THE MODEL WORLD AT YOUR FINGERTIPS

MECCANO MAGAZINE

THE MODEL WORLD AT YOUR FINGERTIPS

Complete Reprint of the first Meccano Magazine

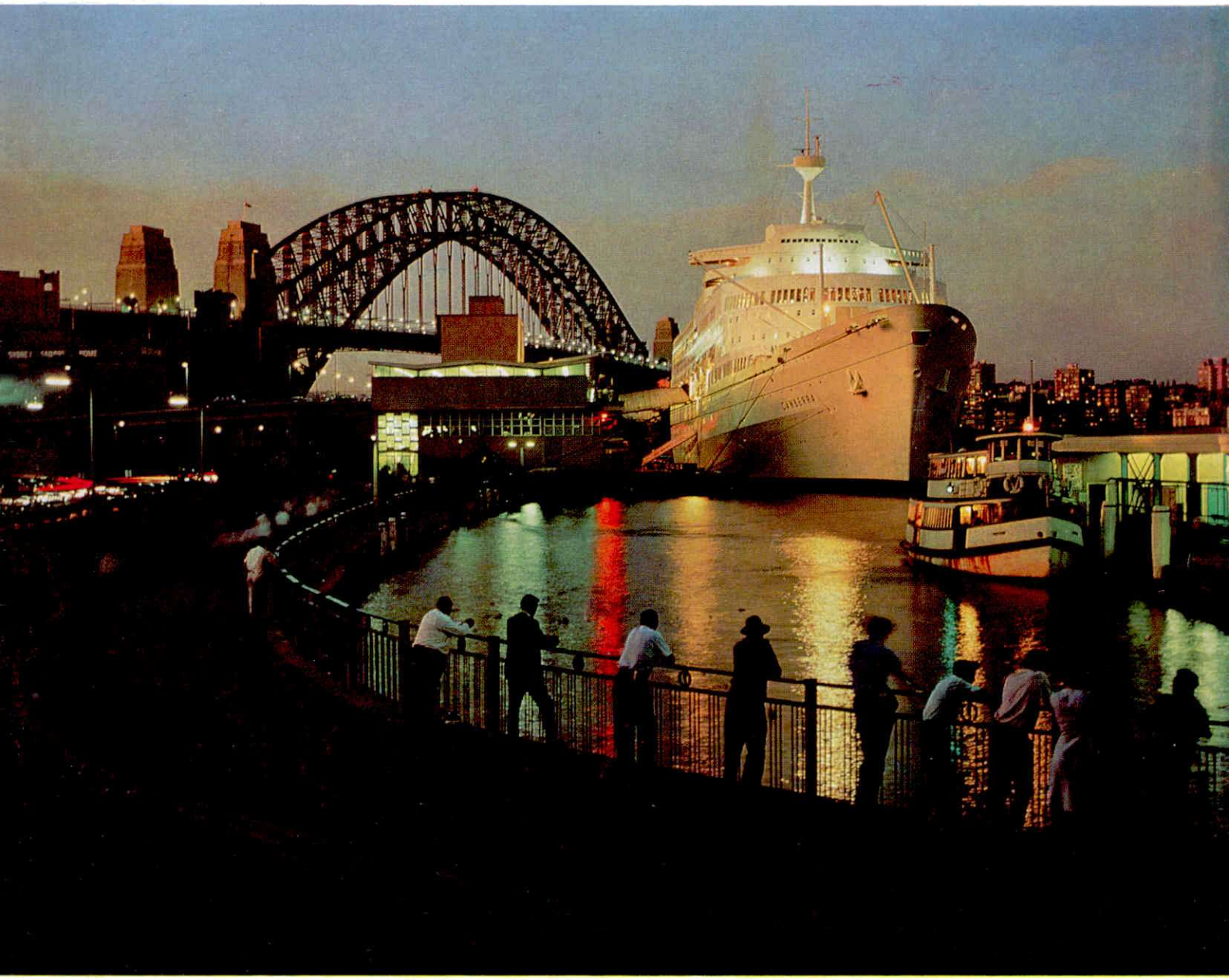
Spitfires to Spaceflight in 25 momentous years

Holsters and Hardware-another Great Guns feature

How we built a two-inch working tramcar

July 1967 Two Shillings

AVIATION PLASTIC MODELLING AEROMODELLING BOATS RAILWAYS RACEWAYS SCIENCE CYCLING PUZZLES COMPETITIONS



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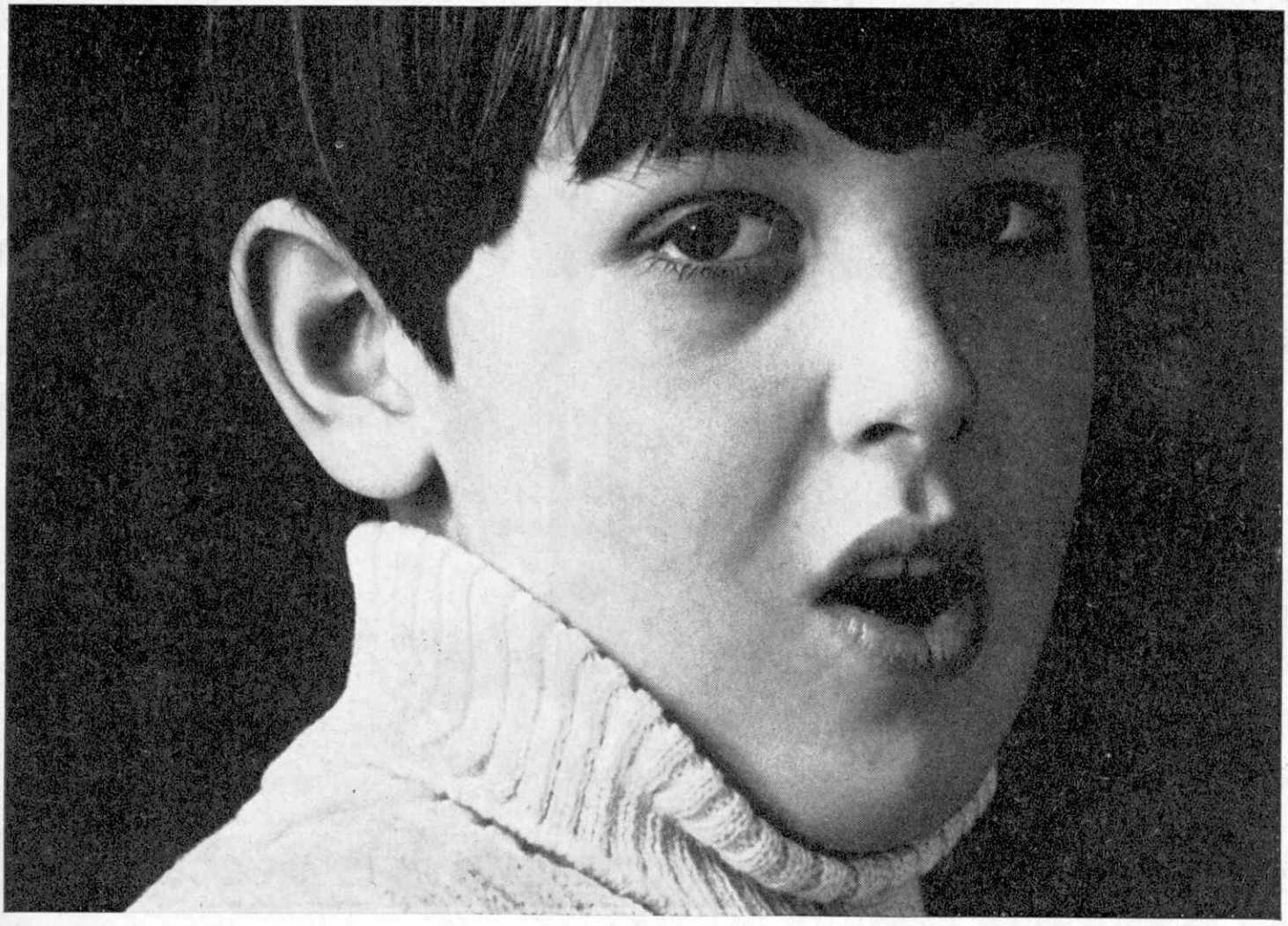

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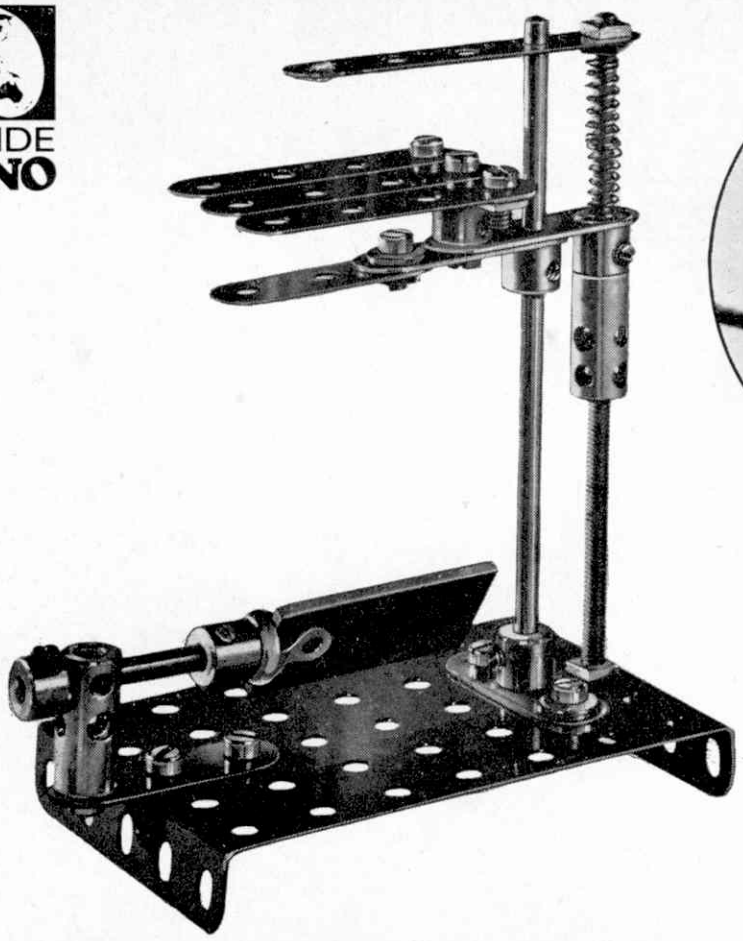
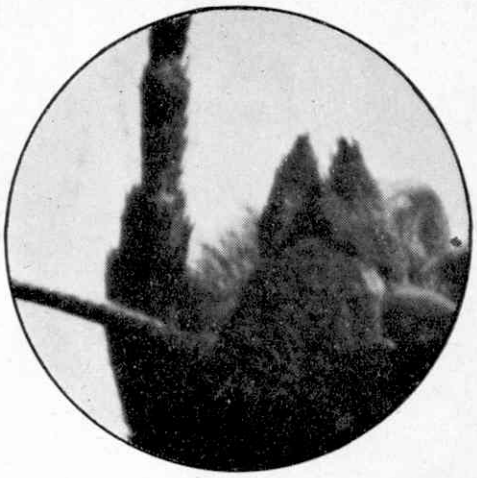
WORLD-WIDE
MECCANO





Above:
part of moth's head, enlarged
approximately 30 times

1 part water, 1 part mirror, a few parts Meccano a touch of genius-and you've got a Microscope

This simple Meccano Microscope magnifies up to 40 times. The lens is a drop of water, suspended in a Meccano hole. We take off our hats to the genius from Solihull who devised this practical instrument with Meccano.

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If you are already a Meccano enthusiast, you'll know what we're talking about, and how to extend your Meccano with the Conversion sets. But, if you have yet to discover the thrills of building with Meccano, there are ten fabulous sets that you should know about These are complete with instructions for making hundreds of models that really work.

We should like you to write about any models you've made which you think would be of interest to other Meccano enthusiasts round the world. Please send photographs and descriptions to Meccano Ltd., Binns Road, Liverpool 13.

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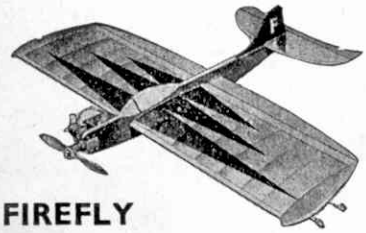
START OFF RIGHT with a KEILKRAFT model aircraft kit!



FIREFLY

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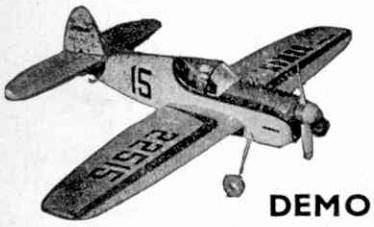

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RIGHT from the start!

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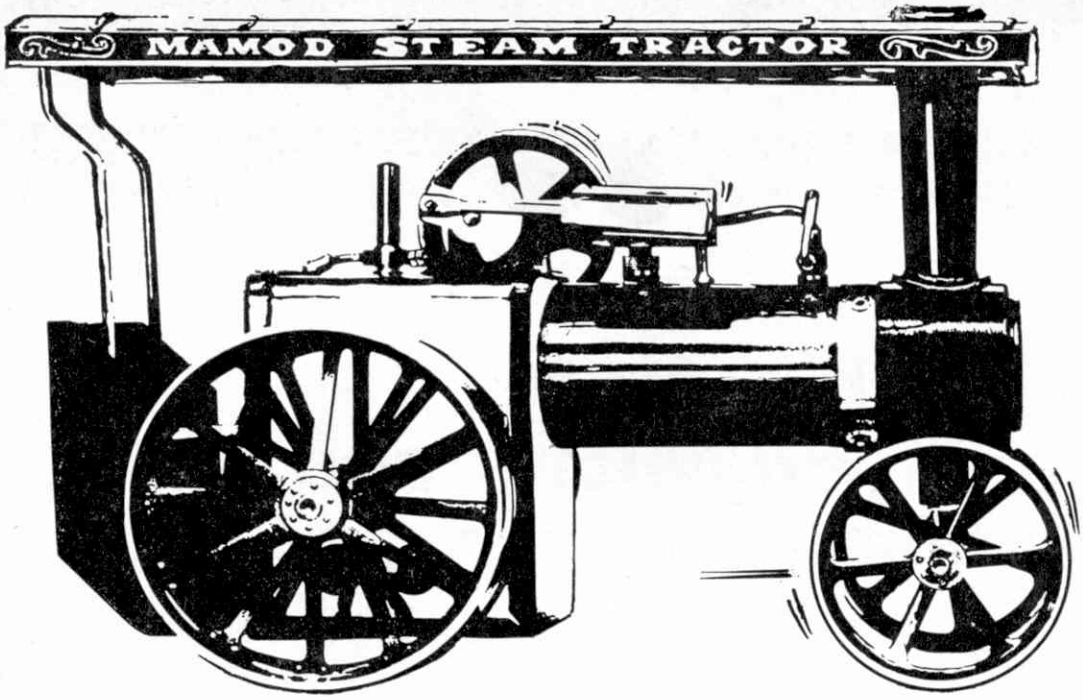

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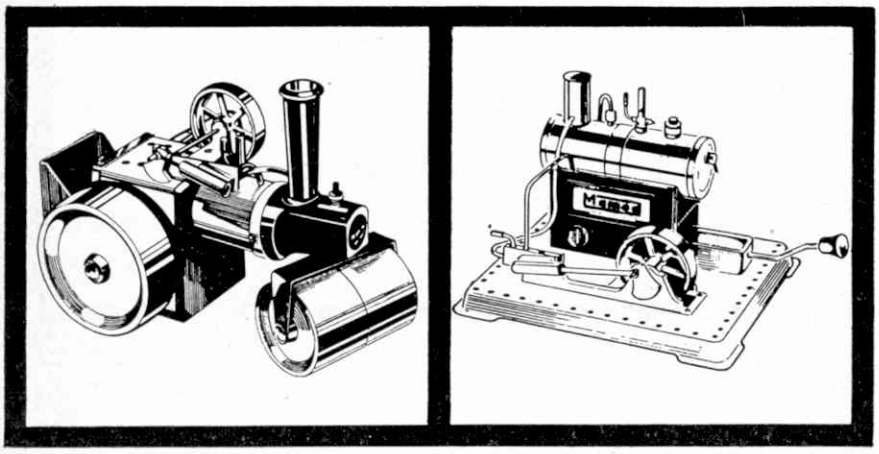

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MECCANO MAGAZINE

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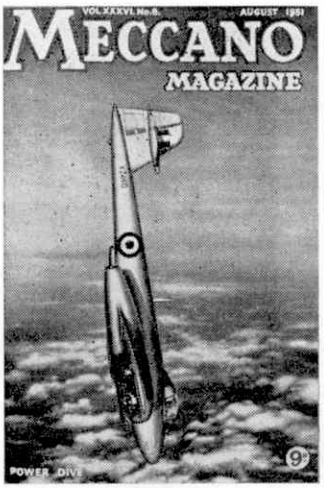
Following my announcement in last month's issue about the end of the present Meccano Magazine, I have received so many letters from readers expressing their sadness about the news, that it will be quite impossible to reply to every one individually. I would therefore, like to take this opportunity of thanking all those who wrote to me and I would also draw their attention to the announcement on page 17 of this issue. My own views about the closure were set out last month, and as this is the last MM I have devoted quite a lot of space to a 'look-back' at the early years of the magazine and the people associated with it. For older readers it will be a reunion with names from the past and for the youngsters, an introduction to the origins and originators of Meccano and its magazine.

The Editor

Contents

1939 'In Line Ahead', an appropriate cover for the outbreak of World War II, and typical of the pre-war large format MM covers.

1941 This was one of the last magazines of the pre-war format; from January 1942 wartime restrictions enforced a reduction to half the cover size which lasted almost twenty years.



1951 A Meteor jet dives over the clouds on the cover of an early post-war MM, but jet propulsion is not the only sign of the post-war age here—the price has gone up threepence.

1953 The decade progresses, and the delta-winged Vulcan typifies the changing shape of familiar things. It is said that man will be in space within a few years.

1961 Back to a larger format, (7¼ in. by 9¼ in.) and the 'Queen Mary' is still as popular as ever, despite competition from the air. Boats have traditionally been popular subjects for MM covers.

1963 One of the last 'traditional' covers, and the bi-plane reflects the tremendous growth of interest in historical transport subjects. The magazine returned to its full present cover size in March 1964.

THIS MONTH'S COVER: The 45,000 tons P & O liner Canberra at Circular Quay, Sydney. Canberra is over 800 feet long, and carries 546 first and 1716 tourist class passengers on her voyages around the world. By courtesy of P & O.

SPITFIRE TO SPACE FLIGHT

by John W. R. Taylor

Below: A flight of Fairey Swordfish against a background of sky and sea. These biplanes had a top speed of 139 m.p.h.

TWENTY-FIVE years ago, when I was a very junior and very hard-up member of Sir Sydney Camm's design team at Hawkers, I began writing articles about aeroplanes. One of them found its way to the desk of Mr. W. H. McCormick, who was then Editor of Meccano Magazine. Unlike other Editors, who had sent me sufficient 'Editor regrets' notes to paper my bedroom, he not only accepted it but offered to pay me the princely sum of three guineas for it, which was far more than my weekly pay at that time!

So started a link with M.M. that has remained unbroken through the years. My first three articles, written in the middle of World War II, dealt, predictably, with the Hurricane and Spitfire fighters and the Swordfish torpedo-bomber. The title illustration to the first of them showed Sir Sydney Camm, but for whom I would probably be an architect rather than mixed up with aviation—which had always been my real ambition.

What incredible changes we have been able to report in M.M. through this past quarter of a century. The dear old Swordfish, despite its wartime achievements, was a left-over from the biplane era with a top speed of only 139 m.p.h. Today, many aeroplanes land and take off at higher speeds than that, and the North American X-15A has reached a speed of no less than 4,250 m.p.h.

In more technical terms, the X-15's unofficial speed record, achieved on November 18 last year, was Mach 6·33, or six and one-third times the speed of sound at high altitudes. The Swordfish's top speed was Mach 0·18 at sea level—not that this would have meant much to the pilots who used it to wreck the Italian fleet at Taranto in 1940 or to cripple the German battleship *Bismarck*.

Machmeters, which indicate the speed of an aeroplane as a proportion of the speed of sound, began to be more important than airspeed indicators only with the arrival in service of the first jet-fighters in 1944. In a dive, the airflow over the wings of these aircraft began to approach the speed of sound. When this happened, the aircraft was buffeted by shock-waves of air, which were sometimes powerful enough to make the pilot lose control. So pilots had to be careful not to exceed a safe Mach number, and the Machmeter told them when they were getting near the danger mark.

When Geoffrey de Havilland, son of the founder of the great D.H. company, flew so fast that his little tailless research aircraft was broken up by shock-waves, the newspapers began to refer to the 'sound barrier'. The speed of sound (Mach 1) was believed by many people to represent the limit beyond which no aeroplane would ever fly.

One person who did not share this belief was Captain Charles Yeager of the U.S.A.F. He was willing to stake his life to prove that aeroplanes could fly through the 'sound barrier', and on October 14, 1947, he became the first man ever to travel at supersonic speed, in the little Bell X-1 rocket-plane. It was a rough ride, and some years later he tumbled, unconscious, for ten miles in the improved X-1A after reaching the then-unprecedented speed of 1,650 m.p.h.

This is the kind of man whose courage and skill have made possible such immense advances in aviation during the last two decades. It was a tremendous thrill to meet him and to hear the inside story of those flights, first-hand. Many other famous persons have been happy to provide stories for the M.M.—men like Sir Alliott Verdon-Roe, Britain's greatest pioneer of flying, Igor Sikorsky, builder of the first four-engined aeroplane and the first really practical helicopter, and even Yuri Gagarin, the first man to travel in a spacecraft.

No less exciting has been the opportunity to share personally in some of the great new developments, rather than simply to talk about them and write about them. This is when my rather battered old "Personal Flying Log Book" comes in handy as a check on dates and other half-forgotten details.

My monthly 'Air News' feature in the September 1948 M.M. told of the international helicopter speed record of 124·3 m.p.h. set up that year by the Fairey Gyrodyne. A few weeks later I made my first helicopter flight in the Gyrodyne, in the capable hands of test pilot F. H. Dixon. Only nine years had passed since Sikorsky's historic first hops, so it was rather like flying in a stick-and-string aeroplane of 1912, nine years after the Wright brothers' first flights.

Not long after that, my wife and I celebrated our fourth wedding anniversary by hopping across the Channel on the vehicle ferry service operated by Silver City Airways between Lympne Airport in Kent and Le Touquet in France. So many people have now travelled by Silver City and its successor, British United Air Ferries, that the service is no longer newsworthy; but it made a good story in the early days—as did a later flight on which we took a sailing dinghy on a trailer, and its towing car, to Cherbourg—the first time an aeroplane, boat and car had ever flown together.

The February 1954 issue contained an even better 'scoop'. Readers of M.M. are often just the kind of youngsters who make first-class aircrew and ground crew members; so the Air Ministry was always very willing to co-operate by providing opportunities for unusual stories.

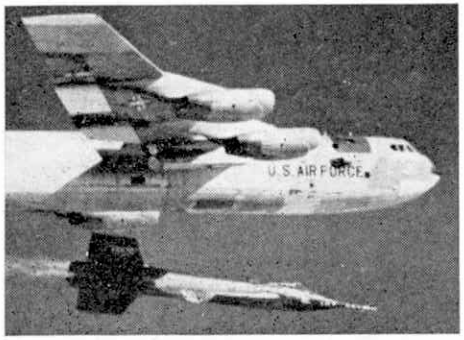
The one for which I gathered facts and photographs at the R.A.F. Station of West Malling on November 26, 1953, was certainly unusual. Quoting from it:

'I could hear the roar of Vampire and Meteor night fighters taking off on practice interceptions as I drew up at the Station Guard House and presented my impressive-looking Air Ministry Pass.

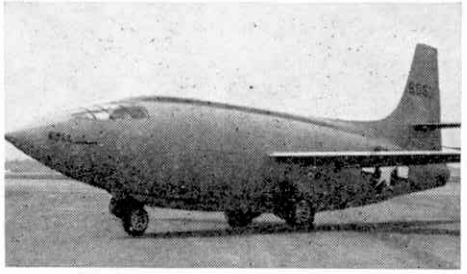
'Fifteen minutes later I was trussed up like a Christmas turkey in the dark, cramped cockpit of Vampire N.F.10 night fighter "E for Easy"; resplendent in borrowed flying suit, complete with "wings" and embroidered squadron crest, yellow "Mae West" life belt, helmet and oxygen mask. I had clipped together the four straps of my parachute and four more straps of the seat harness, and plugged in my radio-telephone (R/T). Despite which I discovered that, by releasing a small catch on the side of the cockpit, I could lean forward quite comfortably and have a good look at the complex radar screens and maze of other equipment which surrounded me.'

We quickly took off on what was, I discovered later, the first-ever flight made by a journalist in a jet night fighter at night. It was an unforgettable experience, but only one of many.

Continued on page 25

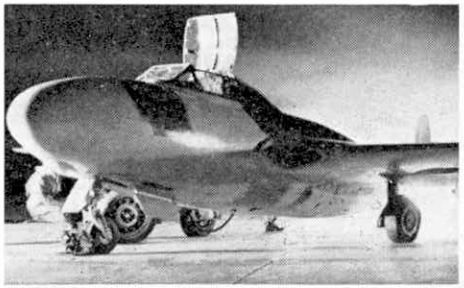


The North American X-15 drops from the wing of a B-52

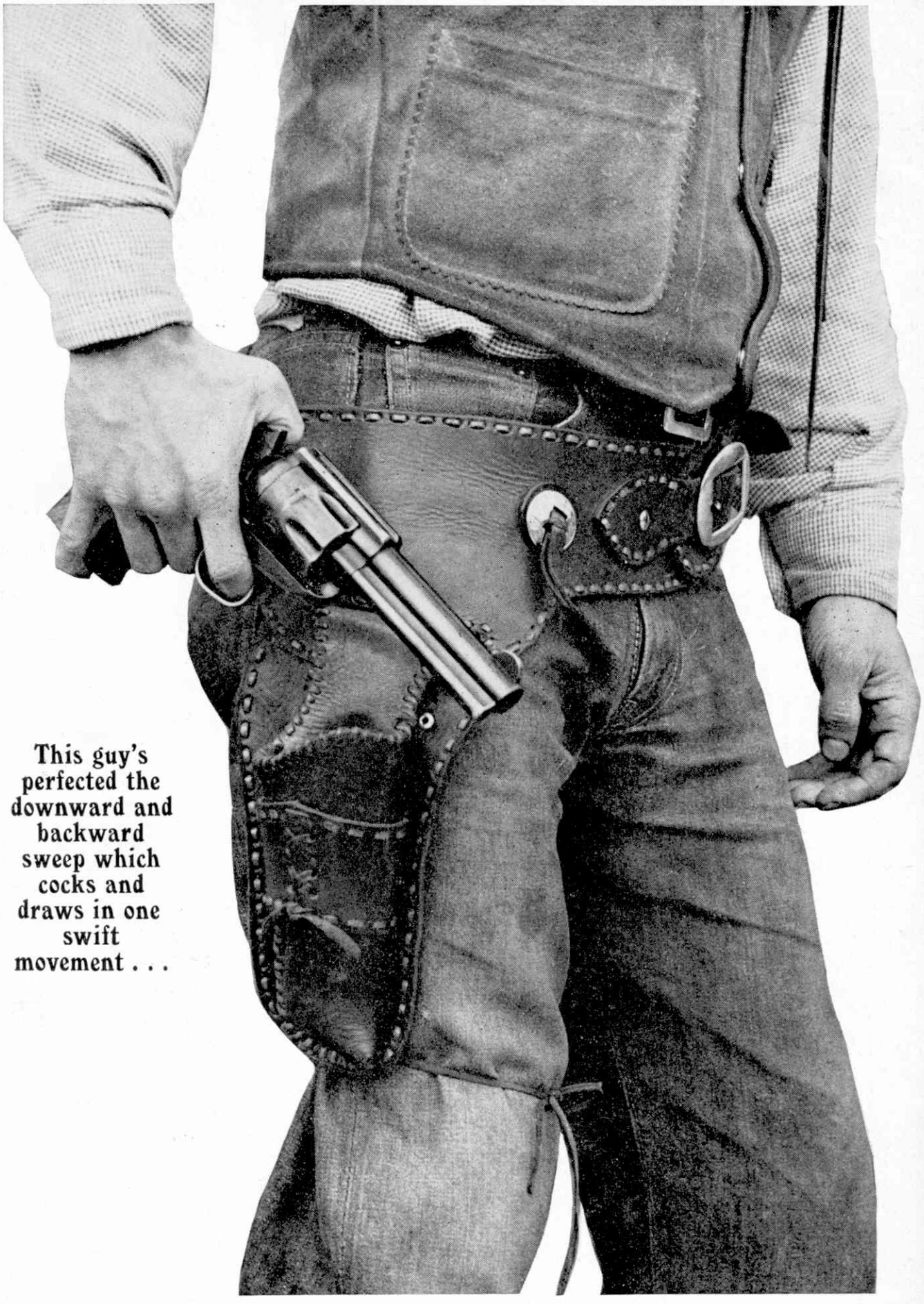


The Bell X-1 rocket plane which, piloted by Captain Charles Yeager of the U.S.A.F., became the first to travel at supersonic speed

The Fairey Gyrodyne which reached a speed of 124·3 m.p.h. in 1948



A Vampire NF-10 night fighter, similar to the one in which the author made his memorable flight described in this article



This guy's perfected the downward and backward sweep which cocks and draws in one swift movement . . .

Holsters and Hardware

By Doug Mitchell

DO you believe those stories about the Western gunfighter? Was he really as good with a six-gun as television makes out? Or was he the sort of guy who could only get his man with a sawn-off shotgun or by shooting him in the back?

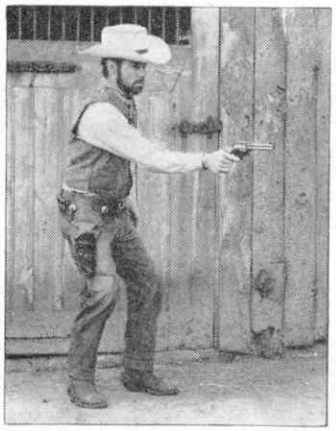
It's the fashion to debunk things these days, and to listen to some self-appointed experts, most of the famous gunmen couldn't have hit a barn — unless they'd been inside it! And as for television, it's all trick camera work.

To be fair, some of it is. You see a scene shot from behind the hero as his hand drops to his gun butt like lightning. Next, the camera is filming from in front as the gun is whipped out and fired. This is a real cheat however effective it may look, because the fast draw is done in two halves. Anyone can slam his hand down on a gun, equally, anyone can draw and fire fast if he starts with a ready-cocked gun with his hand on the butt and his finger on the trigger.

On the other hand, there are some actors, like Robert Fuller, who plays Jess Harper in Laramie, who don't need trick filming to make them appear fast. Robert Fuller is just as fast as they come, and if he is fast why not others? Let's look at some facts and see if the debunkers are right, or if there may be something in those stories after all.

First of all, consider the Quick-Draw Association of America, which

This guy knows what he's about . . .



holds an annual contest to decide the fastest—and most accurate—gun of the year. In 1966 the winner averaged just 0·46 of a second to draw, fire and hit his target with a single-action pistol, which meant it had to be cocked as he drew.

'Ah, yes!' I hear the scoffer say, 'but that was with a modern weapon and it wasn't for real. How would he do if the target was shooting back?'

'Right,' I retort, 'how about the famous fight at the O.K. Corral? Those guns weren't modern and the targets were sure firing back!'

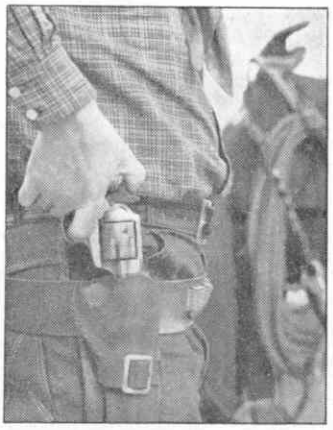
Maybe you know all about this famous gun battle when Doc Holliday and the three Earp brothers, Wyatt, Virgil and Morgan, took on five desperate outlaws? If you do you'll know that the shooting was all over in less than 30 seconds. The lawmen fired 17 shots, eleven of them finding their mark. Three of the outlaws were killed and the other two, Billy Claiborne and Ike Clanton, fled without firing a shot. How's that for accuracy when the target is shooting back?

