FEBRUARY 1925.

MECCANO MAGAZINE

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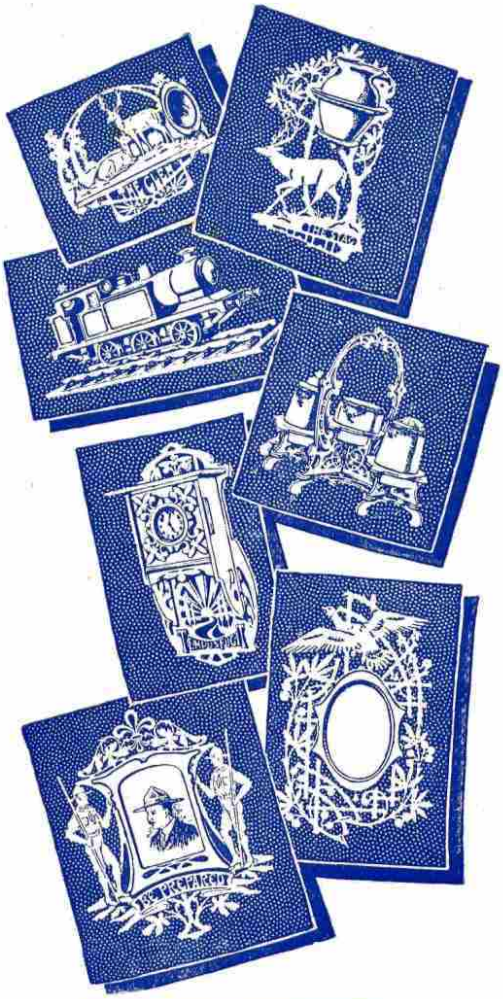
VOL. X
No. 2.

GIANT BLOCK SETTING CRANES. *(see page 54)*



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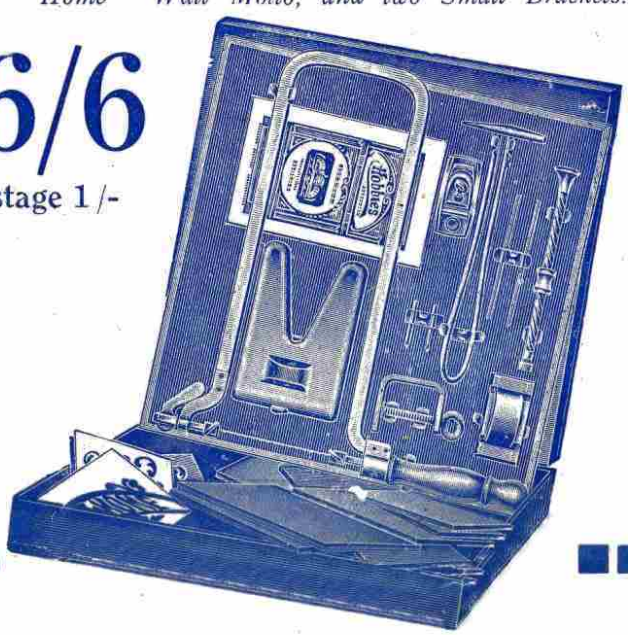

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MECCANO MAGAZINE

PUBLISHED
IN THE INTERESTS
OF BOYS

Vol. X, No. 2.

February 1925

OUR cover this month shows the travelling mechanism of a Giant Block-setting Crane, of the type called "Titan." These cranes are mounted on an under-carriage, which in the case of the crane illustrated consists of two bogies, each with four wheels and running on rails specially laid for the purpose. Titan cranes move along the rails under their own power, which is obtained from the engine mounted on the crane-arm. In the crane illustrated, power is transmitted through shaft and bevel-gearing to the two leading and the two rear pairs of wheels on each side of the track. Our artist has drawn this cover from a photograph kindly supplied by Messrs. Stothert and Pitt, Ltd., Bath, and in the background is seen a "Titan" at work laying blocks at the Madras Harbour breakwater. The work that these huge cranes accomplish is being described in a special serial article, last month's instalment of which dealt with "Goliath" or Gantry cranes. Next month "Titan" cranes will be described and illustrated.

It has for some time been my desire to introduce regular features dealing with engineering and railway news of the month. I am pleased to say that the permanent increase now made in the number of our literary pages enables me to commence both these features this month. Each month these pages will be devoted to news about the latest developments in engineering, and to news of railway matters, such as Company news, new locos, changes in existing railway stock, and other matters that will appeal to all interested in railways. Should any reader be able to contribute news to either of these pages I shall welcome his contributions, and those that are published will be paid for at our usual rates. The news in these pages will be as up-to-date as possible, but I should like to mention that as the Magazine is printed about a week before publication date, it will not be possible to mention any news received between the date that we close for press and the 1st of the following.

New Features

In this number we commence the life of another famous engineer, Sir M. I. Brunel, whose life story reads almost like romance. We shall continue this interesting feature in our March issue, describing the construction of the Thames Tunnel, which was perhaps the greatest of Brunel's many achievements, and one rightly regarded as an engineering triumph. We shall continue also our serial, commenced in this issue, on "*The Story of Copper*," our next instalment dealing with copper mining. I am able to announce also for next month, several interesting articles—including a description of a giant electric shovel, that I am sure will appeal to all my readers, bearing in mind the keen interest aroused by our previous articles on steam-navvies. I have in preparation an illustrated article on the largest floating crane in the world, recently built in this country for the Japanese Government. In the March issue, too, I am hoping to commence the story of Dick's Visit to Meccanoland. Since this story was first published in booklet form, there have been insistent demands for it to be printed in the pages of the "*M.M.*" With a view to satisfying these demands, and in the belief that it will be of special interest to our younger readers, I am hoping to commence the story in March. An illustrated article on the famous loco, L.N.E.R. loco 4472, is also being prepared, and also a thrilling description of a notable tragedy that occurred to an intrepid band of Alpine climbers, at the first ascent of the famous mountain, the Matterhorn. In addition to these special articles our regular features will be continued, and, in response to numerous requests, "Rover" will contribute an illustrated article on map-reading.

Next Month

This month I am printing the article on the "Flying Scotsman" that was crowded out of our last issue. The new "Flying Scotsman," which commenced running between King's Cross and Edinburgh on the 1st October last, represents the latest luxury train for express travel. I am told that the coaches alone on the new train cost £35,000. The carriages are fitted with every modern contrivance that makes for the comfort and convenience of passengers. The train is drawn by one of the L.N.E.R. giant engines of the Pacific type, representing an outlay of £7,500. Every week-day at 10 a.m., the Flying Scotsman has left King's Cross for the last 62 years, and I feel sure that my readers will be interested to read the article describing this new train that is taking its place in a notable railway service and doing its best to maintain the record set up by its predecessors.

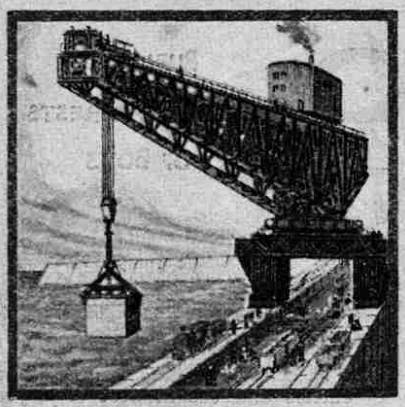
A Luxury Train

Our Cross-word Puzzle Contest has been very successful, judging from the number of entries and the interest displayed by the entrants. As everybody is busy with cross-word puzzles these days (not excepting the Editor of the "*M.M.*," to say nothing of his staff!) I think that something I read the other day might be of interest to my readers. A leading American authority states that he believes Adam and Eve probably played at something very similar to cross-word puzzles in the Garden of Eden! Whether this amazing statement is a fact or not, it seems certain that similar puzzles occupied a good deal of the time of the Hindus and the Chinese as far back as 3,000 years ago. The Red Indians, who lived in America before the arrival of the white man, used to play a criss-cross puzzle with grains of corn, each of which was marked with some ancient sign. The Indians probably brought the puzzles to America from Asia, at a time far back in the earth's history when there was no Pacific Ocean and the two continents of Europe and America were connected by land. Cross-word puzzles have been evolved by combining three other kinds of puzzles (the anagram, the acrostic, and the rebus) with the ancient magic squares, which played an important part in the superstition and mysticism of the Middle Ages. Magic squares were known to the Hindus and Chinese before the Christian era, and were introduced into Europe in the 15th century. Cross-word puzzles are closely allied to chess, and possibly they are an earlier form of that game. Incidentally, it is interesting to know that because of cross-word puzzles there has been a dictionary shortage in New York, and the encyclopædias in the public libraries have to be guarded, readers being made to queue up for their turn to look out definitions! The craze is not confined to New York, for a Boston publishing house reports that because of the cross-word puzzle their usual output of 10,000 dictionaries a month has grown to a monthly production of ten times that number. Although they have increased their staff and are working day and night, they find it impossible to keep pace with the demand. So Cross-words have a value to somebody and American business men are very "cute"—I wonder who is responsible for the present craze. I wonder!

The New Craze

Change of Address

Subscribers should immediately notify the Editor of any change of address. Send a Postcard *giving the old and new address*, so that records may be kept up-to-date.



Giant Block-Setting Cranes

Their Work in Constructing Harbours and Breakwaters

(*Continued*)

AS we have already mentioned, no two breakwaters are exactly alike, and almost every harbour requires particular treatment. The form of breakwater decided upon depends firstly, upon the natural conditions of the site, and secondly, upon the amount of money that is to be expended on the works.

Last month we learned something of the necessity for protecting our coasts from the ravages of the sea by building sea-walls, and also of the conversion of natural bays and inlets into safe harbours for shipping, by erecting rubble breakwaters, such as that used at Portland. This month we are to consider cases where rubble breakwaters are incapable of withstanding the action of the waves, and where, as a consequence, more ambitious schemes must be carried out.

Effect of Natural Conditions

When a natural bay is sufficiently sheltered by a projecting headland, it is only necessary to throw a breakwater across the inlet in order to convert it into a harbour. In such a case the entrance would be between the ends of the breakwater and the headland, if the depth of the water here is suitable. Such harbours as these are found at Plymouth and Cherbourg. Sometimes a single breakwater, thrown from a projecting point of a bay and enclosing a partly sheltered area of water, is sufficient protection, as at Holyhead, Alexandria, and Table Bay.

Where no headland or sheltered bay exists in a place where a harbour is required, it becomes necessary to form an entirely artificial harbour, which is, of course, a more extensive project. Such harbours as these are found at Kingston, Madras and, nearer home, at Dover, to which latter work we shall refer again shortly

In addition to such local conditions as land contour, there are several other factors to which consideration must be given when the construction of a harbour is contemplated. Not the least of these is a careful study of the wreck-chart, to ensure that, when constructed, the harbour may be available to the greatest number of vessels in times of distress. Other important factors to be considered are the nature of the anchorage ground to be enclosed, the strength and direction of the currents, the set of the tides, and, last but not least, the proximity of suitable materials for use in the work.

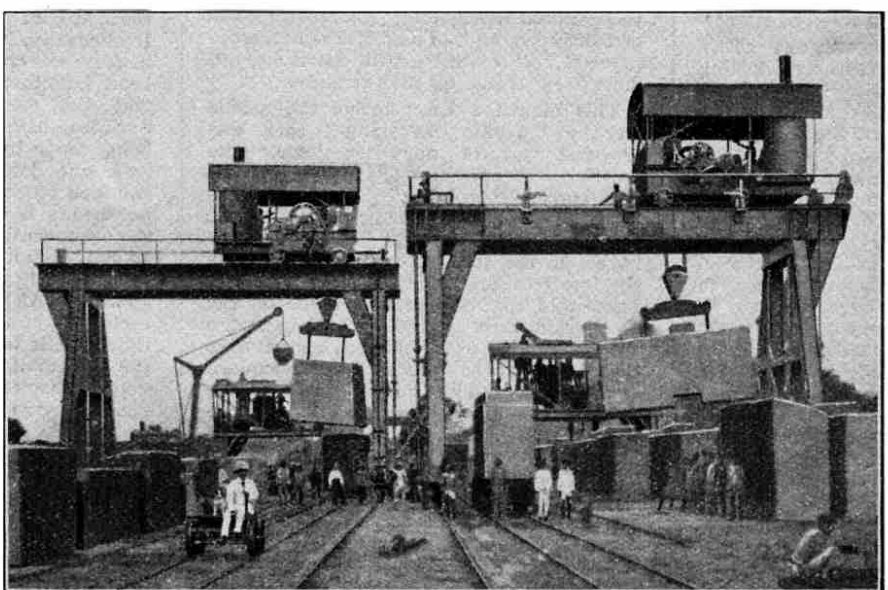
Three Types of Breakwaters

All these matters vary according to the different circumstances of the locality where the harbour is to be built, so that engineers have found it impossible to lay down hard and fast laws, applicable to all cases and all situations. This is why it was stated last month that no two breakwaters are exactly alike. Each harbour requires particular treatment, for where a mound of rubble, deposited in a scattered manner, will serve in one case, such a mound would be quite useless in another.

Although breakwaters thus differ in detail in almost every case, they may be broadly divided into three classes. These are (1) the rubble stone or concrete-block mound type, (2) the mound type surmounted by a thick wall, and (3) the vertical wall type, in which a solid wall is carried up, direct from the sea bottom.

