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JUNE 1968

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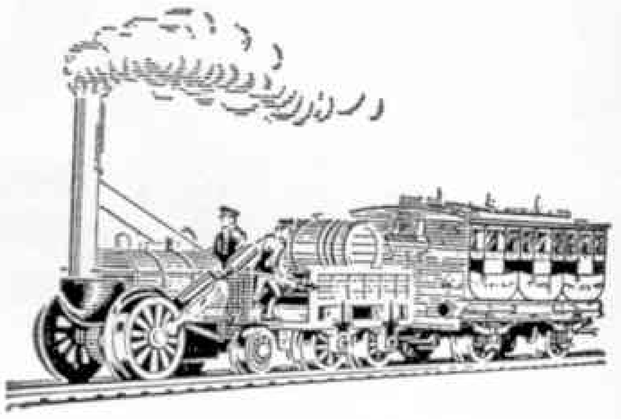

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MECCANO® Magazine

JUNE 1968 VOLUME 53 NUMBER 6

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Advertisement Manager
ROLAND SUTTON

MAP **HOBBY MAGAZINE**

FRONT COVER

The cover photograph of a display, built by James Yule of Perth, Scotland, shows a Napoleonic battle scene. Gunners of the Foot Artillery and French Imperial Guard around the year 1807 (they are very distinguishable by their uniforms of imperial blue trimmed with red) handling an eight-pound Gribeauval cannon. The cannon and soldiers are made from Historex kits. See page 310 for full details.

NEXT MONTH

Our cover for July has a Police Patrol Car painted in action to tie in with a feature on the Hertfordshire Police, detailing just how the Force operates. Meccano Models include a Plastic and Standard Meccano Swing Bridge, Among the Model Builders, and the final part of Bone Shaker. There will also be two pages of Dinky Toy News by Chris Jelley. For the balsa builders we have half-size plans for a rubber powered, propeller-driven car, and full size plans for an electrically operated Cable Car. This is not a gimmick, it will go from the garden to the bedroom window with ease. Chemistry is back again—this time on invisible ink, an all time favourite. A.B.C. of Model Railways, Trackside Construction, Have You Seen, and many other interesting features, make the July Meccano Magazine an issue you must not miss.

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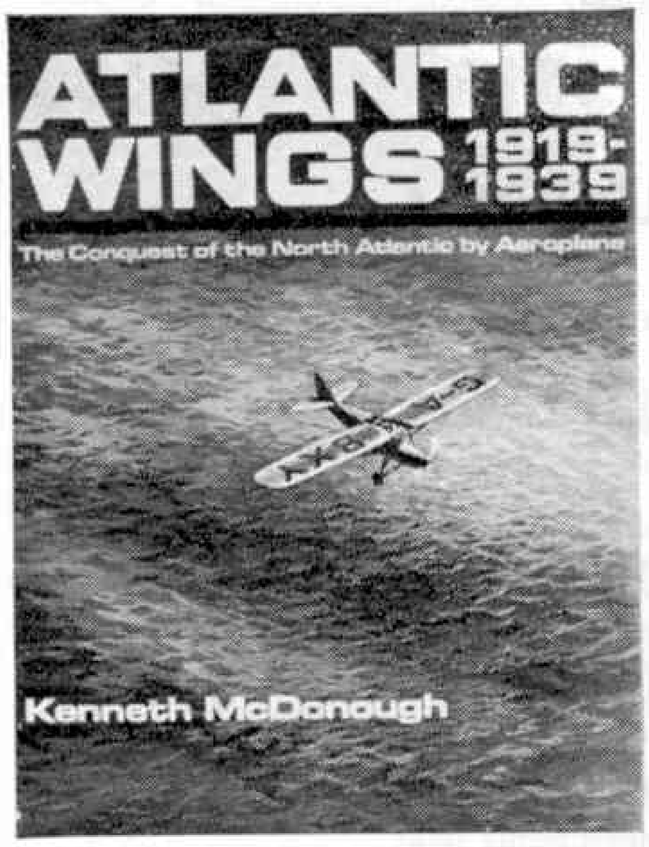

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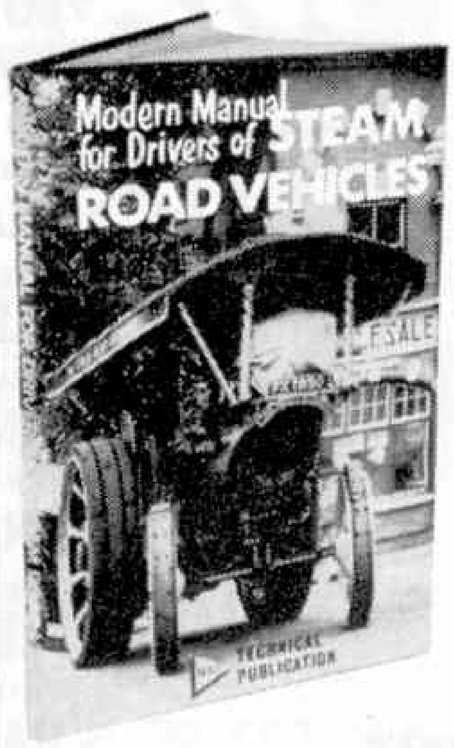

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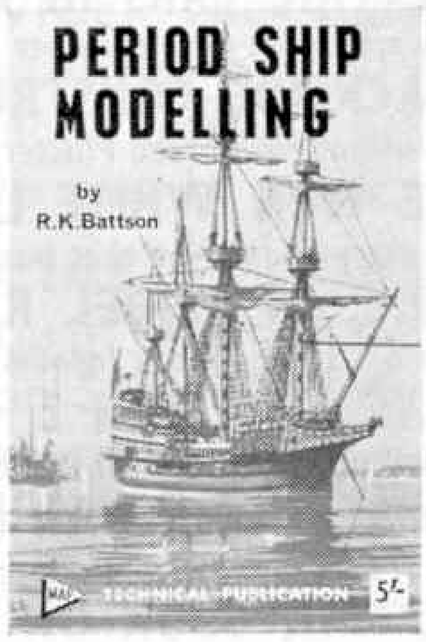

18. PERIOD SHIP MODELLING

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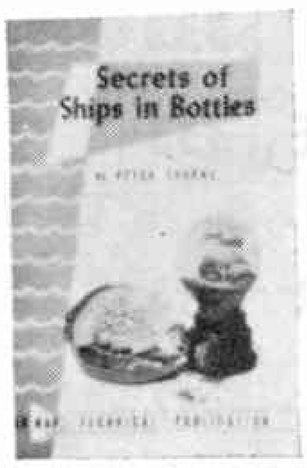

19. SECRETS OF SHIPS IN BOTTLES

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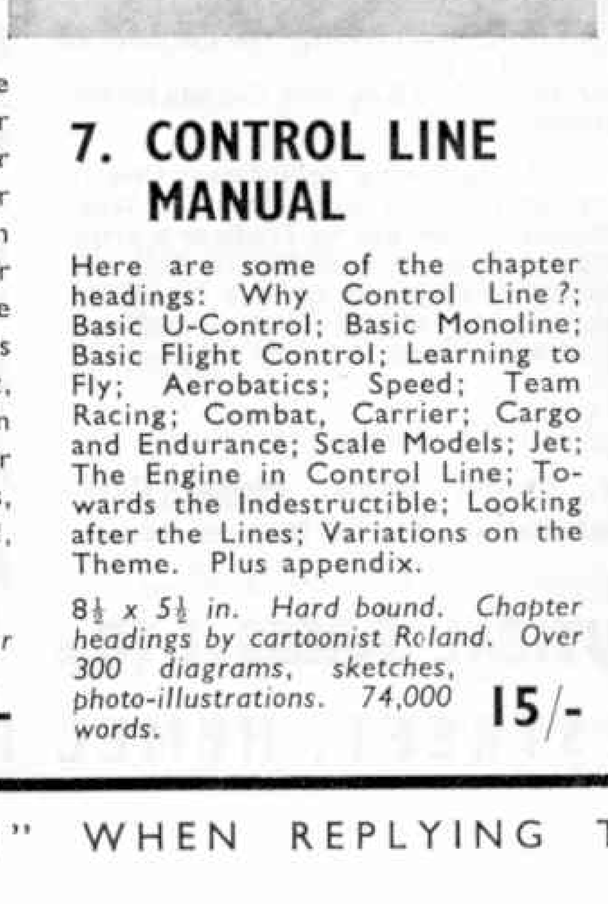

23. MODEL CARS ENCYCLOPAEDIA

This Electric Model Car Racing Encyclopaedia brings together a wealth of information for the benefit of expert and beginner alike, conveniently arranged in A-Z form. It is an attempt to assemble in one place quite a lot of information about electric model car racing in simple alphabetical form where it will be readily available for reference, ranging from Ackerman steering through Drivers and Driving to Pay Circuits and on to Worms and Zinc Spraying.

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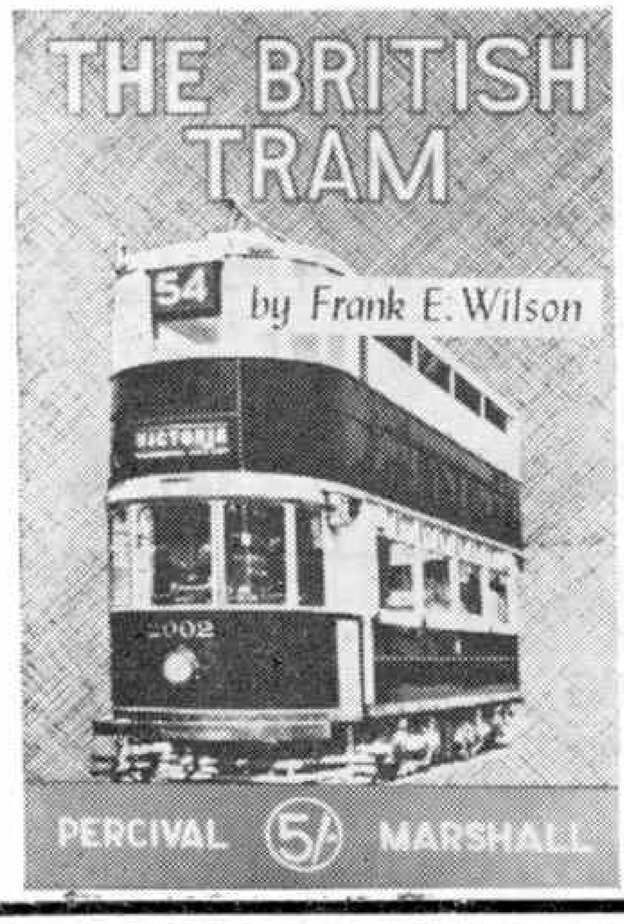

74. THE BRITISH TRAM

"Travel at Midday—Twopence all the Way" was a pre-war slogan of the trams, and author Frank Wilson takes the reader from the very beginning with horse-drawn trams, through their heyday when Austin Sevens were alleged to get stuck in the rails and carried on to the depot, until their eventual eclipse in modern times. Chapters cover History, General Features, Lines, the Car itself, how it worked, and the passing of an era.

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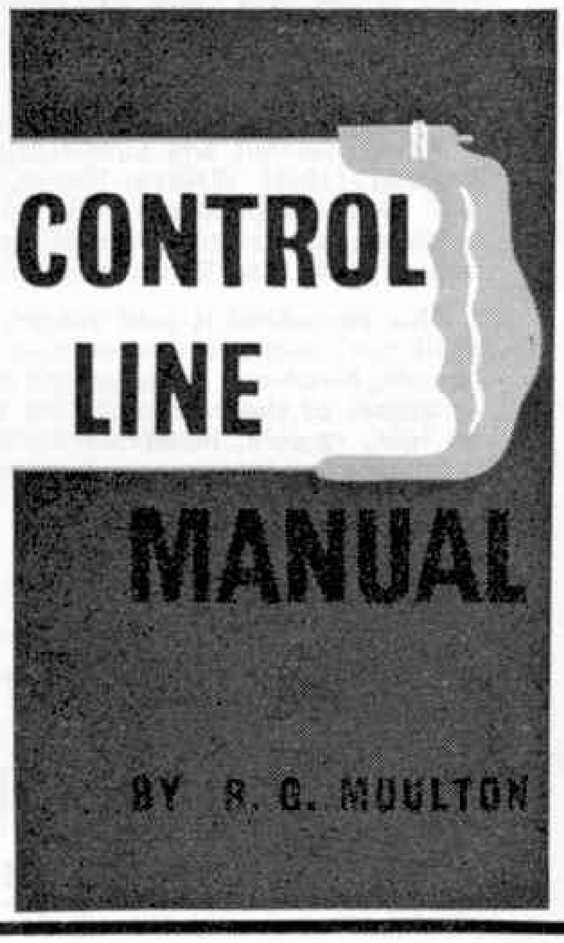
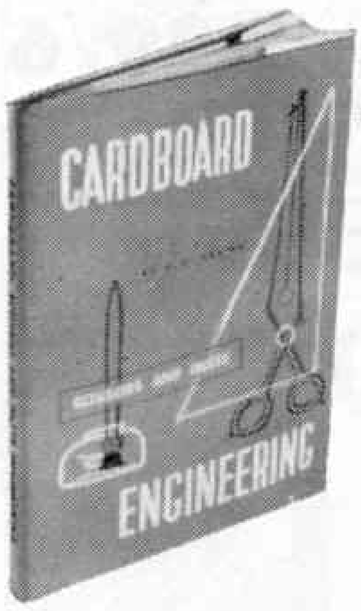


BOOKS for Model Makers . .



56. CARDBOARD ENGINEERING

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102. AEROMODELLER ANNUAL 1967-68

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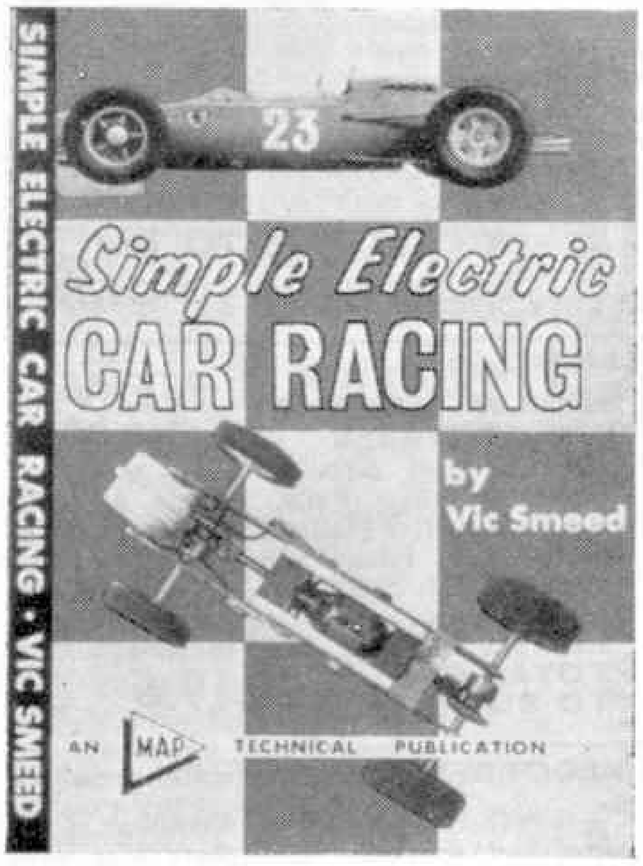

21. SIMPLE ELECTRIC CAR RACING

The ideal introduction to electric cars—practical survey giving the facts of successful car and track construction in full detail Anyone coming new to the hobby will find in its pages the answers to all the questions likely to arise in building cars and tracks from scratch: a great proportion of its content will also be invaluable to those who are content to buy commercial cars and track but who are anxious to get the very best out of their purchases.

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107. RADIO CONTROL MANUAL NO. 2

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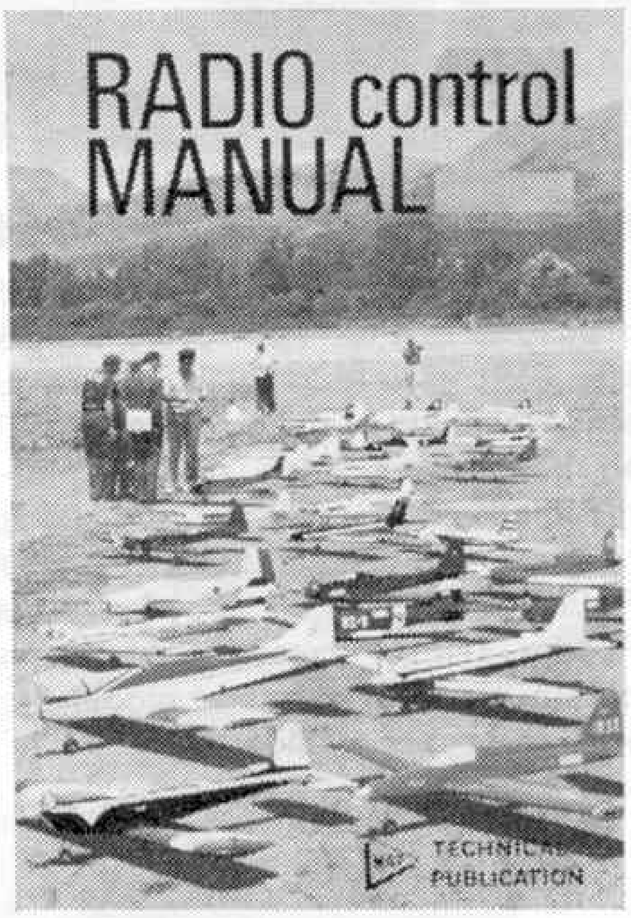

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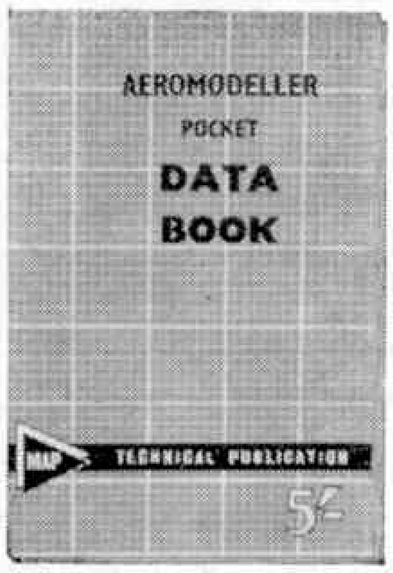

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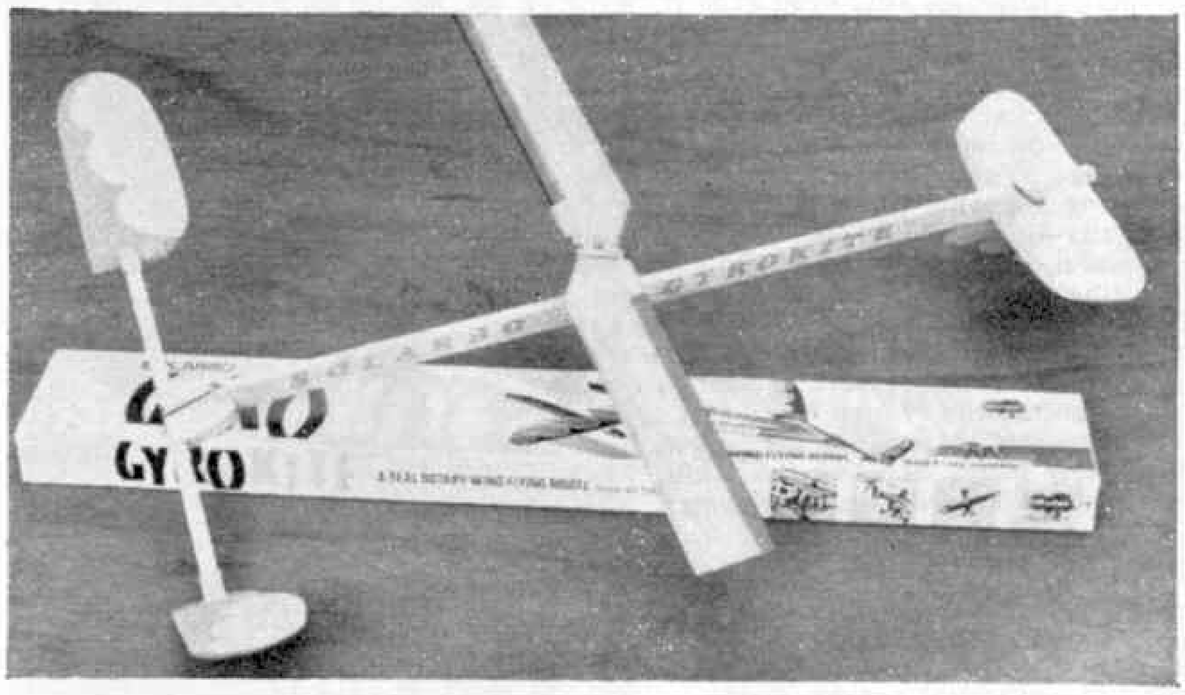

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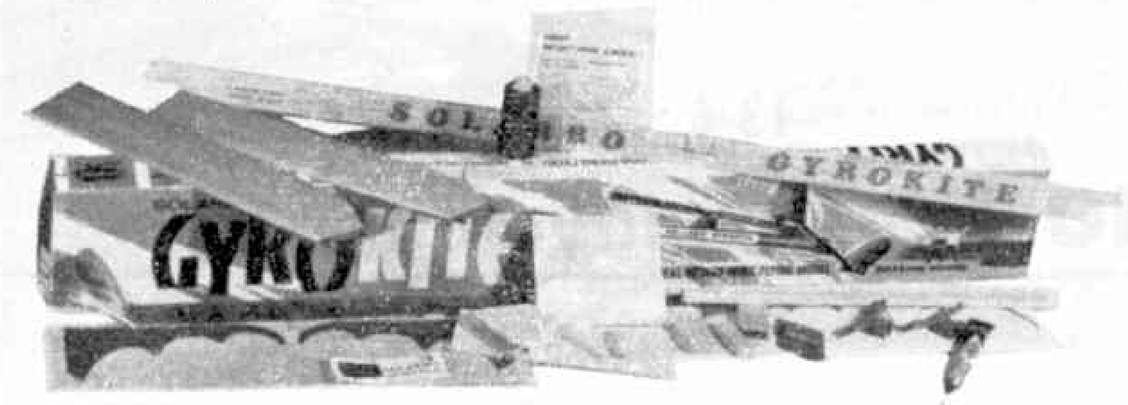

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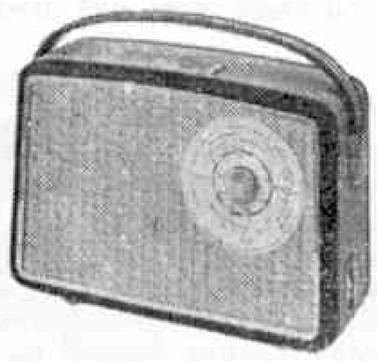

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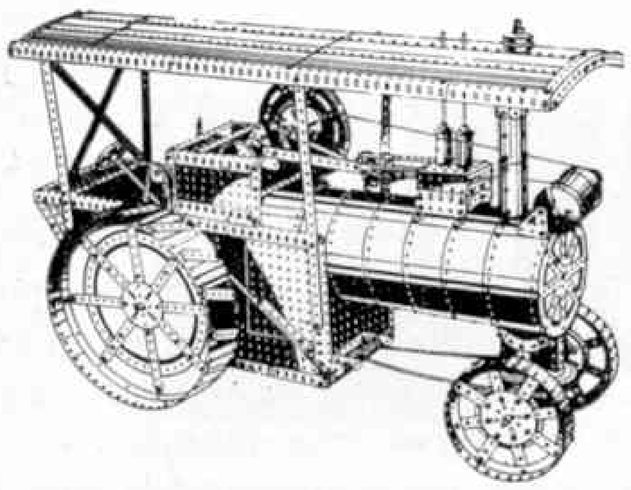

WHAT'S WHAT IN THE MECCANO LINE

The standard progressive Meccano system consists of ten Main Sets, numbered 1-10 inclusive each with an identifying "theme" name in addition to the number. This theme, e.g. "Highway Vehicles" is obtained from the predominant type of model featured in the Instructions Book for the particular Set and does *not* mean that *only* models of that type can be built with the Set. In fact, the number and variety of models that can be produced is limited only by the imagination of the user. Also included in the standard system is a series of seven Conversion Sets. These are not intended as constructional sets in their own right, but simply contain the necessary extra parts to convert a Meccano main outfit into the next larger one, e.g. Outfit 1 + Conversion Set 1A = Outfit 2. Also available, but not included in the standard progressive system, are several self-contained outfits, such as the Power Drive Set and Gears Set, as well as a number of Motors and additional equipment. The following is a list of all items and Sets currently available, with their U.K. recommended retail prices:

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4.	Airport Services	3	10	0
5.	Site Engineering	4	16	6
6.	Ocean Terminal	5	18	6
7.	Mountain Engineer	8	2	6
8.	Breakdown Crew	13	18	6
9.	Master Engineer's Set	23	5	0
10.	Meccano Outfit in 4-Drawer Cabinet	61	10	0
	Meccano Gears Set	1	5	11
	Meccano Mechanisms Set	2	1	0
	Elektrikit	4	9	11

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No. 3a	" " 3 " " 4	1	9	6
No. 4a	" " 4 " " 5	1	15	0
No. 5a	" " 5 " " 6	1	7	9
No. 6a	" " 6 " " 7	2	5	0
No. 7a	" " 7 " " 8	5	15	9

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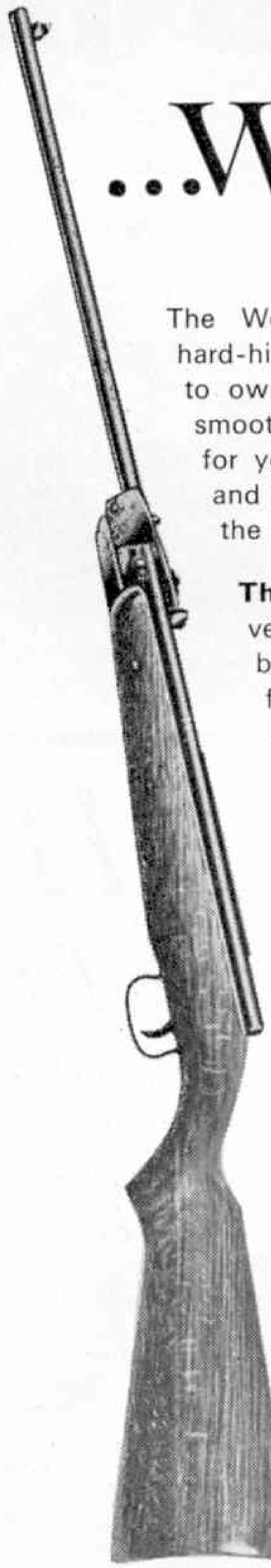

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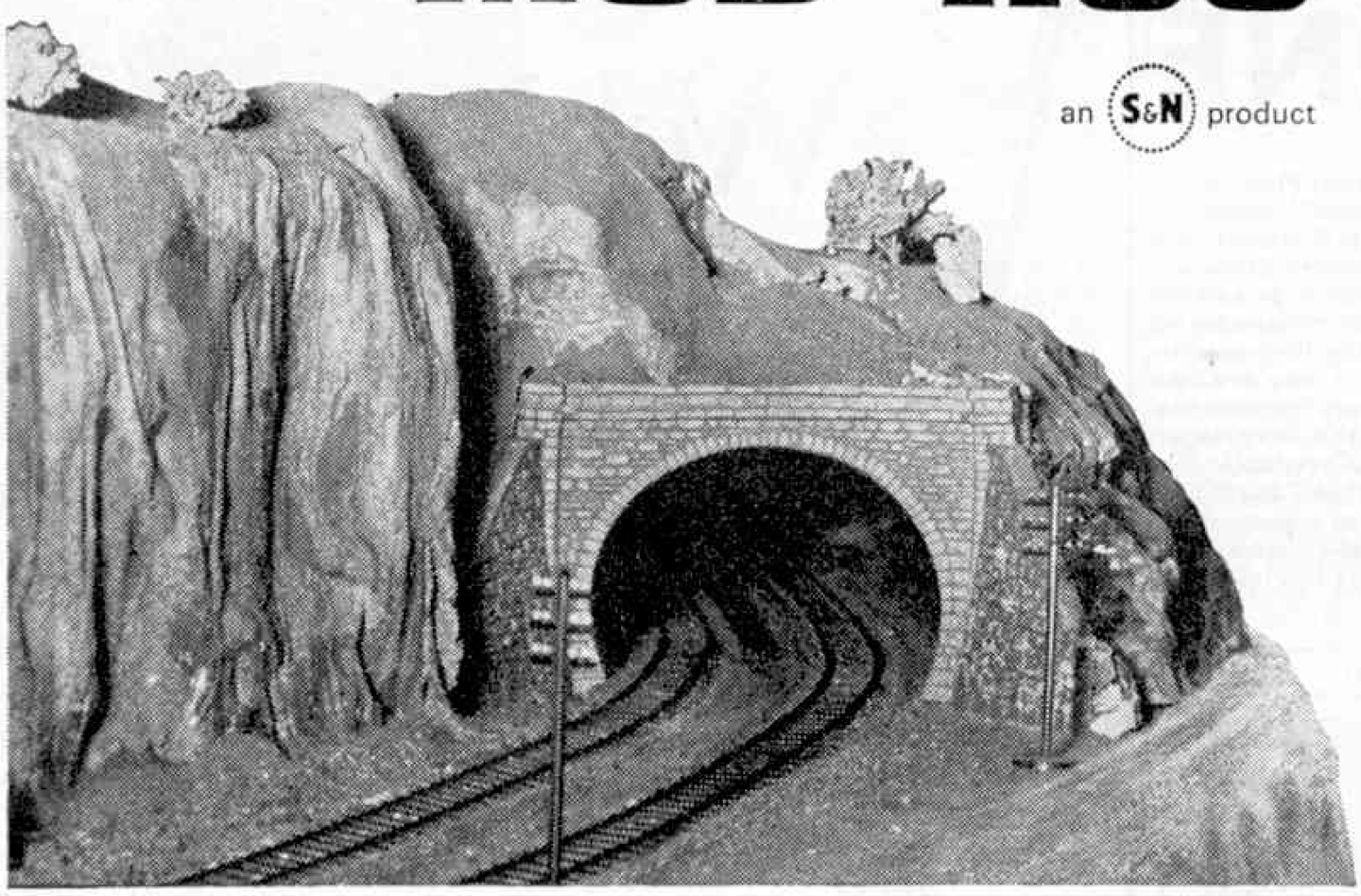

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WORKBENCH

Scalextric go full size !