There's another well-authenticated story concerning Harry Longbaugh, better known as the Sundance Kid on account of he came from Sundance, and Butch Cassidy. Someone had started an argument about the merits of the Winchester rifle and its accuracy against a six-gun, and Butch and the Kid decided to settle it by a demonstration. They buckled on their belts and called for some empty bottles, then they took two each, tossed them into the air and shot them to pieces before they had started to fall. They repeated the trick, if you can call it a trick, several times over.

Just to bring things up to date, but sticking to old-time hardware, a couple of years ago I saw a guy knock down three jam tins at 25 yards with just three shots out of a genuine, original Colt Forty-Five.

So where does this get us? I think the truth is that there were some real top-notch gun-slingers who could do all the things told about them, but that there were a sight more who seldom used a gun and weren't too accurate when they did.

This guy's all wrong . . .



But, you may ask, if there were fast shooters, what was the secret? The quick answer is two words: technique and practice. Let's look at technique first.

This guy's all wrong (above). The barrel is too long to clear the holster quickly, the belt is worn too high so that he has to bend his arm overmuch on the draw and, finally, he's cocking with the ball of his thumb, which is slow.

Now look at the man with the stitched belt and holster. As his hand has swept downwards and backwards to the gun, his thumb has closed right over the hammer spur, knocking it into the cocked position, and already the short barrel has cleared leather (opposite page). This is where practice comes in—perfecting that downward and backward sweep which cocks and draws in one swift movement.

Now for actual shooting. This tough looking gunman (top of page) knows what he's about. His gun is well forward like a pointing finger, his legs are slightly bent at the knees to give his body balance, and the line of the gun is squarely in front of him. When that shooter goes off he's going to hit what it's pointing at! And maybe there's a secret here. If you point your finger at something just in the ordinary way, you'd be surprised how straight and accurate it is—naturally. It's much the same with a hand-gun. If you get used to it being in your hand so you don't think about aiming, it'll hit where you point it.

and this guy is fanning!

One of the biggest mistakes a greenhorn makes when firing, is that he *pulls* the trigger. No, I'm not being funny. If a trigger is *pulled*, maybe jerked is a better word, the gun barrel is deflected slightly to the left by a right-handed man, because of the pressure of the finger and the resistance of the trigger, even if the trigger has a very light action. The trigger should be squeezed, like if you have one of those grip developers in your hand. In this way, the thumb also exerts some pressure and the barrel remains steady.

And this brings me to the vexed question of fanning. Fanning, as you probably know, is when the gun is held with the trigger pulled while the other hand is used to brush across the hammer spur, like in the picture (above), cocking and firing in one movement. It's a very fast way of getting off shots but it's not as accurate as cocking and pulling (sorry—squeezing!) the trigger.

A lot of writers have said that no professional would have ever fanned his gun, and in most cases they're right. When two men faced each other alone, it was the first accurate shot which counted and there wouldn't have been any need for another. Men like Wyatt Earp took their time, as he once said, and made sure the first round scored. But you've got to remember that when Earp took his time, it was still only a split second. What it really meant was that he never got flurried and grabbed his gun hastily. But if a man wanted to spread a lot of lead around quickly, fanning was the way he did it, and if he knew how to use his gun, he mightn't knock the pip out of an ace but he'd sure scare the dealer!

Well, friends, that just about winds it up. There's just one thing, though, if you ever point a gun at anything, be sure you *mean* to hit it. It's no use after you've shot someone in the face trotting out that lame old chestnut 'I didn't know it was loaded'.

A TRAM FOR TWO

Not a project that a novice should tackle, but the constructional dodges Doug McHard employed in building his 2 mm. (N gauge) tramcar, might well help to solve some of your other modelling problems.

TRAMCARS have always fascinated me and so has really small scale modelling. With the coming of a practical N gauge system there was obviously therefore an opportunity to combine the two interests, but it was not until I saw Tony Parkinson's beautiful little 2 mm. tram at the last Manchester Exhibition (see March 1967 M.M.) that I decided actively to do something about it.

The 'Manchester Tram' used an opaque Plastikard body and an Egger mechanism (not Arnold as incorrectly reported in March), it also used a pantograph overhead collector, and I wanted, if possible, to use a trolley pole. I decided that my tram must be transparent—one of the nice things about tramcars is the way you can peer right through them—so the body would be fashioned from $\frac{1}{16}$ in. thick Perspex sheet. I didn't have an Egger mechanism around, but I did have a spare Minitrix 0-6-0 chassis and upon investigation it seemed that it would fit the body, provided the motor could be re-aligned vertically and turned sideways to present a narrower profile. Because of the thickness of the body material the motor brush gear would also have to be rebuilt to bring the tension springs to the front and this, in turn, meant unsoldering the armature wires and rotating the commutator through 45 deg.—a tricky job!

By comparison, the work involved in shortening the chassis was child's play and the alterations can clearly be seen by reference to Photo. 1 where the modified 0-4-0 unit is shown alongside the standard Minitrix chassis. The full size side view (Fig. 2) will also be useful and here I must draw your attention to the slight dissimilarities between drawing and photo. The photographs were taken before the exact body mounting method had been finalised and this is shown correctly in the drawing. A slot is filed in the motor end of the chassis to locate over one of the inner platform ends and the other end is then fixed beneath the opposite platform with a 10 BA bolt. Photos also show the mechanism wired for two-rail operation (testing) but the finished tram uses a proper trolley pole pick-up and a fine enamelled copper wire must therefore be taken to the brass tube trolley-pivot in the roof. The lead weight shown in the drawing is wedged and cemented between the tram sides, occupying as much of the 'tween-deck space as possible without 'blocking out the light'. The more weight you can cram in the better.

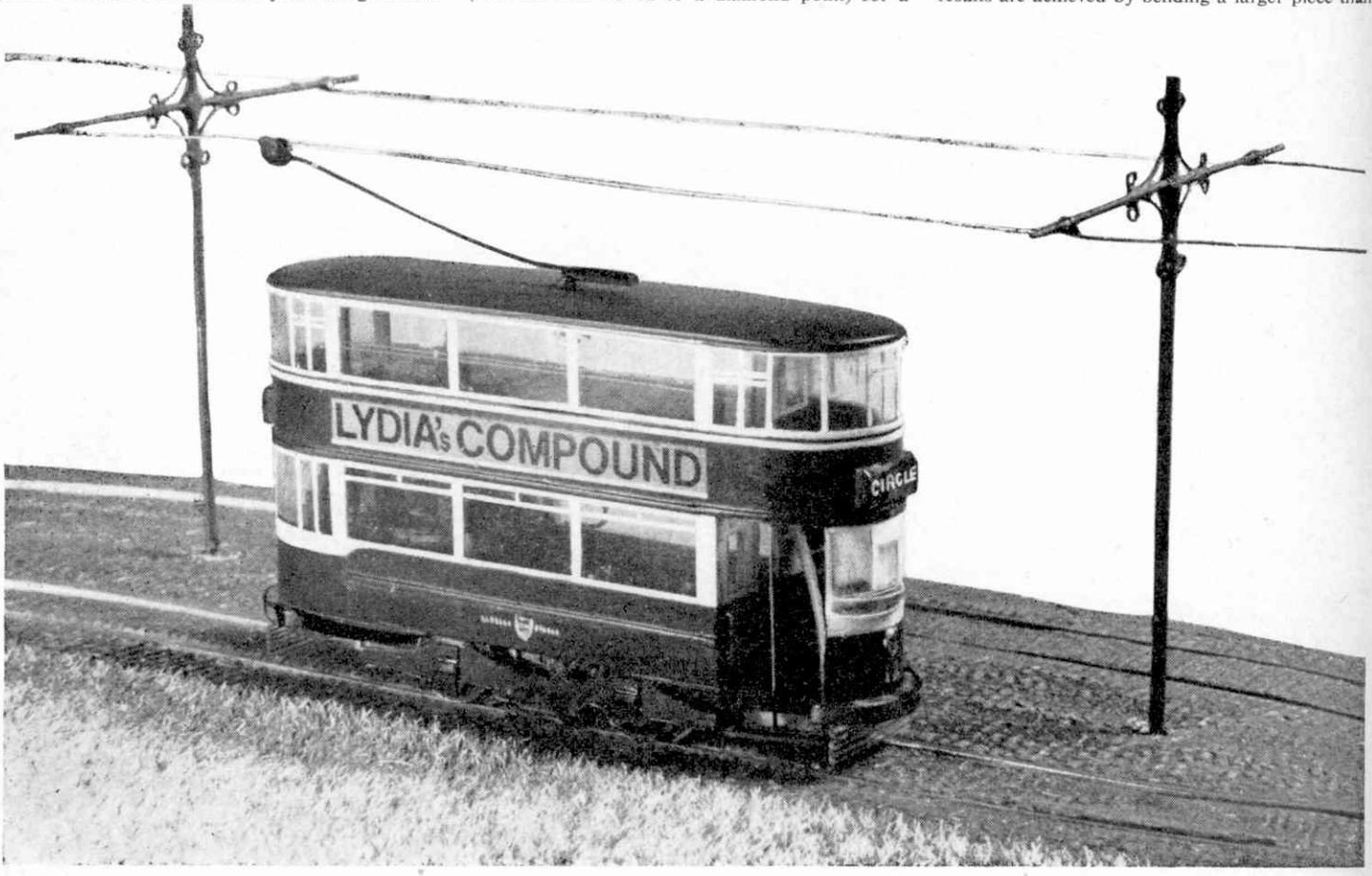
Now, if all that seems like an awful lot of trouble, I would like to tell you about the forthcoming Lima motor bogie which looks like being the answer to the 2 mm. tram constructor's prayer. It is narrow enough to fit within the body without alteration and is, of course, a four-wheel unit. Only trouble is that it will obscure a lot of windows, but for the non-mechanically handed it will provide an easy solution. First examples should soon be seen on the Lima British outline locomotive prototypes.

I decided to have a go at a proper trolley pole pick-up rather than a pantograph. Somehow, a British double-decker doesn't look quite right with a pantograph, although I know, of course, that some *were* used here and there.

A reliable overhead pick-up of this kind is always a problem in small scales but previous experience has shown a carbon block to be the best solution. In 2 mm. scale it would be necessary to make the whole head of carbon and by experiment, I eventually evolved the method shown. Using a Triang-Hornby replacement motor brush, the carbon end was carefully drilled, using a short length of 32 gauge spring steel wire (with the end stoned to a diamond point) for a **'drill'.** This wire is sold in model aircraft shops for control line model flying and comes in 100 ft. coils! You could of course use a proper twist drill, but they are very expensive in these tiny sizes and I found the wire quite successful. Having drilled the block, it was then rough-shaped while still on its brass arm, using No. 400 wet and dry abrasive paper, and various Swiss files. The block is easily separated from the brass before final shaping which can be done after fixing it to the trolley pole. This too is made from 32 gauge steel wire and it is secured in place with a tiny drop of epoxy adhesive such as Araldite or Britfix 88, allowing this to dry out for several hours by gentle heat. The wire is a push-fit and it is only necessary to apply adhesive where in enters and emerges from the carbon head. Don't try to put the adhesive *in* the hole or you may destroy the electrical continuity. The lower end of the trolley pole is soldered to a piece of 18 s.w.g. copper wire shaped as shown in Fig. 3 to represent the trolley counterweight. This in turn is a free fit in the short 18 gauge brass tube which is epoxy glued in the roof. Photo 8 shows the trolley head being drilled and Photo 9 shows the finished head. Notice also the overhead wire which is 33 gauge copper, looped over the supporting cables or arms and soldered.

The body of the tram is, as already mentioned, made from $\frac{1}{16}$ in. Perspex or Plexiglass. This is a rigid acrylic sheet and is fairly brittle. It may be bought by the square foot (about 7s. 6d.) and should be cut with a piercing saw. Leave the backing paper attached until the sawing is complete to avoid scratching the surface.

The body consists of five main units—two sides, two ends and a roof. The ends are shaped by heating the Perspex before a fire and, when soft, bending it over a simple wooden half-round former. It will retain its shape when cool. Best results are achieved by bending a larger piece than



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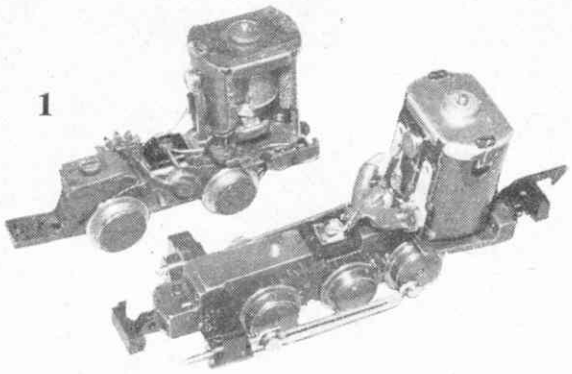

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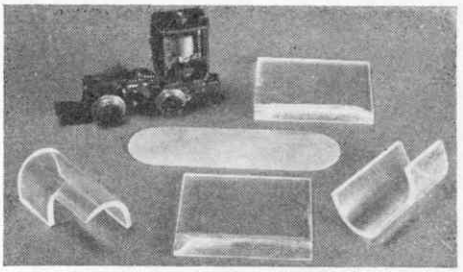

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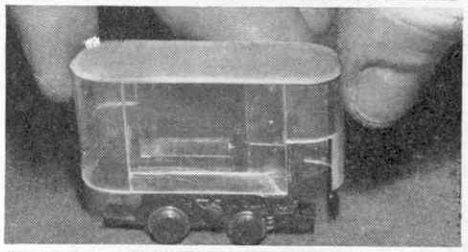

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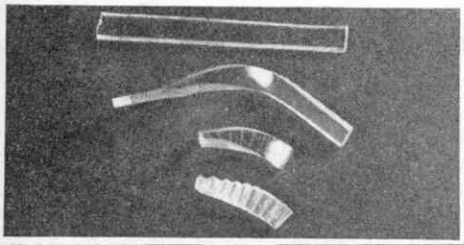

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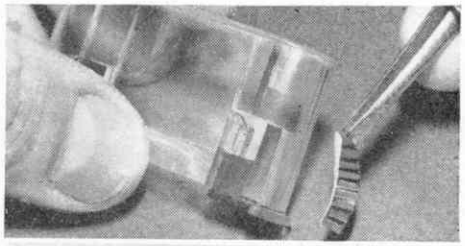

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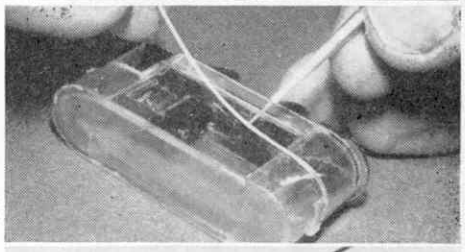

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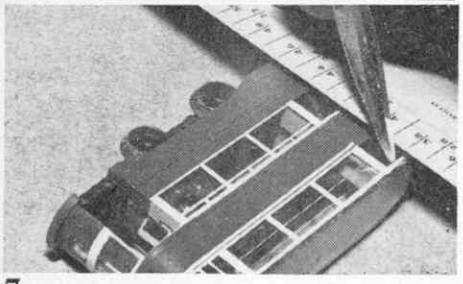

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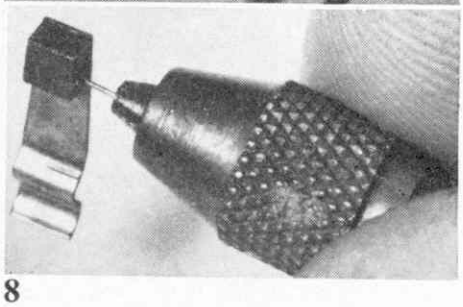

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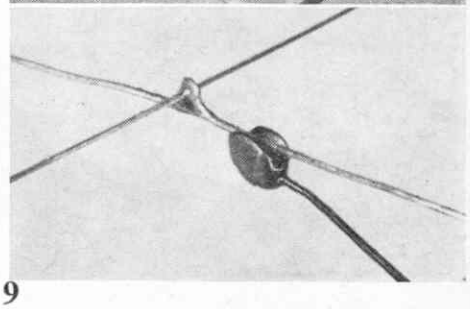


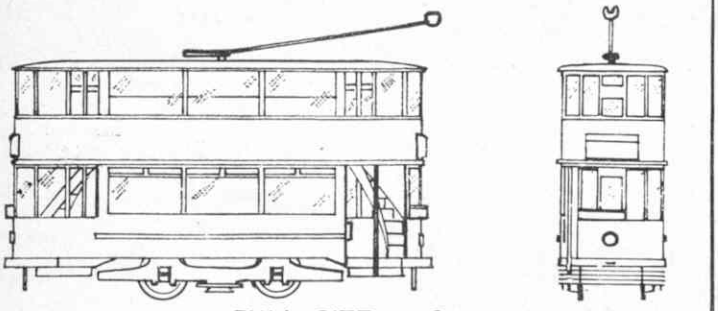


Fig. 1

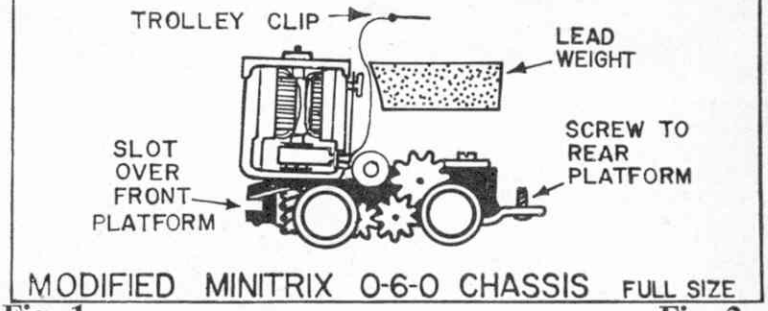


Fig. 2

Left: compare the photograph with the drawing above, and you will see that the picture is almost twice full size!

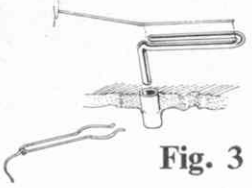


Fig. 3

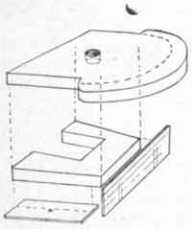


Fig. 4

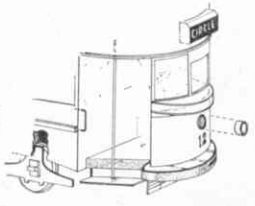


Fig. 5

required, and cutting down to size afterwards. The entrance doorway should also be cut out *after* bending, and the vertical edge of the entrance should be scraped and filed on its inner face until a knife-edge is achieved. Restore the polish with No. 400 wet or dry paper followed by Brasso metal polish. Photo 2 shows the body parts ready for assembly and you will notice the lower edges of the two side panels have been scraped to about $\frac{1}{32}$ in. thick in order to allow the thin plastic (acetate sheet) truck frames to be cemented to the inside faces.

Assemble the body with Sellotape strips and try it for fit over the chassis (Photo 3). If all is well, the parts can now be joined using special Perspex cement, or Johnson's cine film cement. Balsa cement and plastic cement are *not* suitable for this purpose. Hold the bits together with Sellotape until set—leave them for several hours to harden thoroughly before proceeding.

The staircases are also made from $\frac{1}{16}$ in. Perspex, sawn into thin strips, heated and twisted to shape. The step positions are scribed on, and the steps then filed to shape with a square Swiss file. Photo 4 shows the stages of production.

More Perspex is used to fashion the inside compartment ends which are painted before fitting. End platforms are then cut and cemented beneath the body and the stairs—painted and edged with a stiff paper side panel—are fixed in place. Tweezers will be useful here (Photo 5). Perspex is also used to form the destination boxes and then the body beading and rubbing strips are cut from thin acetate sheet and fixed to the body using film cement applied with a No. 00 brush (Photo 6).

The painting can now be carried out and the windows are outlined using a draughtsman's ruling pen and ruler (Photo 7). My tram is dark blue with cream trim and dark grey roof.

Additional detail is added as follows: beneath the end platforms a further piece of $\frac{1}{16}$ in. shaped

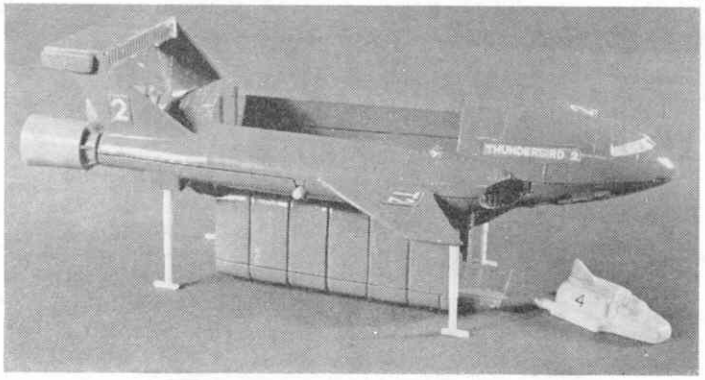
Continued on Page 25.

Thunderbirds are Go!

ALL the publicity surrounding the highly popular television puppet series 'Thunderbirds' tells us that 'Thunderbirds are go' and, as far as I'm concerned Thunderbirds definitely are go! What might be a 'silly children's programme' to some people is, to me, one of the best-produced and most skilful shows on television. Not only are the puppets themselves excellent models and animated by experts, but the equipment and the 'sets' in which they appear are amazingly detailed and real. All this, coupled with the skill of the photographers filming the various programmes, raises the series well above the ordinary run-of-the-mill T.V. show, from a technical point of view alone. Add to this the gripping suspense of the average Thunderbirds story, bearing in mind that it is aimed at youngsters, and you have a top-notch programme.

All well and good, but what, you may be wondering, has this to do with us here? The answer is simple. No matter what individuals think of Thunderbirds, Meccano Limited, as a company, have no doubt that Thunderbirds are go. Already they have produced a Dinky Toy model of Fab 1—the futuristic vehicle owned by Lady Penelope and driven by Parker—of the T.V. series. Now they have come up with another two International Rescue specials—Thunderbirds 2 and 4.

Followers of the series will know that International Rescue, around which the show is written, is an organisation dedicated, as the name suggests, to almost impossible rescues, not only on land, but also under water, as well as in outer space. To help them carry out their tasks, the heroes are equipped with a variety of specialised machinery, mostly rocket-powered, which enables them to do just about any-



The two large pictures show the 'real' Thunderbird 4 diving on an underwater mission, and Thunderbird 2 (the subject of the Dinky model) hovering before extending its landing legs. Both photos are copyright AP Films Ltd. 1966.

By Chris Jelley

thing. The only problem is how to transport the required machinery to the scene of a rescue when needed, and the originators of the programme have hit on the perfect answer—Thunderbird 2!

In effect, Thunderbird 2 is little more than a giant motorised chassis like a space ship with an enormous hole punched in the middle. This 'hole' is designed to accommodate a huge, removable pod or container in which all the necessary equipment is carried. When you think about it, the idea is ingenious. International Rescue can have any number of containers, each ready-loaded with all the equipment necessary for a particular job. It is then only a matter of moments for Thunderbird 2 to pick up everything required in an emergency, thus saving hours of valuable time.

Dinky Toys Thunderbird 2, marketed under Sales No. 101, is made under licence for Century 21 Toys Ltd., who hold the rights on 'Thunderbirds', and it certainly captures all the 'action' of the original. Manufactured almost entirely from die-cast metal for strength, it is of course, an exact reproduction externally on the prototype, from the 'flattened-cigar' shaped body to the raised platform tailplane, and incorporating the stubby, swept-forward wings. Protruding aft beneath the tailplane are the rocket exhausts, in red plastic with silver inserts, which strike the eye and give an appearance of power to the whole model.

Casting detail is very good, showing body panels, rivets, windscreen, flaps, etc., but of far more interest is the 'pod'. Yes! Like the original, the Dinky is fitted with a removable container complete with a drop-down door and carrying, believe it or not, a tiny plastic replica of Thunderbird 4! In the T.V. show, you may remember, Thunderbird 4 is used for underwater work and, as such, is comparatively small and compact. The Dinky Toy version, of course, must be small to fit into the container, but before anybody starts complaining, I should explain that it really comes as a bonus, Thunderbird 2 being the star of the piece, so don't go talking about 'fiddles' or anything like that. The pod, itself, incorporates two free-running rollers, allowing it to be moved into position and also serving as an undercarriage for the complete model when the pod is in place in the aircraft.

Now we come to what I feel is the most intriguing feature of the whole toy—the 'legs'. Before describing them, however, we should take another quick look at the T.V. programme to recap the usual operational methods of Thunderbird 2 when arriving at the scene of a rescue. After finding a suitable landing site, you will remember, the ship hovers over it for a few moments, then slowly lands vertically. As soon as it settles, the pod is released, and four telescopic legs raise the main ship until the container door is clear and can open. Thunderbird 2 then takes off, leaving the container behind, except on some occasions when it remains in the raised position.

The important items here are the legs and I am pleased to say that the Dinky Toy, also, is equipped with four retractable legs. Considering the small size of the model, of course, these could not be made telescopic, but they fold into the body, and are spring-loaded, so that a touch on two little buttons, one at each side, sends them shooting down into position. Consequently, it is possible to reproduce almost the exact operations followed by the original and even if the absolutely identical sequences cannot be followed, you can still have loads of fun.

Overall, the model is $5\frac{5}{8}$ in. long by $1\frac{1}{4}$ in. wide by $2\frac{1}{4}$ in. high on its legs and a height of $1\frac{1}{2}$ in. with the legs retracted. The pod alone is $2\frac{1}{8}$ in. long by $1\frac{1}{4}$ in. wide by $1\frac{1}{4}$ in. high, while Thunderbird 4 inside is $1\frac{3}{16}$ in. long. Thunderbird 2 is finished, generally, in the correct green gloss with yellow legs and, as already mentioned, red rocket exhausts, whereas little Thunderbird 4 is yellow, also with red rocket exhausts. Various identification names and numbers in white lettering appear on the body, wings, and fins of Thunderbird 2 to add the final touch to an excellent Dinky Toy.

This, then, completes the model, but, as this is probably the last issue of Meccano Magazine to be published, I should like to say goodbye to all my readers and should like to thank all of you who have written to me over the past few years. Don't forget, however, that Meccano Limited is still very much in existence, and that new Dinky Toys will continue to appear every month. Watch television and the Press for details.

BOVINGTON MUSEUM

This is the second part of H.L.D's feature on the Royal Armoured Corps Tank Museum. Part one appeared last month.

French representation is in the form of four tanks, including the 1917 Renault FT and the 1939 Char B I-Bis, which was armed with a hull mounted 75 mm. and turret mounted 47 mm. gun. This was the heaviest armed and armoured vehicle in use with any of the combatants in 1940. A mixed collection follows with a Second World War tank from Sweden, and Japan. Two Italian tanks are there, one is the successful M 13/40 medium, which saw much service in the desert. The Russian collection includes the T 34; this is a late model armed with an 85 mm. gun in a redesigned turret. Beside it is a recent trophy of the Armoured Corps, an SU-100. This Russian-built 100 mm. assault gun was captured from the Egyptians during the Suez campaign in 1956, and is still painted in Egyptian colours. The KV I heavy, and a light S.P. 76 mm. anti-tank gun make up the other Russian exhibits.

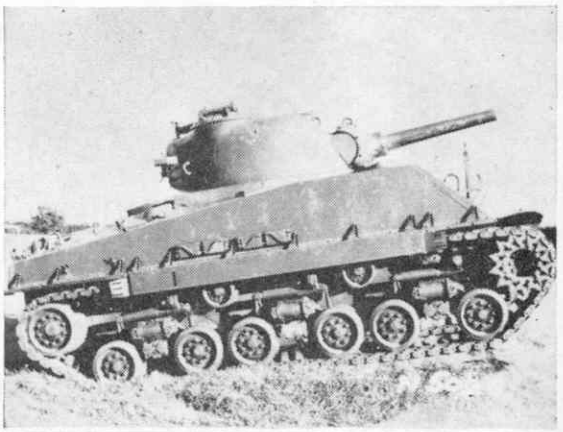
The 'Sherman' was the main battle tank of all the Western Allies and there are two standard tanks exhibited One is the British Mark VC conversion armed with the potent 17-pounder gun. The American heavy 'Pershing', with its 90 mm. gun, was specially designed to overcome the superiority of the German 'Panthers' and 'Tigers'. As it appeared in 1945 it saw little service. The 'Centurion Mark I' was too late to see any wartime action, but it served as the basis for the 'Centurion' series of tanks still in service. The 'Conqueror' was not a success, due to its heavy weight and unwieldy size, but it did see service from 1952 in the British army.

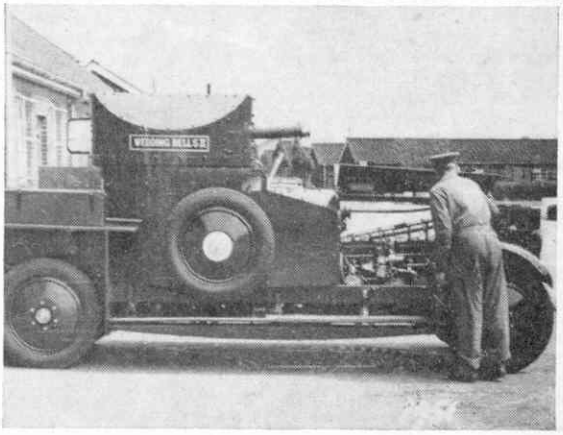
Armoured cars can be a study on their own, and anyone interested will not be disappointed by the display. Commencing with the large solid tyred 'Peerless' of 1917, there are twenty exhibits covering all periods up to the modern 'Hornet' guided weapons carrier, armed with two 'Malkara' anti-tank missiles. The famous Daimler armoured car of 1940—as modelled by Dinky—is an important exhibit. The 75 mm. S.P. gun on the German eight wheeled chassis attracts much attention. The last numbered exhibit is our old friend the German three-quarter-track Sd Kfz 251.

This is not all the Museum has to offer, as there are numerous showcases filled with interesting equipment, uniforms and photographs. There are separate sections for armaments, wireless and instrumentation. One corner is filled with a display of tank engines.

Outside the building there are a further 19 tanks. Many of them are British and American experimentals. Five are special purpose engineers' 'Churchill' including a Flail mine clearer and a Bridgelayer. Two are German 'Jagdpanzers' ('Hunter' tanks). The small one is a 75 mm. gun in the chassis of a Czechoslovakian light tank, this was called the 'Hetzer' ('Baiter'). The other is the large 'Jagdpanther' with a long barrelled 88 mm. gun in the chassis of a 'Panther' tank. Three First World War tanks stand in front of the main entrance, and are the first and last to be seen by the visitor. But before leaving the area, one should cross the road to see the German long barrelled anti-tank gun '88 mm. PAK 41/43' in the grounds of the Junior Leaders' Quarters. At the playing fields on the road to Wool Village, there is a 'Churchill' and a 'Sherman'. The 'Sherman' is of particular note as it is a Mark IBY armed with a 105 mm. Howitzer and fitted with the later type of tracks and suspension.

Grateful thanks are tendered to the Curator for his help, on successive visits to the Museum, which has made this article possible. WARPICS, of 11 Lloyd Road, Birmingham 20, must also be acknowledged for their assistance in providing all of the photographs used to illustrate the feature.





The top picture gives a good side view of the Sherman Mk. IBY which is on display at the playing fields near the Museum. This interesting tank has horizontal volute suspension, very wide track, and is armed with a 105 mm. Howitzer. Below it is the Sherman Mk. VC, which was converted by the British in 1944 to mount the 17 pounder gun. This picture gives a very good idea of the massive armour plate carried by such vehicles. Next photograph shows a Centurion Mk. IX practising on the R.A.C. training grounds to the North of the Museum. It is just about to cross the public roadway. The last picture shows a Rolls-Royce armoured car, used for instruction purposes by the R.A.C.

