VOL. XI. No. 2 FEBRUARY 1926

MECCANO MAGAZINE

Airships as Aeroplane Carriers. (See page 82)

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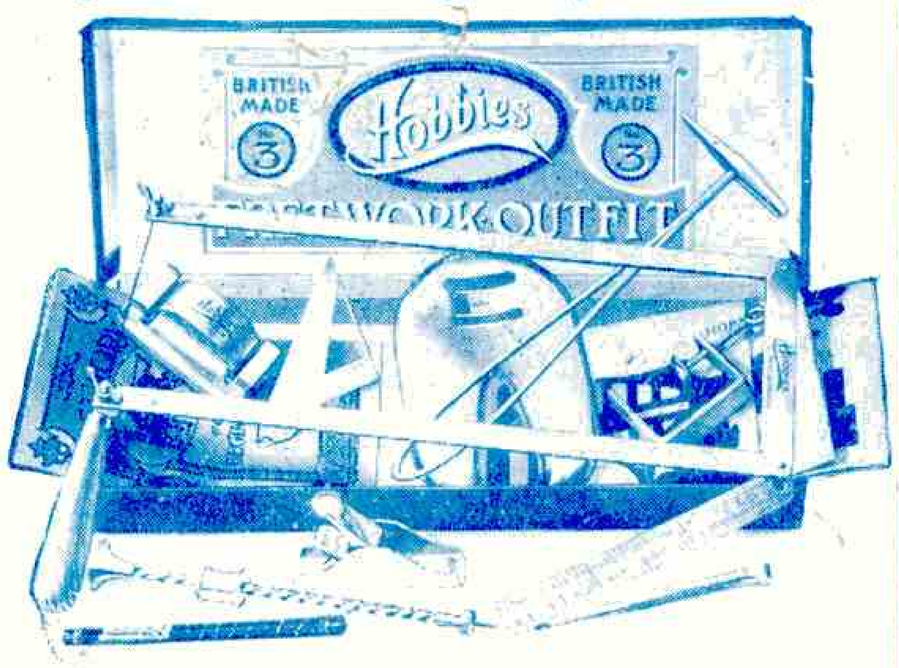

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MECCANO MAGAZINE

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February 1926

With the Editor

Engineering in 1925

It is always interesting in the early part of a New Year to look back on the engineering achievements of the previous twelve months. Even in 365 days so much happens in the engineering world, and so many things are accomplished, that many pages would be required to do the subject justice. In the small space at my disposal, I can only briefly refer to the chief events of the year, many of which have been described fully in the *"M.M."* This month I deal with Railway and Marine Engineering, whilst next month I hope to review briefly Civil and Electrical Engineering, and Air and Road Transport in 1925.

I think it is safe to say that 1925 will always be best remembered as a Railway Year for it marked the centenary of the opening of the first passenger railway. The history of the railway is one of which British engineers may well be proud, for in no branch of mechanical engineering do we owe less to foreign inventors. In no other country are more beautifully-designed, economical and efficient locomotives produced. It is because of this that British-made locomotives continue to enjoy their popularity overseas and that this country continues to receive orders for locos from the colonies and from foreign countries.

Locomotives Built in 1925

Perhaps the two most notable British locomotives constructed during the year were the L.N.E.R. three-cylinder "Mikado," and the "Garratt," the latter—now in service for banking between Wath and Penistone—making its first public appearance in July in the Centenary Procession at Darlington. Interest has been revived in the three-cylinder simple engine, as represented by Mr. Gresley's large locos, and in Sir Henry Fowler's three-cylinder compound engines, of which type large numbers were ordered. During the year at least two firms in this country have been engaged in the construction of turbine locomotives, particulars of which will be announced in the *"M.M."* as soon as available.

The G.W. Railway built 73 locos at Swindon, 10 of which were of the "Castle" type (4–6–0); 10 of the 2–6–0 Goods; 47 0–6–2T Goods and 6 2–8–0T Goods. A large number of repairs were carried out during the year, 1,060 locos alone being dealt with at Swindon. The L.M.S. Railway built 100 4–4–0 Midland compounds; 20 4–6–0 and 10 0–4–4 Caledonian passenger locos, 93 of which were in service at the end of the year. An order from the previous year was completed for 180, 0–6–0 freight tender locos. The Southern Railway added over 80 new locos including 40 of the "King Arthur" class.

In addition to these locos built by the railway companies, a large number of locos of all types have been constructed for home and abroad by private firms who specialise in this work.

Marine Engineering

In spite of the depression in the shipyards several notable vessels were launched and completed in 1925, including the largest motor-liner yet built, the "*Asturias.*" It is pleasing to find that Great Britain continues to hold the foremost place in the building of motor-ships, the total number completed during the year being 44, whereas our nearest competitor (Germany) built 30. Incidentally, it may be remarked that during the year we built the largest marine motor in the world, the cylinders of which are 35½" in diameter.

An order for a turbine steamer to work at a pressure of 550 lbs. to the square inch was regarded as a step forward, for the use of super-pressure steam at sea should result in as great an economy as high-pressure steam has effected in land work. Perhaps the time will come when pressures of 1,000 lbs. or even greater, will be regular practice. Here is a field that I commend to the attention of my older readers, for the subject is full of intricate problems and one in which there is scope for ingenuity and investigation. Not only will super-pressure steam call for a revision in boiler design, but it will lead to modifications in engine design just as Trevithick's high-pressure engine led to modifications in the designs of Watt and his predecessors.

Steamships in 1925

The battleships "*Nelson*" and "*Rodney,*" launched during the year, are the last capital ships that Britain will build until 1931. They are 720 ft. in length, of 35,000 tons displacement, carry nine 16 in. and twelve 6 in. guns, and have a probable speed of 23 knots. During the year further progress was made in the construction of five cruisers of the "County" class, which were laid down in 1924.

The Cunard line built three new liners, "*Axania,*" "*Alaunia,*" and "*Carinthia,*" all of which were of the single funnel class. The first two, 14,000 tons with an overall length of 540 ft., are fitted with twin-screw Parson's turbines of 8,500 shaft h.p. at 90 revs. per minute. The "*Carinthia,*" a 20,277 ton ship 600 ft. in length and a sister ship to the "*Franconia,*" is specially fitted out for round-the-world cruises. Her geared turbines give a total of 13,500 shaft h.p. at 90 revs. per minute.

Another notable ship built during the year is the "*Otranto,*" 20,000 tons and fitted with Brown-Curtis turbines of 20,000 shaft h.p. The P. & O. Company added seven liners to their fleet, four of the "Ranchi" class and three of the "C" class, all intended for the Australian Mail Service. The former are 570 ft. in length, 16,600 ton vessels fitted with quadruple expansion engines of 15,000 i.h.p. and oil-fired boilers. The "C" class ships are 545 ft. in length, of 15,000 tons and equipped with quadruple expansion steam engines. Other notable liners built during the year are the "*Llandovery Castle,*" 10,600 tons, 470 ft. in length, fitted with quadruple expansion engines of 7,000 i.h.p., and the "*Conte-Biancamano,*" 23,000 tons, 650 ft. in length, and the third ship of her type constructed for an Italian company. She is fitted with double reduction geared-turbines—the largest yet constructed for any mercantile vessel—of 24,000 shaft h.p. and her normal speed is 20 knots. Two other liners (built on the Clyde) were the C.P.R. ships "*Princess Kathleen*" and "*Princess Marguerite,*" 360 ft. in length and 6,000 tons register.

During the year several refrigerator ships and ships specially designed for the fruit trade were launched and completed. Special ships also were built, such as the "*Glenledi*" for the Canadian Lakes, and the "*Krisjanis Valdemars*" for ice breaking in the Gulf of Riga, both of which ships will be described in an early issue of the *"M.M."*

Next Month's "M.M."

In addition to our regular features our next issue, which will be published on the 1st March, will contain a special article by Dr. Hele Shaw, F.R.S., "The Young Engineer and Invention." It will also include a splendid account of a triumph of British engineering, describing the Giant Draglines at work on a huge irrigation scheme in India. In that issue I hope also to commence a new feature page "Our Wonderful World," which will deal with interesting inventions and discoveries in many branches of science.

The *"M.M."* may be obtained on the 1st of every month from any Meccano dealer or newsagent, price 3d., or may be ordered direct from this office, 2/– for six issues and 4/– for twelve issues. If any reader experiences difficulty in obtaining the Magazine, he should write to me, giving me full particulars of his difficulty.

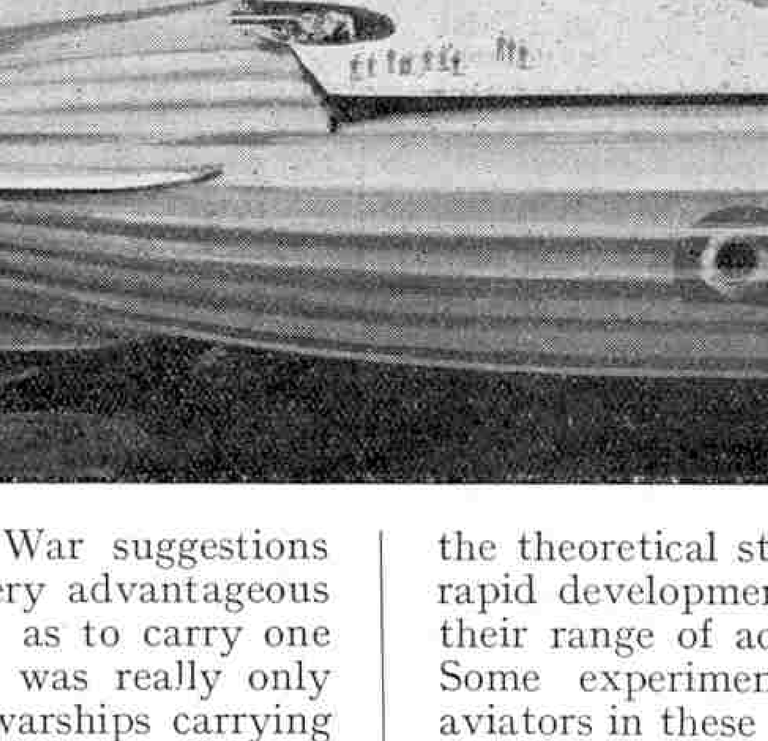
Aerodromes in the Sky:

Giant Airships of the Future will Carry Aeroplanes

DURING the early days of the War suggestions were made that it would be very advantageous if airships could be designed so as to carry one or more aeroplanes. This suggestion was really only a development of the earlier idea of warships carrying aeroplanes, which idea in its latest form has resulted in a light collapsible aeroplane being specially designed for use with submarines, being stowed away on board and assembled when the submarine is on the surface.

The suggestion that airships should carry aeroplanes seemed to provide a solution to the problem of employing aeroplanes at unusual distances from a base. The idea was, that the aeroplanes could be transported over the first part of their journey by airship and thus start out from an advance position with a full supply of fuel and oil, and so be able to fly to a greater distance than was usually possible.

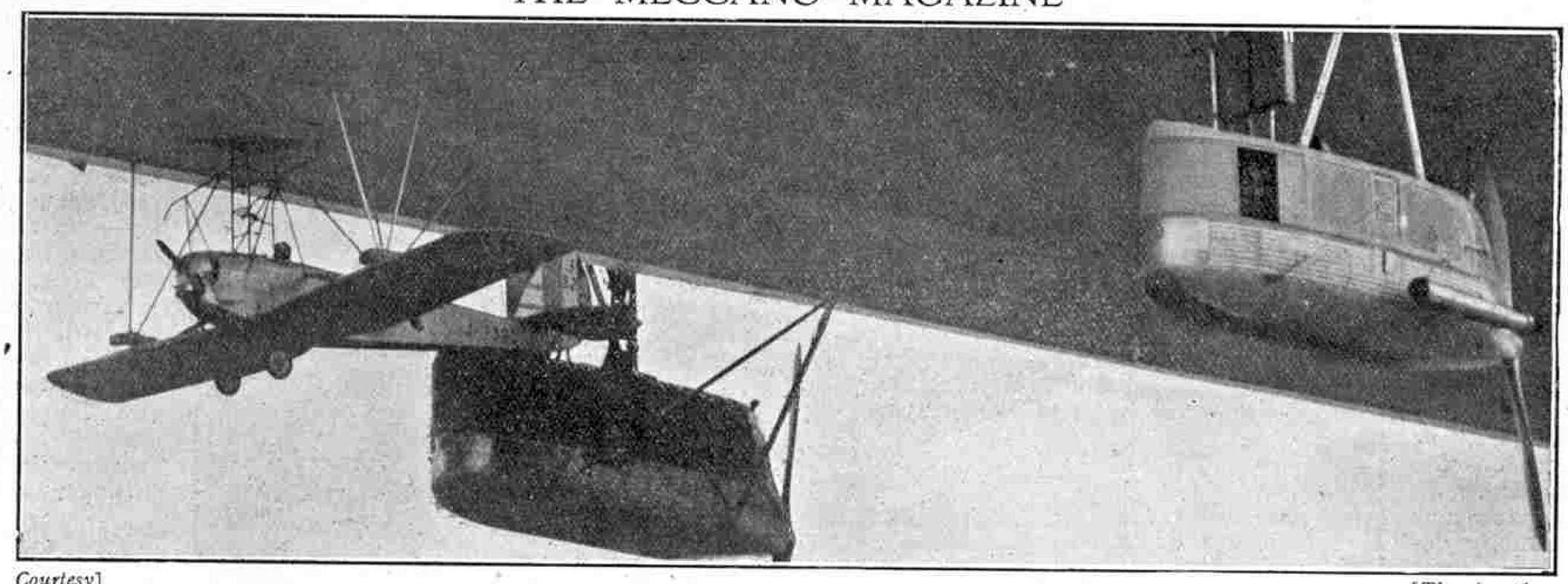
When originally suggested the scheme never went very far beyond the theoretical stage, chiefly because of the subsequent rapid development of aeroplanes themselves, by which their range of action was very considerably increased. Some experiments were actually made by British aviators in these early days, however, but they were not very successful. In at least one instance they even resulted in disaster, when, owing to a portion of the releasing gear failing to act at the critical moment, the daring pilots were thrown out of their machine when some 3,000 ft. up, and were dashed to death.



Experiments of a similar nature were also carried out in America, in connection with one of the smaller airships. Four years ago, also, at Rockaway, New York, an airship was fitted with a cable and winch from which a JN type aeroplane was suspended.

A hook attached to the cable engaged in the ring, allowing the 'plane to hang about 50 ft. below the airship. A special tripping device enabled the 'plane to be released.

Again in 1920, tests were made



Courtesy] [*The Aeroplane*

DROPPING THE PILOT. Squadron-Leader Haig in the D.H.53 ready to be dropped from H.M. Airship R.33

in this country with the British airship R.33 and a "Sopwith Camel" aeroplane, fitted with a bridle terminating in a ring. Flying below the airship and at about the same speed, it was not difficult for the pilot of the 'plane to engage the ring on the hook hanging from the airship, which thus was able to pick up the 'plane.

These experiments have recently been revived and in October last tests were again made with R.33. Between the control cabin of the airship and the two engine cars amidships, a two pronged fork was fixed, with the prongs pointing downwards. On either side of this fork were padded buffers. A metal tube, resembling a trapeze, attached to steel cables, was arranged so that it could be lowered from underneath the airship. The aeroplane was fitted with a steel guide, terminating in a spring clip fixed above the pilot's seat. This arrangement assisted the aeroplane in hooking itself on to the trapeze.

This contrivance operated when the aeroplane flew below the airship and at the correct moment darted swiftly towards the trapeze, grabbing it with its spring clip and remaining swinging below.

Immediately the manœuvre of catching the bar was accomplished successfully, the trapeze with its load was hauled up until the prongs of the fork touched the wings, when the padded buffers steadied the 'plane.

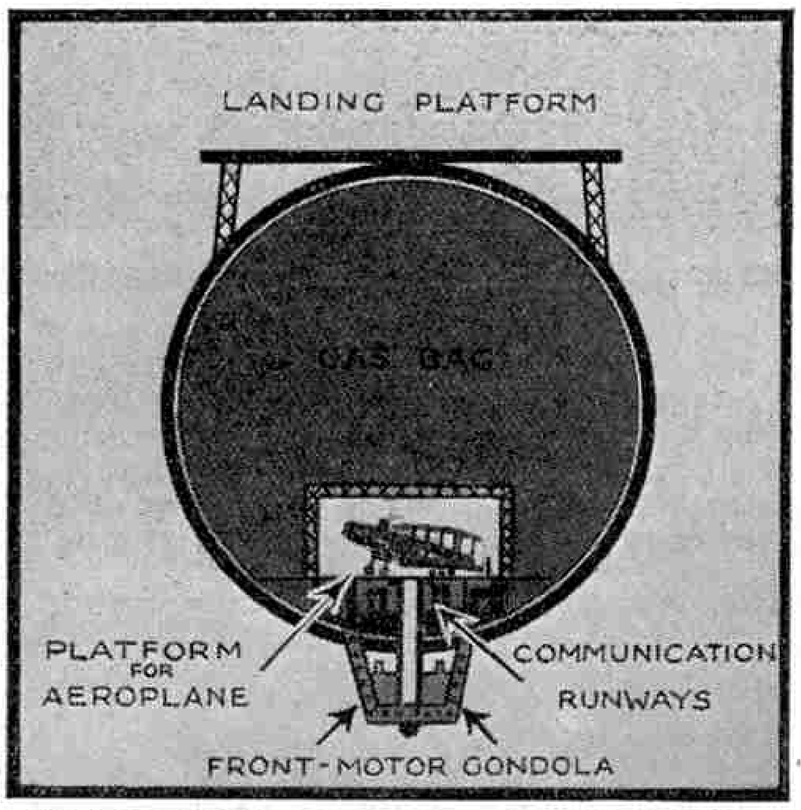


Fig. 1. Showing Storage Arrangements in Airship's Keel

Aeroplane Falls 200 ft.

The first series of the 1925 experiments with R.33 were carried out last October and were only partially successful. Major Scott, one of the leading British airship pilots, was in charge of the airship and the aeroplane was in charge of Squadron-Leader Haig, chief test pilot of the Royal Aircraft Establishment, Farnborough.

With the pilot in his place in the cockpit of the aeroplane attached below, the airship cast off from her mooring mast and rose to a height of about 3,800 ft. cruising slowly above the aerodrome. Squadron-Leader Haig then operated the hand release lever, and the aeroplane plunged earthwards. It continued in a steep dive for some 200 ft. when it recovered its equilibrium and a trail of blue smoke proclaimed that the rush of air had started the engine by revolving the propeller.

The aeroplane flew over and under R.33 for a few minutes and then endeavoured to hook itself on, as arranged, by flying along below the airship, which was then cruising at more than forty miles an hour. As the aeroplane drew near the trapeze, the pilot increased his speed until at the critical moment he swung its nose upwards and the spring clip engaged with the trapeze.

Another Disaster Narrowly Averted

At this moment an alarming accident occurred that might easily have resulted in disaster. The propeller of the aeroplane fouled one of the wires by which the trapeze was suspended. The terrific impact splintered the propeller and caused the 'plane to lurch dizzily forward. With great promptitude Squadron-Leader Haig rapidly operated his controls, and so was able to level his machine and release the spring clip. For the second time, therefore, the aeroplane detached itself and glided down to the aerodrome. Upon examination it was found that only the air screw had been affected, the aeroplane itself being undamaged.

More recently (4th December last) the experiments were repeated, with greater success, a D.H.53 being used. Once again Squadron-Leader Haig was the pilot. On this occasion he successfully disengaged his 'plane from the airship, manœuvred around R.33, flew along underneath her and finally re-engaged the trapeze, which was then wound up to the airship, Squadron-Leader Haig rejoining the crew.

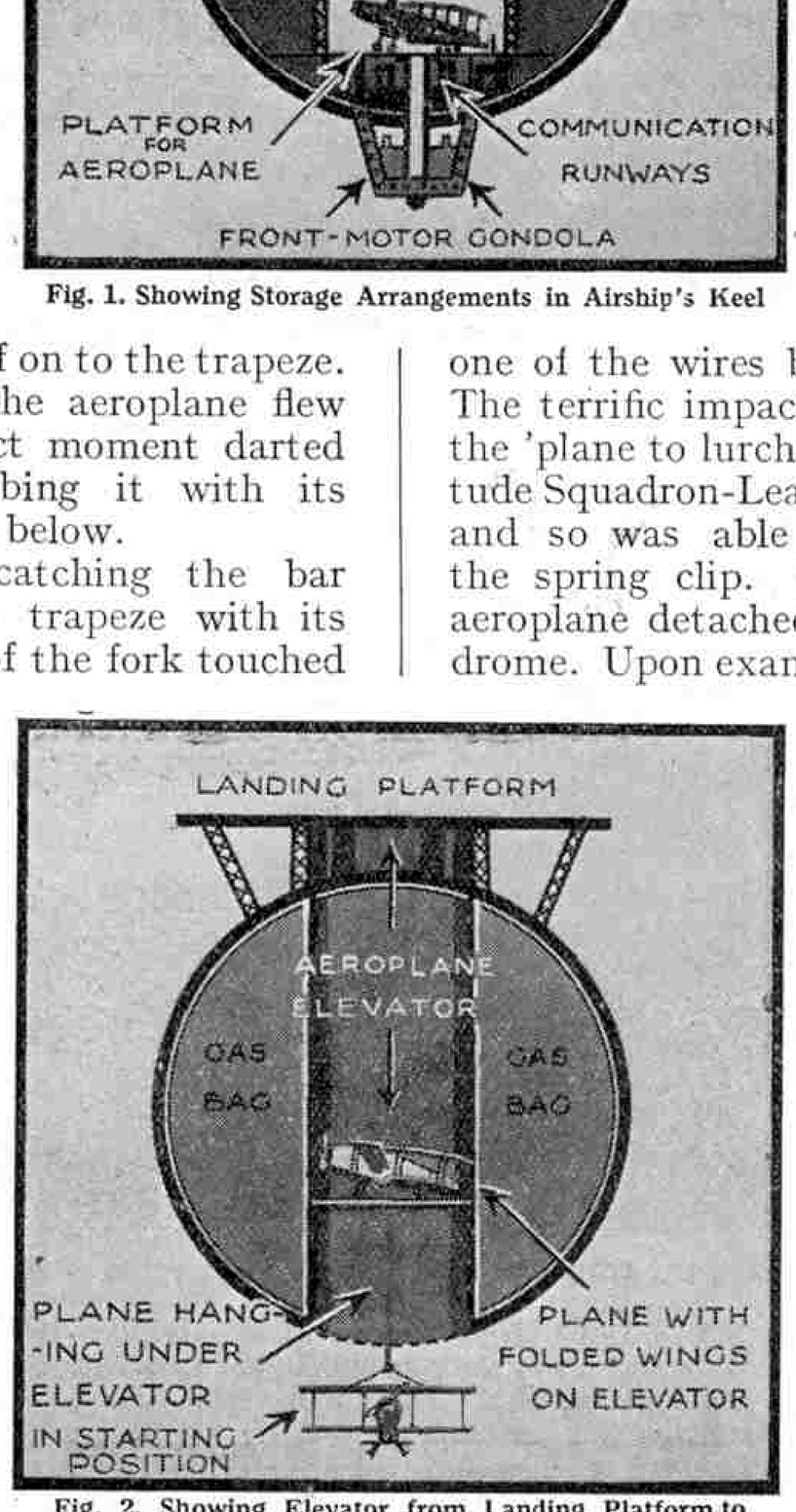


Fig. 2. Showing Elevator from Landing Platform to Storage Chambers

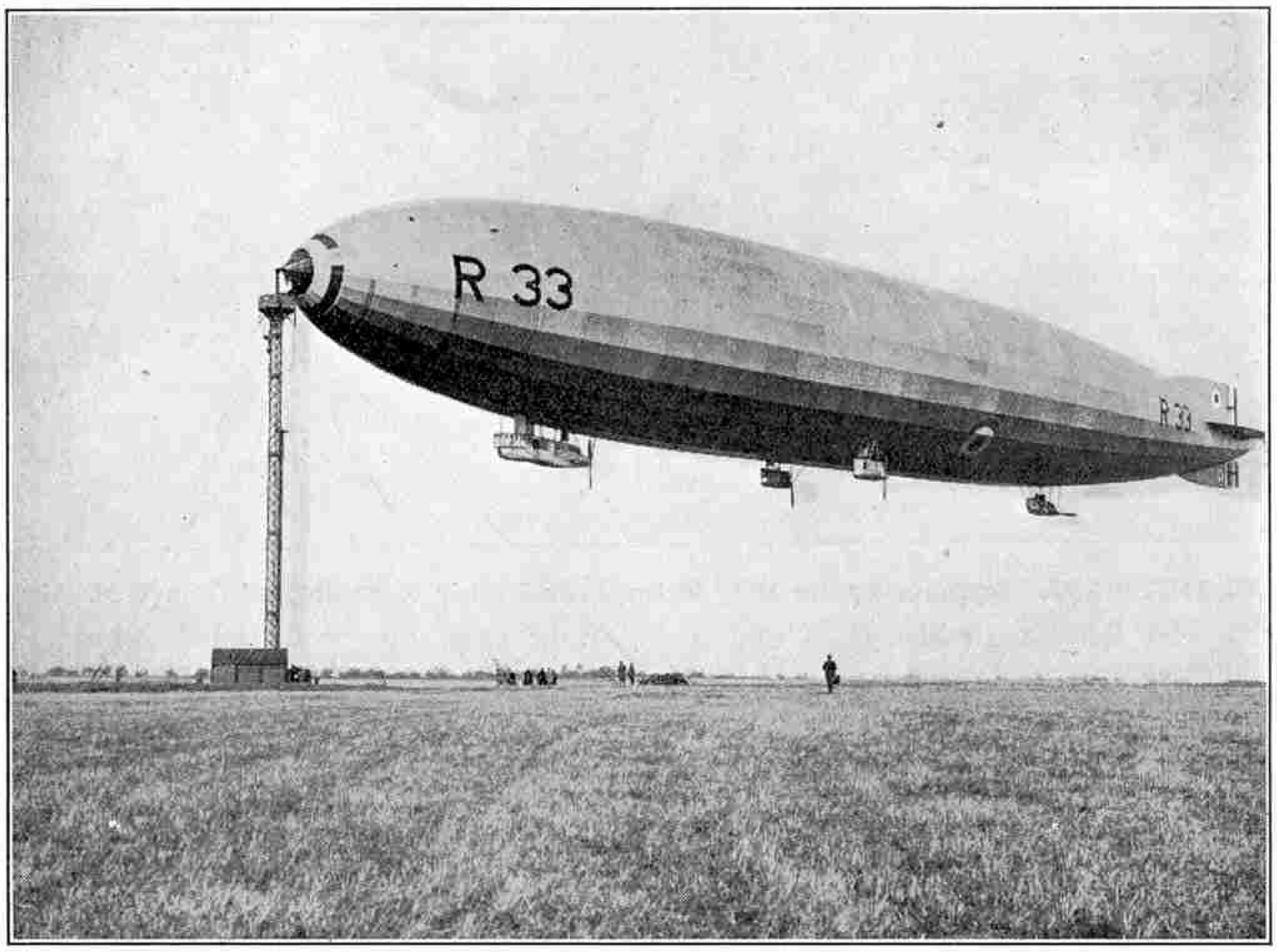
The Value and Purpose of the Tests

To some people it is not quite clear why these tests have been carried out, and they point out that the modern aeroplane, with

its range of 2,000 miles or over, has certainly no need of assistance from a "gas-bag!"

These champions of the aeroplane overlook the fact that the tests have been carried out with a view to the aeroplane assisting the airship—a "turning of the tables," as it were, on the original idea.

Airships are now being rapidly developed for commercial purposes and it is not at all improbable that in the future aeroplanes will be carried by, or attached to, airships to act as aerial life-boats in the event of an accident in the air. They may also be used to act as tenders for landing or embarking passengers and mails in mid-air at intermediate stations. Thus progress on the proposed long Empire air routes may proceed without the delay of the airship having to make a special landing at a mooring mast. On the other hand, when there is such a strong ground wind as to make landing difficult if not impossible for the airship, the passengers and mails could be taken off by aeroplane tenders, which would be infinitely preferable to landing them by the only other alternative of parachutes—though we imagine most of our readers would be quite willing (if not anxious, indeed!) to experience the thrills of a parachute descent, if such an opportunity presented itself!

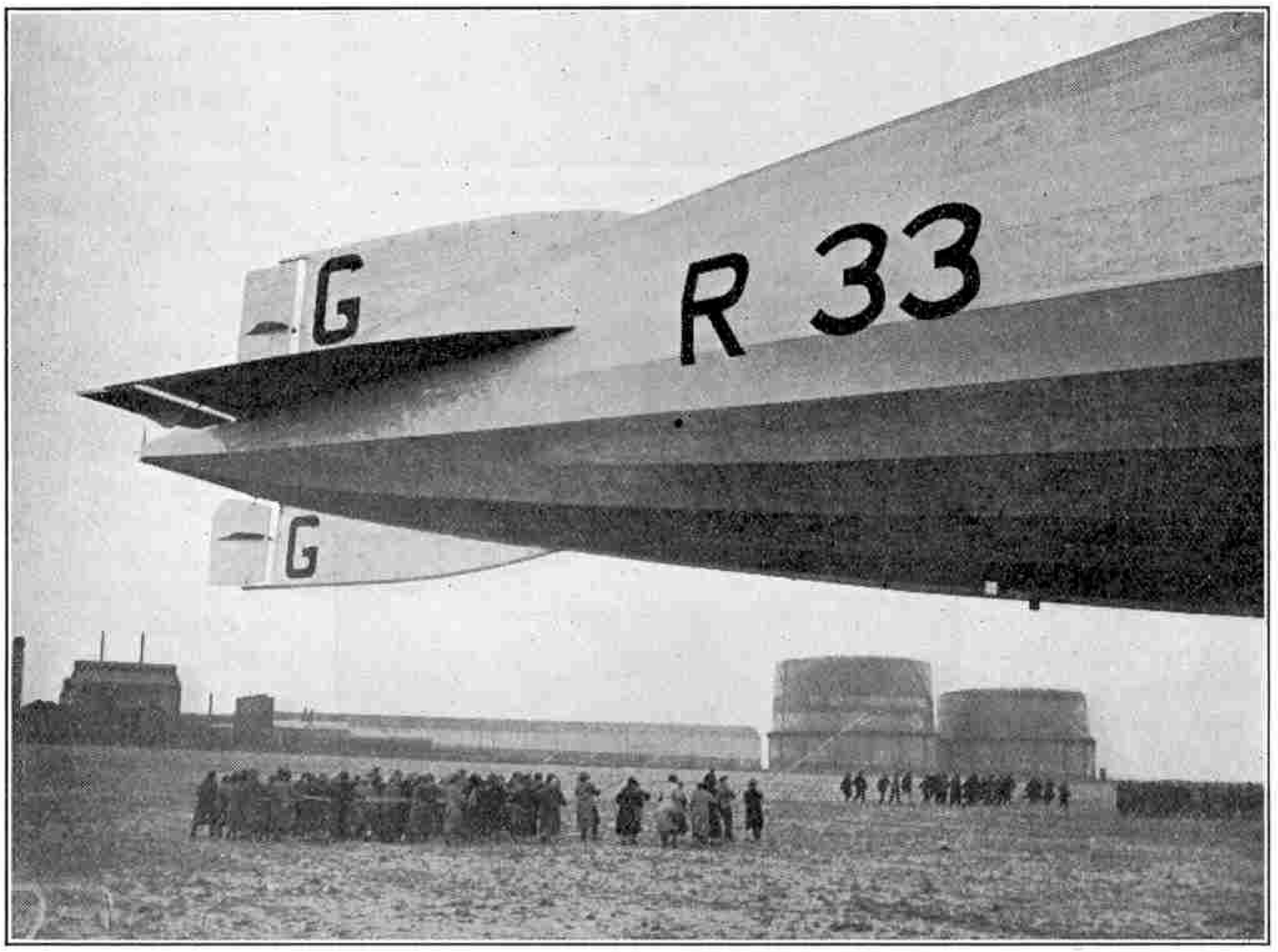


R.33 moored to her mast at Cardington, near Bedford

The New British Super-Airships

No doubt the R.33 experiments will serve a useful purpose and certainly further developments along these lines will be made in the future. The airship is as yet only in its infancy and it is destined to play an important part in world progress and development. On the sea, ships have in the past built empires and altered the destinies of nations. Now, in the air there comes a new kind of ship, which not only challenges time and space but brings an important influence to bear upon the trend of the world's events.

Even to-day our airships are as large as trans-Atlantic liners and are easily able to carry loads of about 15 to 20 tons in addition to their crews and supplies. R.33 has a capacity of 2,000,000 cubic ft. the same as that of the first rigid airship constructed in America—ZR.1, built at Lakehurst, New Jersey by the U.S. Navy. R.101, the new British airship now being constructed at Cardington, will be 720 ft. in length, and will have a capacity of 5,000,000 cubic ft.—over twice that of R.33 and the ZR.1. This leviathan of the air will have a speed of 70 m.p.h., will lift 155 tons, and be able to cruise halfway around the world without a stop!



Part of the ground crew holding the guy ropes of R.33

Airships of the Future

It is not difficult to imagine that in a few years' time even larger airships than R.101 will be built. Even if this super-airship is taken as being the limit of size she could well be fitted out for carrying aeroplanes. These in ordinary times would serve as "lifeboats" or tenders and in time of war as scouts or fighting 'planes, using the airship as an advanced base—an aerodrome in the air, in fact. It is not too much to ask even a practical mind to imagine the time when the naval airship of the future will carry ten or twenty aeroplanes, which will, at least, be capable of defending her from attack.

Then again the airship of the future will probably be designed as a troop carrier, for a fleet of super-airships could move an army to almost any point of the earth in a few days at the outside. Landing this army in the war zone would be the work of the attendant aeroplanes.

Arrangements could easily be made for landing platforms to be built on the top of the airships, as depicted in our cover design this month. The aeroplanes could also be launched from this platform, or they could be picked up and launched by means of special gear suspended beneath the airship, as was used in the recent tests with R.33. If necessary the aeroplanes could be launched direct from the keel by means of a huge trap door, which when

(*Continued on page* 130)

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.

Brickmaking in Ceylon

Few objects are more familiar to us to-day than the ordinary bricks used for building purposes, and this familiarity is apt to make us forget that the art of brick-making dates from very early times.

The ancient Babylonians used burnt brick for constructing their walls and many of their buildings, and we are told that the Tower of Babel was constructed of this material. The Assyrians used brick for building to a considerable extent and even used a kind of brick for their records, a great deal of the Assyrian literature being inscribed in tiny characters on tablets of baked clay.

We are all familiar with the brick-making labours forced upon the Israelites during their bondage in Egypt, their bricks being made of clay mixed with chopped straw, and probably dried in the sun. The historian Pliny records that three different kinds of bricks were made by the Greeks and we know that the Romans used bricks in large quantities and most probably introduced the art of brick-making into England.

Since these early days the art of brick-making has been developed to an enormous extent and thoroughly efficient machinery is now employed for carrying out the various processes. In certain parts of the world, however, brick-making is still carried out on very primitive lines. This is the case in Ceylon, and I am writing a short account of brick-making in this part of the world in the hope that it will interest readers of the "*M.M.*"

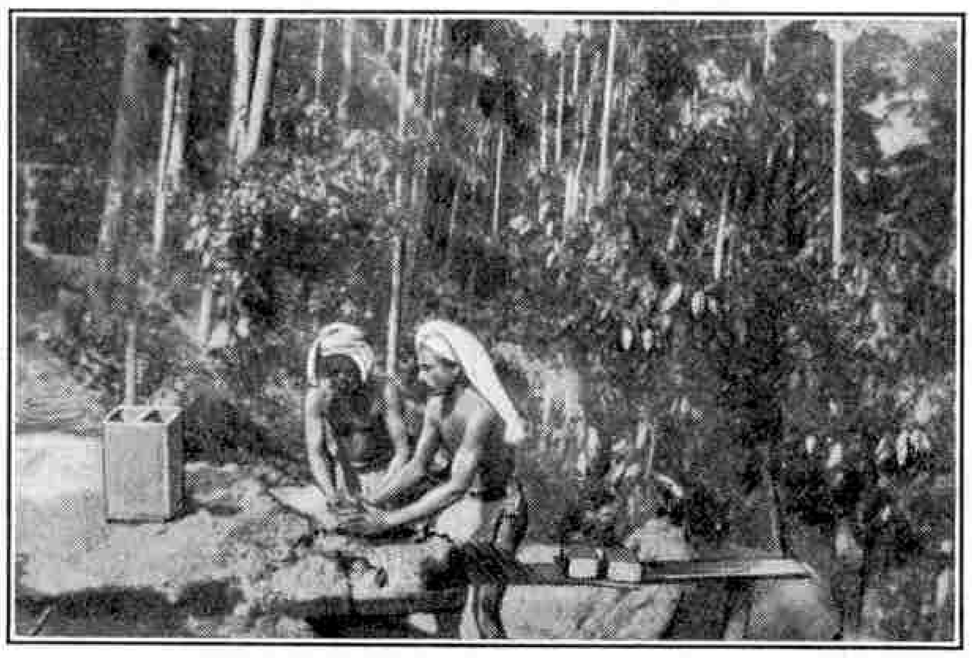


Fig. 1. Forming the Clay into Bricks

First of all, earth suitable for brick-making is cut and transported to the primitive factory in baskets carried on their heads by native workmen. This earth is then placed in a pit and trodden underfoot by a pair of buffaloes specially trained for the work. After a time the earth near the edge of the pit loses its original consistency and becomes clay, and it is then taken out of the pit and dumped in a heap.

The next process consists in forming this clay into bricks of suitable size by means of a wooden implement. These bricks are then placed on wooden slabs as shown in Fig. 1, and heaped up, the wooden slabs being removed as the bricks are placed in position (Fig. 2). The bricks are then left for a few days to dry in the sun.

When quite dry the bricks are built up in a sort of square enclosure called a kiln, and are so arranged that when a fire is lighted at the bottom its heat will rise up to the topmost layer of bricks, which is usually some 8 or 10 ft. above the fire. Baking for at least two days now follows, after which the bricks are ready for use.

The brickworks at which these photographs were taken has a staff of 10 and is capable of an output of at least 500 bricks per day.

B. K. Billimoria
(Kandy, Ceylon).

(*See also illustration on page* 118)

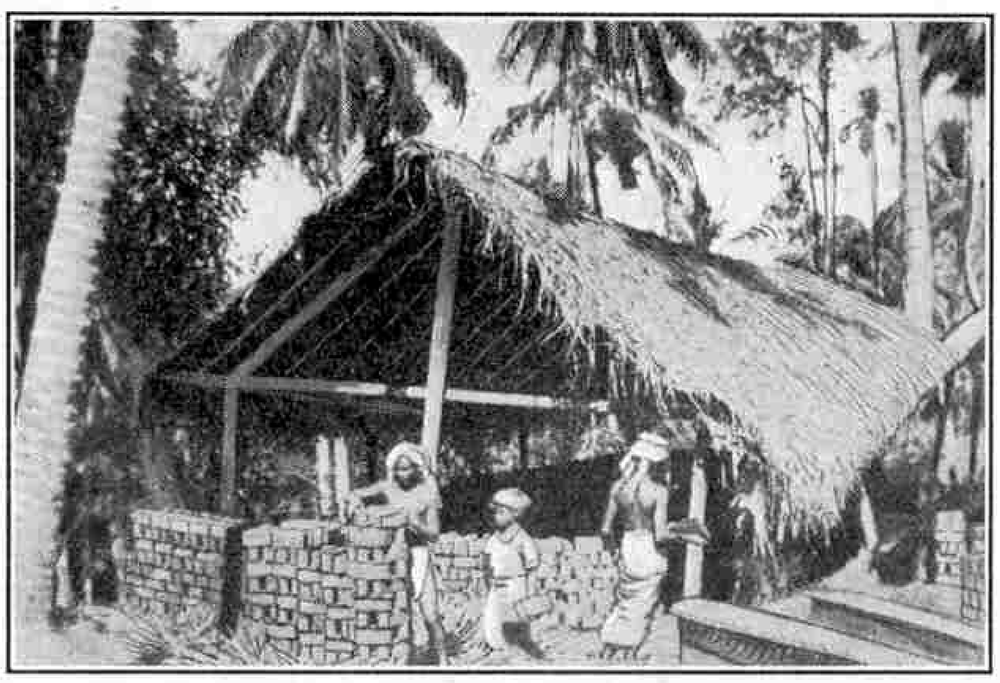


Fig. 2. Stacking the Bricks

Tasmanian Government Railways

Owing to the hilly country the railways of Tasmania have sharp curves and very severe gradients. Even the main line abounds in gradients of 1 in 40 and on other lines are to be found gradients as steep as 1 in 20. Nearly all the lines are State-owned and of 3 ft. 6 in. gauge, a few State-owned and private lines having a gauge of 2 ft. or 2 ft. 6 in. On the 3 ft. 6 in. lines the rolling stock is comparatively large — 9 ft. 6 in. in width and 12 ft. 5 in. in height. The size is limited only by the dimensions of the main line tunnel, and some locos and cars practically graze the roof as they go through, while the lateral clearance is only 1 ft. 6 in.

For general working 2–6–0 and 4–4–0 locos are used, while heavy freight trains are tackled by 2–6–2 : 2–6–2 "Garratts," weighing 100 tons, and 4–8–2 "Mountain" type locos, weighing 120 tons. The expresses are hauled by 120-ton 4–6–2 locos with 5 ft. 6 in. drivers. The principal express is the Hobart-Launceston boat express, which covers the 133 miles separating the two cities at an average speed of 31 m.p.h. This is really excellent considering the nature of the track and the fact that the maximum speed allowed is 45 m.p.h. The express usually consists of four cars with a total weight of about 80 tons, that is only two-thirds the weight of the loco that draws them.

L. Morrisby (Hobart, Tasmania).

MECCANO STANDARD MECHANISMS

Section IV. LEVERS

This article is the fourth of a series explaining some new and interesting aspects of Meccano Model-building practice. Gear ratios, Belt and Rope Mechanism, and Pulleys have been dealt with already, and the following article consists of a simple demonstration of the principle of the Lever.

LEVER OF THE FIRST ORDER

THE lever is the simplest and perhaps most valuable of the various mechanical powers, for it forms a useful medium for increasing or changing the direction of a force in cases where it would be impracticable to employ pulleys. The lever is classed in three distinct groups, and is said to belong to the first, second, or third "order," according to the relative position of the fulcrum, or point at which the lever pivots, to the "power" and the "load."

A lever of the first order is illustrated in Fig. 1. The upright member of this model is constructed from two $5\frac{1}{2}''$ Angle Girders (1) secured to the base (2) by $1'' \times 1''$ Angle Brackets (3) and held together at their tops by two $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets. A short Rod, which supports the lever, is passed through the upright and rigidly secured in a Crank bolted to the rear $5\frac{1}{2}''$ Angle Girder.

As will be seen, the fulcrum A is situated between the load D and the power F. In order to experiment with the properties of the lever, we must first counterpoise the weight of the arm AP. This may be done by adding a weight E to the arm AC, and in the example illustrated, which shows the beam pivoted in its fifth hole, 125 grammes and two $2\frac{1}{2}''$ Strips form the necessary counterbalance to AP.

Example 1

It will now be found that a power load of 50 grammes at B is sufficient to balance a load of 200 grammes at C; therefore this arrangement of the simple lever gives a mechanical advantage of four. The arm AB is 8" in length and CA only 2". As the radius of the point B from the fulcrum A is four times as great as that of the point C, point B must move through a distance four times greater than that through which the point C moves. This explains the mechanical advantage obtained in our model, for we have already seen in Example 2, Section III. (December *M.M.*), that a power is increased proportionally to the distance through which it moves.

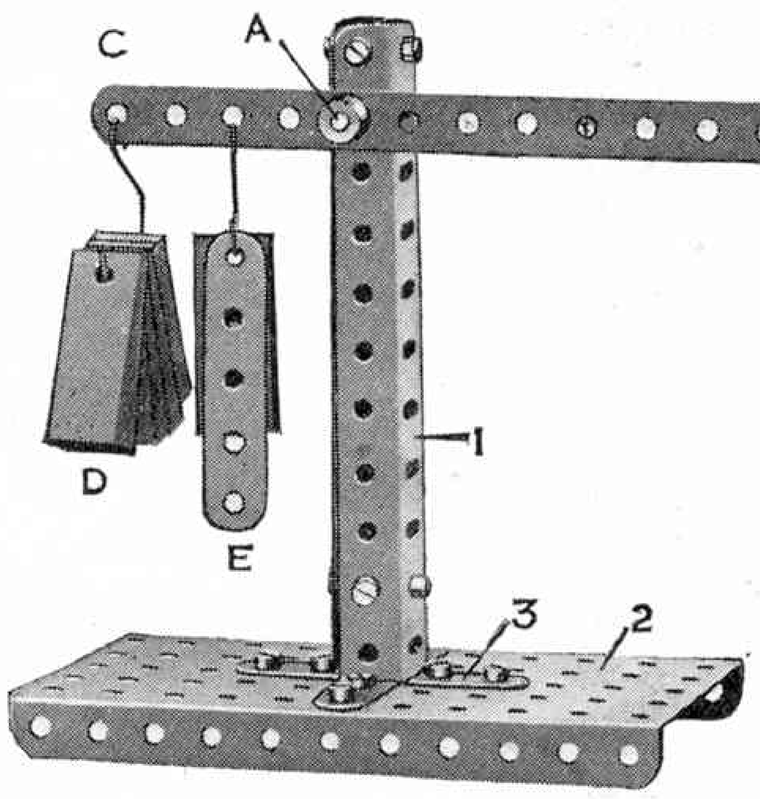


Fig. 1

Example 2

We may further prove this rule by changing the position of the power F to the point G, which is four inches from the fulcrum A. A power of 100 grammes is now found necessary to balance the load D, for G moves through a distance only twice as great as C.

Example 3

The rule may be expressed more generally by stating that the power is to the load as the distance of the load from the fulcrum is to the distance of the power from the fulcrum. By applying the rule, we may ascertain the power required to raise any given load, providing we know the lengths of the two arms of the lever.

Suppose for example, that it is desired to raise the load at C (200 grammes) by applying a power at the point P in the lever. The distance of the load (C) from the fulcrum (A) is 2", and the distance of the power P from the fulcrum (A) is 10". Therefore CA is only one fifth as great as AP; and since the power is to the load as CA (the distance of the load from the fulcrum) is to AP (the distance of the power from the fulcrum), then the power required is only one fifth as great as the load. Hence we find that 40 grammes at P will balance 200 grammes at C.

Further interesting experiments may be carried out with this model by altering the positions of the power and load, or by moving the fulcrum in either direction along the lever. In the latter case, it should be remembered that the weight E must be readjusted to balance the altered length of the arm AP.

LEVER OF THE SECOND ORDER

In levers of the second order, the fulcrum is at one end, the power at the other, and the load lies between the two. This type of lever is shown in Fig. 2, in which A is the fulcrum, B the point at which the load D is applied, and C is the power.

The upright column (1) in this example is constructed in a similar manner to that shown in Fig. 1, but in this case the Girders are $9\frac{1}{2}''$ in length. The Pulley (2) runs freely on a short axle, and is held in place by a Collar (3). A $12\frac{1}{2}''$ Strip represents the lever, and pivots about a short axle journalled in a Fork Piece (4) carried from a Coupling (5) which may be secured by

its set-screw in any position on the Rod (6). The latter passes through the upright Girders (1) and is secured in Cranks (7).

Example 4

The weight of the lever AC is balanced by placing 100 grammes and one 2″ Strip on the load-hook at D. In addition to these weights, the hook D carries a further 150 grammes to represent the load. The load-hook is suspended from a cord passing over the 2″ Pulley (2) and attached to the lever at B.

The power C is 12″ from the fulcrum A, and the point B, at which the load D takes effect, is 2″ distant. Therefore AC is six times as great as AB, and by applying the rule set out in Example 3 in this Section, we know that the power required at C to balance the load D is one sixth of 150 grammes, that is, 25 grammes. It will be found, however, that a slight addition must be made to the power C in order to actually raise the load D, the weight added representing the force lost in friction.

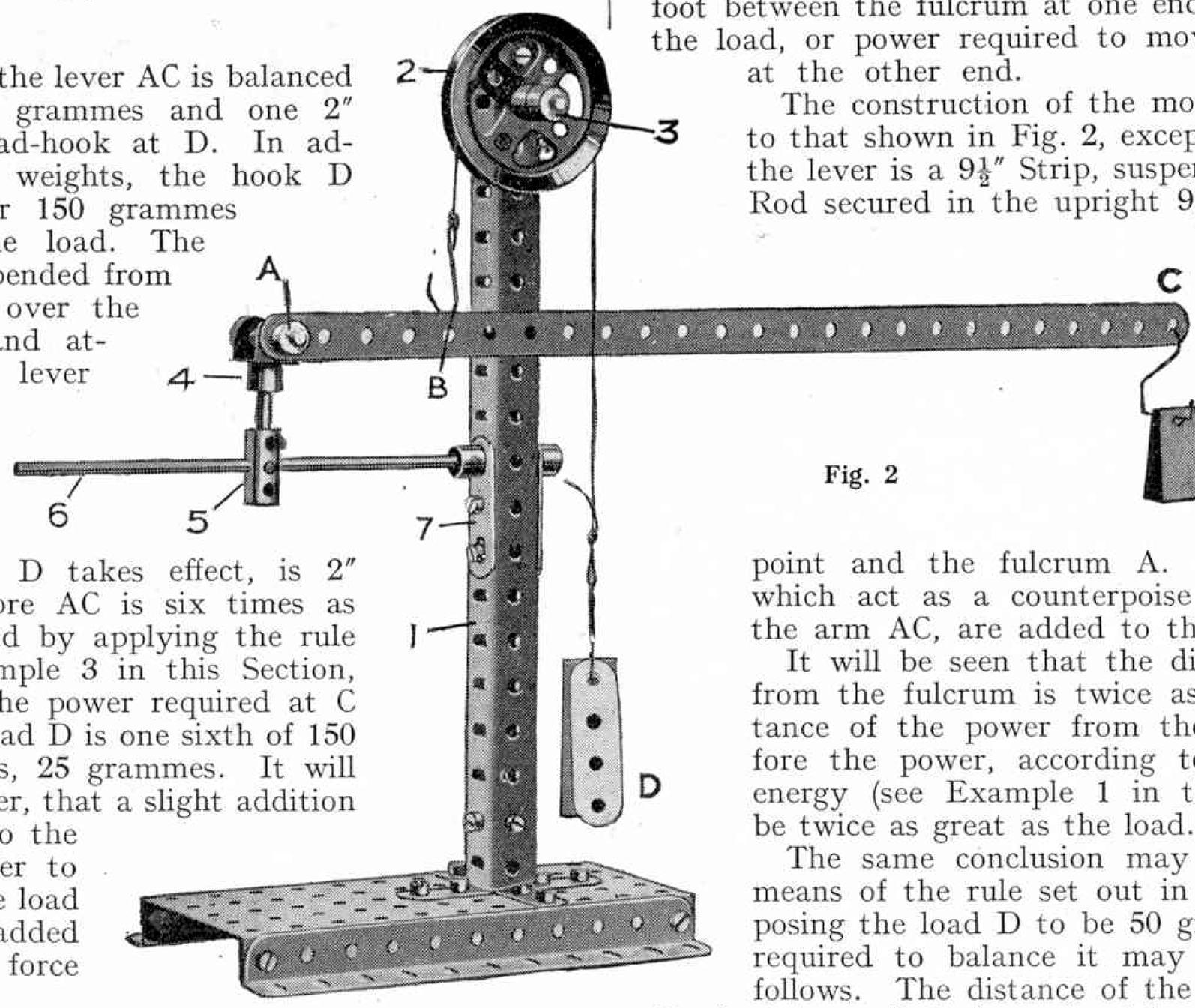


Fig. 2

Further experiments may be carried out with this model by sliding the Coupling (5) along the Rod (6) and altering the position of the point B, or by diminishing the distance of the power C from the fulcrum. In each case the rule set out in Example 3 will be found equally applicable.

It should be noted that whenever the distance of the point B from the fulcrum is changed, it will also be necessary to alter the counterpoise on the load-hook.

LEVER OF THE THIRD ORDER

In levers of the third order the fulcrum is at one end, the load is at the other end, and the power lies between the two.

This type of lever, which is illustrated in Fig. 3, is never employed when it is required to increase power; whenever it is used the power must always exceed the load. The advantage gained in its use is the fact that the power moves through a smaller space than the load. For this reason levers of the third order are usually employed as foot-treadles in such machines as lathes, grind-stones, etc., where the power is applied by the foot between the fulcrum at one end of the lever, and the load, or power required to move the crankshaft, at the other end.

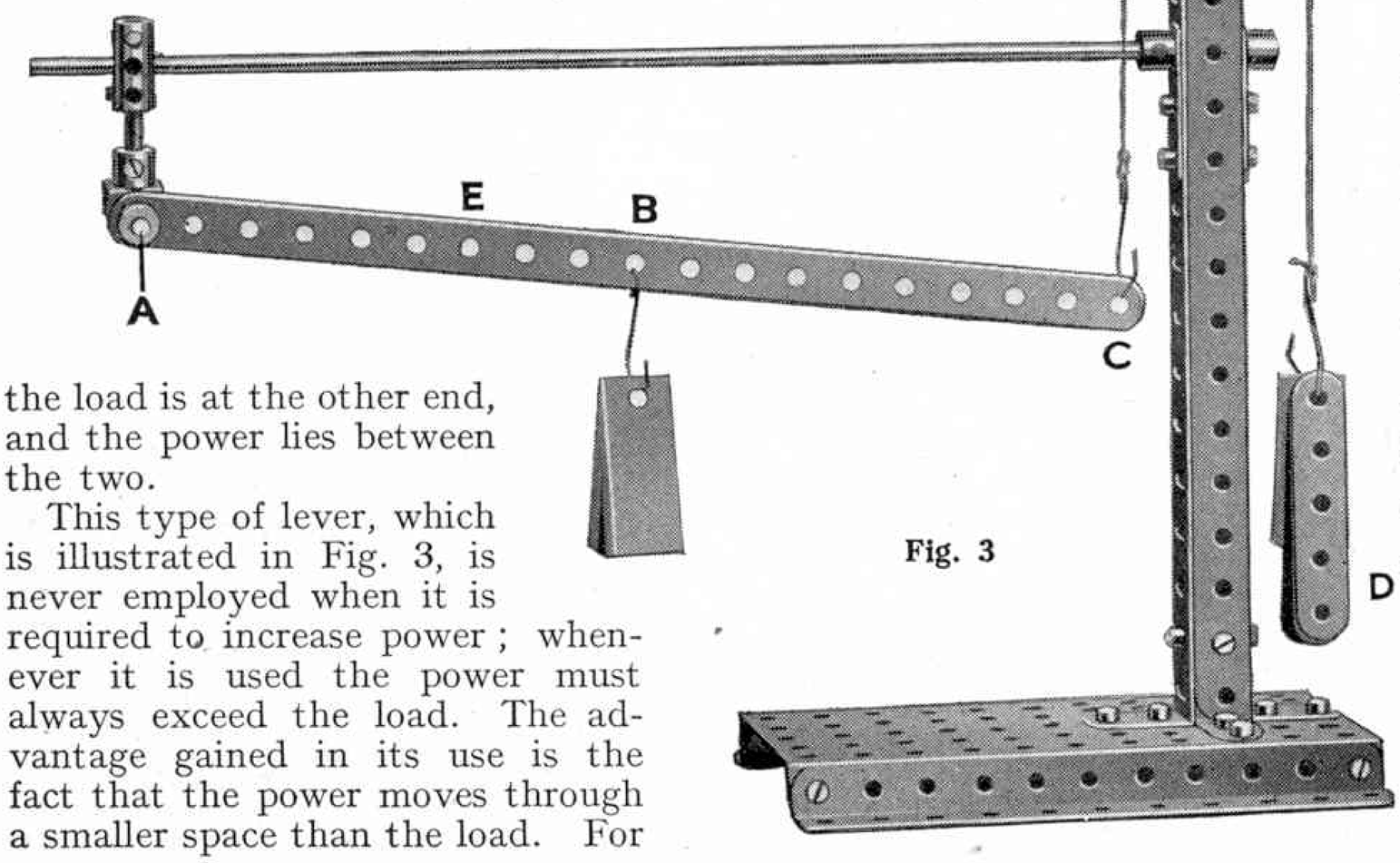


Fig. 3

The construction of the model is very similar to that shown in Fig. 2, except that in this case the lever is a 9½″ Strip, suspended from an 11½″ Rod secured in the upright 9½″ Girders.

Example 5

The load D is suspended from a cord passing over a 2″ Pulley and attached to the lever at C, the power B lying between this point and the fulcrum A. Three 2½″ Strips, which act as a counterpoise to the weight of the arm AC, are added to the load hook at D.

It will be seen that the distance of the load from the fulcrum is twice as great as the distance of the power from the fulcrum. Therefore the power, according to the principle of energy (see Example 1 in this Section), must be twice as great as the load.

The same conclusion may be arrived at by means of the rule set out in Example 3. Supposing the load D to be 50 grammes, the power required to balance it may be ascertained as follows. The distance of the point C (at which the load is applied) from the fulcrum is 9″, and that of the power B is 4½″; therefore AC is twice as great as AB. The rule states that the power is to the load as AC (the distance of the load from the fulcrum) is to AB (the distance of the power from the fulcrum). As the power must therefore be twice as great as the load, the power required is 100 grammes.

Example 6

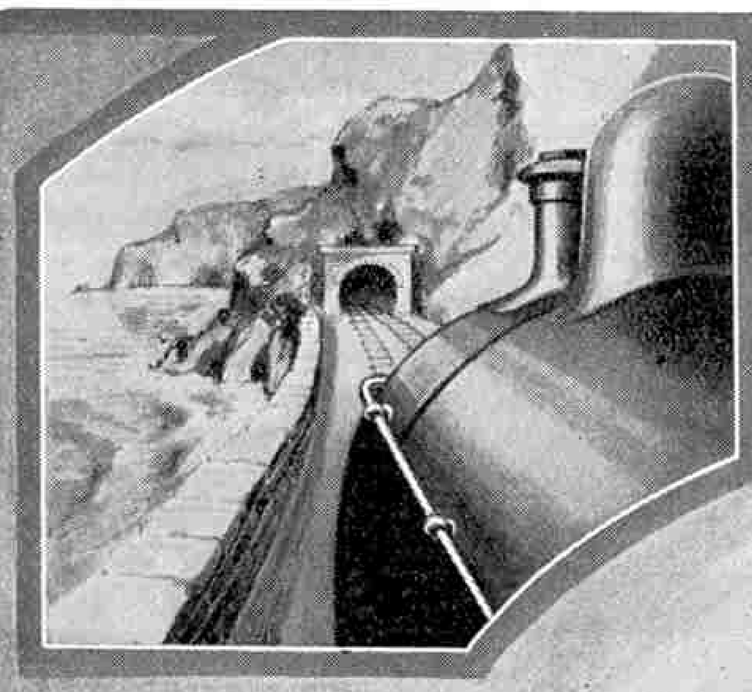
Again, we will assume that the load D of 50 grammes is to be raised by a power applied at a point E in the lever. As the distance from A to E is 3″ and that from A to C 9″, AC is three times as great as AE. Hence, by the same calculation as above, the required power is found to be 150 grammes.

Actual experiments will prove that the results arrived at from these simple deductions are perfectly correct.

NOTE. It may be mentioned that the weights used in these experiments are included in the Meccano Accessory Parts list. They are supplied in two sizes, 25 and 50 grammes (Parts Nos. 66 and 67, price 1s. each). Great care is expended in their manufacture to ensure absolute accuracy.

NEXT MONTH:—

EXAMPLES OF THE LEVER AS ADAPTED TO MECCANO MODELS



Railway News of the Month

Restaurant Car Facilities

Until recently there have been no facilities for obtaining meals on the Southern Railway trains running west of Exeter. This deficiency has been remedied and restaurant cars are now operating between Waterloo and Plymouth, Padstow and Ilfracombe.