THE CHEQUERED Flag Racing Group and Scalextric have just formed a new Formula 3 Racing Team to be called The Chequered Flag/Scalextric Racing Team.

Scalextric, one of our leading manufacturers in slot-car racing equipment and models, and part of the Lines Bros., toy manufacturing group, became interested in the idea of sponsoring a proven, successful and experienced full size racing team in order to publicise their products, and to keep abreast of the latest trends in motor-racing. The Chequered Flag, long established as England's leading private entrant in Formula 3 racing, had the qualities that Scalextric sought—a dozen years in motor racing with excellent results, a compact and well run organisation, and are noted for having helped many world famous drivers on their way to the top while they were unknown. Stars such as the late Jim Clark, Graham Hill, Mike Parkes, Jackie Stewart, Mike Spence, Chris Irwin, Roy Pike, Jacky Ickx and Robin Widdows have all driven for The Chequered Flag, establishing the Flag's reputation for selecting potential Grand Prix drivers at an early stage and materially assisting their careers. Thus The Chequered Flag/Scalextric Racing Team came into being.

This year, the drivers will be 22-year-old Mike Walker from Kidderminster, who has successfully campaigned his own Brabham for the past two seasons, and 19-year-old Ian Ashley from Lincoln, who last year established himself as a force to be reckoned with in Formula 3 with his privately entered Merlyn Mk. 10.

Initially, both drivers became interested in motor racing through slot-car racing, and both were winners on the Scalextric circuits at their schools, and now both are on the way to the top with The Chequered Flag/Scalextric Racing Team. The cars are 1968 McLaren M4A's, with the latest Cosworth engine.

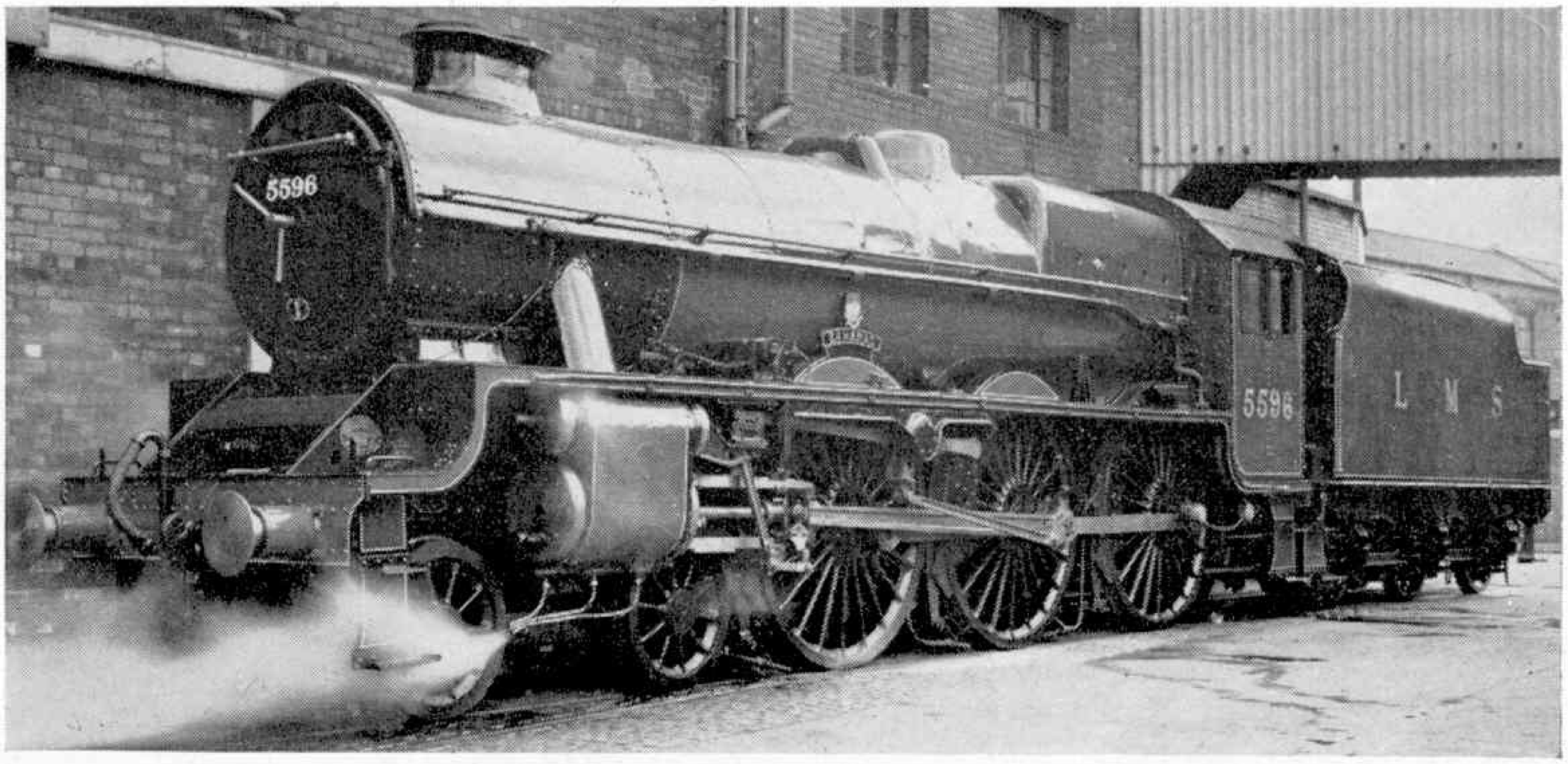
Above, the Chequered Flag/Scalextric Formula 2 racing cars, they certainly look potent. See page 362 for details of new Scalextric model cars. Below, looking like new, in its original L.M.S. livery is the Jubilee Class locomotive No. 5596 "Bahamas" after her restoration by the Hunslet Engine Co.

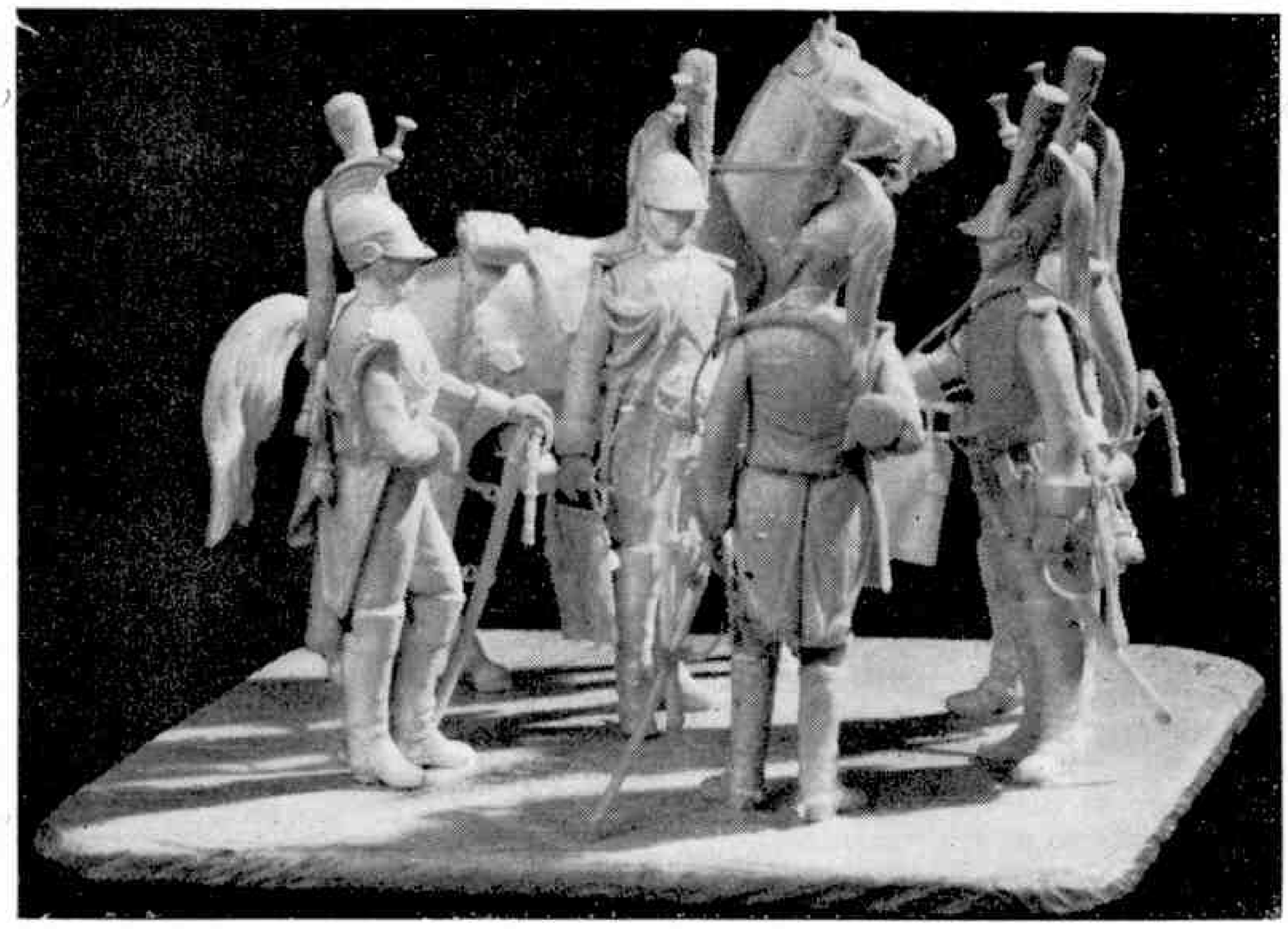
What a slip

Much to our surprise only one reader has written to point out that the heading photograph in *A.B.C. of Model Railways*, part 4, Track Formations in the April issue was wrongly captioned. The picture shows a *single slip* and not a *double slip* as stated. Congratulations to Peter Burgess of Radlett, Herts., for being so observant.

Model paints for prototype

Looking like new, in its original L.M.S. livery is the Jubilee Class locomotive No. 5596 "Bahamas" after her restoration by the Hunslet Engine Co. Ltd. The locomotive is seen outside the works in Leeds, prior to being delivered, under steam, to her new owners, the Stockport (Bahamas) Locomotive Society. During the rebuilding the question arose as to who could supply paint in authentic L.M.S. colours. It was remembered that a range of authentic railway colours was made by Humbrol Ltd., and investigation proved that the required colours were made by them. This Company made up a special consignment of 15 gallons of crimson lake and supplied it in bulk, which was unusual, since their authentic railway colours are normally supplied in ½ oz. tinlets. Had it been supplied this way, the consignment would have represented some 4,800 tinlets !



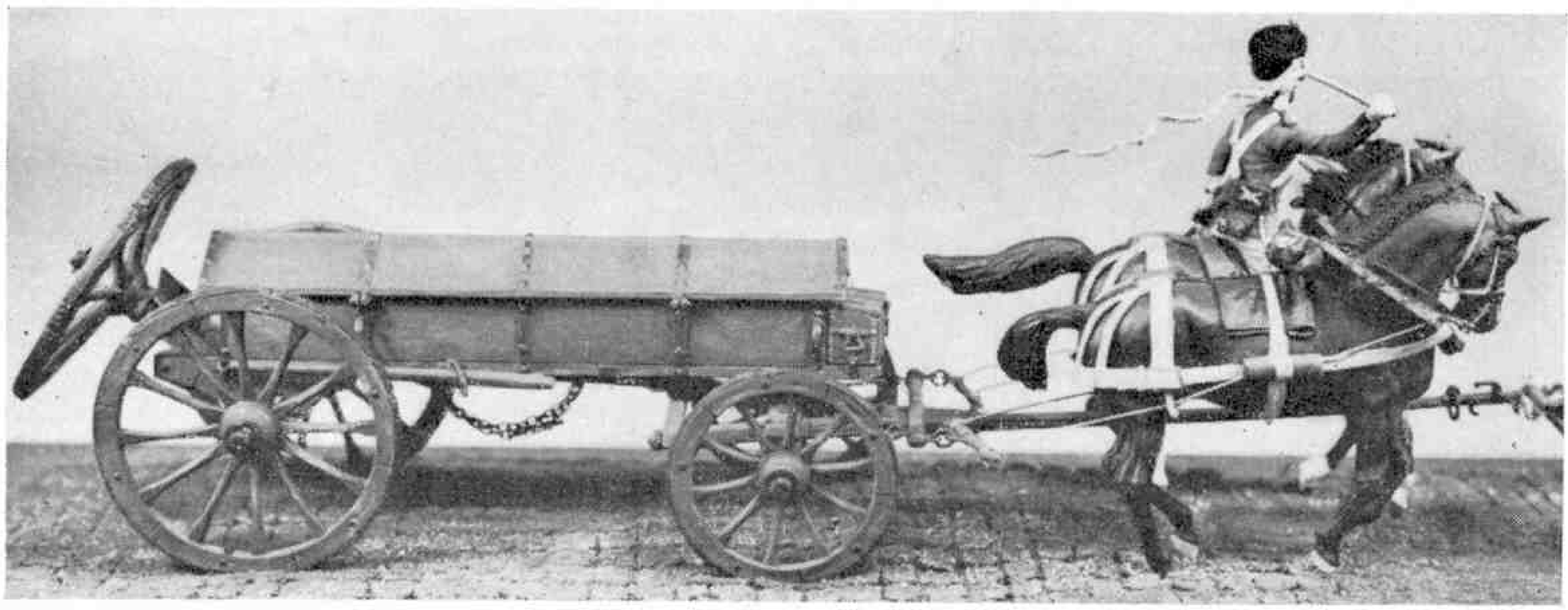


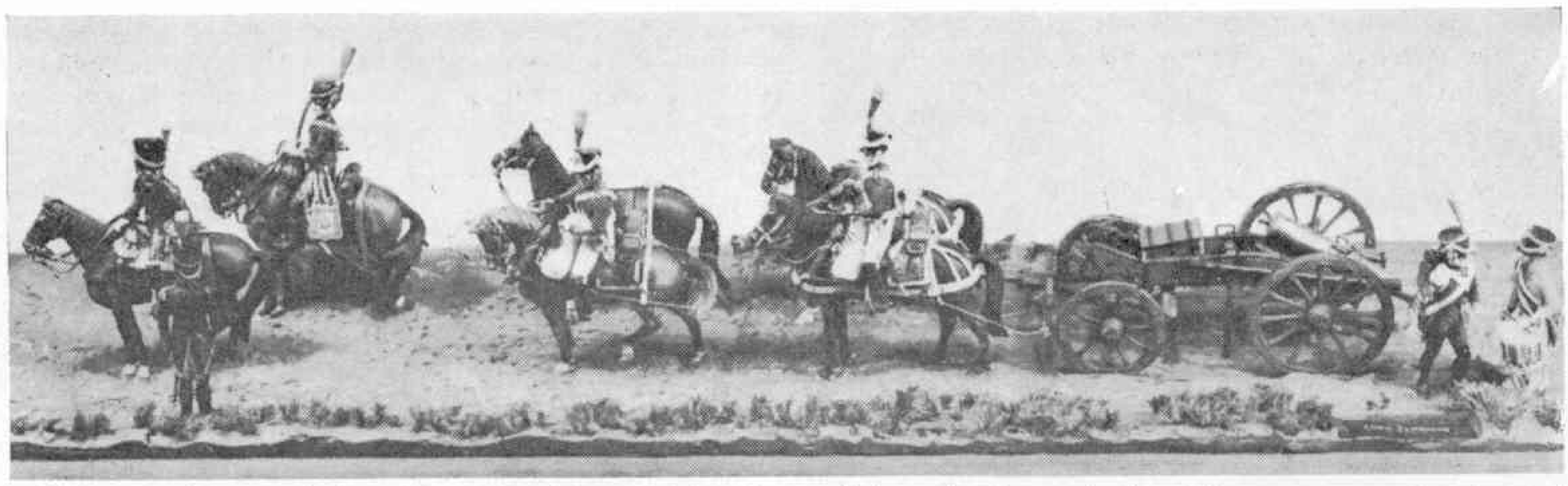
ASPECTS OF MODEL SOLDIER COLLECTING AND CONSTRUCTION

THE MOST colourful period for army uniforms in history was undoutedly the Napoleonic era. The multiplicity of colours used in the making of the uniforms, plus the various emblems and insignia, attained a degree never likely to be reached again. As regiment vied with regiment and corps with corps in sartorial grandeur, everything was designed to inspire the *esprit de corps*, from the latest recruit to the oldest marshal. Under the Emperor, the victorious French armies swept through the continent of Europe, their bearskins and shakos spreading fear and alarm, whilst their field cannon thundered over the face of the land. The enormous pride each regiment generated within itself, manifesting its difference in accoutrements and trappings, can now only be recognised by the regimental and historical expert. In so far as the French armies are concerned, the museums of Paris contain the uniforms and French archives the details of their evolution. Notable French draughtsmen now engrave the various uniforms on to plates, which are then coloured and reproduced to enable the collector of models to copy the colour faithfully. It is significant when we reflect, that the normal uniform of the Emperor, though not drab, appears somewhat sombre against the bright vermilion and gold of his marshals and officers. In so far as Napoleon originated the modern system of conscription, would his psychological approach have dictated to him the possibility that against the great mass of colour his modest uniform would focus all eyes on him? To the model soldier collector, the Emperor maintains his fascination over him, as much as he fascinated the whole world in his day. Certainly in many famous pictures of Bonaparte he is depicted standing forward from his officers, dressed in bottle-green and off-white breeches and waistcoat. By comparison, the brilliant uniforms, golden aiguillette and frogged coats of his staff made a magnificent setting for the Emperor. So to the connoisseur, the collector, and modeller, this period of French history, presents its most fascinating aspect for the indulgence of his hobby.

Lead or Plastic

For years lead was considered the only medium for working in and many fine figures were produced by Berdou, Stadden and Gammage, but in recent years Historex have produced in plastic some remarkable construction kits of Napoleonic figures in 54 mm. (1/30) scale.





These models are designed by the celebrated French military artist, Eugene Leliepvre, and with Bonaparte and his marshals he has achieved remarkable facial likenesses. Starting with hussars from revolutionary times to 1815, the range has continued with chasseurs, artillery, dargoons grenadiers, gendarmes, Bonaparte, Berthier, Bessieres Davout, Mortier & Soult, together with the personnel of the general staff. All the foregoing being mounted figures. The foot figures include both line and guard grenadiers, chasseurs, artillery, fusiliers, voltigeurs and dragoons. In fact, there are now a total of 474 different foot figures and 115 mounted kits with a variation of 80 different horse positions.

Frankly, constructing one of these kits is not an easy task. A mounted figure is composed of 40 to 50 separate parts, but the result is well worth while. Coat tails hang from the body as coat tails should. Straps, epaulettes and cords, etc., are all added to the figure and are not moulded onto it. The sabretache and sword have rings that the straps are threaded through, and the detail is incredible. On the horses even the veins stand out and the muscles are correct for the position the horse is in. There are, at the time of writing, eight different sides and five different heads, so by combining various side and head positions a total of 80 different positions can be evolved, from standing, to trotting, to a full gallop. A silhouette chart with the current catalogue shows the different positions available. With the horseman himself, the head, body, arms and legs are all separate entities, so again an enormous variety of postures can be made, even to twisting around in the saddle with the rider's hand resting on the horse's rump. With foot figures, four basic positions are available: attention, marching, attacking and present arms. However, by combining one leg from an attention position and one from a marching position, a nonchalant position can be produced.

Construction

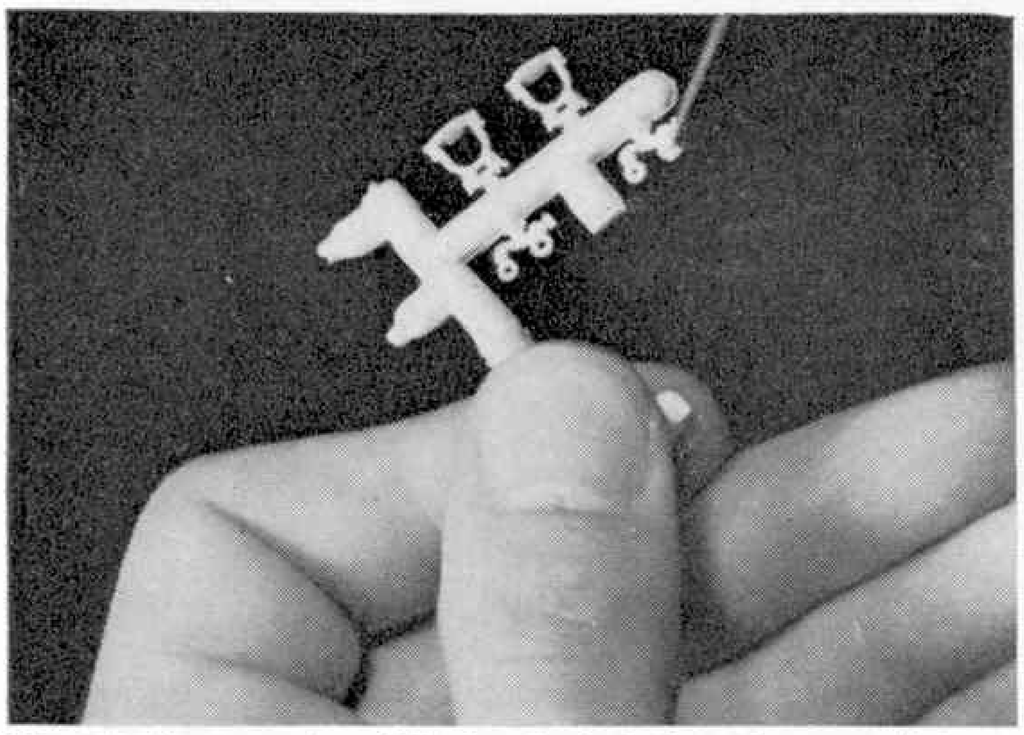
Depending on one's painting ability will determine whether you wish to assemble the model completely or in stages, and whether you wish to add accoutrements or not after painting the basic figure. The straightforward assembly of a figure needs little explanation.

The heading photograph shows a group of unpainted dismounted dragoons. Each figure is composed of approximately 40 separate parts making it easily possible to vary attitudes, and by means of a spare parts service operated by Historex Agents to create figures of little known regiments.

At left a 'caisson' or ammunition waggon showing part of the team of horses in action. The cobbled road is made from plasticine, painted with grey household undercoat and sprayed with sand. The caisson carried 100 round shot projectiles, canister, gun-powder and spares, etc.

At the top of this page a complete 4 horse gun team with various other artillery figures of both foot and mounted regiments. Again the roadway is made from plasticine, but this time to give a muddy appearance. The grass is made from sisal string painted a dull green.

At right, two dragoons. A dismounted trumpeter made up from spare parts, and wearing a gorgeous yellow coat. The musicians were amongst the most colourful of figures. The second figure is a foot dragoon soldier of the Line. Through lack of horses the French High Command established regiments of foot dragoons who would later be re-mounted on horses captured from the enemy.



The plastic sprue to which is attached the stirrups and horse bits, which in this picture are being enlarged by means of a rat-tailed file, to allow the reins to pass through them.

Use any polystyrene cement, always squeezing it onto a board and coating the surfaces to be cemented by applying the cement with a cocktail or match stick.

For large areas, such as horse bodies, coat both halves and squeeze well together. If a little cement oozes out, so much the better; this can be easily cut off afterwards (approximately two hours) and will ensure that there are no small fissures. For straps that do not require any movement whatsoever use very thin plasticard. For reins, sword and sabretache slings the ribbon provided in the kit is the best, although this has a slight tendency to be hairy. Sword rings, although excellent, sometimes need enlarging. To do this use a rat-tailed file and turn it anti-clockwise in the ring. If you turn it in a clockwise fashion the file is forced into the ring and it splits.

Now for the animations and those little extra touches that will make your figure that much more interesting. It is best to have a nonchalant pose and with the foot figures this can be achieved by using one leg from an attention position, and one from a marching position. Alterations of a more violent nature can be carried out by surgery, two methods being commonly employed. The first and best known is to cut a " V " shape in the back of the knee, elbow or ankle joint, bend back and re-cement. The second employs the use of a pyrogravure—a type of controlled soldering iron which allows a very small but constant heat to pass through a metal tip. The tip is applied to the back of the knee joint, pressure applied to the foot and thigh and the leg is then bent into a realistic position.

For adding the more minute details such as grenades and horns on turnbacks, etc., the easiest method is to pick up the grenade, or whatever it is, with the tip of a craft blade or pointed tweezers. For horses and standing figures, stick them straight onto a cotton reel. This makes a very useful holder for painting. For mounted figures and saddles force a spare piece of spruce into a cotton reel and cement the rider or saddle to this.

