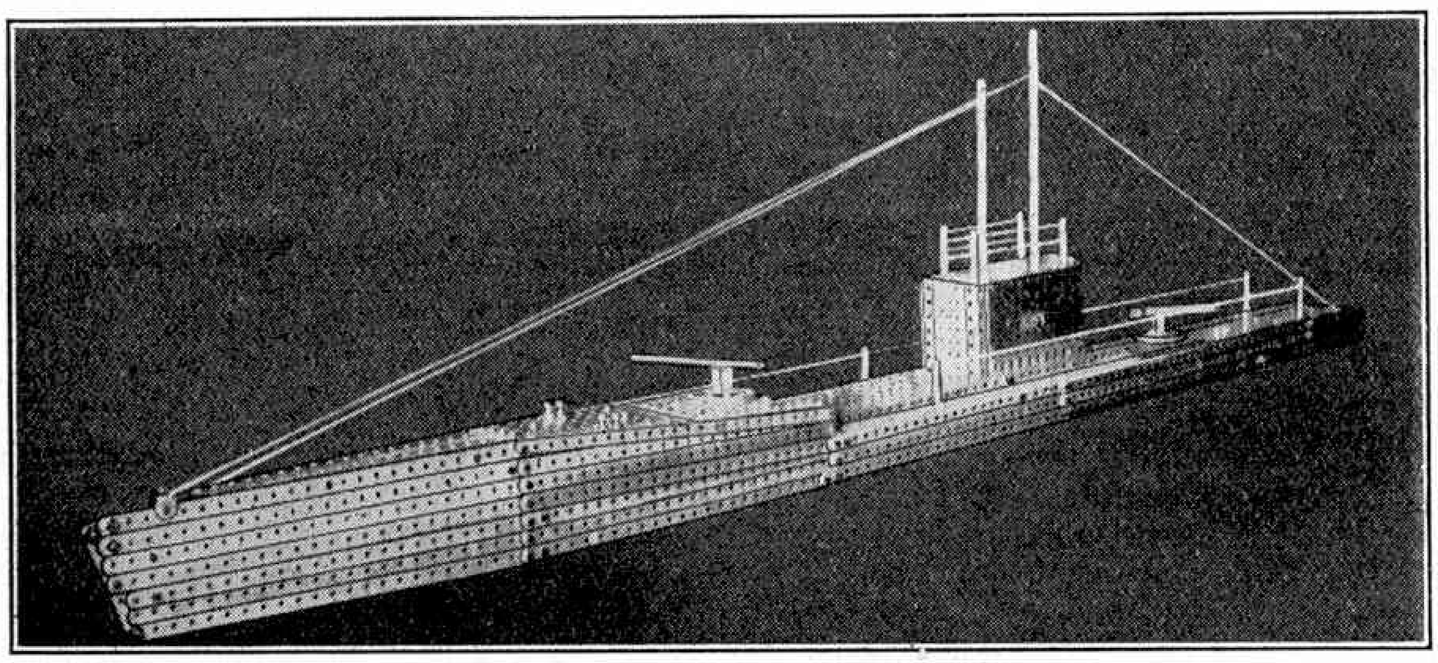
Another prize-winning model shown herewith represents a small cargo steamer, and although not constructed entirely from Meccano Parts, it possesses several very ingenious features. The arrangement of the derricks should be noted; two are attached pivotally to the base of the foremast, and small hoisting winches are secured to the deck immediately beneath each boom. Pieces of cardboard, complete with imitation hatches, are used to form the decks.



Cargo Steamer, by George Murray

A model of a submarine has secured a prize for C. Plantin, who, it will be remembered, has already been successful in two previous contests. His model is shown below, and the photograph gives a good impression of the realistic appearance of the vessel. It will be noticed that a 3½″ Strip in the bow is secured at an angle by means of Flat Brackets bolted to the top row of Strips in the nose of the submarine. The gun platforms and hatches are built up from Wheel Flanges and Face Plates, while port and starboard lights are represented by Strip Couplings secured to the sides of the conning-tower. The latter is built up from Double Angle Strips and Flat Plates in the form shown, and seven 1½″ Angle Girders are bolted to the 2½″×3½″ Flanged Plate at the rear of the tower to form steps. The general construction of the hull may be followed fairly well from the illustration.

Another prize-winning model sent in by W. Thubron represents a large passenger liner. This is fitted with three funnels (Part No. 138), life-boats, wireless aerial, bridge, etc., and Meccano buffers secured to the decks form realistic capstans.



A Modern Submarine, by C. Plantin

The two remaining entries for which cash prizes were awarded both represent small coasting vessels similar in design to the first and second prize-winning models. That sent in by C. Lewis is particularly well built, and presents a business-like appearance. The funnel is built up by bending two 5½″ Strips into a circle and joining them by a number of similar Strips.

The tramp steamer submitted by Oscar Leach is of a very neat design and the proportions are excellent. The boat is constructed entirely from Meccano Parts with the exception of the funnel, and Windmill Sails are again used, this time to form the cabin sides.

The "*Quest*" and other Entries

Amongst other entries my attention was drawn to an excellent model battleship, built by K. Helmore, and a passenger liner by J. Hady. The latter vessel comprises two promenade decks, boat deck (with four lifeboats), luggage derricks, and hoisting winches, etc. An almost equally realistic model submitted by E. V. Banks represents the Orient liner "*Orsova*." O. H. Jacobsen sent in two models—an oil-tanker and a tramp steamer, the "*Golden Goose*"—both of which are of admirable design, although their finished appearance is spoilt somewhat by the use of constructional material other than Meccano.

A little ship of tragic associations—the late Sir Ernest Shackleton's "*Quest*"—forms the subject of a model sent in by G. H. Lyon, who achieves considerable success in the reproduction of this famous vessel. In conclusion, I must mention a notable feature of a torpedo boat destroyer entered by W. Marsden. This is the clever use made of Meccano Universal Joints to form the swivel-mountings and breech-blocks of the smaller guns; a short Rod forming the gun barrel passes through the circular centre piece of the Joint and thence into one of its collars, while the collar in the other half of the Joint is pivotally attached to the deck. The gun barrel is able to swing about the set-screws passing through the arms of the link forming the gun mounting.

The majority of the models submitted were of a very practical and realistic design, and on this occasion few competitors could be accused of overcrowding their work with unnecessary ornamentations. Apparently Meccano boys thoroughly appreciate the fact that the worth of a model is not judged by the quantity of "gadgets" with which it is equipped, but by the character of its construction. A model is awarded points according to the skill displayed in employing Meccano parts to the best possible advantage, and *not* according to the number of parts used in its construction.

No. 3 Outfit Competition Results

THE "Outfit" model-building competitions continue to attract a large number of interesting entries, and I am able this month to illustrate three ingenious models that have gained prizes for their designers in the No. 3 Outfit Contest, Sections A and B of which closed on the 31st March.

The complete list of results in these sections is as follows :—

Section A (boys under 12) :
First Prize (Meccano products to the value of £2-2s.) ; Leonard W. Parsons, 41, Rock Road, Midsomer Norton, Bath. Second Prize (Meccano products to the value of £1-1s.) : Albert Lockwood, 7, Hervey Street, Ipswich. Third Prize (Meccano products to the value of 10/6) : H. R. Webb, 24, Camps Road, Haverhill, Suffolk.

Consolation Prizes (Certificate of Merit and Standard Mechanisms Manual) : E. A. Upcott, London, N.6 ; W. H. Miller, Rufford, Nr. Ormskirk ; E. C. Laundon, Barrow-on-Soar ; Charles Berry, Gt. Yarmouth ; H. Webb, London, N.W.5 ; C. Coyle, Sutton, Co. Dublin.

Special Commendation (Certificates of Merit) : James Ellis, Westcliff-on-Sea ; C. Mickleburgh, London, S.E.22 ; E. L. Dees, Low Fell, Co. Durham ; C. P. Mitchell, Insch ; J. Sibbald, Dundee ; Herbert Dummett, Dorking ; W. H. Andrews, Gt. Shelford ; C. Stabler, Watford ; E. A. Bonsor, London, S.E.25.

Section B (boys over 12 and under 16) :
Prizes same as in Section A. First Prize : E. H. Bradshaw, 139b, Attercliffe Common, Sheffield. Second Prize : R. V. Jones, 8, Park Edge, Harborne, Birmingham. Third Prize : Alex. Sutherland, 90, Sunderland Road, South Shields.

Consolation Prizes (Certificate of Merit and Standard Mechanisms Manual) : A. F. M. Robertson, Manchester ; D. R. Haggis, London, N.10 ; L. K. Griffin, Barrow-in-Furness ; J. Bracey, Portsmouth ; Eric Grant, Withington, Manchester : J. S. Kingham, Wellingborough ; J. Riddell, Rutherglen ; Jack Strong, Bristol.

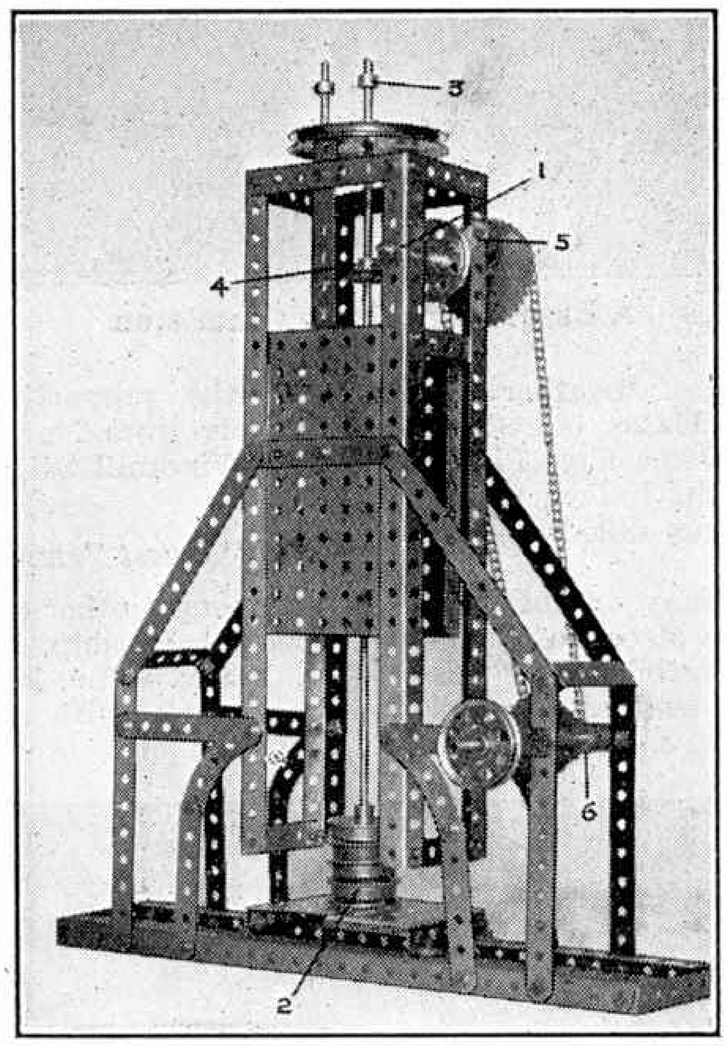
Special Commendation (Certificates of Merit) : A. Fairbairn, Southport ; K. Baker, Cardiff ; L. Greenland, Longbridge Deverill ; G. W. Richards, Winchester ; R. Sandland, Preston ; J. S. Newton, York ; J. Cooper, Redbridge ; T. A. Fillingham, Hessle ; T. Whittle, Charnock Richard, Nr. Chorley.

In addition to the above, further Certificates of Merit have been presented to competitors who sent in models showing particular merit.

Meccano Kinetoscope

E. H. Bradshaw secures First Prize in Section B with a model Kinetoscope. This is an apparatus with which animated pictures may be produced in a manner somewhat similar to the earliest form of the cinematograph, and the varied results obtainable will provide endless amusement. Our Model Department is constructing the model and I shall describe it in the Magazine as soon as space permits, for I feel sure my readers would like to have some particulars of it so that they may build it for themselves.

The Second Prize in this section goes to R. Jones for the clever reproduction of Nasmyth's Steam Forging Hammer



Nasmyth's Steam Hammer, by R. V. Jones (Awarded Second Prize, Section B)

illustrated on this page. It will be noticed that Sprocket Chain and two Sprocket Wheels are used to connect the driving rod with the tappet shaft. These parts are not included in the Outfit but they may easily be substituted by means of cord and pulleys. The hammer-head is formed from a number of Flanged Wheels secured to the vertical sliding Rod 3. The latter carries a 1″ Pulley 4, which is engaged by the ends of a 2½″ Strip 5 (forming the tappet) bolted to a 1½″ Pulley Wheel secured to the shaft 1. The motive power drives by means of the Pulley Wheel shown, a Rod on which is mounted a ½″ Pinion 6, engaging with a 57-teeth Gear Wheel secured to the shaft carrying the lower Sprocket Wheel. The vertical guide Rod 3 of the hammer slides in the boss of a 3″ Pulley Wheel bolted at the top of the tower.

Much amusement may be obtained with this model, especially if it is driven by a Meccano Clockwork or Electric Motor, for it will be found that small pieces of coal or similar material may quickly be crushed under the repeated blows from the hammer.

The Hammerhead Crane shown herewith secures Third Prize for A. F. M. Robertson. This is a good example of the style of model that may be built with a No. 3 Outfit.

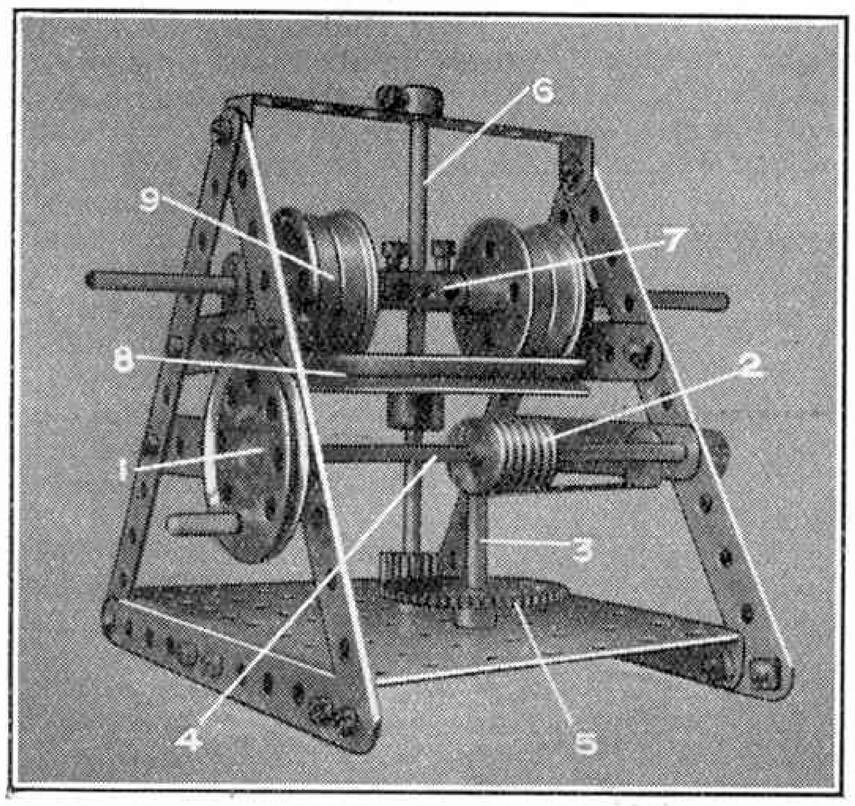
The crane trolley 1 is caused to travel to and fro by means of a cord 2 passing round a Pulley carried on a shaft journalled in the gear-box 3, and round another Pulley at the outer end of the rotating arm, or boom. This type of traversing gear is explained more fully in Meccano Standard Mechanism No. 169. The operation of the crane-hook is effected by a Crank Handle 4 also journalled in the gear-box 3. The boom pivots about a vertical Rod 5, which is secured in the boss of a 3″ Pulley 6 forming the swivelling base. The necessary rotary movement is imparted by the Crank Handle 7 which carries a Worm engaging with a 57-teeth Gear Wheel secured to the Rod 5.

Prize Winners in Section A

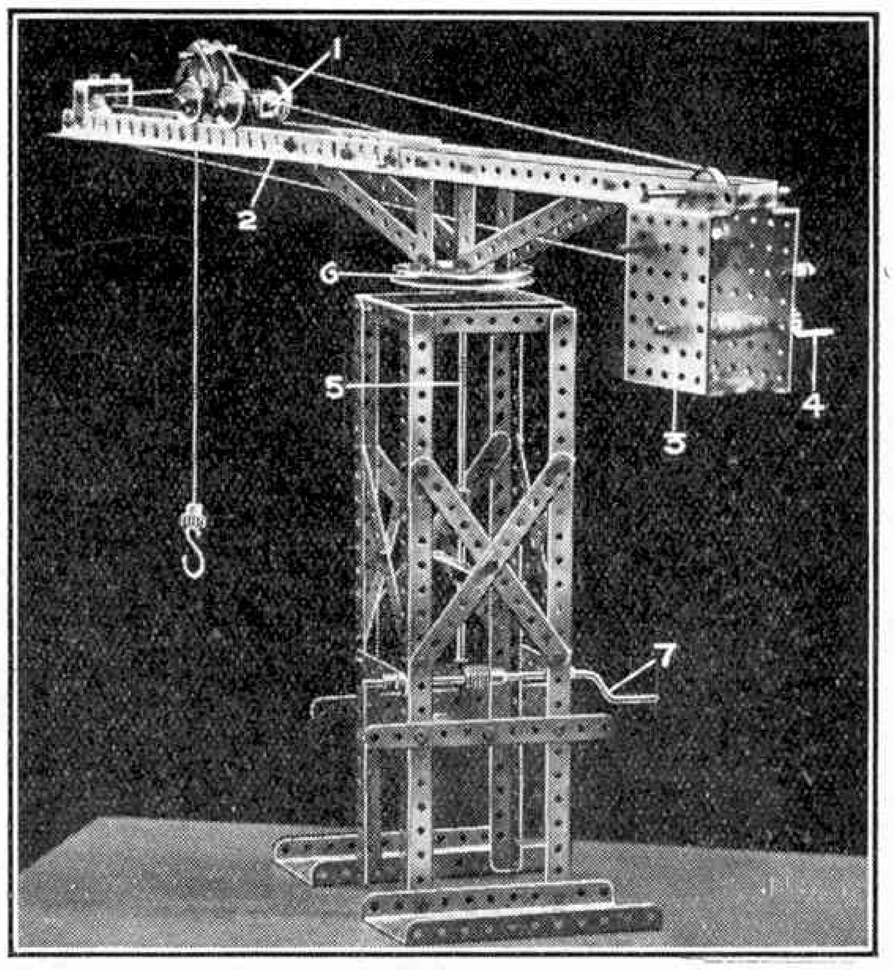
The remaining illustration on this page shows the First Prize-winning model in Section A, a Hand Mortar Mill sent in by L. W. Parsons. The construction of this model is quite simple, though its operation is both realistic and interesting.

The Rod 4 of the hand wheel 1 carries a Worm 2 gearing with a ½″ Pinion secured to a vertical shaft 3, which is journalled in the base plate and further supported by a Double Angle Strip. A Gear Wheel 5 on this shaft drives a second ½″ Pinion secured to another vertical Rod 6. The latter is free to rotate in the central bore of a Coupling 7 and carries a 3″ Pulley 8. Two further Axle Rods, inserted into either end of the Coupling 7, carry the rollers 9, consisting of Flanged Wheels resting upon the Pulley 8. The outer bearings for the rods consist of Flat Brackets bolted to 2½″ Strips secured to the framework of the model.

The Second Prize in this section has been awarded for a model Motor-car Chassis, and a neat representation of the new Auto-giro flying machine carries off the Third Prize.



Hand Mortar Mill, by L. W. Parsons (First Prize, Section A)



Hammerhead Crane, by A. Sutherland (Third Prize, Section B)

"Machine Tool" Competition

We announced in last month's "*M.M.*" a splendid new model-building competition in which some valuable cash prizes will be awarded for Meccano models of Machine Tools. The competition closes on the 31st July for readers in the British Isles, and entries from overseas competitors must be received by 30th October, 1926. Meccano boys should send along their efforts as soon as they are completed.

A machine tool consists of a mechanically-operated instrument with which various materials may be fashioned to different shapes and sizes. The variety of machines grouped under this heading includes such apparatus as mechanical hammers, drills, lathes, stamping, crushing, and planing machines, punches, road-breaking apparatus, excavators, presses, rolling-mills, etc.

You may design your model from any type of machine tool that you prefer, or with which you are most familiar, but all models that you submit in the competition must be your own unaided work, both in design and construction. Any Outfit or number of parts may be used.

Entries will be divided into the following sections: SECTION A, for competitors residing in the British Isles; SECTION B, for competitors residing outside the British Isles. Competitors' ages will be taken into consideration when judging the entries. Prizes will be awarded for the best entries FROM EACH SECTION as follows: FIRST PRIZE, £3-3s.; SECOND PRIZE, £2-2s.; THIRD PRIZE, £1-1s.; SIX prizes of 10/6 each. A few special Certificates of Merit will be awarded, at the judges' discretion, to competitors whose efforts closely approach prize-winning standard, while in addition a number of copies of "Meccano Standard Mechanisms" will be distributed as consolation prizes.

When you have built your model, you should send in a photograph or a good drawing, together with any explanations you may think necessary, although the latter should be made as brief as possible. Photographs or drawings will be returned if a stamped and addressed envelope of the necessary size is enclosed with the entry. Write your name and address on the back of each sheet used, and state your age, name of the competition, and section in which your model is entered. Mark envelopes "Machine Tool Competition."

Meccano in the Home

We mentioned in the May "*M.M.*" some of the numerous practical purposes to which Meccano lends itself, and a competition was announced in which prizes were offered for the best examples of this kind of Meccano construction received from our readers. We entitled the competition "Meccano in the Home," and the models submitted for consideration should consist of some device that may be put to practical domestic use. No doubt all kinds of contrivances will suggest themselves to our readers—tea-pot stands, lamp-brackets, switches, pen-racks, pipe-racks, book-stands, "gadgets" for the home workshop, and innumerable similar devices. We confidently expect some extremely interesting entries and we hope all our readers will compete.

Entries in this competition will be divided into the following sections; Section A, for boys under 12 years of age: Section B, for boys over 12 years of age: Section C, for boys residing overseas. Prizes consisting of Meccano products to the value of two guineas, one guinea, and half-a-guinea respectively will be awarded for the three best entries in each section. Other competitors whose entries show outstanding merit will be presented with complimentary copies of "Meccano Standard Mechanisms," while, in addition, nine special Certificates of Merit will be awarded, at the judges' discretion, for models that closely approach prize-winning standard.

Closing dates, for Sections A and B: 30th June, 1926; Section C: 30th October, 1926.

Having designed some Meccano contrivance on the lines indicated above, you should send in a photograph or good drawing of your work, together with any explanations that you think necessary, although the latter should be as brief as possible. The use of the apparatus should be stated concisely. The model submitted must be your own unaided work, both in design and construction. Any size of Outfit or number of parts may be used.

Important. Write "Utility Competition," together with your name and address, on the back of each photograph or sheet of paper used, and state your age. Mark envelopes: "Utility Competition."

Competition Closing Dates

"No. 4 Outfit" Competition: entries from any country outside the British Isles must reach Liverpool not later than 31st July. Closed for United Kingdom entrants. Full particulars in "*M.M.*" for March 1926.

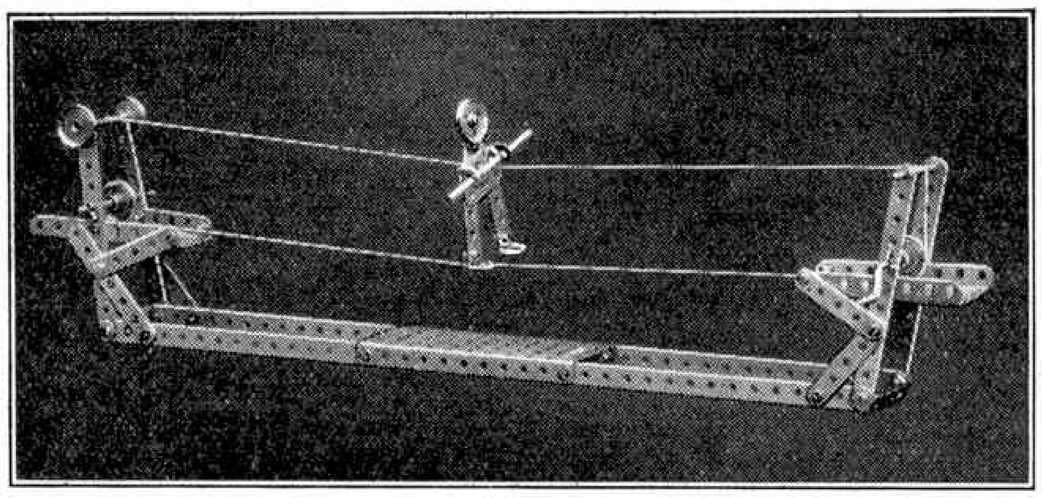
"Bridge" Competition: entries from any country outside the British Isles must reach Liverpool not later than 31st August. Closed for United Kingdom entrants. Full particulars in "*M.M.*" for March 1926.

"No. 5 Outfit" Competition: entries from any country outside the British Isles must reach Liverpool not later than 31st August, 1926. Closed for United Kingdom entrants. Full particulars in "*M.M.*" for April 1926.

"Crane" Competition: entries from any part of British Isles must reach this office not later than 30th June. Overseas section closes 30th September. Full particulars in "*M.M.*" for April, 1926.

The Mystery of the Tight-Rope Walker

A further account appeared in the March Magazine of a boy's amazing experiences during a dream-visit to Meccanoland, in the course of which he met with the queer person who is depicted below posing as a daring tight-rope walker. On a casual glance at the construction of the model, it would seem that the Meccanitian should move to and fro along the outstretched rope, according to the direction in which the Crank Handle is turned. This is not the case, however, for it has been found that in operation the acrobat exhibits a mysterious predilection to move towards the Crank Handle only. We asked one or two of our young friends to explain this result, and were surprised to find a wide variance of opinion in the answers received. One of the most convincing explanations was put forward by a bright Meccano boy who declared that since the inhabitants of Meccanoland were an entirely progressive race, it is not surprising that one of their number should refuse to walk backwards even when expected to do so!



A Queer Inhabitant of Meccanoland whose movements readers were asked to explain

The cord in this model is continuous, and is given a complete turn round the 1" Pulleys and Axle Rods at each end of the model. The lower length of cord passes through the Angle Bracket forming the Meccanitian's right foot, whilst the upper length is led under the balancing-pole and through the centre hole of the Flat Trunnion, which represents his body. The acrobat advances when the Crank Handle is rotated.

Results of the Competition

Nevertheless, it was felt that our readers would prefer a more scientific explanation, and we therefore asked them to send in their own opinions. As might have been expected, the elucidation of the mystery proved quite a simple matter, and we have received literally hundreds of solutions, the majority of which have proved to be correct. We have been obliged therefore to consider such points as neatness, priority, etc., in order to select the winner of the five shillings offered for the best entry received. The award goes to T. K. Lockhart, Merchiston Castle School, Edinburgh. In addition, the following readers who sent in particularly lucid and neatly set-out explanations will each be presented with a complimentary copy of "Meccano Standard Mechanisms"; S. Goodyear, Birmingham; H. A. Davies, Llanrwst, N. Wales; R. M. Clark, Liverpool; E. M. Galloway, Brechin, Forfarshire; I. P. Simpson, Ulverston.

The correct solution is as follows: When the Crank Handle is turned in a clockwise direction the upper portion of the endless cord by which the figure is suspended becomes taut, owing to the friction that must be overcome before the guide Rod and 1" Pulley at the further end of the model begin to rotate. Consequently, most of the weight of the Meccanition is supported by the upper length of cord, and owing to the motion of the latter, the figure tends to lean forward so that his "balancing pole" exerts increased pressure upon the cord. The amount of friction that the cord must now overcome before it can pass through the centre hole of the Flat Trunnion forming the Meccanitian's body is sufficient to cause the figure to move with the cord, the lower portion of which, being comparatively slack, passes freely through the Angle Bracket forming his foot. On the Crank Handle being turned in an anti-clockwise direction, the above results are reversed, since the lower cord is then in tension, whilst the upper is fairly slack and free to pass unimpeded through the Flat Trunnion. When the cord is moved in this direction the tight-rope walker leans backward so that his foot presses tightly against the lower cord, which is in tension, and here again the friction so created is sufficient to carry him along towards the Crank Handle.

Birkenhead Meccano Competition

Mr. J. Woodhall, the well-known Meccano dealer of 256, Grange Road, Birkenhead, has completed a successful Meccano Model-Building Competition. A large number of entries was received and the prize-winning models displayed considerable engineering skill. The successful entrants were as follows:—1st, WILLIAM BLYTHE, aged 12 years, 406, Beckwith Street; 2nd, JAMES MULLINS, aged 14 years, 21, Newton Street; 3rd, FREDERICK STEWARD, aged 12 years, 10, Ravenscroft Road; Consolation, JAMES MCSHANE, aged 12 years, 19, Tyrer Street; JOHN HODSON, aged 14 years, Spital Road, Bromborough; A. CARUTH, aged 12 years, 12, Crosville Road. The models were exhibited in the window of Mr. Woodhall's establishment, where they proved a great attraction.

Another Contest at Dover

Another competition was organised for the benefit of local Meccano boys by Mr. J. Archibald, of 20, Woolcomber Street, Dover, who was agreeably surprised to find such a high standard of excellence obtaining in the large number of models submitted.

The first prize has been awarded to EDMUND HEWITT, of 5, Strond Street, Dover, for a Toplis Level Luffing Crane. The model was copied from the original crane working in a local coal-yard and its operations include the movement of a bucket grab, and swivelling and luffing motions. The grab is suspended by three ropes and is opened or closed as desired by a similar method to that described in "Standard Mechanisms" No. 184. The swivel base of the crane rotates on Meccano ball-bearings (S.M. No. 104), whilst the weight of the superstructure is additionally supported by means of four Flanged Wheels running on a circular guide rail attached to the travelling base.

Other prizes were awarded to E. PAIN, 151, Buckland Avenue, for a model of a Flying Boat, and to H. BALDRY, Woolcomber Street, for a model Motor Chassis.

"Tippler" Competition

In the "*M.M.*" for December 1925, under Suggestion No. 4, mention was made of an apparatus by which the contents of railway coal wagons may be unloaded at a minimum expenditure of both time and labour, and readers were invited to submit suggestions for a Meccano model of such a device. We have received a number of ingenious contributions in this connection, and the best are being constructed in our Model Department with a view to publication in an early issue of the Magazine. The results of the competition will be announced in next month's "*M.M.*"

Greater Safety in Flying

The principle of the gyroscope is employed in the latest safety device, which enables an airman to see at a glance how his machine is travelling. This invention is an adoption of the same idea as the gyro-wheel in the popular spinning top.

One of the greatest difficulties in flying in fog or at night is to know what is happening. For instance, if flying above the clouds it is almost impossible to know (without consulting instruments) whether the machine is turning, or climbing, or descending. Even flying upside-down, it is almost impossible to realise it, except for the rush of blood to the head. At great altitudes things are very deceptive, and the introduction of this control indicator should therefore be of considerable interest.

Although the device will greatly reduce the risk of an aviator losing his way in heavy fogs and at night, perhaps its greatest use will be in detecting side-slips and false turns of machines in flight, and its instant revelation of the slightest deviation from a straight course.

In appearance the dial of the device resembles a speedometer (Fig. 1) and is fitted to the instrument board of the machine. The centre of the dial carries a needle to show the flying speed. Above it, in a semi-circle, are nine small electric lamps, the centre one white, those on the left red, and those on the right, green. Below is a horizontal row of more electric lamps similarly coloured. Each of the lamps marks a 5° change—those at the top of the dial show side-slip (Fig. 3) and those below, when the machine turns to left or right (Fig. 2).

The lamps denoting side-slip are actuated by mercury, contained in a tube, which makes contact with wires from the batteries and so lights up the lamps when the machine side-slips. The lamps in the lower row are controlled by a small gyro-wheel rotated by a suction-created jet of air.

While the machine is flying in a true course and maintaining a perfect balance, two white lights, one in the centre of each row, remain alight continuously (see Fig. 1). They are extinguished, however, immediately the machine turns or side-slips and their place is taken by the coloured lamps, which light up from the centre outward, according to the direction in which the aeroplane may lean or swerve. The pilot is then able to adjust the machine's course, or correct the side-slip, by actuating his controls until such time as the coloured lamps are extinguished and the centre white lights are burning again.

* * * *

Strength of a Jet of Water

Switzerland is perhaps the most progressive of all countries in the generation of electric power, and the Fully Power Station in the Rhone Valley claims to have the strongest and most rigid stream of water in the whole world. This jet turns the huge turbines in the power plant, striking a blow that generates 3,000 h.p., and its appearance up to the moment of impact is that of a polished bar of dark steel, 1½ inches in diameter.

A story, interesting whether true or not, is related concerning this stream of water. A sceptical cavalry officer, when told of its strength, drew his sabre and declared that he would soon show how a flow of water such as that might be severed. With a mighty sweep he brought his sabre down upon it, but the result was not what he expected. The blade was smashed to fragments and for several weeks afterwards the officer wore his arm in a sling! The sword did not disturb the flow of water even momentarily.

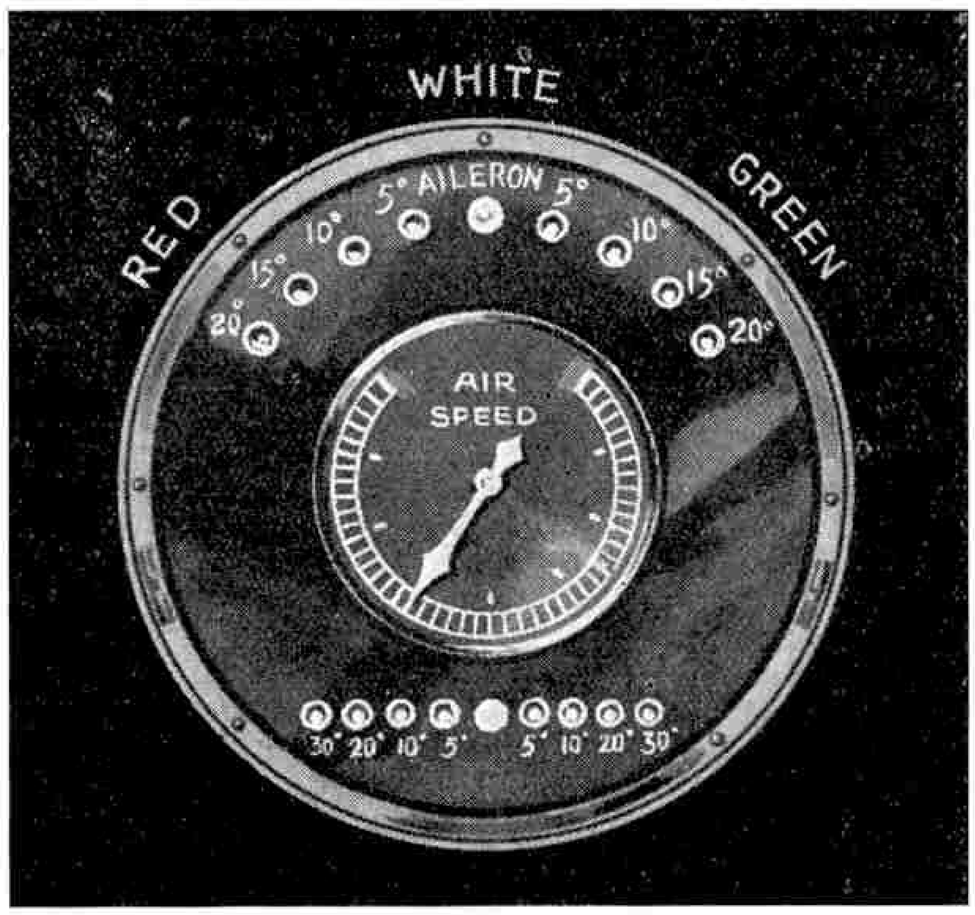


Fig. 1. Dial of Gyroscopic Safety Device for Aeroplanes

"Motionless" Running Machinery

Doubtless many of our readers have heard of the wonderful instrument known as the "stroboscope," an instrument used to study the exact behaviour of rapidly-moving bodies. Until recently such instruments have been very unreliable, but in a new type, invented by the famous Seguin Brothers of Paris, there are considerable possibilities.

The new instrument is different from its predecessors in that it embodies a tube containing neon, the light from which is projected at regular intervals upon the object to be examined. If the rate at which the light is projected be adjusted to the periodic motion of the machinery under examination, such as a propeller or a belt-driven pulley, the moving part will appear to be motionless. On the other hand, if the rate of the periodic ray projection is thrown slightly out of synchronisation, the machinery will appear to be moving slowly, and a slow-motion cinematograph view being thus obtained.

Another improvement on the old type of stroboscope is an instrument known as the "Rotoscope," which consists of a small cylinder driven at high speed. Narrow slits for viewing the object under inspection are cut through the cylinder, parallel to its axis of rotation, and the observer can use both eyes. This instrument makes it possible to read what is printed on a visiting card that is turning at a speed of 20,000 revolutions a minute. According to the speed of the cylinder, the object may be seen from 12,000 to 180,000 times a minute. The duration of each glimpse is anything from one ten-thousandth down to four millionths of a second, but the net effect of the recurring and suitably timed glimpses, together with what is known as "retentivity of vision," is that the observer sees the object in an apparently stationary condition.

* * * *

Protected Metals

The extensive damage caused by corrosion of metals is responsible for the many systems of protection that are invented. One of the newest and most efficient consists of providing the metal with a surface coating of rust preventing material, such as Cadmium or Zinc, and superimposing a layer of tin, both coatings being deposited electrolytically.

Dry Ice

A marvellous material, called "Dry Ice," makes it possible to preserve frozen goods, or ice-cream, for many hours after leaving the refrigerator or freezer. Dry Ice cannot melt, is perfectly dry to touch and yet so cold that a thermometer will be sent down to 110 degrees *below* zero when placed in contact with it!

Although the temperature of Dry Ice is much colder than that prevailing at the North Pole in the depth of Winter, it may be handled with the bare hands provided that the skin of the fingers does not touch the solid lumps for more than a couple of seconds at a time.

The composition of this remarkable material is nothing more or less than the gas that we see rise from a bottle of ginger beer when it is first opened! In other words, Dry Ice is simply carbon dioxide cooled down and compressed into a solid mass. It is made by forcing oxygen through an ordinary lime-kiln, thus creating carbon dioxide, which is converted into snow.

Dry Ice will last twice as long as ordinary water ice. When used for packing goods, the ice is placed around the outside of a small container holding the food, the whole being placed in a larger package made of a waxed cardboard, in itself a good insulator. As the warmth from the exterior air penetrates, it warms the surface of the block of frozen carbon dioxide and slowly converts it into a gas again. The carbon dioxide thus released passes through a small hole in the outer container and when completely evaporated no trace remains to show that there was ever anything else except a package of food inside the larger container.

The Canadian National Railways are considering the desirability of adopting Dry Ice in preference to the ordinary variety, not only in the refrigeration cars that convey food but in the dining cars of the trans-Canadian expresses.

* * * *

Wonders of Rugby Radio

Certainly the new wireless station at Rugby is living up to the prophecy of its engineers that it would girdle the Empire. We have received word, from one of our Australian readers, of a recent case that for speed and general efficiency, is remarkable and probably unique in the annals of wireless history.

It seems that the director of a British company, with whom prompt communication was imperative, was on board a mail steamer in the Australian Bight between Fremantle and Adelaide. A message addressed to him was sent from the Rugby station at midnight. He received it and the operator of his ship wirelessed his reply to a land station. Here it was transferred to the ordinary cable, and the reply was delivered in London before 2-0 a.m. Had only the cable been available, the director would have been inaccessible till the ship reached port.

* * * *

The Rugby station also offers facilities for the transmission of messages containing news of commercial importance for multiple reception in the Dominions, Colonies and in foreign countries.

Transparent Metal Foil

It is claimed that the extraordinarily thin metal foils recently made in Germany will be extremely valuable, not only in scientific research, but also in the construction of high-frequency microphones for short wave radio work and in connection with talking films.

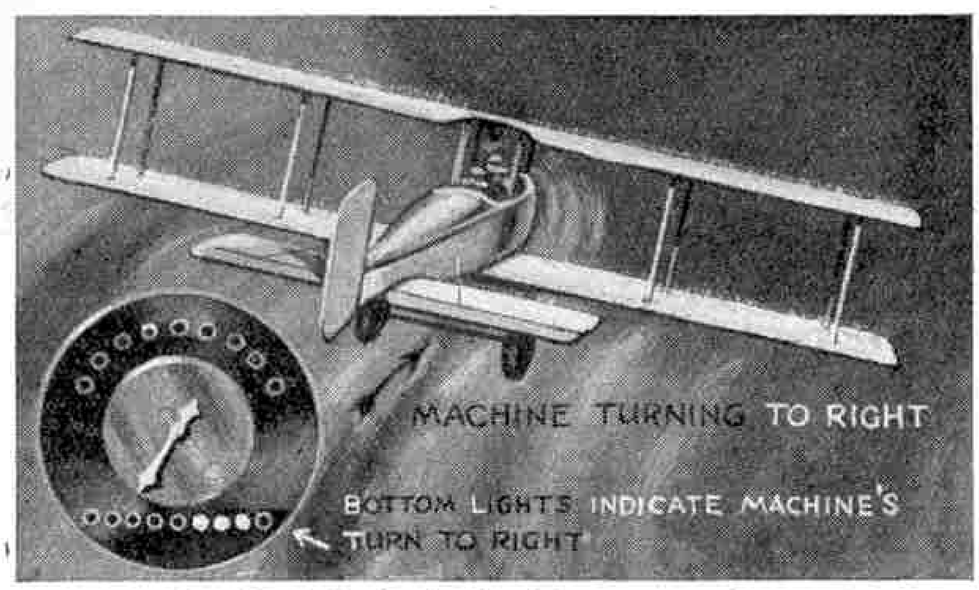


Fig. 2. Safety Device in Action *(see previous page)*

The delicacy of a material so finely prepared as this is almost beyond comprehension and can only be realised by comparison.

Fine gold is extremely malleable and spreads under the hammer to a greater extent than any other metal. The gold-beater, whose craft is one of the oldest in the world, is able to beat gold into leaf so thin that 100 sq. ft. of it weighs only one ounce!

Even so, the thinnest foil that the gold-beater can obtain is some forty times as thick as the foil produced by the new method, which apparently is electrolytic. Gold foil of this thickness—say one ten-millionth of an inch—is perfectly transparent, with a slight yellow tint when viewed by transmitted light but appearing of a dark rose colour when seen by reflected light. Other metals such as silver, nickel and aluminium also may be obtained in foils so thin and transparent that photographs may be taken through them!