* * * *

L.M.S. Mileage

Mr. John Quiry, Accountant-General to the L.M.S., giving evidence to the Railway Rates Tribunal, stated that the estimated yearly mileage to be run by the L.M.S. was 5,000,000 miles less than in 1924, the decrease being due to the cessation of the British Empire Exhibition traffic. He further stated that the Southern Railway was estimating on an increase of 5,000,000 miles in expectation of additional traffic due to electrification schemes.

* * * *

Underground Railway Link

A short tunnel connection is to be made at King's Cross between the Piccadilly and City lines of the London Underground railways. The new link will enable the rolling stock on the City line to gain access to the Piccadilly line to proceed to the Lillie Bridge repair depot. At present the repairs are carried out at Golders Green but the additional strain thrown upon the latter, consequent upon the opening of the Edgware extensions, has made it imperative to provide additional facilities.

The new tunnel will be 400 yards in length and 12 ft. 6 in. in diameter, and there will be a fall of 15 ft. in the level of the track from the Piccadilly to the City line. The former is 73 ft. and the latter 88 ft. below the street level at King's Cross.

* * * *

Projected Railway in Bermuda

The Bermuda House of Assembly has approved of the introduction of a Bill to sanction an electric railway from Hamilton to the capital, across the main island, with branches to various points. For many years Bermuda has maintained a ban upon all mechanical means of transportation, even motor cars being prohibited in the colony. The only mechanically-operated vehicles to be found in the island are used by the Public Works Department for road building. Recently, however, there has been considerable agitation for the introduction of more modern means of transport, and hence the decision to legislate for a light electric railway.

Electric Locos for Canada

Four new electric locos built by The English Electric Co. Ltd. have been sent to Canada to handle dockside traffic at Montreal for the Harbour Commission of that city. These locos run on two four-wheeled bogies and operate on direct current at 2,400 volts taken from an overhead cable. Equipped with four 130 h.p. motors, with electric camshaft control, each loco is capable of hauling a train up to 3,300 tons in weight. In order to facilitate shunting operations, double driving positions are provided at one end. Special attention has been paid to the design and construction in view of the severe winter conditions that exist in Canada.

* * * *

Garratts for L.M.S.

Messrs. Beyer, Peacock & Co. have received an order from the L.M.S. for three Garratt articulated locos for use on the old Midland main line between the Brent Sidings, Cricklewood and Toton. The locos will be of 2–6–0 : 0–6–2 wheel arrangement and, as the coupled wheels are 5 ft. 3 in. in diameter, they will be available for intermediate passenger working, although primarily intended for express goods traffic.

The bogie wheels will be 3 ft. 3½ in. in diameter, the rigid wheelbase 16 ft. 6 in., and the wheelbase of each engine unit 25 ft. 9 in., the total engine wheelbase being 79 ft. The four cylinders will be 13½ in. diameter by 26 in. stroke, and the boiler, the barrel of which will have a diameter of 6 ft. 3 in., will have a working pressure of 180 lb.

The superheater tubes will contribute 480 sq. ft. to a total heating surface of 2,660 sq. ft., the grate area being 44 sq. ft. The bunkers will hold seven tons of coal and the capacity of the tanks will be 5,000 gallons. The total "working order" weight will be 141 tons with a maximum of 18½ tons on each set of coupled wheels.

* * * *

Safety Device

A radio-controlled automatic safety device tested recently on the Père Marquette Railway, Michigan, is able to detect track obstructions many minutes in advance of the train's arrival at the affected point, and to flash a warning signal to the driver. If for any reason the driver should lose control of his engine, through illness for instance, the brakes are automatically applied and the train is pulled up at any danger point on the electro-magnetised track.

New Watford Line

In 1912 the Metropolitan Railway Company obtained Parliamentary sanction to its proposal to construct a connecting line between Watford and the Great Central Railway main line into Marylebone. The proposal was to create a triangular route between Sandy Lodge, Rickmansworth and Watford, the two former points being on the G.C.R. main line, which formed the base, the last, Watford, being the apex of the triangle.

At the time the Bill was presented to Parliament strenuous opposition was offered by the London and North Western Railway, which was widening the line between Chalk Farm and Bushey, constructing a line to connect the Rickmansworth line with the main line, and constructing a branch line to Croxley Green with the intention of electrifying the whole of the new service. The L.N.W.R. opposition was defeated and the Bill passed, but for various reasons it was found impossible to commence the work until 1922.

In expectation of the completion of the work, the Metropolitan Co. electrified their line from Harrow to Rickmansworth at the end of 1924, and in the early part of November of last year the new extension was opened. The three junctions of the triangle are worked from one signal box, with facing points, power operated, 460 yards distant, and day colour-light automatic signalling has been installed.

The Metropolitan Railway are operating an electric service into the City, while the L.N.E.R., as successors to the G.C.R., run a steam service into Marylebone.

* * * *

L.N.E.R. Building Programme

The London & North Eastern Railway announce that their 1926 programme for the construction of rolling stock has been formulated, a total expenditure of nearly £1,900,000 being foreshadowed. Of this amount, £630,000 will be spent upon the construction of 148 new locos for goods and passenger traffic, and in addition 7,400 new wagons of various types will be built at an expenditure of over £1,250,000.

Most of the work will be carried out in the company's own workshops, but the large quantities of material required will provide a considerable amount of employment for workers in the allied trades.

* * * *

During 1924 fifteen people were killed at public road railway level crossings and twenty-four at private footpath crossings.

New Kentish Light Railway

Considerable progress has been made with the scheme to construct a light railway between the towns of New Romney and Hythe in Kent, application having been made to the Ministry of Transport for the necessary powers under the Light Railway Order. Eight and a quarter miles of line are proposed, commencing at the terminus of the Southern Railway at New Romney and running via a route parallel to the existing coast road to Hythe.

The new line will serve Dymchurch and Jesson, both of which places have achieved popularity during recent years as summer resorts. The main interest in the line, however, is more in its direct challenge to the road motor service upon which the district is at present dependent. The track will be of the exceptionally narrow gauge of 15 inches and, therefore, will probably involve only a low initial expenditure.

* * * *

Oil Electric Locos

In a recent note we commented upon the low fuel costs of the oil electric loco, as compared with the steam loco, and it is interesting to learn that five of the present trunk line railways running into New York are ordering oil electric locos to replace the coal-burning type. It is estimated that if all the trunk lines employ these new locos the annual fuel bill would be reduced by £75,000,000 per annum.

* * * *

London Electric Extensions

The London Electric Railways are extending their line between Edgware and Highgate on the North and Charing Cross on the South to Kennington, at which point a junction will be made with the Clapham Common—Morden line. A circular loop is to be provided at Kennington to enable trains to terminate their runs and be reversed. Contracts for crossovers and sidings have been let and it is believed that the line will be ready for opening within the next seven months.

To cope with the additional traffic it is probable that the Charing Cross Station will have to be reconstructed.

Bridge Numbers

The L.N.E.R. have decided to allot numbers to the bridges on their system with the object of making them more readily distinguishable. This innovation will apply to all bridges other than the Forth, Royal Border, Tay and Berwick Bridges, which are well known by name.

Continental Electrification Developments

Rapid progress has been made with the electrification of the Stockholm and Gotebourg Railway, and it is anticipated that the electrification of the whole line should be complete by May. Fifty electric locos have been ordered and, of these, thirty-seven have already been delivered.

The Gotebourg line between Innsbruck and Bluenz is now entirely operated by electricity and the electric power station at Lake Spiller is supplying part of the power for the line already completed. The plant so far installed has a maximum capacity of 24,000 h.p., but when the electrification of the Salzkammergut line is completed, it is anticipated that there will be a considerable speed-up in the production and maintenance departments, and in addition an economy in coal amounting to nearly 130,000 tons per annum.

A Famous Pullman Train

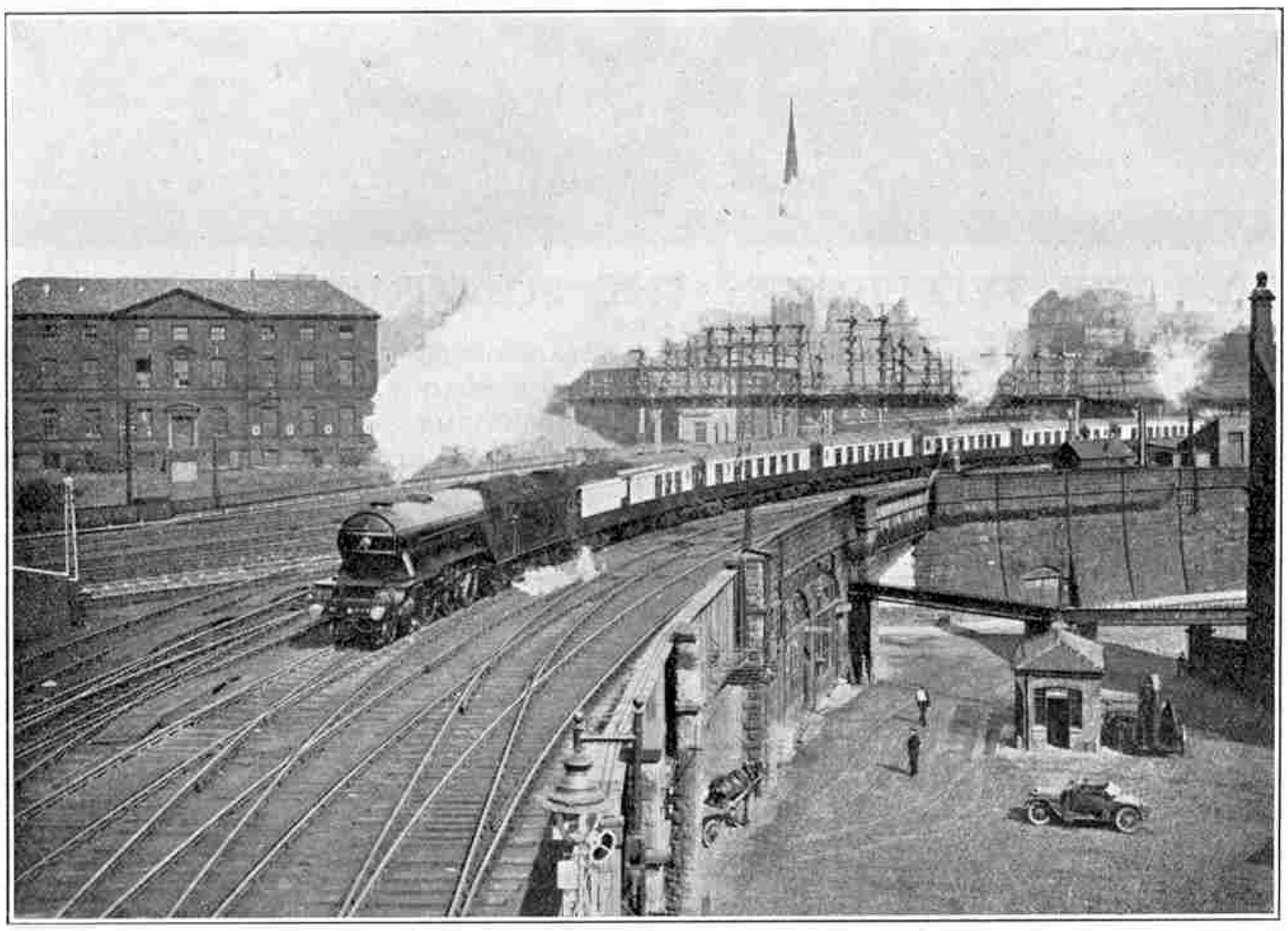


Photo courtesy [*L.N.E.R.*

The photograph shows the L.N.E.R. Harrogate Pullman leaving Newcastle Central Station (West end) for King's Cross, via the famous spa. The train is composed entirely of Pullman coaches, and is hauled by one of the L.N.E.R. Co.'s huge "Pacific" locos

New Station at Lucknow

A new station is in course of construction at Lucknow for the Oudh and Rohlkhaud Railway, and will consist of nine platforms connected by a subway at each end. A large bridge will be constructed to cross the whole station yard. The station would be more accurately described as two stations in one, since there are both metre and broad gauge tracks passing through.

* * * *

Concrete Floored Wagons

Experiments are being conducted in Germany with goods wagons constructed with concrete floors. It has been found that the wagons will withstand heavy concussions at a speed of 17 m.p.h. While the new type is, of necessity, considerably heavier than the ordinary wagon, its initial cost and cost of maintenance are appreciably less.

* * * *

New Locos for South Africa

The Rhodesian Railway has placed an order with the North British Locomotive Company for twenty 4–8–2 type locos, four of which will be fitted with the Lentz Poppet Valves. The engines will have cylinders 20¾ inches diameter by 26 inch stroke.

The Last of the "G.I.P."

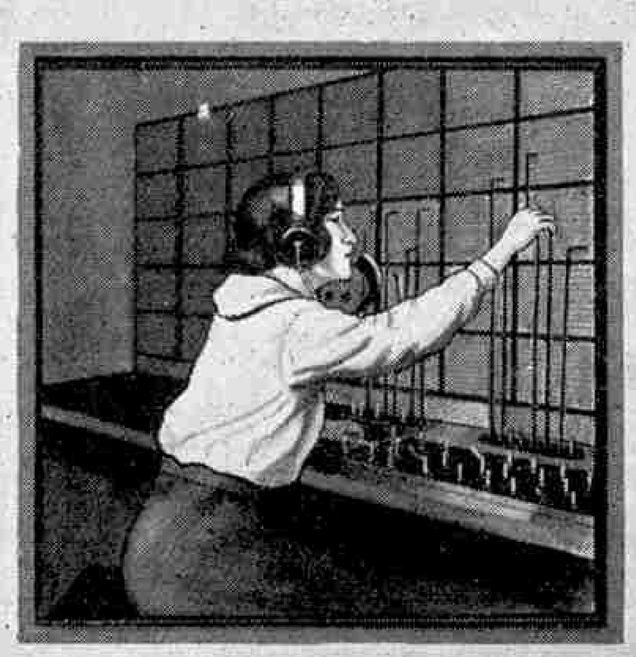
The Great Indian Peninsula Railway has been absorbed into the State system of railways in India, and its individual characteristics will be badly missed.

The company was formed in London in 1845, the first consulting engineer being Robert Stephenson, and the railway's motto was *Arte non Ense*—"By art, not by the sword." The G.I.P. was always one of the most progressive companies, and among its pioneer efforts were the introduction of dining-cars in the East, the fitting of continuous brakes and automatic couplers on all trains and the installation of automatic train control. Finally this line inaugurated the first electric railway in the Indian Empire. Among the G.I.P. locos are some of the heaviest and most graceful running east of Suez, and the newest passenger carriages, 12 ft. wide, are the largest of their kind in use.

* * * *

Railway Inventions

The German Railway Companies have set aside £2,500 to be used as prizes for employees who suggest valuable service improvements or introduce inventions of use for the railway. The scheme embraces all departments of the administration but the greatest importance is laid on technical ideas.



Electricity

XXIII. THE TELEPHONE: THE SUBSCRIBERS' APPARATUS

IN the article in this series last month we saw that the modern microphone transmitter acts as a sort of electric tap, regulated by the sound waves impinging on the diaphragm and controlling the strength of the current flowing through the wires at any particular moment. It translates the sound waves into pulses of electricity.

We saw also that the telephone receiver consists of a diaphragm vibrated by a pair of electro-magnets operated by the line currents, and that it produces a sound only when the current through it varies in strength. A steady current has no effect upon it and the larger the variations in the current the louder will be the sound that it produces.

Simple Telephone Circuit

One of the simplest possible telephone circuits is shown in Fig. 1, where the two receivers, the two microphones and a battery are connected in series. Such a circuit works well enough on a very short line but on longer lines the signals it produces are too weak for practical purposes.

The first great advance towards a perfect telephone circuit was due to Edison who, in 1878, removed the microphones from the line circuit itself and connected them to it through a transformer.

A transformer, as was explained in the "*M.M.*" for September, 1924, page 239, is an instrument consisting of two separate coils of insulated wire wound upon a core of soft iron. The principle of the transformer was discovered by Faraday, who found that when a fluctuating current was passed through one coil, known as the primary, another current was induced in the second coil or secondary.

In all transformers the electro-motive forces set up in the secondary coil are nearly proportionate to the relative number of turns of wire in the two coils. For instance, if the primary coil has 100 turns of wire and the secondary coil 2,500 turns, then the electro-motive force in the secondary circuit will be nearly 25 times as great as that in the primary circuit. Such a transformer thus raises the voltage of the current supplied to it. Similarly, by reversing the arrangement and having more turns of wire on the primary than on the secondary, the voltage of the original current may be lowered. In either case the total power of the current is not altered, for if the voltage is increased the amperage is correspondingly reduced, and vice versa.

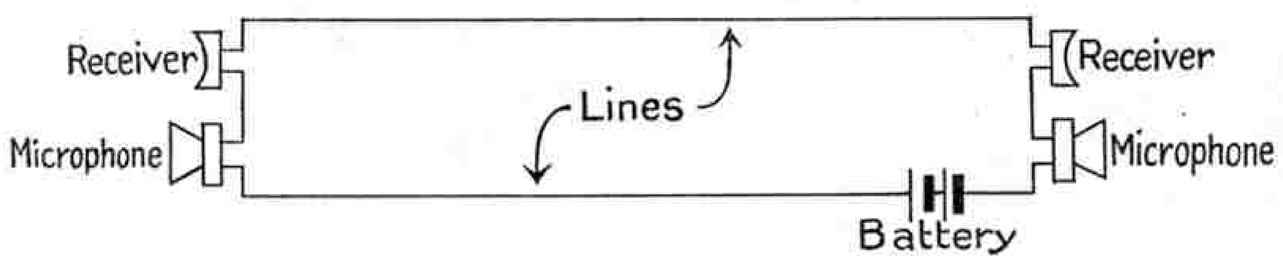


Fig. 1

In telephony it is found of great value to connect the microphones to the lines through transformers, which change the comparatively heavy current into a small current of higher voltage.

Edison's Improvement

This Edison circuit is the basis of the circuits of more than half the telephones in the world and is shown in Fig. 2, where R are the receivers, M the microphones, B the microphone batteries and T the transformers, or induction coils as they are usually termed in telephony. The resistance of the microphone circuits is now considerably reduced, so that the variation in the current flowing in these circuits is considerably increased for the same variation in the resistance of the microphones. The transformers further increase the variation and reduce the steady flow, and consequently this circuit is capable of producing loud signals over quite long lines.

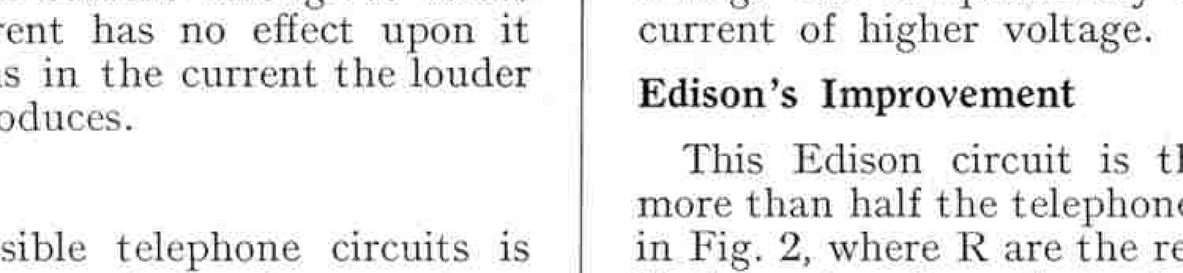


Fig. 2

The pioneers of telephony had many obstacles to overcome before the telephone could be made a commercial success, and not the least of these was the problem of how the caller was to attract the attention of the person to whom he wished to speak at the other end of the line. This person might not be in the same room as the telephone instrument, and it was obviously impossible to make the receiver produce sounds sufficiently loud to attract attention at distances of more than a few feet. It would have been easy, of course, to instal two additional lines and use them to form the circuit for an electric bell, but the extra expense of these lines would have been considerable and would

have constituted a serious hindrance to the adoption of the telephone by the general public.

Call Signal Difficulty

In order to be a practical success any telephone apparatus must fulfil three conditions. First, when the apparatus is not being used for conversation it must be ready to receive or send calling signals. Second, when the apparatus is being used for conversation it must not be able to receive or send calling signals; and third, all this must be accomplished by means of the two connecting lines between the stations.

It was not very long before this problem was solved, but the solution involved some complication of the apparatus at each end. It was found necessary to employ a switch that had to be moved to a certain position in order to carry on conversation, and moved again when calling signals were to be sent or received.

This scheme broke down because subscribers constantly forgot to move the switch, and particularly to return it to the signalling position when they had finished a conversation. As may be imagined, the result was to cause extreme annoyance and worry to subscribers and the telephone companies alike.

A Simple Solution

The final solution of the problem was brought about by mechanism so simple that, after it had been devised, it seemed incredible that no one had thought of it before. The offending switch was incorporated in the receiver hook. When the receiver is lifted off at the commencement of a conversation the hook, freed from its weight, is raised by a spring to a position that places the apparatus in position for conversation. When the conversation is finished the receiver is replaced and its weight pulls down the hook again and restores the apparatus to the position for signalling.

The circuit of one telephone outfit with signalling arrangements is shown in Fig. 3, in which the "talking" wires are shown thick. If the contacts A and C and the receiver hook H are joined to one another and to the pivot D, as is the case during the transmission and reception of speech, it will be seen that the circuit arrangements are the same as in Fig. 2, except that the wires ab, cd in Fig. 2 are represented by the one wire EF in Fig. 3.

When the hook H is up, the local microphone circuit is completed through the battery BB, the microphone M, the primary of the transformer T, and C, H and A. Also the line circuit is completed through the receiver R, the secondary of the transformer T, and C and D. Thus the conditions are correct for the reception and transmission of speech.

When the conversation is finished the receiver is hung on the hook H, moving it off the contacts A and C and on to the contact K. This switches off the speaking and hearing circuits and switches on the bell B and the generator G.

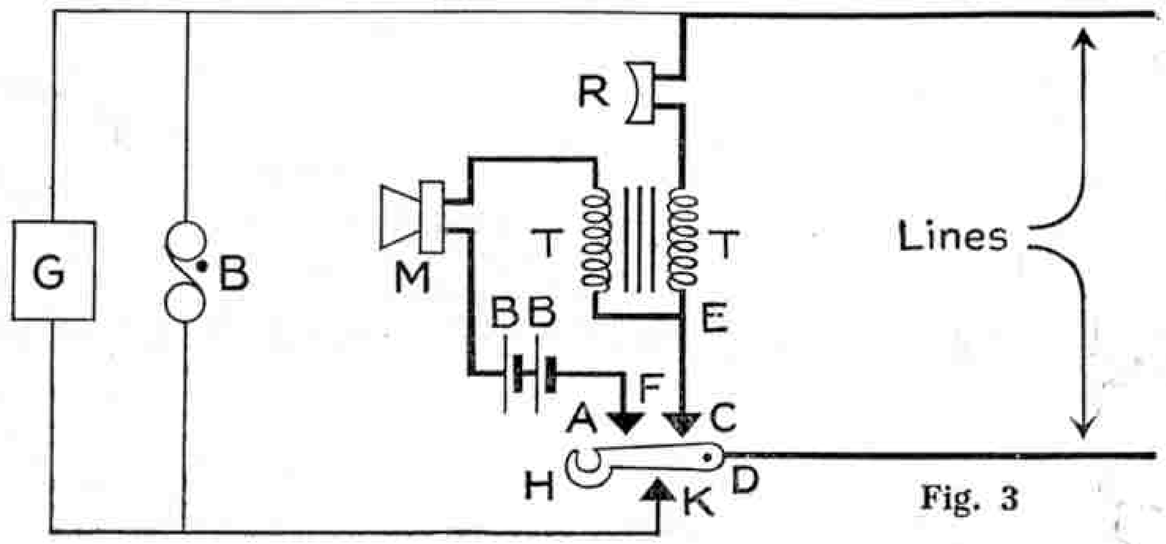


Fig. 3

Bell and Generator

The bell is of a special type consisting of two gongs with a hammer vibrating between. This hammer is operated by two electro-magnets associated with a permanent magnet and requires an alternating current to operate it. There are no "make-and-break" contacts as in an ordinary house bell, and this pattern is correspondingly more reliable.

The generator is really a small dynamo operated by the subscriber turning a handle when he desires to attract the attention of the exchange. It generates an alternating current of a kind suitable for operating the bell at the other end of the line.

An automatic switch is incorporated with the handle of this generator, which breaks the connection through it when it is not in use, so that when the station is called the whole of the incoming current passes through the bell.

Defect of "Local Battery" Systems

There are many variations of this circuit in which the connections are made in different ways. This is, however, probably the most popular of the so-called "local battery" systems, and is typical of them all.

It will have been noticed that this circuit necessitates a separate battery at every station. These batteries require renewing about twice a year and are a source of great expense to the telephone companies. When it is realised that in 1920 there were over 900,000 telephones in Great Britain and over 19,700,000 in the world, it will be understood how serious is the matter of these two calls per year on every subscriber using a local battery circuit. It was to avoid these calls that the "common battery" system was devised, and although a large part of the world still employs the old system, the new method is steadily gaining ground and doubtless will in time render the other obsolete.

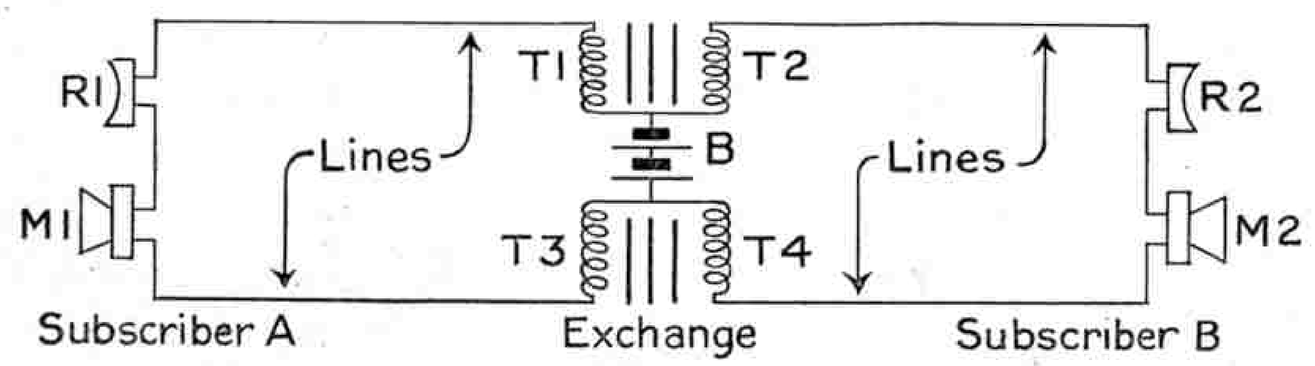


Fig. 4

"Common Battery" Method

In the common battery system, as its name implies, one battery situated at the exchange is used to supply current to all the subscribers. This battery is, of course, considerably larger than the primary cells installed at each station in the local battery system. Many circuits have been devised to enable all the subscribers to use one battery and at the same time lose nothing in efficiency, and also to avoid cross-talk from two subscribers not connected together. The Hayes common battery system is perhaps the simplest and we shall confine our attention to this type.

The connections between two subscribers, the lines passing through the exchange, are shown in Fig. 4.

(*Continued on page* 130)

The Conquest of the Air

All-British Metal Aeroplanes

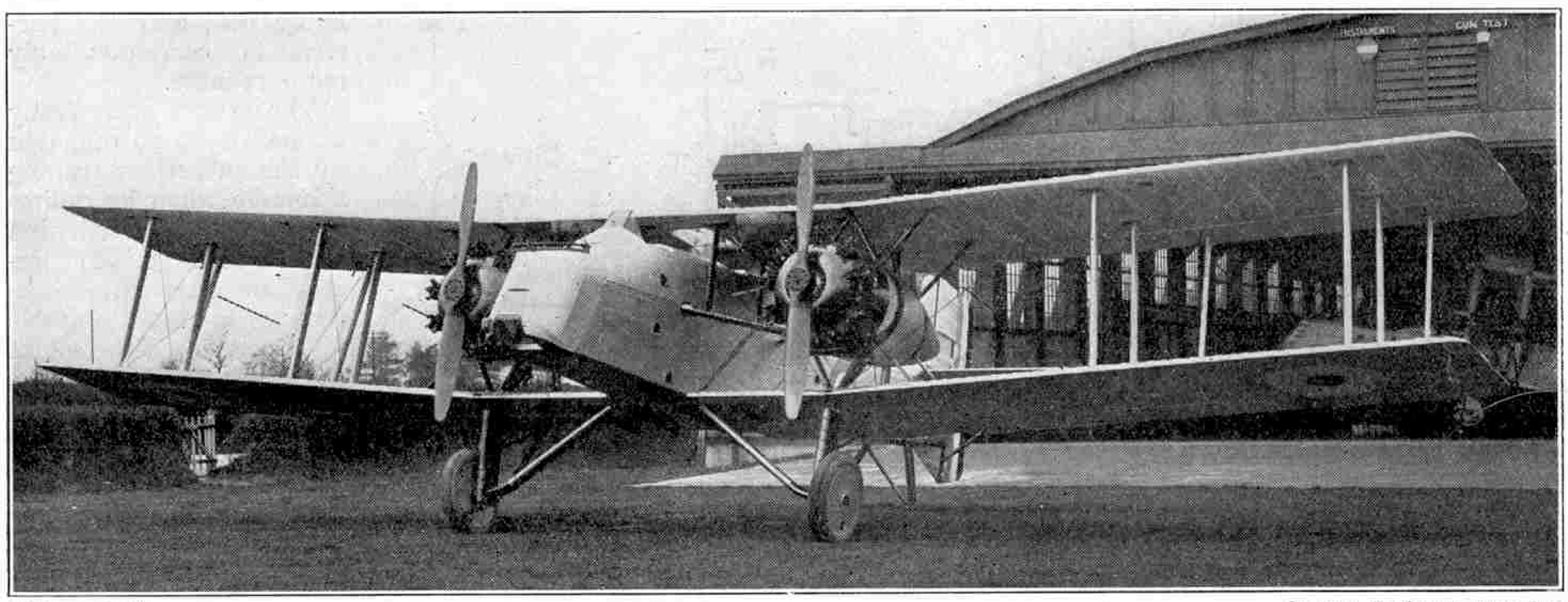


Photo courtesy] [*Messrs. Boulton & Paul Ltd.*

The Boulton "Bugle," Front View

IN our October issue some particulars were given of the Beardmore-Rohrbach system of metal aeroplane construction. We feel sure that readers will be interested to contrast the methods then described with those of a system, totally different in conception, that has been developed in this country by Messrs. Boulton and Paul Ltd., of Norwich, who have worked steadily at the problem of metal construction since the early part of 1918. In this connection it is interesting to learn that all the machines constructed by them during the past five years have been made entirely of metal, except for the fabric wing covering.

Lattice Girder Type of Structure

The accompanying illustration (Fig. 1) shows a skeleton view of the "Boulton," a high-performance reconnaissance and/or day bombing machine, designed for two Napier "Lion" engines, 450 h.p. each.

It will be seen that the usual lattice girder type of structure found in most wooden aeroplanes has been retained, as is the case in all the machines of this make.

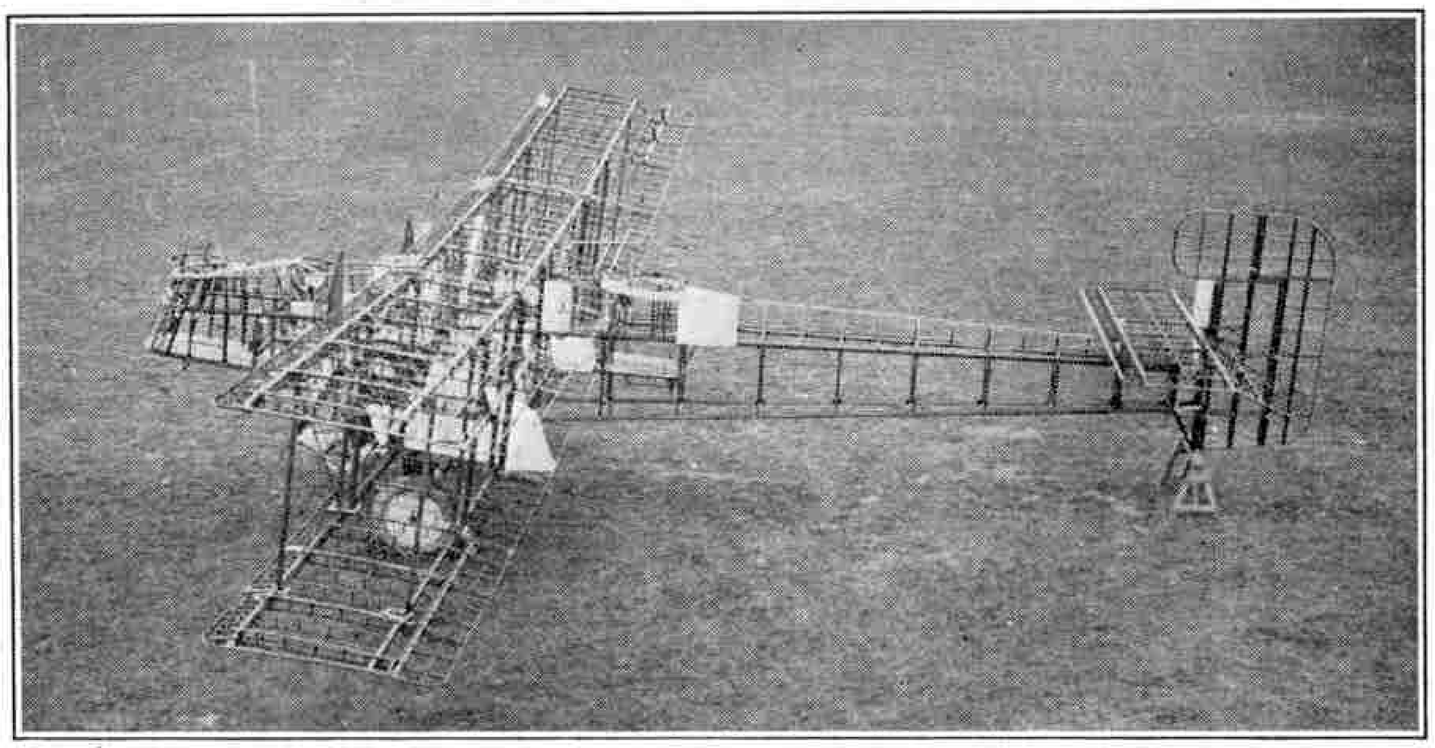


Photo courtesy] [*Messrs. Boulton & Paul Ltd.*

Fig. 1. Skeleton View of "Boulton" Aeroplane

There are two reasons for this. Firstly, because this type of structure has been very thoroughly tested under all conditions of service and, in addition to its proved weight economy, it is possible to estimate very closely the loads in the various members. Secondly, the adoption of this arrangement makes the system readily adaptable to a vast range of designs with very little alteration.

Special Steel and Aluminium Used

The metal used for all the main members of the aeroplane is a high tensile alloy steel, obtainable in tensile strengths up to 80 tons per square inch. The steel is made in strip form and purchased in the various widths and thicknesses required for the different members.

The strip is formed into special sections by passing through a number of sets of rollers or drawing through dies on a specially constructed draw-bench. Two or more sections are then riveted together to form members of the required shape and strength. The secondary portions of the structure, which do not carry main loads but act simply as fairings, engine coolings, fuselage coverings, etc., are made of aluminium or aluminium alloys.

Doped fabric is retained for covering the wings and rear portion of the fuselage, as it is considered that any advantages obtainable from the use of aluminium or other metal coverings are insufficient to compensate

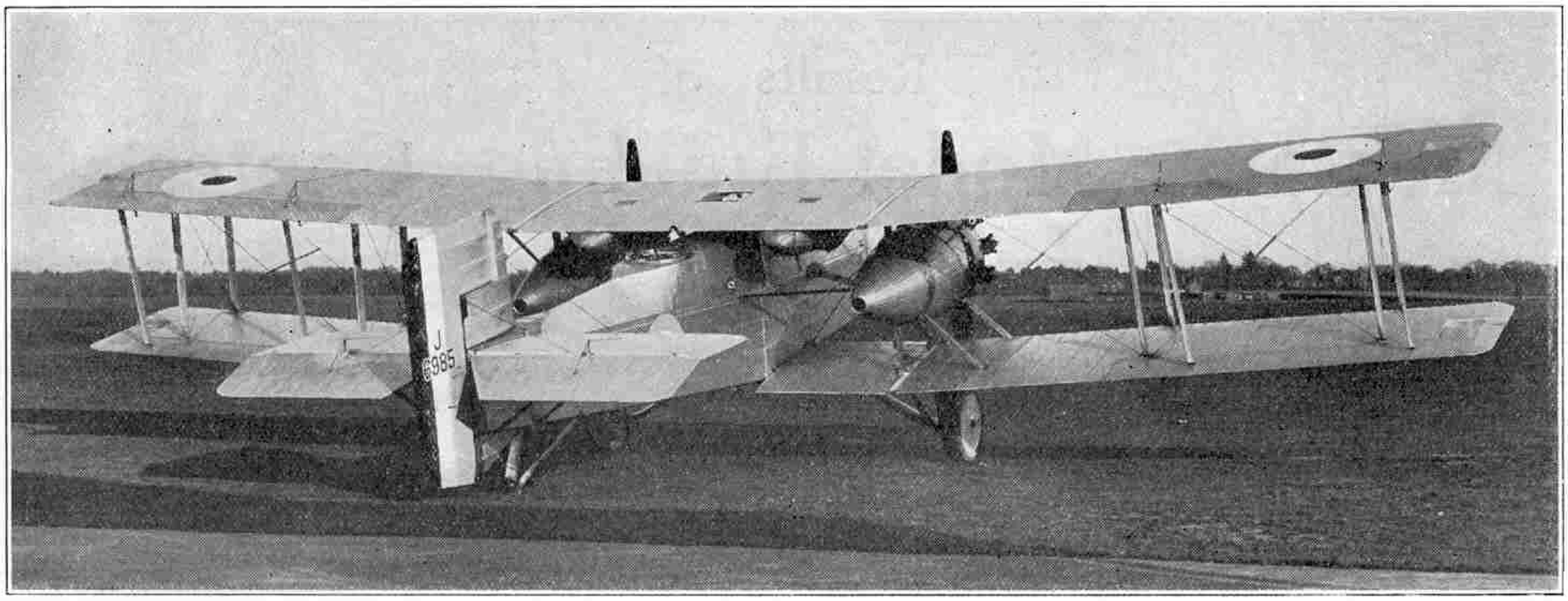


Photo courtesy] [*Messrs. Boulton & Paul Ltd.*

The Boulton "Bugle" Rear View

for the extra weight that is inevitably involved.

Cutting Down Weight

The most important advantage of steel construction is saving in weight, for high tensile steel has a higher specific strength than any other constructional material. For a member of given strength, the weight in high tensile steel is less than in any other material, provided that the member is suitably designed to enable the full strength of the steel to be developed without the member collapsing through local crumpling.

To illustrate the great value of this property, an aeroplane can now be built in steel for about four-fifths of the weight of the corresponding wooden machine. The weight thus saved may be used either to increase the useful load that the aeroplane can carry, or to increase its speed and rate of climb with a given engine power. The steel aeroplane, too, does not warp and lose adjustment in tropical climates as do timber machines, and it is much less liable to collapse from local damage.

One of the greatest advantages of the Boulton & Paul system is its ready adaptability to mass production, owing to the large number of members that may be constructed from a comparatively small number of standardised sections.

Naturally a very considerable experience and a highly developed workshop equipment are required for the production of an all-steel aeroplane, and in this respect the works at Norwich are very favourably placed. In addition to the special machinery for rolling and drawing the sections, suitable riveting and assembly tools have been designed to simplify and speed up these operations.

Electrical furnaces (in which the temperature can be accurately controlled by means of resistances) have been installed for the continuous heat-treatment of the sections to obtain the required degree of toughness. There is also a very complete equipment of modern testing machines, by means of which the strength of the materials is checked both before and after forming into sections. A 4 ft. wind channel enables model aeroplanes and parts to be tested aerodynamically to determine the best external form.

The Boulton & Paul "Bugle"

The aeroplane illustrated is the "Bugle," which, fitted with two 400 h.p. Bristol "Jupiter" engines, made its first appearance early this year. It is one of a series of high-performance twin-engine machines developed from the "Bourges."

The latter machine, which was completed in 1919, caused great astonishment at the time by its fine performance and manœuvrability. Mr. Frank Courtney, the well-known test pilot, flew it to Hendon aerodrome on the occasion of the welcome to the American trans-Atlantic fliers and performed loops, rolls, spinning dives and similar manœuvres which had hitherto been thought possible only on small single-seater machines.

The same manœuvrability is retained in the "Bugle," which has a speed of over 120 m.p.h. and can climb to a height of 5,000 ft. in just over 6½ minutes.

The span of the wings is 62 ft. 6 in. and the overall length 39 ft. 9 in. The total weight of the machine is 8,110 lbs., or over 3½ tons, and it can climb to a height of 18,000 ft. It is also able to fly and climb with one engine only, the control being very little affected even if one of the engines is out of action.

The "Jupiter" engines are of the air-cooled, radial type, having nine cylinders. They are mounted on tubular engine structures in the gap between the wings, one over each landing wheel. The wide track of the latter, 16 ft. 11 in., makes the aeroplane very stable and easy to manœuvre on the ground.

The axles, as also the tail skid, are mounted on patent oleo-pneumatic shock-absorber legs, in which the recoil-damping principle utilised on heavy artillery is combined with the shock-absorbing properties of compressed air, which is pumped into the legs at a pressure of 60 lbs. per square inch.

Accommodates Pilot and Two Gunners

Cockpits are provided for the pilot and two gunners or observers, the pilot being behind and above the front gunner, where he has an excellent view both forwards and downwards for landing. Dual flying controls are fitted in the rear cockpit.

The "Bugle" is a three-purpose machine and may be used either for photographic reconnaissance, or as a medium range day bomber, or as a high-speed fighting machine, according to its equipment and loading. In all these uses it has proved itself to be in the forefront of its class. The type is still being developed, and we may look forward to surprising performances from this class of aeroplane in the not far distant future.

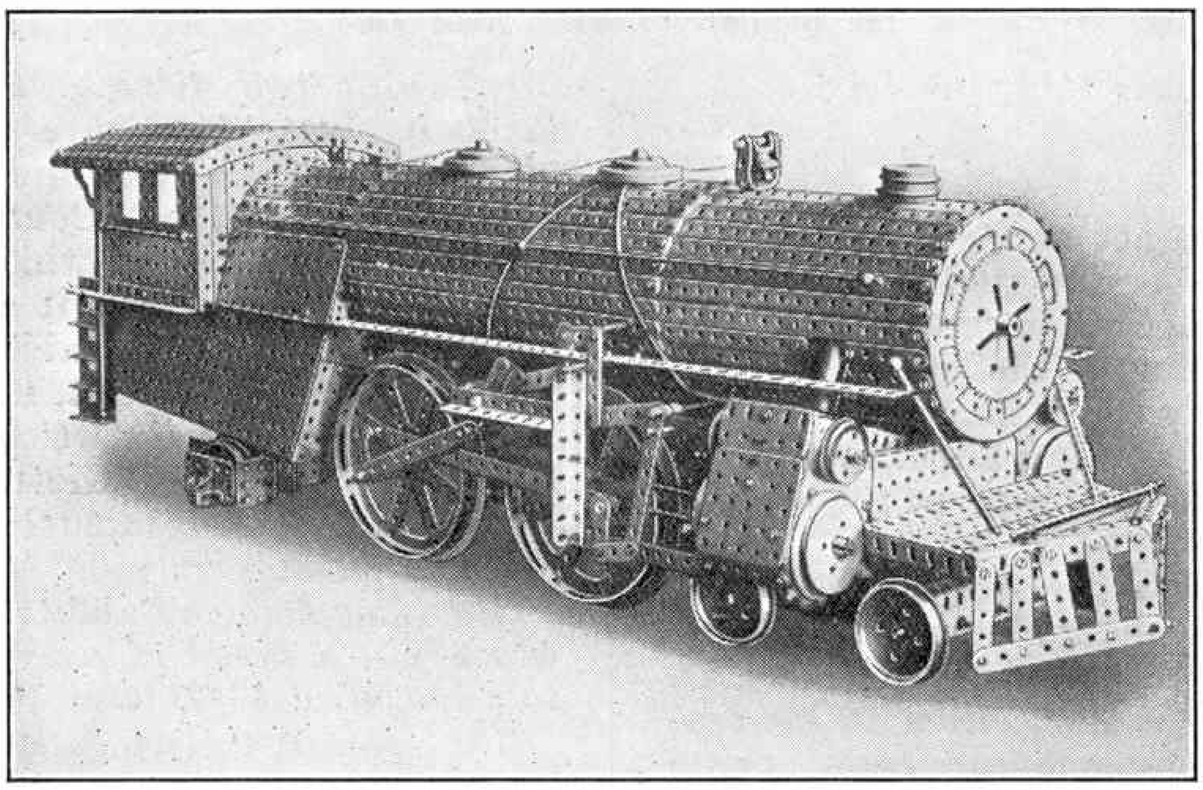
Results of
Meccano Model-Building Contests

By Frank Hornby

THE steam locomotive is one of the finest examples of modern engineering, and it still remains first favourite in the estimation of all those boys who already are engineers at heart. Throughout the hundred years of its existence, it has never failed to call forth a feeling akin to deep affection from an ever-increasing army of enthusiasts. There is something mysterious in the attraction that it exerts, although I am inclined to put the solution down to a habit, into which we have all grown, of subconsciously associating with the railway engine some of the happiest times of our lives—such as that first "break-up" from school; or the holidays, in which it carries us away from smoky towns to wonderful new scenery; or at Christmas, when the locomotive brings home all our brothers and sisters and uncles and aunts from distant parts of the country to spend the vacation together. Then, too, a great charm lies in its gigantic power and speed for what boy—whether young or old—is not thrilled by the presence of those two magic forces?

With this in mind, and knowing the capabilities of Meccano boys, I was led to expect some interesting results from the Locomotive-building Competition, which was announced in the "*M.M.*" for October and November 1925. In spite of this anticipation, however, I was more than surprised when the Editor showed me both the quantity and quality of the entries received. Every imaginable type of locomotive was there, ranging from Stephenson's "Rocket" to the new L.N.E.R. "Garratt," and including an electric mine loco, petrol engines, and even a model fireless steam loco, of the type used in factories where inflammable goods are handled. One competitor sent in a 6-wheeled tank engine which, having an overall length of 5½", constitutes the smallest entry received.

I was very pleased with the results of the Competition, and wish to convey through this article my appreciation and thanks to all competitors, and to express the hope that everyone will continue their model-building efforts and that they will send in further entries in the new competitions announced in this Magazine.



Awarded First Prize; American type Atlantic Loco. (C.P. Plantin)

RESULTS

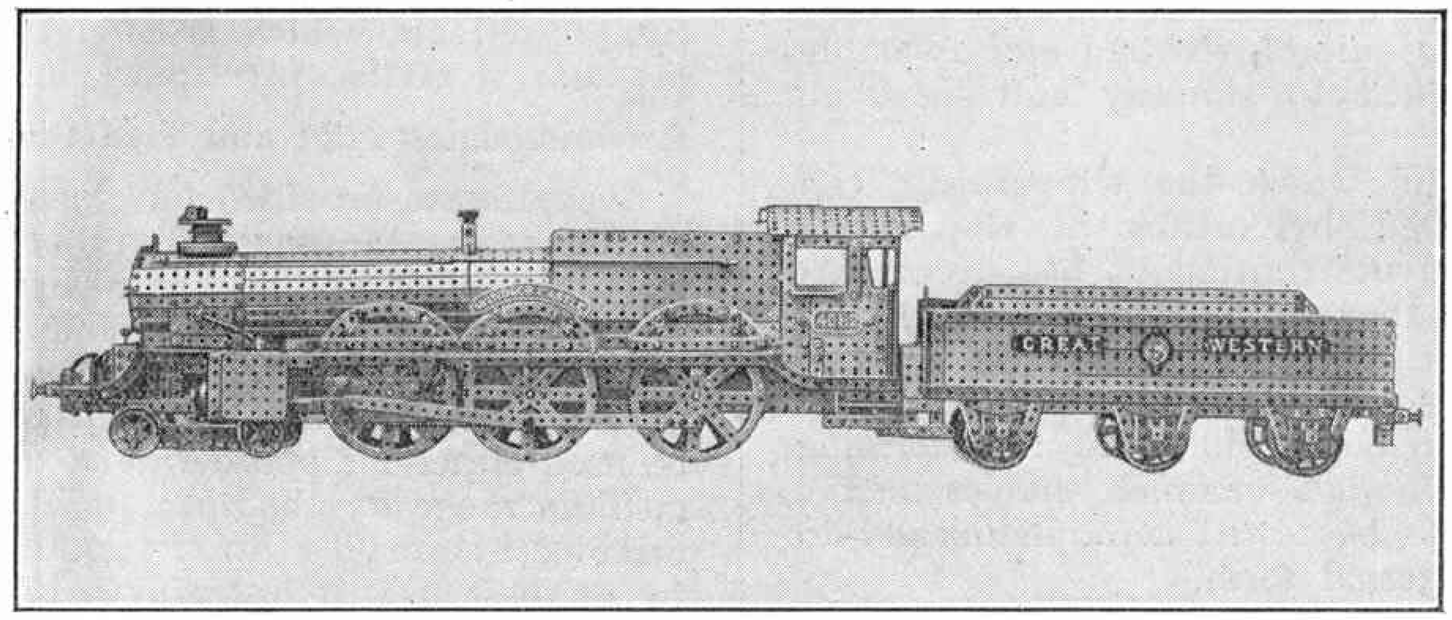
After careful deliberation, the judges have decided to make the following awards in Section A (British Isles):

First Prize, £5/5/–; Charles P. Plantin, 36, Pembury Road, Westcliffe-on-Sea, Essex.

Second Prize, £3/3/–; Leslie B. Lapper, The White House, Cromwell Road, Cheltenham.

Third Prize, £1/1/–; L. W. Grey, 131, Kempton Road, East Ham, Essex.

Prizes of 10/6 each; Keith W. Cameron, Wallasey; Ronnie Viney, Manchester; H. J. Welch, Acton Vale, W.3.; Richard S. Miller, Newark, Notts.; I. G. Gwillim, Plumstead, S.E.18 J. E. Lockett, Manchester.



Awarded Second Prize; G. W. Loco, "Windsor Castle." (L. B. Lapper)

Features of Construction

Tank locos were predominant amongst the entries, and, incidentally, the L.M.S. "Baltic" class holds the honour of being the most widely modelled type of engine. A close second in this field comes the L.N.E.R. "Pacific" tender engine—a difficult type to construct. It is interesting to note that no less than three of the latter and two of the former types are included in the prize winners.

I noticed that some of the entries were inclined to be too decorative. One or two otherwise good designs were completely spoilt by a cab bordering on the Chinese pagoda style! In others a smoke-stack, steam dome, lamps, etc. would assume the most alarming proportions, and so ruin the effect. In all models it is most important to keep the lines as "clean" and business-like as possible.

I was disappointed to find that none of the models submitted of very early locos were quite up to prize-winning standard, although amongst some very good entries were several models of the "Rocket," "Locomotion No. 1," "Royal George," and other famous veterans. One of these models showed very great promise, but small pieces of sheet tin were used in its construction, and the judges came to the conclusion that where the respective merits of models were difficult to decide, preference should be given to those built entirely with Meccano parts.

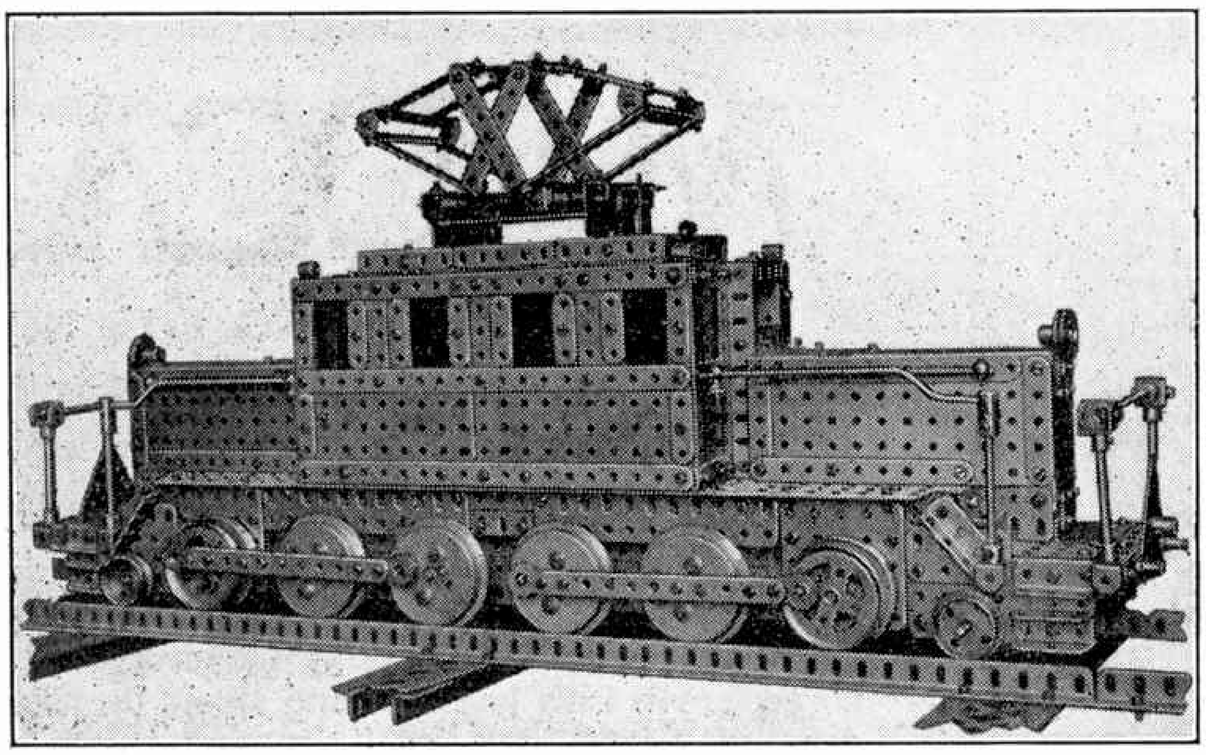
The Prize-Winners

If one takes into consideration the age of the competitor—thirteen years—it must be agreed that the American type "Atlantic" loco, with which C. P. Plantin secures the first prize, is an achievement worthy of the highest praise. The clever representations of cylinders and steam-chests, fire-box, cab, etc., are shown in the accompanying photograph. Amongst many other points of interest, it will be noted that a neat smoke-stack is obtained by using two inverted Flanged Wheels, the boss of the lower wheel being let into the smoke-box between the ends of 2½" and 5½" Strips bolted at the top of the boiler barrel. The warning bell is operated by a cord leading to the cab, and is contrived in an ingenious manner from a ¾" Contrate Wheel and ¾" Bolt swinging from a Double Bracket which is mounted in a 3½" Strip bent almost double and secured to the boiler. Wheel Flanges and 1½" Contrate Wheels are used for the steam domes,

to one of which lengths of Spring Cord are attached to represent sand pipes. Steam inlet pipes consist of Ship's Funnels attached to the steam-chests and cleverly built into the smoke-box, while Threaded Bosses take the place of safety valves. The cab and footplate are fitted throughout with various gadgets made entirely with Meccano parts, including a reversing and steam cut-off lever. This is coupled by Strips to a Bell Crank on the opposite end of a transverse Rod, the end of which may be seen in the illustration inserted in the boiler barrel beneath the front steam dome. This Rod, in turn, is coupled in a similar manner to the radius-rods of the Walschaerts valve gear. The reversing and valve mechanism, therefore, is in accordance with correct engineering principles, both in design and operation.

The axle-boxes fitted to the trailing pony truck deserve mention. They consist of Double Bent Strips mounted horizontally to provide additional supports for the axle, while a Flat Bracket, bolted to a Meccano Hinge secured immediately above the axle bearing, forms a flap, or lid, to fit over the Double Bent Strip. Further Flat Brackets are placed in a vertical position and bolted by their lower holes on either side of the Double Bent Strips. The locomotive is of generous proportions, its length being over 36 inches and its height roughly 12 inches.

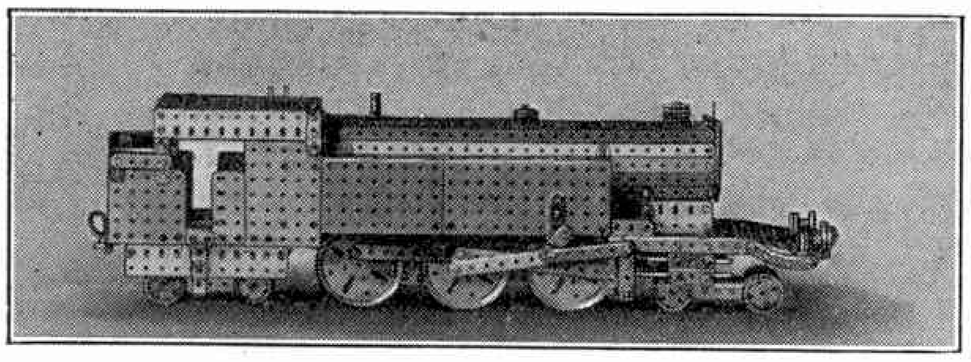
The only criticism that I can find to pass upon this model, and it is really a matter of some importance, concerns the arrangement of the wheels. The size and general position of the boiler and firebox is such that a " Pacific " or 4–6–2 arrangement would not be out of place, and better adhesion would be secured. As it is, the load that the pony truck is called upon to bear—consisting of most of the weight of the fire-box, cab, etc.—is out of proportion, and in actual practice would be far too great. To provide for the addition of another pair of driving wheels, it would be necessary to diminish the " overhang " of the fire-box, which, perhaps, is at present a little excessive.



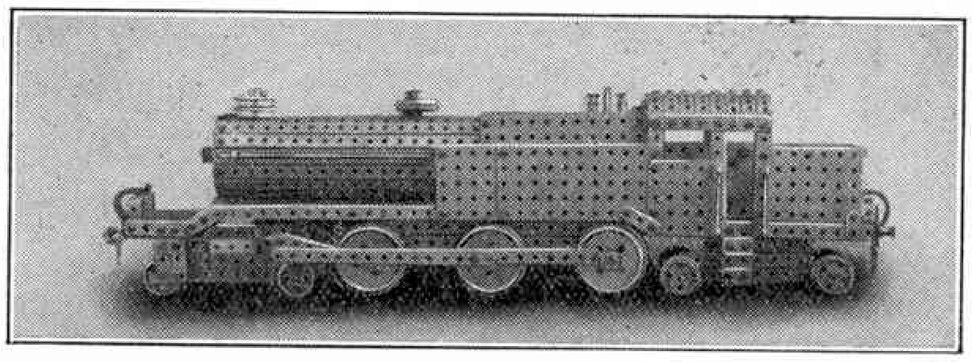
Awarded Third Prize ; Heavy Electric Freight Loco. (L. W. Grey)

the engine-frame, cab, and tender strike one immediately as being particularly well designed.

The safety-valve casing is constructed from a number of Double Brackets bolted together and surmounted by a ½" Pulley with set-screw. A length of Spring Cord leads down over the boiler to represent the sand pipe, whilst a Meccano Spring connected between the smoke-box and valve chest serves as an effective steam inlet pipe. The overall length of the model is 4 ft. 6 ins.