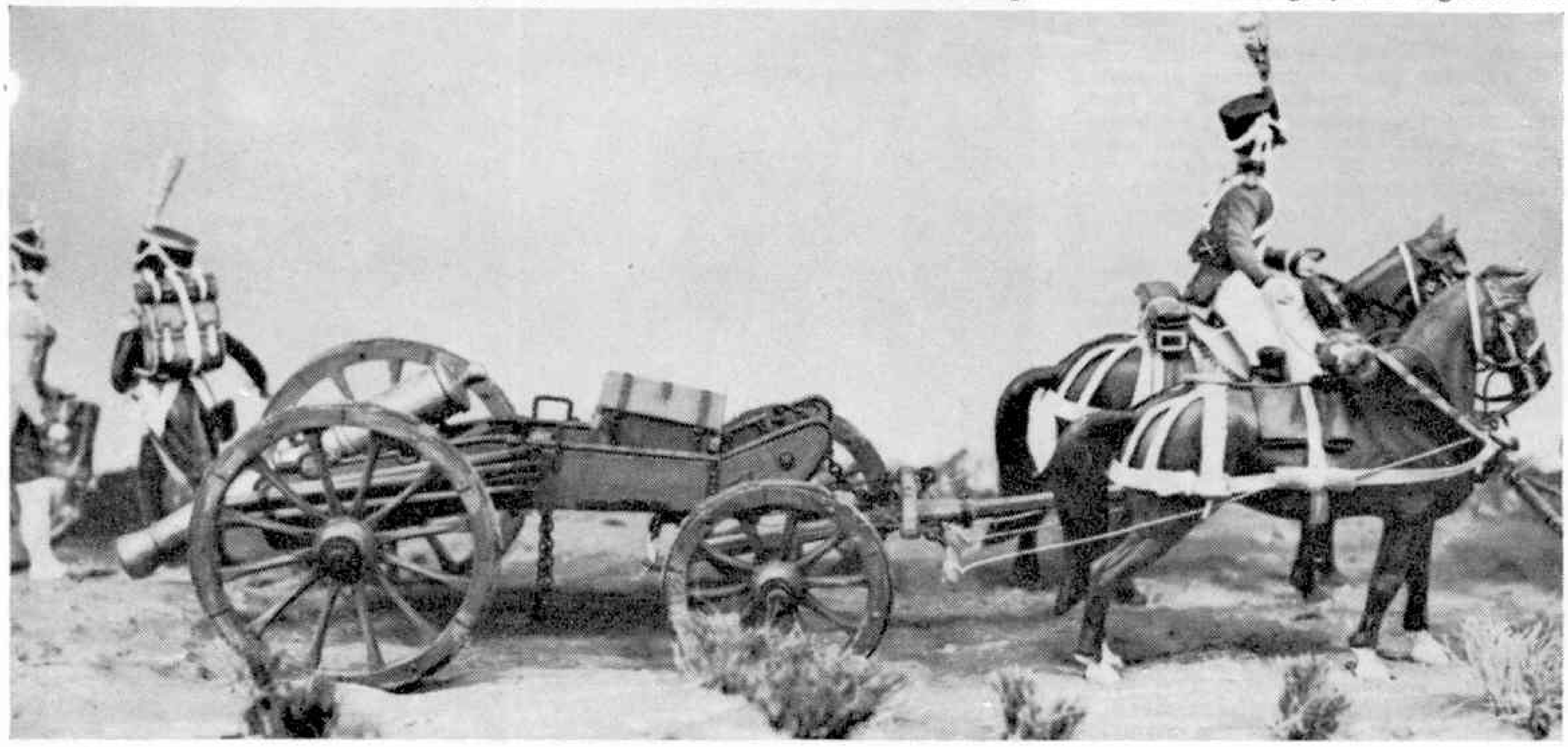
One interesting new way of working in this medium is the making of cloaks, etc. The cloak is cut from a fine material, such as the wife's best linen handkerchief, and then coated with a solution made from spare plastic sprue combined with carbon tetrachloride, and within minutes it has a hard, plastic surface.

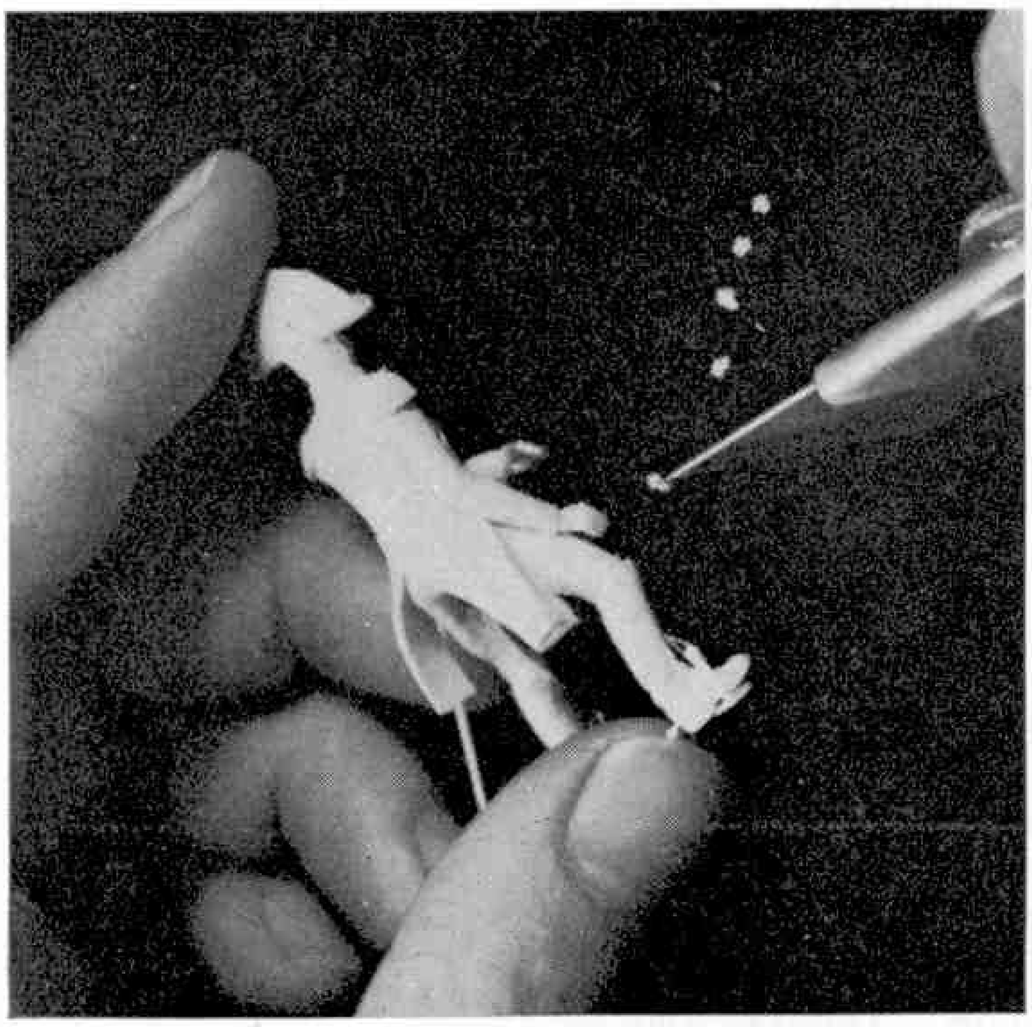
Painting

With the detail being greater on plastic and the figures themselves of a lighter and more delicate appearance the amount of paint used is correspondingly less. No undercoat is needed, and there is never the fear, as there is with lead, of air getting to the metal underneath, and fungas, etc., forming, but on plastic too much brushing will " lift " the paint. Most important of all, however, is the brush. Always buy the most expensive red sable hair brush, usually in the price range of 5s. to 10s., and size 4 to 5 is the best, even for the finest work. Many modellers feel that the more delicate the work the finer the brush should be, and often resorting to 00 or even 000 ! With the larger brush, a point well kept is finer than the smallest brush available and will hold enough paint to get on with the job.

Technique

Now that we have dealt with the materials, one or two small hints on technique. For example, to shade a pair of black gaiters, first paint on an overall colour of dark grey and then paint in the creases and join in the gaiters with jet black. Following this, mix in a little white oil paint with the dark grey and lighten the





Minute grenades being added to the uniform of the Emperor, by means of the tip of a craft knife. Note the size of the figure in comparison with the builder's fingers. A standing figure is only 2½ in. high.

The above all-in-together picture shows a mounted figure being assembled in three stages on cotton reels, which eliminates the handling of figures whilst painting. Also shown are the various types of paints used.

top of the folds, knee and calf muscles. Then wipe the brush clean, and gently blend the colour in, so that no line shows between the different shades. This is where white oil paint comes in so useful as it blends so well, but it is here, too, that one must paint gently so as not to lift the paint underneath. The same technique applies to all general painting, but on a coat or larger area it may be necessary to use two shades to lighten and two to darken. For swords, etc., it is a good idea to mix in a little black or blue to give the effect of steel, highlighting with pure silver. Concerning gold epaulettes: these should be painted with a darkened gold and then, with a fairly dry gold on the brush, lightly touch over the top surfaces of the fringe, etc. Painting faces is a very skilful job. The base colour is made from a mixture of white, yellow ochre, brown, red, in fact, anything until a natural flesh colour is arrived at. After the initial covering of the face the slightest touch of crimson and yellow ochre in with the flesh colour to shade the eyes, the sides of the nose, the slight depression underneath the lower lip, under the chin and around the hair line, then a touch of white into the flesh colour to highlight the ridge of the nose, the sides of the nostrils, the chin and the cheek bones under the eyes. Add a little red to the flesh colour and touch in the cheeks and lips. Now comes the most important part . . . BLEND IT ALL IN. A slightly darker touch of crimson in the flesh colour to show the nostrils, ears, and perhaps a line between the lips. Again, blend it in. The eyes will give the face its character. First the whites, and not too large, then the faintest hairline over the top of the white, following up with the eyeball itself.

Now we come to the most pleasurable moment of painting a Historex kit . . . the horse. These are so well moulded that a really professional finish can be achieved by a novice. Use oils completely with a preference for burnt amber as the base colour, which must be well brushed in. By constant brushing, the paint on the top of the muscles thins, and the highlight shows through naturally. The paint will also form a darker colour in the depressions. The highlights can then be touched in with yellow ochre or white with the particular brown, and the shadows with black oil paint.

At left: A close-up view of the Gribeauval 8 lb. cannon. Eight pound being the weight of the cannon ball. There were also 4, 6 and 12lb. guns. Designed by General de Gribeauval (1715-1789) this artillery system was adopted by King Louis XVI and used by the French armies throughout Napoleonic times, and until the reign of Louis-Phillippe. On the right, an officer of Bonaparte's favourite mounted troops. The Chasseurs a Cheval de la Garde. This figure is depicted in his service dress, which is mainly green but with a red waistcoat trimmed in gold lace !

A great weapon; the British 25-pounder, along with the German 88 millimeter one of the two most renowned guns of World War II. Here it has just come into battery position and with its tractor still in attendance is waiting for action.

BATTLE

by Charles Grant

PART TWO

A Beginning with the Rules

ALL—OR nearly all—the board or table games I can think of involve the opposing players moving their pieces alternately. This system can also apply to the "Battlegame," but it has its disadvantages, notably that the player moving first immediately gives away some idea of what his plans might be to the "enemy." Of course, when the second player has *his* move, then *his* opponent can see what the counterstroke is likely to be. In the long run, it may well average out, but even in the fairly elementary sort of thing we are immediately concerned with, it is better that the players move their pieces—i.e., their troops—simultaneously. This can run up against snags in the more complicated type of game to which we hope to graduate, but by then we shall have some experience in these matters and it will be found that such problems can be solved with a minimum of effort. That same experience shows, too, that the simultaneous move does produce considerably more excitement in the players and speed in the operation of the game.

We'd better make it clear, by the way, what we mean by a "move" which can also be called a "bound" or a "turn" (I've heard both terms used by players with great experience in the hobby). It simply means this. In draughts, for example, a player moves one piece from one square to another—this constituting his entire "move." In "Battle," however, the player can move all his pieces, units or what have you the maximum permissible distance for the particular type of piece involved. If he wishes, naturally, he can obviously leave parts of his forces stationary. This general movement—based on rules we shall shortly go into—makes up the bulk of what we shall call, for want of a better term, the "game move"—the remainder being concerned with the firing of whatever weapons the player can bring to bear on his opponent's forces, men or machine. Quite simply then, the "game move" consists of both players simultaneously moving and/or firing all the troops and weapons they wish to do within the limits of the rules for movement and firing shortly to be described.

The first thing we have to do is to establish the various moves for each particular piece—be it man, gun or vehicle. To do this we shall have to decide on something to act as a kind of yardstick on which the overall scale of different movements can be based. The simplest way of doing this is to start with the object which has the slowest rate of progress. This without doubt is going to be the soldier on foot, plodding along under full kit, carrying rifle, sub-machine gun, or something equally ponderous like a bazooka or part of a heavy machine gun. Here may I interject a point which is of great importance in drawing up the rules? Just as a man, burdened even as we describe, can make a terrific effort and run like mad over a short distance, so a tank, with the driver "putting his foot down" can, particularly on a road, belt along for a spell at a rate greatly in excess of its normal economical cruising speed. Therefore, right at the start we must make it

clear that we are not going to complicate our lives by allocating a number of different speeds to each type of unit in our "army." In the beginning it is necessary to dispense with a number of interesting refinements, but we want to get on with an actual "Battle," although a simple one, as quickly as possible. Afterwards, all things being equal, we can carry on with something a trifle more sophisticated. To this end, the moves we are going to set out at this stage are going to be an "average," a sort of "mean." So here goes.

First of all, as I said, we are going to begin with the infantryman and at the risk of repetition I'll say again that this is going to be an average of his rate of movement and at the moment it does not really matter whether he carries rifle or machine gun, or whether he is marching along a road or making his way through a muddy, ploughed field—there is an average of these various speeds and this will do as our basis for what we are going to calculate—the distance he covers in our "game move." This will, in fact, be the key to all our other moves and indeed to the range of the weapons we introduce into our game.

At standard marching speed of 120 paces to the minute, and reckoning the pace as being 30 in., an infantryman will cover 100 yards in this time, equivalent, in round figures, to a speed of 3 m.p.h. This then is the basis for our scale of movement. Again, as I have said, when it comes to the "crunch," the man can move much more rapidly over a short distance—a quick burst if he is suddenly under fire and making a dash for cover. By the same token, there will be times when he will wish—or be obliged—to get about more slowly, so if we take the 100 yards/minute speed it will suffice as an average. It is the "mean" we have already decided to adopt.

With this as a starter, we can now see—I hope—just where we are going. To a considerable extent this will depend upon the amount of space we have at our disposal—generally speaking, how big a table we have, in effect—and the immediate problem is to translate the 100 yards/one minute relationship we have just established to a convenient equivalent we can use in the "Battlegame." If one is fortunate in having a large table (I'm lucky in that mine measures nine feet by seven), then the infantry move can be quite substantial, but if one is not in such a happy position, then it will have to be pretty small. This is not an insuperable difficulty, however; it will be found that long marches on foot are not frequent and it is envisaged that there will be plenty of transport to bring our footsoldiers into action, and only after they have "debussed" close to the scene of operations will they be obliged to have recourse to "Shanks's Pony."

The "move" of either man—or vehicle—will consist of the distance over which he—or it—travels in a specific interval of time, be it seconds or minutes or even hours in certain circumstances. The longer the time interval, patently the greater will be the distance involved in the move, and this is what we must watch, else troops and vehicles will rapidly vanish over the edge of the table we are using for our "Battle." It is hoped that the moves suggested will suit the majority of players, but I would point out that it is perfectly simple—if the player desires—to increase or decrease them, either by multiplying or dividing them by the same number. If I suggest then that the infantry move be 3 in., the player might prefer to have it rather longer and might double it. This is fair enough, as long as he doubles all other moves—the relationship between them must be constant. It must not be forgotten that if he does increase the basic infantry move, then some others—I can think, for instance, of a fast scout car driving along a road—will be, in proportion, quite enormous. Also, as we shall see, weapon range is also governed by the same scale, and if we don't want to set up artillery in another room, or out in the garden, it—the scale—must of necessity be a rather modest one.

So to conclude—taking one minute as being a convenient time interval to represent the "game move," and remembering that the infantryman was taken to move 100 yards in that time (or 3 m.p.h.), let us enact that the infantry move be of 3 in. This represents 3 m.p.h., so a move of 1 in. being therefore equivalent to 1 m.p.h. this will be an admirable frame into which we can fit—in our next instalment—"Battle" moves for all sorts of vehicles, whether armoured or "soft-skinned."

Advance! A strong column of tanks, with infantry in close support, noses forward towards the enemy. On the wooded knoll behind can be seen a blockhouse now to be abandoned as the troops move on.

Readers' Letters

Publication of a Reader's letter entitles the writer to a Swan-Morton "Unitool," a small "thank you" from the Ed.

Ghost stories

DEAR SIR,—I have not missed an issue of the *Meccano Magazine* for over 40 years, so you may find my views on the current production of interest, as I must be among your oldest subscribers. I would like to congratulate all concerned with the present *Meccano Magazine* on a really excellent publication, I do not believe in ghosts (although I wrote several ghost stories for pre-war Christmas *Meccano Magazines*!), but one feels that—somehow—the late Frank Hornby is back in charge!! You have recaptured the old *Meccano Magazine* spirit, as your older readers will appreciate.

The best *Meccano Magazines* in my opinion were during the period 1927-1937, when most of the magazine was devoted to Meccano Super Models (and small ones!), well illustrated contributions of Meccano Mechanisms, pages of club news (what has happened to the Meccano Guild and "HRC"?), pages of model railway layouts and items of railway interest. And, of course, other articles of general interest too numerous to mention, but always a *Meccano* magazine—and it's back!

I note that some of your other readers comment on "too much Meccano space"; this is plainly ridiculous, those who are not interested in Meccano, lots and lots of Meccano, are not interested in supporting our *Meccano Magazine* and will fade out and let you down, the only ones that will keep you in business are the Meccano boys of all ages—no one else!

I am pleased to see "Spanner" is still in harness, he must be over 70 by now! Give him my best wishes. I would like to see a return to the nickel plated Meccano (or chromed), no scratched, painted, strips and plates. In the "brass and silver" days, Meccano was model engineering, then when "red and green" took over (to capture the five year olds at Christmas) it became a constructional toy and interest faded to a certain extent (except by the faithful) through the years. There was one dreadful period when cardboard Meccano plates (for filling in) were on sale!!

However, with the invention of Plastic Meccano you have captured the youngsters—without messing about with the real thing—so that it can become model engineering again. I note the comments on advertisement pages—let us hope you get lots of advertisements, they are the life blood, no ads., no mag! But always make sure there are plenty of article pages, to keep everyone happy as most of your readers will not understand how essential advertisements are.

I have about three cwt. of Meccano which still gets used.

Southsea, Hants. *L. C. Pudney.*

Happy balance

DEAR SIR,—First, may I congratulate you on the new *Meccano Magazine*. It is a great improvement on the old *Meccano Magazine* especially on that ghastly "picture book" format of the last two years.

It amazes me how the new *Meccano Magazine* has improved. In fact, the April issue is at least twice as interesting as the January one. Would it not be possible, however, to strike a happy balance between slot racing and model railway articles? I must be one of the many readers who is interested in both hobbies. Before the railway fans start screaming about "Model Cars" magazine, to which I subscribe, may I point out that railway fans also have their own magazine called "Model Railway News." There have been at least two railway articles per magazine, yet only one slot racing article has appeared so far. This is a bit unfair, don't you think?

Now onto the Meccano model building section. Personally, I would not shed a tear if this were to die a quick death, never to appear again. In fact, I wish that this section were not to appear in the magazine at all, but then I would not buy *Meccano Magazine* for there would be no such thing. I will not be so selfish as to ask that this be discontinued, as a few readers have done recently, for this is, after all, the heart of the magazine, and the only publication for Meccano enthusiasts. The real enthusiast must feel pretty hard done to for available literature, so the *Meccano Magazine* is really his life blood.

Thanks once again for a really great magazine, if you continue to improve it at the same rate it will soon be the most popular hobbies magazine in the country.

Doncaster, Yorks. *John Edwards.*

Conversion

DEAR SIR,—I am sure than many of the *Meccano Magazine* readers, have, like myself, felt very frustrated when trying unsuccessfully to "convert" a model. I thought, therefore, you might like to convey to them this very simple but effective conversion of a double decker 'bus (I used the Minic Motorways Routemaster) to an open-top "sea front" 'bus. I used a knife to cut away the roof just behind the front windows and in front of the rear windows, cleaning the edges with a smooth file. There are then a couple of other modifications. I removed the upstairs seating unit together with upstairs walls. I then made a hole through the downstairs roof above the platform and cemented in place a small piece of 30 amp fuse wire, as a hand-pole. The only other modification is at the top of the stairs, where three pieces of the roof were used to make a luggage rack that in reality would prevent passengers from falling downstairs.

I found that the best colour scheme was as folows: horizontal line above downstairs window; mudguards; seating; crest on sides: Maroon. Interior (downstairs), body above maroon line: White. Lower body: Cream. Interior (upstairs), except seating: Silver. These colours can, of course, be altered to taste, but I feel this layout of colouring is best.

Farnham, Surrey. *M. Andrew.*

Outdoor reader

DEAR SIR,—I would like to say how much I have enjoyed the new *Meccano Magazine*. The articles on Stamps, Chemistry, Ships, Battery powered Vehicles, Great Engineers and Electronics have interested me most of all. Keep it up! I know this is a Modeller's Magazine, but I would like it to have an article on outdoor hobbies (I am sure other

boys would, too). For example: Camping, Fishing, Canals, Cycling, Youth Hostelling, Gardening (including pool construction, bird-houses, etc.) and places of historical interest, etc. I have visited many old halls, Manor houses and other historical buildings and enjoyed the secret passages and hiding places.
Birmingham 20. *A. Stocker.*

Wide selection

DEAR SIR,—After reading the April issue of *Meccano Magazine*, I feel I must congratulate you on a really super selection of articles. It is even better than the old *Meccano Magazine* with perhaps smaller articles but more of them, giving a greater variety of subjects.

I agree with High Beyts' suggestion of plans for a larger balsa boat and I was pleased to see that you are planning to do this. I was reminded of the "Dolphin 16," the plans for which appeared in the old *Meccano Magazine* covering three issues. I built and sailed this model, as I expect many other readers did, and it was very successful. Could we have something like this, please?

Articles like "Air News" and "Britain's New 25KV Railway System" are excellent and go to make the magazine topical, informative and well worth 2s. 6d.

The cover designs are great. Keep it up. Once again, congratulations on an excellent publication. Nowhere could one find another magazine which covers such a wide selection of hobbies.
Chichester, Sussex. *M. Collinson.*

Old square

DEAR SIR,—I am very pleased to see the recent revival of *Meccano Magazine* and hope that it will add stimulus to a great hobby.

There must be many "Old Squares" like myself who still own quantities of Meccano of yesteryear, and I often wonder if anyone has ever found a satisfactory method of repainting it by simple means at the disposal of the amateur. No doubt most of us have tried using a brush to repaint Meccano, and have also come to the inevitable conclusion that it can't be done, because of paint running through the holes. I have achieved some degree of success by cleaning parts down to bare metal, using paint stripper, wire brush, wet and dry paper, etc., and finishing with an aerosol spray paint. However, it's all very tedious, and I wonder if anyone has really found the answer. As I said, there must be a lot of us who would like to know.
Brixham, Devon. *P. G. Goodier.*

Diesel power

DEAR SIR,—Thank you very much for the new *Meccano Magazine* which is far better than the previous one.

I have often wondered why it is that while Meccano motors include most of the methods of model propulsion, the most powerful form of driving a model for its weight seems to have been overlooked. I refer, of course, to model internal combustion engines. There would be no point in using this form of power for static models, as the Meccano electric motor and a transformer are quite adequate for this, but it would be useful for powering a Meccano car used with a high reduction gearbox, where an electric motor with batteries or an accumulator or transformer would be cumbersome. A Meccano car powered in this way with a drive to the wheels could be run on a tether line very well indeed.

A diesel engine would be unsatisfactory due to cooling requirements, but a small capacity glow-plug engine such as an 0.049 coupled to a gearbox with a reduction ratio of 16:1, a fan to provide some cooling, and a suitable easy starting device might work quite well. The whole thing might turn out to be rather expensive, but the enormous power obtained from it would almost compensate for this. Once again, thank you for the new magazine.
Gloucester. *I. Reid.*

Advertisement pages

DEAR SIR,—I must congratulate you on the new *Meccano Magazine*. The previous publishers had made it a very fine magazine and when I heard that it was to be restarted, I hoped the standard would be as good. I was more than satisfied with the January issue. Since then however, it has progressed considerably, and this last issue (April) has compelled me to write and tell you how superb I think it is. It arrived late yesterday, because of a mistake by the Newsagents, when one of my favourite television programmes was on. I smply had to stop watching and read the magazine.

In "Workbench" you said that some readers complained about the large number of advertisement pages. If they had seen the previous *Meccano Magazine* at all, they would realise that with only four more pages, it had usually over twice as many advertisement pages as the new *Meccano Magazine*. Also, these pages were scattered throughout the magazine.

I have two points to mention about the new *Meccano Magazine*. Firstly, not many people have both plastic and standard Meccano sets, as these are for different age groups. So why not leave out models with a mixture and devote the space to more standard Meccano models—especially Outfit models. I am not suggesting leaving out Plastic Meccano entirely, but please keep it separate. Secondly, could we please have a page entitled "Fireside Fun," as it used to be called, for jokes and puzzles.

Keep up this magazine at its present excellent standard, and perhaps we could have more covers with pictures of large Meccano models as one reader has already suggested.
Woking, Surrey. *P. J. Bennet.*

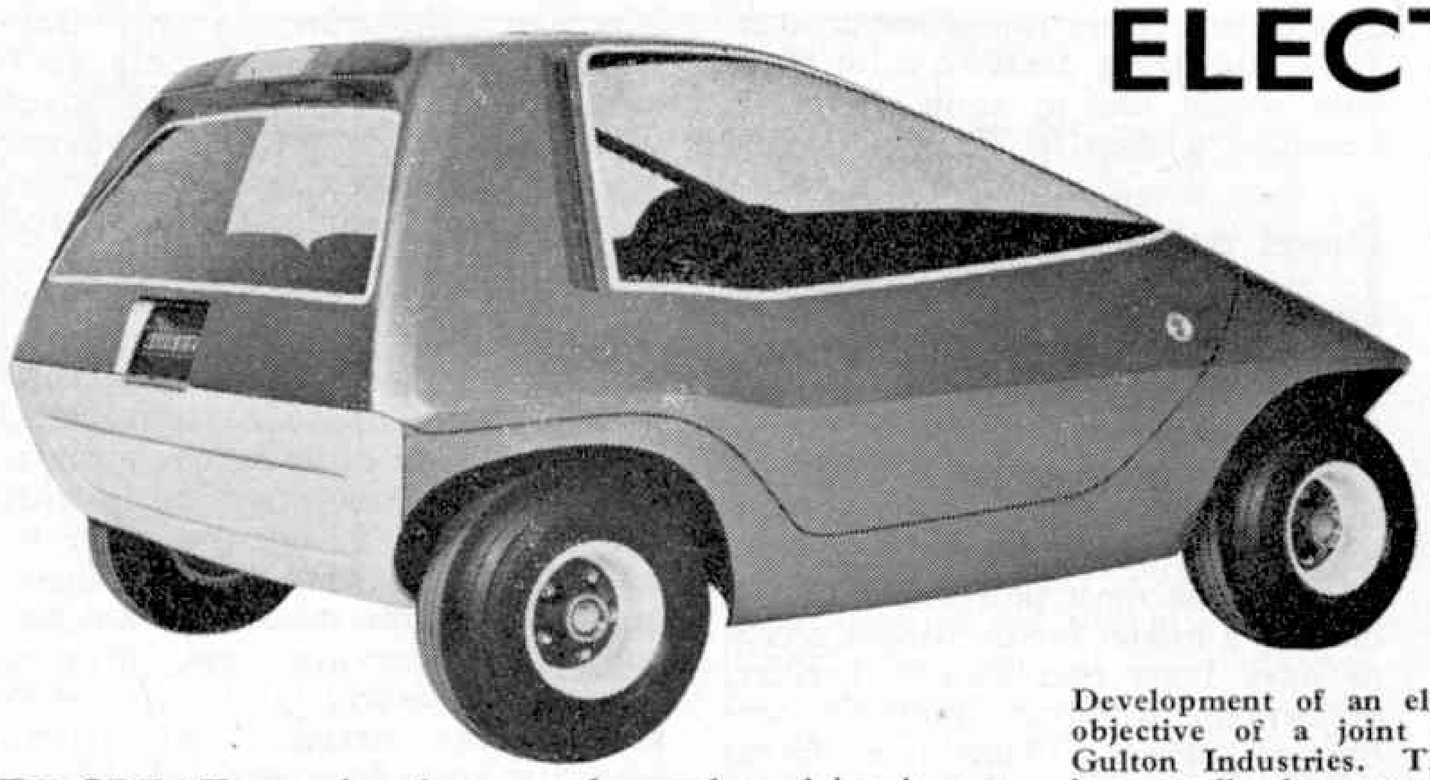
Ken's series

DEAR SIR,—Having witnessed the disposal of Mr. J. Stanmore's suggestion by four of your readers, I felt a little shaky about letting you hear my plea. However, courage has conquered fear, so here goes. I became a *Meccano Magazine* reader when I noticed Ken Wooton's article "At the Turn of a Wheel" in last August, 1966, issue. I followed these articles very closely until the magazine ceased in July, 1967. I was delighted when I heard that the *Meccano Magazine* was resuming production as Mr. Wooton had promised to show us some more "goodies" in future issues. However, my delight soon turned to disappointment when Ken's series did not reappear in the new magazine. I have waited in vain for four months for the return of "The Wheel" and have decided it is time for action.

