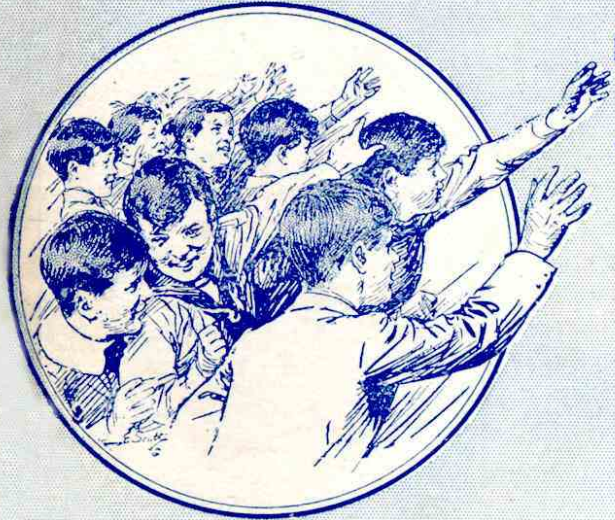


OCTOBER 1923

MECCANO

MAGAZINE

Published in the interests of Boys



PRICE

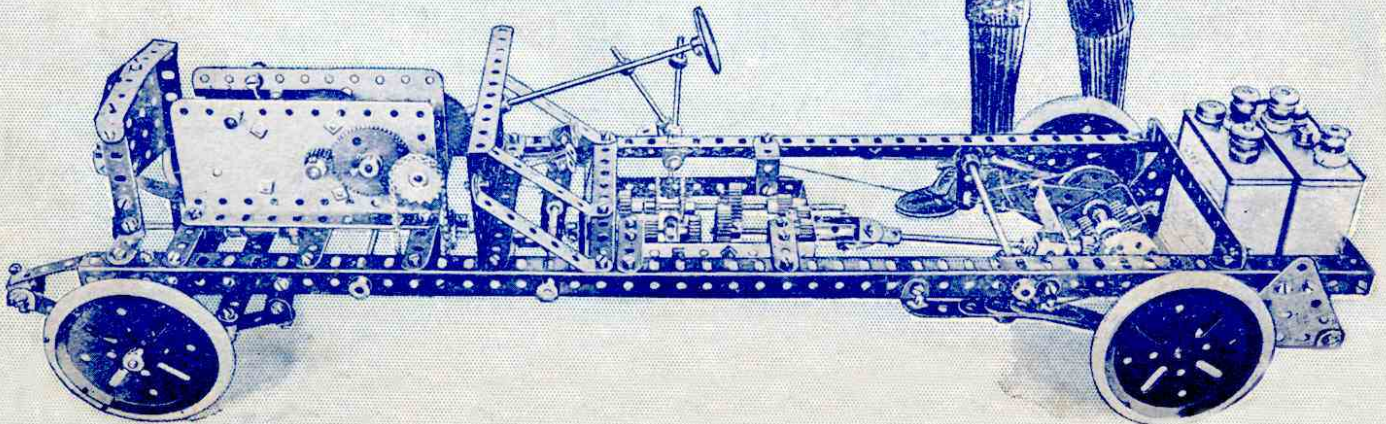
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VOL. VIII.

No. 10

The New
MECCANO CHASSIS

SEE PAGE 122



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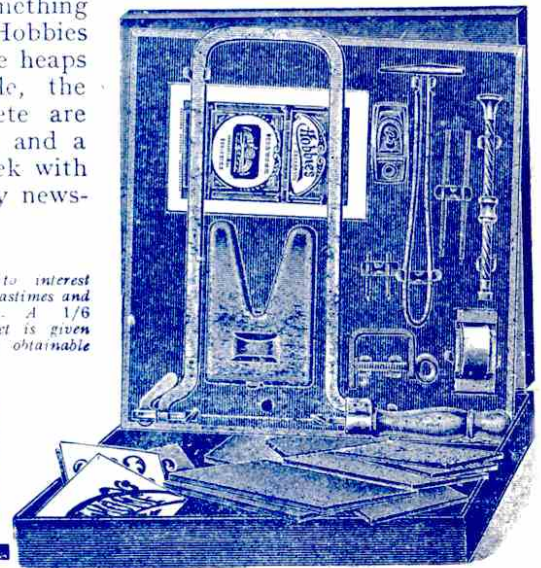
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"FORCE"

TOASTED MALTED WHEAT FLAKES

EDITORIAL OFFICE

Binns Road,
LIVERPOOL

MECCANO



MAGAZINE

PUBLISHED IN THE
INTERESTS OF BOYS

on the
15th of each month



EDITORIAL

AT the commencement of a new Meccano season, I should again like to remind all my readers that damaged or rusty Meccano parts may be replaced at any time by bright new ones at half list prices. The old parts should be returned through your dealer or direct to us, accompanied by a list of the parts, and a remittance covering the cost of the new parts, plus postage.

I am always pleased to receive interesting photographs and short articles from any of my readers and to publish and pay for those of sufficient general interest. Photographs should be clear and sharp, and articles should be neatly written on one side of the paper only. The subjects need not be confined to either Meccano or even Engineering.

I have just read over the conditions and awards of the new Meccano Model Building Competition, and these interest me immensely. It is the biggest thing in competitions of this kind ever held, and I shall follow with great keenness the awarding of the 21 Championship Cups and the hundreds of medals. My greatest concern, however, will be the destination of the Gold Medal and the title of "Meccano Gold Medallist." I have nothing whatever to do with the framing of this competition or the adjudication of the models, but I do hope that this much-coveted title will be secured by a reader of the "M.M." The honour and glory of my great army of readers is at stake, and I confidently believe that each one of them will exercise all his ingenuity and skill to secure and retain the title in our ranks.

My readers may help me very considerably in obtaining new subscribers, by telling their friends about the "M.M."

There are over a million Meccano boys in this country who would all enjoy the "M.M." if only they knew there was such a magazine. Our circulation is growing steadily, but I wish to see it grow

Brains and Bravery

Boys who Rank with Men

BOYS are just men in the early stages. Some develop into man's estate quite slowly, others very quickly. I have known mature men of 18 and young children of 50! One or two seem to have been children for just the first few years of their lives only, whilst others never have been, and never will be, anything else. I am often told that the latter type are the happiest, but they can scarcely be the most useful.

I am not too fond of boy prodigies. They don't seem to fit in with the regular run of life. They are not companionable with other boys, and are out of place amongst men. It is, however, very delightful to see our ordinary everyday boys, our friends at school, our companions at play, giving utterance to manly thoughts and doing manly deeds. We remember that Sir Ernest Shackleton took with him on his last expedition to the Antarctic a young boy called Marr, because he had proved himself to be a manly boy. Marr did good work, and now he has written a very readable book entitled "*Into the Frozen South*," setting out all his adventures during the tragic voyage of the "Quest."

Another manly boy is Eddie Meehan, aged 14, who was chosen from 400,000 schoolboys to be Mayor of New York for one day. The fact that he was so chosen sufficiently demonstrates that he had qualities of manliness and character that strongly impressed his selectors.

I have just learned that Arthur Edward Clark, a young boy living at Sawmore, Ballina, Ireland, has gained a Research Studentship in Trinity College, Cambridge, value £600—a highly creditable performance, especially as the studentship was open to all Universities. Last year he took his B.A. degree at Trinity College, Dublin, gaining a Senior Moderatorship with Gold Medal.

even more rapidly, so that I shall be able to still further increase the size of the "M.M." Then I shall be able to print more and more of those hundreds of interesting subjects, for which competitors in our recent competition have made definite requests. If every reader of the "M.M." obtained only one new subscriber we should double our circulation

When it comes to a question of personal courage, I do not think that boys lose anything by comparison with men. We all know of courageous boys who forced their way into the army during the war, by all manner of daring expedients, years before they were of the age set down by the authorities. We know that those brave boys acquitted themselves like heroes, in France and elsewhere. There were Jack Cornwells in every branch of the service. In times of peace, also, there is no dearth of boy heroism. I read this month of John Burgess, age 13, of the 50th Aberdeen Company, who has received the Cross for Heroism for rescuing a little girl from drowning. Of Robert Watters, 1st Falkirk Company, and Robert Hume, 20th Leith Company, both boys who have received diplomas for similar bravery; and Scout J. Pinnock, of 1st Kingston Troop, who was awarded a life-saving medal for giving his blood to save his sister's life.

There are boy heroes in every community, whose deeds are unknown beyond their own little circle. Boys who are men both in thought and action. I think the Editor of the "M.M." might do worse than ask you boys to report to him any deeds of bravery or special cleverness and manliness, which may come under your observation, so that he may have an opportunity of bringing them to the knowledge of his great army of boy readers.

A. M. D.

We gladly accept our contributor's suggestions, and shall be only too happy to receive any such reports from boys and to give them publicity in our columns.
—EDITOR.

and could then add several more pages. Now, boys, will you try and find at least one new subscriber and so help me to make the "M.M." even better, bigger, and brighter than it is at present? If you know of a Meccano boy who is not a regular reader of the "M.M." and will send me his name and address, I will see that he has a free copy mailed to him.

THE

MECCANO MOTOR CHASSIS

Full Instructions for Building this Interesting Model

PART II.

IN our issue last month we printed the first instalment of these instructions for building the Meccano Motor Chassis, which we consider to be a veritable triumph in Meccano model building. This model has been admired by His Majesty the King, and is in use in several schools of motoring for demonstration purposes. It shows in miniature the main mechanism

Fig. E. The main shaft drives through a pinion (27) engaging with a contrate wheel (26) which is bolted to a cage (23) mounted on the axle rods (16 and 17) which form the back axle. When the shaft (and consequently the pinion 27) rotates, the contrate wheel and cage (23) also rotate, the latter with its enclosed gear wheels (21) enabling either half

of the back axle to rotate independently of the other half. Thus we may even hold the wheel at the end of axle (17), and with the finger spin the wheel on axle (16) either backwards or forwards. If the shaft and gear wheel (27) rotate, however, both rear wheels (mounted on axle 16 and 17) must do so also. Should the wheel on axle 16 revolve at a more rapid speed than the wheel on axle 17 or vice-versa, the difference in speed is taken up by the gear wheels (21) in the cage. Thus when the car is turning a corner or moving in a circle, the

speed is adjusted by the differential.

Building the Differential

The differential, which is shown in Fig. E as a complete unit, is built as follows:—

The $3\frac{1}{2}$ " and 5" axle rods (16 and 17) are in two parts, which abut in and revolve freely in the coupling (18) and the contrate pinions (19 and 20) are nipped on with set screws. The $\frac{3}{4}$ " pinions (21) are nipped on 1" rods (22) for which the middle hole of the coupling forms a bearing. The frame (23) is made from two $1\frac{1}{2}$ " \times $\frac{1}{2}$ " bent strips and two $1\frac{1}{2}$ " strips. If it is

found that the frame binds against the bosses of the contrate wheels, it may be pressed out to ease it.

The $1\frac{1}{2}$ " pulley wheels (24) on the rod (16 and 17) are for the brake cords. 1" threaded rod (25) holds the frame (23) to the $1\frac{1}{2}$ " contrate wheel (26) which takes the drive from the $\frac{1}{2}$ " pinion (27).

The outer frame (28) consists of a $3" \times 1\frac{1}{2}"$ bent strip, and the inner frame (23) is distanced by a collar (29) and the washer (30). The universal joint is made of two reversed double angle brackets (31) connected to the couplings by a $\frac{3}{4}"$ bolt with packing nuts (32) between.