Important Announcement

Dear Reader,

When it was first announced that the July Meccano Magazine would be the last, many readers wrote expressing their regret that action of this kind had been necessary. Meccano Limited wish to acknowledge these views, but feel they should point out, in view of the opinions held by a few readers, that both the Meccano Construction System and the Dinky Toy range of models will continue to be manufactured, irrespective of the future of Meccano Magazine.

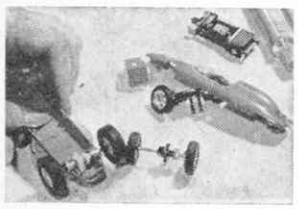
Although this is indeed the last Meccano Magazine to be published by the present publishers, we feel sure that existing readers will be pleased to hear that investigations are being made into the possibility of continuing the Meccano Magazine. It is hoped to recommence publication of the Meccano Magazine later this year, possibly in a different form, and if you would be interested in receiving the new Meccano Magazine, please complete and post the enclosed card, which is addressed and prepaid. We will then undertake to notify you if and when publication recommences.

Yours sincerely,
MECCANO LIMITED
H. J. Fallmann
Managing Director

Building a G.P. Lotus 24

by Godfrey Arnold

ALTHOUGH there are many excellent model racing car kits available, they rarely give the same satisfaction as building one's own car, especially if it is fast, handles well and looks good. The model described in this article can be made using only a balsa knife, although other tools are useful, and will provide performance which belies the low cost of just over a pound.



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In this case, performance is provided by a Race Tuned Scalextric motor and roadholding by using an Airfix body and front suspension, the parts needed being: one Airfix Lotus G.P. body with the appropriate front axle assembly, Airfix pick-up braids, a Scalextric Race Tuned motor (not the Mabuchi type) and a Scalextric Lotus rear axle assembly.

Start by removing the Airfix motor retaining ribs from the lower body pan and remove the rearmost seat locating rib, leaving the front one to provide location for the motor. Cut or file out the original V-shaped axle retaining indentations until the Scalextric rear axle bushes fit snugly and squarely in position, making sure that the centre of the axle is in line with the body joint. Mix some epoxy resin, such as Britfix 88, and fix the axle in position, making sure that the groove in the contrate gear is central and that no resin is on the axle itself, then leave this to set for at least 24 hours.

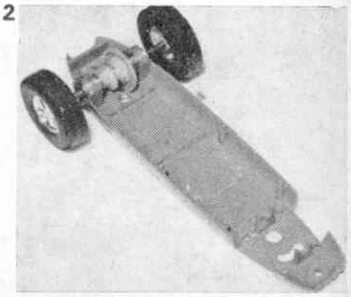
Once this epoxy resin is hard ensure that the motor rests exactly in line with the body joint, cut a hole in the bottom to clear the armature and then cut small pieces of balsa wood to fit around the motor at the front and rear to locate it. Make sure at this stage that the brush spring does not foul the body, and then fit the motor in position, making sure that the gears mesh correctly, that no part of the body fouls any moving parts and that the leads are in place. Six small holes can now be made in the body floor with hot pins or a drill, and the motor 'tied' in position with 15 amp fuse wire.

The Airfix braids can now be fitted as they are on the standard car, except that they are cut off shorter internally, and the ends of the motor leads are pushed into them and retained by the clips that keep the braids in position. Now make sure that the motor turns freely in the direction required (this can be checked by holding the partially finished car on your track and applying power) and change over the leads if necessary.

All that now remains to be done is to cut away the rear of the top of the body, ensuring that the contrate gear does not foul the bodywork, then the front suspension and body can be fitted so that the car is ready for track testing.

A driver should, of course, be fitted and this is easily done by cutting off the Airfix driver at the shoulders and sticking it to the rear cockpit bulkhead. The car illustrated was painted with Humbrol Midnight Blue, given numbers and a Lotus badge from a sheet of MRRC transfers, and the front suspension and the wheels painted silver for added realism. The rear tyres were rubbed down to give better grip and a more authentic size by mounting them on an old Scalextric wheel and spinning them with an electric drill and holding coarse emery cloth against them.

On the track this car is fast and is very easy to drive, its predictable roadholding making it capable of seeing off much more expensive opposition and, provided care is taken in assembly, it will be very reliable.



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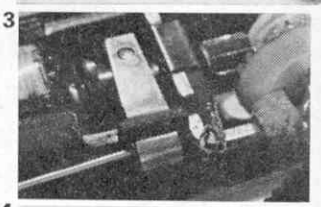

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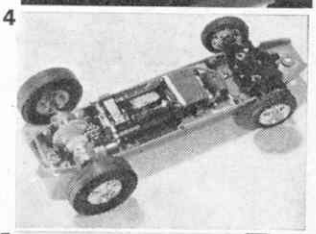

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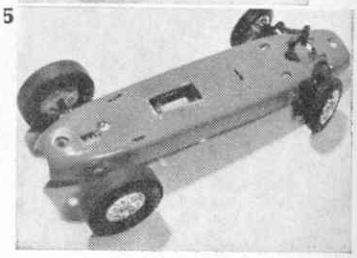


5

1. All the parts of the Lotus before assembly
2. The Scalextric Lotus rear axle assembly
3. Make sure that the brush spring does not foul the body
4. View of the completely assembled chassis
5. The underpan, from below

AT THE TURN OF A WHEEL WITH KEN WOOTTON

AS you probably all know by now, with this July issue, the Meccano Magazine, known affectionately by us all as the 'M.M.', ceases to exist.

Before I go on to this last article proper, I'd like to place on record my own feelings about M.M.'s demise. It's over two months since I first heard of the tragedy—you may say old Ken's overdoing the tearful dramatics a bit—but personally, I do feel it's a great shame.

Though my own contribution began only recently, I've 'known' the magazine for years, and my father also read it avidly when he was a boy, so I suppose I was brought up on and nourished by Meccano and Hornby trains, etc.

Yes, it's all a pity, for I *firmly* believe that a magazine of this nature is *still* wanted in the '60's by the boys of Britain—young and old. It's a pity to see it vanish, overnight, so to speak, after 51 years.

Well, there it is, I've said my piece, and I won't bore you all further with my nostalgic thinking, but go on straight away with this month's models.

I'm ending the series with six pre-war and post-war Dinky Toys, from Meccano's catalogue — the number 36 series. Post-war because these particular models were re-issued *after,* World War II.

Before the war, the series were issued with drivers and passengers and also supplied with slightly different bodies, as the 24 series, which all had Bentley radiators (I was going to show you these later).

Then there were the 24's with Bentley rads but no badge, the two different chassis type 24's—oh, it's all very complicated, and I'll leave it for the present.

As I said at the outset, this series of articles was designed to encourage the *new* collector and, we hope, keep him collecting. This, I hope, we've achieved.

So, when you've digested the details below and know what to look for, go out and try to find some of these old Dinkys; like the Yankee saloons and British sports cars I described earlier, they now have a vintage charm of their own and, furthermore, are excellent castings.

All mine are mint and in their original factory finish, and only obtained, I might add, after many years of searching. I also began with repaints, some without headlamps or bumpers and a few with no wheels! Still, I had a lot of fun, and you can, too, making my own bumpers out of bits of plastic or sheet brass, etc. Repainting 'em can be fun, too, and you'll find your technique improves as you go along. It's truly surprising what a coat or two of paint will do to an otherwise old wreck!

Now to the models, they're all made to the three part construction plan, but not in the same manner as the 39 series American cars, etc., which had separate baseplates but not separate radiators.

All have the same chassis/base plate with different bodies, and rads which are clipped into the body fronts. Axles, unlike the present day ones, are the pinched end sort and these are threaded through the body-chassis sections when wheels are added, thus locking the parts together.

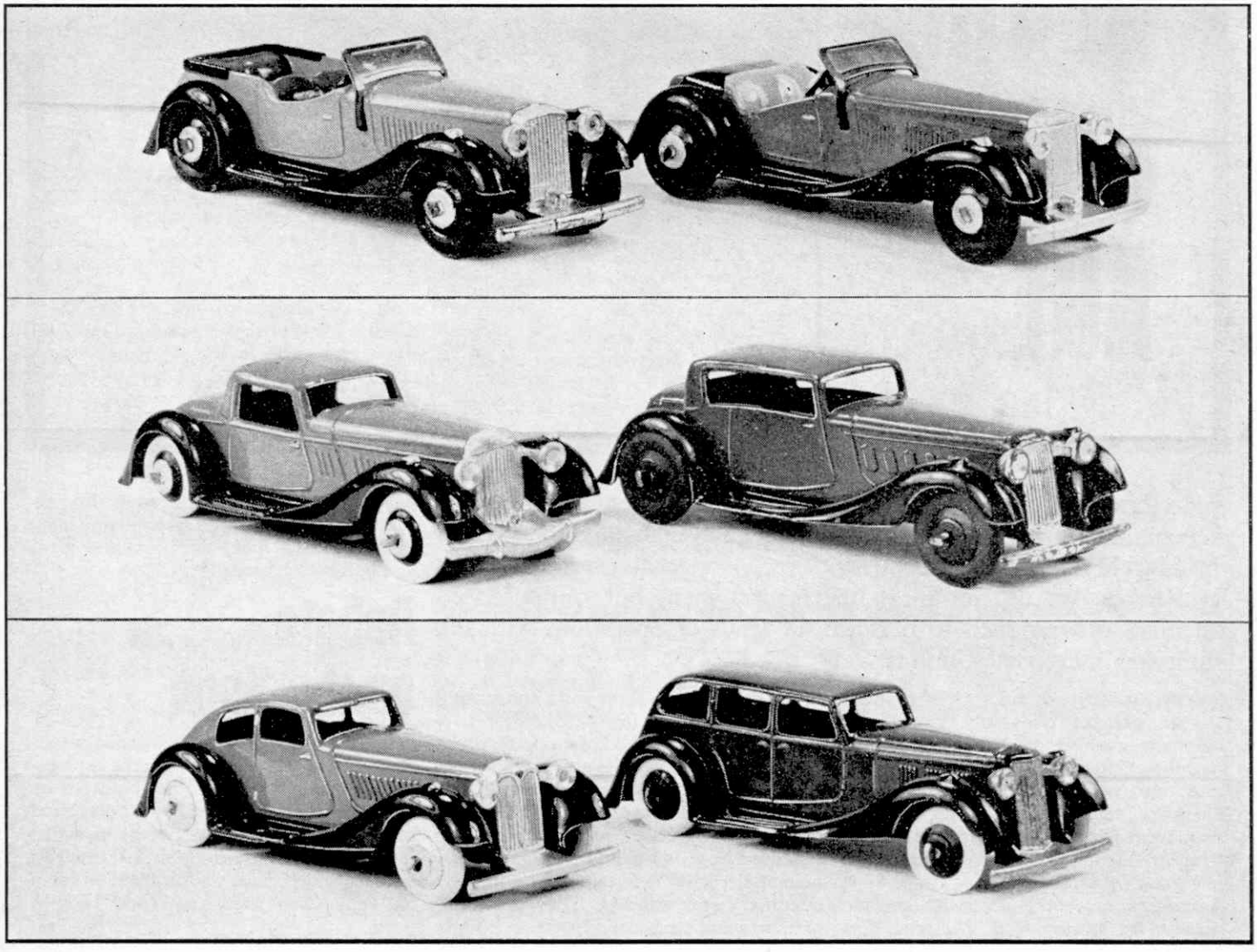
Mine are as follows: 36A Armstrong Siddeley saloon in maroon and black; 36B Bentley two-seater sports coupe in bright green and black; 36C Humber Vogue saloon, mid-brown and black (notice the engine cooling flaps on the bonnet sides); 36D Rover streamlined saloon in the same colours as the Bentley; 36E British Salmson two-seater sports in red and black with matt grey seats by me; 36F Salmson four-seater in light grey and black, again with upholstery by me—this time red.

Radiators are, according to the ads in the old Meccano Mags and catalogues, 'silver plated'. I'm not really sure what this means exactly (could it be nickel silver?) but when new, the cars looked very fine indeed. The radiators yellowed with age and could be scratched fairly easily. Except for this, they outshone our silver paint and even the plastic vacuum metalising — mistakenly called 'chrome'—which is maybe a later version of this Dinky plating, used incidentally on the much earlier Tootsietoys. Does Chris Jelley or anyone else at Meccano know exactly what this early plating is, or was?

Well, that's it. I hope you've all enjoyed 'Turning The Wheel' with me. I've certainly enjoyed writing it and hearing from you all.

I'm indebted to my very good friend Jack Wheeldon of Peco, who has stayed up nights turning out the excellent prints you've been looking at.

Until another time, good luck with your collection, and keep at it!



PHILIPS Young

The DAWN OF THE ROBOT AGE

Photo by permission of The American Embassy

IN A CENTURY or so, men will see the years we now live in as the beginning of perhaps the greatest change ever to affect mankind – the dawn of the Robot Age.

By Robots, we do not mean mechanical men, but computerised machines programmed to perform all kinds of operations with the minimum of external stimulus.

Quietly, almost unnoticed, such robots have become part of our daily lives – fully automatic washing machines, tea-making machines, automatic central heating systems, programmed teaching machines. There are even robots which can duplicate the movements of arms, wrists and fingers, doing production-line jobs with precision, power and delicacy.

Computers are robot 'brains', with fantastic capacity for storing facts, checking new information against those facts, and making calculations at lightning speed.

A robot is the brainchild of mechanical and electronic engineers, who are working in an excitingly creative way to produce machines which can outperform human beings on special tasks. Robots can do routine and repetitive work, without fatigue. They need neither sleep nor entertainment, and their attention never wanders. They can stand pressures and tensions, impacts and gases, which a man could not. They can also perform many functions faster and more precisely than men, and combine great strength with great delicacy.

Robots on the Moon

One of the many exciting ways in which Robots can help mankind is in the exploration of space. Robots are not bothered by long weightless journeys, nor do they need oxygen to breathe. They can be launched into space on the nose of a rocket, dropped onto a distant planet and ordered to carry out exploratory work and report back to Earth.

Engineer News

America's Surveyor 3 is such a Robot. The main illustration shows its construction. When it landed on the moon on April 19, 1967, it was ordered to start scratching, digging, knocking the surface, crushing soil, and scooping out a trench with its extendible arm. It photographed the results after each operation and televised the pictures back to Earth. By the beginning of May, more than 5,000 pictures had been received. The photograph above shows the trench which Surveyor 3 dug in the moon, not very exciting to look at, until you remember that a Robot did it, a quarter of a million miles away from *any* man.

Mastering Radio, Electronic and Mechanical Engineering

If ever there was a certainty in life, it's this. In tomorrow's world, electronic and mechanical engineering will play an ever-increasing role.

One of the best ways to enjoy studying these subjects is with Philips Young Engineer Kits, which set out to teach the basics of the technologies they deal with. Theory is put into practice through the construction of working models – of tractors, cars that stop when you whistle, radios, inter-coms, electronic organs and so on.

The electronic components used are real-life ones, exactly like those you find in robots. Transistors, diodes, resistors, electronic eyes – these are just a few of the components you learn to use.

Take a Diode for instance.

A Diode rectifies current

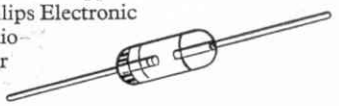
There are two kinds of electric current.

Direct Current (DC), where electrons flow from atom to atom in one direction, the sort of current you get from a torch battery.

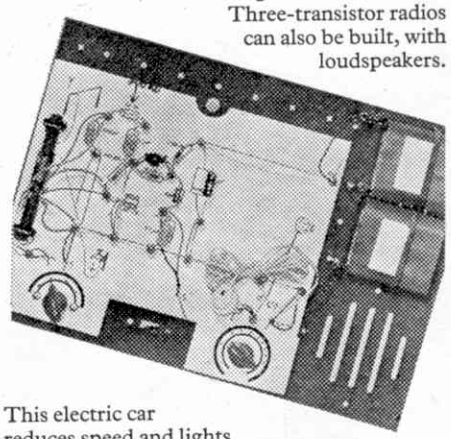
Alternating Current (AC), where electrons pulse backwards and forwards from atom to atom, each to-and-fro movement known as a 'cycle'. This is the sort of current used in the home for electric light or to 'drive' mains radios and TV sets. The normal mains current alternates at 50 cycles per second (50 c/s).

Sometimes, in a radio for instance, Alternating Current must be changed into Direct Current. This is where the Diode comes in. It lets current pass in one direction but not in the other. So if you try to pass Alternating Current through a Diode, the 'forward' pulses would be allowed through, but not the 'reverse' pulses. The current coming out of the Diode would be Direct Current, in a series of pulses. This is what electronic engineers call 'rectification'.

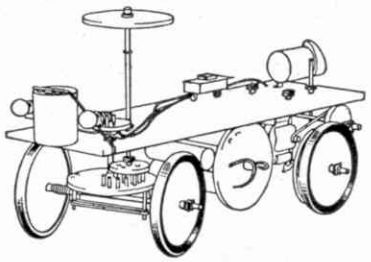
Typical Diode supplied with Philips Electronic and Radio Engineer Kits.



One-transistor radio built with Philips Electronic Engineer Kit. Two and Three-transistor radios can also be built, with loudspeakers.



This electric car reduces speed and lights headlamps automatically when moving into dark areas. Built with Philips Electronic and Mechanical Engineer Kits.

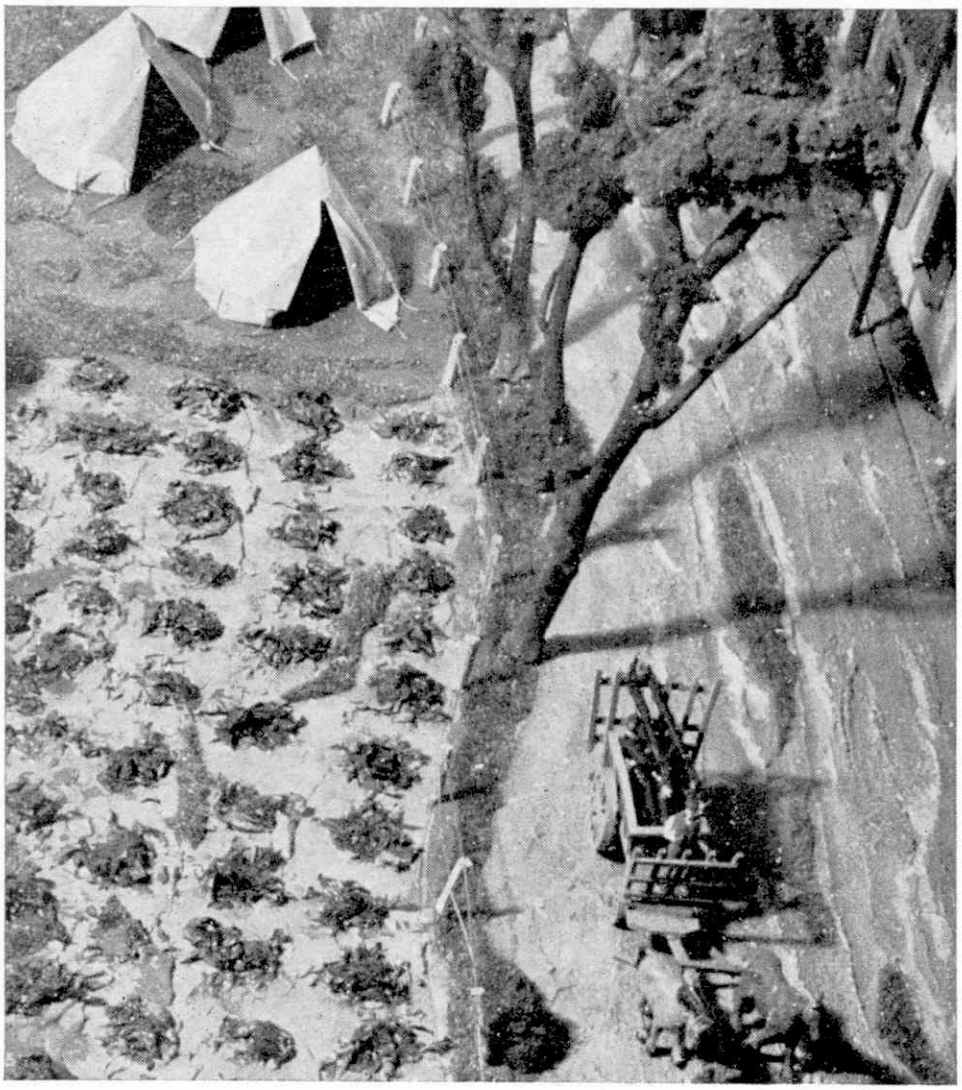


WATCH OUT FOR

FURTHER ARTICLES IN THIS SERIES ABOUT ELECTRO-MECHANICS

Home of the fighting scouts

Ken McDonough



In this, the fifth and final instalment of the series, Ken McDonough describes how you can add the final touches of realism to your model aerodrome. Trees, and vegetation generally, are often a problem to the scenic modeller, and if you've ever been faced with the problem of 'growing' a miniature cabbage patch, then read on and learn how!

THERE are, of course, a large number of track-side models to 00 scale (the approximate equivalent of 1/72nd scale) on the market. Many of the figures can be modified and repainted to represent R.F.C. personnel. Such items as bicycles, oil drums and straw bales will find a ready use in your layout. Model trees, however, are very difficult to reproduce commercially and, almost without exception, they are unrealistic. It is much better to make your own, using natural twigs and pieces of sponge. However, before describing a method of making trees, we are going to show you how to construct a couple of accessories which are not available in any commercial range.

Bell tents were much more widely employed in the first war than in the second. They formed an essential part of the equipment of every military unit. The tent itself is cut out of cartridge paper, using the full-size pattern shown in figure 1a. Bend along all dotted lines and glue tab A to edge A. Now, referring to figure 1b, which is a view of the underside of the tent, glue short lengths of thread to represent the guy ropes at each fold of the paper as shown. The braiding is a small strip of fabric which hangs vertically down from the base of the tent and is glued round the tent over the upper ends of the guy ropes. The tent pole, a short piece of $\frac{1}{8}$ in. dowling, is now glued to the apex of the tent from the inside. The lower end of the pole is pointed so that the tent can be inserted in a hole in the baseboard.

Figure 1c shows the completed tent. Note how the entrance flaps are folded back and glued. The small ventilators are made from balsa scrap. The

free ends of the guy ropes should be glued to the baseboard after the tent pole has been inserted in its appropriate hole. Four bell tents were constructed for our layout, but you can make as many as you like, depending on the size of your aerodrome. Paint your tents a khaki colour and try to introduce some evidence of wear and tear by stippling on some patches of a darker tone here and there.

Figure 2a illustrates a typical telephone pole. Note that, contrary to British practice, there are no crossbars. This type of pole is still seen in rural districts of France and, of course, telephonic communication was not so widespread fifty years ago as it is today. The pole is drawn full-size and made from a length of bamboo or hardwood strip. The insulator brackets are bent from 20 s.w.g. wire or pins, bound and glued to the pole, and the insulators themselves are blobs of cement painted white. Colour the pole dark brown. Telephone wires can be simulated by using 5 amp. fuse wire. The ends of the telegraph poles (three were used in our layout) are painted and inserted in holes in the baseboard. Reference to the photographs will indicate their positions.

Two-inch lengths of $\frac{1}{8}$ in. by $\frac{1}{32}$ in. balsa could represent planks of wood placed over muddy ground. In our layout, imitation grass on a paper backing was employed extensively, except on the baseboards of the houses and road. The grass paper is available in large sheets, and sold at shops dealing with model railway equipment. On the area in front of the hangar, the paper was cut up into irregular shapes and each piece attached separately with P.V.A. adhesive so that patches of bare earth were represented.

Figure 3 depicts our method of making trees. 3a shows a typical sprig. It is a good plan to gather a number of these and select the ones which are most realistic. Plastic or natural sponge is used for the foliage and each piece should be cut into an irregular shape with nail scissors, as illustrated in figure 3b. The pieces of foliage are of various sizes and attached to the sprig with Evo-Stik. Wrap the sponge round the sprig and tie with cotton. The sponge can be either painted after assembly or dipped in a solution of dull green water colour. If the sponge is pre-coloured, allow some time to dry before gluing into place.

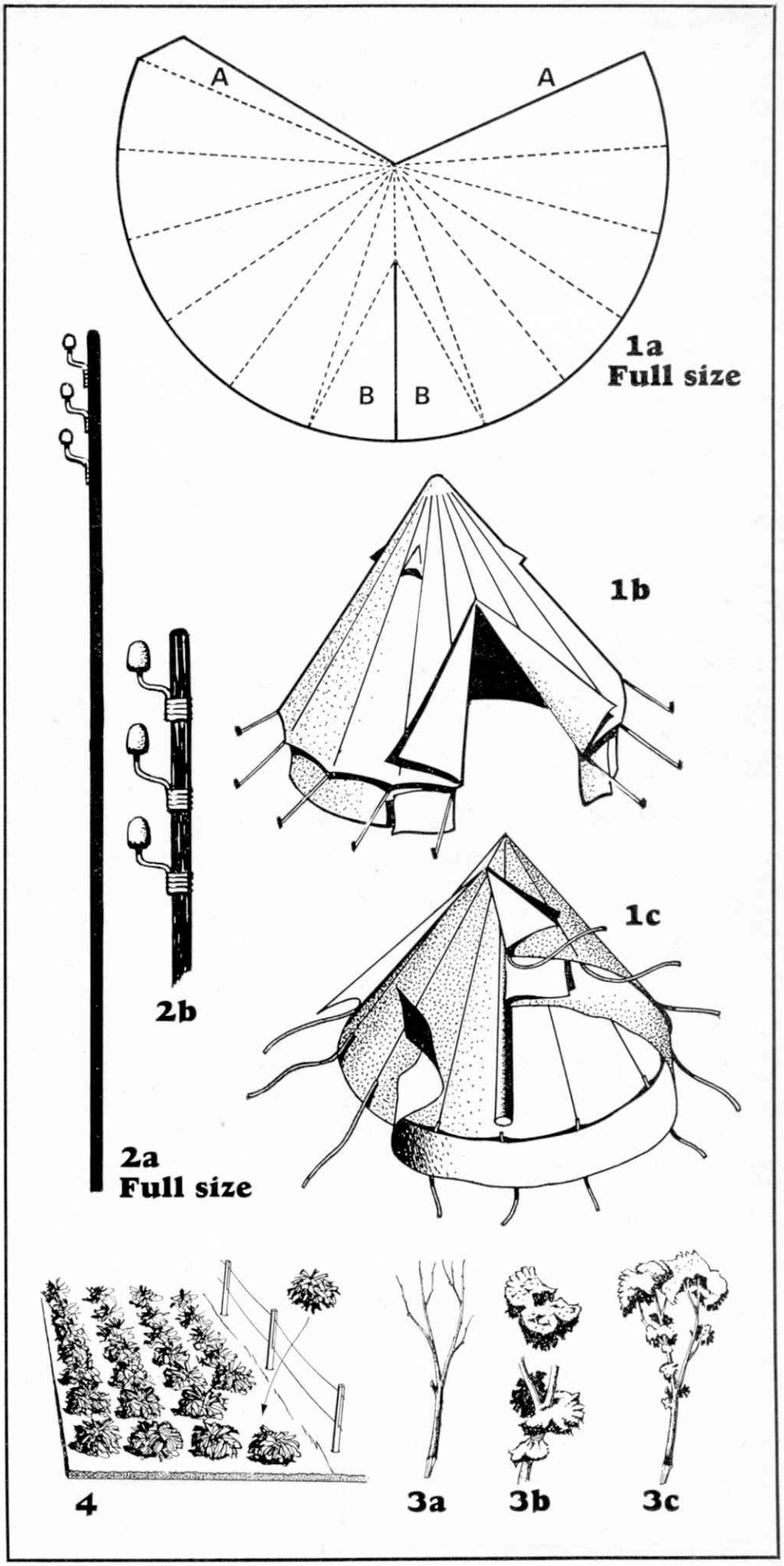
Cultivated fields can be represented in a number of ways. One method, widely employed in architectural models, is to use the bristles of small brushes to give the effect of a wheat or barley field. Bristles can represent tall grass or coarse vegetation, and green tissue paper also has its effective uses.

Many R.F.C. squadrons used to cultivate their own kitchen gardens. The famous pilots, Albert Ball and Charles Nungesser, were both keen gardeners, and found recreation by this means after the strain of war flying. Cabbage or kale is easily made from green tissue paper. First slice the tissue into strips about $\frac{1}{16}$ in. wide. Several strips are then screwed up together and dipped in glue size. Plant the vegetation in regular rows as in figure 4. The fencing is made from matchsticks and thread. Each matchstick is split half-way down with a razor blade to allow the thread to be attached in a continuous length.

There are many other ways by which you can add interest to your model aerodrome. Wherever possible, refer to photographs taken on R.F.C. aerodromes and pick out all the items of equipment that can be reproduced in model form.

As suggested in our previous articles, colouring should be kept dull and not too dark in tone. The best types of colours to use are poster or emulsion paints. The following colours have proved to be the most useful: Vermilion, Yellow Ochre, Cobalt Blue, Oxide of Chrome, Burnt Umber, Burnt Sienna and, of course, White. Ordinary household white emulsion paint is most economical and mixes readily with poster colours. Clear varnish can be applied where necessary to achieve a gloss effect.

Oil colour hogs hair brushes are to be recommended for covering large areas and water colour brushes (Nos. 3 and 6) for the smaller details. A small piece of sponge and a strip of stout card are also useful tools for applying colour.



The Meccano Mag Computer

by Ron Warring

BY now you should have become quite familiar with the working of your computer and working out problems in binary numbers. You can go on extending the range of your computer simply by adding additional stages. Ten stages, for example, will give you a total count of just over 1,000 (actually 1,023); eleven stages will give a total count of 2,047; twelve stages a total count of 4,095; thirteen stages a total count of 8,191; fourteen stages a total count of 16,381; and so on.

This is the most logical way of extending the capability of your computer—simply build more stages as described in the first article and add them on. To help you with number 'translation' or programming the computer we give a further table of binary number equivalents for the computer extended to seven stages.

To speed feeding in digits to your computer you can use an ordinary telephone dial as an input device. This is simply connected to the input tag on stage 1 and the +6 volts line, when manipulation of the dial feeds in the appropriate number of pulses according to the number dialled. In other words, with a dial input there is no need to translate the original number into a binary number first—the dial does this automatically (or rather feeds in pulses, one for each digit involved, which is the same thing as far as the computer is concerned). The answer to an addition (or subtraction) sum performed by dialling in the numbers involved will still, of course, be displayed as a binary number on the computer itself.

Telephone dials are readily obtainable from most radio suppliers and should not cost more than a few shillings. A dial input can be connected directly to stage 1 and does not need the pulse shaper (described below).

There is one point to watch, however. Most dial movements transmit one more pulse than the number actually dialled. This is because movement of the dial between '1' and the finger stop transmits an extra pulse before the '1' position reaches the finger stop. You can check this by examining the movement of the dial from the back. To modify to give a true number of pulses the simplest solution is to alter the position of the finger stop, or fit a new stop, which arrests movement of the dial at a point before the 'make' position for the intermediate digit. This will also speed up the working of the dial as far as feeding true numbers into the computer is concerned.

You can also adapt your computer to accept other than manual input signals. Actually, the effective counting speed of the circuit is considerably better than one pulse per second—or faster than you are ever likely to achieve with manual signalling, however proficient you become at setting up numbers. Thus the computer can also accept pulsed signals of other types, provided the frequency is not too high—say not more than about two pulses per second.

If these pulses are approximately square in shape, or clearly defined, and do not exceed an amplitude of more than 6 volts, positive pulses can be fed directly into stage 1 of the computer via the normally unused 'IN' and 'O' tags. The computer would then count the number of such pulses fed into the computer in a given time, opening up further realms of application.

Many pulsed signals you may wish to count with the computer may not have a suitable pulse shape, however. This difficulty can readily be overcome by inserting a pulse shaper immediately in front of the input to stage 1. The circuit is very simple and is shown in Fig. 1.