Meccano enthusiasts may claim that this is their magazine and that anyway there are two pages of Dinky News for die cast fans. However, may I point out that Meccano also make Dinky Toys, and that although Chris Jelley's articles are very good, they do not mention obselete Dinky models or any other marques. So, now I appeal to the Editor to bring back "At the Turn of a Wheel" and I hope that other die cast collectors will back my plea.
Co. Wicklow, Ireland. *D. Cooney.*

ELECTRIC CARS IN NORTH AMERICA

by Harry McDougall



Development of an electronic power system automobile is the objective of a joint project between American Motors and Gulton Industries. The AM prototype vehicle, the Amitron, is a small, three-passenger car designed for short-haul transportation needs. The wedge-shaped experimental car is 85 inches long, 69½ inches wide and 46 inches high.

IF GREAT-grandmother ever learned to drive it was probably in an electric car. At the turn of the century they outnumbered all others.

A few electric vehicles have remained in service, particularly for bread and milk deliveries, ever since. But only recently, and particularly in North America, has there been increasing interest in them. The prime reason is that, unlike conventional cars, they emit no fumes, so cause no air pollution.

The faults of electric cars—low speeds and short range—no longer rule them out. Two-car families have become common. The second car is normally used by housewives mainly for shopping. So why not fill up with watts instead of petrol? It's cheaper, and the car will last longer. Some electric vehicles recently retired by the New York Post Office had given good service for *forty years* !

One modern electric vehicle that has recently gone into production in California is the Westinghouse Markette. It was designed especially to provide short-range transportation in cities and suburbs. Westinghouse has built more than 20,000 golf carts and fork-lift trucks powered by batteries. So designing and building the Markette required no more than a logical extension of existing technology.

Low maintenance costs and low depreciation (Westinghouse says the vehicle will require no major overhauls until it has been in use for at least ten years) should make the Markette ideal for short journeys. Cruising speed is about 25 m.p.h. and it will travel 50 miles under average conditions before needing recharging. It has a built-in battery charger with a retractable 12 ft. cord that can be plugged into any electric outlet.

When depleted, the batteries require about eight hours to recharge. Westinghouse estimates that, with proper care, they are good for about 600 recharges before requiring replacement—sufficient for about two-three years of normal about-town driving.

The West Penn Power Co., a US hydro-electric company, has designed the Alletric, a Jeep-like car using conventional lead-acid batteries. West Penn have installed outside their head office a standard parking meter converted into a pay-as-you-use electrical outlet and envisage a day which such installations will be common.

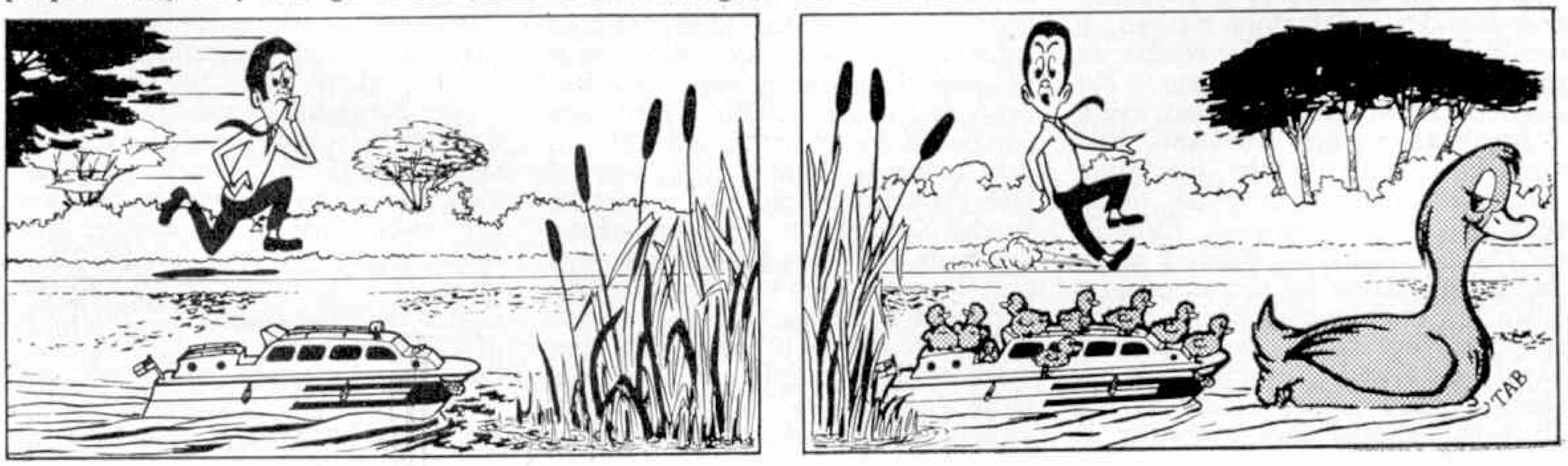
The Yardney Electric Co., New York, also adopted a conventional approach for its electrically powered conversion of a Renault Dauphine. It has a group of four silver-zinc batteries; two fore and two aft. They are the invention of Henri Andre, a French experimenter, and have undergone intense development during the last few years. The batteries are used in many US aerospace and undersea applications.

The converted Renault has a range of 77 miles and a top speed of 55 m.p.h. Pressing the accelerator disconnects and reconnects the batteries in various combinations to give six forward speeds.

The main problem with putting such a vehicle into production is the high cost of the batteries. They would only be good for about 40,000 miles, but most of the cost is for the silver plates and would be recoverable. It has been suggested that the batteries could be rented rather than purchased outright.

Ford's entry into the United States all-electric car stakes is the experimental Comuta, built recently in Britain and now under test in Detroit. It is a tiny 2 plus 2, about half the length of the American Mustang.

The General Atomic Division of General Dynamics, in collaboration with the Edison Electric Institute, is



These front-and-rear views show the silver-zinc battery pack that powers General Motors Electrovair II, an experimental electric car built as a test bed for motor and control elements. Its performance is similar to a petrol powered Corvair, except for its 40-80 miles cruising range before recharge. A standard Chevrolet Corvair can travel 250-300 miles on a tank of petrol.

experimenting with a zinc-air battery that may rival the silver-zinc battery in usefulness, but will be relatively cheap to produce. Prototype zinc-air batteries now under development are intended as the forerunners of larger versions capable of use in delivery trucks.

Almost all electrically-powered vehicles use some kind of battery. But the real breakthrough leading to mass production of electric cars may be the fuel cell. It provides power through an electro-chemical reaction. Gaseous hydrogen is the commonest fuel with oxygen acting as the oxidizer. Fuel cell power units are noiseless, generate less heat and toxic fumes than internal combustion engines, and have no moving parts.

The idea is not new. Sir Humphrey Davy converted chemical energy into electrical energy back in 1801. The simple fuel cell he built used zinc and oxygen in an electrolyte solution.

Allis-Chalmers, which since 1962 has been working on fuel cell research for the United States Air Force, has given some consideration to the problems of a vehicle fitted with fuel cells.

The disadvantages are high initial cost, high cost of fuel (liquid hydrogen contains only one quarter the energy of the same quantity of petrol) and excessive weight. But a fuel cell does not need to be taken out of service for recharging. It is fed with reactants, like the fuels used by conventional cars.

Allis-Chalmers built an experimental fuel-cell tractor which was technically successful. But whereas the weight of the engine and accessories of a comparable internal combustion engine would have been about 80 lb., that of the fuel cell installation was about 200 lb. It has been estimated that a small automobile powered by fuel cells would require a power unit weighing 500 lb.—more than four times as much as the engines presently used.

Allis-Chalmers is now working on second-generation fuel cells which will operate on hydro-carbons. But most success to date has been achieved with experimental installations intended for aerospace projects, using ammonia as the fuel.

Dr. Clare P. Stanford, Director of Research at Allis-Chalmers, has said that when a vehicle powered by an ammonia fuel cell becomes practical it will probably be designed as a unit developing power equal to that of a 35 h.p. internal combustion engine. The car, which Stanford claims could be operating within five years, would be capable of operating at 45 m.h.p. over a range of 200 miles. This performance, he contends, is possible with the present state of fuel cell technology.

Union Carbide has suggested that the car of the future may be a hybrid using nickel-cadmium batteries for heavy work and fuel cells for normal motive power and to keep the batteries fully charged. One pound of liquid hydrogen would give about the same performance as one gallon of gasoline. The day must yet come when a service station attendant, instead of a plain "Fill her up, sir?" will have to ask "Hydrogen, alcohol, propane or ammonia?" and remember to check the oxygen.

An under-the-hood look at an experimental tractor, developed by Allis-Chalmers Research laboratories in 1959, shows the banks of fuel cells which provided the electricity to power this research vehicle. The engineless tractor was presentéd to thé Smithsonian Institution in 1960, where it is now on display.

00 Gauge Trackside Construction

Scenic Modelling . . . ...using plaster reinforced cloth materials

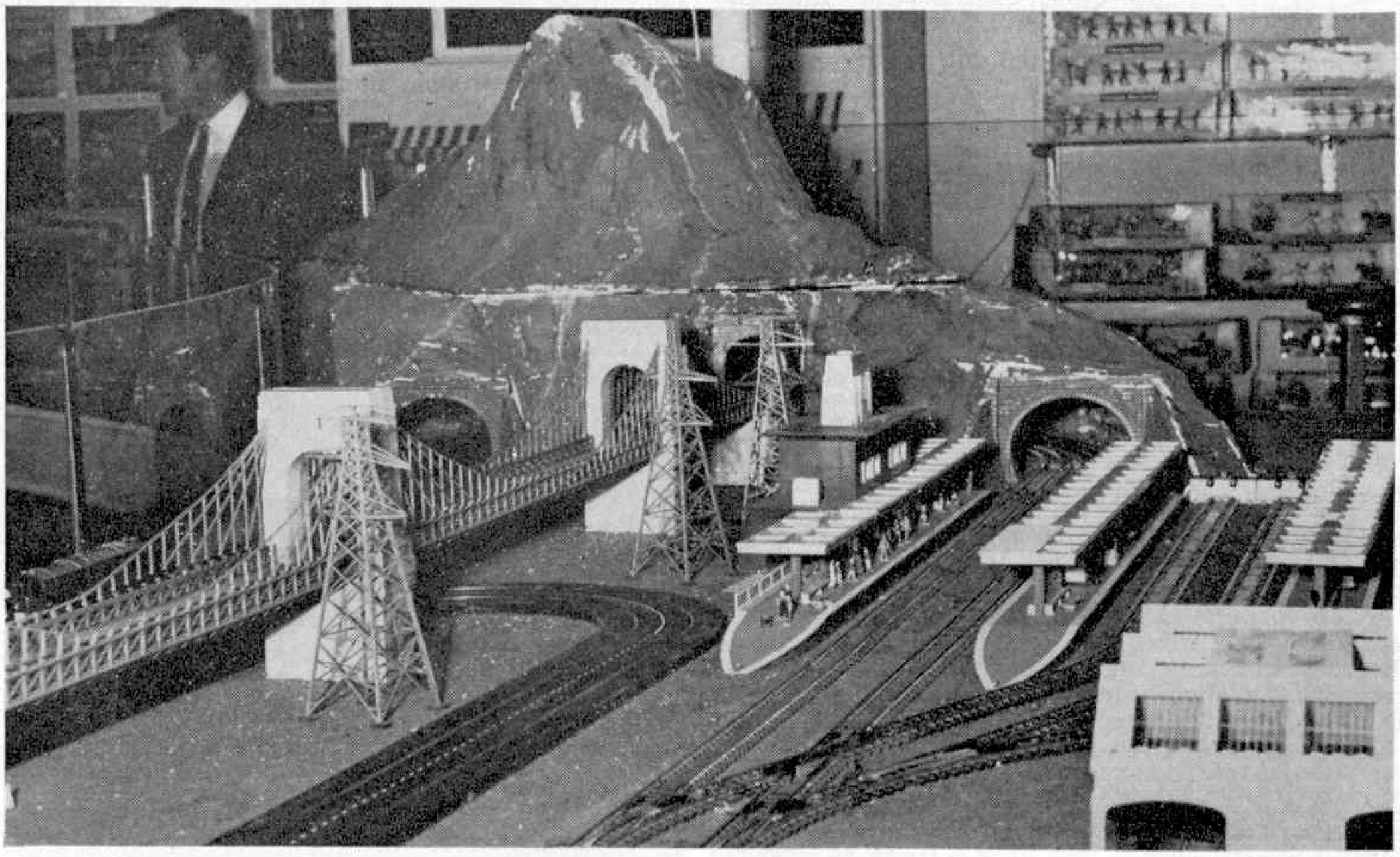
UNLESS YOU are modelling the Trans-Siberian Railway, or the line that crosses the Nullabor Plain in Australia, hills on a model railway layout are a necessity. Take any railway journey in this country (well, almost any) and you will pass through tunnels and cuttings, under bridges and over viaducts; even in relatively flat country, the track itself will probably be raised upon a shallow embankment. Until fairly recent times, the reproduction of such scenery on a model railway was a considerable problem, and required a great deal of "foundation" work to support the "hills." These days, however, the use of plaster-impregnated cloth, moulded over formers of screwed-up newspaper, greatly simplifies what was once a complicated job for the experts.

The photographs show some of the tunnels and embankments we built on a small display layout, using both Mod-Roc and the similar Beattiplast. These invaluable modelling materials are composed of open-work cotton cloth which contains plaster of Paris and a special built-in adhesive. One pack of Mod-Roc contains 12 pieces, each measuring 5 in. × 30 in., which is enough to do quite a lot of scenery. The only additional equipment required is a pile of old newspapers and a large bowl of water. One word of warning before starting: if you value the pleasures of family life, do not operate in the dining room—white furniture is very contemporary, but . . . it will brush off.

When you have decided where the first hill or embankment is to be (choose a small one for a start) screw up a quantity of newspaper and moisten it slightly in the bowl of water. Mould the resultant mass into roughly the shape you require, and place it in position on the baseboard. If necessary, hold it in place with sticky paper tape. The Mod-Roc should be used in 2-3 thicknesses; immerse them, in short lengths, in the bowl of water for about three seconds or until the bubbles cease. Squeeze gently (do *not* wring), and lay the wet material over the newspaper "former." Repeat the process, overlapping each successive piece until the whole area to be landscaped is covered. Smooth the surface to exactly the shape you want, and leave to dry out thoroughly for about eight hours (preferably overnight). It should be mentioned that Mod-Roc is hygroscopic before use; it takes up water and so should always be stored in a dry place.

So much for ordinary "solid" hills of reasonably small proportions; tunnels present different problems, as a hollow space must be left "underground" to allow the trains to pass through. On our small layout, we covered the tracks in with a "roof" of cheap cardboard of the laminated type, in the fond belief that this would provide the support for the covering hill. It did, but complications arose later! As the wet newspaper and Mod-Roc dried out, the supporting

A demonstration layout that used vast quantities of Mod-Roc open work cotton cloth with plaster of Paris. Note how the hill top is removable for transportation and the realistic tunnel mouth entrances. The tunnel portal described in last month's trackside construction is ideal for using with Mod-Roc or Beattiplast constructed hills, etc.



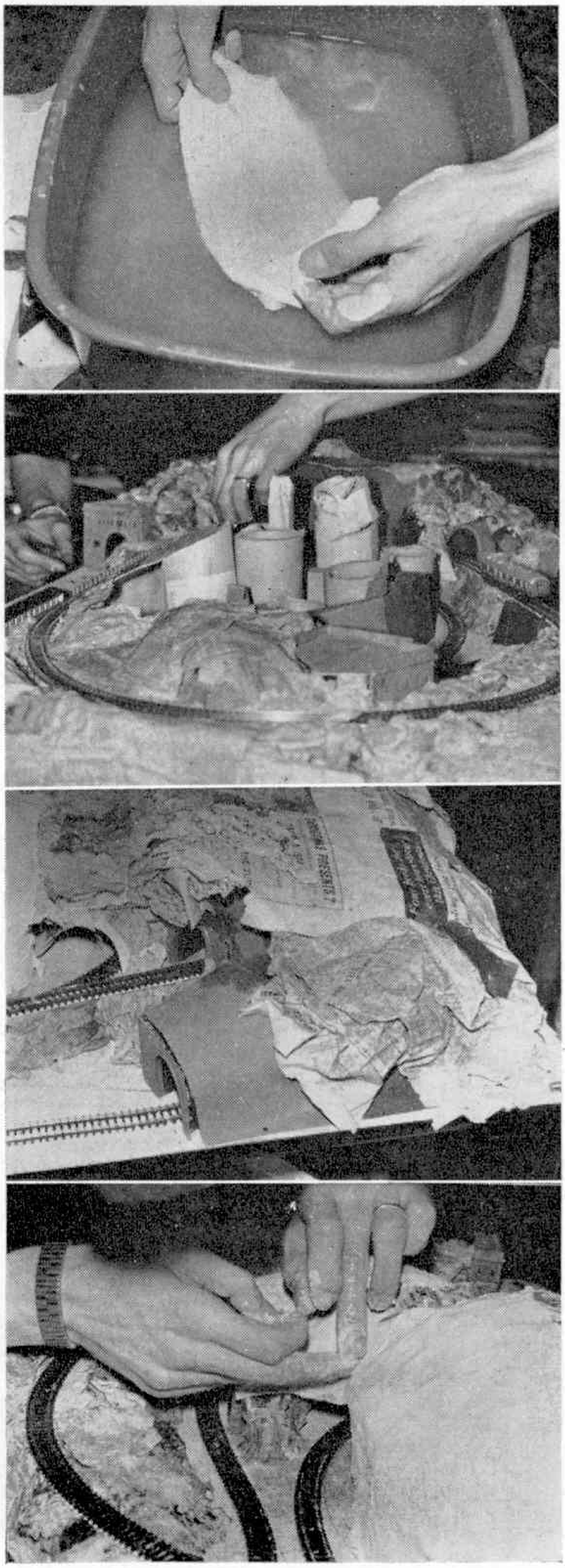
cardboard became steadily wetter; the laminations separated, and the whole lot duly collapsed on to the track, where it was found unexpectedly by a "trial" train! The Mod-Roc "ground surface," however, stood fast, and is firmly in place to this day, with no means of support underneath whatever.

In the centre of our layout we wanted a large and impressive mountain, and to add strength to this otherwise vulnerable feature, we filled in the centre of it with a weird assortment of old cardboard tubes and screwed-up newspaper. The resultant mountain has since proved as solid as the proverbial rock.

Successful scenery on a model railway is usually the result of keen observation of the real thing on the part of the bulider. Always keep your eyes open when travelling through the countryside, noting the shapes of various natural and man-made formations. Have you noticed, for instance, that if your train passes through a chalk cutting, the sides of the cutting are probably very much steeper than those of an ordinary earth one would be? This is because chalk will stay firmly in place at a more vertical angle; cutting sides of earth, at a similar angle, would inevitably slip, causing a landslide. Rock cutting sides are often even sheerer still. Always remember that, in real life, the scenery came first, and the railway much later, and the path of the railway was literally cut through the hills and valleys along the route. On our model railways, the railway must come first, and the scenery later, and making the whole picture look as though the reverse was the case is the main battle of the scenic modeller.

When you have completed the application of the Mod-Roc, your layout will present a very attractive "snow scene" and you will feel disinclined to paint it—we were! However, although you may think that the result looks like Austria in the snow, your friends will merely mutter "Couldn't be bothered to paint it even," so paint it you must. Humbrol paints are ideal for this, and you can supplement these with flock powder or similar substance, to roughen the surface texture a little. We do not intend to say much about colours in this article, as this subject is largely a matter, once again, of personal observation. Be careful, though, not to make your grass too "green"—look at the nearest plot of grass, preferably in sunlight, and half close your eyes. It's almost yellow in places, isn't it? The actual colour varies enormously with the texture. Before painting your favourite hill, practise on a spare piece of plaster first, and decide what colour you want. Vertical faces can be made to look like rock or chalk with a few dabs or streaks of grey or white in the right places.

After painting, the completed landscape can be embellished with trees, fences, telegraph poles, houses and all the things which go to make up a scene. In HO and N many ready-coloured plastic building kits are available from the Continental manufacturers like Faller, Pola and Quick. Trees can be obtained from Britains or Minitanks or you can have a go at making your own. Do not overcrowd the scene, as this usually effectively kills realism; if in doubt, leave it out.



At right, top to bottom. The cloth is immersed in a bowl of water for three to four seconds and gently squeezed out, it must not be wringed out! Next, an assortment of tubes and old junk to act as supports for our centre hill in a display layout. Next, the cardboard tunnel roofs and newspaper hill foundation. See text for problems encountered here, the roof fell right in on us! Right, applying the Mod-Roc and pressing it into the finally required shape over a tunnel portal. This material takes up to eight hours to fully dry so there is no need to rush ahead and risk spoiling anything by skimping to save time. Note the Pola building in the background, we obtained this from Beatties of Southgate.

THE SLIM WHITE LINE

The "Plimsoll Mark" instigated by an outspoken Victorian reformer, has probably been the greatest life saver of merchant seamen the world over.

by John Mannering

THE MODERN seafarer; it is perhaps no longer correct to use the term sailor, is extremely fortunate comapared with his forefathers, in the instruments and equipment on shipboard which are specially aimed at maintaining his safety, and that of his vessel.

Tragedies at sea, such as the recent winter's loss of trawlers in Icelandic waters, will never be entirely eliminated; for on the sea one is dealing with nature's cruellest and most powerful elements: wind and water, and there can never be absolute safety.

But radar, radio, ship-to-shore telephone, radio direction finders, accurate time signals, weather forecasts, electronic echo sounders, self inflating life-rafts, increased reliability and power of modern marine engines, and lifeboat services on most coasts near busy shipping lanes; all help to make the lives of those who go down to the sea in ships less hazardous.

Nevertheless, in spite of all these comparatively recent aids to safety, the one single, simple device which, year by year, saves more ships and their crews than any other, is the Plimsoll Mark.

Until well past the middle of the nineteenth century small coasting vessels and deep sea ships were loaded with just as much cargo as the owners or masters thought fit. And human nature being what it is, many vessels put to sea grossly overloaded in order to earn freight money.

Sometimes if an owner said that so many tons of cargo had to be stowed, the captain might realize full well that it would endanger the vessel; but he also knew that if he refused to put to sea there were plenty of others waiting to take his place. The crews also were well aware that their ships often put to sea too heavily laden, but they could not afford to go ashore and allow others to take their berths.

There was also the dubious practice among a few unscrupulous shipowners of loading a ship to danger point, insuring heavily the vessel and cargo, secure in the knowledge that if all went to the botttom, they at least, would not be the losers.

All these facts were well known in the sea ports of the country, but it was not until Samuel Plimsoll came on the scene that anything was done about them.

Born in Bristol in 1824, Plimsoll experienced poverty as a young man, but eventually, after working as a solicitor's clerk, managing a brewery, and later establishing himself as a prosperous coal merchant in London, he became a Member of Parliament in 1868. Owing, no doubt, to his connection with the coal trade into the port of London, he was only too well aware of the dangerous practice of overloading ships; and he was determined to stamp it out.

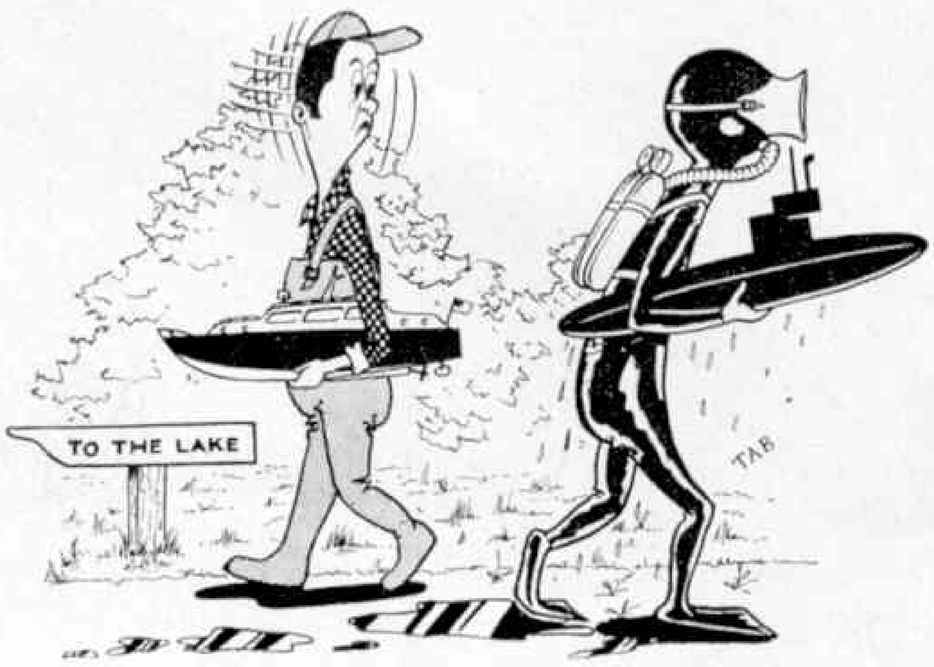
After a long parliamentary struggle against the vested interest of the shipowners, he was eventually instrumental in the passing of the Merchant Shipping Act of 1876. During the long years which he devoted to this cause he was often unduly outspoken and sometimes exaggerated his case but, neverthless, it was only his drive and enthusiasm which enabled him to achieve his object.

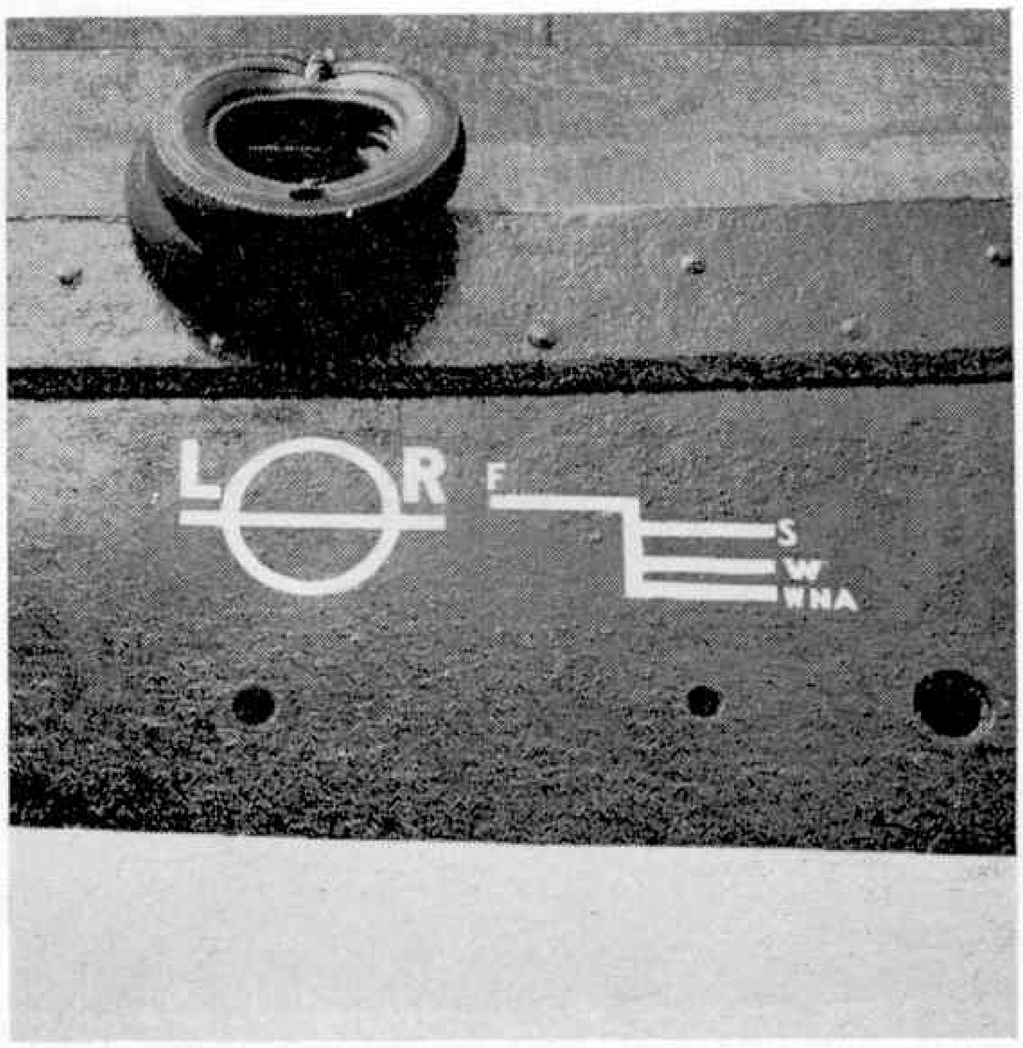
The most important part of the Act was the stipulation that every merchant vessel must carry a line on her side, which came to be known as the Plimsoll Mark, indicating a level beyond which the ship must not be loaded and proceed to sea.