The rear springs (33 Fig. B*) are first connected to double bent strips (34) which are threaded on the rear axles and bolted to the side frame, the rear wheels being then secured to the axle.

Constructing the Gear Box

Now construct the gear box (Fig. F) beginning with the frame. The longer sides are composed of $4\frac{1}{2}"$ strips bolted to $2\frac{1}{2}" \times 1"$ bent strips at each end. These are bolted on the 1" angle brackets (35) at each side.

On the 8" rod (36) a brake pulley (37) is fitted. Insert the rod (36) into the angle bracket (38) and fit on the two $\frac{3}{4}"$ pinions (39 and 39A) and the 50-toothed gear wheel (40).

The bevel pinion (41) takes the drive from the motor, engaging the bevel (41A Fig. B) and the $\frac{3}{4}"$ contrate wheel (42) is driven from the starting handle.

The clutch mechanism (43) is merely ornamental in this model, although an improvement is now in hand by which it actually functions. The bevels (41 and 41A) are driven by the sprocket (44) from the motor (see Figs. A* and G). The 2" rods for the sprocket (44) and the bevel (41A) are mounted in the end holes of 1" angle brackets secured to one of the $5\frac{1}{2}"$ cross strips.

* Illustrated last month.

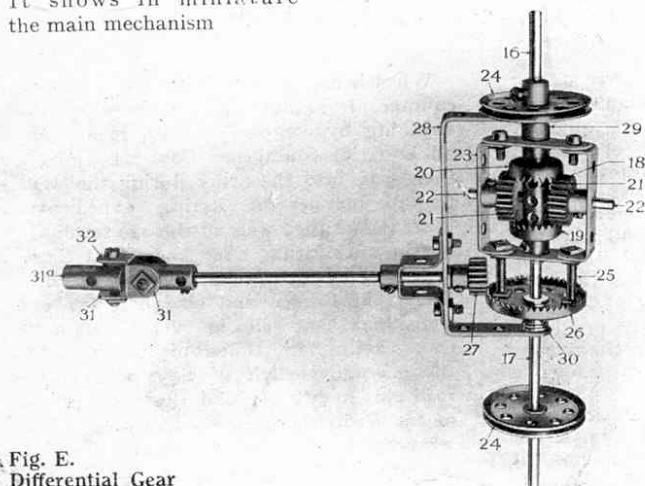


Fig. E.
Differential Gear

of a modern motor-car, and its gear box and differential clearly illustrate the principles on which these mechanisms depend.

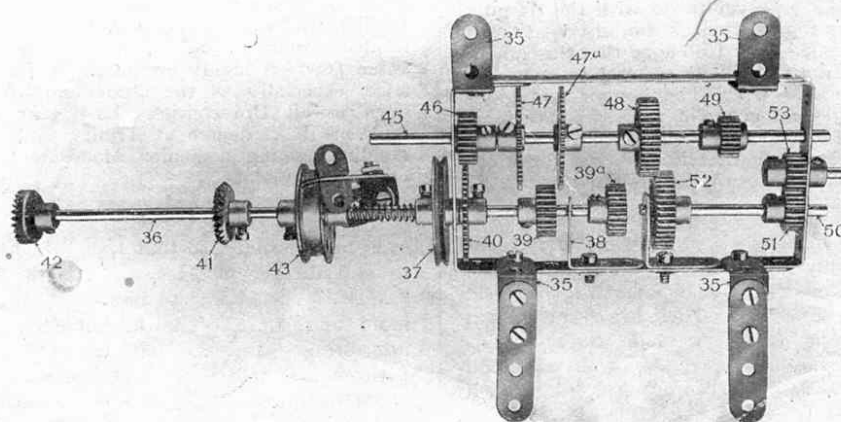
The Back-Axle Difficulty

To describe a differential gear on paper is a very difficult task, and it is very doubtful whether in this form even the most lucidly-compiled explanation leaves the motorist very much wiser. On the other hand, a model in Meccano shows exactly how this wonderful piece of mechanism functions.

Every Meccano boy knows that the differential is introduced in the back axle of motor-cars to allow for the difference in the speed of the outer wheel when the vehicle is turning a corner. As the outer wheel has to travel through a greater radius than the inner wheel, it is obviously impossible to use a solid back axle, as otherwise the difference in the speeds of the rear wheels would cause the axle to twist and snap. In the front wheels the difficulty is overcome by mounting them on stub axles, so that each revolves independently of the other. A similar method is adopted in four-wheeled carriages and lorries, but this practice is not possible in the case of motor cars, because the rear-wheels provide the tractive effort and must therefore be solidly coupled to the shaft that transmits the power from the engine.

An Ingenious Device

The difficulty is overcome in a very ingenious manner, as will be seen from



The Meccano Motor Chassis—(cont.)

The lay shaft (45) is then inserted, and the $\frac{3}{4}$ " pinion (46), the 50-tooth gears (47 and 47A), 1" pinion (48) and $\frac{1}{2}$ " pinion (49) are left loose on the shaft preparatory to the final adjustments. The driving shaft (50) is then inserted and its $\frac{1}{2}$ " pinion

(51) and 1" gear (52) nipped on. A $\frac{1}{2}$ " pinion (53) is pivoted on a 1" rod with collar and set screw. The coupling (31A Fig. E) is then connected to the projecting end of the shaft (50).

Changing Speed

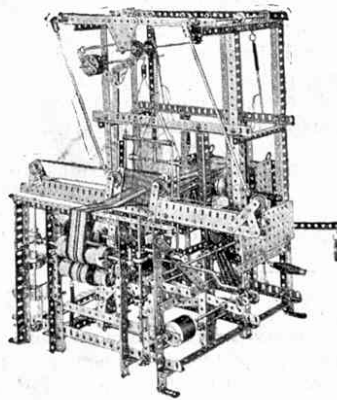
By moving a lever (54) the shaft (45) slides and the changes of speed are controlled. When in top gear the pinion (46) engages the wheel (40) and the pinions (48 and 52) are engaged. For slow speed, the gear (47) engages the pinion (39) and the pinions (48 and 52) are still engaged. For reverse the gear (47A) engages the pinion (39A) and the pinions (49 and 53) are engaged, the latter driving the pinion (51) on the rear shaft (50).

A double bracket (56 Fig. D) is bolted to the side frame to act as a stop for the levers.

As shewn in Fig. G the motor is bolted at the front of the chassis on the $5\frac{1}{2}$ " cross strips, and the 4 volt accumulator from lower cross strips (57) supported by triangular pieces (58).

THE END

How to Build the Meccano Loom



The instructions recently given in the "M.M." for building the Meccano Loom have been reprinted as a leaflet. This is obtainable from all Meccano dealers, or from Meccano Ltd. (post free 4d.) The leaflet clearly describes the construction of this wonderful Meccano model, which weaves neck-ties, handkerchiefs, etc., in a variety of artistic patterns.

A New Meccano Clock

In our November issue we shall commence an article that describes very fully the construction of a Grandfather's Clock from Meccano. This clock, which stands 6 ft. in height, keeps accurate time and is a triumph of Meccano model building. The article will be fully illustrated, and in the same issue will be published a serial dealing with the fascinating story of clocks and other time-measuring devices. To prevent disappointment order your November "M.M." now if you have not already done so.

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, but only those that deal with matters of general interest can be dealt with here. Correspondents will help the Editor if they will write neatly in ink and on one side of the paper only.

H. Warne (Manchester).—You are evidently not a very close reader of the "M.M." Harry, or you would know that we have over a hundred and forty Meccano Clubs in this country.

"Father of Boys" (London).—Thank you for your suggestions, we shall endeavour to include articles of adventures and historical interest as space permits.

N. O. Morden (South Croydon).—Your lengthy criticisms are very helpful, and we shall bear them in mind for future reference.

H. T. Bayliss (Small Heath).—We are at all times pleased to consider contributions from Meccano boys, and we pay for those that are used. We are always pleased to consider articles, no matter what the subject may be.

J. English (Normanton).—We fear there are too many complications involved to allow us to start a Meccano boys' bank. We congratulate you on having saved so much money in five months. Thrift is very excellent, and there is undoubtedly truth in the old saying "Take care of the pence and the £s will take care of themselves."

W. O. Cantele (Bristol).—Your suggestion is already in force; we pay 2/6d. for any photographs published in the Magazine.

B. Baylis (Port Erin).—Although a Christmas Annual would undoubtedly be a success, we fear it would not greatly help to improve the "M.M."

J. Thornley (Clifton).—We should very much like to print our illustrations in several colours, but unfortunately the expense of doing so is prohibitive.

J. Blandford (Cambridge).—We already provide a Magazine binder for holding the year's copies. This costs 3/- post free.

P. Harvey (Clapham).—We fear there are not many of our readers who would appreciate a column written in French. It would remind them too much of school, and the "M.M." is for brightening their leisure hours.

T. E. Langdale (Cloughan).—To print the names of all the members of the Guild would require hundreds of pages of the "M.M." We fear that the majority of our readers would be very disappointed if they opened their monthly copy to find nothing but names and addresses of Guild members in its pages!

H. R. Wright (Mansfield).—Your accident does not seem to have damped your spirits in any way, and we hope that by now your arm is alright again. We are sorry you could not call to see us when you came to Southport. The New Brighton Tower was taken down some time ago, owing to the cost of upkeep being so high.

D. Horne, Jr. (Kirkwall).—"I thank you very much for all your kindness. One would think that you are not an Editor at all, you are so human." All Editors are really human, David, especially those who, like myself, receive so many human letters from such splendid, sturdy boys. We shall be very glad to receive a photograph of your model of a warship.

J. Chadwick (Huddersfield).—We are very glad that you enjoyed your visit to Liverpool so much, and that your visit to our factory was such an outstanding feature of your holiday. We are always very glad to see any of our Meccano boys. A Meccano Magazine binder has been posted to you.

D. M. Murdoch (Ealing).—We have no space just yet for a puzzles column, but this may come later as we have had so many requests for it. We are glad you like the "M.M." so much.

C. J. Bedford (Leeds).—Many thanks for photo of your Meccano photo frame, which will be considered. The "M.M." will grow bigger and bigger, so just watch it.

I. A. Young (West Cholderton).—Photographs of any subjects which are of interest to other boys may be sent in and will be duly paid for if published. Thanks for your suggestion that we start a butterfly-collecting column, but we fear that this would not interest very many of our boys.

D. Abel (Allahabad, India).—Your drawings are quite good and you should persevere. We envy you with the lovely Indian winters of which you tell us. We may be able to start a puzzle column shortly.

J. Miller (Aberdeen).—"I met a chum to-day who asked me to give him one of my 12 $\frac{1}{2}$ " strips. "Then," he said, "I shall have as many as you." "No," I replied, "you give me one of yours then I can divide equally with your brother and we shall all have the same number as you." How many strips had each of us? Will somebody help us to solve this puzzle?

