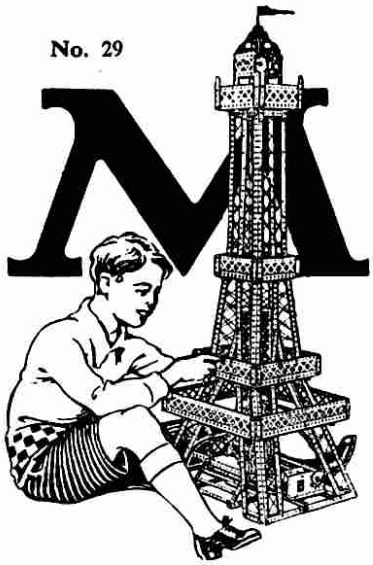
THE NEXT NUMBER OF THE "M.M." WILL BE PUBLISHED ON 15th JANUARY

No. 29 DECEMBER, 1922



MECCANO MAGAZINE

PRICE 1d

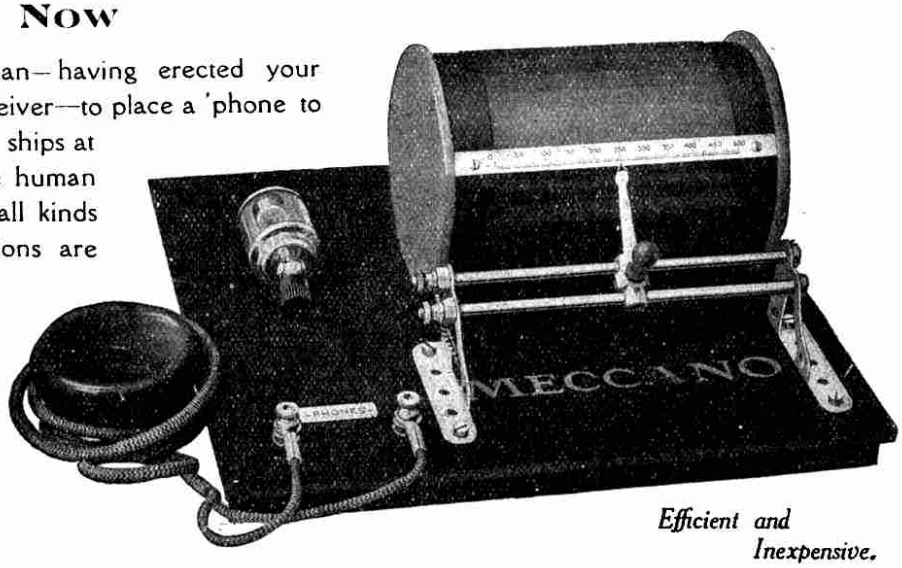
PUBLISHED IN THE INTERESTS OF BOYS.

The Meccano Crystal Radio Receiving Set

For Broadcasting and Morse Reception.

START RADIO NOW

WHAT can be more delightful than—having erected your aerial and connected it to your receiver—to place a 'phone to your ear and hear land stations signalling to ships at sea and ships signalling back; to hear the human voice in song and speech, and music of all kinds with perfect clearness. Broadcasting stations are now installed in London, Birmingham and Manchester, and we understand that the erection of additional stations in Cardiff, Newcastle, Plymouth and Edinburgh (or Aberdeen or Glasgow) is being proceeded with, and that these stations will be in operation shortly.



Efficient and Inexpensive.

The Meccano Crystal Receiving Set will receive telephony (i.e. music and speech) up to 20 or 30 miles. It is not a toy but a piece of scientific apparatus with which any boy may spend hours of delight and enjoyment "listening in." It has been thoroughly tested and has received with great clearness music and speech from broadcasting stations.

The Meccano Receiving Set is low in cost and is complete in itself, ready to be connected to any aerial. A complete Aerial Set is sold separately. After you have purchased this set there is no additional expense (with the exception of a Post Office licence, which costs 10/–), for the concerts are broadcasted free of charge.

Every boy should see that he has a Meccano Crystal Receiving Set for Christmas. Our new booklet, *The Meccano Crystal Receiving Set*, explains Radio so that every boy is able to understand how simple is the reception of broadcast telephony and Morse messages. This booklet will be sent post free to any reader of the "*M.M.*" on application.

PRICES:

Meccano Crystal Receiving Set complete	55/-
Aerial Set (including antenna, lead-in and aerial wires, and insulators) ...	12/6

FOR a long time past there has been much unemployment in the country, and often you boys must have wondered why some men are out of work and hard up, whilst others are in steady jobs and doing well. I think I can tell you. When bad times come in business and an employer finds it necessary to reduce his staff of workers, the first to be sent away are those who are the least efficient—those who have not made themselves indispensable to the business and who can be most easily spared. The men retained are the key men of the business, as you might call them—those who have mastered their jobs thoroughly and without whose services the business would seriously suffer.

Two Classes of workers.

Some day every boy who reads these lines will be in one of these two classes, and to-day is the time to decide which. Believe me, you cannot put off the decision, because you are at this moment heading straight for a business career of some kind. The habits of industry or laziness, keen observation or mental dullness, that you are forming now will go with you when you start in business.

Which Class is Your's?

It is not by listening or by reading that we become proficient, but by doing. You can learn off by heart the finest book on cricket ever written, yet when you stand at the wicket you will probably leave after the first straight ball. The way to learn to play cricket is to keep on playing. You can certainly gain much from books and by listening to experts, but proficiency comes only after hard practical work.

Learning by doing applies just as much in business and in all the serious things of life, as in sport. If you are learning a modern language it is only by speaking and reading it constantly that you can become proficient. The way to learn to write and to draw is to write and draw, and to keep on writing and drawing. The same principle holds good in business. It is not the dreamers, and the listeners who go farthest, but the "doers."

We Learn by Doing.

You will learn by and by that one of the greatest pleasures in life is in striving and working for something worth having, and that the moment you get it the pleasure has gone. The hunter derives his pleasure from the chase, the stalking, the lying in wait, and the final rounding up of his quarry, and not from the dead animals he may bring home. Any successful man will tell you that the happiest time in his life was when he was working hard and building up his reputation and good name, and that by the time he had realised

Build for Success.

Editorial *(continued)*.

that success was his, all the thrill had gone. The boy or man to be envied, and whose happiness we may well covet, is the one who is building up, building up every day, forming his character on definite lines, gaining experience, shouldering responsibility after responsibility, and planning and striving to make a name for himself. The most enjoyable and most profitable game in the world is work.

Three Interesting Competitions.

Which are the Six Best Books for Boys?

Which are the six best books for boys is a difficult question to answer, for everything depends upon the taste of the individual reader.

We are anxious to find out just exactly what type of books readers of the "*M.M.*" prefer—whether they prefer fiction to any other class and if so what type of fiction: school stories, adventures, historical novels, detective tales, etc. For this purpose we announce a Competition in which entrants should send a list of what they consider are the six best books for boys.

The books should be arranged in order of merit and the first prize, a No. 1 Hornby Train Set, will be awarded to the reader who places the six books in the order nearest to that order of merit voted for by all readers participating in the Competition.

The voting must be on post cards only and they should reach the Editor of the "*M.M.*" before the 31st January next. Mark your postcards "Best Book Competition."

Which is Your Favourite Magazine?

We are anxious to find out just what class of reading our readers like best, and we are therefore offering a prize of a No. 1 Hornby Train Set for the best article (consisting of not more than 100 words) on—

"MY FAVOURITE MAGAZINE AND WHY I LIKE IT."

Any weekly or monthly magazine printed and published in Great Britain may be dealt with but not the *Meccano Magazine*. This Competition will close on 31 December, 1922. Mark your envelope "Favourite Magazine Competition."

I also invite my readers to send me a list of which in their opinion are

THE FOUR BEST MAGAZINES

for boys published in this country, in what they consider to be the order of merit. A Meccano Clockwork Motor will be awarded to the boy who places the four magazines nearest to the list of best magazines, as voted for by all the readers participating in this competition.

The voting must be on postcards only, which must be received not later than 31 December, 1922. Address postcards Meccano Ltd., Binns Road, Liverpool, and mark them "Best Magazines Competition."

£250 IN PRIZES.

Meccano Model-Building Competition

Cash prizes to the value of £100, Meccano Outfits, Inventors' Accessory Outfits, Hornby Trains and Zulu Trains to the value of £150.

These prizes will be awarded in the next Meccano-building Competition, for which every Meccano boy should enter. As was the case last year, the Competition will be divided into three sections (1) for boys under 10 years of age, (2) for boys between 10 and 14 years of age and (3) for boys over 14 years of age.

There are no restrictions and no entrance fees. Full particulars and entry form will be sent on application. The closing date for the Competition will be 15th April, 1923, for entries from the United Kingdom, and the 30th May, 1923, for entries from Overseas.

Ask your dealer, or send to us, for an Entry Form.

A New Invention.

A new process has been invented by Mr. H. Bolton of Sheffield for joining tram rails, which will ensure a perfectly smooth and unbroken track. This improved process of welding makes it possible to dispense with joints, except for crossings. The method is already being put into operation in Sheffield, whilst negotiations are in hand with Johannesburg, Calcutta and other big cities abroad with a view to their adoption of the new process.