If the mark is submerged below the water, the ship is too deeply laden. The correct position of the mark is first determined between the ship's designer and the Board of Trade.

The present Plimsoll Mark is an interesting and informative arrangement of short white lines, painted amidships on both sides of a vessel, and is probably a familiar sight to many readers.

The illustration shows the mark newly painted on the side of a small vessel plying north of the tropics.





At left: The bust of Samuel Plimsoll on the Victoria Embankment, London, reminds passers-by of his great work for the safety of seafarers. At right: A Plimsoll Mark, freshly painted on the side of a small ship, in accordance with the Merchant Shipping Act.

LR, standing for Lloyds Register, is the main load line; and the white lines to the right indicate slight variations of loading level under different conditions.

F shows the level to which the ship may be loaded in fresh water. For if a vessel takes her cargo aboard while berthed in a fresh water canal or a lake, she may load down to the line marked F, and when she returns to salt water she will rise in the water until she is back at the Plimsoll line proper.

S indicates her load level in summer time. This is the normal level and is the same as the main Plimsoll line. W indicates that in winter she must not be loaded quite so deeply on account of the increased risk of rough weather; and WNA means winter north Atlantic, where conditions are notoriously bad, calling for a further reduction of cargo weight and an increase of freeboard.

If the ship was trading in the tropics there would be two more lines, TF, tropical fresh, allowing the ship to be loaded a little deeper than the line F; and TS, tropical summer, showing a load line deeper than S but not quite so deep as F.

These slightly deeper loadings in tropical waters are permitted because on the whole better weather is encountered in the tropics. However, if a ship is making a prolonged voyage across several oceans, she must be loaded according to the worst conditions she is likely to encounter, and the north Atlantic in winter calls for the lightest loading of all.

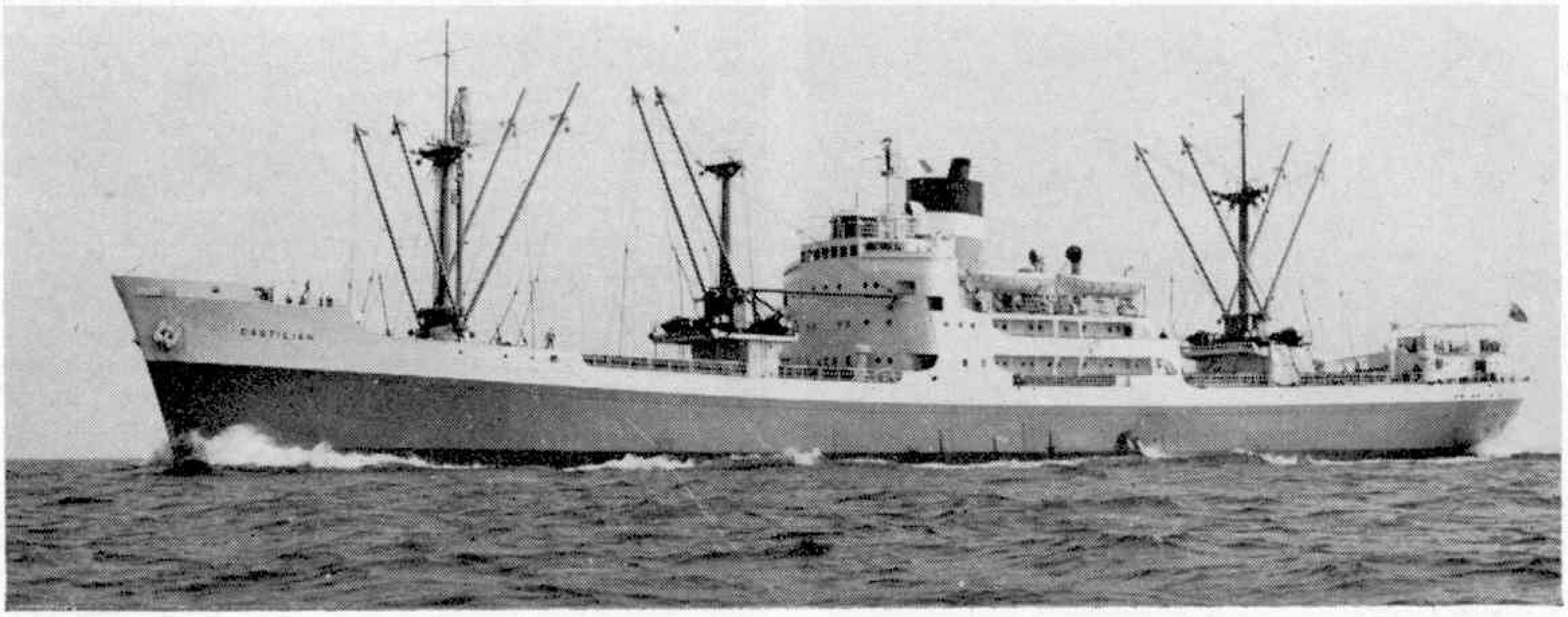
These markings were all confirmed at the International Load Line Convention held in 1930, when maritime nations agreed on regulations for safety at sea, and are now embodied in our Merchant Shipping Act of 1932. Under this Act, both the owner and master are liable to see that the load is maintained and that the ship does not proceed to sea with the mark submerged: further, every vessel must carry a certificate stating that she has been surveyed and that the load line has been marked in accordance with the Safety and Load Line Convention.

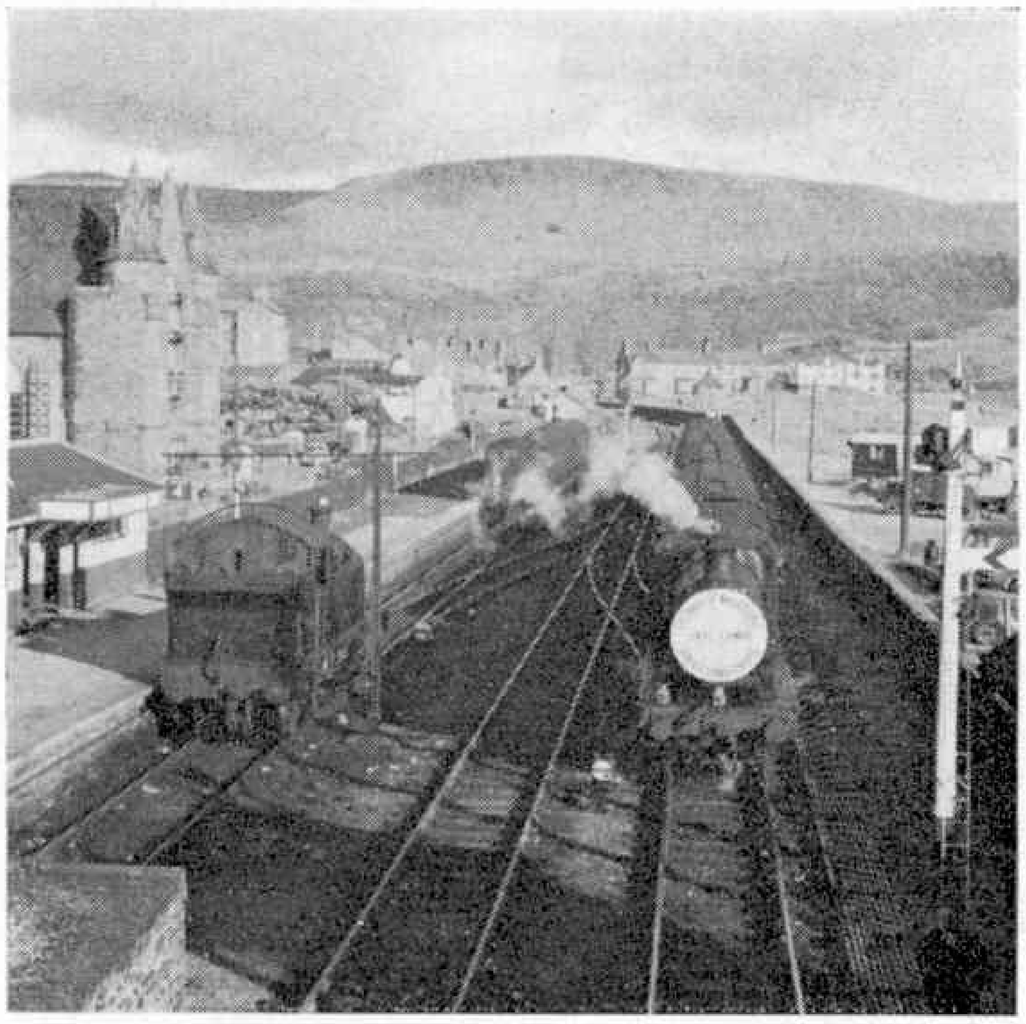
Thus the shipping fraternity have come a long way since the mid decades of the nineteenth century, when owners and masters could load a ship as deeply and dangerously as they wished, risking seamens' lives and the safety of the vessel.

On the Victoria Embankment overlooking the Thames as it ebbs and flows to the pulse of the sea tides, stands a moving and dignified memorial to Samuel Plimsoll, the "seaman's friend." His rather sad, bearded face looks out across the Thames which he knew as a young man, and from which ships often sailed overloaded. By his simple, sensible and effective device, the Plimsoll Mark, he caused the shipping industry to take the most important step forward towards greater safety at sea—never to overload a ship.

When winter gales whistle round the chimney pots, and one can imagine high seas running off our coasts, it must be a reassuring thought to those whose families are connected with seafaring, to know that, thanks to Samuel Plimsooll, there are no ships struggling for survival amid the welter of wind torn seas, carrying loads for which they were not designed.

'Castilian' A modern British cargo vessel makes good speed up the English Channel bound for the port of London. Her Plimsoll Mark (just visible on the hull beneath the funnel), well clear of the water, would have delighted the eye of the Victorian reformer.





Above: Interesting track work in Barmouth station with a locomotive standing in a parcels bay platform on the left. Behind the right-hand engine is a trailing crossover.

FIG 1

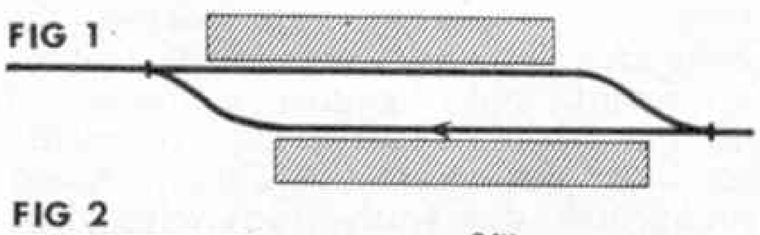
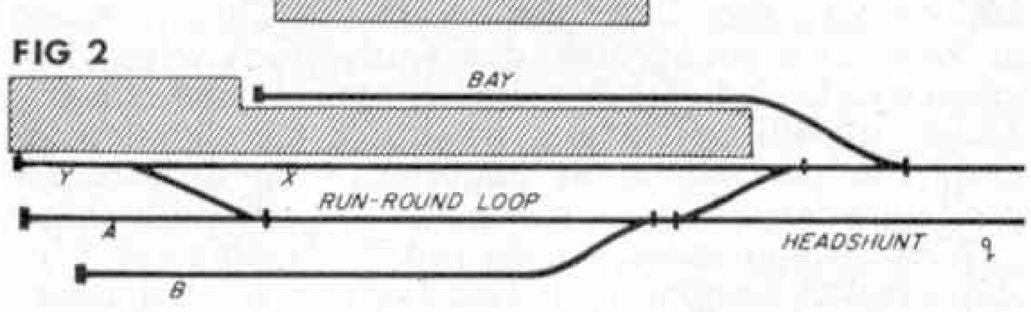


FIG 2



Below: A scene at a station on the layout of Mr. J. L. Holbrook. The scale is O and the station itself is characteristic of the " island ".

A.B.C. of Model Railways

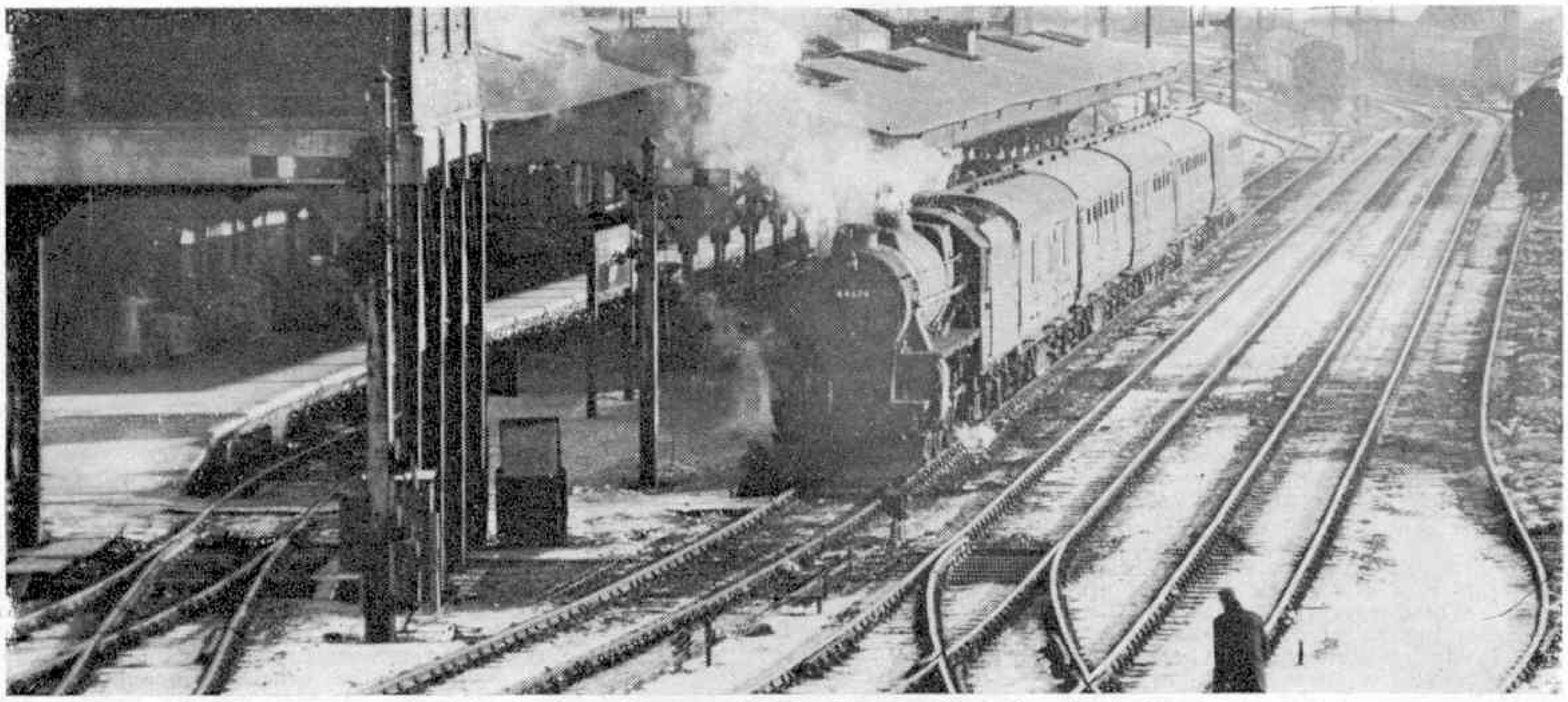
STATION TRACK LAYOUTS

ALL RAILWAY stations fall into two easily defined categories; " through " or " terminal." There are a few stations which incorporate both through and terminal tracks (a good example is Blackfriars, Southern Region), but in these cases, each section of the station is usually considered separately from an operational point of view.

From the railway modeller's angle, it is difficult to say which type of station gives the most operational enjoyment. Whilst the terminus provides the necessity for turning round trains, and servicing and stabling locomotives, the through station on a single line railway can provide passing facilities and a goods yard. *Figure 1* shows a simple passing station on a single line, with a loop and two platforms. Notice how the two points are arranged, so that the straight run is taken in the facing directions (see ABC of Model Railways for April, 1968) and the curve in the trailing direction. This means that non-stop trains can run through the loop at speed with greater safety than if the points were arranged the other way round. On the sketch, we have shown the platforms set opposite each other, on the outside of the loop itself. This was the usual arrangement in the early days of railways, but many lines built towards the end of the nineteenth century and early in this century, used the " island " platform arrangement. As the name suggests, the platform was placed between the tracks; the advantages of this system was that it saved money in wages, as fewer staff were needed to deal with trains, as the trains all, in effect, called at the same platform. Only one set of station buildings and shelters was needed, and buffet facilities could be used conveniently by passengers waiting for both " up " and " down " trains.

Figure 2 shows a simple terminus layout which has become a classic with model railway enthusiasts over the years. There must be thousands of layouts based on this theme, with minor variations. This particular layout is not intended to represent Waterloo or Euston, but a small country terminus of the sort that is becoming all too rare these days. Passenger facilities are provided by just one platform, with a small " bay " behind it for parcels and milk traffic, and possibly an extra passenger train on " Summer Sundays." There is a single-siding goods yard, mainly for coal traffic, and a run round loop; the latter is an essential part of all termini, as it allows the engine of an incoming train to be released from its train, and run round it to the other end, whereupon the train can depart again with the same engine. At large termini, the situation is somewhat different, as it is unusual for the locomotive which brought a train in, to take it out again, and at some such stations, run-round loops are not provided. Instead, the empty stock is taken back to the carriage sidings by the station pilot, a locomotive which " lives " at the station all day and makes itself generally useful.

When designing a model terminus, based on Fig. B, there are several points to bear in mind. First, the " neck " of the run-round loop (y) must be long enough to accommodate your longest locomotive, to allow it to run back over the crossover and past its train. An uncoupler at point **x** is a good idea, as it



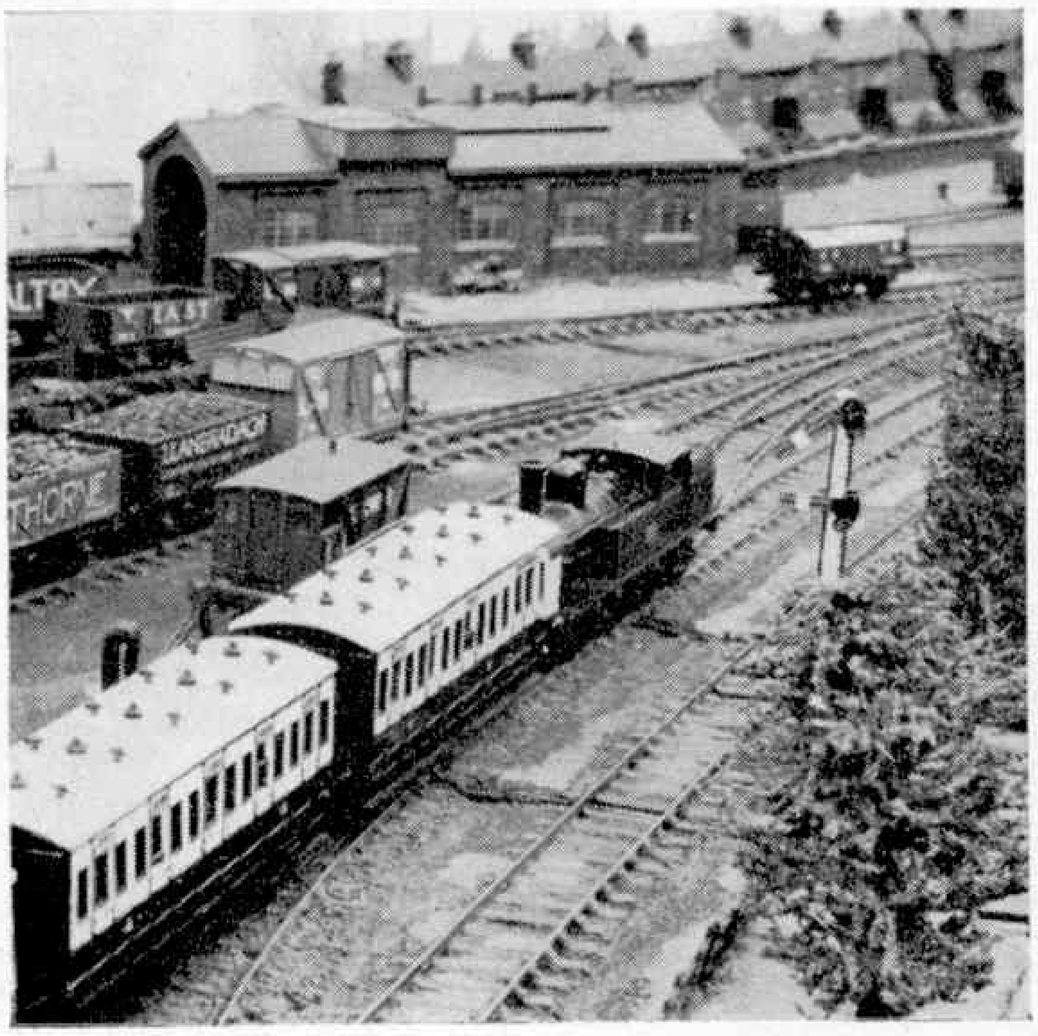
Back in the days of steam a local train starts from Peterborough station; the layout here is unusual as the left-hand track is served by two platform faces.

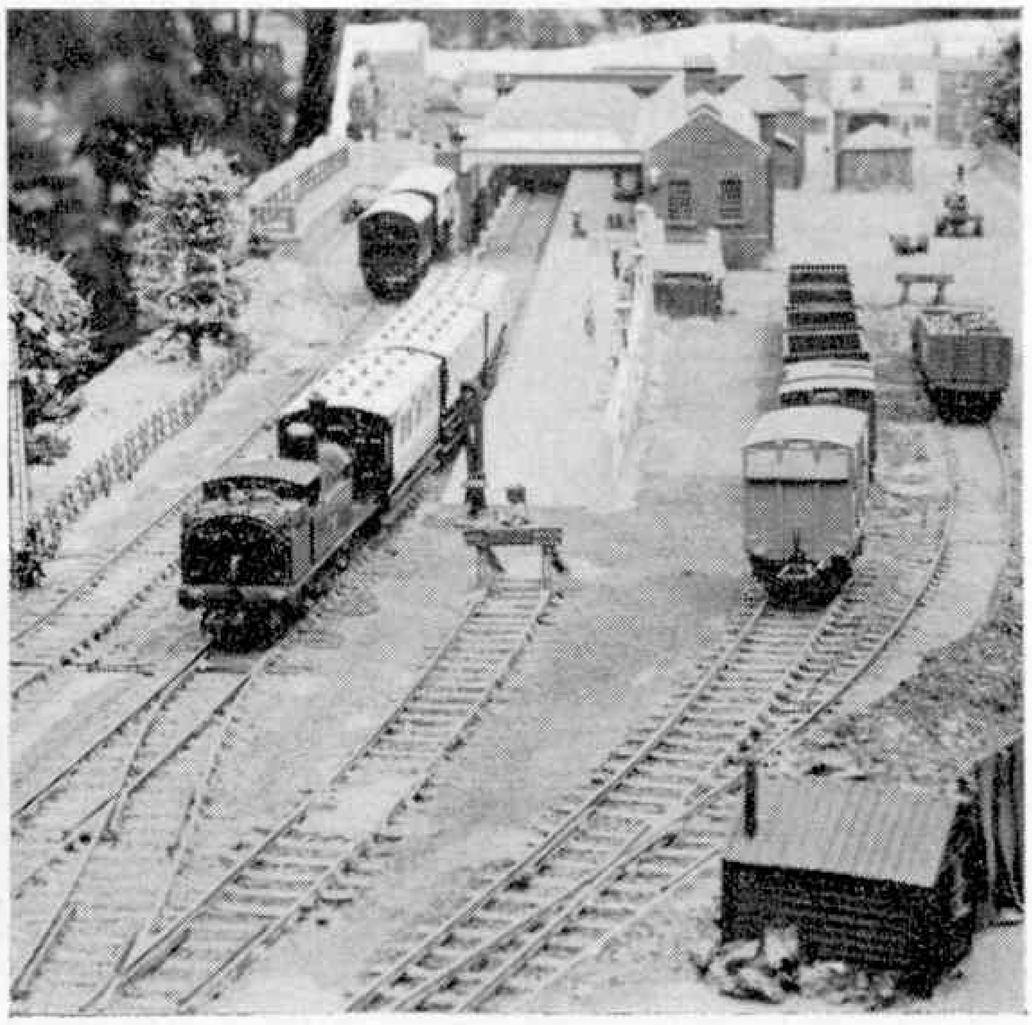
makes the whole operation of running round the train "untouched by human hand" and bound to impress visitors.

The length of the platform road itself must also be of ample length to hold your longest train without fouling the points at either end. Incoming goods trains are dealt with in a rather different way. On arrival, the train is routed, not into the passenger platform, but on to the run-round loop itself. The engine can then run round the wagons via the platform road; now it is at the back end of the goods train, ready to shunt the various wagons into either of sidings a or b. If a track q is provided, long enough to hold the complete train, then shunting operations can be carried out without interfering at all with passenger traffic. Track q is called a "headshunt."

Figures A and B are both very simple versions of typical track layouts found at stations. Both can be elaborated upon in model form; A, for instance, has no goods facilities in our sketch, but it easily could have. A simple siding, running behind one of the platforms and possibly a headshunt running parallel to the main line, would complete the picture. Do not be tempted to include too much trackwork in a small space; it is always very tempting to include just one more siding, but that siding will probably be one too many. Include only trackwork which is necessary and you will be following real railway practice.

These views of G. Williams EN gauge layout show how a typical model terminus can be developed on a baseboard little over two feet wide. Only a single platform is provided with the goods yard behind. The locomotive shed can be seen in the background of the left-hand picture.





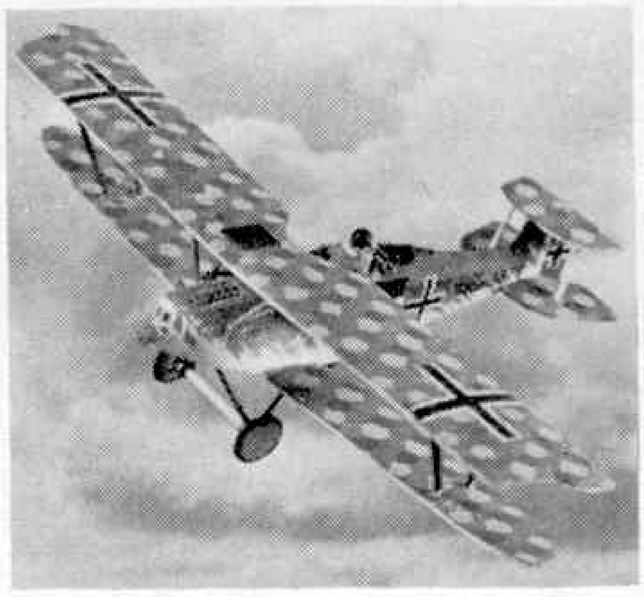
HAVE YOU SEEN ?

Humbrol Ltd., Aerosol Spray Packs

Humbrol Ltd., of Hull, manufacturers of Humbrol enamel paint and Britfix adhesives, have decided to market all their Britfix adhesives under the Humbrol Trade name. This change will take place gradually and will be completed at the end of this year. Humbrol enamel is now available in Aerosol *Spray Packs* and this is a brand new Humbrol product. These sprays can now be used straight onto Polystyrene plastic kits and are to be recommended. There is no need to worry about brush or finger marks on your model any more; just carefully mask the areas you want unpainted and apply the fine spray. Humbrol also market both matt and gloss clear Polyurethane paint in *Spray Packs* and this makes an ideal fuel proofer coating, but make sure your workroom is warm and dry, or it may blush and dry with a white misty finish.

V.I.P. Stock Car Racing. Price £7 19s. 0d.

V.I.P. pioneers in the model car racing world have developed a very new and pretty exciting angle to the hobby, stock-car racing. The system V.I.P. have developed allows two cars to race on one lane, each independently controlled. This is made possible by the use of electric motors and other equipment especially produced for this job. The cars are fitted with powerful springs, which are held up under the body by a catch. These catches protrude outside the rear of the body shell. The pursuing car can ram the leading one, depress the button, release the spring and wham ! The car is thrown off the track and cannot be replaced until the spring is once again secured underneath the car. The transformer needed to operate the cars is 24v, so neither the transformer nor the cars could be raced with the normal types of slot cars, or used in conjunction with the normal 12 volt transformer. The track, however, is the type common to all V.I.P. slot car sets, so it is possible to interchange or combine the two. Price for the set is £7 19s. 0d. and the special transformer is available at £1 19s. 0d.



