

WIRELESS TIME-SIGNALS

How the World's Clocks are Kept Accurate

NO doubt many thousands of our readers are familiar with the time-signals sent out daily by the British Broadcasting Company. These signals, which sound like dots of the Morse code, are sent over the wire to the broadcasting station by Greenwich Observatory, and tens of thousands of listeners find them useful for correcting their clocks and watches each night. It has been said, indeed, that since they have been broadcast there has been a marked improvement in the punctuality of the nation, and not nearly so many trains have been missed as was formerly the case.

In addition to these broadcast signals there are other wireless time-signals that play a very important part in the daily programme of many thousands of sailors on the high seas. In fact it is no exaggeration to say that one of the most important purposes that wireless serves is to communicate Greenwich Mean Time to ships at sea.

Before the days of wireless, ships were compelled to rely upon obtaining the correct time from their chronometers, the accuracy of which it was impossible to check while at sea. On a long ocean voyage, therefore, the error between the chronometer and Greenwich Mean Time grew from day to day, and often became so great as to cause a ship to go many miles out of its course. Some idea as to what this means may be judged by the fact that at the Equator an unknown and unallowed-for inaccuracy of four seconds of time would cause the sailor to make an error of one mile when finding the position of the ship.

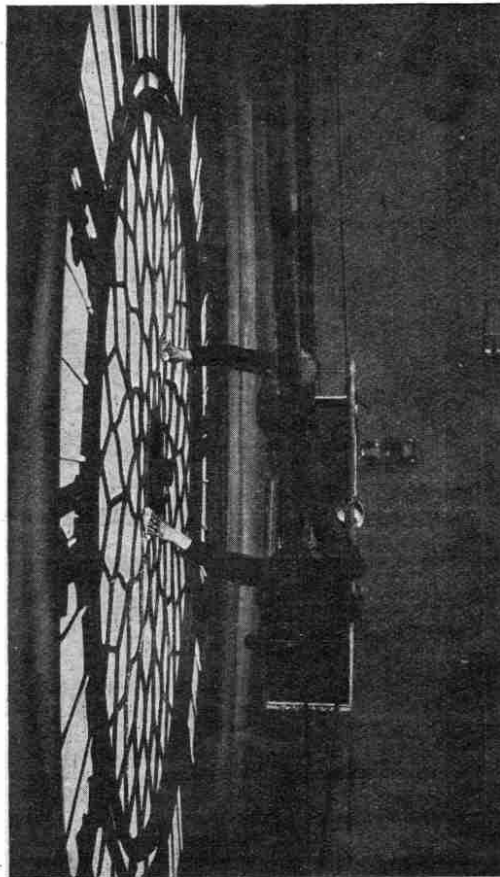
The Importance of Greenwich Mean Time

To find the longitude of a ship at sea it is necessary to compare the local time with the time at Greenwich. The local time is found by observing some convenient heavenly body, such as the sun or moon, and the Greenwich time is taken from the chronometer, which is merely a special kind of clock that keeps time very accurately. Taking the difference between these two times, and allowing four minutes of time for one degree of longitude, the longitude of the ship east or west of Greenwich is quickly obtained.

Since the time at Greenwich is an essential factor in this calculation, it is obvious that if this is not known accurately it is impossible to find the exact position of the ship. The necessity for knowing the position of the ship is obvious, for without it the captain is unable to tell whether he is steering in the correct direction, whether he has drifted, how far he has travelled since he last found his position, and so on. It is in giving the correct time that wireless becomes so useful.

Radio Time-Signals

Many countries now have wireless stations from which the time is broadcast at least once a day, and these signals may easily be picked-up by receiving sets in this country. The most important of the stations sending time-signals are Eiffel Tower (Paris), Lyons, Nauen, Annapolis, Arlington, Honolulu, and San



Big Ben Has a Wash !

It is necessary to wash Big Ben's face periodically, and our illustration shows how this is done. A swinging cage carries the cleaners high up above the street below. As may be judged from our photograph the work requires strong nerves and a cool head.

Francisco. These and the other time-signal stations are so placed that any ship will always be within range of one or other of them.

Eiffel Tower, being the nearest, is the best known to English listeners, and as its transmission is very powerful it may be often picked-up with an ordinary crystal set. The signals regularly work a loud-speaker in the Liverpool district on two valves of a simple non-super circuit with a special tuning coil to tune in to the wave-length of 2,600 metres. "International Ordinary Time-Signals" are transmitted every day from the

Eiffel Tower between 10.0 a.m. and 10.5 a.m., between 10.44 a.m. and 10.49 a.m., and 10.44 p.m. and 10.49 p.m. (These times are Greenwich Mean Time, and one hour should be added at present to correct for Summer Time).

The 10 a.m. time-signal opens with — . — . — ("beginning of message") repeated several times, then "ordinary time signals," then . — . . . meaning "wait." After this, and for the next five minutes, a dot is transmitted every second, with a dash in place of every sixtieth dot. These dashes are not guaranteed to fall at the beginning of a minute, but the dots are guaranteed to fall at intervals of exactly one second. This signal is transmitted for the benefit of ships, and by means of it the officer in charge is able to check the speed of his chronometer and so measure its daily error.

Setting the World's Clocks

More interesting to land listeners are the 10.44 to 10.49 p.m. signals, for besides setting your watch by the signal that sets the clocks of the world, you can test its daily gain or loss to the nearest second. It is also interesting to test the accuracy of the compensation of the balance wheel. To do this, see how many seconds fast or slow the watch is in the morning and then wear it in your waistcoat pocket all day, where it will be kept at a fairly high temperature. Notice, by the evening time-signal, how much it has gained or lost during the past 12 hours. If you then take it out of your pocket and leave it in some cool place, preferably in the same upright position, you can test its accuracy for the next twelve hours. You can then compare the two results and form an estimate of the accuracy of the compensation. For perfection the results should be the same.

The time code for the 10.44 to 10.49 signals, whether a.m. or p.m., is as follows:—

After the introductory signals, beginning at 44 minutes past the hour, is a series of dots, the first dot finishing at 44 mins. 1 sec. and the series continuing until 54 secs. At 45 min. 0 secs. one dot begins. One minute's interval now passes, to be followed by a series of — . . . the first of which finishes at 46 min. 3 secs. These continue every four seconds until the last one finishes at 55 seconds past. At 47 min. 0 secs. a dot begins, followed by another one-minute interval. After this a series of — . . . the first of which finishes at 48 min. 5 secs. and which continue every 5 secs. until the last finishes at 55 secs. A dot then begins exactly at 49 min. 0 secs. This completes the signals.

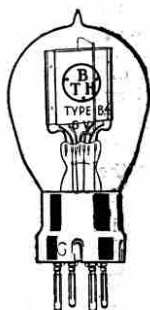
(Continued on page 261)

Five B.T.H. Radio Valves

including two new types



THE introduction of the new B3 and B6 valves makes the B.T.H. range complete. There is now a B.T.H. valve for every need and every purpose, and each is unsurpassed in its particular class.



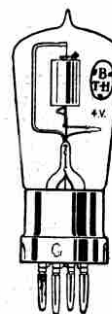
B4 TYPE VALVE, 35/- each. The B4 valve has a very great amplification factor and is free from distortion. It is the ideal valve for loud speaker work.

Filament volts ... 6 volts.
Filament current ... 0.25 amp.
Anode volts ... 40-100 volts.



B5 TYPE VALVE, 30/- each. The B5 valve takes only 0.06 of an ampere, and can be operated from standard dry cells.

Filament volts ... 3 volts.
Filament current ... 0.06 amp.
Anode volts ... 20-80 volts.



R TYPE VALVE, 12/6 each. There is no better 'general purpose' valve. It functions equally well as detector or amplifier, and gives excellent results on all circuits—reflex and otherwise.

Filament volts ... 4 volts.
Filament current ... 0.63 amp.
Anode volts ... 20-80 volts.

The two new types

B3 TYPE, 21/- each.

Filament volts 2 volts.
Filament current 0.35 amp.
Anode volts 20-80 volts.

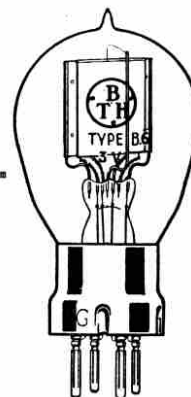


THE B3 VALVE has been developed to meet the need for an efficient 'general purpose' receiving valve which can be operated from a dry battery. The filament of the B3 requires only *half the volts and half the amps.* required by the 'R' valve, but gives the same excellent results as the latter. **THE B6 VALVE** is similar to the world-famous B4 in respect of economy and amplification, but, owing to its lower filament voltage (3 volts), can be used more conveniently with other valves.

Both these new valves, like all B.T.H. valves, are fitted with standard British 4-pin caps, so that no special adaptors are needed.

B6 TYPE.

Filament volts 3 volts.
Filament current 0.12 amp.
Anode volts 60-120 volts.
Price on application.



Obtainable from all Electrical and Radio Dealers, Stores, etc.

The British Thomson-Houston Co. Ltd.,

Works : Coventry.

Offices : Crown House, Aldwych, W.C.2.

Branches at Belfast, Birmingham, Bristol, Cardiff, Dublin, Glasgow, Leeds, Liverpool, Manchester, Middlesbrough, Newcastle, Sheffield, Swansea.

How Wireless Valves are Made

An Industry Marvellous in Exactitude and Efficiency

WE recently had an opportunity of inspecting the Valve-making Department at the works of Messrs. The British Thomson-Houston Co. Ltd. at Rugby. We found the processes employed in the manufacture of wireless valves to be so interesting that we determined to give to our readers some account of the varying stages through which a valve passes before it finally reaches their hands and is used in their Radio sets.

The method by which a wireless valve functions has already been fully explained in these columns (the subject was dealt with at length in our pages from October 1922 to February 1923), but it will make the process of manufacture more clear if we briefly describe how a valve functions.

Filament, Anode and Grid

A valve depends for its action on the fact that when a metal wire (called the "filament") is heated in a vacuum, electrons are emitted from the surface of the wire and fall upon the plate, or "anode" as it is called, after passing through a grid. The metal used for the filament may be platinum, tungsten, molybdenum or tantalum, and it is essential that this wire be enclosed in a vacuum, for if it were not so enclosed it would immediately oxidize when heated to the necessary temperature in air.

We are thus able to appreciate one of the difficulties with which valve manufacturers have to contend, for they have to make filament, anode, and grid, mount these together, enclose them in a bulb and then extract all the air and seal the bulb.

The Function of the Grid

The anode usually takes the form of a cylinder of metal, which surrounds the filament. Sometimes the anode consists of two flat metal plates which are mounted on opposite sides of the filament.

The grid generally consists of a spiral of wire, also surrounding the filament, but placed inside the anode so that it comes between the two. In a certain measure it acts as a gate, controlling the flow of electrons emitted by the filament. When the grid is charged positively with respect to the filament it encourages the flow of electrons through it to the anode,

but if charged negatively it repels some of the electrons and reduces the current flowing from filament to anode.