(1) Mound Type of Breakwater

Mound breakwaters are generally formed by depositing in the sea a mass of hard material along the line previously chosen for the breakwater. Breakwaters of this type are carried a little above high water level and are placed as squarely as possible to the direction of the heaviest waves, for if placed obliquely the waves would soon scatter the material. Such breakwaters are generally adopted when an abundant supply of suitable material is close at hand. They are only constructed, however, when the space on the sea-floor that the breakwater will occupy is of no consequence, and where no quay is required to be built.



Photograph courtesy [*Messrs. Stothert & Pitt Ltd.*

Travelling Gantry Cranes moving Concrete Blocks

The mound type of breakwater is well represented by the works at Table Bay and Alexandria. The former breakwater runs in a north-easterly direction from a point to the north of Cape Town, and gives shelter from the north-west where Table Bay opens on to the Atlantic Ocean. The breakwater is about 2,400 ft. in length and consists of a mound of rubble stone, which the sea has now levelled on the ocean side to a gradient of about 1 in 9 for some distance below low water. The original work was begun in 1860, and in 1881 an extension of the breakwater was made, bringing the

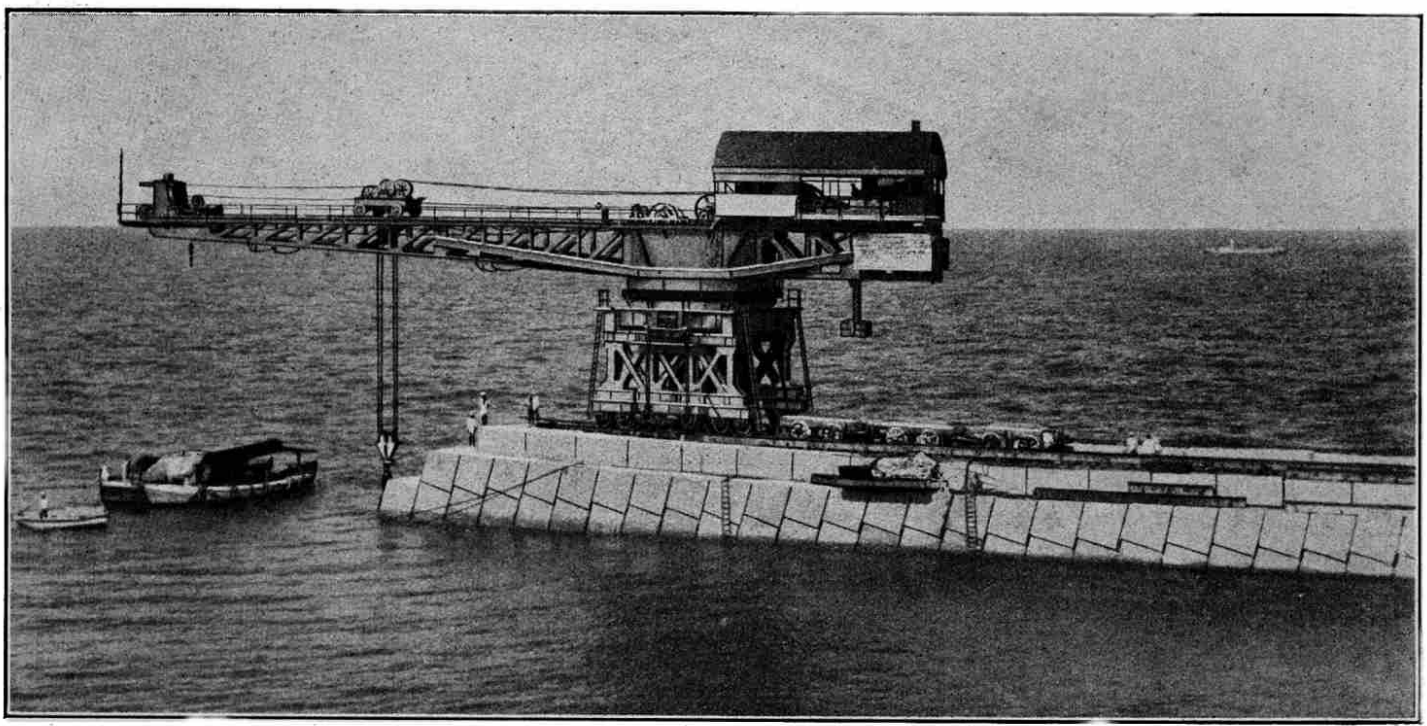


Photo courtesy] **A Titan Crane Laying Concrete Blocks at Madras Harbour** [*Messrs. Stothert & Pitt Ltd.*

length of the breakwater to 3,700 ft. The earlier breakwater was in a depth of 30 ft., but the later works extended it into water 50 ft. in depth.

Although this type of breakwater illustrates the simplest possible construction, it requires a large expenditure of material. At Table Bay, however, this material was at hand in the form of stone excavated from a neighbouring site, so that the consideration of transport of the material did not arise.

Alexandria Harbour

Work at Alexandria Harbour was commenced in 1870. The breakwater shelters an extensive bay to the south-west of the town, near Eunostos Point at the south-western end of Pharos. It runs parallel with the shore for 3,500 ft., and then bends inland in a southerly direction. The total length reaches 9,675 ft., the entrance being between the end of the breakwater and the shore. The breakwater encloses a harbour of 1,400 acres, with a minimum depth of 30 ft. and a maximum depth of 60 ft.

The breakwater itself is composed of a mound of large concrete blocks—each 20 tons in weight—on the exposed side, and rubble stone on the shore side. In building the breakwater the concrete blocks were deposited first, the rubble stone being deposited later, under their shelter. The foundation blocks were let down into the water from the deck of a barge, being placed on the inclined plane and allowed to slide slowly into position. It was necessary to exercise greater care, however, in laying the blocks near and above water level. They were brought from the shore by barge and placed in position by a floating steam derrick. Slings clasped each block at its four side edges, and when the block was in position the slings were released by the pull of a rope and the block was left in place. The rubble stone was deposited by barges with trap doors in their floors and sides, in a similar manner to the sack-block system of breakwater construction mentioned last month.

The Alexandria breakwater required only about two years to construct and was completed in 1872. The rate of progress of a mile a year is remarkably rapid, when compared with the construction of such breakwaters as Plymouth and Cherbourg.

(II) Mound and Wall Type

In the second type of breakwater a rubble mound—similar in many respects to the mound described in the first type, is surmounted by a massive wall. This type is well represented by the Colombo breakwater. The advantages of the mound and wall type of breakwater are that it requires less material than the mound type, and also the top of the wall may be used as a quay in fine weather.

Sometimes this type of breakwater is modified and additional protection afforded by laying large concrete blocks at random on the seaward side. This is the case with the breakwater at Boulogne Harbour, commenced in 1879. The mound is carried out about 4,500 ft. from the shore and curves round towards the old jetty, which lies about 1¼ miles to the north-east. Two entrances to the harbour are formed between the extremities of two other breakwaters, the remainder of the harbour being protected by a breakwater from the shore close to the old harbour. The mound itself is composed of small stones, covered with larger stones and faced on the outward slope with concrete blocks, each of which weighs 24 tons. The whole is surmounted by a masonry wall, standing about 10 ft. above low water. It is interesting to learn that the material for the mound was at first tipped from wagons run along a track-way, which was laid from the shore on top of the breakwater and advanced to the sea as the work progressed. This method was found to be very slow, however, and barges were subsequently employed.

(III) Solid Wall Type

In the third type of breakwater a massive wall is built of blocks of stone, dove-tailed one into the other in order to present the maximum resistance to the waves. Although this type of breakwater requires less material for its construction than either of the other types, it necessitates more careful construction, and also involves the employment of divers. It is dependent, too, on there being a hard sea-floor at the place where it is to be erected, and also on the water being of not too great a depth.

Of this type of breakwater, by far the most notable example is that of the Admiralty Harbour at Dover. As the construction of these massive breakwaters represents the most modern achievements in this particular branch of engineering we shall deal with it next month at greater length than either of the other types warranted.

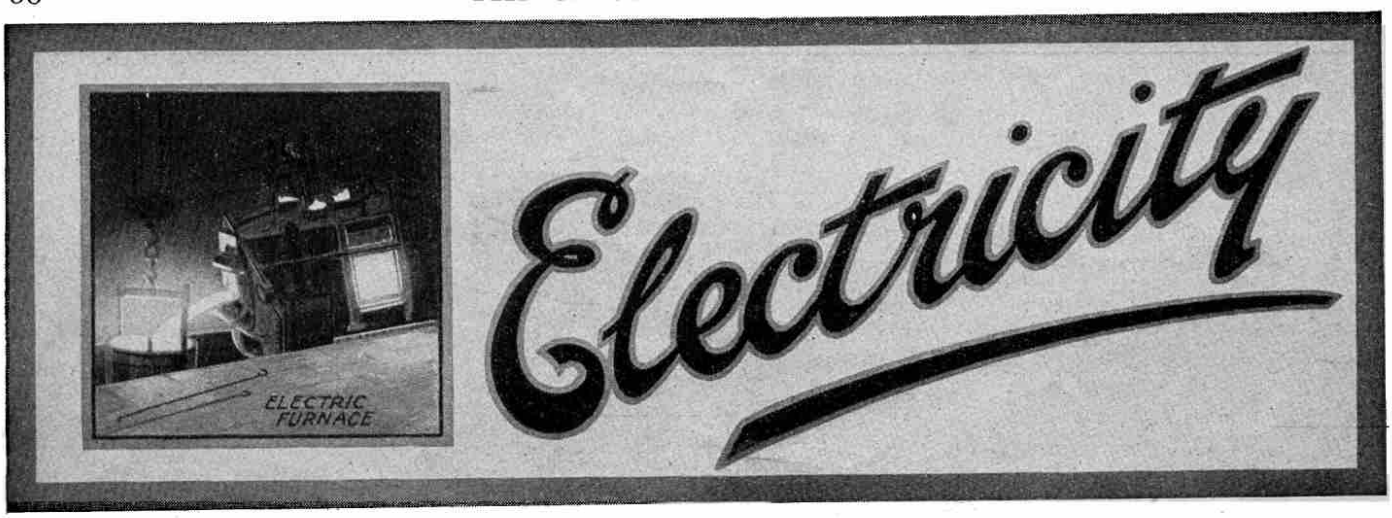
Early Breakwaters at Dover

Because it is situated at the narrowest part of the English Channel and is the nearest point on the English coast to France, the value of Dover as a port has long been recognised. From very early times, indeed, Dover has been a fortified military station, a large part of the castle buildings dating at least from Norman times, if not earlier.

We find that Queen Mary realised that it was necessary to have some form of harbour at Dover, for she sent workmen to Dover to build a breakwater similar to that they had built at Hastings.

The most important improvements to Dover harbour were carried out in the reign of Henry VIII., however, when a small basin was enclosed by a breakwater. This was constructed on the primitive plan by driving two rows of piles into the bed of the sea and filling the space between them with blocks of stone. The waves soon caused breaches in this breakwater,

(*Continued on page* 92)



XII. ELECTRIC CLOCKS

THE great disadvantage of the ordinary pendulum or spring-driven clock is that it requires winding-up periodically to keep it going. It is not a very difficult task to wind up the clocks in our homes, but when the large public clocks in church and other towers require winding, a great deal of energy is called for, owing to the heavy weights or strong springs that are necessary to drive these clocks. It is, of course, possible to instal an electric motor coupled to the winding drum, but this is not always entirely satisfactory.

Clocks that Require no Winding

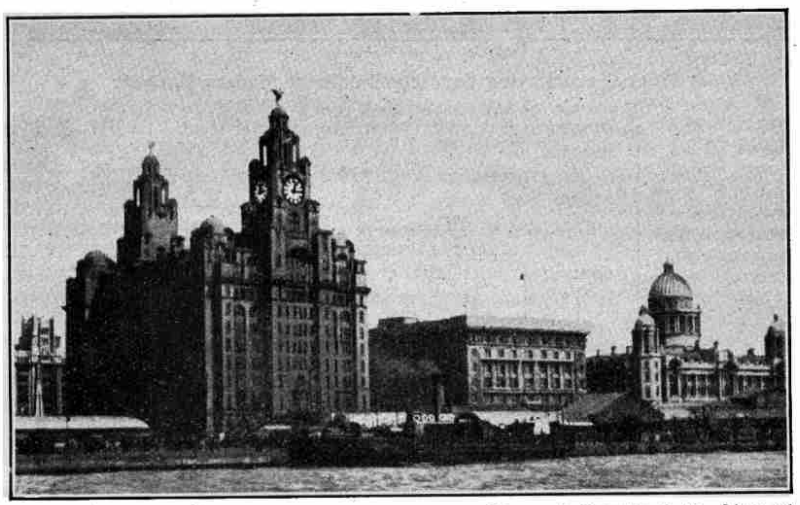
Clocks driven by electricity are free from the disadvantage we have mentioned. Current is directly applied to drive the pendulum, and this, in turn, drives the hands through gear-trains. No springs or weights are required in any part of the driving mechanism.

Once set going, an electric clock will keep on indefinitely, providing that current is continuously supplied. Such a clock requires no attention whatever beyond an occasional check to see that it is keeping correct time. Even this is not of great importance, since many of these clocks may be set so accurately that they do not gain or lose more than one-tenth of a second a week, an accuracy quite sufficient for everyday commercial purposes.

There are three main methods by which a clock may be driven by electricity. In the first and simplest, shown in Fig. 1, the pendulum P, is suspended by the spring S in the usual manner, the bob or pendulum weight B being movable up or down the pendulum in order to regulate the rate of swing. At the extreme end of the pendulum is a soft iron armature A, also shown in the side elevation. Below this there are two electro-magnet bobbins M fixed to the framework of the clock. Thus, as the pendulum swings to and fro, the armature it carries passes over these two magnets and is attracted to them if the current is flowing at the time.