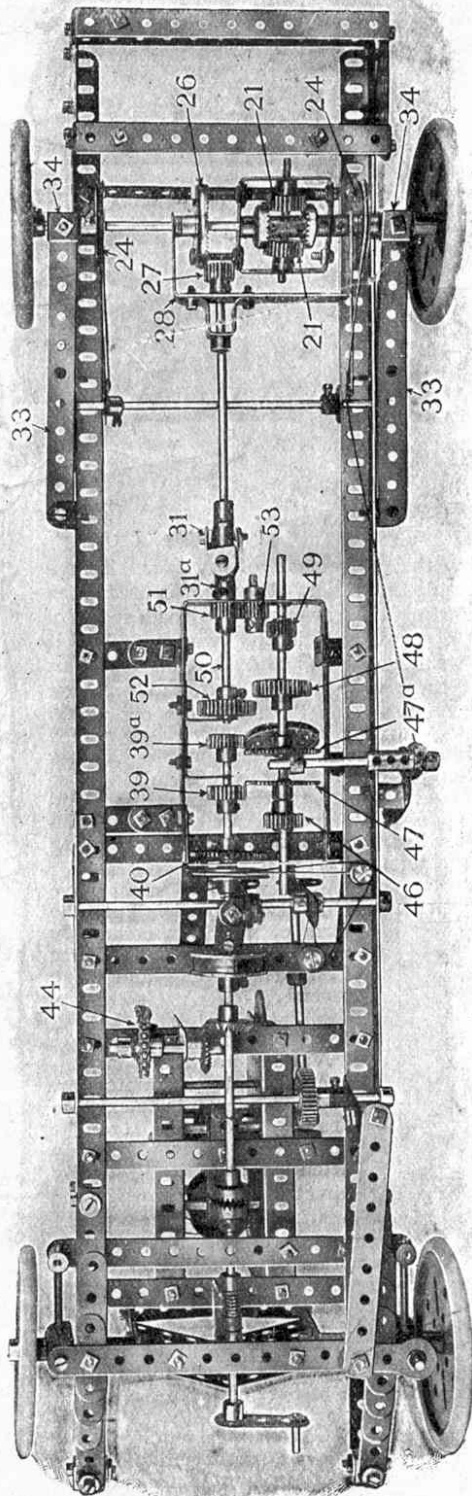


Fig. G.
Under View of Chassis

The STORY OF THE MOTOR CAR

The Wonderful Progress of the Petrol Engine



Photograph by permission

[of the Editor "The Motor"]

(Continued)
PART II

THE steam engine derives its power from steam, which is generally generated at some little distance from the cylinder, the resulting steam being accumulated and conducted under pressure to the cylinder. Here it actuates a piston, the to-and-fro motion of which is converted by a crank, assisted by a fly-wheel, into a rotary motion.

How a Petrol Engine Works

The engine used in motor-cars is of the internal combustion type, and in this type the operation is considerably shorter than in the case of the steam or internal combustion engine. Petrol is vaporised by a carburettor and, mixed with air, is led to the cylinder as a highly-explosive gas. Here it is exploded by an electric spark, which jumps across a gap in the sparking plug.

An explosion is really a very rapid change in the nature of gases, which immediately expand with terrific force. As there is no way out from the cylinder, this expansion forces the piston forward and causes the rotation of the fly-wheel, exactly as in the case of the steam engine. After the explosion, the burnt gases are allowed to escape from the cylinder and the operation repeated. The opening and closing of the inlet and exhaust valves, and also the explosions, take place with great rapidity—certainly several hundreds of times each minute, and in some cases perhaps over a thousand times per minute. Instead of hearing a single explosion, therefore, we hear the "hum" of many explosions, the individual sounds merging themselves into the roar of

a racing car as it hurls itself around the track.

Motor-Car Mechanism

Motor-car engines have generally four or six cylinders, each cylinder containing its own piston. The explosions do not take place simultaneously, but are timed to occur at different intervals for each cylinder. The pistons are connected to a crank shaft, lying parallel to the main members of the chassis. At the front end of the car the starting handle engages with this crank shaft, whilst at

by the movement of a lever situated beside the driver. Low gear is used when starting the car, until the road speed of the car is sufficiently great to allow it to run on second and then on top gear. If there were no low gear, and top gear were put in at the start, the car would shoot forward with a sudden jerk, which would not only be very unpleasant for the passengers, but would also cause serious damage to the transmission and engine. Low gear is used also for hill-climbing and for "crawling" along in traffic.

A few light cars have only two speeds, but the form of gear box commonly used in motor-cars has three forward speeds and one reverse.

130 Miles per Hour

Various inventions in connection with the motor-car, and improvements on existing designs, are being brought out every year. Lately attention has been generally directed to improving the wearing qualities, combined

with economy of running, rather than to the production of more powerful cars, capable of excessive speeds. In fact, the majority of cars on the road to-day will probably average between 10 and 30 h.p. The most powerful of present day touring cars are unlikely to be fitted with an engine of over 60 h.p. An engine of this power will always give as much, if not more, speed than is required, and the steepest hills will present no difficulty.

With regard to racing motor-cars no definite limit of power can be laid down. Engines of over 200 h.p. have been fitted and numerous cars have attained speeds of over 130 miles per hour with ease, on the track.

In our last issue we gave some account of the remarkable development of the motor-car from the earliest times down to the present day. We mentioned that in the first attempts to solve the problem of the self-propelled vehicle, inventors endeavoured to harness the wind and also tried driving an engine by gunpowder. In the concluding instalment of the article here printed, the writer describes the working of the petrol-engine as compared with steam, and concludes with some impressions of racing at Brooklands.

the end near the driver's seat, a fly-wheel is mounted. The purpose of this fly wheel is to keep the engine revolving smoothly.

By throwing in a clutch, controlled from the driver's seat, the power from the engine is transferred by a shaft to the back axle of the car, and the car moves forward. When the clutch is out, however, the engine is disengaged from the road wheels, and the car is able to remain stationary, even though the engine is running.

By means of a gear-box the speed of the engine relative to the driving wheels is controlled. The gears consist of an arrangement of pinions and shafts, the wheels being brought into mesh or released

Steam v. Petrol Engines

As a boiler and furnace are always necessary for a steam engine, it is a somewhat cumbersome machine compared with the petrol engine, and at a considerable disadvantage where the question of weight is concerned. Not only is the petrol engine the lightest power-unit available, but it is also the most simple and the most economical. Had it not been for the development of the petrol engine, the conquest of the air would probably not now be an accomplished fact, for it is impossible to drive an aeroplane with a steam engine on account of the great weight of boiler and furnace involved.

In this connection the demands made upon engineers by the Great War resulted in a more rapid advance towards perfection of the petrol engine in the air than on the race tracks. A considerable advance was also made during the war in the development of the petrol engine in connection with motor boats and other small craft used for coast defence and scouting.

Petrol Engines in Aviation

Since the Armistice the advance of the petrol motor in aviation has been continued, the tendency being to cut down, as far as possible, the very high

engine, James attained the amazing speed of 72 miles per hour on a journey between Croydon Aerodrome and Brooklands. The return journey was successfully made at the same speed, even though

flying against a strong head wind.

This feat, rightly considered as a veritable triumph for the light-powered petrol engine, opens up wonderful possibilities for the future of civilian flying. If fast and light aeroplanes can be built, it is reasonable to expect that their cost will be within the reach of those who at present run motor-cycles, and when this is an accomplished fact it will be no unusual sight to see business men flying to their offices and landing on some convenient roof near-by!

Latest Engines take 'planes 6 miles high

Great progress has also been made recently in regard to high-powered aeroplane engines. Up to quite recently the most powerful single-engined aeroplane in existence was one of 750 h.p., and less than a year ago a

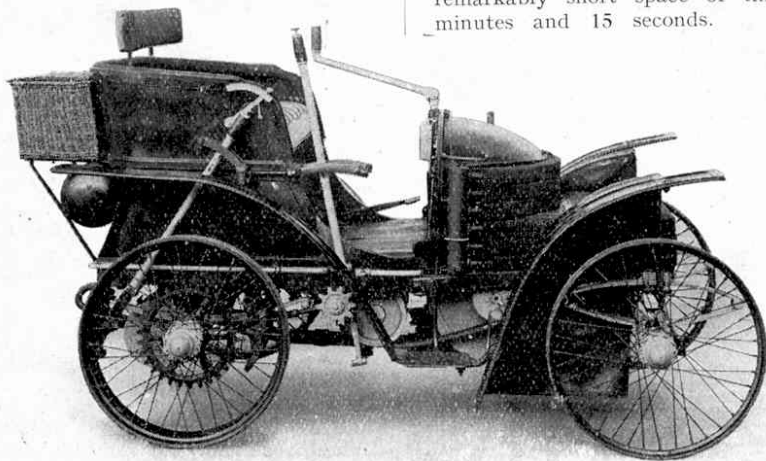
photograph was published in these columns of the Napier 450 h.p. "Lion" engine, which then held more British records than any other aero engine. One of its greatest feats was to climb to a height of 30,500 ft., or nearly six miles, in the remarkably short space of time of 66 minutes and 15 seconds.



Photo

[Board of Education

King Edward at the wheel of an early motor-car



Photo

An early type of motor-car

[Board of Education

powers at one time used, with a great gain in efficiency and saving of weight. Only a few weeks ago, experiments in this connection resulted in James, the well-known pilot, achieving an important record. In a light aeroplane, driven only by a 5 h.p. Douglas motorcycle

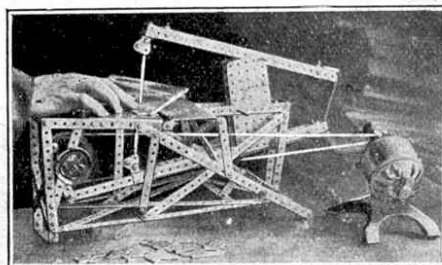
Since this engine was described in the "M.M." the Napier "Cub" aero engine has also been illustrated in these pages. This engine is a marvel of power and skilled construction, and develops 1,000 h.p. The most remarkable fact

(Continued on page 127)

A Meccano Fretsaw

BY MASTER E. BADE.

Many readers of the "M.M." are interested in Fretwork, and to them this model of a Meccano Fretsaw will make special appeal. Incidentally it forms yet another proof of the wonderful capabilities of the Meccano system, for the saw is made entirely from Meccano with the exception of the small cutting blade. It is not a difficult model to build and may be used for a variety of useful purposes such as toy-making, cutting out panels with pierced designs, jig-saw puzzles, etc.



A new and useful Meccano Model

To make the saw-holder, two perforated strips, also a spring and a flat plate are required. One of these strips is fastened securely to the flat plate a few inches from one end. The other strip is pivoted to it by means of a bolt, thus leaving the arm free to move. The spring is employed to connect the shorter ends of the arms. This forms a rocking beam which is then loosely fastened to two arms projecting from the back of the table, in such a manner that it may be moved up and down freely. This arrangement can be easily understood by referring to the illustration.

A pulley wheel is fastened to the smaller strip at the side of the table and connected with the lower arm of the rocking beam by means of a connecting rod attached near the rim of the wheel. Thus, as the wheel revolves, the circular movement is converted into an up-and-down movement.

The cutting edge or saw blade is fixed to the upper and lower strips by cutting slots, where the saw is to go, and arranging bolts with wing-nuts so that the slits may be pressed against the blade. The Meccano electric motor or any similar motor with a pulley-band drive is belted to the wheel and provides the power to force the saw up and down. When using this model it is important to remember that the framework forming the table and its support should be as rigid as possible. The best method of ensuring this is to screw up all bolts tightly and then nail the framework to the table.

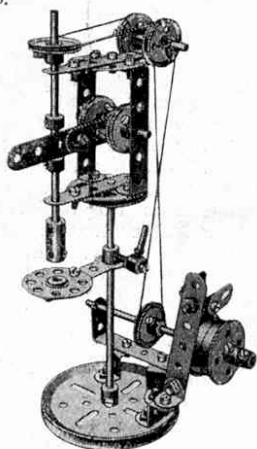
Suitable saw-blades may be obtained at any good ironmongers or dealers in fretwork tools, such as Messrs. Hobbies or Gamages.

We welcome illustrated articles, such as the above, showing new uses for Meccano. Payment is made for any such articles that we are able to publish.—EDITOR.