If the grid is made positive and negative alternately, it will cause corresponding variations in the current flowing through the valve. It is because of this property that the valve is so useful in Radio, for

remains attached to it through all the subsequent processes until it reaches that in which the valve is exhausted, when the bulb is sealed and the tube nipped off.

Having obtained the bulb the next step is the making of the stem on which electrodes, i.e., the filament, anode, and grid. Here again a piece of glass tubing is used, and is heated almost to melting point. At this stage there is introduced to it the four "welds" required for each stem. One weld supports the anode, another the grid, and the two remaining make contact with the ends of the filament.

Why Platinum Wire is Used

The welds themselves are each made up of three parts. (1) A length of copper wire is used to connect one of the electrodes to the corresponding pin in the plug at the base of the valve. (2) A short piece of platinum wire, or some substitute that expands at the same rate as does glass. It is necessary that the wire used should have the same "ex-

pansion coefficient," as it is called, as that of glass, as were it otherwise, when the valve is heated the glass might expand more quickly than the wire, and this would cause the vacuum in the valve to be destroyed. (3) The third part is a piece of nickel wire, and to it the platinum wire is welded, and the copper wire welded at the other end of the platinum wire.

Electrical Welding

It was most interesting to see the wonderful machines employed to weld these wires. The whole process is carried out mechanically, the actual welding being done by a very hot electric spark, which is made to occur at the exact instant required and exactly at the joint of the wires that are to be welded.

Wherever possible the stems for the valves are made on machines. These machines first soften one end of the glass tube and pinch it flat. Meanwhile, the welds are held in such a position that the short pieces of platinum wire become embedded in the pinched glass. The manner in which this work is performed makes one think the machine must almost be gifted with a brain and that it really "thinks" as it does its work.



Photo courtesy]

Interior of B.T.H. Valve Department, Rugby [Messrs. B.T.H. Co. Ltd.]

every small change in the grid charge causes considerably larger changes in the current flowing to the anode. The amplifying and detecting properties of the valve depend upon correctly using the grid and upon its controlling effect on the stream of electrons emitted by the filament.

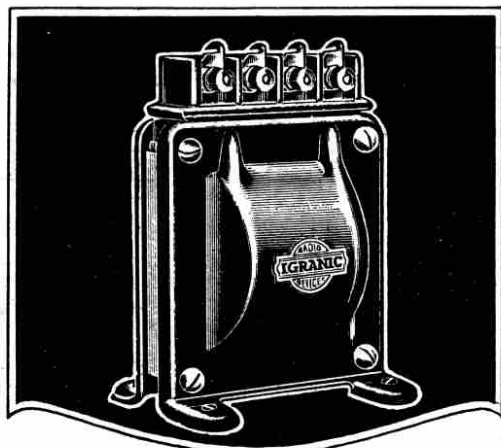
Now that we have gained a rough idea of the working of a wireless valve it is easier to understand the various processes that are employed in its manufacture.

Making the Bulb

The first step in the manufacture of the valve is to make the bulb. This is blown from glass tubing by a special machine in which the glass tubing is heated by bunsen-burners. Air-pressure is then applied so that the glass tubing expands, exactly in the same manner as a soap bubble is blown. This gives a large "bubble" of glass, called the "bulb," which is then cut off from the parent tube. One end of the bulb is enlarged slightly so as to take the valve-stem, as that part of the bulb carrying the electrodes is called. This is, of course, introduced at a later stage.

The other end of the bulb is left attached to a few inches of the glass tube, and this

(Continued on page 275)



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COMBINED FLASH LAMP BATTERY TESTER AND INSPECTION LAMP. It is usually the H.T. Battery which is at fault when you can't get all the stations you want. This "C.W." Battery Tester enables you to test your batteries and quickly locate the trouble. Pat. No. 218957.

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DYNAMOS. Charge your own ACCUMULATORS with a 6 v. 6 amp. DYNAMO complete with CUT-OUT. These machines cost originally £8 - 10 - 0 each. Our special offer of these is 55/- each Carriage Paid. Each machine new and guaranteed.

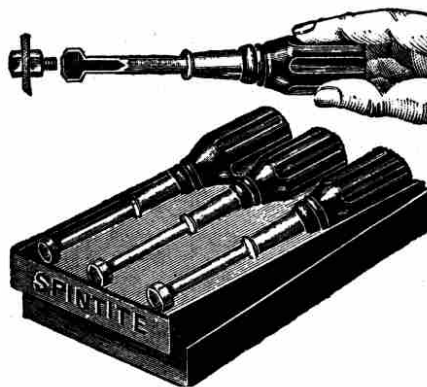
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How to Photograph BIRDS and their EGGS

By John C. Moore-Hills

IN all bird photography there is one essential quality and that is patience.

It is very often necessary to wait hours before getting a photograph of the bird on the nest, and especially is this the case just before the hen-bird begins sitting. Sometimes you cannot get a photograph of the cock-bird at all. I remember, when photographing a Sparrow-Hawk, that the cock only alighted on the nest once during six weeks, and then he left before we had time to get a plate into the camera!

Plates Preferred to Films

If you intend taking up bird photography, the first thing to do is to choose a suitable camera. In my opinion this should be one in which plates and not roll-films are used. A $\frac{1}{4}$ -plate camera is a good size to begin with, but for more advanced photographers a $5" \times 4"$ or half-plate is better.

Having obtained the camera, the next thing is to find a good nest to photograph. I recommend beginners to try taking some ground-bird first, such as a Lapwing, Yellow-Hammer, Tree-Pipit, or Meadow-Pipit, because nests on the ground are generally more conveniently placed than those in trees or hedges.

Even when a good nest has been found, it is doubtful if the birds will remain. Many of them are so easily frightened, and even the "click" of the shutter will often scare them away. The first thing to do in photographing them, therefore, is to accustom them to your presence near the nest. If you do this very carefully you will find that after a time they will become quite used to you and not take any notice.

Don't Visit the Nest too Often

If you do not accustom the birds to

your presence and the appearance of your camera in this way, the birds will in all probability desert the nest and then you will not get any photos. You should allow at least two eggs to be laid before you take the first photograph. It is also very necessary not to keep the hen-bird away from the nest too long, especially when the young are nearly hatched, because if the eggs get very cold the young will die in the shell.



Young Wrens

Do not visit the nest too frequently at first, but take only one or two photographs



Young Green Woodpeckers

of the eggs, for if you keep disturbing the bird she becomes worried and then the eggs are generally a failure.

When the eggs have hatched the interesting part begins, and photographs may be taken every day to show the young at all stages. You may then be able to get photographs of both the cock and hen-birds and of the young being fed.

Photographing Hedge-Nesting Birds

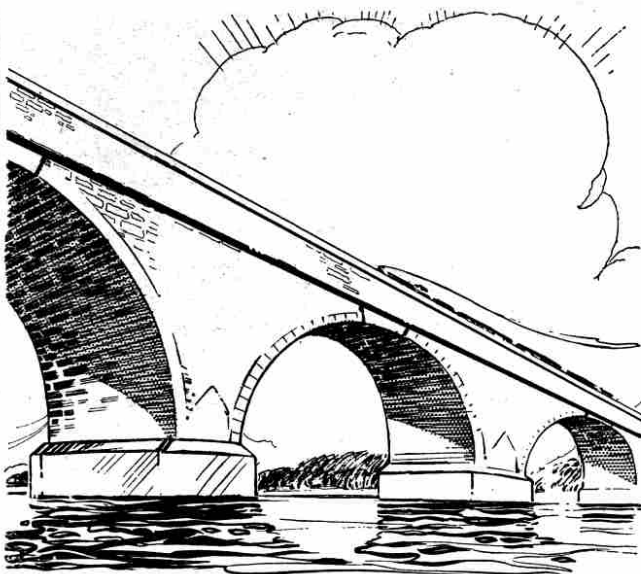
After some experience with ground-nesting birds you can tackle something bigger, either some of the hedge-nesting birds or those that nest in trees. Of the hedge-nesters, perhaps the easiest to photograph are the Hedge-Sparrow, Robin, and Garden Warbler. If you are lucky you may possibly find a Cuckoo's egg in one of these nests, and in such a case you should be careful not to disturb the hen-bird more than you can help because you will be able to get some very interesting photographs and observations.

You should try to find a nest in a hedge which has a ditch running beside it and with plenty of cover round. In this ditch you can build yourself what is called a "hide," or little hut made mostly of boughs and sacking. The hide should be constructed so that it is easy for you to get in, without disturbing the birds. When you have made it, cut a small hole in the sacking just large enough for the lens of the camera. Then inside the hut make a small stand for the camera, and having done this you are ready to take the photograph.

Keep a Note-Book

Endeavour to obtain your photographs under different conditions. A good time to see the hen-bird sheltering her young is during a thunder-storm.

(Continued on page 261)



Where lies the strength of the bridge?

The strength of the bridge lies in its foundation. Deep down into the bed of the river its piers are laid in solid ground.

You yourself resemble a bridge. You will be called upon to carry your burden of responsibility through life. You will have the storm periods when your foundations will be put to the test.

Your foundations must therefore be laid on the solid rock of good health, and good health is only possible through sound teeth. *Sound teeth are clean teeth!*

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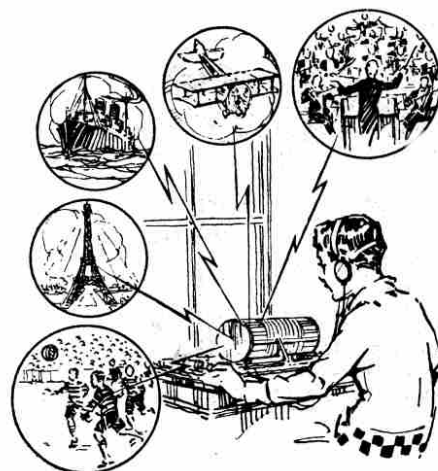
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No. 1 RECEIVER

WAVE LENGTHS: Zero to 1,000 metres.
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Parts to make the No. 2 Receiver, complete in strong carton, including single 'phone, 2000 ohms resistance PRICE (Post free) 23/3
Parts, as above, but without 'phone 15/9

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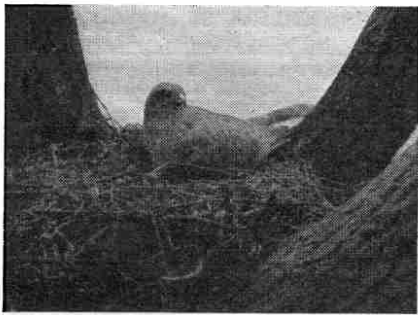
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Birds and their Eggs—(cont. from p. 259)**Cuckoo's Egg in Nest of Garden Warbler**

A friend and I once got some magnificent photographs of a Sparrow-Hawk during a very severe storm. Another good time to take them is on a very hot day when the mother spreads her wing-feathers and tail-feathers out to guard her offspring from the heat of the sun.