An Automatic Switch

If a switch can be arranged so that the current flows round the magnets when the pendulum is approaching them, and is switched off immediately it is over them, it is obvious that the pendulum will receive a succession of pulls that will be sufficient to maintain its swing.



Photograph courtesy of [*Messrs. J. Kearnley & Co., Liverpool*

The Royal Liver Building, Showing the Largest Electric Clock in the World

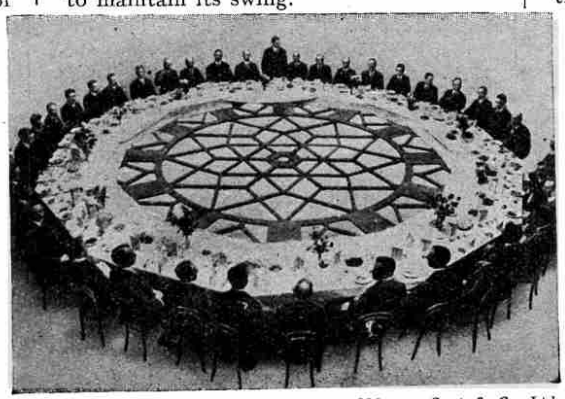


Photo. courtesy [*Messrs. Gent & Co. Ltd.*

Thirty-nine guests at lunch around one of the dials of "Great George"

This is accomplished by means of the arrangement shown to the right of the pendulum and about half way up. A propelling tongue T is pivoted about half way up the pendulum at the point D, the exact position depending upon the rate and magnitude of the pendulum's swing. This tongue rests in the teeth of the wheel R fixed in the clock framework.

Another tongue T1 rests in the teeth of the same wheel R, and is arranged near a third tongue T2, which rests against the stop S, and which carries the contact screw CS1. The tongue T1 also carries a contact screw CS2, which is adjusted so that it touches the contact screw CS1 when this tongue is raised owing to the wheel R being propelled by the tongue T on the pendulum. The tongues and wheel are arranged so that the two contact screws are touching one another when the pendulum is approaching the magnets from the left. Thus the current from the battery BB flows round the magnets and causes them to attract the armature on the end of the pendulum.

When the armature is exactly opposite the magnets the two contact screws part, the current is switched off, and the pendulum "free-wheels" to the end of its swing. On returning towards the left it receives no pull, but when it is swinging towards the right again it receives another pull from the magnets as before.

Thus the pendulum receives one pull for every complete swing and its swinging is therefore maintained. At the same time the wheel R is being turned by the pendulum, and it is a simple matter to drive the hands of the clock through gears from this wheel.

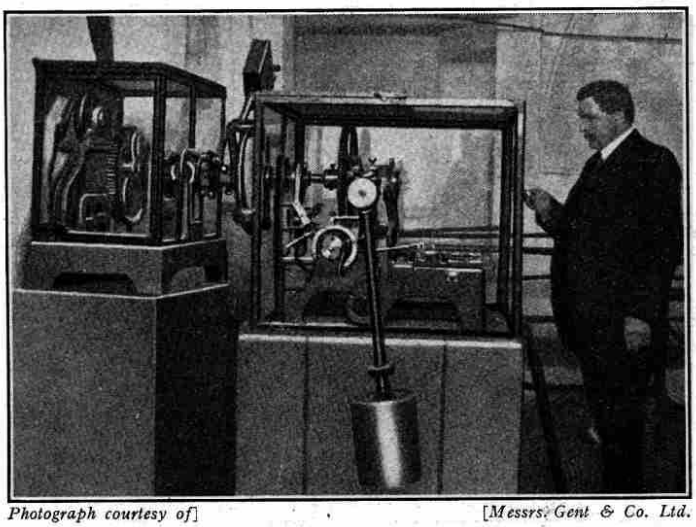
Some Disadvantages

This is probably the simplest type of electric clock, but it possesses several disadvantages that make it of use only when accurate time-keeping is not essential.

One disadvantage is that it consumes a large amount of electricity. The current is probably passing through the coils of the magnets one-tenth of the time, and as these are usually wound with fairly thick wire, a large amount of current is allowed to flow through them.

Another disadvantage is that the pendulum is never swinging "free," for the tongue T is always rubbing against the wheel R, and has to do considerable work in raising the tongue T1 at the period of swing at which the pendulum is most susceptible to any outside retarding effects—that is, when it is moving slowly at the beginning of its swing.

A third disadvantage is that the strength of the battery BB is not likely to remain constant, and in consequence the power of the pull exerted by the magnets will vary. This in turn will vary the magnitude of the swing of the pendulum and prevent it from keeping perfect time.



Photograph courtesy of] [Messrs. Gent & Co. Ltd.

The Control Mechanism for one of the Dials, "Great George," Royal Liver Building, Liverpool.

A Second Type of Clock

The second type of electric clock that we shall describe is shown in Figs. 2 and 3. This possesses several advantages over the previous type, the chief being that it requires considerably less current to drive it and that the pendulum is more free. It has one disadvantage of great importance, however, which is that the magnitude of swing varies considerably, much more than in the previous type.

In this clock the pendulum P is suspended by a spring S and has similar arrangements at the foot with respect to the bob B and the armature A, which is attracted by the magnets M as before. The tongue T is pivoted in front of the pendulum at the point D on the pendulum (Figs. 2 and 3). As the pendulum swings to and fro the tongue T is pulled across the catch C (Fig. 3) on the contact arm CA1, which is pivoted at E and maintained normally against the adjustable stop S1 by the counter-weight W1.

When the pendulum is set swinging towards the left, tongue T is pulled beyond the catch C so that it swings freely in the hollow F. Thus when the pendulum swings towards the right the tongue is inclined as shown in Fig. 3, and therefore passes easily over the catch C until it swings in the second hollow G. The pendulum now swings to the left, the tongue is pulled into the hollow F again, and the process is repeated.

Until now the pendulum has received no pull to keep it swinging, and so it gradually slows down until the tongue is not pulled far enough to the left for it to enter the hollow F. Consequently, when the pendulum swings back to the right, the tongue becomes caught in the catch C, thus pushing down the contact arm CA1 and causing the two contact screws CS1 and CS2 to touch and complete the electrical circuit. This energises the magnets M (Fig. 2) and then gives the pendulum a pull, causing it to swing well to the right, thus pulling the tongue (Fig. 3) out of the catch C into the hollow G again. The pendulum now has a large swing on it again and so the tongue is pulled into the hollows F and G alternately as before, until the pendulum slows down again and allows it to catch in C, when the whole process is repeated. The second contact screw CS2 is, of course, on the contact arm CA2 pivoted at H and provided with a counterweight W2, which normally keeps it pressing against the adjustable stop S2.

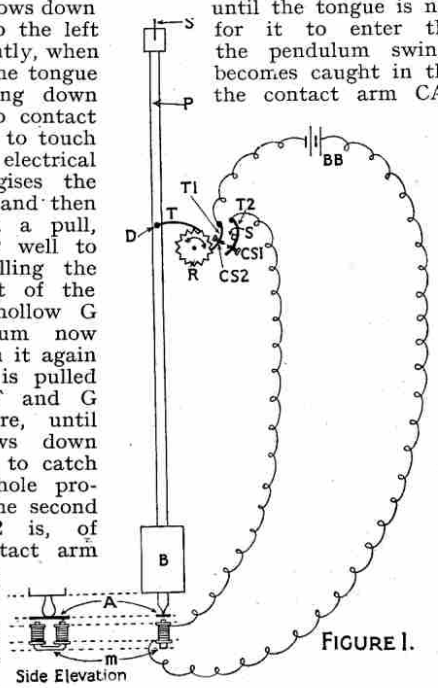


FIGURE 1.

With this arrangement the pendulum receives a single pull when it requires one. Should the battery become less powerful, the result is that the pulls are required more frequently. In practice the pendulum will swing from five to twenty times with one pull, according to the state of the battery.

The hands of the clock are driven through an escapement wheel, which is similar to that in an ordinary clock

A Gravity Clock

The third type of electric clock embodies the principle used in most electric clocks when great accuracy is required, such as for turret clocks and for master clocks which have to control many other dials. Fig. 4 illustrates the chief points in the design.

As before, the pendulum P is suspended by a spring S and carries a bob B at its end. A certain distance from the spring S the click C is pivoted. From the diagram it will be clear that each time the pendulum swings towards the right the wheel W will be moved round one tooth, the right-hand end N of the click C passing in the loop of the catch-arm CA, which, pivoted at D, holds up the gravity arm G. This arm is pivoted at H and carries the contact screw CS1 and the roller R.

The wheel W consists of 15 teeth, one being cut deeper than the others. Consequently, when the point of the catch C falls into this tooth, the right-hand end N rises higher than usual and does not pass into the loop of the catch arm CA but strikes it at the point J. This causes the catch arm to release the gravity arm G, which, in falling, allows its roller R to give the pendulum a push by striking and rolling down the impulse bracket K fixed to the pendulum.

When the gravity arm reaches the end of its fall, the contact screw CS1 meets the contact screw CS2 on the armature L. This completes the electrical circuit, the magnet M attracts the armature L which pushes up the gravity arm G and returns it to the catch on the catch arm CA, which by now has returned to its normal position.

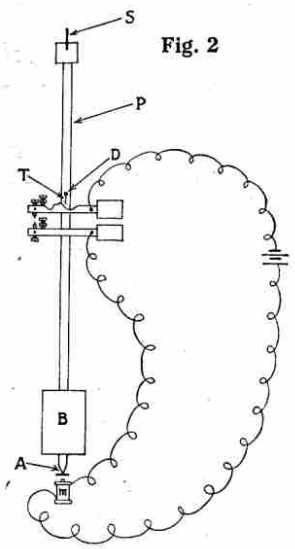


Fig. 2

Advantages of Gravity Type

The object of this movement, of course, is to give an impulse to the pendulum, and the whole cycle of operations takes no longer than a quarter of a second. The pendulum now continues swinging and the click C turns the wheel W round until it comes to the deep tooth again, when the pendulum receives another impulse.

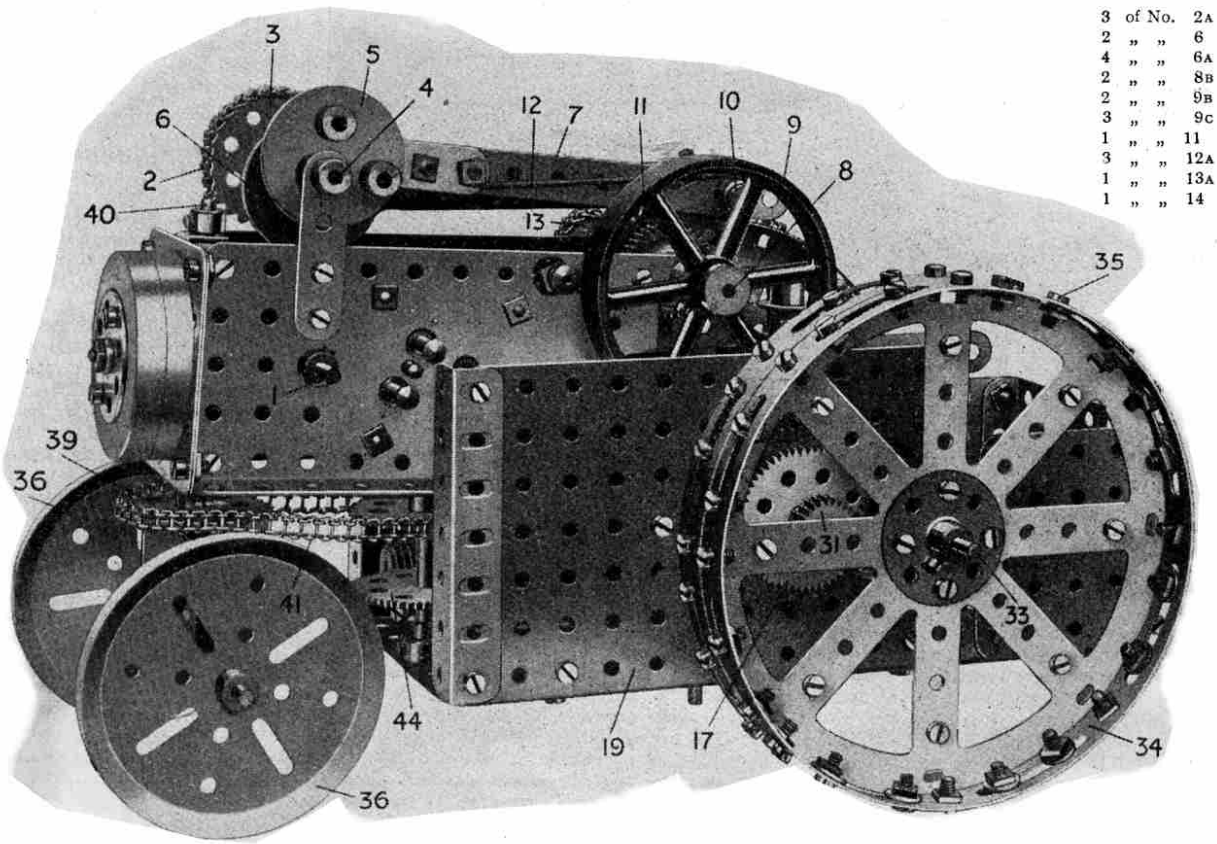
The advantages of this system are as follows. The pendulum is only doing work when travelling at its greatest speed, for it is then that it propels the wheel W or releases the gravity arm G, and it is then also that it receives the impulses from the roller R. This is a feature of great importance, for if the pendulum had any force, whether retarding or accelerating, applied to it when at the end of its swings, it probably would not oscillate at a constant rate. Another advantage is that the bob B can be made very heavy so that the magnitude of the swing remains practically constant. In an example of this type of clock that we have examined the swing is less than 1/32nd of an inch longer after the pendulum has received an impulse than immediately before it.