A well-built " Baltic " Tank Loco. (I. G. Gwillim)

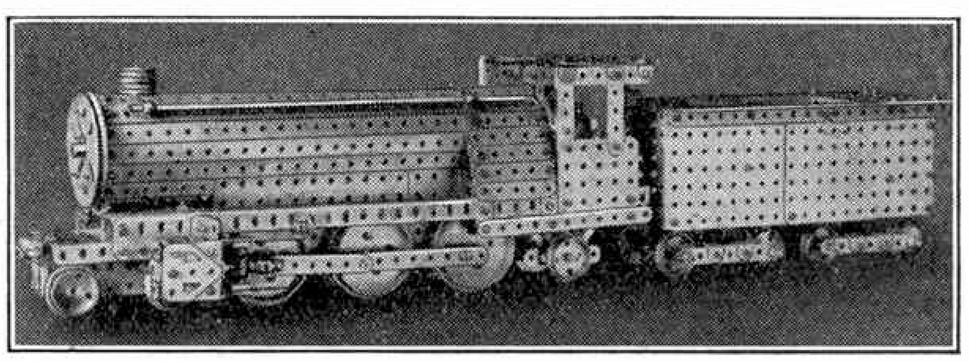


Another " Baltic " Loco. (Ronnie Viney)

Three inverted Flanged Wheels capped by a 1½" Pulley would make a more realistic smoke-stack, perhaps, than the present arrangement, which employs a Wheel Flange, two Flanged Wheels, 2" Pulley, etc. If the improvement is adopted the top of the boiler must be altered to receive the boss of the lower Flanged Wheel inside the smoke-box cover, in a similar manner to that already described in the preceding model. Before this model can be run upon rails, it would be necessary to add Circular Plates to the Hub Discs in order to provide the required flanges, while Wheel Flanges bolted to Face Plates could replace the tender and bogie wheels.

An Electric Freight Loco

A very pleasing model of a large electric freight loco, by L. W. Grey, obtains the third prize. This is undoubtedly the finest model of its type yet produced with Meccano. An interesting use is made of a number of parts in the construction of the handrails, lamps, overhead current collector, etc., and the use of the reversed Wheel Flange in the design of the driving wheels should be noted. The explanation of the special wheels attached to the end coupled axles is not quite clear. I do not know any reason why these should not be identical to the remaining eight wheels. It is possible, however, that these axles represent the armatures of the driving motors, in which case it would be in accordance with proper practice to fit a crank, instead of the wheels, from which to rotate the eight coupled drivers.



" Pacific " type Tender Engine. (J. E. Lockett)

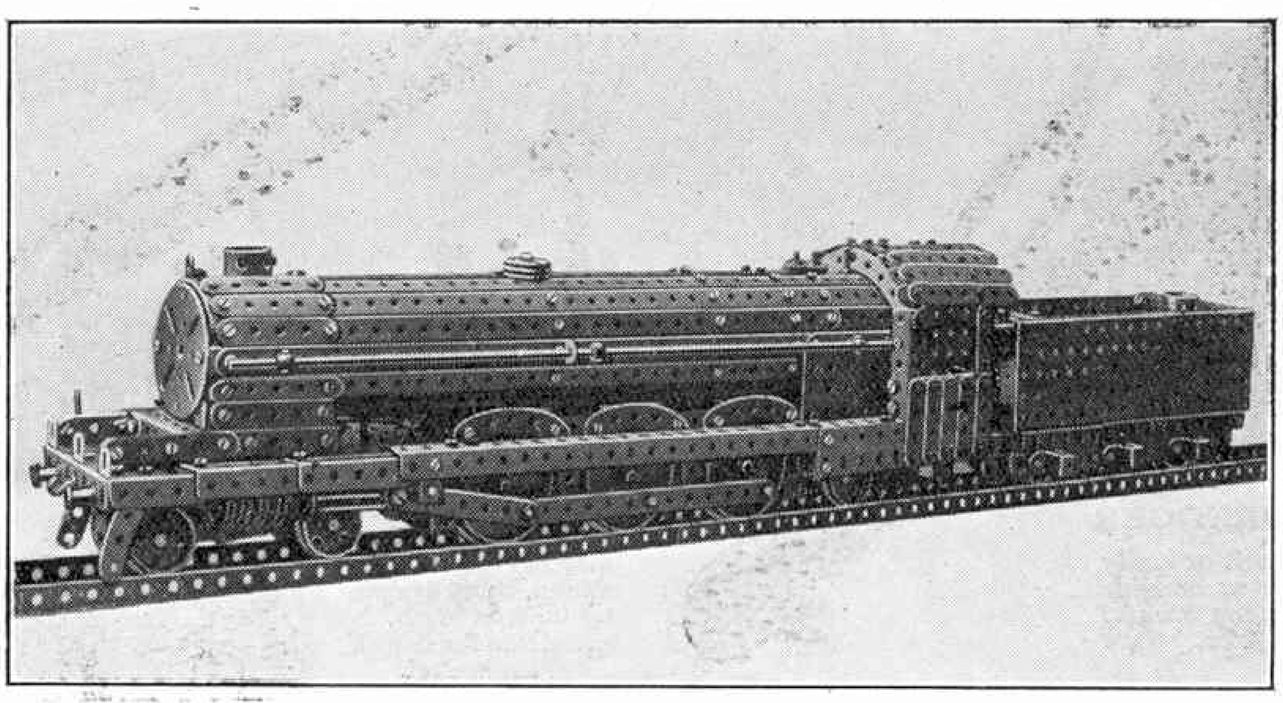
" Baltics " and " Pacifics "

The four further prize-winning models illustrated on this page include two " Baltic " tank Locos and two " Pacific " tender engines. The construction in every case is excellent, and points to the comprehensive knowledge which the designers undoubtedly possess of their subjects. The " City of Newcastle " (R. S. Miller's " Pacific ") is fitted with three cylinders, water pick-up apparatus, hand-screw brake (operated from cab), Westinghouse brake fittings, and other similar details.

In an early issue I hope to illustrate the two remaining prize-winning models for the benefit of a number of readers who, I believe, will wish to construct these models.

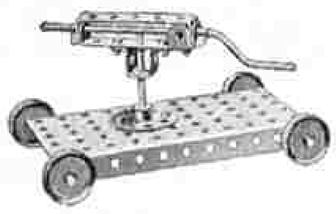
A " G.W." Castle Loco

L. B. Lapper reproduces the lines of the famous G.W. " Castle " class of locomotive with great success. The familiar bullet-shaped boiler is shown with surprising neatness and accuracy, and



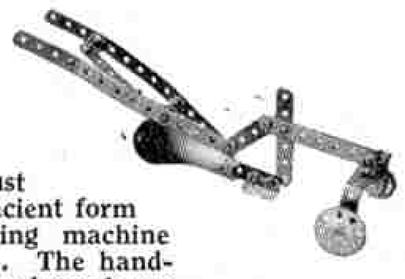
A fine L.N.E.R. " Pacific " Loco. (R. S. Miller)

Result of the "0" Outfit Competition on page 97



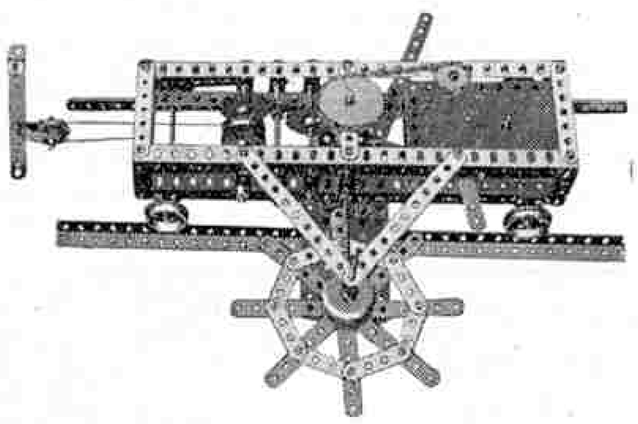
ROCK DRILL

This is a No. 0 Outfit model of a typical pneumatic rock drill, of the type used in mining and other work.



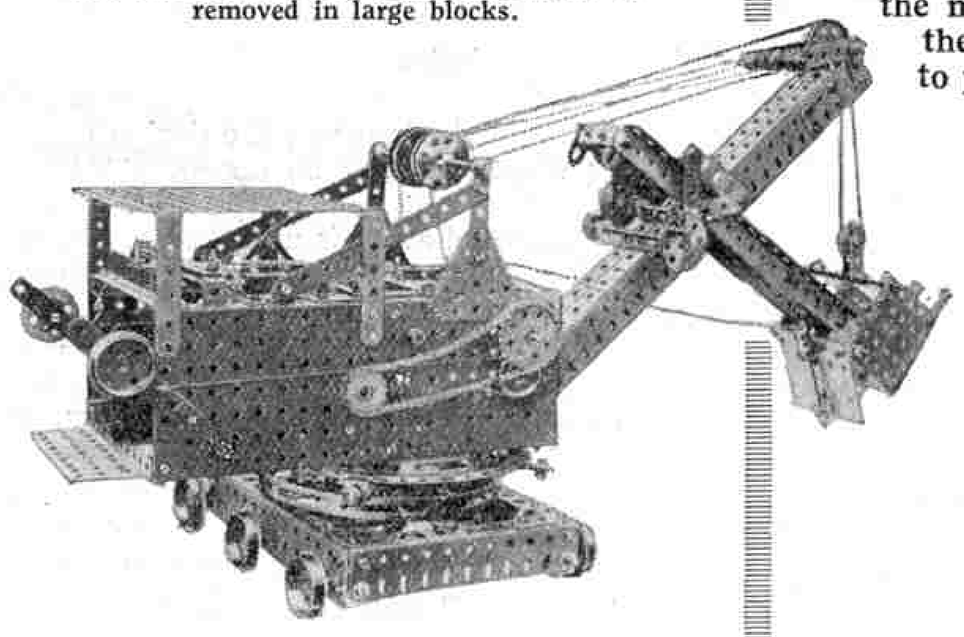
PLOUGH

The plough must be the most ancient form of earth-breaking machine known to man. The hand-manipulated type here shown is fast disappearing from our countryside.



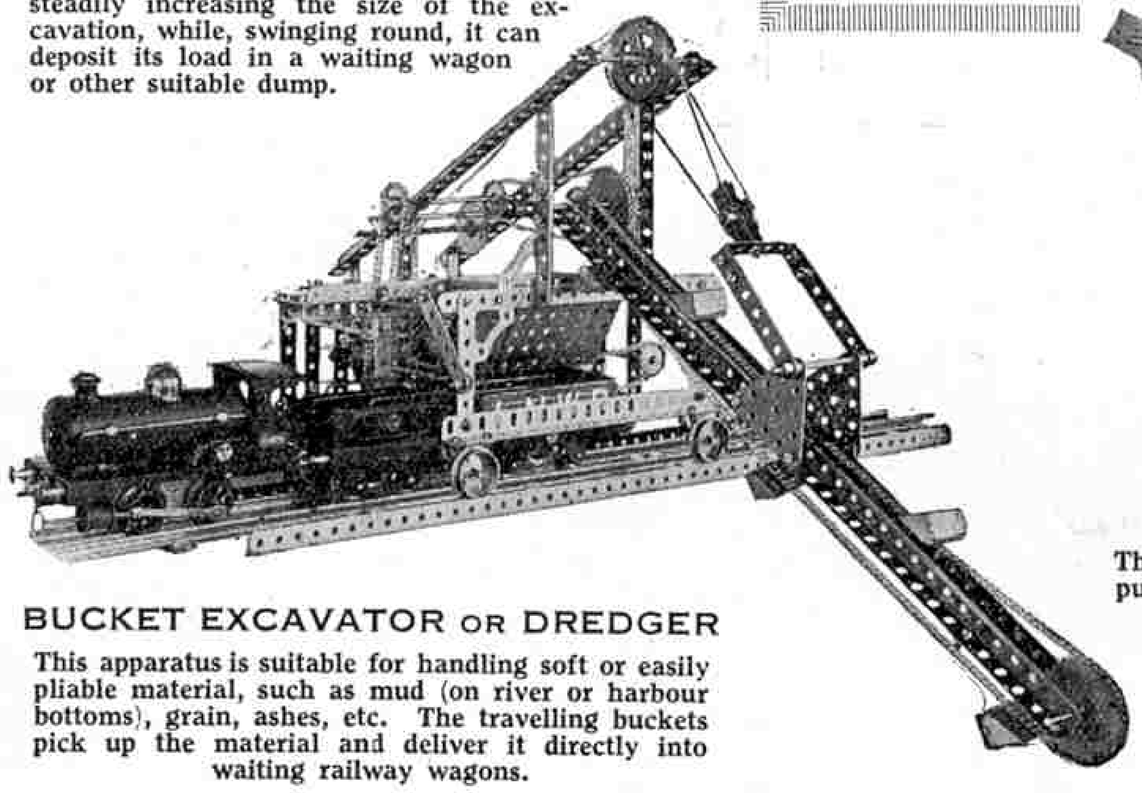
COAL CUTTER

This apparatus, by hauling on a rope, pulls itself along in a direction parallel to the coal-face, while its revolving cutters slice into the coal, which may afterwards be removed in large blocks.



STEAM SHOVEL

The Steam Shovel is employed in the construction of canals, railway cuttings, etc. Each stroke of its arm scrapes several tons away from the sides of the cutting, so steadily increasing the size of the excavation, while, swinging round, it can deposit its load in a waiting wagon or other suitable dump.



BUCKET EXCAVATOR OR DREDGER

This apparatus is suitable for handling soft or easily pliable material, such as mud (on river or harbour bottoms), grain, ashes, etc. The travelling buckets pick up the material and deliver it directly into waiting railway wagons.

MECCANO

ENGINEERING FOR BOYS

EXAMPLES OF MODEL CONSTRUCTION:

2.—Cutting and Digging Machines

TRANSPORT, Irrigation and Mining are three branches of industry responsible for the introduction of many wonderful machines by which channels are cut, tunnels bored, small hills levelled, and rivers deepened. The constant demand for greater efficiency and increased speed at which such engineering works may be carried out, has resulted in the construction of giant engines that are marvels of power and precision.

Innumerable examples might be quoted—such as the Panama and Suez Canals and the Simplon Tunnel—as typifying the extent to which man has been able to force a passage through the most difficult obstacles, with the aid of mechanical power. The immensity of these works leaves one with the impression that they must be the outcome of the slow processes of nature, rather than the result of a few short years of man's intrepid effort.

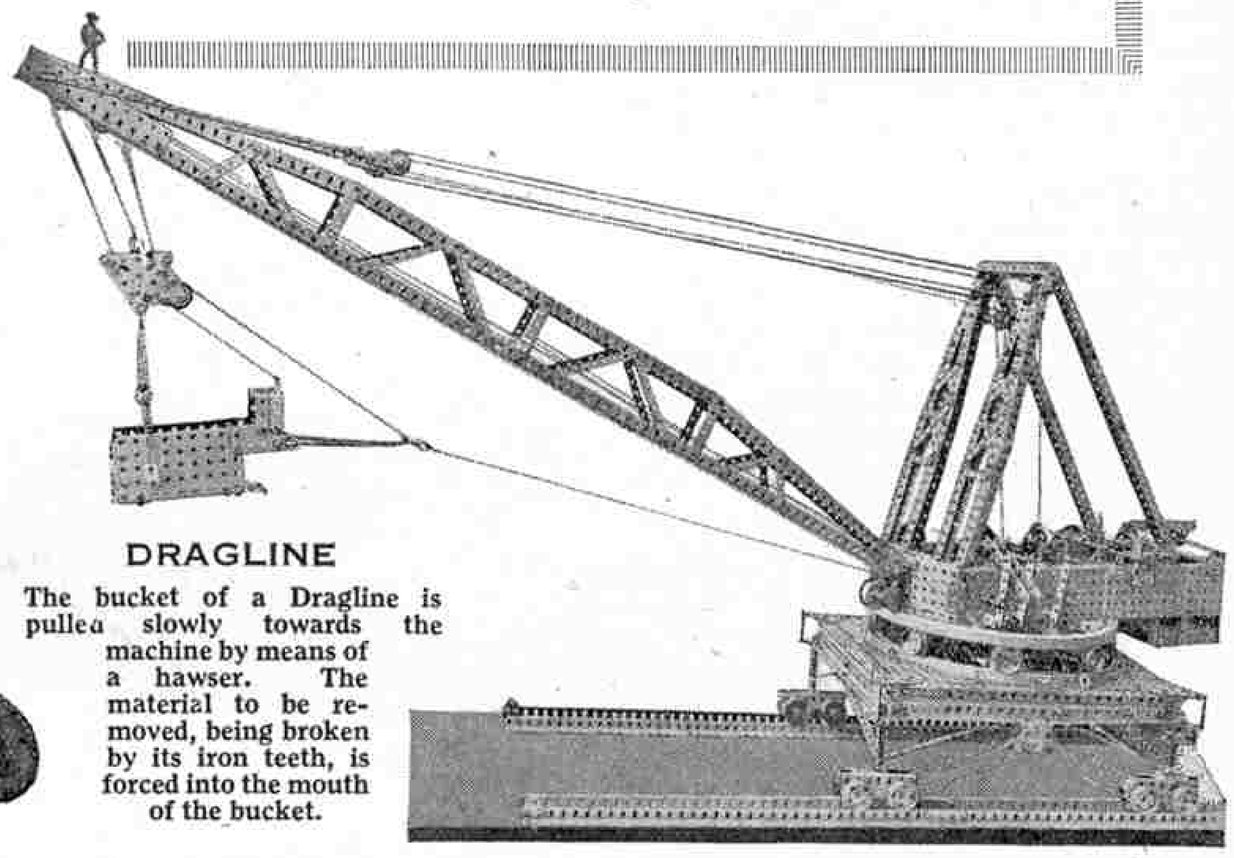
The Meccano models shown accurately reproduce the apparatus now widely in use, and are most fascinating to construct and to put into operation. Excellent fun can be obtained with the Dredger, Steam Shovel, and Dragline by employing a pile of silver-sand, or gravel, beads, etc., as the material to be handled. For this purpose the shovels, or buckets, of the last two models should be lined with sheets of cardboard, to prevent their contents escaping.

MECCANO PRICES

COMPLETE OUTFITS		ACCESSORY OUTFITS	
No. 00	3/6	No. 00a	1/6
No. 0	5/–	No. 0a	4/–
No. 1	8/6	No. 1a	7/6
No. 2	15/–	No. 2a	8/6
No. 3	22/6	No. 3a	18/6
No. 4	40/–	No. 4a	15/–
No. 5 (in well-made carton)	55/–	No. 5a (in well-made carton)	50/–
No. 5 (in superior oak cabinet with lock and key)	85/–	No. 5a (in superior oak cabinet with lock and key)	80/–
No. 6 (in well-made carton)	105/–	No. 6a (in superior oak cabinet with lock and key)	210/–
No. 6 (in superior oak cabinet with lock and key)	140/–		
No. 7 (in superior oak cabinet with lock and key)	370/–		

Meccano Outfits may be obtained from all Leading Toy Stores. Ask to see them.

MECCANO LTD., Binns Road, LIVERPOOL



DRAGLINE

The bucket of a Dragline is pulled slowly towards the machine by means of a hawser. The material to be removed, being broken by its iron teeth, is forced into the mouth of the bucket.

No. "0" Outfit Competition Results

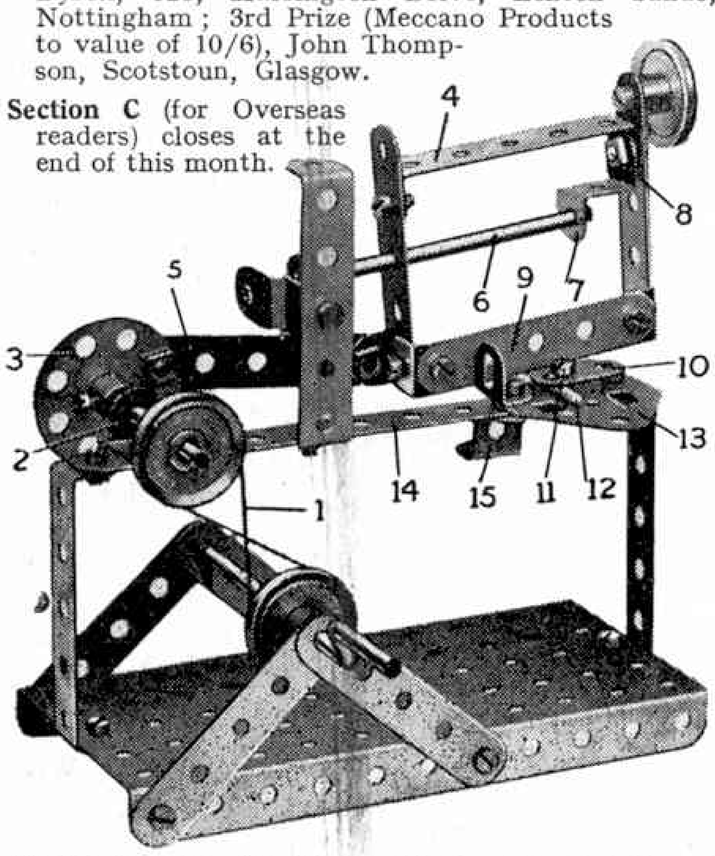
The "0" Outfit Model-Building Competition was a novel departure from the usual type of Meccano Contest, for it was the first to contain a definite limit as to the number and variety of the parts permissible for the construction of competitive models. The results not only demonstrate the ingenuity displayed by competitors in making the best possible use of a small number of parts, but also, I consider, express the highest possible commendation upon the Meccano system, for it is wonderful to find the seemingly endless variations and purposes to which the contents of this five-shilling Meccano Outfit lend themselves.

The results of Sections A and B are as follows :—

Section B (boys over 12 and under 16) :
1st Prize (Meccano Products to value of £2/2/–), L. Jones, 36, Lansdowne Avenue, Leigh-on-Sea, Essex; 2nd Prize (Meccano Products to value of £1/1/–), W. Marsden, 225, Kingston Road, Ilford, Essex; 3rd Prize (tie, each competitor awarded Meccano Products to value of 10/6), E. Anderson, Perry Barr, Birmingham and Rene G. Wood, Mears Ashby, Northants.

Section A (boys under 12) :
1st Prize (Meccano Products to value of £2/2/–), Alec Reid, 39, Beaconsfield Road, Brighton; 2nd Prize (Meccano Products to value of £1/1/–), Fergus Byron, 125, Harrington Drive, Lenton Sands, Nottingham; 3rd Prize (Meccano Products to value of 10/6), John Thompson, Scotstoun, Glasgow.

Section C (for Overseas readers) closes at the end of this month.



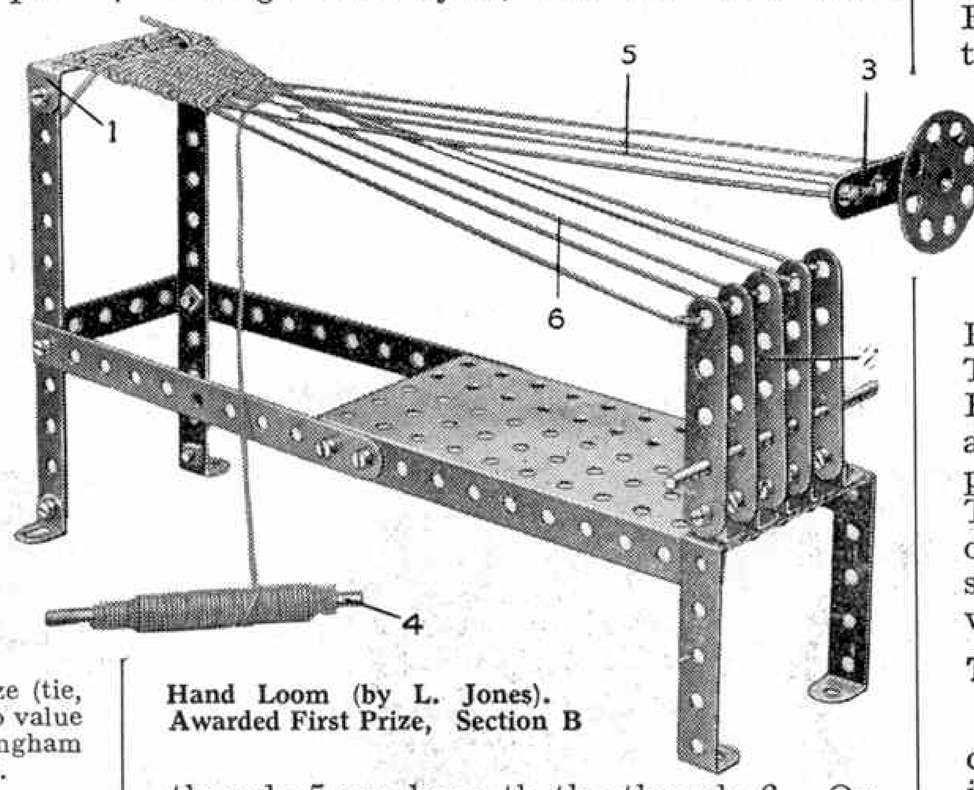
Mechanical Saw (by W. Marsden). Awarded Second Prize, Section B

Four Prize-Winning Models

The winning entries in Section B are illustrated and described on this page, and I feel sure that every reader who possesses a No. 0 Outfit—and indeed, any other size of Outfit—would find them most interesting to build and set to work. I hope to deal with Section A in next month's *"M.M."*

The model which gains first prize may be described as a Hand Loom, and, as will be seen from the photograph, its construction is extremely simple.

The warp threads of the loom are tied at one end to the Double Angle Strip 1, whilst their other ends are secured alternately to the tops of the five upright 2½" Strips 2, and the 2½" Strip 3. The "shedding" movement of the warp is obtained by moving the Strip 3 up or down, care being taken to see that each thread falls properly between the Strips 2. The shuttle 4—a 3½" Rod—which carries the weft, is passed between the two layers of warp 5 and 6 whilst they are in the position shown. The Strip 3 is then lowered, and the shuttle returned through the layers, but this time the



Hand Loom (by L. Jones). Awarded First Prize, Section B

threads 5 are beneath the threads 6. On the Strip 3 being returned to its original position, the operation is repeated as above. The strands 6 should be kept very taut, and for this reason the bolts securing the Strips 2 to the Angle Brackets on the base plate should be made as rigid as possible. Good strong wool or similar material may be used in this apparatus. The weft threads may be closed up with the woven portion of the material each time the shuttle passes, by means of an ordinary comb, representing the "reed" in the actual machine.

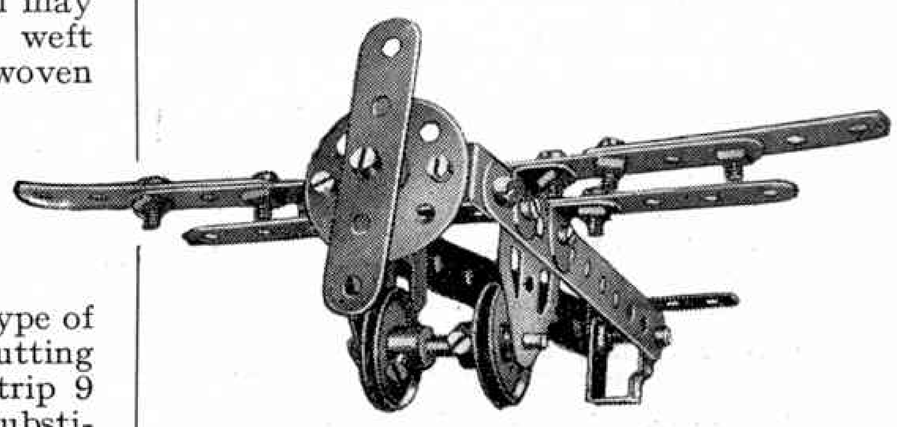
Mechanical Saw

This is an ingenious model of the type of saw widely used in industry for cutting through bars of metal, etc. The Strip 9 represents the saw; this may be substituted by a piece of fret- or hack-saw blade, when the model may be put to really useful work, such as cutting through matchsticks, etc.! The Crank Handle drives through a crossed belt 1 a short Rod journalled in a Double Bracket 2 and carrying a Bush Wheel 3. The rotary movement of the Bush Wheel imparts a reciprocating motion to the saw frame 4 through a 2½" Strip 5 pivoted by means of bolts and nuts (see "Meccano Standard Mechanisms," detail No. 262) to the Bush Wheel and to an Angle Bracket bolted to the saw frame. The latter slides on a 3½" Rod 6, which acts as a guide, passing through the side of the saw frame and supported in the Reversed Angle Bracket 7. A Washer is placed on the bolt 8 between the bracket 7 and the frame. A "vice" is provided to secure the objects in position for cutting. It consists of a Flat Bracket 10 mounted on a bolt 11, a few turns of which causes the Flat Bracket to grip or release the object 12. The bolt 11 enters a nut held between the Flat Trunnion 13 and 5½" Strip 14, which are spaced apart for the purpose by Washers placed on the two bolts holding the Trunnion in place. The saw-frame rests on a stop 15 when not in use. A 1" Pulley secured to the top of the frame acts as a weight and helps to steady the saw.

Travelling Crane

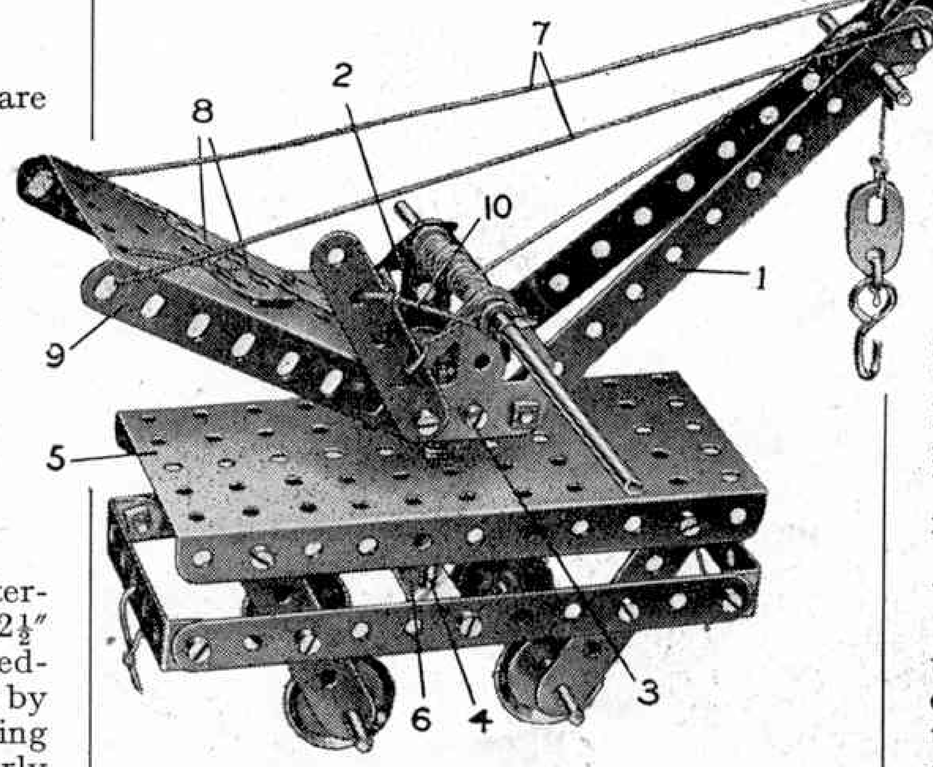
Two entries vied with each other very closely for the third prize, and as it was impossible to choose between the two, the judges decided to duplicate the prize and award it to both the competitors concerned.

One of these models, a Travelling Crane, makes excellent use of the contents of a No. 0 Outfit.



Aeroplane (by Rene G. Wood). Awarded Third Prize, Section B (tie)

The jib 1 of this model is pivotly attached by nuts and bolts to the Flat Trunnions 2, which are bolted at 3 to Angle Brackets secured to the Bush Wheel forming the base of the swivelling portion of the crane. This Bush Wheel is nipped to a 2" Rod 4 passing through the centre hole of the Plate 5 and further supported in a 2½" × ½" Double Angle Strip 6. A Washer and Spring Clip mounted on the Rod 4 below the Strip 6 secures the Crane to the carriage. The jib is supported by means of cords 7 tied to 2½" Strips 8, the holes of which engage the shank of a bolt passed through the Sector Plate 9. By inserting this bolt into different holes in the Strips 8, the elevation of the jib may be altered as desired. The cord 10 of the brake lever is wound once round the Crank Handle, between two Washers. The model may be arranged to run on Hornby Rails by substituting Flanged Wheels for the four 1" Pulleys shown.

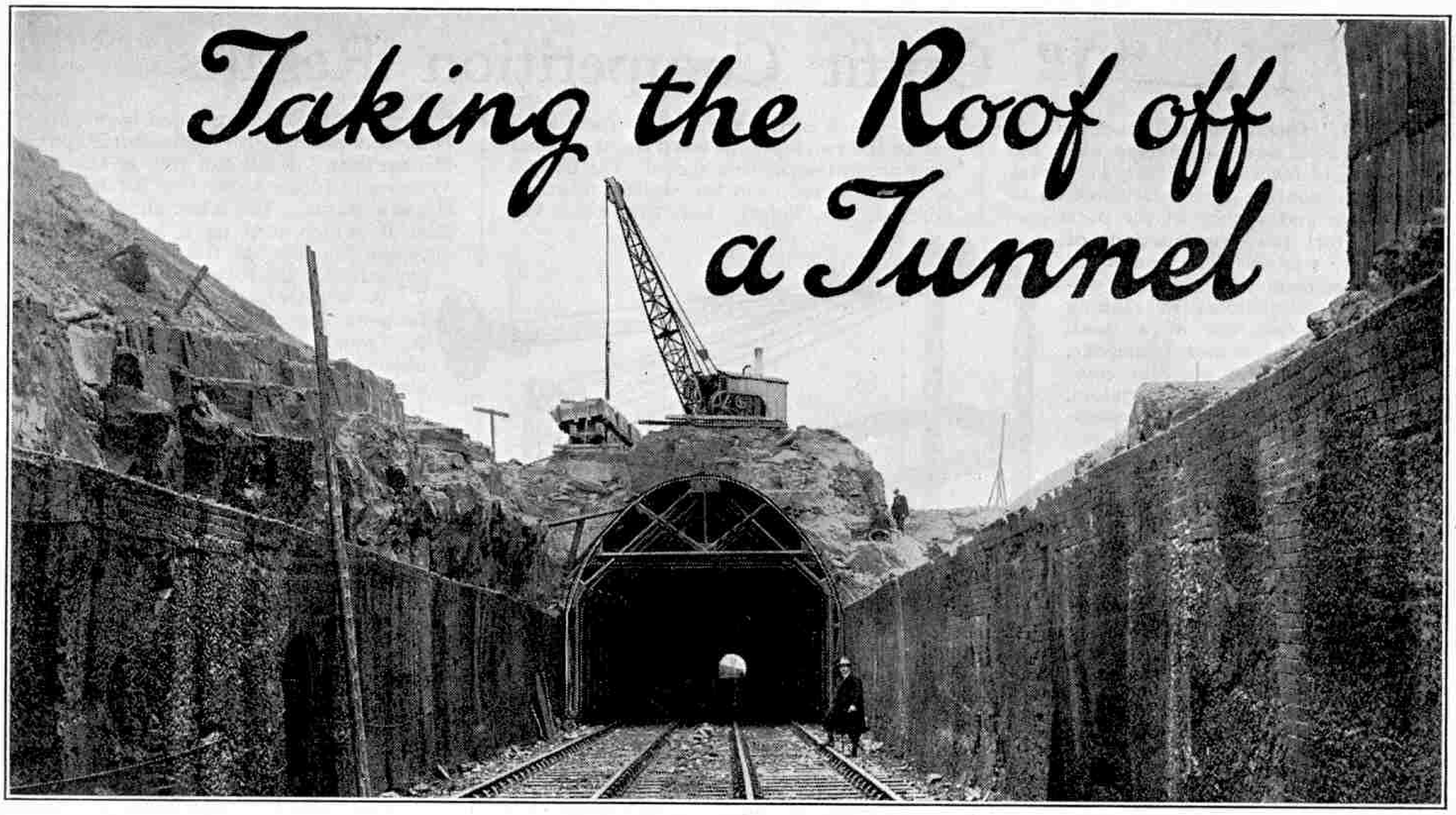


Travelling Crane (by E. Anderson). Awarded Third Prize, Section B (tie)

Aeroplane

The construction of this model is extremely simple, and requires but little explanation. A 2½" Strip representing the propeller is carried on a bolt, the shank of which is gripped by the set-screw of the Bush Wheel.

Taking the Roof off a Tunnel

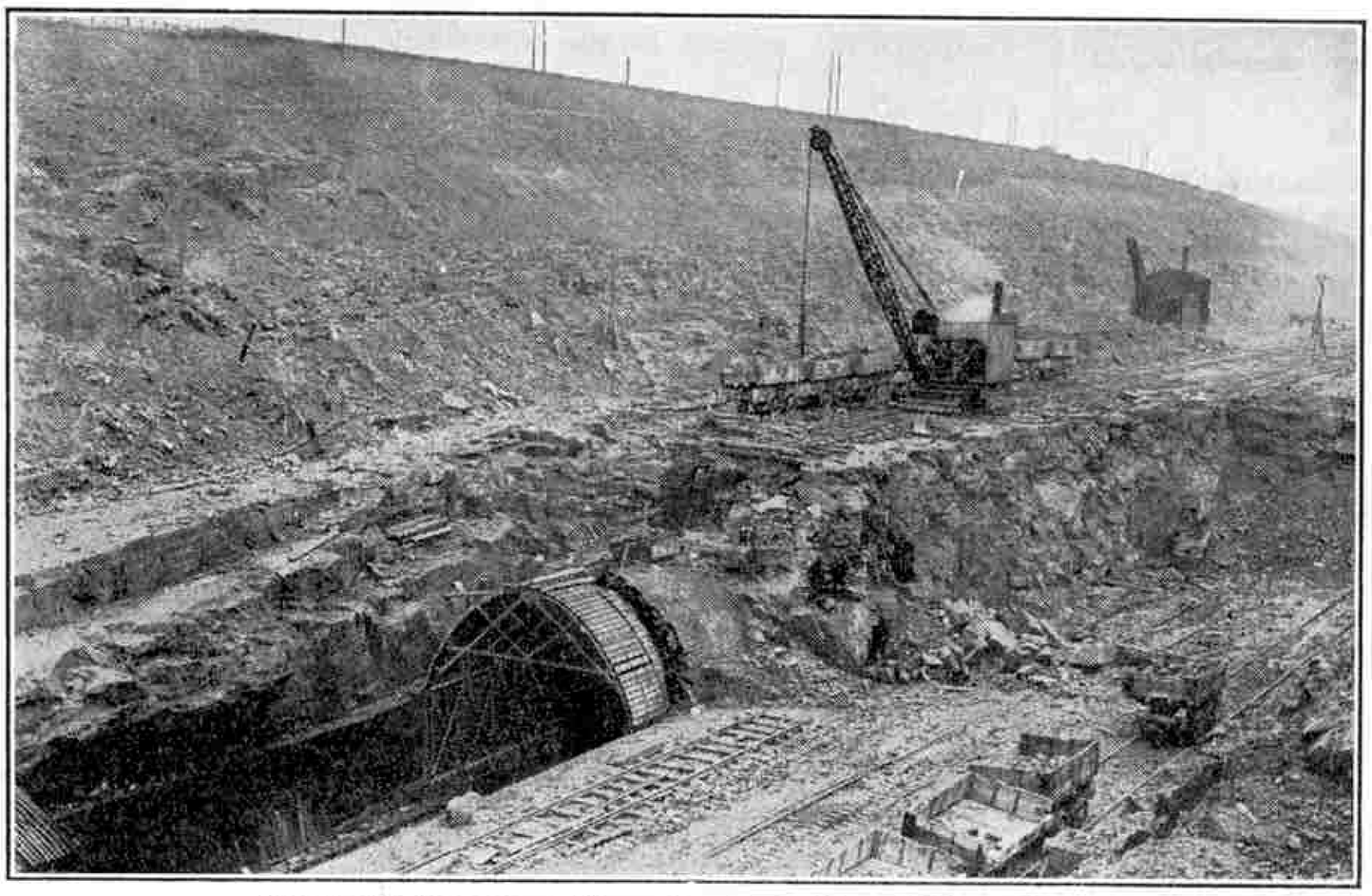


MOST of our readers are more or less familiar with the operations involved in boring a long railway tunnel, but probably few of them know of the unique engineering feat carried out on the London Midland and Scottish Railway, near Wakefield in Yorkshire. This remarkable operation consists in taking the roof off a tunnel bored some 90 years ago to the designs of Robert Stephenson, thus transforming the tunnel into a cutting.

Cutting through Solid Sandstone

The scene of operations is the Chevet Tunnel, about half-a-mile south of Sandal and Walton station. This tunnel, which is just over 700 yards in length, has been demolished as part of the project for widening the permanent way to allow of laying two additional lines of rail between Chevet Junction and Snydale Junction. As far as the former junction there are four running tracks from the south, a distance of 180 miles, and the section of line between the two junctions, $3\frac{3}{4}$ miles long, was the only "bottle neck" between Leeds and London.

The difficulty of the operations lay in the fact that opening out the tunnel involved the cutting of a passage through nearly 80 ft. of solid sandstone. Before the work was commenced, in September, 1923, the metals in the tunnel lay 94 ft. below the surface of the tunnel and now that the work is completed this is one of the longest and deepest railway cuttings in England.



The Solid Sandstone through which Chevet Tunnel ran

Blasting Night and Day

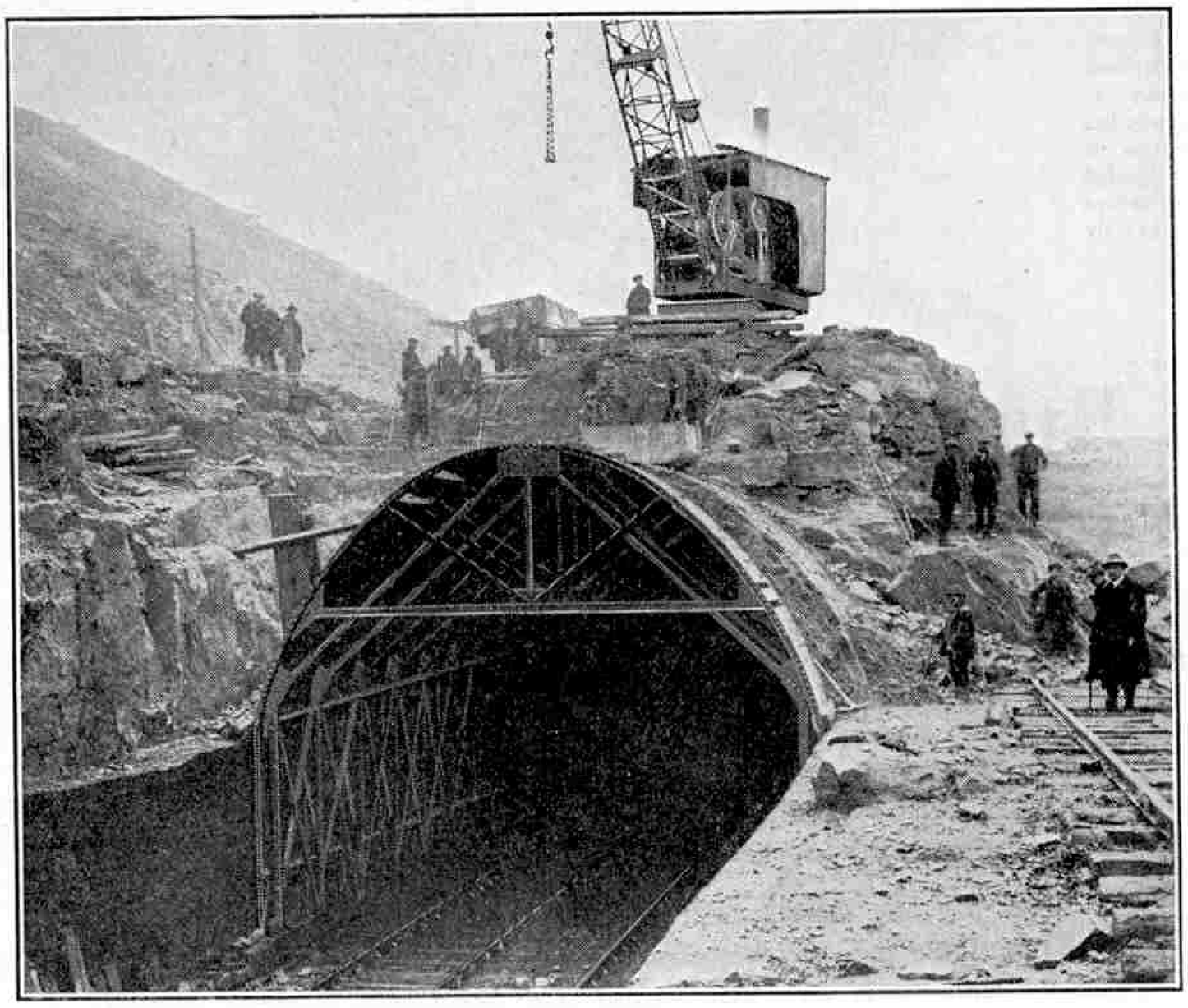
The contractors, Messrs. Armstrong, Whitworth & Co. Ltd., had not got far below the surface when they encountered solid sandstone and from that stage onward progress was made by blasting. The blasting operations have been carried on at intervals throughout night and day, with comparatively little interference with traffic on the line and without the slightest risk of danger to passengers. Indeed, it is probable that few of the thousands of people who travel regularly on the London Midland and Scottish main line between Leeds and Sheffield have been aware that anything unusual was taking place.

The amount of careful preparation and skilful organisation required to carry out this great task in such an inconspicuous manner will be realised when it is mentioned that no less than 240 trains pass through the tunnel every 24 hours. In 1924, in fact, when so many "specials" were being run to Wembley, the daily number of trains was frequently increased

to 270 or 280—more than 11 every hour.

Method of Work

The method of work is very interesting. First of all the workmen lay the explosive charges, generally some 20 or 30 in number. The railway authorities are then informed that blasting is about to take place, and at Sandal and Walton on the north side and at Chevet Junction on the south side all signals are set at danger. A special signal box erected near the mouth of the tunnel is fitted with levers that can be locked with certain keys. The man in charge of this box locks the signals at danger and hands over the keys to a representative of the contractors, and until those keys are returned it is impossible for any signal to be lowered between Sandal and Walton and Chevet.



The operations at Chevet Tunnel in progress

Safety Precautions

All is now ready for the blasting. A bugle sounds a warning call and the workmen promptly retire to a safe distance, with the exception of the two who are detailed to light the fuses. These men quickly run round, light the fuses and then rush off to shelter. Immediately afterwards the explosions occur in quick succession and within a minute or two scores of tons of sandstone are hurled into the air. Some fragments of stone inevitably fall on to the line outside the tunnel, but the line is specially patrolled by railwaymen to make certain that no stones lie across the metals.

In order to prevent the possibility of any bricks being dislodged by the concussion from underneath the arched roof and thus falling on to the line, huge steel shields are erected. There are two of these shields, each 66 ft. in length, one at each end of the tunnel. They rest on small steel rollers running on a temporary wooden track laid along the base of the tunnel walls, and week by week they are moved a little further into the tunnel.

After the explosions have all taken place and the railway patrol has reported that there is no obstruction on the line, word is passed to the contractors' representative who, during this time, has kept the keys of the signal levers in his possession. He now returns the keys to the signalman who unlocks the levers, and the signals are then lowered to permit the passage of any train that may have been held up.

The explosives used in the blasting operations were ammonal and gelignite, and the total amount of excavation was 821,000 cu. yds. Throughout the summer and autumn of 1924 the average amount excavated weekly was 12,000 cu. yds., the maximum number of men engaged during this period being 350. The bulk of the heavy work was carried out by three Ruston and Hornsby excavators with caterpillar tracks.

The demolition of the tunnel was practically completed at the end of last year and it now remains to level the cutting in preparation for the laying of two additional tracks. The whole widening scheme, which involves two extensive cuttings and the reconstruction of some twelve bridges, is expected to be completed next year.

The Chevet Tunnel was constructed in 1836 in connection with the opening up of what was then the North Midland Railway, which subsequently, by amalgamation with the Midland Counties Railway and the Birmingham and Derby Railway, became the Midland Railway. The North Midland Railway was projected by George Stephenson to connect with the Midland Counties Railway at Derby and run to Leeds. Stephenson made it a low-level line along the valleys, avoiding Sheffield on account of the gradients. The line was about 72 miles in length and cost £3,000,000.

In making the surveys for this line the engineers encountered the usual opposition and obstruction from country squires and landowners. One of the landowners concerned was Charles Waterton, the famous traveller and naturalist. Waterton made the fine park surrounding his residence a secure retreat for all birds, and naturally he objected to the close approach of a railway. He had already been irritated by the carrying of the Barnsley Canal almost past his very gates, and when the North Midland officials called upon him to try to enlist his support they were not too enthusiastically received. After prolonged discussion Waterton was asked whether, if he would not give assent to the Railway Bill, he would at least be neutral.

"I will be neutral," he replied, "on condition that you will faithfully promise me one thing."

"Pray, sir, what is it?"

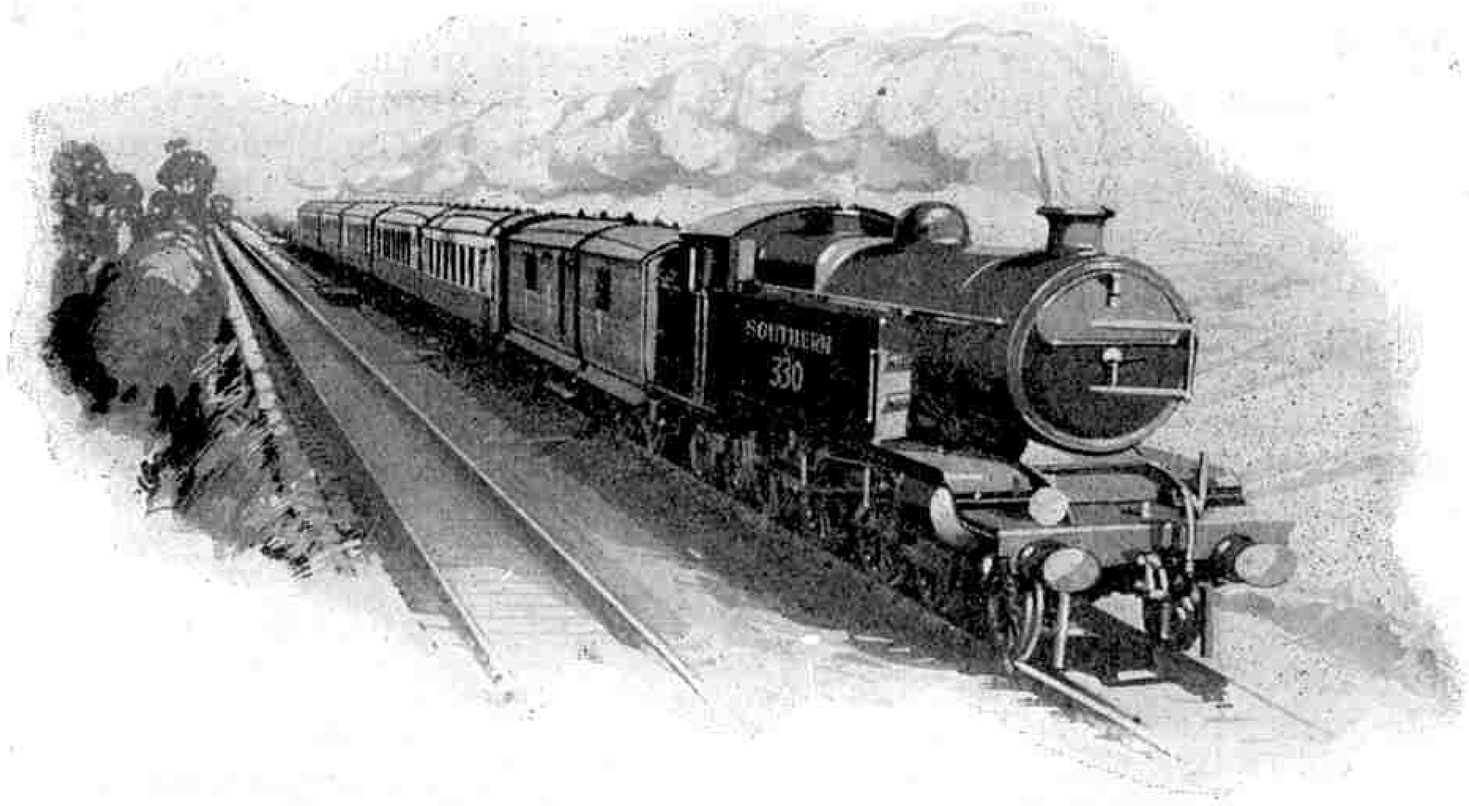
"It is that you take care that your railway, when it is established, shall ruin those infernal canals!"

The North Midland Railway was opened on 11th May 1840. A train of 34 carriages, conveying some 500 passengers and drawn by two locos, left Leeds at 8 o'clock in the morning and arrived at Derby at 1 o'clock amidst the cheers of thousands of spectators. In order to celebrate the occasion in proper style two long lines of tables were laid along the station platform and spread with an ample supply of refreshments, which the visitors consumed standing, to the strains of music!

FAMOUS TRAINS:

The "Southern Belle"

The "Southern Belle" Express runs between London (Victoria) and Brighton. It consists entirely of Pullman cars and is claimed to be the most luxurious regular express in the world. It is generally hauled by large tank locos, and it covers the distance of 51 miles in exactly an hour.



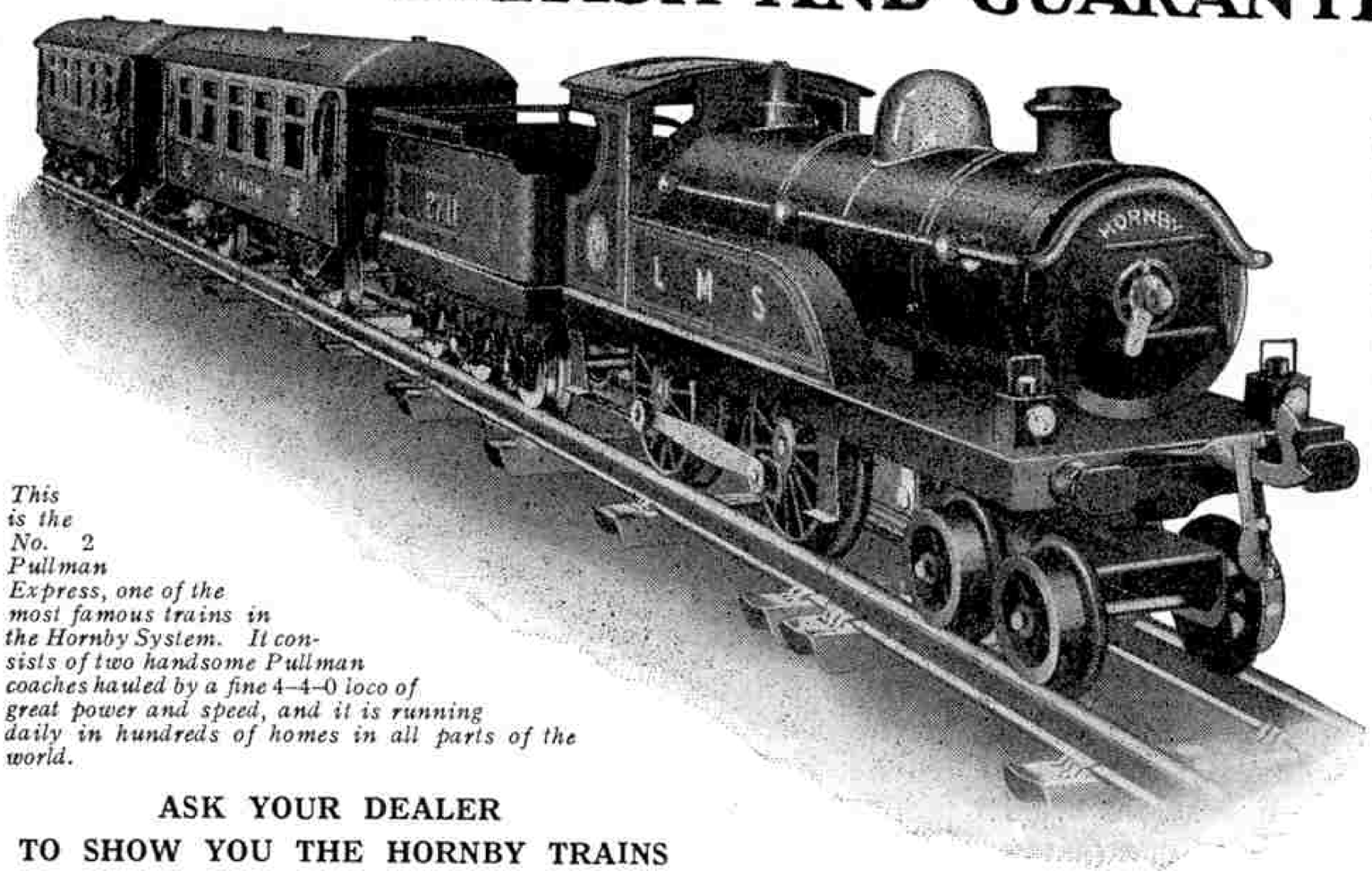
Run Your Own Railway!

ONLY when you've got a *real* train like the Hornby can you enjoy the fun of running your own railway system. It's the finest fun in the whole world, and you will find that even your Father will want to help you when you've fixed up a Hornby Railway!

See how long a Hornby loco runs without re-winding. See how it gets up speed with a heavy load behind it and how smoothly it rides over the points and crossings. You switch it over from one track to another simply by throwing over the points. It pulls up or reverses at any place you wish, by means of the special brake rail supplied with every set.

How fine and sturdily-built are Hornby Locos. How *real* they look. How beautifully they are enamelled in the correct colours! Every part of a Hornby Railway is like that—strong and beautifully finished. Stations, Tunnels, Goods Wagons, Signals, Breakdown Vans, Snow Ploughs, Pullman Cars—all the real things in miniature. If any part gets broken, you simply buy a new part and fix it yourself.

HORNBY TRAINS
BRITISH AND GUARANTEED



This is the No. 2 Pullman Express, one of the most famous trains in the Hornby System. It consists of two handsome Pullman coaches hauled by a fine 4–4–0 loco of great power and speed, and it is running daily in hundreds of homes in all parts of the world.

ASK YOUR DEALER TO SHOW YOU THE HORNBY TRAINS

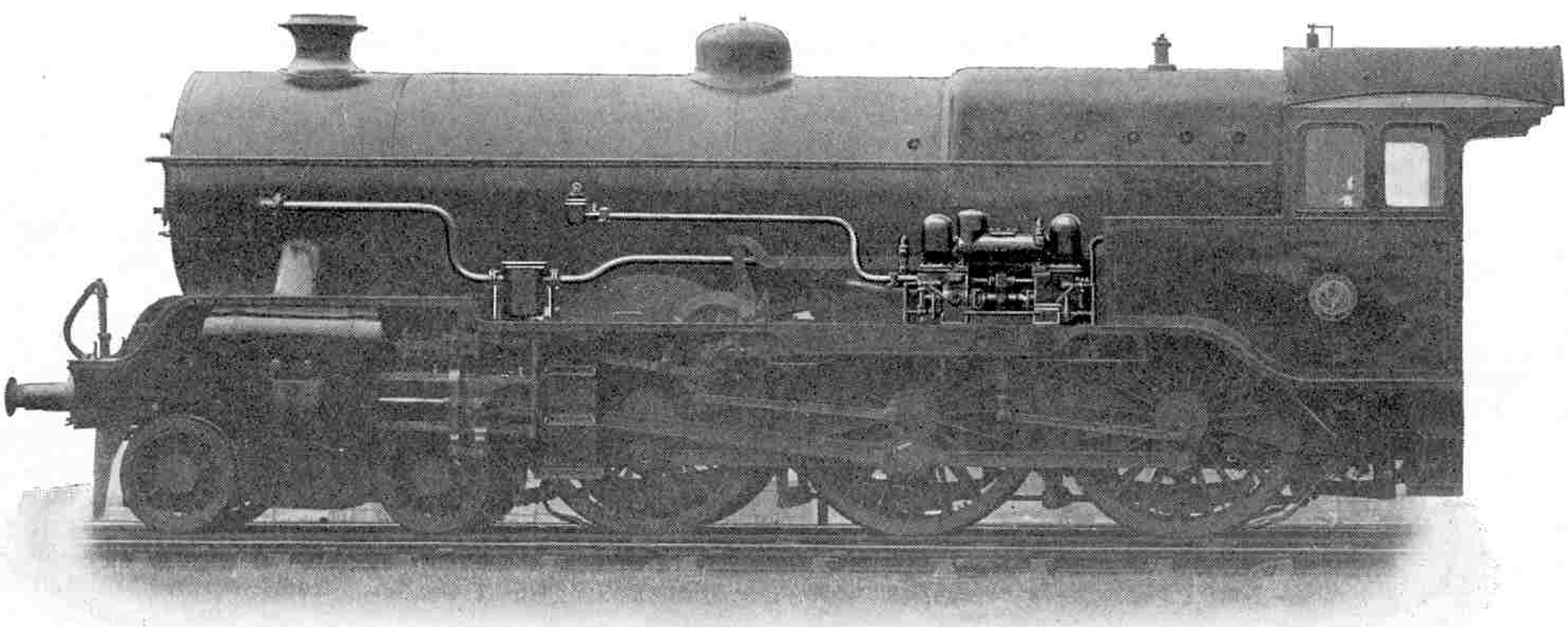
HORNBY TRAIN PRICES

No. 0 Passenger Set, complete	...	24/–
No. 0 Goods Set	,,	... 17/6
No. 1 Passenger Set	,,	... 27/6
No. 1 Goods Set	,,	... 21/–
No. 2 Pullman Set	,,	... 60/–
No. 2 Goods Set	,,	... 37/6
No. 1 Tank Goods Set	,,	... 25/–
No. 2 Tank Goods Set	,,	... 45/–
No. 2 Tank Passenger Set complete		... 45/–

Manufactured by
MECCANO LIMITED
BINNS ROAD
LIVERPOOL

Heating the Feed Water

Testing New Feed Pump for L.M.S. Locos



The "Dabeg" Feed Pump fitted to L.M.S. 4-6-0 Passenger Engine

THE London Midland and Scottish Railway Company has fitted a new type of feed pump to several 4–6–0 superheated passenger locos and 0–8–0 goods engines. This pump, known as the "Dabeg," draws cold water from the tender through the heater, situated above the pump, and delivers it into the boiler through a check valve, which may be seen in the illustration about half-way along the boiler barrel.