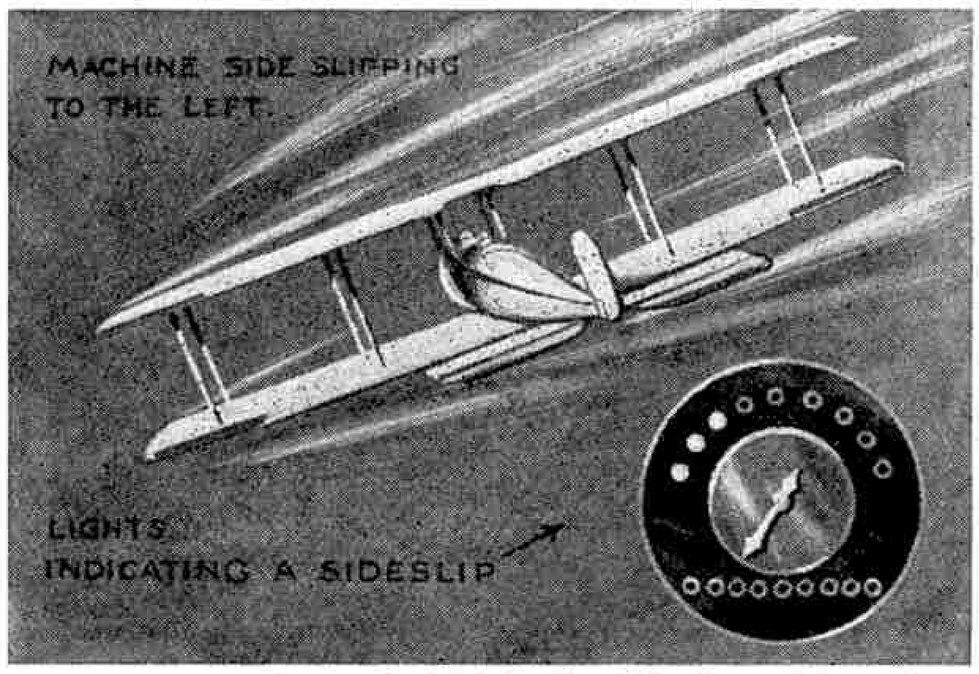


Fig. 3. Device indicating Side-slip

* * * *

A Comparison

Nowadays, when it is commonplace for an engineer to work to a limit no greater than 1/1000 of an inch, it is interesting to recall that nearly one hundred years ago the "standard" yard measure, kept at Westminster, was accidentally broken and had to be repaired. The dovetail joint was so badly made that history states it was nearly as loose as a pair of tongs.

New Solar Observatory in Africa

After careful surveys for a suitable site in Algiers, Baluchistan, and South-West Africa, Beersheda in the last-named area has been selected as the location of an important new solar observatory. This observatory is to be the headquarters of scientists who are to study the variations in the heat of the sun's rays with a view to securing data to enable meteorological forecasts to be made with greater accuracy.

Dr. C. G. Abbott, who selected the African site, states that in past years the heat from the sun has varied considerably, this variation being attributed to sunspots. It appears to be an obvious conclusion that if the amount of solar heat received by the earth varies, the weather also must vary accordingly. The establishment of this conclusion as a scientifically proved fact is a different matter, however, and this is the main object of the investigations to be carried out at the new observatory which, it is anticipated, will be in full commission early in August.

* * * *

Strain Recording Apparatus

A strain-recording instrument specially designed for use with concrete has been adopted by the United States Government for use in obtaining accurate records of the stresses and strains existing in large buildings. The instrument is operated by the change in the electrical resistance of a pile of carbon plates when subjected to pressure beyond the normal for which they are adjusted. The end faces of the carbon plates are connected to an electrically-operated registration device.

A concrete dam now under construction in California is to be used for testing purposes and will be subjected to tests until it is finally destroyed. As the liquid concrete is poured into position in the dam, the carbon plates, to which will be attached sufficient cable to connect up with the registering instrument, will be inserted. In this manner will be obtained a full record of the strains and stresses occurring throughout the test.

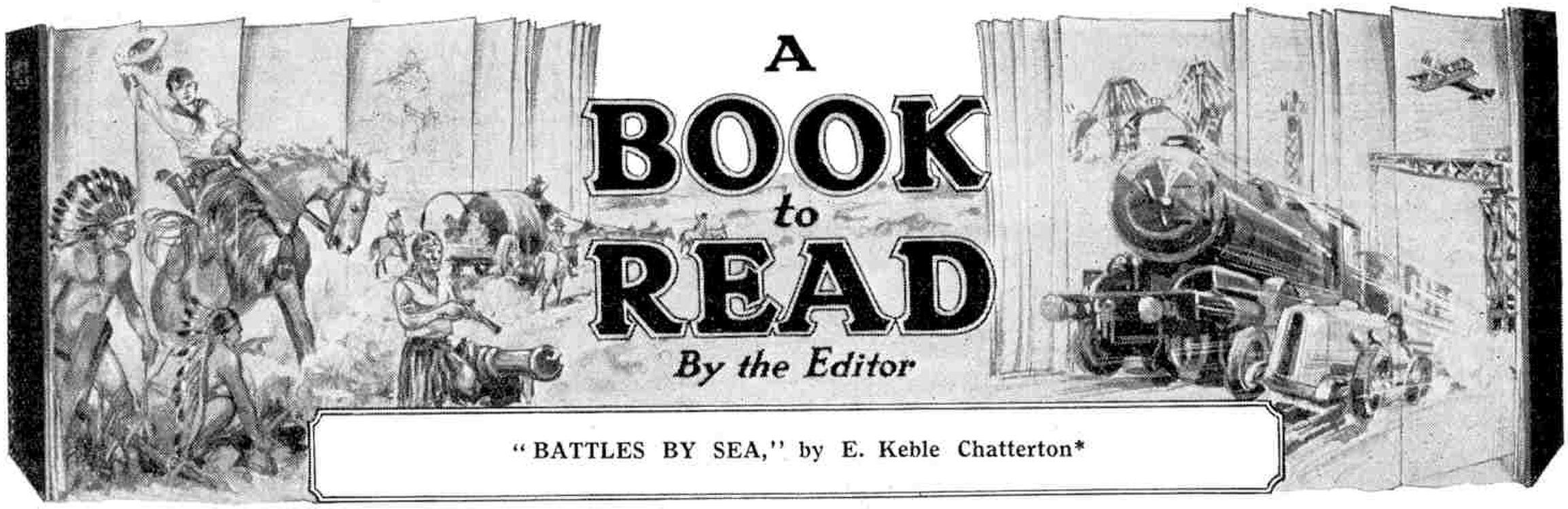
* * * *

Gigantic Concrete Blocks

At Algiers new quays over three miles in length are being constructed of concrete blocks, each 43 ft. in length and weighing 450 tons. The blocks, which are made on floating pontoons, are laid in position by means of floating cranes.

Huge as these blocks are, they do not compare for size with the masonry used in the walls of the ancient Acropolis at Baalbek, Syria. These immense stones are three times the size of the Algiers blocks and are so perfectly dressed and fitted that the blade of a penknife cannot be inserted between the joints. The blocks were cut and shaped by workmen certainly hundreds—and perhaps thousands—of years ago.

The method of erecting these blocks remains to this day an engineering mystery. No mechanical appliances have ever been found but it seems improbable that manual labour alone could have accomplished such mighty tasks.



"BATTLES BY SEA," by E. Keble Chatterton*

EVERY British boy loves to read of the battles, both on land and sea, by which our nation has won the proud position she occupies to-day. In this book there are described many battles by sea about which every reader of the "*M.M.*" will delight in reading. One in particular—the Battle of the Falklands—the stirring story of how Admiral Sturdee avenged the disastrous defeat of Admiral Craddock at Coronal, on 1st November 1914—cannot fail to thrill even the least imaginative person.

At the outbreak of war Sturdee was Chief of Staff at the Admiralty. After Craddock's defeat it became of great importance to wipe out Von Spee's force for, by his victory over Craddock, the German Admiral had gained the command of the seas off South America. In less than a week of the news of Craddock's defeat, the two fine ships "*Invincible*" and "*Inflexible*" were ordered to report at Devonport, where with great haste they were fitted out for their mission.

Admiral Sir F. C. Doveton Sturdee, Bt., K.C.B.

British Battleships on a Secret Mission

With six months' stores on board and their bunkers filled with coal, the two battleships left Devonport on a mysterious and secret mission. They avoided trade routes, altered their course when they sighted shipping, did not use their wireless, and in fact did everything possible to shroud their whereabouts in mystery. At full speed they then steamed across the Atlantic to a secret rendezvous 30 miles off the coast of Brazil. There they found waiting a number of other British cruisers, which had already been in the south Atlantic—the "*Carnarvon*," "*Kent*," "*Cornwall*," "*Glasgow*" and "*Bristol*."

Sturdee took command of the force and the seven vessels then made for the Falkland Islands. They steamed in extended formation with the flagship in the centre, each vessel 10 miles distant from its neighbour, thus making a great sweeping net that would effectively prevent Von Spee's squadron slipping through, if it was in the same waters.

Von Spee had five cruisers—the "*Scharnhorst*" and "*Gneisenau*" (both armed with eight 8.2 in., six 5.9 in., and eighteen 22 pounders, and with a high reputation for good gunnery), and the "*Leipzig*," "*Dresden*," and "*Nurenburg*." Neither Sturdee nor Von Spee knew of the other's whereabouts but Fate was at work and played with the rival forces as we play chess.

A Little Matter that sealed the Fate of the Germans

Unknown to Sturdee, Von Spee also was making for the Falkland Islands, where in the ordinary course he would have arrived two or three days before Sturdee. But this was not part of the great game Fate was playing, for now occurred another of those trifling incidents such as have changed the destiny of nations and altered the history of the world. When off the Horn, Von Spee chanced to sight the British ship "*Grummuir*," laden with coal. Von Spee overhauled her, set to work to empty her, loading up the coal on to his own ships, and then sank her. Had he known that by doing this he had virtually signed his death-warrant and sealed the fate of his squadron, we can quite imagine that he would have given her a very wide berth!

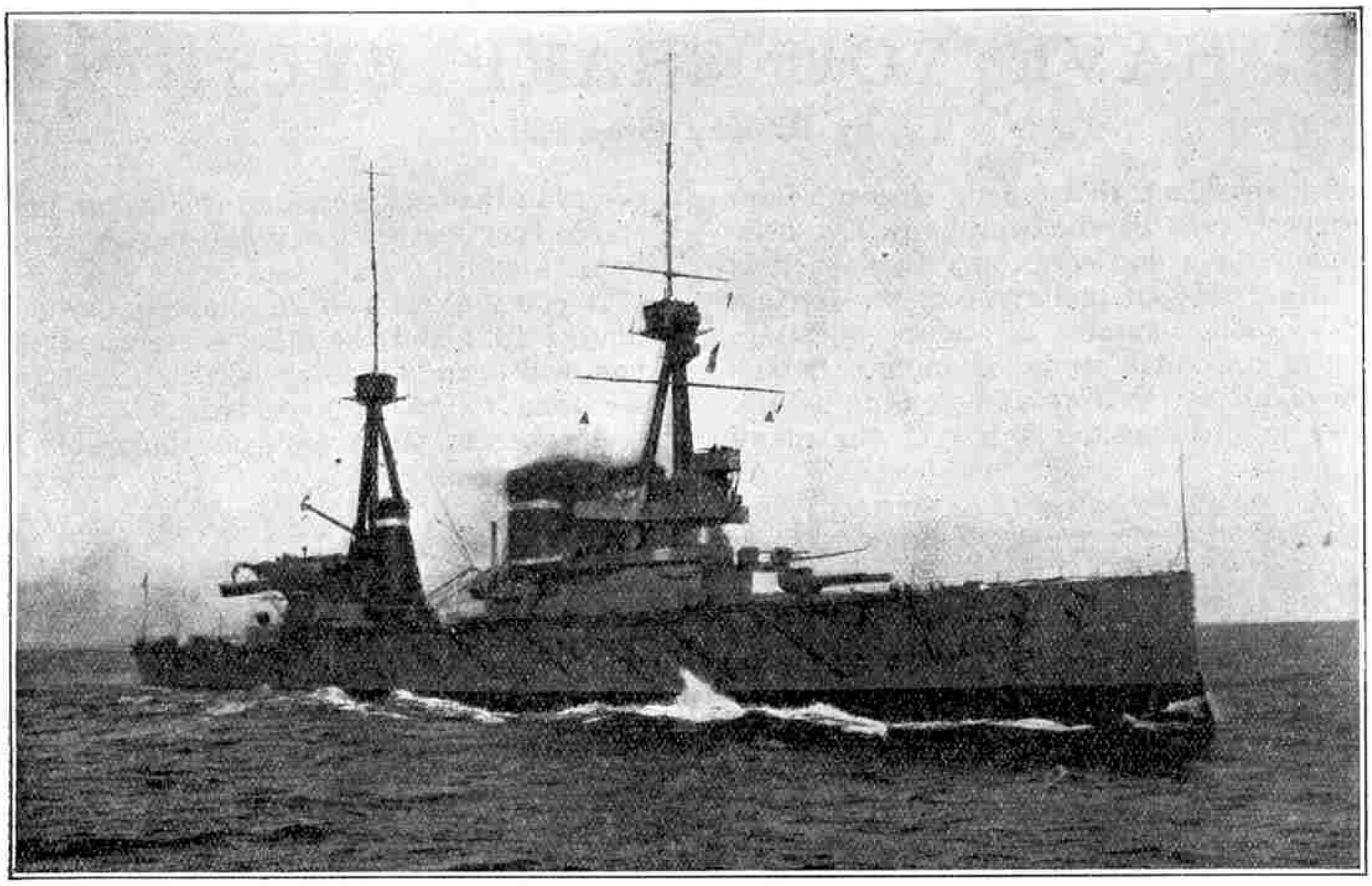
In the meantime Sturdee had arrived off the Falkland Islands, where three colliers were waiting at Port Stanley. The British warships commenced to coal at once, so as to be ready to continue their search for the enemy without delay.

We all know the story of how, when the Armada was sighted off Plymouth Hoe, Sir Francis Drake refused to go on board his own ship until he had finished his game of bowls, saying that there was time to finish the game and beat the Spaniards too. It is interesting to find a parallel to this instance in the Battle of the Falkland Islands.

* Published by Sidgwick & Jackson. Price 7/6

At 8 o'clock on the morning of the 8th December, when the signal station at Port Stanley reported to the "*Invincible*" the thrilling message that two enemy men-of-war were in sight, steaming northwards, Sturdee remarked that Von Spee "came at a very convenient hour, because I had just about finished dressing and was able to give orders to raise steam at full speed and then to go down to a good breakfast!"

As the whole of the British squadron was in the inner harbour, Sturdee sent the "*Kent*," which happened to have steam up, to investigate. Steam was raised as quickly as possible on the other ships and very soon the "*Glasgow*" and the remainder of the squadron were able to leave the harbour. They found that the two strange men-of-war were the "*Gneisenau*" and the "*Nurenburg*," which, it subsequently transpired, had been sent ahead by Von Spee to reconnoitre, the Admiral himself remaining with his three other ships eight miles distant.



H.M.S. "*Invincible*"

British Warships pursue the Enemy

When five or six miles from the Falklands a sub-lieutenant on the "*Gneisenau*" reported that from his position aloft he could see two battle cruisers and five other cruisers in Port Stanley harbour. The sub-lieutenant's news was wirelessed to Von Spee, who evidently got the fright of his life! The two ships were ordered to rejoin the squadron immediately and at once turned about, and the whole squadron steamed as fast as it could to the east. Again Fate was at work, for in turning tail in this manner Von Spee made a fatal error. If he had stayed to fight, concentrating the fire of all his guns on the narrow entrance to the harbour as Sturdee's ships were coming out, or if he had advanced and caught them in the harbour whilst they were raising steam, there would have been a very different story to tell!

Meanwhile, the old battleship "*Canopus*," which had been the sole defender of the Falkland Islands and was lying in the mud in the harbour, had opened fire with her four 12-inch guns.

Sturdee previously had issued orders that the enemy were to be pursued, and the fact that the British ships were able to comply with this order, although they had only had 90 minutes in which to raise steam, is a wonderful tribute to the efficiency and organization of the engine room staffs.

Away they went—the Germans with a start on their pursuers—full steam crammed on by both pursuer and pursued. For two hours the chase continued and then Sturdee decided to attack with his two battle cruisers and the "*Glasgow*," the speed of which had been worked up to 25 knots. Accordingly the "*Inflexible*" opened fire at one of the German light cruisers and the "*Invincible*" engaged the "*Leipzig*" at 17,000 yards. The distance was too great, however, and for another 25 minutes the chase was continued. When the distance was reduced by 500 yards another round was fired, and this narrowly missed the "*Leipzig*." Still refusing to fight, Von Spee decided that things were getting too hot for him and ordered his ships to scatter.

The "*Leipzig*," "*Nurenburg*" and "*Dresden*," turned away to the south-west, but Sturdee had anticipated such a move, and immediately ordered the cruisers "*Glasgow*," "*Kent*" and "*Cornwall*" to pursue the three enemy ships.

* * * *

For the moment we will leave them in pursuit of the enemy and return to the two battle cruisers, which had concentrated their fire on the "*Scharnhorst*" and "*Gneisenau*." The enemy at last opened fire. The distance was about 16,000 yards and although the Germans had only 8.2 in. guns, the British were surprised to find they were easily able to carry the full distance, which was, as a matter of fact, the maximum range of the British 12 in. guns. A point in favour of the British, however, was that the trajectory of the enemy's shells was higher than that of the British shells—in other words, the German shells fell almost vertically whilst the British shells moved more nearly horizontally. The advantage of this, in a long-range gun, can easily be understood.

Sinking the German ships

At 1.45 p.m. the "*Invincible*" was hit, but was not badly damaged and continued to fire rapidly. For the next 90 minutes the fighting was very fierce, the ships approaching to within 10,000 yards of each other. The enemy were hit several times, and soon the "*Scharnhorst*" caught fire forward. The "*Invincible*" herself was lost in a cloud of smoke from her funnels and guns, and the "*Scharnhorst*"—with her third funnel shot away and some of her guns out of action—quickly endeavoured to take advantage of this and slip away. She did not succeed in escaping however, and the British battle-

(*Continued on page* 402)

HAVE YOU SHARP EYES?

by R. Kay Gresswell

IT is now a well-known fact that among Meccano boys are the sharpest eyes in the world, as has been proved on more than one occasion. Perhaps it is because they possess this characteristic that Meccano boys always make such a success of stamp collecting, for it requires the continual study of minute details to make it a thoroughly satisfactory and pleasing hobby.

This month we are to consider a few of the many pairs of stamps that differ from one another only in some small degree. The details of stamp printing have already been explained in these pages, so our readers will at once understand what we mean when we say that the stamps with which we shall deal are not printed from merely retouched dies but are totally different stamps printed from new plates made from new dies.

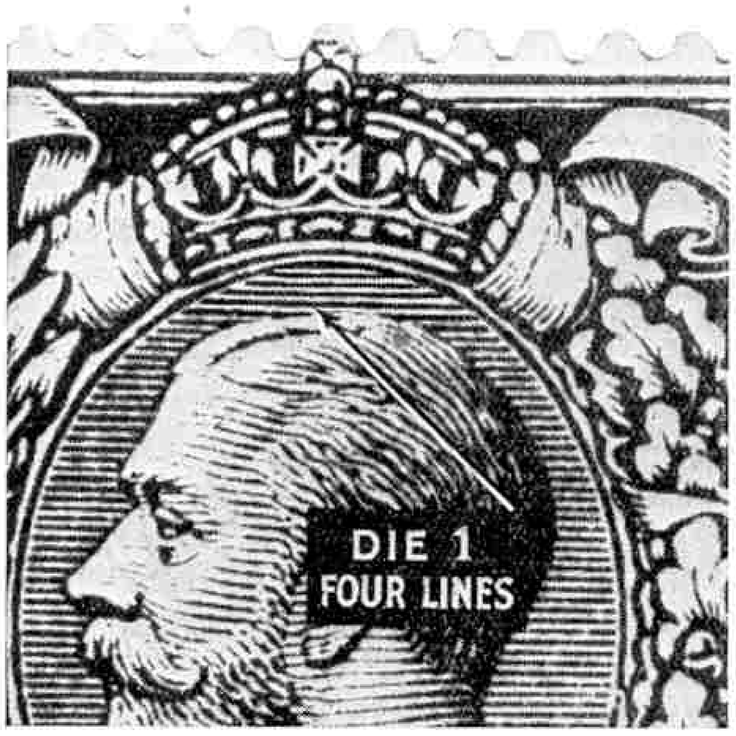


Fig. 1

Great Britain, Present Two-Penny

For example, how many of our readers have noticed that the 2d. stamps of Great Britain issued since September 1921 are different from those issued before that date? The difference is caused by the stamps being printed from new plates and it was probably with the intention of making it possible to tell from which plate a stamp had been printed that the minute variations were made when the new die was being engraved.

The main difference in the two stamps is in the line of colour that runs around the top and sides between the outer frame - line and the body of the stamp itself. In the original die, this line was near the solid colour in the background of the stamp, but in the present stamp it is further away and nearer to the outer frame line.

Fig. 3

If you look at two 2d. stamps, one used before September 1921 and the other a stamp of the present day, you will soon notice the difference, which is easier to see than might be expected.

Another difference (this one illustrated by the enlarged illustrations Figs. 1 and 2) is in the lines of shading in the oval space surrounding the King's head. In the first die there were four complete lines of shading between the top of the head and the oval frame-line, while in the present die there are only three such lines. You can also easily see that all the lines of this shading appear to be closer to one another than in the new die.

Fig. 2

A further small difference is found in the white line around the words "TWO PENCE," which is thin in the first stamp and thicker in the present one.

Collectors mount both these stamps in their albums as they are accounted two different stamps.

Other Chances for Sharp Eyes

There are many other interesting examples of pairs of distinct stamps with very small differences between them and we illustrate several such pairs on this and the next page.

The pair of stamps issued by the British Solomon Islands (Fig. 3), the first in 1913 and the second from 1914 and onwards to the present day,

Fig. 4

Fig. 5

differ only in the inscription describing the use that is to be made of them. On the first, the two tablets read "POSTAGE—POSTAGE" and on the second they read "POSTAGE—REVENUE." Although this is quite a large difference it is surprising how often it passes unnoticed, the two different and distinct sets of stamps often being mounted in the album intermingled. There were four values of the first type, ½d., 1d., 3d., and 11d., the last being, we believe, almost the only stamp of this value that has ever been issued. The second type exists in a complete series of all values both with the old watermark and with the new script CA.

Fig. 7

The Arms of Mauritius

The pair of Mauritius stamps (illustrated in Fig. 5) do not look at all alike when placed side by side, but since we have come across many collections in which these two series have been mixed together in error, probably through paying insufficient attention to the catalogue illustrations, we take this opportunity to describe the major differences. Although there are several variations in the frames—noticeably in the fact that the words "Postage—Revenue" are added in side tablets in the second issue—it is chiefly with the shields that we are at present concerned.

Fig. 8

The first (1895) shows the unauthorised arms used by Mauritius until 1906, when a new arms was authorised, these being shown on the second stamp. A description of the two shields "translated" from the heraldic wording is as follows: In the first quarter (top left-hand corner) in the first shield the ship is drawn as it would be in a picture and it is shown in full sail, whereas in the second it is drawn in an heraldic manner.

Fig. 9

In the second quarter (top right-hand corner) the first shows three palm trees in green on a gold background (the colours of the original shield are indicated by the shading) while the second shows the palms with roots added and they are drawn in a more truly heraldic manner. The third quarter in both stamps contains a key but in the first case the wards point towards the left and in the second towards the right. Also in the first the solid background does not indicate the colour, whereas in the second case the ground of dots indicates gold.

Fig. 10

Fig. 6

The fourth quarter shows considerable change. The wedge has been widened in the second stamp, the star made smaller and the background colouring simplified. In the first case the background was black across the upper portion with below it an area of green and an uncoloured line between. In the revised arms the whole of the ground of this quarter was in blue.

The large oblong stamp of 36 cents issued on the 23rd May 1898 by Mauritius to commemorate Queen Victoria's Jubilee bears the motto "*Stella clavisque maris Indici*" ("The Star and Key of the Indian Ocean") and this explains the presence of the objects in the third and fourth quarters of the arms. The significance of the ship and palms in the other quarters is quite obvious.

Turks and Caicos Islands

In 1910 Turks and Caicos Islands issued a stamp with a face value of ¼d. of rather an unusual but pleasing design, the central item being a typical plant of the melocactus family. This somewhat difficult sounding name is really made up of the two words "melon" and "cactus," owing to the fact that the plant has the appearance of a melon from one to two feet in height covered with a series of spines and bristles. This melon-shaped portion of the plant is surmounted by a cylindrical shape (as shown in the stamp) chiefly composed of tightly packed bristles on the top of which grow small rosy-pink flowers which turn into small red berries. These are very hardy plants and they usually grow on rocky ground in the West Indies and neighbouring parts of the American continent.

In 1913 this stamp with the melocactus as the central feature was supplemented by a series of higher values of the type shown on the left in the illustration (Fig. 4). This series remained in use until 1922 when it was replaced by the present series of the type shown on the right. It will be seen that in both these

(*Continued on page* 381)

Fig. 11

STAMPS!

S 1326.	Congo State. Natives ...	10	1/3
S 1287.	Mozambique. Views ...	13	6d.
S 1292.	Saar. Coal-Mining ...	20	1/-
S 1355.	Ingermanland. Views ...	7	2/-
S 1300.	Norway. Amundsen set	7	5/-
S 1403.	Germany. New air stamps	4	1/2
S 572.	Nyassa. Giraffe, etc. ...	16	1/2
S 1395.	Czecho-Slovakia. Scouts' post	2	8d.

All unused except one or two in Saar set.

FREE. Illustrated lists of stamps and albums. Please write.

STANLEY GIBBONS Ltd.

DEPT. S.15., 391, STRAND, LONDON, W.C.2.

100 DIFFERENT STAMPS FREE.—Send for ½d. approvals.—Cox, 135, Cambridge Road, Seven Kings.

STAMPS on approval, ½d. each. About 1,000 sent.—Sisley, 161, Verulam Road, St. Albans.

1,000 STAMPS 4½d. Postage 1½d. extra.—Rowe, 30, Rye Lane, Peckham, London.

1,000 Mixed Stamps 6d., 1,000 Superior Stamps 1/-. Post. extra.—Kirkham, 125, Gorsey Lane, Warrington.

FREE. 500 Stamp Mounts to approval applicants. —R. Matkin, 66, Derby Road, Burton-on-Trent.

FREE To Applicants for Approvals 9 PICT. MOZAMBIQUE OR 6 PICT. FR. GUINEA

ALBAN SIMMONS, Hillside, NEW BARNET

FREE. 100 Stamps to approval applicants, postage 1d. Boyce, "Winifreda," St. John's Crescent, Whitchurch, Glam.

FREE ! ! Sixpenny Jamaica pictorial with farthing approvals. About 1,000 sent to choose from.—Wyk, Bolehill, Flixton, Manchester.

FREE. All genuine stamp collectors asking to see my approvals can have one of the three following sets FREE. 20 Lichtenstein, 14 Ukraine or 6 Hungary. Every seventh applicant for approvals will be given a fine Stamp Album FREE. Fine Stamp Mounts, 4d. per 1,000, postage 2d.—E. C. Palmer, Wooburn Green, Bucks.

Splendid Packet 30 different Swiss Stamps, 1/-; 50 different, 2/-.—Richemant, St. Légier, Vevey, Switzerland.

206 DIFFERENT STAMPS FREE
Including scarce **Malta** overprinted **War Tax,** pictorial **10c. Syria** unused, obsolete **Siam, Ceylon K.E., 5c. Strait Settlements, 5c. Malay States,** and many fine sets of mint and used including **Provisionals, Air Mail,** pictorial **High Values,** etc. **A Fine Collection.**
Offered **Free** to applicants for approvals making a purchase of **6d.** or over from same. Mention **206** packet and enclose **1½d.** stamp for postage. (Abroad 2½d.) Collections Bought.
HORACE MILLER & CO., WHITSTABLE, KENT

10/- PACKET FREE
This wonderful packet contains 100 different War, Revolution, Armistice and Peace Stamps, catalogued 10/-, and will be sent post free to genuine applicants for approvals.
F. J. HUTTON
Llancloudy, Llangarron, Herefordshire

19 TRIANGLES
A RECORD BREAKER--NO TWO ALIKE
Made only by searching the markets of the entire world. Price 2/7½ post free. A smaller collection of 7 different for 1/- post free. These fine triangle collections are only sold to those requesting my famous approval selections.
Order Now—Stock is limited.
R. ALCOCK, 13a, Clarence St., CHELTENHAM.

1,111 Try the Cheapest and Best 1,111
Method of adding to your collection.
When you buy PACKETS you buy DUPLICATES. I will send you a book of 1,111 different stamps from which you may select any 100 for 3/-.
BUY ONLY THOSE YOU REQUIRE.
1,111 H. HARDY, 285, Archway Road, London, N.6. 1,111

100 DIFFERENT STAMPS
2 TRIANGULAR STAMPS
24-page DUPLICATE ALBUM
FREE!
An extraordinary offer: 100 different stamps from:—Japan, old Belgium (1893), long set Ukraine, U.S.A. (Washington), Austria (newspaper), Russian Army, old G.B. Set 10 rare stamps overprinted, old 40 all different unused. Fine set Hungary (reapers, birds, etc.) Also a very beautiful pair of "three-cornered" stamps and a useful 24 ruled page duplicate Album. **SEND NO MONEY. JUST A POSTCARD** and request this big parcel and approvals.
LISBURN & TOWNSEND, LONDON ROAD, LIVERPOOL

FREE THE ELM PACKET AND PERFORATION GAUGE **FREE**
THE ELM PACKET contains **30 GOOD STAMPS,** all different, no common Europeans. Including set of **20 PICTORIAL FRENCH COLONIALS,** all unused, showing Leopards, Natives, Ruins, Views, Oxen, Explorers, Birds, etc. Also Venezuela (50c. Portrait), Nigeria, Turkey (Crescent and Stars), Chili (Columbus), Brazil (Aviation and Portrait), Mozambique (Pictorial), Cuba, Air Mail, and obsolete G.B.
ABSOLUTELY FREE TO GENUINE COLLECTORS REQUESTING APPROVALS. Also those sending 2d. to cover postage will receive a packet of Portuguese Colonials **FREE.** Special Offers: 50 diff. French Colonials 6d., 100 diff. 1/6, 50 diff. Portuguese Colonials 9d.
J. BURTON, 3, ELM BANK, WALTON BRECK ROAD, LIVERPOOL.

YOU CANNOT GET A BETTER BARGAIN THAN
"DIAMONDS" Thousands of "M.M." Readers have proved this; why not you?
MANY RARE STAMPS have been found by purchasers of **THE "DIAMOND" PACKET,** which is guaranteed to contain **1,000 Unsorted Stamps** from convents abroad. 1 packet, 1/3; 2 packets, 2/5; 3 packets, 3/6; 4 packets, 4/6; 5 packets, 5/6. All post free (abroad 3d. per packet extra).
O. NERUSH, Importer (Dept. E), 2-22, CATHCART HILL, LONDON, N.19.

"1000 PACKET" A Wonderful Offer for 4½D.
The "1000 Packet" contains 500 excellently assorted stamps, a **COMPLETE SHEET OF 100 UNUSED** (very useful for exchanging), a neat booklet (12 pages) for holding duplicates, **25 British Colonials,** usually sold at ½d.—1d. each, including new and obsolete issues, 375 Magic "Strip" Mounts which are three times as quick as the old-fashioned single ones, and my price list of stamp bargains. In addition FREE Sets will be sent to those who send names and addresses of stamp collecting friends.
Postage 2½d. extra. Abroad 6d. ex.
WATKINS (M. Dept.), GRANVILLE ROAD, BARNET, HERTS.

ENCORE PACKET FREE
Contains TWENTY GOOD STAMPS (no rubbish), as follows:—THREE TRAVANCORE including service, HAITI (angel in a tobacco plantation), S. Africa, GEORGIA (1 rouble), Malay Tiger, NEW ISSUE MONACO, Schleswig Plebescite stamp, Brazil, NEW TOGO (cocoanut trees), SCARCE MINT SURCHARGED CEYLON, Old Bulgaria (small lion type), pre-war Serbia (25 paras, mint) Morocco (Ruins at Rabat), Venezuela, Peru, Roumania unused, NEW ZEALAND OFFICIAL, and NEWFOUNDLAND. Send **2d.** (abroad 3d.) for postage and ASK FOR THE ENCORE PACKET. For responsible approval applicants only, 4 OBSOLETE PORTO RICO FREE.
EDWARD SANDELL
10-11, Fetter Lane, LONDON, E.C. 4.

PHILS PHAMOUS PACKETS

1,000 Stamps ...	6d.	25 British Official	6d.
300 different ...	6d.	25 Siam ...	6d.
50 French Col	6d.	100 Brit. Col. ...	6d.
40 PortugueseCol.	6d.	25 Bulgaria ...	6d.
40 C. & S. America	6d.	1,000 different ...	3/-
25 Irish ...	6d.	500 ,, ...	1/-

Postage 1½d. Approvals if required.
PHIL, 20, Castle Street, DOVER.

FREE—2 Bhopal
For 30 days (Colonies, 60 days) we present this gift **gratis** to every Stamp Collector sending **2d.** for cost of postage. (Abroad **3d.**)
Only one Gift allowed to each applicant, and cost of postage must be sent.
ASK FOR OUR PRICE LIST of Sets, Packets, Albums, etc. **Gratis and Post Free anywhere.**
ILLUSTRATED CATALOGUE AND GUIDE TO STAMP COLLECTING
42nd EDITION. 116 pages. Full of information and Bargains. Over 18,000 varieties listed in Single Stamps and Sets. Post free 6d.
Established 1880.
Errington & Martin Ltd., LONDON, E.9.

FREE
100 DIFFERENT unused, or 40 different Pictorials, or 15 Air Post to genuine approval applicants. Lowest Prices in Britain.
A. CLARKE, 2, CANNON STREET, DOVER.

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.*"

Camping Holidays

The popularity of camping holidays appears to be steadily increasing year by year, and certainly from the health point of view it is unsurpassed by any other type of holiday. Those who contemplate camping-out for the first time are often in difficulty in regard to the choice of a site, and in order to meet this difficulty the Great Western Railway Company have issued an illustrated booklet entitled "Camping Holidays."

This booklet contains an extensive list of camp sites extending over some twenty-five counties, and in each case information is given regarding the nature of the site, land available, nearest drinking water supply and the nearest village or town, together with the name and address of the owner or tenant to whom application should be made. Particulars are given also of special fare facilities for campers. The booklet may be obtained at any G.W. station.

Polar Exploration by Air—

(*Continued from page* 383)

her flight all on board took a last look at the three flags fluttering so proudly.

For three days no word was received from the airship and some anxiety was felt in regard to its fate. It was with universal relief that on 17th May the world learned that the "*Norge*" had safely landed at Teller, a small trading post and reindeer centre in Alaska, after a flight of 71 hours in which she crossed 2,500 miles of frozen sea.

Further details of the flight will be forthcoming in due course and in the meantime it is interesting to note that no land was sighted between Spitzbergen and Alaska.

Stamp Collecting—(*contd. from page* 379)

types the plant appears twice at the foot and that the principal difference between the two types is, that the numerals indicating the value have been removed to the bottom corners of the stamp in the 1922 issue to make room for two crowns in the upper corners.

Another British Colony to issue slightly different pairs of stamps is New Zealand. In addition to the Lake Wakatipu view stamps, which have been described already in the "*M.M.*" (February 1925, p. 67), there are the stamps issued in 1901, 1907 and 1909 to celebrate the introduction of Universal Penny Postage in the first year (Fig. 6). Of the two stamps illustrated that on the left belongs to the 1901 issue and the other to the 1909 issue.

While it is easy to distinguish between these two stamps, owing to the variations in frame design and wording, there is only a very slight difference between the 1901 and 1907 issues. There are many small differencies that we will leave to our readers to find and we will merely say that the easiest way in which to distinguish between these two stamps is in the shading on the globe. In 1901 the shading lines were vertical and in the 1907 issue (and the 1909) they were diagonal.

Similar Stamps of Foreign Countries

Turning to a few examples issued by foreign countries we have two splendid Belgian stamps showing the head of King Albert (Fig. 7). The first to be issued was in 1912 and the other in 1913. It is very difficult to tell to which of the two series an individual stamp belongs when it is viewed without another with which to compare it. When two different ones are placed side by side, however, as in the illustration, it is easy to see that in the later issue the head is larger, and, amongst other things, the small outlined squares at the upper corners have been omitted. Incidentally there are two varieties of the latter stamp, one with and one without the engraver's name at the foot.

The two stamps of Germany (illustrated in Fig. 10) have, of course, different inscriptions at the foot, that on the left, issued in 1900, reading "REICHSPOST" and the other, first issued in 1902, having the inscription "DEUTSCHES REICH." The latter stamp also exists with the "REICHSPOST" inscription, however, being issued in this form very soon after the first Germania series. In that case practically the only difference between the stamps is the white line surrounding the portrait of Germania, which line does not appear in the first series. Since these two types with the "Reichspost" lettering were not issued in the same values, no confusion is likely to arise and we take it for granted that no Meccano boy will be so unobservant as to confuse the two series with the different inscriptions.

It may be interesting to note that the Reichspost series in the right-hand type consisting of the five values 25, 30, 40, 50 and 80 pf. exists with this word in thick type and in thin type, thus making two sets for our albums. The Deutsches Reich series was re-issued in 1916 with a plain uncoloured background behind the head instead of horizontal lines but this is so obvious a difference that it can scarcely be classified as a variety requiring "sharp eyes" to detect it.

There are two other German series of stamps that easily pass as being the same if great care is not taken to distinguish between them. These are the small numeral and embossed eagle types of 1875 and 1880. The small numeral type was used for the two lowest values, 3 pf. and 5 pf., and the embossed eagle type for the higher values.

In every value of the 1875 series the name of the currency of the value was spelled "PFENNIGE," whereas in the 1880 series this word was spelled throughout as "PFENNIG"—that is, without the final "E." Since the word is quite small on the stamps it is very easy to pass it by unnoticed. Unused copies of the first series with the final "E" are fairly scarce but used copies of this series and either unused or used of the second series are quite common.

The Palm Trees of Hayti

From Hayti we have a variation quite unlike any other with which we have so far dealt. Instead of the alteration being in an unimportant part of the stamp, with the intention of improving its general appearance, of rectifying an error, or of providing a means of identification, the alteration here is in the central feature of

the design itself. The other and more minor portions of the design remain practically unaltered. Fig. 11 shows the two stamps and it will readily be seen that the difference is in the palm tree occupying the centre of the stamp. In the left-hand specimen, issued in 1891, the leaves are upright and in the other, the 1893 issue, the leaves are drooping.

There are other minor differencies, such as in the amount of shading on the flags and ground, in the height of the letters of the inscription "Republique d'Haiti," and the stamps themselves are different in size. In the 1891 issue they were 20½ mm. × 24½ mm. and in the 1893 issue 19½ mm. × 23½ mm.,—a larger difference than it sounds.

A Test for Sharp-Eyed Readers

Lastly we illustrate two stamps of Rhodesia (Figs. 8 and 9) issued when the country was known on its stamps as the British South Africa Company. The stamp shown in the larger illustration was first on sale in 1896 and was engraved and printed by Messrs. Perkins, Bacon and Co., London. The other was first issued in 1897, being engraved and printed by Messrs. Waterlow and Sons, also of London. There are several differencies in these two types but we do not intend to describe them here. We leave it to our readers to find them for themselves and although one or two of the smallest differences will not be visible in our illustrations, yet it is quite easy to see in them the difference introduced in the design by the authorities to enable them to identify the two stamps. When you have found it, it may be checked by looking in your stamp catalogue where it is probably described. In any case it will be described on this page next month.

Recent Issues

South Africa

In our last issue we referred to the eighty-sixth birthday of postage stamps and in this connection it is interesting to notice the recently-issued stamps of South Africa.

On the 1st of January this year the Union of South Africa issued a 4d. grey blue triangular stamp of the same

design as the first issue of the Cape of Good Hope in 1853. In this way the first issue of the Union under its new name of "South Africa" commemorates the first issue of a portion of the same area. To make the imitation of the old issue more complete the new stamps were issued imperforate!

There are two varieties of these stamps, one containing the inscription in English, "Postage–Fourpence–South Africa," and the other the same in Africaans, "Posseel–Vier pennes–Suid Afrika." There has been quite a rush on the part of stamp collectors to obtain copies of these stamps for which dealers were charging as much as two and three shillings each a few days after issue.

At the same time South Africa issued the new ½d. and 1d. stamps illustrated here. The inscription on these, too, appears

in English and in Africaans on different stamps, but whereas in the case of the 4d. stamps the different languages do not appear on the same sheets, the inscriptions in the case of the lower values are alternately English and Africaans throughout the sheet.

The ½d., which is green and black, shows the head of a springbok, and the 1d., red and black, shows a large old type sailing ship in full sail, with the rising or setting sun in the background. The ½d. and 1d. stamps are both perforated. These two values are printed by Messrs. Waterlow and Sons; the 4d. was printed by Messrs. Bradbury, Wilkinson and Co.

The ½d. stamp is illustrated in the previous column.

How to Start an Aquarium

Pond Life

by W. Coles-Finch

LAST month we described the apparatus required when you go "pond-hunting," and now we will deal with some of the captures you are most likely to make.

First of all you are certain to find the Water Boatman or Boat Fly (*Notonecta glauca*), so called on account of its being provided with two long oar-like legs by the aid of which it sculls its way rapidly through the water. No more interesting creature can be found. It is rather more than ½ in. in length and its colour is yellow with the exception of a black triangle upon the back.

For its size the Water Boatman is quite a ferocious creature and its beak is able to inflict a distinctly painful wound on the hand. As might be expected, it readily attacks other aquatic creatures and, in an aquarium, unless it is well fed, it will destroy even its own species.