This type of clock does not usually have a dial on the same framework. It will have been noticed that there is a temporary switching on and off of the electric current at every 15th swing of the

(Continued on page 87)

A NEW MECCANO MODEL

Electrically-Driven Traction Engine



Parts required :

3	of No.	2A	3	of No.	15
2	„ „	6	1	„ „	15A
4	„ „	6A	3	„ „	16
2	„ „	8B	2	„ „	16B
2	„ „	9B	1	„ „	17
3	„ „	9C	2	„ „	19B
1	„ „	11	2	„ „	21
3	„ „	12A	5	„ „	24
1	„ „	13A	2	„ „	25
1	„ „	14	6	„ „	26
			2	„ „	27
			4	„ „	27A
			2	„ „	30
			2	„ „	31
			1	„ „	32
			2	„ „	33
			2	„ „	33A
			180	„ „	37
			60	„ „	38
			1	„ „	47
			1	„ „	48
			2	„ „	48D
			1	„ „	50
			2	„ „	53
			20	„ „	59
			1	„ „	62
			2	„ „	63
			4	„ „	70
			4	„ „	72
			½	length	94
			4	of No.	95A
			2	„ „	96A
			2	„ „	103H
			2	„ „	115
			4	„ „	118
			2	„ „	130
			1	„ „	132
			2	„ „	137
			1	Electric Motor 4-volt	

TRACTION ENGINES have been familiar features on our roads for many years, and in spite of the invasion by petrol-driven vehicles they continue in evidence.

Primarily, traction engines were intended for hauling heavy loads for long distances on roads, and were designed to travel at a low speed. Instead of the driving wheels being directly driven from the piston rod, as in the case of a locomotive, power is transmitted by a system of spur gearing. The effect of this is to develop a much greater tractive force for each h.p. of the engine.

The driving wheels of a traction engine form the rear pair and are usually of large diameter. The leading pair of wheels are considerably smaller, and their axle is capable of being turned about a central pivot, by which means the engine is steered.

Compound Traction Engines

Small traction engines are generally driven from a single cylinder, but large engines intended for heavy work are of the compound type with two cylinders, high and low-pressure. Traction engines of this type show several advantages over the single cylinder type. For example, with compound cylinders the full expansive force of high-pressure steam is utilised, effecting a saving in fuel and water of from 20 to 30 per cent., with a corresponding saving in the life of the firebox and boiler. This economy in fuel and water consumption is of great importance, apart from the reduced working costs, for often traction engines are required to travel considerable distances, and fuel and water are not always available at all points on their journey.

A further advantage of the compound type is the fact that high-pressure steam can be admitted momentarily into the low-pressure steam-chest by means of a self-closing starting valve, the power of the engine being thus increased and starting facilitated. There is also less risk than with single cylinder engines of sparks being thrown out of the chimney. Yet another advantage is that there is less noise, due to the low pressure of the exhaust steam.

Straw Used as Fuel

Although the standard traction engine is designed for burning coal fuel, almost any kind of fuel may be used, providing a suitable firebox and fire bars are fitted. In large grain growing countries such as Canada and the Argentine, straw is used very successfully as fuel. In this case special boilers and extra large fireboxes are needed, together with a special form of grate, spark-arresting chimneys and straw-feeding apparatus. Wood also may be burned and almost any kind of liquid fuel may be employed.

The value of such engines for heavy haulage work is obvious, but there are also other purposes for which engines of this type may be employed, notably in

agriculture on a large scale. Heavy traction engines are not able to traverse the land to be cultivated so as to haul ploughs or other implements, but they are made to do the work indirectly.

Traction Engines on the Farm

The hauling is done by means of a cable system, which does away with the necessity for the engines passing over the cultivated area. For this purpose, two engines are required, each being fitted with a large winding drum around which passes a cable. The engines are placed one at each side of the field and the plough or other implement is attached to the cable. One engine hauls the plough across the field by winding the cable on to its winding drum, after which the second engine hauls the plough back again by the same means. As the engines remain stationary while pulling the plough they are able to exert their full power on the cable. At the end of each " bout " the first engine moves forward a few yards—while the second engine is pulling the plough across the field—and is ready to pull the plough back again as soon as the second engine has completed its " bout." This operation is continued until the field is completely covered.

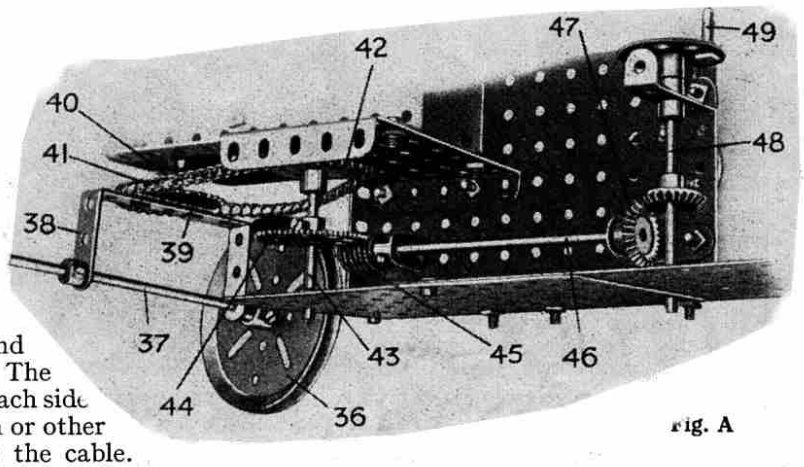


Fig. A

All types of ploughs may be used with cable haulage—paring ploughs for light stubble skimming and paring, where land has been previously cultivated ; topsoil ploughs for cereal and root crop cultivation ; subsoil ploughs for deep cultivation for potatoes, sugar-beet, and other root crops ; breaking ploughs for ploughing land not previously cultivated and so on. In addition to ploughs, almost all agricultural implements may be operated in the same manner, including harrows, rollers, cultivators, ditching machines, etc.

The value of the traction engine on a farm is by no means confined to this kind of work, for the same engine will successfully operate any kind of farm machinery, being specially useful for threshing and similar purposes.

Light Steam Tractors

Among the many interesting applications of the traction engine, apart from agriculture, is that of supplying the needs of the travelling showman. Such engines haul his caravans and apparatus from one fair-ground to another, and during the " show " they are an economical and reliable source of power for running roundabouts of all kinds and driving dynamos for supplying electric light to the circus tents, stalls, etc.

For certain purposes the heavy traction engine is unsuitable, and a smaller and lighter tractor is substituted with great success. This is particularly the case where soft ground has to be traversed, on which there would be a possibility of a heavier vehicle sticking fast. These light steam tractors have great hauling power, although not so great as that of the bigger type, and they have the compensating advantage that they are able to travel considerably faster.

When a tractor is not required for road haulage work it may be used for almost any purpose for which a stationary engine is suitable, including the driving of dynamos, circular saws, pumps and similar machinery. For work of this kind the steam tractor indeed has a very valuable advantage over the stationary engine in that it can go anywhere where work has to be done, and that it can be quickly and easily moved about to the best position for exerting its maximum power.

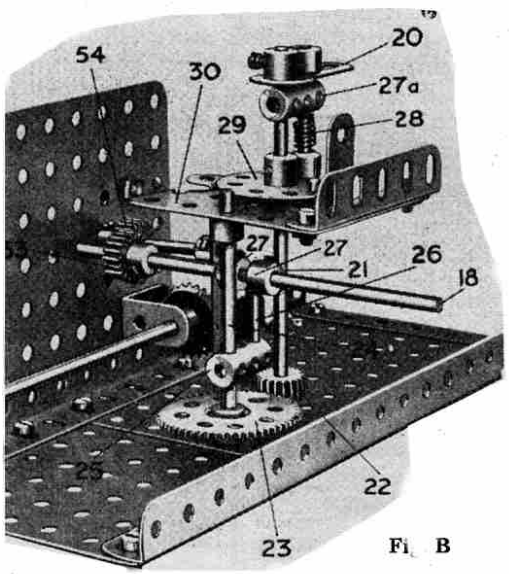


Fig. B

The Meccano Traction Engine

One of the most interesting features of this model is the transmission, which is by eccentrics and pawl and ratchet gearing to the road-wheels. This is a similar form of transmission to that used in the Meccano model of the Constantinesco gear, fitted to the Meccano Chassis and described in our issue of April last.

To deal first with the transmission it may be pointed out that the driven spindle (1) of the Electric Motor carries a ¾" Sprocket Wheel, which is coupled by a Chain (2) to a 1½" Sprocket Wheel (3) on the Rod (4).

Secured on this Rod are two Eccentrics (5 and 6) connected by 4½" Strips (7) to Pivot Bolts (10 Fig. C). These are secured to 1½" Flat Girders (10a) pivoting about a Rod (8) carrying the Fly Wheel (9). On the Pivot Bolts (10) are pivoted double Pawls, which engage two 1" Gear Wheels (11) secured on the Rod (8). Spring cord (12) connected to the screws (11b) keep the Pawls in engagement with the Gear Wheels (11).

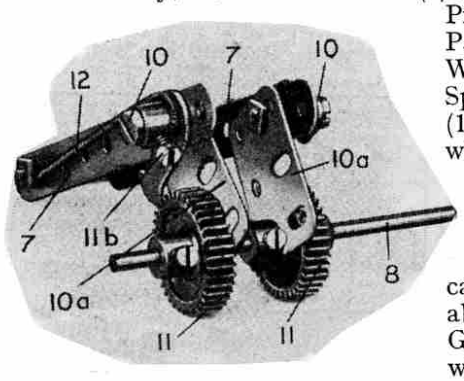
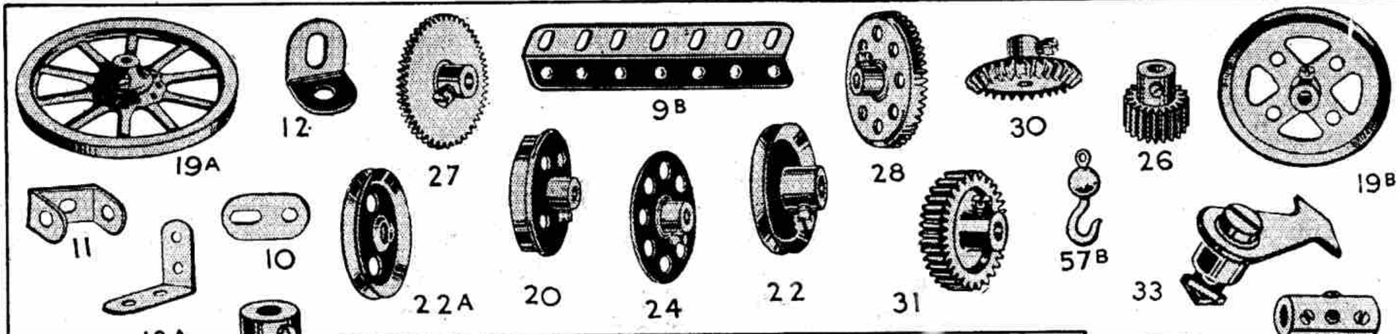


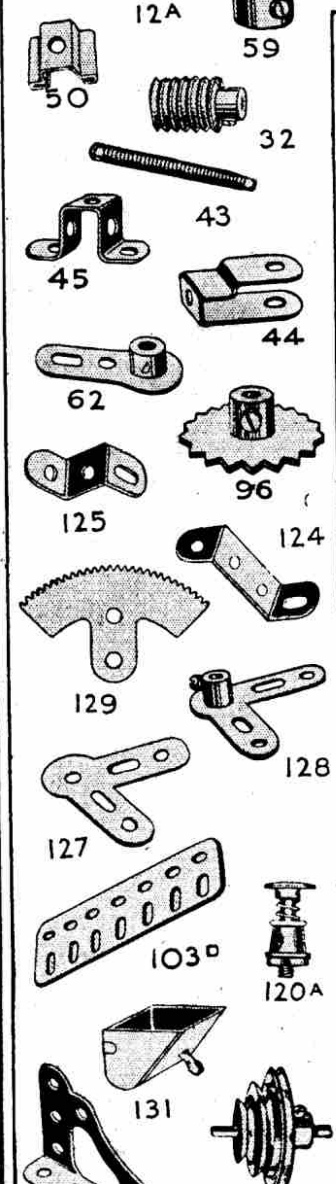
Fig. C

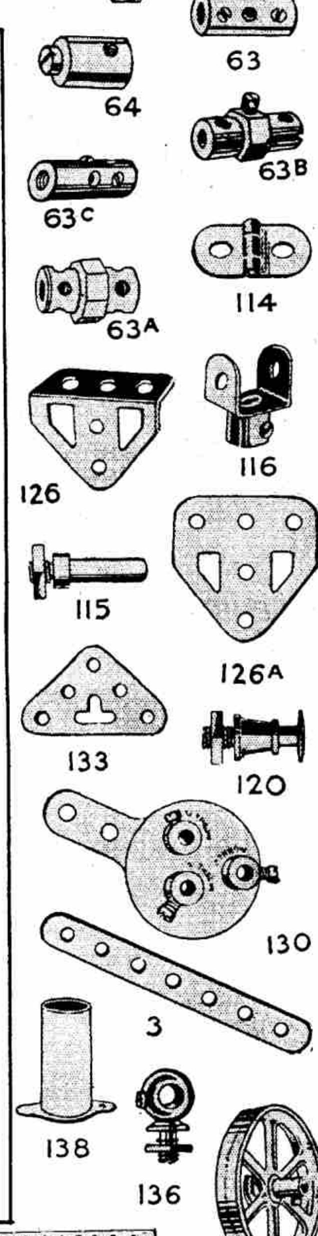
Details of Transmission

Consequently, when the motor is running, the Eccentrics (5 and 6) cause the Pawls to rock to and fro about the Rod (8) and so rotate the Gear Wheels (11) and the Rod (8) to which the wheels are secured. A ¾"