Airfix Hannover World War I Fighter. Price 2s. 6d.

Pride of the Hannover railway wagon works, the CL 111a, was one of Germany's most successful two-seater fighter aircraft of the First World War. Brought into service in 1917, the Hannover CL 111a was a relative latecomer, but proved to be fast and manoeuvrable and almost as tough as the more down-to-earth Hannoversche Wagonfabrik products. Thus it was hard to shoot down and the 500 produced by the time of the Armistice won the respect of Allied air aces. An unusual feature of the Hannoveria was its narrow biplane tail which afforded the rear gunner a wide field of fire. Fuselage mounted grenade racks were fitted for ground attack missions.

All the details of the CL 111a, its crew and equipment are incorporated in more than 30 polystyrene parts in the kit. Even the texture of the wing fabric is simulated. Detailed building instructions, directions for painting the CL 111a's multi-coloured camouflage pattern and a set of marking transfers are also included.

At left: The V.I.P. Stock-car Racing set as received for review, well packaged with a dynamic box-top. Below, the two cars supplied with the outfit. Note the front steering and " crash " spring. The release catch can be easily seen at the back of the car. At right: The special transformer is seen with the hand controller's cars and connector.

Scalextric Ferrari and Lotus 38. Price £3 17s. 6d. each.

Those of you who have an interest in slot cars will be pleased to hear that we've had the opportunity to review a couple of ready-to-race 1/24 scale Grand Prix models manufactured by Scalextric. They are a little on the expensive side at first glance, at £3 17s. 6d. each, but in view of their looks and performance are undoubtedly good value for money. The first box we opened was that containing the Ferrari Formula 1 type. The body shell is a very clean and well finished injection moulding in Ferrari Red team colour and has racing number transfers, etc., on it. The driver is completely painted and apart from the knees down, complete. He sits in a racing type seat, clutching a chromium plated wheel which is mounted in front of a super-detailed instrument panel. All the suspension details (including coil springs on the rear) are included and are chromium plated. The engine, exhausts and gearbox (which, as you may know, is at the extreme rear of the car) are moulded in complete detail and authentically coloured, the engine chrome, the exhausts copper/chromed, and the gearbox metallic silver. The wheels are well reproduced with spoked inserts, just like the real thing. On the power side, we find a very strong cast-metal chassis with a fall-away pick-up arm. The motor is a very potent Japanese tin-can one (a 26D type) which many of the better club-racing types favour. The gears are bevelled (the best kind of gears for model car racing) all adding up to a very reliable and tough car.

The other model we received was an Indianapolis Special (also 1/24th). The body shell on the model is moulded in dark green, and this model also features plenty of details like the Ferrari. Due to the type of car, the engine details are not shown, thus making it slightly less glamorous looking than the Ferrari. It is, however, a very good model and makes up for a lack of chromium, etc., in other ways. It has, for instance, a very attractive red exhaust system, which looks

like a pile of snakes ! Large chromium plated petrol and oil filler caps on the body, and larger wing mirrors than the Ferrari, give it a very attractive appearance. To sum up on these two models, very attractive, very realistic and very, very fast.
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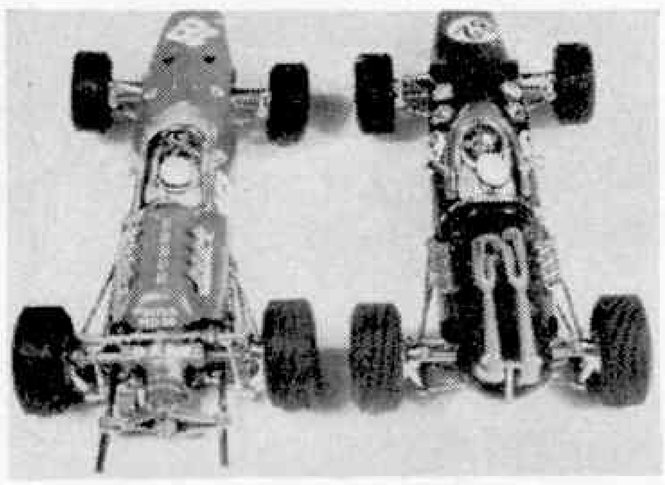


Above: The two 1/24th scale Grand Prix models manufactured by Scalextric. The Ferrari is on the left and the Indianapolis Special on the right.

At extreme left, the Airfix Hannover CL 111a. A really tough fighter that won the respect of the allied air Aces in World War One. At right, the Monogram Junkers Ju 87G-1 Stuka with actual markings for the tank buster version flown by Ulrich Rudel on the Russian front.

Monogram Junkers Ju 87G-1 Stuka. Price 23s. 3d.

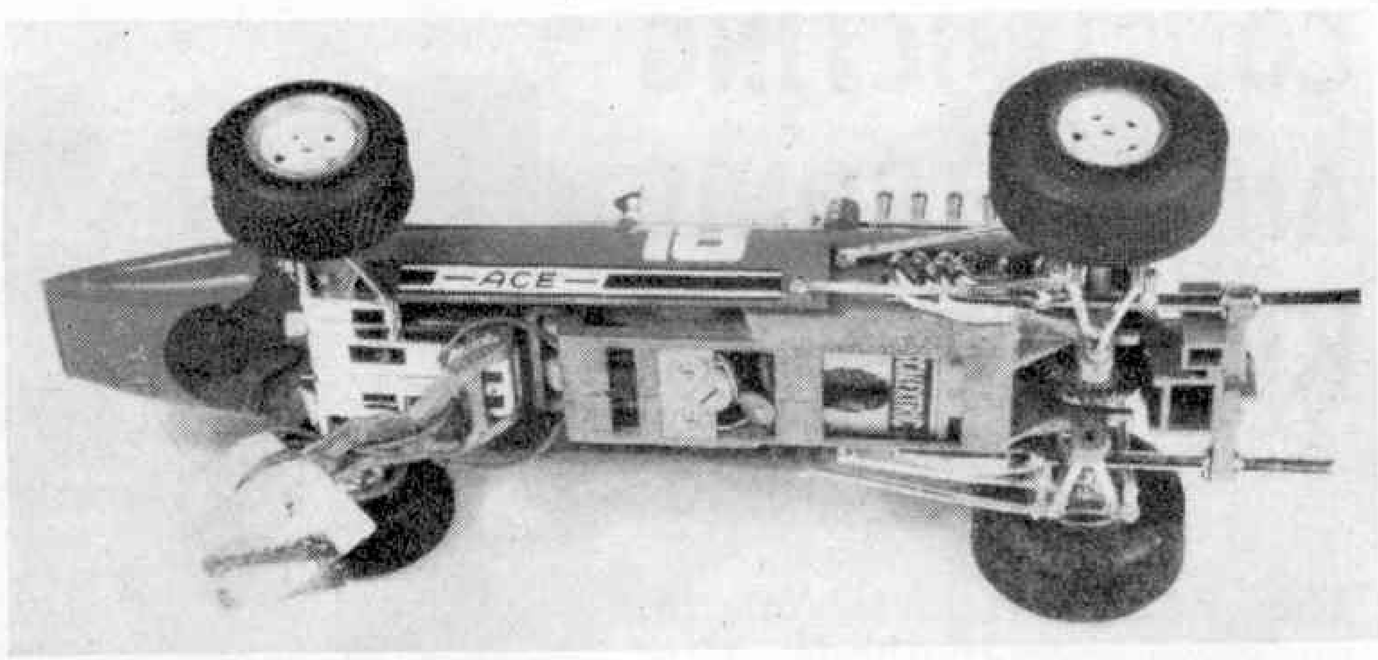
The latest addition to Monogram's ¼ in. scale World War Two aircraft kits is the Junkers Ju 87G-1 Stuka dive bomber. The Stuka attained more notoriety than most of the other aircraft in the arsenal with which Germany launched the Second World War. It was in continuous service from 1938 up to the close of the War, and its distinctive lines and shrill screech were synonymous with dive-bombing. Fitted with two 37 mm. cannons, the G version was highly succesful as a " tank-buster " on the Russian Front toward the end of the war. The actual aircraft the kit is based on was that flown by Ulrich Rudel, destroyer of 500 tanks on the Russian Front. The model features an opening canopy, rotating wheels and propeller, completely detailed cockpit interior with pilot and gunner figures, two 37 mm. anti-tank cannon and full colour transfers depicting Rudel's aircraft. The unusual wing flaps are moulded onto the wings for ease of assembly.

Heinkel He 177A-5 Heavy Bomber from Airfix. Price 9s. 6d.

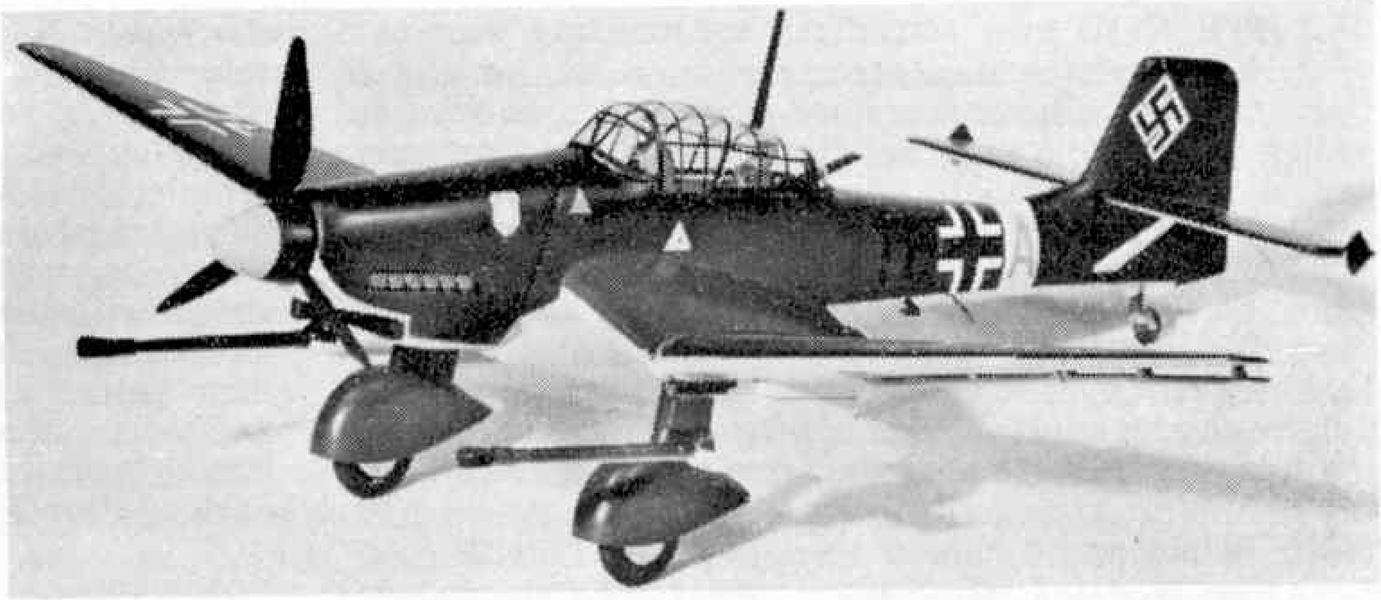
More Heinkel He 177 " Grief " (Griffon) heavy bombers were said to be lost through flying accidents than through enemy action in World War Two. The " Grief " was the only German heavy bomber to go into large-scale production, but it was dogged from its inception by design problems that were never effectively solved. Fire frequently broke out in the twin engines that drove each propeller. And the heavy aircraft—it needed a double undercarriage—was hard to handle in the air and caused heavy crew losses.

Finally, six years after it was conceived, the He 177A-5 played an effective role in the mass raids on London in 1944.

The accurate Airfix scale model of the impressive-looking " Grief " captures every detail in more than 160 polystyrene parts. The model has a wingspan of nearly 18 in. and features movable control surfaces, guns and three Henschell Hs 293 guided missiles. Full assembly



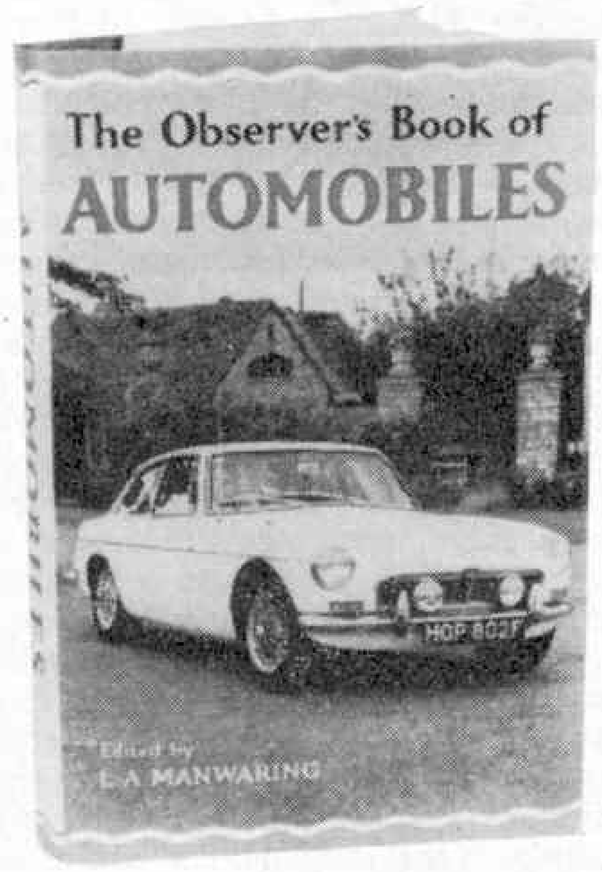
An underside view of the Scalextric 1/24th scale Ferrari gives one some idea of the tremendous quality of this car. Note the bevelled gears on the back axle, competition type tin-can motor, and fall-away pick-up arms. These cars must be seen to be appreciated.



and painting instructions and a sheet of ten marking transfers are included.

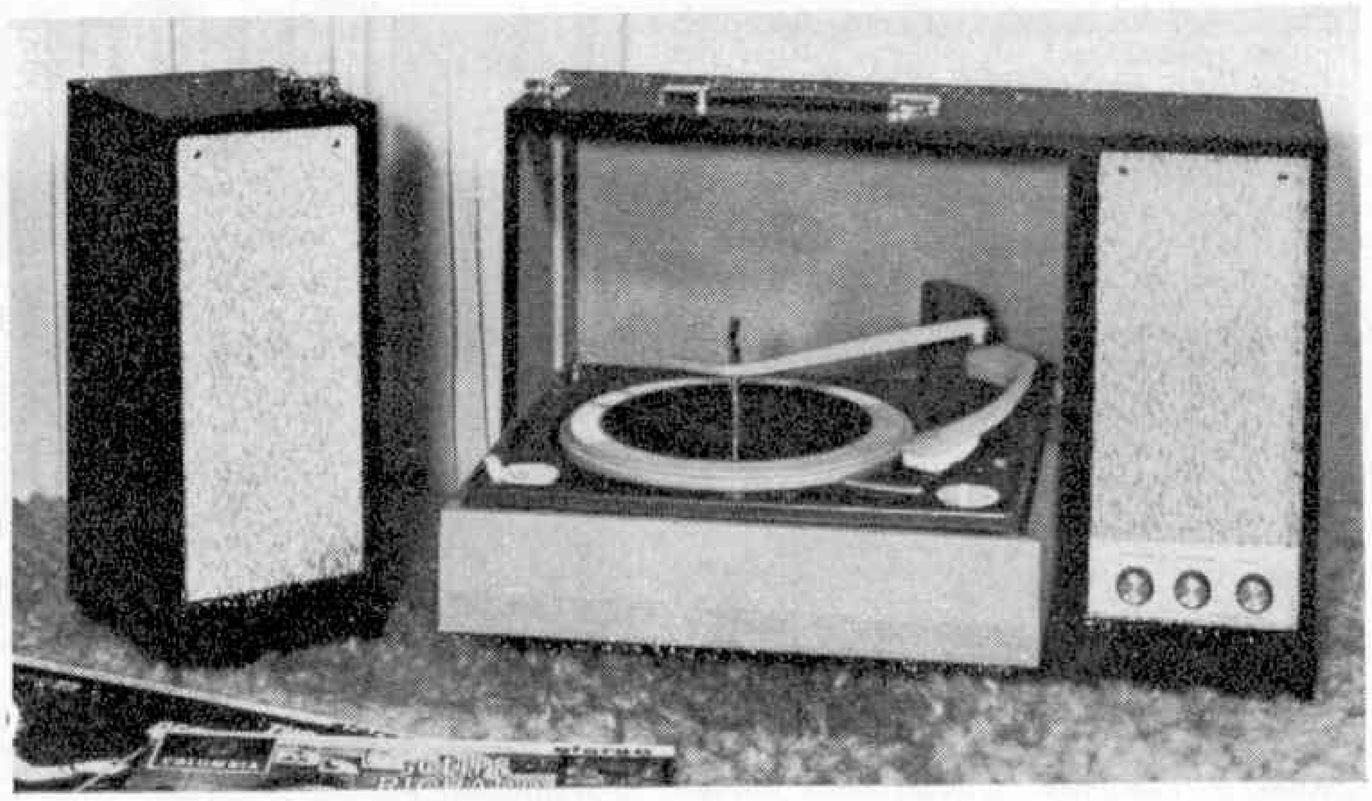
The Observer's Book of Automobiles. Published by Frederick Warne & Co. Ltd. Price 6s.

This, the 1968 edition of the above book edited by L. A. Manwaring, is a completely revised version with all the latest information on current models from many countries including France, Japan, Italy and Canada. It contains information on 150 makes with over 270 photographs, 45 line sketches and 70 makers' badges. It also has a very interesting, but brief, history of the automobile and how it works. There is also a list of number plates and a glossary of technical terms. We were very impressed with the Japanese cars which, at the moment, are little known over here in Great Britain. One of the most interesting descriptions is that of the Italian Lamborghini P.400 Muira Sports Coupe. With its 12 cylinder V formation engine developing 350 brake horsepower or 430 brake horsepower (sprint version), its top speed is 186 or 200 m.p.h. and this is a road car ! All this from a 4 litre engine too. Only 41½ in. high it has superb looks, retractable headlights and—wait for it—a 19.8 gallon fuel capacity, some car !



Above: The latest Observer's Book of Automobiles is very good value for money and is suited to everyone's library. Below: The Heinkel He 177.

CONSTRUCTING AN ELECTRONIC KIT.



The Editor reports on his findings and methods after constructing a stereo record player by Heath kit

HAVE YOU ever considered constructing your own record player, tape recorder or radio for use in your home ? The chances are you haven't, so read on. Most people who read the electronic kit manufacturers advertisements are immediately put off as they have little or no electrical knowledge and a theoretical circuit diagram scares them to death. This is quite natural, and it's the fear of the unknown causing this reaction, but this is easy to overcome. We decided to construct a fairly advanced kit and report our findings for benefit of the many adult *Meccano Magazine* readers and the fathers who always read their son's magazines.

Our selection

After studying the various catalogues we decided that the Heathkit Model SRP-1 Portable Transistor Stereo Record Player Kit made by Daystrom Ltd., of Gloucester, was the ideal choice. Nearly everyone has a portable radio, but many will still be saving up for a record player, especially a stereo portable. For the *technically minded* the total music power output of both channels is 4.5 watts, through two 8 × 5 in. permanent magnet speakers. The overall size is 27 in. wide × 14¾ in. high × 7½ in. deep and it weighs 35½ lb., there are three controls, volume, balance and tone on the case with the on, off, play, reject, multiple control being incorporated into the automatic B.S.R. Monarch record changer. The all transistor amplifier, two 8 × 5 in. speakers, and record changer unit are housed in a modern cabinet of robust construction that comes completely finished including leather cloth covering. You only have to install the electrical components and record changer unit in it. The changer is mounted on a swing down platform, which effectively conceals and protects the changer unit when not in use, while providing easy access to the controls when in the playing position. One loudspeaker enclosure is detachable from the main cabinet so that good separation of the speakers may be obtained for the optimum stereo effect, four to six foot separation is recomended. The detachable speaker enclosure may be simply clipped to the main cabinet for transportation or the playing of *non stereo* mono records.

Read and learn

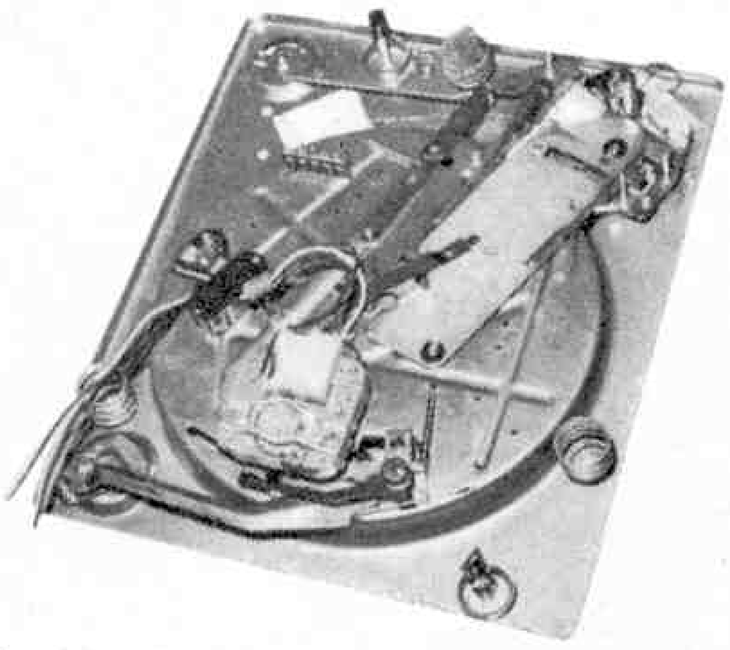
In a kit of this nature the first thing to do is read the instructions booklet very thoroughly; do not unpack the components right away. The Daystrom Heathkit 32-page, 8½ × 11 in. size booklet is very easy to understand and you *do not need to know anything about electronics to understand it.* Unpack the components very carefully and check each one off on the components list *as* you remove it from the packing, do not throw any packing away until this operation has been completed, as some small parts can easily be overlooked, during the rush to see just what's in your kit.

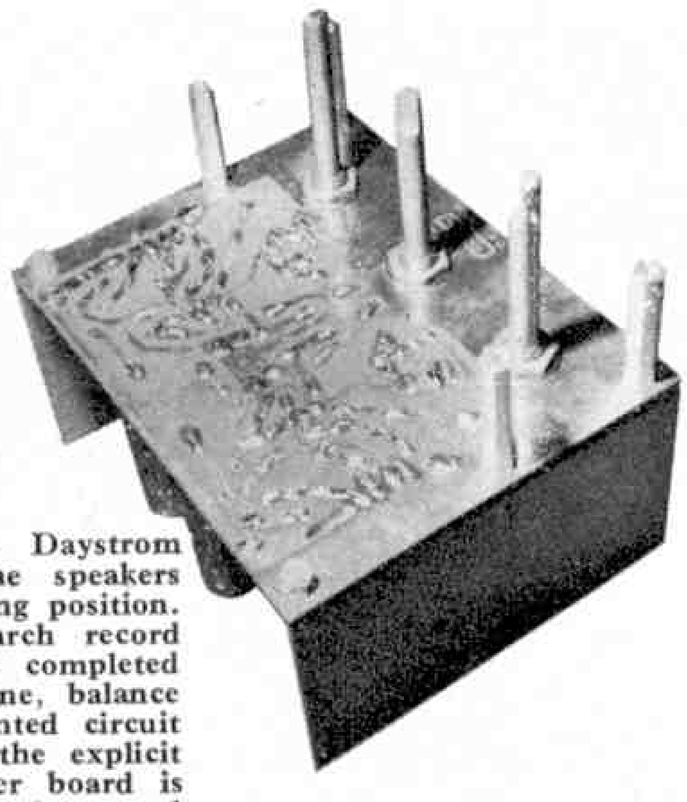
An extremely easy way of storing the components is shown with the leads of resistors and capacitors inserted into the edge of a cut-down corrugated cardboard box, their values can be written on the cardboard next to each component. Moulded egg cartons make very handy trays for storing nuts, bolts, washers, etc. See page 330 for illustration.

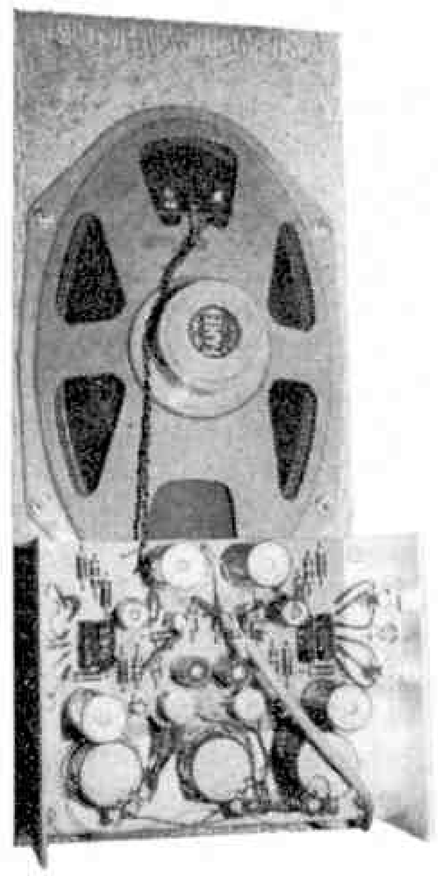
Soldering

One point that does need special care is soldering. Providing you can identify all of the parts against the pictorial illustration and use a small soldering iron reasonably to fairly well you will have absolutely no trouble in constructing a kit.

You *must have good* soldered connections. About 90 per cent of all failures in this type of kit are related to poorly soldered connections. If you are not experienced at soldering, a few minutes' practice with some odd lengths of wire will be helpful. A small efficient soldering iron (about 25 watts with a ⅛ in. or ¼ in. tip diameter) is ideal for circuit board work and all chassis connections. Tags and wires must be clean and free of wax, frayed insulation and other foreign substances before they are soldered. Use only enough solder to thoroughly wet the connection; it is not necessary to fill the entire hole in a terminal with solder. Position the work so that gravity tends to keep the solder where you want it and keep the soldering iron tip clean by wiping it from time to time with a cloth. We used a Weller Temperature Controlled TCP-1 soldering iron with a PU-1 transformer designed for use with the TCP-1 iron, incorporating a holder for the iron, and a small wiping sponge to keep the tip clean. Any poorly soldered joints should be reheated until the solder flows smoothly. Excess solder should be removed by reheating the connection and allowing the excess to flow onto the iron. In some cases it may be necessary to add a little more solder to obtain a smooth, bright appearance. Resin cored solder is supplied with the kit and this type of solder must be used for all soldering. The equipment will not be serviced if acid core solder or paste fluxes have been used. If additional solder is needed be sure to purchase resin core (60:40 or 50:50 tin/lead content) radio/electrical solder.







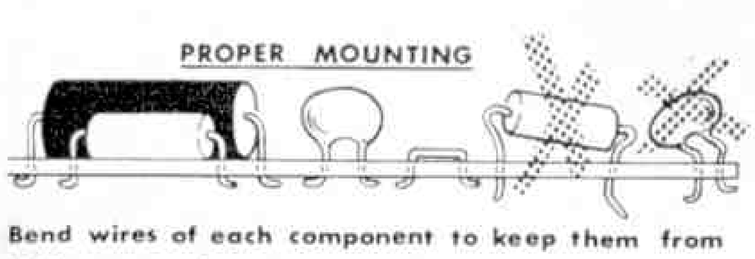
At left, in heading photograph, the completed Daystrom Heathkit Stereo Record Player with one of the speakers detached and the swing-down platform in the playing position. Above, an underside view of the B.S.R. Monarch record changer as supplied in the kit. At right, the completed amplifier mounted on a Dural chassis with the tone, balance and volume controls bolted in position. The printed circuit board work is quite easy providing one follows the explicit instructions. At far right, the completed amplifier board is seen mounted with one of the speakers on the cloth-covered panel board. Below, a few hints and tips on how to work on printed circuit boards as illustrated in the instruction booklet.