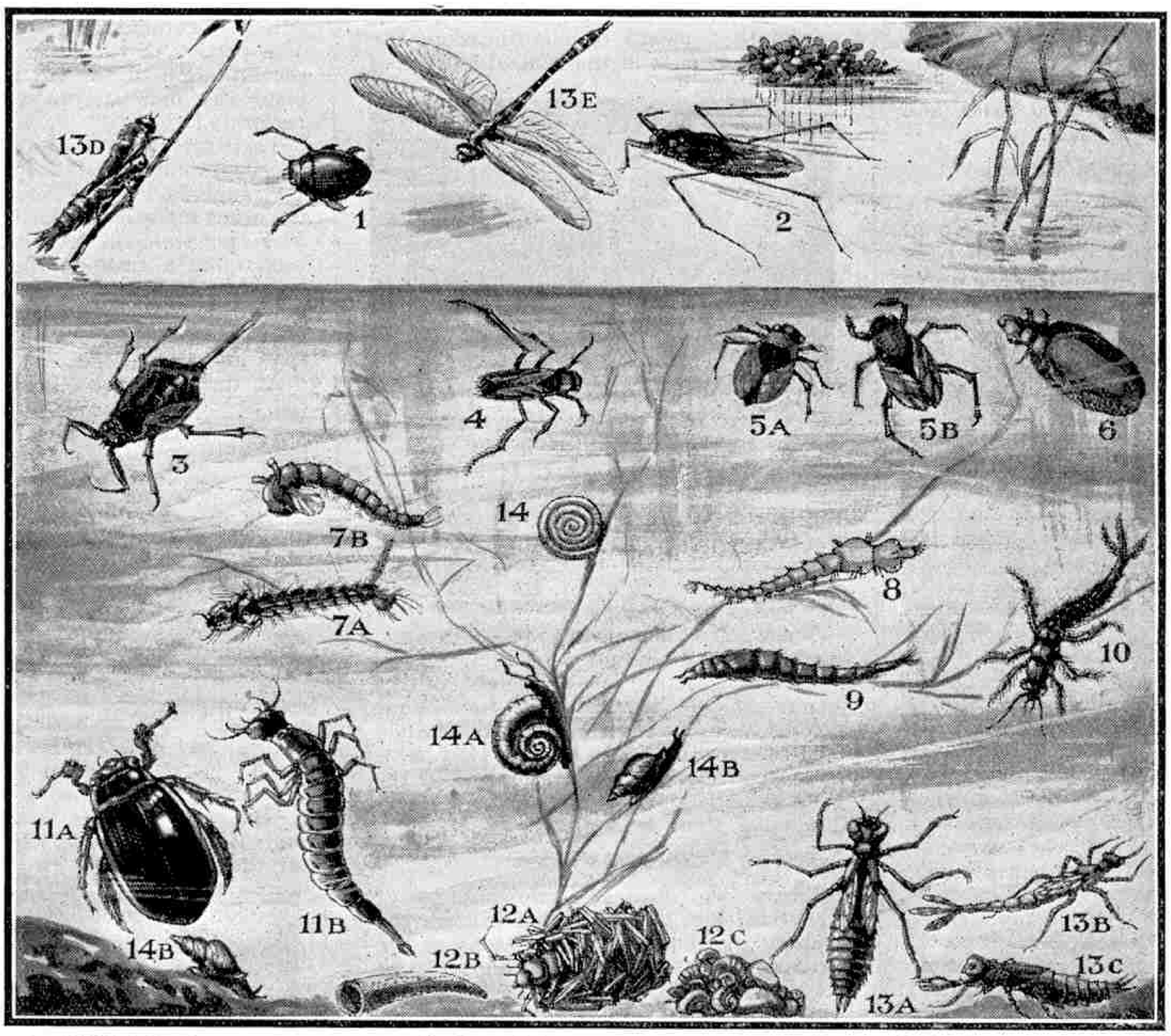
In particular the Water Boatman should never be placed in the same tank as small fishes. The Boatman looks very attractive in the aquarium and is an ideal creature for study, but it will escape if the vessel in which it is placed is left uncovered. Under its wing-cases is concealed a pair of large delicate wings by means of which it makes nocturnal flights, returning to the water at dawn.

If you should come across a flat yellow creature somewhat resembling a dead and faded leaf, you probably have a specimen of the Water Scorpion (*Nepa cinerea*). This creature is very common in most ponds, but it frequently escapes detection on account of its close resemblance in colour to the mud upon which it often rests.

Its appearance is not very attractive, but beneath its sombre outer wings are concealed beautiful opaque, membraneous wings of grey-brown colour. The Water Scorpion will live well in captivity but on account of its aggressive habits it should have a tank all to itself. It will eat almost any animal food and appears to be particularly pleased with a tadpole or small fish.

You may capture also the Whirligig Beetle (*Gyrinus natator*). This creature derives its name from its habit of constantly moving in circles and curves upon the surface of the water. It is about ¼ in. in length and glossy blue-black in colour. It is a good flier, so the tank in which it is kept should be covered. It is not difficult to feed for it welcomes small pieces of raw meat, or water or garden worms.

Many other beetles and small creatures may come into your net and you will find it extremely interesting to watch them and their habits, referring to books for guidance and help in learning their life history.



1. Whirligig Beetle.
2. Pond Skater.
3. Water Scorpion.
4. Water Boatman.
5a, 5b. Water Bug.
6. Water Caterpillar of China Mark.
7a. Larva of Gnat.
7b. Pupa of Gnat.
8. Phantom Larva of Corethra.
9. Larva of Chameleon Fly.
10. Larva of May Fly.
11a. Carnivorous Water Beetle.
11b. Larva of Water Beetle.
12a. Caddis Worm.
12b, 12c. Caddis Worm Cases.
13a, 13b, 13c. Larva of Dragon Flies.
13d. Dragon Fly Emerging.
13e. The Perfect Insect.
14. Planorbis Vortex (Snail).
14a. and 14b. Other Snails useful as aquarium scavengers.

The Caddis Worm (*Phryganea grandis*), the grub of the Caddis-fly, has a special interest. This quaint creature will be found crawling along the bottom of the pond, safely housed in the tube-like dwelling that protects its delicate and defenceless body from harm. This portable house is constructed by the creature from tiny pieces of plants, shells, sand, etc., and it alone saves him from being devoured by the other inmates of the pond, for his plump soft body is a tempting morsel! The various building materials are fastened together by the help of a sticky secretion that hardens to a kind of silk on exposure to the air, the owner clinging tenaciously to the inside of its house by means of small hooks at the extremity of its body.

The Caddis-worm will complete its house or case in from four to eight hours according to the conditions prevailing, and these may be very trying. Mr. E. C. Ash, in his interesting little book "Pond Life,"* gives the following interesting description of what occurs :—

* "The People's Books," T. C. & E. C. Jack

"The building of the case is by no means plain sailing, even should the desired material be in abundance. For each little larva has to reckon with ninety or more brothers and sisters, not including distant relations and perfect strangers, who are equally keen on making a home in the shortest possible time. And so, no sooner has one caddis-worm deftly chosen a suitable object for its personal decoration and started weaving it to the others of its choice, than it is rudely interrupted by a relation or acquaintance.

"Caddis-worms engaged in building fight continually, in a very similar manner as a large number of dogs would over a meagre supply of bones. The owner of a case just started is seized, and during the subsequent struggle loses the result of its labour—the various parts being instantly utilised by its friends and relations; so one can imagine that the completion of a case is no easy matter should the necessary material be scarce."

It is an interesting fact that, whatever material is used, the creature usually manages to make its house of the same specific gravity as the water, so that it has no difficulty in moving about the pond.

When the time of change arrives the worm seeks the shore and abandons its house. The skin then splits and the perfect fly emerges and takes wing.

Provided that sufficient plant life is present, the Caddis-worm will live well in the aquarium and if taken out of its case will promptly proceed to build a new one. It is no use trying to haul it out by the head as this is certain to result in serious injury and the only way is to attack it from the rear with a piece of straw when it will usually leave its home without much argument.

The Dragon-fly is one of the most remarkably beautiful of all pond creatures and it is familiar to even the most casual observer. It has been described as the hawk of the insect world and certainly its rapidity when in search of food is really astounding. The swiftness of its stroke and its unfailing accuracy of aim make it a deadly hunter, and no matter how the victim dodges, the Dragon-fly is equal to the occasion.

The Dragon-fly is frequently spoken of as the "Horse Stinger." The creature certainly has a savage appearance, but it is perfectly harmless and is absolutely incapable of injuring horses or cattle.

The life-history of the Dragon-fly is one of great fascination and is well worth study. The female deposits her eggs on the water of a quiet pool or on the leaves of some aquatic plant. When the eggs hatch, the larva that emerge are usually dark-brown in colour, thus matching the mud in which they live. They have decidedly healthy appetites and they secure their prey by means of a curious apparatus known as the "mask." This peculiar organ partly covers the lower part of the head and acts as a sort of insect trap. When the larva wishes to seize its prey it suddenly thrusts out the mask, grasps its victim by means of a pair of strong curved hooks or claws, and all is over.

The larva moults several times and finally loses its appetite and climbs some convenient water plant to which it clings tightly by means of its hooks or claws. Presently the old body-covering splits and the perfect Dragon-fly emerges. At first the insect is helpless but as it rests its wings dry and expand, and before long it takes to flight, appearing to revel in its new power of movement.

The larva of Caddis, Dragon and other flies should be kept in a shallow pan or tank of water in which are growing plants that raise their heads above the water, such as Watercress, Forget-me-not, or Crowfoot. Plants of this type are necessary in order that the creatures may climb the stalks above water to complete the final stage of their metamorphosis.

It is regrettable that the Dragon-fly is becoming rarer and indeed certain species seem likely to disappear entirely before very long.

Polar Exploration by Air—

(*Continued from page* 356)

A trailing aerial of 300 ft. in length is used both for transmitting and receiving.

"The wireless apparatus is admirable," said Major Scott, who made the trip from Rome to Pulham in the "*Norge*." "We were talking to the British Air Ministry when we were over the Mediterranean, and all the time during the journey over France we were receiving weather reports from the Italian and French authorities. All the wireless messages were by Morse, and not by wireless telephone."

On the night of 13th April the "*Norge*" proceeded to Oslo where she was moored to a mast, as there was no shed there large enough to accommodate her. She was under the command of Colonel Nobile, the designer, and had a crew of 21 men. It is interesting to know that Lieut. Riiser Larsen, who was with Amundsen's 1925 seaplane expedition was second in command.

Immediately the airship was safely moored, the work of refuelling her and refilling the gas bag commenced, and within twelve hours of descending at Oslo the "*Norge*" was once more on her way. The voyage over the Baltic Sea and Esthonia was made without mishap and this 700-mile trip ended satisfactorily when the "*Norge*" landed at the aerodrome prepared at Trotzk, near Leningrad, about eight o'clock in the evening.

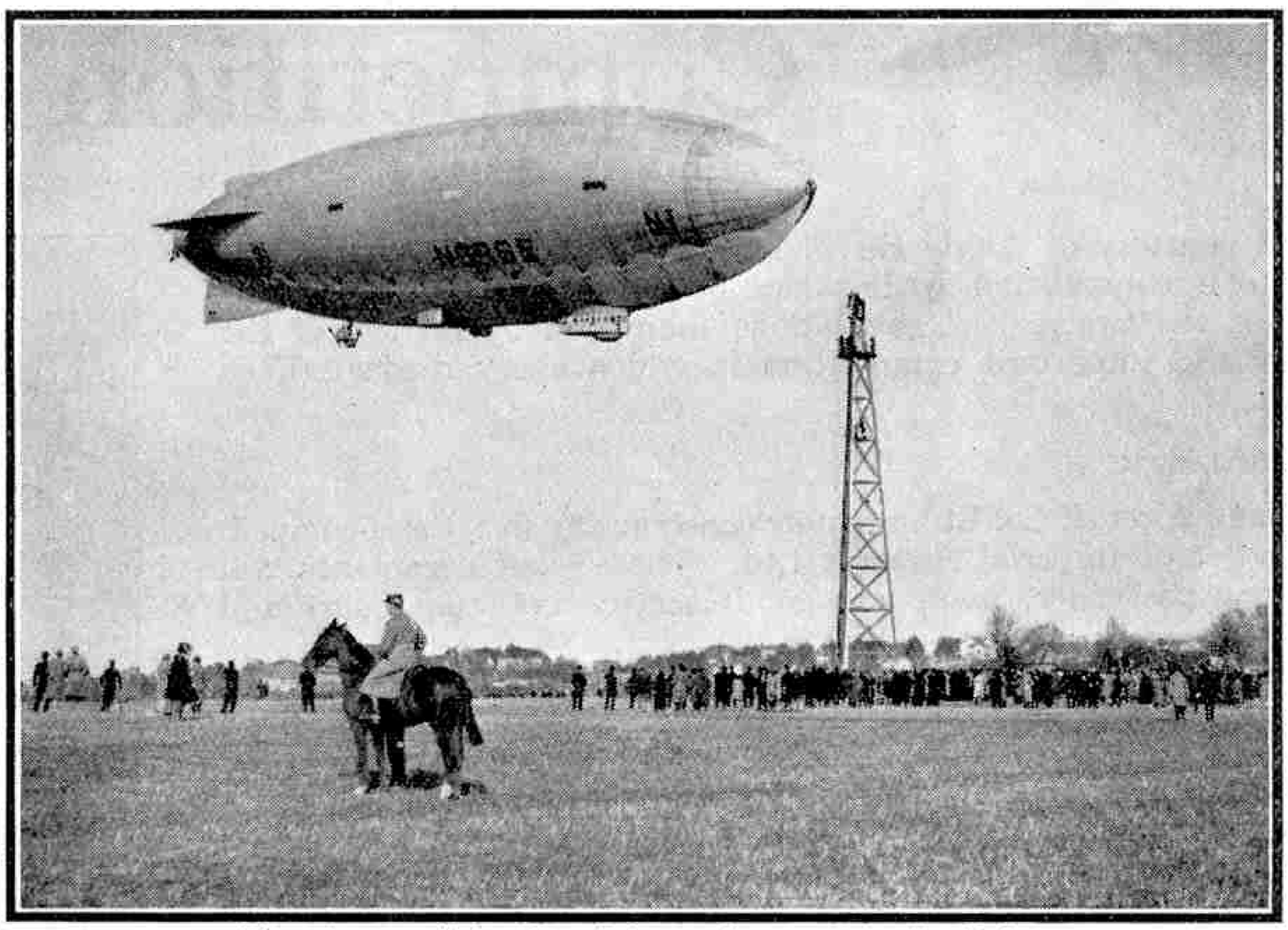
The airship remained at Trotzk until word came through that the special aerodrome at Spitzbergen was ready to receive her. The work on this building—which Amundsen declared was the largest timber construction he had ever seen—was temporarily stopped by the severe arctic weather.

At Spitzbergen the "*Norge*" entered upon the most momentous phase of her flight. On the morning of 11th May she was headed for the Pole. Steadily she continued her northward flight without faltering or mishap, and by 2.30 a.m. on the following day she was circling over the Pole.

When it was ascertained on the "*Norge*" that the Pole was actually reached, the engines were slowed down and the airship was brought down to a low level. It was an impressive moment. The crew stood with bared heads while Amundsen, Ellsworth and Nobile each hurled downward to the ice a steel-pointed staff carrying the flag of his country. The rods remained standing with their points embedded in the ice, and as the airship reascended to continue

(*Continued on page* 380)

Off to the Pole



The "*Norge*" leaving Oslo on her way to the Pole

FREE FLIGHTS fo

In Famous de Havilland "

FIRST PRIZE: A 100-Mile Fligh

TO BE AWARDED I

Competition for Nam

THROUGH the courtesy of the de Havilland Aircraft Co. Ltd., we are able to announce a competition with prizes of an unusual nature. This contest is for the twelve best suggestions submitted by readers of the "*M.M.*" in a new and important competition in which every reader stands an equal chance.

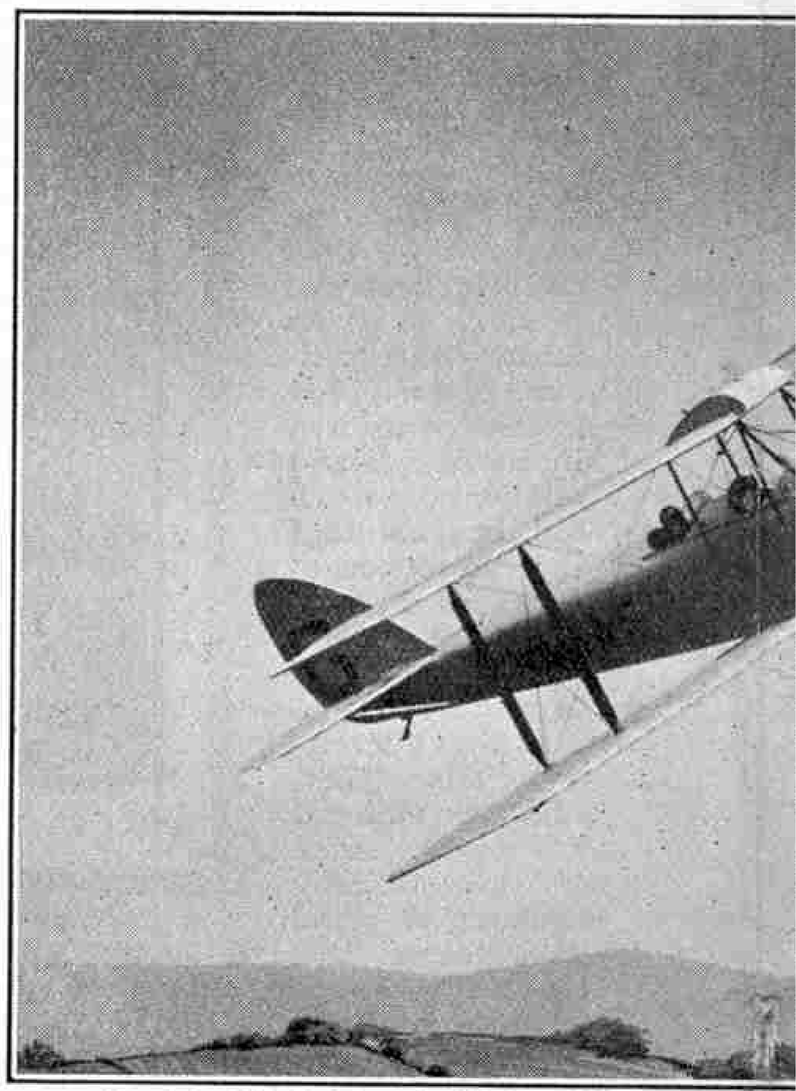
Naming the New Air Liners

The de Havilland Aircraft Co. Ltd. are now constructing five three-engined air liners to the order of Imperial Airways Ltd. These giant aeroplanes will be used on the new passenger, mail, and goods service between Cairo and Karachi.

Our readers are invited to offer suggestions for a suitable type name for these machines. It is important to note that readers are not required to name the individual machines, but to offer a suggestion for a name that may be applied to the particular type to which these machines belong.

For instance, the name "Moth" is applied to a particular type of de Havilland light aeroplane, and not to one individual machine. The individual "Moth" aeroplanes may have their own names, and these appropriately might be the names of well-known moths such as "Puss" (Moth), "Tiger" (Moth), etc.

In the same way the new air liners will probably have individual names, but this will be decided later. What our readers have to do is to choose a name for this particular type of machine, the dimensions of which will naturally be on a gigantic scale in view of the duties to be performed.



Captain H. S. Broad, the well-known pilot,
This particular machine was specially constructed for n lady passenger seems well pleased with her experience and n "M.M." readers who are fortunate enough to be a

Suggestions for Competitors

It is becoming the general practice to give to aeroplanes type names that commence with the same letter as the name of the maker. We have, for example, the Vickers "Vanguard" (described in this issue) the Boulton "Bugle," the Parnall "Pixie," and so on.

In the case of the new de Havilland air liners, therefore, the ideal name would have "D" as an initial letter. The name would also be suggestive of the sphere in which the new air liners will operate, and might describe their work in Empire communication.

None of these conditions, however, need be regarded as essential, and it may be that some reader will send in a bright suggestion, the merit of which will outweigh these desirable qualities.

Not only will the winner have the honour of naming the new air liners, but he will be awarded a prize of either (a) a 100-mile flight in a "Moth" in any direction from Stag Lane Aerodrome (he may choose his own direction for this flight of 50 miles out and home) or (b) two half-hour flying lessons in a "Moth."

We anticipate that there will be thousands of entries in this Competition, and when we mentioned this fact to the de Havilland Aircraft Co., they generously proposed to give eleven additional flights, as well as the 100 mile flight awarded to the sender of the selected name.

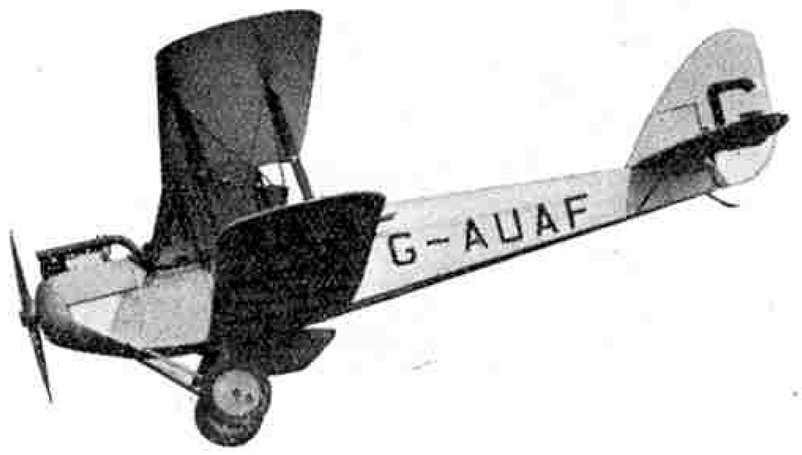
The sender of the second best suggestion will be

Two de Havilland "Moths" "Taki

or our READERS

"Moth" Light Aeroplanes

ght—Eleven Other Prize Flights



IN THIS SIMPLE

ing New Air Liners

pilot, testing a de Havilland "Moth"
for ne of the Australian Light Aeroplane Clubs. The and no doubt her pleasure will be shared by the twelve be awarded prize flights in similar machines.

entitled to a half-hour's flying lesson on a "Moth," and the senders of the next ten best will be awarded "joy rides" in the immediate neighbourhood of the Stag Lane Aerodrome.

All suggestions must be submitted on postcards addressed "Air Liner Contest," Meccano Magazine, Binns Road, Liverpool.

Each postcard must bear only one suggested type name and this should be clearly written in the top left corner. At the bottom of the card should be written the name, address, and age of the entrant.

The closing date for this competition is July 5th and it will not be open to Overseas readers.

We shall make arrangements to deal with the entries as speedily as possible and we hope to announce the result of the contest in our August issue, or September at the latest.

It will help in the task of judging if readers will send in their entries as early in June as possible and thus relieve the heavy work that will be entailed if the bulk of the entries come in at the end of the month.

Readers may submit more than one suggestion if they wish to do so, but additional suggestions must be submitted on separate postcards. Only one suggested name must appear on each card and entries not complying with this rule, and entries not on postcards, will be disqualified.

There is no age limit (so as to give the fathers and uncles a chance!) and, of course, our girl readers may enter if they wish.

The flights will be arranged to take place in August and/or September according to weather conditions and the convenience both of the de Havilland Co. and the winners.

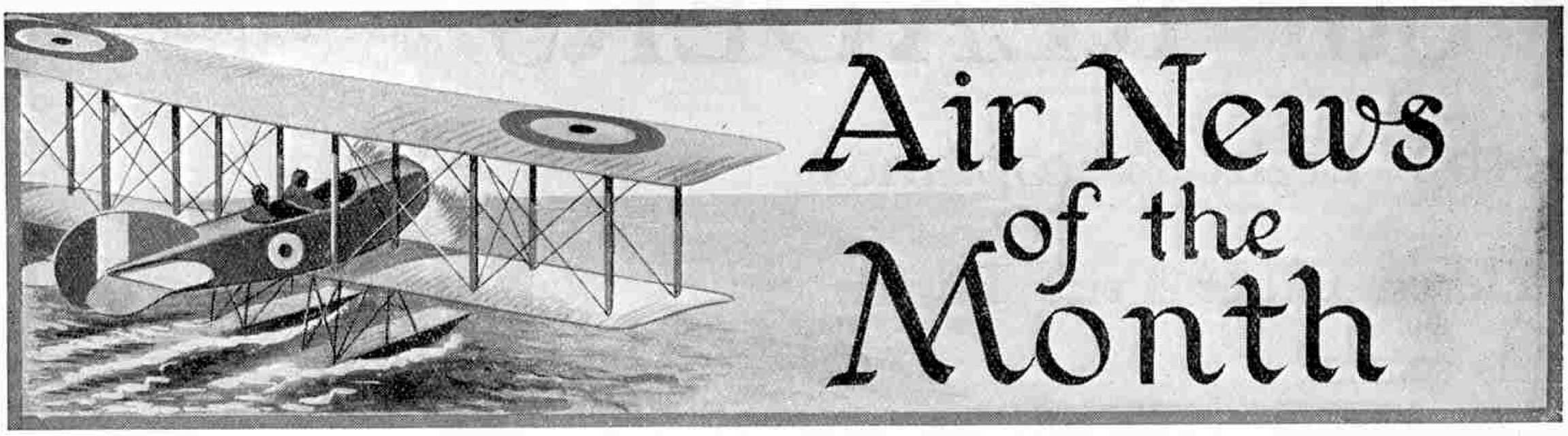
Where the Flights Will be Made

The flights will be made from the de Havilland Aircraft Co.'s Aerodrome at Stag Lane, Edgware, Middlesex. The prize-winners must make their own arrangements for reaching the Aerodrome at the appointed time on the day of the flight. Of this they will be notified in good time beforehand and in fixing the dates the winners' convenience will be studied as far as practicable.

Possibly some of the prize-winners may not be able to participate in their prize-winning flight for one reason or another—they may, for instance, live at a distance from London and be unable to get up to town to take their prize—or they may not be able to get leave of absence from school or business, to make the flight. In view of such a contingency arising we are arranging to compile a list of competitors in order of merit. Thus, for example, should the winner of the first prize not be able to take his flight, he could renounce his flight in favour of the next on the list. In this way the list will automatically work down to those of our readers who live in London, or who are able to come up to London to the Stag Lane Aerodrome.

Of course, if the winner of the first prize has to renounce his right to the flight in favour of the next on the list of merit, his suggested type name for the air liners would still be adopted.

"Taking Off" with Passengers



Chickens Stop Aeroplane

While the Napier D.H. Imperial Airways express was flying from London to Paris recently, one of the passengers, an engineer, noticed a curious squeaking noise. Thinking that the noise came from the engine, and failing to locate its direction, he passed a note through to the pilot who decided to land and investigate. While on the ground, with the engine running, the pilot failed to find anything wrong. Suddenly he began to listen intently and then put his hand under the back seat in the cabin and drew forth—a box of day-old chickens that were being carried to a French poultry dealer!

* * * *

Troops by Aeroplane

Fifteen Vickers-Napier-Victoria machines, each equipped to carry 25 soldiers with their accoutrements, and intended for use in Iraq, are almost ready for trial. These machines represent the first serious attempt to test the possibilities of rapidly transporting troops by air to places otherwise inaccessible. The engines used will develop 1,000 h.p., sufficient to provide a speed up to 120 m.p.h., while the minimum flying speed is as low as 40 m.p.h.

* * * *

Attempt to Break Round-the-World Record

An attempt is to be made this month to break the record for the fastest journey round the world held by an American traveller, Mr. J. H. Mears, who covered the distance in 1911 in 35 days 10 hours. The United States air pilots were 5 months 22 days on the way in 1924, but their flight was done in stages. Jules Verne's famous traveller, the imperturbable "Mr. Fogg," took 80 days on his dash round the globe. In this new race against time, Mr. Linton Wells, a United States aviator, and Mr. Edward E. Evans, a U.S. business man, will not only use the existing air lines, but will specially charter aeroplanes for rapid flights over certain sections of the route.

The trip starts from New York with a flight to Victoria, B.C., and thence by steamer to Japan. A fast steamer will take the travellers to Vladivostock and it is intended to cross Siberia to Moscow in a specially chartered aeroplane. From Moscow to London the ordinary air routes will be employed, and another flight will be made either to Southampton or Cherbourg to catch an ocean steamer. The time allowed between leaving Moscow and boarding the liner for home is only 24 hours and the complete trip is estimated to last not more than 25 days, and possibly several days less.

United States Air Force

The United States Military Aviation programme issued recently discloses that, if effect is given to its suggestions, the Army Air Force will possess in five years' time 2,200 aeroplanes, 1,650 regular officers, 550 reserve officers on active flying service and 15,000 other ranks, including 500 cadets.

* * * *

The Government of the Federated Malay States has placed a contract for an aerial survey with the Air Survey Company of London.

* * * *

Ocean Air Travel

Sir Sefton Brancker stated recently that his plans for the development of British aviation included the construction of a landing stage in Galway, for the use of trans-oceanic aircraft. He also advocates that mails from America should be taken off the mail steamers in Bantry Bay and brought to London by aeroplane, thereby effecting a great saving in time.

* * * *

The Brennan Helicopter

Replying to a question in the House of Commons, Sir Samuel Hoare, Secretary for Air, stated that the question of making available for publication details of the Brennan helicopter, at present on the secret list, was under consideration.

It will be remembered that this machine was the subject of experiment for several years. Very little is known concerning it owing to the secrecy maintained, but during a trial in October last the machine rose only a few feet in its vertical flight and then crashed to the ground. The total expenditure on the machine has been £55,000.

* * * *

World's Longest Flight

Lecturing on his recent flight from Rome to Tokio and back, the Marchese di Pinedo stated that the first section from Sesto Calende to Melbourne, 14,000 miles, was completed in 160 flying hours, the total time occupied being 50 days. The second stage from Melbourne to Tokio included two stops of three weeks, one at Sydney for engine overhaul and the other in the Philippine Islands. The total time occupied on the second stage was 70 days, the 8,000 miles being flown in 90 hours. This was the most difficult portion of the journey, as it involved long sea crossings in bad weather and landing in areas known to be hostile. The third portion of the journey was from Tokio to Rome, and the flying time was 110 hours, 21 days being required to cover the distance of 11,500 miles. The average flying speed for the journey was therefore 94 miles per hour.

Aircraft Safety

Aircraft able to operate in really bad weather with a degree of safety at least equal to, if not greater than that of steamers and trains were foreshadowed by Air Vice-Marshal Sir W. Sefton Brancker, in the course of a recent lecture.

Sir Sefton said he had been actively engaged in the development of air transport since the war, and in spite of its slow progress he was more optimistic and more enthusiastic than ever before. Referring to the safety of passenger flying, he said greater stability was being developed by various means. A gyroscopic rudder had lately been tried which so stabilised a machine that in steady weather a pilot could leave his seat and visit the passengers in the cabin!

The most difficult problem facing air transport was the reduction of costs to a level at which this new form of transport could pay its way as a commercial enterprise, unaided by Government subsidy. We were predominant in the world as shipbuilders, and it was important that we should be ready to supply the demand for aircraft, which would be enormous when air transport could be made to operate on a really commercial basis.

* * * *

London-Moscow Air Mail

The London-Berlin and Königsberg-Moscow letter air mail route has been re-opened this season and it is anticipated that the service will prove more reliable than hitherto. The chief countries served and the probable times of normal transit to them are as follows:—North-east Germany: Königsberg 24 hours, Danzig 24 hours, Memel 32 hours. Lithunia: Kovno 1¼ days. Lettonia: Riga 1½ days. Estonia: Tlallinn 2 days. Russia: Beyond Smolensk and Moscow, 1½ days.

The Königsberg-Helsingfors service is still suspended.

* * * *

Trophies for Mr. A. Cobham

During the past few days Mr. Alan Cobham and Mr. A. B. Elliott, his mechanic, have been kept busy attending presentations. At the recent Royal Aero Club dinner the "Britannia Trophy" and the club's gold medal were presented to Mr. Cobham and a bronze medal to Mr. Elliott. It is specially noteworthy that the award of the "Britannia Trophy" was in respect of the flight to Rangoon and back with Sir Sefton Brancker as passenger, and that this is the second occasion on which Mr. Cobham has gained the award.

A further presentation was made at a dinner of the Institution of Aeronautical Engineers, when the "Simms" gold medal and a silver medal were awarded to Mr. Cobham and Mr. Elliott respectively.

R.A.F. Appointments

Those of our readers who will be between the ages of 23 and 25 on 1st September next will be interested to learn of the appointments as Stores Officers in the R.A.F. that are being offered by the Air Ministry. It is essential that all applicants for the post should have had a sound business training extending over a period of not less than five years.

On account of the complexity of aircraft, their engines and instruments, and the wide range of equipment and materials for their maintenance, the number of different articles in use in the Royal Air Force—from complete aircraft down to nuts and bolts—is no less than 70,000, of which the average unit holds and uses 3,000 to 8,000. The Stores Officer is responsible for demanding and issuing these, for maintaining them in good condition while in store, and for keeping the necessary records for control of stock. When an aircraft crashes he is responsible for the separation and sale of the materials recovered and for utilising all undamaged parts. He is also responsible for the administration of such services at his station as fuel, light and water.

A competitive examination will be held in London in July and the successful candidates will be gazetted to commissions as Pilot Officers on probation. After a year's satisfactory service they will be eligible for promotion to the rank of Flying Officer. Promotion above the rank of Flying Officer will be by selection. The pay of a Pilot Officer in the Stores branch will be 12/4 a day and, including the value of allowances, the total emoluments will amount to £368 a year. The similar figure for Flying Officers on promotion will be £401 and for Group Captains (the highest rank for which provision is made) £1,147.

Application forms can be obtained from the Secretary, Air Ministry, London, W.C.2, and must be returned completed not later than 7th June.

* * * *

Brussels to the Congo

The Belgian aviators who set out to fly from Brussels to the Belgian Congo and back completed their mission safely. On their return to Brussels they were greeted at the aerodrome by a wildly enthusiastic gathering that included the King and Queen of the Belgians. The King decorated the airmen in honour of their successful 10,000 miles flight.

The "*Flying Bullet*"

An aeroplane to which the above name has been given is shortly to undergo tests. The new machine has been designed and constructed privately by Mr. A. V. Roe, and it is claimed that it will be the fastest fighting machine constructed in Great Britain. It is fitted with a direct-drive Napier "Lion" engine, and has a speed, when carrying a full load, of between 170 and 180 m.p.h. It has been built in London, but the tests probably will be carried out at a remote flying ground on the south-west coast.

Courtesy] [*Messrs. Vickers Ltd.*

Side view of the Vickers "*Vanguard*," described in our article on page 362

Spanish Airmen's Hardships

Captain Estevez and his mechanic, members of the party of Spanish aviators who are flying from Madrid to the Phillippine Islands, have been ordered to return to Spain as a result of their forced landing in the desert near Amman while flying between Cairo and Baghdad. It is thought that the privations suffered during the several days that they were missing may have affected their health and rendered them unfit to continue the flight.

The unfortunate airmen were eventually rescued from their perilous position by a search party of machines of the Royal Air Force. The King of Spain, in expressing his appreciation of the gallantry displayed by the British aviators in the course of the rescue, intimated his desire to be allowed to confer decorations upon those members of the R.A.F. immediately concerned in the rescue.

* * * *

Plans for New Zeppelin

Plans for the construction of an all-steel Zeppelin with a duralumin envelope covering have been completed at Detroit. This air monster will have a greater lifting capacity than any airship yet constructed, and owing to its light weight and high speed should bring Europe within three days of America. It is intended to build small models and gradually to work up to a metal-clad ship of 5,000,000 cu. ft. capacity—twice as great as that of the "*Shenandoah*."

Boarded by Pirates

To be held up by pirates is probably the most unlikely experience that one would expect to fall to the lot of an aviator, but this actually happened to Lieutenant Botved of the Danish Army and his crew, in the course of his attempted flight from Copenhagen to Tokio. Fortunately for the peace of mind of intending aerial travellers, the incident occurred on the ground, a leaking petrol tank having forced the airmen to land at Ninghai. This district is infested with Chinese pirates, and the machine was relieved of all its spare parts together with the party's loose personal property. As a final attempt to remove everything portable, the robbers deflated the tyres.

When the aviators arrived at Shanghai, five days later, they presented a fearsome appearance, not having had a shave or wash since the encounter with the pirates.

* * *

A Memorial Trophy

A new trophy, to be known as the Laurence Minôt Memorial Trophy, has been presented to the R.A.F. by a donor who wishes to remain anonymous. The trophy will be awarded annually to the crew of the bombing aeroplane that obtains the highest degree of accuracy in individual classification bombing practices during the year. It will be open to all bombing squadrons under the command of the Air Officer Commanding-in-Chief, Air Defence of Great Britain, and the first award will be made on the results of classification practices in 1927.

The word "crew" includes the pilot of the aeroplane and the bomb aimer, whether officer or air gunner. The trophy will be held for one year by the unit in which the winning crew was serving at the time that the trophy was won.

* * * *

Another World Flight Projected

We are informed by an Italian correspondent that Colonel the Marchese di Pinedo, the hero of the world's longest flight, covered last year, is considering an attempt to fly round the world. It is probable that the machine used will be a Dornier Wal fitted with a 500 h.p. Isotta Fraschina engine. Colonel de Pinedo, in company with his engineer, Signor Campanelli, recently visited the Aeronautical Construction Company's works at Marina di Pisa and inspected some machines of the type indicated.

MECCANO

EXAMPLES OF MODEL CONSTRUCTION:

3.—Transport by Rail

THE present-day railway system is one of the greatest triumphs of engineering. For one hundred years a vast network of steel rails has gradually been extending all over the country. Means of locomotion have grown more and more efficient, until to-day we are able to travel for almost any distance at a great speed and with every comfort. It is almost impossible to imagine the everyday life of the public before the introduction of railways. Because of the difficulties of travel the ordinary individual a century ago seldom travelled far from his native town or village, with the result that the countryside beyond a certain radius was as remote to him as a foreign land.

Railway Transport is represented by a number of fine Meccano models, as will be seen from the examples shown on this page. Meccano locos are not only realistic in appearance but they may be driven by the Electric or Clockwork Motors and employed in building up complete working model railways.

Meccano Outfits range in price from 3/6 to 370/–, and may be obtained from all leading toy stores. Ask to see them.

MECCANO LTD., Binns Rd., LIVERPOOL

EIGHTH SERIES:

Meccano Model-Building Contests

MANY MORE PRIZES TO BE WON

A TEST OF ORIGINALITY

THE ingenuity and novelty of design displayed in many of the entries received in our recent model-building competitions prompts us to announce for this month an entirely new form of contest, in which the type of model to be submitted depends entirely on our readers' imagination or personal inclination. The prizes will be awarded to the competitors whose efforts are considered by the judges to possess the most original features, either with regard to the type of apparatus that they represent or to the novel uses of Meccano parts or movements that they employ. Any kind of apparatus may be submitted in the competition, but it is important to remember that the winning feature will be novelty.

All models submitted in the competition must be the competitor's own unaided work both in design and construction. Any Outfit or number of parts may be used.

18 CASH PRIZES. The competition entries will be divided into the following sections :—

Section A, for competitors residing in the British Isles ; Section B, for competitors residing outside the British Isles. Competitor's ages will be taken into consideration when judging the entries.

Cash prizes will be awarded for the best entries FROM EACH SECTION as follows :—

First Prize, £3-3s. ; Second Prize, £2-2s. ; Third Prize, £1-1s. ; Six Prizes of 10/6 each. Other competitors whose entries show outstanding merit will be presented with special Certificates of Merit, while in addition a few complimentary copies of " Meccano Standard Mechanisms " will be awarded for entries that closely approach prize-winning standard.

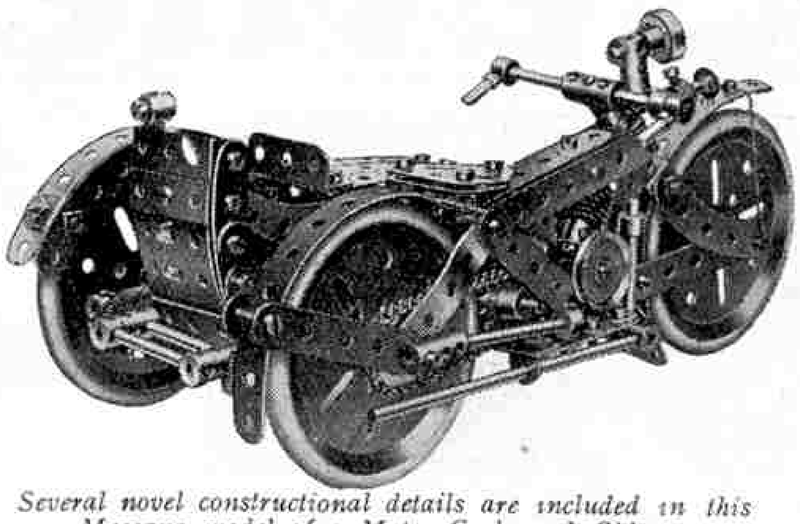
Closing date for Section A, 31st August, 1926. Overseas Section, 30th November, 1926.

HOW TO ENTER. Readers should send in clear photographs or good drawings of their models, together with any explanations that may be necessary, although the latter should be made as brief as possible.

The first prize in each section will be awarded to the competitor who builds the model that the judges decide to be the best entered in that section, and the second and third prizes will be awarded to the second and third best models, and so on. It is wise to remember that very often simple and straightforward models prove better than the most complicated structures.

Important. The following instructions should be followed closely : The competitor's name and address must appear on the back of each photograph or sheet of paper used, together with his age, name of the competition, and section in which the model is entered. Envelopes should be addressed " Originality Competition," Meccano Ltd., Binns Road, Liverpool.

Models should not be sent. A clear photograph or good drawing is all that is necessary. Photographs or drawings of unsuccessful contributions will be returned if desired, providing a stamped addressed envelope of the necessary size is enclosed with the entry, but it should be noted that photographs of prize-winning models become the property of Meccano Ltd.



Several novel constructional details are included in this Meccano model of a Motor Cycle and Sidecar

"SELECTED PARTS" COMPETITION

Prizes Offered for Simple Models

As a variation to our recent " Outfit " Competitions we now announce a contest in which the models submitted must be constructed from only those Accessory Parts shown in the list below. Each part included in the list must be used, and none may be added. Competitors may construct any type of model that they prefer, but it should be as original as possible. All models submitted must be the competitor's own unaided work both in design and construction.

4 of No. 1	2 of No. 17	52 of No. 37
8 " " 2	2 " " 18A	6 " " 38
8 " " 5	1 " " 19	1 " " 45
2 " " 8	4 " " 20	6 " " 48A
2 " " 10	4 " " 22	1 " " 52
2 " " 11	2 " " 22A	1 " " 62
4 " " 12	1 " " 23	1 " " 115
2 " " 15	1 " " 24	2 " " 125
4 " " 16	8 " " 35	2 " " 126A

Entries will be divided into the following sections :—

Section A, for boys under 12 years of age.
Section B, for boys over 12 years of age.
Section C, for boys residing Overseas.

Prizes will be awarded for the best entries FROM EACH SECTION as follows :—

First Prize : Meccano or Hornby Goods to the value of £2-2s.
Second Prize : Meccano or Hornby Goods to the value of £1-1s.
Third Prize : Meccano or Hornby Goods to the value of 10/6.

Other competitors whose entries show outstanding qualities will be presented with special Certificates of Merit, while in addition a few complimentary copies of " Meccano Standard Mechanisms " will be awarded for models that closely approach prize-winning standard.

Closing date for Sections A and B : 31st August, 1926. Overseas Section, 30th November, 1926.

Important. These instructions should be followed closely. The competitor's name and address must appear on the back of each photograph or sheet of paper used, together with his age, name of the competition, and section in which the model is entered.

Envelopes should be addressed " Selected Parts " Competition, Meccano Limited, Binns Road, Liverpool. Models should not be sent. A clear photograph or good drawing is all that is necessary. Photographs or drawings of unsuccessful contributions will be returned if desired, providing a stamped addressed envelope of the necessary size is enclosed with the entry, but it should be noted that photographs of prize-winning models become the property of Meccano Limited.

As your lens sees it! EXACTLY

NOT with half the detail missing because the film was under-exposed.

Gevaert Film makes Perfect Pictures, because the speed of the emulsion ensures fully exposed negatives when light is poor or weather dull. Yet its latitude prevents over-exposure in bright sunshine.

Start the season well, and get Perfect Pictures all the time.

Negatives on Gevaert Roll Film and prints on Gevaert Gaslight or Self-Toning Paper.