Into the Land of Fun

BY
"SPANNER"

I DON'T quite know how many years it is since I built my first Meccano model, but it seems a very long time ago. I remember the hobby quite well when it was known as "Mechanics Made Easy," and I have followed its amazing career as Meccano with pleasure, mingled with something akin to awe. My work has always been amongst boys, and I know hundreds and hundreds of them—boys of all kinds and shapes: big, little, fat, thin, red-haired, black-haired, chubby, and pale faced ones. I know numbers of crippled and ailing boys, too, whom I love for the rare qualities of patience and gentleness that I have never failed to find in them. All these boys play with Meccano—that's the striking thing to me! I believe that I have seen a larger number and a more varied assortment of Meccano models than anyone. Of course, I encourage the boys, because over and over again I have seen what a joy and a help the hobby has been to every boy who has taken it up.

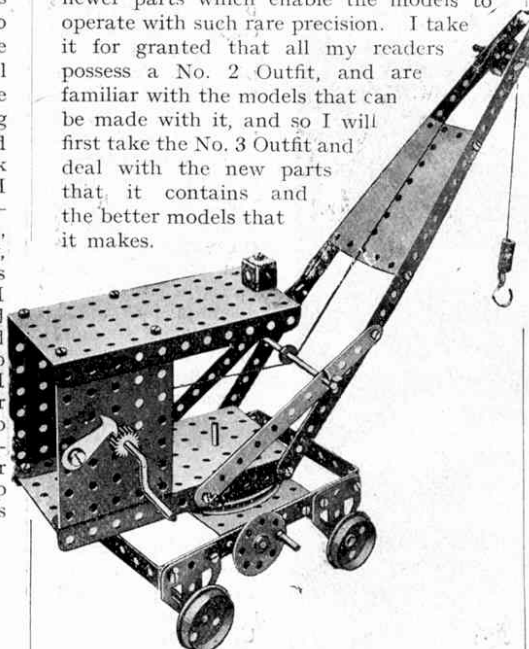


Model No. 312 Drilling Machine

One little tendency that I have noticed recently, however, is that some of my young friends are apt to stagnate. I mean they build the same models over and over again with little variation, instead of getting into the higher reaches of the hobby, as you might say. Now I think this is a big mistake, because there can be no doubt that one of the very greatest charms of the Meccano hobby is that it is temptingly progressive. I mean, the further you get into it, the more fun you have, the more you enjoy yourself, and the more you learn. I don't like to see a boy with a No. 1 or a No. 2 Outfit just stay there contented, when for a tiny sum he could get a few extra parts, or a new Accessory Outfit, which would add tenfold to his fun and enjoyment.

In this short series of articles I shall try to tell beginners something about the bigger Outfits—what they contain and what they will do, and I shall describe some of the more attractive models. In doing this I shall point out their best mechanical features and note the ingenuity and cleverness of design in many of the

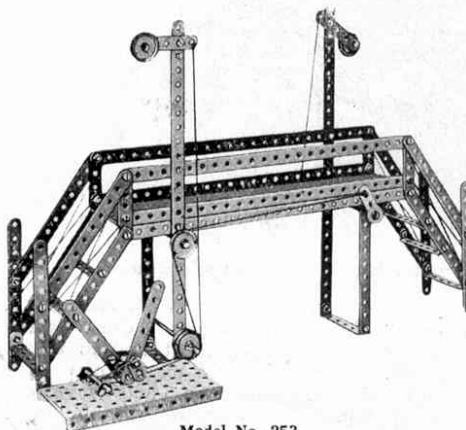
newer parts which enable the models to operate with such rare precision. I take it for granted that all my readers possess a No. 2 Outfit, and are familiar with the models that can be made with it, and so I will first take the No. 3 Outfit and deal with the new parts that it contains and the better models that it makes.



Model No. 318
Railway Breakdown Crane

And here let me mention that I have just seen a copy of the new edition of the complete Manual, and a delightful production it is. Nearly all the models have been revised and many entirely reconstructed, new parts being used to great advantage. Nothing in the world would please me better than to be able to place a copy of this Manual in the hands of every Meccano boy, because of the increased amount of fun and joy that I know he would obtain from building the models described and illustrated in its pages. I consider this Manual a triumph for those who have compiled it, and I find fresh charms in it every time I open it.

First of all as to the extra parts that a No. 3 Outfit contains, over and above the No. 2. Of course there is a larger number of the regular or basic parts,

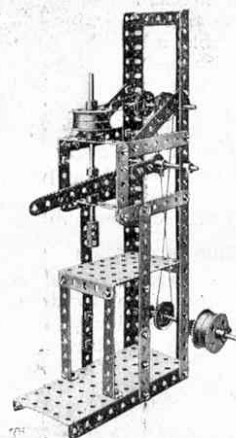


Model No. 253
Footbridge and Signals

such as strips, rods, girders, nuts and bolts, etc., and these make possible bigger and more complicated models. It is, however, the new parts, which the Meccano boy meets for the first time, that will interest him most. The 3" and 1½" Pulley Wheels (Nos. 19b and 21), for instance, figure effectively in many of the new models. These, together with the Pinion Wheels, Gear Wheels and Worm Wheels (Nos. 26, 27a and 32), are now used for the first time, and will bring delight to the progressive boy.

All these parts are beautifully designed and accurately made, and give an added charm to the models. Talking of these particular gear and worm wheels reminds me of the fact that big quantities of them are now being used in the construction of wireless sets all over the country—an excellent testimony to their accuracy and usefulness. There are other new parts in the No. 3 Outfit such as the new Pawl (No. 33), Curved Strips (No. 90), etc., which I shall mention a little later.

Now in regard to the No. 3 models. There is no limit to the number of different models that may be made by a clever Meccano boy with a No. 3 Outfit. In the New Manual 203 models are illustrated and described, including Cranes, Oscillating Steam Engine, Wagons, Motors, Derrick, Guns, Bridge, Aeroplane, Scales, Lathes and a host of others.



Model No. 326 Hand Punch

An interesting model is the Railway Breakdown Crane (No. 318), with which any amount of enjoyment and fun may be obtained. It is mounted on a four-wheeled truck, and may either be run along the ground, or run on a track made from Meccano strips. The crane will raise and lower its load, and swivel around on its truck by means of a worm and pinion, a movement often used in engineering and essential to the working of many of the improved Meccano models. It is not possible to build this movement into a model without part No. 32 Worm-Wheel, or part No. 26 Pinion-Wheel, both of which are contained in Outfit 2a. The crane will hold its load in any desired position by means of a Pawl (part No. 33) which engages with a Pinion-Wheel (No. 26). Both Pawl and Pinion-Wheel are included in the No. 2a Outfit. The Pawl, introduced about two years ago, has proved of great value in model-building, and moves freely on a pivot bolt.

(Continued on p. 137)

Holiday Essay Competition

In order to encourage Meccano boys to use their cameras, we have announced photographic competitions from time to time. Last year we announced, in addition, the Holiday Essay Competition, and as this Competition was so successful we are repeating it again this year. Intending entrants should write a description of some interesting event that took place on their holidays, and illustrate their essay with their camera. The photographs may be either sent separately or mounted in position on the essay. Although the exposure must have been made by the competitor, the photographs need not necessarily have been developed or printed by him, although this point should be mentioned when submitting entries.

Photographs may be of any size or finish, and there are no restrictions and no age limit, but the age of the competitor will be taken into consideration in judging the entries. The first prize will be Meccano goods to the value of £1 1s. 0d., and the second prize Meccano goods to the value of 10/6, to be chosen by the winners from our current catalogue. Closing date 30th October (Overseas: 30th December).

A New Essay Competition FOR THOSE WITHOUT CAMERAS

As announced in our issue last month, there will be a special Essay Competition for those without cameras. The essays should deal with some holiday experience, and this section will be divided into two classes.

- (A) Boys under 14 years of age, and
- (B) Boys over 14 years of age.

In this section two Hawk-Eye cameras, taking pictures $2\frac{1}{2} \times 3\frac{1}{4}$, and made by the Kodak Company, will be awarded as prizes. The winners will thus be able to enter the Photographic Competitions that will be announced from time to time in future issues of the "M.M."

In both competitions the essays should be neatly written on one side of the paper only, and the full name and address should appear on the back of each sheet. Essays may be of any length but should not exceed 1,000 words. There are many subjects to choose from, such as a visit to some beauty spot or a ruined castle; some thrilling adventure or some new experience gained on holiday.

This competition closes on the 30th October for the United Kingdom, and 30th December for competitors abroad. The winning essays will be published in the "M.M."

Fifth Photographic Competition

It has been decided to hold a Fifth Photographic Competition, on similar lines to those previously held. Competitors must themselves take the photographs, but may obtain assistance in the developing and printing if desired. The name and address must be clearly written on the back of each photograph submitted, which may be of any size and either mounted or unmounted, as these points will not be taken into consideration when judging. It should be stated whether the photograph has been developed and printed by the entrant, as this will, of course, be taken into consideration. The competition will be divided into two sections as usual:—

- (A) Boys of 14 years of age and under.
- (B) Boys over 14 years of age.

The subjects this time are to be either

- (1) A FAMILY GROUP,
- (2) AN ANIMAL STUDY, or
- (3) MISCELLANEOUS SECTION.

The first prize in each section will be a Hawk-Eye Camera, made by the Kodak Company, and it is hoped to publish the winning photographs in the "M.M."

The closing date for entries from the United Kingdom is the 30th November, and for entries Overseas, 29th February, 1924.

The Story of the Motor Car (cont. from p. 125)

about it is, however, that its total weight is only 2,000 lbs. This combination of lightness and power renders the Napier "Cub" very suitable for use in the air.

As might be expected, this powerful engine is capable of very high speeds and long flights; thus making the 'plane to which it is fitted particularly useful for long-distance bombing work. A speed of 144 miles per hour, or about $2\frac{1}{2}$ miles per minute has been attained; and the machine is capable of non-stop flights of over 1,000 miles.

36,000 Horse Power Engines

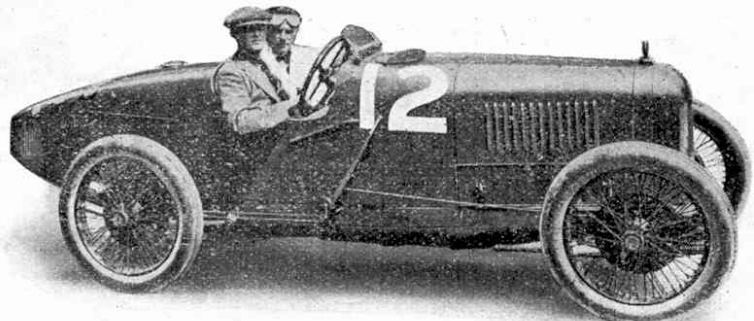
The truly wonderful progress of the petrol engine has not even ceased here, however, for while the Napier "Cub" engine was admitted by experts to be the most powerful of its kind ever manufactured, more recent developments have been introduced. We mentioned last month that in the motor-car industry the manufacturers introduced additional cylinders to gain greater speed. In the same way aero-engine makers increased the number of engines to obtain greater power. By means of this method of

the sides of a shallow basin. It is this banking that enables racing cars to negotiate the bends at speed, for if the track were not banked in this way, the cars would fly off and overturn.

It is an amazing experience to ride at Brooklands in a race, and one cannot help wondering what the pioneers of the motor-car would think if they were able to witness one of these frequent events.

A row of cars is lined up on the track, their engines spluttering and emitting a dull roar from the exhaust pipes. The cars resemble a pack of greyhounds, being low-built, lean-looking and without any superfluous weight. Many of them have special "stream-lined" bodies, in order to cut down to as low a point as possible, the resistance of the wind at speed.