The pump has two stages, between which a direct contact preheater is interposed. Horizontally opposed rams are coupled to a common crosshead, the rams being given their reciprocating motion by means of a rocking lever, the end of which is coupled by a driving rod to a small return crank attached to the pin of the trailing coupled wheels.

Cold water is forced by one stage of the pump through the preheater to the second stage, and thence, in its heated state, to the boiler. A pipe brings the exhaust steam from the cylinders to the preheater, the steam used being about 15 per cent. of the total amount of steam exhausted. Several features enable this type of pump to compare very favourably with the usual injector. For instance, it is driven directly from the driving wheel of the engine and thus proves exceptionally economical in the power consumed for its operation. Also, the exhaust steam, after passing through a separator in the heater, comes into actual contact with the feed water, and radiation losses are practically eliminated.

The pump is largely automatic in action and is controlled by a three-way cock regulator, coupled to a pipe attached to the delivery of the cold water pump and leading back to the tender. This valve has its control attached to the reversing arm shaft of the engine, and is arranged so that different degrees of valve-opening correspond to different percentages of steam cut-off, thus making the feed water supply approximately equal to the boiler demand at all times. This means that, as the cut-off is shortened and the steam consumption consequently reduced, a portion of the water drawn in by the cold-water stage of the pump is returned again to the tender tank, the quantity entering the boiler varying in accordance with the setting of the reversing lever, being least at the smallest admission and greatest at the maximum cut-off. When the engine is coasting, with the reversing lever fully over, the whole volume of water is restored to the tender without entering the boiler.

The dimensions of the delivery pump plunger are such that it will supply approximately 36,000 lb. of water per hour when making the number of pulsations corresponding to a speed of 60 miles per hour with an engine having a 6 ft. 3 in. driving wheel, which is the size of wheel used on the passenger loco illustrated. This loco is provided with four cylinders, 16½ in. diameter by 26 in. stroke, and works at a boiler pressure of 180 lb. per square in. When hauling a train of 380 tons—which represents an average for this class—at a speed of 60 miles per hour with the regulator fully open and expansion of from 25 to 30 per cent., the water evaporated would equal approximately 37,000 lb. per hour. These conditions of regulator opening, expansion and speed correspond to the maximum amount of steam likely to be required, and thus the supply and demand are approximately equal at this speed.

On the London and North Eastern Railway a 2–8–0 mineral loco of Great Northern design, No. 3476, has been fitted with a somewhat similar arrangement known as the "Worthington" feed water heater and pump.

Jackie Coogan's Visit

to the American Meccano Factory

by Frank Hornby

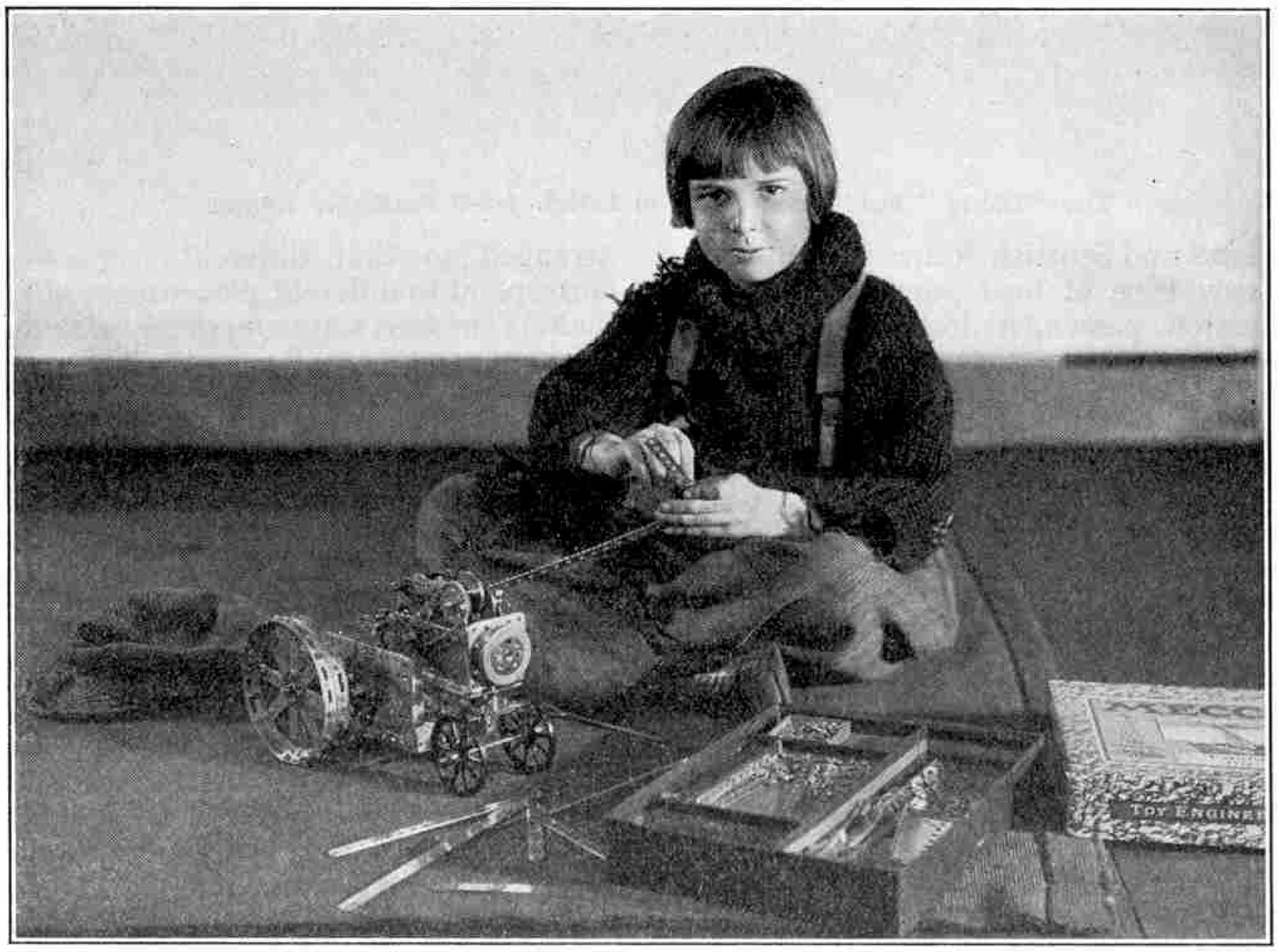
During a visit to America, Mr. Hornby, the inventor of Meccano and Managing-Director of Meccano Ltd., was able to show Jackie Coogan over the Meccano factory at Elizabeth, New Jersey, U.S.A., and below he gives an interesting account of his chat with this "great little" film star. Jackie Coogan is undoubtedly the world's most popular boy, and I feel sure that many thousands of our readers who have witnessed his clever acting on the screen will be interested to read of the happy "off" hours that Jackie spends with Meccano and other boyish hobbies. On completing his tour of the American factory, Jackie was surprised to learn that there was a still bigger factory at Liverpool, and another at Paris, and he has made up his mind that he will certainly visit the Head Office of Meccanoland on his next trip to Europe.—EDITOR.

MOST of us, I suppose, enjoy spending an occasional evening at the cinema and I must confess that this is one of my favourite forms of recreation. The films I like best are those that deal with children and their doings, and I suppose that is quite natural, as most of my life has been spent in caring for boys and studying and providing for their well-being and enjoyment.

Once or twice during the last few years I have experienced the very pleasant surprise of discovering in some little domestic scene depicted on the screen, a boy or a number of boys playing with Meccano models. When this has happened I have felt an almost irresistible,and, of course, ridiculous desire to step around to the back of the stage and have a little talk with them.

The films that have given me a very real and genuine pleasure are those that depict that wonderful little genius Jackie Coogan, going through all manner of extraordinary experiences in that daring, clever, and lovable way with which we are familiar. The first picture that I saw him in was "The Kid," and I remember wondering at that time if he had ever heard of Meccano and if he enjoyed playing with it like all the other millions of boys do. I decided that no doubt he had had so busy a life thrust upon him, that he would not have much time for any form of recreation and that his companions would be much older people who would have no sympathy with regular boyish pursuits. I remember thinking what a pity it was that we could not get hold of him and pitch him in among a bunch of boys of his own age and give him a great time playing Meccano and trains and football and fishing.

I have seen Jackie Coogan on the screen a number of times since then and each time the same thoughts have run through my head, so you can imagine the keen pleasure I experienced when I received a very kindly and appreciative letter from Jackie's father telling me how much his son enjoyed playing with Meccano. I wrote back to Mr. Coogan at once telling him how glad I was to receive his letter and telling him also of the great interest with which I had followed the work of his clever son. Very shortly he sent me another letter telling me more about the fine models that Jackie had made. He also gave me full permission to reproduce his first letter and to tell all the other Meccano boys that Jackie was one of them. Better still came a letter from Jackie himself, which I am printing here, and I am sure Jackie will be very proud to see his letter reproduced in the *Meccano Magazine*.



The Meccano Tractor is one of Jackie Coogan's favourite models. He is seen above "putting it through its paces"

Jackie Wants to be an Engineer

Like all other keen Meccano boys Jackie naturally wants to become an engineer. That is one of his wishes that I hope will not be gratified because, although we might discover in him a great engineer, we should certainly lose one of the most lovable laughter-makers the world has ever known.

In one of his letters Jackie expressed the hope that

some day, in some part of the world, we might meet, because there were a lot of things concerning Meccano that he wanted to ask me about. Whilst I entertained the same wish perhaps even more keenly than Jackie himself, I thought it very unlikely that he and I would ever be within a thousand miles of each other. A month or so later I was on a visit to the offices of the Meccano Co. Inc.—an associate company of Meccano Ltd.—and to my great surprise, I received a letter saying that Jackie was in New York and that he wanted to come over to Elizabeth, New Jersey, to inspect the Meccano Factory with me, if it could be managed.

Jackie arrives at the Meccano Factory

It did not take long to fix up arrangements and within a day or two I had the pleasure of welcoming both Jackie and his father at my American office. Jackie got to work at once with his questions, and I soon realised that there was very little I could tell him about Meccano models or Meccano parts and their uses. He was thoroughly familiar with them all and could intelligently discuss the construction of an Auto Chassis, the Meccano Loom, the Clock, and he could tell me the functions of various cranes and discuss the details with me. What I liked best about him, though, was his keen imagination. He told me he had been to Paris and that when he saw the Eiffel Tower he felt sure it had been designed from Meccano. He said he had a notion that he could build an exact model of the Eiffel Tower himself every bit as big, if only he had enough parts and enough time, and then he added, "Wouldn't it be fine if Meccano boys could run it, and operate the elevators, and let all the other Meccano boys who came, examine the machinery and explain it all to them!"

"And what would your part in the matter be, Jackie," I asked.

"Oh!" he replied, "I would be the elevator boy and I would say 'Step right in; this is free day to Meccano boys, and it's all quite safe, everything's made of Meccano.'"

I could tell by the look of pleasure on Mr. Coogan's face, that while the idea amused him, he was proud of his boy's intelligence.

JACKIE COOGAN PRODUCTIONS, INC.

OFFICE OF THE PRESIDENT

JACK COOGAN, PRESIDENT
LILLIAN R. COOGAN, SEC'Y & TREAS.

HOLLYWOOD, CALIFORNIA.

March,
Twenty-fifth,
1925.

Mr. Frank Hornby, Pres.,
Meccano Company, Inc.,
Elizabeth, N. J.

My dear Mr. Hornby:-

I think you will be interested to know that my boy, Jackie, is a Meccano enthusiast. He loves to build models and then to operate them and what a range of models he has built with Meccano.

I like him to play with it and I have noticed that whilst Jackie is amusing himself with Meccano, he is at the same time acquiring a good knowledge of engineering. As a father, I am a firm believer in the modern idea of learning while playing.

Jackie has had unusual opportunities of satisfying his toy wants and I think it very much to his credit that he selected Meccano.

If other boys are getting as much pleasure from Meccano as Jackie is - what a host of boy friends you must have!

Wishing you every success,

Cordially yours,
Jack Coogan

P.S. I am glad to tell you that recently Jackie, only nine years old, passed with honors an examination for boys of thirteen.

JACKIE COOGAN PRODUCTIONS, INC.

OFFICE OF THE PRESIDENT.

JACK COOGAN, PRESIDENT
LILLIAN R. COOGAN, SEC'Y & TREAS.

HOLLYWOOD, CALIFORNIA.

Mar. 31, 1925.

Mr. Frank Hornby,
Elizabeth, N.J.

My dear Mr. Hornby.

I have many good times playing with my Meccano. I have been a Meccano fan since the first set was given to me, and like it so well that some day I may be an engineer.

Your friend,
Jackie Coogan.

—and Jackie Coogan's own letter to Mr. Hornby

A letter from Jackie's Father—

"Jackie has been drumming this kind of stuff into me ever since he came back from his recent visit to Europe," he said, "Everyone in Hollywood knows of Jackie's keenness on building Meccano models. He has asked our art director next time they need a miniature bridge to use Meccano to make it. The art director tells me that many of his suggestions are on really practical lines, and he will be able to make use of them. Jackie has read somewhere that architects and builders use Meccano parts for modelling out their structures in the first place, and that a big engineering firm build up special models of anything new they may be designing, with Meccano parts, and so try out the various movements and mechanical details first in this way; and he sees no reason why we in our business should not make similar good use of Meccano."

(*To be continued*)

Lives of Famous Engineers

XXV
JOHN SMEATON
LIGHTHOUSE BUILDER

LAST month we saw how the Eddystone lighthouses of Winstanley and Rudyerd came to disaster, the former by the power of the sea and the latter by fire, and how Smeaton had the task of erecting a third lighthouse.

Even with the knowledge of the fate of the first two lighthouses there still prevailed at this time a popular impression that nothing but wood could possibly stand on the Eddystone rock. Smeaton, on the other hand, realised that stone was the only possible material for such a structure. He arrived at this conclusion to a large extent as the result of a careful study of the previous structures with the object of discovering their defects. He soon became convinced that both structures were deficient in weight and that even if Rudyerd's lighthouse had not been destroyed by fire, it probably would have shared the fate of its predecessor and been washed away in a heavy storm. Smeaton's conclusion was that the lighthouse must be so contrived as not to give way to the sea and therefore that it must be so strong that the sea would be compelled to give way to it.

Smeaton Visits the Rock

Having decided upon stone, Smeaton's next problem was how the blocks were to be fastened together in order to obtain the greatest possible strength. At first he considered the possibility of binding the blocks together by iron cramps but this method he soon dismissed as not only inadequate but also impracticable. Gradually he thought out a scheme of dovetailing on the lines adopted in carpentry. He considered that by this means the blocks might be made mutually to lock one another together, thus securing unassailable strength.

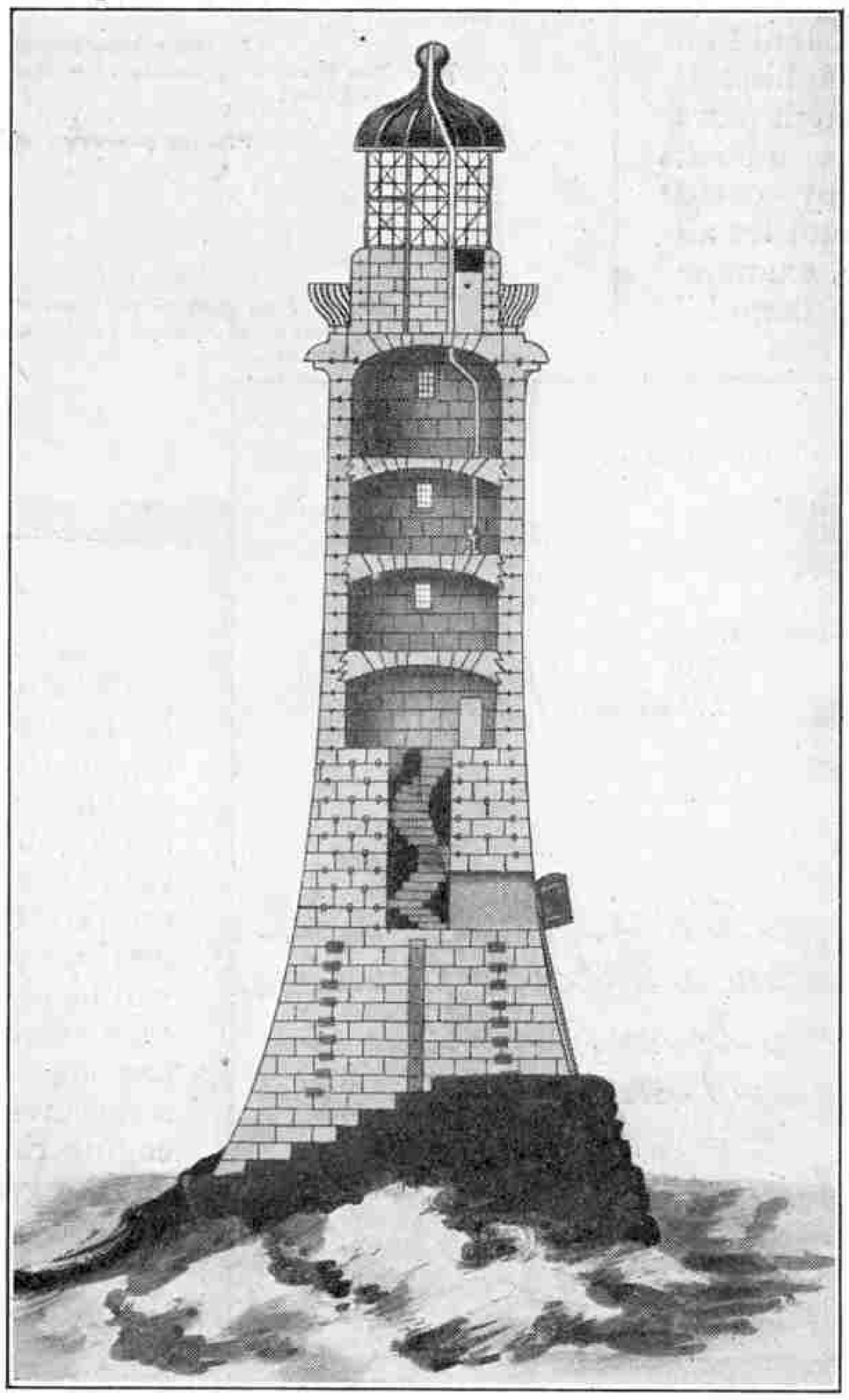
Having considered these important preliminaries Smeaton's next task was to visit the rock itself, and for this purpose he set out from London to Plymouth. As indicating the terrible state of the roads at that time it is interesting to note that this journey occupied no less than six days! On arrival at Plymouth Smeaton was introduced to a foreman shipwright named Josias Jessop, who gave him valuable information regarding the previous lighthouse and rendered great assistance throughout the progress of the new work.

Delays through Bad Weather

Very naturally Smeaton was anxious to visit the Eddystone rock at once, but he was delayed a few days owing to bad weather. Finally, on 2nd April, 1756, the weather had improved sufficiently to permit of a voyage to the rock, but on arrival there it was found that the waves were breaking over the landing place with such violence as to make landing impossible. A second trip was made three days later and on this occasion Smeaton was able to land upon the rock and stay there for two hours. The only traces he found of the previous lighthouses were the iron branches fixed by Rudyerd and traces of those fixed by Winstanley. After this, with various interruptions due to bad weather, Smeaton continued to visit the rock regularly and gradually completed his design for the structure.

His next step was to return to London and make his report to the proprietors. In order to make his scheme perfectly clear he set to work to construct a complete model of the lighthouse and this occupied over two months. The time spent upon this model was well repaid, however, as after examining it the proprietors, and later the Lords of the Admiralty, fully approved of the design.

Smeaton then returned to Plymouth to commence the necessary arrangements for constructing the foundations of the lighthouse, breaking his journey at Dorchester to order a supply of Portland stone of which he had decided that the lighthouse should be mainly built. On his arrival at Plymouth workmen were engaged and workyards hired, and vessels were provided for the transport of men and materials between the shore and the Eddystone Rock. Josias Jessop, of whom Smeaton by this time had formed a high opinion, was appointed resident engineer of the building.



Section of Smeaton's Lighthouse

Work on the Rock Begun

On 3rd August, 1756, Smeaton visited the rock and fixed the centre and laid down the lines. Work then commenced and as far as weather conditions would allow proceeded regularly. In the most favourable circumstances it was impossible for work to be carried on for more than six hours continuously, and in order to make the utmost of any spells of fine weather the men worked by torchlight.

Smeaton's main object during this first year was to complete the cutting out of the rock of all the recesses to receive the foundation stones. He soon found that the amount of time wasted in voyages between the rock and the shore was very serious and therefore he arranged for a vessel called the "Neptune" to be anchored at a convenient distance from the rock and utilised as a floating store house. As the season progressed the weather conditions

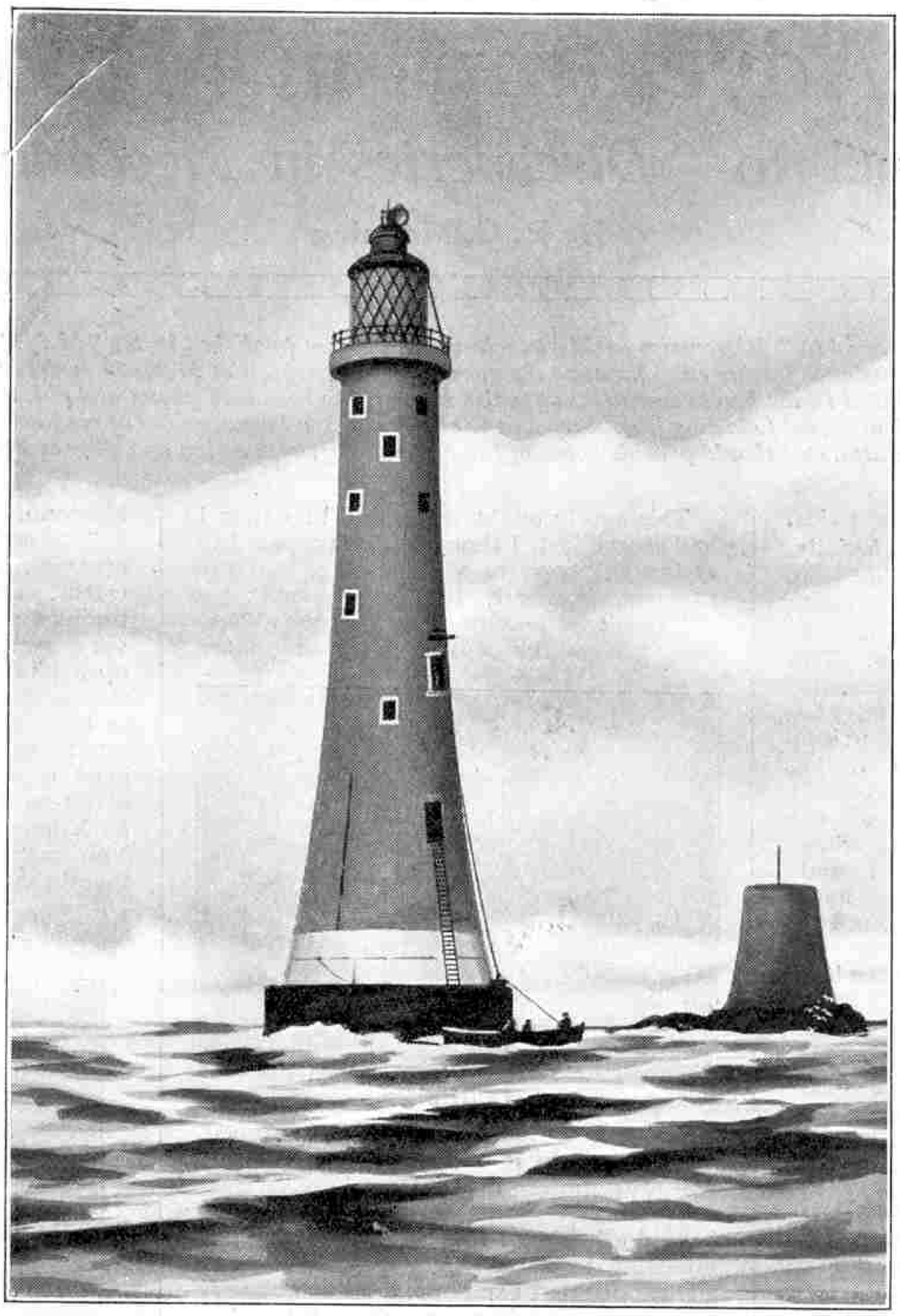
became worse and for many days together work was out of the question. Landing at such times was almost impossible and even if the men could have reached the rock they would have been washed off immediately. Every possible opportunity of work was seized, however, and frequently the men were landed on the rock for spells as short as two hours. By the end of November the necessary cutting of the rock was completed and the working party prepared to return to the mainland to proceed with the dressing of the stones for use in the following year.

A Thrilling Experience

The homeward voyage of the "Neptune" provided Smeaton with a thrilling experience of which he wrote a graphic account. A fierce gale was blowing and as the "Neptune" found it impossible to make Plymouth Harbour she was steered for Fowey. During the night the gale steadily increased and at one period Smeaton heard a sudden clamour on deck, and ran up to see what was happening. It was raining hard and something like a hurricane was raging.

"It being very dark," says Smeaton, "the first thing I saw was the horrible appearance of breakers almost surrounding us; John Bowden, one of the seamen, crying out 'For God's sake heave hard at that rope if you mean to save your lives.' I immediately laid hold of the rope at which he himself was heaving as well as the other seamen, though he was also managing the helm. I not only hauled with all my strength, but called to and encouraged the workmen to do the same thing. In as little time as I have been describing our situation the vessel's head was brought round so that we no longer faced the breakers which, from the darkness of the night, were almost the only objects we could see. The vessel was then heaved down by the stress of the wind, her gunnel to the water, but as we soon found she answered her helm, we concluded she was making way. It would require a pen of a different sort from mine to describe the jeopardy of our present situation, while we were uncertain whether or not we should escape the rocks on which the seas were breaking with a tremendous noise."

No vestige of land could be seen and as the sailors were very uncertain as to their position on the coast they put out to sea again, facing huge waves which occasionally broke completely over the ship. At daybreak they found themselves driving towards the Bay of Biscay. Wearing ship, they once more steered for the Cornish coast and before night had sighted the Land's End. Another miserable night and day passed and finally, after a terrible tossing for four days, they came to anchor in Plymouth Sound to the great relief of those on shore, who had begun to fear that the "Neptune" had gone down.

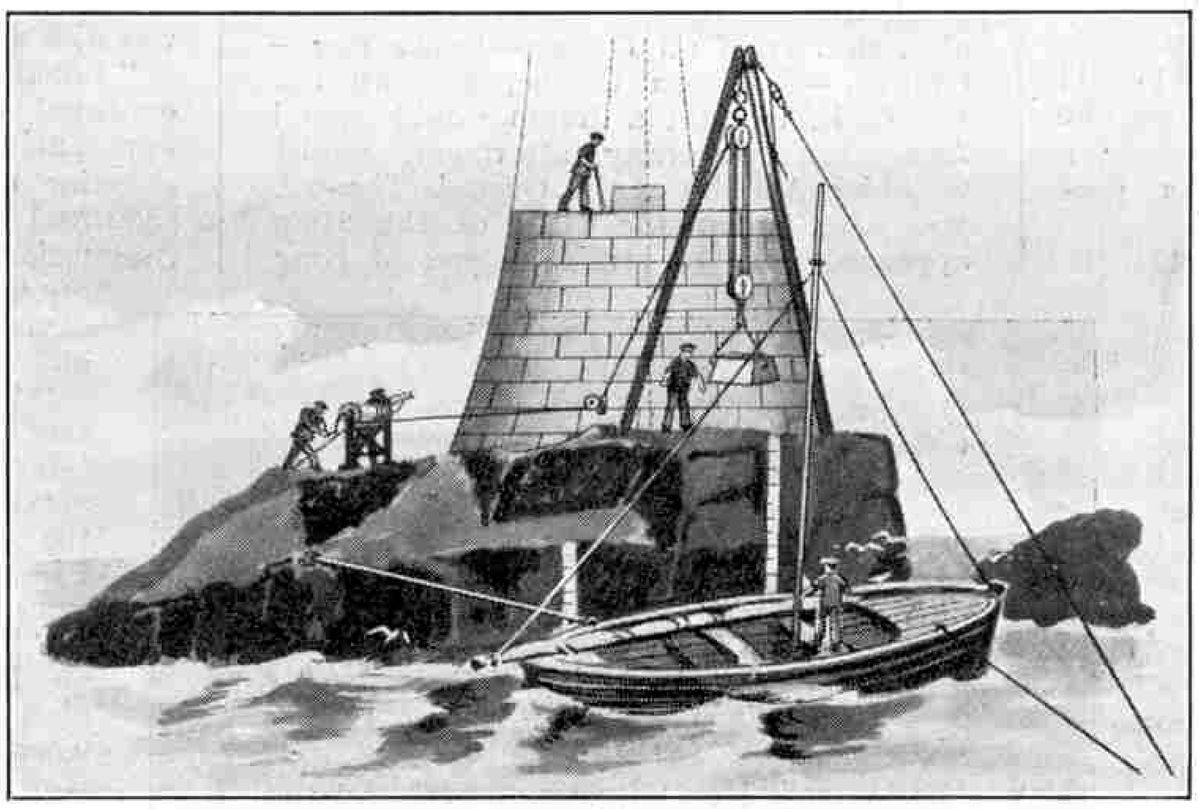


Present Eddystone Lighthouse and Stump of Smeaton's Tower

Preparing the Stones

The following winter was occupied in preparing the stones for the next summer's building operations. Smeaton himself laid out all the lines on the workroom floor in order to secure the greatest accuracy in fitting. He had considerable difficulty in finding a floor large enough for this purpose, and apparently the authorities of Plymouth were not too well disposed towards him as his request for the use of a suitable room in the Guild Hall was refused by the Mayor on the pretence that the chalk marks would spoil the floor! He was also refused the use of the Assembly Rooms for some similar reason, and at length had to obtain the necessary floor space by taking down a partition in the coopers' workshops. By the time weather conditions permitted building operations to be commenced, nearly 450 tons of stone were dressed and ready.

As early as possible in the summer of 1757 building on the rock was commenced and by the 12th June the first stone, weighing 2¼ tons, had been landed and securely fixed in its place. By the evening of the next day the first course of four stones was laid and the second course was completed by the end of the month. There were many interruptions during the earlier operations due to wild weather and heavy seas, but when the sixth course had been laid it was found that the building rose above the average wash of the sea and from that time progress was more regular and rapid.



Work advanced to 15th course, showing method of landing and hoisting the stones

Simple Method of Work

The method of work adopted was very simple but at the same time very effective. When the stones of which a course was to consist were dressed, they were brought together upon a platform in the yard and fitted into exactly the position they would occupy in the building. Each stone was then marked and numbered so that it could be restored to its proper position without difficulty. Each course of stones was then taken out in a vessel, landed and fixed in place without any confusion occurring.

Smeaton spared no pains to make his structure as solid as possible. Not only

(*Continued on page* 127)

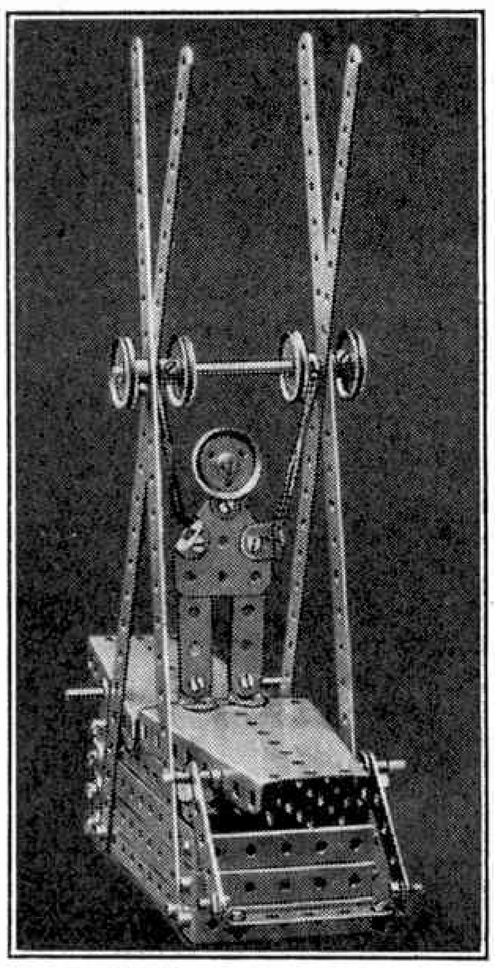
Further Adventures in Meccanoland

A Sequel to "*Discoveries in Meccanoland*"

By R. C. Manning

In this amusing sequel to "Discoveries in Meccanoland," which we published in the "M.M." for Xmas 1924 and January 1925, our contributor further enlarges upon the more humorous aspects of Meccano model-building. The quaint "Meccanitians" included in the previous articles appealed to Meccano boys both young and old, and we believe that the further examples illustrating the following little story will be welcomed by a large number of readers. The models may all be made with a No. 1 Outfit, and should provide hours of fun both during construction and after completion.—EDITOR.

MY brother Jack and I are twins. We are not at all alike facially, but we closely resemble each other in one particular characteristic, that is, in the keen delight we take in trying each to outdo the other. This little rivalry of ours has been responsible for many exciting adventures and, alas, for many less exciting but more painful parental corrections! Probably it has also been the means of keeping us both in our school "soccer" team, for should one of us succeed in scoring a goal, it almost certainly meant that a second goal would be forthcoming from the other!



A Sudden Appearance

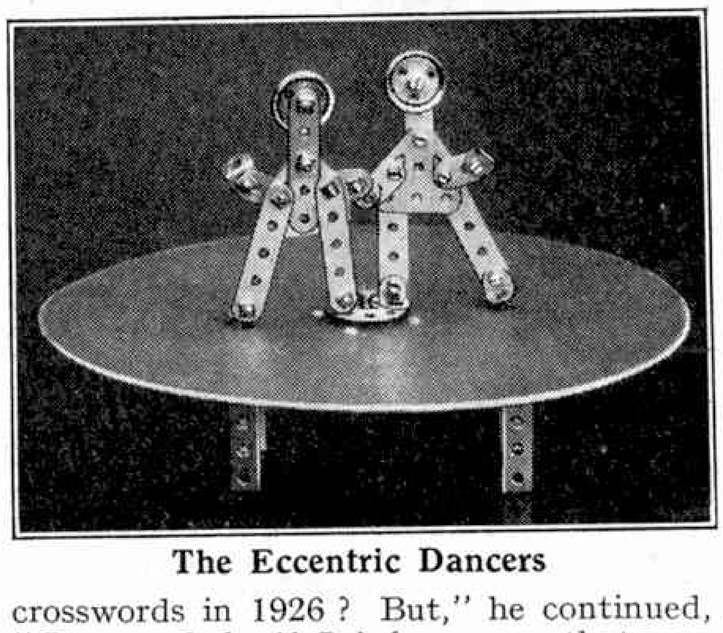
You may imagine then from the above how I boasted after my wanderings in Meccanoland, which happened, as you all know, a year or so ago. Jack was exceedingly quiet—for him—for a long time after this and I could not get him to join me in any of those escapades for which we were both so famous—or perhaps I had better say notorious!

Try how I might to entice him, there was always some excuse. At last I began to get alarmed, thinking that perhaps he was ailing for the Measles or some other such wretched thing. I remembered when Smith Minor had measles he was shut off from the world and we didn't see him for ages. Great Scott! supposing Jack had them! I could see nothing else for it but that I should have to go and get measled too! All my fears in this direction proved groundless, however. One day, thinking to rouse him into action, I hailed him.

"Hi! Jack, can you tell me the name of a popular Magazine? It has seven letters and there's a 'can' in it."

This surely ought to remind him that I had scored last, I thought, and prepared to dodge the book he was reading. To my surprise, however, he merely said:

"Don't you know that I made a New Year's resolution not to have any more



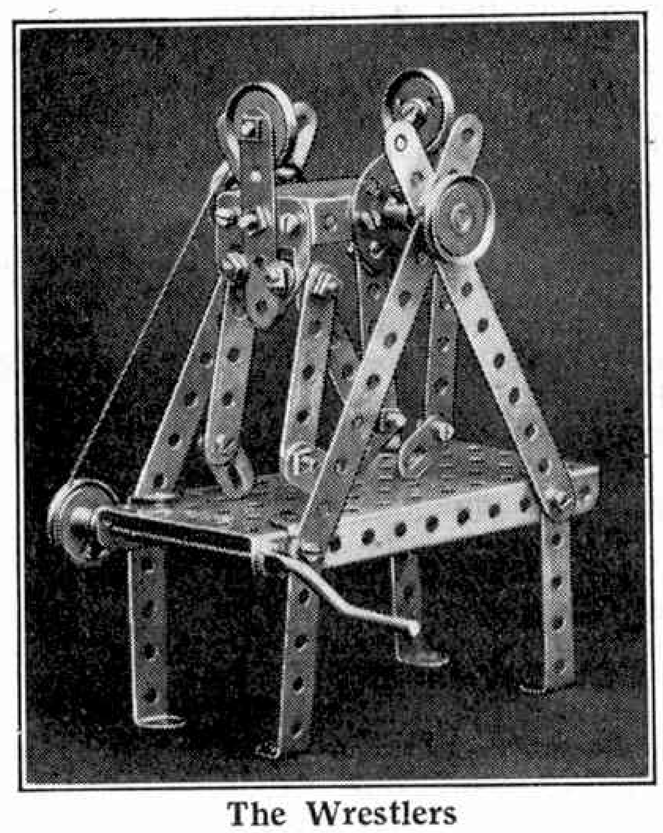
The Eccentric Dancers

crosswords in 1926? But," he continued, "It may help if I inform you that you will also find *me* in it before long."

I felt there was something mysterious behind all this, so that when a day or two following he came running downstairs in a state of great excitement I was not very much surprised but a good deal relieved, for I knew that I was at last about to learn what had been puzzling me, and also bothering Jack for so long a time.

"Dick," he said, "you remember that great adventure of yours last Christmas with the Meccano Outfit that Uncle Rex gave you?" As if I had forgotten that! "Well, don't think I was jealous or anything of the sort, but I really did think that what you could do I could do also, so I tried all I knew—mince pies—Gulliver—Robinson Crusoe, and all the rest of it, but not a dream would come! And then yesterday afternoon, whilst watching Aladdin at the Queen's Theatre, you said, when the Geni of the Ring appeared, that he reminded you of King Meccano. This gave me an idea.

"As soon as we reached home, I went upstairs, got out your No. 1 Meccano Outfit, and started working out this brainwave of mine. I did not get on very well, however, and having made up a kind of box, I stopped to think out the next step. Somehow it wasn't half so easy as I had expected. How long I sat there thinking I can't say but my head became quite dizzy and I was just about to give up when my eyes wandered back once more to my unfinished model. You may judge of my surprise when I found that it was now no longer unfinished, but was fitted with a lid and two long side pieces and a crosspiece, and there



The Wrestlers

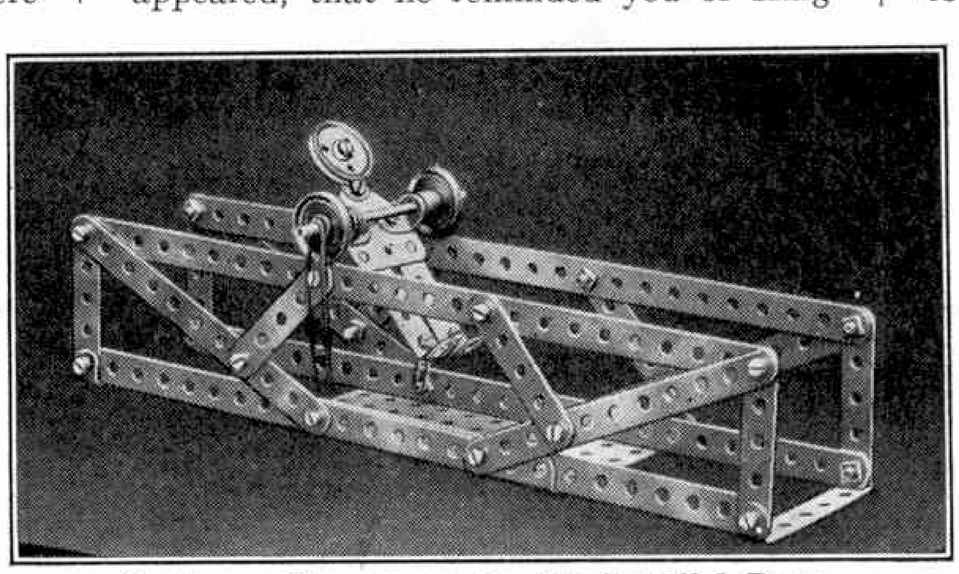
was also a little step at one end.

"Looking through the holes I half expected to find something inside, but apparently it was empty. I decided to examine it a little more closely, but as soon as I had touched the lid there was a commotion, and out from the box sprang my Geni of the Ring! The apparition came to rest on top of the lid, which had closed down immediately.

"'I knew you were coming,' said an extraordinary little creature, 'so I prepared a surprise for you.'

"I then recognised in my 'Geni' the celebrated King Meccano, and I began to feel more at ease, although somewhat excited.

"'Welcome to Meccanoland,' went on His Majesty. 'We are always glad to see fresh faces, especially when they are as keen as yours. Now I have no doubt that you are eager to take a look round my domains, and I shall be very happy



Professor Strongarm on the Parallel Bars

to conduct you personally. What would you particularly like to see ?'

"'Oh!' said I boldly, 'a little of everything if you please, your Majesty.'

"He smiled, and said, 'I'm afraid that would be quite impossible, but however, I will do what I can. Come with me.'

"You may be sure I did not require a second invitation, but followed the strange boastful little figure in high glee. For some reason, it did not strike me as at all peculiar that he should now be quite as big as myself!

(A SUDDEN APPEARANCE.—The bottom of the box-like portion of this model consists of a 5½"×2½" Flanged Plate, whilst three 5½" Strips bolted to upright 2½" Strips form each side and three 2½"×½" Double Angle Strips constitute the ends. The front Sector Plate, forming the lid, is pivotly carried on an Axle Rod passing through its sides, three holes from the end, and the rear Sector Plate is pivoted in a similar manner, except that the Rod in this case passes through the fourth holes from the end. Pieces of thin elastic are tied to the end holes in each side of the front Sector Plate, at its widest end, and are connected to the ends of screws at the bottom of the box. The Meccanitian is placed face downwards inside the box, with his feet towards the far end of the model. The tension of the elastic holding the lid should be sufficient to keep him in this position. On tilting the plate slightly, however, he will suddenly shoot out from the box, drawn by the elastic bands connected to the upper transverse 3½" Rod).

"We passed through a tiny door in the wall—probably the identical entrance which you used last year—and I found myself staring at the most amazing sight that I have ever seen. There is no need for me to describe to you the wonderful country in which I then stood, with its thousands of inhabitants all happily busy, and its gigantic steel buildings, railways, engineering works, and pleasure gardens, for you have already journeyed over it. I shall just tell you of one or two things that King Meccano pointed out in particular.

"The first building we entered proved to be a magnificent gymnasium, where Professor Strongarm was booked for a display on the Parallel Bars. We found him tearing about the floor on a pair of huge bar-bells. I was rather alarmed, thinking he would bowl us over, but he stopped, luckily, just in time, and placing the weights upon the bars he turned to me.

"'Sorry I gave you a turn,' he said, 'but one good turn deserves another. Watch!'

"He then proceeded to give a wonderful exhibition, turning over and over whilst keeping the weights balanced on the bars and moving to and fro along their whole length.

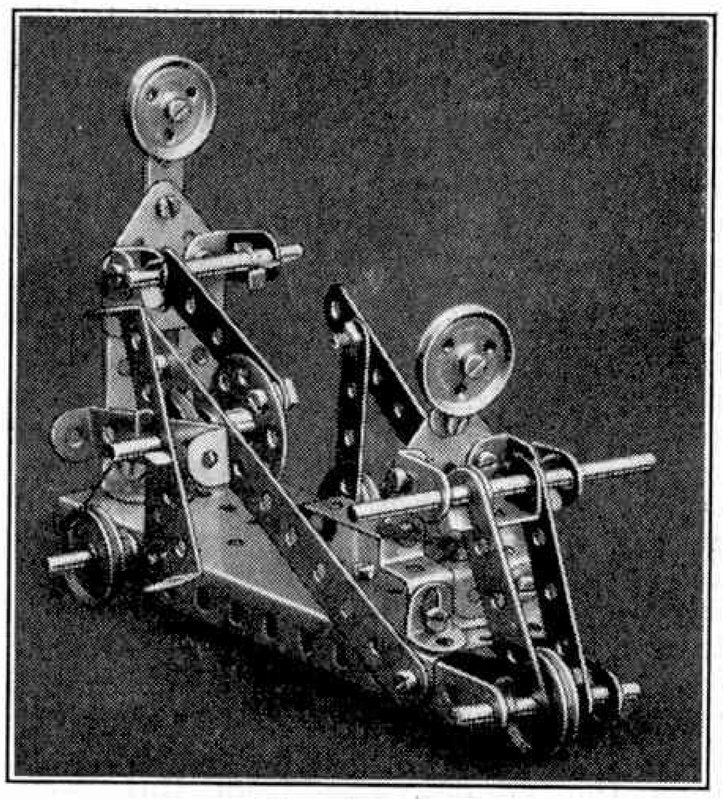
(PROFESSOR STRONGARM.—The construction of this model is shown quite clearly. Washers may be placed between the 1" Pulleys and the Angle Brackets representing the Professor's hands, and if these are adjusted so as to press slightly against the wheels, the gymnast will describe complete revolutions as the wheels move along the "bars." The model should be tilted at one end for this purpose. The photograph shows the Professor held captive by means of small elastic bands).

"This was only one of the many marvellous things I saw in this place, and, as we moved about it reminded me somewhat of Wembley. I hardly knew what to look at first. My guide hurried me along to where a couple of wrestlers were vainly endeavouring to throw each other. They were very evenly matched, and though they often tossed each other clean over their heads, somehow they always managed to land on their feet. Kicking was evidently permissible, for they indulged in it constantly but without any apparent result.

(THE WRESTLERS.—Two 2½"×½" Double Angle Strips, one of which is bolted to the Bush Wheel shown, form the arms of the wrestlers. The legs are all pivoted by means of bolts and lock-nuts. Sharp irregular movements of the Crank Handle will result in amusing antics by the wrestlers).

"A little further along we came across a pair of eccentric dancers who were engaged in some wonderful performances on a small circular platform.

(THE ECCENTRIC DANCERS.—The right arms of the dancers are bolted loosely together by means of a Reversed Angle Bracket. The outer "legs" should be lock-nutted to the Flat Trunnions. The model is operated by rotating a 1" Pulley beneath the dance floor (a circular piece of cardboard mounted on a large Flanged Plate). This Pulley is secured to a short Rod carrying the Bush Wheel on which the dancers are mounted. If desired the Pulley may be connected by cord to a Crank Handle suitably mounted at a distance).



Hay-Making

"I was beginning to congratulate myself that what I had already seen would give me enough 'stunts' to equal even your own adventures when I was reminded that 'if I wanted to see anything more I had better not waste time!' So out we went again into the open; this time we appeared to be going into the country.

"'Here is something that will interest you,' said my companion, as we were passing some farm buildings, and pointed to a machine which was being cleaned and oiled. 'This is a machine we use for hay-making, for, as you know, Meccanitians believe in making hay while the sun shines. You see we are quite prepared!'

"He had the machine brought out and I was amazed to find how effective and yet how simple it was.

(HAY-MAKING MACHINE.—The base of this model is constructed from two Sector Plates bolted together. The Angle Brackets representing the feet of the Meccanitian at the rear of the machine are inserted beneath an elastic band stretched across the end of the Sector Plate. The Meccanitian is pivotly connected by a 2½" Strip to a Bush Wheel secured on the shaft of the threshing wheel, which is rotated from the road-wheel by an endless cord. The driver is supported on a seat composed of a ½" Reversed Angle Bracket and 2½"×½" Double Angle Strip).

"There were many tools and more elaborate machines to be seen on this farm—every imaginable task, it appeared, was performed by machinery. There were tractors, ploughs, sowing and reaping machines, threshing apparatus, chaff-cutting machines, churns—everything, in fact, that a model farm should possess."

(To be concluded next month)

Competitors, Kindly Note

Owing to the very large number of entries in the Meccano Model-building Contests, we regret that it is impossible to return competitors' drawings or photographs unless specially requested. We shall be glad, therefore, if all competitors in the recent contests, who desire the return of their entries, will kindly forward a stamped and addressed envelope of the necessary size, at the same time indicating the name of the Competition and Section in which their model was entered. The required photograph or drawing will then be despatched with the least possible delay.

By the time this issue of the Magazine is in the hands of our readers, the "Aeroplane" and "No. 1 Outfit" Competitions will have closed as far as the British Isles are concerned, and the task of judging the entries in these Sections will have commenced. The second pair of Competitions promise to equal the success of the "Loco" and "0 Outfit" Contests. The results, together with some particulars of the prize-winning models, will be published in an early issue of the *"M.M."*

"Motor" Competition

In this competition, as first announced in the January *"M.M."*, we are offering splendid awards for new Meccano models of Motor-driven Road Vehicles. The competition closes on the 27th of this month for readers in the British Isles, and entries from overseas competitors must be received by 31st May. Meccano boys should send along their efforts as soon as they are completed.

You may construct your model on the lines of any existing machine that comes under the general classification of "Motors"—limousines, 'buses, lorries, fire-engines, motor tractors, etc.—and you may use any Outfit or number of parts.

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, £5-5s.; SECOND PRIZE, £3-3s.; THIRD PRIZE, £1-1s.; SIX additional prizes of 10/6 each.

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, and section in which your model is entered. Mark envelopes "Motor Competition."

"No. 2 Outfit" Competition

As announced last month, we are offering prizes for the best models made entirely from a No. 2 Meccano Outfit. Models comprising parts that do not appear in this Outfit will be disqualified. It is not necessary to use all the parts contained in the Outfit. Those boys who possess larger sets may compete, providing they use only those parts that are in a No. 2 Outfit.

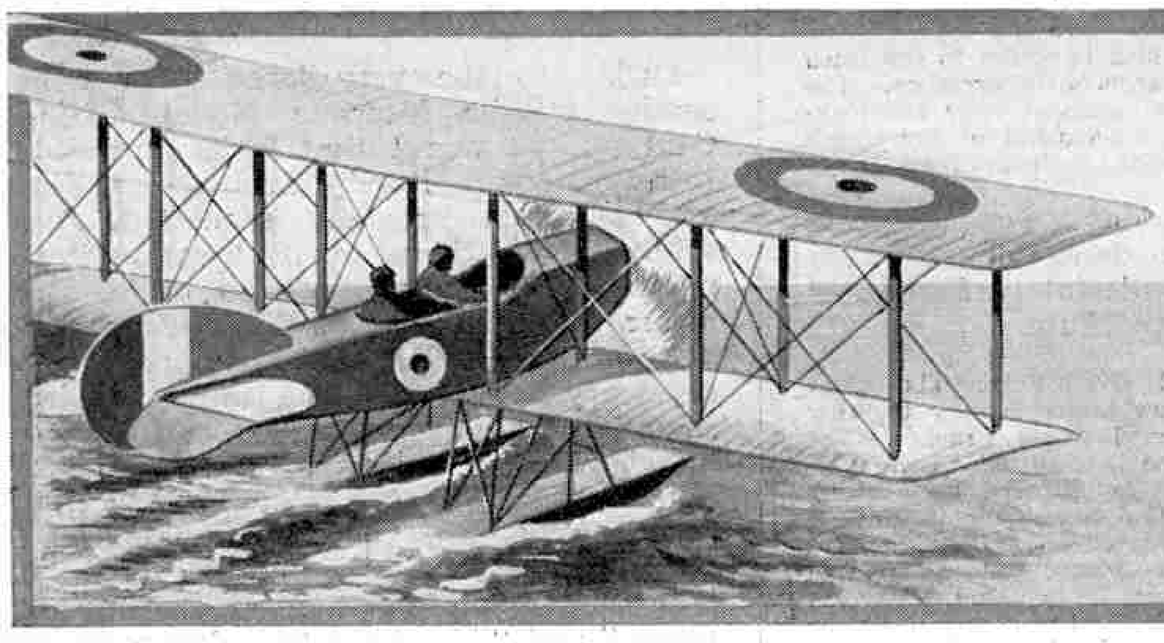
Models should not be sent. A clear photograph or good drawing is all that is necessary; this will be returned if desired, providing a stamped addressed envelope of the necessary size is enclosed with the entry.

Entries will be divided into the following sections:—SECTION A, for boys under 12. SECTION B, for boys over 12 and under 16. SECTION C, for boys residing overseas, and not exceeding 16 years of age. Prizes will be awarded for the three best entries FROM EACH SECTION as follows:—FIRST PRIZE: Meccano Goods to the value of £2-2s. SECOND PRIZE: Meccano Goods to the value of £1-1s. THIRD PRIZE: Meccano Goods to the value of 10/6.

Closing dates for Sections A and B: 27th February. Overseas Section, 31st May.

New Zealand (1926) Model-Building Competition

We again take the opportunity to draw the attention of all readers who reside in New Zealand to the splendid Model-building Competition arranged for that country by Messrs. Browning, Ifwersen Ltd., the Meccano Agents. Entries in this competition will be divided into three sections, according to competitor's ages, and over three hundred prizes are offered. The first prize in Section 1 consists of Meccano Products to the value of £7-10s. The last day on which entries may be received is 31st May. Would-be competitors may obtain their entry forms, together with all necessary particulars, from their Meccano dealers, or direct from Messrs. Browning, Ifwersen Ltd., P.O. Box 129, Auckland.



Air News of the Month

Weight-Lifting Record

A "*Goliath*" aeroplane fitted with four 500 h.p. engines recently attempted to break the world's record for height and duration of flying while carrying 6,000 kilograms, equal to about 6 tons actual cargo, including the weight of pilot and mechanic and fuel. The machine remained in the air for just over 72 minutes, establishing a duration record for this weight. An altitude of 3,500 metres was attained and the machine remained at this height for 55 minutes. The total weight of the machine at its departure for the flight was 14,500 kilos. The total weight of the cargo was 7,040 kilos (nearly 7 tons), composed of 6,000 kilos cargo, 710 kilos petrol, 160 kilos oil and 170 kilos allowed for the combined weights of pilot and mechanic. This is believed to be the greatest weight yet lifted by a heavier-than-air machine.

* * * *

Light Aeroplane's Fine Flight

One of the most remarkable light aeroplane flights ever accomplished was made recently by Colonel the Master of Semphill in a D.H. *Moth* two seater. In this tiny 60 h.p. machine he flew from London to Dublin, including a daring 70 mile sea-crossing, in four hours 45 minutes flying time.

* * * *

A Record Parachute Jump

In November last Flight-Lieut. Carter of the Royal Canadian Air Force jumped from an aeroplane flying at a height of 20,000 ft. above the High River Aerodrome, Alberta. Apart from the height from which the jump has made, it is interesting to learn the effect of the rarified atmosphere upon the speed of the fall. A recording barograph indicated his early speed at 1,400 ft. per minute, but lower down this rate had dropped to between 800 and 900 ft. per minute. Although the jump was made when immediately over the aerodrome, Flight-Lieut. Carter landed some six miles away, after having been in the air for 17 minutes from the time when he left the machine.

* * * *

The Fairey "Freemantle"

Imperial Airways have taken over the huge seaplane known as the "*F.F.*," which was specially designed for an attempted round-the-world flight.

The machine is a large float seaplane equipped with a 650 h.p. Rolls-Royce engine and providing storage in its floats for sufficient petrol for a 1,200-mile flight. Under the fuselage other storage tanks provide accommodation for more fuel, increasing the machine's range to 2,000 miles. A non-stop flight from Southampton to Malta is projected and meanwhile long distance tests are being carried out.

New Instruments for Aerial Navigation

An interesting instrument for calculating the height of an airship in flight is to be used in the experiments to be carried out by R.36 after the completion of the experimental work of R.33. The latter airship has been engaged in experimental research in structural strength and aeroplane carrying, and R.36 is to undertake navigational and special apparatus tests prior to the building of the huge airships that are proposed to be used on the Empire Air Routes.

The new instrument utilises sound echoes as a means of determining height. Satisfactory experimental results have already been obtained by means of balloons from which explosive charges were lowered to a distance of about 20 ft. and then exploded electrically. The instrument records the time that elapses between the detonation and the reverberation from the ground, and from this time the height is calculated. A high degree of accuracy is claimed for this instrument and it is stated that at moderate heights it does not err beyond 15 ft.

Another valuable instrument for air navigation is an air sextant invented by the Spanish Admiral Continno. During a recent test flight the pilot was able to ignore entirely the landmarks by which he usually took his bearings and to calculate his position by means of the sextant.

* * * *

Mid-Atlantic Take Off

The "*Saturnia,*" one of several big new luxury liners that are to ply between Naples and New York, is to be equipped with a special platform from which it is proposed to despatch mail and passenger-carrying aeroplanes from the ship to land. The idea is to speed up ocean travel, and the Italian company that is financing the project states that, by despatching a machine when 1,000 miles from the port to which the steamer was bound, nearly two days would be saved. Experiments also are to be conducted in sending out a seaplane carrying late mails to overtake the ship on her outward voyage. The seaplane would alight on the water and be lifted on board by special tackle installed for the purpose.

The machines proposed to be used are small seaplanes equipped with folding wings and timed to accomplish the 1,000-mile flight in eight hours. Passengers availing themselves of the service will be required to pay a special fee over and above the ordinary passenger fare.

As a development of this project one can foresee a regular service of trans-Atlantic seaplanes working in conjunction with the recognised mail boats. Provided all goes well, the machines, following a recognised mail route, will not land throughout the journey, but in case of necessity will alight close to a mail steamer and be lifted on board for adjustment. By pre-arrangement of the steamers' time tables the seaplane will be able to locate a vessel within, say, one hundred miles, and thus be in actual contact throughout the voyage.