GEVAERT LTD.
Walmer Road
LONDON, W. 10

FAST ROLL FILM

(CALL IT GAY-VERT)

Gevaert

RACQUETS & BATS *for BOYS!*

"THE MARVEL" Tennis Racquet

is a high grade product, built with sycamore wedge and handle. It is bound at the shoulders and has two extra main strings which adds considerably to its driving power. Made in all the usual weights. Price, post free, 12/-

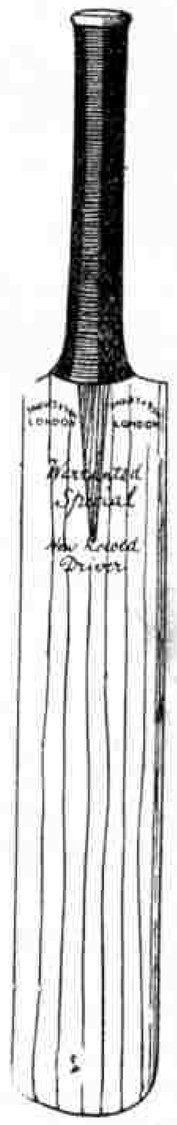
Exceptionally good Tennis Balls, very resilient, from 12/- per dozen.

"THE CLUB" All-Cane Cricket Bat

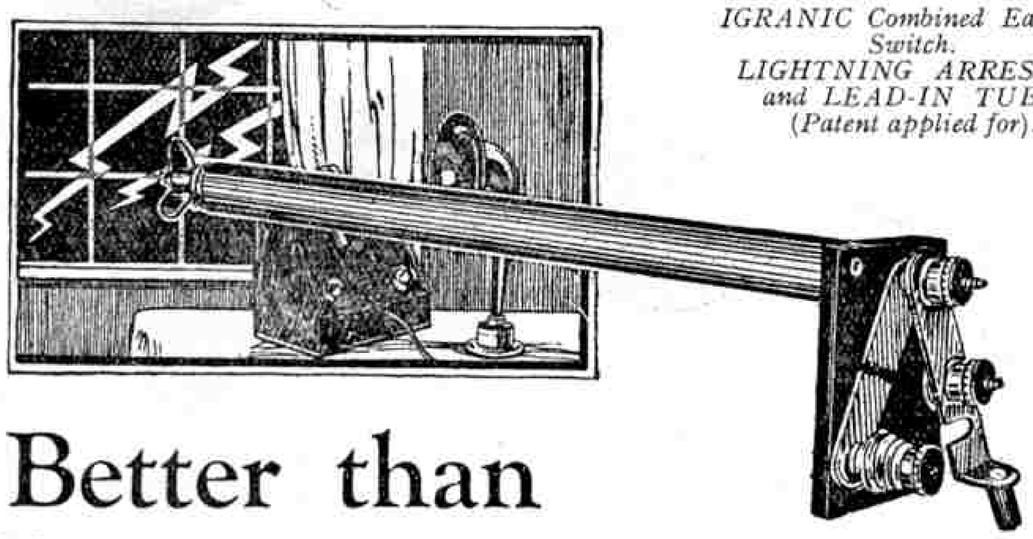
is of good quality Willow, with best Sarawak all-cane handle, fitted with non-slip binding. Inexpensive, and the most serviceable bat at the price.

Size	3	4	5	6	Harrow
Price	7/3	8/3	9/6	10/6	15/-

All goods carriage paid in Great Britain.



BROWN, MUFF & Co. Ltd. *of* BRADFORD



IGRANIC Combined Earthing Switch. LIGHTNING ARRESTER and LEAD-IN TUBE. (Patent applied for).

Better than Insurance

You need not fear lightning. The presence of an aerial in your garden need not constitute a danger—it can even act as a safeguard—provided it is always connected to an Igranic Combined Earthing Switch, Lightning Arrester and Lead-in Tube. It costs but 6/6 and yet consists of three essential devices in one. Be wise and fit one immediately—it is better than an insurance policy.

All reputable dealers stock this and the range of Igranic Radio Devices. **Write for List J29.**

Exclusive Manufacturing Licensees of

IGRANIC ELECTRIC COMPANY LIMITED

PACENT Radio Essentials

149, Queen Victoria Street, London. **Works: Elstow Road, Bedford.**

"WIRELESS MADE EASY"

RADIO BUILDING IN THE BLACKADDA WAY

THE BLACKADDA RADIO COMPONENTS AND ADAPTORS ALL FIT THE STANDARDISED TABLE AND ALLOW ANY CIRCUIT TO BE QUICKLY ERECTED OR DISMANTLED.

BUILDS JUST LIKE MECCANO

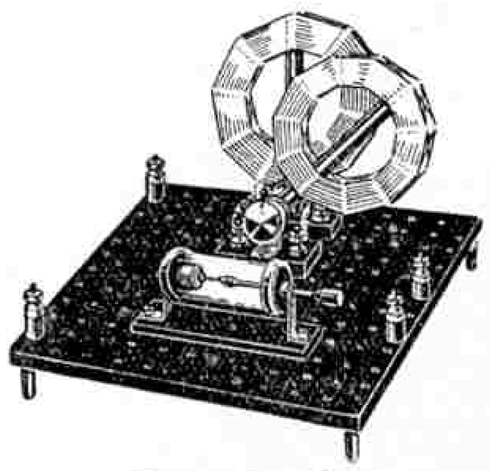
Parts for constructing a Crystal Set as illustrated. Price 19/6 (Six Coils).

1 Valve Set with Reaction. Price £2 12 6 (2 Coils).

1 Valve Amplifier. Price £2-1-0

Building Table. Price 3/6

NO TOOLS REQUIRED.

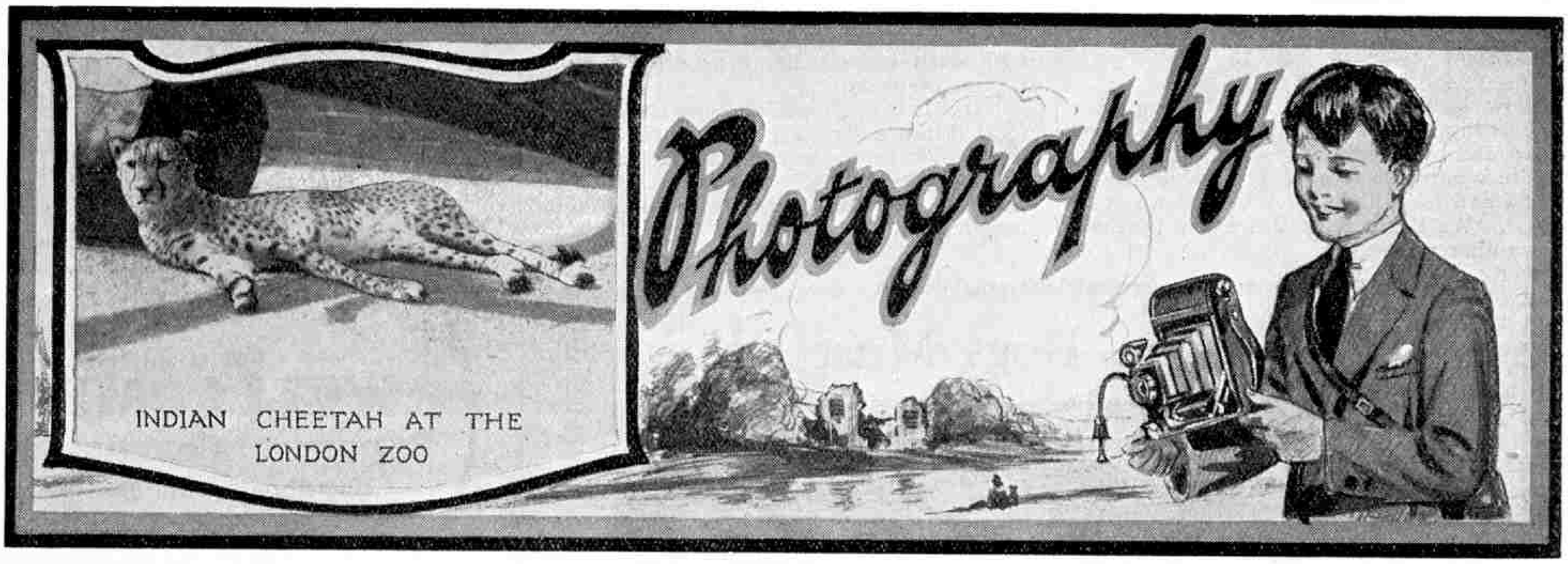


Patent No. 185,180 (A Typical Crystal Set).

WRITE FOR BOOKLET WHICH DESCRIBES THE BLACKADDA WAY AND ILLUSTRATES FULL RANGE OF COMPONENTS AND SETS.

THE BLACKADDA RADIO COY. LTD.

Telephone: Derby, 1820 **Sadler Gate, Derby** Telegrams: "Blackadda," Derby



XV. SUCCESS IN SNAPSHOT PHOTOGRAPHY: THE FOCUSSING PROBLEM

IN last month's article we sought to guide our photographic readers through some of the pitfalls of haphazard snapshotting, with special reference to the question of exposure. This month we come to another essential point, the securing of sharp focus.

The popular hand cameras of to-day, excluding the reflex type, may be divided into three classes—those fitted with a focussing screen, those having a focussing scale but no screen; and those having neither one nor the other. With the first class of camera focussing presents no particular difficulty, because the image of whatever is to be photographed is seen on the focussing screen. It is thus only necessary to alter the distance between the lens and the plate by means of the focussing mechanism provided, until the image, or the particular part of it required, is perfectly sharp. Focussing with the second type of camera is more difficult because there is no focussing screen and therefore no image to use as a basis; while the third type has its focus permanently fixed.

Suppose we are using a camera fitted with a focussing scale marked for distances of 6, 9, 15 and 25 ft., and beyond that with the letters "Inf." representing "Infinity," or extreme distance. If we wish to photograph an object at a distance of, say, 25 ft., we move the pointer along the scale until it points to the 25 ft. mark. It then remains to make sure that the camera actually is 25 ft. away from the object. In some cases it is possible to measure the distance with a tape measure, or as an alternative we may secure considerable accuracy by striding out the distance. When measurement by either of these means is possible we may be fairly certain that the object to be photographed will be quite sharply focussed. In other cases, however, we are left to estimate the distance by means of the eye, and here creeps in the possibility of considerable error.

After a good deal of practice, most people acquire the ability to estimate distances by the eye with a fair degree of accuracy. Beginners find this very difficult, however, and indeed some people never acquire the necessary skill. It might appear, therefore, to be an almost hopeless task for the beginner to secure sharp focus by means of a focussing scale in circumstances when actual measurement of the distance is impossible. Fortunately there is a margin of error in focussing that makes the problem much less difficult.

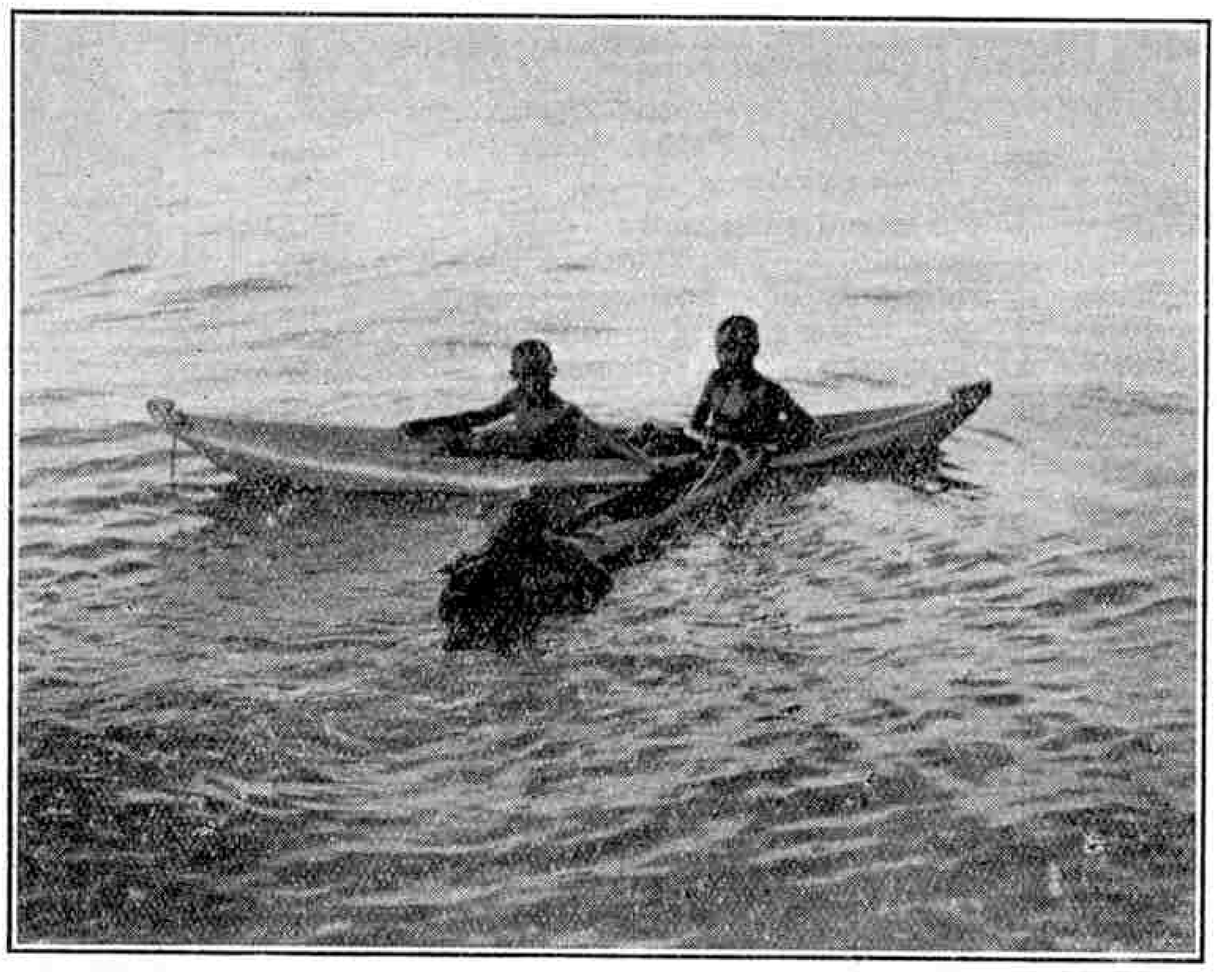
If, for instance, we set the focussing scale to 25 ft., any object photographed at exactly that distance will appear perfectly sharp, but in addition the object may be moved a certain distance nearer to the camera or further away from it without any appreciable loss in sharpness. This distance through which a focussed object may be moved to or from the camera, while still remaining sharply focussed, is known as "depth of focus," and it is a very valuable asset to the photographer.

Depth of focus or depth of definition is dependent upon the focal length of the lens and the size of the stop employed. In using a camera fitted with a focussing scale, and particularly on occasions when distances cannot be measured, it is very useful to know the point on the scale at which the indicator should be placed in order to secure the greatest depth of definition. This distance on the scale is known as the "hyperfocal" distance, and it varies with the focal length of the lens and the size of the stop in use.

The hyperfocal distance may be calculated very simply provided we know the focal length of our lens and the size of the stop. The stop values are almost invariably indicated, and if by any chance we do not know the focal length of the lens we may ascertain this in a simple manner. Focal length is the distance from the plate or film to the lens when the latter is focussed on "Infinity," the measurement being made to the glass of a single lens or to the diaphragm of a double lens. In the case of a fixed-focus camera we simply take things as they are and make the necessary measurement, as the lens is permanently focussed for a distant object.

Having now obtained the necessary two factors we find the hyperfocal distance in feet by means of the following simple rule:—Multiply the square of the focal length by 100 and divide by the F number of the stop multiplied by 12. Many cameras are fitted with U.S. or Uniform System numbers and the corresponding F numbers may

Picking up Pennies in Zanzibar



Young natives of Zanzibar ready to dive for pennies, thrown by the passengers of mail steamers. This snap was sent to us by M. J. Manak, one of our Zanzibar readers

be obtained from the following table :—

U.S.	1	2	3	4	8	16	32
F.	4	5.6	7	8	11	16	22

Now let us take an actual example. Let us suppose we are using a lens of 5 in. focus and an aperture of F/8. First of all we square the focal length which gives us 25 and multiplying this by 100 we get 2,500. We then divide this figure by the F number multiplied by 12, in this case 96, and the result, ignoring a small remainder is 26. We now know that the hyperfocal distance for our lens when we are using the stop F/8 is 26ft.

Possibly our readers will be saying to themselves :—

"What is the good of this hyperfocal distance now we have found it?"

It is useful in many ways. In the case just mentioned, if we set the focus of our camera at 26 ft. all objects from half the hyperfocal distance, that is 13 ft., to "Infinity" will be in focus, the sharpest focus of all being at 26 ft. In other words we have secured the greatest possible depth of definition when using stop F/8. On the other hand, if we focus on "Infinity" we know that all objects 26 ft. or further from the camera will be in focus, nearer objects being out of focus.

In the case of a fixed-focus camera the relative positions of lens and plate or film are fixed permanently by the manufacturer. Usually this distance is such as to bring into focus objects at a moderate distance—in other words the best average result is secured. For very many purposes a fixed-focus camera answers excellently but it must always be remembered that with such instruments near objects will be out of focus.

Here again it is useful to know the hyperfocal distance for each stop, as this gives us a guide to the nearest point that will be in approximately sharp focus. It is true that in such cameras the lens is not focussed on the "Infinity" point, but the difference does not seriously affect our calculations, and at any rate, we shall be able to guard against trying to take snapshots of our friends in positions so close to the camera as to make sharp focus impossible. This difficulty, of course, may

(*Continued on page* 393)

Where Dogs Must Work

This photograph, a snap sent by one of our readers, shows how dogs are made to work in Belgium. They are harnessed to small carts, which they haul about the streets. They do not seem to object but, like the Eskimo dogs, take an intelligent interest in their duties

27th Photographic Contest

For this month we have as the subject of our competition "A Sports Photograph." Any outdoor game or pastime comes within the scope of this contest, which should make a strong appeal to our snapshotting readers. No photograph is more popular than one depicting a sporting incident, whether at cricket, tennis, swimming, running, jumping or boating. Readers must remember the limitations of their cameras, however. It is not possible to secure a good photograph of the winner of the senior T.T. motor cycle race passing the post at speed, if one's camera shutter works no faster than 1/100th of a second!

The usual two sections will be held, A for those of 16 and over, and B for those under 16. Prizes of photographic or Meccano Goods to the value of £1 1s. and 10/6 respectively will be awarded to the first and second prize-winners in each section.

Closing date, 30th June. Overseas, 30th October.

Result

25th Photographic Contest

The title of this contest was "Records," and the contest lived up to its title, for the number of entries was by far the largest we have ever received in a photographic competition. An interesting feature of the entries, which were very varied, was the number of photographs of the Shakespeare Memorial Theatre at Stratford-on-Avon, showing it both before and after its destruction by fire.

The awards were as follows :—

First Prizes—Section A, C. R. CHRONANDER (Berkhamstead); Section B, R. C. H. WALTON (Tunstall). Second Prizes—Section A, L. E. HORGAN (Birmingham); Section B, R. H. DAW (Birkenhead). Consolation Prizes—Section A, D. E. Smith (Liverpool); HAROLD SCOTT (Armley); Section B, W. SALT (Shrewsbury), A. MARTIN (Prescot).

Overseas Results

21st Photographic Contest

FIRST PRIZES. Photographic Materials (or Meccano products) to the value of £1-1s.

Section A: A. SCOTT, Canada; Section B: E. HEINRICH, S. Australia.

SECOND PRIZES. Photographic Materials (or Meccano products) to the value of 10/6.

Section A: M. J. MANAK, Zanzibar; Section B: D. C. MACFARLANE, New Brunswick, Canada.

22nd Photographic Contest

First Prizes, Section A: H. A. FRASER (Wellington, N.Z.); Section B: S. TYLER (Sydney). Second Prizes. Section A: V. W. HALPE (Ceylon); Section B: R. T. SMITH (Montreal).

Photographers!

Start the season well

Price 1/6

Obtain a copy of this book

'WELLCOME' Exposure Calculator

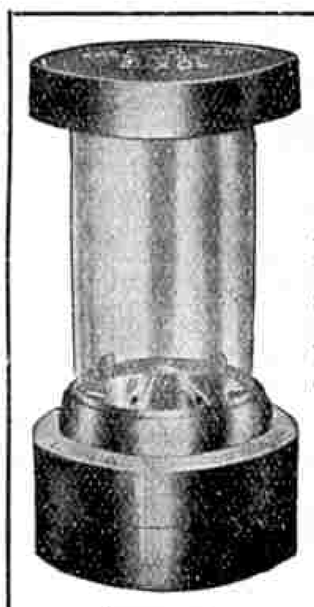
Handbook and Diary

Cuts out failures. Saves Money

Write for free literature

All Photo Dealers

BURROUGHS WELLCOME & CO
3, SNOW HILL BUILDINGS, E.C. 1



"LUXOL"

DARK ROOM

LAMPS.

Burn PARAFFIN, No Loose Oil. Special Absorbent Imperishable Wick. No Smoke, Absolute Safety. No Fogging. Ideal when travelling, at School, or on Holidays. Complete in metal case. Always ready.

PRICE 3/-

EXTRA RUBY or YELLOW GLASSES...1/6 (Post. ex.)

From all Dealers or

'Luxol' Safety Light Co. Ltd. 57, Southwark St., London, S.E.

PATENTED.

£50 a Month for Happy Snaps

23 Cash Prizes are offered each month in the ENSIGN Happy Snaps Competition. You need not be an expert to win one of the prizes. Full details in every carton of ENSIGN Speedy FILM. Buy a spool To-day.

FREE BOOKS about PHOTOGRAPHY

By sending a postcard now you can get interesting illustrated booklets that tell the story of snapshot taking. They show clearly and simply just how to take better snaps and how to judge between good prints and bad. They teach you more in a few minutes than you could learn by experience in months.

Write now—simply send your name and address on a postcard to **ENSIGN HOUSE, Dept. A.E., 88-89, High Holborn, LONDON, W.C.1.**

ENSIGN Cameras and FILM

are made in Great Britain. For picture-making qualities they have no equal. Ask your Dealer.

Courtesy] ["*The Aeroplane*"

This unique photograph, taken on the recent flight from London to the Cape, shows the wonderful Victoria Falls, on the Zambesi River. The famous bridge is seen on the left. The Falls are nearly a mile in length

Success in Snapshot Photography :—

(*Continued from page* 392)

be provided for by the use of supplementary lenses, which, by altering the focal length of the original lens, make portraits at close quarters possible.

It is interesting to prepare a table of the hyperfocal distances for our lens as used with different stops. In working out such a table small remainders may be ignored. Using a lens of 5 in. focus we have seen that with F/8 the hyperfocal distance is 26 ft. Using stops F/11, F/16 and F/22, the distances are respectively 18 ft., 13 ft. and 9 ft. A very useful table of this kind, worked out for lenses of from 3 in. to 7 in. focal length, is given in the "Wellcome" photographic handbook.

The Meccano Leaflets

Those readers of the "*M.M.*" who have not already had copies of the Meccano Instruction Leaflets may order copies direct from this office. The following are the three leaflets published.

(1) CHASSIS LEAFLET gives full instructions for building the splendid Meccano model of a motor chassis. This has a three-speed gear-box (including reverse), clutch, differential, and elliptical springs and is driven by the Meccano electric motor, the accumulator being accommodated at the back of the chassis. The details of construction of the model are in accordance with actual automobile practice. So accurately does this model show the working of a motor car that it is in use in many schools of motoring for demonstrating the working principles to the pupils.

(2) LOOM LEAFLET, gives full instructions for constructing the Meccano Loom for real weaving. With this loom splendid hat-bands and neck-ties may be woven in numerous artistic designs, the patterns depending upon the ingenuity and taste of the builder of the model.

(3) CLOCK LEAFLET deals with the construction of the fine Meccano Clock. This is of the Grandfather type and stands over 6 ft. in height. It has a long pendulum and is worked by a weight. The Meccano Clock keeps splendid time and is both of ornament and use in any house. (By an ingenious device the clock may be made to electrically control any number of dials in different parts of the house. Full particulars of this interesting application will shortly be published in the "*M.M.*")

The price of the leaflets is 3d. each and postage 1d. should be added to every order.

Lives of Famous Engineers—(*cont. from p.* 361)

breakwater were carefully marked out by buoys to which barges were attached while their cargoes of stone were emptied into the sea. By March 1813 portions of the work were visible at low water and a year later the wall had so far advanced as to enable a vessel to be anchored under its shelter.

A succession of gales early in 1817 demolished about 200 yards of rubble on the upper parts of the wall and this revived a previous discussion as to the best slope the wall should have to resist the sea. It was found that the storms had changed the slope from a ratio of 3 to 1 to about 5⅓ to 1, and Rennie concluded that this was the best slope. It was intended that the work should be continued with this ratio, but most of the exterior face was actually completed at a slope of 3 to 1 as before. A few years later another terrific storm took pieces out of the upper reaches of the breakwater and left the slope of the wall in the ratio of 5 to 1, thus confirming Rennie's view that this was the best slope for resisting wave action. The undertaking was completed at the end of 1848.

The last of Rennie's great designs was that of New London Bridge. This bridge was not completed until ten years after his death, however, and we shall consider it in detail when we come to the engineering career of his son Sir John Rennie.

During the last few months of his life Rennie suffered increasingly from illness, but with indomitable courage he continued to direct his various schemes. Less than a week before his death he wrote to the Navy Board giving them advice regarding the gates for the Pembroke dry dock. His last letters to his assistants urged upon then the need of attention, punctuality and despatch—three qualities that had been so conspicuous in his own life.

Rennie died on 4th October 1821, and was buried in St. Paul's Cathedral close to the grave of Sir Christopher Wren.

Over 172 Miles an Hour—

(*Continued from page* 357)

To quote Major Segrave's own words: "Somewhere about the finish of the second kilometre I put my foot down as hard as I could—and hanged if, before I had gone 200 yards, the supercharger wasn't cracked from end to end! It was that leap that weakened it!"

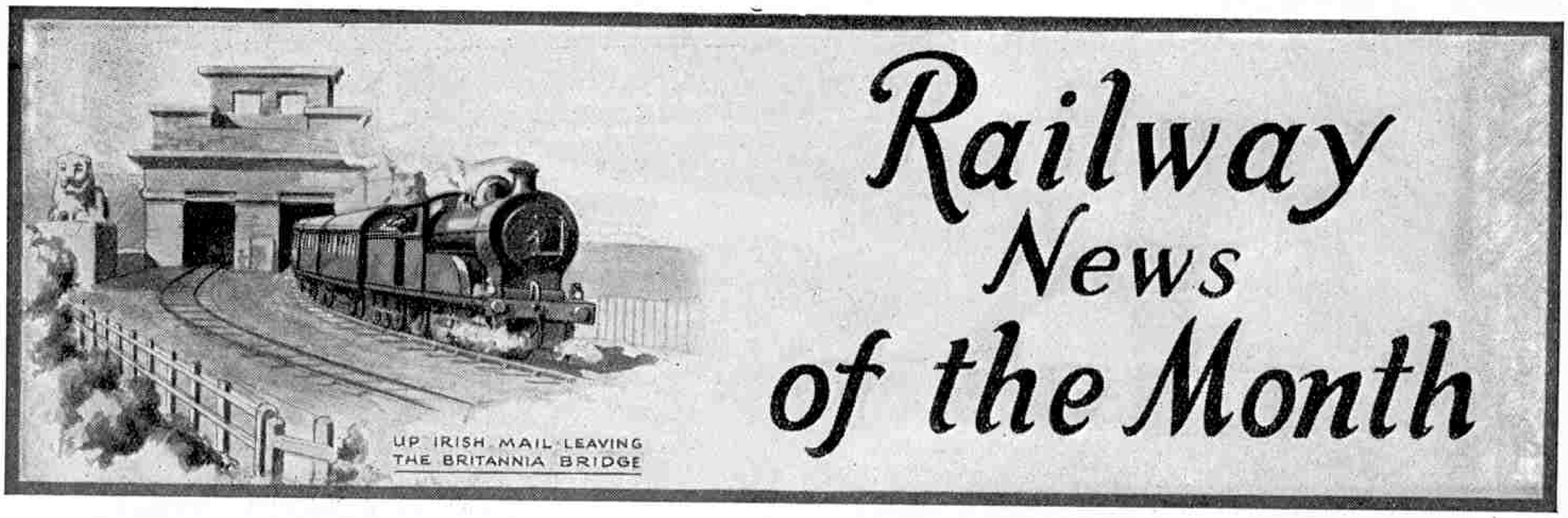
"Ladybird" commenced to spit fire and smoke, and coughed and spluttered, finishing the mile at a painful limp. Her day was over, but the kilo. record was broken.

Major Segrave fully intends to resume his efforts and at the next attempt "Ladybird" will be fitted with two "blowers," each rather smaller than the original, but in combination equally effective.

The Triumph of "Babs"

It is an interesting fact that one record-breaking feat is often quickly followed by another, and scarcely had the excitement of Major Segrave's exploit subsided than news came from Pendine Sands, Carmarthen, of even more terrific speeds. The hero in this instance was the famous motorist Mr. J. G. P. Thomas, driving his specially built car "Babs," which is fitted with an enormous aero engine. On his first attempt Thomas's mean speed for the flying kilometre was 169 m.p.h., and for the flying mile 168 m.p.h. On the following day he did even better, in spite of the conditions being unfavourable owing to the sands being too moist. This time he accomplished the kilometre at 171.69 m.p.h., and the mile at 170.624 m.p.h.

On one occasion during the two days, Thomas covered a mile at the stupendous speed of 172.3 m.p.h., and he still cherishes the ambition of reaching a speed of three miles per minute!



Railway News of the Month

All-Steel Trains

The first all-steel train to run in this country, apart from those used on the London tube railways, made its pioneer journey from Birmingham to London recently. The innovation is a step forward in the attempt to overcome the problems of long distance week-end traffic by providing a frequent service of centre corridor trains for third-class passengers only.

The L.M.S. Railway have decided to give this experiment an extended trial for various reasons, among which are the facts that the world's supply of timber is rapidly diminishing, and that the steel coach employs the product of British industries, whereas the wooden coach employs foreign materials. Moreover, the steel coach is less liable to fire and is stronger in construction. By next month 235 steel-bodied third-class vestibule corridor carriages will be in the service of the company, and during the summer they will be partly used for the long distance week-end traffic.

The new cars possess certain novel features so far as British main line stock is concerned. The bodies are constructed entirely of steel, and even the floors are built of compressed steel sections, covered with fireproof cement. Of the 235 cars of this new type, 200 are wholly passenger-carrying and will accommodate 56 passengers each with a table to every set of four. Thirty-five of the cars are brake carriages, each containing 40 seats together with a luggage and guard's compartment, so that the whole train may be made up of a uniform type of vehicle.

In appearance the cars are very little different from those constructed of wood, the main features of the standard L.M.S. design having been retained.

* * * *

A Luxurious Tourist Train

A specially-designed tourist train is shortly to make its appearance in America under the ownership of the Raymond and Whitcomb Co., a New York tourist agency, for whom it has been built by the Pullman Car Co.

The train will carry out a series of railway tours, irrespective of a timetable, over various American sight-seeing routes. It will carry its own cinema and dance hall in addition to two sleeping cars and the ordinary Pullman accommodation. The tours will include the Canadian Rocky Mountains and California, and the outcome of the experiment will be awaited with interest.

Americans Impressed by British Railway Efficiency

The party of American hotel proprietors and managers that visited Great Britain in April, received a strong impression of the efficiency of British railways. On landing at Plymouth they were conveyed by the G.W.R. to Paddington in two trains, one weighing 273 tons and the other 286 tons. The times for the 227-mile journey were 233 minutes and 235 minutes respectively, the engine on the first train being the "*Abbotsbury Castle*" (No. 4083) and on the second the "*Berkeley Castle*" (No. 4085).

On the third day of the visit the party was conveyed from Manchester to Euston in two trains, each weighing 326 tons, drawn by "*Private E. Sykes, V.C.*" and "*Private W. Wood, V.C.*" two locos named after L.N.W. railwaymen. Although definite instructions were given to the drivers that there must be no special exhibition of speed, both trains finished the 189 miles run in eight minutes under schedule.

* * * *

New Ticket Machine

The Underground Railways are shortly to introduce a new type of ticket machine that will print, number and date-stamp tickets at the time of issue, at the rate of five per second.

* * * *

Some Recent Contracts

The contract for the electrification of 73 kilometres of line for the Estrada de Ferro Oeste de Minas for the Republic of Brazil has been placed with the Metropolitan Vickers Electrical Company, Trafford Park. All the engineering work in connection with the utilisation of the waterfall on the Bannal River, dam, canal, headworks, pipeline, etc., the complete power station, overhead trolley line, and five 45-ton 1,500-volt direct current electric locos, is included in the contract, the value of which is approximately £250,000.

* * * *

Contracts have been placed by the Southern Railway with various British firms for 30,000 tons of rails, 700 tons of fishplates, and 10,000 tons of conductor rails.

* * * *

The North British Locomotive Company, Glasgow, have received orders from the Rhodesian Railways for twenty 4-8-2 locos and tenders.

* * * *

The L.M.S. Railway have placed an order with Messrs. Sir William Arrol & Co., for 21 level luffing cranes for use at Grangemouth Harbour.

Rail Traffic Control

The L.N.E.R. have decided to introduce a train-control system in the Cambridge area, covering Ely, March, Spalding, Peterborough, Bury St. Edmunds, Bishops Stortford and St. Ives. The estimated cost is £8,000, but a considerable saving in train power will be effected by the elimination of a big proportion of the time wasted in working traffic through the area.

* * * *

New Coaling Plant

To expedite the coaling of engines at the Doncaster railway depôt, where approximately 250 engines call each day for their supplies, the L.N.E.R. are constructing a new coaling plant. A ferro-concrete hoist, 100 ft. high, will hold 500 tons of coal in its overhead bunkers, and an electric hoist, capable of lifting a 20-ton wagon, will convey the coal to the bunkers, from which small shoots will feed the coal into the engine tenders. The facilities will enable two engines to be coaled simultaneously, the fuel supply rate being five tons in two minutes.

The workmen at the Doncaster works, with the exception of those working in the Crimpsall repair shops, have received notice to revert to full-time work. The men affected, who number between 2,000 and 3,000, have been working on short time for about a year.

* * * *

Proposed Manchester Tube

A proposal to construct tube railways in Manchester has been receiving the attention of a special committee of the City Council. The committee's report is not yet available, but it is stated that there are no engineering difficulties involved in the scheme, and that the main problem is financial. The depth at which a tunnel would be constructed would be between 40 ft. and 80 ft., at which point sandstone chiefly would be encountered. The estimated cost of the proposed tube for a total length of 14 miles is £4,000,000.

* * * *

Tokio Underground Railway

The first section of the new Tokio underground railway is expected to be completed in June of next year. The section will be 1½ miles in length, and it is planned to commence a regular four minutes' service in July with trains built to accommodate 600 passengers.

Reconstruction of Crewe Workshops

The L.M.S. Railway announce that, when the alterations now proceeding at their Crewe workshops are complete, the new works will be the largest locomotive building and repairing establishment in the country, covering 160 acres.

The steelworks and the loco erecting shops are the principal features of the new building. The new erecting shop will measure 850 ft. in length and 193 ft. in width, and each of its three bays will be equipped with two 50-ton and two 10-ton high-speed cranes. The steelworks, unique among railway workshops in this country, will have two furnaces of 45-ton capacity and two of 70 tons, which will replace several old hand-charged furnaces. The steel produced will be used for manufacturing rails, axles, tyres, and various locomotive parts.

The company's gasworks, which supply also the town of Crewe, have become inadequate, and a large reconstruction scheme has been put in hand. This entails the pulling down of the old retorts and their replacement by modern horizontal retorts, the provision of a 1,000,000 cu. ft. gasometer, new purifying and exhausting plant, and the laying out of a considerable mileage of new mains to meet the greatly increased demand.

In modernising the works a great quantity of new machinery is being installed, including electric high-speed cranes, a five-ton magnet that picks up lumps of pig-iron as if they were iron filings, and a vertical bending press for bending steel plates.

The works will have a yearly output capacity of about 100 new locos, 1,500 complete overhauls and heavy repairs, and 350 new boilers.

* * * *

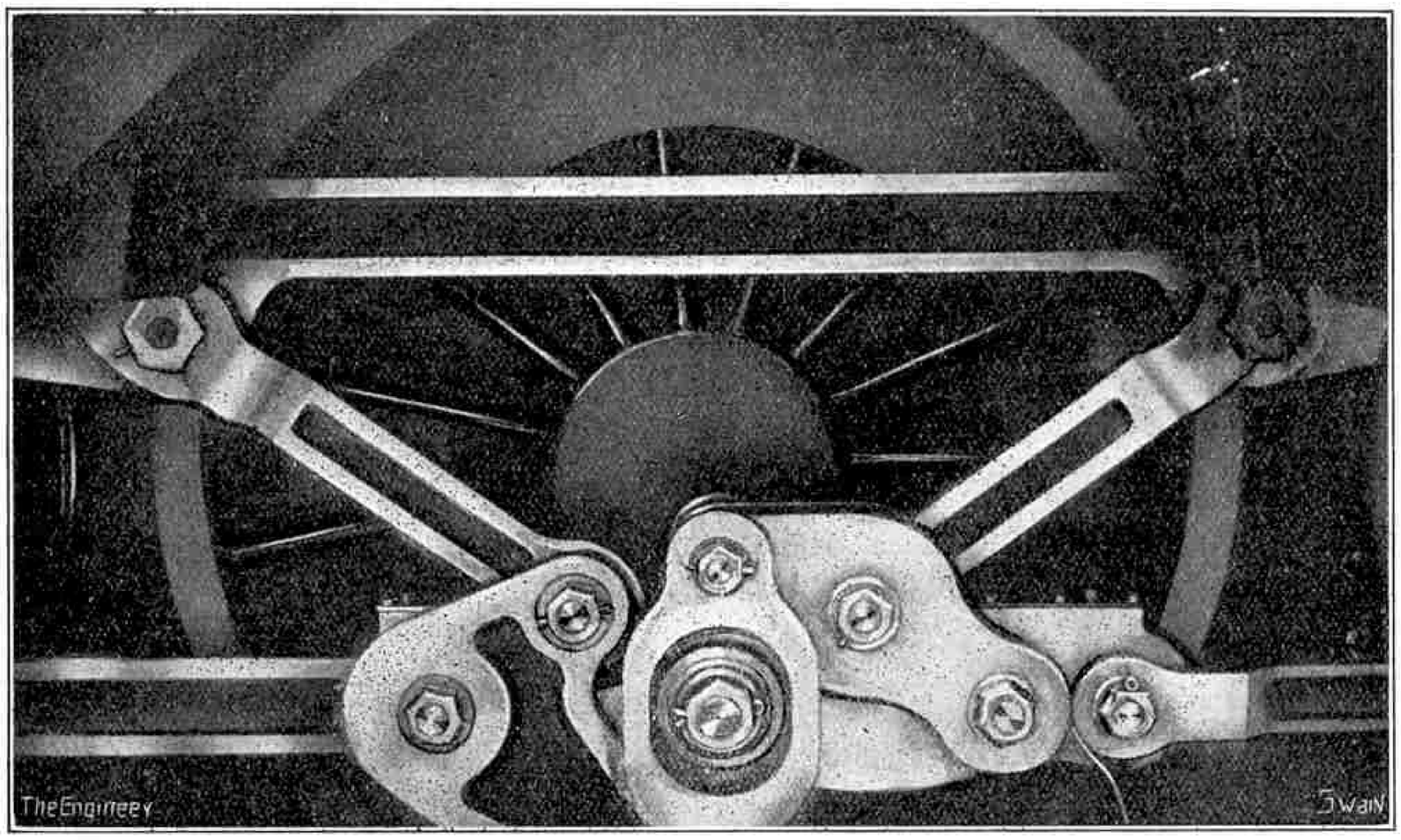
Accidents During 1925

During last year there were 24 railway accidents on British railways in respect of which inquiries were held. These figures show an increase of four in comparison with 1924, and a decrease of four with 1923. Passenger trains were involved in 19 accidents, these being made up of 13 collisions, 2 derailments and 4 buffer-stop collisions. Goods trains made up the remainder of the total.

Loetschberg Railway Locos

Two powerful 2–6–6–2 electric locos, built at Geneva, have recently been put into service on the Loetschberg Railway. The locos are fitted with six twin motors of 700 h.p. each, and will be able to haul 560-ton trains up heavy gradients at a speed of approximately 30 m.p.h. The transmission of power to the driving wheels from the motors will be accomplished by means of the Westinghouse-Sécheron individual axle drive system.

Interesting Link Motion



Courtesy] [*"The Engineer"*

New Type of Link Gear fitted to Electric Locomotive built by the Italian Westinghouse Co.

Our illustration shows the linkage connecting the motor cranks to the driving wheels. The triangulated form in which the links are arranged is designed to distribute the power of the motors equally, as well as to overcome as far as possible the disadvantages of the "dead point" in the cranks.

L.N.E.R. Museum

The exhibits at the York railway museum are increasing in number very quickly and a portion of the old Queen Street carriage works has been reconstructed to house the specimens of rolling stock that the L.N.E.R. propose to preserve. Several old railway coaches and wagons are on show, and in addition to the Hetton Colliery loco the following locos will be exhibited:—Stirling's 8 ft. single express engine, No. 1 G.N.R. Fletcher's 2-4-0 type 7 ft. express engine, and the Stockton and Darlington 0-6-0 long boiler engine, No. 1275.

* * * *

Safety First

Owing to the increase in accidents to members of the staff of the Great Western Railway in 1924, when there were 371 more than in the preceding year, special efforts were made last year to instil the doctrine of "Safety First" among the employees of the company. The result was highly satisfactory, the total number of accidents in 1925 being 2,832, or 114 less than in 1924.

The words of the Great Western "Safety" motto are:—"Look before you leap. Ask: Is it safe?"

Underground Improvements

Important additions to the Underground Railways programme of extensions and improvements are foreshadowed by the scheme, recently outlined by Lord Ashfield, for duplicating the District Railway tracks between Hammersmith and Acton Town and running the trains from the Piccadilly line over the extended track.

The proposed extension would give the stations west of Hammersmith direct communication with such important centres as Knightsbridge, King's Cross, and Piccadilly Circus. In addition, a general speeding up between Ealing, Hounslow and Hammersmith could be undertaken, as a larger proportion of the trains could run non-stop between the stations mentioned.

* *

Big Railway Order for Germany

Contracts for 20 heavy main-line locomotives have been placed with the German firms Maffei, of Munich, and Henschel, of Cassel, by the Railways and Harbours administration of South Africa.

These orders form part of a large inquiry for locos for which tenders had been received from the leading builders of Great Britain, the United States, and the Continent. The British tenders, it is believed, compared very favourably in price with those accepted, and in passing over them it is probable that the South African authorities had in mind the possibility of labour troubles affecting the delivery dates.

* * * *

New S.R. Locos

Fifteen new 4–4–0 express locos intended for use on the Eastern section of the Southern Railway have just been delivered. The general design follows closely that of the "L" class, but the boiler pressure has been increased from 160 lb. to 180 lb. per square inch. The tractive effort is not seriously affected, as the cylinder diameter has been reduced to 19½ in. from 20½ in.