Basically, this pulse shaper circuit used a single transistor positively biased to cut off via a resistor connected to the +6 volts supply. Negative pulses applied across input 1 and 0 are then applied to the base of the transistor via another resistor, causing the transistor to conduct the pulse. On cessation of the pulse the transistor becomes non-conducting again, producing a square positive pulse as an output to the first stage.

It is well worth adding the pulse shaper to your computer as it is easy enough to construct and uses only a minimum of components. It is then there for use, should you wish.

Start by cutting out a Paxolin panel to the exact size shown in Fig. 2 and drilling holes for mounting tags in the positions shown. These tags are mounted on the underside to complete the panel (Fig. 3). The resistors and transistors are then soldered into the circuit as shown in Fig. 4.

Components required for this circuit are:

Paxolin panel: 2½ in. by 1 in.

Resistors: R1 15 kilohm.
R2 220 kilholm.

Incidentally, there is another method of working subtraction by *adding* the *complements* of the binary numbers concerned. The complement of a number is given by changing the '1's' to '0's' and the '0's' to '1's'.

Thus if the binary number is 10011
the complement is 01100

Adding the complement of the number is the same as *subtracting* that number.

Thus to subtract by complements on the computer, follow these stages:

(i) Set all SW2 switches to add.
(ii) Operate the reset switch to extinguish all lights.
(iii) Use a wire to connect the *output* tag from the *last* stage to the *input* terminal on the *first* stage. (This is to provide 'end carry-over', which is an essential feature for correct working of the computer.)
(iv) Operate the set switches on the various stages to set up a number (binary equivalent, of course!)
(v) Now operate the set switches to add the *complement* of the number to be subtracted.
(vi) Repeat as necessary to add the *complement* of any other numbers to be subtracted.
(vii) Finally read the answer as a binary number and translate into its ordinary number equivalent.

You will find that subtraction by complements in this manner is generally faster and easier than straightforward subtraction.

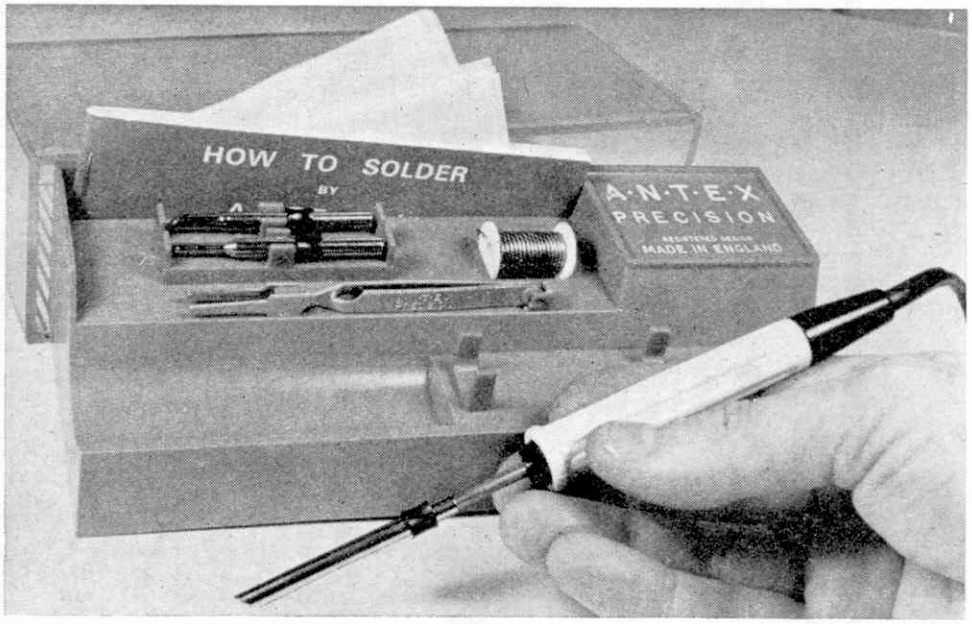
R3 2·2 kilohm — All ¼ watt tolerance 10%
R4 330 kilohm

Transistor: Mullard OC71 (or equivalent).

Seven terminal tags and rivets or eyelets to mount on panel.

Connection of this panel to the first stage of the computer is shown in Fig 5. This calls for an extension of the base and side pieces of the cabinet by 1⅛ in. The 'OUT' tag is bolted to 'IN' on stage 1; and the '0' tags similarly connected. Connecting in the pulse shaper is then completed by the wiring of the +6 V and −6 V tags to the respective wires on the side of the cabinet.

Negative pulse input is applied via Input 1 and 0. Positive pulse inputs can be applied directly via Input 2 and 0.



This new Antex soldering kit is ideal for the type of work involved in assembling the computer. Self-contained case and interchangeable soldering tips are only two of its many features.

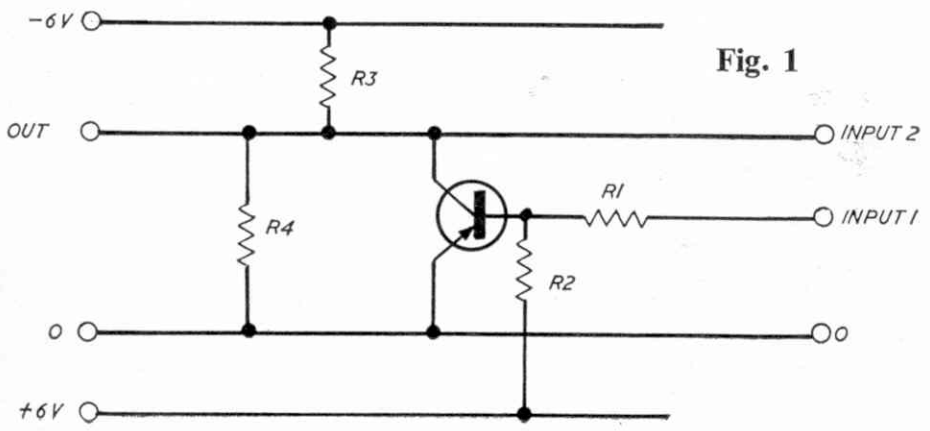


Fig. 1

BINARY NUMBERS EQUIVALENT TO 64-127
(SEVEN-STAGE COMPUTER)

Decimal No.	STAGE 7	6	5	4	3	2	1
64	1	0	0	0	0	0	0
65	1	0	0	0	0	0	1
66	1	0	0	0	0	1	0
67	1	0	0	0	0	1	1
68	1	0	0	0	1	0	0
69	1	0	0	0	1	0	1
70	1	0	0	0	1	1	0
71	1	0	0	0	1	1	1
72	1	0	0	1	0	0	0
73	1	0	0	1	0	0	1
74	1	0	0	1	0	1	0
75	1	0	0	1	0	1	1
76	1	0	0	1	1	0	0
77	1	0	0	1	1	0	1
78	1	0	0	1	1	1	0
79	1	0	0	1	1	1	1
80	1	0	1	0	0	0	0
81	1	0	1	0	0	0	1
82	1	0	1	0	0	1	0
83	1	0	1	0	0	1	1
84	1	0	1	0	1	0	0
85	1	0	1	0	1	0	1
86	1	0	1	0	1	1	0
87	1	0	1	0	1	1	1
88	1	0	1	1	0	0	0
89	1	0	1	1	0	0	1
90	1	0	1	1	0	1	0
91	1	0	1	1	0	1	1
92	1	0	1	1	1	0	0
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94	1	0	1	1	1	1	0
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97	1	1	0	0	0	0	1
98	1	1	0	0	0	1	0
99	1	1	0	0	0	1	1
100	1	1	0	0	1	0	0
101	1	1	0	0	1	0	1
102	1	1	0	0	1	1	0
103	1	1	0	0	1	1	1
104	1	1	0	1	0	0	0
105	1	1	0	1	0	0	1
106	1	1	0	1	0	1	0
107	1	1	0	1	0	1	1
108	1	1	0	1	1	0	0
109	1	1	0	1	1	0	1
110	1	1	0	1	1	1	0
111	1	1	0	1	1	1	1
112	1	1	1	0	0	0	0
113	1	1	1	0	0	0	1
114	1	1	1	0	0	1	0
115	1	1	1	0	0	1	1
116	1	1	1	0	1	0	0
117	1	1	1	0	1	0	1
118	1	1	1	0	1	1	0
119	1	1	1	0	1	1	1
120	1	1	1	1	0	0	0
121	1	1	1	1	0	0	1
122	1	1	1	1	0	1	0
123	1	1	1	1	0	1	1
124	1	1	1	1	1	0	0
125	1	1	1	1	1	0	1
126	1	1	1	1	1	1	0
127	1	1	1	1	1	1	1

Spitfire to Space Flight—from page 9

Ten months later I had my first opportunity to sample an autorotative (engine-off) landing in a helicopter—an S-51 in the capable hands of Westland test pilot Derek Colvin. It was less alarming than I expected and enabled me to provide a perfect answer to M.M. readers who had written to ask what happens to a helicopter if the engine stops in flight.

In October 1954, I accompanied Fairey test pilot David Masters on a demonstration of the Gannet anti-submarine aircraft at Ringway Airport. It was tremendous fun, even though I couldn't persuade the radar 'dustbin' to lower itself, which was my only job. I felt pretty dismal when I discovered that I'd been wrongly briefed, and that it would have worked if I had pushed the switch up instead of down; but morale rose when the evening newspapers described part of our display as a 'Dive of death over Ringway'. For me it had been a very enlivening rather than killing experience, but it must have looked hair-raising from ground level. David was quite a pilot!

Meeting and flying with a lot of wonderful pilots has, perhaps, been the most rewarding part of a job that has not given me a big total of flying hours in my log book, but has enabled me to fill its pages with scores of interesting and unusual aeroplanes, landing and taking off at quite a lot of interesting places.

To one pilot, whom I will call John, I owe my life; for his skill achieved a seeming miracle when the transport aeroplane in which we were flying got into a spin from only 1,300 feet—though I feel that it was, perhaps, the hand of God rather than even John's which pulled us out of that one.

It is strange to think that next time I go aerobatting in a light aircraft over the Lagoon in Venice, skimming the Solent in a Hovercraft, jetting in armchair luxury to the Holy Land, watching the crowds go past during a flight at the Farnborough Air Display, or simply travelling from A to B on an ordinary airline service, there will be no opportunity to tell you about it in M.M. Perhaps, on second thoughts, I'm getting out just in time. Gannets, Vampires and Gyrodynes were fine; but would I say 'Yes' so enthusiastically if someone invited me to join the first batch of journalists to go into orbit?

A Tram for Two—from page 13

Perspex locates the chassis ends and supports the step and life guard—both made from thin acetate and latter scribed to represent wooden slats as in (Fig. 4).

The grab pole is made from 32 gauge steel wire Araldited in place. The headlamp is cut from a piece of brass tube embedded in the Perspex end and then filled "to the brim" with Araldite which will dry out to represent glass.

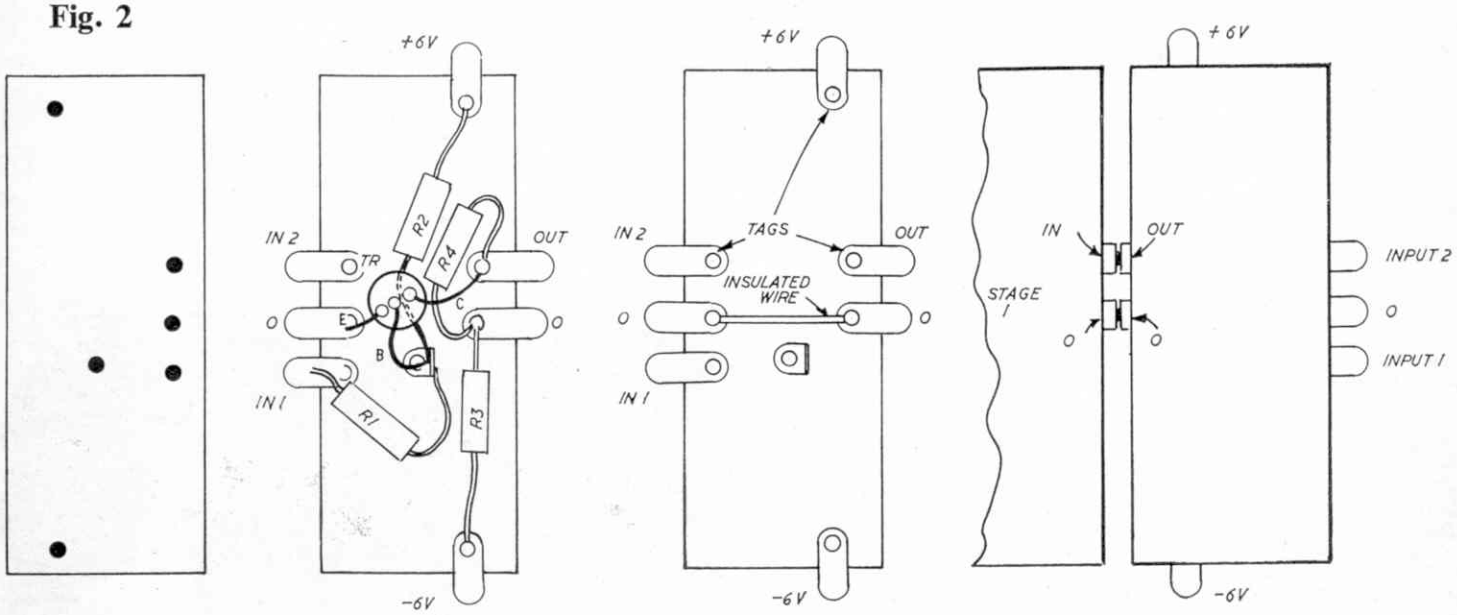
A bow projection ($\frac{1}{16}$ in. Perspex) is fitted to each end beneath the driver's windows and the little wire grab handle on the compartment end is fixed in place by pressing with the tip of a hot soldering iron. The hot wire will sink into the Perspex and be permanently secured. Fig. 5 shows these parts and also the method of attaching the truck sides to the inner faces of the body. The axle boxes are built up with pieces of thin acetate sheet.

If the overhead is considered as the 'common return' and the existing chassis 2 rail insulation is retained, then it is possible to run two trams quite independently on one track (two wheels being 'dead'). However, point and track laying is simplified and electrical reliability greatly improved if all four wheels are used for positive pick-up but, of course, only one tram may then be run on each track.

The proportions of our little tram are the same as those of the LCC Class 'M' car of 1910, but although the overall dimensions are exactly correct there are so many styling alterations and simplifications that the model is really representative of no full size prototype. The Class M, for instance, had open driving compartments and twin trolley poles. Perhaps we should call ours a Class M.M.!

Having proved that a realistic 2 mm. tram is a practical possibility the next job is to lay the track system, and that's going to be as much a challenge as the tram. The heading photo gives some idea of the effect that can be produced with patience, but realism is never achieved by rushing a job, and the task ahead will therefore be an extended one.

Fig. 2



A BACKWARD GLANCE

When Ellison Hawks first knew the M.M., it was merely a four-page bi-monthly and he little thought that, as Editor, he was destined to steer it through the exciting years of the 'twenties and early 'thirties. Norman Tudor, for many years, filled the role of 'Spanner'. In this article, they both cast a backward glance over the years.

THE Press announcement that the 'Meccano Magazine' was to cease publication with this July issue was sad news, not only to present-day readers but also to many fathers who were the Meccano boys of some 30 years ago. So the 'M.M.' follows into oblivion those other stalwarts—'Young England', 'The Captain', and more recently, the 'Boy's Own Paper'.

When I joined Meccano Ltd. in 1921, the 'M.M.' consisted of four pages, and was priced 1d. Issued bi-monthly until September 1922, after which date it was published on the 15th of every month, the price remained until December 1923. I had always been interested in boys' magazines and it seemed to me that this was an opportunity to develop something on the lines that I had been thinking about for many years. I determined that as soon as possible I would develop it but, as my appointment was as Advertising Manager for Meccano Ltd., and because of planning the advertising campaign for the following Christmas, my idea had to be postponed.

Gradually, as more time became available, I was able to introduce new features and, whilst we were asked to deal with new Meccano models, it seemed desirable to associate these with their prototypes in actual life. To comply with this request the publication of a special instruction leaflet, the Meccano motor chassis, provided an opportunity (September 1921). The next special model to be described was the Loom (November 1921) and the story of spinning and weaving was introduced. The idea ultimately became the basis of many of our informative articles—for instance, the Grandfather Clock (November 1923) with the story of Big Ben and the Greenwich Time Signals.

This projected programme was interrupted when Mr. Frank Hornby (our Governing Director) paid one of his visits to the United States where he had his first experience of receiving sound and speech broadcast by radio. Later, our design department produced a 'cat's whisker' receiving set on which broadcast was received from stations that were transmitting at that time. As a result the Meccano Crystal Receiver was introduced for which it was claimed that 'any boy could assemble it in one evening'. In London we listened to concerts from Marconi House and later from 2LO, and the set proved to be as efficient as more costly instruments. The enthusiasm for this radio development soon percolated to the pages of the 'M.M.' and it was suggested that in future considerable space should be devoted to a radio section.

Although the radio receiver demonstrated the possibilities of applying Meccano to this latest science, the idea did not remain so simple, for the crystal detector was further developed by the use of amplifying valves, including the Fleming amplifier and the de Forrest third electrode that led to the extraordinary developments of later years. The interesting fact remains that the Meccano crystal set, as announced in the 'M.M.' (September 1922), did give readers a foretaste of the wonders of today's T.V.

Incidentally, the development of this interest produced one of the first letters that, as Editor, I received over the years from many famous men. Sir Oliver Lodge, F.R.S., one of the early scientists working with Hertzin waves, expressed his interest in the Meccano receiver and congratulated us on being able to enjoy the practical experience of recent scientific discoveries. He wrote 'Perhaps some of your readers will be able to engage in work that will lead to even further improvements, the ultimate end of which no-one can foresee.'

There are very many nostalgic items that come to mind, but I have only a limited amount of space in this farewell article so that I must curtail my reminiscences and deal only with one or two of outstanding interest. At the pantomime 'Sleeping Beauty', staged at the Empire Theatre, Liverpool, in 1925, the stage was filled with gigantic Meccano models and real Meccano boys wearing the regular jersey. Marie Blanche was the charming principal boy and George Robey and 'Wee Georgie Wood' helped to make the show an enormous success.

Meantime, with the enlargement of the 'M.M.' and the increasing number of subjects with which we decided to deal, it became imperative that our staff should be increased and we were fortunate over the following years to engage many enthusiastic workers to whom, as Editor, I would pay tribute to the loyalty and support they gave me. (Incidentally, I have only recently heard that I was known to them as 'Uncle Ellison'!) It was pleasing to know that the experience they gained whilst working for the 'M.M.' stood them in good stead in their subsequent careers. During the later years they wrote telling me how useful their training had been and how it enabled them to obtain advancement on their way through life. Sad to say some of them are no longer with us. Gisbert Garrett joined the 'M.M.' and for some years he dealt with aeroplane matters. In 1940 he joined Hawker Aircraft Ltd., to become Technical Publications Manager and the Editor of the Hawker Siddeley Review. At the time of his death (January 15, 1959, aged 49 after a long and painful heart complaint) he was Chairman of the London Association of Industrial Editors and a member of the National Executive. Sir Roy Dobson recorded his tribute to Garrett as 'a loyal and stalwart servant who endeared himself to all of us. We shall miss him sadly'. I take this opportunity of endorsing Sir Roy's tribute.

Another member of the staff was Trevor J. Edwards who dealt with photographic matters and whose portrait appeared (January 1926) in one of his articles on trick photography showing him inside an 8 oz. medicine bottle. One day I

Meccano clubs, affiliated to the Meccano Guild, thrived in the years between the wars. The picture at far right shows the committee members of the Holy Trinity Meccano Club, Barnsbury, London, the first club to be affiliated to the Guild. Ellison Hawks is sitting third from the left

Ellison Hawks

asked Trevor if he knew anything about stamp collecting. He confessed he knew nothing about it. 'Well' I said, 'you had better learn something quickly because I would like you to take over the philatelic pages. Buy a packet of stamps, some hinges, and a S.G. Catalogue, and get cracking and produce a thousand words for next month's "M.M." '. For many years Trevor Edwards continued his articles, and when the War caused many employees of Meccano Ltd., to be relegated as redundant, he found his experience to be of such use that he had no difficulty in obtaining an important post with H. R. Harmer Ltd., the philatelic auctioneers of Bond Street, London. There he worked with considerable success until his death in September 1956.

I was surprised to read in the Editorial in last May's issue the idea of young Meccano enthusiasts getting together to form clubs to co-operate in building large models that would have been too big a project for them to tackle individually. I have been out of touch with Meccano matters for many years and I cannot help wondering what happened to the one-time Meccano Guild that was formed in the early days with exactly this proposition in mind. When I left Meccano Ltd. in 1935 the Guild had over 250,000 members and over 750 affiliated clubs each with an adult leader. In February 1926 we announced that the largest Meccano Club in the world was that at Auckland, New Zealand. Founded by Frank Wiseman in 1924, its phenomenal growth afforded a striking example of what can be done by unlimited enthusiasm applied at the right time. The Club was affiliated in March 1925, by which time its membership had reached the remarkable figure of 660, and this in the following year had increased to over 800.

The object of the Guild was precisely what the present Editor had in mind when he made his suggestion: (1) to make every boy's life brighter and happier, (2) to foster clean-mindedness, truthfulness, ambition and initiative, and (3) to encourage boys in the pursuit of their studies and hobbies, especially in the development of their knowledge of mechanical and engineering principles.

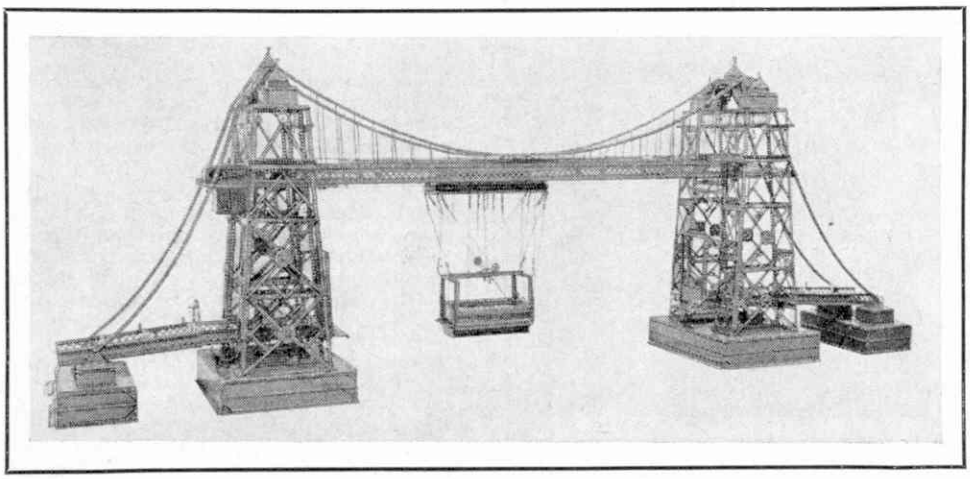
Apart from the members meeting on club nights, visits were made to various interesting firms, including the 'Daily Mail' printing works, the Royal Mint, the General Omnibus Company, and other local works that were of interest in the areas. The Secretaries of the clubs sent weekly reports of their meetings to me and on occasions I paid visits to some of the clubs to give lectures on some engineering wonders that tied up with the Meccano models featured in the 'M.M.'. (I still have my collection of lantern slides but as these were the old 3¼ in. by 3¼ in. they do not fit modern projectors). The accompanying photograph shows the committee members of the Holy Trinity Meccano Club, Barnsbury, North London, the first club to be affiliated to the Guild.

When the 'M.M.' commenced to branch out to cover subjects that were of general interest to all boys, I found my fan mail increasing considerably and I was soon receiving 400-500 letters a week from readers in all parts of the world. It was an inspiring thought to realise that a series of ships were making for Southampton, in the holds of which were letters from Australia destined to land on my desk at Liverpool and that further ships from New Zealand, United States, Canada and the European countries were also heading for Britain, with more letters for my desk. To all letters replies were sent in the language in which they were written, for Meccano Ltd. had a staff of translation experts since the manuals were published in no less than 16 languages. (Incidentally, the 'M.M.' was, at one time, published both in French and Spanish.) So that it was no great task to turn to our experts to translate the replies to my correspondence into their own language.

Although I have only touched on the fringe of my early years as Editor, I have already exceeded the space kindly placed at my disposal. I hope that these notes may have been of interest, especially to those who became the fathers of the Meccano boys of today.

And so I make my farewell gesture to past and present readers, 'wherever they may be'—feeling that our efforts in those early days were well worth while.

The Meccano Magazine Transporter Bridge



The Transporter Bridge illustrated here is one of the famous pre-war 'Super' models, and is still built by advanced Meccano enthusiasts today. A really superb example of engineering in miniature, it was similar in design to actual examples at Runcorn and Middlesbrough

.... and Norman Tudor

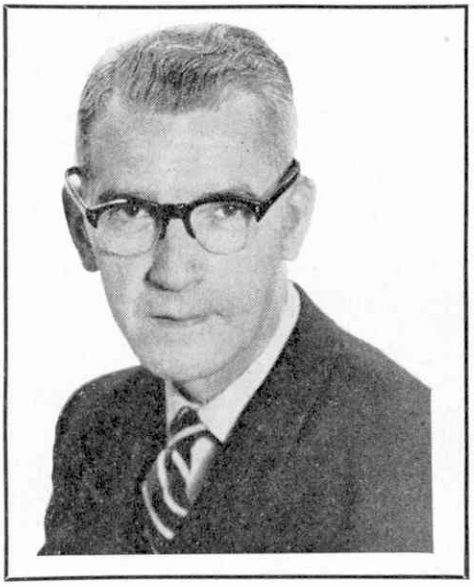
BEGINNING in 1927 my association with the M.M. covered the major period of its 51 years of existence. In looking back over the years I do so primarily as one whose main concern was with the preparation of those sections of the Magazine devoted to Meccano enthusiasts, the development of the Meccano system in general and other matters associated with the great hobby of model-building.

The Magazine had been in existence for about 11 years when I, as a young engineer and writer, joined the Editorial staff. During this time it had grown from a simple newsheet with line illustrations, in which form it first appeared during the later years of the Great War, to a high quality, many-paged publication splendidly illustrated in half-tone and with a cover printed in full colour. Much of the progress from simple beginnings had

Norman Tudor

been made under the Editorship of Ellison Hawks who was in control when I joined the staff.

Originally the Magazine had been planned primarily as a medium to weld together in happy association the many thousands of Meccano model-builders in all parts of the world and to provide them with ideas and assistance in obtaining the utmost pleasure from their hobby. It was also the official organ of the Meccano Guild. Later, after the introduction of Hornby Clockwork and Electric trains the Hornby Railway Club was formed, and special sections of the Magazine were devoted to articles of interest to model-railway enthusiasts. Many years later with the advent of the



Norman Tudor was associated with the M.M. for the greater part of its 51 years of existence. As 'Spanner', he was responsible for the Meccano model building articles during the inter-war years

now famous Meccano Dinky Toys miniatures and the formation of the Dinky Toys Club still further special pages were added to the Magazine to cater for the interests of members. Thus the Magazine eventually served as the official organ of all these world-wide organisations.

During the inter-war years the model-building sections of the M.M. reached their peak and many very fine Meccano models were illustrated and described. There was, for example, a range of about 20 super models designed and built in the Magazine model-building department. These were planned for construction from the largest Meccano Outfit of the period—the super models, as older readers will remember, included the Meccano Loom, Giant Hammerhead Crane, Motor Chassis complete with three-speed gearbox, clutch, differential and Ackermann steering gear, and the Meccanograph designing machine. Their appearance in the M.M. excited the interest of model-builders everywhere, and even now there is a steady demand for details of their construction.

Also during this period the very popular feature 'Spanner's Suggestions Section' was at its peak, a feature which figured in the M.M. regularly for nearly 20 years. Hundreds of ingenious Meccano mechanisms were described and illustrated. Many of these were designed by the M.M. staff, but others were contributed by enthusiasts from all parts of the world. I took very special interest in preparing the material for these 'Suggestion Section' pages for it involved me in correspondence with model-builders in most countries and resulted in many friendly contacts that I am pleased to say I still have the privilege to enjoy.

I come now to the dark days that came with the outbreak of the Second World War in 1939. For some years previously the Editorial chair had been occupied by W. H. McCormick who had succeeded Ellison Hawks, and when war came it brought many difficulties for him and his Assistant Editor, Frank Riley, B.Sc. One by one members of the staff left to join the Armed Forces and the severe Government restriction on paper supplies seemed likely to make it impossible for the Magazine to continue. Fortunately, the latter difficulty was eventually overcome, but although publication was allowed to continue, both the size and number of pages had to be very greatly reduced. The wartime M.M. therefore was a pale shadow of its former self but Mr. McCormick and his small remaining staff did a splendid job in maintaining regular publication under the difficulties they faced.

When the war ended in 1945 came the equally difficult task of building up the Magazine by reviving many old popular features and introducing new ones, and recovering the lost circulation that paper controls and wartime conditions generally had made inevitable. However, with the return of staff from the Forces and the eventual easing of restrictions, the M.M. slowly recovered; but it never again appeared in the same format as had been customary prior to 1939.

A few years after the war, Mr. McCormick retired and Frank Riley succeeded as Editor. Under his control the Magazine progressed steadily for several years and its coverage was extended to include articles by experts on up-to-date topics such as electronics and space research.

On Mr. Riley's eventual retirement after nearly a decade as Editor, his position was taken over by Geoffrey Byrom, who continued in control until 1964 when the Magazine passed to its present publishers who I am sure readers will agree have upheld the high standard previously achieved and have produced many magnificent issues.

Now it is all over and I am writing my last contribution to the Magazine that has taken such a large place in my life and for which I have always had great regard and affection. I am both proud and privileged to have been associated with it and with the various Editors and other members of the staff who have controlled its destiny. Among these I would like to mention specially Ernest Miller, a most able Assistant Editor for many years and Leslie Norman, who for 30 years contributed a continuous stream of articles on both real and model railway topics. A word of congratulation also to my very good friend Harold H. Taylor of Huddersfield, a textile machinery expert, who designed and built for me many of the finest working Meccano models illustrated and described in the M.M. during the last 20 years.

It is sad indeed that economic conditions and the very high costs entailed in publishing now-a-days make it no longer possible to continue this fine Magazine, which throughout its 51 years of existence has striven always to provide wholesome entertainment and instructive reading for young people everywhere. The world will be poorer for its passing.

The Very First MM

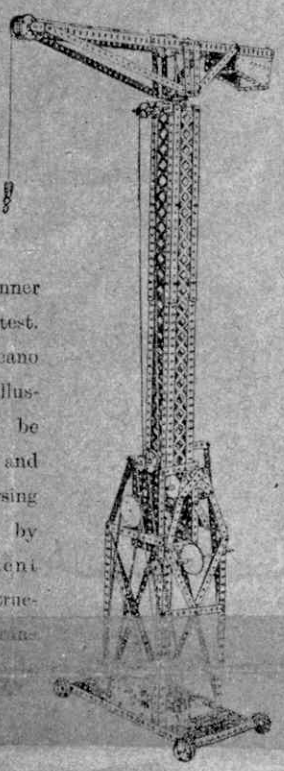
On the following four pages we have reproduced in its entirety, the very first issue of Meccano Magazine, dated September-October 1916. This was the seed from which the M.M. grew and the models which were illustrated in that first issue, so long ago, can still be built today. Such is the appeal of the Meccano Hobby! You can, of course, pull out this reproduction of the first M.M. and have your own 'Number One', only slightly smaller than its original $13\frac{1}{4}'' \times 10''$ format.

VOL. 1. No. 1 SEPT.-OCT., 1916

THE MECCANO MAGAZINE

TO HELP MECCANO BOYS TO HAVE MORE FUN THAN OTHER BOYS

A Fine New Meccano Crane



This is a Prize Winner in the last Meccano Contest. When run with the Meccano Electric Motor, as illustrated, the jib may be swung, the load raised and lowered, and traversing movement obtained by means of independent mechanism. Full instructions for building the crane [illegible] a set of Instructions.