At a signal from the starter, the competitors let in their clutches and the cars jerk forward as the road wheels take up the drive. For a moment or two things are somewhat uncertain, until the racers settle down to their stride. Once they have "got going," however, it is a fight to the finish, and the cars hurl themselves around the track at speeds which our fastest express trains could never maintain.



Photo]

[Sunbeam Motor Co. Ltd.

The Sunbeam Racer that won the Grand Prix

combination, it is possible to obtain amazing powers. In America at the present day there is an aeroplane driven by several engines which together develop over 36,000 horse power! Wonderful flights of endurance and speed have been made by this mammoth machine, and it undoubtedly heralds the dawn of a new era of yet more powerful aeroplanes.

It seems strange, indeed, to realise that this mighty monster of the air owes its existence to the brains and perseverance of those early inventors who drove their weird vehicles at speeds of only two and three miles per hour! Yet the fact remains, and our present day wonders of colossal power and breathless speed are the direct result of the labours of such men as Cugnot and Gottlieb Daimler.

Speed Thrills at Brooklands

The racing track known as Brooklands, at Weybridge, London, has played no small part in the advance and improvement of the motor-car. Brooklands is to-day the Mecca of all enthusiastic motorists, who may here attain high speeds with safety. The wide racing track of concrete is "banked" in places so that it resembles

The Joys of Racing

One mile after mile is covered in this way. Sometimes one or two cars may draw ahead of the field, and if they are particularly speedy they may retain the lead until the end of the race. At other times, however, the result is by no means so certain, and constant changes take place in the order of running.

To drive a car in one of these races requires no little skill, and you may be sure that racing motorists do not invite their nervous mothers or aunts to spend Saturday afternoon with them, racing on Brooklands!

It is an experience which I am sure every Meccano boy would thoroughly enjoy, however, for there is nothing more exhilarating than to control one of these monsters that is capable of dashing around the track at racing speed. At times such as these, I am afraid that the wonderful story of the petrol-motor, of the difficulties and achievements of the engineers that have made possible these thrilling experiences, are sometimes forgotten by the drivers of the racing cars!

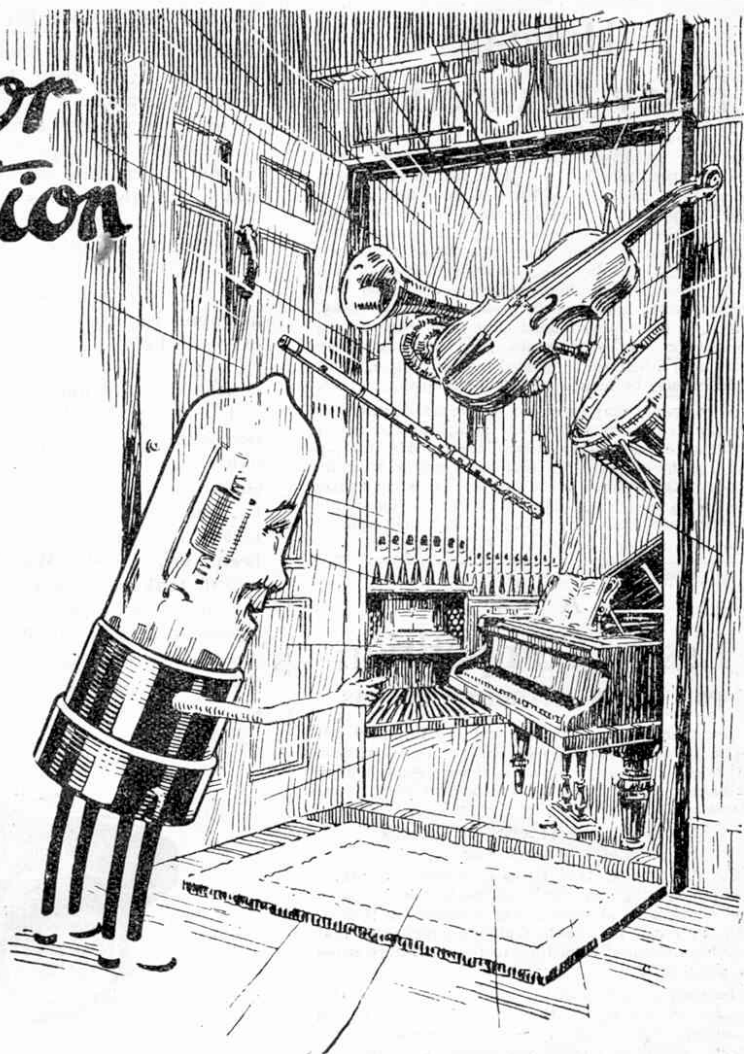
THE END.

NEXT MONTH:
"The Romance of Clock-Making."

The Valve for perfect reception

The holiday season is over and your thoughts are turning to the pleasures of the longer nights.

Broadcasting has improved by great strides since last winter, both in quantity and quality. To enjoy it to the full, you must use Mullard Valves.



The Mullard Weco valve for use with a single dry cell. of any other type of valve	Twice the life	£1 10 0
Type "ORA" and "R" for general reception with 4 volt accumulators		£0 15 0
Type L.F. (low filament current) for general reception with 2 volt accumulators or suitable primary batteries		£1 7 6
Type P.A. for Loud Speakers, giving good volume without distortion		£1 2 6
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Ask your usual dealer for them and for particulars of other Mullard Products.

Mullard

Obtainable from the Leading Electricians, Wireless Dealers, etc.

Advt. of the Mullard Radio Valve Co., Ltd., Balham, S.W. 12.

(B.P.S. 56)

The Men Who Gave Us Radio:

V. DOLBEAR, WILLOUGHBY SMITH, EDISON, and PREECE.

In previous articles in this series we have described the work of numerous scientists of the nineteenth century who contributed to the discovery of wireless telegraphy and radio telephony. In our last article we mentioned the discovery of the telephone and its great importance in wireless invention. We also dealt with the brilliant prediction of Clerk Maxwell of the existence of electric waves, and dealt with the work of Professor Trowbridge, who successfully communicated without wires by induction.

Dolbear

In 1883 Professor Dolbear, an American, succeeded in sending signals through space without wires and nearly forestalled Marconi. "The idea," he tells us, "is to cause a series of electrical discharges into the earth at a given place without discharging into the earth the other terminal of the battery or induction coil—a feat that I have been told many times, is impossible, but which certainly can be done."

Dolbear used very similar apparatus to that subsequently employed by Marconi, and his signals could be heard in any part of a large building. At distances up to 100 ft. from the transmitter the signals could be heard with the telephone at some distance from the ear. At first Dolbear could send signals only over half a mile, but later he claimed to have sent and received them over as great a distance as 13 miles.

Dolbear was evidently under the impression that the air assisted in some way in bridging the gap between transmitter and receiver. To-day, however, we know that he was undoubtedly using the Hertzian waves, though he was in ignorance of their existence. As we shall shortly learn, these waves did not become known until some six years later.

Willoughby Smith

Willoughby Smith, in 1883, suggested a method by which communication with moving trains might be effected by the use of induction. His idea was for a wire to run along the permanent way, parallel with the rails.



WILLOUGHBY SMITH

Willoughby Smith was born at Great Yarmouth on 16 April 1828, and for some time was engaged in experimenting with covering wire for electrical purposes. He was engaged in cable work and underground land lines, and in 1854 assisted in laying the first Mediterranean cable. In 1865 he accompanied the "Great Eastern," laying a cable from Ireland to Newfoundland, and later assisted in laying the French Atlantic cable. He died at Eastbourne 17 July 1891 and was buried at Highgate.

Around the engine or carriage, in which the apparatus was to be installed, a coil of wire was wound in such a manner as to get as long a length of wire parallel to,



Sir William H. Preece was educated at King's College, London. He became Engineer-in-Chief to the General Post Office in 1899. He was born in Wales on 15 February 1834, and died at Carnarvon, 6 November 1913.

and as near as possible to, the line wire. Willoughby Smith relied on the coils of wire picking up currents from the line wire by induction, and so enabling signals in the Morse code to be received on the train. A transmitting apparatus was installed in the carriage to enable signals to be sent from the train by a reversal of the process.

Edison

T. A. Edison, the famous American inventor and scientist, improved upon Willoughby Smith's method. His method was used in 1887 on the Lehigh Valley Railway, where it worked very successfully. Messages were sent and received without difficulty, even though 25 ft. separated the line and the train wires, and although the train at times attained a speed of 60 miles per hour.

Edison later took out another patent to cover the application of this method of "aerial telegraphy," as he called it, to ships. "Ships at sea," he wrote, "many miles apart, will be able to communicate by means of balloons or kites soaring above their decks."

Preece

So far most of the investigations with the possibility of communicating without wires had been carried out in America. Now, however, England was to make a valuable contribution to the solution of the problem. The work of Trowbridge and Dolbear, and the invention of the Bell telephone, inspired Sir (then Mr.) William H. Preece to carry out further research.

Preece was for many years Chief Engineer to the Telegraph Department of the G.P.O., and when the cable from Southampton to Newport (Isle of Wight) broke down in 1882 he established communication across the Solent without wires. He employed Morse's method of conduction, using a buzzer actuated by thirty Leclanché cells, the signals being sent by means of a Morse key. Signals were clearly heard in a telephone at Newport and replies received at Southampton.

Preece had noticed how readily telephone wires picked up telegraphic signals by induction, even though in some cases they were as much as 80 ft. above the telegraph cables. He determined to carry out a series of experiments, and for this purpose laid out two squares of insulated wire, a quarter of a mile apart, on the Town Moor at Newcastle. In the circuit of one square was a telephone transmitter, and in the circuit of the other a telephone receiver.

It was found that words spoken with the transmitter were audible in the receiver, although the two circuits were not connected in any way. Speech was distinctly heard, even when the squares were separated by 1,000 yards. In 1895, Preece established and maintained communication without difficulty by this method between the Isle of Mull and the mainland, about two miles away.

NEXT INSTALMENT:

HUGHES, HERTZ, ONESTI, and BRANLEY.



EDISON

Thomas Alva Edison was born at Milan, Ohio, on 11 February 1847, and when 12 years of age became a newsboy on the Grand Trunk Line. He commenced to experiment in Chemistry, and later printed the "Grand Trunk Herald," the first newspaper to be printed in a railway train. His many inventions include several telegraphic improvements, the megaphone, phonograph, cinematograph, and practical adaptations of electric lighting.

RADIOGRAMS



The latest development in radio-telegraphy makes it possible to control ships and aeroplanes from land stations.

The principle of this new development is very simple, and consists of transmitting on very short wave lengths to the object to be controlled. Reception is by valves, which are made to operate magnets, each having a special duty.

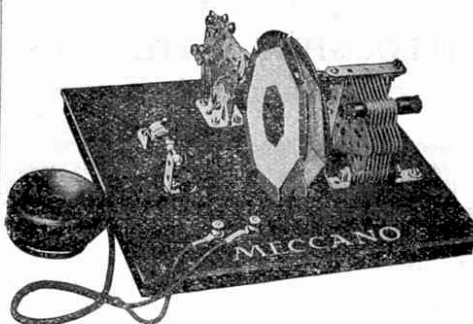
It is possible that in the near future New Zealand will have direct wireless communication instead of the present chain or relay system.

On a four-hour watch a Radio operator on the great liner "*Majestic*" recently transmitted two hundred complete messages. As the number of words ranged from 8—65 each message, the rate was a little more than one message in a minute.

The Czecho-Slovakian Government has imposed a tax on all owners of radio apparatus.