A Great Airman: The Late Sir Ross Smith

and his

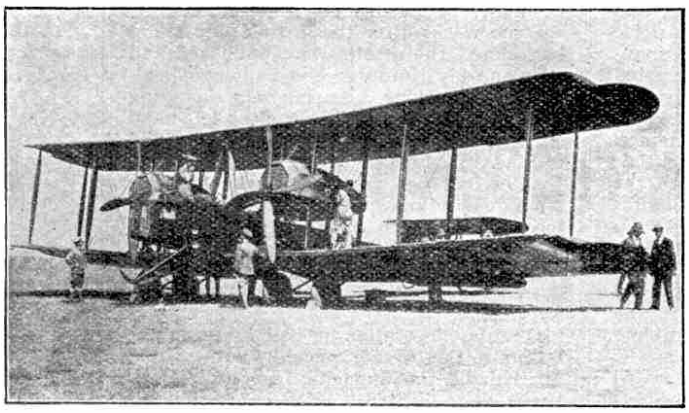
Flight from England to Australia.

(Concluded)

Flight Round the World Proposed.

Soon after landing in Australia, Sir Ross began to discuss the idea of a "round-the-world" flight. Finally he and his brother made up their minds to sail for England by different routes, so that they might look for the most favourable course for the suggested project. Both arrived in England and compared notes, and it was soon decided to make the attempt.

When the aviators had parted company in Australia, Sergeant Bennett had eagerly promised to join the next adventure that the brothers might contemplate. The bond of attachment between the brothers and their former companion and engineer was exemplified in a cable inviting him to join in the "round-the-world" flight. Immediately on receiving this cable, Sergeant Bennet gave up his work. Two days later he was on his way to England.



Photograph by] *[Messrs. Vickers Ltd.*

The late Sir Ross Smith and his companions landing in Australia immediately after their great flight from England.

The Vickers-Viking.

As on the former occasion, the machine chosen for the new enterprise was designed by the famous Vickers Firm, to whom we are indebted for some of the fine photographs that have illustrated this serial.

The Vickers Viking-Amphibian is the latest product of aircraft research, combining the best features of aeroplane, seaplane and flying boat. It is a single-engined biplane, the central hull resembling a boat, but fitted with a special chassis for ground landings. The machine is thus able to alight on, or take-off from, either land or water, a characteristic that marks a most important advance in aeroplane construction. The machine is driven by a 450 H.P. Napier engine of a type known to the British Air Ministry as the "Lion." The Napier "Lion" was originally designed to satisfy military conditions but since the cessation of hostilities has been used for commercial purposes. On the Vickers-Viking the engine drives a "pusher" air screw and is supported above the hull by struts in the main-plane strut-way.

The dimensions of the machine selected were:—Length overall, 34 feet. Height overall, 14 feet. Span, 50 feet. Accommodation for six passengers was provided and a petrol capacity of 90 gallons. Full speed near sea level was 105 m.p.h.

Details of the Flight.

Such a type of aircraft as this, was obviously the only one to be considered for a flight that involved a journey of 21,500 miles, along the coast lines, over vast bodies of water, and across the Atlantic Ocean. It was hoped to complete the flight in 240 flying hours, spread over a period of about three months. It was planned that the last stage should be from Newfoundland to Ireland, allowing 18 hours for the Atlantic crossing. By this arrangement the airmen calculated that by leaving Newfoundland (some day during July) at 2 o'clock in the afternoon, they could complete the flight to London by noon the day following. An additional tank was to be fitted for the Atlantic crossing, thus bringing the petrol capacity up to 390 gallons.

The Fatal Test-Flight.

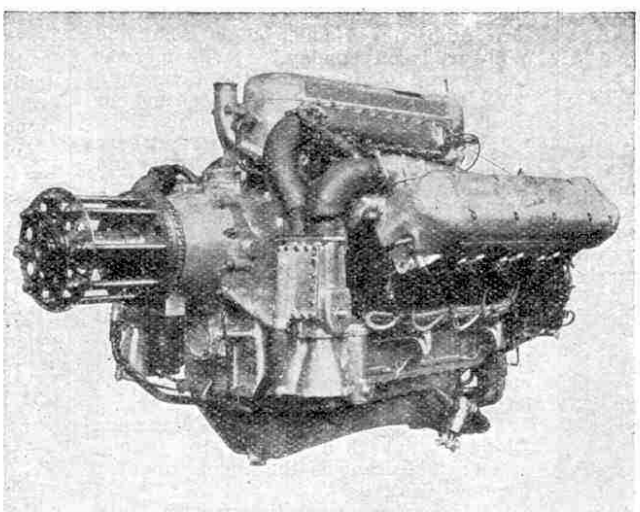
The programme fixed upon 25th April for the commencement of the flight from Croydon Aerodrome, and preliminary flying tests of the machine were being made. On the 13th April Captain Corkrill, chief test pilot of Messrs. Vickers Ltd., having flown the Amphibian for half-an-hour, handed it over to Sir Ross for a test flight. Sir Keith, who was also to have taken part in this trial, arrived at the aerodrome a few minutes too late, and the flight was made without him.

Then came the fatal accident. In turning, flying speed was somehow lost and the machine commenced a spin, from which the pilot was unable to recover. The spin ended in a nose dive and, with a sickening crash, the great Amphibian, for which so much had been planned, was a mass of wreckage on the Brooklands Motor Track. Sir Ross, the pilot, was killed instantly in his seat and Sergeant Bennett, the faithful engineer, received such terrible injuries that he died a few minutes after being picked up.

Heroes of the Air.

Thus a nation and a great Empire mourned the loss of two of her bravest sons, and to that glorious list of heroes who have given their lives to the conquest of the air were added two more names. They will go down to posterity as examples of courage, endurance and sacrifice in the cause of knowledge and progress—the names of two men who set out to conquer and to do big things. For these reasons alone we are proud to be able to pay a tribute to their memory in the pages of the "*M.M.*"

THE END.



Photograph by] *[Messrs. Napier & Sons, Ltd.*

The 450 H.P. "Napier Lion" Aero Engine.

It is claimed that this engine has more British records to its credit than any other aero engine.

Giant 'Planes.

Great importance is attached to recent developments in the construction of giant aeroplanes. An aeroplane with accommodation for 25 infantrymen, with full equipment, including machine guns, has been built at Coventry for the British Army. It is driven by two 450 h.p. Napier "Lion" engines and has a speed, fully loaded, of 100 miles per hour.

The U.S. Navy also are building a giant aeroplane that is to have a wing span of 150 ft. The power unit consists of three 400 h.p. Liberty Motors in streamline and geared to an 18 ft. three-bladed propeller. The 'plane will have a maximum speed of 110 miles per hour and a cruising radius of 3,000 miles. It is claimed that an all-metal monoplane equipped with a similar power plant would be capable of a speed of 150 miles per hour, for 20 hours with 12 passengers aboard.

How Jimmy Thornton Made Good

By MASTER HARRY R. WICKLINE.

Jimmy Thornton's dad had been an engineer at a great steel works in his native town of Bridgeville, but a fearful accident occurred one day, resulting in his losing his life along with several other workmen. Jimmy helped to support his Mother and little sister and was employed as an office boy with a firm of motor vehicle manufacturers. He was very much interested in engineering and in his spare time would go into the shops and watch the expert mechanics assembling the motors. Engines, transmissions, gear-boxes and differentials grew from a collection of parts into the splendid and powerful " Forward " motor trucks under the efforts of the workmen.

In his leisure hours at home Jimmy would get out his Meccano Outfit and build many models, striving to imitate in miniature the " Forward " truck. The lessons he had learned in the assembling shop were well remembered, for as he wanted to be a motor engineer, he had done all that he could to learn the fascinating business. Henderson, the foreman, took an active interest in Jimmy, giving him many hints and other assistance. Every man on the staff, from the chief draughtsmen downwards, was a friend of Jimmy's. He soon knew the " Forward " truck by heart and was able to explain everything about it that an ordinary person could wish to know and in addition many things that only an expert would think of enquiring about.

One day Jimmy received a long official-looking envelope.

At the time this story is written Jimmy's attention was centred on the big Meccano Competition, and his great desire was to win a prize. He often thought eagerly of the cash prizes that would mean so much to him, for his father, good and kind though he had been, had left them little with which to fight the battle of life.

At his home the model on which he had been working was now completed and Jimmy had the satisfaction of seeing it work just like its great counterpart. One day he took his model to the works and showed it to Henderson who looked at it and said :—

" Lad, you are a genius. It is indeed the ' Forward ' truck in miniature."

After having received this commendation, he hopefully filled up his entry form for the Meccano Competition and despatched it wishing that it might receive the first prize, for that would mean a great deal to him and his Mother. Meantime he worked hard, and day after day dreaming of becoming a motor engineer. His dreams did not stop at that, however, but soared until he saw himself chairman of a Motor Company of his own !

Some weeks after the great Competition had closed the results were published and then one day Jimmy received a long official-looking envelope, bearing the inspiring name " Meccano Ltd." in the top left-hand corner. Eagerly he tore it open and found inside a cheque for £15. When he read that he had won the second prize with his truck his joy knew no bounds. His success in this, his first competition, did not " turn his head " however, but he continued to work as hard as ever, every day considerably improving and adding to his knowledge.

One day just after he had taken in the letters to the private office, he noticed that Mr. Knight, the Managing Director, seemed to be very excited. Such expressions as " That order cannot be lost " and " Where is Dobson ? " filled the air. [Dobson was the Sales Manager for the " Forward " Company.] " The boss must have important business on hand to be so excited " thought Jimmy as he went about his duties. Later in the morning he was summoned to Mr. Knight's office and sent with a telegram recalling Mr. Dobson, who was travelling in Scotland. On coming back Jimmy saw that the Managing Director was pacing the floor and the Works Manager and two other Directors were in consultation with him.

Passing the door of the office, Jimmy heard Mr. Knight saying :

" We cannot lose this deal. It will bring us more business, for the firm from whom this enquiry comes are the largest wholesale grocers in the country. To sell them a fleet of a hundred ' Forward ' Trucks will bring our firm to the favourable notice of many other truck buyers. Mr. Addison is to be here in the morning and if Dobson cannot be here to talk to him, the deal is off. We must have some one to explain the working details of the truck to Mr. Addison ; Henderson is sick and Williams is on holiday." [Williams was the general engineer for the Company.] " We simply cannot lose this deal and our rivals across the way are after it also."