* * * *

The Auto-Giro

The Air Ministry have been so impressed with the Auto-Giro built by Senor Cierva that they have placed orders with one of the leading aircraft manufacturing companies for the construction of four or five machines of this type. It is proposed to test to the full the possibilities of this curiously designed machine.

* * * *

A New Aerodrome

The Air Ministry have purchased 179 acres of land and buildings at Castle Bromwich, near Birmingham, for the purpose of constructing an aerodrome. The site has been used previously for the British Industries Fair and extensive alterations will have to be made before the two Air Defence Squadrons which it is intended to instal can take up their quarters.

* * * *

An "Aeromobil"

A German civil engineer has built an aeroplane that can be transformed by simple adjustments into a motor-car. The wings fold back and thus enable the machine to be housed in a small garage. The weight, including a passenger and fuel for a five hours' flight, is 772 lbs. When converted into a motor-car the machine is 4 ft. 11 in. in height, 4 ft. 4 in. in width, and 19 ft. 8 in. in length. The inventor, who calls his contrivance the "Aeromobil," estimates that it could be manufactured and sold at a price approximating to that of an average small car.

* * * *

Secret Experiments

Keen curiosity has been aroused by secret experiments that have been carried out at Croydon Aerodrome recently by Professor A. M. Low who, during the war, was in charge of the Air Ministry's experimental branch. Professor Low, accompanied by huge quantities of apparatus, has made several flights over London recently, but great secrecy prevails as to the object. Rumour has it that the experiments are in connection with wireless control of aeroplanes.

Paris to Kano Flight

The Royal Air Force flight from Cairo to Kano (Nigeria) and back was completed successfully towards the close of last year, the total actual flying time being 16.45 hours.

The chief interest of this flight lay in the fact that standard service machines were used and flown according to a set programme. Not only did the machines carry out their work without trouble of any kind but also they completed the return journey a day ahead of schedule. The flight demonstrates the practicability of sending out aircraft on a working time-table with full confidence that they will arrive at the various pre-arranged points absolutely to schedule.

Extraordinary enthusiasm was displayed along the line of route and every town was crowded with natives who had come in from the surrounding districts to see the aeroplanes. Some of the less enlightened even attempted to chase low-flying machines! The Kano aerodrome, which is some 700 yds. square, was surrounded by a crowd standing twelve deep, and at Kaduna the enthusiasm was intense when a party of native chiefs were taken for a demonstration flight. At Midugari it was stated that some of the natives had marched for 14 days in order to see the machines.

* * * *

An Aerial Run-About

A light aeroplane known as the "*Demonty-Poncelet*," fitted with an enclosed glass-windowed cabin in which two passengers sit side by side, and a glass panel in the floor giving a view of the ground immediately below, is being successfully flown on the Continent. This air limousine has a single lifting wing above the fuselage. It is propelled by an engine rated at 45 h.p. and is capable of a speed of 78 miles per hour.

* * * *

New American Mail Service

Experimental flights have been conducted recently from Barranquilla, Colombia, through Central America, Havana and Key West, Florida, with the object of ascertaining the possibility of inaugurating an air mail service between North and South America. The new line will concentrate on mails and express freight rather than passenger traffic, and it is anticipated that, owing to the present poor connection between the two continents, the transportation time for mails will be reduced by from 3 to 18 days. The route will be in two sections, from Barranquilla to San José and from Puerto Berrio to Key West, leaving the portion across Guatemala to be performed via the existing railway.

First Air Restaurant Liner

The Rolls-Royce Vanguard, the largest air liner in the world is the first air restaurant car. Driven by two engines totalling 1,300 h.p. the machine is capable of carrying 22 people at 115 m.p.h., and arrangements are provided for serving meals whilst in flight.

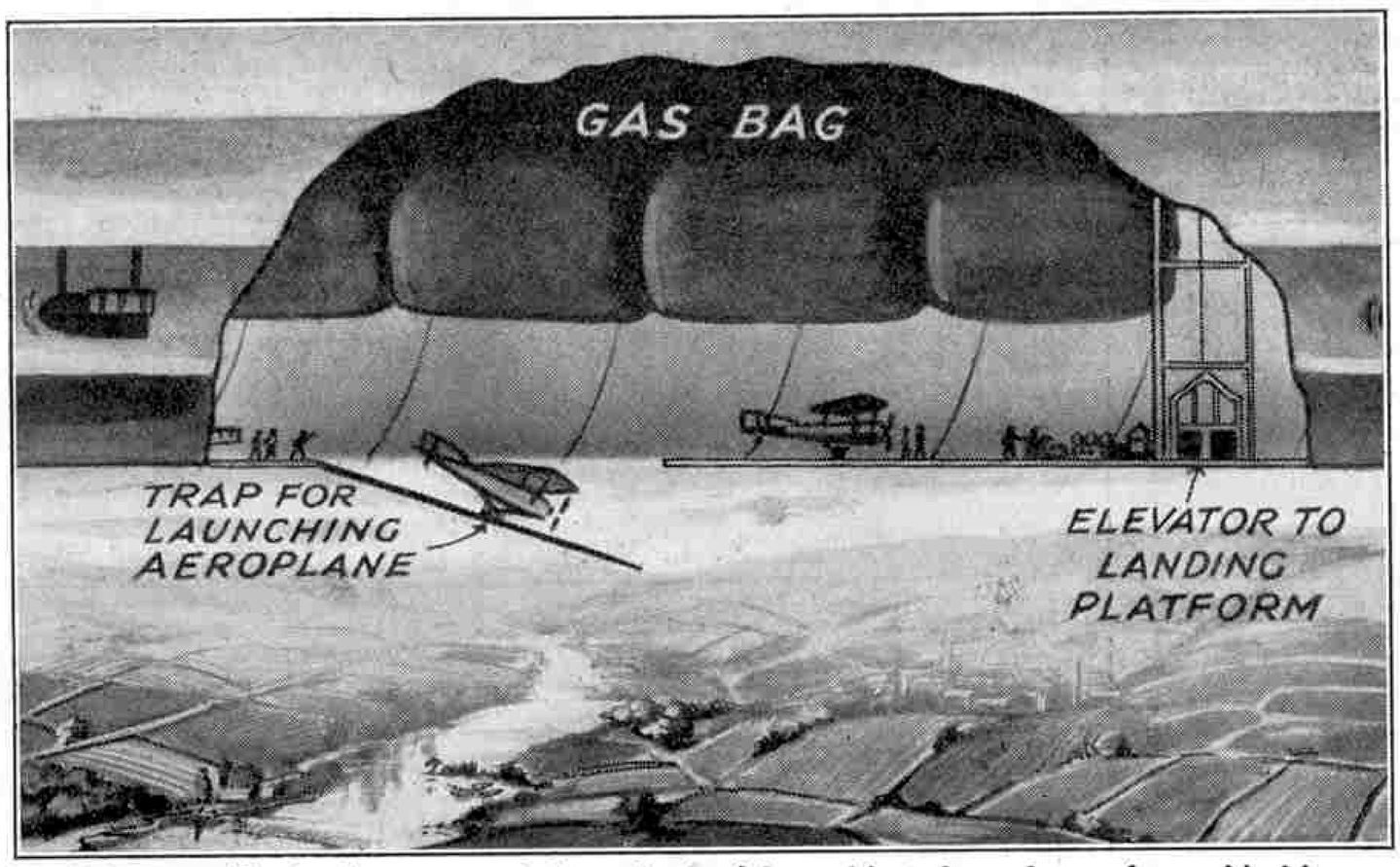


Diagram illustrating suggested method of launching Aeroplanes from Airships
(*See special article, page 82*)

Improvements at Croydon

Extensive alterations and improvements are in progress at the Croydon Aerodrome in addition to those already mentioned in our previous issues. Foundations have been laid for new sheds to replace the existing war-time buildings. The new sheds are to be built by the side of the new motor road to Brighton and will provide a clear space of over one mile in width, thus enabling several Handley-Page passenger aeroplanes to take off or alight at the same time. A control tower rising high above the other buildings will afford accommodation for the meteorological staff and pilots, and in a glass-enclosed room at the top of the tower a traffic controller will be in continuous communication with the machines throughout their cross-Channel flight. The whole scheme, which involves an expenditure of nearly £250,000, will, when complete, make Croydon the finest commercial aerodrome in the world.

* * * *

A Simplified Engine

A new type of aeroplane engine minus coil, high tension leads, magnets and sparking plugs has been constructed at the Royal Aircraft Establishment, Farnborough, after considerable experiment with a compression-ignition system. A special device injects heavy oil into the cylinders and the pressure to which it is subjected causes spontaneous ignition. In comparison with the ordinary engine it is considerably simpler in construction, and it is anticipated that it will be cheaper to run. Ground tests have been successfully carried out and aerial tests will be made shortly.

The Fairey Ambulance Seaplane

The Fairey Ambulance Seaplane is now being used in British Guiana by the Real Daylight Balata Company, and its first flights are reported to have been highly satisfactory. Hitherto from 17 to 21 days have been occupied in bringing a patient from the company's "up country" estates to its Georgetown headquarters, but the seaplane has reduced the journey to a few hours. Hangars have been erected and slipways built at the terminal points and at various points on the route.

British Guiana has shown considerable interest in aviation for several years, hoping principally for a practical solution of the problem of transportation into the interior, and it is probable that the British aircraft industry will be benefited by the anticipated developments in this part of the world.

* * *

Gliding Record

The German airman Schultz claims to have broken the world's gliding record by remaining in the air for 12 hours 6 minutes during a glider meeting held in the Crimea. In 1924 the same airman accomplished a flight lasting 8 hours 42 minutes 8 seconds, a feat greatly in advance of anything recorded up to that time.

* * * *

Silent Air Expresses

An Imperial Airways Vickers-Rolls-Royce air liner is to be used for some elaborate noise-eliminating trials based on the results obtained in recent laboratory experiments. It is expected that passengers will be able to travel in the saloon without hearing more than a faint murmur of the powerful engines.

The special apparatus used in the Air Ministry tests shows that the propeller is the cause of much of the aeroplane's roar, not only by its rotation but also by vibration and sounds created as air is hurled from its blades. It is hoped to decrease this noise by altering the shape, size and number of the blades. The noise made by air waves beating against the sides of a fast aeroplane also contributes to the problem, and this difficulty is to be overcome by introducing special sound-proof materials into the saloon walls.

* * * *

Signposts for Airmen

Acting upon a suggestion of the United States Army Air Service, the Standard Oil Company, California, has undertaken to assist aviation by painting the names of towns and cities on the roofs of its warehouses in letters 12 ft. high. It is anticipated that other large commercial firms will follow this example.

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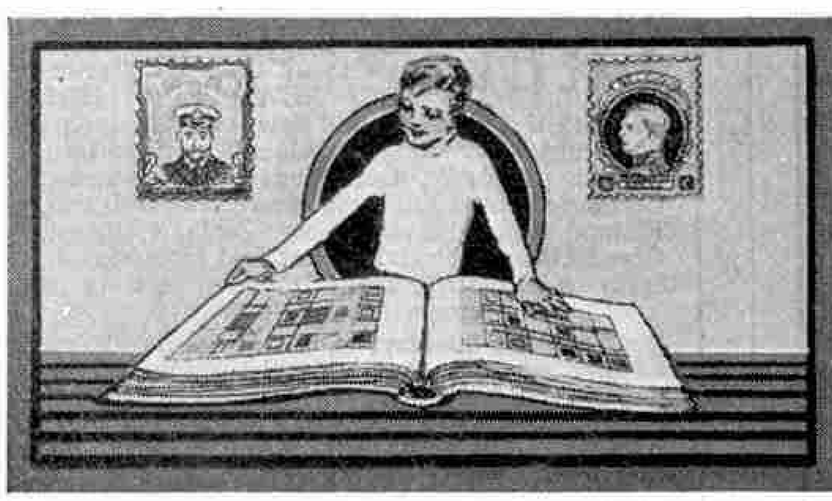

Stamp Collecting

How Peru Gained Her Freedom

THE first signs of the great struggle for Peru's freedom were shown on the death of that distinguished descendant of the Incas, Jose Gabriel Condorcanqui. He had adopted the name of his imperial Inca predecessor, Tupac Amaru, and he and his family were put to death by the Spaniards in circumstances of great cruelty when his rebellion failed in 1783. Notwithstanding all the measures of the authorities to put an end to the struggle, the fight for freedom was waged with such vigour that at last it ended in the Declaration of Peruvian Independence on 28th July 1821.

Many circumstances helped to strengthen those who were fighting for freedom. There was, for instance, the triumphant end to the War of Independence that freed the United States from the Mother Country. There were also the French Revolution and the successful struggles on the plains of Central Europe of the nations who were fighting down the tyranny of Napoleon.

Statue of San Martin
(1907-8)

Struggles for Freedom

It was during those years that the new era for Peru was born, and as the fight went on the revolutionaries gained strength until at last they succeeded and the old order gave way to the new.

Chile and Buenos Aires had already (in 1816-1817) declared their independence. Peru was the cradle of South America and its premier state, and as such it was only to be expected that she would be the last to rise and rid herself of the rule of the mother country. But the fire was smouldering at Lima, the capital, and from there the smoke curled away over the provinces to the distant frontiers. Men burning with patriotism and possessed only of one idea—to fight for their freedom—were doing great service in the great cause.

San Martin Crosses the Andes

There were, of course, many failures—the years 1811 and 1814 witnessed disasters that were followed by the execution of all the rebel leaders—but by 1817 the progress of the national cause was such that Pezuela, Spain's last legally constituted Viceroy, informed the home Government that the whole country was ready for insurrection. He further stated that he did not know how to meet the coming peril, for he was ignorant of the quarter whence the blows would come.

Pezuela had 23,000 men at his command and his power was too great to permit any effective military organisation to materialise in Peru. In Buenos Aires, however, there was freedom of action, and here, between 1814 and 1817, General Jose San Martin had been forming an army of 2,500 men and 260 officers. His plan was to cross the great mountain range, the Andes, to shatter finally the Spanish power in Chile, and then march into Peru. Napoleon was the greatest of the brilliant soldiers of that age, and the fact that both he and Hannibal had crossed the Alps was the source of San Martin's daring attempt and subsequent success.

The great exploit began on 17th January 1817, and San Martin's army emerged from the mountains on the west in the following month. The vanguard drove the Spanish force before it and on 5th April 1818 Chile saw the end of Spanish rule when the battle of Maipu was fought and won by San Martin and his troops.

Admiral Lord Cochrane
(1921)

How Englishmen Helped

The victorious San Martin now returned to Buenos Aires to prepare for the destruction of Spanish power in Peru where, as we have seen, it was strongly entrenched. He realised that his objective could never be gained while Spain retained command of the sea, and therefore he pointed out to Chile that if she was to keep inviolate her newly-acquired freedom she must fit out a fleet able to cope with the Spaniard.

The outcome was the purchase of the "*San Martin*" (nity-six guns), the "*Lautaro*" (forty-four guns) and the "*Galvarino*," an old British corvette commanded by an Englishman, Captain Martin Guise, and three brigs—the "*Chacabuco*," "*Araucano*," and "*Pueyrredon*." This small fleet put to sea on 9th October 1818 and immediately justified its existence by capturing the Spanish frigate "*Maria Isabel*," thus adding another fifty guns to its strength.

San Martin realised that if it was vital to success that a fleet should be created, it was no less vital that it should be commanded by a man of outstanding naval ability. He found such a man in the famous Admiral Lord Cochrane, tenth Earl of Dundonald, who was appointed to the command. On 22nd December 1818 he hoisted his flag on the "*Maria Isabel*," which had meanwhile been curiously re-named the "*O'Higgins*."

General San Martin
(1918)

Fire-Ships Explode Too Soon

That Englishmen played no small part in Peru's fight for independence is evident from the fact that, with one exception—that of Captain Forster, an American officer—each unit of the squadron was commanded by an English officer.

In February 1819 Lord Cochrane and his fleet sailed from Valparaiso for Callao, where they found a Spanish naval force of three frigates, three brigs and six armed merchantmen sheltering under the guns of the castle. There was a thick fog at the time, but Lord Cochrane engaged the forts and, after taking the island of San Lorenzo and establishing a base for making fireships, the fleet returned to Valparaiso on 17th June.

This little expedition had been a mere trial trip, so in September Lord Cochrane again set sail for Callao, with 400 marines. In the meantime fireships had been constructed at San Lorenzo, but when these were brought into action they failed by exploding prematurely. Cochrane repulsed 750 of the enemy at Pisco, however, where two of his brigs were securing supplies. His greatest success on this voyage occurred when he anchored off Santa, north of Collao, and landed a party under Ensign Viday who captured the town after defeating a Spanish force three times their size. This feat having been accomplished, the squadron again returned to Valparaiso in December 1819.

Saved by a Friendly Priest

In the meantime General San Martin had been successful in recruiting and raising the "sinews of war" in Buenos Aires. By August 1820 he had five infantry battalions and two regiments of cavalry at Valparaiso. The Peruvians themselves had not been idle and at Lima intrigue and discontent were steadily undermining the position of the Viceroy and rendering his situation one of peril. San Martin's secret agents came and went by way of Ancon, while his proclamations were scattered everywhere.

(*Continued on page* 113)

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How Peru Gained Her Freedom —

(*Continued from page* 111)

The patriots, especially Riva Aguero, made many friends among the upper classes, including the head of the Nautical School, Don Eduardo Carrasco, who carried on a secret correspondence with San Martin's agents and supplied the General with a considerable amount of military information. The Viceroy had to close the College of San Carlos because every student was full of the new revolutionary ideas. About this time Riva Aguero and Carrasco were arrested, but their lives were saved by the patriotic action of Montenegro, a Franciscan priest, who destroyed all San Martin's correspondence in their possession when he visited them in their cells, with the result that they were released for want of incriminating evidence.

On 21st August 1820, when things were ripe for action, San Martin sailed with his army of invasion. On 7th September the fleet, under the command of Admiral Cochrane, anchored in Paracas Bay, six miles south of Pisca, and on the following day the troops landed. On 5th October San Martin detached a force of two battalions of infantry, eighty horses, and two field guns, which was to march into the interior under General Arenales, a devoted patriot. The expedition was successful, and the General returned early in 1821 after defeating General O'Reilley's force at Cerro de Pasco.

(*To be continued*)

Advertising on Stamps

We illustrate above the new Italian stamp carrying an advertisement at the foot. One hundred thousand of these stamps have been placed in circulation by the Italian Government. It will be noticed that the advertisement fills a space similar in size to the official imprint. It appears below the stamp itself, of which it is an integral part, so that it cannot be separated without mutilating the stamp. In the case illustrated the advertiser is the Singer Sewing Machine Co.

Advertising on stamps is not an entirely new idea, for Pears Soap tried to persuade the Post Office to allow them to advertise on the backs of stamps in Queen Victoria's reign. Messrs. Pears had a number of ½d. and 1d. stamps printed "Pears Soap" on the back to show how they wished to advertise, but the scheme was not approved. These trial stamps are comparatively rare and copies of the ½d. with "Pears Soap" printed on the back in orange, blue, or mauve are catalogued 7/6 each.

In 1893 the stamps of New Zealand were adorned on the back with the advertisements of New Zealand firms, and also of Beecham's Pills, Sunlight Soap and other commodities. These advertisements were continued for a year but were then stopped because some people thought there would be a danger in absorbing printers' ink when moistening the stamps!

Not only is Italy encouraging advertisements on the stamps themselves but is issuing special postmarks also to advertise goods. Anyone who receives such stamps or postmarks should keep them in their albums as they are always of interest and some day they may be of value.

A Rare "Penny Red"

Most of the penny reds are catalogued at from about 2d. to 6d. each, used. After Plate 77 (a very scarce stamp) the next rarest is the last in the series, Plate 225, which is catalogued at 25/- used and 60/- unused. All the remainder are priced below 1/- except Plates 132 and 133, which are each catalogued 1/- used. Plate 219, catalogued 1/6 used and Plates 223 and 224 catalogued 2/6 each used. The 1d. rose red, Plate 116, imperforate, was issued at Cardiff and is catalogued £30, but our readers are not likely to come across many of these!

Some Recent Issues

FRANCE

Ronsard commemorative

On 9th October 1924 France issued a stamp of the value of 75c. to commemorate the fourth centenary of the birth of Pierre de Ronsard, the French "Prince of Poets."

Ronsard was born on 11th September, 1524, of a good family with positions at the court of Francis I. Ronsard was educated at home for some years but went to a college at Paris when he was nine. Soon he became attached to the households of various members of the French royal family and gave signs of having an important diplomatic career before him. This was made impossible, however, when he became permanently deaf about this time. Undaunted by this misfortune and determined to make his life as useful as possible, he devoted himself to study and after seven years commenced to write poetry. He at once became famous and soon permanently resided at the court, although the last few years of his life were spent at his several homes. He died in 1585.

The stamp was designed by G. Dautes, engraved by L. Delzeres, and surface-printed at the French Printing Establishment, Paris, on paper perforated 14 × 13½.

Olympic Games Issue

To commemorate the Olympic Games held at Paris in 1924 a series of four stamps of different designs was issued. All show the usual allegorical figures associated with this type of sporting contest and the two lower values (10c. and 25c.) in addition have the background occupied by views. That on the 10c. (illustrated) shows the Colombes Stadium, where the games were held. This stadium has a seating capacity only one-half of that of the Wembley Stadium although, owing to its construction, it looks nearly as large. It is built chiefly of steel with a high roof over the more expensive seats. The view on the 25c. shows Notre Dame and two bridges over the Siene. The two

high values (30c. and 50c.) are of the same size as the 10c. and 25c. but are upright.

The series was designed by E. Becker, the well-known stamp designer, the 10c. and 50c. were engraved by G. Parison, the 25c. and 30c. by G. Daussy, all values being perforated 14 × 13½. It was originally intended that they should remain on sale until the end of December, 1924 but they were withdrawn on 31st August.

HOLLAND

The 1924 series to be permanent

The permanent series issued by Holland during 1924 consists of two types of very different styles. That used for the values over 5 cents. shows Queen Wilhelmina facing left and is very neatly executed, perhaps, almost too finely engraved for a postage stamp. The four values from 1c. to 4c. inclusive show a most peculiar design, which, we are informed, is of a dove. It is drawn in a style similar to that employed for the Lifeboat centenary stamps recently described on this page. The series is perforated 12, except the 5c. which is perf. 12½, although various other gauges are expected to make their appearance.

The 10c. and 15c. were issued in special colours at the International Philatelic Exhibition held at the Hague. The normal colours for these values are rose and ultramarine respectively, the special colours being grey-green and black.

ARGENTINE REPUBLIC

Outwitting the Forger

As a result of the discovery that large numbers of forged stamps of the previous issue were being circulated throughout Buenos Aires, a new series in the type illustrated was issued during 1923. They were surface-printed and all values up to 1 peso were in the one type, which shows a portrait of General Jose de San Martin, the prominent figure in South American history.

These stamps had been on sale little over a year when they were superseded by a new series identical in every respect except that the stop below the "c" of the value has been removed. We have seen no official explanation of this alteration, and wonder whether some new forgeries had been discovered making it necessary to alter the design again.

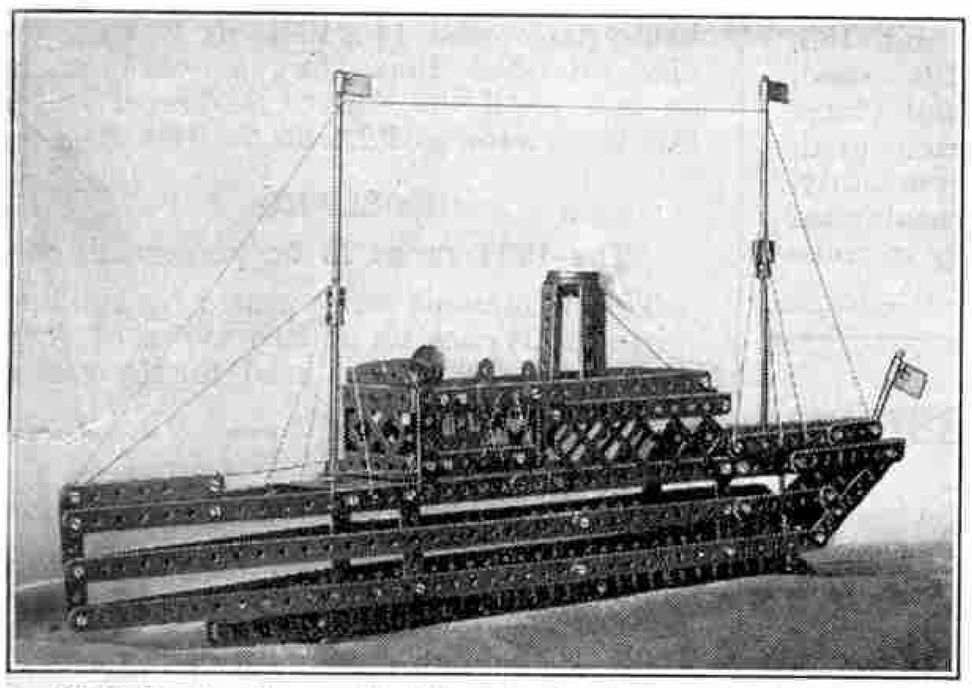
FOURTH SERIES.

Meccano Model-Building Contests

MANY MORE PRIZES TO BE WON

The competitions announced below are the fourth pair of a series appearing in these pages each month. Every contest is complete in itself and separate prizes are offered for the best entries received in each. Subsequent competitions appearing in the Magazine will be arranged on similar lines, but the size of the Outfit involved in the "Outfit" contests, and the type of model required in the "Model" contests, will continually change. In this way we hope to extend the opportunity of competing to all our readers, whether they possess a No. 0 or a No. 7 Outfit. The results of the competitions will be announced in the "*Meccano Magazine*" two or three months from the date of the issue in which they appear.

In the January issue of the "*M.M.*" we announced the third pair of competitions of the series, in which some valuable prizes are offered. These two competitions do not close until the end of the present month, and form the subject of an announcement on page 107.



Model Trading Steamer, built by Lionel Acherley, of Christchurch, and entered in the New Zealand (1925) Competition. The vessel is made entirely from a No. 3 Outfit.

"SHIP" COMPETITION
18 Cash Prizes

Entries in this competition 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 additional prizes of 10/6 each.

Closing date for Section A, 31st March, 1926. Overseas Section, 30th June, 1926.

Do not send models. A clear photograph or good drawing is all that is necessary. Photographs or drawings will be returned if desired, providing a stamped-addressed envelope of the necessary size is enclosed with the entry.

HOW TO ENTER. The subject chosen for this month's competition is a Ship. Any kind of sailing vessel—from a rowing-boat to a liner—may be included under this heading. All that you have to do is to design your model from whatever type of vessel you prefer, and when it is completed send us a photograph or good drawing of your effort, together with any explanations that you think necessary, although the latter should be made as brief as possible. Write your name and address on the back of each sheet used, and state your age, and section in which your model is entered. Address the envelope : "Ship Competition," Meccano Ltd., Binns Road, Liverpool.

You may use any Outfit or number of parts. The first prize in each section will be awarded to the competitor who builds the vessel that the judges decide to be the best model 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 the simplest and most straightforward models are better than the most complicated structures.

"NO. 3 OUTFIT" COMPETITION

In this competition prizes are offered for the best models made entirely from a No. 3 Meccano Outfit. Models comprising parts that do not appear in this outfit will be disqualified. It is not necessary to use all the parts contained in the outfit.

The fact that some boys possess larger sets need not prevent them from competing, for their entries are eligible providing only those parts which may be found in the No. 3 Outfit are used.

An interesting feature of the contest is the fact that all competitors will be using a similar number and variety of parts.

Entries will be divided into the following sections :—

SECTION A, for boys under 12.

SECTION B, for boys over 12 and under 16.

SECTION C, for boys residing overseas, and not exceeding 16 years of age.

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

FIRST PRIZE : Meccano Goods to the value of £2-2s.

SECOND PRIZE : Meccano Goods to the value of £1-1s.

THIRD PRIZE : Meccano Goods to the value of 10/6.

SIX CONSOLATION PRIZES, consisting of complimentary copies of "Meccano Standard Mechanisms."

Closing dates for Sections A and B : 31st March, 1926. Overseas Section, 30th June, 1926. Address envelopes : "No. 3 Outfit 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 will be returned if desired, providing a stamped addressed envelope of the necessary size is enclosed with the entry.

We append a list of parts contained in the latest No. 3 Outfit, for the reference of competitors.

Contents of No. 3 Outfit:

10 of No.	1	2 of No.	17	12 of No.	35	1 of No.	57
18 „ „	2	2 „ „	18A	1 „ „	36	4 „ „	59
6 „ „	3	2 „ „	19	90 „ „	37	2 „ „	62
2 „ „	4	1 „ „	19B	12 „ „	38	1 „ „	63
12 „ „	5	4 „ „	20	3 „ „	40	4 „ „	90
2 „ „	6A	1 „ „	21	1 „ „	44	1 „ „	98
8 „ „	8	4 „ „	22	1 „ „	45	2 „ „	100
8 „ „	10	2 „ „	22A	1 „ „	46	2 „ „	111
4 „ „	11	1 „ „	23	10 „ „	48A	1 „ „	115
14 „ „	12	1 „ „	24	2 „ „	48B	1 „ „	116
3 „ „	12A	2 „ „	26	2 „ „	52	4 „ „	125
2 „ „	15	1 „ „	27A	3 „ „	53	4 „ „	126A
3 „ „	15A	1 „ „	32	2 „ „	54	1 „ „	134
4 „ „	**16**	**1 „ „**	**34**	**1 „ „**	**56**	**1 „ „**	**147**

1 of No. 148

XI. TRICK PHOTOGRAPHY

THOSE of our readers who have followed up the ideas suggested in our article of last month will have found an almost endless variety of applications of the same principle, or even combinations of two or more tricks.

The difficulty in writing on this subject lies mainly in the choice of illustration, for each trick presents the opportunity for innumerable modifications. Before passing on to suggest variations of the tricks explained last month we must mention what is apparently one of the most mysterious tricks of all, but which is in reality one of the simplest in achievement—the "Headless Man."

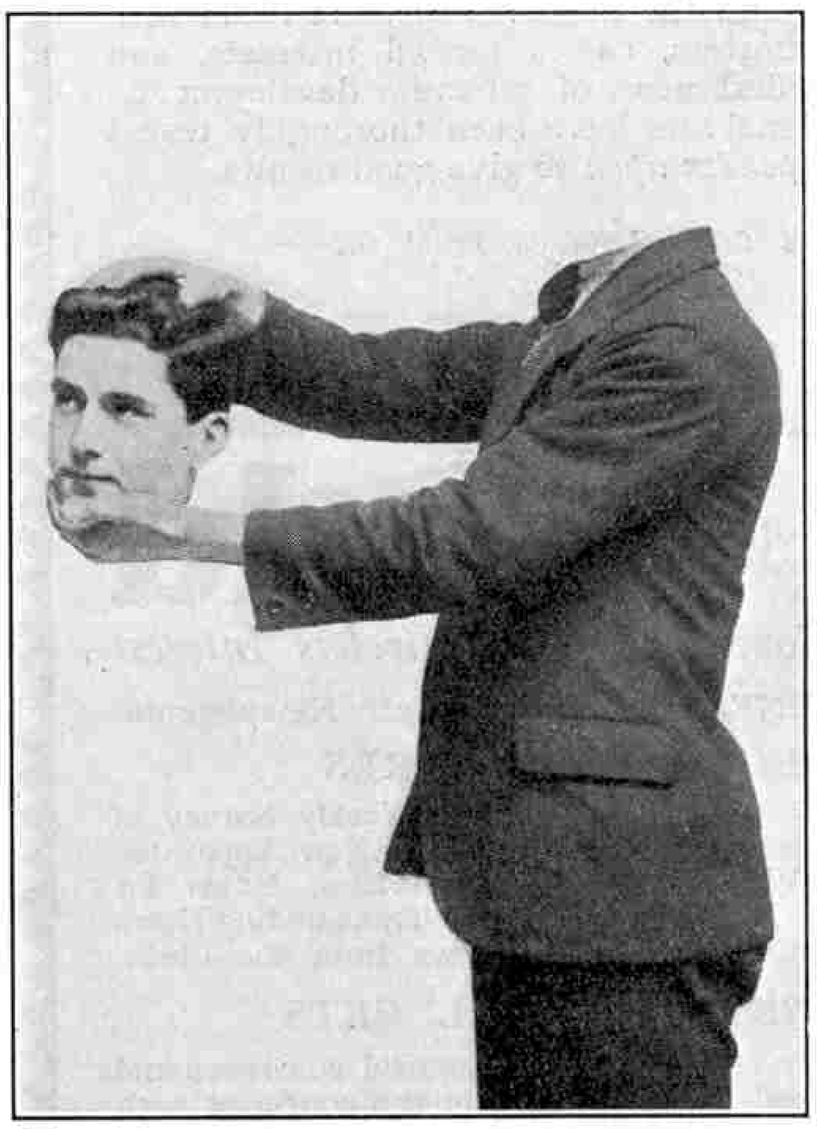
The accompanying illustrations and those on page 117 reveal both the idea and the means by which the illusion is produced. The apparatus required consists of two large white sheets, one to serve as a background and the other to be wrapped around one of the sitters, together with a small white cloth to cover the head and neck of the other sitter. As only one exposure is necessary, the simplest form of camera is capable of doing the work successfully.

The two sitters should be of similar build, since any marked difference would lead to incongruity in the finished result. One sitter must be swathed from the neck downwards with a white sheet, while the other sitter, whose head is covered with the smaller white cloth, holds the former's head in his hands. It is, of course, necessary for the photographer to arrange the pose, which must be comfortable, and as soon as the expression of the exposed face is suitable the exposure can be made.

Care must be taken to give slightly more than the normal exposure. An image of sharp contrast is wanted, and in order to obtain this development must be prolonged until a considerable degree of density has been built up in the negative. The prolonged development, coupled with over-exposure, will have the effect of "clogging up" the high lights or whites of the picture, until the tell-tale shadow detail in the "shroud" is blotted out.

Other applications of this principle will suggest themselves to our readers, and while we could fill a considerable amount of space with further suggestions, we must content ourselves with only one or two.

A man shaving himself or extracting one of his own teeth would prove very easy and give quite a humorous result, while a photograph of the headless man engaged in trimming off with scissors one or two awkward curves in his neck is also within the scope of this method.



A Gruesome Event!

Double-Printing

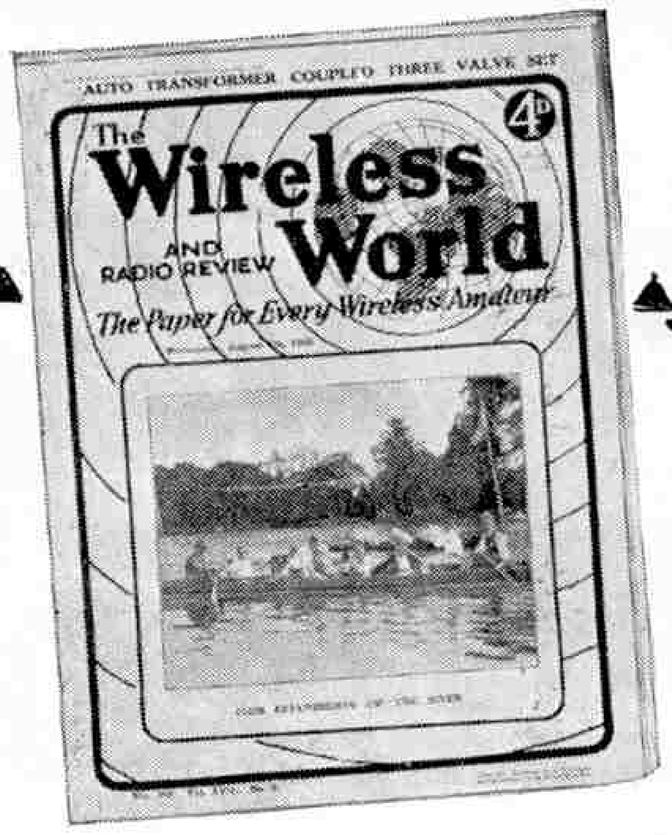
Although the process known as double-printing comes under the heading of trick photography, it is as a matter of fact a recognised practice in pictorial photography of the most serious kind and is extensively employed to add portions of one view to another to make a perfect whole. Double or "combination" printing is most frequently employed to put in a more suitable background to a portrait or to place figures in landscapes, but it is also extensively used by cinema producers when unusual results are required, and readers will find it a great help towards the production of mysteries. The process is extremely useful and a mastery of the principle readily enables us to combine prints from two, three or even more negatives to make up one picture.

The simplest method of combination printing is undoubtedly contact printing with P.O.P., using red water-colour paint, or any of the opaque mixtures sold for blocking out negatives, as the shading medium.

Let us suppose that we have a photograph of a mutual friend, the effect of which is rather spoiled by an unsightly brick-wall background. It is desired to transplant our friend from his "backyard" into the foreground of a pretty landscape photographed on another occasion.

Since we have the negatives of both

The Complete Wireless Newspaper



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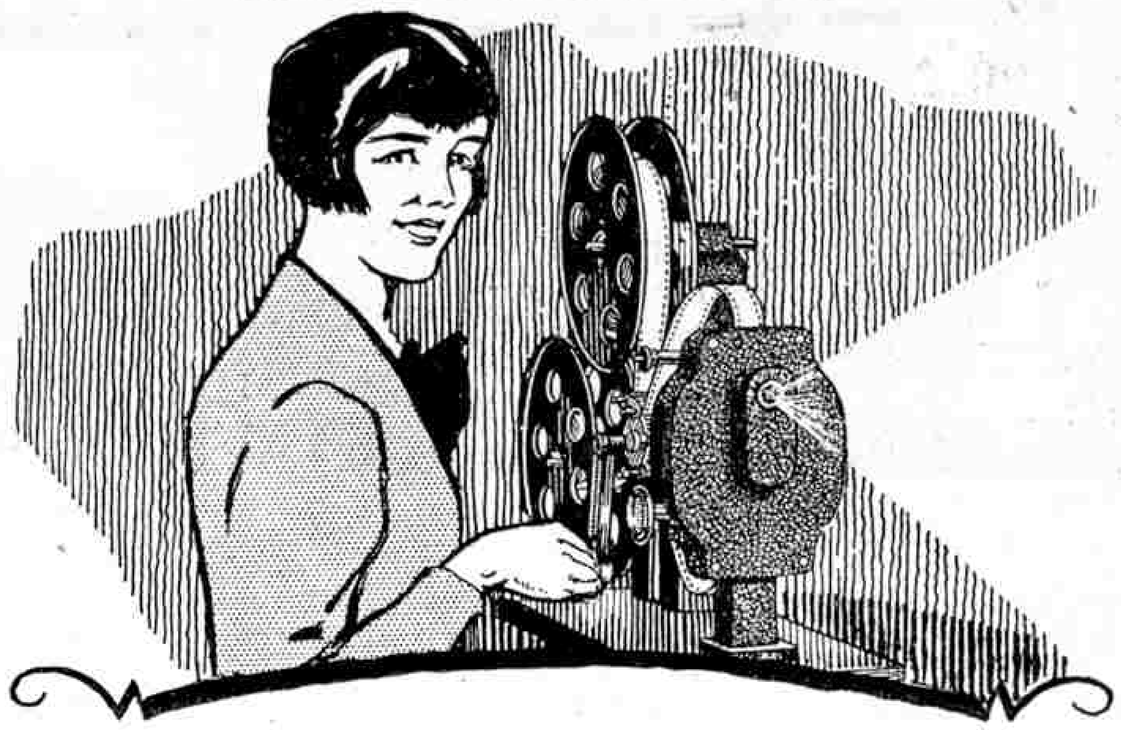

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scenes the task is not difficult and calls for little beyond reasonable care and attention to one or two essential details, the most important of which is that of lighting. Obviously it would be absurd to transfer a figure lighted from the left into a view lighted from the right, so we must be sure that both our pictures are lighted from approximately the same angle. Too much emphasis cannot be laid upon this point, for success is impossible unless the rule is observed. We have seen many first attempts at double-printing in which the manipulation of the prints was perfect but the effect ruined by disregard of the basic principle of identical lighting.

Method of Working

Assuming that our negatives have passed this exacting test we will commence work on the portrait negative, which we call "A," the landscape negative being labelled "B," for identification purposes. The first thing to be done is to paint out everything except the portrait on "A," a fine-pointed brush being used to preserve the outline of the figure and sufficient colour laid on to render the blocked-out portion equally dense in every part. As soon as the paint is dry we can make an ordinary P.O.P. contact print, which will give us a photograph of the figure against a plain white background.

Our next step is to paint over the figure on the P.O.P., so that it is completely protected from light action while the remainder of the print is being made. Bearing in mind that P.O.P. is sensitive to daylight, it is as well to carry out this painting operation in artificial light. Care must be exercised to ensure accuracy in exactly covering the outline, overlapping either way being avoided.

The paper is now placed in contact with negative "B" and the landscape is printed in until we judge it to be of the same depth of tone as the figure. The print now shows a landscape with a paint-covered figure, and a little rinsing under the tap will quickly remove the paint.

The complete picture is now ready for toning and fixing in the usual manner. Provided that all the operations have been carried through carefully, there should be nothing to indicate that the picture is otherwise than a straight print from one negative.

Paste-on

Another method of achieving the same result is on lines very similar to those of the "big head on a little body" trick, described last month. This is a "paste-on" process, the parts to be added being simply cut from their own prints and pasted on another print in the required position. The combined print is then copied by making another photograph of it and a straight print is prepared from the resulting negative.

To achieve perfect results by this method a little knowledge of retouching is necessary. No great skill is required, however, and we recommend readers to try their hands at retouching by means of pencil shading on the second print. All that it is necessary to do is to hide any signs of a joint.

Of the two methods we recommend our readers to begin with the first. It will be found to present fewer opportunities for error, and also to be less expensive when mistakes, which must occasionally occur, are made. To render the description simple we have confined ourselves to a very straightforward combination, but endless scope is provided by this method for the production of different types of subjects.

Most of the tricks already described in this and the preceding article can be produced by double-printing where it is not desired to employ one negative only, and in addition such effects as "Grandpa vaulting a pillar-box," a man jumping over a tall building, or even a Rugby footballer making a gallant leap six yards into the air to prevent a "drop" at goal from crossing the bar, can very easily be achieved. The "vaulting Grandpa" would require three exposures and printings—first, an ordinary portrait of Grandpa; second, a chum vaulting a fairly wide object, and third, a street scene including a pillar-box. Grandpa's head would have to be super-imposed upon the vaulter's shoulders, and he in turn placed over the pillar-box.

Many really good trick photographs can be produced by combining two or more of the foregoing principles, and we propose to suggest a few ideas that will, we hope, stimulate our readers' imaginations.

The Gigantic Carrot

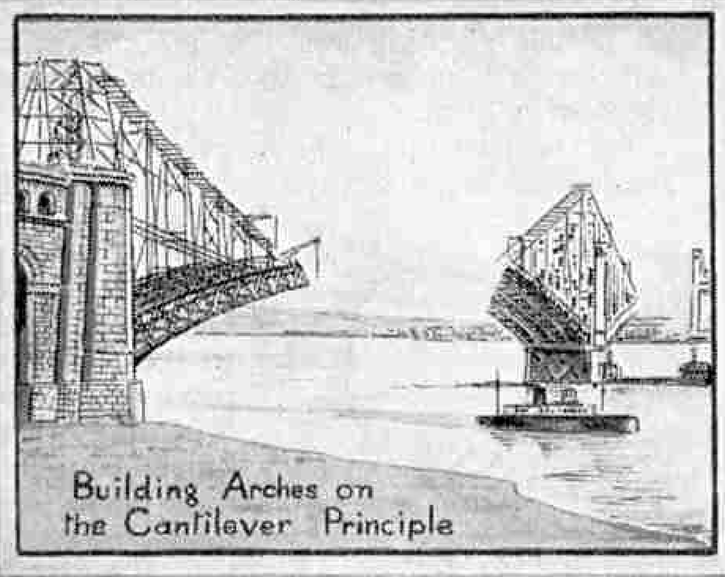
Most of us have a friend who will persist in boring us by describing the wonderful marrows or carrots he or his father has grown. Here is a chance to get level! We may not be able actually to grow any of those freak marrows or carrots, but we can produce a photograph depicting one or the other of sufficiently huge an aspect to make the expert "sit up and take notice."

The photograph can be produced by double-printing, all that is required being a vegetable garden or border and an ordinary camera.

Our first photograph is a "close-up

(*Continued on page* 130)

How to Strangle Yourself!



Engineering News of the Month

Largest Turbo-Electric Liner

An order has been placed with the Newport Ship-building Company for a 22,000 ton turbo-electric drive passenger liner. The vessel, which will have a speed of 18 knots, is the first of three to be built for the New York-California service of the Panama-Pacific Line, and will be the largest and most luxurious to be built in an American shipyard. The vessel is expected to be ready for service by the autumn of 1927, and will alternate with the Manchuria, Mongolia, and Finland, in the New York-Panama-San Francisco service.

The new liner will be 600 ft. in length, 80 ft. in breadth and 52 ft. in depth, and will accommodate 362 first-class and 368 tourist-class passengers. Capacious refrigerators will be fitted for carrying California fresh fruits, and the ventilated holds will have a capacity for 7,800 tons of freight. Among the novel features will be side ports through which automobiles may be driven on board, outside staterooms for both classes, private baths for all the first-class rooms, and unusually large deck spaces for promenading and sports.

For a vessel of this size and type, the turbo-electric drive is an innovation. The power installation, including turbo-electric engines of 18,000 horse-power driving generators coupled to twin-screws, will be supplied by the General Electric Company. There are to be twelve water-tube boilers.

* * * *

New Humber Pier

The London and North Eastern Railway Company have placed a contract with Sir William Arrol & Co. Ltd., Glasgow, for the reconstruction of the final portion of the New Holland pier. The scheme for the reconstruction of the pier was commenced two or three years ago, and the contract now let to Sir William Arrol & Co., will consist of the sinking of a large number of cylinders into the river bed to carry the new pier. The work will take two years to complete and will cost £84,000.

The new pier will probably result in another being erected at Hull. The Railway company maintains a ferry service between Hull and New Holland, and at present vehicular traffic on the Hull side, particularly motors, has to be hoisted on board the ferry boats in a crate.

World's Deepest Hole

There was recently completed on the Rand the deepest hole in the world. It is No. 4 shaft at the City Deep gold mine, and its total depth is 6,900 ft. At a depth of 4,500 ft. an enormous cave has been dug which houses an electrical winding engine and gear of similar power to that of the steam winding plant on the surface.

More than 250,000 tons of rock were hauled to the surface during the sinking of the shaft.

Primitive engineering methods are still used in many parts of the world. Here is a reader's photograph of a present-day brickworks in Ceylon, where bricks are still made without the labour-saving machinery now available.
(*See article on page* 85).

Fire on Motor Vessel

The motor ship "*Pizarro*" recently caught fire while lying in the West Brocklebank Dock at Liverpool. In spite of the efforts of two fire brigades and the Mersey Docks and Harbour Board's fire-boat, the vessel was gutted, finally turning turtle and sinking.

The cause of the fire is not known, but it started in No. 3 hold. The ship had a very inflammable cargo, made up of paper, silk and cotton, while her tanks were full of oil fuel, which constituted the greatest danger. By immediate pumping off of a great deal of this, a much more serious disaster was averted. The vessel burnt for about eight hours and when she finally sank a great cloud of steam arose as her white hot plates touched the water. Salvage operations were commenced immediately.

The "*Pizarro*" is a vessel of 3,300 tons and was one of the first two motor vessels entirely built and engined by Sir Wm. Beardmore & Co. Ltd.

Cable Ship in Gale

The cable ship "*Lord Kelvin*" recently arrived at Queenstown very badly damaged, with her decks in absolute chaos and her after-holds filling with water, the result of a severe battering received in a terrible south-westerly gale in mid-Atlantic.

Late at night, when most of the crew were asleep, a huge wave struck the vessel broadside, carrying everything overboard, washing away the forward bridge super-structure and engine-room telegraphs, staving in the life boats and tops of the tank hatches, and flooding the holds. To add to the confusion, the in-rush of water to the engine room damaged the dynamos and put out all the electric lights. During the darkness two other vessels, responding to "S.O.S." signals, nearly rammed her owing to no lights showing, but the crew made their presence known by lighting flares. They then managed to turn the ship and run before the gale. Fortunately, their steering gear remained undamaged, although all orders to the engine room had to be transmitted by relays of men.

The "*Lord Kelvin*" is a vessel of 2,640 tons, built by Messrs. Swan Hunter & Wigham Richardson in 1916. She belongs to the Western Union Telegraph Company and carries a crew of 85.

* * * *

New Avonmouth Dock Gates

Messrs. Sir W. G. Armstrong-Whitworth Ltd., have received an order from the Bristol Dock Committee for a new pair of steel gates for the Avonmouth Dock. The dock entrance is 80 ft. in width and the gates, which will be of the bouyant type, will weigh over 300 tons.

* * * *

£30,000 a Day Loss

An explosion due to the breaking of the shaft of a turbine-driven machine at the Power Station at Vereeniging, South Africa, caused a complete stoppage of work at the ten gold mines and, according to a report, while the machinery was out of action the mines lost about £30,000 daily. The amazing part about the explosion is that although pieces of machinery were thrown among the houses in which 130 people were sleeping no one was seriously injured, the only injury being received by a member of the staff, whose face was splashed with hot oil.

Bridging the Dee

The new tunnel under the River Mersey, from Liverpool to Birkenhead, which has already been described in our columns, has led to another very big scheme being put forward, namely, the construction of an embankment across the River Dee from Hilbre Point to Point of Ayr. At present all traffic from Cheshire to North Wales has to go via Queensferry Bridge or by rail through Chester, and the scheme now put forward would, therefore, save considerable time and expense in the delivery of goods to traders in North Wales.

It is pointed out that the debris excavated from the Mersey Tunnel could very well be used in the construction of the embankment, which could carry a road and a railway track across, saving a distance of 21 miles.

Within the embankment would be an area of about 30,000 acres, approximately 18,000 of which could be reclaimed and made available for agriculture. Many thousands of acres of workable coal seams would become accessible by the sinking of pits in the reclaimed area.

* * * *

Large Tramway Order

The Leeds Corporation recently placed with the Metropolitan Vickers Electrical Co., of Trafford Park, Manchester, the largest contract for tramway equipment placed in this country for many years, the value being £85,000 and providing for the complete electrical equipment of 150 tram-cars. Work will be commenced almost immediately and the company's works both at Manchester and Sheffield will be kept busy for some time.

* * * *

World's Largest Industrial Motor for U.S.A.

Made by the General Electric Company, the largest industrial motor in the world is to be installed by the McKinney Steel Company at its River Surface plant, Cleveland, Ohio. This will be the first large steel rolling mill to be driven by a sychronous motor, an induction motor being usually employed.

The motor will be rated at 9,000 h.p. running at 107 r.p.m., 6,600 volts, 3 phase, 25 cycles, operating at unity power factor. It will be connected direct to a Morgan continuous billet mill, a shaft extension on each end being coupled to a long lay shaft running the full length of the mill. Bevel gearing from this shaft will drive each stand of rolls.

C.P. Liner on Fire

Nine officers' cabins, part of the navigation bridge, and the navigating instruments were destroyed in a fire which broke out recently in the Canadian Pacific liner Minnedosa, while lying in the Tyne prior to undergoing repairs, and caused about £5,000 worth of damage. It is not known how the fire started.

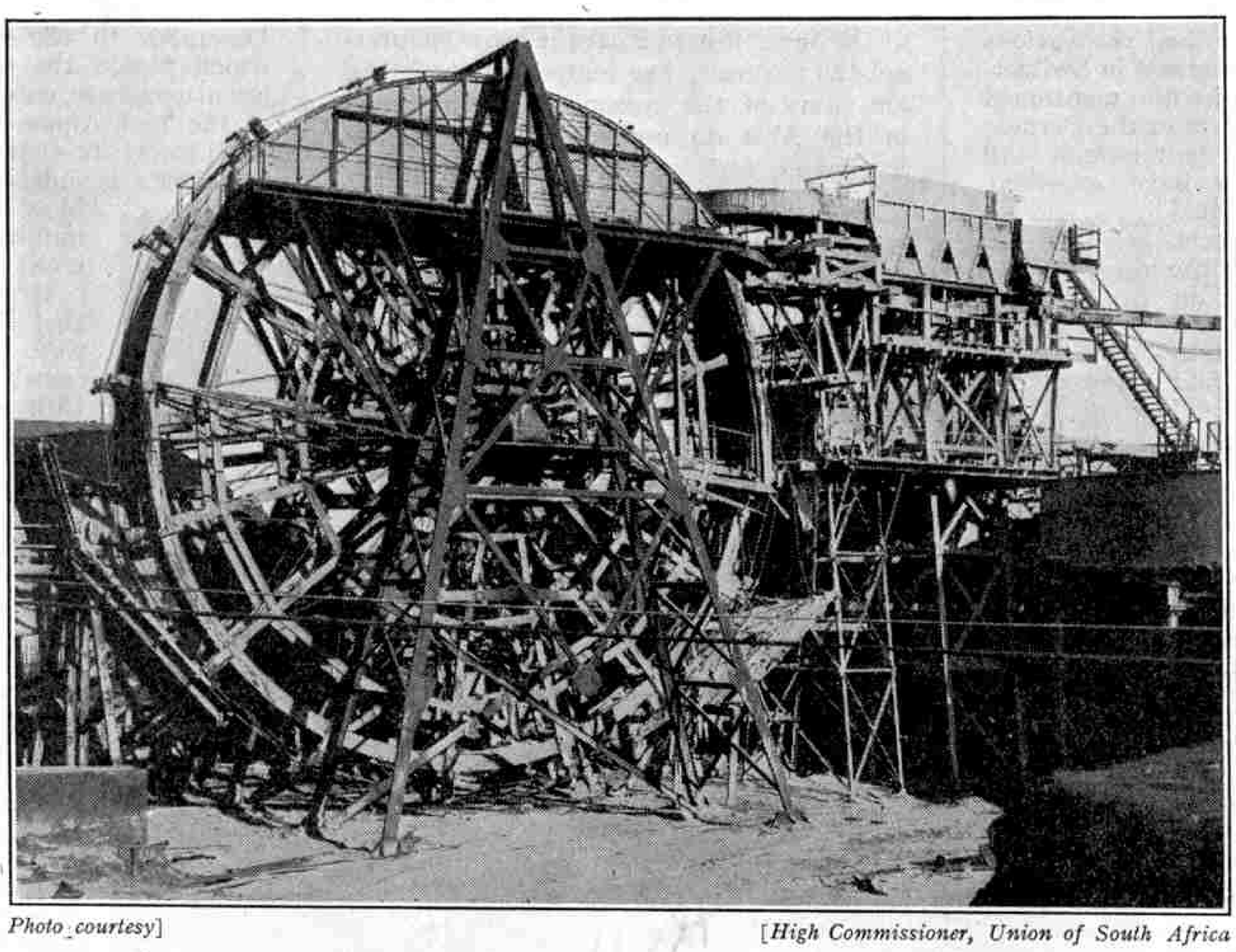


Photo courtesy] [*High Commissioner, Union of South Africa*

This is not the Big Wheel with which all Meccano boys are familiar but a Tailing Wheel Classifier, part of the machinery employed at a Johannesburg Gold Mine. In "The Story of Metals" next month we shall deal with "Gold."

American Firm to Build British Sugar Beet Factory

Work will shortly be commenced on the construction near Peterborough of a big sugar-beet factory. The factory will be built some one and a half miles from Peterborough by the Dyer Co., of Cleveland, America, who were awarded the contract at a cost of £350,000, a stipulation being that 75% of this amount must be spent with British firms. The result is that although the Dyer Co. will erect the building, the machinery and equipment will be almost entirely of British manufacture. The Dyer Co. are one of the largest beet-factory builders in the world, having constructed about two-thirds of the sugar factories in the United States and many in other countries.

* * * *

Italy-America 6,000 mile Cable

The completion of the new Italian cable from Rome to South America is a remarkable example of the combination of Italian enterprise and British workmanship.

The cable, which begins near Rome and ends at Buenos Aires 6,000 miles distant, has been completed within three years. Orders for equipment to the value of £1,000,000 were placed in England, chiefly with Greenwich and Woolwich firms, and 60 British operators have been engaged to staff the stations.

Severn Bridge Scheme

Local authorities are again pressing upon the Government the importance of a bridge across the river Severn from Chepstow to Beachley, in order to relieve the steadily increasing traffic congestion at the Severn Tunnel.

The erection of a bridge would save at least 50 miles in the detour from South Wales, round Gloucester to the West of England. Road traffic is increasing continually, and the flank will never be turned by another bridge lower down the river than the point proposed.

It has been suggested that the Great Western Railway Company and the local public authorities should build between them a single bridge, and the railway company proposed an equal division of the cost. Their load requirements, however, would be much greater than those of the local authority so that their fair share would really be about two-thirds of the total cost.

The minimum width of the Severn at Beachley is just one mile. The minimum span to meet navigation requirements would, with independent bridges, be a source of dispute, but an ultimate settlement of about 1,000 ft. might be expected. An independent road bridge 5,300 ft. in length by 50 ft. in width, with big spans and heavy foundations, would cost about £1,500,000.

* * * *

The Mersey Tunnel

The initial step in the construction of the Mersey Tunnel was made when the preliminary contract for the sinking of working shafts at Birkenhead and Liverpool was awarded to Messrs. Edmund Nuttall & Sons Ltd., of Trafford Park, Manchester. The value of the contract is over £443,000 and was awarded after very careful examination of the different tenders submitted. The surprising point about the various tenders was the great difference in price, some firms quoting nearly one million pounds.

This contract is, of course, only a preliminary to the construction of the actual tunnel, and the headings now to be made will consist of two separate borings, the dimensions of each being 15 ft. by 12 ft. From these borings the two final sections of the tunnel will be evolved, but for this work fresh tenders will be invited. Work on the tunnel was officially started by Princess Mary and it is hoped that the tunnel will be opened for traffic by the end of 1928 or the beginning of 1929.

Winter Sports in Switzerland

A Paradise for Sports-loving Meccano Boys

By H. E. Underwood

LAST month we described the various sports that are practised in Switzerland on snow and ice and mentioned the principal winter resorts in the Bernese Oberland and French Switzerland. All the places referred to have excellent hotels and all the usual facilities for winter sports, but the greatest hotels, the best rinks, the fastest runs and the most distinguished visitors are to be found in the canton of Grisons, and particularly that fairyland in the mountains, the Engadine.

Arosa is the first resort, arriving from the North, and is reached by mountain railway from Coire. From Landquart, on the Federal Railways, a line branches off to Klosters and Davos, while from Coire the main line of the Rhaetian railway leads through the Albula tunnel to St. Moritz and the other Engadine resorts, chief of which are Pontresina, Celerina and Zuoz.

St. Moritz is the most important of all the Swiss winter sport centres, and as it is typical of its kind, a description of its arrangements for winter sports, and of the events that take place there every year will give a fairly correct idea of what the winter resorts in the mountains are like.

Before dealing with St. Moritz in detail, however, one matter of interest may be mentioned.

It is a never-failing source of surprise to those who visit Switzerland in winter to see visitors, comparatively lightly clothed, sitting in the open air having tea at tables set on the ice or snow, and apparently not feeling the cold in the least. This certainly appears puzzling and it requires a little explanation. In the first place, it is a well-known fact that snow makes for warmth. Cold produced by chilly winds and a damp atmosphere, and cold produced by a high altitude and a thick layer of snow, are two very different things. The dry, invigorating, tingling cold that is felt in the mountains in winter cannot harm anybody, but on the other hand invariably does a great deal of good, purifying the blood and giving new strength to the muscles.