When taking bird photographs it is very interesting and instructive to keep a book containing all your notes of observations of the birds, their call notes,

**Sparrow-Hawk on Nest**

cries when alarmed, and the different kinds of food with which they supply their young. Such notes made by yourself are always much more valuable than anything you read in books.

You can also build hides in trees to photograph Hawks, Owls, Rooks, etc., but you will find these hides much more trouble to build, as they must be made fairly strong and waterproof to withstand wind and rain.

When you wish to find out the habits and peculiarities of any special birds it is best to look out for a pair that are building in a good position for photography, and when they have finished making the nest you can then fix up the camera and, if necessary, the hide. Now is the time to begin making your observations and taking notes of everything they do, the building material used, the length of time taken to complete the nest, the alarm and call notes, and anything that strikes you as interesting or unusual. As time goes on the notes become more interesting, the number of eggs laid, shape, size, peculiar markings, date of hatching, and the different foods brought to the young.

As it may be of interest to some readers, I give below a few extracts taken from my Sparrow-Hawk notes:—

May 7th—Pair of Sparrow-Hawks building in Wood X. Oak tree, nest about 35 feet up. May 15th—Nest finished. Started fixing up hide. May 21st—First egg laid, rather on the smallish side and only slightly blotched with reddish brown. May 26th—Sixth egg laid, all rather light in colour and very slightly marked. Bird a young one and probably laying for first time. June 6th—Hen-bird sitting well. Took one photo. June 10th—One egg ejected, addled. Took one photo. June 14th—Two eggs chipped. Took two photos. June 17th—All youngsters off and doing well. Took five photos. June 18th—Cock-bird brought small field-mice and a baby starling, which the hen tore

**Nest and Eggs of Yellow Hammer**

up and distributed to her offspring. Took six photos.

A photograph of this particular Sparrow-Hawk's nest is shown here, and the bird is shown feeding its young in the photograph embodied in the heading of this article. Readers of the "M.M." will remember that several photographs, and a detailed description of my observations of this bird appeared in No. 9, Vol. VIII (September 1923).

**Nest and Eggs of Tree Pipit****Wireless Time-Signals**

(Continued from page 255)

The chief points of the time code stated in tabular form, are:—

Beginning at :	Signal :	Repeated until :	At :
hrs. mins.		hrs. mins. secs.	hrs. mins. secs.
10 44 etc.	10 44 54	10 45 0 one dot
10 46	— etc.	10 46 55	10 47 0 "
10 48	— etc.	10 48 55	10 49 0 "
	End of time-signal	End of time-signal	End of time-signal

As already stated, all these times are Greenwich Mean Time, and during the summer months it will be necessary to add one hour to make them conform with Summer Time.

These time-signals are entirely automatic in action, being controlled by special apparatus at the Observatory in Paris, and connected to Eiffel Tower by underground land-lines. The accuracy of the signals is guaranteed to a fraction of a second, the apparatus being switched on a few moments before the signals are due to begin.

Similar codes are employed by the various other stations transmitting time-signals and, since every ship is always within hearing of at least one station, the captain is able to correct his chrono-

meter every day, instead of once every voyage as previously.

Broadcasting Big Ben

No time-signals for ships are transmitted in this country, but the British Broadcasting Company transmits from all its stations the time on several occasions every day from either Big Ben (guaranteed to two seconds) or from the main clock at Greenwich Observatory. The Big Ben chimes for the quarters begin at 15, 30 and 45 minutes 0 seconds past the hour.

Correction

A printer's error occurred in our last month's issue. The late Sir Dighton Probyn was born in 1833 and not in 1883 as stated.

The chimes for the hours begin at 59 minutes 38 seconds past, the first stroke of the hour chime beginning at 0 minutes 0 seconds. The Greenwich signals consist of six dots. These represent seconds, and the last is exactly the half-hour.

These time-signals serve many useful purposes, such as correcting turret, tramway, and railway clocks, etc., and it has been remarked that people have been more punctual since the B.B.C. began transmitting these time-signals. Clocks and watches are now put right at least once a day instead of once a week as in the old days, and consequently fewer people miss trains and trams and fewer are late for appointments. This is a great thing to have accomplished, and during the future it will save very many working hours from being wasted.

Foresight in Photography

We have received from Messrs. Burroughs Wellcome & Co. Ltd. (Snow Hill Buildings, London, E.C.1) a copy of a delightful booklet, "Foresight in Photography." On the cover is a particularly fine reproduction of Commander Wild in the "crow's nest" of Sir E. Shackleton's *Quest*. The original photograph, it is interesting to learn, was developed by tabloid chemicals for which the firm are famous. Among the other illustrations is an interesting and novel presentation of the effects of chromium intensification and of the possibility of subsequent modification by the use of reducers and other methods. The booklet also contains a classification of plates and films according to their development speeds, time tables for development, and much other useful matter. Readers may obtain a copy (post free) by mentioning that they saw this offer in the *Meccano Magazine*.

Stamps for Sale

(See also page 270)

FREE. Harding Memorial Stamp and Pictorial Set. Ask for approvals and enclose 1½d. postage. Powell, 73 Bond Road, Surbiton, Surrey.

100 DIFFERENT FREE to genuine collectors asking for approvals and enclosing 2d stamp for postage. 30,000 varieties from ½d. upwards.—Hooper's, 90, Harcourt Avenue, Manor Park, London, E.12.

FREE. 50 Stamps, all different, to approval applicants for my famous sheets, all ½d. each.—Scott, 154, Wellesley Road, Ilford.

50 DIFFERENT Foreign and Colonial, including unused. 6d. Postal Order.—Jackson, 188, Rathgar Road, Rathmines, Dublin.

FREE! 25 Roumanian to those sending postage and asking to see Approval Sheets.—C. Florick, 179, Asylum Road, London, S.E.15.

STAMPS. 60 different free to applicants for approvals. All ½d. each. Send postage.—Cox, 135, Cambridge Road, Seven Kings.

75 STAMPS, 4½d. Montserrat, Soudan, Lourenco Marques, Grenada, etc. 50 Austria, 4d. 50 Hungary, 5d. 50 French Colonials, 1/- 10 Salvador, 6d. Edwards, 43, Edmund Street, Camberwell.

"THE PHILATELIC MAGAZINE."—The best stamp newspaper, only costs 3d. a fortnight from your newsagent. Specimen free to all mentioning "M.M."—Harris, 46, Victoria Street, S.W.1.

THE "DIAMOND" PACKET contains **1000 UNSORTED STAMPS** from Convents abroad. 1/3 post free. 2 pkts., 2/5; 3 pkts., 3/6; 4 pkts., 4/6; 5 pkts., 5/6.
Nerush, Importer (Dept. E), 2-22, Cathcart Hill, London, N.19.

STAMPS. Dispensing Collection 22,000 (also Collection entire £1 and £25). Approvals 8d. and 9d. in 1/- discount, cash, or exchange Meccanos or anything useful.—"Olivet," Stretton Road, Addiscombe.

BARGAIN PACKET FOR 1/-, postage 1½d., including Abyssinia, cat. 1/-; Transvaal 2/6 unused; Salvador, cat. 6d.; 2 Nicaragua, cat. 10/-; Norway, cat. 1/-.—C. Lewis, 26, Lichfield Road, Cricklewood, London.

Duplicates sent on approval at 8d. and 1/4 for 50. Also few Colonials priced singly.—H. H. Woodruff, 9, Burgoyne Road, Harringay, N.4.

STAMPS. Large number mint and used British Colonials, also Persian and other foreign at bargain prices. Selections choice copies, priced separately, on approval.—Collector, 31, Kensington Gardens, Bath.

STAMPS. Write for Book of 500 varieties to select from at ½d. each.—Theobald, 54, Antil Road, N.15.

FREE. 30, including 1 Krone Denmark, 1 Gulden Holland. To applicants for approvals from ½d. each.—Betts, 49, Durham Road, Wimbledon.

NONE FREE—NONE AS CHEAP!! Farthing Stamp Approvals; about 1000 sent.—J. V. Wyk, 439, City Road, Old Trafford.

FREE. Packet of MINT Stamps and packet of Mounts to all applicants for my approvals. Special discount.—C. Negus, Bury, Huntingdon.

SET OF 8 TRAVANCORE FREE to applicants for approvals. Try my ½d. Booklets.—S. Huckle, 53, Birkenhead Avenue, Kingston-on-Thames.

FREE!

5 Dutch Indies different to every applicant for approvals at ½d. per stamp, real good value; or for 1,000 Superior Assorted 1/-.—Gall, 37, The Avenue, Durham.

MINT BRITISH EMPIRE

BERMUDA, Ship Design, ½d. green, Script ... 1d.
BRUNEI, Scripts, 2 c. red-brown, 1d; 3 c. green, 1½d.; 4 c. mauve, 2d.; 6 c. black, 3d.;
12 c. ultramarine ... 6d.
NEW ZEALAND, K.G., ½d. yellow-green ... 1d.
POSTAGE EXTRA.

ALEC KRISTICH (N.R.P. 279),
82, Marchmont St., Russell Sq., London, W.C.1., Eng.

20,000,000

FINE PICTURE STAMPS,
Just what you want, Colonial and Foreign,
to be cleared cheap.

HANDSOME FREE GIFT

To all who send for sheets of same (enclosing postage).
You make a profit on any you sell.
YOUNG, 96, Park Street, Camden Town, London.

TRUTH IN ADVERTISING.

We have the real thing, no foreign goods, or foreign workmanship. Powerful Table Light, ready for use, only 4/-. Cupboard Lighting Set, 2/6. Steam Engines, 7/6. Dynamos, 7/6. Electric Motors, 5/9. Luminous Paint, 2/9. Bell Sets, 5/6. List free.
A. W. NORTH, 47, Parchment Street, Winchester.

N NORRISCO BARGAINS B

100 diff. SCANDINAVIA (Cat. 10/-)
only 1/6. Postage extra.

A small supply of similar packets was previously offered but quickly exhausted, and we were unable to renew stocks at that time. We have, however, just made another fortunate purchase and are passing the benefit on to our customers. The packet is of excellent quality, and contains stamps of NORWAY, SWEDEN and DENMARK only, with values to 1-kr. and including many out-of-the-way items.

SATISFACTION GUARANTEED ALWAYS OR CASH REFUNDED.

Other splendid packet offers:—

500 different stamps 2/- 100 diff. British Cols. 1/-
1000 " 6/- 500 " " " 18/6
100 diff. French Cols. 1/9 1000 " " " 85/-
500 " 30/- 3000 " " " £60

Our illustrated lists will surely interest you and may be had FREE for the asking.

NORRIS & CO. (Dept. M.M.), LEABROOKS,
ALFRETON, Derbyshire, England.

START THE SEASON WELL!