(Continued on page 61)







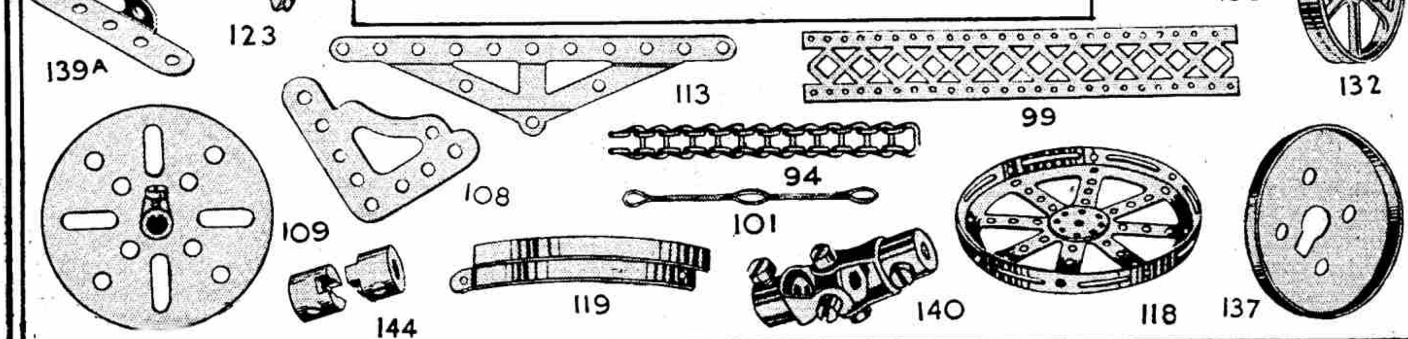
MECCANO

ACCESSORY PARTS

WE illustrate a selection of accessory parts that every Meccano boy will find useful in building the larger and more interesting models. Many of these parts have been only recently introduced, and although we know that they have an universal use (were it otherwise they would not have been added to the system) we may not yet know all their applications. There are endless possibilities in the employment of Meccano parts; indeed, we wonder if there is now a mechanical movement known to engineering that any boy cannot duplicate with Meccano.

No.	Part		s.	d.
10.	Flat Brackets	½ doz.	0	2
11.	Double Brackets	each	0	1
12A.	Angle Brackets, 1″ × 1″	,,	0	1
19A.	Wheels, 3″, with set screw	,,	0	8
20.	Flanged Wheels	,,	0	6
	Pulley Wheels:			
19B.	3″ dia., with set screw	each	0	8
22.	1″ ,, ,, ,, ,,	,,	0	4
22A.	1″ ,, without set screw	,,	0	2
24.	Bush Wheels	,,	0	6
25.	¾″ Pinion Wheels ...	,,	0	6
26.	½″ ,, ,, ...	,,	0	4
27.	Gear Wheels, 50 teeth...	,,	0	9
27A.	,, ,, 57 ,, ...	,,	0	9
28.	1½″ Contrate Wheels ...	,,	0	9
29.	¾″ ,, ,, ...	,,	0	6
30.	Bevel Gears	,,	0	10
31.	1″ Gear Wheels, 38 teeth	,,	1	0
32.	Worm Wheels	,,	0	6
33.	Pawls (complete) ...	,,	0	4
43.	Springs	,,	0	2
44.	Cranked Bent Strips ...	,,	0	1
45.	Double Bent Strips ...	,,	0	1
50.	Eye Pieces	,,	0	2
57B.	Hooks (loaded)	,,	0	5
59.	Collars and Set Screws	,,	0	2
62.	Cranks	,,	0	3
63.	Couplings	,,	0	6
63A.	Octagonal Couplings ...	,,	0	8
63B.	Strip Couplings	each	0	8
63C.	Threaded Couplings ...	,,	0	6
64.	Threaded Bosses ...	,,	0	2
94.	Sprocket Chain	per length	0	6
96.	Sprocket Wheels, 1″ ...	each	0	3
101.	Healds, for Looms ...	doz.	0	9
108.	Architraves	each	0	2
109.	Face Plates, 2½″ diam.	,,	0	4
113.	Girder Frames	,,	0	2
114.	Hinges...	per pair	0	4
115.	Threaded Pins	each	0	2
116.	Fork Pieces	,,	0	3
118.	Hub Discs (5½″ diam.)	,,	1	3
119.	Channel Segments (8 to circle, 11½″ diam.)	,,	0	4
120.	Buffers	,,	0	2
120A.	Spring Buffers ...	per pair	0	8
123.	Cone Pulleys	each	1	3
124.	Revsd. Angle Brackets, 1″	½ doz.	0	10
125.	Revsd. Angle Brackets, ½″	,,	0	6
126.	Trunnions	each	0	3
126A.	Flat Trunnions	,,	0	2
127.	Simple Bell Cranks ...	,,	0	3
128.	Boss Bell Cranks ...	,,	0	4
129.	Rack Segments, 3″ diam.	,,	0	6
130.	Triple Throw Eccentrics	,,	1	3
131.	Dredger Buckets ...	,,	0	2
132.	Flywheels, 2¾″ diam....	,,	2	3
133.	Corner Brackets... ...	,,	0	3
136.	Handrail Supports ...	,,	0	3
137.	Wheel Flanges	,,	0	4
138.	Ship's Funnels	,,	0	4
139.	Flanged Brackets, Right	,,	0	2
139A.	,, ,, Left	,,	0	2
140.	Universal Couplings ...	,,	0	9
144.	Dog Clutch	,,	0	6

You may obtain Meccano Parts from your Dealer



The Meccano Traction Engine—

(*continued from page 59*)

Sprocket Wheel (13) on the end of the Rod (8) is coupled by a chain to a 1½" Sprocket Wheel (14 Fig. D) on a Rod (15). This Rod carries at its other end a ½" Pinion (16) engaging a 57-toothed Gear Wheel (17) on a Rod (18), which is mounted to slide in the Rectangular Plates (19) forming the sides of the Tractor.

The Rod (18) is caused to slide by turning the Crank (20 Figs. B and D), which in turn is secured on a Rod (21) carrying a ½" Pinion (22) engaging a 57-toothed Gear Wheel (23) on another Rod (24). This latter Rod carries a Coupling (25) in which is secured a short Rod (26) engaging between two Collars (27) on the Rod (18).

Below the Crank (20) is fixed a Coupling (27a). A spring-controlled short Rod (28) slides in the Crank (20) and Coupling (27a) so that this Rod (28) may be lifted against the Spring. The action causes its lower end to engage with one or other of the holes in a Bush Wheel (29), secured to the Rectangular Plate (30).

On the Rod (18) is a ½" Pinion (53), and when the Rod slides, this is adapted to engage an idle ½" Pinion (54). This Pinion (54) is mounted on a short rod and permanently in engagement with another Pinion (55) on the Rod (33), upon which are fixed the Travelling Wheels (34).

Reversing Gear

The Rod (33) also carries two 50-toothed Gear Wheels (32). Pinions (31) on the Rod (18) are adapted to be engaged with these 50-toothed Gear Wheels when the Pinion (53) is out of engagement with the Pinion (54), and vice versa. In this manner the Pinions (53, 54 and 55) form a reversing gear, and by moving the Rod (18) by the Crank Handle (20) a forward or reverse drive of the tractor may be obtained. After being moved, the rod (18) is locked in position by the Short Rod (28) engaging one of the holes in the Bush Wheel (29).

The small compression-spring extracted from the Meccano Spring Buffer (part No. 120a) will serve admirably in exerting the necessary pressure on the Rod (28).

Each of the road-wheels (34) is made up of two hub discs bolted back to back, a number of Bolts (35) being secured round the flanges to enable the wheels to obtain a grip on the ground.

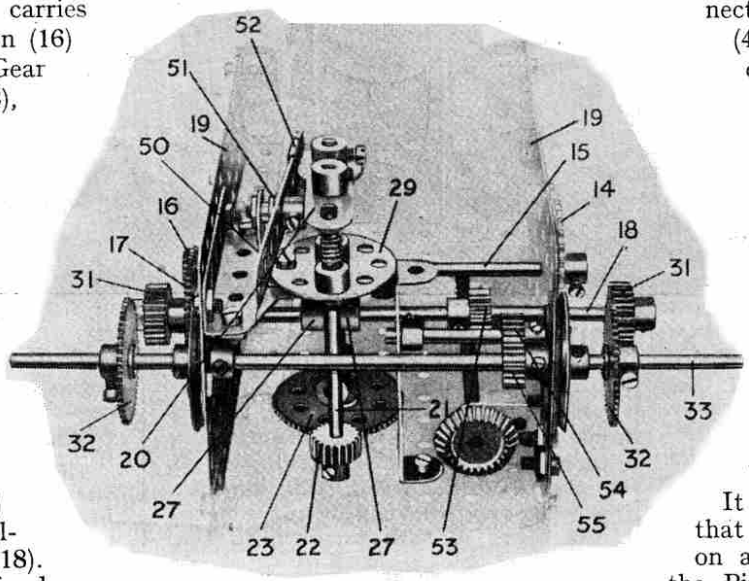


Fig. D

Steering Mechanism

Fig. A shows details of the steering mechanism. The Steering Wheels (36) are carried on the Rod (37) journalled in a 3" × 1½" Double Angle Strip (38), which is bolted to a 1½" Sprocket Wheel (39) secured on a Rod (40).

The Sprocket Wheel (39) is coupled by Sprocket Chain (41) to another 1½" Sprocket Wheel (42) secured on a Rod (43). On this Rod is a 57-toothed Gear Wheel (44) engaged by a Worm (45) secured on a Rod (46). This is connected by the Bevel Wheels (47) to a vertical Rod (48), on which is secured the Steering Handle (49).

Consequently, by turning the Handle (49) the Worm (45) rotates the Gear Wheel (44) and its Rod (43), the Chain (41) moving the Steering Wheels (36) as required.

The switching of the motor on or off is controlled by the Strip (50 Fig. D) pivoted at (51) and connected to the control lever of the motor by an Eye Piece (52).

It will therefore be seen that if the motor is switched on and the clutch (formed by the Pinions 31) be placed in gear, the drive from the motor to the wheels (34) will be effected through the Eccentrics (5 and 6), Gear Wheels (11) and Gear Train (16, 17, 31 and 32) to the Rod (33) carrying the Wheels (34). While the motor is still running the drive may be declutched by operating the Crank Handle (20).

It should be noted that the Eccentrics (5 and 6) are opposed to one another when secured to the Rod (4). In this way they alternately impart the thrust, or driving motion, to the Rod (8).

BRIGHT IDEAS

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

F. Morris (Upton).—We are afraid that the present design of clockwork motor is not adaptable to a speed regulation. Its power is limited, and any check put upon the spring would decrease the efficiency of the motor.

F. Rimmer (Sydney, N.S.W.)—No 7 Outfit builds all the models in the complete Manual and many hundreds of others. Save up your pocket-money, Frank: and by means of accessory Outfits you should soon be able to build up your present No. 4 into a No. 7, and thus realise your ambition!

Edward Cooper (Acton, W.)—By giving the cord two laps round the crank handle and then fastening with two ordinary half hitches a firm grip is obtained.

E. W. Byles (Dovercourt, Essex).—We have a number of further additions to the Hornby train in contemplation. We appreciate the need of a large type bogie passenger carriage.

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

A. Dakin (Bradford).—A suitable means of connection between Strip and Rod is exercising our attention. Thanks for your suggestion in this direction.