Circuit board basics

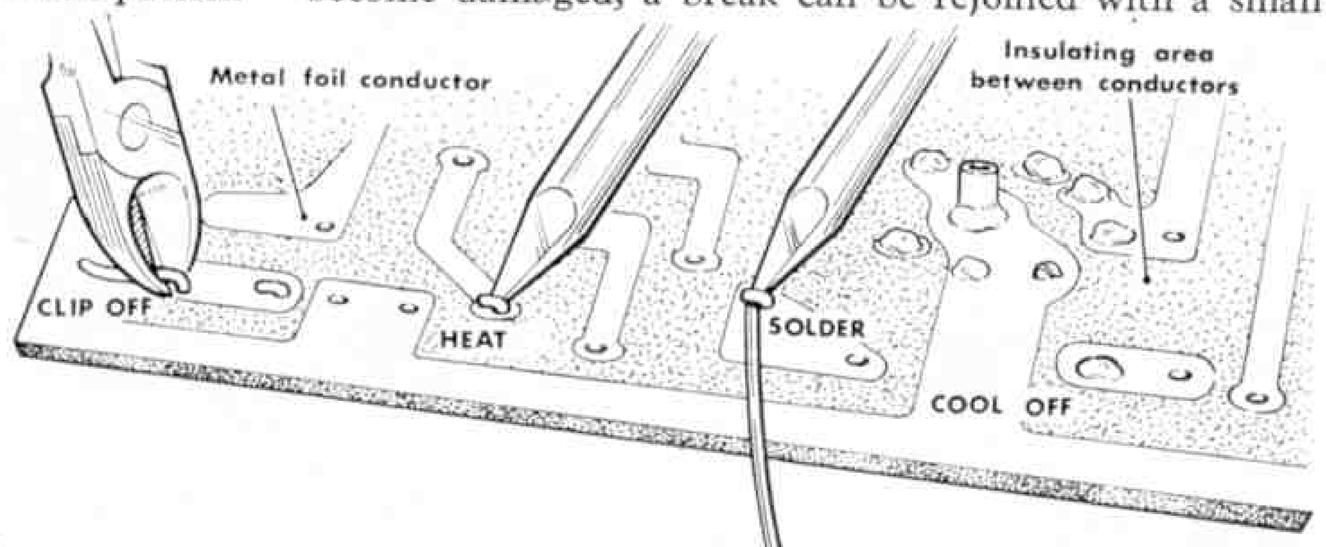
Before attempting any work on the circuit board the observation of a few basic precautions will ensure proper operation of the unit when first switched on. Proper mounting of the components on the board is essential for good performance. A good general rule to follow is that all components on the printed circuit board should be tightly mounted to the board, unless the instructions state otherwise. All wires should be kept as short as possible to minimise the effects of stray wires and shorts. Proper and improper methods of mounting are illustrated.

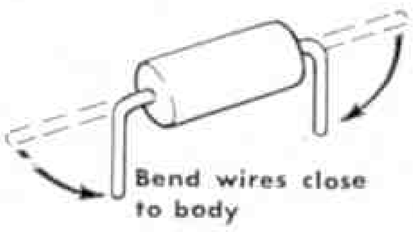
Tubular capacitors and resistors have to have their wires bent to fit and disc capacitors normally require no preparation unless the tags are bent, in which case they can be straightened with a pair of pliers. Components should have their leads bent outwards to retain them in position, with each lead being cut about $\frac{1}{8}$ in. from the board and dressed flat against the foil, making sure it does not extend beyond the conductor area.

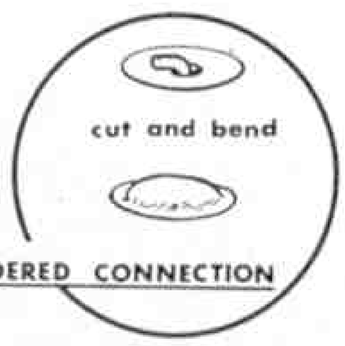
The technique of soldering leads to a circuit board is quite simple. Position the tip of a soldering iron so that it firmly contacts both the circuit board foil and the wire or tag to be soldered. The solder should be placed between the iron and the joint to be soldered, hold the tip of the iron in place until the solder has " welded " both the component lead and the foil pattern on the board. Apply more solder if necessary and allow it to flow smoothly over both surfaces, when this is achieved, quickly remove the iron. Sufficient solder must be used to surround and adhere to the component lead on all sides, but the possibility of an unwanted bridge between adjacent conductor areas whether by solder or an excessively long component lead must not be overlooked. It is important that no movement should occur during cooling off, otherwise a " cold joint " will occur which will sooner or later give trouble. After soldering a group of components, each and every joint must be examined to ensure that no joint is overlooked and by comparing with the illustration, that no solder bridges, dry, cold or otherwise imperfect joints have been made. This is *very important* as a higher percentage of failures occur for these reasons than for any other. If solder is accidentally bridged across insulating areas between conductors, it can be cleaned off by heating the connection carefully and quickly wiping the solder away with a soft cloth. Holes which become plugged can be cleared by heating the area immediately over the hole while gently pushing the lead of a resistor through the hole from the opposite side, and withdrawing before the solder rehardens. Do not force the wire through; too much pressure before the solder has time to soften may separate the foil from the board. If the foil does become damaged, a break can be rejoined with a small

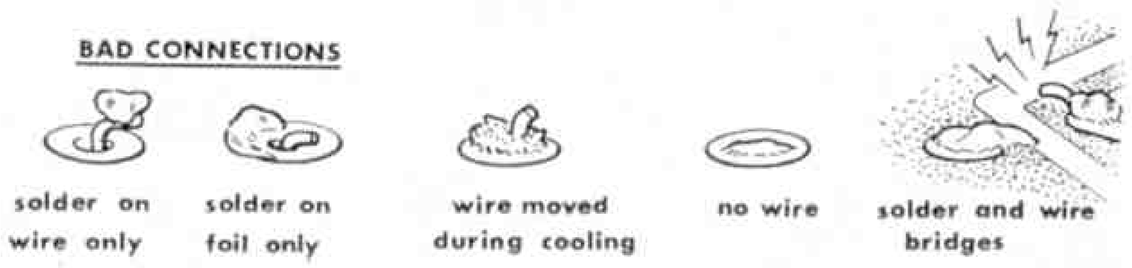


Bend wires of each component to keep them from falling out when the board is turned









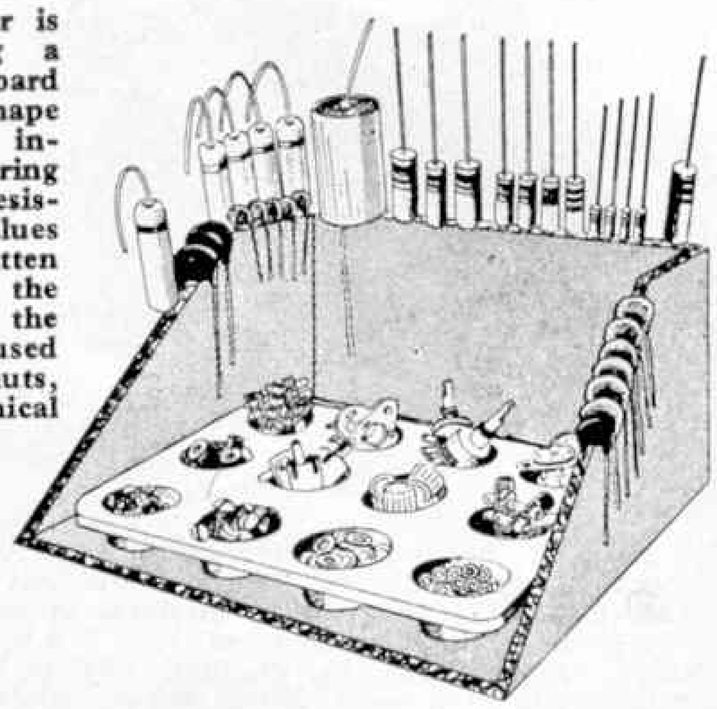
piece of bare wire soldered across the gap or between the foil and the head of a component.

These then are the golden rules: care and patience, good soldering and the explicit following of all instuctions, no matter how basic they may seem. You can construct an electronic kit quite easily, as the *professionals*, who make T.V.'s, radio's, etc., and do all the soldering are usually girls who have been trained in a few days to use a soldering iron, and you have the great advantage of constructing your kit for the pleasure of it; to them it's work ! Read on and see how the Editor fared constructing the test Heathkit Stereo Record Player.

Our experiences

Firstly, all the components were checked off and identified in the very comprehensive instruction manual. Construction started with the amplifier circuit board. To this we soldered all the resistors, transistors and capacitors checking each one off the pictorial illustrations in the handbook as we went along. The values were easy to identify as the colour code is listed for each component. With the amplifier circuit board complete it was mounted onto the Dural chassis with the three controls in place, tone, volume and balance. This was also quite easy and all parts fitted together very well. When assembled, six sheet copper transitor heat sinks were added, four of them being bolted to the chassis. We made an error here by cutting some transistor leads too short (who said we can't read), but new transistors were soon supplied by Daystrom. Two more resistors and capacitors were then added to the chassis circuit control unit and the three controls wired to the printed circuit. You have to be careful not to solder each wire separately as you add them: some terminals have as many as four wires on them and these should all be soldered at once; the instructions are quite explicit here. Reverting to the transistors for a moment, take very great care to make sure they are correctly mounted, it's easy to get the leads the wrong way round, we know, we did !

The next step in the operation is to remove the speaker panel from the main cabinet, also remove the detachable end speaker. A mains transformer is installed in the rear of the main cabinet speaker area, an electrolytic capacitor and a terminal strip. These are wired up to the chassis/circuit board and then to the speaker which is mounted on the removable fabric

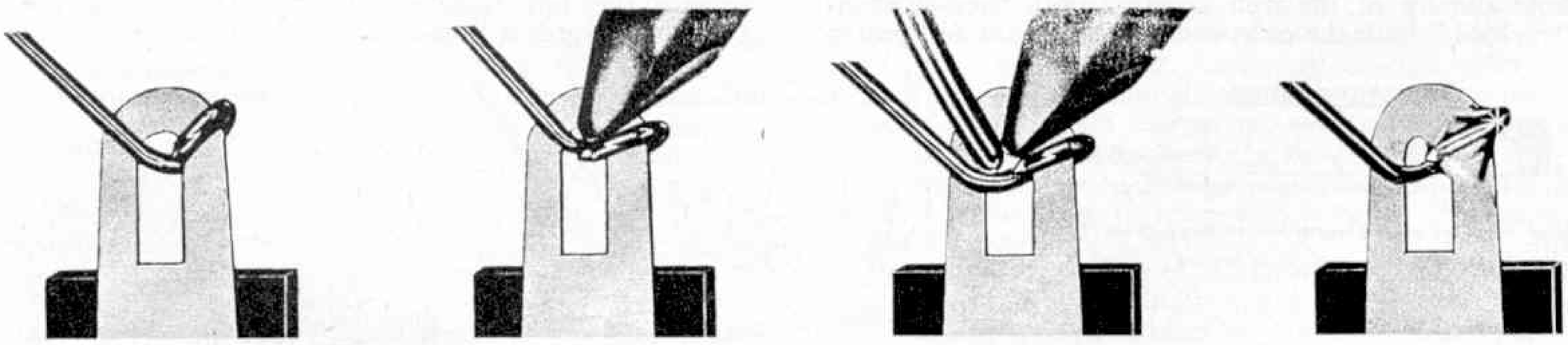


This simple holder is made by cutting a corrugated cardboard box to the shape shown and is invaluable for storing transistors and resistors. Their values may be written against them on the box. Note how the old egg carton is used to store odd nuts, bolts and mechanical components.

covered panels. This completes most of the complicated work, it just remains for the record changer, which is a self contained unit, to be wired in, the other speaker is added and wired to the main case speaker. You may think we are skipping complicated parts over very lightly, but this is not the case, it really is as easy as this.

The cabinet is very nicely finished in two/tone leather cloth and all of the components fitted without any forcing or undue trouble. *Before* the great moment comes to switch on, *check everything*, as a misplaced wire or transistor can cause a lot of damage to other components. Our player worked fine, with crisp sound from both base and treble speakers and it's surprising how members of the family *tell guests and visitors* how *you* made it, yet they may not say it to you direct ! For those who have trouble or have any faulty components (we did not), Daystrom have an excellent Technical Consultation Service with skilled professional trouble shooters always ready to advise you. They also run a factory repair service so you can return the completed kit to them if all systems aren't functioning properly.

At £27 15s. 0d. for the complete kit this may be out of the reach of many, but for those that can afford it we can wholeheartedly recommend it, it would cost far more to purchase a ready made set of comparable quality in the shops. Perhaps you have been thinking of something like this, let us convince you, it's good fun and a week of evenings will see it finished !



The do's and don'ts of soldering terminal connections. Above, left to right; firstly attach the end of the wire to the terminal. Next, place the flat side of the soldering iron tip against the connection; the tip should touch both the wire and the terminal. Next, place the solder against the soldering iron tip and the connection; the solder will melt and flow into the connection. Lastly, remove the solder and then the iron from the connection; do not remove the wires until the connection has hardened. Check the connection, a good soldered joint should look smooth and bright. At left, two illustrations to show how a soldered joint should not look. A poor or ' cold ' solder connection will usually look crystalline and have a grainy texture, or the solder will stand up in a blob and will not have adhered to the connection.

Captain Cook on Stamps

by J. A. Mackay

ONE OF the four stamps to be issued on May 29 commemorates the first of the epic voyages made by Captain Cook to the Pacific which began exactly 200 years ago. Cook received scant recognition during his lifetime, but to him is due the credit of giving Britain an empire in the Pacific so soon after the American colonies had turned their backs on the mother country. The exploits of Captain Cook have been recorded on stamps before and quite a sizeable collection of stamps in this theme can be formed.

In fact, Captain Cook was portrayed on a stamp in the very first set of adhesive postage stamps ever produced by a government postal administration—the series issued by New South Wales in 1888 to mark the centenary of the colony. James Cook was born in humble circumstances on October 28, 1728, in the village of Marton, near Cleveland, Yorkshire, where his father was a farm labourer. Young James had a very elementary schooling before being apprenticed, at the age of 12, to a haberdasher in Staithes, near Whitby. This employment seemed too tame for a lad of adventurous spirit and some time later he entered the employment of Messrs. Walker, shipowners of Whitby.

For 14 years James Cook served in the coastal shipping trade, sailing as far as Norway and the Baltic, but also gaining a close acquaintance with the seaports of Britain. During this period he progressed slowly and uneventfully, eventually gaining his mate's ticket. In 1755 he joined the Royal Navy and, after four years' service, was given his first command, the sloop *Grampus*. In 1759, as master of the *Solebay*, he was responsible for sounding and surveying the St. Lawrence River and acting as pilot to General Wolfe's expedition which scaled the heights of Abraham and took Quebec from the French. The bicentenary of this battle was commemorated by a Canadian stamp in 1959 and this could form the introduction to a collection of Cook stamps.

Subsequently he was appointed marine surveyor of Newfoundland and Labrador under Governor Palliser, his former naval commander. He won a reputation as a skilful map-maker and, in spite of his poor educaiion, became a mathematician and astronomer of some standing. His observations of the solar eclipse in August 1766 brought him to the attention of leading scientists in England and in May 1768 he was promoted to lieutenant and given command of an expedition to the South Pacific to observe the transit of Venus. He set sail on the *Endeavour* in August 1768 and reached Tahiti the following April. Having observed the transit he explored the South Pacific and spent six months charting the coasts of New Zealand. His map, together with his portrait and a picture of his ship, were featured on the 1d. stamp issued by New Zealand in 1940. The 3d. stamp in the Christchurch Exhibition set of 1906 and the 2s. stamp in the 1935 definitive series showed Cook landing at Poverty Bay.

From there he sailed on to Australia, whose eastern shores he chartered carefully and named New South Wales, after a supposed resemblance to Glamorgan. New South Wales portrayed him on the 4d. stamp of its "One Hundred Years" series of 1788. Captain Cook was also portrayed on the 7s. 6d. stamp in Australia's last definitive series before decimal currency was adopted; the same design is now in use as a 75c. stamp. Cook sailed through the Dutch East Indies and returned to England via the Cape of Good Hope. His exploits earned him promotion to commander and an appointment to a second expedition to explore the great southern continent. In July 1772 he set out from Plymouth with the *Resolution* and the *Adventure* and spent the next three years exploring the South Pacific and Antarctica. He covered more than 60,000 miles, discovering islands ranging from New Caledonia in Polynesia, to South Georgia in the Antarctic, and yet managed to return to England with the loss of one man only. He stamped out scurvy by making his crews suck limes, hence the nickname "lime-juicer" or "limey" applied to English seamen.

Cook reached England in July 1775 and was immedi-

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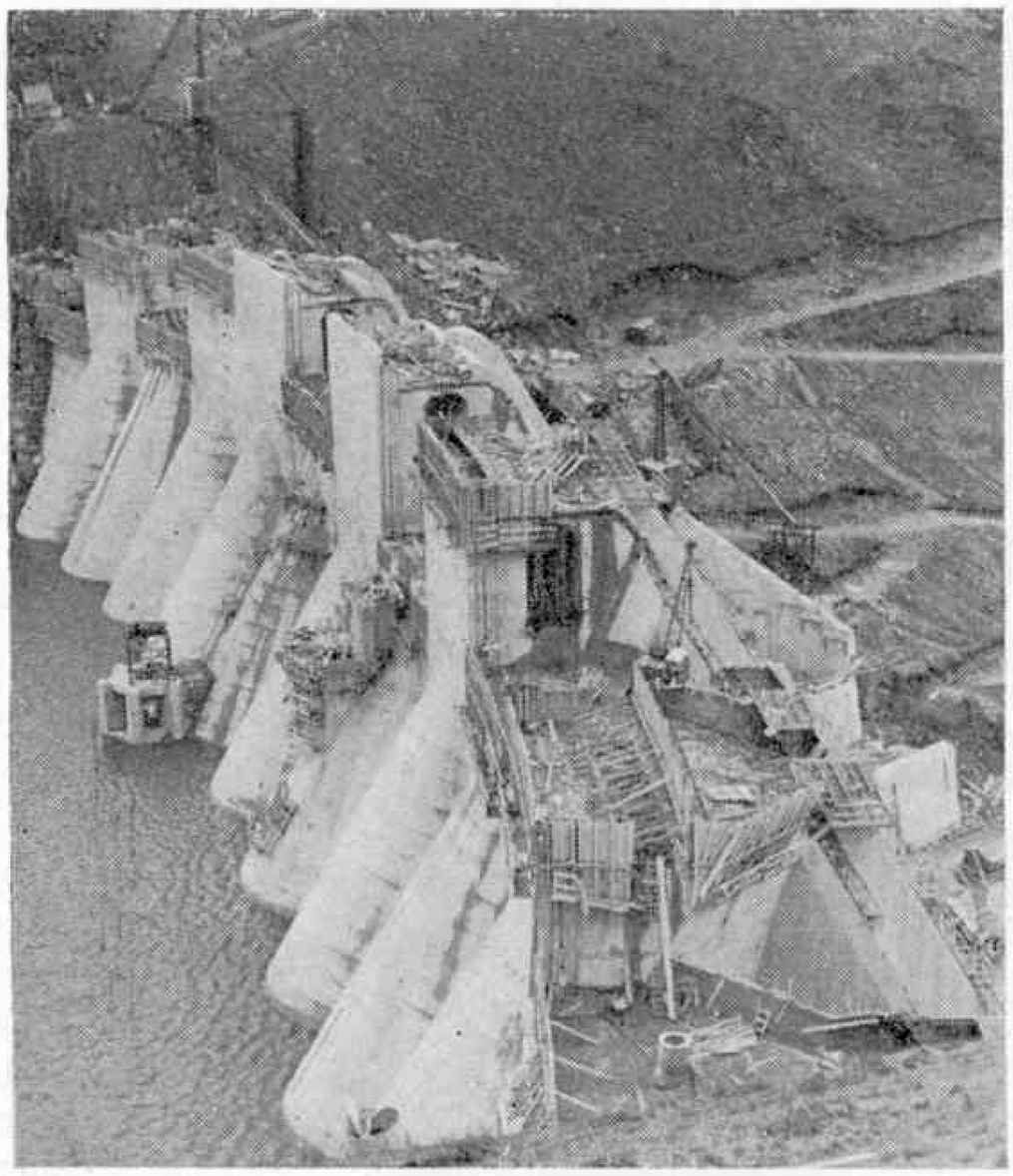
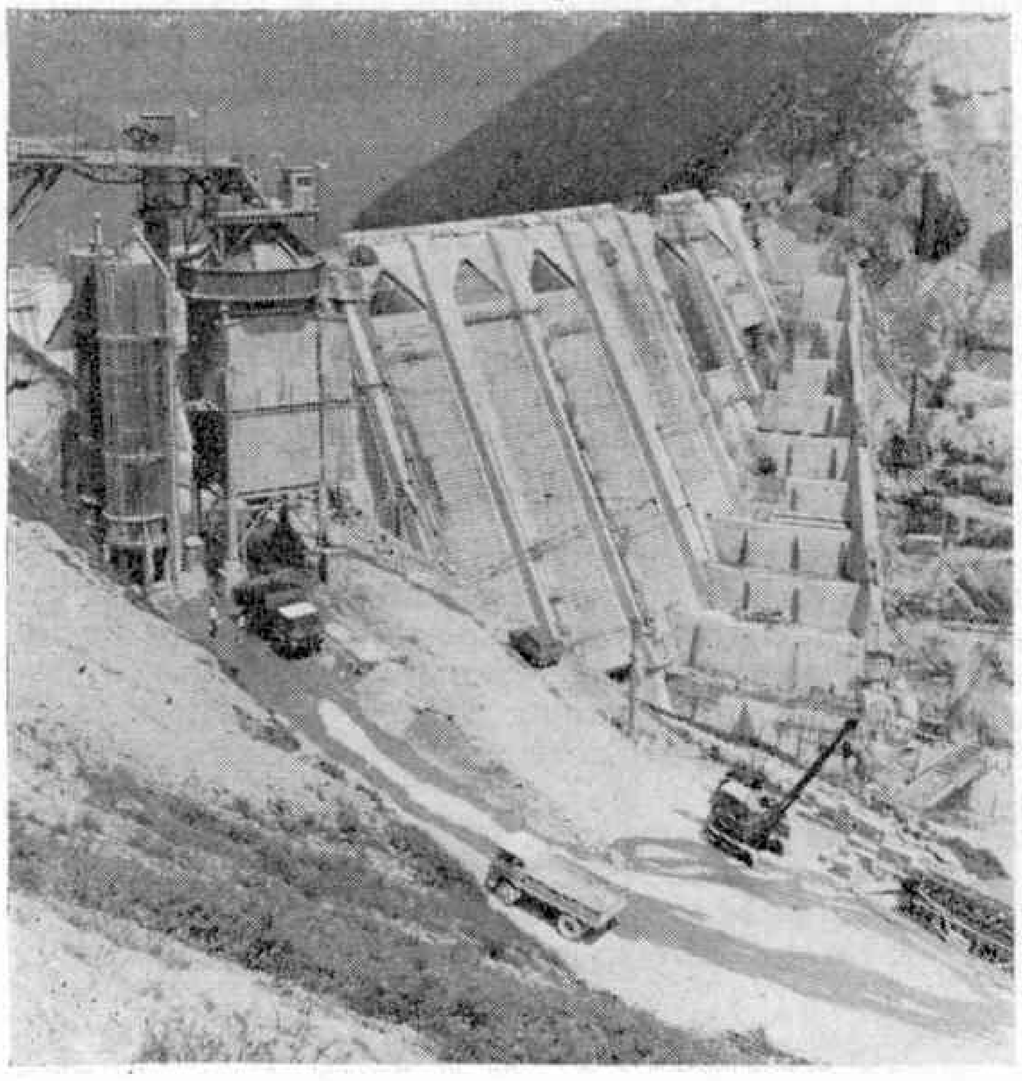


This picture clearly shows the shape of the buttresses on the up-stream side of the Clywedog Dam. This shows construction during March 1967.

THE NEW CLYWEDOG DAM IN MID-WALES

by Edward G. Hodgkins

The nearly completed dam in June 1967, shows its tremendous size and depth. Such an enormous structure is essential to contain eleven million gallons of water.



FOR MANY years there have been two growing problems in the Severn Valley. In the winter months the heavy rainfall in the mountains of Mid-Wales swells the many streams that converge on the upper Severn. This in turn raises the level of the river to such an extent that towns such as Newtown, Shrewsbury and as far downstream as Tewkesbury and Gloucester suffer flooding. This event occurs every year and, apart from the misery caused in inhabited areas, it also leaves farmland under water for months on end.

No sooner have the floods subsided than the appeals go out for economy in the use of water all along the river. Garden hoses are banned, just when the gardens need watering, etc., etc. Then, in 1963, an Act of Parliament was introduced in an attempt to improve the situation by building a dam high up in the mountains of Montgomeryshire to control the flow of the river. This Act empowered 13 water authorities in the area together with the Severn River Authority to combine to form the Clywedog Reservoir Joint Authority. This group would then construct a giant buttress dam across the River Clywedog, a tributary of the Severn, thereby increasing the daily ration of water allowed for each member.

The River Clywedog runs through some of the bleakest, most desolate areas of Mid-Wales to meet the Severn near the quiet town of Llanidloes. There is no other town for miles and so it became necessary to build a camp to house the contractors near the construction site. Very few major projects in Britain can have been conceived so far from civilisation.

The Plan was to flood a deep, winding valley in the mountains above Llanidloes and, by means of giant sluices in the heart of the dam, regulate the flow of water into the Severn. Roadworks for the project were started in November, 1963, while main site work on the dam was begun in April, 1964. The dam was completed late in 1967, but a great deal of clearing-up and landscaping of the area still remains to be done.

The buttress dam is the tallest in Britain, being 237 ft. high above foundations (the crest being 927 ft. above sea level). The crest length is 600 ft. and some 230,00 cubic yards of concrete were used in the construction. The reservoir behind the dam will, when full, be six miles long and will contain 11,000 million gallons of water.

The concrete was fed to the top of the dam by an overhead cableway, which was sabotaged early in 1966 by objectors to the project. This had the effect of putting the completion date back by several months and afterwards a very strict security watch was kept all over the site.

About 15 miles of new roads have been built together with two new bridges, owing to the flooding of existing roads. Also a secondary dam 35 ft. high and 600 ft. long has been built to contain the reservoir at a low point part-way up the valley. The total cost of the project will be of the order of £4¼ million.

It is intended that, as far as possible, water released through the dam will be fed through an 80 kW turbine (for generating power for use in the dam) and a 500 kW turbine (to feed the public supply system).

To cater for the considerable public interest expected, extensive car parks are being provided, together with sailing and fishing facilities. The area is being planted with selected trees and shortly what was once a dark, empty valley will have become another popular Welsh beauty-spot.

With acknowledgements to the Consulting Engineers: Sir William Halcrow & Partners, and to the Main Contractors: Reed & Mallik Limited.

EARLY MECHANISATION IN THE FIRE SERVICE by A. W. Neal

THE FIRE chiefs at the turn of the century must surely have looked upon the steam-driven fire engine with some speculation. It was a complete break-away from the four-in-hand horse-drawn vehicle with its reliability and quick turn-out.

Such a fully mechanised pump was brought out by Merryweather and Sons Limited in 1899. Steam power had already been applied to the pump, but with this vehicle steam was given a second duty, that of propulsion. The Fire King pictured here was described by the makers in the following terms: "*The machinery is so designed that the pumps may be easily thrown in or out of gear, and the crankshaft geared on to a countershaft from which the rear running wheels of the engine are driven by cog wheels and chains. The boiler can be fired by petroleum, the oil being carried in two large tanks placed between the frames under the driver's seat. A special burner of latest design is fitted, and the water in the boiler being kept at low pressure by gas or other heating arrangements in the fire station.*"

The maker's claim that the engine could turn out in 60 or 90 seconds from an alarm would have been a controlling factor in the adoption of this new approach to fire-fighting at that time.

The Fire King's reign was, however, a short one; it lasted but four years. The petrol-driven motor car was making its impact on road transport and was ideally suited to this particular application. Nevertheless, such important fire brigades as Brighton, Johannesburg, Singapore, Santiago and many others adopted the Fire King.

Our picture shows the Fire King to have followed closely the traditional lines of the horse-drawn engine, with a vertical boiler and a fire step at the rear for the Engineer. The high front seats for the driver and the Captain are exactly as in horse-drawn engines. It is strange with such a new approach (for the era) to fire-fighting vehicles that its centre of gravity was not lowered.

Our picture depicts one of the Motor Fire Kings introduced into service during 1899. Photo courtesy—Merryweather and Sons Limited, the original manufacturers.