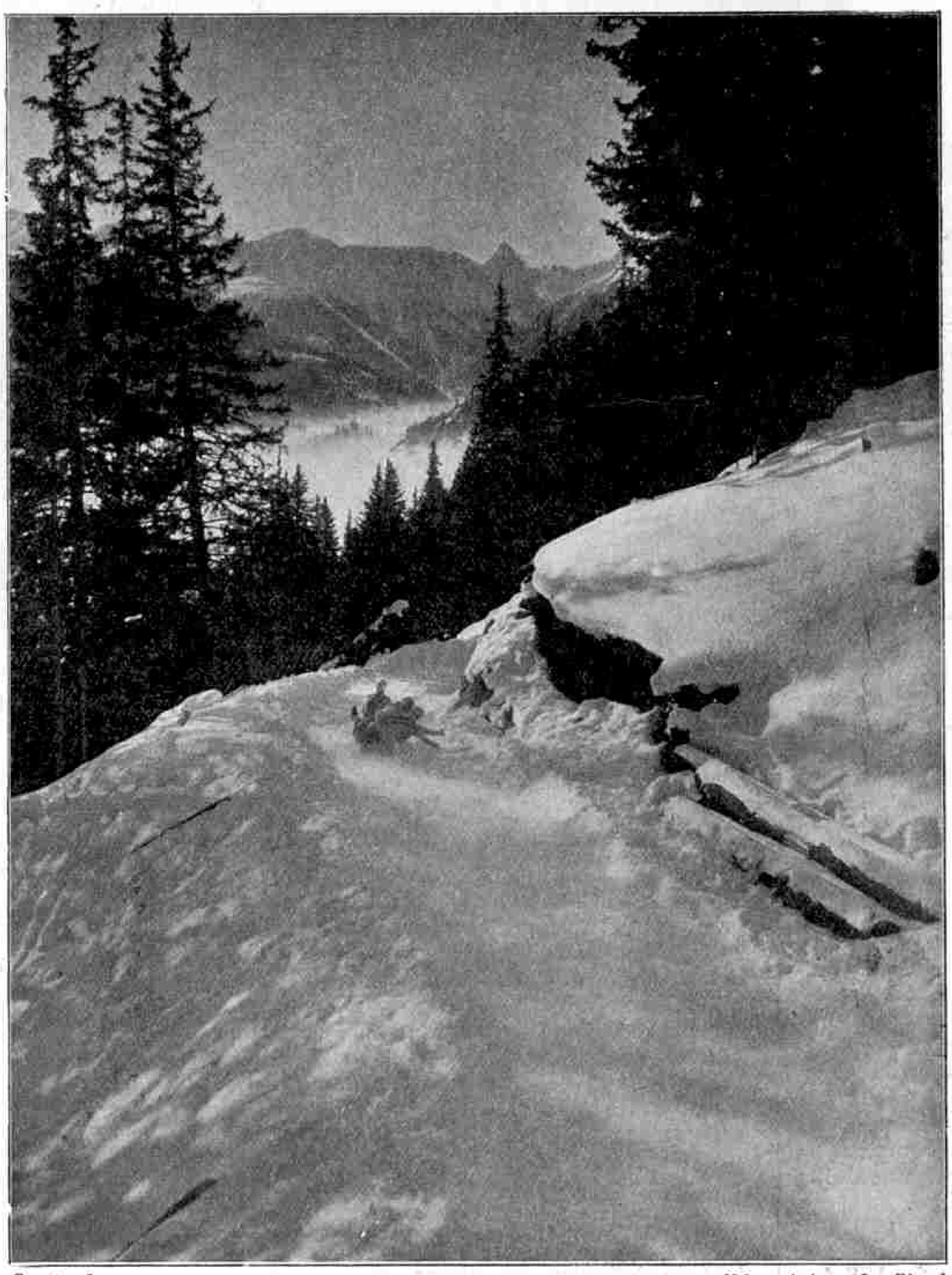
St. Moritz

Another factor is the absence of clouds and mist, particularly in the Engadine. The air is clear and pure, and the rays of the sun reflected from the snow counteract the naturally low temperature. These are some of the reasons why sportsmen in the Alps do not need to dress like Esqimaux, and why a fall in the snow, so far from doing harm, makes one feel rather better than before!

The village of St. Moritz is at an altitude of 6,089 ft. There are a dozen great first-class hotels, and about twenty second-class hotels, accommodating altogether over 3,000 visitors. Fourteen special rinks are reserved for skating, curling and other ice sports; ski-ing grounds abound, and there is a well situated platform for ski-jumping. The bobsleigh, toboggan and skeleton runs are of world-wide reputation.

St. Moritz is situated at the culminating point of the Upper Engadine. Its winter season extends from the beginning of December to the end of March, during which period the dryness and purity of the atmosphere, combined with the warmth of the high-Alpine sunshine, make it an ideal resort for every kind of winter sport. St. Moritz is indeed proud of its Italian-blue skies and the great number of hours of sunshine it enjoys throughout the year.

It is interesting to note that St. Moritz Spa was well known as a health resort as far back as the 15th century. The place was then known as St. Mauritius, and it is recorded that Pope Leo X. issued a bull extending absolution to all who visited it. The iron springs of St. Moritz were known to the Romans and even long before their time. In 1907 a prehistoric well was discovered which, according to an expert view, was in use 3,000 years ago. Two bronze swords and a pin were found in this well and these are now preserved in the Engadine Museum. The famous Swiss doctor Paracelsus, who flourished in the 16th century, described the St. Moritz wells, which he regarded as being better than all others.



Courtesy [*Mrs. Aubrey Le Blond*

Tobogganing, Davos Platz

Tobogganing at 80 miles per hour

The following description of the tracks is from an account by Mr. F. E. Brantingham, in a booklet published by the "Kurverein" of St. Moritz:—

"There are three chief runs for tobogganing, the first and the second being, as it were, stepping-stones to the third. The Village Run is for novices grown out of childhood. As soon as they acquire a certain skill, they advance to the Dimson Run, the curves of which are sharper and the descents steeper than those of the Village Run. Graduated from the Dimson, the full-fledged rider tackles the Cresta Run which has a greater fame than any in the world. It is three-quarters of a mile in length with a drop of 514 feet, and abounds in hazards which afford keen sport to the votaries of the run, so keen that the Cresta rider returns to St. Moritz winter after winter for the joy experienced in the descent. The average speed is 45 miles an hour. The maximum speed on the fastest part of the run is 80 miles an hour.

"To quote the Engadine Year-Book: 'Every variety of turn from the sharp

corner to the most gentle curve is to be found in the Cresta run. The slope of the ground changes every few yards. Leaps or sudden depressions which cause the machine to leave the track and skim through the air before touching the ice again are introduced.' "

At many resorts, the upper end, or start, of the toboggan or bobsleigh track is reached by funicular railway, which takes up the riders and their machines at very moderate charges. This is the case at St. Moritz, Davos, Engelberg and Les Avants.

The Ideal Playground

Mr. Geoffrey Winthrop Young, in the "Swiss Travel Almanac" for 1924-5, discusses the problem of why the Swiss Alps are so frequently described as the "ideal playground." The main reason, he says, is startling in its simplicity—the Alps are just the right size!

"Human beings have legs of a certain length, muscles and lungs of a certain capacity, and there are only so many hours of light during which they can enjoy action or enjoy sight in the course of any single day. We see at once that Nature, when she experimented with mountains like the Himalaya, without any thought of the physical limitations of walkers or climbers or tourists, wasted force extravagantly; she produced a region on a scale far too lavish, too humanly obstructive. The majority of Himalayan peaks must remain for ever inaccessible by any but mechanical means; the greater mass of the colour and detail in their stupendous panoramas can never give individual pleasure to the human eye.

"At the other end of the scale, we see that a great proportion of the earth's hills, including our own valleys and summits, are too small in scale. . . . In the Alps alone is the height of the peaks, the scale of the valleys, and of the distances between valley and valley, rightly adjusted to the amount of strength and of capacity for appreciation which a human being possesses, or to the length of daylight by which his adventures must be, safely, delimited."

Curling

The upper illustration on this page gives a good idea of curling at St. Moritz. This sport grows steadily in popularity and there are now eight curling clubs in the Engadine, five of which belong to St. Moritz. The Jackson Cup takes premier place among the various curling trophies. This cup is a permanent Challenge Cup open to all the clubs of Switzerland that are affiliated to the Royal Caledonian Curling Club of Scotland, and is regarded as the blue riband of curling in Switzerland.

Curling at St. Moritz

New forms of sport are introduced every year at the leading resorts, the latest being the up-to-date method of ski-kjöring in which a motor-cycle takes the place of the old-fashioned horse!

Gymkhanas can scarcely be called a sport but none the less they play an important part in the programme of every self-respecting winter sports resort. They usually consist chiefly of races of various kinds on snow or ice, and the ingenuity of the organisers is taxed to the utmost to find something new and amusing for every gymkhana of the season.

A Merry Tailing Party

Much more could be said of the delights of themountains, of the great international ski-ing, jumping and ski-kjöring contests, of the Bobsleigh Derby, which is run at St. Moritz, and of the wonderful excursions that can be made in the high mountains. But nothing can give an adequate impression of the real lure of the mountains, the thrill of those long, whirling descents on the snow. I hope many "*M.M.*" readers will have the opportunity of proving this for themselves

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. Scrivener (Reading).—We have heard the conundrum "What is home without a Mother?" John, but "What is life without the '*M.M.*'" is a new version, and the only reply we can suggest is "no life at all." It is a splendid plan to ask your eldest sister to provide you with Magazines for a year as a Christmas present! What is home without an eldest sister

K. C. Russ (Dongarra).—We smiled at your scheme to use "Locomotion No. 1" (as shown on our September cover) for funerals. Don't you think that a ride on it would be almost worth dying for! Your remarks about the seamen's strike are noted, and the office boy who opened your envelope reports a few valuable additions to his vocabulary. Meccano calendars have been suggested before, but we will consider the idea.

Donald McIntyre (Edinburgh).—The choice of a lamp depends largely upon your requirements. Oil lamps are perhaps the most convenient for town and suburban riding but, on the other hand, if you make long journeys at night along dark roads, an acetylene lamp with its brilliant light will suit your purpose better. Acetylene lamps are a little more trouble than oil lamps, but they are quite satisfactory if given regular attention.

R. Abrahams (Bass Hills, Australia).—"I live in the Bush and have only my brothers to play with, and we have a baby sister too." We are glad that Meccano affords a diversion in the Bush, and suggest that you join the Correspondence Club and have a Meccano chum in another part of the world with whom you can exchange letters.

N. Fraser (Canterbury, N.Z.)—Your high opinion of Americans is in full accord with our own, N.F. Your remarks about the British Fleet are noted and appreciated. So the Waiau River has been flooding its banks again! It seems determined to make itself a nuisance.

M. C. Long (Honiton).—Unfortunately you are too far away from the nearest broadcasting station to receive telephony, but if you are conversant with the Morse code you could receive messages from ships at sea.

Jacobus Viljoen (Dist Bethlehem).—We are very pleased to hear from you and think your English is very good. We note that your composition about Meccano in school was highly praised. That is because your heart was in your work!

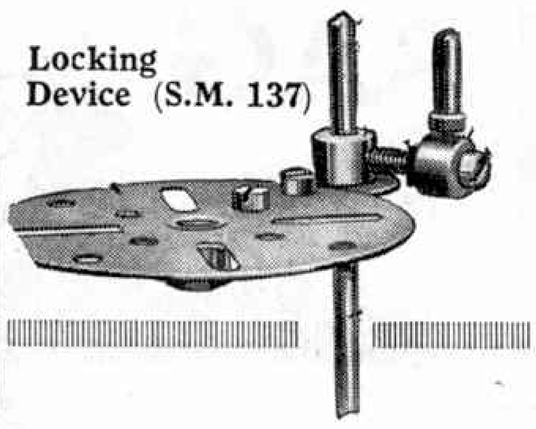
L. Jones (Horsham).—We are not surprised to learn that "half the house stood round you" while you read the "Hornby Book of Trains." Enthusiastic praise for this book is received from Meccano boys all over the world. Apart from this, we like it very much ourselves!

H. Rutter (Consett).—We note that you would not give up reading the "*M.M.*" for thousands of pounds, and that your ideal holiday would be a visit to Liverpool. We like your enthusiasm and we read your article on the Derwent Valley with pleasure. It is not quite suitable for our pages, but try again. You have a nice literary touch.

E. Stroud (Hadleigh).—We have written you separately concerning suitable engineering publications. We agree with you that the wonders of real life are much more fascinating than those told of in the usual boys' publications. Let us know if we can help you further.

J. Baldry (St. Leonards-on-Sea).—"Our physics master was so delighted with our Meccano model that he asked if he might be allowed to display it on speech day to explain its mechanical principles." This kind of thing is taking place every day, Jack. We like to bring it home to our boys from time to time so that they may know that they are playing with a toy that has real value.

M. C. Hatherly (Nottingham).—"I know one boy who is 25 now, who is B.Sc., and has several other Engineering degrees who had Meccano in his youth and says that it helped him considerably. I expect you have had countless other such letters as this, but never mind, just add mine to the chorus of praise." We have added it, Mary, and have given it a place of honour. Ask your young brother to write to us—we may be able to help him to keep up his interest in the really good things of life.



Suggestions Section

Edited by "Spanner"

(13)—Meccano Compasses

(R. Garton, Chelsea, S.W.3)

The novel Compasses illustrated in Fig. 13 comprise an ingenious adaptation of Meccano parts, and form an extremely useful instrument. The legs consist of two 5½″ Curved Strips (1) meeting together within the slot of a Strip Coupling (2), and having their lower ends inserted in further Strip Couplings (3) and (4). Flat Brackets (5), bolted at (6) to the legs, are inserted in these Strip Couplings also, in order that their thickness, together with that of the 5½″ Curved Strips, shall be sufficient to enable the Couplings to be secured rigidly to the legs by means of the bolts shown, which pass through both jaws of the Couplings.

A piece of pencil-lead is secured by the set-screw of coupling (3), and a small nail, from which the head has been cut or filed away, is gripped by the set-screw of Coupling (4).

Two 2½″ Strips (7) serve to strengthen the legs, and the end hole of one also answers as a guide-slot for the sliding 2½″ Curved Strip (8). Sufficient clearance is obtained for this purpose by placing Washers on the bolts between the 2½″ Strip and 5½″ Curved Strip.

(14)—Steam Dome for Locomotive

(C. W. Parkin, Grimsby)

Although a large number of readers have been actively engaged recently in model locomotive building, it is doubtful whether many have realised the possibilities that the Meccano Cone Pulley offers in connection with the design of a really effective steam dome. Charles Parkin draws our attention to its merits in this direction, however, and we illustrate his idea in Fig. 15.

It will be seen from this that the Cone Pulley (1) is secured by its set-screw to the shank of a ¾″ Bolt (2) which is mounted in the centre hole of a Double Bent Strip (3). The latter is bolted to the ends of the Strips (4), forming part of the boiler shell, in an inverted position, i.e., with the head of the bolt (2) inside the boiler. Thus when the remainder of the boiler is built up on either side of the Strips (4), the Double Bent Strip and the boss of the "dome" are hidden from view.

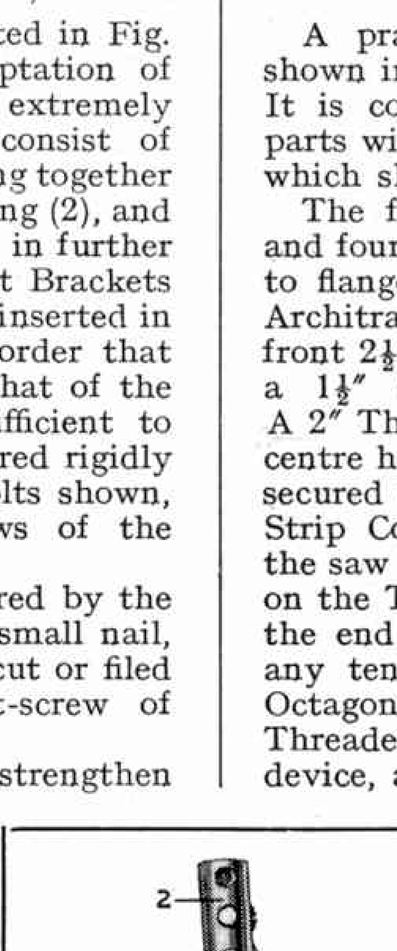


Fig. 13. Compasses

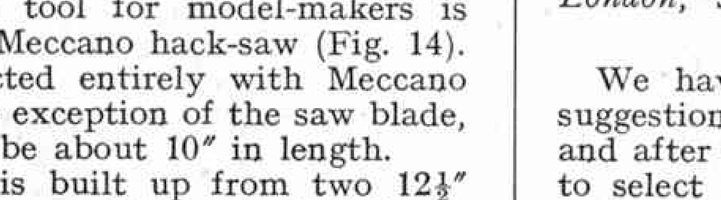


Fig. 15. Hack-Saw

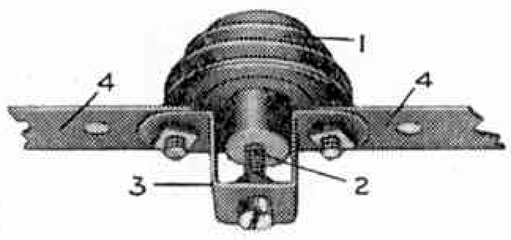


Fig. 14. Steam Dome for Locomotive

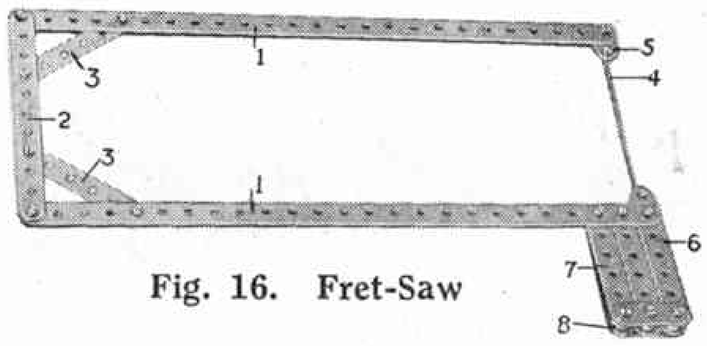


Fig. 16. Fret-Saw

(15)—Hack Saw

(G. Boedeker, Croydon)

A practical tool for model-makers is shown in the Meccano hack-saw (Fig. 14). It is constructed entirely with Meccano parts with the exception of the saw blade, which should be about 10″ in length.

The frame is built up from two 12½″ and four 2½″ Angle Girders, bolted flange to flange, and braced at each end by an Architrave to secure extra rigidity. The front 2½″ Girders (5) are splayed to secure a 1½″ Girder (4) between their ends. A 2″ Threaded Rod is passed through the centre hole of this Girder (4) and its end is secured very tightly by the set-screw of a Strip Coupling (3), in the slot of which the saw blade (1) is carried. A nut placed on the Threaded Rod and screwed against the end of the Coupling (3) will prevent any tendency of the Rod to turn. An Octagonal Coupling (6), mounted on the Threaded Rod, forms a simple adjustment device, a few turns of which stretches the saw taut. It will be noted that the opposite end of the latter is bolted between two Flat Brackets (2).

In place of the wooden grip used by our Contributor, we have constructed a Meccano handle from which neither bolts or sharp edges protrude to hurt the hand. It consists of four 3½″ × ½″ Double Angle Strips (7) bolted to a Bush Wheel (8) and to the lower four holes in the end 2½″ Girders of the frame.

(16)—Fret-Saw

(D. G. Knibbs, Birmingham; Herbert Hart, London, S.E.21; and Oswald Yeomans, Redditch)

We have received a large number of suggestions for Meccano fret-saw frames, and after careful consideration we decided to select three of the best contributions and to construct a model from these incorporating the most interesting points suggested. This model is shown in Fig. 16.

The various parts of the frame are duplicated to obtain additional strength. It is made up from two pairs of 12½″ Strips (2) braced by 3″ Strips (3). The fret-saw (4) is gripped between the Flat Brackets (5) and between the ends of two 3½″ Strips (6). The latter, together with four 3″ Strips (7), form the handle, the shape of which is improved by mounting three Collars (8), with set-screws removed, on ½″ Bolts between the outer ends of the Strips.

We may here remind readers who are interested in the subject of Meccano fret-saws, that an interesting model in which a fret-saw was operated by an electric motor, was described in the *"M.M."* for October 1923. Such an arrangement should prove a real boon to fretwork enthusiasts.

(17)—Meccano "Toaster"

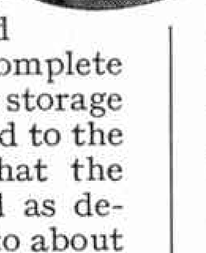
(E. W. Griffith, Cheltenham)

E. W. Griffith sends a seasonable suggestion for a Meccano "Toaster," which he declares enables one to toast bread, muffins, etc. before a roaring fire in the good old-fashioned way without the unpleasantness of scorched hands and face. The apparatus consists of a vertical 11½″ Axle Rod secured to a pedestal formed from two 5½″ × ½″ Double Angle Strips crossed one upon the other, with their centre holes secured to the bottom of the upright Rod by means of a Bush Wheel or similar part. A Coupling sliding upon this Rod may be secured in any position by its set-screw, and supports a horizontal Rod which in turn carries at its outer end another Coupling supporting two short Rods placed at right-angles. The latter, again, are connected by Couplings to two further Rods forming prongs on which to secure the bread, etc. for toasting. A series of Flanged-Wheels mounted at

the foot of the vertical Rod give additional steadiness to the stand, whilst further Flanged Wheels should be added to a short Rod secured in the opposite end of the movable Coupling to counter-balance the weight of the prongs.

(18)—Compressed Air Storage

Probably many readers have used a bicycle-pump in order to test model steam engines, and they may have noticed that a much greater speed is obtained from the use of air-pressure in place of steam. A suggested "tank" in which compressed air may conveniently be stored consists of a length of old inner tubing as used on automobile wheels. The ends should be united by the vulcanising process, or failing this, tied very securely with cord. An air valve, with core removed, allows the air to escape freely into a small rubber tube leading to the steam engine. A second valve should also be provided complete with core, for use when inflating the storage tube. A pinchcock may be attached to the tube leading to the engine, so that the latter may be stopped and started as desired. The "tank" is pumped up to about twice its normal size, when it will run the engine for several minutes before the air pressure need be renewed.



(19)—Scriber

E. R. Philips (Teddington) has made a scriber with the aid of Meccano parts. The marking point—a gramophone needle—is gripped by the set-screw of a Coupling, in the other end of which an Axle Rod is inserted to form the handle. This makes a very useful tool with which model-makers can mark out dimensions and designs on metal.

(20)—Binding the *"M.M."*

E. R. Baddeley (Stourbridge) sends a practical suggestion in connection with the *"M.M."* Spring-back Binders. He found that the Magazines when inserted in the binders were apt to slip too far within the case, with the result that a portion of the reading matter in the inside columns became invisible. He therefore procured a large circular cork, and splitting this longitudinally down the centre, placed the segments between the rounded back of the binding case and the inside edges of the Magazines, so holding them in the correct position.

(21)—Braking Electric Trains

Wilson Robson (Blyth, Northumberland) sends a suggestion for use in connection with electrically-operated railways. A projecting lever attached to the locomotive is caused to strike, in passing, the arm of a small switch placed alongside the track, and so breaks the circuit. The switch may be placed outside a station so that the train will run alongside the platform before pulling up.

Suggestions Received

The following Suggestions have been received and are having attention: Automatic Signalling and other devices, for use with Hornby Electric Train (J. B. Gibson); Automatic Switch (Albert Pickering); Spring Pistol (Wm. McLauchlan); String Cutter (G. B. Rees and F. Martin); Meccano brake (W. L. Holcroft and others); Accumulator carrier (J. Heap) and many others.

(22)—Carpenter's Brace

(*G. Muirhead, Manchester*)

We are able to illustrate in Fig. 18 another useful and very novel tool for fret-workers—a miniature brace and bit. Incidentally, it employs the Meccano Crankshaft in a manner that is probably new to most of our readers.

The Crankshaft 1 is mounted in one end of a Coupling 2 and carries two 1" loose Pulleys 5, which are held in place by a Spring Clip 6. When in use, a 1½" Pulley 3, with set-screw removed, is placed on the

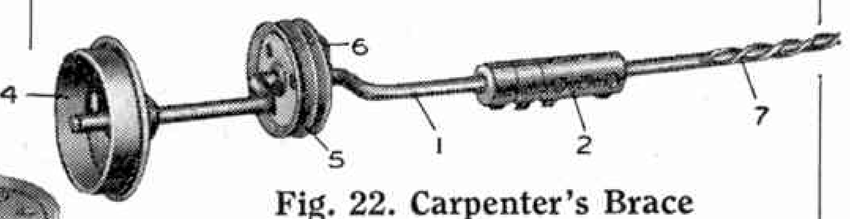


Fig. 22. Carpenter's Brace

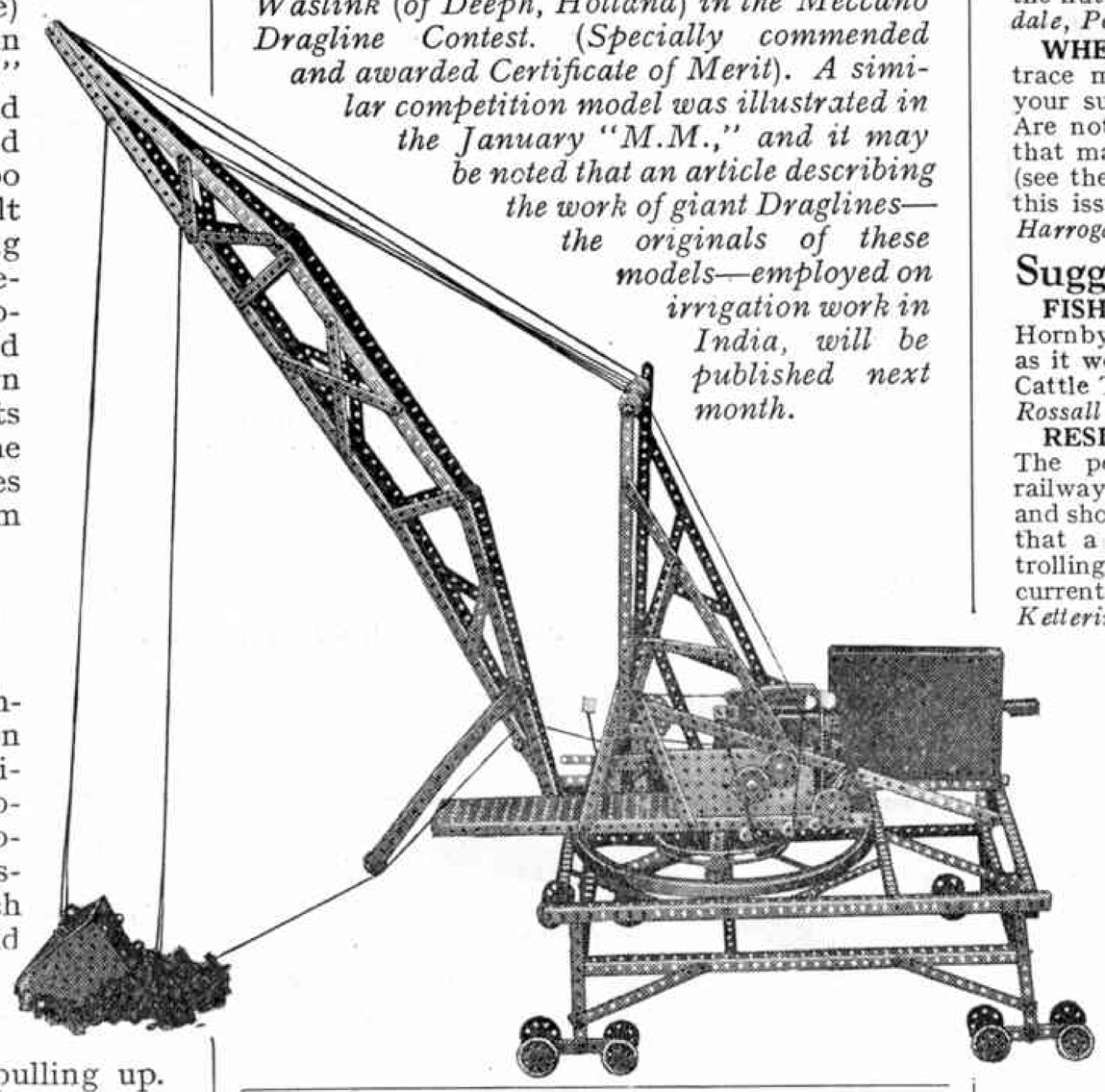
end of the Crankshaft and rests upon the Flanged Wheel 4. The tool is steadied by the Pulley 3, which remains stationary in the hand, while the Crankshaft is rotated from the handle formed by the Pulleys 5. The tool-piece 7 is secured in the opposite end of the Coupling 2 by the set-screw.

Suitable tools for use with this brace are found in any fretwork outfit, or may be obtained from ironmongers or dealers in fretwork accessories.

Further contributions for the Suggestions Section are invited. Special awards of five shillings each will be paid for any suggestions published showing special merit, whilst the senders of all other contributions used (not including, of course, those mentioned under "Replies") will be presented with compl mentary copies of "Meccano Standard Mechanisms."

Another Model Dragline

An interesting model, submitted by G. Waslink (of Deeph, Holland) in the Meccano Dragline Contest. (Specially commended and awarded Certificate of Merit). A similar competition model was illustrated in the January "M.M.," and it may be noted that an article describing the work of giant Draglines—the originals of these models—employed on irrigation work in India, will be published next month.



This Month's Awards

Five shillings will be awarded to each of the contributors concerned for Suggestions Nos. 13, 14, 15 and 22, whilst the senders of Nos. 16 (three awards), 17, 19, 20, and 21 will each be presented with a complimentary copy of "Meccano Standard Mechanisms."

In Reply

In this column we reply to suggestions regarding improvements or additions to the Meccano and Hornby Train systems. We receive many hundreds of such suggestions every week, and consequently we are able to deal only with ideas that show particular interest or ingenuity. Every idea, whether acknowledged in this column or not, is carefully examined and considered.

Suggested Meccano Improvements

BRAKE FOR CLOCKWORK MOTOR.—Hitherto we have experienced no trouble with the brake lever in the Meccano Clockwork Motors. If you find that it is not reliable in action, the small projecting portion of the lever may be bent slightly in order to press more firmly against the governor disc. (*Reply to Michael Richandson, Ledbury*).

IMPROVING THE "M.M."—We agree that it would be preferable to publish the *Meccano Magazine* without any advertisements at all, but if we did so, it would be necessary to charge our readers a shilling or more per copy instead of threepence! Although we believe our readers represent the most staunch body of supporters of which any journal can boast, yet we should not like to make quite such a demand on their pockets each month! (*Reply to Cyril Hood, Taunton, and others*).

MODEL MOTOR-CAR.—The manufacture of a constructional model motor-car as a separate Meccano product is not suitable. It is quite possible to build excellent models of this description with Meccano, as will be proved, we believe, in the "Motor" Competition. (*Reply to F. Brocklebank, Ashton-upon-Mersey*).

Suggested New Meccano Parts

TRACTOR FUNNELS.—There is little demand for a funnel of the type you suggest for steam tractors, etc., although we shall bear the idea in mind. Meanwhile, a very good substitute may be formed from four Double Angle Strips, of any desired length, bolted together at the ends. (*Reply to J. B. Crossland, Lancaster*).

IMPROVED EYE PIECE AND FORK PIECE.—(1) Your suggestion for an Eye Piece fitted with boss and set-screw is noted and will receive attention. (2) A Fork Piece may easily be connected to a Coupling by means of a 1" Rod. We do not think the adoption of a special boss would be sufficiently advantageous. (3) We do not know of any purpose for which slots in Flanged Plates would be particularly useful. Have you movements where they are necessary in mind? (*Reply to Cyril Hood, Taunton*).

SPRING WASHER.—We think that the small compression spring fitted to the Meccano Buffer (part No. 120A) should fulfil all the functions of your suggested spring washer. The spring is removed by unscrewing the nut on the end of the buffer. (*Reply to L. Tweeddale, Port Sunlight*).

WHEELS WITH DETACHABLE DISCS.—We cannot trace many advantages that would be gained from your suggested wheel with adjustable discs or rims. Are not its functions covered by the various wheels that may be fashioned from existing Meccano parts? (see the "Wheels" advertisement on another page of this issue). (*Reply to R. A. de Yarburgh-Bateson, Harrogate*).

Suggested Hornby Improvements

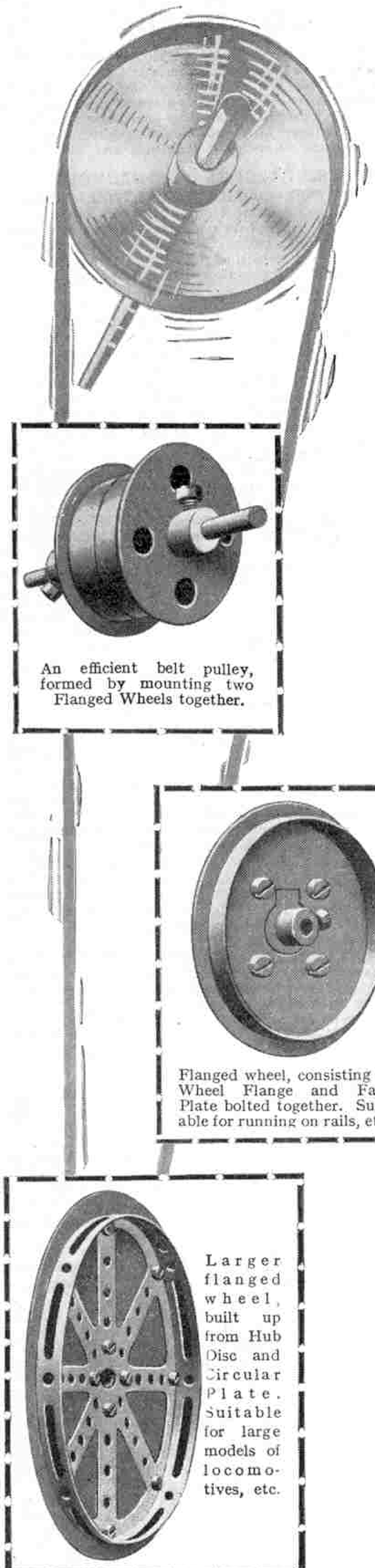
FISH VAN.—The addition of a fish van to the Hornby Series is not likely to prove very popular, as it would be similar in design to the existing No. 1 Cattle Trucks and Milk Vans. (*Reply to Jack Archer, Rossall Beach*).

RESISTANCE FOR LOW VOLTAGE CURRENT.—The possibilities of a low-voltage model electric railway have occupied our attention for some time, and should we decide to proceed with this it is probable that a resistance will be designed suitable for controlling the speed of a train when running from a current of 4 or 6 volts. (*Reply to M. Partridge, Kettering*).

TROLLEY SYSTEM FOR ELECTRIC LOCOS.—To adopt the Hornby Electric Train to run from an overhead wire would prove a costly matter on account of the extra gear necessary—such as the trolley, wayside standards, etc.—as well as adding difficulty to the preparation of layouts. In the British Isles, the third rail is in more general use than the overhead wire system. (*Reply to Teddie Morton, Huddersfield*).

"HOME" AND "DISTANT" SIGNALS.—Both the Hornby Signal and Junction Signal may now be obtained in "home" or "distant" types. These should provide the necessary signalling apparatus with which to furnish the average Hornby layout. Suggestions for signal gantries are receiving attention, but we doubt whether the demand is sufficiently large at present to warrant their introduction. (*Reply to A. Hodgkinson, Fleetwood*).

MODEL CRANE.—The manufacture of a special model crane for use in connection with Hornby railways is not necessary, for such models may be made with Meccano. Moreover, by using the existing parts, a greater realism will be effected at a smaller cost, while the builder is able to exercise his ingenuity in devising the type of crane most suitable for his particular requirements. (*Reply to A. Hodgkinson, Fleetwood*).



An efficient belt pulley, formed by mounting two Flanged Wheels together.

Flanged wheel, consisting of Wheel Flange and Face Plate bolted together. Suitable for running on rails, etc

Larger flanged wheel, built up from Hub Disc and Circular Plate. Suitable for large models of locomotives, etc.

MECCANO

ACCESSORY PARTS

WHEELS

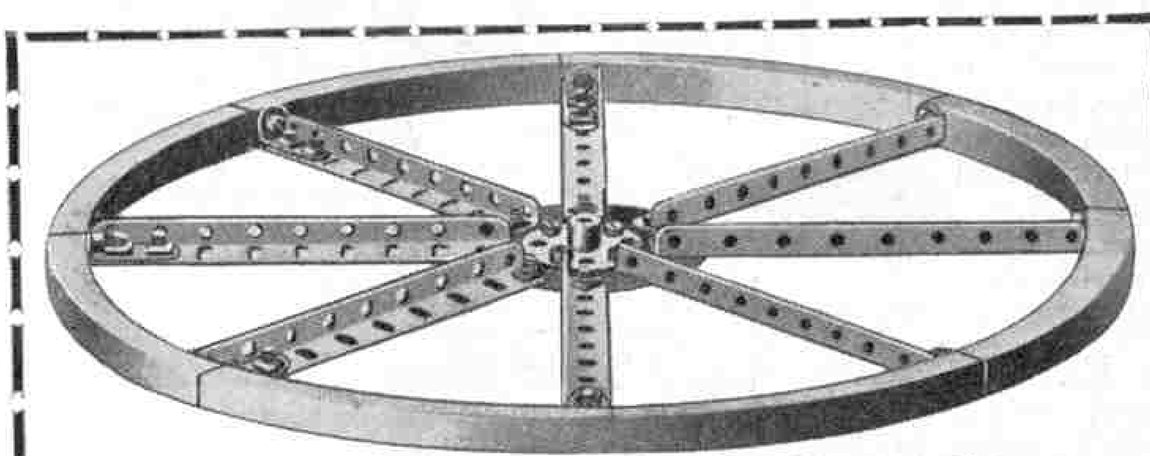
SOMEBODY has said that the wheel is the world's greatest invention. However much truth there may be in this statement it is safe to say that from a remote period—when prehistoric man made the first steps towards its evolution by discovering the use of log rollers—to the present day, the wheel has proved to be one of the greatest assets in engineering.

Wheels take an important place in the Meccano system, of course. There are 31 accessory parts that may be placed under the category of Wheels, ranging from ½" to 6½" in diameter, while other parts readily lend themselves to the construction of still larger or different types of wheels. The list appended below contains particulars of a number of such Meccano parts. Gear and other toothed wheels are not included, for space has previously been devoted to them in this Magazine. All the smaller pulleys are made of solid brass, and are marked with the splendid finish and perfect accuracy of manufacture for which all Meccano parts are noted and appreciated throughout the world.

No.		s.	d.
19a.	Wheels, 3" diam. with centre boss and set-screw. 10 spokes, for use as road-wheels ... each	0	8
20.	Flanged Wheels, 1⅜" diam. For use as belt pulleys or rail wheels ... ... "	0	6
19b.	Pulley Wheels, 3" diam. with centre boss and set-screw, V-grooved ... ... "	0	8
19c.	" " 6" " " " " " " " ... ... "	2	6
20a.	" " 2" " " " " " " " ... ... "	0	6
21.	" " 1½" " " " " " " " ... ... "	0	6
22.	" " 1" " " " " " " " ... ... "	0	4
22a.	" " 1" " without " " " " " ... ... "	0	2
23.	" " ½" " " " " " " " ... ... "	0	2
23a.	" " ½" " with " " " " " ... ... "	0	4
24.	Bush Wheels, 1⅜" diam., perforated 8 holes ... ... "	0	6
109.	Face Plates, 2½" diam. For use in lathes, etc. Perforated and slotted ... ... "	0	4
118.	Hub Discs, 5½" diam., 8 spokes; outer rim perforated and slotted ... ... "	1	3
119.	Channel Segments (8 to circle, 11½" diam.) Channel section, ½"×½" ... ... "	0	4
123.	Cone Pulleys, 3 V-grooves "in steps," 1½", 1", and ¾" diameters ... ... "	1	3
132.	Flywheels, 2¾" diam. die-cast white metal alloy, with brass boss and set-screw. Separately turned and finished on lathe, enamelled and stoved. Milled groove round outer circumference and small grooved pulley at centre ... ... "	2	3
137.	Wheel Flanges, 2⅛"×½". May be bolted to any of the larger pulleys ... ... "	0	4
142.	Rubber Rings (round section). May be used with 3" Pulleys to represent pneumatic tyres ... ... "	0	4
143.	Circular Girders, 5½" diam., L-section. Slotted and perforated ... ... "	1	0
145.	Circular Strips, 7" diam. over all, perforated ... ... "	1	0
146.	Circular Plates, 6" diam. May be used as flywheels, etc. ... ... "	1	3

Your dealer will be pleased to show you all the Meccano Parts. Ask him for a complete list, or write for one direct to

MECCANO LIMITED, BINNS ROAD, LIVERPOOL

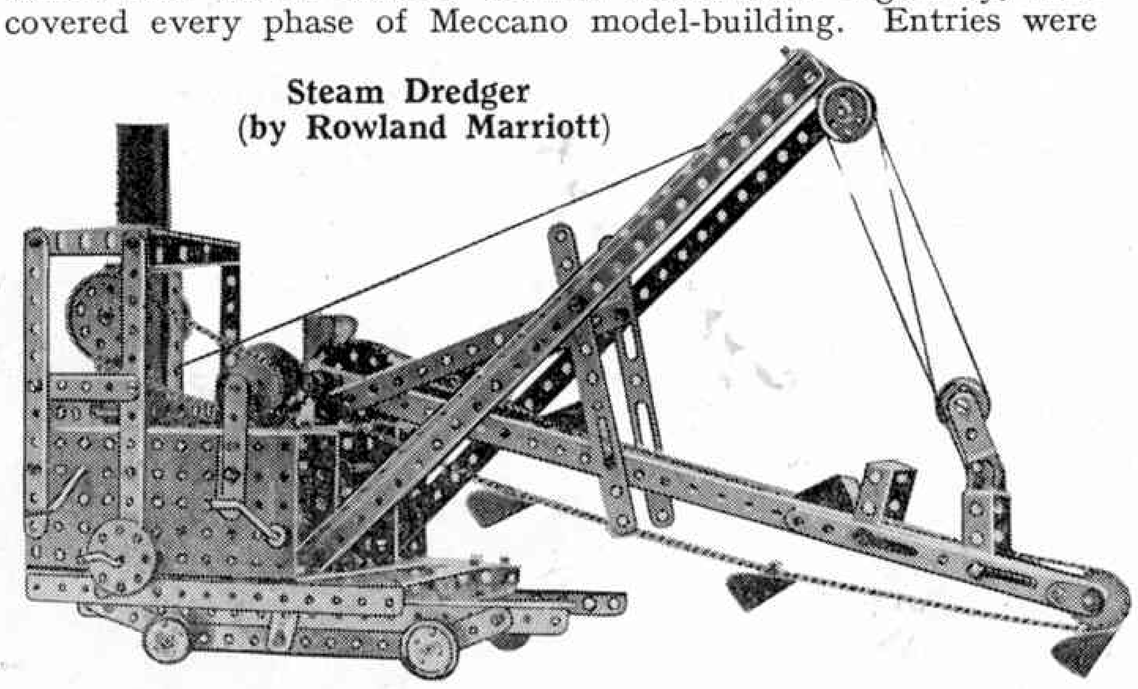


Large wheel, built up from 8 Channel Segments, Face Plate, Angle Girders, etc. May be used as base for rotating models, or fly-wheel in Beam Engines, and many other purposes. Diameter 11½ ins.

New Zealand (1925) Model-Building Contest

A very successful model-building contest was organised in New Zealand during 1925 by the Meccano Agents for that country, Messrs. Browning, Ifwersen Ltd.

The large number of entries received from all parts of both North and South Islands showed remarkable ingenuity, and covered every phase of Meccano model-building. Entries were



Steam Dredger (by Rowland Marriott)

divided into four Sections, five special prizes and five consolation prizes being allocated to each section. The principal awards were as follows :—

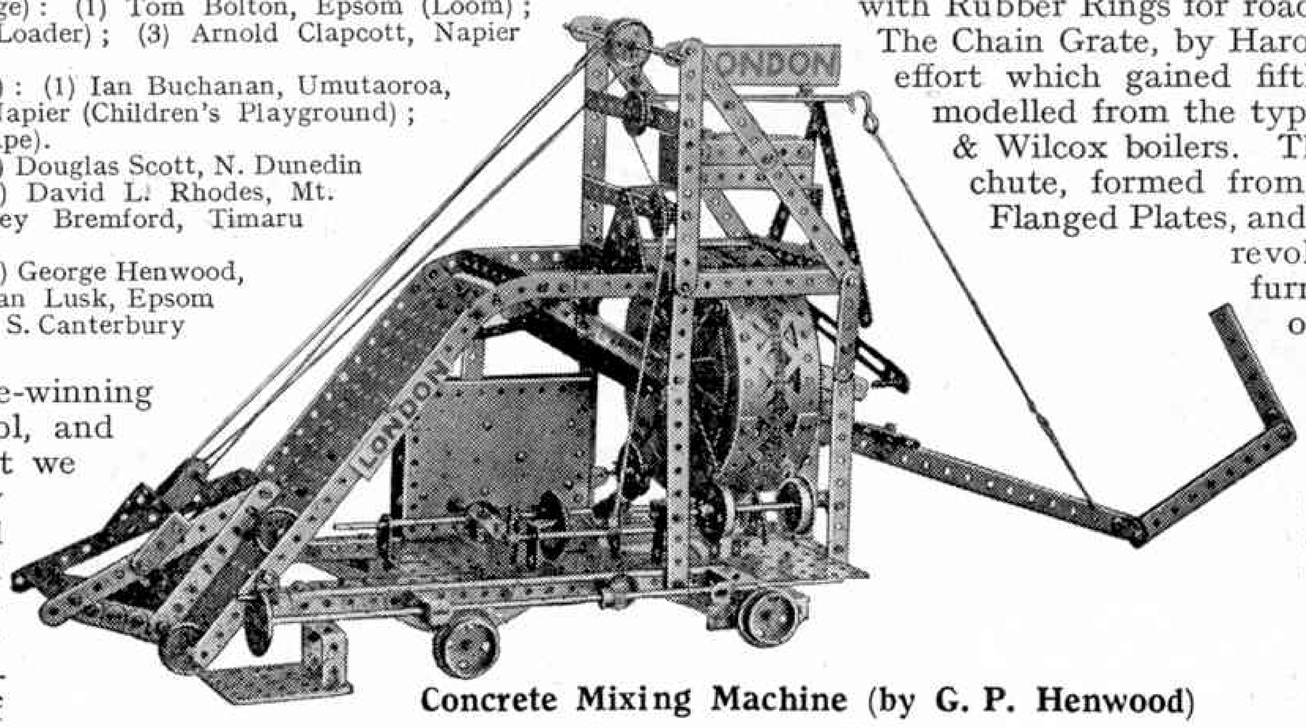
Section 1 (boys 14–18 years of age) : (1) Tom Bolton, Epsom (Loom) ; (2) John Wray, Remuera (Nelson Loader) ; (3) Arnold Clapcott, Napier (Radial Travelling Crane).

Section 2 (boys 10–14 years of age) : (1) Ian Buchanan, Umutaoroa, H.B. (Loom) ; (2) Neil Macfarlane, Napier (Children's Playground) ; (3) Gordon Saxby, Napier (Fire Escape).

Section 3 (boys under 10 years): (1) Douglas Scott, N. Dunedin (Double-Ended Cross-Cut Saw) ; (2) David L. Rhodes, Mt. Albert (Stone Crusher) ; (3) Rodney Bremford, Timaru (Floating Crane).

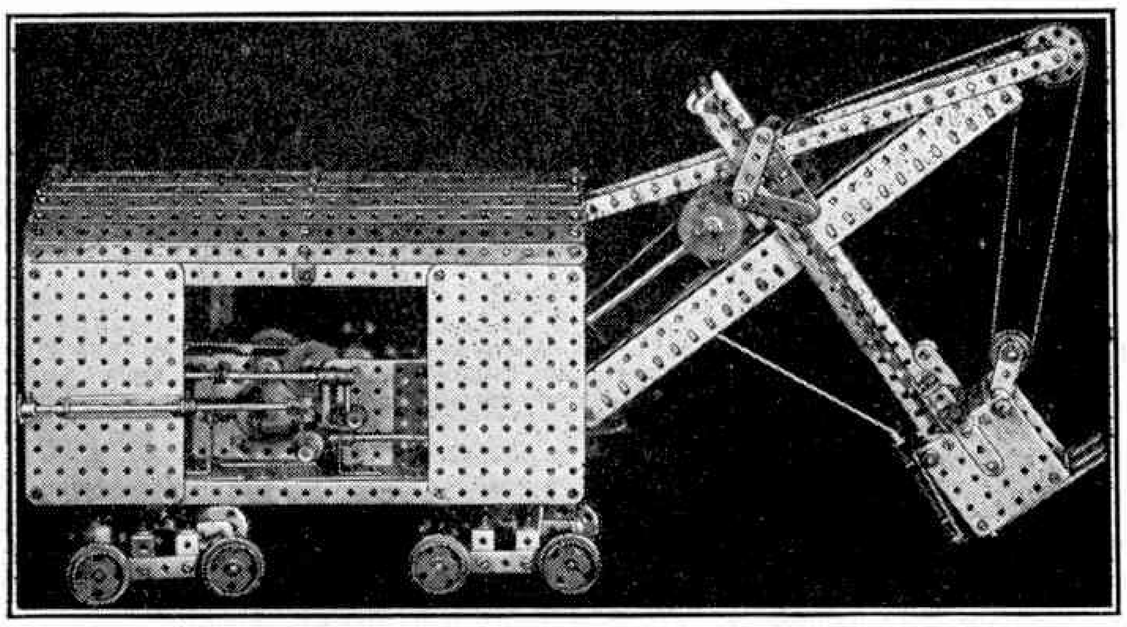
Section 4 (Most Original Model) : (1) George Henwood, Takapuna (Concrete Mixer) ; (2) Alan Lusk, Epsom (Vegetable Cutter) ; (3) Robert Jukes, S. Canterbury (Biplane Bomber).

Photographs of every prize-winning model were sent to Liverpool, and it is unnecessary to add that we spent many hours carefully examining them. We should like very much to illustrate and describe every winning model, for we feel sure that all our readers would be keenly interested in the excellent work of New Zealand Meccano boys. This is quite impossible however, and owing to the smallness of the available space we can only describe three or four that appear to be of particular general interest.



Concrete Mixing Machine (by G. P. Henwood)

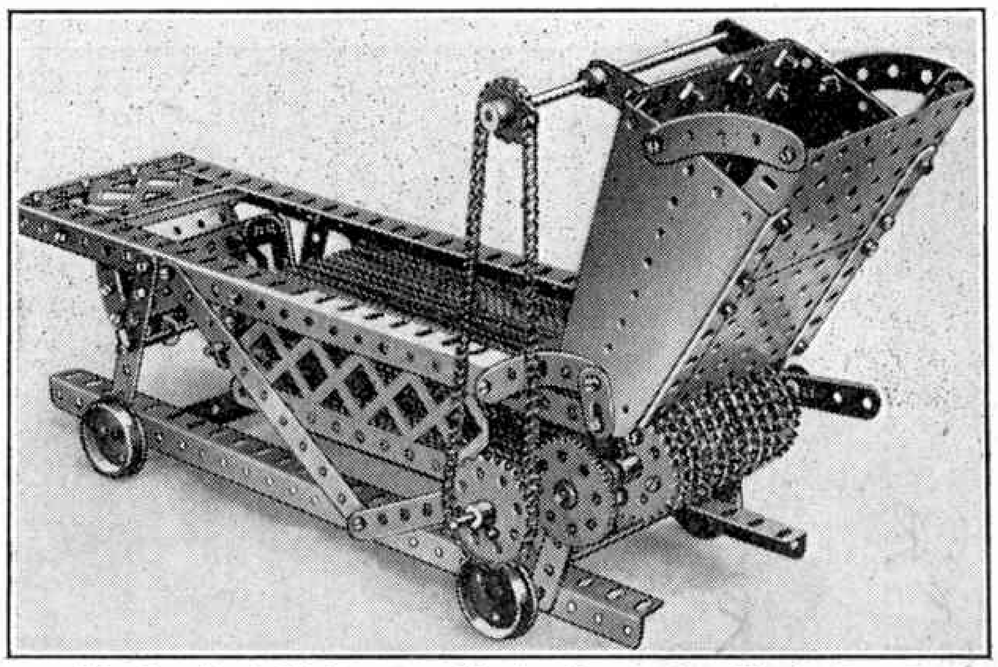
The ingenious concrete-mixing machine constructed by G. P. Henwood is quite a new departure in model-building, and reflects great credit on its designer. The mixing-drum is built up from a $12\frac{1}{2}''$ Braced Girder bent round $5\frac{1}{2}''$ Circular Girders, and carries buckets inside for mixing purposes. It rests on four Flanged Wheels and is rotated by means of the Sprocket Chain shown, which engages with a $\frac{3}{4}''$ Sprocket Wheel on a shaft driven from the Clockwork Motor. The loading hopper is hauled up the incline and caused to discharge its contents down the chute (a Sector Plate) into the mixing drum. Amongst other refinements included in the model will be noticed the discharging chute, which



Giant Electric Shovel (by Norman Stewart)

is controlled by a suitable lever, water tank—secured just above the rotating drum, steering gear, etc.

Gordon Saxby's model Fire Escape includes appropriate mechanism by which the ladder may be elevated, extended, or smoothly rotated as a whole unit. The appearance of the chassis is most



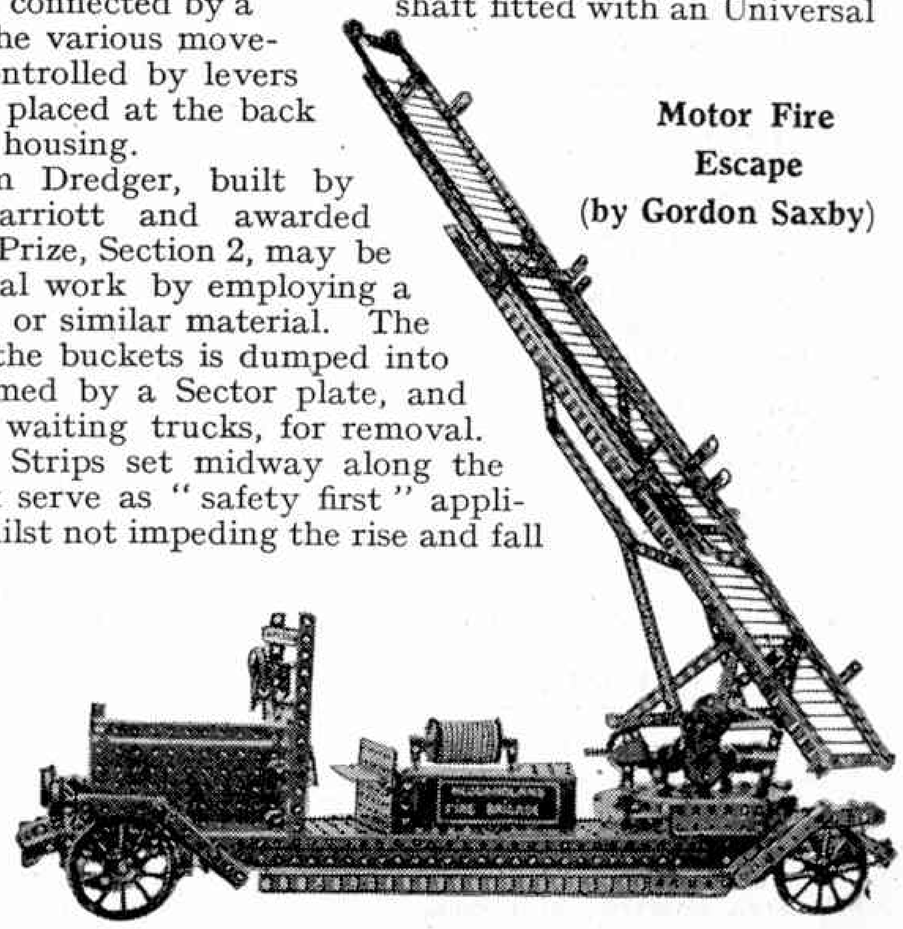
Mechanical Stoker or Chain Grate (by H. A. Boyd)

realistic, but would be enhanced even further by the use of 3″ Pulleys with Rubber Rings for road wheels.

The Chain Grate, by Harold A. Boyd, is a very original effort which gained fifth prize in Section 1. It is modelled from the type widely in use with Babcock & Wilcox boilers. The coal is passed through the chute, formed from Sector Plates and $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates, and thence is carried by the slowly revolving chains through the furnace. The grate is composed of ten equal lengths of Sprocket Chain, passing round drums constructed from four $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips bolted between two $1\frac{1}{2}$ Sprocket Wheels. The drums are operated by means of a Crank Handle mounted at the top of the coal-chute and the $\frac{3}{4}''$ Sprocket Wheel and Chain gear shown. An ash dump is provided at the rear of the grate. The model is mounted on wheels so that it may easily be run into the recess prepared for it beneath the boilers, or withdrawn for repairs.

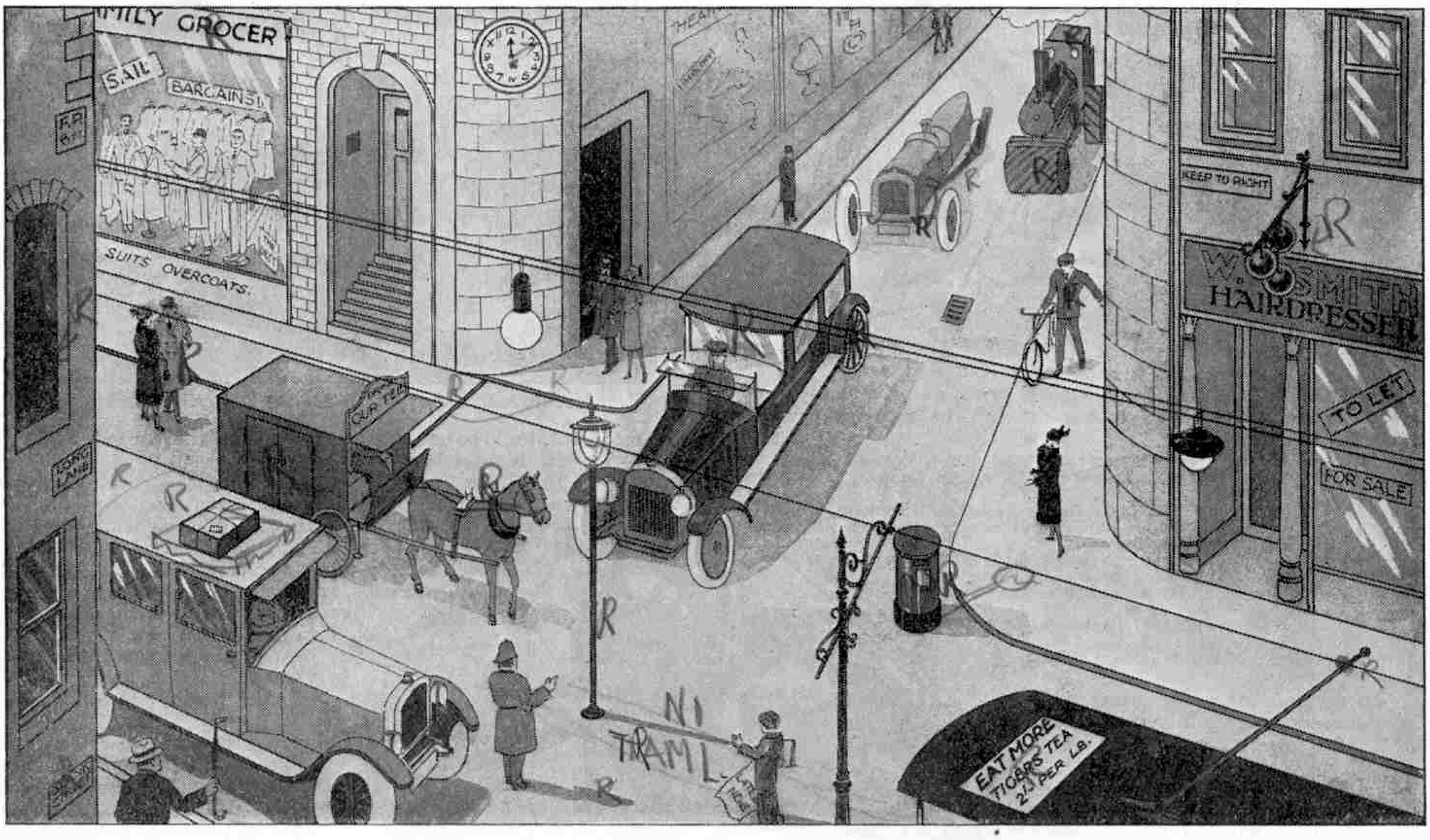
The Giant Electric Shovel, by Norman Stewart (Consolation Prize, Section 1) is worthy of special mention. The construction is compact and follows actual practice very closely. The racking movement of the shovel arm is operated from the Electric Motor, to which it is connected by a shaft fitted with an Universal Joint. All the various movements are controlled by levers conveniently placed at the back of the engine housing.