Jimmy waited to hear no more but very timidly opened the door of the office and said in a weak voice :

" Perhaps I can help you."

" *You !* " exclaimed the three in chorus, " What do you know about trucks ? "

" Very little," said Jimmy, " but I do believe I can explain the truck to Mr. Addison. I won a prize for a model of it from Meccano Ltd., Sir, and it worked just like the real truck. Henderson also taught me a whole lot about it. Please, Sir, do let me try."

" H—m—," mused the Managing Director, and then turning to Jimmy, asked : " Meccano is the engineering toy for boys, isn't it ? "

" Yes Sir," returned Jimmy with pride, " you can make anything with Meccano."

" Before we give you permission," said the Managing Director," we should like to see this model of your's."

So Jimmy went home to fetch his model. He explained it to the Managing Director in whose mind no doubt lingered. It was the " Forward " truck in miniature.

" Wonderful ! You are a real mechanic," said the Managing Director. " You shall talk to Mr. Addison."

Jimmy explains his model of the "Forward" Truck.

The next morning Mr. Addison called and Jimmy, dressed in his best, was ready to receive him. Jimmy showed his Meccano model of the " Forward " Truck and explained it so well that in an hour's time the Managing Director had the firm's order for a hundred trucks.

After the interview Mr. Addison, talking to Mr. Knight, asked :

" Where did you get that lad ? "

On being told, Mr. Addison said : " He knows your truck from A to Z."

" Yes," said the Managing Director smilingly, " he is our youngest engineer."

From that time Mr. Knight took an active interest in Jimmy who learned the business so thoroughly that to-day Mr. James Thornton, though only twenty-six years of age, is Assistant Manager of the " Forward " firm and bids fair to reach a higher position before long. In speaking of his success to his friends he would say " It is all due to Meccano. Without my Meccano I wouldn't be where I am now. Boys, if you want to be something, get a Meccano Outfit and with it study the principles of engineering."

He was only voicing the sentiments of a million other happy Meccano boys many of whom will surely become enrolled amongst the world's greatest engineers.

Note These Dates.

The following are the dates on which the undermentioned Meccano Competitions close (for full particulars see page 2) :—

1922.		
31 Dec.	" My Favourite Magazine."	
31 ,,	" The Four Best Magazines."	
1923.		
31 Jan.	" Third Photo. Competition."	
31 ,,	" The Six Best Books."	
31 March.	Inter-Club Competition (Guild).	
15 April.	£250 Model-building Competition.	
30 May.	£250 Model-building Competition (Overseas).	

RADIO SECTION

The Thermionic Valve.

THE INVENTION THAT MADE WIRELESS TELEPHONY POSSIBLE.

The following, the third instalment of an article specially written for the "Meccano Magazine," explains the principle of the Thermionic Valve and describes Professor Fleming's application of the "Edison effect" to Radio. The final instalment, which will appear in the next number of the "M.M.," will explain how Dr. Lee de Forest, an American Scientist, further improved the valve.

(Continued)

Edison Suggests Wireless Communication.

Desiring to perfect his incandescent electric lamp, Edison did not immediately pursue his discovery of the peculiar action, which became known as the "Edison effect." That he realised its importance, however, is demonstrated by the fact that he took out a patent protecting the discovery. The scientific vision of this remarkable inventor is made clear when we find that his patent specification illustrates a suggested means of wireless communication and includes diagrams of receiving wires that are not unlike the aerial antennæ now in general use.

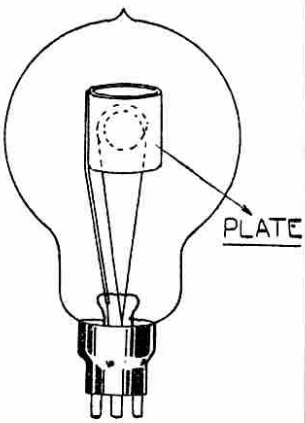


FIG. 3.

It is interesting to remark in passing that Edison's patent was subsequently acquired by Senator Marconi, who was at that time developing his inventions in wireless telegraphy.

The idea of the evaporation of electrons from hot bodies was not completely established until 1912. From this theory is drawn the important conclusion that while electrons (or electronic energy) can freely leave the surface of a hot metal, they cannot leave the surface of a metal that is cold.* We thus see why it is that the electrons cannot leap from the plate to the filament, for the plate is a cold metal from which the free electrons cannot escape.

* By "cold" we mean any metal below a dull red glow]—an important fact for those who use valve sets to remember.

"Sounds" that we cannot Hear.

Edison's effect was adapted by Professor J. A. Fleming for use in Radio work. Those of you who have studied electricity know that there are two types of current called "Direct" and "Alternating." They are called thus because in Direct current the electrons flow in one continuous direction, but in Alternating the current changes direction alternately. It is currents of the latter type that are dealt with in Radio reception, for the transmitting station disturbs the ether by sending out alternating oscillations, which fall upon the aerial of the receiving station.

These oscillations are much too rapid to become audible in a telephone earpiece, for just in the same way that our eyes cannot perceive the ultra-violet rays of the spectrum, the mechanism of the human ear cannot deal with such extremely rapid vibrations. To render the oscillations audible, therefore, the current must be changed from Alternating to Direct. I wonder if you have already guessed how Professor Fleming showed this might be done by using Edison's discovery?

Prof. Fleming Adapts Edison's Discovery to Radio.

We have already seen that the plate in the carbon lamp attracts negative electrons, but repels positive electrons. If we place the plate and the filament of such a lamp in the circuit of an alternating current, it is clear that only the negative electrons will be allowed to leap from the filament to the plate—the positive electrons being repelled by the plate. Thus only half the alternating current will pass through the circuit. The electrons of which that half is composed will be travelling in one direction only, thus forming a direct current, which—as Professor Fleming pointed out in 1904—can be made audible to the human ear with a telephone receiver.

Those of you who understand the working of a motor-cycle engine know that the inlet valve opens and allows petrol-vapour to pass from the induction pipe to the combustion chamber. Immediately the gas has passed, the inlet valve closes and the explosion takes place. The inlet valve allows the gas to pass only in one direction, and the positively-charged plate acts in exactly the same way. Now you will understand how it is that a modified electric lamp comes to be called a Valve.

Not only did Professor Fleming show how the Edison Effect might be applied to Radio and used as a Detector, but he also brought the plate nearer to the filament and altered its shape. Edison has used a small rectangular plate, but Professor Fleming introduced a cylindrical plate, or one that surrounds the filament as shown in figure 3. It will be clear that by doing this the efficiency of the valve was greatly increased, for by surrounding the filament, the plate captured the electrons that leave the filament on all sides, whereas Edison had only captured a few on his small plate. The shaded portion in Fig. 4 shows the area in which no electrons were captured with the plate as used by Edison.

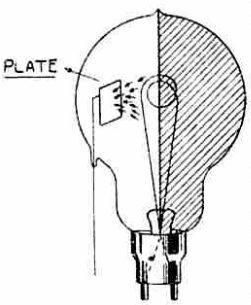
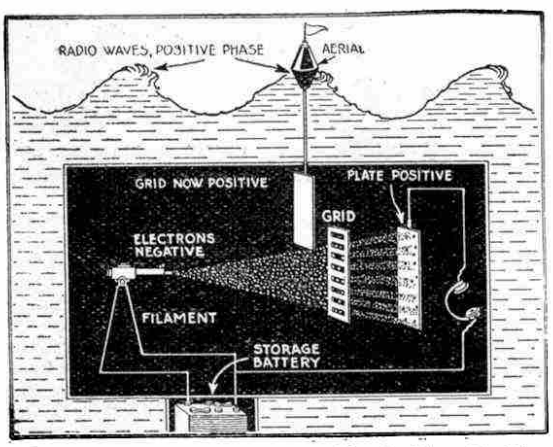


FIG. 4.

The apparatus may, in fact, be compared with a machine-gun (the filament) which is bombarding a target (the plate) with bullets (the electrons). These bullets must pass through the grid before they reach the target, the oscillations from the aerial causing the grid to act as a spasmodic shield. When the positive half of the aerial current reaches the grid the negative electrons are allowed free access to pass to the target (see Fig. 5).

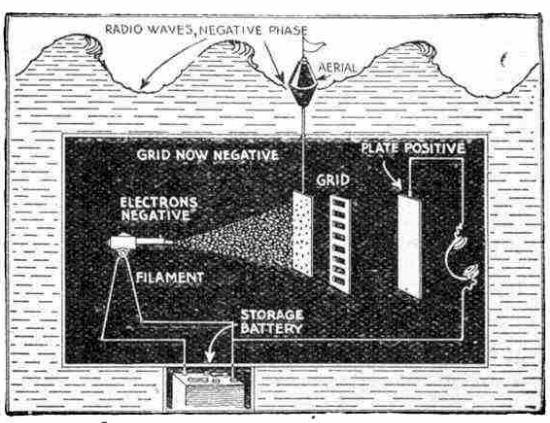
(To be concluded.)



By courtesy [*Popular Science Monthly.*

FIG. 5.

The filament of a valve resembles a machine gun, electrons taking the place of bullets.



By courtesy [*Popular Science Monthly.*

FIG. 6.

The grid of a valve acts as a shield between machine gun and target.