Packet of 500 different stamps, none after 1914, no better value anywhere, only 3/-; cheap long sets; all different, 10 Bolivia, 3d.; 10 Dominican Republic, 3d.; 10 Barbadoes, 6d.; 20 China, 4d.; 20 Argentine, 5d.; 10 Mexico, 2d.; 25 Mexico, 6d.; 50 Brit. Cols., 6d. Postage extra, but purchasers of any of above also asking to see approval sheets receive 10 Zoological Stamps FREE.

C. F. HENCHER, "Ruxley," Chilworth, Guildford.

15/- WORTH CHOICE STAMPS FOR 3d.

50 varieties, many unused, Danzig, grand lot Austrian 1908/23, Magyar, scarce Ukraine on Russian Rbl., fine Poland choice German Set 5 Air Post, Superb Munich, Slesvig, etc. Bargain, post free 4½d., abroad 6d.

Nelson T. Hillier, The Stamp Mart, Horsmonden.

'The Incomparable Stamp Packet.'

1000 well-mixed Foreign, 20 Colonials, 10 Philippines and 20 Mint, all different. The lot post free 1/3 (abroad 1/6). Collectors' duplicates purchased or exchanged in any quantity. Address—

S. F. BICKERS,

LORDSWOOD AVENUE, SOUTHAMPTON.

MINT NEW ISSUES.

Fiji script, 3d. blue, 4½d.; Gibraltar scripts, 1½d., 2½d., 6d., 7d., new shades; Nauru Pict., ½d., 1d. mint, pair 2½d.; Sierra Leone, script, 1d. purple, 1½d.; Southern Rhodesia, ½d., 1d. mint, pair 2½d.; Brazil, 1924, in 4 colours, 200R., 3d.; France Pasteur 75c., 4d.; Sower 85c., 5d.; Azores P. Dues, new values, set of 6, 9d. Postage extra under 2/6.

G. GALLOWAY, N.R.P.,

25, Carisbrooke Road., St. Leonards-on-Sea.

STAMPS

All different, 70 for 4d., 100 for 7d., and 200 for 1/3. Well-assorted mixture, 500 for 4d. Germany, mint, all different, 12 for 3d. All post free. Belgian unused railway stamp to applicants for approvals (6d. in the 1/- discount).

ARCHIBALD, 20, Woolcomber Street, DOVER.

50 France ... 1/- 50 Sweden ... 1/-
30 Swiss ... 9d. 40 Italy ... 9d.
25 Holland ... 6d. 40 Bavaria ... 9d.
50 French Cols. 9d. 50 Portugal Col. 9d.
90 United States 1/- 40 Belgium ... 1/-
150 Germany ... 1/- 50 Entire Cards 1/-
150 Austria ... 1/- 300 Postage ... 1/-
150 Hungary ... 1/- 600 Postage ... 5/-
50 Czecho-Slov. 1/- 500 Revenue ... 5/-
50 Roumania... 1/- 1000 Revenue 17/6

Postage Extra.

Fine selections ready in separate countries.

J. Russell, Chetwynd, Shanklin Drive,
Westcliff-on-Sea.

225 DIFFERENT REVOLUTION WAR AND PEACE STAMPS FREE

This packet is printed to sell at 10s. and contains many "hard-to-get" sets high-class pictorials, and odd values, catalogued 1d. to 7s. 6d. each. Given free to all requesting approval books and sending 4½d. to cover cost of postage, packing, etc. (abroad 9d.).

R. WILKINSON,

Provincial Buildings, OOLWYN BAY.

MONSTER PACKET OF 40 DIFFERENT STAMPS FREE

to all remitting 1/- or more for purchases from our famous approval sheets. Gift to all applicants. Liberal Discount Given. Try also our EMPIRE Packet of 24, including Morocco Agencies, Kenya, new Egyptian, Straits Settlements and Exhibition issue, 9d.

EMPIRE STAMP CO.,

7. MOSTYN AVENUE, WEMBLEY.

APPROVAL SELECTIONS

We send out approval selections suitable for any class of collector, but our Classes A and B are specially for the beginner and junior collector.

Class A consists of booklets containing from 100 to 500 varieties, all at ½d., 1d. or 1d. each (no higher price).

Over 1000 different Foreign and 500 different British Colonials are included in this series.

Class B consists of specially-arranged booklets containing from 20 to 100 varieties of any one country. Prices from 1d. to 1/- each.

25% Discount on purchases of 2/6 or over.
Ask for a selection of your favourite country. 1925 Price List now ready. Abridged List (16pp) Post Free. Complete List (50pp) 3d.

THE MIDLAND STAMP CO. LTD.
(Warwickshire) LEAMINGTON SPA (England)

55 DIFFERENT, including Nauru, Phosphate Steamer mint; Sudan, camel, small; Sudan, camel, large; Abyssinia, zoological; 2 France, Pasteur; German East Africa, Yacht Hohenzollern; Holland Jubilee, large; Iceland; 3 Cuba; 2 Siam and 2 Triangular Austrian Express Stamps. 55 different for 10d. post free.

500 different, used and mint, mostly European, wonderful value, 1/3 post free.

W. E. WILLIAMSON,

55, Nunhead Grove, LONDON, S.E.15.

POLAND

100 different used and unused, including rare imperfs., cat. many times my price. Only a limited number available. The 10th order received will have a pair of stamps (cat. 30/-) added quite free.

Price 5/-. Postage extra.

E. GURD, "Gatooma," Blake Road,
East Croydon, SURREY.

A GRAND STAMP COMPETITION OPEN TO ALL COLLECTORS

(Particulars and Entry Form enclosed with all our 1/- Packets).

Twenty Prizes value £1-10 to 5/- and 50 Consolation Prizes. An equal chance for all competitors.

Approval Selections of cheap stamps, with large discounts, sent on application. State countries in which you are interested.

PERCY DUNBAR,

19a, Barnard Road, Clapham Junction, S.W.11.

(Continued on page 270)

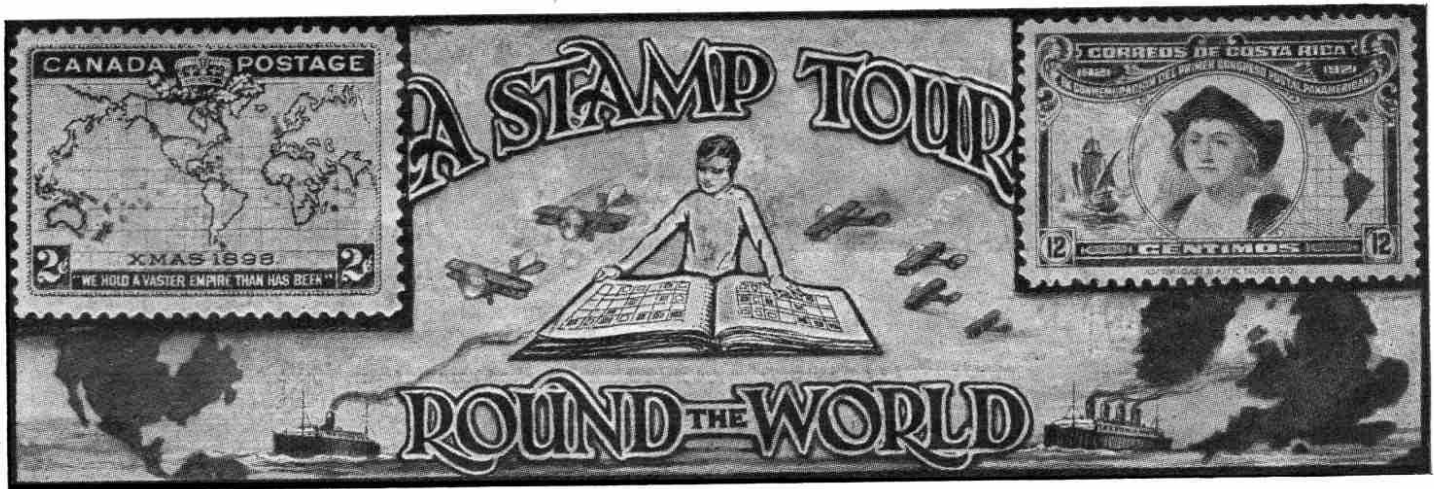
FREE!!

STAMP COLLECTOR'S OUTFIT AND 60 DIFFERENT STAMPS
This Tremendous Advertising offer contains all the following:—60 different stamps (25 unused), including British Colonials, Indian Native State, Victoria (rare old Q.V.), East Africa and Uganda, Cuba, New South Wales (long obsolete), interesting Philippine Isles (mint), Gwalior on India, U.S.A. (pict.), Peru (scarce), Wurtemberg (unused imperf.), Russia, Polish Republic, many War and Armistice. A truly fine collection of stamps! The Outfit contains pkt. peelable hinges, and a unique novelty that all collectors should have, a combination pocket folder, and a mathematically-correct perforation gauge. The whole lot sent absolutely free to all genuine approval applicants.

SEND POSTCARD ONLY TO:—LISBURN & TOWNSEND, 201a, London Road, LIVERPOOL.

Collections Purchased.

FREE!!



I. INTRODUCTION

I FEEL sure that Meccano boys would be glad of the chance of making a tour round the world, in company with a stamp-collecting friend to guide them and point out the wonders encountered on such a journey. The longing to travel, to visit foreign places, to hear foreign speech, and to see the famous buildings and engineering wonders of the world is with us all, irrespective of age or occupation.

A Magic Carpet

Unfortunately most Meccano boys cannot satisfy this wish, but as stamp collectors they have something equivalent to the Magic Carpet that carried its lucky owner anywhere he wanted to go. In our albums we find pictures of all kinds of strange and beautiful scenes. We learn to know one foreign language from another. We see pictures of the people of all lands in their native dress. We acquire knowledge of the famous people and the famous things of many countries. Kings, Presidents, heroes, national emblems, national products, historical scenes—all are recorded on the stamps in our albums.

By means of stamps we may make an imaginary tour of the world, and in this series of articles I invite all stamp collectors to make such a tour with me. In this tour we shall visit only those places that at some time or other have appeared on a postage stamp.

It must be remembered that we are making not merely a journey round the world, but a tour. The difference between these two words is enormous. The former merely implies travelling round the world in the shortest possible space of time, as in Jules Verne's fascinating story "*Round the World in Eighty Days*" (which I hope you will all read if ever you have the opportunity to do so), while a tour means that the journey will be other than direct, and that we shall see many places that would be missed altogether if we were to rush round the world as fast as road, sea, or air could take us.

Liner and Aeroplanes

In our tour we shall travel by a liner specially chartered for us (regardless of expense!) and placed entirely at our disposal throughout the journey, so that we may be free to go anywhere at our own pace. When we wish to visit some inland place we shall be fortunate enough to be able to use a large fleet of aeroplanes,

which have been arranged for in advance. On completing our inland visits we shall always return to our ship, which will be awaiting us at an appointed spot.

This imaginary tour will be made by means of stamps illustrating the many places we shall visit. Consequently, the reader-traveller will find it useful to have his stamp catalogue and album before him when he is taking this tour, for we shall not have sufficient space to show by stamps all the places that will concern us.