A Message to Meccano Boys from the Inventor of Meccano

Since I first took out patents for Meccano in 1901, the hobby has made remarkable strides. I look back upon those days with keen pleasure, because even then boys recognised the merits and usefulness of Meccano parts and bought them eagerly. In those early struggling days, I had no factory to make the parts, or in which to work out new ideas. The difficulties were numerous and often almost insurmountable. Now Meccano is manufactured in the largest toy factory in the British Empire, equipped with the latest machinery, operated by many hundreds of skilled workpeople.

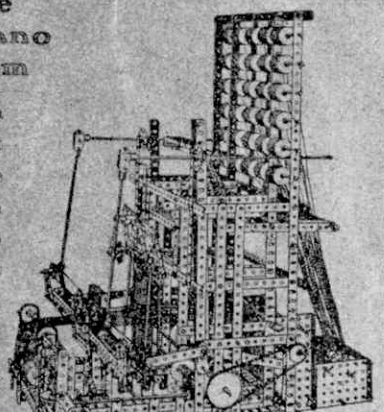
During these eventful fifteen years, a million boys of all nationalities and ages have bought and played with Meccano. Once they have started the hobby they have continued with it, buying the new parts and the new manuals as they came along. More boys play with Meccano than play football or cricket or any other hobby. I have corresponded with so many boys about Meccano, and I have got to know them so well, that I have come to look upon every Meccano boy as a personal friend, and I do not think that since the world began any man was so blessed with boy friends as I am. It is a great happiness to me to be able to send to them all a message of good will through the Meccano Magazine.

In future issues I want to tell you of some of the early struggles and experiences which I had in gaining opportunities for you to buy Meccano and in getting it manufactured, how some of the best parts and models were suggested to me, and plans which have been laid for the future development of the hobby. I want to know you all better, and I want you to know Meccano and myself better. My determination is the same now as it has been for fifteen years: to keep Meccano the happiest, most pleasurable and most instructive toy which boy ever had.

A. Hornby

Manager, Liverpool Meccano Co. Ltd.

The Meccano Loom



This is a magnificent new Prize Model which every Meccano boy will want to build and use. It automatically weaves ties and belts in all colours. It was designed in Lancashire, the home of weaving, by a Meccano user, who took for his patterns the great looms at which he worked to earn his living. It is perfect in every detail, and, like all other Meccano models, the work of an expert. Every boy should build this wonderful model, and learn all there is to know about weaving.

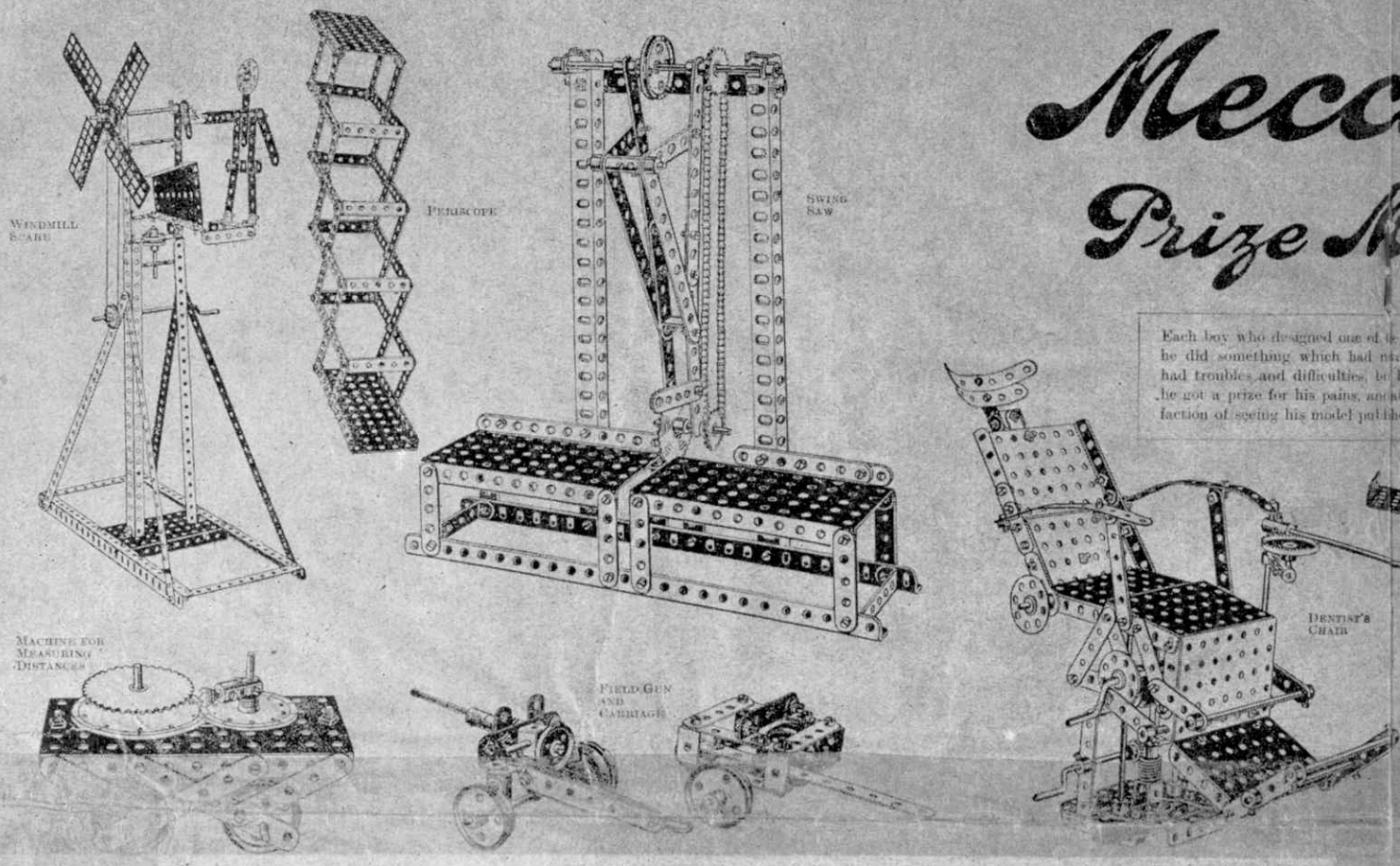
Our First Number

Meccano boys have been asking us for some years now to start a Meccano magazine, and here it is at last. This is a modest little first number, but it will achieve its purpose if it makes all you Meccano boys feel that you know us a little better. We have a lot of interesting developments in store, all of which will be announced in the *Meccano Magazine*, and we want you boys to look out for them, as they will all mean more fun and pleasure for you. Some of you are apt to get into a rut and to think that you are having all the fun it is possible to get out of Meccano, whereas, as a matter of fact, we are going ahead all the time and discovering new models, new ideas, and new fun for you. Write to the Editor as often as you like; he is just a grown-up boy with a lot of experience, and he knows how boys feel about things, and how to help them out of their difficulties. If your letters to him are interesting enough, you will probably find them printed in the *Meccano Magazine*.

The Editor.

The New Meccano Manual of Instructions

If you want to really taste the joys of Meccano you must obtain this new edition of the Meccano Manual of Instructions. For the first time it reveals the great possibilities of the hobby. It contains hundreds of prize-winning models with instructions for building them. There are models in this book which have taken years to bring to perfection. Models to play with, like the Helter-skelter, the Automatic Billiard Player, Joy Wheel, and Box Ball Alley; models to work with like the Meccano Loom, which automatically weaves ties and belts in all colours just as good as any you could buy in the shops, the Meccanograph for making thousands of exquisite designs with years of interest in it for children or grown-ups; engineering models like the Jack Knife Bridge, Stone Sawing Machine, Weighing Machines of various patterns, new Cranes and Bridges, scientific models, models of Guns, Armoured Cars, and others of war interest. By the time you have made all these models, you will have learned many useful engineering things, you will be a much brainier fellow than when you started, and you will be ready for the new supplementary editions of the Manual of Instructions which are in preparation. Every Meccano boy should keep himself up to date with new manuals. It is only by doing this that he can get the full value from his Meccano outfit. The new edition contains 326 models and costs 1s. 3d. or 1s. 6d. post free. You can obtain it either from your regular dealer, or from us if you have any difficulty.



Meccano Prize M

Each boy who designed one of t
he did something which had n
had troubles and difficulties, b
he got a prize for his pains, and
faction of seeing his model publi

All these models won prizes in the last grand Meccano Competition.

The Meccano Inventor's Accessory Outfit

No Meccano boy should be without this accessory outfit. No matter what regular outfit you have, the parts are useful. It contains a set of large wheels which can be used on motor cars, trucks, &c., two sizes of sprocket wheels with a length of chain for giving a positive drive and dispensing with the usual cord, which is apt to get slack and slip round the pulley. It also contains a supply of the new braced girder for building large, imposing models. There is also included in it a supply of heads, which are indispensable in building a Meccano Loom. It also contains other parts previously included in the higher-priced outfits only. It is a great help to the young Meccano inventor who desires to extend the scope of his outfit. The cost of the Inventor's Accessory Outfit is 7s. 6d.

"Dad"

When father has money we call him "Father." When he teaches Sunday School, we call him "Papa." If he shops with mother and wheels the baby carriage, we call him "Pa." But if he buys us Meccano and gives us a hand with the models till his fingers ache with screwing up the bolts with them instead of using a screw-driver, we call him "Dad."

World-famous Meccano Beats Germans Hollow

This is the verdict of Mr. A. W. Gamage, of the firm of A. W. Gamage, Ltd., London, expressed in an article which he has just written for "Pearson's Weekly." Mr. Gamage writes: "Luckily Germany did not capture every section of the toy trade. In some directions we are still pre-eminent. Britain's soldiers were second to none; they were perfect in every detail. *The world-famous Meccano toys beat the Germans hollow.* Our rubber balls were excellent, and our big wooden toys licked creation."

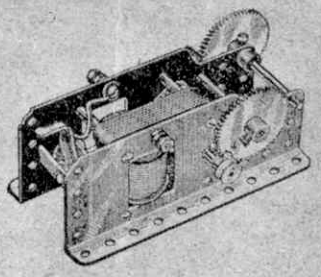
Mr. Gamage's verdict on Meccano is endorsed by every toy dealer and every boy in Great Britain. In some directions the Germans certainly did not have it all their own way, and when this terrible German-made war is over it will be our endeavour to see that much of the toy business which was formerly held by Germany and Austria will be wrested from those countries, and that the British public will know that when they are buying toys they are supporting British workmen in British factories.

Meccano Outfits as Prizes

The following well-known publications are offering Meccano Outfits as prizes in the competitions which they are running this winter:—

"The Scout,"
"Home Notes,"
"Pearson's Weekly,"
"Everywoman's Weekly."

Some of you clever Meccano boys should have no difficulty in securing these outfits.



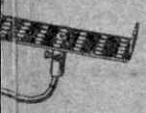
The Meccano Electric Motor

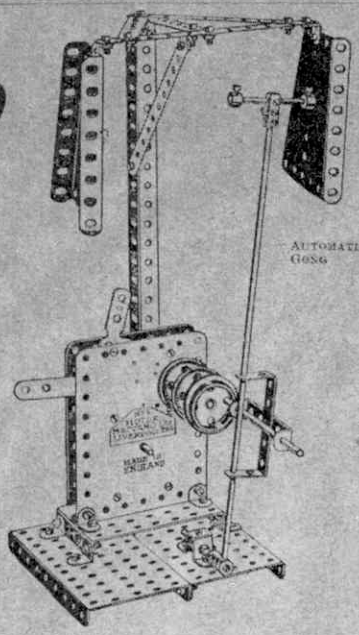
This is a perfectly designed motor which makes it possible for a boy to run his models continuously. Properly geared, it has enormous lifting power. It has the Meccano equidistant holes along the base and edges, and can be fitted into the Meccano models without difficulty. It is simple to use, and there is no danger whatever attached to it. It may be run with dry batteries, an accumulator, or direct from the home supply with a transformer. Where possible, we recommend that an accumulator be used giving four volts. This lasts for a long time, is very reliable, and can be easily recharged at small cost.

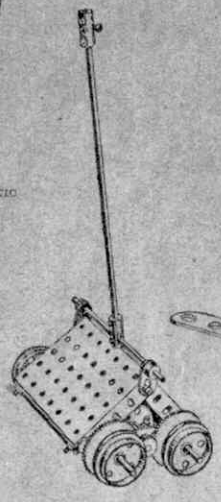
The motor is supplied in two patterns, one without reversing gear, costing 7s. 6d., and the other with reversing, stopping, and starting gear, costing 12s. 6d. Instructions go with each motor. Ask your dealer to show it to you.

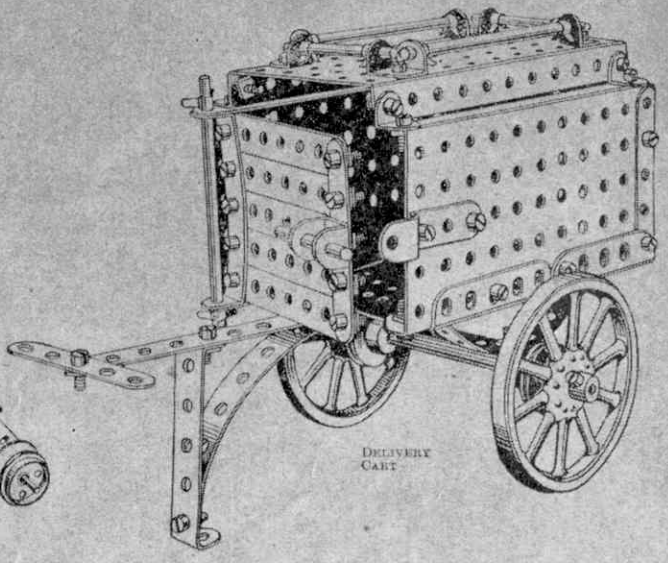
cano Models

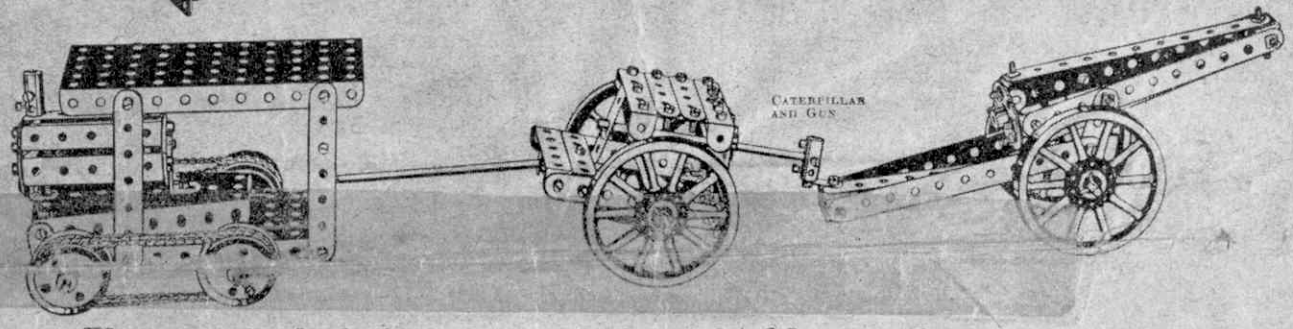
these models is a discoverer; never been done before. He so he overcame them. Then nother that he had the satis- ished here.











They are included in the new Manual of Instructions

A New £200 PRIZE CONTEST

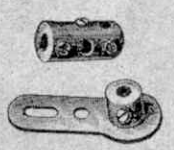
1st Prize £50 in Cash. 140 other prizes

Another grand Meccano Contest has started, and we want every boy to have a try for one of the big money prizes. These contests help the Meccano fun along and make model-building worth while. If you invent something new you prove yourself to be an original thinker, and if there is merit in it you get well paid for your work. The first thing to do is to study all the models which you make from the Manual of Instructions, and think out improvements on them. This gets your brain at work on new ideas, and it is just those ideas which we want. If you are contented to simply copy the Meccano models as you see them, you will never be successful in inventing anything new. Get to work now. See what the other fellows have done in the last two big competitions, and then go to work on something better. Do not forget the entry form; your dealer will give you one or we will post one to you on request.

The Meccano Braced Girder

This is a new flexible girder enabling large constructional models to be built, such as bridges, elevators, towers, etc., and forming a most effective decoration for many of the smaller models. It is a perfectly designed part on the lines of actual girders used in building construction. It is sold in two sizes, 5½" costing 1s. per ½-doz., and 12½" costing 1s. 6d. per ½-doz.

The Meccano Crank and Coupling

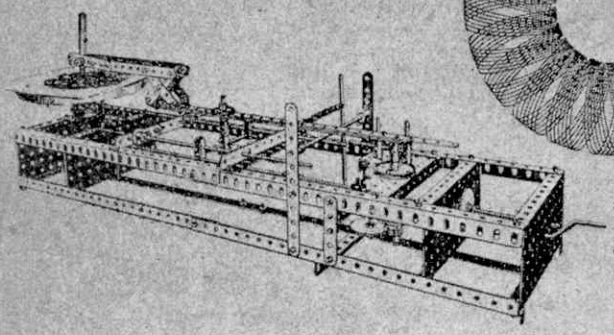


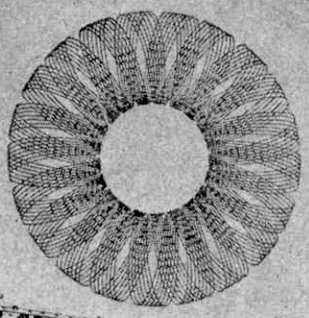
These are specially patented parts without which it is impossible to build many of the best Meccano models. They are perfect in design, and are adapted to hundreds of different uses. It is such parts as these which give Meccano its supreme position amongst constructional toys. New uses for them are being devised every day, and every Meccano boy should study them carefully. The cost of either crank or coupling is 6d.

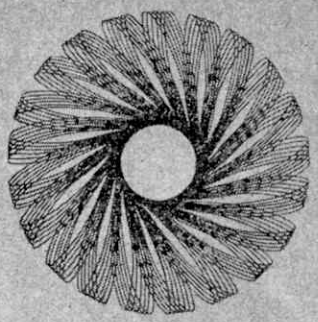
More Prizes for Meccano Boys

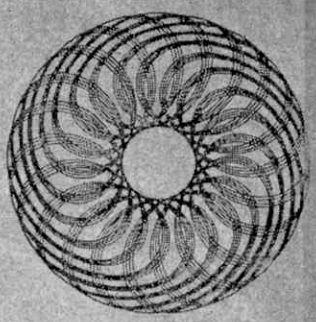
We often receive very interesting letters from enthusiastic boys telling us of the pleasure they derive from their Meccano outfits, and some of these letters show unusual literary merit. We now offer a prize of a No. 2 Meccano outfit for the best essay on "Meccano as a Toy," and a similar prize for the best essay on "Meccano as a help to the study of Engineering." The essays should not consist of more than 500 words, and must be received by us not later than January 1st, 1917. Any user of Meccano may try for these prizes.

The Meccanograph









These are a few of the wonderful designs which may be made with the Meccanograph. By simply altering the adjustments slightly, thousands of exquisite designs may be made, all different. There is no difficulty anywhere, and even a young boy can make the machine for himself and use it. It is only necessary to pin the paper on the table, place the pencil in the proper position, and turn the handle. The machine itself gives you the design. We ourselves are experimenting with this machine all the time, and we shall have further useful suggestions to make regarding it in the next issue of the *Meccano Magazine*. In the meantime, we offer a prize of a No. 3 Meccano Outfit for the best set of 12 designs made with the machine sent in to us before January 31st, 1917. Full instructions for building this model will be found in the new Meccano Manual of Instructions.

The Premier Toy

Every boy who takes up Meccano finds it the liveliest and finest hobby which ever brightened up his play hours. It gets hold of you. Once you take it up, you never drop it again. It takes for ever to do all the fine things possible with Meccano. Scores of boys who have had their outfits for many years write to us and say that Meccano is the only winter hobby really worth while.

When you are building a Meccano model you know what you are making for, and you know where, that you are going something, and that you will have something to show when you are through. And, really, a finished Meccano model is a thing to be proud of. That isn't all, though. You know just how you feel after you have got through a game of football, or cricket, or had a round of golf. You know perfectly well that next time you can play a much better game. That's exactly how you feel about Meccano. You can always see how to improve on your work next time. The most perfect machine in the world can be improved upon, and the most perfect Meccano model can be bettered. And, do not forget that when you are improving a Meccano model you are inventing just as surely as the man who invented the motor-car or wireless telegraphy, or the telephone; and inventing pays these days. Scores of engineers and designers, architects and others, use Meccano in their business, and they tell us there is nothing so good for working out their ideas and inventions. The reason is that Meccano parts are just like parts of real machines, and they work beautifully together and give you all kinds of both simple and complicated movements. All the Meccano parts are called by their right engineering names, and you learn them off without any trouble. You come to know how big engineering feats are accomplished, and you take the biggest interest in them. Thousands of boys all over the world owe their success to the time they put in on Meccano, and whether you become an engineer or not a little sound knowledge of engineering and mechanical movements is always useful.

MECCANO

Gems from our Mail Bag

G. T., Torquay, writes: "My Meccano boy is immensely pleased with the Inventor's outfit, and we both think the Girder Strips are lovely. I don't suppose you ever get to know the ages of your many little engineers, but I often wonder if my son is one of the [illegible] He is only seven, and has been a real keen and [illegible] Meccano boy for two years. I can tell you it is on wet days."

[illegible] to very young boys. We wonder if any of our readers can beat this record.—Ed.

N. L. J. writes us from Batavia, Illinois, U.S.A.: "It gives me pleasure to state that furnishing my son with his Meccano outfit we found to be one of the very best investments that we have been able to make for him. The only difficulty experienced is to get him away from his planning and work long enough to give him the necessary food and rest."

Yours is the kind of letter we like to receive, N. L. J. An eminent engineer once told us that he preferred to have Meccano boys in his office. They came to him fascinated with engineering problems, which was a good start, and they had also learnt habits of diligence and orderliness.—Ed.

W.K., of Walney, writes: "I am a user of Meccano, and I and all my pals say it is the best hobby a boy can have. One lad has a ——— outfit, and he says it is as good as Meccano. He nearly got mangled, and has a thick ear and a swelled nose, and went out of school on his neck."

We hope this gentle treatment convinced the erring one.—Ed.

M. A. L. writes from Tarquah: "With much regards to your Meccano book which I am saw in 'London Opion' to-day and it was very funny as you described to all the nations. Being that I am need off, but I hope the discrition shall pay me or shows me the way of doing good and to leave in a good health and I beg to ask you too if ever you know somebody else called Astrologier. Please direct me their addresses but when something discurtion to me I has been lost all—but do not overcharged me for your Meccano Prizes. Yours newly customer a Trial."

You seem to be in a dreadful trouble, M. A. L. We wish we could help you.—Ed.

K. A., Alvechurch, writes: "I live well out in the country, and Meccano is my only amusement. I have had it about five years now, and in all the outfits I have not had one part that did not fit exactly. It is an ideal toy."

This is an excellent tribute to the thoroughness of our Inspection and Testing Departments.

Prices of Meccano

No.			
0	Outfit with full instructions for building		3/9
1	do.	do.	6/6
2	do.	do.	12/6
3	do.	do.	20/-
4	do.	do.	32/6
5	do.	do.	47/6
6	do.	do.	115/-

No. 6 in well-finished cabinet with lock and key.

Accessory Outfits

No.							
0a	[illegible]	[illegible]	[illegible]	No. 0	[illegible]	No. 1	3/3
1a	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7/-
2a	[illegible]	[illegible]	[illegible]	[illegible]	do.	3	3/-
3a	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4a	do.	do.	4	[illegible]	5	[illegible]	[illegible]
5a	do.	do.	5	do.	6		37/6

Meccano Outfits with Electric Motors

These are the regular Meccano outfits with the Meccano Electric Motor added. Each one is a magnificent present for any boy.

No. 1x	with non-reversing motor	12/6
,, 2x	,, ,, ,,	18/6
,, 3x	,, reversing motor	30/-

Each Meccano outfit is complete with all parts and tools necessary for building models. Full instructions are included and the youngest boy can commence to build at once without study. An accessory outfit may be purchased at any time enabling bigger and more interesting models to be built. Additional parts may also be purchased separately, at prices given in our published lists.

Remember that though boys play with Meccano for pleasure, and though they get more genuine fun from it than from any other toy, it also gives them a sound knowledge of engineering. Through playing with Meccano, many a bright boy has been started on a prosperous career in one of the most important and profitable professions—engineering and mechanics.

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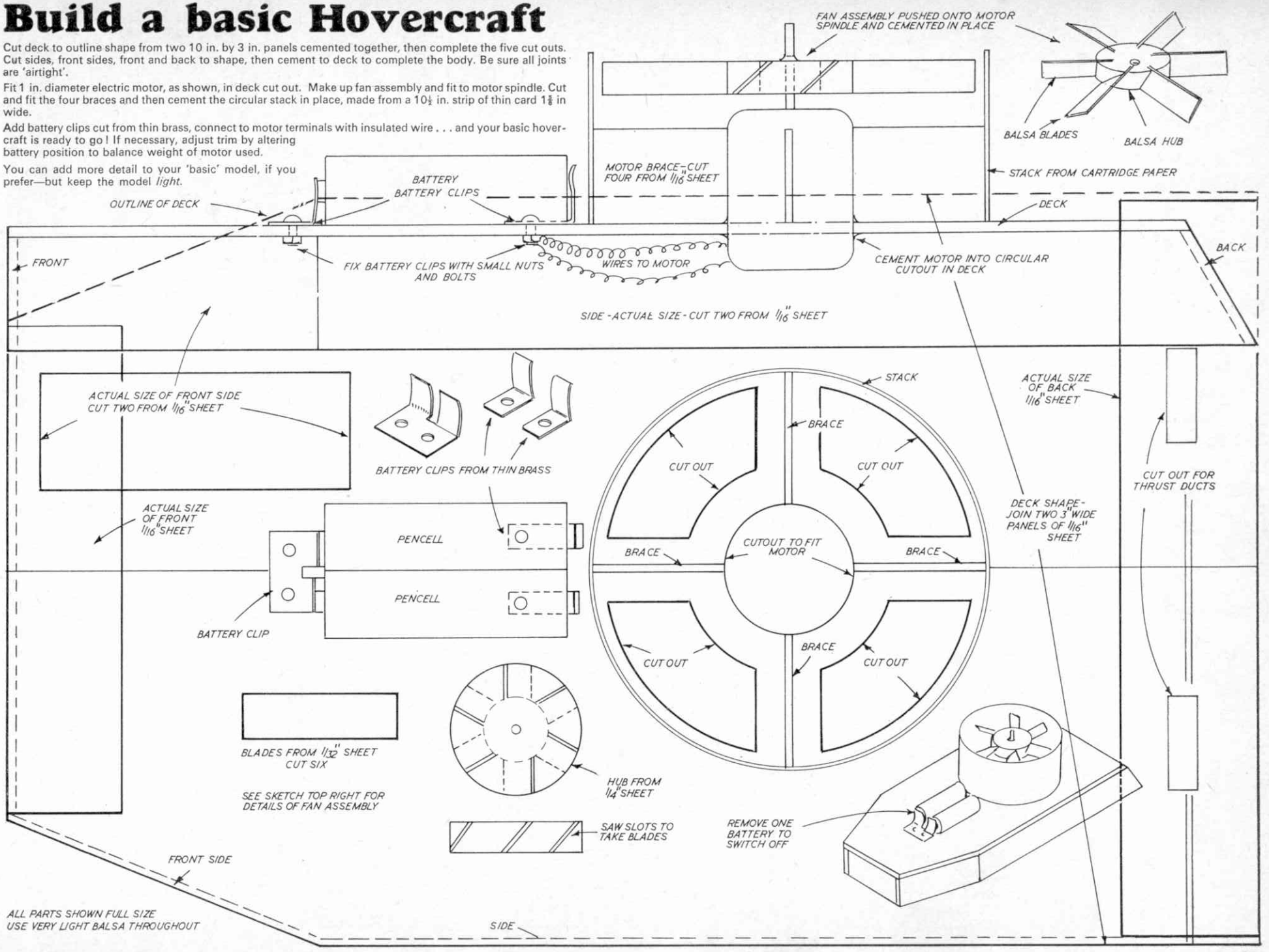
Build a basic Hovercraft

Cut deck to outline shape from two 10 in. by 3 in. panels cemented together, then complete the five cut outs. Cut sides, front sides, front and back to shape, then cement to deck to complete the body. Be sure all joints are 'airtight'.

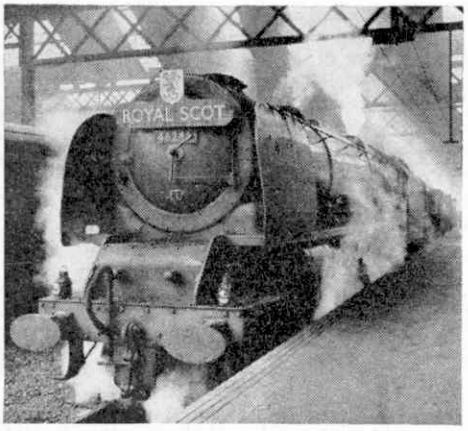
Fit 1 in. diameter electric motor, as shown, in deck cut out. Make up fan assembly and fit to motor spindle. Cut and fit the four braces and then cement the circular stack in place, made from a 10½ in. strip of thin card 1⅜ in wide.

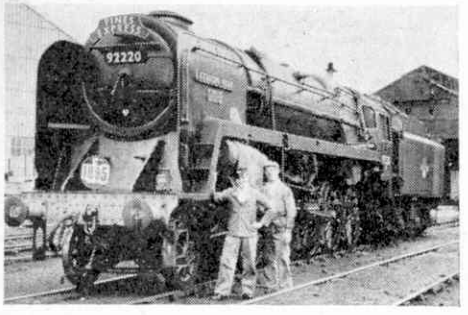
Add battery clips cut from thin brass, connect to motor terminals with insulated wire . . . and your basic hovercraft is ready to go! If necessary, adjust trim by altering battery position to balance weight of motor used.

You can add more detail to your 'basic' model, if you prefer—but keep the model *light*.



Looking back over





One of the famous 'Coronation' class Pacific locomotives 'City of London', leaving Euston with the 'Royal Scot' train

Described as 'Britain's Mightiest Locomotive' in the 1927 'M.M.', G.W.R. 'King' locomotive No. 6001 'King Edward VII' is seen here in Saunderton Cutting with a Birmingham Snow Hill-Paddington train

'Evening Star', the last steam locomotive to be built by British Railways and now scheduled for preservation

IT is in many ways fitting that this final issue of the 'M.M.' should include a farewell article looking back over the last 50 years at those events in the railway world that made news, and which have formed the subject of many articles written by some of the most famous names in railway literature. Looking through the fifty volumes of 'M.M.', names of acknowledged experts like O. S. Nock, Cecil J. Allen, R. S. McNaught and R. A. H. Weight, appear above articles on interesting topics of the day.

When 'Meccano Magazine' first appeared in 1916 its contents were confined purely to Meccano modelling, and it was not until 1922 that they became more diversified by the addition of notes and features on a wide variety of subjects. In the May/June issue, railways made their first, but brief, appearance with a photograph and caption on the G.W.R. Locomotive "Princess Mary", which had recently been used to convey H.R.H. Princess Mary and Viscount Lascelles from Paddington to Shifnal. From 1923, however, which roughly coincided with the introduction of the first Hornby Trains, railways made regular and even considerable appearances in the pages of the Magazine.

News of railway events was regularly included, making the 'M.M.' only the second magazine at that time to regularly devote space to the subject. The emphasis was not, however, entirely on news, although in 1924 we see articles describing the famous Wembley Exhibition with photographs showing the L.N.E.R. exhibits of 'Locomotion No. 1' and the almost legendary 'Flying Scotsman' No. 4472, the subject of many articles in the Magazine. There was also an interesting feature on a new L.M.S. coaling stage that lifted 10-ton wagons and which was capable of coaling two locomotives in two minutes. Apart from these, however, were a number of informative articles on the lives of famous engineers, including George Stephenson, the builder of the Liverpool-Manchester and other railways, and his son, Robert Stephenson, builder of locomotives and bridges. London's tube railway also received full attention and mentioned is the 'Passimeter', a mechanical apparatus, which combined the duties of booking clerk, barrier attendant and ticket inspector—and that was in 1924!