A gentleman residing in Aberystwyth, whilst listening-in to an American broadcasting station, distinctly heard the clapping of hands in the concert room.

Build your own Radio Receiver



In a recent issue of the "*M.M.*" we gave full particulars for building a Radio Receiver from Meccano parts. These instructions may now be obtained in the form of a beautifully illustrated leaflet, printed on art paper (price 4d., post free).

In addition to Meccano parts being of service for the construction of a complete Crystal Receiving Set, they are of particular use for experimenting in Radio. Their standardisation and universal adaptability enable new circuits to be tried out, and changes to be quickly made.

If you are building a Radio Receiver or experimenting in any way, you will find these special Meccano Radio parts of great assistance.

Next month we hope to give a full list of Meccano Radio parts in fibre.



H. Foy (Salford).—If you crossed your aerial with your neighbour's in the way you indicate, and both of you were using crystal receivers, there would be no difference in the clarity and strength of the messages received. On the other hand, if one of you was using a valve set, then both your instruments would be affected by oscillation, so that it would be impossible for either of you to receive intelligible messages.

L. Hart (Liverpool).—Using a coil 2" diameter and 5" in length you should be able to receive broadcast transmitted on a wave-length of 200 to 400 metres up to a distance of 15 miles. From this you will see that it is impossible to receive telephony from Manchester. If you acquired a knowledge of the Morse code, however, you would find great enjoyment in listening-in to telegraphy transmitted from Seaford and from ships at sea.

Gerald Briggs and Edwin England (Malta).—The Meccano agents in Malta (Malta Import & Export Agency, 15, Marina, Malta) will always be very happy to answer questions relating to local conditions governing the reception of telephony and telegraphy.

A. L. Chattell (Bedford).—A frame aerial erected in the way you mention would be quite efficient used in conjunction with a valve receiver. A frame aerial is not as good as the open type, however, and should not be used unless absolutely necessary, or by way of interesting experiment.

N. McAndrew (York).—Manchester is the nearest broadcasting station to York, but as it is approximately 70 miles distant the reception of broadcast with a Crystal Receiver would be impossible.

S. Williams (London N.W.6).—One Meccano Headphone is included in the Receiving Set. If desired, additional phones may be purchased separately at a cost of 10/- each.

John Hopkinson (Sowerby Bridge).—An ordinary telephone head-piece is not adapted to Radio receiving, it will be necessary for you to obtain more delicate head-phones.

HERE'S A LOUD SPEAKER YOU CAN AFFORD IT ONLY COSTS £1

120 ohms or 2,000 ohms.

We have only been able to secure a limited number of these excellent instruments and consequently can only accept orders with cash. Delivery will be made in strict rotation and as quickly as possible.

These Loud Speakers are thoroughly reliable and efficient and give excellent results.

Black Satin Finish, complete with Cord.

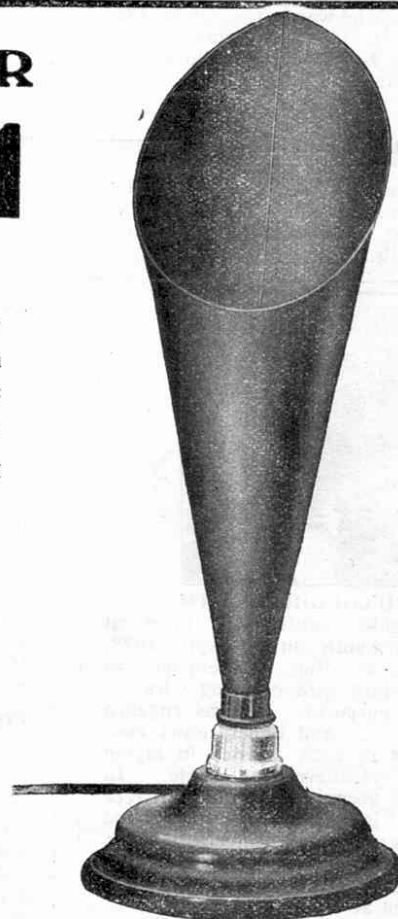
Headphones only 18/-

120 ohms, 2,000 ohms or 4,000 ohms.

Guaranteed efficient. Money returned if not satisfied. Send your order to-day.

H. W. ROSENWALD

21, Dale Street, LIVERPOOL



The MECCANO CHAMPIONSHIP COMPETITION

21 Cups & 460 Medals: total value £250

During the past two or three years our annual Model-building Competition has assumed such proportions and has attracted such world-wide interest, that we are now able to run it in a form we have long had in mind, and which we think will be greatly appreciated by Meccano model-builders all over the world.

For the purpose of the 1923-4 Contest we have divided the various countries into the following groups (1) Great Britain, (2) Australasia, South Africa, Canada, India, and all Countries within the British Empire, (3) United States and South America, (4) France, Belgium and Switzerland, (5) Scandinavia and Holland, (6) Italy, (7) Spain and Portugal.

In each of these groups, three Championship Cups will be awarded for the best models submitted, and the winner of each Cup will hold the title of "Meccano Champion" for his particular group and section for twelve months from the date of the awards.

The Cups, which have been specially designed for us, are of superb quality, very handsome in appearance, and stand over 8 inches in height. Each Cup will be engraved with the name of its winner, and will form a valuable reminder of his prowess and skill. A suitable pedestal will be provided with each cup.

MECCANO GOLD MEDALLIST

The competitor who, in the opinion of the Judges submits the best model in the entire Competition, will be awarded a specially-designed solid Gold Medal, and will be the "Meccano Gold Medallist" for a year. His name and the year in which he gained the title will be engraved on the medal, which will remain his property.

In addition to these special awards, there will be Silver and Bronze Medals in each section and Certificates of Merit to a limited number of other entrants. The total value of the prizes to be awarded will amount to £250.

The following is a complete list of the awards:—

SECTION A. (For competitors under 10 years of age on 15th April next). Championship Cup and the title of "Meccano Champion" for his group and section for the year commencing 1st July next. Twenty Silver Medals and 50 Bronze Medals.

SECTION B. (For competitors over 10 years of age and under 14 years of age on the 15th April next). Championship Cup and the title of "Meccano Champion" for his group and section for the year commencing 1st July next. Thirty Solid Silver Medals and 100 Bronze Medals.

SECTION C. (For competitors over 14 years of age on 15th April next). Championship Cup and the title of "Meccano Champion" for his group and section for the year commencing 1st July next. Sixty Solid Silver Medals and 200 Bronze Medals.

In all there will be 110 Silver and 350 Bronze Medals awarded to the competitors in order of merit, and a limited number of Special Certificates of Merit in each section.

THE TOTAL VALUE OF THE PRIZES WILL AMOUNT TO £250

Full particulars, together with an entry form, will be mailed (post free) on request. Send for your form to-day.

Model-Building Competitions

OUR readers will be pleased to know that many Meccano dealers throughout the country are arranging Meccano Model-Building Competitions for boys living in their districts. Full particulars, together with an Entry Form, will be supplied to any boy by the dealers mentioned below.

Many excellent prizes are being awarded in these local competitions, and the winning models will automatically be entered in the Meccano Championship Competition. Thus, boys entering a local competition stand a double chance of winning a prize, and I hope that all Meccano boys will give their loyal support to these local competitions.

List of Dealers organising Local Competitions.

BRIDGEND: Messrs. G. Dobbins & Sons, 26, Caroline Street.
BRISTOL: S. H. Arthur, 15/16, Narrow Wine Street.
BRISTOL: Messrs. Geo. Plum & Co. Ltd., Dolphin Street.
CARDIFF: Messrs. Wilces Toy Shop, High Street Arcade.
CHESTERFIELD: Messrs. S. Johnson & Son, 298, Chatsworth Road.
COVENTRY: Messrs. Jepsons, 1, Cross Cheaping.
CROYDON: Messrs. L. H. Turtle Ltd., 53, North End.
HANLEY: John Peppers, 63/65, Piccadilly.
LLANELLY: R. M. Rowles, 82, Stepney Street.
NEATH: Messrs. Hedges, Windsor Road.
NEWCASTLE, Staffs.: W. Hill, 4, Red Lion Square.
NORTHAMPTON: Messrs. Slade's Stores, 40/42, Abington Street.
NOTTINGHAM: Messrs. Redmayne & Todd Ltd., Carrington Street.
PECKHAM: Messrs. Peckham Gramophone Stores, 141, High St.
PRESTON: Messrs. Richard Marsden & Son Ltd., 115, Church St.
ROCHDALE: Messrs. Dean & Holt, York Road.
ROTHERHAM: Messrs. Wallace Heaton Ltd., High Street.
STOKE-ON-TRENT: Messrs. Hughes & Barber Ltd., The Royal Press, Longton.
SOUTH TOTTENHAM: W. G. Ames, 693/697, Seven Sisters Road.
TUNSTALL: Thomas Farr, 121a, High Street.
WARRINGTON: T. Prince, 4, Horsemarket Street.
WOLVERHAMPTON: H. H. Speke, 12/14, Bilston Street.
YORK: Messrs. T. Holgate & Sons, St. Helens Square, 1-2, Stone-gate.

Birthday Gifts for Meccano Users

When is your birthday?



As most of our readers are aware, Meccano has now been in existence for over twenty years, and its career has been one of uninterrupted success. Ever since its early days, when it was known as "Mechanics Made Easy," the hobby has flourished and grown rapidly. In 1908 its name was changed to Meccano and at the same time the business was established as Meccano Limited. It is thus fifteen years since the present Company was formed—and these have been fifteen years of unbroken success and progress.

In the course of his work, Mr. Hornby, our Managing Director, has met many thousands of happy Meccano boys, and he wishes that during this notable year in the history of his firm he could meet all the others to chat over with them old Meccano experiences. What a gigantic and unique gathering it would be, for there are millions of Meccano boys of all ages and of all nationalities!

Such a gathering is, of course, quite impossible, but Mr. Hornby has thought of celebrating the fifteenth birthday of Meccano Limited in a manner that will, he hopes, bring joy to the hearts of thousands of Meccano boys. He has decided to give a handsome birthday present to each purchaser of a Meccano Outfit, Hornby, Zulu or King George V. Train Set, whose birthday falls on the same date as his own.

This birthday gift will take the form of a handsome wallet in Morocco leather, and Mr. Hornby has taken the greatest interest and pleasure in its selection and design. It is strong, durable, and of excellent quality, and will wear for many years. Mr. Hornby hopes that it will serve as a pleasant reminder of him to those boys whose birthday is on the same date as his own.

Full particulars, together with special entry form of this offer, are enclosed in every Meccano Outfit or Train Set. All that is necessary is that the purchaser of one of these articles should fill in this form and post it to Meccano Limited. The date of Mr. Hornby's birthday will be announced in the *Meccano Magazine* for May next.

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The Wrinkle Book. By ARCHIBALD WILLIAMS. 7/6 net.

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All About Our British Railways. By G. G. JACKSON. 6/- net.

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**Boys of the Ages**

by L. W. L. Scales

(Published by Ginn & Company, London. Price 3/6).

Every boy is able to understand and appreciate history, if the events of which he reads are chronicled with human stories surrounding them. Because of this, books that tell of the dreams and deeds, and of the learning and crafts of famous men throughout the ages are a welcome departure from the ordinary method of treating history. The author of *Boys of the Ages* is to be complimented on the manner in which she presents her stories, and we are tempted to journey with her through mysterious ancient Egypt, artistic Greece, romantic Persia, and through the glorious Roman Empire to mediæval Europe.