The Start

The tour starts from the Meccano Works in Liverpool, where there is an eager throng of readers, all ready to go on the stamp tour. Many of the travellers have brought their Meccano Outfits with them, intending to build models of the engineering wonders seen on the tour.

After we have said "Good-bye" to Mr. Hornby and to the Editor of the "*M.M.*," we board the fleet of special motor cars waiting for us and drive down to the Pier Head. On our way we see St. George's Hall and pass through Church Street and Lord Street, the busiest streets in Liverpool. From the landing stage we obtain a magnificent view of the world-famous Liver Building, with its wonderful tower and largest electric clock in the world. Boarding the waiting liner at St. George's Landing Stage (itself a wonderful achievement of engineering) we soon see the last mooring rope cast-off, to allow half-a-dozen tugs to turn the great liner in the river

so that we shall face the sea. . . . Now we are under way—we have a voyage of two thousand miles before we reach our first stop, St. John's, Newfoundland.

(To be continued)

one or other of the stamps forming the bottom row of the sheet. Recently, the control numbers have been under the second stamp from the left on the bottom



Fig. 2

row of stamps.

Stamps are not printed every day, as might be expected. Most values are printed three times a year in sufficient quantities to serve until the next printing. Some stamps that are little used (the 7d. value for example) are printed less frequently, the stock obtained from a single printing lasting sometimes as long as twelve months.

Early Controls

The first controls were those of 1887, and this printing had the letter "A" on the bottom margin of the sheet. With each succeeding printing the next letter of the alphabet was used, so that the second printing was lettered "B," the third "C," until "R" was reached by the 1/2d. stamps and "X" by the 1d. stamps. These were the two letters in use at the end of Queen Victoria's reign.

With the accession of King Edward the controls re-commenced at "A." In 1904 an important addition was made in the form of a number, to indicate



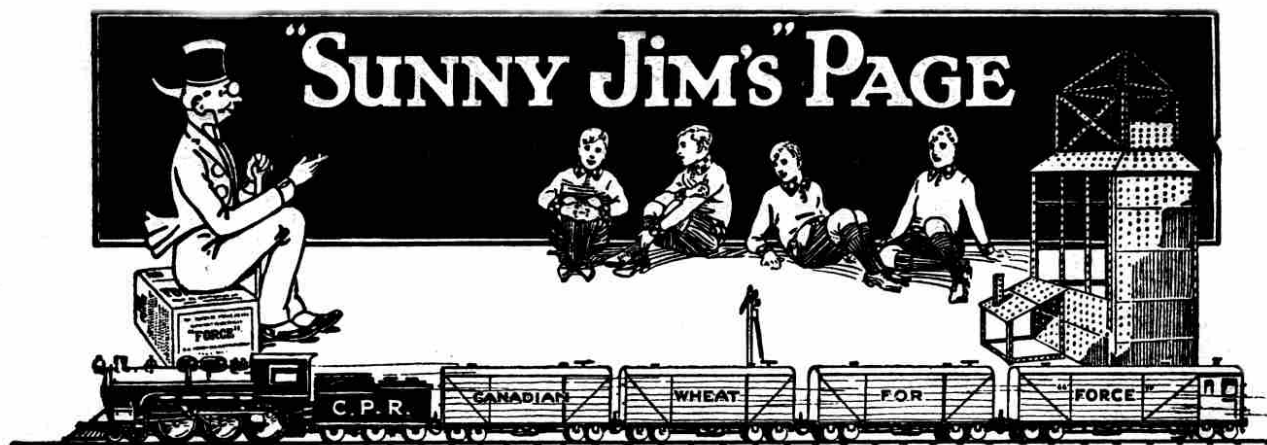
Fig. 1

(Continued on page 275)

Control Numbers

At some time or other, every stamp collector has seen the letter and number that appear in the margin of sheets of stamps. These are called "control numbers," and their purpose is to enable the Post Office officials to know to which printing a certain sheet of stamps belongs. To make this possible each different printing must, of course, have a different control number or letter, that has not been used before.

Some years ago the control numbers appeared in various positions, although they always have been in the margin under



The Football Season's Here!

Sunny Jim gives some Hints on Play

Once more King Cricket gives place to the monarch of Winter sport, King Football, and all you boys, I'm sure, are looking forward with keen anticipation to the joyous days ahead. Great days of healthy tussles on the football field.

"Phip-p-p" goes the whistle, and away down the field goes the forward line—but stay, let us now get down to the practical business of overhauling our kit and tuning ourselves up with a view to improving our game.

Now you, reader, where do you want to play—forward, half, back or goal? Let us see what the qualifications are for some of these places on the field.

Dribbling, passing, shooting, and dodging are the four important assets of the good centre-forward.

Learn to keep the ball at your toe, to control it at speed.

Practise with a rubber ball when by yourself and determine to master it.

When the opportunity comes to

make a good pass, do not let proficiency at dribbling make you selfish. Learn to shoot with either foot, for it is the centre-forward who receives the passes from the wing men, and who must place the ball with speed and precision into the mouth of the goal.

The half-back aspirant must be prepared to combine the qualities of both the forwards and the full-backs. He has both an offensive and defensive game to play. He will play in close co-operation with the forward line, it is up to him to keep the game in the enemy's territory. Learn to kick hard and true. Never keep the ball for long—your play is to feed the forwards. Learn to tackle fearlessly. It is the half-backs who are the first line of defence when the enemy presses.

Good tackling is the greatest asset a full-back can have. He only is between the ball and the goal when the opposing forwards rush in. A poor tackle and the goalkeeper is undefended and the goal in danger. Clear the ball with accurate kicking. Determine where to send it and see it goes there. Hard kicking at random is often worse than useless; it may give the ball to a back or half-back of the opposing side. Heading, too, is a necessary qualification for a full-back. Catch the ball on the forehead so that you can direct it. It is, of

course, useless simply to let it bounce on to your head and off again.

Wherever you elect to play always remember that the team spirit is the thing. A side that pulls together always does well.

Learn thoroughly to play the game you choose, but, be it forward, half, back or goal, remember that merely knowing *what* to do isn't everything. You must be able to



do it. To play as hard a game after half-time as before it you must be strong and healthy. Set to work now to build up health and strength by asking your people to let you have a good wholesome whole-wheat food. "FORCE" is the food you should eat, because it is actually whole wheat grains, steam-cooked and malted for easy digestion, then rolled and toasted crunchy crisp for wonderful nutty flavour. "FORCE" doesn't need



any cooking. It is ready to eat with hot or cold milk according to your fancy. You'll like "FORCE" so much that you'll want it for breakfast and supper every day—you'll tell all your chums about it. Send now for a free sample packet and get to know this fine health-giving food that is so good for everyone. Begin to build strong virile muscles that will be of real service to you, not only on the football field, but in all walks of life.

Sunny Jim

**POST THIS FREE COUPON
FOR A FREE SAMPLE OF "FORCE"**
to "Sunny Jim," Dept. M.C.1, 197, Great Portland Street,
London, W.1.

Name _____
Address _____



Fireside Fun

THE Esau Wood "Tongue-twister" last month seems to have had a quietening effect upon most of those young people who during the past month or two have delighted in bombarding a harassed Editor with terrible "twisters!" This month, therefore, we are having a rest from "tongue-twisters"—indeed, there have been so few "retaliations" to Esau Wood that I am managing to take a short holiday, and "tongue-twisters" will speedily be forgotten amid the Yorkshire moors! There I shall have an opportunity of thinking out some new schemes for the amusement of "*M.M.*" readers. I advise you all to look out for further announcements and surprises, for I feel sure this page will cause more "brain-puzzling" and much laughter around thousands of fire-sides during the coming months.

Puzzle No. 31.

The name of a flower is hidden in each of the following sentences, the letters occurring consecutively in the correct order.

1. Shall I put this stamp in Kate's album?
2. What lovely hair! I should like mine to curl like it.
3. If that man is insane, money should not be given to him.
4. My cousin Ada is your sister-in-law.
5. My brother has travelled in Japan, Syria and India.
6. Will Mr. Carlo be liable for this damage?
7. Do you hear how Tom and Sarah are bellowing in the nursery?
8. I read to that poor negro several times a week.
9. This case is urgent. I anticipate serious results.

(Contributed by William Wilson, Edinburgh, to whom
2/6 has been sent.)

A profiteer bought a luxurious country home and set about making it even more luxurious. Money, of course, was no object. One of his plans was to have a fishpond containing eels.

"But you can't keep eels in a pond," protested his neighbour, to whom he had confided his idea. "They have to go down to the sea every year, you know."

"Well, I won't have 'em, then!" exclaimed the profiteer. "I always takes the missus and the kids every year, but I ain't going to take no eels!"

This Month's Short Story

Boy. Gun.
Joy. Fun.
Gun bust.
Boy dust.

Puzzle No. 32.

Arithmetic puzzles seem to appeal to a large number of our readers, judging by the letters I have received recently. Here is another good one:

A lady went to a bazaar with a sum of money in her purse. She paid 1d. entrance fee, then spent half of what she had. She next spent 2d. for the concert, and spent half of what she had left on chocolates. Going through to the next room she paid another 2d., then spent half of her remaining money. Finally she paid 2d. for a lucky "dip" in the last room, and there spent half of what she had left on a bunch of violets. Going home she found she had only one penny left. How much money had she when she started from home?

(Contributed by M. Ward, East Ardsley, Nr. Wakefield,
to whom 2/6 has been awarded).

An inmate of a mental hospital sat holding a stick, with a piece of string attached, over a flower bed. A visitor approached, and wishing to be affable, asked :

"How many have you caught?"

"You're the fourth!" was the unexpected reply.

White: "Hello! Black, are you off to the North Pole?"

Black: "No, I'm going to paint the front door."

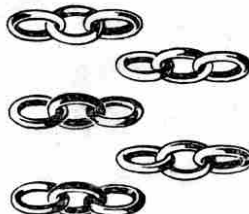
White: "Then why are you wearing all those coats?"

Black: "Well, it says on the tin: *To obtain first-class results, put on three or four coats!*"

(Contributed by Frederick Wright, 34, Upperthorpe Road, Sheffield).

Puzzle No. 33.

A lady brought to a jeweller a chain which was broken into five pieces and asked him to mend it for her, promising to pay him 1/- for every link that he had to break and weld. When it was finished



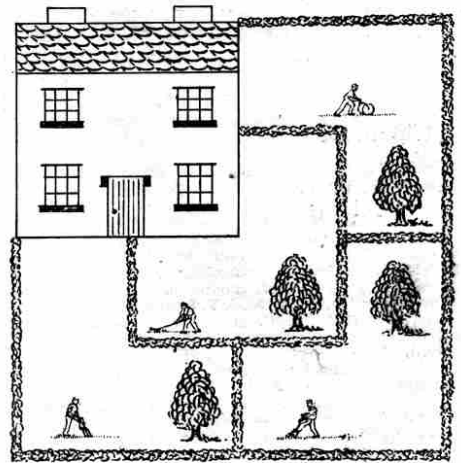
she was surprised to receive an account for only 3/-. How did the jeweller manage to mend the chain by breaking only three links?