In many ways, 1925 was a momentous year for railways with, among other things, the locomotive trials between the G.W.R. 'Castle' Locomotives and the L.N.E.R. Pacifics—an event that has had enthusiasts arguing ever since. One of the locomotives that took part, 'Pendennis Castle', still exists to this day and is now privately preserved. The other event that received widespread publicity, and which was also included in the Magazine, was the centenary celebrations of the Stockton and Darlington Railway, when a procession of veteran locomotives travelled over the original Stockton and Darlington railway line. Also published in the 'M.M.' to coincide with this event, was a whole series of appropriate articles, including 'The men who gave us Railways', and an article on Richard Trevithick, an early steam locomotive pioneer.

September 1925 also saw the first article of 'Railway News of the Month', a series that has had a variety of names and authors, and which survives to this day in the form of 'Railway Notes'. Always eager to keep its readers well informed, the Magazine began an occasional series on the new locomotives that were appearing and among the first mentioned were the ill-fated 'River' Tanks of the Southern Railway. Praised when they were first introduced in 1925, these were to be the cause of many serious railway accidents, including the one at Sevenoaks in 1927 when thirteen people were killed and twenty-one seriously injured. More praiseworthy, however, were the L.N.E.R. 'Directors', built for express passenger service in Scotland, and also the very notable 'King George V' of the Great Western Railway, which visited America in 1928 and which was the subject of two articles, including one which described it as 'Britain's Mightiest Locomotive'. Only a few months previously, the Magazine had carried an article called 'Britain's Most Powerful Locomotive'—the Southern Railway's 'Lord Nelson' Class.

One of the most popular qualities of the 'M.M.' has always been the emphasis it has given to interesting and informative articles and when, in 1930, for example, the L.M.S. celebrated the centenary of the Liverpool and Manchester Railway, an article in the Magazine described in most vivid terms how George Stephenson vanquished the problems attendant in crossing the bog of Chat Moss and, indeed, in completing the line between the two towns. One could also read about the 'Great Railway Speed-up' described by 'Observer' in the 1932 Magazine, when railway speeds on all the principal routes were accelerated. Among the most notable of trains were the 'Liverpool Flyer', the G.W.R. 'Cheltenham Flyer' and the 'Merseyside Express'.

Only three years later, in 1935, the L.N.E.R. was to achieve a speed record of 102 m.p.h. by 'Flying Scotsman' running between Leeds and London—anticipating by a few years the world steam speed record of 126·5 m.p.h. set up by 'Mallard'. That, however, was in the future, and many developments of great interest were to take place including, in 1935, the centenary of the Great Western Railway, the introduction of what was to become a ubiquitous design of 2-6-2 Tank Locomotive for the L.M.S. and a completely new type of steam locomotive, the L.M.S. turbine, 'Turbomotive'. Britain also saw its first streamlined train, the 'Silver Jubilee Express' on the L.N.E.R., pulled by those most famous locomotives, the record-breaking A4 Pacifics.

News was something the 'M.M.' certainly wasn't short of, and articles on new railway equipment, methods and new locomotives appeared in 1937. Among these were the L.M.S. 'Patriots', a name

the years

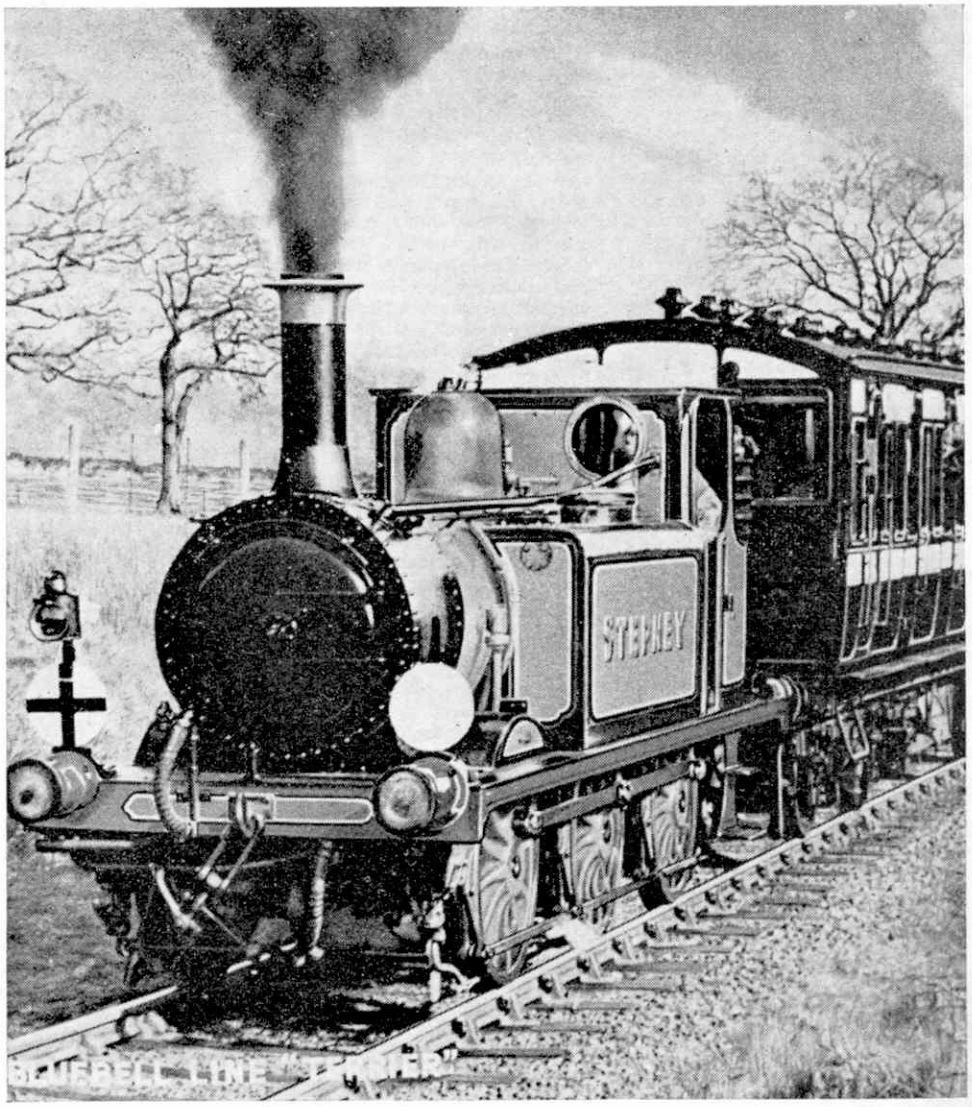
revived from a former L.N.W.R. 'Claughton' locomotive, and also the L.M.S. Coronation Scots, specially streamlined to compete with the L.N.E.R. In 1938 an article celebrating the centenary of the London and Birmingham Railway was published, destined to be one of the last before the shadow of war fell upon the world.

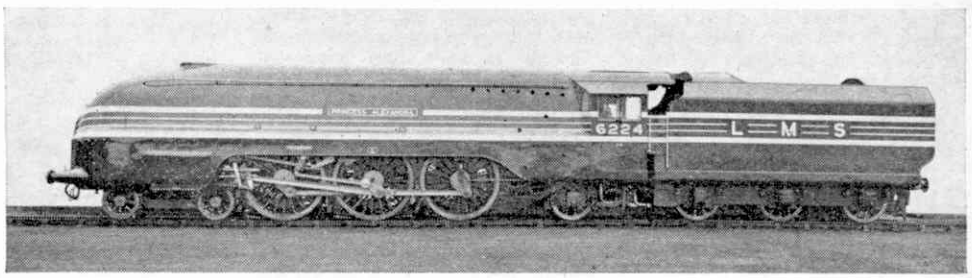
Regular features began to appear in number once again in 1944, and one of the first described the then new 'Peppercorn' Pacifics of the L.N.E.R. These and the new 'County' Locomotives mentioned in the 1945 'M.M.' were among the last six-coupled engines to appear before nationalization. During the following year, the centenary of the L.N.W.R., Doncaster built its 2,000th locomotive. Since 1941, however, the Magazine had reduced its format and thickness because of wartime restrictions, and although editorial policy continued more or less unchanged there was less space for any individual subject. The emphasis was still on news, and much space was devoted to the new standard locomotives introduced by British Railways between 1951 and 1954. There were, however, articles of interest, especially the one covering the making of the film 'Titfield Thunderbolt' in 1953, when a film company took over the Camerton and Limpley Stoke Branch of the G.W.R. The veteran 0-4-2 locomotive, 'Lion', formerly belonging to the Liverpool and Manchester Railway, was used in the film.

Engine nicknames also formed the subject of an article in 1953 and one was educated as to the meaning of 'Bongo' and 'Bill Bailey'. In 1954, one of the largest locomotives to be built by British Railways was introduced into service. This was the new standard 2-10-0 Locomotive, designed for heavy freight trains, and Mr. Frank Riley, Editor of the Magazine at the time, wrote an article about these impressive engines. The doom of the steam engine, however, was already sealed, for the first of the multiple-unit trains appeared in 1954, although another ten years were to pass before the momentum of dieselisation would finally eclipse the steam locomotive. Only six years later, in 1960, the last steam locomotive left the erecting shops at Swindon. Called 'Evening Star', this was the last of the 2-10-0 locomotives and is now scheduled for preservation.

Preservations and museums, in fact, had become of great interest to railway enthusiasts everywhere, and already the picturesque Festiniog Railway had been re-opened, a museum for trams had been set up in Crich, and Swindon had its own museum, which included in its exhibits the record-breaking 'City of Truro'. Articles on all these subjects appeared in the Magazine and, in 1963, a new regular feature called 'Trackside News' made its debut, although the 'Railway Notes' feature written for many years by Mr. R. A. H. Weight continued until the Magazine was taken into the International Publishing Corporation in 1964.

It is perhaps a strange coincidence that this should be the last in the long line of railway articles at a time when the steam locomotive itself is also on the eve of extinction.





A famous 'M.M.' cover of the early 'sixties showing an ex L.B. & S.C.R. 'Terrier' class engine working on the Bluebell Line in Sussex

One of the streamlined 'Coronation Scot' locomotives built by the L.M.S. in 1937 and intended to compete with the streamlined trains of the L.N.E.R.

By Mike Rickett

Flipper - The MM Sub Part 2

by Ron Warring

WE now come to the finishing details and fitting out the 'M.M.' submarine ready for her trials. The hull, which was completed in part (i), is divided into six watertight compartments, only one of which (the battery compartment) is accessible via a hatch. Just in case any leakage should develop we want to be able to drain these compartments. This is particularly necessary in the case of the motor compartment where leakage may take place up the stern tube.

A hole is bored in the deck above each compartment for drainage purposes. Do not try to drill these holes. Use a length of $\frac{1}{2}$ in. diameter metal tubing sharpened at one end and pierce the holes with a twisting motion—Fig. 7. The position of these holes is shown on the plan view drawing given with part 1.

Each hole is then plugged with a cork, cut down to $\frac{1}{2}$ in. length. Choose the length of cork cut to ensure a really tight fit. To enable the corks to be withdrawn when pushed down flush with the deck, bend a loop in a short length of 20 s.w.g. wire, pass the wire through the cork and then turn over the end on to the bottom of the cork. Paint the tops of the corks and the wire loops grey and, when dry, press them in place.

The main hatch is covered in a different way, using part 9 cut from $\frac{1}{8}$ in. marine ply to the bottom of which is cemented a 'plug' of $\frac{1}{2}$ in. sheet balsa. This fits into the deck cut out, allowing part 9 to sit flush with the deck. However, to get a proper seal a gasket of similar shape to part 9 (but with a cut out to fit over the plug part) is cemented to the bottom of part 9 with Bostik. This gasket is cut from $\frac{3}{32}$ in. or $\frac{1}{8}$ in. soft neoprene rubber sheet. The complete assembly is shown in Fig. 8. Note that this hatch cover fits over the two lengths of studding which protrude from the deck and is then secured with two 4 BA wing nuts. Tightening down the wing nuts squashes the gasket into close contact with the deck and produces a positive watertight seal. At the same time the hatch can be removed at any time—e.g. it will have to be removed to switch the motor on, and also to replace batteries. Although it may seem a little awkward having to unscrew and then replace the hatch every time to switch the motor on, this does provide positive waterproofing of the switch and electrics which can never be assured with a deck mounted switch, especially as the model is intended to operate under water as well as on the surface.

The ply hatch also forms the base to which the conning tower is cemented. The conning tower design has been kept very simple. Outline shapes are shown on the full size plan and details in Fig. 9. It is carved from a balsa block 3 in. long by $3\frac{1}{2}$ in. by 2 in. You do not need to buy a block this size. You can build it up from pieces of $\frac{1}{2}$ in. sheet left over, glueing together with Cascamite.

The top part is hollowed out, Part 10, cut from $\frac{1}{8}$ in. ply, is cemented in place to form the gun platform which is completed by sticking brass pins into the ply and then soldering on a brass wire handrail, as shown. The gun is made from dowel and scrap ply pieces, assembled as shown. Mounting the gun on a dowel enables it to be swivelled.

After completing the conning tower and cementing it to the top of the hatch (part 9), give this whole assembly two or three coats of medium grey flat paint.

The twin bilge keels are $22\frac{1}{4}$ in. lengths of $\frac{1}{8}$ in. by $\frac{3}{16}$ in. spruce, which are cemented to the bottom of the hull on about the mid point of the rounding—see section drawing B-B on the main plan. These are not essential and can be omitted, if desired, but they will assist in helping the sub run straight and true on the surface in a crosswind or cross sea. Be sure that they are lined up accurately fore and aft, otherwise they will have a steering effect.

The $\frac{1}{8}$ in. square hardwood strip cemented to the underside of the bows represents the cable cutter on a full size sub. On the model it serves the main purpose of protecting the bow against accidental damage. It will have to be steamed to the curve and is best cemented in place with Cascamite rather than balsa cement. The notches can be cut with a file after fitting, or omitted entirely. They add to the scale appearance but can prove troublesome in catching and trapping weed when the model is operating.

Both the bilge keels and the cable cutter are painted black after fitting.

The stanchions and handrail should be fitted to the deck as these greatly improve the appearance of the model. Single ball plastic stanchions can be used, or large plated pins (preferably brass pins). The handrail can be a length of thin nylon or thread, or thick fuse wire. If using pins for the stanchions, the handrail can be secured to each pin with a dab of epoxy resin adhesive.

Only a minimum of deck fittings are needed to impart a realistic appearance. These can be restricted to six bollards, positioned as shown on the main plan; and a gun on the foredeck which can be made from dowel and ply scraps. The gun should be mounted on a circular base drilled out to be a tight fit on a short length of $\frac{3}{16}$ in. hardwood dowel cemented into the deck. Stanchions, handrail and gun should all be painted grey.

The rudder assembly comprises both a vertical rudder (for directional control) and a horizontal rudder (for trim control). Two alternative methods of making this assembly are shown in Fig. 10. In one, a conventional rudder is fitted in a tiller tube passing through the hull. The horizontal rudders are then cut separately from 18 gauge brass sheet and bolted or riveted to the vertical rudder, as shown. The whole group turns as one for steering, via movement of the tiller. Trim control is obtained by bending the horizontal rudders.

In the alternative method the horizontal rudder is cut from 18 gauge brass sheet and screwed to the bottom of the hull above the vertical rudder, with additional brass wire bracing. The vertical rudder is then fitted as a separate unit.

The hydrovane assembly is shown in Fig. 11. A thick walled brass tube is fitted in the hull and well cemented in place to prevent leaks. This carries an 18 gauge steel wire arm, bent as shown in Fig. 12 with two $\frac{7}{8}$ in. lengths of brass tube slipped to the side arms before making the final bend. A vertical wire arm is soldered to one side just outside the hull tube; and a washer to the other side.

The hydrovanes are cut from $\frac{1}{16}$ in. ply to the dimensions shown in Fig. 12. These are then *sewn* to the $\frac{7}{8}$ in. lengths of 18 gauge tube on the wire arms. They are thus hinge mounted and can be folded up vertically. To hold in their normal horizontal position for running they are simply held out by a small rubber band engaging with the end of the wire arm, as shown.

The hydrovanes provide automatic 'dive' and 'surface' control, which works as follows. The vertical wire carries a small disc cut from plastic

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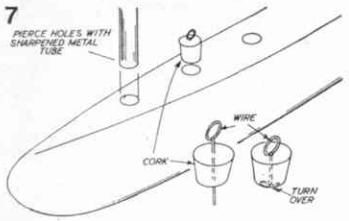

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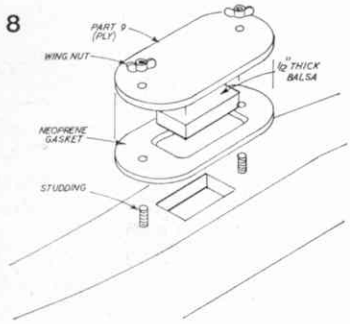

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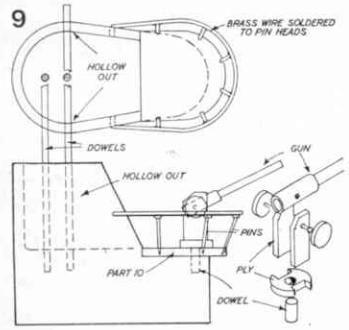

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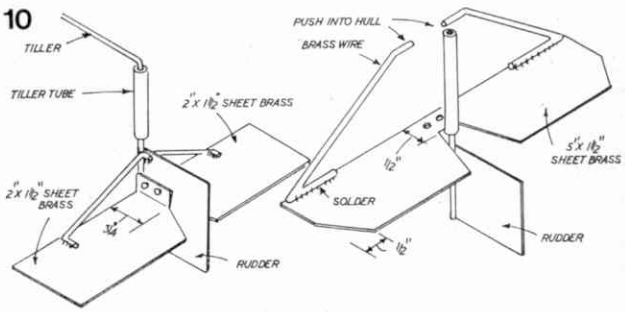

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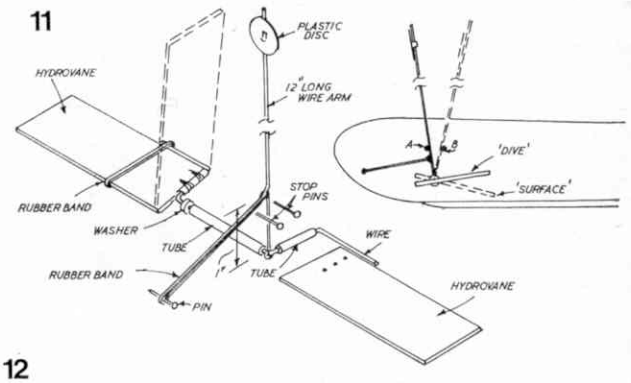

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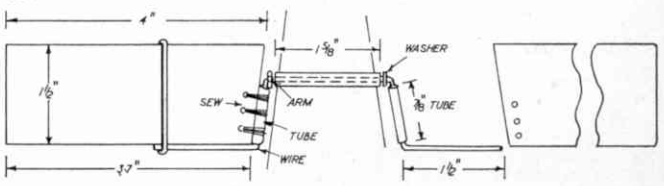


material, pierced to mount on the wire but free enough to be slid up and down. This wire is kinked about 1 in. up from its pivot point and a rubber band is taken from this kink and fastened to the hull side with a pin. A further pin 'A' is then pushed into the hull side to act as a forward stop, limiting the 'dive' position assumed by the hydrovanes. This pin position, and the position of the pin anchoring the rubber band which controls the band tension can only be determined by experiment.

A second stop pin 'B' is then pushed into the hull side to limit the backward movement of the arm, and thus the 'surface' position of the hydrovanes to approximately the same, but opposite angle, of the 'dive' trim. As the model submerges and continues to dive the small disc on the end of the wire arm will eventually sink below the surface. It will immediately be subject to water pressure which will cause the arm to pivot back and bring the hydrovanes to the 'surface' position. With adjustment of band tension, stop pin positions and the height of the disc on the wire arm an automatic trim position can be found where the model will run just below the surface with the disc partly submerged.

Initial trials should be carried out in a bath of water. Make sure that the hatch is securely clamped down, then put the model in the water. It will probably float laying to one side and at an awkward angle. Ballast weight is needed to establish a proper trim, this forming the ballast keel which is screwed to the bottom of the hull. The exact amount of weight required can only be found by trial and error, but a fair amount of weight will normally be needed.

The best material for the ballast keel is strip lead (i.e. lead sheet cut into strips about 1 in. wide); or bars of plumbers' solder (the latter being obtainable from any ironmonger's shop). Simply add enough lead strip (of solder bars) until the model floats level and with the decks almost awash. The ballast keel can then be attached permanently with woodscrews of sufficient length to pass through the balsa bottom and up into the obeche hog.

Trimmed in this condition—decks nearly awash—the model should submerge satisfactorily under the action of the hydrovanes when driven forward by the propeller, but you will need a stretch of open water to try this. Start with only a very small 'dive' trim on the hydrovanes and gradually increase. To be on the safe side you can let the model trail a light line so that you can haul it back if it gets into trouble. It will take a little time to sort out the best trim and get the automatic hydrovane control working effectively. The idea is to get a good diving performance without having to use so much ballast weight that the model is nearly submerged in the static position. The more powerful the motor the higher the model can float in the water with initial trim.

Of course, for surface running only, you need considerably less ballast weight; and under these conditions the hydrovanes can be folded up against the hull sides and held with a rubber band. Find how much difference in ballast keel weight you need to change from 'surface running' to 'diving trim' conditions and make that amount of weight detachable (e.g. you can fit that section of weight on bolts or studding screwed into the hog). You can then run your model under either conditions, simply by removing or adding the additional 'diving trim' weight from the ballast keel.

Once properly set up, the automatic hydrovane control will 'fail safe'. That is to say, if the rubber band breaks and the model continues to dive, the hydrovanes will revert to 'surface' trim as soon as the disc on the wire arm has submerged, if not before. It is advisable to change this band at fairly regular intervals, however.

After every outing, particularly when the model is new, it is also advisable to remove all the bungs to open up each compartment and check that no water has got in. *Always* open up the motor compartment after each period of use and drain, if necessary, as water may have worked up the stern tube. If the hatch gasket does not appear to be sealing perfectly and this cannot be cured by tightening down the wing nuts more strongly, seal around the edge of the hatch with waterproof grease before putting the model into the water.

You may also think it advisable to carry a 'wreck' buoy on your model. This can be a large cork tied to a length of thread strong enough to haul the model ashore. The other end of the thread is secured to the hull. Drill a hole in the deck above the bow block to pile the thread into and then lightly glue the cork over the top with *water soluble glue*. If the model submerges and fails to rise again—it could get trapped by weed, for instance—the glue will gradually soften and eventually let the cork break away and bring the line to the surface. Once you can reach the cork you can retrieve the model.

Radio Control

A SUBMARINE presents some rather different problems for radio control compared with other models, but is still a perfectly practical proposition. The first—and obvious—requirement is that the radio gear must be contained in fully sealed compartments. The only access to the interior of our model is to the engine compartment via the removable conning tower hatch—and a position close to the motor is just where the receiver does *not* want to be. It needs building in to a forward compartment where it can be completely sealed off and as far from the electric drive motor as possible to eliminate interference. As a further precaution the drive motor should be *suppressed*. This can be done quite simply by connecting a 0·01 microfarad condenser across the motor terminals—or, better still, one condenser from each terminal connected to the casing of the motor (provided this is metal) and the motor casing then connected by a further wire soldered to the stern tube.

The receiver should be located in its own compartment and positioned so that its tuning control can be reached via the removable drain plug in that compartment. This is important as you can only tune the receiver properly when the model is in the water (although this does not apply in the case of superhet equipment).

The aerial can also be fitted to this compartment—or the one immediately aft—and should comprise a wire 'whip' mounted in the deck in a suitable fitting, such as a brass bush. The complete aerial wire and the base fitting should then be *insulated* with plastic sleeving. This is to prevent the aerial being 'earthed' when the model submerges. The receiver should then respond to transmitter signals as long as there is any portion of the aerial still above water. Thus if a 3 ft. whip aerial is used the model can be submerged to a depth of about 30 in. or so and still maintain control.

Now let us consider what controls can be utilised, and what safeguards can be used should the model submerge too deeply with loss of radio contact. First and foremost the model must be trimmed with positive buoyancy—i.e. deck just awash, so that in the event of the motor stopping when submerged it will rise to the surface. It is also advisable to keep the control systems employed as direct as possible.

This means that for single channel radio it would be best to consider just *one* control only. The choice here is (i) motor on-off control; or (ii) diving vane control.

With *motor control* the front vane can be rigged to 'dive' trim and fixed in this position. Radio signal 'on' should then be arranged to switch the motor on, so that the signal has to be *held* on to keep the motor running. The model will then dive and continue diving until loss of signal (e.g. when the aerial is fully submerged, or the transmitter signal is released). This is a 'fail safe' system, but it does not give very good control.

With *diving vane* control the front vanes should be biased by rubber band tension to 'surface' trim. The radio signal is then used to drive the vanes to the 'dive' position via a suitable actuator. Release or loss of signal then retrims the model for surfacing. This is rather better than motor control since the motor keeps running all the time and, with practice, the dive signal can be switched on and off to maintain submerged running. It is also 'fail safe' again for in the event of loss of radio response the model is automatically trimmed for 'surfacing'.

Of course, you can also use the automatic 'dive' control as on the free running model and use the radio for controlling rudder or motor stop-start (or forward-stop-reverse, although there is little scope for running a submarine astern). This, in fact, is probably the *safest* system for single-channel control, and there is no reason in this case why motor switching *and* rudder should not be controlled by a single actuator like the Graupner Kinematic; or main and secondary actuators.

Whatever system you decide to employ, a *motorised* actuator should be used, not an escapement (although the Kinematic is an exception). An actuator to drive the rudder (and/or motor switching can be located in the compartment immediately behind the drive motor compartment. For working a rudder control the tiller tube will have to terminate *inside* the hull to bring the tiller arm forward into the aftermost compartment. This will be a potential source of leakage, so make sure that this compartment is completely watertight and sealed off from the compartment with the actuator in it. It should also be drained regularly through its removable drain plug.

With multi-channel radio far more scope is offered, and a six-channel outfit can give complete control, viz:

(i) Two channels operating the forward vanes via a progressive action actuator giving a complete dive trim control.

(ii) Two channels switching the motor via a suitable actuator; or, preferably, giving *variable* motor speed via a progressive type actuator driving a potentiometer.

(iii) Two channels controlling the rudder, either with self-neutralising action or progressive, as preferred.

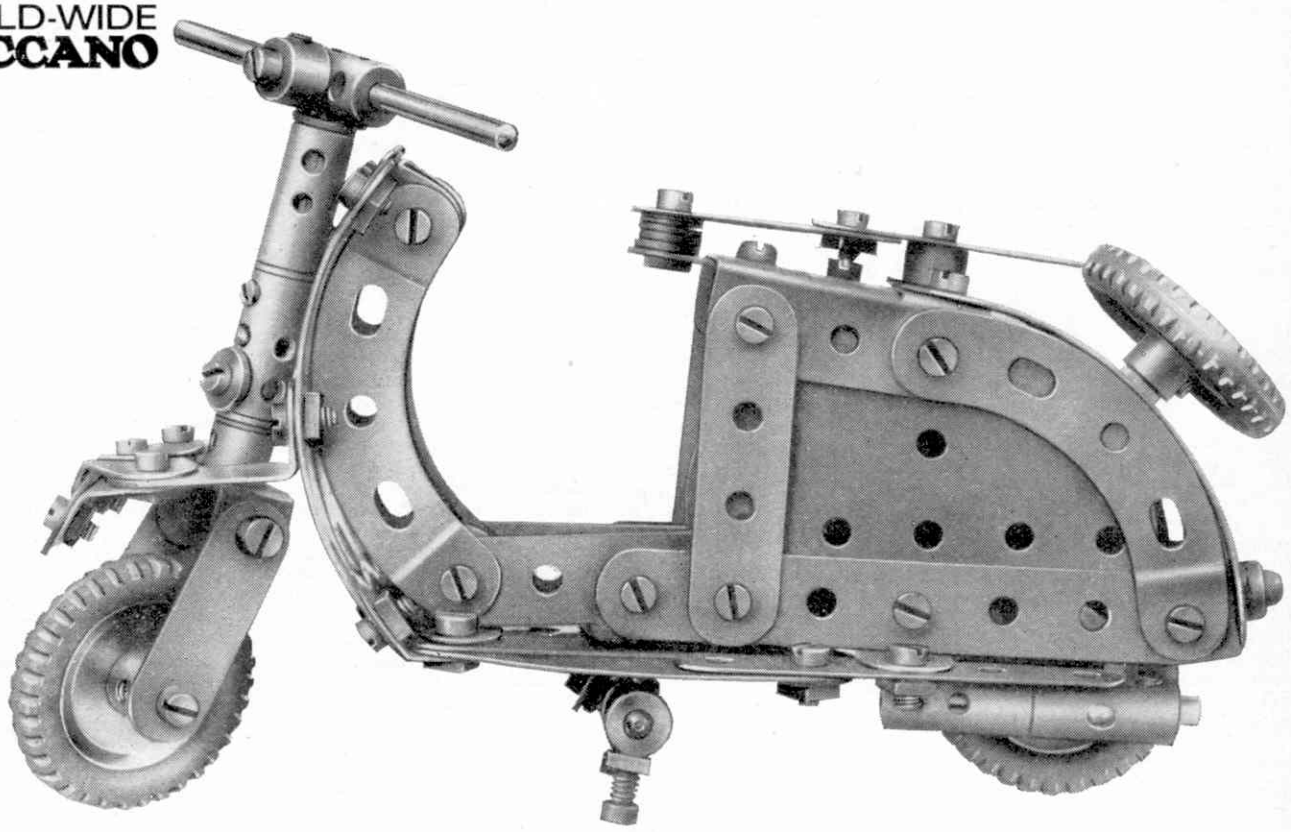
The main snag with this set-up is that there is no 'fail safe' provision. The required 'emergency' action is to be able to stop the motor so that the submarine will rise to the surface under its own positive buoyancy. Loss of radio contact with the six-channel system described will merely leave the motor running in the last 'control' condition. A separate 'fail safe' arrangement is therefore necessary, working on the motor circuit.

In this case a similar form of 'mechanical' control can be used as on the free running model. For example, a vertical wire pivoted in the deck and fitted with a small plastic disc can be used to operate a microswitch in the motor circuit, cutting off the motor supply and thus stopping the motor when the disc is submerged and the wire is pushed backwards. Instead of a separate wire you can even use the aerial wire for this purpose, i.e. using a fairly stiff wire for the aerial and putting the plastic disc on this. The aerial must be pivotally mounted at the bottom so that when it is moved backwards it operates a microswitch cutting off the motor supply circuit.

The main difficulty with either method is that by introducing a pivoted joint on the deck for the wire (or aerial) an opening is produced in the deck, as the switch must obviously be mounted inside the hull. This opening must be completely sealed without interfering with free pivotal movement of the wire. The best way to do this is to make up a small 'gaiter' or flexible plastic sheet which covers the opening completely and is also firmly bound to the emerging wire.