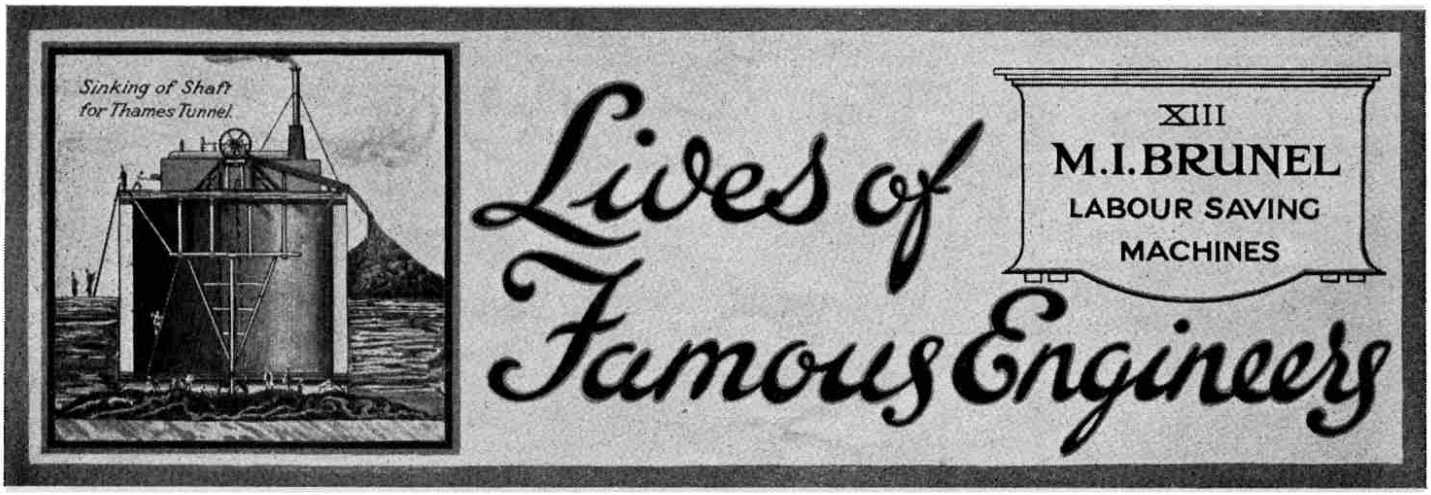
S. Olszewski (London).—Additions to the Hornby Trains are continually being made. Your suggestions for new items have been duly noted.

Ralph J. B. Marsden (Tarver, Lancs.)—(1) We think that a hinge with two hole ends might be a little on the large side. We shall go into the matter. (2) We doubt whether a motor train set would be popular. There are at present no indication of any demand for this particular type of rolling stock.

E. T. Ratcliffe (Faversham).—We fear that the space in our locos is rather too confined for the fitting of a speed controller, although possibly something on the lines of a gramophone controller might be feasible on the larger type. We appreciate very much your keen interest in Meccano, and are always glad to hear from our enthusiastic friends.

Evan Davies (Llanrhystyd).—Your suggested reversed crank can be effected by existing parts, i.e., by employing two ordinary Cranks fastened together. Unnecessary duplication of parts is a thing we try to avoid.

L. Chilvers (Norwich).—Our present Corner Bracket will take care of the functions of your suggested ½" flat angle strip. The latter is certainly neater, but it would duplicate the other. (2) Although we have not shortened the Crank piece we have made a uniform width of ½" over all. We scarcely think that any improvement would be gained by shortening it.



XIII. SIR MARC ISAMBARD BRUNEL

MARC ISAMBARD BRUNEL was born at Hacqueville in Normandy, on 25th April, 1769. His father was a farmer and small landowner, and the family were highly respected in the district. The boy was destined for the Church, and at the age of eight was sent to the College of Gisors. He proved a hopeless pupil, however, his mind being full of the interesting things to be seen in the carpenter's shop and the wheelwright's yard in his native village. No inducement or punishment could persuade him to give his attention to literary or classical studies. His father was determined that the boy should fall in with his wishes, and after various punishments—including solitary confinement—had failed, he sent him to the Seminary of St. Nicaise at Rouen. This change produced no better result, however, for the lad's love for drawing and for making mechanical models could not be suppressed.

In our March to July numbers last year, we gave an account of the careers of the two Stephensons, George and his son Robert, and we showed how Robert inherited to the full his father's engineering ability. This month we are commencing the story of another father and son who reached great distinction in the engineering world—Sir Marc Isambard Brunel and his son Isambard Kingdom Brunel.

It is interesting to note that—as in the case of the Stephensons—the two Brunels not only reached eminence in their separate achievements but also accomplished wonderful results when working together. There is no more remarkable instance of inherited engineering ability than that provided by the life histories of the Stephensons and the Brunels.

In the following article we deal with the first stage of the career of Sir Marc Isambard Brunel, and show how his keen brain was continually seeking to substitute machinery for hand labour in every possible direction. Our subsequent instalments will deal with the construction of the Thames Tunnel, on which father and son worked together, and with the great personal achievements of I. K. Brunel, including the Great Western Railway and that impracticable monster "*The Great Eastern*," a steamship, which—as we shall see—was many years in advance of her time.

Resolves to Visit England

While at Rouen young Brunel spent as much time as possible wandering about the quay, and one incident of this period is worth recalling. One day he noticed two large iron cylinders that had just been landed, and he was at once eager to know for what purpose they were intended. After making many fruitless enquiries he came across a friendly boatman who told him that the cylinders were part of a steam engine for pumping water, and that they came from England, where many such things were made. "Oh!" the boy immediately exclaimed, "when I am grown up I shall go and see that country!"

Before long it became clear to Brunel's father that his son could not be turned from mechanical pursuits, and he therefore arranged for him to study drawing, perspective, and hydrography, with a view to his entering the navy.

Being interested in his new studies young Brunel made rapid progress, and in due course he became appointed to a corvette. His naval service lasted six years, but of this period of his life there is little or no record and nothing of special note seems to have happened to him.

On leaving the navy early in 1793, Brunel found his country in the throes of the revolution. He stayed for a while with a relative at Rouen, where he met an English lady, Miss Kingdom, who afterwards became his wife. Brunel's position as a somewhat enthusiastic royalist became dangerous, but apart from this, conditions in France at that time were terrible, and as there was absolutely no prospect of his obtaining employment, he decided to try to get to America. After considerable difficulty he succeeded in obtaining a passport.

Leaves France for America

In July, 1793, he sailed from Havre on an American vessel, but scarcely had he begun to congratulate himself upon his good fortune in getting safely away from France than he found, to his horror, that he had left his precious passport behind.

This was a real disaster, but Brunel was not dismayed. Borrowing a passport from a fellow passenger, he produced a copy of it so perfect in every detail, even to the seal, that he felt fairly confident it would escape detection. His handiwork was quickly put to the test, for immediately afterwards a French frigate hove in sight and signalled to the American vessel to stop. Officers came on board to examine all passports, and Brunel, feeling that to draw attention to himself by showing the slightest hesitation might be fatal, was the first to present his passport for examination. His anxiety at that moment may well be imagined, for if any irregularity in the document had been noticed he would have been arrested at once and taken back to France. Fortunately, however, his copy was so well made that it passed muster.

The remainder of the voyage was uneventful, and Brunel landed at New York in September, 1793.

Civil Engineering Career Begins

Brunel was now in a strange land and was faced with the problem of finding employment suited to his abilities. He determined first of all to seek out two Frenchmen, M. Pharoux and M. Desjardins, who had been fellow passengers on the voyage from Havre, and who had come to America on behalf of a French company to organise the survey of a large area of land in the neighbourhood of Lake Ontario. Brunel found his friends and was gladly accepted as a member of the survey expedition.

The three Frenchmen, assisted by four Indians, successfully carried out their task. On the way back to New York, Brunel and Pharoux made the acquaintance of a

Sir Marc Brunel's Signature

Mr. A. Thurman, a prominent New York merchant, who was greatly interested in opening-up the internal communications of the country. Recognising the ability of the two Frenchmen, Thurman engaged them to make a survey for a canal to connect the River Hudson with Lake Champlain. Pharoux was placed in charge of the operations, but he soon came to realise that Brunel's abilities were far superior to his own, and it was not long before he passed over the command to him. This survey marked the beginning of Brunel's career as a Civil Engineer. He carried out other work in conjunction with Thurman, and was so successful that in some twelve months he had built up a considerable reputation and had placed himself on a sound financial footing.

About this time the need was felt in the United States for a larger House of Assembly for the accommodation of Congress, and plans for a new building were invited. Brunel, his friend Pharoux, and many others submitted plans, but the designs of Brunel were so far superior to all others that the task of selection was easy. Although the scheme was abandoned on the ground of economy, the time and thought Brunel had put into these designs were not entirely wasted, for shortly afterwards his plans—considerably modified, however—were accepted for a new theatre in New York.

By this time Brunel had become so highly esteemed in New York that he was appointed Chief Engineer, and in 1796 he was admitted to the full rights of citizenship.

Departure for England

Brunel had never forgotten his determination—expressed years before on the quay at Rouen—to visit England. In 1798 he carried out his resolve, and, setting sail from New York in January, landed at Falmouth in March. Not long afterwards he married Miss Kingdom, the English girl whom he had met in Rouen, six years before. He did not return to America but settled down in this country, where he lived for the remainder of his life.

During the next few years Brunel brought out a number of interesting inventions, including a machine for twisting cotton thread and forming it into balls. His first great work in this country, however, was the invention of machinery for making wooden pulley-blocks for the Navy, thereby superseding the slow and costly method of production by hand.

Block-making Machinery

As we saw in our December issue, a block is a case containing one or more pulleys by means of which heavy articles are easily raised or lowered. At the period of which we are writing, ships were entirely dependent on their sails, steam-engines not having then been introduced. All sails were raised or lowered by means of blocks and pulleys, and some idea of the number used in the Navy alone may be gathered from the fact that a 74-gun ship required no less than 1,400 blocks of various sizes.

Although the making of blocks might be thought to be quite a simple process, as a matter of fact it was no means easy. Any hitch in the raising or lowering of the sails of a ship might, in certain circumstances, be followed by serious results, and therefore each part of every block had to be made with the greatest accuracy. Many attempts had been made to produce blocks by machinery, but Brunel's machines were the first to be really satisfactory.

Assisted by Maudsley

Brunel had a remarkably sound knowledge of mechanics, but he was not a practical mechanic, and it was fortunate that he was introduced to Henry Maudsley—the inventor of the slide-rest for lathes—exactly at the correct time. This introduction occurred in an interesting manner. A certain M. de Bacquancourt, another refugee from France, was an accomplished amateur turner, and in passing Maudsley's little shop in London he became interested in the various articles displayed in the window. One day he went into the shop and had a long conversation with Maudsley, with the result that afterwards he was accustomed to call in from time to time to examine whatever new work was in progress. Bacquancourt was also a friend of Brunel, and when the latter mentioned that he was in difficulties in regard to finding a mechanic sufficiently skilled to carry out his designs for block-making machines, Bacquancourt described the beautiful work that Maudsley was producing, and advised Brunel to visit him. Brunel did so and found Maudsley thoroughly equal to carrying out all his ideas with the utmost precision. Ultimately the whole of Brunel's block-making machinery was made by Maudsley, the task occupying nearly six years.

From an old [*Engraving*

Sir Marc Isambard Brunel

Forty-four separate Machines

The remarkable feature of Brunel's block-making process mechanism was that it required no less than 44 separate machines. It would be tedious to describe the process in detail, but in outline it was as follows :—

Pieces of wood were first cut roughly to the size of the block, and were then taken to a *boring machine*. This bored a hole for the pin, and one, two, or three holes—as the case might be—for single, double, or treble blocks, to receive the first stroke of the mortising chisel. Next the block was taken to the *mortising machine*, which cut the mortises for the sheaves. After this the corners of the block were cut off by means of a circular saw, thus preparing the block for the *shaping machine*, which shaped the outward face of the block to its correct curvature. Finally, a *scoring machine* cut a groove to receive the binding or strapping of the block.

The blocks were made of English elm and the sheaves of *lignum vitae*, a wood obtained from a tree grown in the West Indies and in South America, its particular value being the fact that, owing to the diagonal and oblique arrangement of the successive layers of its fibres the wood cannot be split.

In making the sheaves the first step was to cut up the logs of wood by means of a circular saw into plates of the required thickness. These plates were then taken to a *crown saw*, which bored the central hole and also shaped them to a perfect circle. The sheave thus formed then went to a *coaking machine*, the cutter of which, passing around the central hole of the sheave, formed a groove for the insertion of the coak or bush. The sheave was then passed in turn through *drilling, facing, and broaching machines.* Almost all these machines were made in three different sizes to take blocks of various dimensions.

Advantages of Brunel's Invention

The advantages gained by Brunel's block-making machinery were enormous. Not only were the blocks turned out to the desired size with perfect accuracy, thus avoiding all variations due to inferior or careless hand workmanship, but the speed at which they could be constructed was very much more rapid than that of hand labour. Then again, the machine-made blocks were about thirty per cent. cheaper than the hand-made variety.

Mr. Richard Beamish, in his life of Brunel, written in 1862, gives the following striking description of the practical value of Brunel's machinery :—

"Where fifty men were necessary to complete the shells of blocks previous to the erection of Brunel's machinery, four men only are now required, and to prepare the sheaves six men can now do the work which formerly demanded the labours of sixty. So that ten men, by the aid of this machinery, can accomplish with uniformity, celerity and ease, what formerly required the uncertain labour of one hundred and ten.

"Beautiful as are the combinations and contrivances in the block machinery, and highly deserving as the inventor may be of credit for originating such labour-saving machines for the production of ships' blocks, there is a far higher claim to the admiration and gratitude of all constructors of machinery and all workers in metal. In this block machinery exist the types and examples of all modern self-acting tools, without the aid of which the various mechanical appliances of the present day could not be produced with the marvellous accuracy that has been attained."

(*Continued on page* 95)

Stamps for Sale

(*See also page* 66).