Our readers will like the story of Hugh, which will take them into the adventurous time of Queen Elizabeth, and they will delight in the story of the Italian painter Francisco, and the Song of the Birds.

Boys—and girls, too—will derive abundant pleasure, and will be stimulated to historical study, by this book, which is well printed and bound.

"How to Identify" Series

(Published by the Epworth Press, London. Price 1/9 each).

From the large number of letters that I receive from time to time it is apparent that thousands of Meccano boys are students of Nature. They delight in roaming the countryside, in finding birds' nests and in adding wild flowers to their collections. For such boys there can be no better guide to all branches of Nature Study than the books which form this series. The subjects are well covered by such volumes of the series as "*Wild Flowers*," "*Woodland Trees*," "*Birds' Eggs and Nests*" (with coloured plates of the eggs), "*Fresh Water Wonders*," "*Beetles and Spiders*," and "*British Birds*."

The volumes are handy for carrying in the pocket, and are well illustrated and interesting. At some future date I hope to describe some of them more fully.

"Model Yachts, Sailing Boats and Submarines."

(Published by "Boy's Own Paper" Office. Price 1/6 net).

Published in the same series as "*Carpentry and Bench Work*," this volume forms an excellent guide to the construction of all kinds of model sailing-craft. The explicit directions and numerous diagrams enable any boy of average intelligence to build not only model yachts of large size, but also submarines that dive and rise to the surface; racing yachts, and model steam launches that attain quite a good speed under their own power.

Wigwam Stories

by M. C. Judd

(Published by Ginn & Company, London. Price 4/6).

Red Indian stories have always appealed to boys of all ages, and we think they will always do so. Generally we associate Red Indians with exciting fights, scalping and bloodshed, but it is a refreshing change to read this delightful collection of stories, told by North American Indians and gathered from many different sources. Here we read of the Red man's habits, of his mode of living, and, perhaps most interesting of all, of his traditions and myths. In this book are found some of the most beautiful stories ever told; stories of the great forests and rivers; of the winds; of the moon and of the stars. Hunting stories; battle stories; stories of giants and stories of fairies. We recommend this book to all interested in Red Indians, for they will obtain a wonderful insight to their true nature and noble character.

BOOKS RECEIVED

We have received copies of the undermentioned books during the past month, and these will be reviewed in this column in a future issue.

"THE ART OF DRIVING A MOTOR CYCLE" (Temple Press), 2/-

"THE GREAT WHITE SOUTH" by Herbert G. Ponting (Duckworth), 7/6

"ALL ABOUT OUR BRITISH RAILWAYS" G. E. Jackson (T. C. & E. C. Jack), 6/-

"THE ROMANCE OF RADIO" by Ellison Hawks (T. C. & E. C. Jack), 3/6

"THE LAST SECRETS" The final mysteries of Exploration, by John Buchan (Nelson), 5/-

SOME USEFUL BOOKS

PRACTICAL LESSONS IN METAL TURNING. By PERCIVAL MARSHALL, C.I.Mech.E. The best Instruction Book on the Lathe for Young Engineers and Amateur Mechanics. With 220 Original Illustrations. 210 pp. Price 3s.; post free 3s. 3d.

THE A.B.C. OF DYNAMO DESIGN. By A. H. AVERY, A.I.E.E. Clearly explains the Principles of a Dynamo and How to Calculate Sizes and Windings of Machines. With Numerous Designs and 70 Illustrations. Price 3s.; post free 3s. 3d.

ENGINEERING MATHEMATICS SIMPLY EXPLAINED. By H. HARRISON. A Splendid Text-Book for Apprentices, Students, and Engineers. Price 2s. 6d.; post free 2s. 8d.

PETROL MOTORS SIMPLY EXPLAINED. By T. H. HAWLEY. (Revised by E. W. WOLFORD). Describes the Principles on which Petrol Motors Work, and the Uses to which they are Applied. Illustrated. Price 1s. 6d.; post free 1s. 8d.

SMALL ACCUMULATORS: HOW MADE AND USED. The first book of the world-famed "Model Engineer" Series, and one still in great demand. Contains 41 Illustrations, and deals thoroughly with its Subject. Price 9d.; post free 10d.

ELECTRIC BELLS AND ALARMS. By F. E. POWELL. Gives Instructions for Fitting same to any Part of any Ordinary Building. 51 Illustrations. Price 9d.; post free 10d.

GAS AND OIL ENGINES SIMPLY EXPLAINED. By W. C. RUNCIMAN. An Elementary Instruction Book for Amateurs and Engine Attendants. Fully Illustrated. Price 9d.; post free 10d.

WIRELESS CIRCUITS AND CONNECTIONS. This handbook contains 90 useful Diagrams of Circuits and Connections, with Explanatory Notes; making an excellent guide to the most effective arrangement of the apparatus. Price 6d. net; post free 7d.

WIRELESS AT HOME. Containing all information necessary for the novice in Wireless Telegraphy and Telephony to fit up and get the best use out of his station; together with helpful hints for the receiving of broadcast Wireless News, Concerts, etc. Written in clear and understandable language. Illustrated. Price 6d. net; post free 7d.

HOW TO MAKE A SIMPLE WIRELESS SET. By A. V. BALLHATCHET. Gives complete instructions for making a successful Crystal Receiving Set with all accessories. 48 pages, 22 illustrations. Price 6d.; post free 7d.

JUNIOR MECHANICS AND ELECTRICITY. A Journal for Beginners of all Ages; deals with Tools and Tool Making, Lathes, etc., Aeroplanes, Model Boats, Electric Motors, Dynamos, Wireless Telegraphy, etc. Will interest all mechanically inclined. Monthly 3d. net; annual subscription, post free, 4s.

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Contains instructions and clear working diagrams for making a great variety of models and other apparatus, including Wireless Telegraphy and Telephony Sets.

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Treats of the use of tools and materials under these suggestive headings: The Carpenter's Shop—The Laboratory—The Engineering Shop—The Electrician's Shop—The Metal Worker.

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A book to lead boys (and girls) out into the Great Out-of-doors, there to develop a love of Nature and to take a delight in the things that happen in the "Wilds." A most interesting book with a wide appeal.

Other Books will be added to this Series.

Cassell & Co. Ltd. La Belle Sauvage, E.C.4



Stamp Collecting is a Science

Those who despise stamp-collecting do not always realise that as a science it may be made as exact or as accommodating as the individual collector wishes. It is a science, too, that numbers amongst its practical uses the discovery of forgeries and the assistance of postal officials. Stamp-collecting widens one's outlook upon the world, and teaches exactitude, neatness, and observation, to say nothing of geography, history and art.

Amongst other details the stamp collector finds it necessary to study the currencies of nations; the different methods of printing, and the many varieties of paper. He learns much concerning different shades of colour, inks, and dyes. He studies postal history and postal methods, as well as many other subjects. To collect stamps is to acquire a liberal and varied education without knowing it.

Beginner and Specialist

Stamp-collecting exists to-day in many different forms. On the bottom rung of the ladder is the boy who sticks his stamps

anywhere and anyhow in any book. Somewhere near the top of the ladder is the collector who makes his hobby the most scientific of sciences, and who possesses, or endeavours to possess, used and unused copies of every known variety of every known stamp, even to the smallest variation in shade and thickness of the paper upon which the stamp is printed!

It might seem that the first thing to do to become a stamp-collector is to obtain a quantity of stamps. Before doing so, however, you should decide what kind of stamps you intend to collect. There are at least six different classes of stamps, including (1) the ordinary stamps, used for prepaying the postage on letters, post cards, and parcels. (2) Official stamps, used for pre-paying the postage on matter posted by a Government department: (3) Registration stamps, used for pre-paying postage on registered or insured packets. (4) Postage Due stamps, used to show how much postage is due to be paid by the receiver, when a packet has been insufficiently stamped. (5) Newspaper stamps. (6) Express Delivery stamps.

Limiting your Collection.

You will probably decide to commence by collecting the ordinary postage stamps (class 1 above) first, and also collecting such of the other classes as may come into your possession, but, concentrating on increasing the size and interest of your main collection.

Dealing especially with ordinary postage stamps you may decide to collect postage stamps from all countries of the world, or you may prefer to limit your activities to stamps of the British Empire, to European stamps, to picture stamps, or only to

stamps showing the head of King George V.

If you decide to limit your collection in some way, however, it is strongly recommended that you should be geographical. For example, if you decide to collect only "picture" stamps, collect certain stamps only of each country. You will then be collecting for the sake of the pictures, and not for the sake of showing the postal history of the country, which is the final aim of any real stamp collection.

It is perhaps best to start by collecting all stamps that come your way and then, as you go on—if you find it necessary—limit your collection to those countries the stamps of which interest you most. In any case you should endeavour to make your collection as complete as possible for those selected countries.

Used and Unused?

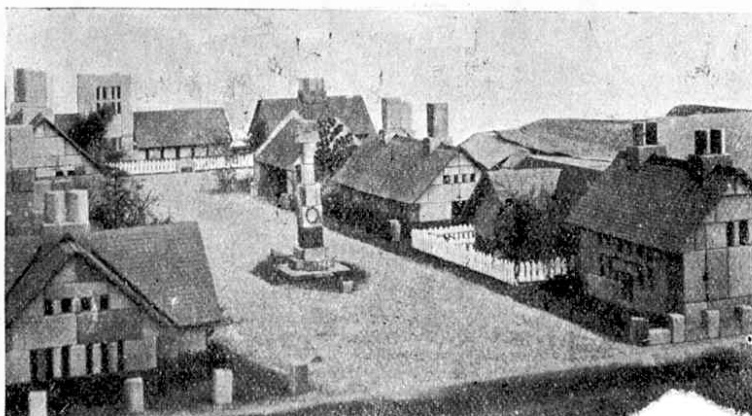
Another point to be decided is whether you will collect used stamps only or unused, or even one used and one unused specimen of each stamp. The usual solution, mainly because it is the cheapest, is to collect used stamps only, but when you come across unused specimens, to collect these as well! This also is the best from the philatelic point of view, for in a sense an unused stamp is only half a stamp. It has been made, but it has been of no use. A used stamp, on the other hand, has fulfilled its purpose by carrying a letter or parcel safely through the post—it is a true stamp, and no longer merely a scrap of printed paper!

NEXT MONTH.

BUYING PACKETS, ETC.

Lott's Bricks

A System of Beautifully Made Artificial
Stone Blocks for Constructing Buildings



Add a Garden City to your Model Railway

The above Village is built entirely from Plans contained in Boxes 1 and 2 Building Bricks are of Artificial Stone. Signal Boxes, Platforms, Goods can readily be constructed from the materials in the various sets.

Obtainable at all Leading Stores and Toy
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Box 1 6 Models, complete with
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Box A Complete with Plans, Bricks,
Roof, Fences and Trees... 5/-

" B " " " " " " " 5/6

" 1 " " " " " " " 10/-

Plans for 18 Models enclosed.

" 2 Complete with Plans, Bricks,
Roof, Fences and Trees... 10/6

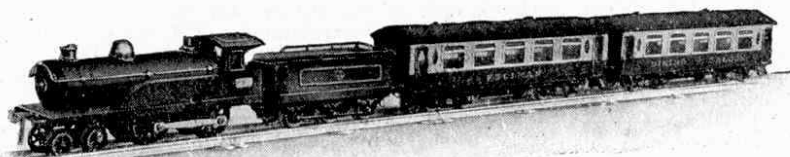
Plans for 18 Models enclosed.