The "Maunsell" type superheater with snifting valves has been fitted, and the smoke-box arrangement re-designed. Special attention has been given to the layout of the cab and footplate, with the result that the comfort of the driver and fireman has been considerably improved.

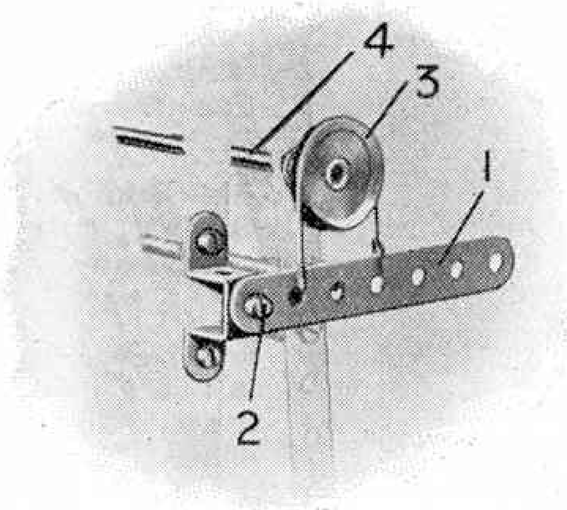
MECCANO STANDARD MECHANISMS

Section VI. Brakes and Retarding Appliances

This article is the eighth of a series explaining some new and interesting aspects of Meccano model-building practice. Previously we have dealt with Gear Ratios, Belt and Rope Mechanisms, Pulleys, Levers, Clutches and Drive-Changing Mechanisms, and the following article describes some simple Meccano Brakes and other Retarding Appliances. These "Standard Mechanisms" may be adapted to numerous Meccano models, and will improve both their appearance and efficiency in operation.

THE strap and lever brake (S.M. 81) is used in actual practice to a large extent. The strap, which is represented in the Meccano model by means of a piece of cord, is usually faced with leather or wood, in order to obtain the necessary grip about the circumference of the rotating wheel, or brake drum.

In our illustration, the brake cord is tied at both ends to a lever 1, and passes round the groove of the 1″ Pulley 3 secured to a Rod 4.

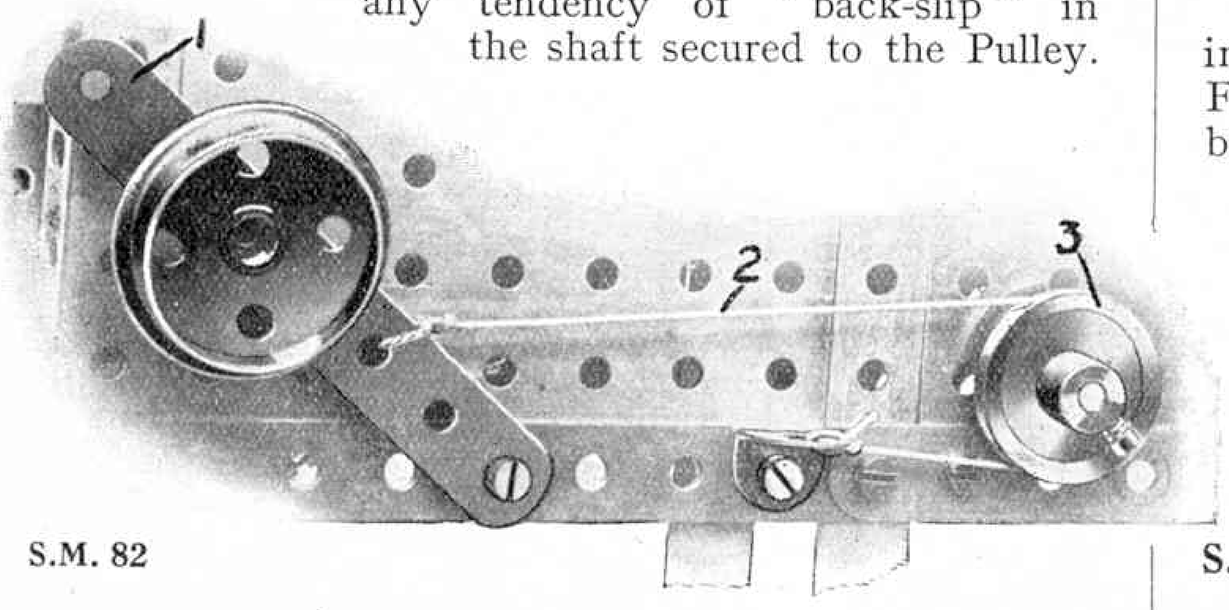


S.M. 81

On pressing down the lever, which is pivoted at 2 by means of bolt and nuts (S.M. 262), the grip of the cord increases about the Pulley 3 and so retards or stops the rotation of the shaft 4.

S.M. 82—Strap and Weighted Lever Brake

This brake is similar to that described in S.M. 81, except that the lever 1 carries a Flanged Wheel, which is secured by its set-screw to the shank of a bolt passing through a hole in the lever. The weighted lever so obtained imparts a continual pressure on the cord 2 about the 1″ Pulley 3, the shaft of which may revolve freely only when the lever is lifted slightly, so relieving the tension in the brake band. This type of brake is used in a number of Meccano cranes and similar models, where the continual pressure that it exerts may be employed to overcome any tendency of "back-slip" in the shaft secured to the Pulley.



S.M. 82

S.M. 83—Strap and Lever Brake

This is a type of strap and lever brake adapted to the Meccano Motor Chassis. A short cord 2, passing round a 1½″ Pulley Wheel secured to the back axle 1, is tied to the round hole of the Crank 3 carried from a shaft 4. This Crank 3 is connected to another Crank 7 by means of a cord 6, and the Crank 7 is bolted to a short Rod secured at right angles to the foot of the hand lever 5. It will now be seen that the grip of the cord 2 about the 1½″ Pulley may be increased on moving the lever 5; this gradually checks the rotation of the back axle 1. The object of the Crank 3 is to increase leverage on the cord 2.

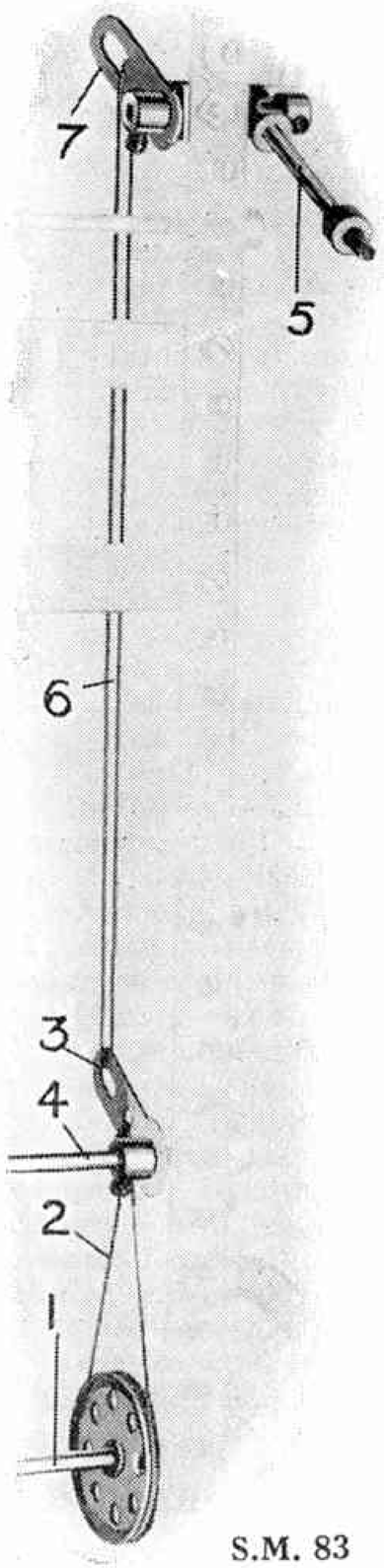
When fitting this brake to a Motor Chassis, or similar model, a further Crank corresponding to that shown at 3 should be secured to the shaft 4 and caused to impart a retarding effect on the other end of the back axle 1 by the same means as that already shown (i.e. cord and 1½″ Pulley).

S.M. 84—Pawl and Ratchet Wheel

S.M. 84 illustrates the standard Meccano Pawl and Ratchet Wheel gear, which allows the shaft carrying the Ratchet Wheel to rotate in one direction only. The advantages of such an arrangement are obvious, especially when attached to model Cranes, hoisting-tackle, etc., where the Pawl and Ratchet gear prevents falling-back of the load as it is hoisted.

It is sometimes found advantageous to apply slight pressure on the Pawl—by means of a spring or weighted lever—to ensure its engagement with the teeth of the Ratchet Wheel.

The Pawl may be used also to impart motion to the Ratchet Wheel. For this purpose, the Pawl should be attached to a suitable lever which oscillates about the ratchet shaft. Thus, on every forward movement of the lever, a short rotary motion is conveyed through the Pawl to the Ratchet Wheel, but the latter remains stationary during the return stroke.



S.M. 83

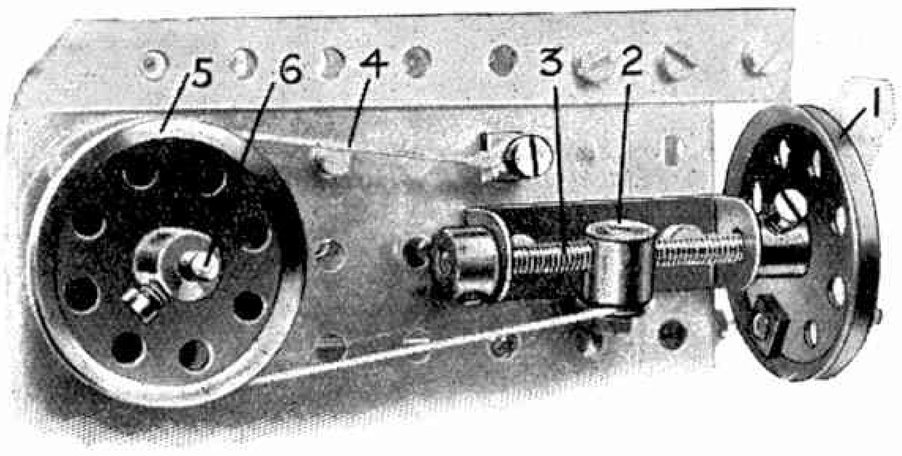
S.M. 85—Strap and Screw Brake

The brake in this case is similar to those described in the first three examples, except that it is controlled by a screw adjustment in place of a lever.

Rotation of the hand-wheel 1 causes the Threaded Boss 2 to travel in either direction along the Threaded Rod 3, thus diminishing or increasing the grip of the cord 4 engaging the Pulley 5, which revolves with

the driven shaft 6.

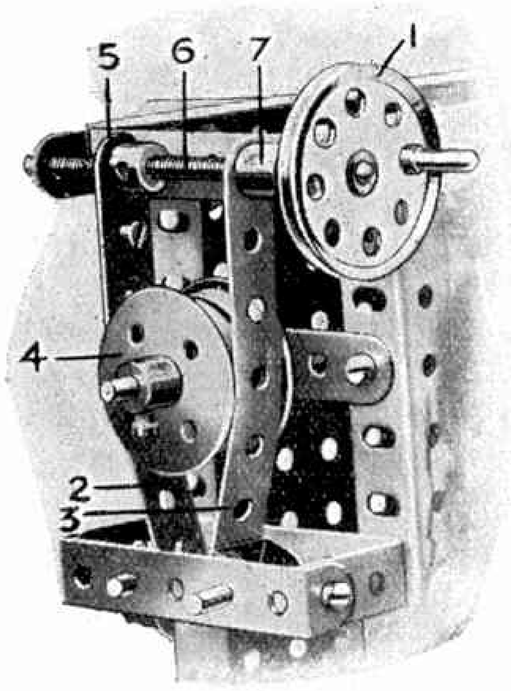
An advantage of this brake is that the speed of the shaft 6 may be varied as required, or the pressure of the cord 4 altered to meet different loads; the grip of the cord 4 about the Pulley 5 cannot vary when once set unless the hand-wheel 1 is turned.



S.M. 85

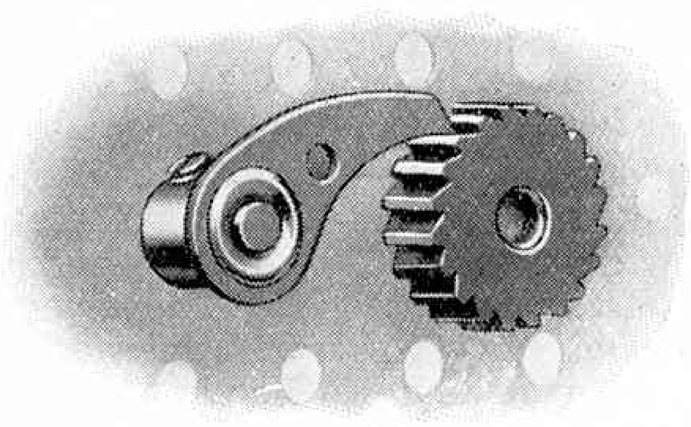
S.M. 86—Screw-Operated Double Band Brake

S.M. 86 shows an efficient type of brake which should prove useful in many Meccano models. The speed of the mechanism which it controls may be varied to accurate degrees and when fully contracted it forms a powerful and rigid brake.



S.M. 86

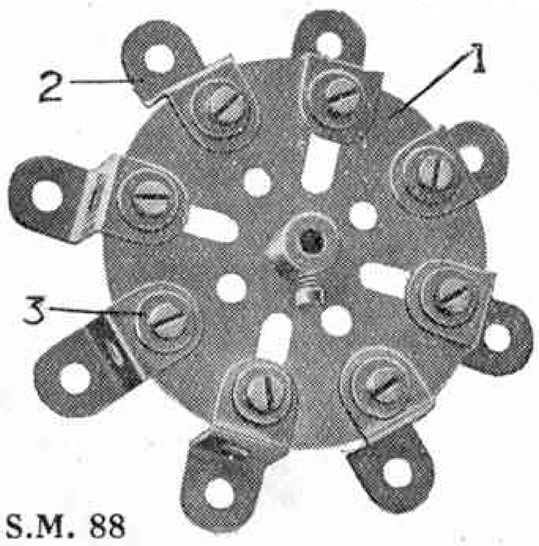
Rotation of the hand-wheel 1 brings together the brake bands 2 and 3, thus applying a firm grip on the drum 4 formed from two Flanged Wheels mounted on the driven shaft. The Strip 2 is bolted to a Threaded Crank 5 engaging the Threaded Rod 6 of the hand-wheel, and the Strip 3 presses against a Threaded Boss 7. The Threaded Boss revolves with the Rod 6, to which it is locked by means of a nut also mounted on the Rod 6 and screwed tight against the outer end of the Boss. The Rod 6 should be allowed sufficient play to move to and fro in its bearings as the brake bands contract or open. The brake bands are bolted at their lower ends to Double Brackets pivotally carried on $1\frac{1}{2}''$ Rods. They may be lined with leather or other material at the points of contact with the brake drum, although such a lining is not essential in the Meccano model.


S.M. 84

S.M. 87—Centrifugal Governor

S.M. 87 illustrates a common form of engine governor which depends for its operation upon the centrifugal force exerted by two rapidly revolving weights.

The weights 1 are carried on $1\frac{1}{2}''$ Strips 2 pivotally connected to a Bush Wheel 3 secured to the vertical Rod 4, and to another Bush Wheel 5 sliding freely upon the Rod 4. This Rod is driven by any suitable method from the engine or motor; as the speed at which it rotates increases, the weights 1 fly outward, with the result that the Bush Wheel 5 moves up the Rod 4, the extent of the movement varying according to the velocity of the engine.

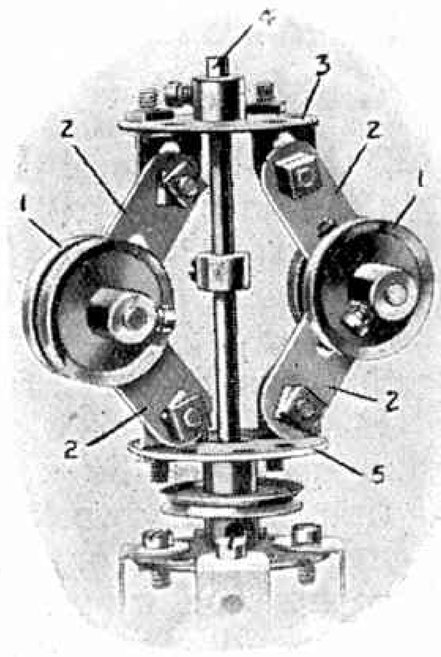


S.M. 88

The movement of the wheel 5 is employed to gradually apply a brake or some other retarding contrivance, so preventing any tendency of the engine to "race." In the case of a steam engine, the governor is caused to enlarge or diminish the steam inlet as the Wheel 5 descends or ascends, and thus maintains the engine at a constant speed.

S.M. 88 and 88a—Clock Escapement

The commonplace yet very ingenious contrivance by which the speed of clock mechanism is controlled forms an interesting subject for a Meccano model. S.M. 88 illustrates the escapement wheel, and S.M. 88A the pallets and crutch, from the Meccano Clock. The escapement wheel consists of a Face Plate 1, to which are attached eight $\frac{1}{2}''$ Reversed Angle Brackets 2. Washers 3 are placed beneath the heads of the bolts to ensure that the Brackets 2 are held very rigidly in place.



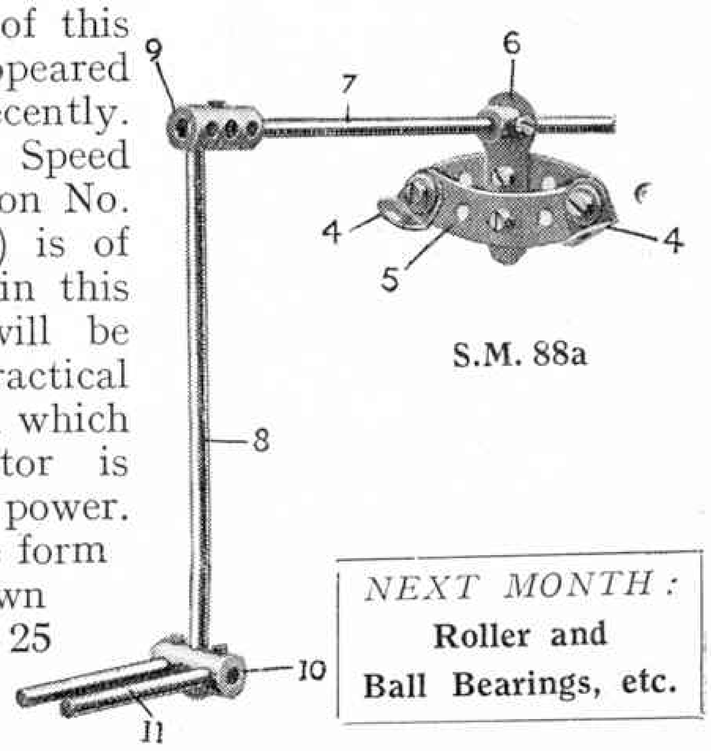
S.M. 87

The pallets are formed from Angle Brackets 4 bolted to the crutch 5, which consists of two $2\frac{1}{2}''$ reversed Curved Strips bolted one on either side of the web of a Crank 6. The latter is bolted on a 6″ Rod 7, and a 5″ Rod 8 is secured in a Coupling 9 on the end of the Rod 7. At the lower end of this 5″ Rod is a Coupling 10 carrying two 2″ Rods 11.

The escapement 7 is mounted pivotally in the Clock case just above the escapement wheel, and the pendulum, suspended from a suitable pivot, passes through the fork 11. As the pendulum swings to and fro the crutch 5 rocks about its axis, so allowing the pallets 4 alternately to release a tooth of the escapement wheel 1.

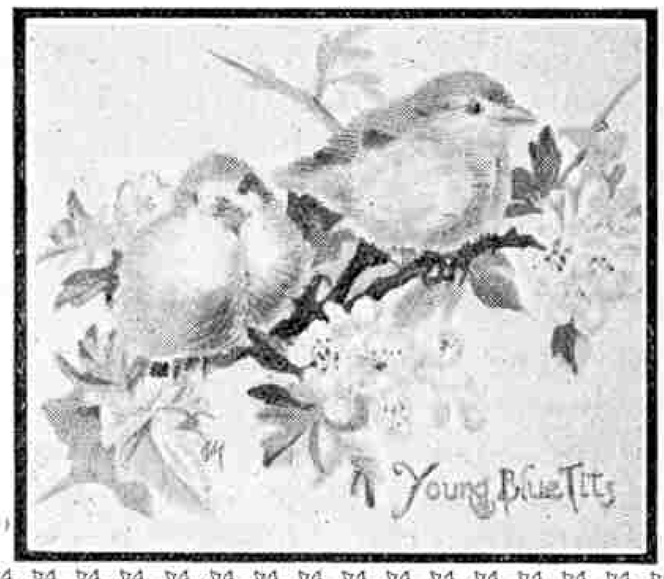
Other Meccano Brakes

There are many other methods of constructing Meccano brakes and retarding appliances, but some of these are only applicable to certain types of models, and therefore their inclusion in Meccano Standard Mechanisms is not justifiable. We would draw our readers' attention, however, to one or two appliances of this kind that have appeared in the Magazine recently. The Automatic Speed Governor (Suggestion No. 29, April "*M.M.*") is of particular interest in this connection, and will be found of great practical use in all models in which a Clockwork Motor is employed to impart power. Also, a very simple form of brake was shown in Suggestion No. 25 in the March issue.



S.M. 88a

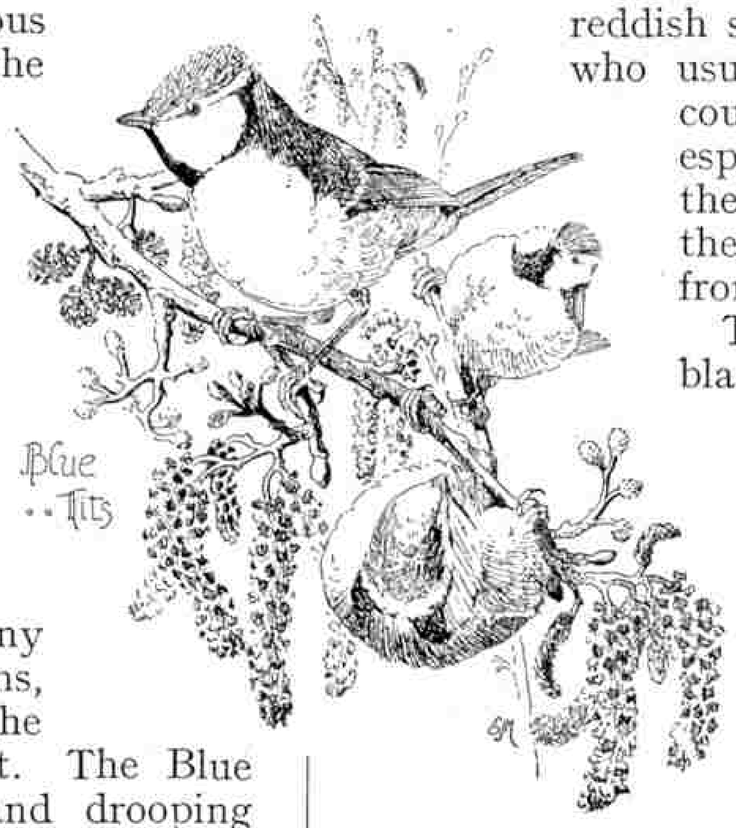
NEXT MONTH: **Roller and Ball Bearings, etc.**



A Family of Acrobats

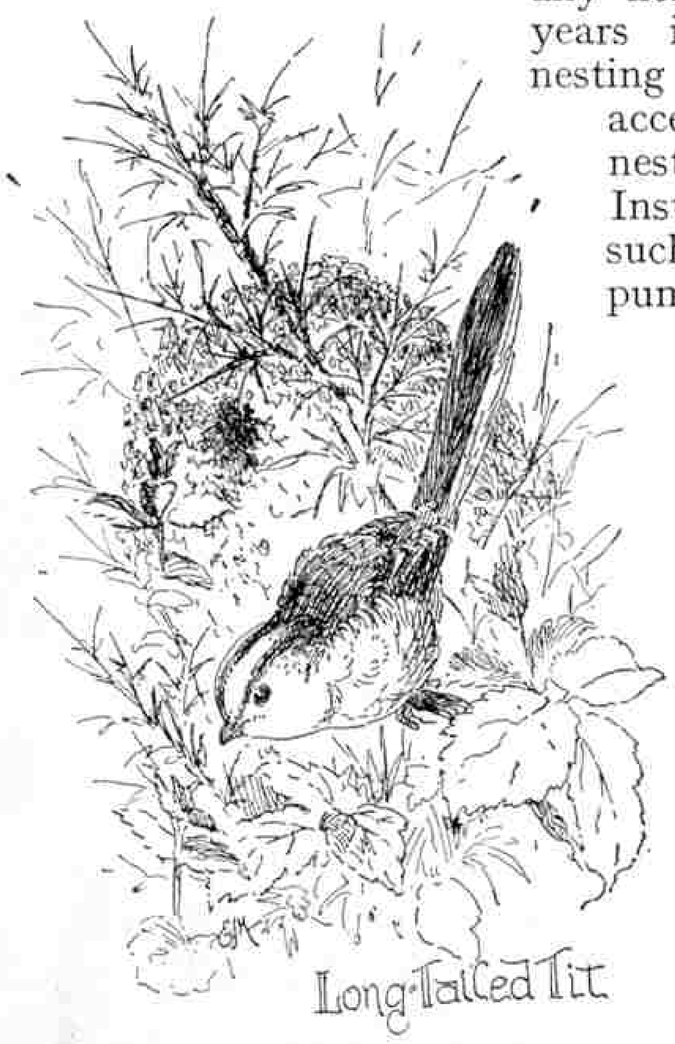
by Eric J. Helsby

WE have all heard of the marvellous balancing feat performed by the famous Blondin over Niagara Falls, but this feat was not more wonderful than the acrobatic and balancing performances carried out every day by the spider on her tight-ropes, monkeys among branches of trees, and last but not least, Titmice, sometimes called "monkeys in feathers."



It is a delight to witness the acrobatic skill displayed by a little company of Titmice as they work along a hedgerow, lightly tripping or flitting among the branches and twigs, placing themselves any way up and in the utmost variety of positions, while rapidly yet carefully searching for the insect food on which they chiefly subsist. The Blue Tit will quickly investigate the buds and drooping catkins as it proceeds along an alder spray, which hangs lower and lower as the bird works towards the outermost tip and, after clinging suspended for a moment to utter its "tinkle-tinkle-tinkle," hurries away to join its companions.

The azure crown and dark streak through the eye distinguish the Blue Tit from the Great Tit, the latter having a black head and breast-stripe. Both birds are green above, sulphur-yellow beneath, and have blue wings and tail and white wing-bar. Almost any hole serves, often many years in succession, for a nesting place, and no bird accepts the offer of a nesting box more readily. Instances of curious sites, such as letter-boxes, hats, pumps, etc., are numerous. We know of one pair of "Blues" who, having access through an open window, built their nest and reared their young in an overturned jam-jar that lay on a pantry shelf!



The nest is composed of dried grass, moss and feathers. Usually about seven—sometimes many more—eggs are laid, white with light reddish spots, a favourite pattern with Tits, who usually have but one brood and are courageous parents. The Blue Tit especially will bite fiercely if taken in the hand and boys who have poked their fingers into likely holes call it, from sad experience, "Billybiter!"

The Coal and Marsh Tits have black heads, but the Coal has a conspicuous white nape-spot not possessed by the Marsh. The latter, which is found also in woods, is brown and grey above with dull white underparts.

The Coal Tit, whose diet consists mainly of beech, oak, larch and other woodland seeds—which other tits also take—is said to hide food sometimes, like the squirrel, in various crannies in trees for use in times of scarcity. For a nesting site he prefers a chink in a willow bole or the burrow of a small animal.

The Marsh Tit, in addition to insects, takes thistle and other seeds, and to the soft materials of his nest, found usually in a tree trunk, willow down is often added. There are usually from five to nine eggs and sometimes second broods. Mr. Richard Kearton, the well-known ornithologist and bird photographer, gives an interesting description of the domestic life of the Marsh Tit:—

"Close by we discovered a Marsh Tit's nest, containing a huddling crowd of almost fully-feathered fledgelings, situated in a hole in the trunk of a tree, and not more than four feet from the ground. The male and female were both hard at work feeding their young ones. They always went away for food together and returned in each other's company with a harvest of small, light-green caterpillars. If they became separated for a moment, they called to one another in notes which could be heard at a surprising distance. When near the nest and waiting to

enter it, they let their wings droop low by their sides, and shook them in the tremulous manner so common to young birds of many species when being fed after they have left the nest. I have noticed the same habit in other members of the Tit family."

It is interesting to note that Mr. Kearton says there is every reason to believe that Tits, along with Pheasants, Partridges, Grouse, Eider Ducks and Wrens, occasionally lay their eggs in the nests of other birds of their own species.

The tiny, fluffy Long Tailed Tits, which feed almost entirely on insects, are well concealed as they roam through the trees in small parties or families. The bird usually selects a gorse or other bush in which to build its home, a masterpiece of British nest construction that occupies both sexes for about a fortnight. It is compacted of soft fibrous materials closely felted together with spider-silk, decorated with light and dark lichens and lined with a great quantity of feathers. The pretty youngsters number eight or more.

There are also Willow, Crested and Bearded Tits, but these are rarer members of the family.

The calls of Titmice are characteristic, consisting of repetitions of one or two notes, with variations having different meanings and also pretty trills.

The Blue Tit, besides its "tinkle," has a quavering "tsee-tsee-oo-oo-oo-oo-tsee-tsi." The great Tits "teacher-teacher," reminiscent of a squeaky cycle pump, is varied by "tiffli-tiffli, chivili-chivili," and a rapid "toorle-oorle-oorle-oorle-eeseez-eeseez-eeseezi." It has also the Chaffinch's "pink! pink!" The Coal Tit's call is a soft, clear "iffee-iffee," and that of the Marsh, "cheevi," while the Long-Tailed Tit has a thin "zi-zi-zi." After careful observation it is possible to recognise each species by its notes, in spite of the variations.

Young Tits are much like their parents, only duller in colour, and are fed entirely upon insects. In order to appreciate rightly the services of Titmice and other birds in checking insect pests, we must realise the needs of a growing brood and the rate at which insects multiply. The damage done to fruit tree buds is on the whole negligible. Many useful insects are taken with the harmful ones, however. We have also watched Blue Tits hunting along the eaves of cottages for spiders.

Winter is perhaps the best time to observe the Titmice, for then they are not so easily concealed by foliage. Food is less plentiful, and if we hang a piece of suet or a nice bone in a suitable position in the garden, near a window, we shall not have to wait long for a free acrobatic entertainment. Many other birds besides Titmice may be attracted to our gardens and thus give us an excellent opportunity of studying them at close quarters and, if we have cameras, of obtaining a series of interesting photographic records.

Feeding the Birds

In order to secure regular visits from our bird friends it is only necessary to provide a regular supply of food every day at the same place. The selection of the "dining table" requires a little thought. A wide window ledge may be used, but it is not very satisfactory because movements of people inside the room are apt to frighten the birds away or at least make them nervous and "jumpy." Perhaps the best method is to make a rough sort of table, consisting merely of a board fixed on top of an upright, and place this in such a position as to secure an uninterrupted view from a convenient window.

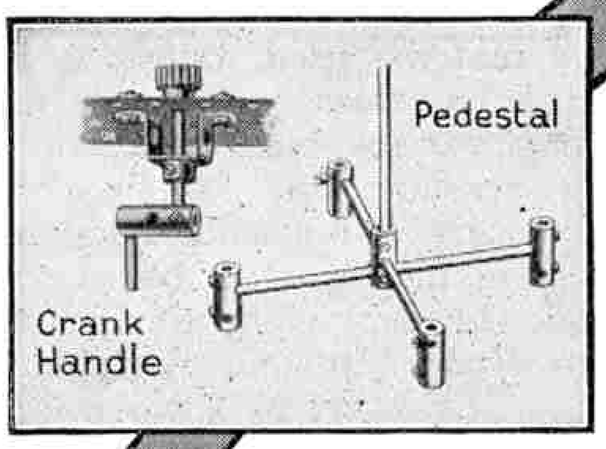
There appears to be a common impression that birds can be attracted only in winter when food is scarce. It is quite true that winter is the best time, especially for the shyer and less common birds, but if the little "dining table" is kept supplied with dainties day after day, with unfailing regularity, many birds will form the habit of paying daily visits. In hot summer weather there is nothing birds enjoy more than a bath, and if we provide for them a shallow vessel such as a pie dish, and keep this full of water, we shall derive a great deal of pleasure and amusement from the happy splashing of our little friends.

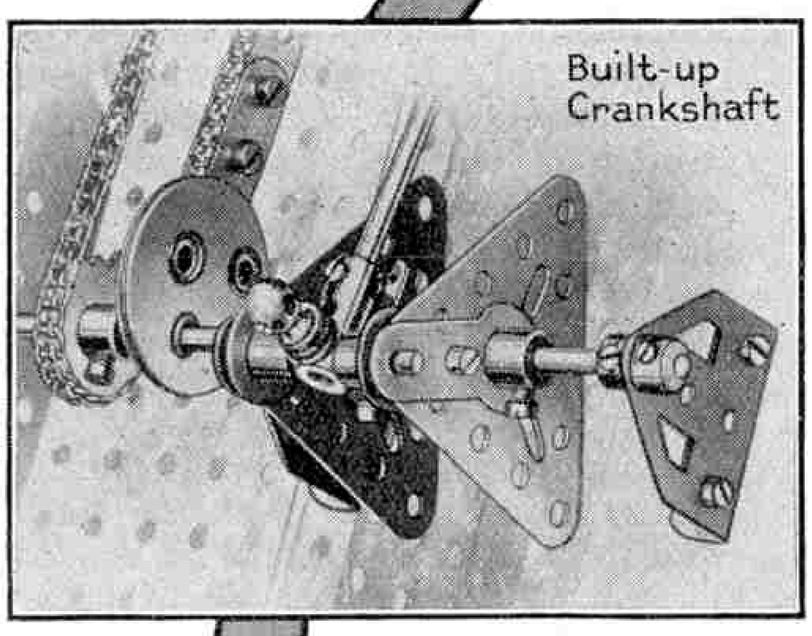
A Chance for the Photographer

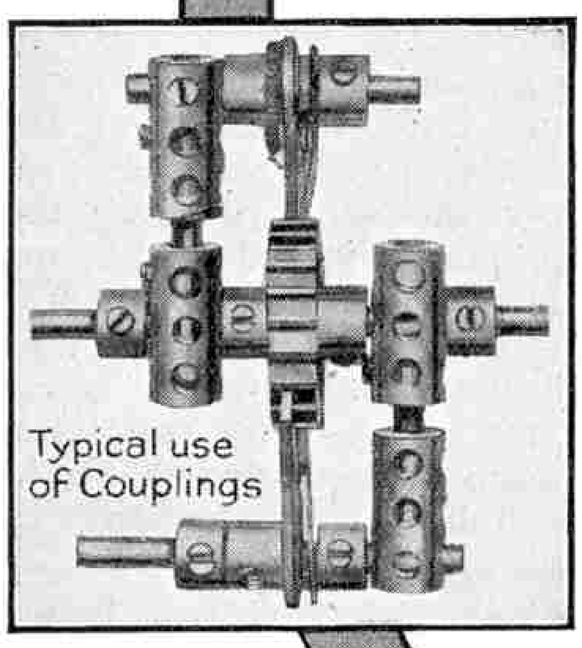
When the birds have grown accustomed to coming regularly for food and have realised that they are quite safe, they take more time over their meals and allow us excellent opportunities of securing their portraits. If the feeding place is sufficiently near the window, and directly in front of it, photographs may be taken through the glass, with the camera inside the room. Regarded from a photographic point of view, window glass is full of imperfections, but provided that the window is clean and that the camera lens is parallel to it, quite good photographs may be obtained. An alternative method is to open the window sufficiently far to clear the camera.

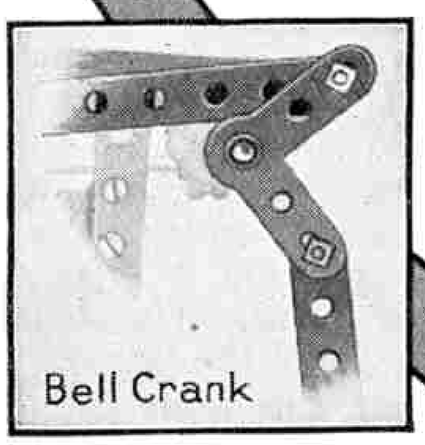
If the camera is to be used outside in the garden it must be screened in some manner, but as a general rule it is not necessary to provide a very elaborate hiding place. The essential thing is to keep the screen always in the same position, so that the birds become accustomed to it and take no notice of it. Unless the hiding place affords complete cover it is best to operate the camera shutter from a distance. This is a troublesome business with some cameras, but the majority of shutters may be worked quite easily by means of a long thread. It is, of course, important to fix the camera firmly in position, otherwise it will move when the thread is pulled to release the shutter, and thus ruin the snapshot. Rapid plates or films should be used.

MECCANO — ENGINEERING IN MINIATURE









MECCANO ACCESSORY PARTS

Cranks, Couplings, etc.

CONSTRUCTING a Meccano model is a fascinating pastime. Piece by piece, you are able to watch it growing beneath your hands. As the Strips fall into their allotted places the whole structure is gradually strengthened. The framework completed, you add the mechanism—Gears, Cranks, Rods, Pulleys, Cords, etc.

Then comes the most thrilling moment of all, when you set the model in motion. Thanks to the accuracy and wonderful adaptability of the Meccano Couplings, Cranks, and other real engineering accessories, the movable portions of the model begin to function exactly as you had intended they should, and exactly as they do in actual practice.

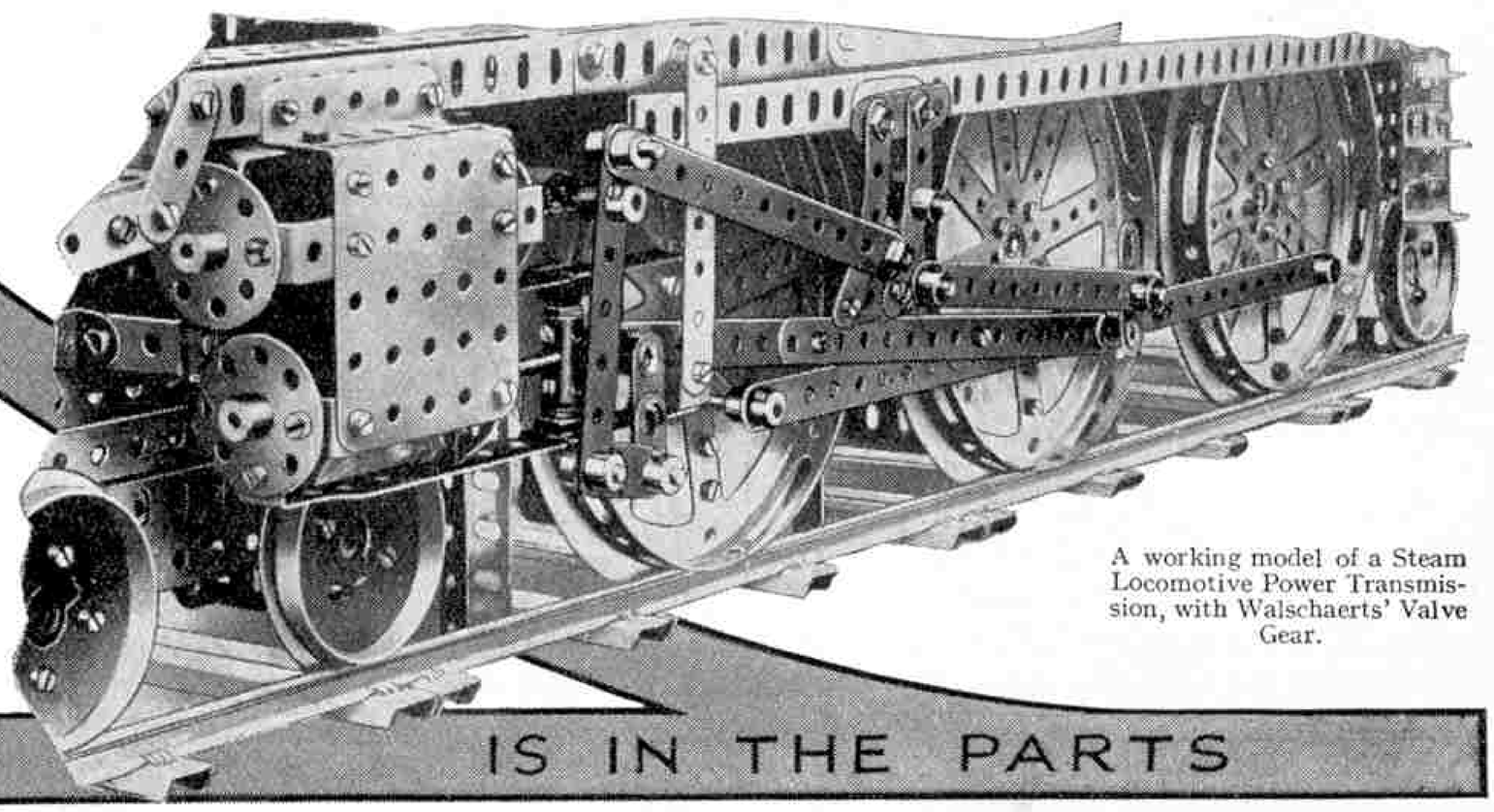
On this page we show a few uses of Meccano Cranks and Couplings, but—as *"M.M."* readers know—the number of mechanical movements that may be obtained with these parts is almost unlimited.

No.			s.	d.
19.	Crank Handles	each	0	3
38.	Washers	doz.	0	1
43.	Springs	each	0	2
50.	Eye Pieces	,,	0	2
57.	Hooks	,,	0	1
57a.	,, (scientific)	,,	0	1
57b.	,, (loaded)	,,	0	5
58.	Spring Cord	per length	0	9
59.	Collars with set-screws	each	0	2
62.	Cranks	,,	0	3
62a.	Threaded Cranks ...	,,	0	4
63.	Couplings	,,	0	6
63a.	Octagonal Couplings ...	,,	0	8
63b.	Strip Couplings	,,	0	8

No.			s.	d.
63c.	Threaded Couplings ...	each	0	6
64.	,, Bosses ...	,,	0	2
65.	Centre Forks	,,	0	2
115.	Threaded Pins	,,	0	2
116.	Fork Pieces	,,	0	3
120.	Buffers, for locos, etc.	,,	0	2
120a.	Spring Buffers ...	per pair	0	8
121.	Train Couplings	each	0	2
127.	Simple Bell Cranks ...	,,	0	3
128.	Boss Bell Cranks	,,	0	4
134.	Crank Shafts, 1" stroke	,,	0	3
136.	Handrail Supports ...	,,	0	3
140.	Universal Couplings ...	,,	0	9
144.	Dog Clutches	,,	0	6

Your dealer will be pleased to show you all the Meccano Parts; ask him for a complete Price List.

MECCANO LTD., BINNS ROAD, LIVERPOOL



A working model of a Steam Locomotive Power Transmission, with Walschaerts' Valve Gear.