The Steam Dredger, built by Rowland Marriott and awarded Consolation Prize, Section 2, may be set to do real work by employing a heap of sand or similar material. The refuse from the buckets is dumped into a chute, formed by a Sector plate, and thence into waiting trucks, for removal. The Slotted Strips set midway along the fixed derrick serve as "safety first" appliances, for whilst not impeding the rise and fall of the movable derrick, they prevent the latter crashing in the event of failure of the hoisting rope.



Motor Fire Escape (by Gordon Saxby)

Competition Page



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

It is over a year since we held our last Puzzle Picture Contest and during the past few months we have been asked frequently for another puzzle of this popular type. In response to these requests we commence this month the first of a series of Puzzle Pictures which, we hope, will provide exercise for the sharp eyes of our readers.

In the above picture our artist has introduced intentionally a number of errors, and the task of competitors consists in finding and making a list of these mistakes. Competitors' lists should be written on one side of the paper only and at the foot of the list the total number of errors found should be noted. The descriptions of the mistakes should be kept as short as possible.

Four prizes of Meccano or Hornby Train goods (to be selected by the winner) to the value of £1 1s. 0d., 15/–, 10/6 and 5/– respectively will be awarded in order of merit to the four competitors who send in the longest lists of genuine errors.

Closing date 27th February. Overseas, 30th June.

Thirteenth Drawing Contest

In our past drawing competitions we have included a great variety of mechanical subjects—Locos, Aeroplanes, Steam and Petrol Wagons, Electric Tram-cars, etc. In a recent letter one of our readers suggested that a suitable subject would be "A Motor Fire Engine," and we are adopting his suggestion this month. Beyond the fact that the Fire Engine must be motor propelled and not drawn by horses, there are no restrictions in this competition.

The competition is divided into two sections, "A" for readers of 16 and over and "B" for those under 16. Prizes of Drawing or Painting materials (or Meccano or Hornby Train goods) to the value of £1 1s. 0d. and 10/6, will be awarded respectively to the entries considered to be best and second-best in each section.

Closing date 27th February. Overseas, 30th June.

23rd Photo Contest

In view of the extension of the article on Trick Photography to a second instalment, it has been decided to leave the January Photo Contest open for another month, thus affording readers ample opportunity to submit their entries.

The closing dates are therefore altered to 27th February. Overseas, 30th June.

Results

October Puzzle Competition

First Prize, Meccano or Hornby Train Goods, value £1/1/–, Thomas Milne (Broughty Ferry, N.B.)

Second Prize, Meccano or Hornby Goods, value 10/6, R. W. Selby (Chard, Somerset).

Third Prize, Meccano or Hornby Goods, value 5/–, C. E. Hayes (Putney, S.W.)

September Essay "My Favourite Loco"

We wish that the Mechanical Engineers of our British Railways could have an opportunity of studying some of the numerous entries for this competition. Meccano boys are famous for their critical powers of observation, and to their virtues we must now add that of stern discrimination. Beyond all doubt the L.N.E. "Pacifics" and G.W. "Castles" are prime favourites, even though a large number of entrants fought for the claims of the humbler general "fuss-about" locos, and advanced sound reasons for their opinions. We have great sympathy with the boy who loved the loco that hauled him home for tea and was never late!

We have not space to quote all the locos named, but our readers will be interested to know that the "Flying Scotsman" and the "Caerphilly Castle" were on top and strangely enough each was quoted by the same number of readers!

Awards :—

First Prizes—Section A, N. Ward (Halifax) Section B, H. F. R. Burningham (Southampton). Second Prizes—Section A, D. M. Murdoch (Ealing, W.5); Section B, James Moore (Carlisle).

19th Photo Contest

We were gratified to observe that our readers interpreted in the widest sense the words "railway scene," and as a result the entries were exceedingly numerous and varied. George Stephenson's birthplace and his "Invicta" loco, the "Wagon-Lit" in which Marshal Foch signed the Armistice instruction, huge Pacifics hurling along and fussy little tanks shunting—all were represented. Scenes from Swiss, French, and Indian railways indicated that we number some widely-travelled readers among our homeland company.

From a photographic standpoint the majority of the entries were good and the average quality shows a marked improvement.

Awards :—

First Prizes—Section A, H. W. Simpson (Liverpool); Section B, Stewart Owen (Norbury, S.W.16). Second Prizes—Section A, T. W. Little (Leicester); Section B, F. G. Simpkins (Treharris, Glam.)

Results

Christmas Present Contest

The flood of entries for this contest once more proved our readers' enthusiasm and resulted in the selection of the following articles as the most popular, the order given being decided by the voting :—The Hornby Electric Train ; The Hornby No. 2 Pullman Train ; Meccano Outfit No. 7 ; Miss America Launch ; Structo Auto Builder No. 12 · Gambrell Baby Two Wireless Set.

The prize was awarded to D. MACDOUGALL (Kinlochleven, Argyllshire), whose list gave the chosen six in the correct order of voting.

Most Difficult Puzzle

The voting in this contest placed the various puzzles in the December "*M.M.*" in the following descending order of difficulty :—161, 150, 160, 152, 158, 153, 159, 157, 154, 155, 156 and 151. No completely accurate list was received and the prizes of £1 1s. 0d., 10/6 and 5/- were awarded respectively as follows :—A. C. GRIMEBERG (Muswell Hill, N.1) ; K. BROOKES (Leek, Staffs.) ; J. L. A. ROGERS (Oldham).

21st Photo Contest

The awards were as follows :—

Section "A"—First Prize, F. G. CLEMENTS (Luton). Second Prize, A CARRIER (Northampton). Section "B"—First Prize, R. STIMSON, Jnr. (Lowestoft). Second Prize, A. IVES (Crosland Moor, Huddersfield).

Cover Voting Competition

The voting in this contest was extremely heavy and the result is interesting. The final order of popularity of the covers was as follows :—December, September, April, June, May, October, January, November, March, February, July and August. Detailed comment on the results of this contest will be made when the Overseas results are available.

No competitor succeeded in giving a completely accurate list and prizes of Meccano Goods to the value of £1 1s. 0d., 15/-, 10/6 and 5/- respectively, were awarded to the following competitors whose forecasts were most nearly correct :—G. N. O'NEILL (Donnybrook, Dublin) ; H. BEATS (Dundee) ; R. H. HILL (Sheffield) ; L. A. DUCK (Elsted, Midhurst).

Copies of the new Manual, "Meccano Standard Mechanisms," have been awarded to A. KIMMINGS (East Acton, W.3) ; W. O. LITTLE (New Southgate, N.11) · R. RUSSELL (Scarborough) ; P. STEWARD (Kings Lynn).

Christmas Essay Contest

Awards :—

Section "A"—First Prize, J. MOORE (Carlisle). Second Prize, P. A. DUNSTON (Streatham, S.W.16). Section "B"—First Prize, T. W. PIPER (Scunthorpe). Second Prize, F. W. SKINNER (Lanark).

December Puzzles

The awards (Meccano or Hornby Train goods, value £1 1s. 0d., 10/6 and 5/- respectively) were as follows :—K. F. WHYMAN (Stockton Heath, Ches.) ; J. YATES (Mossley, Manchester) ; E. J. DICKIE (Muswell Hill, N.10).

Christmas Painting Contest

The majority of the entries showed that our artist readers had a very vivid conception of the requirements of their task and many strikingly original designs were submitted.

The awards were as follows :—Section "A"—First Prize, W. J. GLENN (Ipswich). Second Prize, R. F. YOUNG (Wembley). Section "B"—First Prize, A. HEBDIN (Ringmer). Second Prize, A. CHADWICK (Macclesfield).

Overseas Results

6th Drawing Competition

The Overseas Section of this competition, the subject of which was "A GREAT PASSENGER LINER," once again showed that our Home readers cannot give our Overseas readers any points for enthusiasm and artistic skill. There was a very large number of entries and steamships of every maritime nation were represented. The standard of the best entries was so high that the judging required very close attention to details.

As was the case in the Home Section, the "*Majestic*" was the most popular ship, and it was pleasing to observe the many entries from boys living in out-of-the-way inland towns who used illustrations of this ship to aid their imaginations. Many of those boys had never seen an actual liner.

Awards :—

Section A—First Prize, R. A. EVANS (Linwood, Christchurch, N.Z.) Second Prize, J. DE CONTI MANDUCA (Sliema, Malta). Section B—First Prize, N. GREENSLADE (Wellington, N.Z. Second Prize, G. MORALDI (Rome 8)

16th Photo Contest

This competition, the subject of which was "A JUNE LANDSCAPE," proved extremely popular and entries were received from all parts of the world. The scenes illustrated, as was to be expected, were widely different in type, and especially was it strange to find prints showing parched deserts side by side with snow-laden plains in one competition !

Our photographic readers should note that the title of a competition subject is not necessarily to be the title of their own entry for that particular contest. Any title may be used, provided that the general rules of the contest are carried out.

The judging of this competition was not so difficult as usual, the winning entries being easily the best, and the awards are as follows :—

Class A.—First Prize, F. VAN BULCH (Paris XI.) ; Second Prize, PRINCE EVANS (Hakitika, New Zealand). Class B—First Prize, D. B. MARSH (Nashwaaksis, York County, New Brunswick) ; Second Prize, J. FLETCHER (Dunedin, New Zealand)

Eighth Drawing Contest

The entries for this contest were more numerous than usual and there was little to choose between the ultimate prizewinners. Ships of all ages, ranging from slave-galleys to aeroplane carriers, were represented. The prizewinners were as follows :—

Section "A"—First Prize, J. DE CONTI MANDUCA (Sliema, Malta). Second Prize, C. CAMERON (Christchurch, N.Z.)

Section "B"—First Prize, P. RENAULT (Alencon, Orne, France). Second Prize, J. KNOX (Hawkesbury, Ont., Canada).

Eighteenth Photo Contest

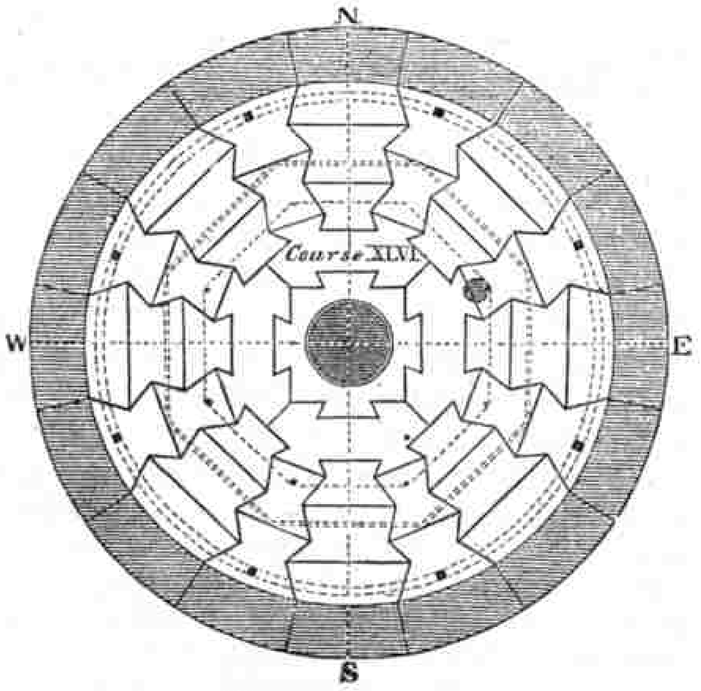
The following are the awards :—

Section "A"—First Prize, T. K. LENG (Singapore). Second Prize, E. SMITH (Toronto, Canada). Section "B"—First Prize, L. STEVENSON (Napier Barracks, Karachi). Second Prize, H. HARRIS (Ficksburg, O.F.S.)

Lives of Famous Engineers—

(*Continued from page* 105)

were the blocks dovetailed so as to lock one into the other, but also they were joined by trenails, or pegs of oak, which were driven into holes bored in the stones. The fixing was so secure that Smeaton stated that a trenail would pull in two sooner than pull out of the hole into which it was fitted. Additional firmness was given to the stones dovetailed into the rock by means of oak wedges and cement inserted between each. By the end of the season the ninth course of stones had been completed without any accident



Plan of the 46th course, showing method of dovetailing

more serious than the occasional washing away of stones or tools which were easily replaced.

The Last Stages

After a particularly wild winter Smeaton landed again on the rock on 12th May, 1758, and was delighted to find the work exactly as he had left it six months previously. In spite of the raging seas not a block had been moved. Work proceeded with few interruptions until late in September, by which time the twenty-fourth course was finished, the building now

Lives of Famous Engineers—

(*cont. from p.* 105)

having been raised a little over 35 ft. above its base. This completed the solid part of the structure and formed the floor of the store room. Above this point the apartments for the lighthouse keepers were built with walls 26 in. thick. By the end of this year's work the twenty-ninth course was completed and a sort of temporary house was constructed over the work to protect it during the winter.

The following season was abnormally rough and it was not until 5th July that the workmen could land upon the rock and continue their building operations. The structure was now well beyond the heavy stroke of the waves and operations continued so rapidly that by 17th August the forty-six courses of stones were completely finished and the lighthouse had reached its specified height of 70 ft. The final mason's work done was the cutting of the words "Laus Deo" (Praise to God) upon the last stone set over the door of the lantern.

Light Exhibited for First Time

Smeaton's work was now almost complete and his anxiety had become so great that he lived entirely in the lighthouse and personally assisted his workmen in the finishing of the last details. The light was first exhibited on the night of 16th October, 1759, and the engineer was able to leave the rock knowing that his work was well and truly accomplished.

Smeaton's lighthouse stood for over 100 years, and probably might still have been standing but for the fact that the reef itself had become undermined and weakened by the sea. Various efforts were made to save the lighthouse, but without success, and in 1877 Sir Charles Douglass, Engineer-in-Chief to Trinity House, announced that Smeaton's structure was to be taken down. In the following year the first stone of the present lighthouse, built to the design of Sir James Douglass, was laid upon the rock at a distance of about 100 ft. from Smeaton's tower. The new lighthouse was completed in 1881. Smeaton's lighthouse had then reached the end of its long and useful career and it was removed, with the exception of its stump, to Plymouth Hoe. The stump of the tower still remains—a lasting monument to the genius of the man who, in this one structure, brought the lighthouse so close to perfection that subsequent designers have found little to alter except in detail.

NEXT MONTH :—

Smeaton as Harbour Engineer

The Future of the Young Engineer—

(*Continued from page* 131)

"The heights by great men reached and kept
Were not attained by sudden flight,
But they, while their companions slept
Were toiling upward in the night."

Believe me, developments in Engineering science and practice were never so numerous as to-day ; the horizon for young Engineers was never wider, the possibilities of success never greater.

I pray you therefore to approach your work with a proper pride in this great profession you have embraced, with quiet confidence in the future it holds for you, and with a determination that your motto shall be that of Benjamin Franklin—"Plough deep while sluggards sleep."

The Secretary's Notes

The first session of 1926 is now well on its way, and before it closes I wish to draw the attention of Leaders and secretaries to the importance of taking every opportunity of getting into personal touch with other clubs in the district, and wherever possible arranging inter-club visits. In a world-wide organisation such as the Meccano Guild there is always a danger of the constituent clubs becoming to some extent isolated, with the result that a certain amount of the Guild spirit is lost. There is no doubt that whenever two clubs exchange visits an increase of enthusiasm becomes noticeable in both. The exact nature of these visits is not of very great importance, the main thing is that the members of two or more clubs shall meet together, exchange views and enter into some kind of friendly rivalry. A very good idea is to arrange a football or hockey match with the members of a neighbouring club, and afterwards to have tea and spend a couple of hours together in the club room, each club in turn acting as host. No doubt many clubs think that such a scheme is beyond their financial resources. This may be the case with some of the very small clubs, but I am sure that in most cases the idea is possible, if only it is tackled seriously.

The Guild Spirit

The situations of certain clubs of course make it impossible for them to carry out inter-club visits, but even in such cases it is possible for very close contact to be established and maintained. This may be done in a variety of ways, but perhaps the most successful method is that of a series of mutual exchanges. For instance, programmes may be exchanged with an invitation for friendly criticism, and this procedure invariably results in each club profiting by the ideas of the other. In the same manner there may be an exchange of photographs of models built or any kind of work done by the club during the session, and the exchange of accounts of excursions or rambles, or visits to some engineering works, is always a source of interest. I should like to see such exchange partnerships arranged between many of our most enterprising home clubs and clubs overseas. I feel certain that if the Leaders of such clubs would "break the ice" and get into contact with one another, there would be little difficulty in arranging partnerships of interest that would prove of great mutual value. I shall be only too glad to do all I can to help on any such schemes.

Club Partnerships

During the past year there was a steady improvement in the number and quality of reports received from the secretaries of clubs, and now the only matter about which I have any serious complaint is that the reports are often too short and lacking in detail. I should like secretaries to remember that, whereas I can always cut down a report that is too long for the space available, I cannot add to a report that is too short! The increase in the number of secretaries' reports has coincided with a decrease in the number of letters from Leaders, and this has been a source of great regret to me. I should like every Leader to make a point of writing to me at least once every session giving me his views regarding his own club and the Guild in general.

Leaders' Reports

A Lincolnshire Meccano Club

Our photograph shows some of the members of the St. Barnabas (Barnetby) Meccano Club. This fine club celebrates next month the sixth anniversary of its establishment. Mr. Watson, the Leader, who is shown standing on the right of the group, has successfully guided the club through its earlier difficulties to its present flourishing condition. The club also owes much to the active interest taken by its President, the Rev. T. E. Meurig Davies.

The Largest Meccano Club in the World

Wiseman's Meccano Club, which has its headquarters at Auckland, New Zealand, enjoys the distinction of being the largest Meccano Club in the world. The phenomenal growth of this club affords a striking example of what may be done by unlimited enthusiasm applied at the right place and at the right moment.

The club was founded towards the end of 1924 by Mr. Frank Wiseman, whose interest in its welfare has never waned and who is now its President. Mr. Wiseman was fortunate in obtaining the valuable assistance of Mr. W. Shearer who, as holder of the responsible positions of Leader and Secretary, has been very largely instrumental in guiding and developing the club's activities.

Affiliation with the Meccano Guild was granted in March, 1925, by which time the membership had reached the remarkable figure of 660. A great Recruiting Campaign was organised, as a result of which the membership was increased to 754 by the following June.

At the present time the membership of the club is about 800 and the last meeting in 1925 proved a fitting conclusion to a record year. The great event of this meeting was a visit from Mr. Mackley, Chief Locomotive Engineer of the Railway Department for the North Island of New Zealand. Mr. Mackley delivered a lecture on the Westinghouse brake, and by means of a model and diagrams explained the mechanism of this brake so lucidly as to be understood by the youngest member present. On this occasion several fine Meccano models were displayed and after examining these in detail Mr. Mackley said: "While we have boys who can do this highly technical work, New Zealand need have no fear for her future engineers." The members of the club are justly proud of this high tribute to their work.

The evening's programme was completed by the announcement by the President of the results of a great Model-building Contest. The models had been exhibited in public for a week, during which time they attracted very keen local interest. The decisions in the contest were the result of skilled judging by two eminent engineers—Mr. S. E. Lamb, Director of the School of Engineering, Auckland University, and Mr. Ballantyne, Civil Engineer. The prizes were presented to the successful competitors by Mrs. Wiseman, amidst great enthusiasm.

CLUB NOTES

Louth M.C.—Has held a highly successful Exhibition, and the membership shows an increase. M. Spurr delivered a very interesting Lecture on "Loco Types." Club roll: 15. *Secretary*. H. Bell, 10, Dyar Terrace, Charles Street, Louth.

Garstang and District M.C.—One of the members recently gave a fine Cinematograph Display, which was enjoyed by all. The Football Team is distinguishing itself. Club roll: 12. *Secretary:* J. T. Berry, Victoria Terrace, Garstang.

Holy Trinity (Barnsbury) M.C.—After the Exhibition a general review of the past session was held, and the officials are full of schemes for the new session. Members recently took part in a Church Sale of Work, in conjunction with the Holy Trinity Radio Club, and the net proceeds for two days realised £4 2s. 6d. Club roll: 30. *Secretary*: R. Clarke, 77, Richmond Road, London, N.1.

Great Baddow (Chelmsford) M.C—An Exhibition of Models was recently organised and prizes were awarded for the best attempts. A Motor Tractor, Plough, Automatic Weighing Machine, Motor Car and two types of Cranes were among the models exhibited, and a fine model of a Workshop with electric motor was loaned from Headquarters for the occasion. *Secretary*: J. Boreham, Post Office, Baddow Road, Chelmsford.

Luton M.C.—A Lecture dealing with various Types of Aerials was delivered some time ago, and a general Wireless Evening has also been held. An Arts and Crafts Exhibition was held in the town and instead of holding a meeting the entire club visited this interesting Exhibition. *Secretary*: W. Goldsmith, 69, Tennyson Road, Luton.

Pinxton M.C.—This newly-affiliated club is doing excellent work. An exhibition was recently held and the proceeds were presented to the Pinxton Wharf Chapel trustees in recognition of their kind support in giving the use of the club-room free of charge. Club roll: 37. *Secretary*: Harold Elliott, 150, Wharf Road, Pinxton, Nottingham.

Skelmanthorpe Wesleyan M.C.—Mr. F. Heeley delivered a Lecture on "Curiously Shaped Coins" and exhibited interesting specimens from his collection. A Lecture on "The History of London's Underground" was loaned by the Underground Railway Co. and was supplemented by lantern slides, providing a very interesting evening's entertainment. Club roll: 23. *Secretary*: R. G. Field, Prilling House, Skelmanthorpe, nr. Huddersfield.

Pitsea and District M.C.—Recently held a very successful Exhibition extending over three days. The membership is steadily increasing and the spirit of the club is very enthusiastic. Club roll: 10. *Secretary*: Edward Knight, Stamford House, Vange, Pitsea.

Queen Elizabeth's School M.C.—At a recent Exhibition models of the Forth Bridge, a Meccano Theatre fitted with electric light, and an Aeroplane won distinction. Many other interesting models were displayed and a Hornby layout was operated by several members. A Magazine will shortly be circulated and is to be published each term. Club roll: 15. *Secretary*: A. Sprague, Queen Elizabeth's School, Crediton, Devon.

Diss M.C.—A fine Christmas party was enjoyed by all, and the club re-commenced activities with a business meeting on January 2nd. A Lecture on "Wireless" is keenly anticipated. Club roll: 10. *Secretary*: J. J. Maling, 15, Heywood Road, Diss.

Blackpool M.C.—Lectures on Wireless have been enjoyed and an interesting talk on "The History of Railways" was delivered by a member. Model-building Competitions have been organised and prizes awarded. Club roll: 30. *Secretary*: Maurice Naylor, "Dalesford," St. Annes Road, Blackpool.

High Wycombe Royal Grammar School M.C.—An unusual and interesting Lecture was given by the Leader, Mr. Grant, on "Building a Gramophone," various types of gramophones being discussed and some records played. Lectures on "Moths and Butterflies" and a demonstration of Gaslight Printing provided further attractions. A Lecture on "Enlarging," by Mr. Grant, was greatly appreciated. Fretwork is a popular section of the syllabus. Club roll: 59. *Secretary*: H. R. Foden, Taviuni, Copthall Lane, Chalfont St. Peter, Bucks.

Richmond (Surrey) M.C.—The membership has increased so greatly that it has been found necessary to take another and larger room, and more enrolments are now expected. A Concert was held with great success. Club roll: 40. *Secretary*: A. R. White, 15, Albert Road, Richmond.

St. Mark's M.C.—A successful Exhibition was recently held. The Display of Models included a Loco, two Coaches, Motor Chassis, Weighing Machine and an Anti-aircraft Gun, while a Miniature Railway provided a further attraction. A second Exhibition and Concert held in January were highly successful. Club roll: 22. *Secretary*: Geo. C. Green, 21, Hafton Road, Catford, London, S.E.6.

Accrington M.C.—An interesting Lecture on Bridges was delivered by Mr. Denner, a patron of the club. A "Story Evening" has also been held, on which members brought interesting stories along and read them aloud. Club roll: 20. *Secretary*: V. Waterhouse, 45, Ramsbottom Street, Accrington.

1st Herne Bay M.C.—Has started the new Session very well indeed. The syllabus has been printed in every membership card, through the courtesy of a local firm. This is well punctuated with "Musical Jollity Evenings," and Socials, Games Tournaments, and Model-building and Hobbies evenings feature prominently. Club roll: 24. *Secretary*: C. W. Russell, 4, Clifton Villas, Herne Bay.

Holy Trinity (Blackburn).—A Whist Drive proved a huge success, and realised a substantial sum. The Football Team is establishing a good record, having won all but three of its matches this season. An Exhibition is being held this month and a Working Model has been loaned from Headquarters for the occasion. *Secretary*: Tom Donald, 6, Camden Street, Blackburn.

Meccano Club Leaders

No. 24. Mr. F. Craven Broad

Mr. F. Craven Broad is Leader of the Cheltenham Grammar School Meccano Club. This club was formed in October 1924 and was affiliated in the following month. Under Mr. Broad's capable leadership the membership has grown steadily and a splendid spirit prevails throughout the club. Mr. R. R. Dobson, M.A., Headmaster of Cheltenham Grammar School, is President of the Club and takes a keen interest in its progress.

In addition to his Meccano Club activities, Mr. Broad is Assistant County Commissioner for the training of the Scout Officers for Gloucestershire and is also District Commissioner for Cheltenham, Tewkesbury and Winchcomb.

Beverley Road (Bolton) M.C.—A fine Hornby Train Layout in the club room proved a great success and members spent a very jolly evening. A club library has been organised and patrons in the district have given it a good start by contributing a number of excellent books. The membership has been increased by means of a Recruiting Campaign. A Meccano outfit has been offered by the Leader, Mr. Cooper, for the best Essay on the Meccano Guild. Club roll: 20. *Secretary*: H. Henshaw, 35, Kendal Road, Bolton.

St. Mary (Bourne) M.C.—In order to attract new members the secretary has had leaflets distributed by local shop-keepers, and many interested enquiries have resulted. A similar recruiting plan is being arranged for neighbouring villages. The Exhibition recently held was highly successful, and a fine working model of a Derricking Crane was loaned from Headquarters for the occasion. Club roll: 20. *Secretary*: D. L. White, "Rosedale," Stoke, Near Andover, Hants.

Italy

Siena M.C.—This newly affiliated club holds regular meetings in a room in the house of the Leader, Mr. Alfredo Bruchi. Model-building evenings are held in the winter, and for the summer months games and outdoor amusements are arranged, to be held in the large garden of the Leader's house. Football and Cricket teams are being formed, and a course of Gymnastics is an attractive feature. Philately is a popular hobby with members. *Secretary*: Valentino Bruchi, 39, Via Ricasoli, Tuscany, Italy.

South Africa

Observatory Meccano and Wireless Club.—One of the Members delivered a Lecture on the Giant Block-setting Crane, Titan type, and was recommended by his Leader for the award of a special Merit Medallion. Many new schemes have been devised for the coming session. *Secretary*: J. Wilson, 6, Irwell Street, Observatory, Cape Province, South Africa.

Australia

Glenelg (Australia) M.C.—An interesting Lecture on Locos was given by the Leader and was greatly appreciated by the members. For a Hornby Railway night members brought their train sets and a very fine display was made, the Leader supplying a large layout with points and turntable. A Loco Drawing Contest was enthusiastically received by members. A visit to the South Australia Gas Company's works was made recently, and a photograph of the club was taken on that occasion. Club roll: 43. *Secretary*: Keith Holmesby, 22, Partridge Street, Glenelg.

Unaffiliated Clubs

Wyggeston Grammar School M.C.—Is making excellent progress under the Leadership of Mr. Reynolds. An Exhibition was held at the end of the school term with great success. Club roll: 20. *Secretary*: G. W. Darly, 30, Kimberley Road, Leicester.

Bridge Street (Barnsley) M.C.—Is progressing well under the Leadership of Mr. Cooper, who is assisted by a committee of six. A Savings Bank has been formed and a Club Magazine is in course of preparation. *Secretary*: J. H. Norman, 1, Bridge Street, Stairfoot, Barnsley.

Poulton-le-Fylde M.C.—A club room has kindly been provided by the President. It is interesting to note that the membership has been increased by means of local advertising. *Secretary*: G. A. Nickson, Strathdene, Derby Road, Poulton-le-Fylde.

Skirbeck (Boston) M.C.—Members have suffered a loss in the departure of the Rev. B. Stokes for Singapore. Two meetings are held weekly, one for the older boys and the other for younger members. *Leader:* Mr. J. E. Sharman, 11, Glebe Terrace, Skirbeck, Boston.

Napier (N.Z.) M.C.—This enterprising club held a successful Exhibition at Christmas and also performed a Play. The Leader is Mr. F. Drew, and the club roll is 18. Applications for membership will be welcomed by the *Secretary*: Noxley Pickering, 48, Shakespeare Road, Napier.

Middlesbrough M.C.—This is the third attempt made to establish a Meccano Club in Middlesbrough, and it promises to be highly successful. An adult Leader has not yet been obtained, but regular meetings are well attended, and Competitions and an Exhibition of Models have been organised. "Five-minute Speeches" formed the attraction at a recent meeting, each member drawing a slip of paper from a hat and speaking for five minutes upon the subject written thereon. Publicity is obtained by the insertion of notices in the window of the local Meccano dealer. *Secretary*: A. Bradley, 23, Laurel Street, Middlesbrough.

Bellahouston M.C.—An adult Leader has been obtained for this Club, which is progressing very well. Two highly successful Hornby Train evenings have been enjoyed, besides many Model-building meetings. Every effort is being made to advertise the club and attract new members. Club roll: 15. *Secretary*: Ninian Ralph, 9, Torbeck Street, Bellahouston, Glasgow.

Summit (New Jersey) U.S.A. M.C.—A small band of enthusiasts are working to organise a good club at Summit, meetings being held at the homes of members until a suitable club room is procured. Applications for membership will be welcomed by the *Secretary*: Ralph Fisher, 91, Springfield Avenue, Summit, New Jersey, U.S.A.

Haslingden M.C.—Excellent progress has been made and a substantial increase in membership is a welcome feature. Two interesting Lectures were given by local gentlemen, whose kindness was much appreciated by members. A Hornby Night proved highly successful, and it is hoped to introduce a Chess Section. A Club Magazine is being prepared. Club roll: 22. *Secretary*: K. G. Tupling, 16, Alexandra Terrace, Haslingden, Manchester.

Edinburgh Castle (Bow) M.C.—Interesting Model-building and Social Evenings have been spent and an Exhibition is planned to take place shortly. A number of members visited the exhibition held by Christ Church M.C. recently, and spent a very enjoyable time. *Secretary*: E. Wedon, 173, Turners Road, Bow, London, E.3.

Proposed Clubs

Kew (Melbourne, Australia).—A Meccano Club is being formed by Geoffrey Cane, 23, Adeney Avenue, Kew Melbourne, and local Meccano boys are invited to join.

Southampton M.C.—It is proposed to inaugurate a club and all those who are interested should communicate with N. A. Jevons, 80, Shaftesbury Avenue, Southampton. A Leader has not yet been obtained but it is hoped to remedy this deficiency before long.

Wallasey M.C.—A strong endeavour to form a club in Wallasey is being made. Meccano boys in Wallasey who wish to support the project should write to Master Ronald Linacre, 84, Rowson Street, Wallasey, who will be glad to have their views and suggestions.

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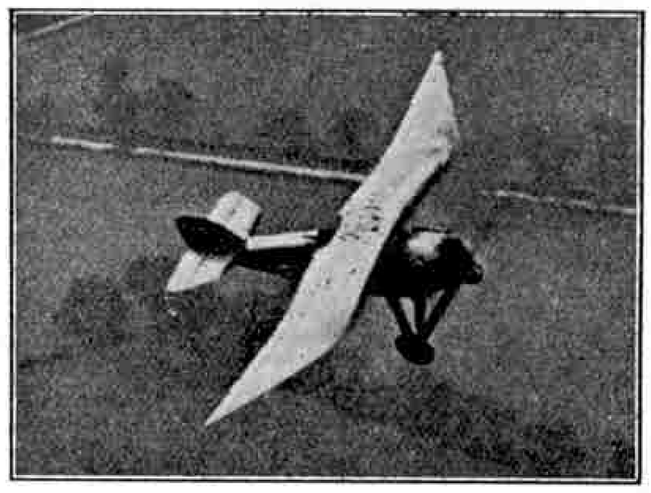

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Electricity—(*cont. from page* 91)

In this figure everything but the actual speaking lines has been omitted. Under the conditions shown, current from the battery B flows through the circuit T3, M1, R1, T1 and also through the circuit B, T4, M2, R2, T2. T1, T2, T3 and T4 are the four coils of two transformers, R1 and R2 are the two receivers, M1 and M2 the two microphones.

When subscriber A speaks into his microphone M1, he sets up a fluctuating current in the circuit M1, R1, T1, B, T3, the power being supplied by the battery B. The two coils T1 and T3 repeat these fluctuations to T2 and T4 by transformer action, thus setting up similar fluctuations in the circuit T2, B, T4, M2, R2. This acts upon the receiver R2 and subscriber B hears the sound reproduced. The same effect happens when he speaks into his microphone M2.

Protection Against Lightning

It will be seen that this reintroduces the microphone into the main circuit as in Fig. 1, but this disadvantage is overcome in various ways and is compensated for by the great advantage of the common battery. In this type of circuit the signalling generator is removed and the lifting of the receiver off the hook automatically calls up the operator at the exchange. The bell for calling purposes is retained as before.

When overhead lines are employed it is necessary to instal at every subscriber's station a protecting device consisting of a fuse and a spark-gap, in case the line should come in contact with any cable carrying a heavy electric current, such as a tramway trolley wire, or in case it should be struck by lightning. The instruments employed in telephony are only suitable for very feeble currents of a fraction of an ampere and it is easy to understand that if a heavy current suddenly passed through them they would be absolutely ruined.

Aerodromes in the Sky—(*cont. from p.* 84)

opened would simply drop the aeroplane into space, when it would recover its equilibrium as easily as if doing an ordinary nose dive. (See illustration on page 109).

There should be no difficulty in stowing away these aeroplanes in the body of the airship and along the keel line, where their weight would help to counteract the weight of the landing platform. When a 'plane landed on the platform it could be immediately disassembled, as was described in our recent article on the Fokker aeroplane which was fitted with quickly-detachable and interchangeable wings and engine unit.

Elevators, similar to those found in up-to-date garages, could be arranged in hollow shafts, running through the envelope of the airship and connecting the landing platform with the storage chambers in the keel. This would enable a number of newly arrived 'planes to be quickly moved from the platform where their weight was detrimental to the balance of the airship.

Altogether the prospect is full of possibilities. Who can say that in years to come it may not fall to the lot of some of our readers to develop the ideas here suggested—stranger things have happened!

Photography—(*cont. from page* 117)

of a carrot or other selected vegetable, and the image of it must be as large as it is possible to get on the plate. The second exposure, for which a second plate must be used, is an ordinary garden snapshot. A friend who is in the plot should be placed in the pose beloved of the man who proudly exclaims "Alone, I did it," while he gazes fondly at the object of his pride, which in this case is to be the monster carrot. To complete the effect, the poser should crook his arm, and the carrot should be super-imposed on this arm. It would be desirable to disturb the earth at his feet to produce the signs of the mighty upheaval consequent upon the uprooting of the carrot! The negative should be developed in the ordinary way and the print prepared as in double-printing. The main thing to be observed in subjects of this kind is the placing of the inserted portion.

A similar method is adopted when producing the illusion of a tiny man standing upon another man's hand, the only difference being the preparation of the inserted figure, which must be as small as possible.

In conclusion, it is as well to remind our readers that success in trick photography is assured not so much by the apparatus used as by imagination and forethought. The actual manipulations are fairly easy, and while mistakes may arise in the first attempts, those who have looked ahead will be able to correct their errors and obtain perfect results on a second trial. The subject is full of fascination and provides a considerable knowledge of photographic processes.

The Future of the Young Engineer

By W. Reavell, M.I.M.E., M.I.N.A.

We print this month the conclusion of an address recently given at the Portsmouth Municipal College. This address is of general interest to our readers as its author is the Vice-President of the Institute of Mechanical Engineers, and Managing Director of a large engineering firm in Ipswich.

(*Continued from last month*)

THERE is another field to which it is opportune to refer, and that is the field of Technical Engineering Salesmanship. Here England has been neglectful, and she must alter. In days gone by, when England was pre-eminent, and indeed almost alone in Engineering development, machines were constructed and the purchaser had to come to the manufacturer to get them. To-day, it is an exploded doctrine that orders will come to the manufacturer, and it is an equally exploded doctrine that 'anyone can sell.' The salesman of old times was referred to somewhat contemptuously as "the Drummer."

I remember well how this important question of Salesmanship was brought home to me many years ago, when I first started in business. I had visited America to look into the latest types of Machine Tools in use there, and, when purchasing our own machinery, I was struck with the difference between the type of English salesman and those who represent American firms. I remember particularly the representative of an American firm then well-known in the manufacture of semi-automatic machines. He was a skilled, trained Engineer, of good presence and address. He was able to examine the work to be done, to calculate and guarantee the time in which each piece of work could be performed, and to set the machine up when delivered. He could, by actual demonstration, prove that the times he had stated for the work could easily be accomplished.

Even at that time America selected for her salesmen the best trained and best equipped men from her Works. In Britain we have largely adopted this practice to-day, but I am convinced we must do more. It may fall to the lot of some of you, after your College training, to be associated with modern firms in this capacity. It is a false notion to think that it is beneath the dignity of a College trained man to devote himself to the selling of specialised products.

I recall well, as a young draughtsman who had already specialised in a particular branch of Marine Engineering, my feelings on receiving from my chief a request to go and interview a client who was considering the purchase of one of these machines. My feeling was that I had trained myself to design and construct, and not to sell. I remember well the terse views expressed by my Chief as he pointed out that a machine was of no value until it was put to work, and that a trained Engineer was, in his opinion, the most fitting man (given the other necessary qualifications) to present to a possible purchaser in the best way the merits of the machine he had designed and made.

I think that there is ample scope for a new branch amongst Engineers, the members of which would be called "Commercial Engineers." It would be an enormous help to the development of British Engineering if it could be realised that her best men could with advantage be employed as Technical Trade Missionaries. I picture the time when an Employer or purchaser, instead of refusing to see the old time "Drummer," will welcome the new Commercial Engineer and will discuss his immediate problems with him. The Commercial Engineer will show him, from his special knowledge, the best way to overcome his difficulties. He will calculate for him the expected efficiency of the machine proposed and its power costs; will sketch out the best installation of the plant, and be capable of giving him experienced hints in running the machine. He may then be able to prove to the purchaser that the possibly cheaper machine of his rival is not the best one to select.

For any of you who take up this branch of work, there are some rules to observe. The first I would make that of absolute straightness. Never claim what you cannot perform, and never make statements that you cannot prove. It is better to be called straight than great, but the best way to become great is by being straight.

Another is:—Do not waste time. One of my youthful memories is of a motto in the office of a man on whom I called. The motto was—

> Call upon a man of business
> At his place of business,
> And in business hours.
> First, transact your business,
> Then go about your business,
> That he may finish his business.

A third is:—Do not despise your competitors, whether at home or abroad. Learn all you can of their products, and thoroughly grasp the essential features of novelty or economy on which they rely.

If this imperfectly sketched picture of the openings for the young trained Engineer encourages you, may I presume upon my short acquaintance with you all and exercise an older man's privilege of giving you a closing word of advice. It is of course trite to say that "Genius is an infinite capacity for taking pains," but a deal of truth lies behind it, for at the end it is "Work" that tells. Do not be afraid of work. On this subject Mr. J. L. Garvin recently wrote—"Many years ago it was when Cyril Jackson, the great Dean of Christchurch, nearly at the end of a long life, gave Peel, a brilliant undergraduate about to begin his political career, the following advice: 'Work very hard and unremittingly. Work, as I used to say sometimes, like a tiger, or like a dragon, if dragons work harder than tigers. Don't be afraid of killing yourself; only retain, which is essential, your former temperance and exercise, and your aversion to mere lounge, and then you will have abundant time both for hard work and company.' If Christchurch had handed down nothing but this letter it would have handed down much. When was the strict truth about life more ruthlessly told? They are great words, as great as ever came out of Oxford. Advice is too weak a description of them. They are marching orders given to Peel and to any other man worthy to be given them. They were delivered over a century ago. They hold good for all centuries."

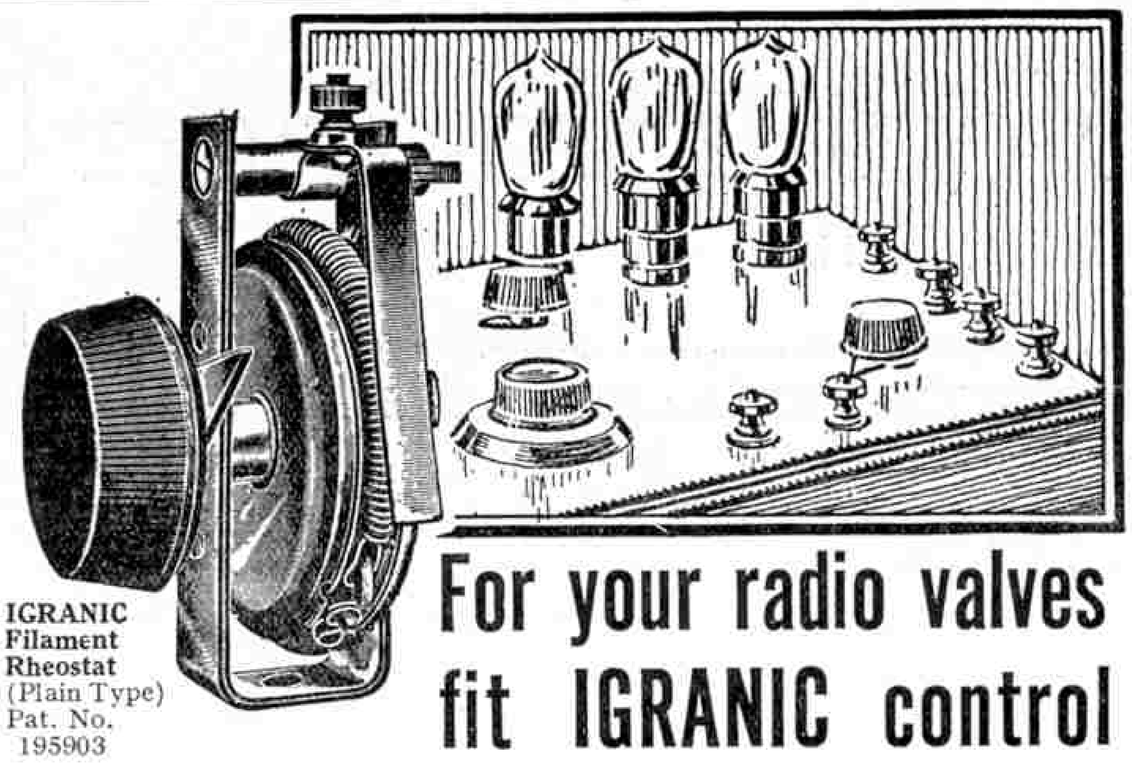
I would not assert that to-day work is shirked and sport is paramount, but I am not so sure that the value of work for its own sake, in the building of character and the promotion of happiness, is thoroughly appreciated or understood.

A reference to Smiles' "Self-Help" to-day is apt to provoke smiles, and to refer to Longfellow may be unpopular. Nevertheless I believe that that great poet's views on the reasons for success are as true to-day as when he wrote:—

(*Continued on page* 127)

Young Engineers of Japan

We are pleased to be able to publish this photograph of Kenichi Sakurai and his brother, both keen Meccano boys who live in Nakayamate-dori, Japan. An account of these young engineers' model-building was given in our August number. The brothers send their New Year greetings to "all the other young engineers in the Meccano Magazine."



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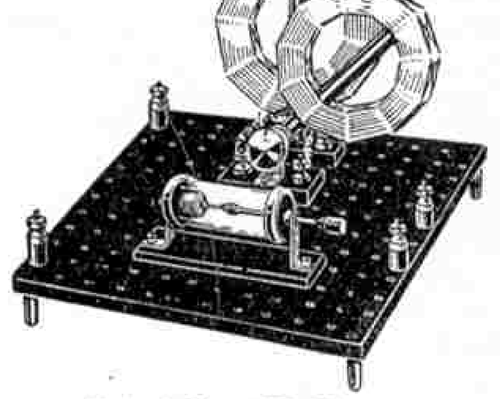

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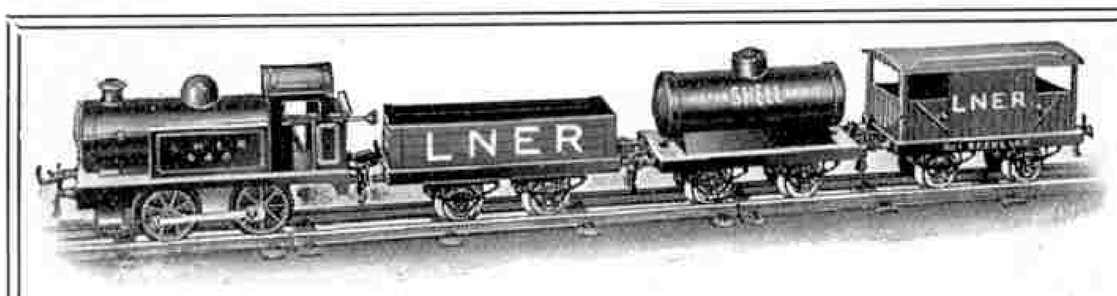

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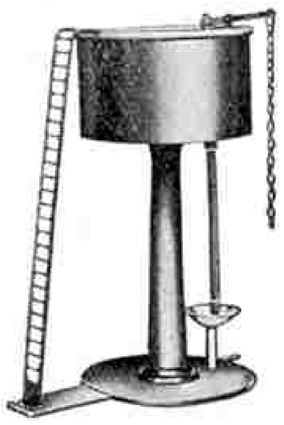

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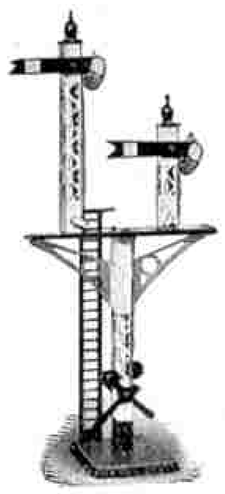

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February Puzzle Competition

THE condition that every puzzle in the January issue had to be solved in order to win a prize had only a very slight effect in decreasing the number of entries. A large number of competitors tackled the whole of the fifteen puzzles courageously and in most cases their efforts were extremely creditable. Certain puzzles appeared to give trouble to everybody and I shall comment upon this next month when I announce the result of the contest.

I was sorry to see that some competitors had not read certain puzzles carefully enough, with the result that they started off from the very beginning on the wrong track. I advise all those who intend to enter for a puzzle contest to read the puzzles through carefully two or three times in order to make quite certain of what is required.

Several readers have written to me in regard to alternate solutions of one or two of the puzzles in the December "*M.M.*" I am fully aware that many puzzles have more than one solution, and I take this opportunity of stating again that *any correct solution of any puzzle will be accepted.*

This month I am introducing a type of puzzle that is new to this page. This takes the form of a conversation between two Meccano boys, which I have called "A Battle of Wits." My readers will find that the various problems put forward in this little conversation are quite interesting and some of them not too easy to solve !

This month I offer prizes of £1-1s.-0d., 15/-, 10/6 and 5/- respectively for the four best sets of solutions of the five problems in "A Battle of Wits," in addition to solutions of any three other puzzles on this page. In regard to the "Battle of Wits" puzzle, it is not necessary for competitors to repeat any of the conversation. All they need do is to number their solutions 1 to 5.

Entries must reach this office on or before 27th February and there is no Overseas Section.

I should like to publish more puzzles on the lines of the "Battle of Wits" and therefore I offer this month a special prize of £1-1s.-0d. for the best puzzle on similar lines. Entries for this special prize must reach this office on or before 27th February, Overseas, 30th June.

(*Owing to pressure upon our space, the solutions of Puzzles 169 to 176 are held over until next month*).

A Battle of Wits

Puzzle No. 177.

"Oh, James," said Bob, "my Hornby train travels its own length in two seconds, and goes completely through my Windsor Station—which is 2 ft. 9 in. long—in 5 seconds. Can you tell me the length of my train ?"

"Why yes," said James, "I should think your train is —— inches long."

"Right !" laughed Bob.

"Now," said James, "the track I have for my Hornby trains is just 12 ft. round. One-third of it is uphill, and my train ascends it at the speed of 8 in. per second. The next third is downhill, which the train descends at just double that speed. The remainder is level, and the train traverses it at 1 ft. per second. Can you tell me how long it takes the train to go round my track three times ?"

"That's easy," replied Bob. "The average speed is 1 ft. per second, so it will take 36 seconds to travel the 36 ft."

"You're caught nicely," said James with a smile. "I both worked it out and timed the train, and it is just —— seconds. Do you see where you are wrong ?"

"I think I do," answered Bob after a pause. "By the way, how many 12½ in. strips have you ?"

"Just half the number of my 5½ in. strips," said James—who delighted in puzzling his friend—"and if all my strips of both sizes are placed in one straight line, ends touching but not overlapping, they come to the smallest possible exact number of feet, without any inches or fractions."

"Then you have —— 12½ in. strips," said Bob.

"Correct," replied James.

Not to be outdone, Bob said : "Well, yesterday I put all my 12½ in. strips in a straight line, with the ends exactly touching, and then I found that if I overlapped each joint five holes it reduced the length of the line by 19 per cent."

"That's a teaser," was James' comment, "but I suggest that you had —— of those strips."

"Right !" exclaimed Bob.

"One more, then I must go," said James. "Last night I loaded my train with 241 marbles. In every truck I put 17, and in every van 21. How many trucks and how many vans did I use ?"

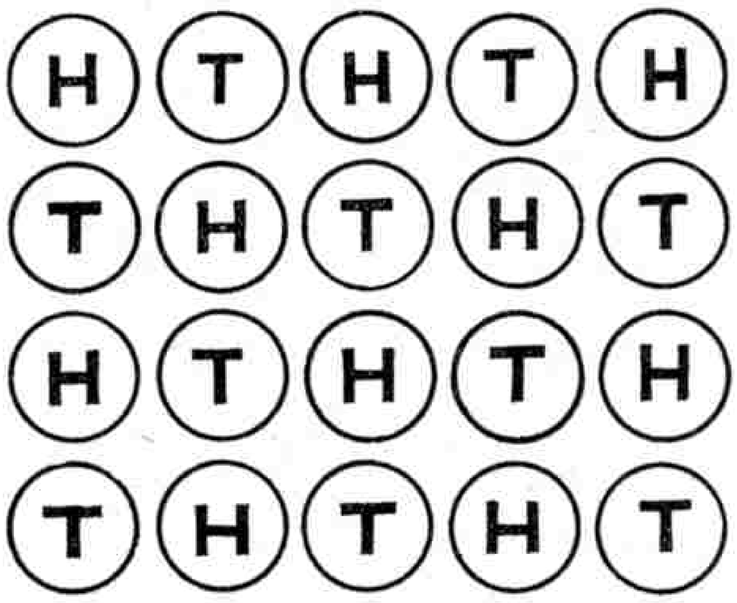
Bob studied a while and then answered "I should think you used —— trucks and —— vans."

"Right !" said James, "but it's Club night, and we must hurry."

* * * *

Puzzle No. 178.

Arrange twenty coins, head and tail upward alternately, in four rows of five as shown in the following diagram. The problem is to re-arrange these coins, *in one move* so that each of the five rows consists of coins either all head or all tail. The operation involves several coins, but the changes of position are to be carried out *in one continuous move without stopping.* No coin is to be reversed from head to tail or vice versa.



Puzzle No. 179.

The blanks in the following sentences are to be filled in with certain letters. Each of the words so formed consists of all the letters composing the previous missing word with one letter in addition :—

— don't like — — said the man in the black — — —. The — — — — — we have just witnessed is interesting, but if we — — — — — — a man we — — — — — — — a — — — — — — — — power of investigation, and there will be a— — — — — — — — — against — — — — — — — — — — when the — — — — — — — — — — — — of this is realised.

Puzzle No. 180.

What sentence is indicated by the following ?

2B
AAAAAAAAAA
TCRIIOFULSES
STANDING
Is the mark of a mean

* * * *

Puzzle No. 181.

With 15 matches make ten triangles, nine diamonds and one hexagon.

* * * *

Puzzle No. 182.

I am a shoe-maker, I work without leather.
I have the four elements joined together,
Fire, water, earth and air,
And every customer wears two pair.
What am I ?

Answers to Last Month's Puzzles

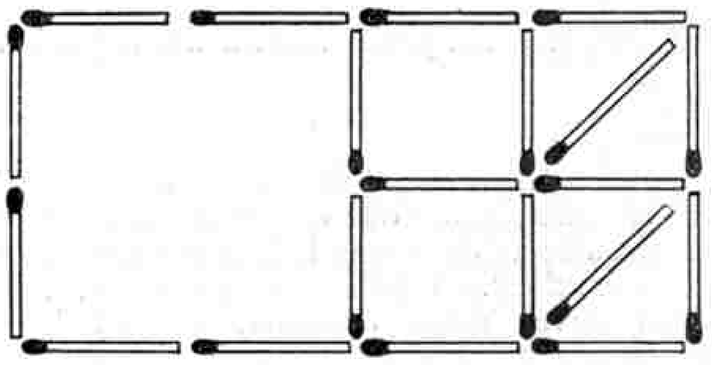
No. 162. The words are—Coffee, officer, doffed, proffered, toffees, offered, office, offspring, scoffed, coffin, offend, officials, send-off, Koff, offing.

* * * *

No. 163. "There is many a slip 'twixt the cup and the lip."

* * * *

No. 164. The matches are arranged as shown below :—



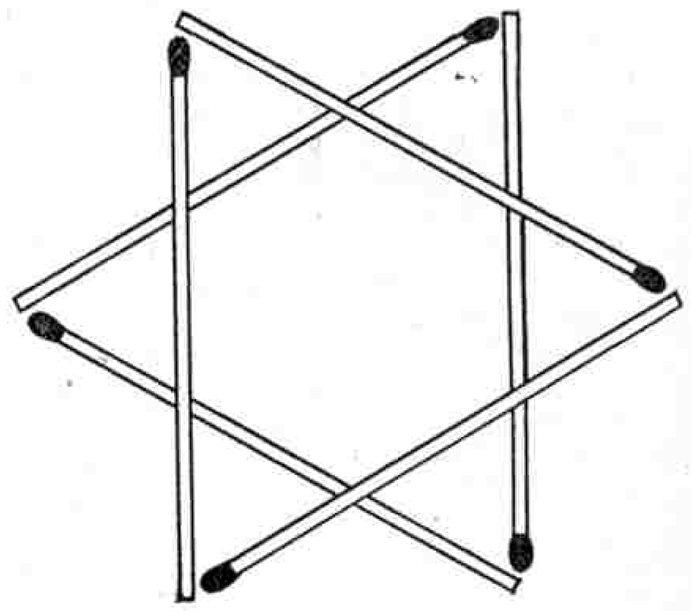
No. 165. The word "foot."

* * * *

No. 166. The friend was wrong. If the man sold one house for £990 and made a profit of 10 per cent. the house must have cost him £900. If he sold the second house at the same price and lost 10 per cent. he must have paid £1,100 for it. Therefore the man lost £20 on the two transactions.

* * * *

No. 167. The matches are arranged as follows :—



No. 168. The following are the moves for the different rows of coins :—

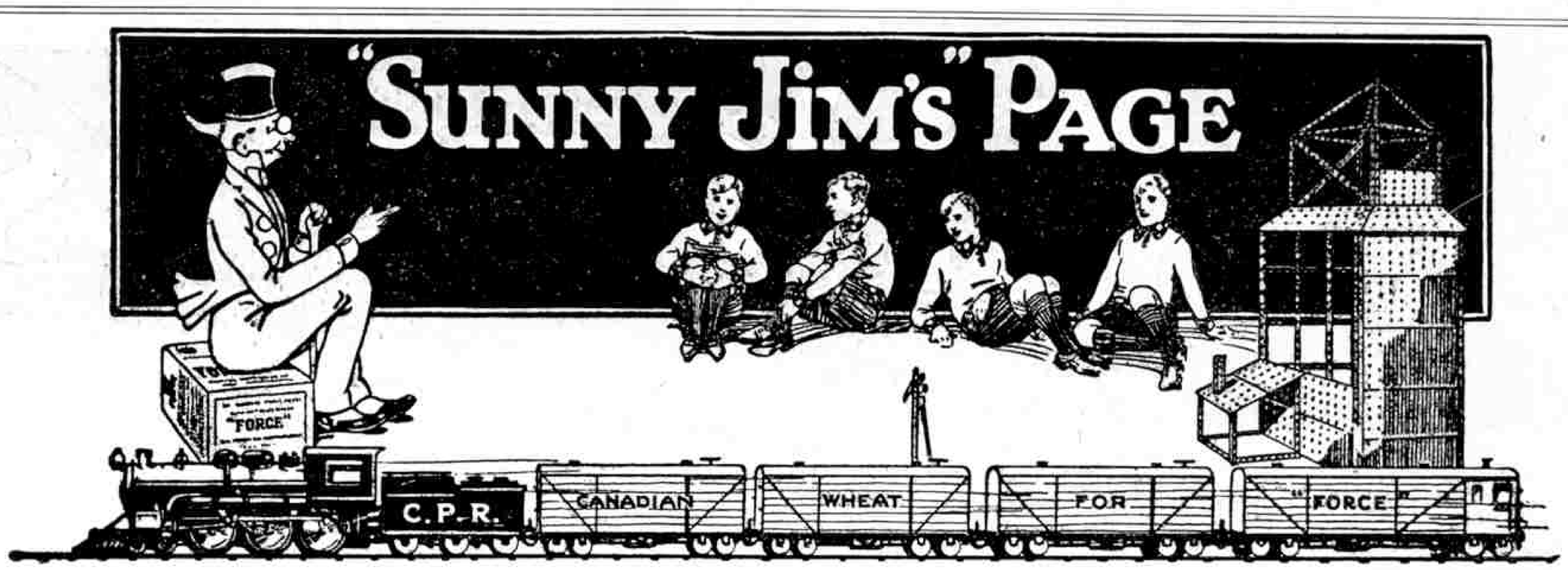
Row of eight—4 to 7, 6 to 2, 3 to 1, 5 to 8.

Row of ten—4 to 1, 6 to 9, 8 to 3, 5 to 2, 7 to 10.

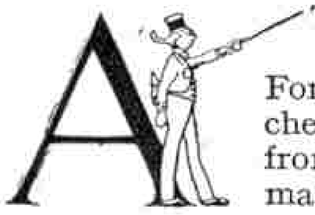
Row of twelve—5 to 2, 9 to 6, 7 to 11, 8 to 4, 12 to 10, 3 to 1.

Row of fourteen—10 to 13, 14 to 12, 5 to 2, 6 to 9, 7 to 11, 8 to 4, 3 to 1.

Row of sixteen—12 to 15, 14 to 16, 5 to 2, 9 to 6, 7 to 11, 8 to 4, 13 to 10 and 3 to 1.



SUNNY JIM INVENTS A BISCUIT DIFFERENT FROM ANYTHING YOU EVER TASTED BEFORE



AT last Holforce Biscuits are an accomplished fact! For many years I have cherished the idea that from "FORCE" could be made a biscuit nicer than any other there is. I now have made it! Holforce Biscuits are quite different from all other biscuits. They have a scrumptious "munchiness" that makes the eating of them a wonderful experience. They are the kind of biscuit you have dreamed about—the sort that you can go on eating and eating and eating, yet never get tired of. Once you taste them you'll want a whole packet yourself.