" 3 Plans for 49 Models ... 17/6

HORNBY CLOCK WORK TRAINS

THE TRAINS WITH THE GUARANTEE

A most valuable and remarkable feature of the Hornby Train is that it can be taken to pieces and rebuilt just like a Meccano model. All the parts are standardised, and there is as much fun taking Loco, Tender, Wagon, and Coaches to pieces and rebuilding them as there is in playing with them. Any lost or damaged parts may be replaced with new ones.



No. 2 PULLMAN TRAIN

HORNBY TRAIN PRICES

No. 1			
Goods Set	...	25/6	
Passenger Set	...	35/-	
Locos	...	each	16/-
Wagons	...	each	3/8
Tenders	...	..	3/6
Passenger Coaches	..	..	6/6



No. 1 PASSENGER TRAIN

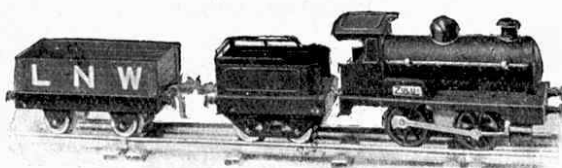
No. 2			
Goods Set	...	45/-	
No. 2 Pullman Set	...	70/-	
Locos	...	each	30/-
Wagons	...	each	3/9
Tenders	...	..	4/-
Pullman Cars	...	..	16/-



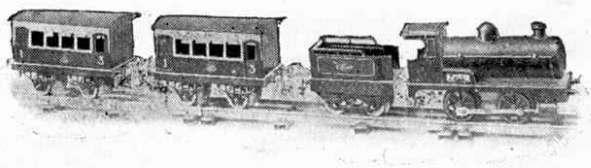
No. 1 GOODS TRAIN

ZULU CLOCK WORK TRAINS

The Zulu Clockwork Train is a cheaper type of mechanical train, the chief characteristics of which are fine and durable mechanism and immense strength of construction in all parts. The Zulu Loco is well designed and efficient, and will give long and excellent service. Richly enamelled and highly finished; fitted with brake and governor; non-reversing.



ZULU GOODS TRAIN



ZULU PASSENGER TRAIN

Zulu Train Prices

Goods Set	...	18/6
Locos	...	each 10/6
Passenger Set	...	25/-

GUARANTEE

Hornby and Zulu Trains are tested, and their efficiency is guaranteed. A form of guarantee is furnished with each loco, and we undertake to repair, or replace, at our option any loco that fails to run satisfactorily from any cause other than misuse, within 60 days of purchase.

Zulu Train Prices

Tenders	...	each 2/6
Wagons	...	.. 3/-
Passenger Coaches	..	5/-

TANK LOCOS

Hornby Tank Loco

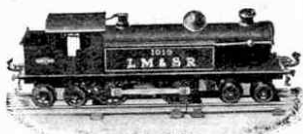
The Hornby Tank Loco is a powerful model embodying all the characteristics of the Hornby Train. It is 11½" in length and is fitted at both ends with a special bogey.

Price 32/6

Zulu Tank Loco

A strong and durable loco capable of any amount of hard work; richly enamelled and highly finished; fitted with reversing gear, brake and governor.

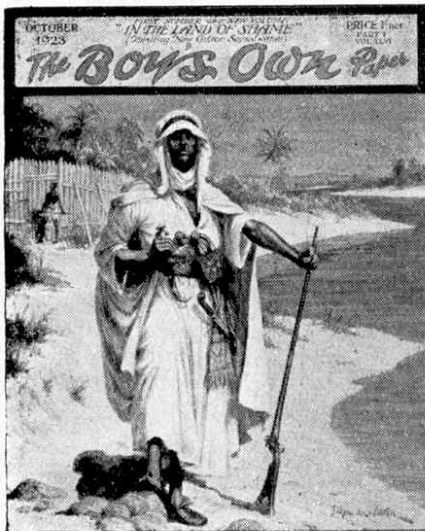
Gauge 0, in black only ... 12/6



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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.

Ellson Dallaway (Pevensley).—A good representation of a motor car leaf-spring may be made from strips of graduated lengths slightly curved. See the illustration of this type of spring in our Chassis Leaflet.

H. Chesters (Crewe).—We greatly admired your sketch of the crane, illustrating the use of the suggested bent angle girder. Could you not use existing girders of the required length and make your connection by means of $2\frac{1}{2}$ " curved strips?

H. Coates (Notts.).—We have a tank engine already on the market, but this is not quite as elaborate as your suggestion.

F. Beeston (Cambridge).—We illustrate our 3" pulley fitted with a rubber ring in the Chassis Leaflet. Although the form is a little different, the effect is the same as your suggestion.

A. G. Cooke (West Kirby).—A "T" girder may be constructed from four angle girders bolted to a flat girder, a form of construction adopted in a model of the Quebec Bridge we made recently for the Canadian National Railways. The effect is the same as your suggestion except that it comes a little narrower between the parallel surfaces.

Bernard J. Hobden (Battle).—(1) Set-screws are adopted in all instances wherever possible. Grub screws have to be used in the smaller wheels on account of the interference with other gear wheels that set-screws would cause in sliding actions. (2) The dark colour of the grub screws is caused by the tempering process through which they are put. (3) We abolished the groove in the flanged wheel as it departed from the true type.

G. Hardy (Surbiton).—We should be interested to hear of any uses and advantages that you have found for the $2\frac{1}{2}$ " pulley, and for the combined bush and pulley you suggest.

M. Lemarchand (Boulogne).—(1) We list a train coupling (No. 121) which you will doubtless agree is superior to your suggested oval hook. (2) The present expansion spring may be employed as a compression spring by first of all extending it slightly.

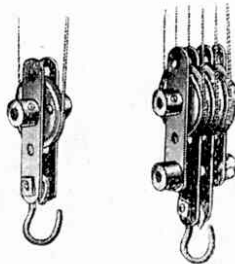
R. E. Gray (Forest Hill).—A flat sector plate would necessitate some means of fastening to the rest of the structure. The existing flange fills this requirement.

N. F. Keith (Geelong).—We shall give consideration to your suggested corner-angle plates.

E. C. Horsley (Malton).—The power of the clockwork motor would not allow of any type of friction speed controller.

Park Simpson (Northallerton).—At the moment we are experimenting with a Clockwork motor of a revised type.

B. Tucker (West Worthing).—Combination tools somewhat similar to those you suggest are stocked by most tool merchants.



J. Mears (Ashstead).—We illustrate above two methods of assembling pulley blocks. These, with two other examples, are shown in Model No. 442 in the new edition of our Complete Manual. (Price 2/10½ post free).

A. Fraignes (Paris).—The most satisfactory braking action is that of a cord that runs loopwise over a pulley on the moving shaft. This method is universally employed where high braking power is required.

Into the Land of Fun—(cont. from p. 126)

This may also be used as a separate bolt and applied to other forms of pivots, such as a pivot for the boss of a crank, intermediate gear wheel, or loose pulley.

I always think the Drilling Machine (No. 312) is another interesting model. This is a simple model to build, but no less interesting than the Railway Break-down Crane. It is an exact representation of the large machines used in engineering shops for drilling sheet iron and metal, and when I last went over the Meccano factory I noticed a large number of these drilling machines being used in the manufacture of Meccano parts. This model may be worked by the crank handle (part No. 19) included in the Outfit, or it may be worked from the electric or clockwork motor by running a belt over the flanged wheel on the right of the model. In either case the drill is revolved by means of a crossed belt drive over the upper pulleys.

The boy who is lucky enough to possess a No. 3 Outfit need not fear that he will be short of amusement during the dark winter evenings. There is no end of fun and real enjoyment to be obtained from the great number of models illustrating different mechanical principles. When constructed, each model means hours of pleasure, both in building and in play, and there is little wonder that to Meccano boys the winter months are the happiest of the year.

NEXT MONTH:
MORE No. 3 MODELS

Californian Boy Helps His Mother

by Inventing New Wool-winder

THE story of invention is always interesting reading. Every boy likes to read of the early electrical experiments of Benjamin Franklin, or of how young Watt, in watching the kettle boil, was led to think of the power of steam and the possibility of a steam engine. In inventing models many a Meccano boy does something that has never been done before, or improves on an existing idea. Boys who do either the one or the other are real inventors, as much so as Benjamin Franklin or James Watt.

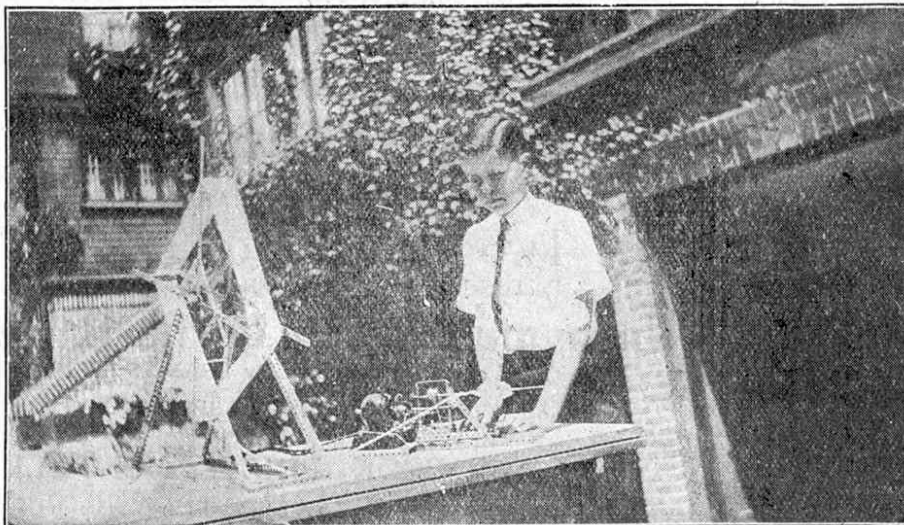
Bartlett Stephens, who lives in San Francisco, is a boy of this type. This bright Meccano boy, who is just fourteen years of age, had often noticed the amount of labour and time expended by his mother in winding

skeins of wool. With the true spirit of invention, he set about applying his knowledge of Meccano to constructing a mechanical method of winding. As

members of the family, whose job it was to hold the skein whilst mother wound off the wool!

Our illustration shows Bartlett with his model, which consists of a collapsible frame, some twenty-six inches in height. This carries the skeins of wool, while a guider directs the worsted to a rod, supported in a frame and geared to an electric motor. On the motor being started up, the rod commences to wind the wool into a ball, pulling it off the skein which it is able to do because the frame rotates.

When wound the ball of wool is easily removed from the rod and a little care and manipulation during the process ensures the firm round ball, that our mothers insist on having.



Master B. Stephens, of San Francisco, with the Meccano Wool-winder that he has invented

a result, he evolved an appliance that does away with many tedious hours for

the firm round ball, that our mothers insist on having.

What is the first principle of building construction?

It does not matter how carefully a building is planned or how beautifully it is built; the skill of the finest craftsmen in the world may be lavished on it—all will be in vain unless the foundations are sound.

All over the world there are splendid buildings, which are cracking and collapsing because the foundations are giving way.

You yourself are rather like a building—it does not matter how clever you are with your brains or your hands. It does not matter how strongly you feel you will be able to do great things when you are grown up, unless your foundations are sound, unless you have *good health*, you will collapse.

Now the very foundation of good health is good teeth—you cannot be really fit and well unless you have sound teeth. Sound teeth are *clean teeth*.

It is a simple and pleasant matter to keep the teeth in perfect condition by the twice daily use of Gibbs Dentifrice. It cleans and brightens the teeth by removing the greasy food deposits and polishing the millions of tiny waves and facets into which the enamel of a normal tooth is divided.

It is these facets of the enamel (seen only through a powerful magnifying glass) which give the bright, sparkling appearance to clean teeth.

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