(Contributed by Ronald Storey, Scarborough, to whom the monthly prize of 5/- has been awarded).

Answers to last Month's Puzzles

No. 28. 72 Leaps.

No. 29. Below is shown how the four sons carried out the conditions of their father's will, taking an equal portion of his land so divided that each son had a piece exactly equal in size and shape and each containing one tree.



No. 30. 12 Seconds. There are five intervals between strokes of one and one-fifth seconds each when six is struck. There are ten intervals of one and one-fifth seconds each when eleven is struck.

☐ We offer a prize of 5/- for the best puzzle submitted each month, and four prizes of 2/6 each for any other puzzles printed.

Puzzles should be expressed as clearly as possible and the answers should be given in each case. Diagrams should be clearly drawn and letters should be addressed "Puzzles," Meccano Magazine, Binns Road, Liverpool.

☐ We hope to announce next month a special
☐ **Puzzle Competition for Guild Members.**

[illegible]

A mournful-looking gentleman was bewailing the fact that he had no friends. "I have only one friend in the world—my dog!" he proclaimed.

"Why don't you get another dog?" asked a cheery optimist.



A gilded youth, tiring of life in an office, decided to go to sea. He managed to get a job as a stoker on an Atlantic liner. Having signed on, he went aboard, and was ordered below. Three days later in mid-ocean, he was found, in resplendent garb, conversing with a young lady on the promenade deck. In answer to the irate officer's remarks the gilded one replied pleasantly, "Oh, haven't you heard? I've left!"

Competition Corner

Result of Second "Lynx-Eyed" Contest

Judging from the numerous entries received in this competition, it is apparently quite impossible to really puzzle Meccano boys. In spite of the fact that we spent many hours making up the most difficult and tricky puzzle-pictures from the Meccano Manual, 32 competitors succeeded in solving all the pictures.

This competition has been by far the most difficult yet announced, and the 32 successful entrants fully deserve the title of "Lynx-Eyed" readers, as well as the congratulations of their fellow competitors.

In accordance with the rules governing a tie, neatness of writing was taken into consideration in awarding the prizes. Also, in order that every successful entrant should receive a prize, the number of consolation prizes has been increased to 28, and a special fourth prize awarded to the youngest competitor sending in the nearest entry. The list of prize-winners is as follows:—

FIRST PRIZE (Hornby No. 2 Tank Loco):—
J. H. KETTLE, of Barrow-on-Soar, Loughborough.

SECOND PRIZE (No. 1 Radio Receiver):—
L. WELLAND, of Thames Ditton, Surrey.

THIRD PRIZE (Meccano Double Headphones):—
P. T. BOURNE, of Rotton Park, Birmingham.

SPECIAL FOURTH PRIZE (Meccano Clockwork Motor):—R. PHILP (age 10), of Chesham, Bucks.

CONSOLATION PRIZES to the following Competitors:—E. Aspinall (Wallasey), N. F. Beckett (Bromley, Kent), L. Chilvers (Norwich), C. Clark (Bletchley), D. Clement (Pontesbury, Salop.), S. Collier (Manchester), W. R. Croft (Pontesbury, Salop.), C. G. Emmett (London, W.14), M. S. T. Fowler (Teddington), P. Gardiner (Bristol), E. H. Glover (London, N.5), R. H. Herbert (Wallasey), G. W. Hook (Honiton, Devon), J. Jennings (Dublin), J. Kemp (London, N.W.10), D. MacLean (Chasetown), W. Manning (Purleigh, Essex), G. S. Marsh (Thornton-le-Fylde), J. T. Milnes (Cawthorne), T. J. Mullins (Birkenhead), D. Porter (Cheltenham), W. Selby (Chard), D. Schofield (Lincoln), S. H. Simons (Barking), T. W. Tugwell (Tunbridge Wells), N. Ward (East Ardsley), J. Wilkinson (Ardsley), G. H. Williams (London, S.W.15).

The correct solutions to the three sets of Puzzle-pictures will be given in the November issue of the "M.M." It is impossible to publish the answers before that number, as the Overseas Section of the competition does not close until 31st October, 1924.

We shall announce another of these popular competitions in the near future. We hope that all competitors who have not been fortunate enough to win a prize in this contest will enter and have better luck next time.

Result of Eighth Photo Competition

A large number of the entries in this competition were holiday snaps, and it seems evident that picnics, bathing, sailing and camping have been occupying the attention of many readers during the last few weeks. Some beautiful photographs of country roads, lakes and woods were also entered, and in these a high pictorial standard was shown.

There were two prizes offered in each section, i.e., Meccano goods to the value of 10/6 and 5/- respectively, to be chosen by the winner from the current catalogue. The First Prize in Section A (under 14 years of age) has been won by L. E. Ashforth, of Birmingham, for a very fine river scene, and the Second Prize by Denis Salt, of Shrewsbury, for his clever snap of the Bumping Races at Shrewsbury School.

In Section B (14 years and over) E. Muir, of Birkenhead, wins the First Prize with a study of a country lane, which is exceptionally clear in detail. For his snap entitled "Summer in the Woods" Bryan Pearson, of Lye, Stourbridge, has been awarded the Second Prize in this contest. We hope to see more entries by these clever photographers in future competitions.

New Contest for Meccano Cyclists

As there are evidently very many enthusiastic cyclists among readers of the "M.M.," it has been decided to announce another cycling essay competition. The essays received in the last contest were of a very high standard, and entrants in the new competition should not find any difficulty in describing their "Most Enjoyable Cycle Outing," which is to be the subject.

Nearly every cyclist has happy memories of some particular ride which he enjoyed more than any other. This run may perhaps have been into the country, down to the sea, or even into a local town. A few moments' thought will soon recall the details of that most enjoyable trip, and as the essay may run to 500 words there will be quite sufficient space to do full justice to the subject.

The entries in this competition will be judged by "Rover," and the prize offered is a supply of puncture-sealing solution sufficient for two tyres, to be chosen by the winner from an advertiser in the "M.M." Entries should be plainly written in ink on one side of the paper only, and each sheet must bear the competitor's name and address on the back. Envelopes should be marked "Cycling" in the top left-hand corner and should reach this office before 30th September.

FOR OVERSEAS READERS

Result of Essay Contest

The choice of Overseas Stamp Collectors showed a considerably wider range than that of Home Competitors in a similar competition. Although many well-considered and neatly-written entries were received, no two entrants dealt with the same sets. The prize of stamps to the value of 10s. 6d. is awarded to Master Allan Watson, of Pretoria, South Africa, who very naturally chose the South African stamps as the subject of his essay. His description of the various issues of Transvaal, Cape, Natal and Orange River Colony was particularly good, and he is obviously an enthusiastic collector.

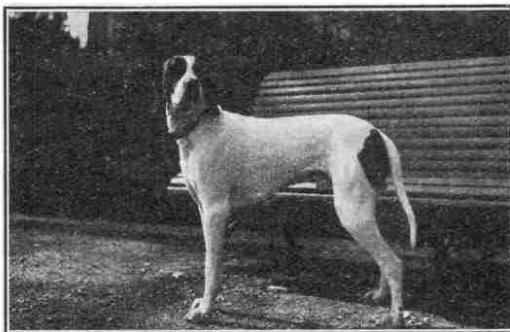
An essay deserving special mention was entered by Master E. A. Mutelholzer, of British Guiana, whose favourite stamps were five of the British Guiana Jubilee.

Result of Seventh Photo Competition

An outdoor scene was the subject of this contest, and the wide scope it afforded attracted numerous entries from all over the world. Among the many interesting scenes portrayed were snaps of native life in India; Australian railway pictures; views of Malta and New Zealand; a fountain in Rome; a lucerne field in Australia; a Canadian cattle-ranch; and photos of the British Service Squadron in Sydney.

Two prizes were offered, and are awarded to Master Aly Ahmed Shawky, of Cairo, Egypt, the winner of Section A, and to Master F. D. Nrih, of Bombay, India, in Section B. In each case the prizes are Meccano goods to the value of 10/6, and we congratulate these two readers on their well-deserved success.

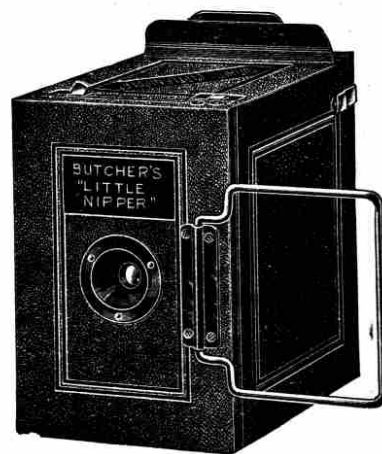
FROM ITALY



We illustrate above a beautiful dog that belongs to Master R. Bandiera, one of our readers in Italy. The photograph was awarded third prize in one of our recent Overseas Photographic Competitions.

THE LITTLE NIPPER PRIZE COMPETITION

For all under 17 years.



Prizes:

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Cricket Bat
Silver Watch**

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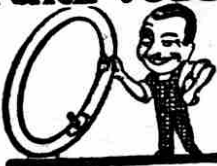
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Variable Gears

by "ROVER"

SOME weeks ago a reader very kindly sent me a cutting from a leading cycling journal giving particulars of a five-speed gear that will shortly be available. While this innovation will be watched with considerable interest by every keen follower of cycle design and construction, the great majority of road users probably will remain content with the present two-speed or three-speed gears, which have so firmly established themselves. Every cyclist at some time or other considers the idea of fitting one of these labour-saving devices to his machine, so that a few words on the subject should prove of interest to many readers.

Gears and Levers

Gearing of any sort is primarily a form of leverage, and a variable gear is merely an arrangement by which variations in leverage may be obtained as required. It is impossible to construct a single fixed gear for a cycle that will be equally suitable in all circumstances. A high-geared cycle is fast on the level but is bad for hill-climbing; a low-geared machine is slow on the level but is excellent for hill-climbing. In order to enable the cyclist to travel fast over level roads and still be able to mount hills with the least exertion, combinations of two or three gears have been introduced. These operate either on the bracket or in the hub of the rear wheel.

With the exception of one well-known make, two-speed gears are constructed on the gearing-down principle. By gearing-down is meant that in high gear the drive is direct or straight through, while in the lower gear the drive is through a train of wheels, the effect of which is to reduce the number of wheel revolutions to each revolution of the cranks. By increasing the gear the energy of the rider is used, so to speak, in large amounts, and his speed is consequently increased. Reducing the gear, however, causes the rider's energy to be applied in smaller amounts, with a consequent decrease in speed.

Novices often wrongly imagine that a low gear enables a rider to climb a hill more quickly than he could do with a high gear, but as a matter of fact the opposite is the case. A longer time is taken to climb the hill but the ascent is accomplished with less effort. The great point to be remembered when changing from normal gear to low gear is to maintain the same rate of pedalling, and not to be tempted into pedalling faster in the endeavour to keep up the same speed.