W. G. Symons (London).—(1) Crystals must always be of high resistance and so should telephone head pieces. (2) Single ear-phones vary in resistance from 1,000 to 2,000 ohms. (3) Two ear-phones connected in series would have a combined maximum resistance of 2,000 to 4,000 ohms. (4) Meccano ear-phones are each wound to a resistance of 2,000 ohms. This resistance has been chosen as being the most suitable for general purposes.

Lawrence Salter (Southall).—You have omitted to give your address.

W. G. Symons (Streatham, London, S.W.16).—The tuning buzzer is sometimes helpful in getting a correct wave length adjustment quickly. However the Meccano Crystal Receiver allows one to tune-in so quickly to the desired wave length that it is doubtful if a buzzer can be considered of great importance.

B. Spencer (Hull).—The cost of the Meccano Receiving Set has been kept as low as possible in order to place a set within reach of the average boy, rather than introduce too costly an apparatus. Refinements can always be added later.

J. G. Shennan (Aberdeen).—(1) Your specification refers to a fixed or blocking condenser which would not allow you to "tune-in" or modify incoming signals. (2) A broadcasting reception licence is necessary. This is obtainable from the Post Office, and it costs 10/-.

C. Woods (Diss, Norfolk).—We are experimenting with a Valve Set, and it is hoped to place this on the Market in the near future. It will be announced in the "*M.M.*" when ready. The fact that your aerial is enclosed on all sides by houses will not prevent you receiving, but it is better to get as open a position as possible. You should be able to obtain triangular flat plates from your dealer, but if you are unable to do so send your order here for attention.

O. Moore Ede (Rugby).—(1) Every Meccano Radio Set is thoroughly tested but it would not be practicable to give a guarantee of reception of signals and broadcasting in a defined range. There are so many factors to consider, such as atmospheric conditions, insulation, and position of aerial and the like. (2) Do not use a gas pipe for earthing. Can you not attach your earthwire to a water-pipe, or failing a water-pipe, to any metallic fitting running to the ground.

R. J. Thomas (Bath).—(1) I do not know of any Broadcasting Station within a radius of 25 miles of Penmachno. (2) The large and powerful Station at Carnarvon is not a Broadcasting Station; it transmits code messages on high wave lengths. (3) You could receive telephony from Manchester by using a Valve Set. The Meccano Valve Set will shortly be on the market, and will be announced in the "*M.M.*" in due course.

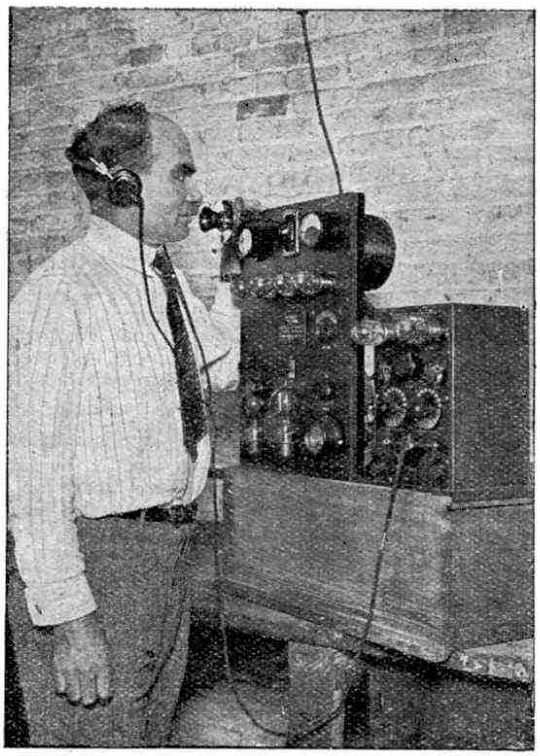
David Lloyd (London, E.3).—An article will shortly appear in the "*M.M.*" dealing with the construction of aerials.

O. Hill (Brimington).—(1) With a Valve Set it should be possible to hear concerts broadcasted from both Manchester and Birmingham. (2) An announcement will be made in a forthcoming issue of the "*M.M.*" giving full details of the Meccano Valve Set. (3) The Meccano Crystal Set will receive on wave-lengths of up to approximately 500 metres.

N. W. Hopkins (Gathurst, near Wigan).—(1) The Mersey Docks and Harbour Board speak to the Bar Lightship, usually on a wave-length of 440 metres. (2) It does not follow that messages transmitted on a given wave-length will be received in a certain radius on apparatus capable of accepting that wave length, unless the incoming message has retained its power. (3) The broadcasting station at Manchester will probably transmit on a wave-length of 360–400 metres, employing sufficient power to allow clear reception within a wide radius. (4) I am unable to say whether there will be a broadcasting station at Liverpool—we should all welcome one.

Thomas Hine (London, S.E.16).—The Meccano Crystal Set is a tested instrument in every sense of the word and gives clear reproduction without distortion.

T. Banbury (Leyton).—Tuning coils wound on a hollow cylinder may be used with or without a condenser, as a sliding connection partly serves the purpose of a condenser and thus "tunes-in" to obtain the desired result. Many tuning coil receivers are fitted with a condenser in addition to the slide arrangement in order to give finer tuning. It is only with cylindrical coils that a slider can be used, condensers being used for other types of coils.



Photograph [*Radio Broadcast.*

Dr. Lee de Forest Broadcasting in America.

Dr. de Forest's Latest Invention

Dr. de Forest, whose name is well-known in connection with the perfecting of the Thermionic Valve, has recently invented a new Radio Transmitter that will operate from the socket of an electric lamp.

Up to the present it has been necessary to have special apparatus to generate the current to operate the transmitter, but this difficulty has also been overcome in the new invention.

The details of the apparatus have not yet been made public, but we are able to reproduce a photograph of Dr. de Forest using his new invention to broadcast to thousands of listeners in.

William Pringle (West Stanley, Co. Durham).—I am very interested to know that you have made a Wireless Set with Meccano parts, and that it works splendidly and should be glad to have full particulars.

J. C. Moore-Hills (Felsted, Essex).—Your nearest Broadcasting Station (London) is outside the range of a Crystal Set for telephony. You should however, be able to receive telegraphy transmitted from distances up to 100 miles. In your case, this should enable you to receive code messages from ships at sea.

W. Anderson (Preston).—Much depends upon the power of the sending station. You could not listen-in to the Hague Concerts with a Crystal Set—to receive them a Valve Set is required. If your ear-phones are both of the same resistance (denoted by figures stamped on them) you could have them made into a double head-set, and use them on your Wireless Set. If one is stamped say 1,000 and the other 1,500, the resistance will be unequal, and they would not be suitable for use as a double head-set. From what you say, it would appear that your ear-phones are for use with an ordinary household short-distance telephone. They may, therefore, be unsuited for use as wireless phones.

J. Harris (Clovelly, N. Devon).—I am not quite clear as to your meaning when you ask whether you "must have an Outfit as well as a Meccano Radio." There is in preparation a one valve amplifying unit to be connected to the Meccano Crystal Set.

R. Greaves (Derby).—I am interested to hear that you are making a complete wireless installation at your school and I shall be glad to hear that this has been successful.

Frank Hyde (Liscard).—The nearest Broadcasting Station will be Manchester, which distance is outside the range of a Crystal Receiving Set. You should, however, be able to listen-in to ships at sea, and receive telegraphy transmitted from distances up to (and perhaps over) 100 miles. You will be interested to know that the Bar Lightship sends telephony daily upon a wave length of 440 metres, which is within the range of the Meccano Crystal Receiving Set, and several amateur stations transmit telephony in Liverpool and district.

B. Wellwood (Hastings).—The Meccano Crystal Receiving Set conforms to the requirements of the Postmaster-General, and is designed to receive broadcasting on the wave-length stated, but allowing a margin, up to approximately 500 metres. Aerial outfits are supplied separately.

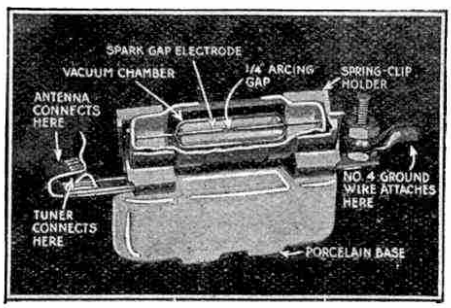
F. Donald Cawley (Hale).—The Meccano Receiver is a single 'phone. Two of these however, could be attached together by means of a 12½" Meccano strip, thus forming double head-gear.

(*Continued on page* 12.)

Trapping a Flash of Lightning.

In nearly all large Radio stations, and in many amateur stations also, a device called a "lightning arrester" is used to prevent possible damage to the apparatus by lightning.

The principal part of a lightning-arrester is known as a "Vacuum Gap." This consists of two wires separated by about ¼" and enclosed in a tube from



Photograph by courtesy of "Popular Science Monthly."

which the air has been exhausted. When lightning strikes the aerial it is conducted to the lightning-arrester. Here it comes to the vacuum gap, and, finding it easier to jump the gap than to follow the fine wire in the receiving instruments (which offers a greater resistance) it is directed to the ground wire, and so is earthed without doing any damage.

In America, insurance companies require all Radio Sets with outdoor aerials to be protected by an approved device.

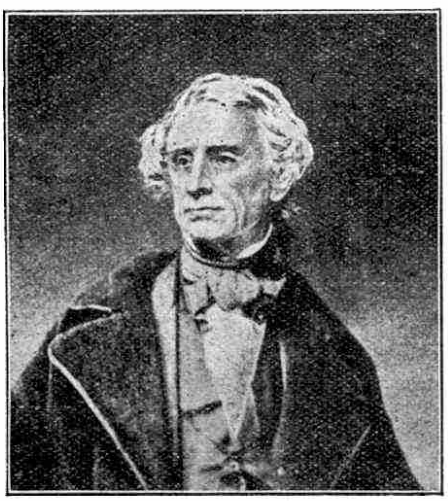
Signalling by Means of "Dot and Dash"

AN INVENTION WITH FAR-REACHING BENEFITS.