Choosing a Name

When the first batch of the "umptieth" experiment came out of the oven I seized a biscuit and crammed it into my mouth. I was anxious. I had tried so often, and had never quite obtained the kind of flavour I knew you boys would like. But I was in too much of a hurry. The biscuit was hot! It burnt my mouth!! For ten nerve-wracking minutes I had to sit beside the tray while the biscuits cooled off. Then I tried another—more cautiously this time. It was nice and cool and—yes! The elusive flavour was there!! Captured!

10 NERVE-WRACKING MINUTES

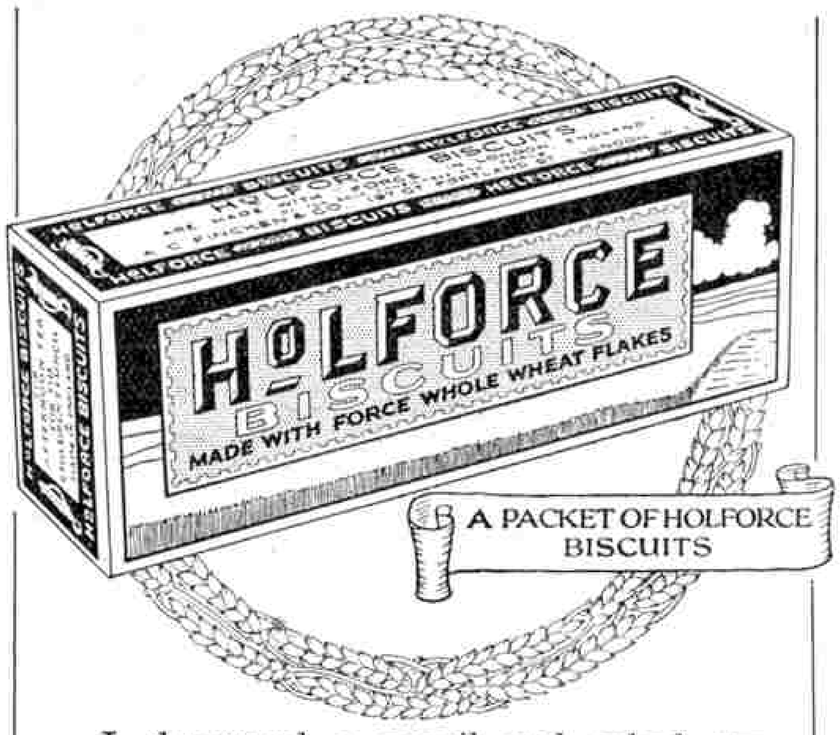
When the excitement had died down came the business of thinking out a name. Said my assistant:—

"Let the name tell us something about the ingredients. The biscuits are made with butter, eggs, flour, sugar and whole "Force." In fact they are whole "Force" biscuits. 'Then whole "Force" biscuits they shall be called,' said I."

And whole "Force" biscuits they are, but it is spelled Holforce so as to make one word of it.

We decide on the packing

"What sort of a label should I put on the box?" That question was a weighty one.



I sharpened a pencil and asked my assistant to bring me a few reams of drawing paper and some pots of paint. For three days I drew labels. I drew them in all shapes and sizes, in all colours and hues. But the trouble was to choose the most suitable. The baker always chose the ones I had given up as hopeless, and I didn't like the ones he liked. Then we both had an idea.

I DRAW A LABEL

"Holforce Biscuits are made with "FORCE," said the baker.

"And "FORCE" is the whole of the wheat," said I.

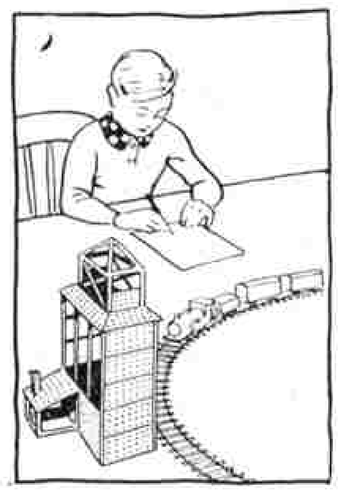
"Let the label show a field of wheat," said we both together.

And so it does. There is a yellow field of wheat and blue sky ("Force" is made from Canadian wheat), and on this is a grey panel bearing the words—

"Holforce Biscuits, made with "Force" whole wheat flakes."

Spreading the News

The last step in introducing these wonderful Holforce Biscuits to all you Meccano Boys is still being made. This step, which is as important as any, is called "distribution." It is the big task of putting Holforce Biscuits into all the grocers' shops all over the country. I have only just started doing this. There are thousands and thousands of shops. If you waited until I had time to get round to your grocer you would not be able to taste Holforce Biscuits for, perhaps, a long long time.



FILL IN THE FORM BELOW

Of course, by the time you read this I might have called on your grocer, so, to make sure, go in and ask him for a 7d. packet of Holforce Biscuits (made with Force). If he hasn't any, FILL IN THE FORM BELOW and I'll send you a packet straight from the bakery, and pay the postage and packing of it myself. So, either way, you can be sure of tasting this new discovery of mine, with which I am so sure you will be delighted.

Yours for Holforce, *Sunny Jim*

TEAR THIS OUT

(If you do not wish to tear your copy of the Meccano Magazine, copy this form on to a sheet of paper and it will do just as well).

HOLFORCE BISCUITS

SPECIAL ORDER FORM FOR MECCANO BOYS ONLY

To Sunny Jim, 197, GT. PORTLAND ST., LONDON, W.1.

Please send me a packet of your Holforce Biscuits, for which I enclose 7d. in stamps.

This is the *exact price* of a packet of Holforce Biscuits, because you have promised to pay for cost of postage and packing.

My Name is.....

My Address is.....

.....

Fireside Fun

SMALL CONSOLATION!

Nervous Passenger (As car begins descent of steep hill): "Do be careful down this hill. You told me last week it was very dangerous."

Owner of Car: "Yes, but it's alright now, I insured the car yesterday!"

* * * *

Candid Friend: "I can never read your letters, your hand-writing is shocking."

Wily one: "Yes, I know that, but if I wrote better people would find out that I cannot spell!"

* * * *

Angry Passenger (Waiting for train): "What use are the figures in your time-tables?"

Station Master: "Well sir, if it were not for those figures we should never know how much late the trains were."

* * * *

ECONOMY!

Mother: "Did you post my letters, Tommy?"

Tommy: "Yes, mother."

Mother: "But why have you brought back the money I gave you for the stamps?"

Tommy: "I didn't have to use it mother, I slipped the letters into the box when nobody was looking."

* * * *

Boot-Black: "Shine, sir?"

Passer-by: "No, thanks."

Boot-Black (persuasively): "Shine your boots so that you can see your face in them sir?"

Passer-by: "No, thanks."

Boot-Black: "Coward!"

* * * *

HE KNEW!

Old Gentleman (Lost in fog and hearing footsteps): "Can you tell me where I am going?"

Weary Voice (From the darkness): "Into the river. I've just come out."

* * * *

First Student: "What language have you decided to take for your exam.?"

Second Student: "Pictish."

First Student: "What on earth for?"

Second Student: "Only five words of it remain!"

* * * *

The doctor stood by the bedside and gazed gravely down at the sick man. "I can't hide from you" he said, "the fact that you are very ill. Is there anyone you would like to see?"

"Yes," replied the sufferer faintly.

"Who is it?"

"Another doctor."

WHAT DID HE MEAN?

First Artist: "Business is rotten with me just now."

Second Artist: "Oh! I'm doing splendidly. Got a commission this morning from a millionaire, he wants his youngsters painting very badly."

First Artist: "Well, you are the very man for the job."

Sir Harry Lauder's Christmas Card

This autographed Christmas card from Sir Harry Lauder was put up to auction at the Christmas luncheon of the Liverpool Rotary Club, and after being sold and re-sold several times was finally purchased by Mr. Frank Hornby. The sale of this card and a collection of the luncheon table produced a sum of over £36 for the funds of the Liverpool Boys' Dinner-Hour Club. The sketch presumably represents the famous comedian himself, enjoying his pipe.

Nervous Old Lady (To boatman): "Are people ever lost in this river?"

Boatman: "Oh no, mum. We always find them the next day!"

* * * *

Science Master (Explaining a piece of Mechanism): "Now boys, you will notice that this machine is turned by a crank."

And he wondered why they all tittered.

* * * *

Author: "Have you read my new book?"

Friend: "Yes."

Author: "What is your opinion of it?"

Friend: "Well, if you want me to be candid, I think the covers are much too far apart!"

VERY TIRED!

The tramp slowly and thoughtfully extracted a match from his pocket and placed the tip of it against the iron tyre of a cart that was standing beside the curbstone. Then he waited.

Presently the driver of the cart noticed him. "Hullo!" he said, "what are you waiting there for?"

"I am waiting till you move on," replied the tramp, "so that your wheel will strike this match and I can light my pipe!"

* * * *

Actor: "And just at that moment somebody aimed a cowardly egg at me."

Friend: "What do you mean by a 'cowardly' egg?"

Actor: "One that hits you and then runs!"

* * * *

Sailor: "When I was in the Mediterranean I once sailed through a shoal of sardines."

Maiden Aunt: "Rubbish, how could sardines possibly swim in those little tins!"

* * * *

Q. What is put on the table and cut but never eaten?

A. A pack of cards.

* * * *

A LITTLE MISUNDERSTANDING!

Plumber: "I have called to see the old geyser."

Maid: "You're too late, missus has just gone out!"

* * * *

In the course of a sensational film, the villain, after a desperate run, had reached the railway bridge.

"What is he going to do now?" whispered a small child to his mother.

"He's going to blow up the bridge," was the reply

"But, mother," protested the small boy, "he can't do it; he's out of breath already!"

* * * *

HARD LINES!

At a fancy dress ball for children a policeman was stationed at the door and instructed by the committee not to admit any adults. Shortly after the ball commenced a woman dashed up to the door and demanded admission.

"I'm sorry, mum," replied the policeman, "but I can't let any grown-ups in."

"But my little girl is dressed as a butterfly," exclaimed the woman, "and she has forgotten her wings."

"Can't help that," replied the policeman. "Orders are orders, so you'll have to let her go as a caterpillar."

* * * *

Q.: Why is a whipping of the utmost service to a boy?

A: Because it makes him smart.

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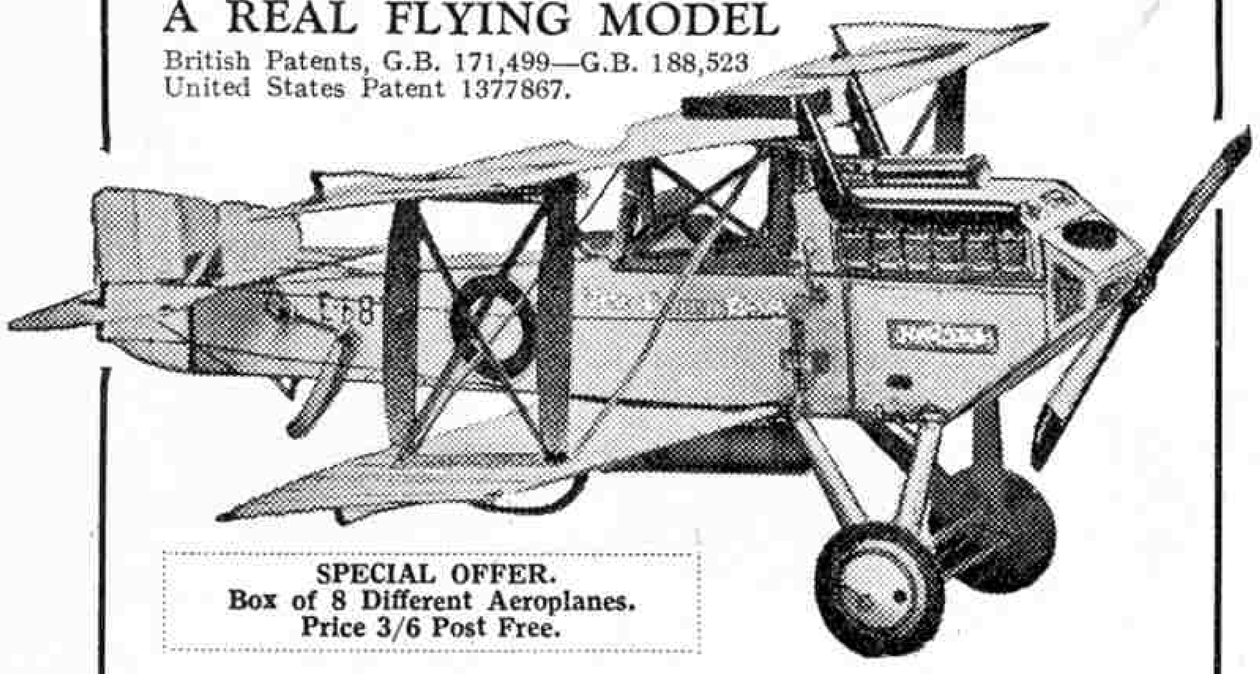

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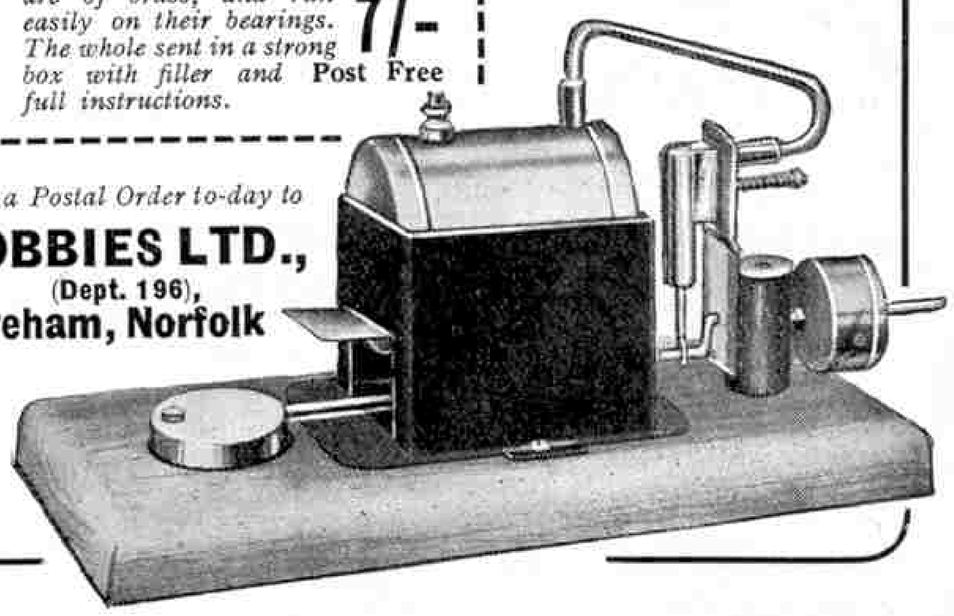

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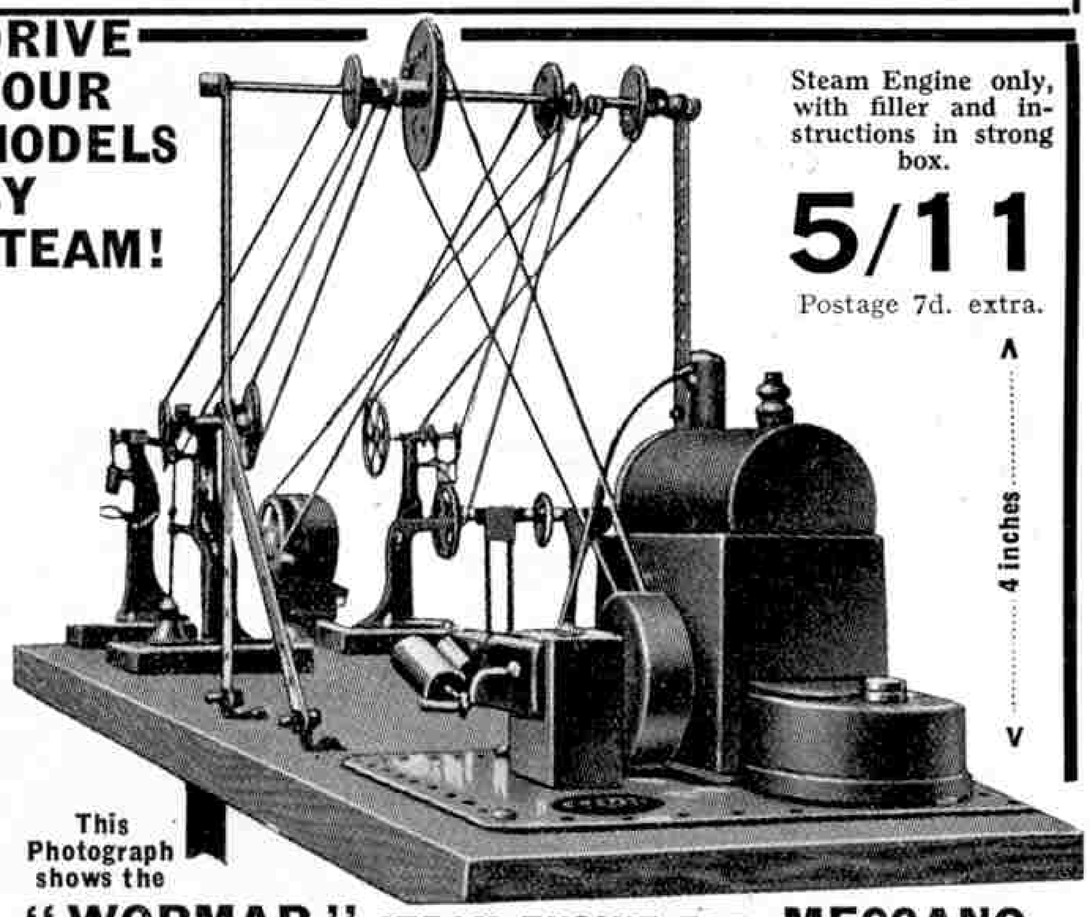

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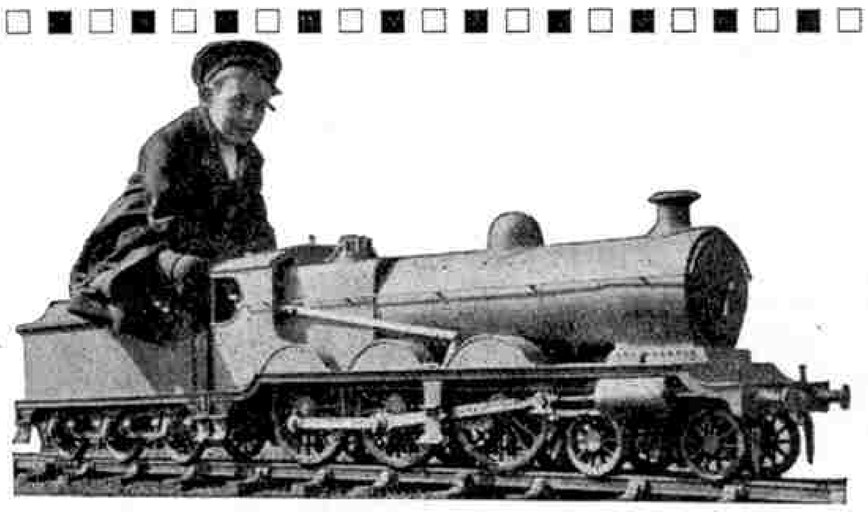

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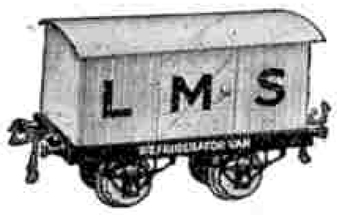

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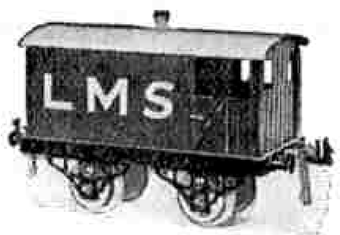

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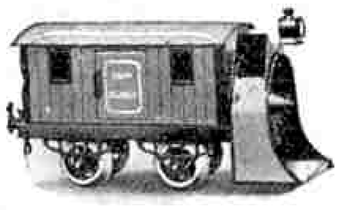

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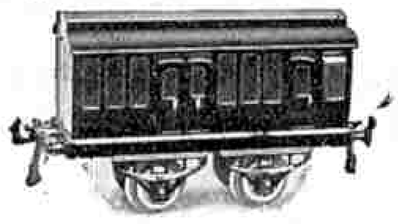

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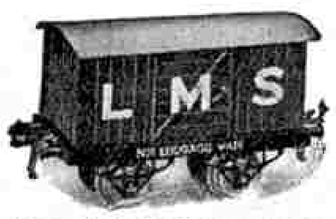

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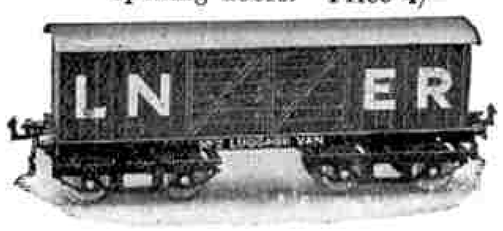

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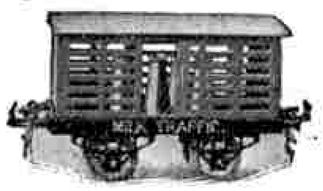

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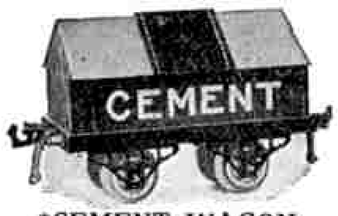

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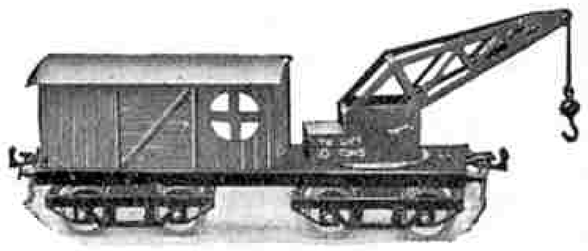

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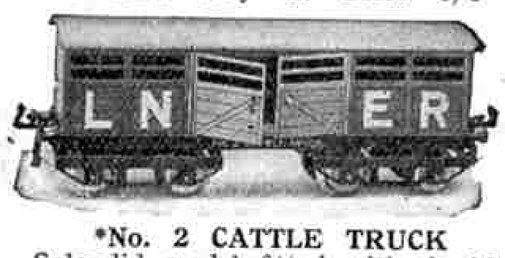

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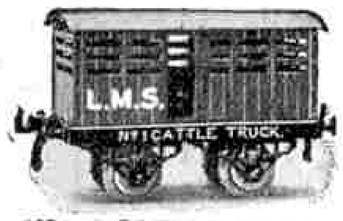

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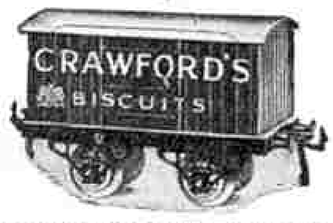

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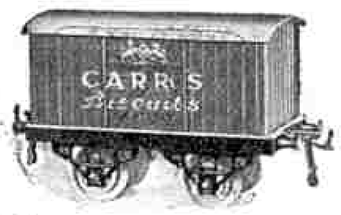

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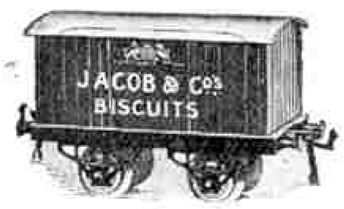

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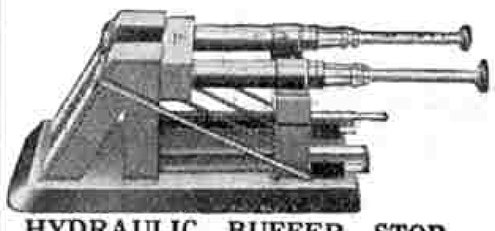

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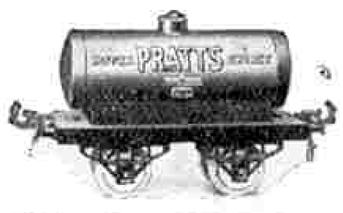

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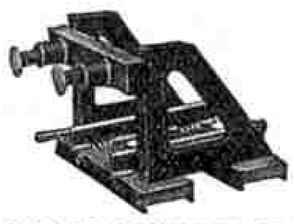

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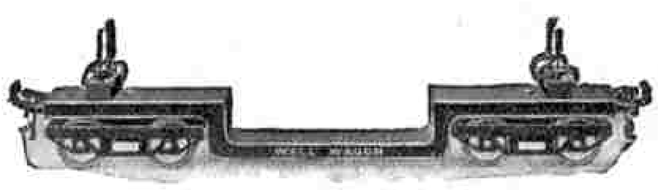

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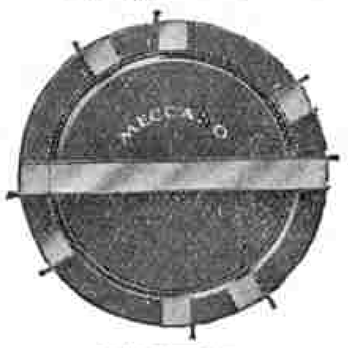

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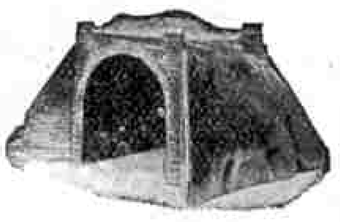

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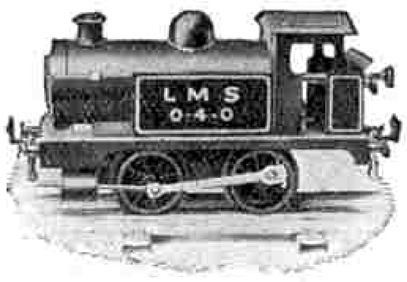

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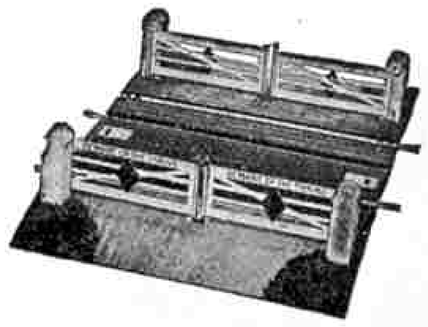

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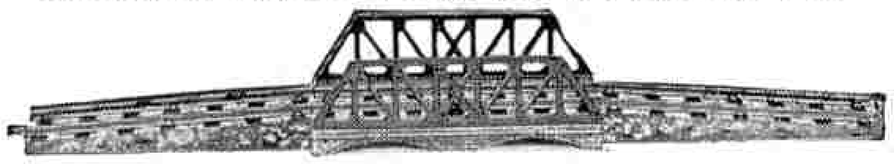

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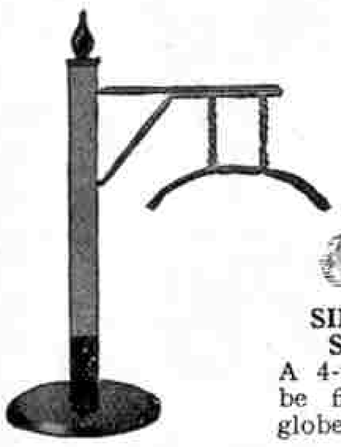

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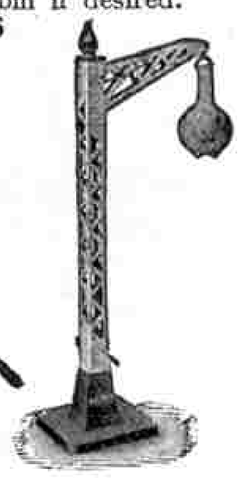
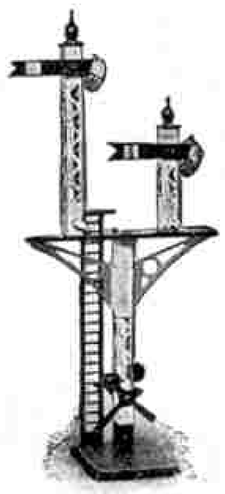
Price **1/9**



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



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Signal arms operated by levers at base. Very realistic model standing 14-in. in height.
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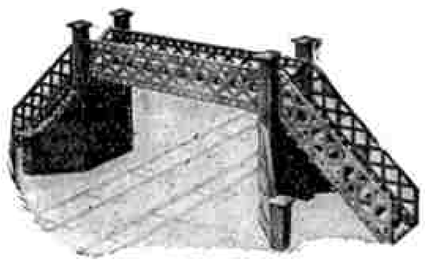

LATTICE GIRDER BRIDGE
Constructional type. Strong and well proportioned.
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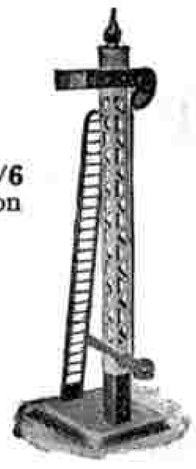

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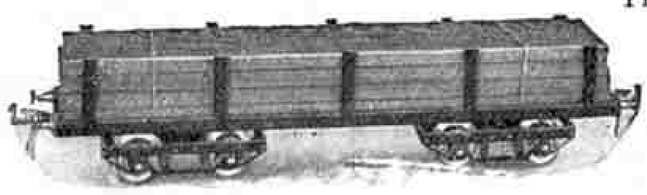

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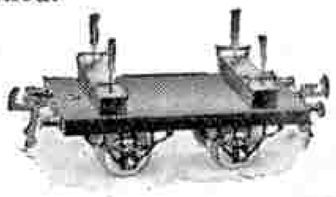

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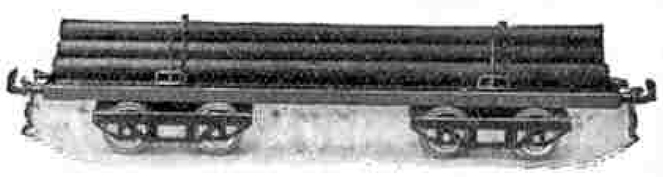

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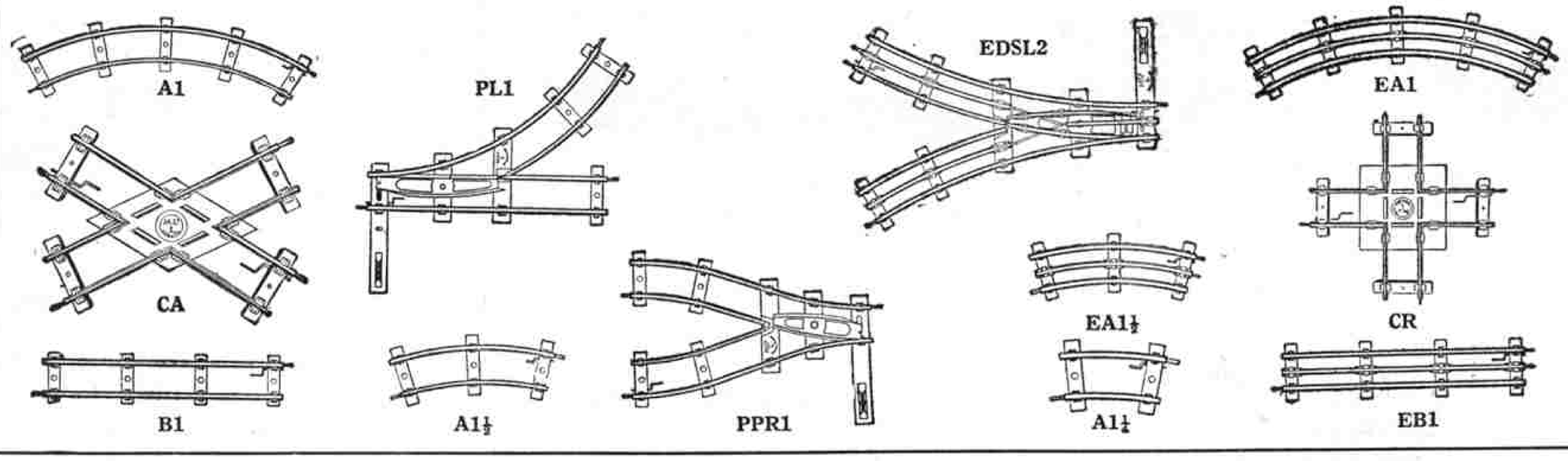

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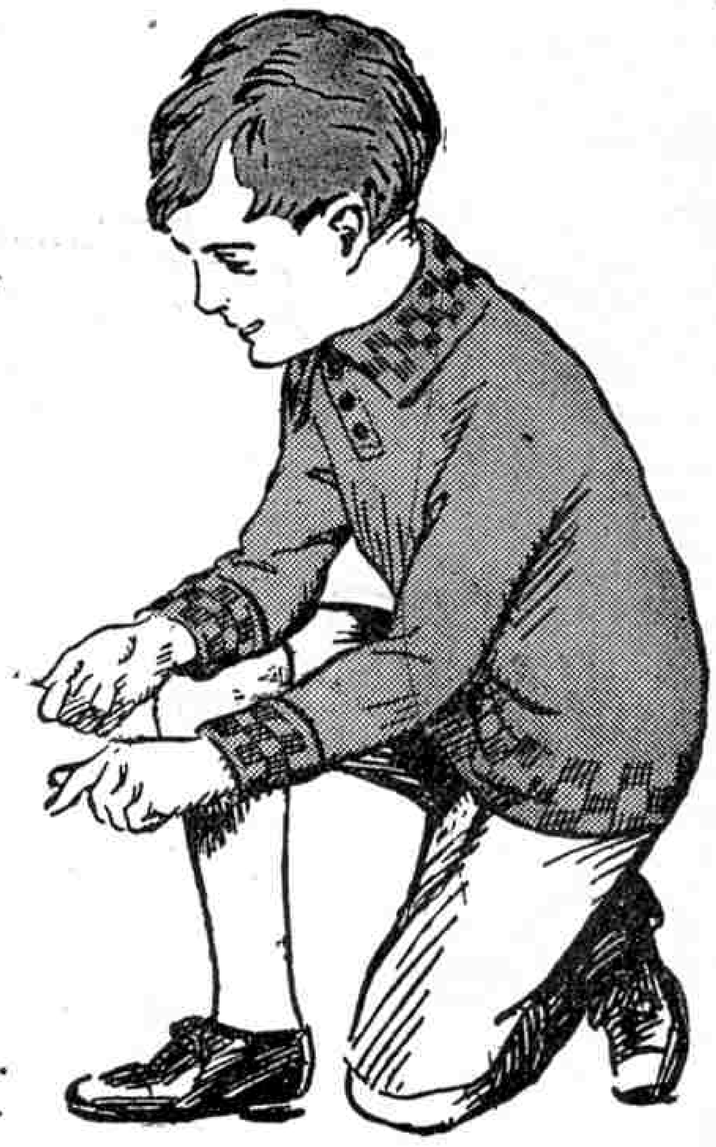

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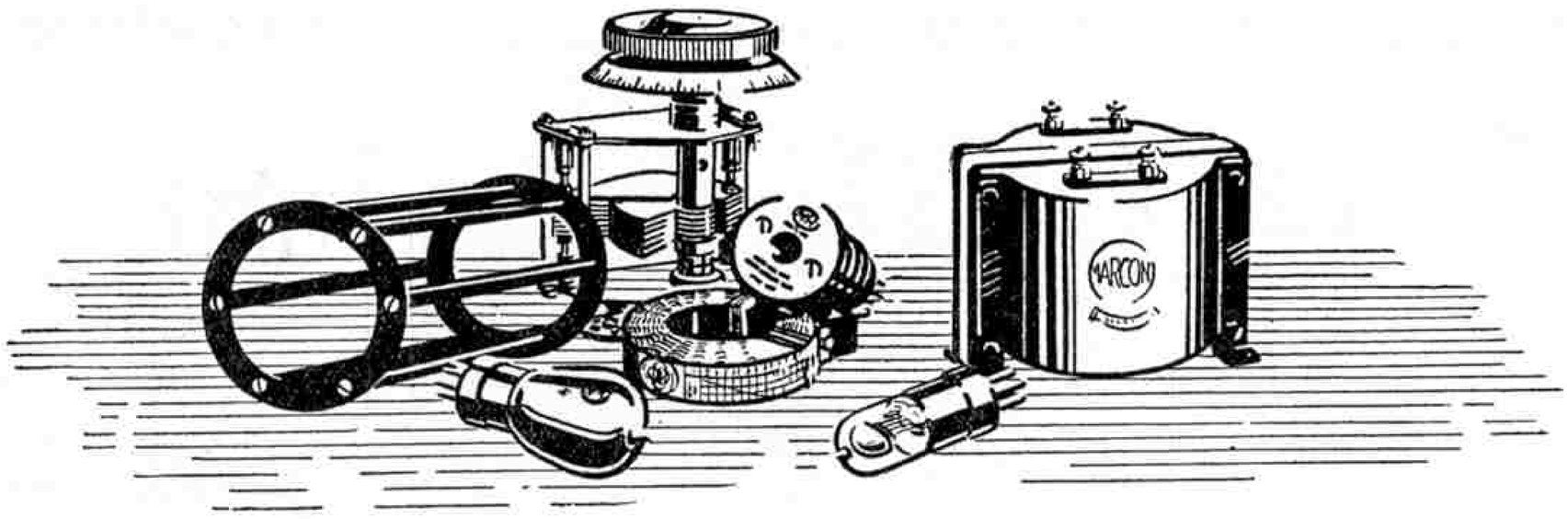

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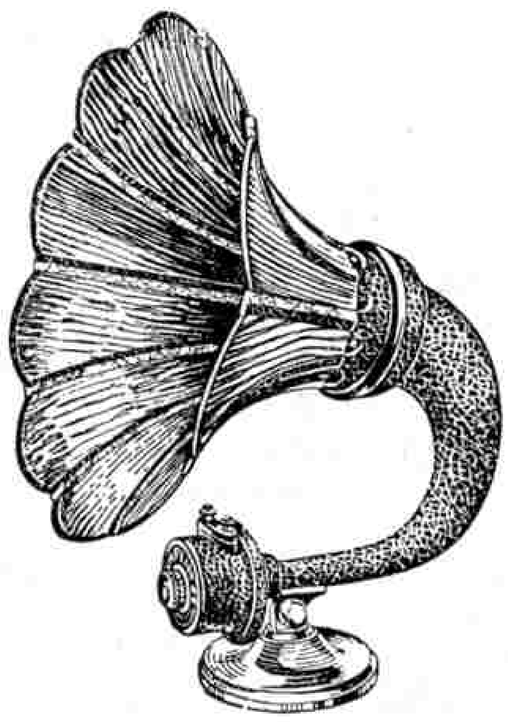

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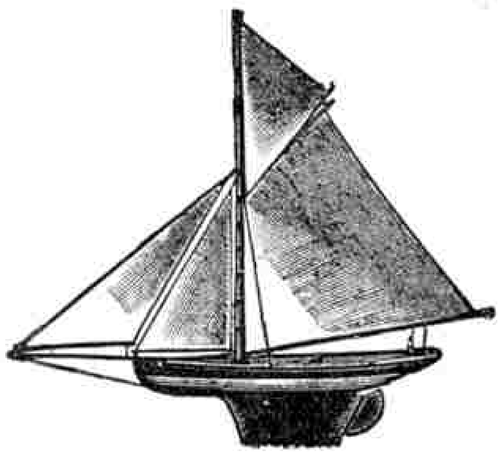

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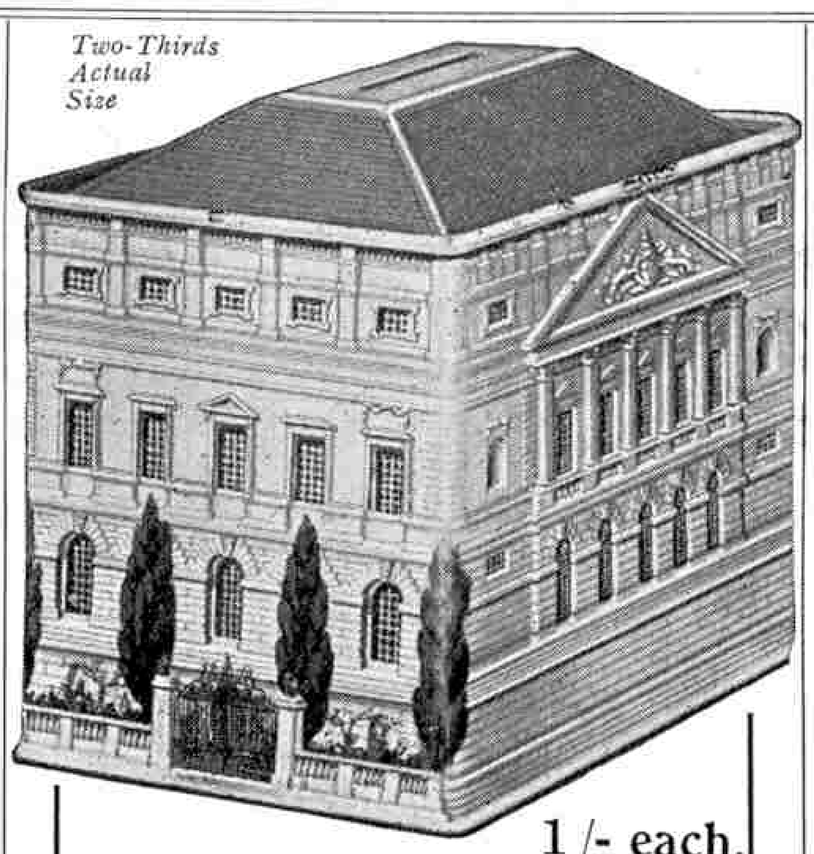

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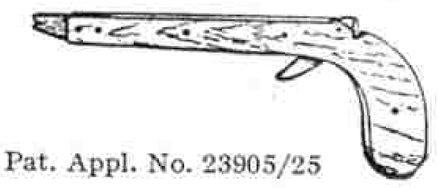

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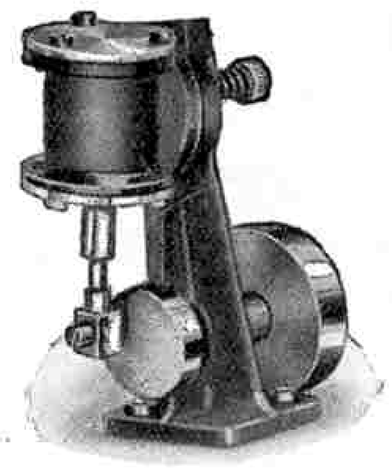

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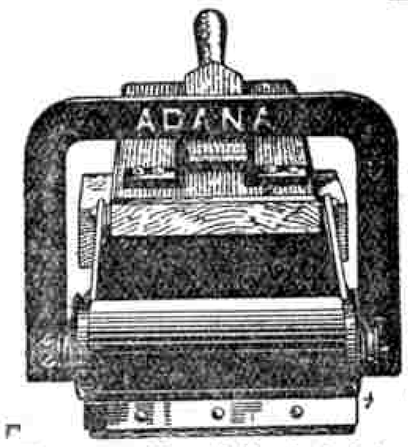

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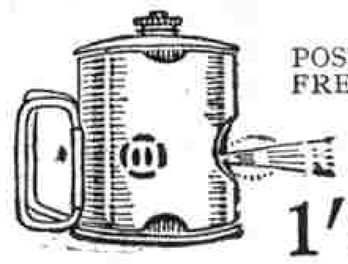

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(*Rate: 1d. per word, min. 1/-*).

Stamps. Selling fine private collection of foreign stamps.—Apply, E. Richardson, 20, Heworth Green, York.

For Sale. Six Tinplate Points, 1/9 each, right or left. Send for Rails List.—Forgan, Gorstage, Northwich, Cheshire.

Stamp Approvals from 8 a 1d. Also exchange wanted with other collectors.—Knight, 11, Clyde Road, S. Leonards-on-Sea.

For Sale. One Acetylene Generator, with 17 litre burner. One Projection Lens, 55 M.M. E.F. One Condenser Lens, 2ins. diam. One Lens Mirror, 2¾ins. diam. The lot, £1/5/-.—W. H. Tyreman, 120, Morton Street, Middleton, Manchester.

Wanted. Cigarette Cards, preferably sets. State lowest price. Will also exchange.—Charles Bagnall, 50, Gordon Square, London, W.C. 1.

Launch, Miss America, 11/-, used twice.—Hamelin, Rockmount View, Trinity, Jersey, C.I.

2A Brownie Camera, 2-4 volt Electric Motor and Small Steam Engine, 23/- or offers.—J. Mercer, 48, Ripon St., Blackburn.

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For Sale. 52 consecutive numbers of "Meccano Magazine," 6/10.—Box No. 102.

A few dozen Japanese 3m. unused Stamps, one penny each, postage extra.—"Stamps," Meccano, 1a, Liverpool. Box 103.

Cassell's Children's Book of Knowledge, Vols. 1 and 3, bound, 8/6 each. Vols. 2, 4, 5, 6, unbound, 6/- each. Post free.—D. Potter, The Ferry, St. Catharine's, Guildford.

Stamps and Cigarette Cards cheap.—S. Scott, 5, Carlisle Terrace, Malahide, Dublin.

Wanted. Puppy Gratis. Good home given.—Evens, 48, Ashford Road, Maidstone, Kent.

For Sale. Fellowes Crystal Receiver, complete with Copper Aerial, Insulators, etc., Headphones, Lead and Earth Wires, Micro adjusted Detector, Igranic 150 Coil, 100 ft. Electron Wire, 50/-.—F. Cheffins, 9, Jubilee Crescent, Gainsboro', Lincs.

Wanted. Clean copies of "Nelson Lee Library" (1923–1924). Must be cheap.—Box No. 104.

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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.**

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Beautiful Model Yacht, 6 ft. 6 in. long. Most splendid condition. £5 for quick sale. Cost £20.—Chappen, 37, Cliff Parade, Leigh-on-Sea.

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Stammering. Stammerers or Parents should write for my 36-page booklet, post free.—Lee Wareing, Dale Avenue, Bispham, Blackpool.

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MECCANO MAGAZINE

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

EDITORIAL AND ADVERTISING OFFICES:—
BINNS ROAD, LIVERPOOL.

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

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

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

Advertisements

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

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

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

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

Proofs of advertisements will be sent when possible for space bookings of 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 3d. per copy, or mailed (post free) direct from Liverpool, 2/- for six issues, or 4/- for twelve issues.

IMPORTANT.

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

CANADA: Meccano Ltd., 45, Colborne Street, Toronto.
AUSTRALIA: Messrs. E. G. Page & Co., 52, Clarence Street, Sydney, N.S.W.
NEW ZEALAND: Messrs. Browning, Ifwersen Ltd., P.O. Box 129, Auckland.
SOUTH AFRICA: Mr. A. E. Harris (P.O. Box 1199), Textile House, Von Brandis St., Johannesburg.

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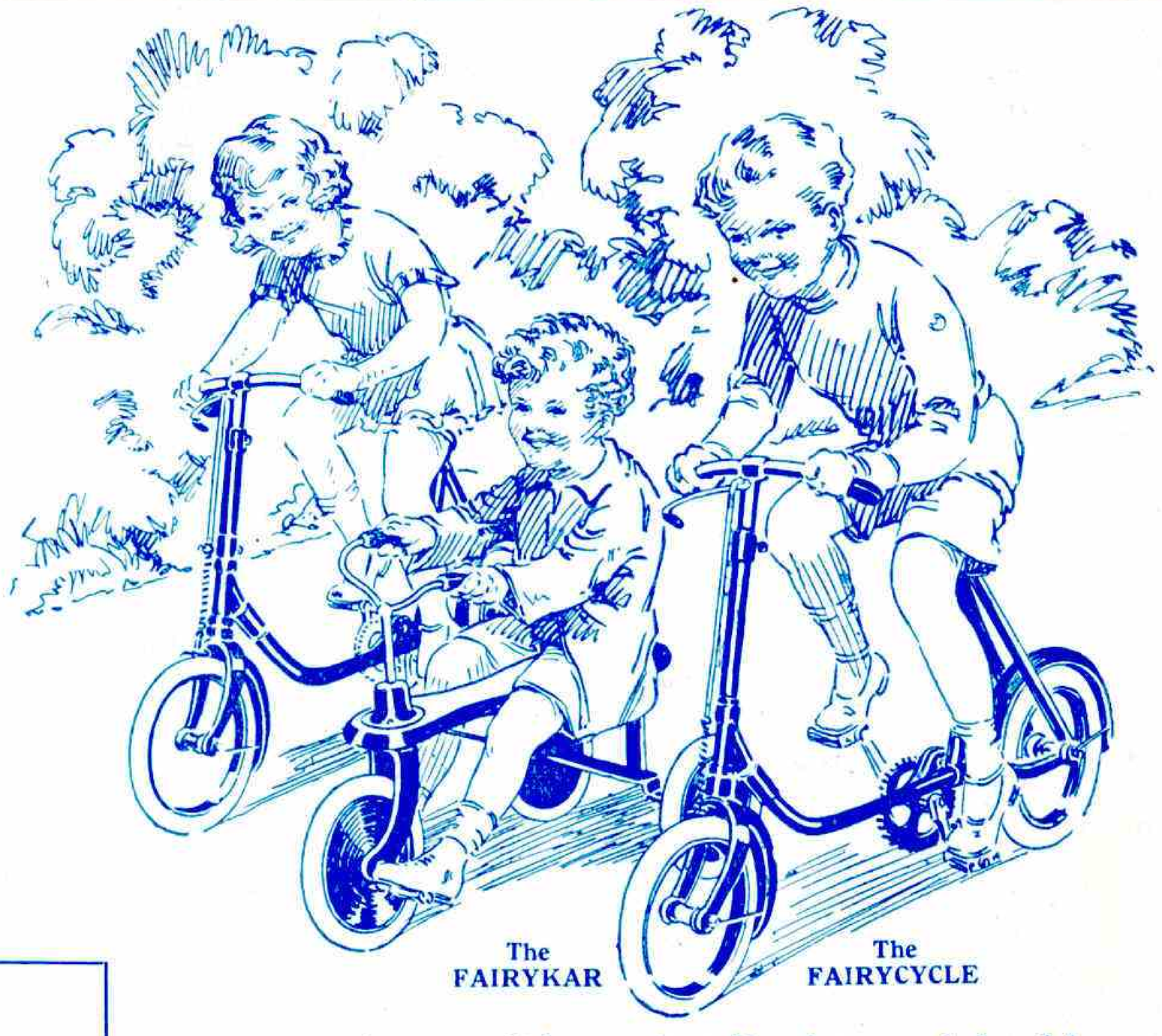
Don't Miss All This Fine Fun



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The FAIRYCYCLE

There's lots and lots of jolly fun and healthy exercise for boys and girls of all ages, to be got out of fine toys like these. Just think what splendid games you could have if you owned any one of them. They are very sturdily built and will stand any amount of hard knocks, so you wouldn't be afraid of enjoying yourself to the full. Just show this to Dad and tell him how *very* much you would like them, and which you really want most of all.

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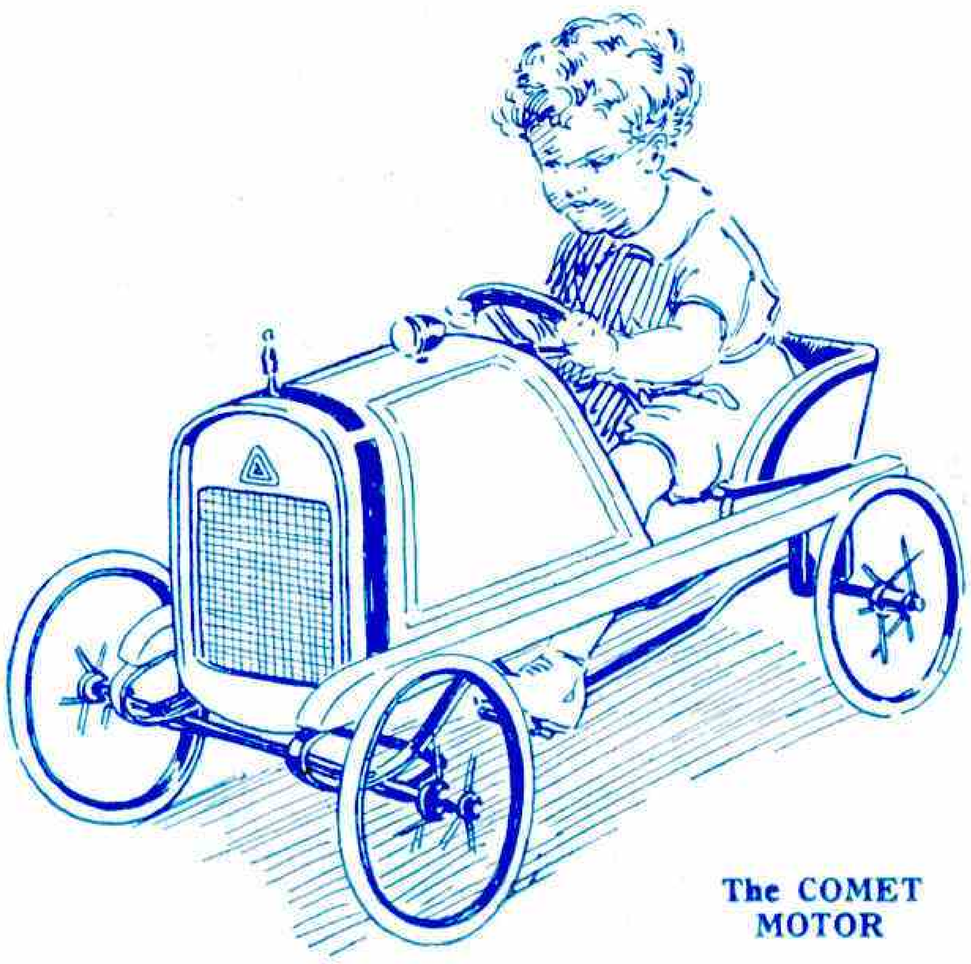

The COMET MOTOR

The Comet

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Only **27/-** each

with wired-on rubber tyres. Many other models, all types, up to Saloon Models with balloon size tyres.

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61/6

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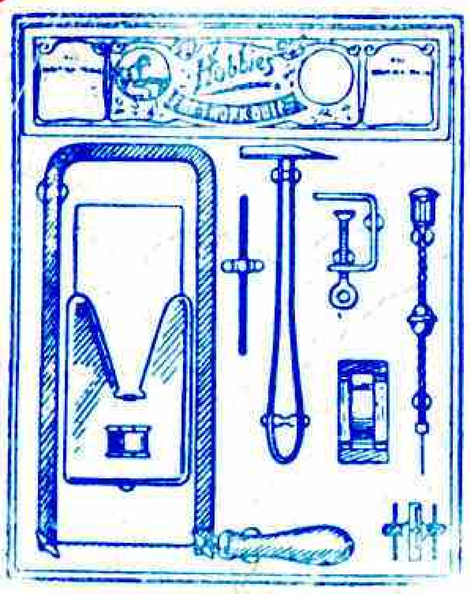

FRETWORK

This hobby will help you to pass many happy hours this winter. Outfit as illustrated, containing 12" frame, Archimedean drill with bits, cutting table with iron cramp, fretwork hamper, sandpaper block, 1 doz. saw blades and design. Post 9d. Price **6/6**

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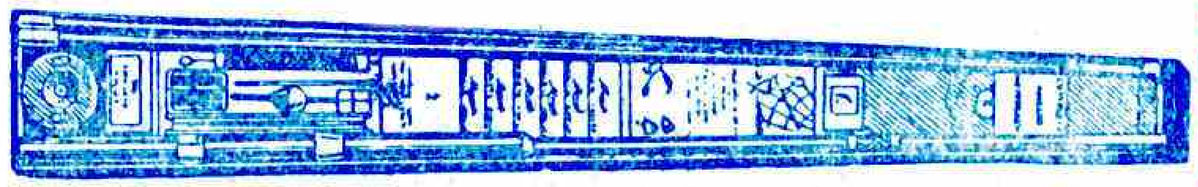
Other Outfits 8/- 9/6 12/- 13/6

If you'll write and tell us about your hobby we will send you a beautiful Catalogue all about it—QUITE FREE!



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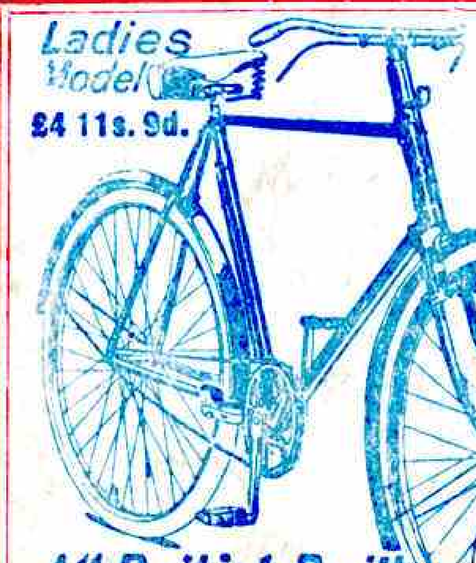

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of course, will be a Gamage "Popular"—the machine with an "Everlasting" guarantee against defective materials or bad workmanship. Sturdily and strongly built of finest British materials by British workmen, it will last for years and years. Fitted with our celebrated NON SKID Holborn Cord Roadster Covers, which are guaranteed for 12 months. Cash Price

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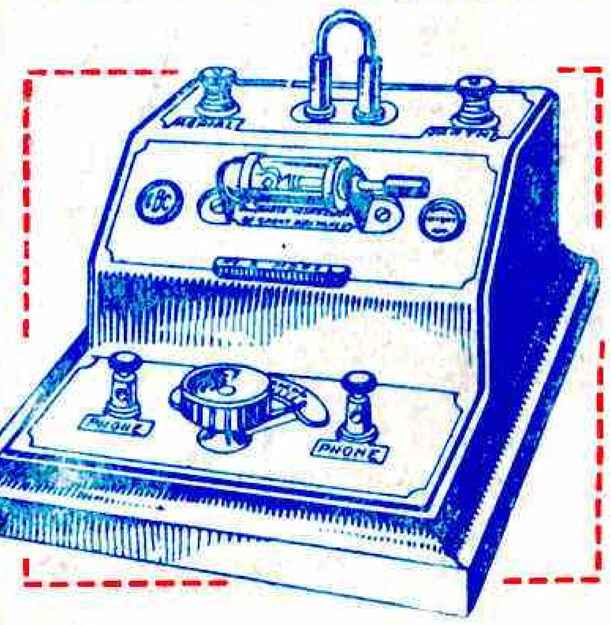

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This sturdy and handsome set is made from one solid moulding, thus forming a very substantial apparatus to handle. Complete with semi-Opal Glass Protected Detector, D.L.S. Crystal and "Pall madium" Catswhisker. Post free. **10/6**

Our Radio List tells you all you want to know about Wireless—send for a Copy.

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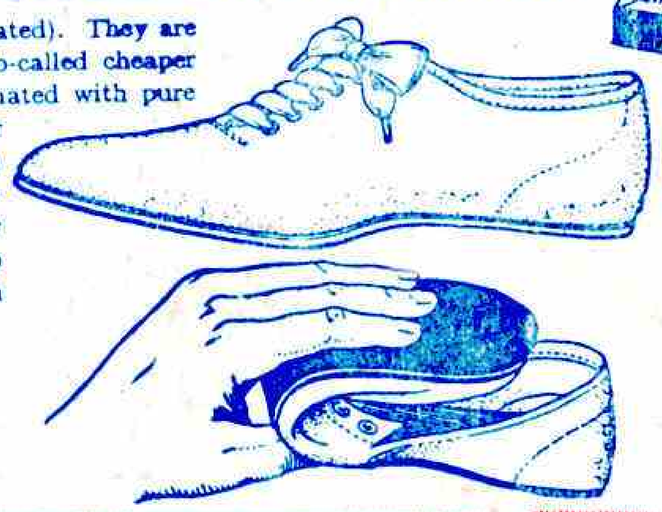

HERE IT IS!

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