THE GENIUS IS IN THE PARTS

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.

A Glimpse of Tasmania

I am sending you a photo showing Lenah Valley road near my home. I daresay you will think it very wild and uncivilised looking, but as a matter of fact it is only about a mile from the electric car route. To reach the spot from the city you take the tramcar at the G.P.O. The car runs north along the main street for about a mile and then westward for another mile, along Augusta Road—a long, wide avenue in which are situated the homes of the more wealthy citizens. At the terminus you walk straight ahead to where the road descends sharply and turns southwards, and rounding a bend you come suddenly into Lenah Valley, a small compact opening between the steep rolling hills.

There are gardens everywhere, and the hills on each side are simply covered with apple orchards, which extend up both sides and along the bed of the valley. There are not more than three dozen houses in the whole valley and these are mostly big modern places. Altogether it is a delightful spot and I only wish I could take a party of "*M.M.*" readers through the valley. What a time we should have—especially if you could come too, Mr. Editor!

A Road Scene in the Lenah Valley, Tasmania
(The Mountain in the distance is Mount Wellington, 4,166 ft. in height)

L. MORRISEY (Hobart, Tasmania).

A Visit to Farnborough Aerodrome

A short time ago I visited the flying ground of the Farnborough Aerodrome. The day was fine and consequently several machines were on the ground. The majority of them were 264 h.p. Rolls-Royce-engined "Bristol Fighters" of various sizes, but there were also a few larger machines among them. On a hill to my left a small gun was firing Very lights, presumably for practice or tests.

Two or three Ford cars fitted with an arrangement for starting the aeroplane engines were travelling about among the machines. This starting arrangement takes the form of an erection above the car and driven by the car engine. This is connected to the boss of the aeroplane propeller and starts up the engine, thus saving a great deal of labour.

The procedure of starting up one of the Bristols is interesting. The machine is wheeled out of the shed to a convenient position and overhauled by mechanics. It is then filled up with petrol, oil and water, the petrol being obtained from a portable tank that is wheeled about to any machine requiring it. The Bristol has two tanks, one immediately behind the pilot's seat and the other under the top wing. The former tank is below the level of the engine and therefore an air pump is necessary to force the petrol from it up to the carburettors. This pump is situated on a strut of the undercarriage and is operated by a small propeller worked by the force of the air.

When these preliminaries are over, pilot and observer get into the aeroplane and take their seats. The engine having been started, the pilot accelerates it to see that it is sound. Before he can do this it is necessary for one man to hold the extremity of the lower wing and for another to hold the tail to keep it down. The latter must keep his back to the exhaust for it is almost impossible to face the dust it throws up. The aeroplane then takes off, circles once or twice, and heads for its destination.

When the machine comes down it is guided by mechanics and enters its shed under its own power. On one machine I noticed a wireless aerial hung from the ends of the lower wing, thus forming a rough triangle.

As I was leaving the ground a small Parnall "*Pixie III.*," such as that described in the July 1925 "*M.M.*," went up and I waited long enough to watch it perform a few "stunts." These machines are easy to handle and many people come to the aerodrome to watch them.

The Royal Aircraft Establishment with its huge airship shed forms an imposing group of factory buildings on the north side of the aerodrome, where all experimental work in connection with the R.A.F. is carried out. A measured distance with timing boxes at each end is provided for testing the speed of machines.

Farnborough may be described as the home of military aeronautics, starting with the R.E. Balloon Coy., and followed by the R.F. Corps. This aerodrome has been the scene of many disasters and fatalities in airship and aeroplane experimental work. At one time man-lifting kites were used for observation purposes under the supervision of Mr. S. F. Cody, who met his death by the crashing of his once famous machine.

W. HARBORD (Epsom College).

Books to Read—(*continued from page* 377)

cruiser, getting clear of her smoke, commenced to hit the enemy severely.

The "*Scharnhorst*" soon lost her second funnel, steam was escaping through the shell-holes that had been made in her hull, and it was seen that she was on fire. Notwithstanding this, she continued to fire steadily and accurately. At 3.40 she had practically no speed, however, and was on fire from end to end. About 14 minutes later she took a strong list to port and, with her flag still flying, rolled over and took a headlong dive, carrying to a watery grave not only officers and men but Admiral Von Spee also. The Atlantic closed over her—not a soul survived. Von Spee met his end and Admiral Craddock was avenged.

The End of the "*Gneisenau*"

Meantime the "*Gneisenau*" was being badly battered by the "*Inflexible*," and shortly after 5 o'clock, with her forward funnel shot away, she was hit by the "*Invincible*." At 5.30, having used all her ammunition including even her practice shells, her guns stopped firing. She had a heavy list to port, was on fire from end to end, and steam and smoke were issuing everywhere. At 6 o'clock she heeled over, and her crew followed their comrades on the "*Scharnhorst*" to an ocean grave.

A Test for the Boilers

Let us now see how the British cruisers fared in their pursuit of the enemy. The "*Glasgow*" drew ahead of the other cruisers and engaged the "*Leipzig*," the "*Kent*" took on the "*Nurenburg*" and the "*Cornwall*" also opened fire on the "*Leipzig*."

The enemy now set a very hot pace, but despite the fact that the "*Kent*" was 11 years old and therefore out of date, and in any case was only designed to do 22 knots, she performed the amazing feat of steaming at 23 knots in pursuit of the "*Nurenburg!*"

Admiral Craddock Avenged

We can well imagine the exciting scene on board as the British stokers, determined to avenge their shipmates in the crews who were wiped out with Craddock, piled more coal on to the furnaces than had ever been dreamed of by the boiler-designers! The boilers withstood the terrific demands upon them, but coal ran short, and then every scrap of wood that could be gathered from any part of the ship, and indeed anything that would burn, was thrown down into the stokehold and piled on to the fires. At last, with her furnaces red hot and her boilers at bursting point, the "*Kent*" came within range of her rival and opened fire about 5 o'clock in the evening. Although it was dusk, firing continued until darkness fell, by which time the amazing speed of the "*Kent*" had reduced the range to between 2,000 and 3,000 yards. So far as the "*Nurenburg*" was concerned, the game was up. At 6.35 p.m. she was on fire, her guns were out of action, and in less than an hour she sank.

Meanwhile the "*Cornwall*" had opened fire on the "*Leipzig*." In three hours' time she, too, was on fire, and about 9 p.m. she heeled over and sank.

The "*Dresden*" unfortunately escaped, steamed through the Straits of Magellan and then made for the island of Juan Fernandez—famous as the abode of Robinson Crusoe—where she remained, out of the war.

Thus, by Admiral Sturdee's masterly tactics, by the brilliant work of his officers and the dogged determination of the men who served under them, Von Spee's squadron was destroyed and the seas were left clear for the transport of food, munitions and troops for the Allies.

Interesting New Books

We hope to deal with the undermentioned books in an early issue.

"BROADCAST RECEPTION"
by J. L. Pitchard (Messrs. Chapman & Hall), 8/6 net

"THE SOUTHERN RAILWAY"
by G. E. Mitton (A. & C. Black Ltd.), 2/6 net

"CHATS ON SCIENCE"
by E. E. Slosson (G. Bell & Sons), 6/-

"THE RED HOUSE OF BOVILLE"
by H. Elrington (Nelson), 5/- net

"MY FRIEND TOTO"
by Cherry Kearton (Arrowsmith), 5/- net

"HALF HOURS WITH THE TELESCOPE"
by R. A. Proctor (Longmans, Green & Co.), 5/- net

"STRUCTURAL STEEL WORK"
by Aitkin (Chapman & Hall), 9/6 net

Radio Sets Built Like Meccano

The Blackadda System of Radio construction is one we can heartily recommend to all readers interested in the fascinating hobby of building their own radio sets. The system of standardised components, connecting wires and nuts and bolts of only one diameter makes for simplicity and ease of construction in a remarkable degree. The Bakelite panel on which the parts are mounted is drilled with equidistant holes and all the parts—crystal detectors, coil holders, transformers, valve holders, etc.—are equipped with two or more threaded bolts set at the same centres as the holes in the panel. Thus, as every hole in the panel is numbered, it is delightfully easy to follow the makers' instructions.

The possibilities of the system are practically unlimited and anyone who can read can construct by means of it anything from a simple crystal set to the most elaborate valve sets. Just as one can take a Meccano model to pieces when one is tired of it, so with the Blackadda system one can build radio sets, pull them to pieces, and rebuild them again. We ourselves constructed a crystal set from the makers' instructions in less than half an hour, the only tool used being the box spanner provided with the set. We then tested our handiwork and within ten minutes picked up Liverpool, Manchester and Daventry.

Another interesting point is that, as the holes in the panel are of the same size and at the same centres as the Meccano equidistant holes, wireless apparatus can be built into Meccano structures.

We strongly recommend those readers who are interested to obtain full particulars from the makers, The Blackadda Radio Company Limited (48, Sadler Gate, Derby), whose advertisement will be found on page 390.

Compressed Air for Driving Models

The builder of model boats and aeroplanes is always faced with the difficulty of providing them with a suitable motive power. Owing to the small size of such models it is essential that the power element should be light, and within the possible weight limits it is extremely difficult to crowd an engine having the necessary power. This admittedly serious problem is solved by the use of compressed air plant, which is clean, costs nothing, is so simple as to be really "foolproof," and has the further great advantage of being free from the danger of fire. As regards lightness it is ideal, and in the case of boats the buoyancy of the air container will save the situation in circumstances when a boat with any other motive power would almost certainly sink.

The interesting catalogue issued by The D.A.P. Model Aero and Engineering Company (185, Replingham Road, Southfields, London, S.W.18) contains particulars of some exceedingly interesting compressed air plants designed specially for the driving of models. In addition there are described and illustrated motorboats and various types of aeroplanes ready fitted with compressed air engines. Finally, this well-produced catalogue illustrates some remarkably ingenious air-driven motor vehicles for children; elastic-driven aeroplanes, and a great variety of parts and accessories for model construction.

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

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

J. A. Woodward (Chesterfield).—Your proverb for Meccano competitors, "Nothing venture, nothing win," is quite sound, and certainly expresses the right spirit for entering these contests. We know quite a number of proverbs, too, and they are very useful at times, but they have a nasty habit of getting mixed up, sometimes with comical results!

Jack Moore (Brisbane, Australia).—A Meccano Club in Brisbane should be very successful, Jack, for we have many young friends in your part of the world. We hope that you will soon succeed in securing a satisfactory Club-room, so that your Club may be affiliated with the Guild.

O. Beeston (London, N.)—Judging from your description of the condition of your inner tube, we should say that the rubber is perished and not worth bothering about. If you use it you will have continual trouble and it is far better to fit a new tube now.

W. James (West Kirby).—The two brakes on a bicycle should work independently and either should be capable of stopping the machine.

Michael Bosc (London).—Your greeting card to Mr. Hornby was very much appreciated, Michael, and your birthday good wishes are heartily reciprocated. Unfortunately, your card did not give your school address, or Mr. Hornby would have acknowledged it personally. Perhaps you will send your address along.

C. Jones (Birkenhead).—

"There was a young boy of Locarno
Who played with his set of Meccano
He borrowed a pot and burned the whole lot
Though he never dare let his dear Ma know."

We must congratulate you, Clifford, upon being one of the few boys who have been able to find two really good rhymes to the word Meccano, and for this reason we must certainly print your limerick.

S. Lennox (The Bield).—We have received several interesting letters from you each one bearing the address "The Bield." We have written to you several times at this address but it is obviously insufficient as all our letters have been returned by the Post Office. Please write again soon giving us your full address.

A. T. Welford (London, W.3).—"My No. 1 Hornby Engine, though it is four years old, and has been dropped in a fountain and left out in the rain, has had only 3/6 spent on it on repairs and runs as well as ever!" If you had wrapped it up in cotton wool and brought it up on Glaxo you could scarcely expect better results, could you?

I. Shamah (Jerusalem).—Patent medicines do not improve your memory. If we knew of a really good memory "lotion" we would certainly have our office sprayed with it three times a day!

Gracie Hall (Glenageary).—"I think the Meccano brooch is a very good idea for the girls." Strangely enough so do we, Gracie! Your interest is appreciated and we hope that you passed your music exam. with flying colours.

J. Eve (North Ockendon).—Having been a Meccano boy for 5 years you should have joined the Guild long ago. However, we are glad that you have discovered the error of your ways at last, and wish you a long and happy connection with the Guild movement.

F. C. Brown (Wallington).—"I shall go on taking the "*M.M.*" until I am well over 70!" Of course, F. C.! In fact we expect you will be just starting really to enjoy it by then! Personally, we hope to carry on our editorial activities until we are well over 90!

J. King (Niton, I. of W.)—We had heard about the road-slip, and are pleased to hear that you were not on the road at the time. No doubt you will be glad when the new road is finished. Your enthusiasm for Meccano is appreciated and we are interested to learn that you also have a fine collection of foreign stamps.

Jack Pickin (Dayton, Ohio).—Your Auntie is very kind to send you the "*M.M.*" regularly. We note that you enjoyed your visit to the Meccano Factory and your meeting with Mr. Hornby. Your message was passed on and we are asked to convey Mr. Hornby's cordial regards. So you saw no less than eight whales during your journey—some people have all the luck, Jack!

Competition Page

CRICKET FORECASTING CONTEST

The Six Champion Counties

Interest in the national summer game, cricket, shows no sign of waning, and indeed, if one may judge from the amount of space devoted to the game in the columns of our newspapers, enthusiasm is greater than ever. The first-class county cricket programme is, of course, somewhat overshadowed this year by the Test Matches, but none the less we are all eagerly watching the progress of the championship. It is very interesting to try to forecast the results of the cricket season and this month we are introducing a "Cricket Forecast" Competition.

Competitors are required to forecast the counties that will occupy the first six places in the championship table at the end of the season. No percentages or points are to be given, but only the names of the six counties chosen, placed in the order in which the competitor thinks they will finally arrive.

The forecasts must be written on postcards addressed "Cricket Competition," Meccano Limited, Binns Road, Liverpool. The only other written matter to appear on the card is the name and address of the competitor. No competitor may submit more than one entry.

Cash prizes of £1 1s. 0d., 15/-, 10/6 and 5/-, will be awarded respectively to the four most accurate forecasts.

Closing date 30th June.

Fifteenth Drawing Contest

During the past few months our drawing contests have covered almost every phase of transport, and this month, continuing the series, we announce as the subject of our 15th Drawing Contest, "An Airship In Flight."

The various illustrations of airships published recently in the "*M.M.*" will be found extremely useful, especially by competitors who have never seen an airship in flight. It should be remembered, however, that original efforts will receive preference over mere copies from illustrations.

Prizes of drawing or painting materials (or Meccano Products if preferred) to the value of £1 1s. 0d. and 10/6 respectively will be awarded to the first and second prizewinners in each of the usual two sections, A for those of 16 and over and B for those under 16.

Closing date, 30th June. Overseas, 30th October.

Overseas Essay Contest

"From My Window"

We were greatly impressed the other day by an Overseas reader's account of the view from his window and it occurred to us that it would be interesting to have similar descriptions from other readers in Overseas countries. We are therefore announcing a contest, *open to Overseas readers only*, for the best essays of not more than 500 words describing "The View From My Window." We wish it to be understood that it is the descriptive value of the essay that will count, and that readers who have uninteresting views will suffer no handicap as compared with those who are more fortunate in this respect.

There will be two sections, A for readers of 16 and over and B for those under 16. Prizes of Meccano goods to the value of £1 1s. and 10/6 respectively will be awarded to the best and second-best entries in each section.

Essays must be written on one side of the paper only and must be marked :—"Windows' Contest."

Closing date : 30th October.

Results

April "Sharp Eyes" Contest

The popularity of this type of contest is amply demonstrated by the steady flow of entries. Owing to the Overseas section still having a month to run, it is not desirable to make much comment on the entries, but it may be said that many competitors lost points by marking as missing, various details that could not be seen from the viewpoint from which the drawing was made.

Prizes of Meccano Products to the value of £1-1s., 15/-, 10/6 and 5/- respectively, have been awarded to W. S. Whitehead (Berkhamstead) ; D. Macdonald (Epsom) ; B. Murphy (Dove, Nr. Sheffield) ; E. White (Worcester).

Fourteenth Drawing Contest

Generally speaking, the drawings submitted were of excellent quality, but in each section the winners stood out prominently above the other competitors.

Section A—First Prize, W. B. Heathcote (West Bridgford) ; Second Prize, F. Herriott (Peebles). Section B—First Prize, W. Bryan (Manchester) ; Second Prize, H. Coble (Westcliff-on-Sea).

Competition Closing Dates :

HOME	
Cricket Competition	30th June
Fifteenth Drawing	30th June
Twenty-Seventh Photographic	30th June
OVERSEAS	
Twenty-Third Photographic ...	30th June
Thirteenth Drawing	30th June
First Sharp Eyes	30th June
Twenty-Fourth Photographic	31st July
March Essay	31st July
Second Sharp Eyes	31st July
Twenty-Fifth Photographic ...	31st July
Fourteenth Drawing	31st July
Third Sharp Eyes	31st August
Twenty-Sixth Photographic ...	30th September
May Essay	30th September
Fourth Sharp Eyes	30th September
Twenty-Seventh Photographic	30th October
From My Window Essay ...	30th October
Fifteenth Drawing	30th October

Watch the Closing Dates :

Competitors, both Home and Overseas, are particularly requested to make a careful note of the closing dates of any competitions for which they intend to enter. Week by week we receive entries for various competitions that have been closed for some time. Some of these entries are excellent and it is a pity for competitors' good work to be wasted on account of losing sight of the closing date.

Overseas Results

Cover Voting Contest

The voting in this contest was exceedingly heavy and, as was to be expected, the winning entries were very close in order of merit. No competitor succeeded in giving a completely accurate forecast of the result but five competitors made only one mistake. The correct list is as follows :—December, September, June, April, May, October, January, November, March, February, July and August. It will be seen that this order is the same as that in the Home Section with the exception that the positions of June and April are reversed.

First Prize (£1-1s.), Anand Kunvar (Delhi, India). Second Prize (15/-), H. R. Brookes (Auckland). Third Prize (10/6), R. Lang (Cottesloe, West Australia). Fourth Prize (5/-), G. D. Shah (Ahmedabad, India). Consolation prizes of Meccano Spring Back Binders have been awarded to P. V. Ramachandra (Bangalore, India) and B. K. Choksi (Karachi, India).

Most Difficult Puzzle

The voting in this contest was as follows :—161 ; 152 ; 150 ; 153 ; 158 ; 155 ; 160 ; 157 ; 154 ; 159 ; 156 ; 151, and the special prize of £1-1s. is awarded to W. F. Kaler (Otago, New Zealand).

December Essay

Section A—First Prize, R. White (Bulawayo, S. Rhodesia) ; Second Prize, Ralph Garcia (Trinidad, B.W.I.) Section B—First Prize, James Welch (Johannesburg) ; Second Prize, B. Osborne (N. Sydney, N.S.W.)

Christmas Painting Contest

There was a very large entry for this contest and many striking and original Christmas card designs were submitted. Section A—First Prize, E. Bonnici (Malta) ; Second Prize, V. R. Heeramanech (Bombay). Section B—First Prize, T. MacLachlan (Dunedin) ; Second Prize, N. Simpson (Sydney, N.S.W.)

Best Match Puzzle

The prize of £1-1s. is awarded to Desai Seavax Franji, India.

Loco Parts

First Prizes. Hornby Train goods to the value of £1-1s.

Section A : H. Best, Johannesburg ; Section B : C. O. Nanton, Trinidad.

Second Prizes. Hornby Train goods to the value of 10/6.

Section A : R. Delaney, Sydney, N.S.W. ; Section B : W. J. Hornidge, Victoria, Australia.

The Secretary's Notes

Club Magazines

From time to time I have urged in these columns the value of Club Magazines as a means of securing additional publicity and at the same time increasing the interest of members. During the past twelve months I have been greatly interested to observe the tendency among clubs to run a magazine of some kind, however small it might be. One of the first club magazines that came to my notice was "Strips and Cranks," the excellent little paper that has been published by the Herne Bay M.C. since early in 1924. This Magazine is elaborately prepared and full of interesting reading and illustrations, both serious and humorous, and the appearance of each number is awaited with keen interest by members. Another interesting little paper is published by the Rhos-on-Sea M.C. This magazine makes a speciality of topical touches regarding members of the club, and a series entitled "Who's Who in the Club Room," if not always flattering to the members concerned, is certainly very amusing! Accrington M.C. has revived its magazine and in its new and improved form this should prosper. Other excellent and promising papers have recently been commenced by Diss M.C. and Richmond (Surrey) M.C., the magazine of the latter club being entitled "The Meccano Herald." Sparkhill M.C. is to have its monthly magazine very soon, and an unaffiliated club at Greenfield, near Oldham, is preparing to introduce a magazine in the next winter session.

Indian Club's Enterprise

The only overseas club that so far has established a magazine is the Delhi M.C., India. This paper covers a wide range of subjects, but it invariably includes an important Meccano section and the Meccano Guild spirit is prominent throughout its pages. It has 16 pages of good reading matter, well printed, and appears in an attractive blue cover. Some of the model-building competitions announced in the pages of this magazine are of great interest.

Guild Emigrants

One of the most encouraging features of the Guild is the steady growth in the number of overseas members and Meccano Clubs. Every year a certain number of Guild members leave the British Isles to commence a new life in some distant part of the Empire. Very often it is possible to arrange for such members to be put in touch with clubs or Guild members in the country of their adoption, but in order to do this it is necessary for early information to be sent to Headquarters. In particular I should like to urge all Guild members who contemplate emigration to New Zealand or Australia to let me know as soon as possible. I will then endeavour to place them in communication with the Meccano Club that will be nearest to them, or with Guild members if there is no club within reasonable distance. I shall be glad if Leaders and secretaries of clubs in this country will inform me when any of their members are proposing to emigrate, in order that the machinery of the Meccano Brotherhood may be set in motion to do all that is possible to ensure a warm welcome for its members in their new country.

Models Loaned from Headquarters

The demand for models to be loaned from headquarters for the purpose of club exhibitions increases steadily, and from the reports I receive it is evident that these models attract a great deal of interest and attention wherever they are exhibited. As it is likely that the popularity of these models will increase still further, I wish to draw attention to one or two points in connection with them. First of all, club Leaders and secretaries must remember that I cannot undertake to have a model built and despatched for an exhibition on a particular date unless three weeks' notice is given. If possible, indeed, models should be applied for a clear month before they are needed, so as to allow a safe margin. Another important point is that, when a model is applied for, it should be stated whether electric current is available or not in the room where the exhibition is to be held, otherwise our Model-building Department cannot tell whether to fit the 4-volt or the 100-250 volt electric motor. The final point I wish to emphasise is that models are loaned from Headquarters on the condition that the clubs concerned pay the return carriage, and this should be clearly understood by Leaders and secretaries.

Stamps and Photos

The membership of the Correspondence Club continues its steady rate of increase. I have received recently a number of queries from new members as to whether there is any objection to the exchange of stamps and photographs, and I wish to make it clear that there is no objection whatever, and that in fact I strongly recommend such exchanges. My experience is that the exchange of photographs brings members into closer contact. It is very much easier to write to a boy living perhaps thousands of miles away if you have a photograph of him and perhaps also some snaps of his home and its surroundings.

As regards stamps, many enthusiastic collectors have two or three correspondents in different parts of the world and their exchanges are of the greatest mutual interest and advantage. The exchange of gifts is, of course, on an entirely different footing and is against the rules of the club.

First Club Affiliated

Our photograph shows the President, Leader and Members of Holy Trinity Meccano Club, Barnsbury, London, which has the honour of being the first club to be affiliated with the Meccano Guild. This affiliation took place in 1918, and the steady progress that has been maintained since then is due mainly to the untiring enterprise of Mr. Stuart H. Wilson, Leader, and the keen interest taken by the Rev. S. C. Rees-Jones.

CLUB NOTES

Tenterden M.C.—Recently held its first annual Exhibition in the local schoolroom. Mrs. A. R. Boorman performed the opening ceremony, and spoke highly of the work accomplished by the club and of the educational value of Meccano. The exhibits included working models of Aeroplanes, Motor Cars, Cranes and Windmills, and a Marine Engine model loaned from Headquarters for the occasion. A Meccanograph model attracted much interest, as also did a Motor Chassis and a model of H.M.S. "*Benbow*." Five Hornby Train layouts, with passenger and goods tra ns running continuously, occupied a special section. The Misses I. Groves and M. Whiteman provided pianoforte music. Club roll: 31. *Secretary*: Arthur Nicholls, The Creamery, Tenterden, Kent.

Ilfracombe M.C.—Recent activities include Competitions held in the club room and a successful Concert. On the occasion of the latter, members took the name of "The Gooswell Songsters," and the proceeds realised £4 9s. 5d. A club patron, Mr. Dalling, recently delivered a very interesting lecture on "How Animals Breathe." Club roll: 31. *Secretary*: T. Blackmore, 23, Shaftesbury Road, Ilfracombe.

Robertsbridge M.C.—Was recently affiliated after being in existence for three years. Summer activities include Cycle Runs and Paper Chases, and a Cricket Team is proving very successful. Competitions in Model-building are keenly contested. A Social was organised to close the session and was well attended. Club roll: 28. *Leader*: Mr. R. A. Leonard, Robertsbridge.

St. Marks (London, S.E. 6) M.C.—A regular course of Model-building is maintained, each meeting concluding with games. The Leader, secretary and librarian have been re-elected, with L. Gobey as treasurer. A party visited the headquarters of the British Broadcasting Company recently and the outing proved very interesting. Club roll: 28. *Secretary*: Geo. C. Green, 21, Hafton Road, Catford, London, S.E. 6.

1st Herne Bay Meccano and Hobbies Club.—Games Tournaments are a popular feature and Table-Tennis, Draughts, Dart-throwing and Air-gun shooting are greatly enjoyed. At the close of the session prizes were presented to the successful competitors by Mr. Frank Grey. A fine Exhibition was recently incorporated in the Spring Show of the Herne Bay and District Horticultural Society. The Meccano stand proved a very popular feature of the Show, and press notices were particularly favourable. Two special models, a Horizontal Engine and a Big Wheel, were loaned from Headquarters for the occasion. A fine Hornby Train layout with signals and all accessories caused much interest, and several new members were enrolled. Club roll: 35. *Secretary*: C. W. Russell, 4, Clifton Villas, Herne Bay.

Maryfield (Dundee) M.C.—The Summer syllabus includes Cricket matches and Rambles, and a Cycling Club is being formed. A rally of all members for a business meeting is arranged to take place shortly. Club roll: 34. *Secretary*: S. Smith, 14, Maryfield Terrace, Dundee, Scotland.

Weston-Super-Mare M.C.—Arrangements are now being made for a club Camp. A visit to Cardiff Broadcasting Station is to take place this month, and is eagerly anticipated. Special application forms for club membership have been drawn up and printed, and these, with leaflets explaining the aims and objects of the club, are distributed among intending members. Club roll: 13. *Secretary*: R. B. Nichols, 3a, Royal Parade, Weston-Super-Mare.

Marsh Street Conway (London E. 17) M.C.—The various sections devote their activities to Meccano Inventing, Model-building and Time Competitions, Railways, Library, Fishing, Chess, Stamp Collecting and Photography. A Club Orchestra of ten instruments has been introduced and promises to be highly successful. Competitions are organised in connection with most of the sections, and are keenly contested. Summer activities include Tennis, Running, Cricket, Picnics, a visit to the London Zoo and a day at the Houses of Parliament. Club roll: 50. *Leader*: Mr. J. A. Gandy, 23, Woodville Road, Walthamstow, London, E. 17.

Beccles Excelsior M.C.—Is preparing for an Exhibition of Models to be incorporated in the local Flower Show. In addition to an attractive display of models, members are designing scenery to show them off to advantage. The Leader, Mr. W. C. Watts, purposes to give members a course of lessons in First Aid. Club roll: 24. *Secretary*: B. J. Andrews, 30, Station Road, Beccles.

Rhos-on-Sea M.C.—A recent Exhibition of Models was a great success, being attended by over 150 visitors. The proceeds realised £3 13s. 10d. A portion of this sum was given in prizes to the builders of the winning models, which were decided according to the voting of the visitors, who were asked to write down on slips of paper the numbers of the models they considered best. The models included a Loom, Cranes, Motor Lorries, Drop Hammer, Race Game, Coco-Nut Shie, Liner and Eiffel Tower. The Liner and a Crane model tied for first prize. A large Hornby Train layout occupied a separate room, which was well filled all the time. A printing machine is to be purchased for the club Magazine. Club roll: 24. *Secretary*: G. E. Mellor, "Bradda," Allanson Road, Rhos-on-Sea.

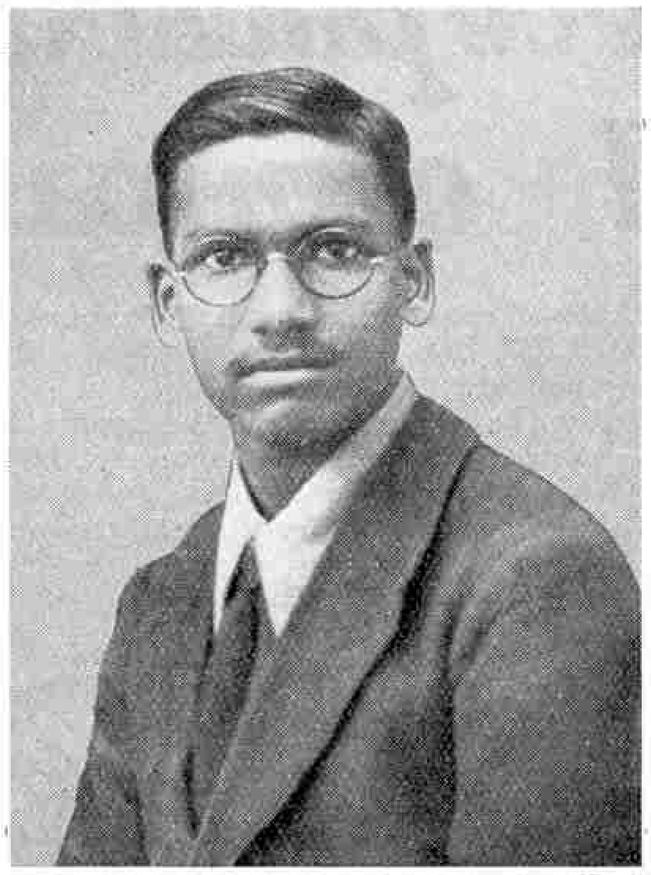
Sandwich M.C.—Interesting activities include Model-building, Games, and a Lecture on South Africa by a patron of the club, the Rev. C. Hutt, which was greatly enjoyed. It is hoped that Mr. Hutt will pay another visit in the near future. Club roll: 21. *Secretary*: W. H. Barlow, 9, Paradise Row, Sandwich.

St. George's (West Ham) M.C.—A successful Exhibition was recently held with a good display of Models, and in spite of bad weather the attendance was good. Valuable assistance was given to the club by the officials of Christ Church M.C. Later in the year it is hoped to arrange another Exhibition on a larger scale. Club roll: 25. *Secretary*: C. Smith, 277, Burgess Road, East Ham, London, E. 15.

Southport M.C.—Good progress is reported and outdoor meetings are being held during the Summer months. Current activities include Sports, Picnics, Rambles and Bathing. Club roll: 18. *Secretary*: W. E. Williamson, 10, Delamere Road, Ainsdale.

Meccano Club Secretaries

No. 6. Mr. R. Raman



Mr. R. Raman is Secretary of the Children's Meccano Club, Delhi, India. This club was founded in May 1924, and affiliated with the Guild in November of the same year. The keenness and enterprise of Mr. Raman and the members surmounted many difficulties that occurred in the earlier stages of the club's career, and the Leaders, Mr. L. Raghubir Singh and Mr. A. P. Mitra, have consistently rendered extremely valuable help. The present flourishing condition of the club is the reward of this united effort.

Greenock Academy M.C.—Meetings are held after school hours on Wednesday afternoon, boys bringing models that have been constructed at home and displaying them in the classroom. The Leader, Mr. John L. Kinlock, M.A., who possesses considerable knowledge of engineering, then explains the mechanism of each model, testing it thoroughly and suggesting improvements. The models are graded into three classes according to the number of the outfit owned by each boy. Marks are given, regularity of production of models being taken into consideration, and prizes are awarded at the end of each session. Club roll: 25. *Secretary*: Ronald Calder, Greenock Academy, Greenock.

Louth M.C.—A Model Fairground held recently proved extremely successful, every member submitting a model. The display included Swing Boats, Flying Chairs, Traction Engines and Steam Horses, and side shows were also provided. A Model Dockyard attracted general interest. Club roll: 15. *Secretary*: H. Bell, 10, Dyas Terrace, Charles Street, Louth.

Accrington M.C.—A Model-building Competition proved very popular, the models entered included a Motor Bus, Titan Crane, and several types of Aeroplane. The Motor Bus model, the entry of the secretary, was awarded first prize. Summer activities include Rambles and Cricket matches. The club Magazine has been revived and promises to be a success. Club roll: 12. *Secretary*: R. W. Rush, 11, King's Road, Accrington.

Harrogate and District M.C.—This club's first Exhibition proved highly successful. The display included a Transporter Bridge, Workshop, several smaller models, and a fine Hornby Train layout. There was a good attendance, many tickets being sold. Club roll: 8. *Secretary*: E. M. Allen, "St. Ives," Pannal Ash Road, Harrogate.

Exeter M.C.—Weekly meetings in the club room are maintained in addition to outdoor activities. The Rowing, Electrical and Cycling sections are growing apace, and special red flags bearing the letters E.M.C. for attaching to bicycles, are to be introduced. The club Orchestra is progressing well, and recently received its first invitation to appear publicly. Club roll: 184. *Secretary*: L. G. Lendon, 72, Old Tiverton Road, Exeter.

Blackpool M.C.—An interesting Lantern Lecture on "Cabinet Making" was delivered by J. Dale. An evening devoted to a Mock Court proved very successful, every prisoner being given chocolates and spanked! Mr. Slingsby, the Leader, was a jovial judge. Club roll: 30. *Secretary*: Maurice Naylor, "Dalesford," St. Annes Road, Blackpool.

Edgeley (Stockport) M.C.—An interesting Summer syllabus is maintained. One night each week is spent in the club room. A long-distance Cycle Race is to be held shortly, and Sports Evenings are greatly enjoyed. Club roll: 12. *Secretary*: E. M. Meadowcroft, 150, Granville Street, Edgeley, Stockport.

Withington M.C.—Model-building evenings are still popular and attendance is good. A successful Exhibition has been held, the models including a Windmill, Gantry Crane, Swivelling Crane, Drawbridge, Swing Bridge, Luggage Barrow, and two "Meccanitians." Outdoor activities include Country Rambles and Cricket. Club roll: 8. *Secretary*: K. Cradduck, 36, Mauldeth Road, West, Withington, Manchester.

Haslingden Secondary School M.C.—Interesting Lectures have been given recently, some of the subjects being "The Romance of the G.P.O.," "The Men Who Gave Us Radio," "Bridges and Bridge Building," and "Fire"—the last being given by the Leader and illustrated with interesting experiments. An electric lantern was loaned to the club recently and the services of a lanternist have been procured. An interesting and instructive address on "Gas Manufacture" was subsequently given by the Manager of the local Gasworks, Mr. Broughton, who invited members to visit the works. A charabanc trip to Meccano Headquarters was arranged a short time ago, and the Leader and members spent an interesting morning in a long tour of inspection, after which light refreshments were provided. Club roll: 30. *Secretary*: Grenville D. Yarnold, Beech Villa, Hud Hey Road, Haslingden, Manchester.

Diss M.C.—A Mock Trial, a Social Evening, and a small Whist Drive have been held with great success. Four models were recently constructed in the club room and afterwards displayed in the shop window of a local Meccano dealer. Club roll: 20. *Secretary*: John G. Maling, 15, Heywood Road, Diss, Norfolk.

Australia

Glenelg M.C.—Is flourishing satisfactorily, and an increase in membership has been effected. A Model-building Competition was recently held, a trophy for the best original model having been offered by Mr. Meggitt, a patron of the club. The competition was judged by the Leader, Mr. Patrick, the prize going to Robert Harris. The Leader has delivered two lectures, which were greatly enjoyed, on "The Steam Engine" and "Books." An Essay Competition on "My Favourite Author" was recently announced, and the first of a series of monthly model-building competitions has for its subject "A Model Railway Station." Club roll: 45. *Secretary*: Keith Holmesby, 96, Partridge Street, Glenelg, S. Australia.

New Zealand

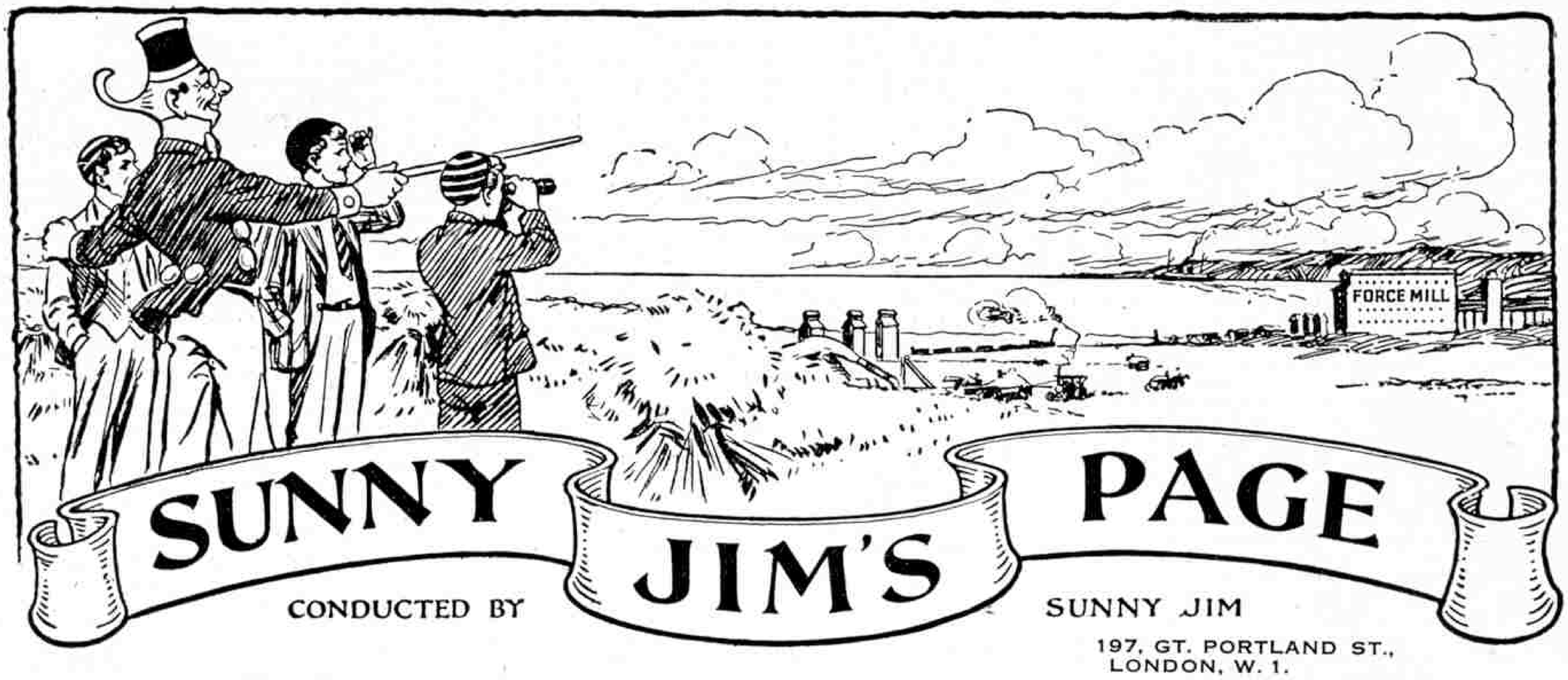
Wiseman's M.C.—Good progress is reported. The club recommenced activities in March and a fine programme was arranged for the opening evening. The first item was the presentation of a Special Merit Medallion to Mr. W. Shearer, the enterprising secretary. The officials of this club take a particular interest in Guild members emigrating from England. Every effort is made to get in touch with them when they arrive, and on becoming initiated into Wiseman's M.C. they find themselves at once in the midst of good friends. Club roll: 800. *Secretary*: W. Shearer, 170, Queen Street, Auckland, New Zealand.

Clubs not yet Affiliated

Orrell Park (Liverpool) M.C.—A sound little club has been formed under the Leadership of Mr. Jones of 19, Jonville Road, Longmoor Lane, Fazakerley, Liverpool. It is hoped that affiliation will be secured very soon, and Liverpool Meccano boys interested in the movement are invited to communicate with the secretary. Club roll: 10. *Secretary*: L. Hodkinson, 5, Cobham Avenue, Moss Lane, Orrell Park, Liverpool.

Neath M.C.—A small club has been formed at Melyn, Neath, and it is hoped to secure the services of a Leader shortly. Local boys interested should write to the Secretary, Maldwyn Evans, 11, Burrows Road, Melyn, Neath.

St. Albans M.C.—Regular meetings are held in an office over a Commercial College. It is hoped to secure a more suitable club room at an early date. A popular feature of the syllabus is Cycling, and as there is very fine scenery in the vicinity, many enjoyable trips have been organised. *Leader*: Miss Constance Brooks, 46, Holywell Hill, St. Albans.



Thrice is "Force" packed to keep in the original oven-toasted flavour

Something new, boys! Yes, and I'm quite excited about it too. I have discovered a way to add an extra deliciousness to "FORCE." Shall I tell you all about it? Right! I'll start from the beginning.

A short time ago I was strolling around the electric toasting ovens at the "FORCE" mills in Canada, inhaling the scrumptious odours that came from the toasting whole wheat flakes, and wishing that every "FORCE" eater could taste "FORCE" as I could then—straight from the oven.