No matter how loudly one may shout, or how powerful one's lungs may be, the human voice cannot carry for more than a few hundred yards in normal circumstances. As the transmission of messages by the human voice is thus very limited in its range, other means have had to be adopted for communicating over a distance. One of the earliest means of signalling was by beacons, or bright fires, on hill tops.

Warning Beacons.

Beacons were generally used as alarm signals and in this way a warning of invasion, or news of the movements of some enemy, was conveyed from hill to hill, and so over a wide area of the country, in a comparatively short time. The earliest beacons were simply stacks of wood on high places; later, pitch was often employed. Watchers were always on duty at these beacons and horsemen were stationed at most of them to give notice in daytime of an enemy's approach, for the fire could only be seen at night. Beacons were maintained by a tax levied by the Sheriff of the County. We are reminded of these early signal stations by the names of several high points, such as Brecknock Beacon, Beamsley Beacon, etc.



Professor S. F. B. Morse.

(We are indebted to Messrs. Constable & Co., Ltd., for permission to reproduce this engraving, which appears in "S. F. B. Morse, His Letters and Journals.")

Smoke Signals.

Savages often used pillars of smoke for signalling. These they controlled by breaking up the ascending smoke clouds with a blanket, as they rose from the fire. This caused a disjointed pillar to appear in the sky, becoming visible over a wide area. The different appearances of the smoke had various meanings, according to a prearranged code. Even to-day some native races communicate news over surprisingly long distances, by beating in a peculiar way on their *tom-toms*, or native drums.

In all forms of signalling a code is necessary. Although language itself may be described as being a code for the expression of ideas, it is not a successful code unless it is common knowledge to both the sender and the receiver of a message. A particular language say English—is of no use to a Frenchman, who wishes to send a message and has no knowledge of English.

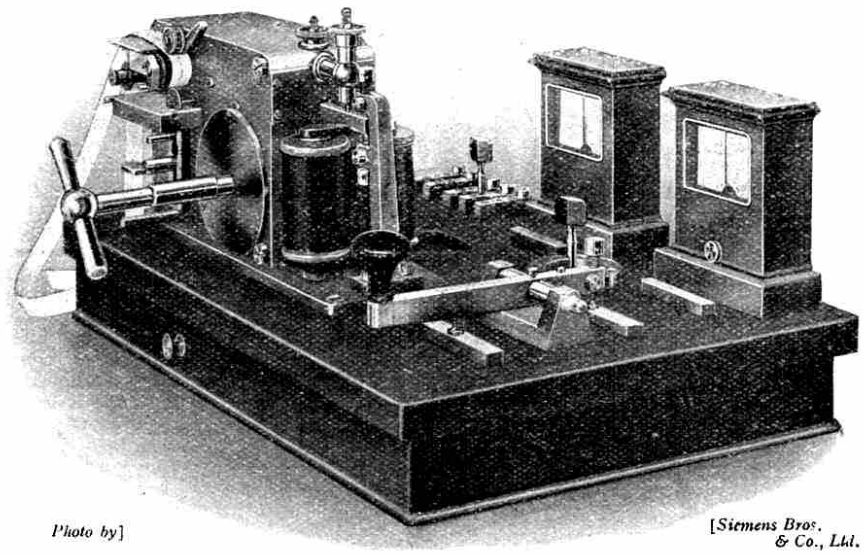


Photo by [*Siemens Bros. & Co., Ltd.*

Telegraph Sounder Instrument.

Showing Sender Key and Sounder. Messages may be received automatically on the tape recording instrument also shown.

The Morse Code.

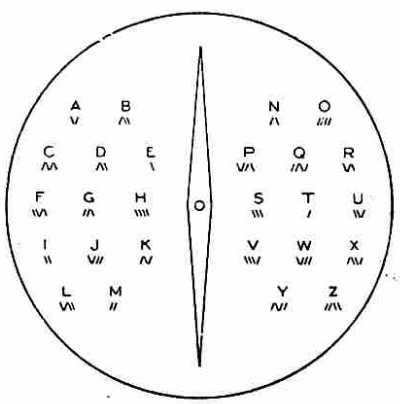
When it was discovered that electricity could provide a powerful medium for the transmission of messages by means of sound, it was also realised that it was very necessary to arrange a code for the interpretation of these sound signals. After many experiments the code ultimately adopted was one in which different combinations of telegraphic sounds represent letters of the alphabet. This code is called the Morse Code, because it was invented by S. F. B. Morse, an American artist and inventor. The use of the Morse Code is now universal, irrespective of language.

Professor Morse was born at Charleston, Massachusetts, on 27th April, 1791, and graduated at the University of Yale in 1810. He visited England to study painting with Benjamin West and in 1813 was awarded the Gold Medal of the Adelphi Society of Arts for the "*Dying Hercules*," his first effort in sculpture. Returning to New York in 1813 he became Professor of Design at New York University.

Although an artist of attainment and distinction, Professor Morse was also deeply interested in science and was an ardent student of chemistry. He devoted much time to electrical and galvanic experiments and after a visit to Havre, in 1832, conceived the idea of an electro-magnetic telegraph, the working of which he demonstrated in 1837. An attempt to patent the invention in England was unsuccessful and a bitter and prolonged controversy ensued with Professor Wheatstone over the priority of the invention, Wheatstone claiming it as his own.

"Sounder" and "Needle" Receivers.

Morse developed his code for use in connection with his system of telegraphy and this was quickly adopted in most European countries. It is largely upon the Morse code that our modern system of telegraphy has been built up. Sound signals—"dots and dashes"—are sent over an electro-magnet wire and are received on one of two types of instruments. In the first, or "sounder" type, the sounds are noted by the interval of silence between one and the next. A short sharp sound is described as a "dot," and one three times as long as a "dash."



In the second, or "needle" type, a metal needle, pivoted in the centre, is made to deflect to the left or right. On each side of it is fixed a piece of metal with different tones. The ear of the receiving operator is trained to detect the dissimilar notes, caused by the needle being deflected and striking either of the pieces of metal. These sounds represent either dots or dashes.

The accompanying diagram shows the alphabet with the deflections of the needle illustrated under each letter, giving the combinations of dots and dashes representing each. It will be noted that the

Signalling by Means of "Dot and Dash" *(contd.)*

Photo by] [*Siemens Bros. & Co., Ltd.*

Single Needle Telegraph Instrument.

letters "E" and "T" are represented by a single deflection to the left and to the right respectively. The combinations throughout are arranged in order of simplicity, according to the number of times that the letters they signify occur. The particular arrangement of letters in the English language renders the needle system specially applicable for use with it.

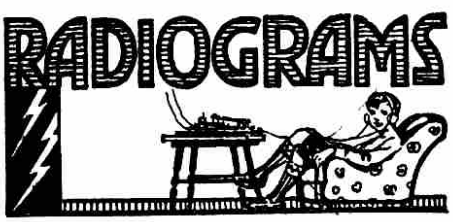
Those of our readers who are Boy Scouts will know that the Morse Code is used not only in signalling by sound, but also in visual signalling. Visual signalling may be carried out by means of flags, the heliograph, or, at night, by lamps. Indeed, whenever a distinction can be made between a dot and a dash—a short and long interval—the Morse Code may be used to spell out messages.

Learning Morse.

The many boys who are taking an interest in Radio will no doubt wish to learn the Morse Code, so that they may be able to read messages from ships at sea, as well as from land stations which transmit only in Morse. The best way to learn Morse is by constant practice with a buzzer such as may easily be made from Meccano, as described in the Electrical Manual. By accustoming the ear to the sound intervals and letter combinations, a knowledge of the code is gradually acquired. Gramophone records of the Morse Code may also be obtained and afford an easy and inexpensive method of practising the reception of messages at different speeds.

Professor Morse's Signature

Although code practice may, perhaps, appear to be dull work, it must be remembered that there is drudgery in all work. The best fun in the world is to work with a zest and to find each day that you can do something that you could not accomplish the day before. After a little practice at code you will become increasingly expert until the time comes when you will be able to pick up messages on your receiving set and astonish your friends by interpreting into an intelligible message what seems to them only a confused jumble of noises.



An important orchestral concert, given by the New York Philharmonic Orchestra, was recently broadcasted by Radio. The concert was first transmitted by special wire to the broadcasting station WJZ at Newark, New Jersey (a distance of about 20 miles) from whence it was amplified and broadcast.

* * *

The concert was enjoyed at Headquarters of Meccano Inc., at Elizabeth, N.J. It was particularly interesting to our New York representatives to hear the wonderful music reproduced with great clearness of tone by the Meccano Crystal Receiving Set.

The concert itself was performed to 10,000 persons in the New York Stadium and by means of Radio it is estimated that it was heard by over half a million people.

* * *

Experiments with Radio for the transmission of police messages in America are reported to have proved a complete success. It is proposed to equip the eight high-power cars used by the Detective Department in Chicago with both sending and receiving sets.

* * *

During Radio experiments recently conducted on a train at San Francisco, a concert was received so clearly that passengers on the train were able to dance to the music. The train was equipped both with receiving and transmitting apparatus and, in spite of rain and thunderstorms, constant communication was maintained with the broadcasting station 100 miles distant.

* * *

The American liner "*Leviathan*" is now being reconditioned and refitted. When completed its 740 cabins will each have a Radio Receiving Set installed.

The Manchester Broadcasting Station is now transmitting nightly but not at present on Sundays. The wave length is 385 metres and the power approximately 1,500 watts.