Turn to page 33 for plans and building instruction for a basic Hovercraft

WORLD-WIDE
MECCANO



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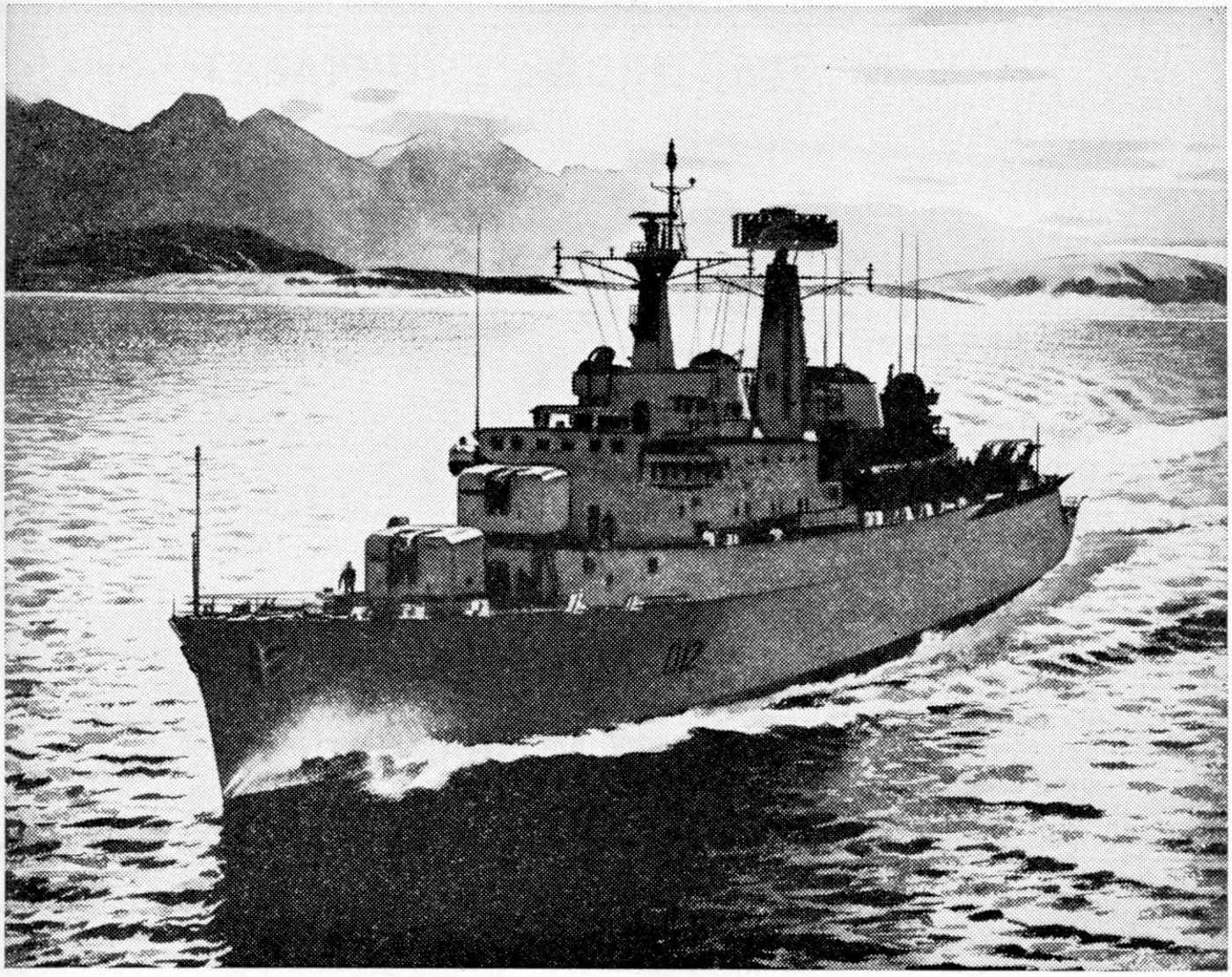

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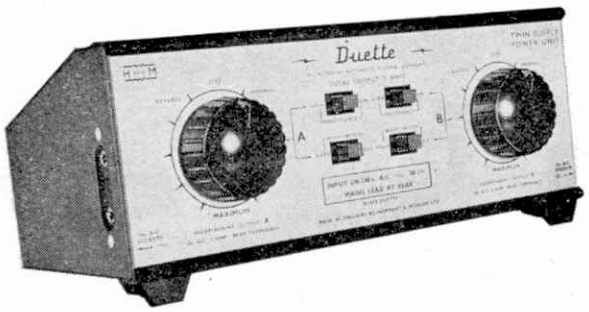

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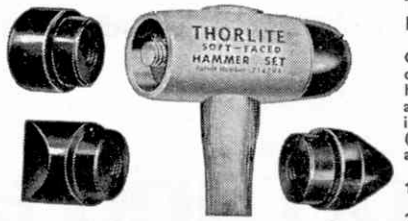

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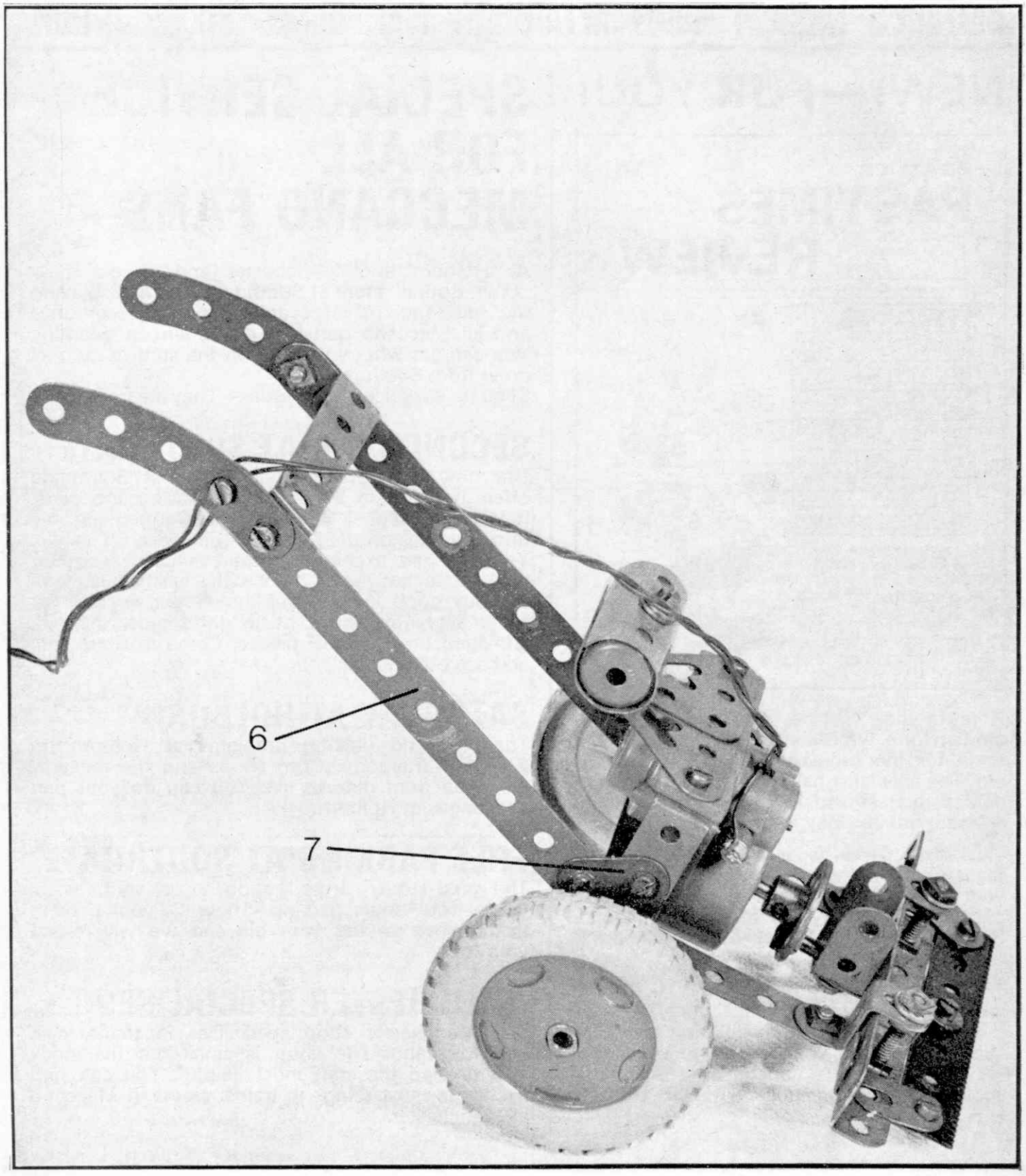
Three Simple Models by 'Spanner'



SINCE this is the last issue of the Magazine, we felt that three smaller models of the type we have been describing to readers for many years would be most appropriate, and we therefore show the construction of a Revolving Travelling Crane, built from the Junior Set, a Motor Scythe that uses the Emebo Motor, and a Lorry built from the Play-Set. Each of these three models is quite simply built, and we trust that our readers find them of interest, in this the final article in the series. May we also thank all Meccano enthusiasts for the interest and support they have given over the years.

Revolving Travelling Crane

Build the gantry first by bolting to each side of a 5½ in. by 2½ in. Flanged Plate 1, two 5½ in. Strips 2 and a 5½ in. by 1½ in. Flexible Plate 3. In the last hole but one in each of the 5½ in. Strips forming the 'legs', fasten the Double Angle Strip 4. A 3½ in. Rod is placed in the end holes of each pair of Strips and one of these has two 1 in. Pulley Wheels secured to it whilst the other has one 1 in. Pulley Wheel and a 1 in. loose Pulley Wheel, held in place by a Spring Clip. A Bush Wheel 5 has two Trunnions bolted in the diagonally opposite holes, and to the flanges of these Trunnions are bolted two 2½ in. Strips 6 and 7 and a Flat Trunnion 8. The Strips 6 are extended by Cranked Curved Strips 9 that support a 1 in. Rod carrying the 1 in. loose Pulley Wheel 10. The Bolt joining these Strips together also holds the Angle Brackets to which are bolted two Fish Plates fastened together in the shape of a 'V'. Two 2½ in. by 1½ in. Flexible Plates 12 are joined together using two Fish Plates instead of Washers. These are then attached to the flanges of the Trunnions. The crane is attached to the gantry by securing a 1½ in. Rod in the Bush Wheel 5, through the centre hole in the Flanged Plate. A 1 in. Pulley Wheel is fixed to the Rod underneath the Plate, holding it in position.

The model is completed by placing a Crank Handle in the Flat Trunnion 8. A length of Cord with a Loaded Hook attached is secured to the Crank Handle.

Parts required

4 of No. 2	4 of No. 22	1 of No. 52
4 of No. 5	2 of No. 22a	1 of No. 57c
4 of No. 10	1 of No. 24	2 of No. 90a
2 of No. 12	5 of No. 35	2 of No. 126
2 of No. 16	32 of No. 37a	2 of No. 126a
1 of No. 17	32 of No. 37b	2 of No. 189
1 of No. 18a	8 of No. 38	2 of No. 194
1 of No. 19s	2 of No. 48a	

Motor Scythe

With this model, begin by bolting in the second hole from each end of a 3½ in. by ½ in. Double Angle Strip 1, a 2½ in. Strip 3 and a 1½ in. by ½ in. Double Angle Strip 2. An Emebo Motor is attached to the upper lugs of the Double Angle Strips and also two 1½ in. Corner Brackets which have a Sleeve Piece bolted to them. In this is a Nut and Bolt 5 and a Washer to represent the filler cap. Chimney Adaptors are also pressed into each end of the Sleeve Piece. The handles, made from a 5½ in. Strip 6 bolted to a 2½ in. Curved Strip are attached to the Double Angle Strips 2 by 1 in. Triangular Plates 7. Two Fish Plates 9 and a 1 in. by ½ in. Angle Bracket underneath are secured to the ends of a 3½ in. Rack Strip 8, whilst the 1 in. by ½ in. Double Bracket 11 fastened to a 1½ in. Strip is secured to the Rack Strip by the Nut and Bolt 10. A 4½ in. Angle Girder 12, placed in between the 2½ in. Strip, the 1 in. by ½ in. Angle Brackets and the Fish Plates, is attached to the ½ in Reversed Angle Brackets by ¾ in. Bolts, three Nuts and two Washers. The completed unit is now bolted to the Strips 6. A Threaded Pin is fixed to a 1 in. Bush Wheel 13 (Elektrikit Part No. 518) which is secured to the motor shaft. The lugs of the Double Bracket 11 should be bent slightly outwards so that the Rack Strip moves freely to and fro. The Road Wheels are mounted on a 4½ in. Rod placed in the Double Angle Strip 1.

Parts required

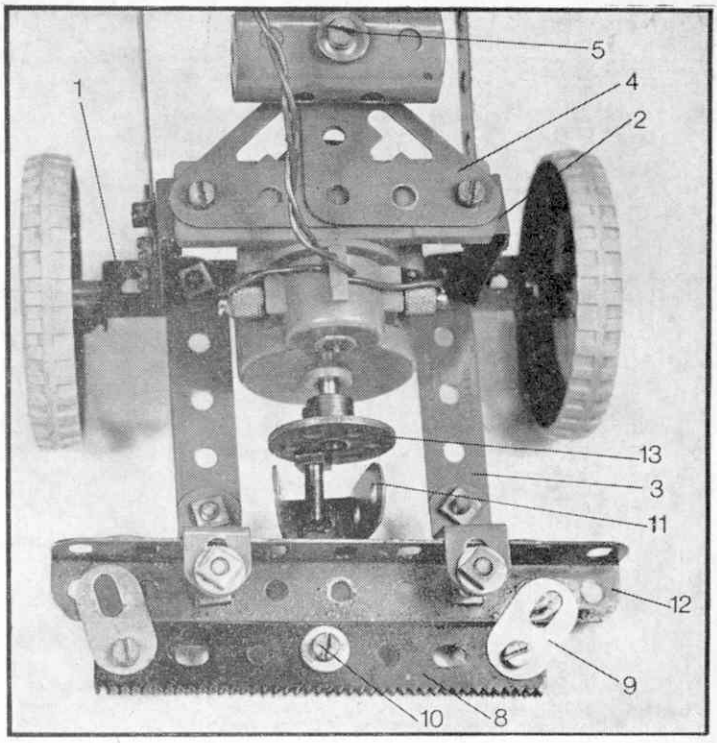
2 of No. 2	20 of No. 27b	2 of No. 111c
2 of No. 5	9 of No. 38	1 of No. 115
1 of No. 6a	2 of No. 48	2 of No. 125
1 of No. 9a	1 of No. 48a	2 of No. 133
2 of No. 10	1 of No. 48b	1 of No. 163
1 of No. 11a	2 of No. 77	2 of No. 164
2 of No. 12b	2 of No. 90	2 of No. 187
1 of No. 15a	1 of No. 110	1 of No. 518
28 of No. 37a	2 of No. 111	1 Emebo Motor

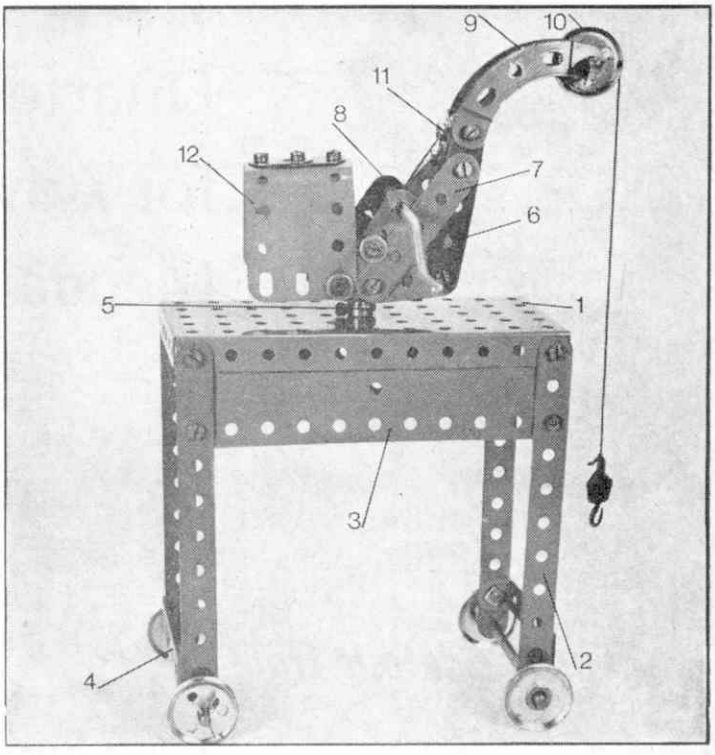
Lorry

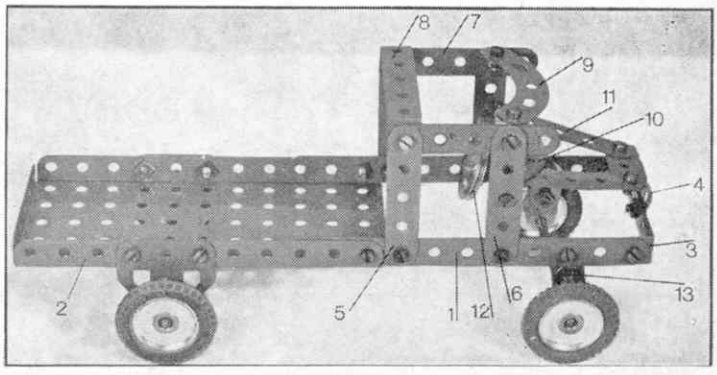
Finally, for this small model, begin by bolting two 5½ in. Strips 1 to a 5½ in. by 2½ in. Flanged Plate 2. The 5½ in. Strips are joined together at the front ends by a 2½ in. by ½ in. Double Angle Strip 3 which supports a Trunnion 4. Now fasten the 2½ in. Strips 5 and 6 in position, so that they are supported by a further 2½ in. Strip 7. Join the cab sides together with a 2½ in. by ½ in. Double Angle Strip 8 and a 2½ in. Cranked Curved Strip 9 with an Angle Bracket bolted to each end. In the centre hole of the 2½ in. Strips 6, secure an Angle Bracket to which is attached a Cranked Curved Strip 10 and a 2½ in. Strip 11. The latter are bolted to the Trunnion 4. A 1 in. loose Pulley Wheel 12 is bolted to an Angle Bracket that is fastened to the Curved Strip 10. The front axle is journalled in a Fish Plate 13 bolted to another Fish Plate secured to the Strips 1. Two Flat Trunnions bolted to the sides of the Flanged Plate support the axle for the rear wheels. The 1 in. Pulley Wheels complete with Tyres are secured to the axles to finish the model.

Parts required

2 of No. 2	1 of No. 22a	2 of No. 90a
8 of No. 5	31 of No. 37a	1 of No. 111c
4 of No. 10	30 of No. 37b	2 of No. 126
4 of No. 12	4 of No. 38	2 of No. 126a
2 of No. 16	2 of No. 48a	4 of No. 142c
4 of No. 22	1 of No. 52	







Stamps News By F.E.Metcalfe

"U.N."

Although U.N. stamps are not as popular, perhaps, in the rest of the world as they are in the U.S.A. (where they can be used for postage, if the mail is handed in at U.N. headquarters, which it very often is, particularly by collectors), they are still very much the vogue here in Great Britain. Thus the new definitive 1½ c. stamp which was issued in March is meeting with ready sales, as was to be expected. It replaced the stamp which had been on issue for sixteen years, so no one can claim that it came before its time. Four million copies have been printed by Courvoisier of Switzerland, and the designer was the Hungarian Jozsef Vertel. As usual the result is an exceedingly attractive stamp, as can be seen from the illustration.

Tristan da Cunha

We are told, without anyone batting as much as an eyelid (stout people amongst stamps nowadays), that a postal need for 4d. and £1 stamps has arisen. So, of course, we are getting just these stamps and, such is the popularity of those far off island stamps, that they will be in the 'hot cakes' selling class just as long as they are on issue. As this new high value was taking over the royal portrait design of the 10s. value, the latter is also being changed and H.M.S. Challenger (I wonder if that was the warship I served in for a time during the first world war?) shown instead. We are told that the 4½d. stamp is no longer needed, so these have been surcharged 4d. Altogether, changes which will add to the popularity of Tristan stamps, for providing it is not overdone (I hope the £1 stamp isn't classed thus), new stamps do evoke interest. This is why the special issues of our own country have set the stamp market so literally ablaze, and sent prices rocketing. And don't overlook the forthcoming Duke of Edinburgh set.

All Phosphor

Phosphor and non-phosphor lined stamps have provided a lot of fun for British collectors, and some profit for many. Now, of course, all our stamps to the 2s. 6d. value are to be phosphor lined, as is generally known. But one reader (and perhaps there are others similarly puzzled) wants to know what the lines are really for, and why the high values are not lined. Well, first of all the high values are not generally used on letters, unless they are going by registered post, or air mail, and these are handled differently to ordinary mail. Machines are now in use in many big post offices, where much mail is handled, which are known as Automatic Letter Facing Machines. These machines prepare letters for date stamping by facing them the same way up, with stamps in the top right corner. The machines work best with phosphor lined stamps. The cost of having all stamps lined is, of course, an extra expense, but such is the labour saving by using stamps thus treated that the cost is well worth while, and that explains, I hope, the queries which have been received from time to time regarding the why and wherefore of the phosphor business. Incidentally, whilst the British post office was, I think, the first to adopt the system (as to be quite fair, it often is, for there are few postal administrations as up to date, yes, and efficient, in spite of the way we grumble over late deliveries), others like Canada, U.S.A., Holland, etc., have now followed its lead.

International Tourist Year

Under the aegis of the United Nations, a number of nations are issuing a set of stamps to mark this, the I.T. Year, and India released March 19, a single in participation. A nice little stamp it was, too. I cannot say that these omnibus issues, which are what collectors call stamps issued by a number of countries, with the same object in view, are particularly popular with collectors. But odd stamps of low face value, such as the one India released, sell readily enough, and this has meant that the stamp illustrated has been almost a best seller. Indian stamps are, of course, very popular with British collectors and, as I have previously remarked, with every reason, because whilst this postal administration sees to it that all important events are marked by an attractive stamp, no attempt is ever made to exploit collectors. May it stay that way, as an example to all those P.O.'s whose aim is apparently the opposite.

Beetles

There are an awful lot of lady collectors, many of whom will be interested in popular Papua and New Guinea stamps, but I wonder if the Beetle set (nothing to do with the other Beatles, or they would be popular) will be quite to their taste. Anyhow, the four stamps issued April 12, each of which illustrates, in full colour, one of the many kinds of insects which are to be found away in the South Pacific. I must say that I took care to buy a set, and the dealer told me it was a best seller. After all, the designer was a lady, a Mrs. P. M. Prescott, who has in all designed over twenty stamps for P. and N.G.

The Tip of the Month

A few weeks ago, I was shown a collection which was really the pride and joy of a father, son and daughter. They lived in the suburbs of a large city (I will not be more explicit than that, for obvious reasons), and most Saturday mornings the three of them trip off to the city and spend around five shillings on what they fancy in the way of what they consider attractive stamps, and I must say that they do pick up some nice looking items. But I am afraid that their number one concern seems to be numbers, and they know to a single just how many stamps their joint collection contains. And, alas, in their desire to get as many stamps as they could, they worked on the principal that half a stamp is better than none. In other words, even damaged specimens were included. They get such pleasure out of the hobby that it would have been cruel to criticise, but it is certainly true that the collection would have looked much better if at least two hundred copies were removed. And this is my tip. Condition is getting more and more important. In fact, stock-book type of albums are being used more and more so that mint stamps may not even have hinges attached. That is, perhaps, going a bit too far, but it's the trend, so do try and keep torn (however small the tear, unless the stamp is a valuable specimen) or heavily cancelled stamps out of your collection. It will be all the better for it.

And now I must add the word 'finis' to these articles, which I have been writing for many years, and all I will say is that if they have given readers half as much pleasure in reading them, as they have given me in writing them, then I will be well satisfied. Stamp collecting is a grand hobby, and if these notes have been instrumental at all in making just one new recruit, then one collector at least has benefited. Goodbye to you all.

Super Model Rebuilt—continued from page 47

13. The grab is now freed from the suspender and it can be lowered in the open position (Fig. 11). On reaching the material to be removed, the hoisting rope is allowed to fall quite slack so as to give the weight of the Collar 16a a chance to pull the knot free from the catch, and so permit the closing of the jaws when hoisting is commenced.

The two ½ in. by ½ in. Angle Brackets 14, by bearing against the connecting arms of the grab, serve to maintain the grab head in a horizontal position in relation to the jaws under all conditions of service.

Parts required :

14 of No. 1	2 of No. 18b	8 of No. 63
15 of No. 1a	8 of No. 20	1 of No. 65
13 of No. 1b	9 of No. 20b	7 of No. 70
35 of No. 2	3 of No. 21	2 of No. 72
16 of No. 2a	6 of No. 22	4 of No. 76
17 of No. 3	7 of No. 22a	5 of No. 77
19 of No. 4	1 of No. 23a	1 of No. 94
33 of No. 5	2 of No. 24	5 of No. 96
6 of No. 6	3 of No. 25	4 of No. 96a
10 of No. 6a	7 of No. 26	4 of No. 102
4 of No. 7	1 of No. 26a	6 of No. 103
4 of No. 7a	4 of No. 27	4 of No. 103a
26 of No. 8	4 of No. 27a	2 of No. 103e
14 of No. 8a	2 of No. 28	4 of No. 108
9 of No. 8b	2 of No. 29	1 of No. 110
22 of No. 9	4 of No. 30	10 of No. 111
10 fo No. 9a	1 of No. 30a	6 of No. 111a
2 of No. 9b	1 of No. 30c	10 of No. 111c
1 of No. 9c	1 of No. 32	2 of No. 111d
1 of No. 9e	645 of No. 37a	2 of No. 114
2 of No. 9f	578 of No. 37b	2 of No. 125
14 of No. 10	156 of No. 38	2 of No. 126
1 of No. 11	3 of No. 40	7 of No. 126a
24 of No. 12	1 of No. 46	4 of No. 133
4 of No. 12a	8 of No. 48	1 of No. 133a
2 of No. 12b	9 of No. 48a	4 of No. 136
2 of No. 13	4 of No. 52	4 of No. 140
1 of No. 14	7 of No. 52a	1 of No. 145
4 of No. 13a	4 of No. 53a	2 of No. 147c
3 of No. 15a	2 of No. 55	1 of No. 163
1 of No. 15b	2 of No. 55a	2 of No. 167b
18 of No. 16	6 of No. 58	2 of No. 196
4 of No. 16b	51 of No. 59	1 Power Drive
8 of No. 17	6 of No. 62	Motor
6 of No. 18a	1 of No. 62b	

Lead Weights Large=24 2 in. Strips=50 grms.
Lead Weights Small=12 2 in. Strips=25 grms.
Steel Weights 6 of 3½ in. by 2 in. by ½ in.

A super model rebuilt part 2

The Construction of the Jib

THE main constructional features of the jib may be seen fairly clearly by a careful study of Fig. 2. The two lower longitudinal side members each consist of one 24½ in. and one 12½ in. Angle Girder overlapped ten holes, whilst each of the upper longitudinal members is composed of one 24½ in. and one 7½ in. Angle Girder overlapped four holes. The bottom end of the jib is extended at an angle to the main portion by 12½ in. Angle Girders, the ends of which are connected together by 4½ in. by 2½ in. Flat Plates. Where the 24½ in. and 12½ in. Angle Girders, join at X and Y (Fig. 1), Fishplates are used to connect them together.

The upper extremity of the jib is extended by 7½ in. Angle Girders that are bolted to the end holes of the side members, and a 7½ in. Strip is placed over the slotted holes of each Girder in order to give a neat appearance. Bracing should now be added to the sides as shown, care being taken to ensure that the various Strips are disposed exactly as indicated in the illustration.

The completed sides are now joined together. This is effected at the bottom end by Girders, each of which is 10 in. long (one 5½ in. and one 7½ in. Angle Girder overlapped six holes), and is bolted to the top and bottom sides of the jib, 2 in. in front of the Jib Pivot Pin 14a.

The extremities of the two upper longitudinal members of the jib are connected by a 3½ in. Angle Girder and those of the lower members are joined by a 3 in. Angle Girder. Having in this manner determined the taper of the jib, it is a simple matter to bolt into place intermediate cross-members of the correct length and then to add the bracing. The latter is triangulated, which makes the jib very strong, and yet permits of light construction.

The jib head has two distinct sets of Pulleys. One set is at the extreme end of the jib and consists of a 1½ in. Pulley secured to a Rod that has a 1 in. fast Pulley mounted loosely on each extremity. The other set comprises three pairs of Pulleys on a common Rod. The centre pair comprises two 1 in. loose Pulleys, on each side of which are placed Flat Trunnions to act as guards for the hoisting rope, and each of the two remaining sets consists of a 1 in. fast and a 1 in. loose Pulley. The respective groups are spaced on the Rod by Collars and Washers, and the bosses of the fast Pulleys serve to keep the Pulleys away from the supporting frame, so that they all may run freely.

Construction of the Gear-box

The Gearbox (Figs. 5 and 6) enables the four movements of hoisting, slewing, travelling and luffing to be driven from the 6 volt Meccano Electric Motor (a Power Drive Unit is fitted in today's model) merely by the operation of two levers. A point worthy of note is the fact that it forms a self-contained unit that is readily fitted into the model.

The 5½ in. Angle Girders 18, 18a, are butt-jointed together so that their vertical flanges point in opposite directions, the left-hand pair being bolted to a 5½ in. by 2½ in. Flanged Plate, whilst the right-hand pair are connected together by means of a 2 in. Strip. The Girders 18a also are secured at right-angles to, and two holes from each end of a 9½ in. Angle Girder that will eventually be secured to the ends of the Girders 11 (see Fig. 4). Cross Girders 40, each 7½ in. long, are bolted across the Girders 18, 18a to carry the Centre Plate 19 and the right-hand plate of the gearbox, and a 5½ in. Angle Girder 20. The Centre Plate 19 is a 5½ in. by 2½ in. Flat Plate and it is secured to the Cross Girders by a 5½ in. Angle Girder.

Having now completed the constructional part of the gearbox, we now turn our attention to the gearing. The Mainshaft 21, which is driven by the Motor, has secured to it a 1½ in. Contrate driven by a ½ in. Pinion on the Motor Shaft. On each side of the Mainshaft are two sliding Layshafts 22 and 23, each of which carries a ¾ in. Pinion and a 57-teeth Gear, the latter being in constant mesh with the ½ in. wide Pinion on the Mainshaft.

The Layshaft 22 is moved in its bearings by the Crank 36, which is secured on an 8 in. Rod that carries the Lever 37. The Layshaft 23 is actuated in a similar manner by the Lever 39 through the medium of the Crank 38. Both Cranks carry bolts, the shanks of which locate between Collars spaced a short distance apart on the Rods.

By sliding the Layshaft 23 to the right the ¾ in. Pinion is brought into engagement with a 50-teeth Gear 26. This Gear is secured to a Rod carrying a ¾ in. Contrate that is in mesh with a Pinion on a Rod 41. The latter is journalled in a Flat Trunnion that is bolted to the front top edge of the Gearbox and also in one of the 5½ in. by 3½ in. Flat Plates forming the front of the cabin. It has secured to it a ½ in. Bevel, and this meshes with a 1½ in. Bevel on a short vertical Rod on the lower extremity of which is fixed a 1 in. Sprocket Wheel 35.

A reinforced bearing is provided for the Rod carrying the Bevel and the 1 in. Sprocket Wheel 35 by bolting a 7½ in. Girder across the Girders 18a beneath the floor plates. The Rod also passes through the end hole of a Strip that is bolted to the upper portion of the roller race.

On moving the Layshaft 23 to the left the ¾ in. Pinion is brought into mesh with a 50-teeth Gear 27 on the Hoisting Barrel Shaft. The Hoisting Barrel 31 consists of a Sleeve Piece, one end of which is passed over a ½ in. fast Pulley secured against the face of the 50-teeth Gear, and it is held firmly in place by means of a ¾ in. Flanged Wheel that is pushed on to its other end.

The Hoisting Barrel is fitted with an automatic servo brake that allows the load to be hoisted with perfect freedom, but applies the brake when the barrel tends to unwind. An unequal-armed Crank, composed of a 2 in. Strip bolted to a Double Arm Crank, is fitted on the end of a Rod that is journalled in the Gearbox Sideplate and in the 5½ in. Angle Girder 20. The Rod may be operated by the Lever 33 that is secured to it by a Coupling; by raising the Lever the brake is released. A short length of Cord is passed round the Brake Drum 32 and its ends tied to the shanks of bolts on the extremities of the Crank. The automatic servo effect is accounted for by the fact that the points of attachment of the brake band to the Crank are at different distances from the fulcrum.

A 50-teeth Gear 25 is secured to a Rod that also carries a ½ in. Pinion. The latter will mesh eventually (when the Gearbox is mounted in place) with a 1½ in. Contrate on the upper end of the Rod 9 (see Fig. 4). In this manner the drive will be transmitted from the Gearbox to the wheels.