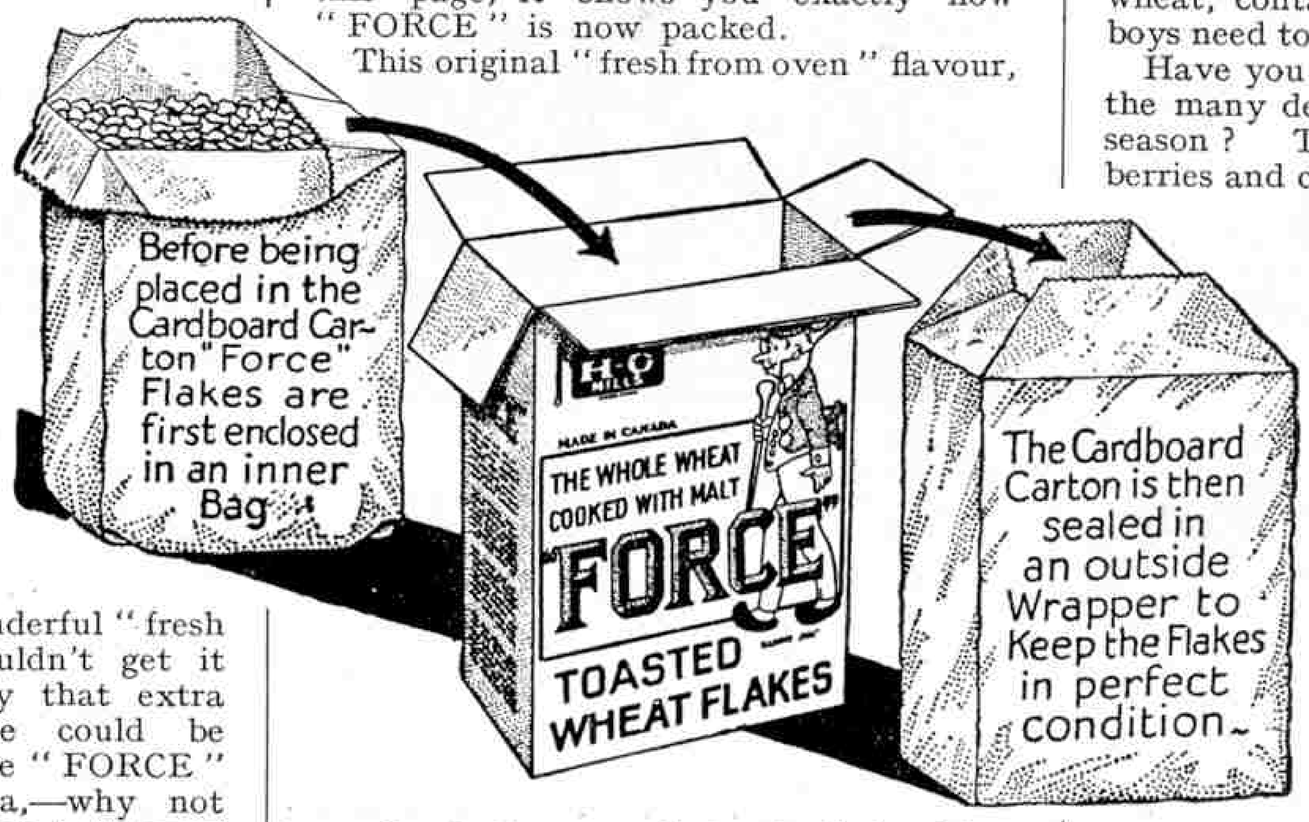
There seemed to be something extra specially nice about this freshly toasted "FORCE." It had a flavour all its own.

I kept thinking of this wonderful "fresh from oven" flavour—I couldn't get it out of my mind. If only that extra delicious "FORCE" taste could be captured and packed into the "FORCE" packet, ---- ah! an idea,—why not seal in the original oven-toasted flavour?

I stayed up all night and thought the matter out, and the next day I had my idea all ready to be put into practice. A NEW INSIDE PAPER BAG LINING ought to do the trick—and so it did. With the triple protection "FORCE" now has, the "fresh from oven" flavour of "FORCE" has been sealed right into every packet.

Study the illustration in the centre of this page, it shows you exactly how "FORCE" is now packed.

This original "fresh from oven" flavour, previously known only to the baker himself, can now be enjoyed by all "FORCE" eaters.



You Meccano Boys know the extra appetizing appeal of good things to eat when they come hot from the oven. It's the same with "FORCE." When it comes fresh from the oven it possesses a flavour different from any you have ever known before—the very flavour you will find in every packet.

Remember that there is nothing else like "FORCE" both for flavour and nourishment. "FORCE," being *whole* wheat, contains all the nourishment you boys need to build up strong manly bodies.

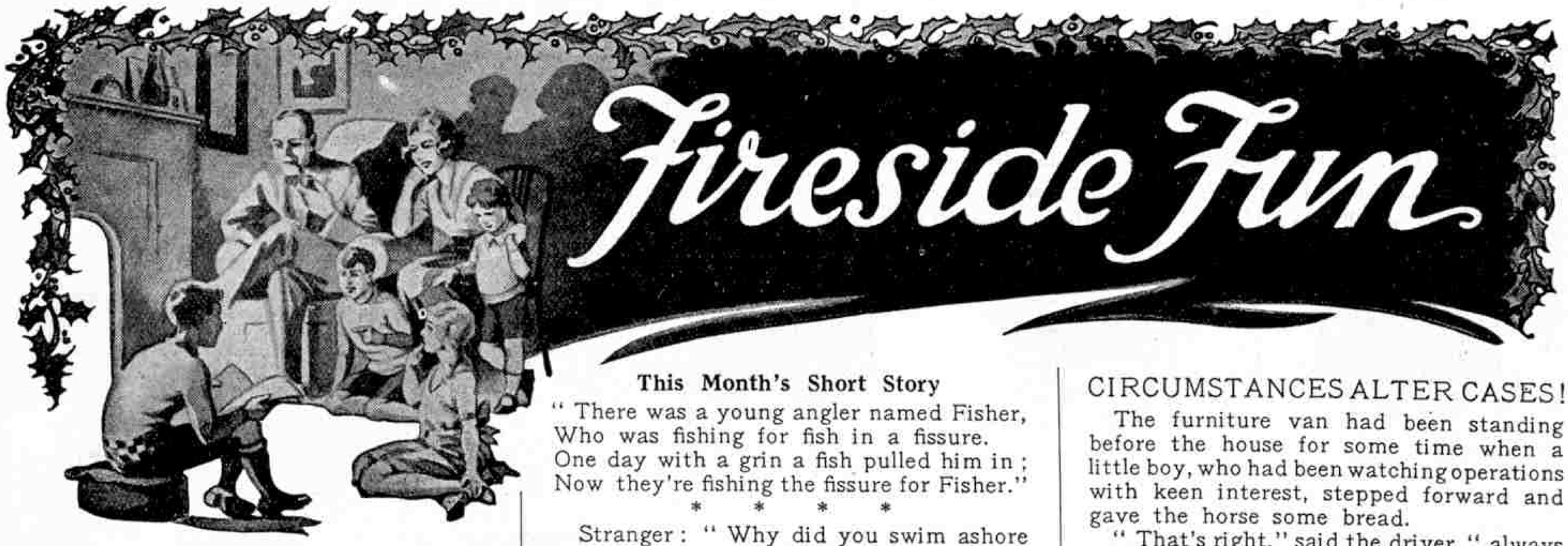
Have you tried "FORCE" with any of the many delicious fruits that are now in season? Try "FORCE" with strawberries and cream. Ask mother to serve it with stewed cherries, even gooseberries will taste nice if served with "FORCE"—and they are so good for you.

If you are keen on getting as much nourishment as you can out of your food, you can do nothing better than unite with this King among Cereal foods, the famous all-food fruit, Bananas. Sliced banana served with "FORCE" and milk makes a wonderfully appetizing breakfast. You will have to taste it to know what it is really like.

No "FORCE" dish needs any cooking, because "FORCE" is already cooked. Keep on eating "FORCE" regularly every day, not only because it is nice to eat, but to save mother the trouble of cooking, and to grow healthy and strong yourself.

SUNNY JIM KITES.—Hundreds of Meccano boys were disappointed last time I offered Sunny Jim Kites, because I was not able to keep up with the big demand for them. I have now made a fresh supply, and if any of you would like one of these jolly kites, each bearing my picture in colours, you have only to send to me a "FORCE" packet top accompanied by a postal order for 1/-, when I will be delighted to send off to you one of the famous Sunny Jim Kites. Mark your envelope Meccano Kite. **SUNNY JIM.**

THEY ALL GO WITH "FORCE"



A REAL ENGINEERING FEAT!

At an Irish County Council meeting the provision of a new bridge in place of the old one was under discussion and at length the following extraordinary propositions were submitted by one of the members :—

1. That the old bridge be removed and a new one built.
2. That the materials of the old bridge be used in the construction of the new one.
3. That the old bridge be left standing until the new one is completed.

* * * *

Teacher : Tommy you have not done a stroke of work this morning and I have told you again and again that the devil finds work for idle hands to do. Now take your copy book and write that out 20 times.

* * * *

Boy : " A man called to see you about half an hour ago, sir."

Man : " Was he tall or short ? "

Boy : " Both, sir."

Man : " Don't be ridiculous, he can't have been both ! "

Boy : " Oh yes he was sir, he was tall and he wanted to borrow ten shillings, so he was short too."

* * * *

Mrs. Gadabout : " So your brother is taking lessons on the violin. Is he making progress ? "

Little Willie : " Yes'm. He's got so far now we can tell whether he's tunin' or playin'."

* * * *

NOT SATISFIED!

Young Jock had just returned from a painful interview with the minister, to whom he had said, in reply to a question, that there were one hundred Commandments.

Upon meeting another lad on his way to the minister's, he enquired : " An' if he asks you how many Commandments there are, what will ye say ? "

" Say ? " queried the other lad. " Why, ten, of course."

" Ten ! " reiterated the first youth in scorn, " I tried him wi' a hundred, and he wasna' satisfied."

* * * *

Waiter (to guest who has been waiting for a long time) : " Did you ring the bell, Sir ? "

Guest (sadly) : " No, I was tolling it, I thought you were dead."

* * * *

Q. Why did the signal box ?

A. To make the engine tender.

This Month's Short Story

" There was a young angler named Fisher,
Who was fishing for fish in a fissure.
One day with a grin a fish pulled him in ;
Now they're fishing the fissure for Fisher."

* * * *

Stranger : " Why did you swim ashore and leave your pal ? "

Pat : " I had to save myself first. Now I'm going back to save Mike."

* * * *

Boss : " Why are you so late, Thomas ? "

Office Boy : " Sorry, Sir, but there was a fog in town."

Boss (6 ft. 6 in. tall) : " But I came from town quite easily this morning."

Office Boy : " Yes, Sir, but it was a ground fog."

* * * *

ONLY HALF A JOB!

" Are you the man wot pulled our Jimmy out of the dock ? "

" I am, m'dear ! "

" Well, where's 'is 'at ? "

* * * *

Q. Why ought a greedy man to wear a plaid waistcoat ?

A. To keep a check upon his appetite.

* * * *

THE THRILL!

Tramp : " Yes, lady, it was awful. I heard the chug-chug of the engine and smelt the petrol. I sprang, but was too late. The machine passed over me."

Lady (giving him a shilling) : " And did the motor car hurt you ? "

Tramp : " Motor car, ma'am ? It was an aeroplane ! "

* * * *

Judge : " Rastus, you are acquitted."

Rastus : " Ah's what ? "

Judge : " You are acquitted."

Rastus : " Does dat mean I got to give de watch back ? "

CIRCUMSTANCES ALTER CASES!

The furniture van had been standing before the house for some time when a little boy, who had been watching operations with keen interest, stepped forward and gave the horse some bread.

" That's right," said the driver, " always be kind to dumb animals. But does your mother always give you big chunks like that ? "

" No," replied the boy, " I didn't get that one from my mother."

" Where did you get it from then ? "

" It was lying in the van."

" What ! " howled the driver, " You miserable little 'ound, that was my breakfast ! "

* * * *

Music Hall Magician (to youngster he has called upon the stage) : " Now, sonny, you've never seen me before, have you ? "

Boy : " No, daddy."

* * * *

Small boy (gazing from window) : " It's raining, daddy."

Father (more interested in newspaper) : " Oh, let it rain."

Small boy : " I was going to, daddy."

* * * *

A teacher named Key was instructing his class in the customs of Spain. " In Spain," he said, " instead of being called Mr. Key I should be called Don Key."

And he wondered why the class laughed.

* * * *

HOW HE KNEW!

The squad, under the benign and kindly eye of a veteran officer, were being subjected to visual tests. In a distant field a party of men were undergoing instruction in entrenching work. To the officer commanding the squad they appeared as mere dots, and he decided that here was a very good test.

Singling out a smart young man, the officer asked him for the number of men composing the entrenching party.

Immediately came the answer : " Sixteen men and a sergeant, sir ! "

" Right. But how can you distinguish a sergeant at that distance ? "

" He's not doing any digging, sir ! "

* * * *

A fire having occurred in a Hebrew shop there was some little discussion with the insurance company's representative as to the cause of the fire. An Irish shopkeeper who was called in to express his opinion said : " Moses thinks it was the gas lights, Ikey thinks it was the electric lights, but to tell you the truth I think it was the Israelites ! "

* * * *

Reporter : " You believe the Flettner Rotor is as powerful as an ordinary sail ? "

Engineer : " Yes, of course. In a roundabout way."

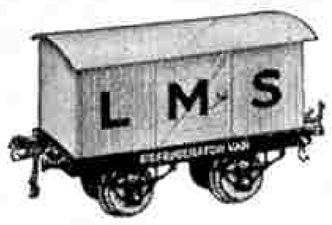
ROLLING STOCK AND ACCESSORIES

(HORNBY SERIES)

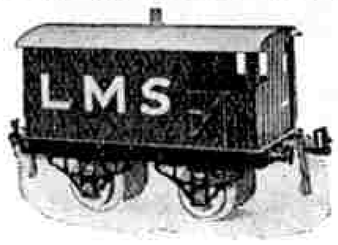
There are now 50 different train accessories—Stations, Signal-boxes, Lamps, Wagons, Level-Crossings, Foot-Bridges, Turntables, etc. Further accessories will be added to the system from time to time, and will be announced in the pages of the "*M.M.*"

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

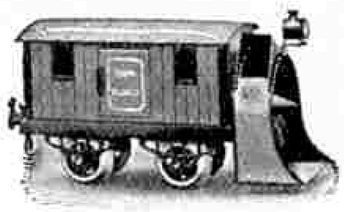
BRAKE VAN
Finished in grey, with opening doors. Price **4/-**



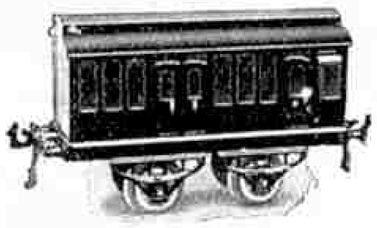
***REFRIGERATOR VAN**
Enamelled in white, with opening doors. Price **4/-**



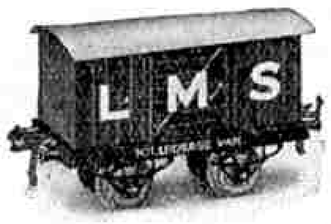
BRAKE VAN
Finished in grey, with opening doors. Price **4/-**



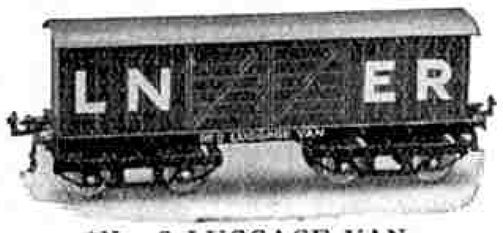
***SNOW PLOUGH**
With revolving plough driven from front axle. Price **5/6**



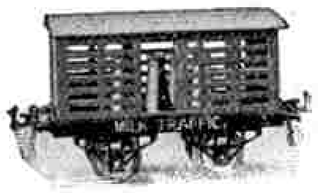
***GUARD'S VAN**
Realistic design, fitted each side with opening doors. Price **3/6**



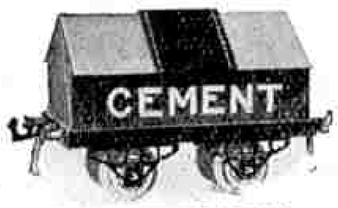
***No. 1 LUGGAGE VAN**
With opening doors. Price **4/-**



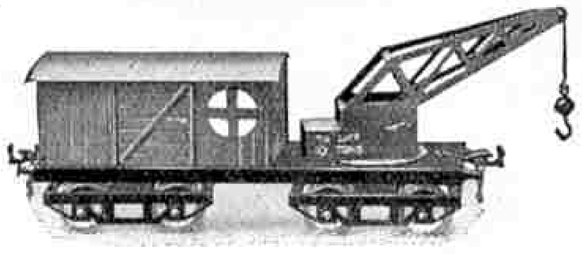
***No. 2 LUGGAGE VAN**
Finished in blue and green. Fitted with double doors. Suitable for 2-ft. radius rails only ... Price **6/6**



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

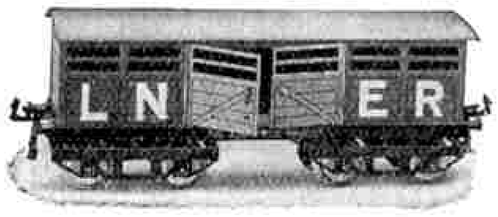


CEMENT WAGON
Finished in grey and black. Price **4/-**

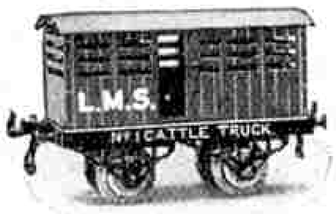


***BREAKDOWN VAN AND CRANE**
Beautifully coloured in grey and black, with opening doors. Suitable for 2-ft. radius rails only ... ... Price **7/-**

SECCOTINE WAGON
Beautifully finished in blue, with opening doors. Price **4/-**



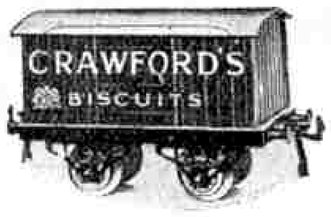
***No. 2 CATTLE TRUCK**
Splendid model fitted with double doors. Suitable for 2-ft. radius rails only ... ... Price **6/6**



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

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

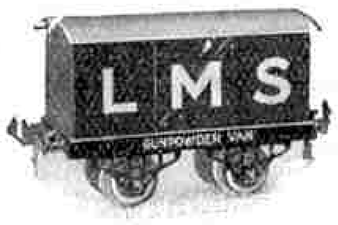
ROTARY TIPPING WAGON
Finished in grey and green. Price **4/-**



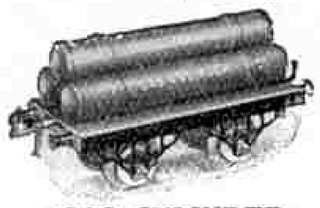
CRAWFORD'S BISCUIT VAN
Finished in red, with opening doors ... Price **4/-**

CARR'S BISCUIT VAN
Finished in dark blue, with opening doors. Price **4/-**

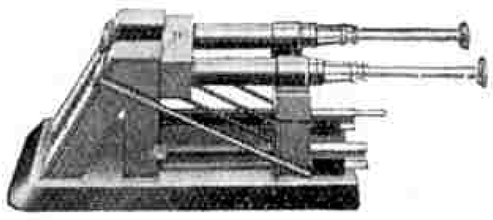
JACOB'S BISCUIT VAN
Finished in crimson lake, with opening doors. Price **4/-**



***GUNPOWDER VAN**
Finished in red, with opening doors. Price **4/-**

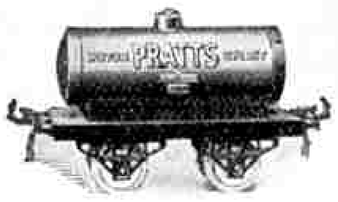


***GAS CYLINDER WAGON**
Finished in red, lettered gold. Price **3/-**



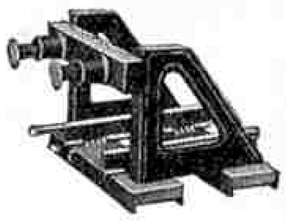
HYDRAULIC BUFFER STOP
Price **5/-**

PETROL TANK WAGON "SHELL"
Finished in red. Price **3/-**



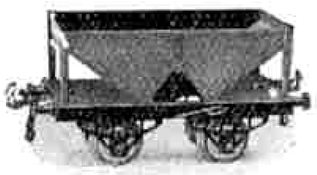
PETROL TANK WAGON "PRATTS"
Finished in green. Price **3/-**

MOTOR SPIRIT TANK WAGON "NATIONAL BENZOLE."
Price **3/-**



SPRING BUFFER STOP
Price **1/6**

***CRANE TRUCK**
Finished in grey and black ... Price **4/6**

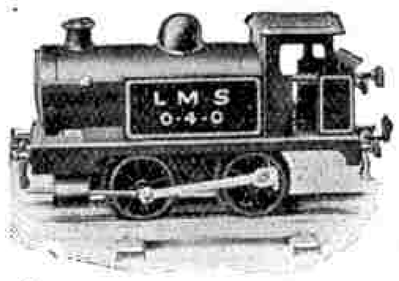


***HOPPER WAGON**
Mechanically unloaded. Finished in grey and black ... Price **4/-**

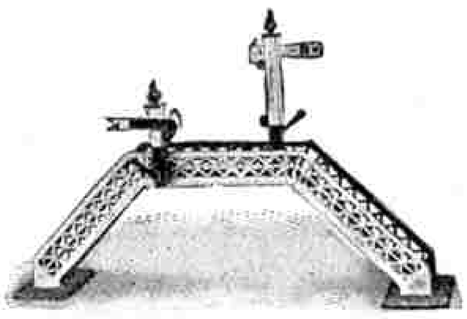
***TROLLEY WAGON**
Finished in grey and red. Suitable for 2 ft. radius rails only ... Price **6/-**

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**

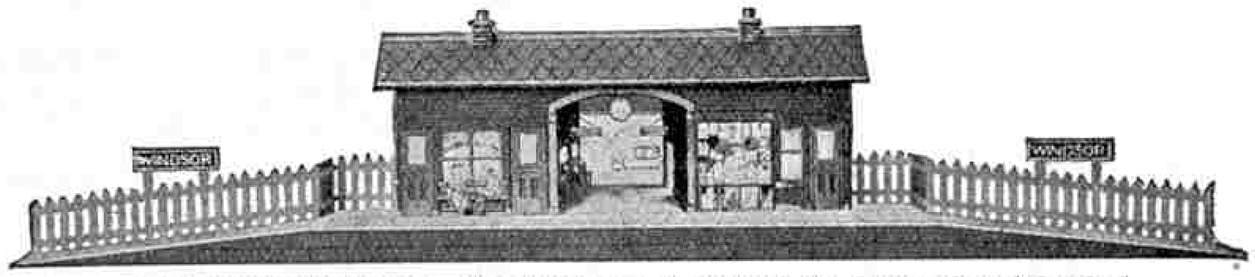
HORNBY No. 2 TANK LOCO
Beautifully finished in colours to represent L.M.S. or L.N.E.R. Companies' locos. Fitted with reversing gear, brake and governor ... ... Price **30/-**

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

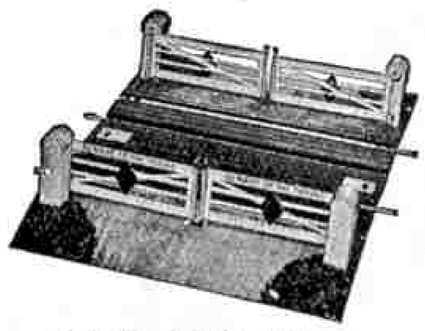
ROLLING STOCK AND ACCESSORIES

(HORNBY SERIES—*continued*)

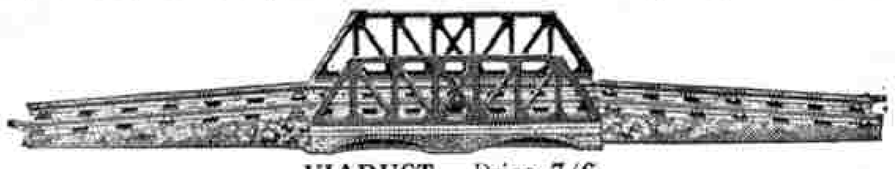
SIGNAL CABIN
Dimensions: Height 6½-in., Width 3½-in., Length 6½-in. Finished in colour and lettered "Windsor." Roof and back open to allow signal-levers to be fitted inside cabin if desired.
Price **6/6**



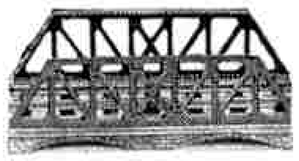
RAILWAY STATION. Excellent model, beautifully designed and finished.
Dimensions Length 2-ft. 9-in., breadth 6-in., height 7-in. Price **12/6**



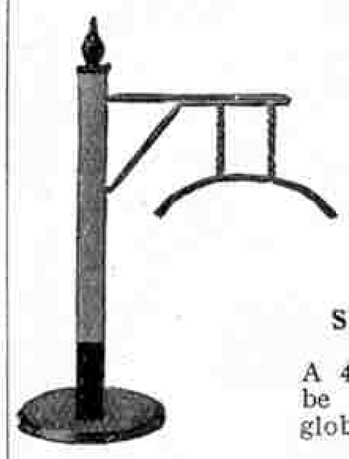
LEVEL CROSSING
Beautifully designed in colour. Measures 11½ × 7½-in. with Gauge 0 rails in position.
Price **6/6**



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

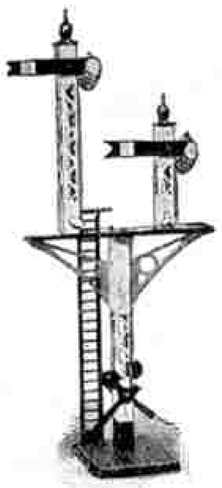


VIADUCT (Centre Section only) Price **4/6**
ELECTRICAL VIADUCT (Centre Section only) Price **5/-**

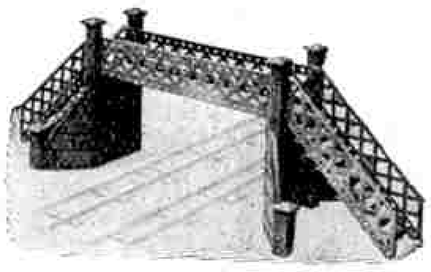


LOADING GAUGE
Price **1/9**

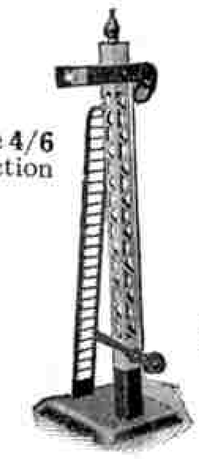
SINGLE LAMP STANDARD
A 4-volt bulb may be fitted into the globe. Price **3/-**



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

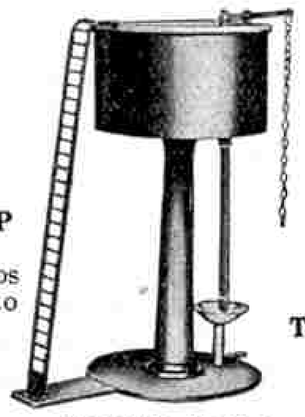


LATTICE GIRDER BRIDGE
Constructional type. Strong and well proportioned.
Price **10/6**



SIGNAL
Price **2/6**

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

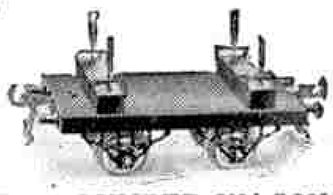


WATER TANK
Brightly coloured in red, yellow and black, 8½-in. in height, with flexible tube and pump lever.
Price **6/6**

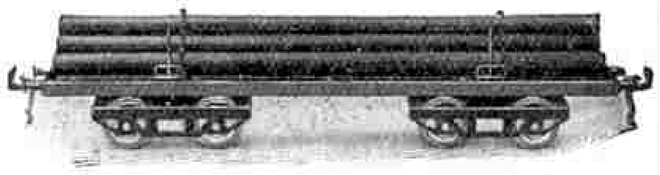
TELEGRAPH POLE
Price **2/6**

***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/-**

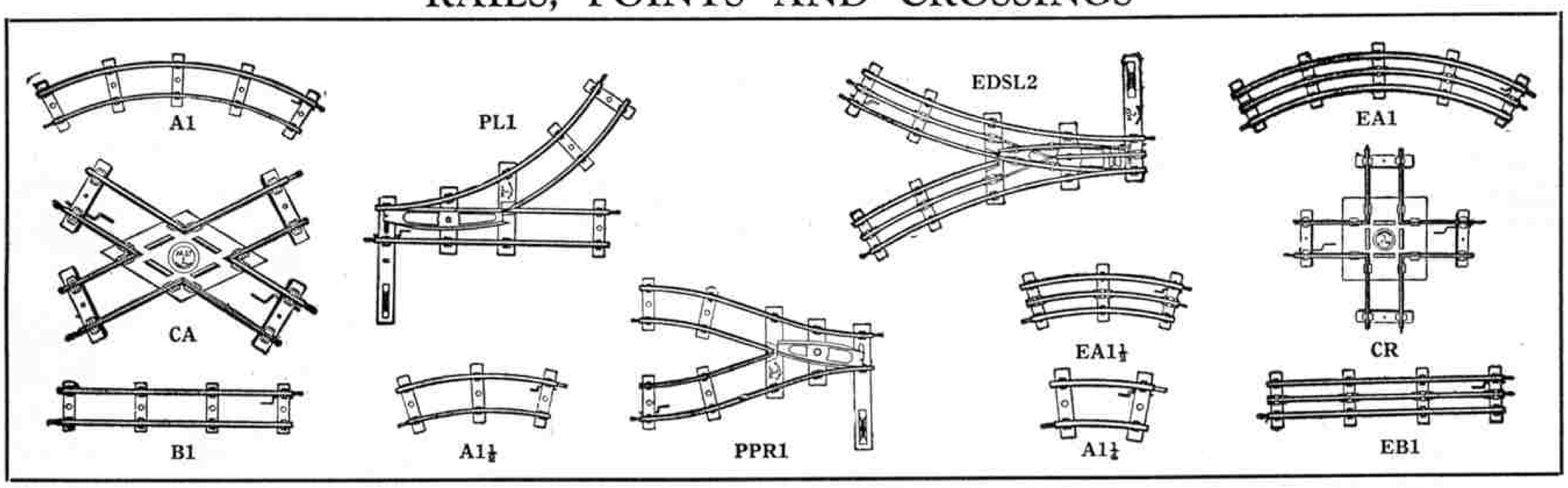
PLATFORM ACCESSORIES
No. 1. Miniature Luggage.
Price per set **2/-**

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

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

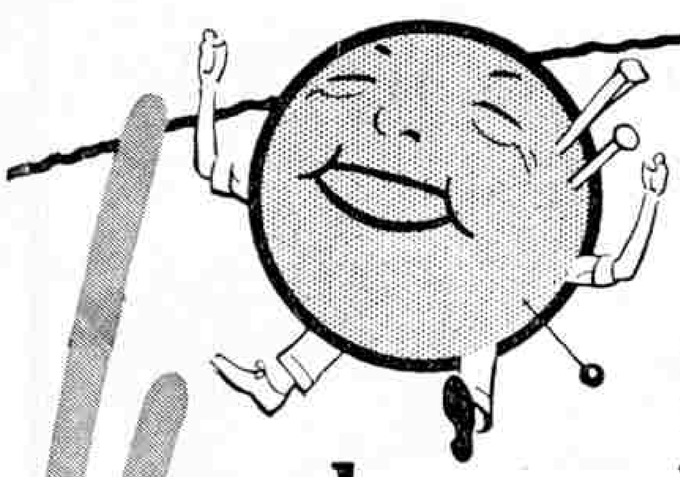
PLATFORM ACCESSORIES
No. 2. Milk Cans and Truck.
Price per set **2/-**

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



Soars above all others

The genuine Sorbo *ball*

YOU want the ball that really bounces best—therefore insist on Sorbo, the original unburstable ball—not a flabby foreign imitation.

You can slash a Sorbo Bouncer and prick it—you could not burst it however much you tried—and it never loses its bounce.

Insist on a genuine Sorbo, the British ball that never "gives in."

Sorbo Bouncer

THE BALL YOU CAN'T BURST

Of all dealers. Prices 2½d. to 1/6 each.
In assorted colours.

SORBO RUBBER-SPONGE PRODUCTS, LTD.
Sorbo Works, Woking.

BRITISH MADE — GUARANTEED

THE STEAM ERA FOR MECCANO

Just as Stephenson's Steam Engine brought about a new era in engineering, so has the Wormar Steam Engine for Meccano revolutionized the methods of Meccano workers throughout the whole world. We have received large numbers of unsolicited letters testifying to the tremendous additional pleasure and instruction Meccano workers of all lands have derived from the use of this engine with their Meccano sets. Realism has always been the goal of model workers and the Wormar Engine not only enables you to drive your models exactly like the real machines you are imitating, but when you see the clouds of steam, and hear the roar of the high speed engine coming from your Meccano Steam Crane, etc., you feel you are really making engineering models and not just clockwork toys.

Being drilled with standard Meccano drilling (by kind permission of Messrs. Meccano Ltd.), the engine can be transferred from one Meccano model to another by removing 4 screws.

THE WORMAR ENGINE FOR MECCANO

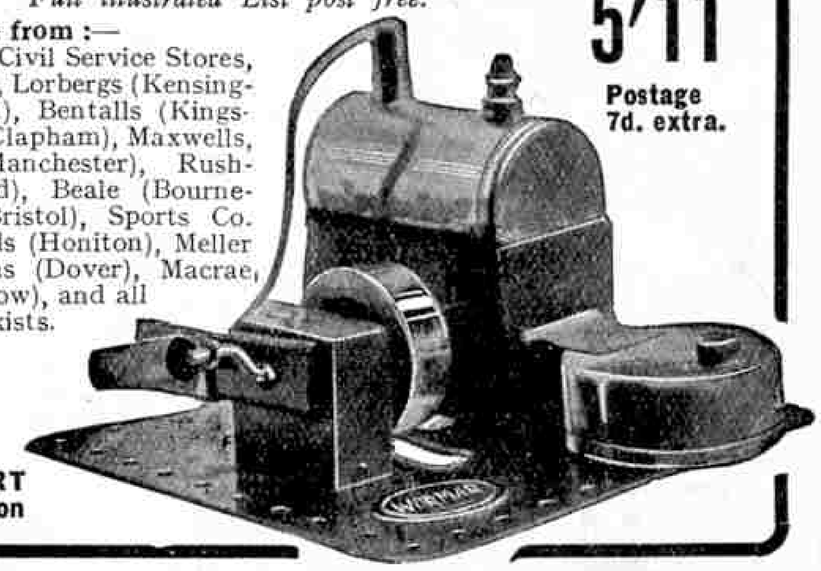
gives colossal power and tremendous speed, and being sturdy British make is totally different from the cheap foreign engines.
Full illustrated List post free.

5/11
Postage 7d. extra.

Obtainable from :—
Hamleys, Selfridges, Civil Service Stores, Whiteleys, Benetfink, Lorbergs (Kensington), Odds (Croydon), Bentalls (Kingston), George Smith (Clapham), Maxwells, Wiles, Nesbitts (Manchester), Rushworths (Huddersfield), Beale (Bournemouth), Arthurs (Bristol), Sports Co. (Tamworth), Dimonds (Honiton), Meller (Doncaster), Dawsons (Dover), Macrae, (Hellensburgh, Glasgow), and all large Meccano stockists.

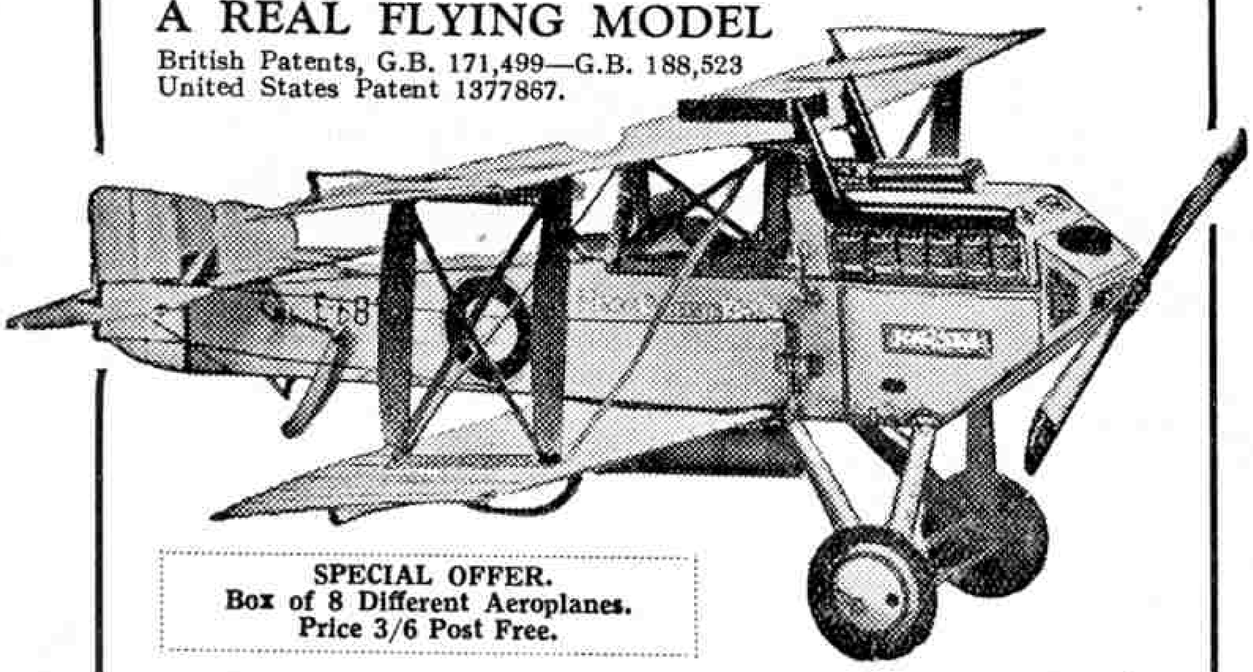
If any difficulty in obtaining, send P.O. 6/6 direct to (mention dealer)

WORBOYS & SMART
158, King Street, Luton



A REAL FLYING MODEL

British Patents, G.B. 171,499—G.B. 188,523
United States Patent 1377867.



SPECIAL OFFER.
Box of 8 Different Aeroplanes.
Price 3/6 Post Free.

Build This Fine Model Aeroplane

The very thing for the dark evenings. The model has all the parts and controls that you'll find on the big planes. Elevators, ailerons, machine-guns, pitot tubes, windscreens and even a miniature dashboard with dummy instruments, gauges, etc. Real elastic shock absorbers are fitted to the landing wheels and tail skid.

When you have built up the model you can make it do everything that a real plane can do.

Size of Model 12", Span 13" Long.

Complete Set of Cardboard Parts printed in colours, together with all necessary Elastic, Wood, Wire and Book of Instructions.

PRICE 1/- (Post 4d. extra)

Our New 1926 Catalogue is now ready. Price 2d., post free.

Send P.O. off to-night to :

WILLIAM E. APPLEBY (N/C) & CO.

(Dept. K.), 217, Jesmond Road, Newcastle-on-Tyne.

Electrical Values

only obtainable at

FRANBER'S

A Selection of Franber's Accessories. All articles you require taken from our profusely illustrated Catalogue.

C212. Midget Switch, N.P. **6d.** each.

Distant customers may Order by Post with every confidence.
Satisfaction or money refunded in full.

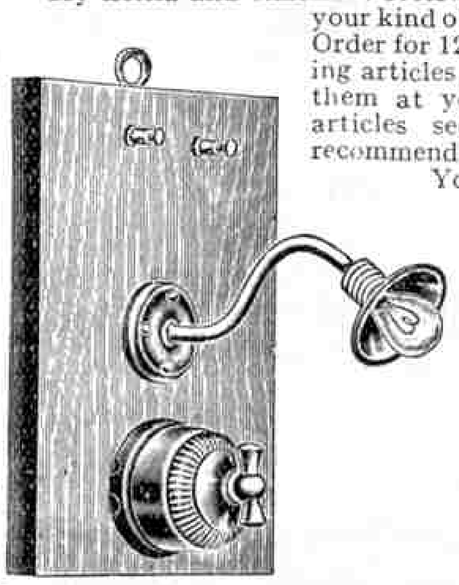
One of the many unsolicited Testimonials received :

To Messrs. Franber & Co., Birmingham. Triplicane, Madras.

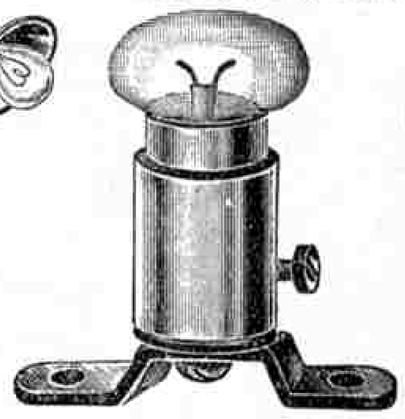
Dear Sirs,

My friend and classmate received your illustrated Catalogue and thank you for your kind obligation. We enclose you Postal Order for 12/– to cover the cost of the following articles, and should be pleased to receive them at your earliest convenience. Your articles seem very cheap, and we will recommend them to our friends where we can

Yours truly,
.....
Electrical Engineer, Madras.



C225. A small Bracket, useful for Pantries, etc. Wired ready for use. **1/9** each.



C13. M.E.S. Holder. **4d.** each.

C238. Cycle Lamp, complete with Bulb and Battery. **3/11** each.

WRITE FOR OUR ILLUSTRATED CATALOGUE.
Sent Post Free.

FRANBER & CO.

The Mail Order House for Everything Electrical

163a, High Street, Deritend, BIRMINGHAM

JAEGER
Pure Wool

The New "Meccano" Jersey

This Jaeger "Meccano" Jersey is made in the special "Meccano" pattern. It wears splendidly and prevents chill when a boy gets hot, as every boy will sooner or later. The "Meccano" Jersey appeals to every boy at once as well as to the "grown-ups" who study the health, happiness and appearance of children.

22″	24″	26″	28″	30″ Chest
7/–	7/9	8/6	9/3	10/–

Colours :—Navy body with Light and Dark Saxe dice effect.
Mid Grey body with Black and White ,,
Fawn body with Brown and Saxe ,,
Brown body with Fawn and Red ,,
Saxe body with Navy and Dark Saxe ,,
French Grey body with Lt. and Dk. Saxe ,,

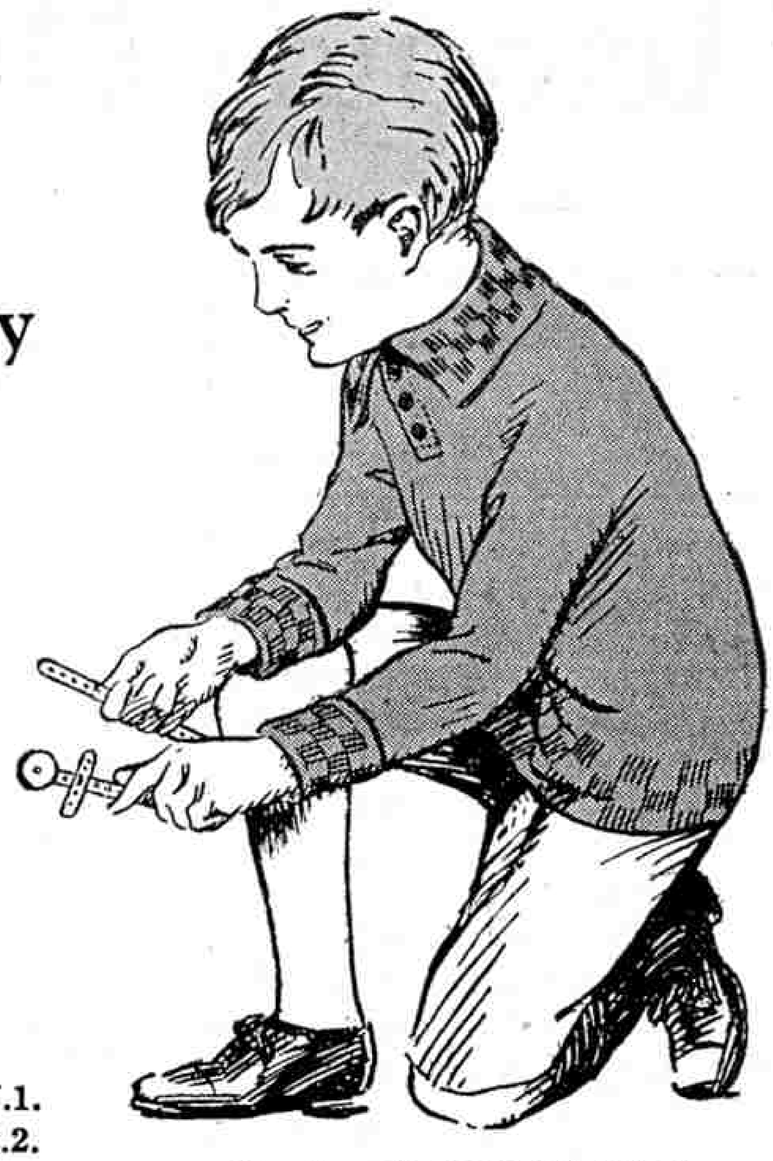
Three-quarter Hose, Turnover Tops to match

3, 4	5, 6, 7	8, 9, 10
2/9	3/3	3/9

Obtainable only from Jaeger Depots and Agents.
(Write for the address of your Local Agent).