On a recent evening the programme was as follows: — 5.55 p.m. Calling-up. 6, Children's Story. 6.15, News. 6.30, Children's Story. 6.50, Pianoforte Recital. 7.30, Entertainer. 7.35, Fashion Notes. 7.50, Short Lecture. 8 to 9.10, Operatic Records. 9.15, Late News. 9.25, Dance Music. 10, Final Announcements and "Good-night."

* * *

Broadcasting may be heard in the London area from Marconi House during the evening. The wave length is 369 metres and the call letters 2 L O. The power used is about 1,500 watts.

News is broadcasted at 6 p.m., concert at 8, late news 9, and a second concert at 9.30 p.m.

* * *

Broadcast may now be heard every evening from the Birmingham Broadcasting Station at Witton. The power is about 1,500 watts and the wave length 425 metres. The call signal 2 W P. The programme begins at 6.30 p.m. with a concert.

* * *

Broadcast is sent out from the Eiffel Tower, Paris, from 6.25 to 6.50 p.m., when a concert (in French) is transmitted. The wave length is 2,600 metres, the power 4,000 watts and the call signal L O.

* * *

The Russian Government is to undertake the organisation of broadcast concerts, speeches, and lectures.

* * *

Amateurs in this country and in France, Holland and Germany will endeavour to pick up messages transmitted by wireless amateurs in Canada and the United States. The tests will be carried out until the 21st instant., transmission being made from midnight to 6 a.m.

* * *

Owing to disturbances from "atmospherics" the concerts broadcasted every Thursday from the Hague will be discontinued. Whilst these concerts have been badly jammed, the Sunday concerts have been received successfully all over the country and will therefore continue to be given.

* * *

Amateurs in London and district may hear during almost any evening the following amateur stations sending out telephony on wave lengths between 200–300 metres. After each station we give the call letters:—

Park Lane, London ...	2 B Z.
Blackheath	2 F Z.
Snaresbrook, E.	2 K T.
Purley	2 K Z.
Hammersmith	2 L W.
Walthamstow	2 O N.

The Secretary's Notes.

By the time that Guild Members read these lines they will be anticipating many Christmas activities. They will realise with a start that the old year has nearly passed and that Christmas is almost here. Already many correspondents have written telling me of the increased Meccano joys that the coming Christmas will bring them. Others are anticipating the ever-welcome holidays, when school books will be put away and the days are free for frolic and fun. I sincerely hope that all anticipations will be realised and that the New Year will bring happiness and success to every Guild member.

Christmas Greetings.

The first of the busy Winter Sessions—now drawing to a close—has proved very successful. The Guild has been increasingly active this Session. Not only have many new Clubs been formed, but existing Clubs have engaged in many new activities. At the moment the majority of Clubs are preparing for Concerts, Exhibitions, or Displays for the Christmas Holidays. At the same time the ordinary Club work goes merrily on, the members meeting together on club nights for model building, lectures, or some other interesting programme arranged by the Club Leader.

Close of First Session.

The Club Membership Cards—the issuing of which was announced in the September "*M.M.*"—have now been available for some time. The new Card is very similar to that of last year and the majority of Meccano Clubs have already received supplies. Every member of an affiliated Club may obtain a card from his Club Secretary. Any Club requiring further supplies should apply at once.

Membership Cards.

As announced in the last issue of the "*M.M.*" the Recruiting Campaign is again in full swing. In this connection I should like to impress upon members how essential it is that their names and addresses should appear on the back of each recruiting form as, otherwise, there is no means of recording their recruits. When a member has recruited three members a handsome Medallion is despatched to him. If he then obtains six additional recruits—making nine in all—he returns his Medallion to be engraved with his name and the words "Special Award." I shall be pleased to send further particulars on request.

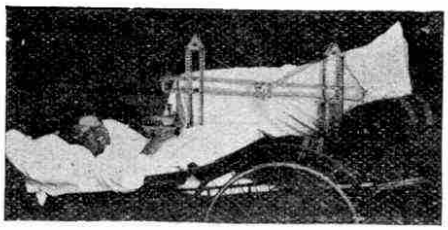
The Recruiting Campaign.

In my "*Notes*" last month I drew attention to the fact that two Cash Prizes of £5 and £3 will be awarded for the best models built by Meccano Clubs during the Winter Session. The conditions of entry are that the model should be the joint work of the Club members and that it must be constructed at the Club meetings. There is no restriction as to the size or type of the model or to the number of parts used in its construction. The model itself is not to be sent in, but either a clear sketch or photograph submitted. The models will be judged by the President of the Guild, Mr. Frank Hornby, and the closing date of this Competition is 31 March, 1923.

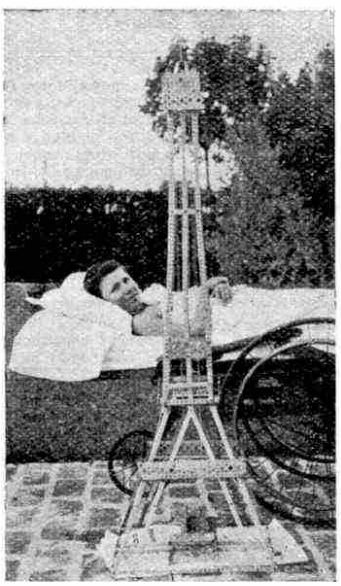
The Inter-Club Competition.

One of Meccano's Million Boy Friends.

A Happy Meccano Boy in S. America.



Here are two photographs of Master George Campbell who lives in Buenos Aires, South America. He is a most enthusiastic Guild member, and despite the fact that he is at present unable to walk, he has succeeded in establishing quite a successful Meccano Club which will probably be affiliated with the Guild very shortly.



Master Campbell is a keen Meccano model-builder, and spends a good deal of his time in following his hobby. He has built many fine models, including the model of the Eiffel Tower, shown above. He has joined the Guild Correspondence Club, and takes the *Meccano Magazine* regularly, and is thus a real up-to-date Meccano boy, whose bright cheery letters it is a pleasure to read.

Short reports of Club doings are printed in this column. Should any Guild member desire to join any of the Clubs mentioned he should write for particulars to the Club Secretary, whose name and address is given.

Fairway (Bexhill-on-Sea) M.C.—The members are still all keen and enthusiastic. Mr. Granger, B.Sc., a local gentleman, is displaying great interest in the Club and he has kindly promised to take the chair at some of the meetings. A successful Winter Session is anticipated. *Secretary:* Master W. C. Bradbrook-Chissell, 1, Wickham Avenue, Bexhill-on-Sea.

Buckfastleigh M.C.—Affiliated last year, this Club has recommenced activities. The Leader is Mr. A. Chivall and a Club-room has been kindly provided by the Vicar, the Rev. J. Lucas. Several friends are taking a great interest in Club affairs and altogether the present Session promises to be even more successful than those held hitherto. *Secretary:* Master H. Parsons, Bell Cottage, Buckfastleigh, S. Devon.

Kilmarnock (Riccarton) M.C.—A successful Exhibition was held recently and a number of interesting models were on view. Parents and friends were invited and nearly £1 was added to the Club funds. The Club continues to make good progress in every way. *Secretary:* Master A. Todd, 96, Campbell Street, Riccarton, Kilmarnock.

St. Paul's, Hammersmith, M.C.—Under the direction of Mr. Paulus, who is interested in mechanics, electricity, and wireless, this Club has every prospect of holding two very progressive and enjoyable Sessions. A very fine display held recently interested the Mayor, and other local friends. *Secretary:* Mr. V. J. Scott Warrell, 41, Bridge Road, Hammersmith, London, W.6.

Holy Trinity (Blackburn) M.C.—Good work is being done and the members have commenced to prepare for the Concert and Exhibition, to take place next Spring, at which it is probable that the Meccano Play "*Nonsense Nana*" will be produced. *Secretary:* Master J. Catlow, 183, Whalley New Road, Blackburn.

1st Belfast M.C.—A very successful Concert was held recently and it is hoped to purchase a No. 6 Outfit for the general use of the Club in the near future. Arrangements are being made to secure a Camp for the use of the members during the Summer months. At present there are over sixty members. *Secretary:* Master J. Sinclair, 39, Oakland Avenue, Bloomfield, Belfast.

Clubs Recently Affiliated.

Swaffan M.C.—Established in connection with the Swaffin Road Boys' School, by enthusiastic boys under the supervision of one of the staff, Mr. J. Lever. *Leader and Secretary:* Mr. J. Lever, Swaffield Road L.C.C. (B.) School, The Grove, Wandsworth, S.W.18.

Chard M.C.—Now has sixteen members and since inauguration there has been a full attendance each night. An interesting syllabus has been drawn up, including model building, lectures, competitions, etc. *Secretary:* Master Frank Macey, 17, Ashfield, Chard, Somerset.

Mount Gould (Plymouth) M.C.—Meetings held every Tuesday night. The membership stands at sixteen, and with a Club Leader who is an engineer, I feel sure that rapid progress will be made. *Secretary:* Master Donald Frost, 28, Carfrae Terrace, Lipson, Plymouth.

Woodville (Thornton Heath) M.C.—Formed in connection with the Sunday School attached to the Woodville Road Methodist Church and already good progress has been made. *Secretary:* Master B. Morley, 12, Liverpool Road, Thornton Heath, Croydon.

Limes School M.C.—Meetings held every week and the Club which was organised by scholars at the Limes School is steadily increasing in size and usefulness. *Secretary:* Master E. T. Lean, The Limes School, Croydon.

Roan School (London, S.E.23) M.C.—This is another School Club and an interesting programme is being arranged and will, I feel sure, meet with the approval of all the members. *Secretary:* Master A. H. Savage, 144, Werlanger Road, New Cross, London.

Clubs Not Yet Affiliated.