Two-speed and Three-speed Gears

To the new owner of a bicycle the choice between a two-speed and a three-speed gear is invariably a difficult matter. Unfortunately no fixed rule can be given. The two-speed gear is the cheaper, but the three-speed gear provides a wider range of gears and consequently results in easier riding. Both have their advantages depending upon the

work for which they are intended, but whichever is finally chosen, care should be taken that the direct drive is on the gear to be most frequently used. In the case of a two-speed gear it is usually preferable to have the low gear in reserve, and the direct drive should be on the high gear, as in the Eadie variable-hub or other similar make. Some riders prefer to ride mainly through gearing, keeping the direct drive as a reserve gear, but this plan is not to be recommended for general use.

Hub or Bracket Gearing

The three-speed type allows the rider to retain his ordinary gear for normal work, and at the same time gives him a high gear for riding on the level or on down grades and a low one for climbing hills. There are numerous makes of three-speed gears, one of the best known being the Sturmey-Archer. In ordering a variable gear it is advisable to specify a normal drive geared slightly higher than would be the case for a similar single-gear bicycle.

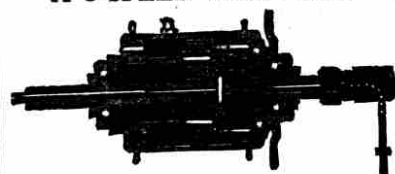
A free-wheel is included in both types of gear, and a back-pedalling brake may be fitted or not, according to the wishes of the purchaser.

Whether the rider adopts hub or bracket gearing also depends on his own choice, as either may be fitted. Many experienced riders maintain that in bracket gearing, that is gearing by the chain-wheel bracket, the extra weight is not so noticeable. They also claim that, as the gear wheels are larger and stronger when the bottom bracket type is used, friction is less likely to be set up. On the other hand a two-speed or three-speed hub is far more simple and equally effective, and may be fitted easily to any make of machine.

The question of the best place for the gear-lever itself is of minor importance. The

(Continued on page 270)

A 3-SPEED GEAR HUB



Courtesy of]

[Sturmey-Archer Gears Ltd.

A sectional view of a Sturmey-Archer Three-Speed Gear Hub, showing the toothed wheels which give the different gears

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The Secretary's Notes

Very soon club night once more will be the great event of the week, and preparations for the First Winter Session are already well in hand. Club Leaders and Secretaries are busy planning their programmes, arranging lectures and visiting or writing to all past members in preparation for the opening date. Several clubs in fact have already started their First Winter Session, though the majority are waiting until the end of the month before calling their first meeting. I have already received advance copies of a number of club programmes and several of these incorporate new and interesting items for club nights. I hope to be able to pass these on to Club Secretaries in a future issue, and meanwhile shall be interested to receive further copies of any other programmes available.

I should like to draw attention here to the excellent results that may be obtained by the Club Leader visiting the parents of as many of the members as possible before the opening of the session. During such visits the Leader will not only give the parents a better knowledge of the club and its officials, but he will also be able to arouse their interest in the work of the club. At the same time the Leader is very likely to come in contact with gentlemen who are not only qualified, but also willing to give lectures to the club from time to time. Many interesting lectures from engineers, mechanics, sailors and others have been obtained in this manner, while permission to visit various works or factories has often been secured.

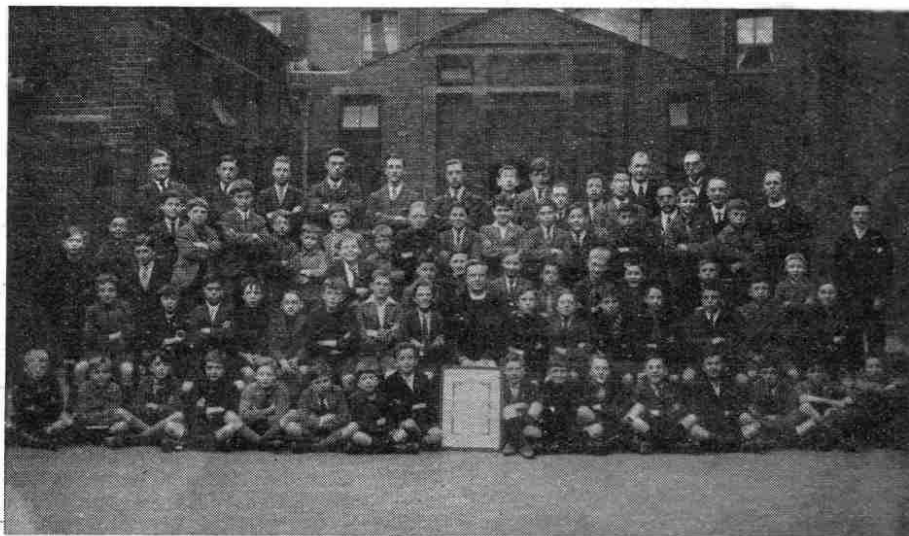
As in past years, the summer months have been a strong test of the stability of our new clubs. Unfortunately several of our smaller ones have had to be disbanded, owing to lack of support or for various other reasons, but in every case the club has been of very recent institution with a small membership. Though I greatly regret their failure, it is not to be expected that every club that is started will be a success and become permanently established. With the elimination of the few failures, we are able to commence our new session under the most favourable conditions, confident that every one of the 116 clubs on the records is alive and energetic, and prepared to do its very best for the good of its members.

World's Largest Meccano Club

With a club roll of one hundred and three members, the St. Mary's (Newington Butts, London) M.C. now has the distinction of being the largest Meccano Club in the world. The club was founded by the present Leader, Mr. G. Treves, at the beginning of 1921, as the St. Mary-with-

was published in the "*St. Mary's Meccano Monthly*," a club magazine edited and printed by the Leader.

Our photograph shows a group of the club members and the Committee, but these represent only about two-thirds of the club's full strength, the other members



St. Gabriel Meccano Club, and its progress has been steadily maintained. The present name of the club was adopted in July 1923, and at the end of that year an Exhibition was held which, in addition to being one of the most successful held by any Meccano Club, resulted in a considerable increase in membership.

To celebrate the premier position attained by the club, a general meeting of all members and old boys was recently called. There were nearly 200 present, and representatives of the local newspapers also attended. The meeting proved very successful and an interesting report

being unable to attend owing to school duties. The Club President, the Rev. W. J. Margetson, M.A., is in the centre of the group, behind the framed club certificate, and Mr. Treves, the Club Leader, is the last on the right in the back row.

The previous club record was held by the Observatory Meccano Club, of South Africa, with a membership of 80, and as this enthusiastic club is making extensive efforts to regain the title, and has already considerably increased its membership, Guild members no doubt will follow the progress of these two friendly rivals with the greatest interest.

The help of every Guild member is needed in the Recruiting Campaign. First of all, see that all your friends are members of the Guild. If you belong to a club, the best way is to take your friend along with you to a club night. Introduce him to the Club Leader and members, and when he sees what a Meccano Club really is he will very soon be asking for an application form. Those who are not near a club should point out the advantages to be gained by being a member of the Guild. The world-wide recognition of the Guild badge, the Correspondence Club—so useful to stamp collectors—the Recruiting Medallions and the competitions in the "*M.M.*" for Guild members only, are all strong arguments which should be used in favour of joining the Guild.

Finally, always remember to have an application form handy—supplies may always be obtained free from Headquarters—so that when you do find a recruit you will be able to make sure of him on the spot! If every member who reads these words will put them into practice a record for 1924 will be assured.



Davenport M.C.—Members recently spent a week in camp near Middlewich, and some interesting visits were paid to local canals, locks, and salt-works. A visit to the cinema on Wednesday and a cricket match on Friday were thoroughly enjoyed. The campers returned home on Saturday evening after presenting their hostess with a vase in appreciation of her kindness. The Leadership has now been resumed by Mr. Main, who was in charge of the camp, and the Winter Session is being eagerly anticipated. Club roll: 35. Secretary: Master A. D. Stoker, 124, Bramhall Lane, Stockport.

Boston Model-Making M.C.—A day's visit to Skegness was the most popular event in the programme of the Summer Session. Splendid weather was experienced, and after tea in the Pavilion, to which members did full justice, the party returned home in the evening. The Cricket Club continues to prove popular, and a full fixture list is evidence of its prowess on the playing field. Several members recently visited the British Empire Exhibition, and the accounts of their experiences were much enjoyed by the club. Club roll: 30. Secretary: Master R. Robinson, 30, Woodville Road, Boston.

How to Run a Meccano Club

by the
Guild Secretary

Redruth M.C.—Owing to its steadily-increasing membership the club has now been divided into two sections, the "Nuts" and the "Bolts," each under a captain. The recently-introduced Ambulance Section is proving very popular and a Second Section will shortly have to be formed. Some weeks ago a visit was paid to the local reservoir, when the surveyor, Mr. King, kindly conducted the party and explained the construction and uses of the reservoir. The Club Magazine is now firmly established, is very well arranged and neatly printed. Club roll: 36. **Secretary:** Master Leonard Trenberth, Tunnel Stores, Redruth.

Barnethy M.C.—Two successful Exhibitions were held during the Summer Session, the proceeds of the second amounting to £3 6s. 11d., which was given to the Church Building Fund. Cricket is a popular evening occupation. A Field Fête was due to be held in the middle of last month, with the object of raising sufficient funds to purchase a billiard-table and football and cricket outfits. Members are keenly interested in wireless, and the club is fortunate in possessing a two-valve set. The membership for the session shows an increase from 20 to 29 and more new members are expected on the opening of the Winter Session. Club roll: 29. **Secretary:** Master R. H. Ward, Laurel Villas, Victoria Road, Barnethy, Lincs.

Australia

Footscray M.C.—This prominent Overseas club continues to make good progress, the programme for the past session including several interesting debates, model-building evenings, wireless and electrical experiments and engineering lectures. The session was concluded with a club banquet and social evening, at which a surprise was sprung on the members by the Club Secretary and an assistant, who built a model stage and cinematograph and gave an excellent entertainment. The club will shortly move into the new Scouts' Hall now being built, when more members can be enrolled. **Secretary:** Mr. H. Roach, 48, Stirling Street, Footscray, Victoria, Australia.

Malta

1st Malta M.C.—Owing to present warm weather, meetings are now being held outdoors as much as possible. A camp at Easter proved quite successful, though it was somewhat marred by bad weather. Outings are being regularly held throughout the present session. Club roll: 26. **Secretary:** Master A. Grech, 173, Prince of Wales Road, Sliema, Malta.

Clubs not yet Affiliated

Windsor M.C.—At present there are 17 members of this club, and a room is now in the course of erection. A Club Leader has not yet been obtained, but it is hoped to secure one very shortly. Intending members should write for full particulars to the **Secretary:** Master K. Greenwood, 83, Victor Road, Windsor.