JAEGER HEAD RETAIL DEPOT : 352/54, OXFORD ST., LONDON, W.1.
WHOLESALE & SHIPPING : 95, MILTON ST., LONDON, E.C.2.

BRANCHES : AUSTRALIA—Melbourne, 325, Flinders Lane. Sydney, 38/44, York Street.
CANADA—Montreal, 1187, Bleury Street.



The New "Meccano" Jersey

THE MECCANO BOY KNOWS THE VALUE OF

SECCOTINE

(REGD. TRADE MARK)

WITH it he makes or mends things innumerable—Picture Frames, Models, Bats, Balls, Boats, Boxes, Bags, Books—Oh a hundred things. And then he can help his

MOTHER

She will have Chairs, Tables, Beds, Slippers, Curtains—at least fifty things. And his

SISTER

Every day in life she will bring him something to be made or mended with his wonderful SECCOTINE.

THREE SIZES AT

4½d., 6d. and 9d. per tube.

WRITE FOR A FREE BOOKLET ABOUT WHAT SECCOTINE CAN DO

McCAW, STEVENSON & ORR LTD., THE LINENHALL WORKS, BELFAST

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.

HARRY BROWN,
1, Moss Lane,
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.

BROWN, MUFF & CO. LTD.,
BRADFORD.

W. CARTER,
15, Bridge Street,
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

SALANSON LTD.,
20, High Street, BRISTOL.
4, High Street, CARDIFF.

SAM TAYLOR,
Silver Street,
Tel. 320 BURY.

HAROLD HUNT,
38, Spring Gardens,
Tel. 202 BUXTON.

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

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

R. H. JEPSON,
1, Cross Cheaping,
COVENTRY.

PURSEY & MOCKRIDGE,
The Sports Outfitters,
Tel. Dartford 173 DARTFORD.

HENRY WHALLEY,
195, Duckworth Street,
DARWEN.

RATCLIFFES TOYERIES,
19, Osmaston Road,
DERBY.

C. E. MELLER,
"Dolls' Hospital,"
DONCASTER.

JOHN ARCHIBALD,
20, Woolcomber Street,
DOVER.

DIXON'S,
41, High Street,
DUNDEE.

DRAFFEN & JARVIE LTD.,
Nethergate,
DUNDEE.

CARTER'S STORES,
2, Terminus Buildings,
Tel. 953 EASTBOURNE.

BASSETT-LOWKE LTD.,
1, Frederick Street,
EDINBURGH.

WRIGHT'S DOLLS' HOSPITAL,
14, High Street,
ERDINGTON.

UPTON BROS. LTD.,
Sandgate Rd. and Tontine St.,
FOLKESTONE.

HARRY HUBBARD,
8, High Street,
(Opposite the Cricketers) GILLINGHAM.

ROBERT BALLANTINE,
103½, St. Vincent Street,
GLASGOW.

CLYDE MODEL DOCKYARD,
22-23, Argyll Arcade, GLASGOW.
Model Makers to the Admiralty, the Railway Coys., etc.

POLLOCK & CO., 36, Bridge St. and
222 and 245, Argyle Street
and 39, Paisley Rd. West, GLASGOW.

FLETCHER'S TOYLAND,
77, Deardengate, HASLINGDEN.
Grand Building, RAWTENSTALL.

HAMMOND'S LTD.,
Paragon Square,
HULL.

SMITH & DANIELS,
59, Westgate St., IPSWICH.
25, Market Place, GT. YARMOUTH

PEARSON & DENHAM (PHOTO) LTD., 6, Bond Street,
LEEDS.

ROBOTHAM,
"Baby's Kingdom,"
Tel. 4809 LEICESTER.

LLOYD & SON,
2, Station Street,
LEWES.

BYCROFTS EMPORIUM,
366, High Street,
LINCOLN.

C. LUCAS, Hobbies Depot,
35, Manchester Street,
LIVERPOOL.

Reliance Cycle & Motor Co.,
29/31, Manchester St., Liverpool.
Argyle & Conway Sts., Birkenhead.

THE ARUNDEL CYCLE & MOTOR STORE, 52, Church Road,
Upper Norwood, LONDON, S.E.19.

F. R. POTTER & SON,
43, Market Place,
LOUGHBOROUGH.

H. G. PARTRIDGE & CO.,
10, Chapel Street,
Tel. 234 LUTON.

BARR'S CHILDREN'S PARADISE,
49, Deansgate,
Tel. City 165 MANCHESTER.

BAXENDALE & CO. LTD.,
Miller Street,
Tel. 5900 City (20 lines) MANCHESTER.

A. FRANKS LTD.,
95 & 97, Deansgate, MANCHESTER.
90, Bradshawgate, BOLTON.

A. INMAN,
Moorfield Arcade, 105, Lapwing Lane,
Didsbury, MANCHESTER.

Meccano & Hornby Train Supplies

The seventeen 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.

JOHN NESBITT LTD.,
42, Market Street,
MANCHESTER.

H. WILES LTD.,
124, Market Street,
MANCHESTER.

SHAW'S BAZAARS,
30-36, High Street,
MARGATE.

R. SCUPHAM & SONS,
35, Linthorpe Road,
MIDDLESBROUGH.

DIBBS' DOLLIES' HOSPITAL,
NELSON, LANCS.

ALFREDS, TOY SHOP,
77, Northumberland Street,
NEWCASTLE-ON-TYNE.

WILLIAM OLLIFF,
13, Grainger Street West,
NEWCASTLE-ON-TYNE.

THE OXFORD SPORTS DEPOT,
117, St. Aldates',
OXFORD.

A. J. ROBERTSON,
39-41, Broad Bridge Street,
Tel. 374 PETERBOROUGH.

DEAN & HOLT,
78, Yorkshire Street,
ROCHDALE.

A. J. TINKER,
20, London Road,
SHEFFIELD.

WILSON, GUMPERT & CO. LTD.,
57, Fargate,
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.

Full particulars for advertising on this page will be forwarded on application to Advertisement Manager: *Meccano Magazine*, Binns Rd., Liverpool

ROLLER SKATES

Provide **healthy, ideal** and **safe** exercise for **boys** and **girls.**

They have become almost as much a necessity as a **Meccano** or a **Hornby Train.**

Our **Sales** are **increasing** every day and **our prices** are still **THE LOWEST IN THE TRADE.**

No. 3 with Threaded Clamps and Case-hardened Steel Wheels are only 5/- pair
No. 5 with best Ball-bearing Wheels 10/- ,,
No. 6 ,, ,, ,, and Block Heels, as illustrated 11/- ,,

Postage and Packing 1/- per pair extra.

Send at once to
Bateson's Sports Depôt, Blackpool

BE a Soldering EXPERT

With a 1/6 tin of **"BRITINOL"** Paste Solder, you will be able to do *any* soldering job successfully, easily and quickly—to your bicycle, wireless, or any job you like, and you will be able to solder easily. Get a tin to-day from your dealer, or direct from us, post free.

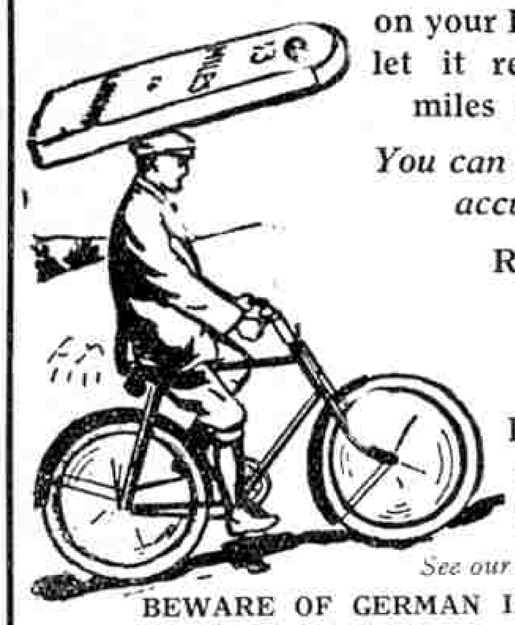
Dept. "5," BI-METALS LTD.,
Sugar House Lane, LONDON, E.15

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

—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.

No More Punctures

Stop tinkering with tyre levers, messy solutions and patches. Send a P.C. for this booklet which tells how to end puncture mending for ever. It's

Free

to Meccano Readers.
Address:
JACKSON'S IMPERVO
(Dept. 31a)
5, Point Hill, Greenwich, S.E.10

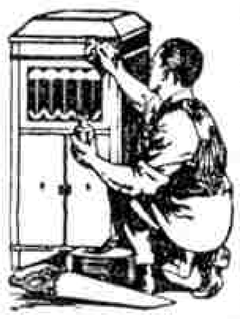
THE AUTOMATIC PEA REPEATER

The most reliable pistol on the market. Takes 25 shots at one loading, best black finish, each in box with instructions and supply of ammunition, post free 2/3.

New model 17-shot Pea Repeater, black finish, post free 1/3.

R. DILNOT, 125, Chiswick High Rd., London, W.4.

BUILD IT YOURSELF



You can Build
a £40 Sideboard Gramophone,
or a £20 Four-Valve Set
with our Drawings & Fittings for 40/-

Catalogues 2d.

Wireless Components.
Jazz Sets, Gramophones and Records.
R. C. BURT & CO.,
366, York Rd., Wandsworth, S.W.18.

SPECIAL OFFER OF BLOW-LAMPS.

Strongly made, size 4 × 3¾". Gives powerful flame, removes paint, etc., solders without iron. Simple, safe, economical. Worth 3/6. Satisfaction guaranteed or money back, **1/6** each, 3 for 4/-, post free.

WILKINSON & SON,
24, North Road,
CLAPHAM, S.W.

POST FREE **1/6**

MAKE GRAMOPHONES.

Our 64-page Catalogue tells you for **3d. how to do it** and what accessories to choose. **Motors** in 25 sizes, from **9/-**; Tone arms, **4/6**; Speakers, **2/6**; Headphones, **27/6** pair; Cabinets from **9/-**. Gramophones from **30/-**. Carr. paid.

The Regent Fittings Co., D.78
120, Old St., London, E.C.1.

Established 21 years. Telephone: Clerkenwell 2923.

BRITISH MADE

LOTT'S BRICKS

ARTIFICIAL STONE

FOR YOUR MODEL RAILWAY

NEW PRIZE COMPETITION

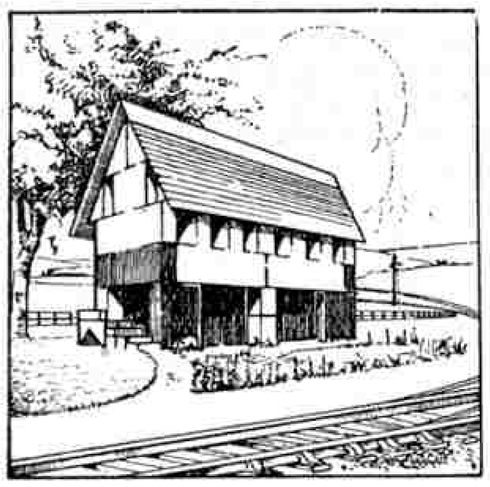
FOR THE BEST DESIGN FOR A

RAILWAY STATION OR TERMINUS

1st PRIZE, £3 3s. 2nd PRIZE, £2 2s. 3rd PRIZE, £1 1s. (In Goods)

METAL PARTS MAY BE USED. CLOSING DATE 30TH SEPTEMBER, 1926

Prices and Contents of Boxes:



SIGNAL CABIN OA
PRICE 3/3

LOTT'S BRICKS.

Box O	... 6 Models	...	2/–
,, OA	... 12 ,,	...	3/3
,, A	... 30 ,,	...	5/–
,, 1	... 48 ,,	...	10/–
,, 3	... 72 ,,	...	17/6
,, 6	...101 ,,	...	42/–

TUDOR BLOCKS.

Box 1 ...	12 Models	...	3/6
,, 2 ...	18 ,,	...	7/6
,, 3 ...	24 ,,	...	21/–
,, 3A ...	(Supplement)	...	25/–
,, 4 ...	30 Models	...	42/–

GARDEN SETS.

Box 1 ... 4/– Box 2 ... 6/–

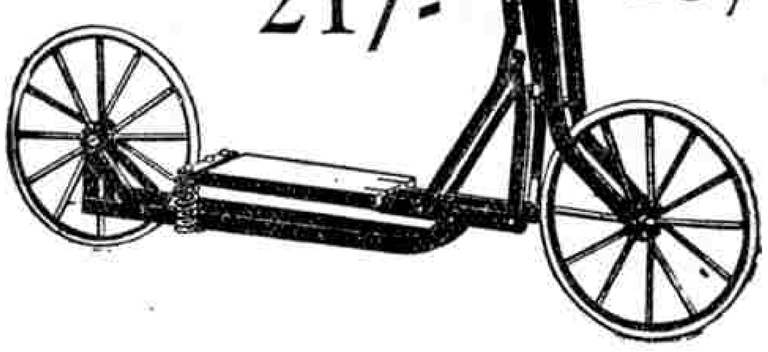
A CHESHIRE HOUSE
Box 4 TUDOR BLOCKS
PRICE 42/–

Farm Buildings in endless variety can also be built with the contents of even one box.

WRITE FOR ILLUSTRATED LIST and ADDRESS OF NEAREST AGENT

LOTT'S BRICKS LTD., WATFORD, England

THE TAN-SAD
"SPEEDI-SPRUNG"
21/-



Kiddies enjoy this All-British Toy

To every active boy and girl Tan-Sad Wheel Toys offer pride of ownership and hours of boisterous, healthful pleasure in the open air. The exclusive advantage of Tan-Sad springing gives comfort and added safety to all Tan-Sad Toys. Ask your local dealer to show you our wonderful range of scooters.

TAN-SAD WHEEL TOYS

TAN-SAD LTD., Drake Works, Albert St., BIRMINGHAM
London: 9, Phœnix Place, Mount Pleasant, W.C.1.

"Model Ships" "Model Trains"

Book of Model Ships. Over 80 pages fully illustrated, No. S/17.
Price **6d.**

Book of Model Trains. Over 170 pages fully illustrated. No. A/17
Price **6d.**

Either or both of the above books may be had from our branches, or they will be sent post free direct from our Northampton Works.

BASSETT-LOWKE LTD., NORTHAMPTON

London Branch:
112, High Holborn, W.C. 1.

Edinburgh Branch:
1, Frederick Street.

GUARANTEED TO SAIL!

12/9d.

(Post Free)

"REGATTA" RACING YACHT

SPECIFICATION. Four white sewn sails, fitted with rings giving adjustable tension. Hull painted and varnished in colours. Mast removable. Lead keel. Length of hull :—18".

Specially designed for

PANTOYS LIMITED

7, Promenade, Cheltenham

TERMS TO TRADE ON APPLICATION.

CATALOGUES OF CHEAP SHIP FITTINGS

are now ready. Post Free.

HOBBIES FAMOUS MOTOR BOATS

Miss America	...	...	... 12/6
The Peggy	...	...	... 22/6
The Pioneer	...	...	... 30/-

Price List Free.

Money returned if not satisfied.

PHOTOGRAPHY

Our British Camera Catalogue is now ready.

Post Free, 2d.

C. LUCAS

35, Manchester Street

LIVERPOOL

Agent for { **Hobbies Ltd. Meccano Ltd.** / **Bassett-Lowke Ltd.** }

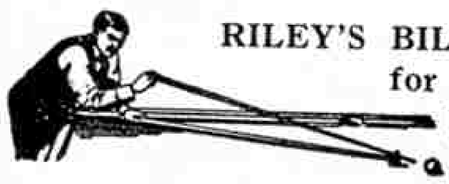
JENNERS

PRINCES STREET EDINBURGH

LIMITED

EDINBURGH AGENTS for MECCANO and Hornby Trains

JENNERS PAY CARRIAGE



RILEY'S BILLIARD TABLES for the home.

Riley's "Home" Billiard Tables—to fit conveniently on any dining table. Prices from **£7**, or in monthly instalments. Riley's "Combine" Billiard and Dining Tables to suit any room. Prices from **£22 10s.**, or in monthly payments. **7 Days' Free Trial,** and Carriage paid.

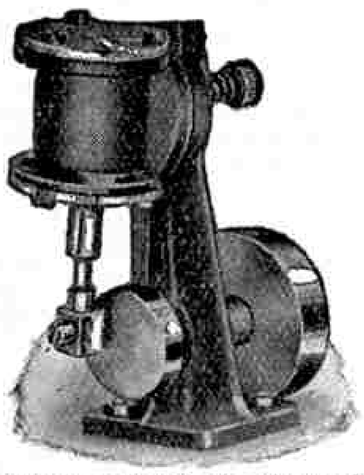
Send for FREE Price List

E. J. RILEY LTD., Deal Works, ACCRINGTON.

SAFETY REVOLVERS for BLANKS

No license. Ideal for Theatricals and all Sports.
Single Shot. Small **2/6**, Large **4/6**
Six Chamber (Blue Steel or Nickel) **7/6**
Eight " " " **10/6**
Ten " " " **15/-**
(Extra large heavy pattern). Post Free.
All perfect guns. Cartridges (not sent abroad) **1/6 per 100.** Carriage 9d. any quantity.
Colonial postage on all guns 9d. extra.
SEND FOR LIST.

J. BISHOP & CO., 41, Finsbury Square, LONDON, E.C.



"I am very pleased with the plant which drives a Meccano model at terrific speed although I have used 3 sets of reduction gear. The S.T. plant must be the most powerful engine on the market for its size."

Thus writes a customer. The engine shown above can be built with a screwdriver and we give full instructions. We *guarantee* the engine to work well.

S.T. Engine Parts ... 5/- } *Post*
Finished Boiler 8/- } *Free*

Send stamp for list 12M or 6d. for complete "Engine" catalogue (80 pages).

Stuart Turner Ltd.

HENLEY-ON-THAMES

Boys!—

build a working model railway, realistic in appearance and efficient in operation, by using

HORNBY TRAINS

AND ACCESSORIES

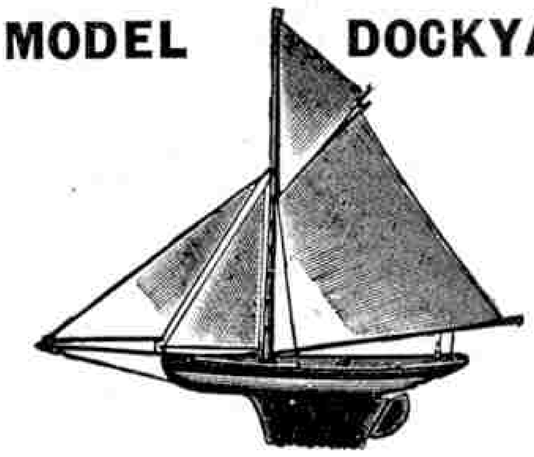
Model Railway enthusiasts will find their every want satisfied at the

Arundel Cycle & Sports Stores

"The Hornby Train Shop"

52, Church Road, Upper Norwood, S.E.19

KENSINGTON MODEL DOCKYARD



Sailing Yachts & Fittings

HOBBIES STEAM LAUNCHES
MOTOR BOATS

HORNBY TRAINS
MECCANO OUTFITS AND PARTS
WORMAR STEAM ENGINES

Requisites for
CRICKET, TENNIS, FISHING, PHOTOGRAPHY

AIR GUNS AEROPLANES
Electric Motors & Accumulators

Send 1½d. Stamp for List "M."

C. H. LORBERG

185, Kensington High St., London, W.8.

THIS SPLENDID

MODEL FIELD GUN

ON APPROVAL!

Built to scale from a real Royal Artillery Field Gun, the famous Wembley Cannon is a fascinating piece of scientific workmanship as well as a splendid fun maker. British designed and British-made throughout of tempered steel, brass and bronze. It bangs, flashes, pivots, elevates, etc., in the true R.A. style, and needs no special ammunition. Spare parts always in stock. Of all leading stores, or send 4/9 to-day to makers for model "on appro."—Money returned instantly if not satisfied.

HANWELL'S TOYS, 38, Alexandra Road, NORTHAMPTON.

PRICE 4/9 POST PAID. (C.O.D. if preferred).

"MECCANO MAGAZINE" BINDERS

Your Magazines may be kept clean and tidy by enclosing them in one of the special binders we supply. Two sizes, prices 3/- and 3/6 post free, from Meccano Ltd., Binns Rd., Liverpool.

This Space is set to ½ inch s.c. and costs 5/- per month. The sum is the 64th of £16, the price of a whole page advertisement. Over 70,000 copies of the December number were distributed all over the world. You therefore reach this exclusive public for less than one penny a thousand.

Readers' Sales and Wants

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

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

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

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

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

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

READERS' SALES

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

Wanted. Meccano Magazines, September 1923, January, February 1925. 1/- each offered.—Box 601.

Look, Boys! Send for my free bargain list.—Master P. B. Corin, 1, North Parade, Penzance.

500 Different Cigarette Cards, 2/9. Sets from 3d. Lists.—Thornton, 159, Grosvenor Road, Wavertree, Liverpool.

Books, Fretwork, Tools, Miscellaneous Articles. List Free.—Box 603.

L. C. Smith Typewriter, latest improvements, nearly new, excellent condition, £10.—Kerbey, 38, Breckwell Park Gardens, London.

"Force" Cricket Bat, selected by Hobbs, cost £1-1s., for 10/- or nearest. Good condition.—Box 602.

For Sale. 50 Hobbies Fretwork Designs, 12/- or nearest offer.—S. Green, Motcombe, Dorset.

Am selling some of my things (Stamps, Cinematograph, etc.) Stamp for list.—Hutchinson, 24, Middleton Road, Waterloo, Liverpool.

Wanted. "Crusoe" Mag., No. 5, Oct. 1924.—Eakins, 54, Lanedale Avenue, Levenshulme, Manchester.

Exchange Stamps with collectors in all countries.—Herbert, 71, Richmond Hill, Langley, Birmingham, England.

Model Railway, Gauge 1, valued 15 to 20 pounds. Full particulars on application to—R. Cox, Radcliffe-on-Trent.

Sale. Greenheart Fishing Rod, also Fishing Tackle. Send for particulars.—Bell Ham Hall, Scruton, Bedale.

100 Cigarette Cards, 6d., Postage 1½d. extra.—Rowe, 30, Rye Lane, Peckham, London.

Small Petrol Engine, Charge Accumulators, etc., exchange considered. Particulars—Purser, Abberton, Pershore.

SMALL ADVERTISEMENTS

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

Patents, Trade Marks, Inventions Advice Handbook & Cons. free.—B. T. King, Regd. Patent Agent, 146a, Qn. Victoria St., London, E.C.4. 40 years' refs.

Model Petrolmotor Castings. Cylinder bored inclusive. 9/9 set. Cat. 3d.—Butler's Stores, Littleover, Derby.

Edison 4 minute Blue Amberol Phonograph Records, also attachments for old Machines. Lists.—Robinson, 333, Hainton Avenue, Grimsby.

AN ART ENLARGEMENT from your best snapshot, 10"×8", 1/6 post free. Send film.—Bruce Johnston, Photographic Expert, Keighley, Yorks.

RAILWAY PHOTOGRAPHS. Best quaiity post cards of express trains and engines, 4/- per doz. List and sample card 4d.—F. R. Hebron, 30, Stonard Road, London, N.13.

HOME CINEMATOGRAPH MACHINES and ACCESSORIES. FILMS at summer prices. Buy now and have the best at lowest price. Send for illustrated catalogue, post free.
FORD'S, Dept. M., 13, Red Lion Square, London, W.C.1.

CINEMATOGRAPH FILMS, cheap. British-made Machines and Cinema Accessories.—Filmeries, 57, Lancaster Road, Leytonstone, London.

CINEMA FILMS, 100 ft. 1/-, 1000 ft. 6/-, delivered.—Phillips, 64, Ewart Street, Brighton.

CUT THIS OUT. 'Meccano' Pen Coupon Value **3d.**
Send 5 of these coupons with only 2/9 direct to the **Fleet Pen Co., Fleet Street, E.C.4.** You will receive by return a splendid British 14-ct. Gold Nibbed Fleet Fountain Pen value 10/6 (Fine, Medium, or Broad Nib). If only 1 coupon is sent the price is 3/9. 3d. less for each extra coupon up to 4 (Pocket Clip 4d.) Satisfaction guaranteed. Your own name gilt letters, either pen 1/- extra. **Lever Self-Filling Model with Safety Cap, 2/- extra.**

D.A.P. MODEL AERO & ENG. CO.
THE PIONEER FIRM FOR MODEL AEROPLANES, ACCESSORIES AND MATERIALS
OUR MODELS HOLD OFFICIAL FLYING RECORDS
Illustrated Catalogue 4d. Post Free.
D. A. P. MODEL AERO & ENG. CO. (Dept. M.), 187, Replingham Rd., SOUTHFIELDS, S.W.18

A Book Every Boy Should Have. GET IT NOW!
The Compendium of Applied Electricity
A comprehensive little book on electricity giving all details of electricity in nature in experiments and in its practical use. Full of illustrations and with dictionary of electrical terms at the end. Post **2/2**
Get our list of Technical Books. Free.
S. RENTELL & CO. LTD., 38, Maiden Lane, LONDON, W.C.2.

MAKE YOUR OWN ELECTRIC LIGHT
These wonderful Dynamos light brilliantly 4-6v. lamps, and are very easy to work. **5/6,** post 6d. Will also work as Electric Motors.
GREENS (Dept. E.N.), 14, New Oxford Street, London.

"MONARCH" De-Luxe LARGE CAMERAS
Regd.
Take Perfect *size* **3½" × 2½" LARGE PHOTOS**
Optically Ground Lens, Viewfinder, etc. **Complete Accessories.** Best quality Plate, Developing and Printing OUTFIT. **Send P.O. 2/- ! Thousands of Testimonials!** 1926 *Catalogue* 1,000 *Big Bargains, post free.*
SALE PRICE 1/9 Post 3d.

The LEEDS BARGAIN Co., (M), 31, Kendal Lane, LEEDS.

NATURE STUDY
Obtain your supplies of Books, Collecting Apparatus and Specimens from
WATKINS & DONCASTER, Dept. M., 36, Strand, London, W.C.2 (P.O. Box 126).
'Phone: Gerrard 9451. Full Catalogue Post Free.

METAL CEMENT
Repairs defective iron or steel castings, easily mixed, no heat required to use. Sets hard like metal, can be filed and polished, withstands fire and oil, expands, contracts, prevents pitting, stops leaky radiators, cylinders, boilers, gas, water, steam or air pipes. Ideal filling for flanged joints, countersunk bolts, rivet heads, butt seams on plates, cracks, etc.
1/3, 2/6, 4/6 (7 lb. tins **16/-**), Post Paid.
ALBERT FEATHER, WHITE ABBEY ROAD, BRADFORD, Yorkshire.

"MECCANO MAGAZINE" BINDERS
There is no better way of keeping your Magazines clean and tidy than by binding them in one of the special binders we supply.
These binders have strong stiff backs, covered with black imitation leather, tastefully tooled, and are lettered in gold. The large binder holds 12 Magazines—price 3/6 post free. The small binder holds 6 or 8 Magazines—price 3/- post free. Meccano Ltd., Binns Road, Liverpool.

MECCANO MAGAZINE

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

EDITORIAL AND ADVERTISING OFFICES:—
BINNS ROAD, LIVERPOOL.
Telegrams: "Meccano, Liverpool."

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

To Contributors. The Editor will consider articles and photographs of general interest; payment will be made for those published.

Binding Cases. Your Magazines may be kept clean and tidy by enclosing them in one of the special binders we supply. Two sizes, prices 3/- and 3/6 post free.

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

Advertisements

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

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

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

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

Proofs of advertisements will be sent when possible for space bookings of 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.

Obtaining the "*M.M.*" Overseas

Readers Overseas and in foreign countries may order the *Meccano Magazine* from regular Meccano dealers, or direct from this office. The "*M.M.*" is sold Overseas at 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.

CANADA: Meccano Ltd., 45, Colborne Street, Toronto.
AUSTRALIA: Messrs. E. G. Page & Co., 52, Clarence Street, Sydney, N.S.W.
NEW ZEALAND: Messrs. Browning, Ifwerson Ltd., P.O. Box 129, Auckland.
SOUTH AFRICA: Mr. A. E. Harris (P.O. Box 1199), Textile House, Von Brandis St., Johannesburg.

This Month's Special Articles

	Page
Air News	386
A Family of Acrobats	398
Books To Read	376
Over 172 Miles an Hour	357
Club Notes	405
Competition Page	403
Conquest of the Air	362
Electricity—Telegraphing Pictures	358
Engineering News	364
Famous Engineers—John Rennie	360
Fireside Fun	407
Free Flights For Our Readers	384
From our Readers	401
How To Start An Aquarium	382
Mail Bag	402
Model-building Contests	370–389
Our Wonderful World	374
Photography	391
Polar Exploration by Air	354
Railway News	394
Secretary's Notes	404
Stamp Collecting	378
Standard Mechanisms	396
Story of Metals—Gold IV.	366

Lines Bros. Famous Toys

THEY'RE BRITISH MADE AND WORLD FAMOUS

Lines Bros. Toys are made at the largest Toy Factory in the world by skilled British Craftsmen. Each Toy is well finished and soundly constructed, and the value is the finest the Toy World has ever seen.

For your protection as well as our own, Lines Bros. Toys are marked with the famous Red Triangle Trade Mark. Every toy that bears this Trade Mark is made to give you complete satisfaction, and your children countless months of happiness.

Look for the Triangle Trade Mark on all these toys

The Fairycycle Association

The new Fairycycle Association will appeal very strongly to children everywhere. It has been formed in their interests, and of course, membership, while it is quite free, is confined to all purchasers of the Fairycycle. Full particulars will be gladly sent on application.

The Fairycycle

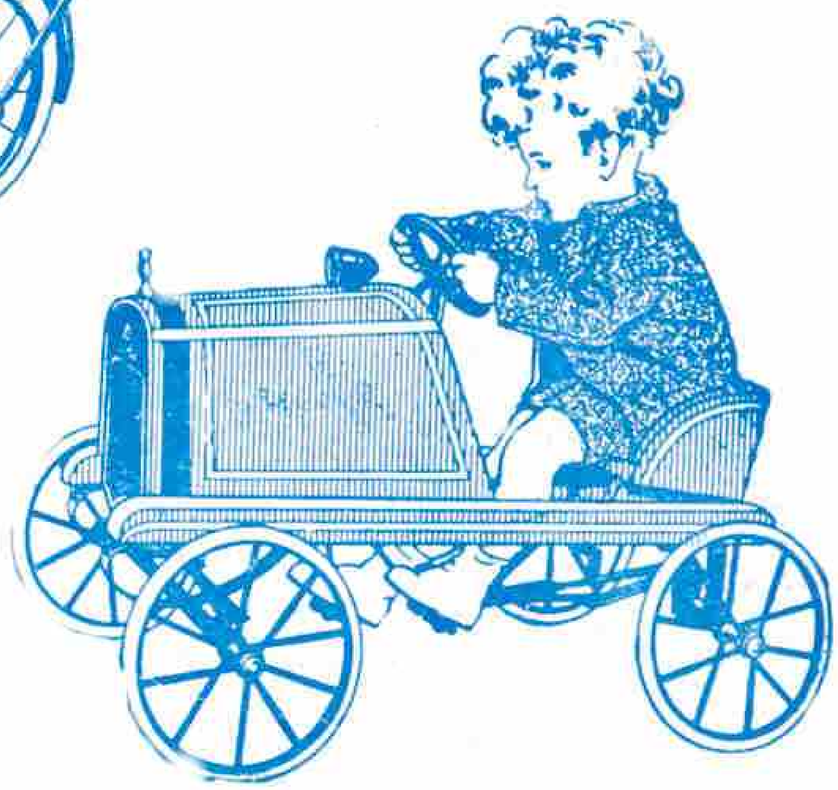
Regd. Trade Mark

The Fairycycle is a real Cycle—not a make-believe. It is beautifully constructed, and runs ever so easily. It is perfectly safe too.

REDUCED PRICE **39/6**

New Model Price **42/-**

Similar to Model A but includes new Patent combined Stand and Carrier; a great improvement.



The Pedal Fairykar

Regd. Trade Mark

Here is the very thing for the tiny chap. It is painted a gay, bright red, with nickel-plated handlebar and stem; rubber pedals, etc.

No. 4a No. 5a.

REDUCED PRICES **10/6 & 19/6**

These prices apply only in Great Britain.

Obtainable from all good Toy Shops and Stores.

Sole Manufacturers:

LINES BROS. LTD., 9, Fore Street, LONDON, E.C. 2.

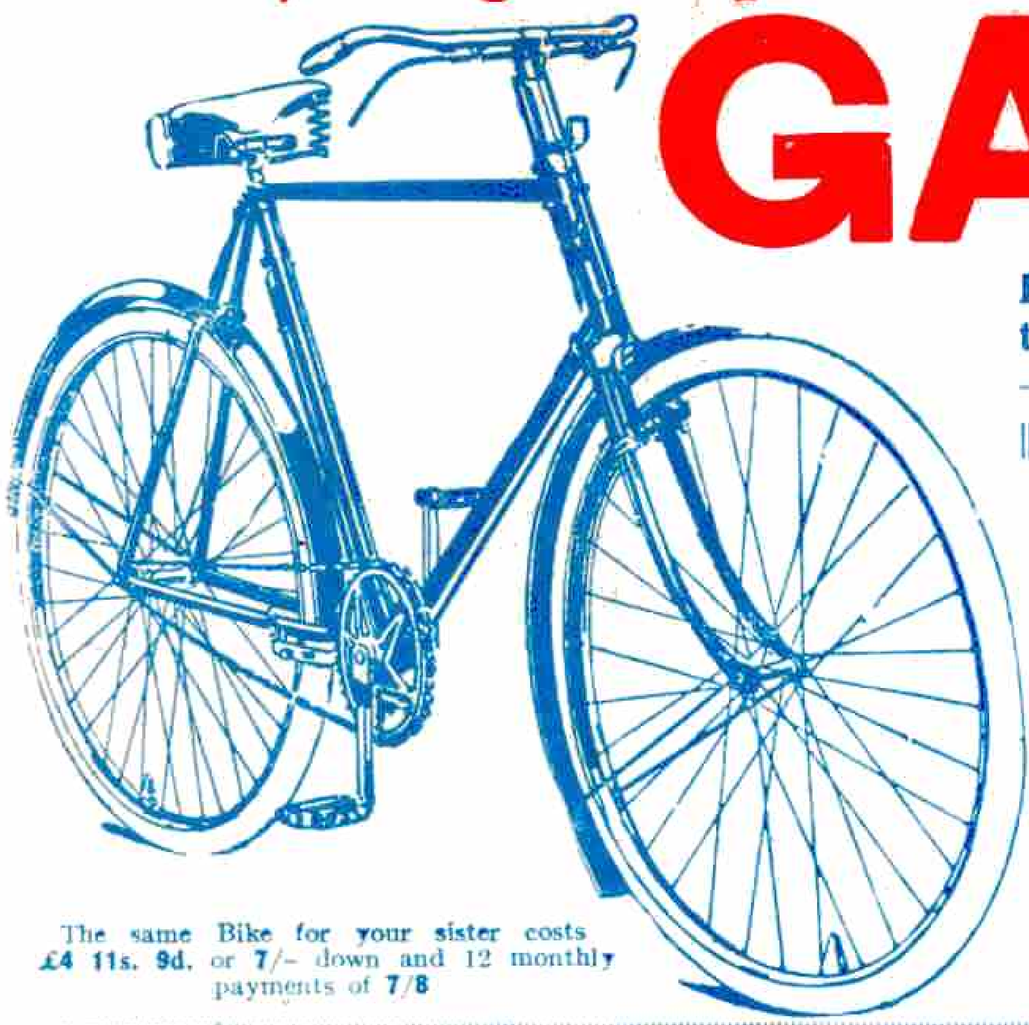
The Comet Motor

This smart little racing model is the very thing for boys and girls of 2½ to 5 years, and will stand plenty of rough wear.

REDUCED PRICE **21/-**

Cricket, Cycling, Camping, "Cup-hunting"
—every single requirement can be obtained cheaper at

GAMAGES



The same Bike for your sister costs **£4 11s. 9d.** or **7/-** down and 12 monthly payments of **7/8**

If you live too far away to actually visit this Wonderful Store—write to Gamages for their Latest Free Illustrated Catalogue to be sent you —mentioning the particular game or hobby you are most interested in.

Ride a "Popular" Bicycle

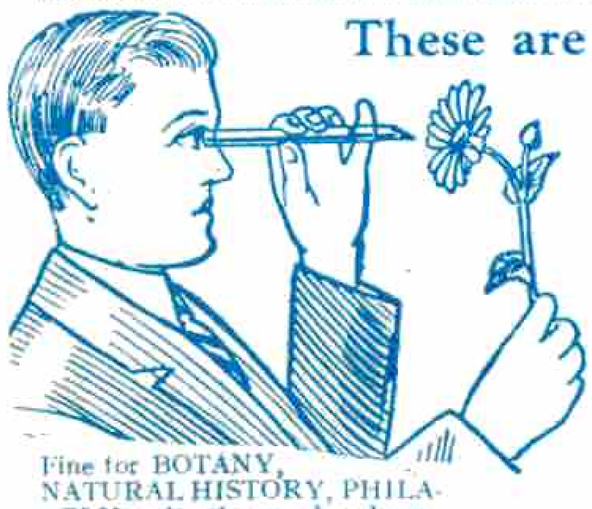
and get the utmost enjoyment from your Summer runs. Thoroughly reliable machines, they are fitted with our celebrated "Holborn" Cord Non-Skid Tyres and all fittings are of splendid quality. Frames are finished three coats of best black hand-polished enamel, artistically lined. Nickel plated Handlebars. 22in., 24in. and 26in. frames. Cash Price

£4 : 5s.

Get Dad to get you one on Easy Terms

7/- DOWN secures delivery! Simply pay your first deposit, take possession of your machine, and settle balance in 12 Monthly Payments of **7/-**

These are Good!



Pencil Microscopes—entirely new! Exceedingly powerful, magnifying 18 diams. The lenses are ACHROMATIC and consequently give magnificent definition.

Fine for BOTANY, NATURAL HISTORY, PHILATELY and a thousand-and-one other purposes. No "Meccano" Boy can be without one this Summer. Order yours right away before stocks run low. Post free. Price **5/-**

Get a "Designoscope"

—and get amazing beauty from the most unpromising material. By means of this wonderful invention you can produce glorious designs from bits of string, rags, leaves, tinsel—any old thing. Simple, easy to use, and requires no elaborate preparation. A wonderful asset to artists, designers, etc., etc. Post 4d. Price **4/11**

Get this Webley Pistol!

·177 or ·22 Calibre.

This Air Pistol is supplied in Box containing "Webley" special Pellets, spare Barrel Joint, Washers, and Cleaning Rod.

GUARANTEED ACCURACY

All Pistols before leaving the Factory are mechanically tested for accuracy up to 10 yds.

The Pistol illustrated is extremely accurate and highly recommended. Weight 22 oz. The Barrels are interchangeable. Price **30/-**

Extra interchangeable Barrels **10/-** net. ·177 Pellets, **2/6** per 1,000. ·22 Pellets, **2/6** per 500.

Model de Luxe specially designed for Target practice with adjustable backsight (both lateral and vertical), and special vulcanite grips at **40/-**

For the best shooting results use "Webley" Pellets.

COMPASSES

in brass cases, fixed metal dial 2" diam., with stop. Price **2/9**

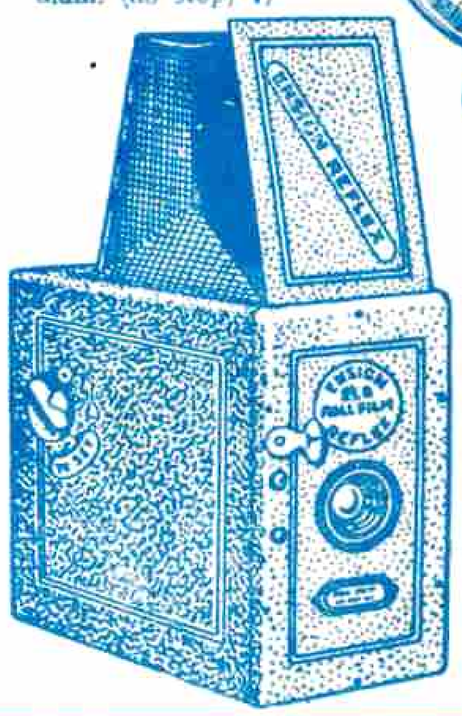
Do., Card Dial, 2¼ diam. (no stop) **2/6**

Do., Card Dial, 1 9/16 diam. (no stop) **1/3**

Do., Card Dial, 1¼ diam. (no stop) **1/-**

Hornby & Meccano Parts

Gamages stock all Hornby and Meccano Parts and will send them carriage paid to any address in the United Kingdom.



CAMERAS

Nearly Half-Price!

Get one of these Reflex Roll Film Cameras. Daylight loading for standard size Films, 2¼ × 3¼ British made by HOUGHTON. Takes beautiful pictures. List Price 38/6. Gamages Price to "Meccano" Boys

21/- Post 8d.

Films (any make) per spool of 6, **1/2**

Hundreds of Meccano Readers are ordering this Webley Air Rifle!

Power, Accuracy, Simplicity and Perfect Balance

Patented in all the principal countries of the world.

Only the best wrought materials are employed, and all component parts are interchangeable and easily obtainable. ·177 or ·22 Bore. BARRELS:—Rifled, and, being interchangeable, it is possible to have both calibres in one rifle. PISTON:—Fitted with Patent Rings, replacing the ordinary leather washer. SIGHTS:—Fitted with adjustable foresight laterally and backsight vertically.

WEIGHT:—5½ lb. LENGTH:—34 ins. Length of Barrel, 19 ins. Complete Booklets, giving complete Instructions for Air Rifle and Pistol, post free on request.

72/6 Price

Extra interchangeable Barrel, Calibre ·177 or ·22 **25/-**

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

and at BENETFINKS, CHEAPSIDE, LONDON, E.C. 2.

PUBLISHED BY MECCANO LTD., BINNS ROAD, LIVERPOOL.
Printed by Stembridge & Co. Ltd., Albion Street, Leeds.