Hanson (Bradford) M.C.—When this Club is permanently established affiliation will be granted. The present membership stands at fifteen, and the Club Leader, Mr. J. R. Whitworth, 107, Curzon Road, Bradford, will be pleased to welcome new members.

Petone (N.Z.) M.C.—This Club is being run under the temporary leadership of Mr. G. H. Harrison. Meccano boys living in Wellington should get into touch with the *Leader:* Mr. G. H. Harrison, 63, Hutt Road, Wellington, New Zealand.

Brierley Hill M.C.—A Club is being formed here and any boys who are interested should communicate with the *Secretary:* Master C. Lee, The Cottage, 1, Pensnett Road, Brierley Hill, Staffs.

Mossley Hill (Liverpool) M.C.—Master Jack Hesketh, 23, Oakdale Road, Mossley Hill, Liverpool, is endeavouring to start a Meccano Club in that district. Meccano boys in the district are invited to call and see Master Hesketh.

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.

J. Aspin (Birmingham).—(1) Ideas for new parts are made clearer if instances of their applications are given. What uses have you found for the suggested ratchet gears? (2) We already list a Lattice Girder Bridge in conjunction with the Hornby Train series and have under consideration the introduction of a signal unit for Hornby Trains.

D. Wilman (London, N.).—See the first part of our reply (above) to J. Aspin, Birmingham. What uses have you found for the suggested "free wheel" piece?

F. E. R. Nunn (Colchester).—(1) The great obstacle to a constructional spring motor is the handling of the spring. Serious accidents often occur in the dissembling and assembling of a spring unit in other than expert hands. (2) The universal coupling enables a joint in shafting to be made at varying angles. Your suggested spring coupling would not ensure a positive drive.

M. Demont a Montigny—(En-Arronaise Aisne).—Connecting two face plates with double angle strips of the desired length will give a fairly good representation of an engine boiler. It is rather a difficult matter to standardise curved sections.

Herbert Lee (Bridport, Dorset).—We are continually increasing our range of rolling stock for Hornby Trains. We suggest you apply to your dealer for our latest list.

M. Bordenane (Neuilly, S. Seine).—The theory of your hinged coupling is alright, but unfortunately it is not a practical article of manufacture.

Eric Hart (Hove).—Ball bearings for wheels of small dimensions are not practical. Moreover, they would be too expensive.

A. J. Gibbs (Leytonstone, E.)—Your suggested ball race certainly contains possibilities. We shall go into the matter very carefully.

J. H. Wilson (Dowlais, Glam.).—We shall give careful consideration to your suggestion for fixing a boss to the rack segment.

G. T. Taylor (Marlow).—Models of cars and lorries vary so in size that a standard radiator is not feasible.

Geoffrey W. Dobson (S. Ealing).—(1) Our Electrical Manual will be revised shortly and the principle of the two-way switch will be dealt with in detail. (2) In Model No. 2, Fig. 2, there is also an insulating washer between the switch arm and the plate at 5. (3) By not insulating the negative terminal on the motor the convenient method of framing one side of the motor is possible. This method is adopted in the latest type electric trains.

Martin MacFarlane (Plymouth).—Sorry, but afraid we do not follow your suggestion for a curved strip.

J. Street (Fenton, Staffs.)—(1) We now include in our list of parts detachable discs for attachment to face plates. This should give you the size of flanged wheel for which you ask. (2) If the possibilities of cam wheels develop we shall certainly introduce them. (3) We should be interested to hear of any use you have found for the tapped gear wheel. (4) Your suggested modification to the eye piece, making it capable of being used with a 12½" strip, is sound, and we shall go carefully into the matter.

Douglas Heathfield (Johannesburg, S.A.).—We have introduced a flanged disc somewhat on the lines of your suggestion.

E. Thompson (York).—Rails in Gauge 1 will be issued shortly.

T. A. Bosomworth (Bridlington).—If circumstances permit, we hope to be able to issue a turntable next year.

John Morris (Shinfield, near Reading).—The ½" pitch sprocket wheel you suggest departs from our standard and we could not manufacture it.

Gillie Kowitz (Muldu, Queensland, Australia).—The present spring may be attached by its loop to a strip with a nut and bolt by simply extending the last coil a little.

M. Roesqueyrous (Bordeaux).—We have yet to find sufficient scope for large circular plates to warrant their inclusion in the Meccano system.

Gordon Phillips (E. Croydon).—(1) We doubt the advantages of 18½" and 24½" strips. Up to the present we have found no scope for them. (2) Increased length of rod may be easily effected by the use of the coupling. (3) What are the particular advantages of an isosceles triangular plate?

Stanley Hale (Abingdon).—What uses have you found for the suggested curved strip?

M. Vuillemin-Beaune (Cote d'Or).—(1) A 3" pulley wheel with a rubber ring gives a very good representation of an automobile wheel (see our model Motor Chassis). (2) We think the interior triangular bracket you suggest may have some uses and we shall give it consideration.

John C. Potts (Queensland).—The placing of the boss inside the flange of the flanged wheel would be disadvantageous on account of the inaccessibility of the set screw.

Sidney Heckford (Colchester).—(1) The present 1½" pulley may be used as a loose pulley by leaving the set screw unsecured. (2) We do not see any advantage in a smaller fly wheel. (3) The difficulties of wire stays are their inadaptability to varying lengths, their method of tightening and securing. (4) We have adopted string as being the most convenient agent for driving.

L. Pariente-Oran (Algerie).—(1) We are at the moment experimenting with an escapement constructed with existing Meccano parts. It is being used in a model clock we are designing and has proved very successful. No doubt it would be adapted to the other uses you mention. (2) We already demonstrate an electro magnet in our Electrical Manual.

Rene Castellan (Marseille).—We are sorry, but we do not quite follow your description of the Meccano rail system you have devised. Send us a little sketch.

John C. Morton (Belfast).—We do not advocate the making of track from Meccano parts, as it is not altogether satisfactory.

G. Doulet-Gonesse (Seine et Oise).—It would scarcely be worth while introducing a special sewing machine needle, unless it could be used with an actual working model.

E. Raffells (Anfield, Liverpool).—(1) We deprecate the adverse criticism of the engineers to whom you have submitted your models. We have on record numerous high tributes to Meccano from eminent engineers and scientists, many of whom employ the Meccano System in their experimental work. (2) See our reply above to G. Speight, Sheffield, re bearing. (3) We do not quite follow the suggestion contained in your Fig. B. Also we should be interested to hear of the application you have found for the suggestion in Fig. D.

J. Petitdemange (Neuilly, Seine).—We think that curved girder sections might be useful and we shall consider the idea.

Jack McCaskill (Gairloch, Ross-shire).—(1) A crane drum may be made from two face plates connected together by means of double angle strips of the required length. (2) If we issued a double action steam cylinder, we should have to issue the remainder of the model and as an independent item it would be useless.

John King (Greenwich, S.E.).—We shall give consideration to your suggestion for making braced girders 2½" wide with a centre hole in the latticing.

H. Wright (London, S.E.).—See our reply (above) to John King, Greenwich, re braced girders.

R. Clarke (Woking).—Our latest type of electric motor is fitted with an armature axle of standard size.

Michael Petras (London).—We shall go carefully into the question of providing the bobbins with a means of attachment to Meccano parts.

M. Broc (Arras).—(1) The occasions on which the suggested crank head would be used are so few that it would scarcely be worth introducing it specially. (2) Regarding your second suggestion, would not a short rod with a collar and set screw, to act as the head, serve the same purpose? Further, the threaded pin could be used where a short length rod is required. (3) We have under consideration the introduction of single angle strips which would give the formation you suggest.

Harry C. Key (Calcutta).—We are continually increasing the range of rolling stock of the Hornby Trains and the type of wagon you suggest may be included at a later date.

Austin Broomhead (Birmingham).—You will find that rack strips (No. 110) will serve the purpose of a rack rail.

L. D. Ricketts (Kennington, S.E.11).—We scarcely think it necessary to manufacture a pulley wheel with a deeper groove than that already in existence. For all general purposes we have found that the present depth of groove meets all requirements.

J. W. Walton (Northants).—(1) The part you suggest for the pump arm and plunger may be made with a strip, a strip coupling and a rod. (2) Steps for motor cars, wagons, etc., may be made by attaching either a 1" reversed angle bracket (No. 124) or a ½" reversed angle bracket (No. 125) to the sides of the chassis.

Second Photographic Competition Results.

Photo by [*F. W. Osborne.*

The Nave.

We have pleasure in announcing the results of the above, the names of the prize-winners being as follows:—

Section 1.—Master F. W. Osborne, 50, Earlsdon Avenue, Coventry.

Section 2.—Master G. Rennison, East View, Seaton Delaval.

Section 3.—Master F. E. Paul, 15, Albert Grove, Southsea.

These boys are to be congratulated on the excellence of their work, Master F. W. Osborne's interior view of a Church being a particularly fine study in light and shade. "The Reaper" with the team of patient horses is a splendid piece of outdoor work, whilst "The Harbour, Naples," is another well-taken view.

The first prize, a No. 1 Hornby Clockwork Train Set, has been despatched to Master Osborne, and Zulu Train Sets to Masters Rennison and Paul.

The general standard of work submitted was very high and was even better than that submitted in our previous Competition. I sincerely trust that I shall have the pleasure of again seeing the names of the prize-winners in competitions of a similar character in the future.

The attention of our readers is drawn to the Third Photographic Competition, full particulars of which appear elsewhere on this page.

Photo by [*G. Rennison.*

The Reaper.