Richmond M.C.—Already possesses a club-room and adult Leader, and will shortly be eligible for affiliation with the Guild. Meetings are held every Friday at the Duke Street Sunday School-room between 7 and 9. Any Meccano boy interested is cordially invited to attend. **Secretary:** Master E. J. C. Smith, 70, Lower Mortlake Road, Richmond, Surrey.

Linthorpe M.C.—Has been fortunate in securing Mr. Dodd, the chief engineer of Messrs. Dorman, Long & Co.'s (Middlesbrough) Engineering Works as Club Leader. The members were invited to visit the Works, and a very enjoyable and interesting time was spent. A local Exhibition of models has been temporarily postponed, but several outings for the summer months are being discussed. Affiliation will be applied for as soon as a club-room is obtained. **Secretary:** Master G. Pringle, 20, Poplars Road, Linthorpe, Middlesbrough, Yorks.

Peebles M.C.—The enthusiastic Club Secretary has now been successful in obtaining the Secretary of the local Y.M.C.A. to act as Club Leader, and as a club-room has already been secured, affiliation will shortly be granted. The Suspension Bridge across the Tweed near Peebles makes a splendid subject for a Meccano model, and the members are taking full advantage of the fact. **Secretary:** Master De Lancey Samwell, St. Peter's Rectory, Peebles.

Penarth M.C.—Several interesting lectures on Cranes, Bridges and other Engineering subjects have been given by members. A paper-chase held early in the season was greatly enjoyed and a variety concert given by the club proved equally successful. An adult Club Leader has not yet been found, but it is hoped to persuade some local gentleman to take up this office in the near future. **Secretary:** Master M. Hallett, 64, Westbourne Road, Penarth, Glam.

Meccano Club's Exhibition

A Sixth Annual Exhibition is being arranged by the Holy Trinity Meccano Club on the 17th and 18th October. Working models will be on view, and also a miniature railway system. Guild members and their friends in or near London are cordially invited to visit the Exhibition, and a further announcement, together with particulars of how to reach the Hall, will be given next month.

LAST month I drew attention to the desirability of encouraging club members to prepare and read short lectures or papers on some subject in which they are specially interested. In the ordinary way it is unusual for a boy to stand up before his friends to read a paper of his own composition, but from every point of view it is excellent for him to accustom himself to do this. The research necessary in preparing a paper, and the orderly thinking needed to write it are splendid practice for any boy, and the actual reading of the paper develops a confidence that will be of the utmost value to him in later years.

Preparing the Papers

At the same time it is only in exceptional cases that a boy is able to attempt this work entirely unaided. The Club Leader can help very considerably in giving advice in regard to the best books to read and the most likely places in which to search for the information required. The Leader may also assist in the preparation of the paper and in giving a few hints as to correct and confident delivery. There are always large-hearted people around who are ready to help, and no doubt the young lecturer will be able to obtain considerable assistance from parents, employers, teachers and older friends.

The reading of the papers should not occupy more than about a quarter of an hour, and each one may be followed by a few appropriate comments from the Club Leader, who should encourage the members of the club to ask questions and join in a general discussion of the paper. In such discussion it often happens that some members are able to add interesting additional facts to those put forward by the lecturer. Illustrations by working models will also prove very helpful, but care must be taken that this is not overdone, because then it becomes tedious and spoils the whole effect. Principles should be dealt with in a few clear sentences, and all involved technical terms should be avoided, as the younger members will not understand them, and will not be im-

pressed by them no matter how clever they may sound.

Special Medallions

The subjects to choose from for preparing such lectures are innumerable, and in a later issue we shall give a list of suggested titles, each one of which will provide enough material for half-a-dozen lectures,

so that there should be no repetition of topics in any club for a very considerable period.

In order to encourage this feature of papers by members the Guild allots each session a Special Merit Medallion to each club, to be given to the member who delivers the best paper. After the papers have been read at the club meetings, the one that is considered to be the best, either as the result of a vote of the whole club or as the decision of the Leader, must be sent to me at the end of each session with any comments by the Leader.

This Special Merit Medallion, which is illustrated on this page, is very beautiful both in design and finish, and on each one will be engraved the name of the recipient, which will also appear in the "M.M."

Inventing with Meccano

One of the best features of Meccano is that it encourages boys to invent, and in the work of invention the best qualities of an individual—initiative, keen thought, patience and perseverance—are brought into play. This opportunity for invention, therefore, should be given the greatest possible encouragement by Club Leaders and Secretaries. It may be fostered by means of competitions among members, and often patrons of the club will be willing to offer prizes to those who excel, particularly if a model happens to show some mechanism in which they are commercially interested. The results may be inserted in the local paper, and if a local dealer is approached no doubt he will be pleased to exhibit the winning models in his shop windows, with a neat card announcing the results.

(To be continued)

Meccano Club Leaders No. 15. Mr. LIONEL C. HOBBS



The Leader of the "Glevum" Meccano Club, Mr. Lionel C. Hobbs, was the first Scoutmaster to form a Meccano Club in conjunction with his Scout Troop. The innovation proved exceedingly popular, and many Scout and Cubmasters have since followed suit with equal success.

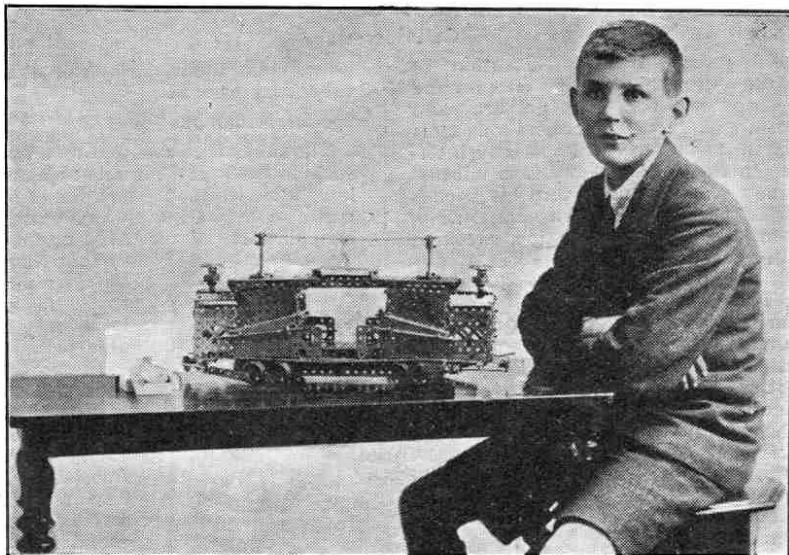
Founded in March 1920, the "Glevum" M.C. was affiliated with the Guild in June of that year. The Club is attached to the 1st Gloucester British Boy Scouts, a troop formed in June 1909. Cricket and swimming are popular summer activities, and a week's camp is arranged by the Leader every year. At a recent big concert, organised by this Scout Club, the sum of £20 was raised towards the expenses of a visit by the Scouts to the British Empire Exhibition at Wembley.

Members of the "Glevum" M.C. are to be heartily congratulated on their good fortune in securing such an enthusiastic and capable Leader and Scoutmaster.



Special Merit
Medallion
(About half actual
size)

Staffordshire Reader's Success



Our illustration shows Master John W. Bagnall, of Stafford, who recently won the First Prize in a model-building competition organised by Messrs. W. H. Smith & Son. John is eleven years old and is keenly interested in engineering, which is scarcely surprising, as his father

is an engineer. His greatest interest, however is in railways, and he has a thorough knowledge of the many different types of locomotives all over the world. His prize-winning model is of a Mexican Railway Loco shown in the accompanying photograph.

Electricity—(cont. from page 239)

domestic purposes. In a large town the current from the power station is led along underground cables to sub-stations distributed at various points, and generally underground. From the various sub-stations the current is distributed as required by a network of underground cables. At each sub-station the current passes through a step-down transformer so that its voltage is lowered to the required point. The current is then ready for use, but of course it is still alternating current, and if it is desired for certain purposes to have a continuous current supply, the alternating current must be converted. This may be done by means of an electric motor and a dynamo coupled together. The motor is constructed to run on the alternating current from the transformer and it drives a dynamo that generates continuous current. There is also a machine called a "rotary converter" which is largely used and which does the work of both motor and dynamo.

In this article we have dealt with power stations in which the source of power is steam. Another source of power is that of water. Water power is only used to a very small extent in this country, but in many parts of the world, particularly in America, enormous hydro-electric power stations have been constructed. Next month we shall describe some of these hydro-electric schemes, and especially those in which the immense volume of water passing over the Falls of Niagara is harnessed and made to produce current supplying light and power for huge areas.

NEXT MONTH:—

**Harnessing Niagara :
Hydro-Electric Power Stations**

Stamps for Sale

(See also page 262)

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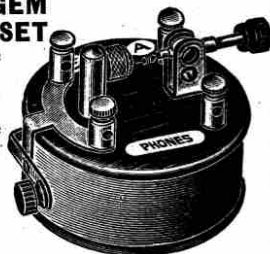
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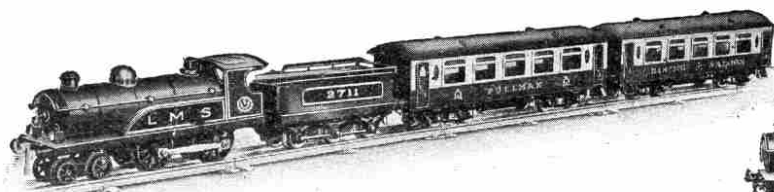
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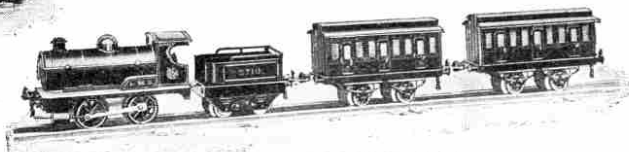
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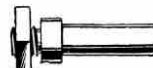
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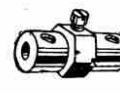
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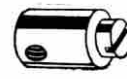
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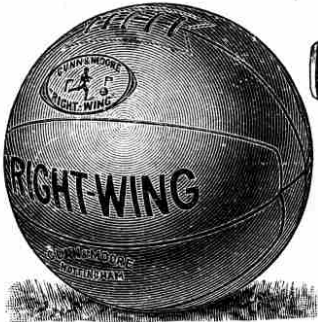
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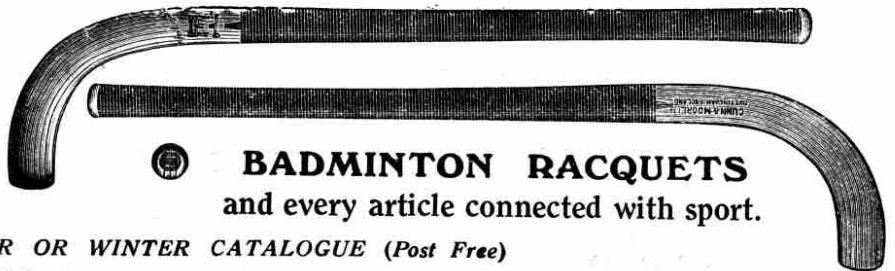
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