The last movement to be considered is that of luffing the jib. The two luffing cranks, each obtained from a Crank overlayed by a 2 in. Strip, are secured on the extremities of an 11½ in. Rod 29, which has fixed to it a ¾ in. Contrate that meshes with a ½ in. Pinion 28 on a short vertical Rod. The latter has a further ½ in. Pinion that meshes with a Worm on the Rod carrying the 50-teeth Gear 24. The Rod with the Pinion 28 is journalled at its bottom end in a Strip and at its upper end in a Corner Bracket that is attached to the Flanged Plate by a 1½ in. Angle Girder. One of the bolts that serve to secure the 1½ in. Angle Girder to the Plate is also passed through a 2½ in. Angle Girder, which is bolted vertically to the Plate for strengthening purposes.

Finally, the Power Drive Unit is secured to the 7½ in. Angle Girder 40 bolted between Girders 18a by ⅜ in. Bolts and to the 5½ in. by 2½ in. Flat Plates 34, bolted in positions shown to form the floor of the Gearbox, by ordinary Bolts.

Final Assembly of the Model

We now come to the most interesting stage of the construction, that of fitting together the various units to form the complete model. The Gearbox unit should be first fixed into position on the Girders 11 and 12 between the Girders 13, securing it at points a, b and c, shown in Fig. 4. It will be necessary to remove the Rod temporarily before sliding the Gearbox into place, with the control levers to the front.

A 'spider' for the roller race is now obtained from a 7½ in. Circular Strip, to which eight 2½ in. by ½ in. Double Angle Strips are bolted at 45 degrees to each other. Journalled in the lugs of each Double Angle Strip is a 3½ in. Rod, carrying a Collar on its inside end and a ¾ in. Flanged Wheel on its outside end. The 'spider' is placed on the lower Flanged Ring of the roller race, then the superstructure is lowered on to it so that the upper Flanged Ring of the roller race coincides with the Flanged Wheels of the 'spider'. The 5 in. Rod passes freely through the 9½ in. Strips bolted to the Flanged rings and also through a 1 in. Corner Bracket 42 attached to a 5½ in. Angle Girder that is bolted to a 5½ in. by 2½ in. Flat Plate in the centre of the Gearbox. Mounted on the upper end of the Rod is a 1½ in. Contrate Wheel that meshes with the ½ in. Pinion on the shaft carrying the Gear 25. The upper Race should bed down quite evenly on the ¾ in. Flanged Wheels and the complete superstructure should turn at a touch.

The jib is mounted pivotally on the front of the tower by passing the 11½ in. Rod 14a through the Flat Trunnions 14 and through the bosses of Cranks that are secured to the side of the jib. It is now necessary to add weights at Z in the shape of pieces of scrap lead melted into blocks of the required shape, or large quantities of Meccano parts, until the jib is accurately balanced. The connecting Strips 30a may then be attached pivotally by lock-nutted bolts to the luffing cranks 30, while a 12½ in. Strip 43 is bolted to the top of the Angle Girders 44 in the third hole from the end.

The hoisting cord is attached to the hoisting barrel 31, and is led over one of the pulleys 16 at the superstructure head, passing through a guide pulley on its way. The guide pulley consists of a 1 in. loose Pulley running between two Bush Wheels mounted on an 8 in. Rod that is secured by Handrail Supports to the tower. From Pulley 16, the cord passes over one of the centre pair of Pulleys at the jib head, back over the remaining Pulley 16 and then to the other centre Pulley on the jib head, after which it runs over the 1½ in. Pulley at the extremity of the jib and so down to the load hook or grab, to which it is secured.

The Single Suspension Grab

Although the model may be used as an ordinary crane by fastening a Loaded Hook to the end of the hoisting cord, its interest is vastly increased by the addition of a grab.

The grab employed on the model is known as the single suspension type, and is opened and closed merely by manipulation of the hauling rope, instead of depending for its operation, as is quite usual, upon two distinct falls of rope wound on separate barrels.

Fig. 7 is a general view of the

single suspension grab, whilst Fig. 8 shows the grab head partly dismantled. From the latter view it will be seen that the mechanism of the grab is ingenious yet, at the same time, remarkably simple. The construction of the jaws themselves should not present any particular difficulty since they are fairly apparent from the illustration. The apices of the Triangular Plates forming the sides of the jaws are attached pivotally by lock-nutted bolts to 1 in. Triangular Plates that are locked rigidly to each end of a 2½ in. by ½ in. Double Angle Strip 1, and four connecting links (4½ in. Strips) are attached pivotally to the outer ends of the jaws by lock-nutted bolts. The Double Angle Strip 1 is weighted by the addition of a number of 2 in. Strips or a 50-gramme weight, to make the jaws open.

The side plates 2 (Fig. 8) carrying the operating mechanism are 3 in. Flat Girders, which are connected together by 1 in. by ½ in. and ½ in. by ½ in. Angle Brackets 3, 3a. On the side plate shown detached are fixed two 1 in. Triangular Plates that carry 1 in. by ½ in. Angle Brackets 4 and 5, and to the Bracket 5 is secured a Double Bracket, with two Flat Brackets 6 bolted to it. Two Washers are placed between each Flat Bracket and the Double Bracket for spacing purposes.

The hooks 7 are composed of 2½ in. Strips bent to the shape shown in the illustrations and attached by means of ½ in. Bolts to 57-teeth Gears. The ends of the Strips are each fitted with a Pawl and a Flat Bracket. The catch 9 is composed of a Centre Fork shortened by $\frac{3}{16}$ in., held in the end bore of a Coupling, which also carries a Handrail Support 10 and a balance weight 11 consisting of a 1 in. Rod to the end of which is secured a Collar. The Gears are arranged to mesh with each other so that the Hooks 7 lie at the same angle to the perpendicular, and the Rods on which they are secured should be perfectly free to turn in the side plates 2.

The Handrail Support 10 of the catch is mounted freely on the spindle of the right-hand Gear, and a ⅜ in. Bolt 8 is secured by double nuts to the Gear in the third hole from that in which the 2½ in. Strips are secured. Each hook is kept in the normal position by a piece of Spring Cord 12, one end of which is attached to the side plate and the other to a set-screw inserted in the boss of the 57-teeth Gear. Each piece of Spring Cord should be partially carried round the boss of the 57-teeth Gear before it is attached, so that its effort to come back to its normal state, and not its actual tension, is utilised to return the hooks. If it were used in the normal way, the tension would be too great for the purpose in view.

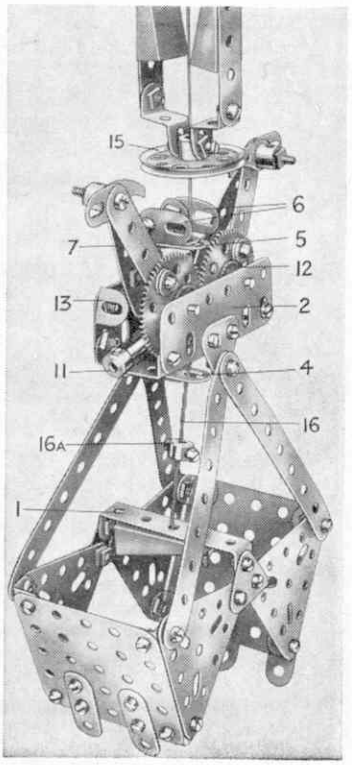
The connecting links between the grab proper and the grab head are attached by lock-nutted bolts to the 1 in. Triangular Plates, and the hoisting cord 16 is secured to the cross member 1. The cord is then threaded through the round holes in the lower guide 4 and a large knot made in it in such a position that when the jaws are open the knot rests on top of the guide. The cord is then passed through the upper guide 5 and through the 1½ in. Pulley 15, which is termed the 'suspender ring'. This consists essentially of a 1½ in. Pulley that is hung by two cords 17 from the jib head. These cords are each passed over the Pulleys 15 on the tower (Fig. 4) and over the outside pairs on the jib in exactly the same manner as that followed with regard to the hoisting cord, but the ends of the cords are attached to 1½ in. Strips 17a at the top of the tower, and are not let down to a winch. A winch may be added if it is desired to effect discharge at different levels, otherwise it is only necessary to adjust the suspender to the most convenient height and then secure the ends of the cords to the Strips 17a. The object of the pulley system is to maintain the suspender in one horizontal position through all luffing angles in accordance with the Toplis principle.

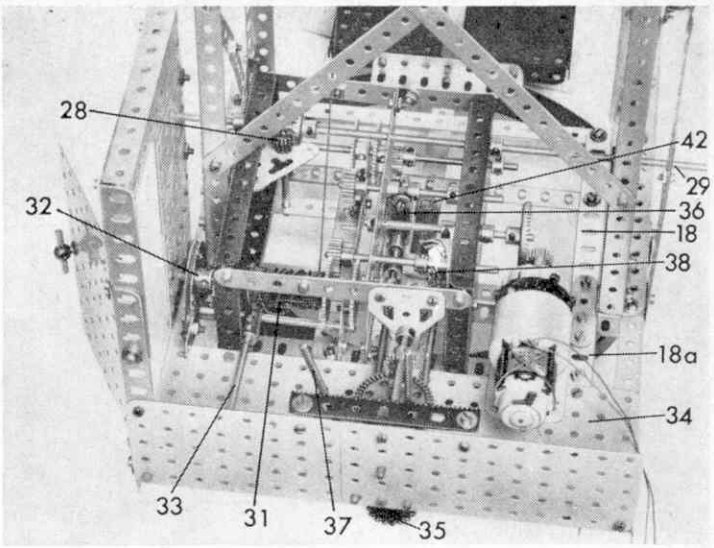
The diagrammatic illustrations (Figs. 9-11) should help to make clear the operation of the grab. The grab should be assumed to be approaching the suspender with jaws closed (Fig. 9). In this position the hooks 7 are resting against the stops 6, the catch 9 is not touching the cord, and the knot is above the catch. The Pawls on the ends of the hooks are now forced over the rim of the suspender, thus allowing the catch to rise and bear against the hoisting rope.

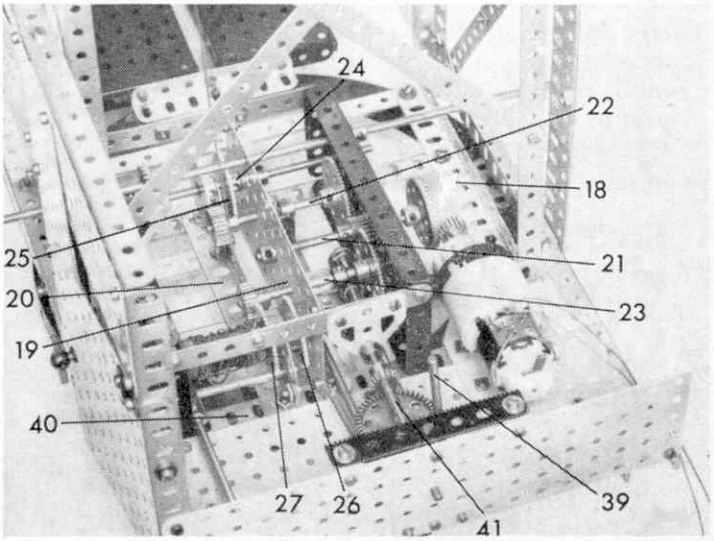
Now if the latter is lowered, the weight of the grab is borne by the hooks and the jaws open. As the grab opens to its fullest extent the knot in the hoisting cord passes to the underside of the catch 9 (Fig. 10).

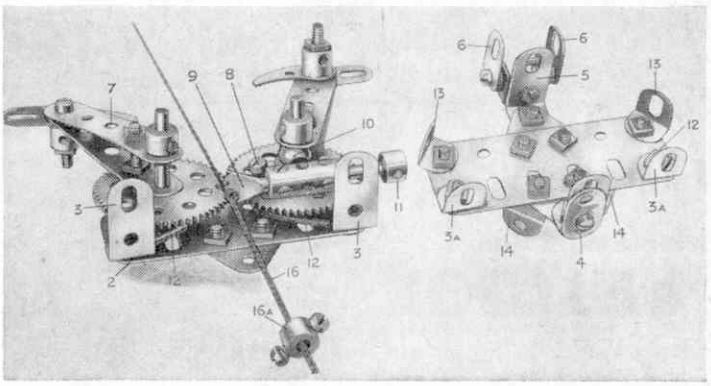
To release the grab from the suspender, the hoisting rope is hauled in a little, thus causing the knot to bear against the underside of the catch. The latter bears, in turn, against the ⅜ in. Bolt 8 and the arms of the hooks fall back on the stops

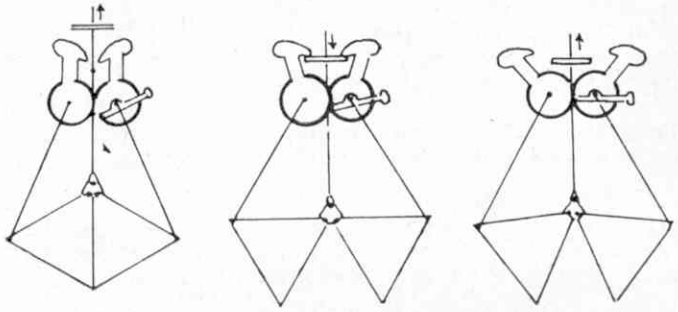
Continued on page 45



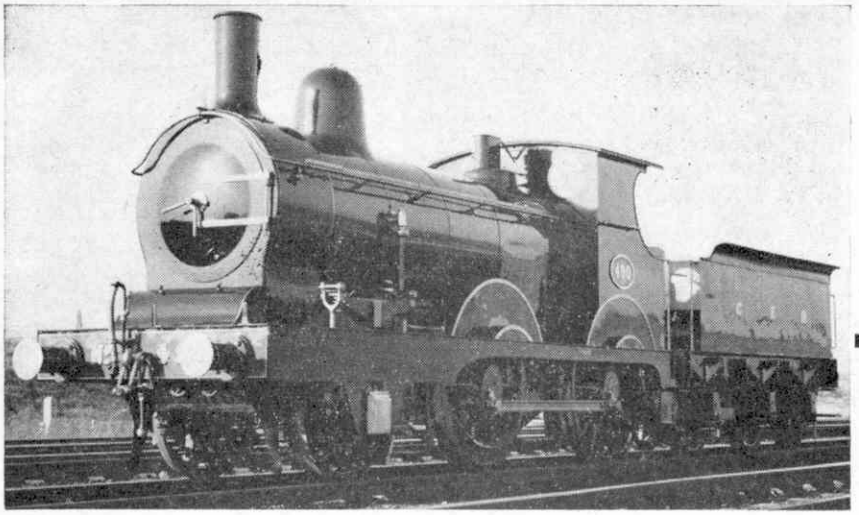








Diagrams illustrating the operations of the grab



Transport Museum

Travel back in time! The Museum of British Transport contains relics of public transport over five generations: Historic locomotives—Royal coaches—trams—horse-drawn and other buses. You can also see *Mallard,* the fastest steam locomotive ever built—126 mph on 3 July 1938.

Visit also: **The Railway Museum, York**
The Great Western Railway Museum, Swindon

Museum of British Transport
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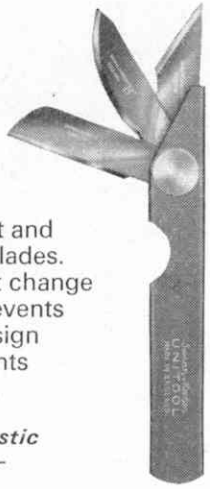

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Bilsthorpe, Newark.

M. Baverstock
London, E.14.

G. Bray
Barton-on-Humber Lincolnshire.

G. Bunn
Broadstone, Dorset.

C. Burton
London, S.W.4.

C. Cottam
Plymouth, Devon.

N. Critchley
Inverness, Scotland.

A. Croome
Newport Monmouthshire.

J. Dowds,
Belfast, 13 N. Ireland.

G. M. Drodz
Hinckley Leicestershire.

W. Green
Fort William Scotland.

C. Haley
Somercotes Derbyshire.

G. Jones
Wymondham Norfolk.

G. Kilminster
Wexham Estate Slough.

R. Lewis
Port Talbot Glamorganshire.

R. McHugh
Newport Monmouthshire.

D. Muir
Coatbridge, Scotland.

D. Oliver
Dudley Worcestershire.

S. Palmer
Thetford, Norfolk.

D. Payne
Paignton, Devon.

J. M. Rogers
Lyndhurst Hampshire.

B. Snow
Weymouth, Dorset.

B. R. Volk
Brighton, 6, Sussex.

A. Waller
Sandling, Maidstone.

S. Ward
Hythe, Kent.

2ND PRIZE

M. Almond
Wallington, Surrey.

J. Batchelder
Littlebourne, Kent.

N. S. Blofield
Copnor, Portsmouth.

A. Borland
Bangor Caernarvonshire.

P. Brissenden
Sittingbourne, Kent.

P. Burgess
Stourport Worcestershire.

G. F. Campbell
Findochty, Banffshire.

B. L. Chapman
Tickhill,Nr.Doncaster.

G. Climo
Tintagel, Cornwall.

P. Coyne
Laleham, Middlesex.

M. Denman
Heavitree, Exeter.

D. Durston
Wembley, Middlesex.

A. Edward
Aberlour, Banffshire.

P. Emuss
Codsall Wolverhampton.

J. Flack
Rushden Northamptonshire.

D. Fraser
Leigh-on-Sea, Essex.

A. Gerrard
West Heath Birmingham, 31.

A. Gibson
Ballymena County Antrim.

M. J. Gorrard
Carshalton, Surrey.

A. M. Graham
Richmond, Yorkshire.

J. Gutcher
Wheatley Hill Durham.

J. D. Hall
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K. Hebson
Threlkeld Cumberland.

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High Road Well Halifax.

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K. Kelsall
Stoke-on-Trent Staffordshire.

A. Lace
Egremont Cumberland.

I. Lax
Stanmore, Middlesex.

R. MacGregor
Raigmore, Inverness.

T. Marsh
Weymouth, Dorset.

P. Meakin
Salford, 6, Lancashire.

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• Sales, wants, swops, bargains, obsolete Dinkies? Advertise for them in MINIATURE AUTO'S Modellers' Market, the feature collectors read. 2d. a word private, 5d. a word trade. Details in any copy of Miniature Auto, or from Knightsbridge Publications, 3/4 St. Andrew's Hill, E.C.4.

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• Boy aged 16 wishes to start a Meccano club. Anyone interested please contact Rupert Alexander, 82 Parkside, Shoreham, Sussex.

• Bound M.M.'s, July 1927 to January 1966, offers over £20; 10,000 Cigarette Cards, from 1904. Offers to: Maurice Taylor, 501 Sutton Road, Southend-on-Sea.

• Meccano Set 3, gears outfit B, Triang railway equipment. N. McNee, 117 Brahan Terrace, Perth.

• 86 M.M.'s, January 1956 to June 1963, £3, post paid. Wild, Bonnybush, Pilford, Wimborne.

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• M.M.'s, 1956-62, unmarked; Black Figure Skates (sevens); offers. 18 Dovedale Avenue, Kenton, Middx.

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• M.M.'s, December 1964-April 1967. S.a.e., Bone Campion's, Saint George's Road, Bickley, Bromley, Kent.

• Collector will have shortly for sale or exchange Meccano Magazines which are being bound at this moment, and should be available June. Bound vols. 1924, 1925, 1926, 1928, 1929. Separate months in original covers, 1925, 1926, 1927, 1929, 1950-1960. Instruction leaflets. Pre-war. Ten set leaflets. Most of these unexamined, but in excellent condition. Stephenson, Stoneycroft, Station Road, Earl Shilton, Leicestershire. Telephone Hinckley 3234 daytime; Earl Shilton 2049 after 7 p.m.

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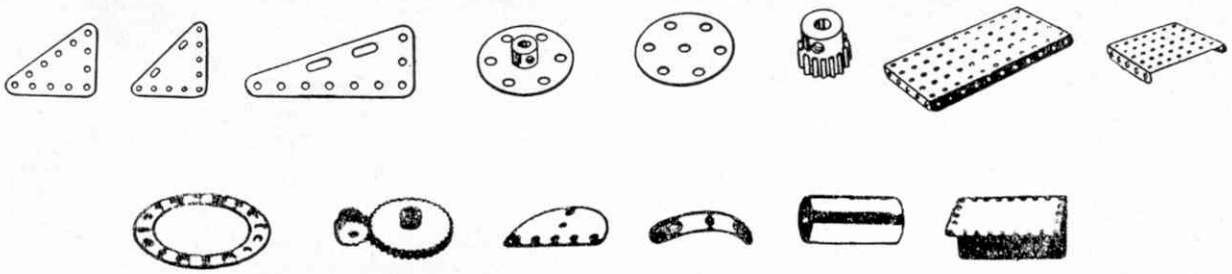

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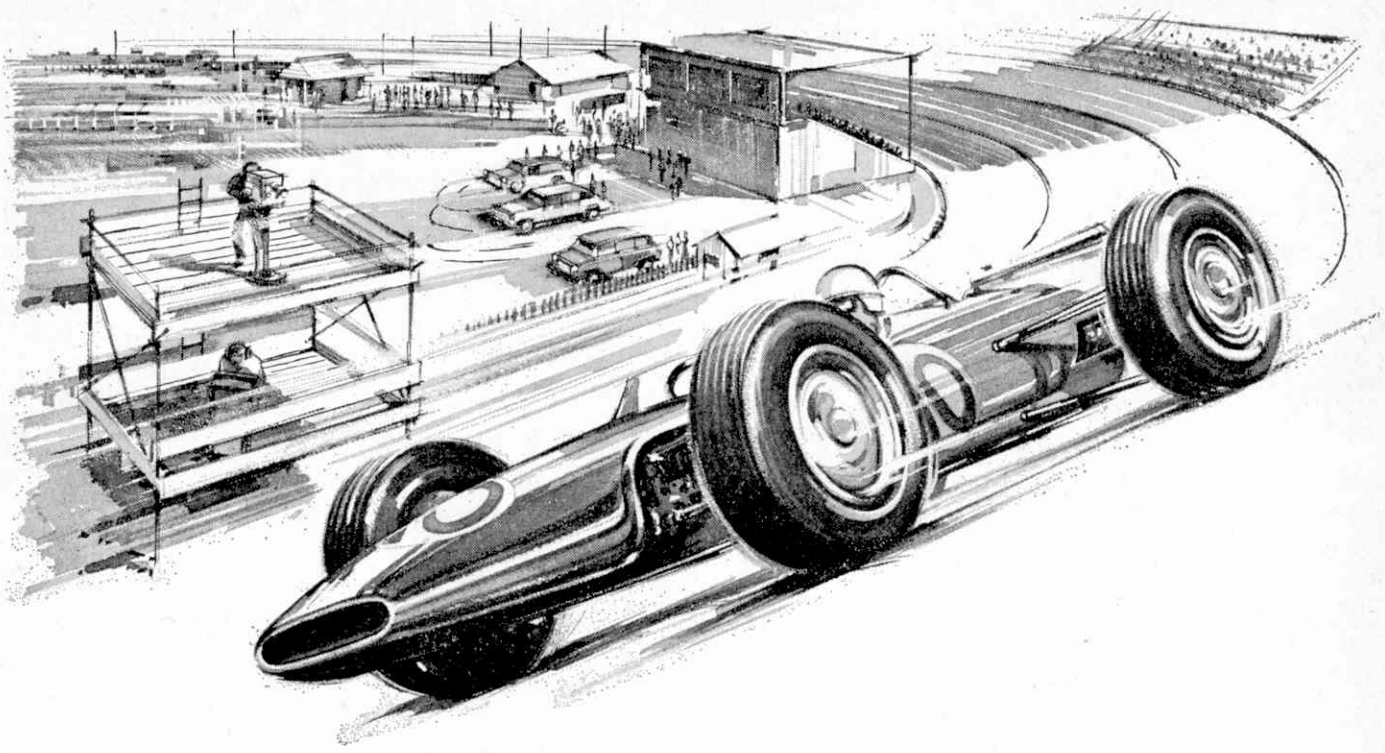

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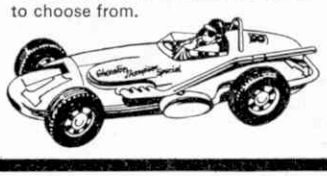

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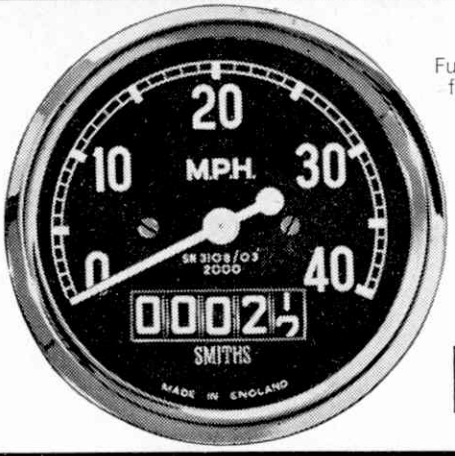

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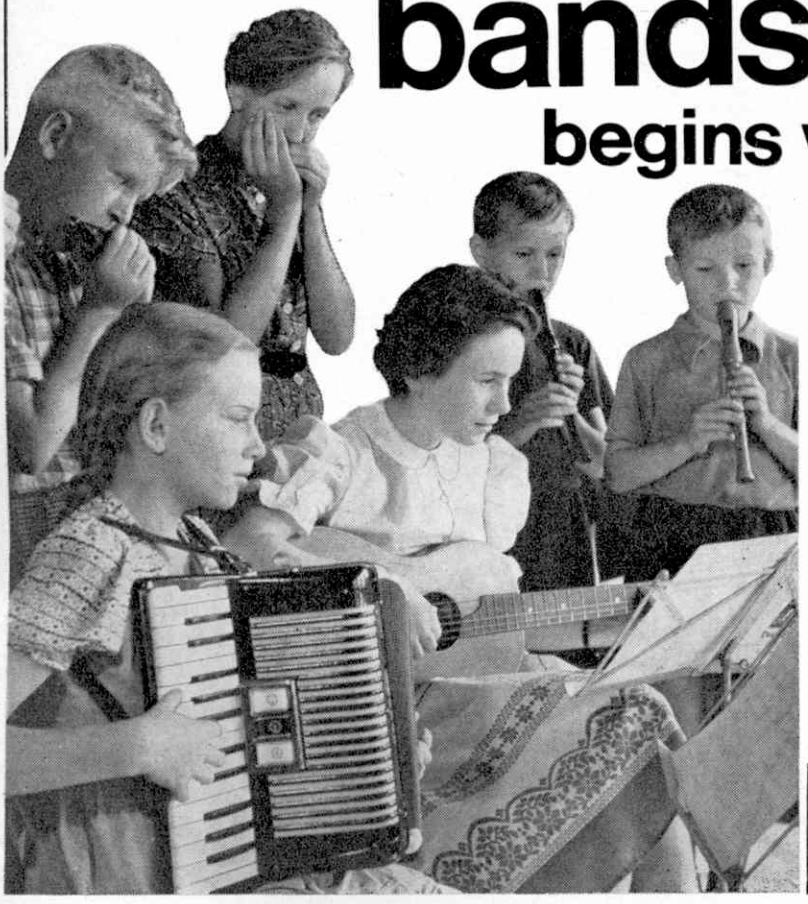

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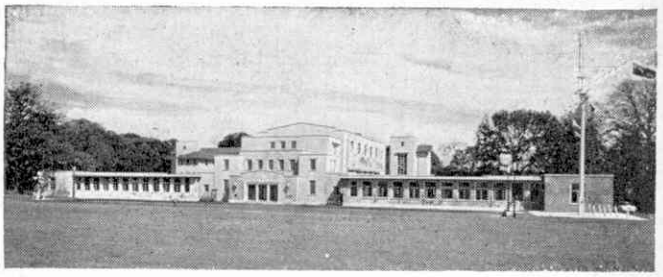

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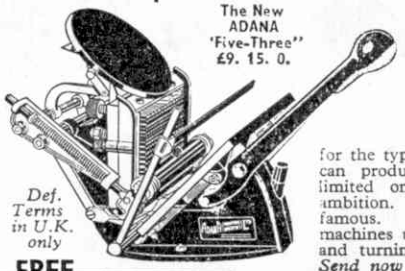

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Write for Price List of Components required to build 'Electronic Computer' Described in this issue

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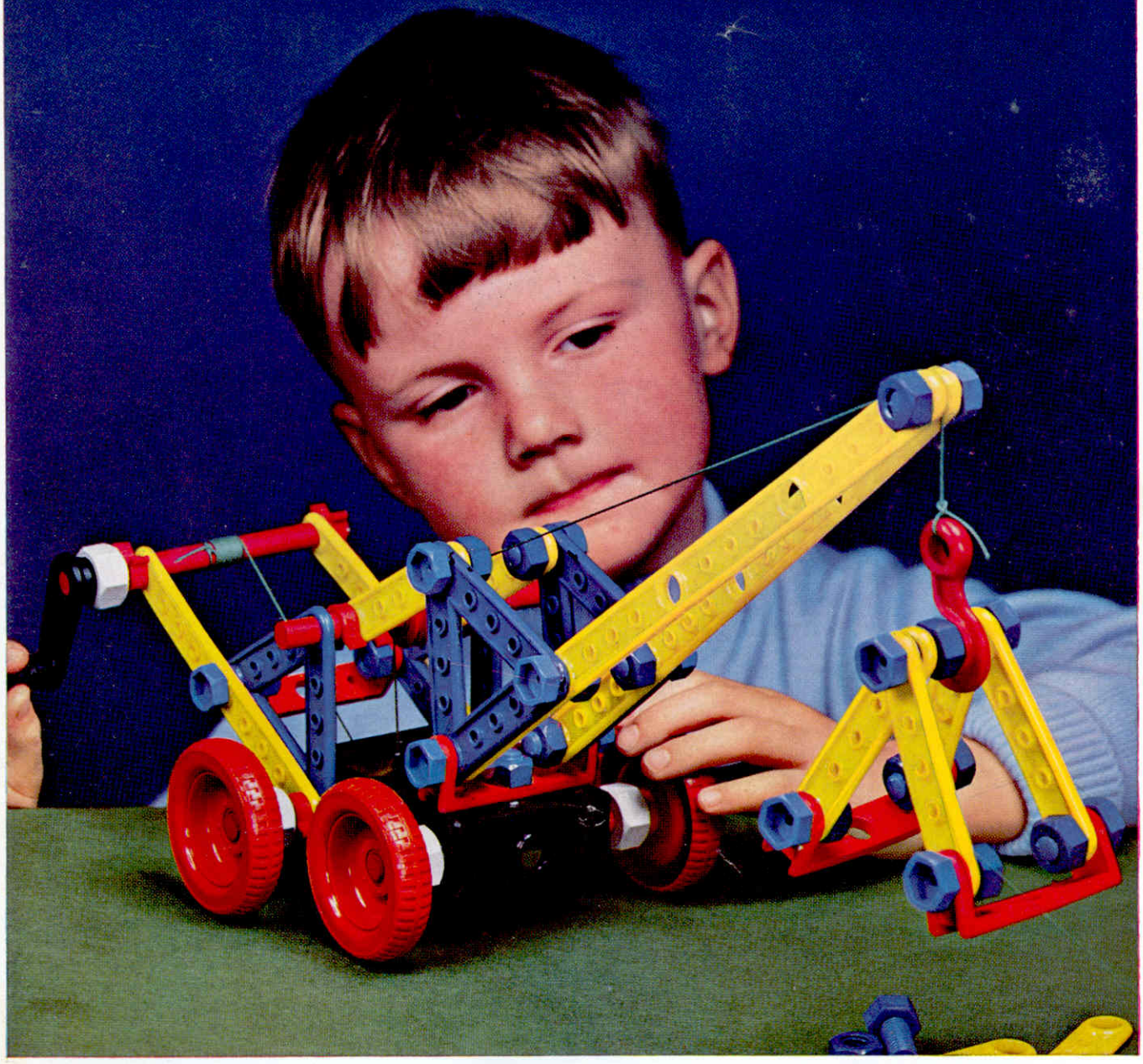
This little boy built a smashing 'grab' for fun– with the big, chunky pieces of new Plastic Meccano



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