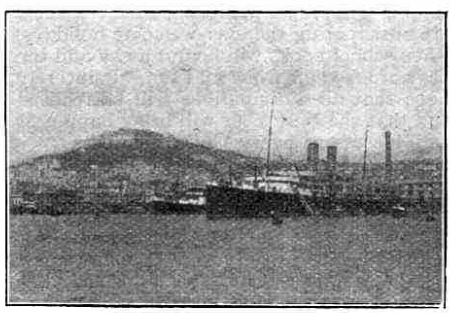


Photo by [*F. E. Paul.*

The Harbour, Naples.

OUR MAIL BAG

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

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

A. G. Binnie (Wandsworth).—We are pleased to know that our new booklet *Meccano Products* is so popular in your school. It is certainly a fine list of glorious toys. We note that you think that in its new form the "*M.M.*" is "spiffing." Your poetry does not rhyme too well, but there is no doubt as to its sincerity and truthfulness.

L. Cresswell (Forest Gate).—Some day we may be able to start a Photography Column in the "*M.M.*" but at present limited space and a surfeit of interesting articles places it "out of court."

K. Addison (St. Leonards-on-Sea).—We are pleased to know that you enjoyed building a Big Wheel and an Eiffel Tower for your dealer to exhibit in his window. This was good building practice for you, and at the same time you were doing your dealer a great service.

Eric Smith (Dulbydilla).—Thanks for your interesting letter and for your suggestions in connection with the Guild, which we will consider. The photographs are safely to hand and may be used later.

W. Jones (Denton).—We are pleased to know that you find our letters helpful. We trust you will soon be safely through all your present troubles.

Leon Willis (Scarborough).—There is no objection to your Competition drawings being done in pencil, provided they are clear and easy to follow. We are afraid it would not be practicable to build with Meccano parts model aeroplanes that would fly.

Horace Drew (South Croydon).—Your suggestion that we should include a coloured photograph of Mr. Hornby in the Christmas number is a seasonable one but unfortunately there are practical difficulties in the way that make it impossible. We are pleased to hear of the good progress of your Club and look forward to receiving the promised photograph.

A. R. Robinson (Beccles).—We quite agree with you that no man need fear failure if he can truthfully say "I have done my best." We trust your ambition to become a B.Sc. will be fulfilled and that you will win that University Scholarship.

H. White (Newton Hyde).—We hope shortly to deal with the questions you have raised in the Radio Section of the "*M.M.*" In the meantime you will be interested to know that both light and electric waves travel at about 186,000 miles per second, while sound waves travel about 1,090 feet per second.

E. J. Baker (Torrington).—We are pleased to have your opinion that the "*M.M.*" is better with every issue. The suggestion regarding Club note-paper has not been overlooked and we are inclined to agree with you, that for Meccano writing-pads there would be a "roaring trade."

Robert Allen (Darvel).—
"Father sits by the fire and reads the 'Evening Times.'
My sister, on the hearthrug, looks at her nursery rhymes,
Mother in the parlour, plays upon the piano,
But I'm the happiest of them all with my Meccano."

I am sure all our readers will agree with you, Robert, but we must mention that Meccano does not rhyme with "piano." The correct pronunciation is, of course, "Mek-ar-no."

J. Thomson (Leith).—"I hope that stories adventure, yarns and so forth will never appear in the "*M.M.*" for there is quite a sufficiency of other information without taking up valuable space for stories."—We are inclined to agree with you, John, but many of our readers have expressed the desire that we should include fiction and, as you know, it is an Editor's ambition to try to satisfy the taste of all his readers.

F. K. Butterworth (London, S.E.26).—Many readers of the "*M.M.*" are clever carpenters, and no doubt they have already adapted your suggestion to make a special cupboard for their spare parts.

E. Robinson (Lyndhurst).—"The Magazine improves in all ways with every issue. When I read the last number I felt like coming to Liverpool and giving you all the praise I possibly could."—We should have been pleased to see you, Ernest, and we hope you will be able to pay us a visit in the future.

Choosing My Christmas Present.

By Mrs. Hilda Hadley.

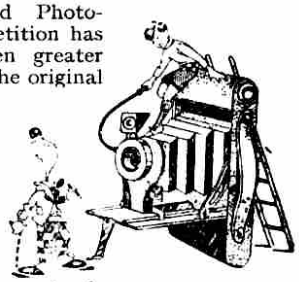
I.

When boys and girls are filled with glee,
And Xmas holidays are here,
My Mother says: "Now, Peter, see
What you would like to have this year;
There are some lovely books to buy,
And rubber fishes by the score,
Toy aeroplanes that really fly,
And cannons for the nursery floor."
But my reply is always plain:
"*I want a Hornby Clockwork Train!*"

II.

I like tin soldiers very much,
The teddy bears are fully grown,
But I would give a million such
To have one "Hornby" all my own
The hands within my pockets itch
To wind and run it on the floor,
O would I were an Idle Rich,
Instead of just a Newly Poor!
So this is always my refrain:
"*I want a Hornby Clockwork Train!*"

Third Photo. Competition.



Our second Photographic Competition has met with even greater success than the original competition, and in response to several requests we announce a third photographic competition. The prize will be awarded for the best photograph of

"A WINTER SCENE."

There are no restrictions or entry fees and any type of camera may be used. Prints may be of any size and finished in any way, it being immaterial whether they are mounted or not. The photographs must be taken by the competitor but the developing and printing may be done by others. The entries will be judged on their pictorial merit.

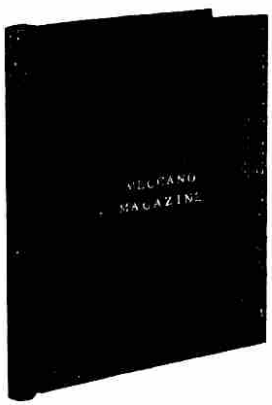
The closing date is 31 January, 1923. The first prize will be a No. 1 Hornby Clockwork Train Set and other prizes will also be awarded according to merit.

A Christmas Present for your Chum.

For Christmas, or New Year would you not like to give your chum a present that he will really appreciate? Let us tell you how you may do this—send him the *Meccano Magazine* regularly. To send him six issues will cost you 6d. or twelve issues will cost 1/–. As each issue reaches him by post, your friend will be reminded of your thoughtfulness, and we warrant he will thoroughly enjoy reading every line of this fine Magazine. With the first number we will write a little note to your friend telling him of your kindness and conveying your good wishes to him.

Special order forms in connection with the above matter may be obtained on application. Orders sent by letter will, however, receive the same attention.

Magazine Binder.



In response to numerous requests we have introduced a spring-back binder for *Meccano Magazines*. The binder has a strong stiff back, covered with imitation leather, tastefully tooled. It takes a large number of copies and keeps them neat and clean. In black, lettered gold. Price 3/– each, post free.

RADIO REPLIES (*continued from page 6*).

F. Berry (Cloughford).—The use of an ordinary telephone ear-piece receiver is not recommended, as the resistance is often unsuited to radio work. The resistance of radio 'phones ranges from 1,000 to 4,000 ohms. The Meccano 'phone has a resistance of 2,000 ohms, and is suitable for all general radio purposes.

W. Fleming (London, W.1).—Meccano Radio Sets are designed to conform to the requirements of the P.M.G. and are adapted to tune to certain limits in the vicinity of the wave length used for Broadcasting. The Meccano Valve Set will have a wider range of reception.

R. W. Schofield (Southport).—Your nearest Broadcasting Station will be Manchester, which is outside the range of a Crystal Set for receiving telephony. There is, I believe, an amateur station at Birkdale, from which messages are occasionally transmitted, although I have no definite information on this point.

F. Hulatt (London, S.E.1).—The resistance of the Meccano 'phone is 2,000 ohms. Write to me again when you encounter any radio difficulty.

N. Sunderland (Manchester).—The addition of plates to the condenser would not increase the wave length. If, however, the condenser is placed in the secondary circuit, instead of its present position in the primary circuit, longer wave lengths could be received. A loud speaker might be used with a Crystal Set, but would not give good results.

C. Hetherington (Glasgow).—C.W. signals can be received by a Valve Set because it possesses a Heterodyne ratio or action (which roughly means, rythmic beating on time of oscillations) a property not possessed by a Crystal Receiver.

B. Summers (Westcott).—I am afraid a reliable telephone receiver cannot be obtained at a cheaper price than 18/6.

S. Smith (London, S.W.4).—An open space is preferable for the erection of an aerial but a Radio wave is not greatly influenced by structural matter, such as buildings, trees and the like. Provided that a reasonable height at one end of the aerial can be secured, and the aerial well insulated, reception will not be difficult. I suggest you erect an aerial at least 20 feet from the earth at one end, and if you can attain this elevation at the corresponding end, so much the better. If you are unable to elevate your aerial at both ends to 20 feet, it will be in order if it runs from a height of 20 feet at the one end, to 8 to 12 feet at the other. The position of the aerial is chiefly a question of local conditions.

Noel Brewis (Gateshead).—Yes, there is to be a Broadcasting Station at Newcastle and it will be possible for you to listen in with a Meccano Crystal Receiving Set.

T. N. McNaughtan (Glasgow).—Broadcasting Stations are to be erected at London, Plymouth, Birmingham, Manchester, Newcastle, and Aberdeen. There will also be a Broadcasting Station at either Glasgow or Edinburgh.

F. Whitworth (Manchester).—The aerial is a very important part of the Wireless Outfit, for it receives the vibrations or impulses sent out by the transmitting stations and conveys them by means of the leading-in wire to the receiver. The term antenna is often used to signify an aerial—for the meaning of antenna is a feeler—and that is the duty of a wireless aerial, literally to feel or search for signals.

PUBLISHED BY MECCANO LTD., BINNS ROAD, LIVERPOOL.
Printed by The P.P. Press, King Edward Street, Liverpool.