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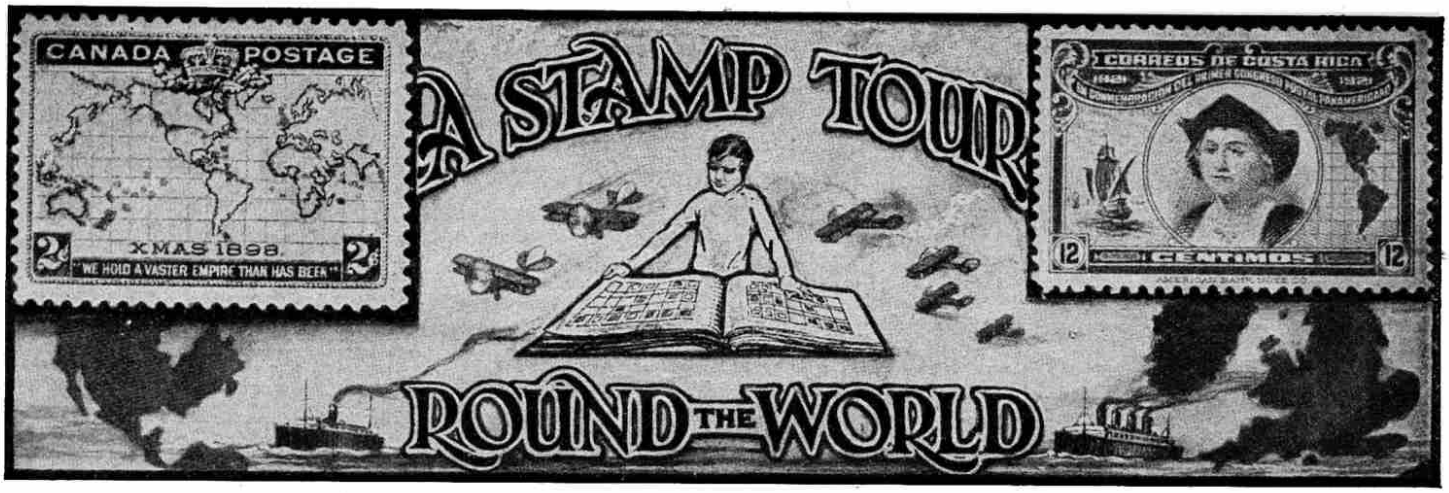

VI. SOUTH AMERICA

WE have now completed our tour of Central America, and turning our aeroplanes towards the south we regain our ship at Panama. From here we set sail southwards down the Pacific until we arrive at Guayaquil in Ecuador.

From Guayaquil we fly to see Chimborazo (Mountain of Snow), nearly 21,000 ft. in height. This is the highest mountain in Ecuador and was once believed to be the highest in the Andes, but had to give place to Aconcagua, a volcano 23,080 ft. in height, the first ascent of which was made in 1897 by Zurbriggen. Chimborazo is shown on the 1 sucre value of the 1908 commemorative issue and illustrated here. The mountain is snow-clad and believed to be an extinct volcano. Its magnificence is imposing from all points of view, but it is seen at its best from the Pacific side, where the forest rises to the snow-line, above which the mountain towers another 5,000 ft.—a cone of dazzling whiteness.

A Suspension Bridge in Peru

Returning to our liner at Guayaquil we again skirt the west coast of South America until we reach Callao, the seaport of Lima. Although Lima appears on most maps to be on the sea-coast, it is actually 7½ miles inland, standing on the left bank of the River Rimac.

Lima is the capital and principal city of Peru, and many of its buildings and monuments have been portrayed on various postage stamps of the country, notably in the 1907–8 issue. In this issue the 1 centavo value shows the Bolognesi Monument, which stands in a small square of the same name; the 5c. shows the fine equestrian statue of San Martin, the famous South American general. This statue is in the Plaza de la Exposicion. The Medical School is shown on the 20c. value, and the General Post Office on the 50c., the latter building also appearing on the 2 centavos value of the 1897 series, which was issued to commemorate its opening. The 1 sol shows the Hippodrome and the 2 soles the Columbus Monument, which, designed by the famous sculptor Salvatore Revelli, stands in the favourite fashionable walk, the Paseo Colon. This consists of long parallel drives and paths ornamented with many statues set in trees and shrubbery.

Boarding our aeroplanes we fly to Paucartambo, a town important for gold mining. It is situated on the river of the same name, being rather more than three hundred miles east of Lima. Here is a suspension bridge, which is shown on the 1 centavo value of the 1897 commemorative set already mentioned.

One of the Highest Lakes in the World

From Paucartambo we continue inland in order to reach Bolivia, which shares with Paraguay the disadvantage of possessing no coastline. Bolivia is not entirely mountainous, as is usually supposed, over half the country being composed of low-lying plains, swamps and forests.

In this country we first visit Lake Titicaca (1916, 1c.) one of the most highly situated lakes in the world, being 12,644 ft. above sea level. It is 138 miles in length and its greatest breadth is 69 miles. This lake is navigated by steamers running between various ports on its shores and the Peruvian railway port of Puno, a portion of the lake being in Peru.

About 70 miles south-east of the end of Lake Titicaca is the great Mount Illimani (21,200 ft.) with its snow-clad summit. This mountain is shown on the 5 centavos value of the 1916 issue. The 1 centavo of the same issue shows Potosi (15,381 ft.), one of the more prominent peaks in the Cachimayo range.

We now fly still further across the continent until we reach the Atlantic coast and arrive at the capital of Uruguay, San Felipe y Santiago de Montevideo, or, as it is usually abbreviated, Montevideo. This city is the chief port of the country and stands on the north shore of the Rio de la Plata.

Some Magnificent Buildings

Several views of Montevideo appeared on values of the 1895 issue. The 2 centesimos shows the Teatro Solis, or Theatre of the Sun, a magnificent building, as may be seen from the illustration on the stamp. The 3 pesos shows the Cathedral, facing the Plaza de la Constitución. Its two square towers, 133 ft. in height, with the large dome behind, make a very conspicuous landmark for a considerable distance around. The building was consecrated in 1804 and became a cathedral in 1869.

The fortress of Montevideo (1895, 2 pesos) is on an island in the bay and possesses a lighthouse with a light that can be seen 25 miles out at sea.

From Montevideo we fly up the Rio de la Plata until Buenos Aires is reached on the west bank of the estuary. Buenos Aires is, of course, the capital of the Argentine Republic and is 127 miles from Montevideo. The estuary is about 34 miles in width at this point but is so shallow that vessels can only enter the docks through artificial channels maintained by constant dredging.

Several views of this city are shown on the 1910 commemorative issue. The ½ centavo and 10 pesos stamps show monuments erected to commemorate the revolution of 1810, which resulted in the formation of the republic. The 4 centavos shows the historic fortress of Buenos Aires where Don Cisneros, Viceroy of the country before the revolution, was held a formal prisoner until he left for the Canary Islands. The 12 centavos shows the modern Parliament House at Buenos Aires.

Rosario is a river port of Argentina on the river Paraná and is illustrated on the commemorative stamp issued to celebrate the completion of the dock in October 1902. Since that time great progress has been made in extending the port by building quays, drawbridges, sheds, depots, cranes, and other appliances for handling merchandise.

NEXT MONTH:—

THE ISLANDS OF THE PACIFIC

Stamps for Sale

(*See also page* 64)

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

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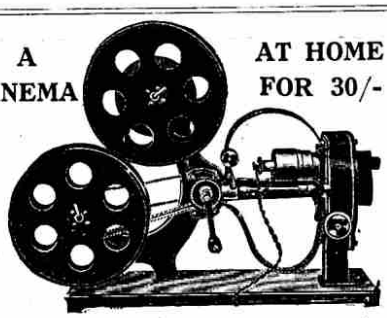

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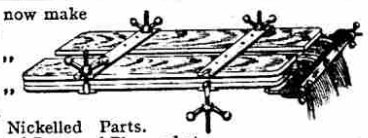

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The pages of the "*M.M.*" offer you a world-wide market. For a small charge of 10/– per column inch (2¼ inches wide), your advertisement is brought to the notice of thousands of potential customers each month. An advertisement in the "*Meccano Magazine*" will be read by over 100,000 readers in all parts of the world.

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The Stamps of Togoland

The pre-war German colony of Togo lies between the Gold Coast Colony and Dahomey, West Africa. On 7th August, 1914, the capital, Lome, was captured by the Allies, and Togoland was surrendered by the Germans on 26th August. Until 1921, two sets of stamps were on sale at the same time, the one issued by the British and the other by the French.

The British Expeditionary Force seized some German Togo stamps at Kamina, a town some 100 miles from Lome. These were sent to Lome, and overprinted there at the Catholic Mission. The overprint reads "TOGO Anglo-French Occupation" in three lines, and is found in various sizes on different stamps. Stamps are also known with the whole overprint in capitals, whereas formerly the word "TOGO" alone was in capitals, and there are several other varieties and errors, which are of interest to specialists and advanced collectors.

At first the German values of the stamps were unaltered, but later the stamps were surcharged "Half penny" or "One penny," as the case may be, in addition to the Occupation overprint.

The French overprint is the French translation of the British overprint and reads "TOGO Occupation franco-anglaise." On the German colonial stamps it appears in three lines and is found with either thin or thick letters. Stamps with the thin type were overprinted at Porto Novo, Dahomey, and those with the thick at the Catholic Mission, Lome.

In 1916 the French Colonial stamps used in Dahomey were overprinted with the same wording, but in four lines instead of the three as formerly. The currency of the country was at the same time altered from pfennigs and marks to centimes and francs.

In 1921 the same types of Dahomey stamps—but in new colours—were overprinted with the one word "TOGO," and this is the issue current to-day.

Togoland had an area of over 33,000 square miles. About one third of this is given to Britain and joined to Gold Coast, the remainder is under French protection, which commenced in 1920.

Curious Perforations

Within the last few years various curious perforations have come into use owing to the growing popularity (especially in America) of "penny-in-the-slot" or stamp-vending machines. In this country, up to the present, ordinary perforation has been used for stamps supplied by these machines, but in other countries large holes or rectangles often take the place of perforations to enable the feeders in the machine to obtain a sure hold on the stamps. These varieties are interesting and should be collected, for they show a very important event in the history of the post offices in various parts of the world.

Although it is supposed to be only advanced collectors who distinguish between the different perforations in their collections, the subject is one that is receiving increased attention from collectors in general—principally, perhaps, because some stamps have a very different value according to the particular gauge of their perforations.

RECENT ISSUES

Greece

Lord Byron Commemoratives

It is not often that an Englishman is honoured by a special issue of stamps in a foreign country, but this is the case with Lord Byron, the poet, who died at Missolonghi, Greece, on 19th April, 1824. The recently-issued set consists of two values, both engraved and printed in this country by Messrs. Bradbury, Wilkinson and Co. The 80 lepta, deep blue, shows an excellent and well-known portrait, while the 2 drachma, black and violet, shows Lord Byron entering Missolonghi, the picture being taken from a famous oil painting by Vryzaky. These stamps commemorate the centenary of Byron's death, and have been issued in recognition of his work for Greece in 1824. Both stamps are single-line perforated, and are printed on soft paper without watermark.

Russia, Western Army

Many readers doubtless possess stamps that they are unable to identify, often owing to these stamps not being included in the catalogue they are using. This applies particularly to new Europe issues, many of which are recognised by some firms of stamp dealers and not by others.

A fairly common set of stamps that falls within this category is that issued by the commander of the Western Army of Russia, which claimed independence in 1919. These stamps are catalogued by Messrs. Stanley Gibbons but not by many other firms. The set consists of eight values, 5, 10, 15, 20, 30, 50, 60, and 75 kopecks and is imperforate. All values are of the same design, showing in the centre a double-headed eagle holding a sword in one claw and an orb in the other, in colour on a white ground. Across the top of the stamp are the words РЧССКАЯ ЛОЧТА in two lines in uncoloured letters on a solid ground. At the foot in the centre is the value in uncoloured numerals on a solid ground, and at either side the word КОЛ in thin coloured letters on white.

The eagle is the same as that on the earlier stamps of Russia and very similar to that on the first issue of Bosnia and Herzegovina with which stamps these Russians must not be confused.

We have also seen the same stamps overprinted ЕДИНСТВО И СВОБОДА but no information concerning this can be obtained and it must be considered to be an unofficial issue.

Errors of Spelling

People who are able to spell correctly seem to be born, not made. There must be many of our readers who cannot recall ever having had any trouble with the spelling lesson—that bugbear of our school days. After years of struggling to master the spelling of the thousands of words that compose the English language, there comes a day when we no longer have to bother ourselves about it—we find we can spell at last. Some are not so fortunate, however, but seem fated to go through life bad spellers.

Even so, we should not expect to find spelling mistakes on postage stamps but, as it happens, they are comparatively frequent. Such renderings as "censt," "cetns," "cnets," "Pfnny," "Penge," "Peuny," "Pnney," "Pencf," "Dollaps," "Potsage," "Pcstage" and so on are quite common, and even Queensland once spelled her name "Qoeensland!"

Occasionally spelling mistakes have quite a humorous result. In the case of a certain British Colony where a native language is used, a type-setter spelled a certain overprint wrongly. The result was that it read that the reader was a thief, instead of reading that the value of the stamp was altered to one shilling!

New Zealand reveals a glaring example of a spelling mistake in the form of the 2½d. value of the pictorial issue of 1898. The stamp, which is fairly common, was first issued with the name of the lake shown as "WAKITIPU," the correct rendering being "WAKATIPU." This error necessitated a new set of dies being made, and the authorities at the same time took the opportunity of moving the words "POSTAGE AND REVENUE" from the top to the bottom of the stamp and deleted the words "MT. EARNSLAW" from the foot, this name being that of the mountain at the far side of the lake.

In Reply

B. Weir (Liverpool).—The lion on the Wembley stamps has been the subject of much discussion among philatelists. Some claim that it looks more like a mastiff! We certainly think there is room for improvement in the design.

S. Ward (Grimsby).—The Prince of Wales appears on several stamps, and a portrait of him in his young days is included in the series of Royal Family portraits issued by Newfoundland. The Prince is depicted on the 3c. stamp and Princess Mary on the 5c.

T. Martin (Manchester).—The triangular stamp to which you refer is a well-known stamp issued by the Cape of Good Hope. Prices of these particular stamps vary from 10/– to £240, which is the present catalogue price for a used copy of the 4d. vermillion, an error in colour as the correct colour is blue. We will deal with this stamp in a future issue.

N. Corlett (Brighton).—The 5c. Red Cross was issued by France on the ordinary 10c. stamp showing a sower. Monaco issued a 5c. Charity Stamp on the current 5c. issue.

L. Howard (Southampton).—The stamp you describe, showing a messenger on a bicycle, is a 10c. special delivery stamp issued by the United States.

B. Wentworth (Derby).—The figure represented is throwing the discus in the Olympic Games.

N. Davies (Douglas, I.O.M.)—The stamp you send is of no value—it is one of the common stamps recently issued and classed as "Neurope."

The Meccano Guild

A Great Fellowship of Boys

President: Mr. Frank Hornby, Managing Director of Meccano Ltd.

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

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

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

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

How to Become a Member

Individual membership of the Guild is granted to every boy possessing a Meccano Outfit who applies on the prescribed form and who promises to observe the objects of the Guild, and to wear his badge on all possible occasions.

The cost of the Guild membership badge is 7d. post free in the United Kingdom, but members abroad will be required to pay 5d. extra for registered postage, and stamps for the necessary amount should be sent along with the form of application. The Guild badge is beautifully enamelled in blue and is made for wearing in the lapel of the coat. Any boy wearing the Guild badge is at once recognised by other Meccano boys as a member of the great brotherhood of boys who have undertaken to live a clean, truthful and upright life. No introduction or ceremony is necessary between Guild members, who may be recognised at once by the badge they wear.

In addition to the badge, the President of the Guild presents each member on joining with a Certificate of Membership, measuring 7 inches by 9½ inches, and printed in orange and sepia. It is a replica of the large Club Certificate, and is intended to be framed by the Guild member and hung in his bedroom.

BADGE OF 

MEMBERSHIP.

THE THREE GREAT OBJECTS OF THE GUILD

(1) To make every boy's life brighter and happier.

(2) To foster clean-mindedness, truthfulness, ambition, and initiative in boys.

(3) To encourage boys in the pursuit of their studies and hobbies, and especially in the development of their knowledge of mechanical and engineering principles.

Every boy who joins the Meccano Guild promises to observe these three splendid objects, and to do all in his power for their furtherance.

Meccano Guild Correspondence Club

All Meccano boys have similar thoughts, share the same pleasures, and are stimulated by the same ambitions. They long to tell other Meccano boys of their own schemes and ideas, and to exchange notes about Meccano model-building and all the other things in which boys delight. This is now made possible through the medium of the Guild Correspondence Club, which places members of the Guild in communication with other members in some other part of the country or abroad.

To those boys who are interested in foreign languages, the Correspondence Club provides a medium for their advancement in this respect, for correspondents can often be found for them in many foreign countries, particularly in France. For those who do not desire to correspond in a foreign language, but who wish to know something of the life of boys abroad, correspondents are found in the Colonies or in English-speaking countries. Full particulars of the Club will be sent on application.

MECCANO CLUBS. Meccano Clubs are founded and established by enthusiastic Meccano boys under the guidance of the Guild Secretary at Headquarters. At the present time there are over 100 active Clubs in various towns and villages in this country, as well as many Clubs Overseas and in foreign countries. Each Club has its Leader, Secretary, Treasurer and other Officials, all of whom, with the exception of the Leader, are boys. The Club's year is divided into four sessions, namely, Autumn, New Year, Spring, and Summer, and an appropriate programme is arranged for each session. The details of meetings, etc.—ranging from rambles, cycle-runs, and cricket matches to model-building competitions—are left to the decision of the Club Leader or the Club Committee.

If the nearest Club to you is too far away for you to join, or if you are unable to join for any other reason, consider the possibility of forming a new Club in your own district.

EXISTING BOYS' CLUBS

In many cases Meccano sections have been started by existing Clubs for boys, and they devote an evening a week to the hobby. The Guild makes no distinction between these Clubs and Clubs solely devoted to Meccano, and the Certificate of Affiliation is granted, provided that the boys are members of the Meccano Guild and conform to the Guild regulations—at any rate so far as the Meccano section is concerned. Meccano boys who are already members of such Clubs and who are desirous that an evening a week should be devoted to Meccano, should suggest this to the Secretary.

AFFILIATION CERTIFICATE

When a Club has been formed, has a recognised Club-room, an adult Club Leader and at least six members, the Leader applies for affiliation with the Guild. Subject to the approval of the President this is granted, and the Club is then able to avail itself of the privileges of affiliation. The Club is presented with the Guild Certificate of Affiliation with the Club's name inscribed on it. It is printed in orange and sepia, measures 23 inches by 18 inches, and is specially suitable for framing and hanging in the Club-room.

STARTING A MECCANO CLUB

A Meccano Club is usually started at the suggestion of some enthusiastic Meccano boy having friends who are also interested. The boys get together and decide to form a Club, following which they interview some adult and ask him to become their Club Leader.

At first the meetings may be held in the houses of the members, each of whom will perhaps take it in turn to entertain the Club. As a temporary arrangement this is to be commended, but the time comes when the members feel that the increased membership necessitates greater accommodation. The Club Leader and Secretary then approach some authority (such as a Church, Chapel, or School, or perhaps the local Y.M.C.A.), whom they know to have a suitable Club-room, arrangements are made and the room is taken. Perhaps a small rent is asked to cover heating and lighting, and this is covered by the Club subscription, which the members will be requested to pay, the rate per week being fixed by the Leader and the Committee. The authorities at the Church, Chapel, or School are often only too pleased to provide a suitable room and, where desired, to assist in the appointment of a Club Leader to guide and control the work of the members. The factor which counts most in the success of the Club is the enthusiasm and earnestness of the members themselves. No Church or School authority has yet resisted an appeal where the objects are so desirable and beneficial as those of the Meccano Guild, if the appeal is properly presented.

In all these arrangements the Guild Secretary at Headquarters renders every assistance, writing where necessary to the local authorities, and doing all he can to help the formation of the Club.

Those who contemplate starting a Club should write to the Guild Secretary, and on receipt of 2d. in stamps to cover postage, he will send them a copy of " How to Run a Meccano Club," a special booklet of helpful suggestions.

THE GUILD RECRUITING CAMPAIGN. The President wants every Meccano boy to be a member of the Guild, and wishes every member to do his utmost to help to make the objects of the Guild widely known. With this end in view a special Medallion is presented to each member of the Guild who obtains three new recruits, and an additional mark of merit is given when nine more members are recruited. Full particulars of the Recruiting Campaign will be sent on request.

SPECIAL MERIT MEDALLION
(Reverse)

SPECIAL AWARDS TO CLUB MEMBERS

Every encouragement is given to members of Clubs to do good work and to prepare short lectures or papers on subjects in which they are particularly interested. The experience and confidence in himself a boy thus gains in standing up before his friends and reading a paper of his own composition will prove invaluable to him, and to still further encourage this excellent work, a Special Merit Medallion is allotted to each club and awarded to the member who delivers the best paper. Further particulars of this scheme may be obtained from Headquarters.

SPECIAL MERIT MEDALLION
(Obverse)

HOW TO JOIN. Intending members should write to the Secretary of the Meccano Guild, Binns Road, Liverpool, asking for a membership form; this should be signed and returned to Headquarters with remittance of sevenpence if they live in the United Kingdom, to cover cost and postage of the Guild Badge and Certificate, or one shilling to cover the extra postage if they live abroad. On receipt of these applications, they will be enrolled as members of the Guild.

RECRUITING MEDALLION

The Secretary's Notes

At this period of the year I receive many requests from Club Leaders and Secretaries for advice as to the best method of making an Exhibition pay. In some cases it is desired to hold only a Club Exhibition, for the purpose of raising funds for purchasing additions to the Club's Meccano or Sports Outfits, or for starting some new feature such as an Air Rifle Shooting Section. In other cases the object is to take part in a bazaar or other effort to raise funds for some local church or charity. Every Meccano Club is capable of producing an interesting layout of Hornby Trains and various Meccano working models, and the inquiries I receive usually take this form :— "Which Meccano models can be used to provide a paying side show ?" There are several models that can be usefully employed for this purpose, but the two that have proved most successful in actual practice are the Silhouettograph (Model No. 634) and the Meccanograph (Model No. 708).

Models for Exhibitions

The Silhouettograph invariably proves a great attraction, and by charging a small fee for each person to be silhouetted, quite a considerable sum may be collected. The writing arm is extended by means of 11½ inch Axle Rods and Couplings for a distance of roughly 3 ft. The person whose head is to be drawn is asked to sit with his profile exactly opposite the writing board, which should be a smooth piece of wood or very stout cardboard. The outer end of the writing arm is then passed steadily round the profile, while a piece of pencil lead, secured in a coupling on its other end, executes a likeness upon a sheet of paper pinned to the writing board. The pencil is held against the paper by slight pressure exerted through a spring. With a little practice quite good results may be produced, and it is surprising how eager people are to be silhouetted when they have seen the likenesses obtained by their friends.

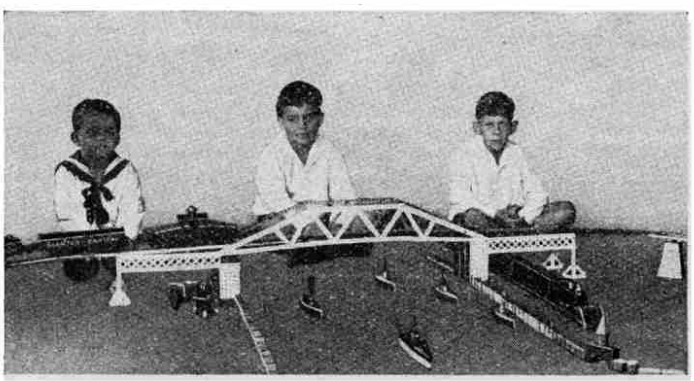
How to use the Silhouettograph

Little need be said about the Meccanograph. Its popularity is remarkable wherever it is exhibited, and it is frequently the means of opening people's eyes to the wonderful possibilities of the Meccano system The attention of passers-by should be first attracted by means of a few elaborate designs placed in a conspicuous position. These designs are much more striking if they are executed in different coloured inks or worked up with water colours. Once interest has been aroused, it is generally quite easy to persuade people to pay a small fee to make a design of their own, and it is a common thing to see people become so fascinated by the machine that they make quite a number of designs before they can tear themselves away!

Meccanograph Designs

In addition to these models, simple competitions may be made a source of small, but useful profit. A very successful scheme is to fill a glass jar with Meccano Nuts and Bolts and invite people to guess the exact number in the jar. A small charge is made for each guess, and a small prize is awarded to the one guessing the exact number, or if, as is extremely likely, nobody guesses the correct number, to the attempt coming nearest to it. Another useful competition on similar lines consists of fitting up a model and inviting people to guess the total number of holes in the strips composing it, or the number of Nuts and Bolts used in its construction.

Simple Competitions



Three Dutch Meccano Boys enjoying a Merry Christmas

Davenport (Stockport) M.C.

The Davenport (Stockport) M.C. was formed in November, 1922, and in April, 1923, became affiliated with the Guild. Last autumn the Club assisted at a bazaar in aid of the funds of the local church, and made £25 by exhibiting a complete layout of a Hornby Railway together with various Meccano models.

Great keenness has always been shown by the Club to view as many local factories and works as possible on the principle that "seeing more is learning more." During the summer months members keep together by arranging cycling tours and camping out, and last year the Leader, Mr. Main—a most energetic and enthusiastic worker—took the boys to camp for their holidays. Such outings are always popular, and it is hoped that similar arrangements will be made this summer if we are favoured with any!

Our photograph shows some of the members on an outing last summer.

Week by week, I receive letters from members of the Guild Correspondence Club showing the valuable work the Club is doing in regard to building up lasting friendships between Meccano boys in all parts of the world. A recent illustration of this is afforded by the case of an English boy and a Dutch boy. These boys corresponded regularly for two years, and although they had never seen one another, such a strong friendship sprang up that the Dutch boy's parents invited the English boy to spend a holiday with them. The English boy did so and had a most delightful time, and now that the two boys have become personally acquainted they are the greatest possible chums. But for the Guild Correspondence Club it is certain that these boys would never have heard of each other. Such instances as this are by no means rare, and I urge all Guild members to consider seriously the idea of joining the Club this year.

Forming Lasting Friendships

During the past few months I have been very interested to note the rapidly-growing number of girl Meccano enthusiasts. Many of these girls have already joined the Meccano Guild, but others appear to have an idea that they are not permitted to become members. I wish to take this opportunity of stating that this is not the case. Girls have as much right as boys to join the Guild, and I shall welcome their applications for membership. There is also not the slightest reason why girls' Meccano Clubs should not be formed and run satisfactorily. The larger clubs might consider the possibility of following the example of the Claygate Club in having a separate section for girls. The girls' branch of this club has over 30 members. If this idea appeals to any Club Leader I have no doubt the Leader of the Claygate Club, Mr. Haynes, would be glad to give any information.

Girls and Meccano Clubs