PIONEERING THROUGH AIR POWER

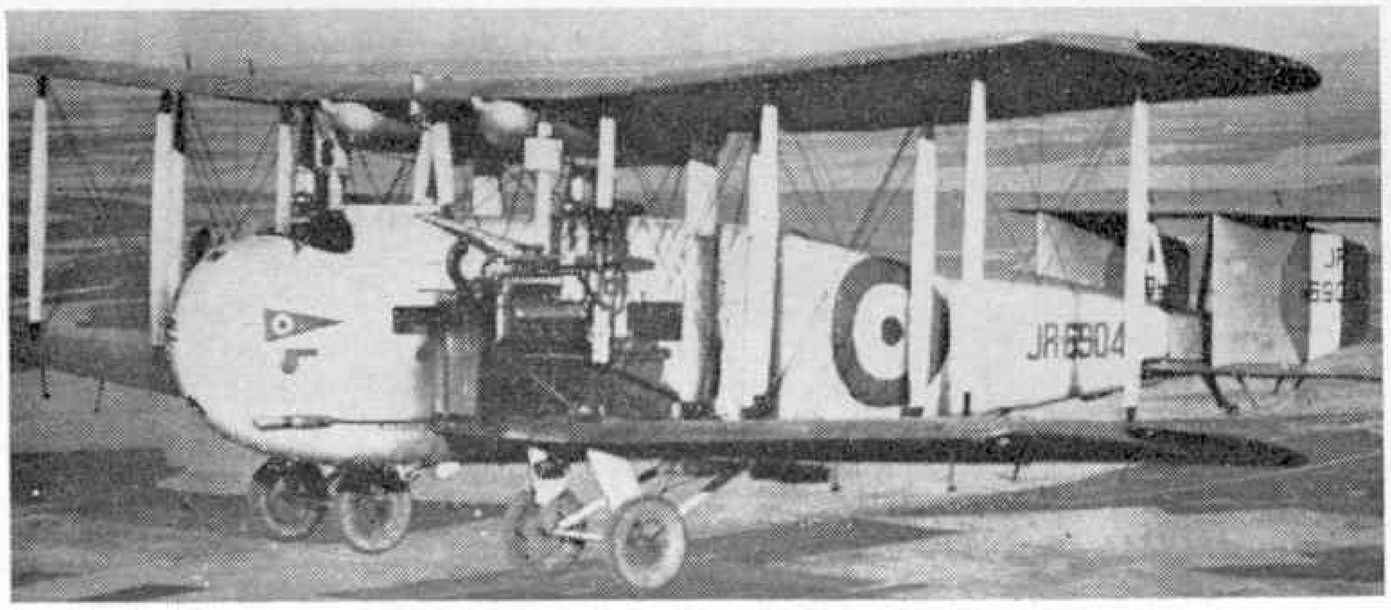
John W. R. Taylor Meccano Magazine's own Air Correspondent describes just some of the great advances pioneered by the Royal Air Force during its first 50 years

WHEN THE Royal Air Force puts its first squadron of Hawker Siddeley Harrier strike aircraft into service, this will represent the greatest advance in military aviation since the introduction of the jet-engine.

Since the R.A.F. was formed, in April 1918, the speed of its fastest combat aircraft has increased ten-fold, from 138 m.p.h. to more than twice the speed of sound. Firepower has grown from a pair of Vickers machine-guns, or a clutch of 112 lb. bombs, to batteries of deadly air-to-air missiles which home automatically on their target, and the hydrogen bomb. But there have been times when air force leaders would willingly have exchanged some of the high speed and devastating firepower for an ability to operate in places where there were no airfields.

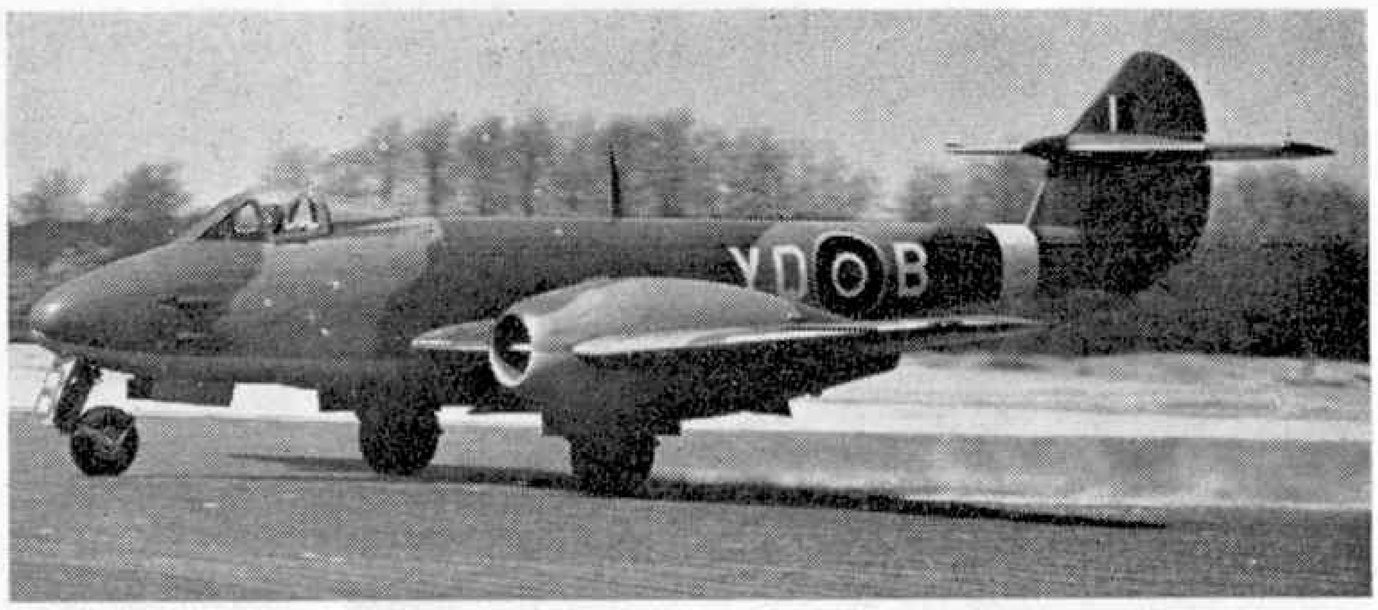
The key to success in modern warfare is close team-work between air and ground forces; and this is why the Harrier is so important. Being able to take off and land vertically, it can go almost anywhere that an army fights, operating from beaches, jungle clearings, factory yards, platforms on ships, or any other fairly flat, clear space. Within seconds of having a target pointed out to them, pilots can be airborne and speeding into action—offering the kind of ground-attack support of which army commanders dream.

No other air force has an aircraft like the Harrier,



Above: The future of the R.A.F. lies, without doubt, in closer co-operation with Ground Forces and Field Commanders. The Hawker Siddeley Harrier, vertical take-off and landing, reconnaissance aircraft, pictured here for the first time in its operational camouflage, is now in production for the Royal Air Force.

At left: An ambulance version of the Vickers Vernon, as used in Iraq in the early 1920's. Vernons were used to pioneer the Cairo-Baghdad airmail service. Powered by two 450 h.p. Napier Lion engines this one belonged to No. 45 squadron.



At right: A Meteor F3 of No. 616 Squadron. No. 616 Squadron were the first jet fighter squadron in the world to go into action, on July 27th 1944, flying attacks against the V.1. flying bombs, while stationed at R.A.F. Manston in Kent.

Blow: The Supermarine S.5. No. 219 which was a contestant in the 1927 Schneider Trophy Race and came second. This aircraft had a top speed of 320 m.p.h. and was powered by a 878 h.p. Napier Lion engine. No. 220, its sister aircraft, won the race.

combining the go-anywhere capability of a helicopter with the speed and firepower of a jet-fighter; but it is nothing new for the R.A.F. to lead the world, technically or operationally. Throughout the whole of its first 50 years it has pioneered new ideas, most of which have later benefited airline flying as well.

An early example of this was the desert air mail service which the R.A.F. started in the Middle East, less than three years after the end of the first World War.

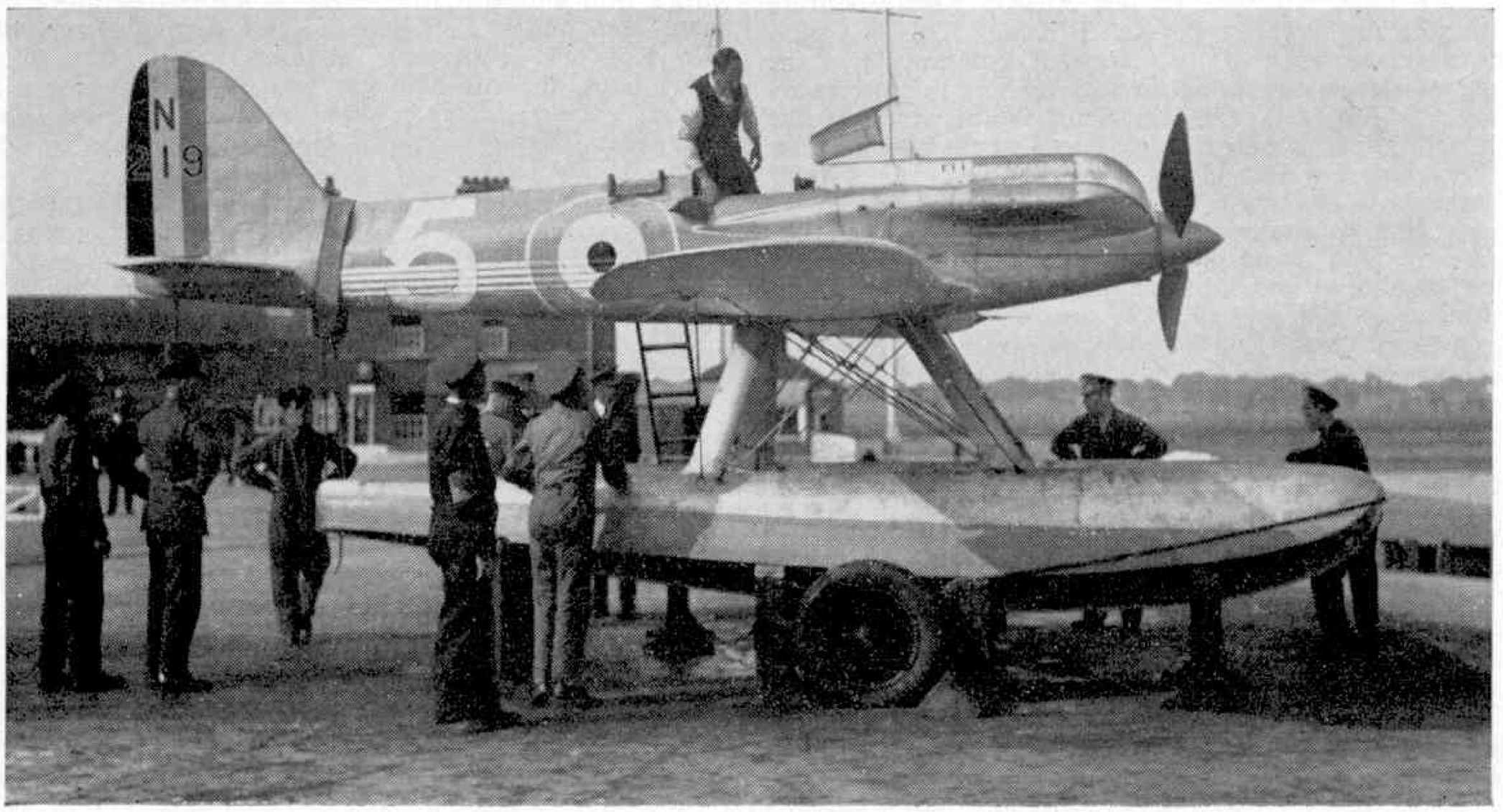
Nowadays, when letters often reach us from the other side of the world in three or four days, it is difficult to imagine what it was like when all foreign mail went by sea. Letters written by British soldiers stationed in Iraq had to go by ship, via Bombay, and took about 28 days to reach the men's families in the U.K. This meant that no answer could be expected for something like nine weeks, which seemed an eternity to men living in unpleasant conditions, far from home.

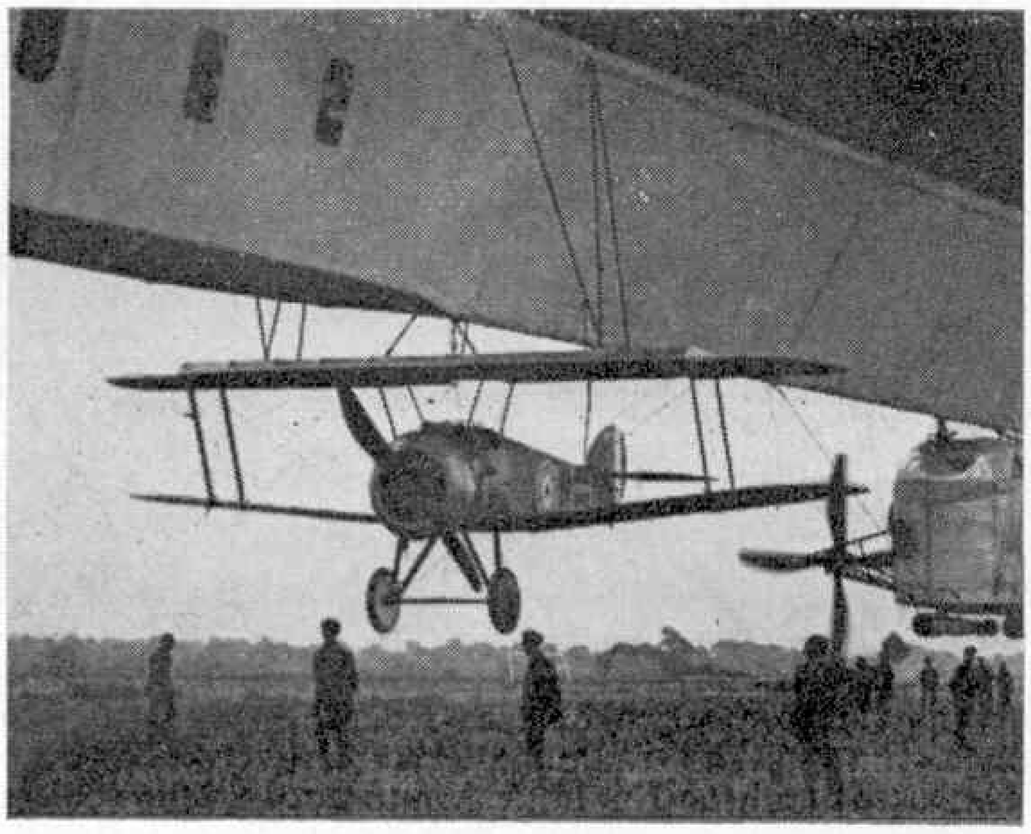
Even replacement aeroplanes travelled from Egypt to Iraq in packing cases, via the Red Sea and Persian Gulf, as there were no established air routes in that part of the world and, of course, no radio aids, beacons, meteorological services or anything else to help anyone foolish enough to attempt a flight from one country to another.

All this changed in 1921. The R.A.F. decided to fly its replacement aeroplanes from Egypt to Iraq, to save time. The traditional caravan route between Damascus and the Euphrates could not be followed, as much of it passed through territory over which British military aircraft were banned. So the R.A.F. simply ploughed a furrow right across the southern part of the Syrian desert, which is not very sandy, and pilots used this as a navigation aid during the worst part of each trip.

" Flying the furrow " proved so straightforward that a regular air mail service was soon opened between Cairo and Baghdad. The single-engined D.H. 9A bombers which began the work on June 23, 1921, were supplemented first by twin-engined D.H. 10's and then by Vimys and Vernons. Letters to England now took only five days and the operation was kept going, with great success, for five years.

It ended then only because Britain's national airline, Imperial Airways, formed in April 1924, felt that it had gained sufficient experience to take over the task. That explains why the first sector of the great network of air routes that eventually linked every corner of the British Empire with England was between Cairo and Baghdad—seemingly a rather strange choice until one knows the background story.





In the first ten years after the Armistice in 1918, the R.A.F. blazed a trail for the airlines to follow in many other places. Before any civilian companies began flying in Europe, it operated its own private airline services between London and Paris, carrying urgent despatches and V.I.P. passengers to the Peace Conference, and air mail services for the benefit of the British Army of the Rhine in Germany. On May 14-15, 1919, a D.H. 10 of No. 120 Squadron made history on the latter run, by becoming the first aircraft to carry mail at night.

An R.A.F. airship, the R.34, was the first aircraft to make a two-way crossing of the Atlantic, between July 2 and 13, 1919, only a fortnight aftter the epic flight of Alcock and Brown. It seems strange, in retrospect, that Major G. H. Scott, commander of the R.34, and his crew received no official recognition of their achievement, when Alcock and Brown—and Ross and Keith Smith, who made the first flight from Britain to Australia—were all knighted.

Today, few people remember the R.34's great flight, or the other successes of our Airship Service during the first few years of the R.A.F.'s life. This is a pity, because the story of its successful experiments in the use of airships as flying aircraft carriers is quite exciting. So, in a different element, is the story of the R.A.F. pilots who flew a tiny Parnall Peto biplane from the submarine M.2 in the late 'twenties, even if their main claim to fame is that they were probably the only men ever to receive double "danger money" in the form of both flying pay and submariner's pay !

The airship and submarine carrier programmes were dead ends; but other R.A.F. ventures of the 'twenties pioneered ideas that are now routine for the world's major air forces. Iraq was the testing ground for many of these projects, for it was there that the air force proved the practicability of an entirely new method of keeping the peace in a trouble-spot. Known as air control, this involved using just eight squadrons of aeroplanes and a small number of troops, instead of the huge ground force needed previously to deal with outbreaks of violence.

Misguided critics of air control complained of the "moral wrong of dropping bombs on poor ignorant tribesmen." In fact, the scheme saved hundreds, or even thousands of lives. If a tribe began raiding and killing its neighbours or trying to overthrow the authorities, the new technique was to warn its leader that if he did not stop at once his village would be bombed at a certain time on a specified date. Often the warning was enough. If it wasn't, there were seldom any casualties, as the rebels made themselves scarce when the bombing took place.

To counter one uprising, at Kirkuk, in February 1923, two companies of the 14th Sikhs—a total of some 480 officers and men—were flown to the town on board the Vernons of Nos. 45 and 70 Squadrons. This was the first major air-lift of troops ever attempted and saved the situation. One sheikh, who did not quite get his facts correct, but had the right general idea, commented: "With my own eyes I saw what happened. Hundreds of soldiers marching through the town, having come by air straight from London, where it is well known there is an inexhaustible supply. Allah is great, but who can stand against that ?" He asked to be regarded officially as pro-British from that moment.

The commander of No. 45 Squadron was Sqn. Ldr. A. T. Harris, who was destined to become the great wartime leader of Bomber Command. Unimpressed by the Vernon's role as a troop carrier, he had a hole cut in the nose of each aircraft, to take a primitive bomb-sight, and fitted bomb-racks under the wings. Other aircraft in the Middle East were converted for air ambulance duties; and some of the first-ever experiments in psychological warfare were made with a Victoria troop-carrier, which had a loudspeaker built into its cabin floor, for broadcasting messages to troublesome tribesmen.

The Cairo-Baghdad route was only one of many opened up or surveyed by the R.A.F. In the Autumn of 1925, three D.H. 9A's were flown in formation across Africa from Cairo to Kano, in Nigeria, and back. In the following year, a specially-formed flight of four Fairey IIID's made the long journey south from Cairo to Cape Town and back, and then had their wheels exchanged for floats and carried on to England. In all, they covered 14,000 miles, with so little difficulty that the Air Ministry decided to repeat the flights regularly as part of normal service training.

Bearing in mind how little money the R.A.F. had at its disposal in the 'twenties, its achievements were nothing short of miraculous. In 1922, for example, the entire sum allocated to the Air Force by the Government was under £11 million—less than the cost of two Concorde supersonic airliners today. Yet, five years later, the Air Ministry was able to pay for the special racing seaplanes that Britain entered for the Schneider Trophy contest, and provide pilots to fly them.

Even when its pilots gained the coveted Trophy outright, with consecutive wins in 1927, 1929 and 1931, and raised the world speed record above 400 m.p.h. for the first time, some people felt that this was a waste of money. But from the Supermarine seaplanes that they flew, R. J. Mitchell evolved the Spitfire fighter; while Rolls Royce used experience gained in building engines for the Schneider racers to create the Merlin and Griffon engines which, more than any others, carried the R.A.F. to victory in World War II.

When the Handley Page slot promised new standards of safety in the 1920's, by reducing accidents due to stalling, it was adopted enthusiastically by the R.A.F. The switch from wood to metal construction was made as soon as its advantages had been proved; and the R.A.F. led the world in teaching pilots blind flying "on instruments" in the early 'thirties. A few years later, the Air Ministry ordered the Spitfire and its great partner, the Hurricane, which, with their arma-

Continued on page 351

Above: A vista of rusty boiler tops and chimneys at the enormous Newport scrapyard. Below: A once famous Southern Region 4-6-2, shorn of its name-plates, awaits the final blow of the breaker's hammer.

The End of the Line

by E. Harper

LITTER IS a major problem in every walk of life. What to do with unwanted goods, too big to go into the dustbin, is an ever recurring puzzle, but how would you like to deal with an unwanted locomotive engine ?

Progress brings an increase in redundant stock for British Railways. Railway engines become obsolete, but they cannot be left in sidings for ever. Something has to be done about them, so, in time, they make their sad last journey to the scrap-yard.

Engines that were once the pride of the section, in all shapes and sizes and of all ages, find their way to the yards in Barry docks and Newport, S. Wales. Some have been there nearly nine years. With out-of-date rolling stock, they wait, their wheels half hidden by weeds and grass, until it is their turn to be broken up. Every day they are joined by more. It is estimated another 1,000 will swell the ranks in 1968.

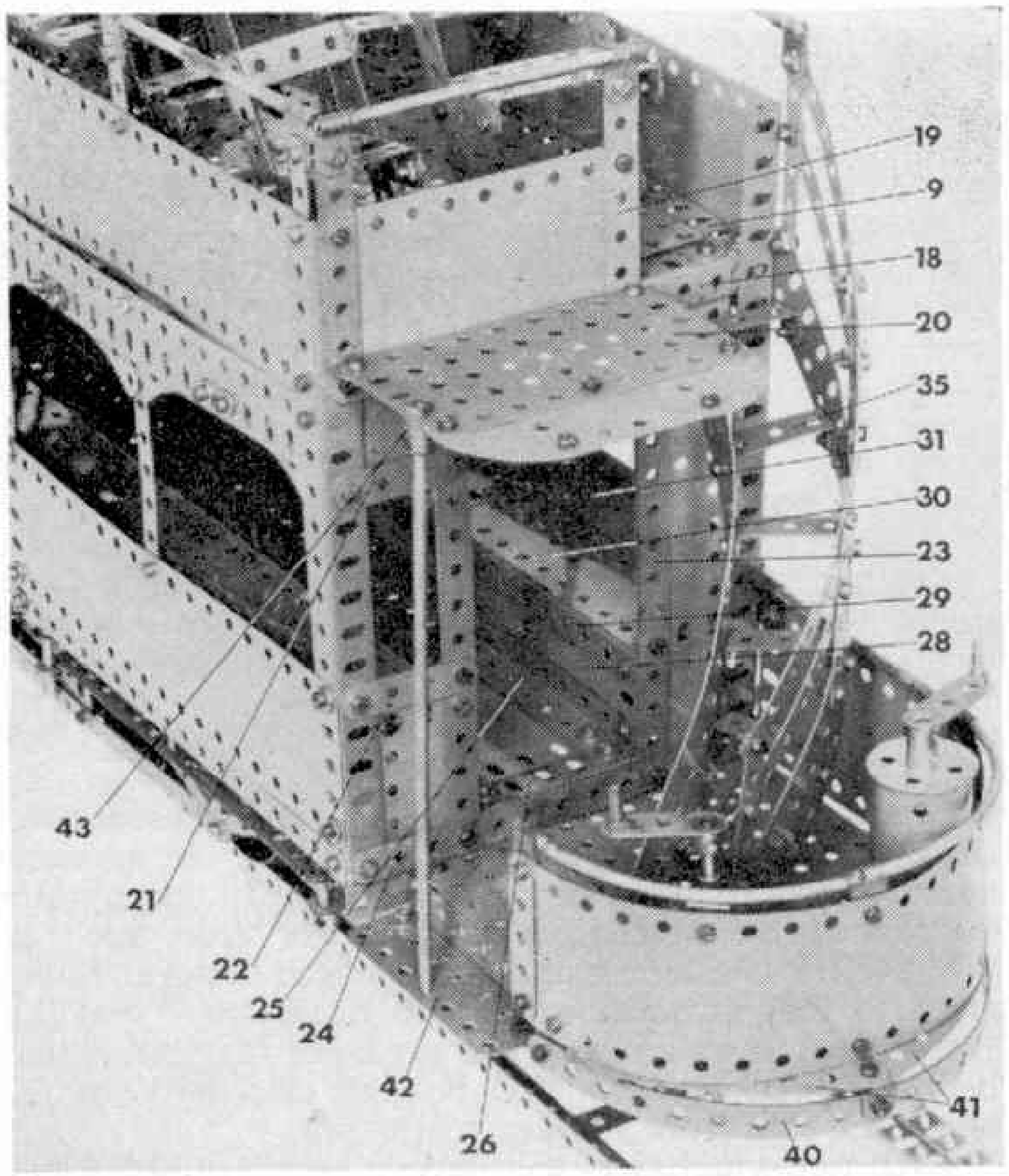
A few are sold, but only a few, as collector's museum pieces. Prices range from £500 for a tank engine to as much as £3,000 for a really smart express locomotive. A fair average would be around £1,000.

Of course, breaking them up gives employment. Two men can flame-cut an engine into small parts in one week. Not every part is melted down, for annually train enthusiasts journey to the yards to buy souvenirs such as lamps, name plates, emblems, etc. At auctions name plates can fetch as much as £100. In appropriate cases they are sometimes donated for free, such as "The Girl Guide" name plate which naturally was given to that association. A pub called the "Hayling Billy" has, in its grounds, the engine of that name, that before it was axed, carried holiday crowds down the one-track line from Havant to the sea.

Even non-purchasers will make a sentimental journey to the yards. Railway societies come by the coach load. Private individuals turn up by car or on foot. Letters flood in requesting information or offering cash. One little lad offered his money box in exchange for a real engine.

Much of the material of an old engine, such as brass and copper, fetches good money, particularly overseas. South America is a good buyer; to the tune of £2 million for scrap steel in a recent year. The Far East is also very interested but, though demand is keen, sadly for the sentimentalist, the supply is higher.

There is something very sad in seeing once powerful locomotives deprived of their strength. Too old-fashioned for modern transport, they still have a dignity in redundancy. They join the ranks of demolished buildings, stage-coaches, sunken ships and old trees hewn down to make way for progress.



Above, as on real trams, the Meccano model is equipped with two identical driving platforms, one at each end, carrying an external stairway to the top deck as well as the driving control. This view shows one of the platforms in detail.

BONE SHAKER

by Spanner

Try building this advanced Meccano model based on an old 1903 tramcar used by Bradford City Tramways early this century. To be concluded next month.

DURING THE first quarter of this century virtually every major town and city in Britain established an electric tramway system. Trams, in actual fact, were the first-ever means of mass urban public transportation and there are many people, even today, who maintain (perhaps with good reason !) that they would still have advantage over the buses that have replaced them. Nonetheless, they have been replaced, but I venture to suggest that just about everybody mourns their passing to some extent. Most Meccano model-builders, having a mechanical bent, certainly do so, but we, at least, are in a position to recreate the glory of the old tram days in model form, which is what our model-builder has tried to do with the excellent advanced model featured here. It is based on a 1903 tramcar used for many years by Bradford City Tramways with complete success.

Construction, although lengthy, is not difficult.

Chassis

Bolted to one end of an 18½ in. Angle Girder 1 is a 5½ × 5½ in. compound flat plate 2, edged by a 5½ in. Angle Girder 3 and built up from one 5½ × 3½ in. and one 5½ × 2½ in. Flat Plate. The assembly projects a distance of nine holes past the end of Girder 1. A second 5½ in. Angle Girder 4 is bolted to the underside of the plate, as shown, the securing Bolts also fixing a 4½ × 2½ in. Flat Plate 5 to the top of the plate. Bolted to the underside of this last Plate is a 2½ × 1½ in. Flexible Plate 6.

Another entire Girder/Plate arrangement is now similarly built up and the two are joined at each end by a 3½ in. Angle Girder 7 bolted between compound flat plate 2 and the opposite Angle Girder 1. The "truck," incorporating the wheels, will also be attached to Girders 1, but it is advisable to leave this until after the main bodywork has been completed.

Bodywork and fittings

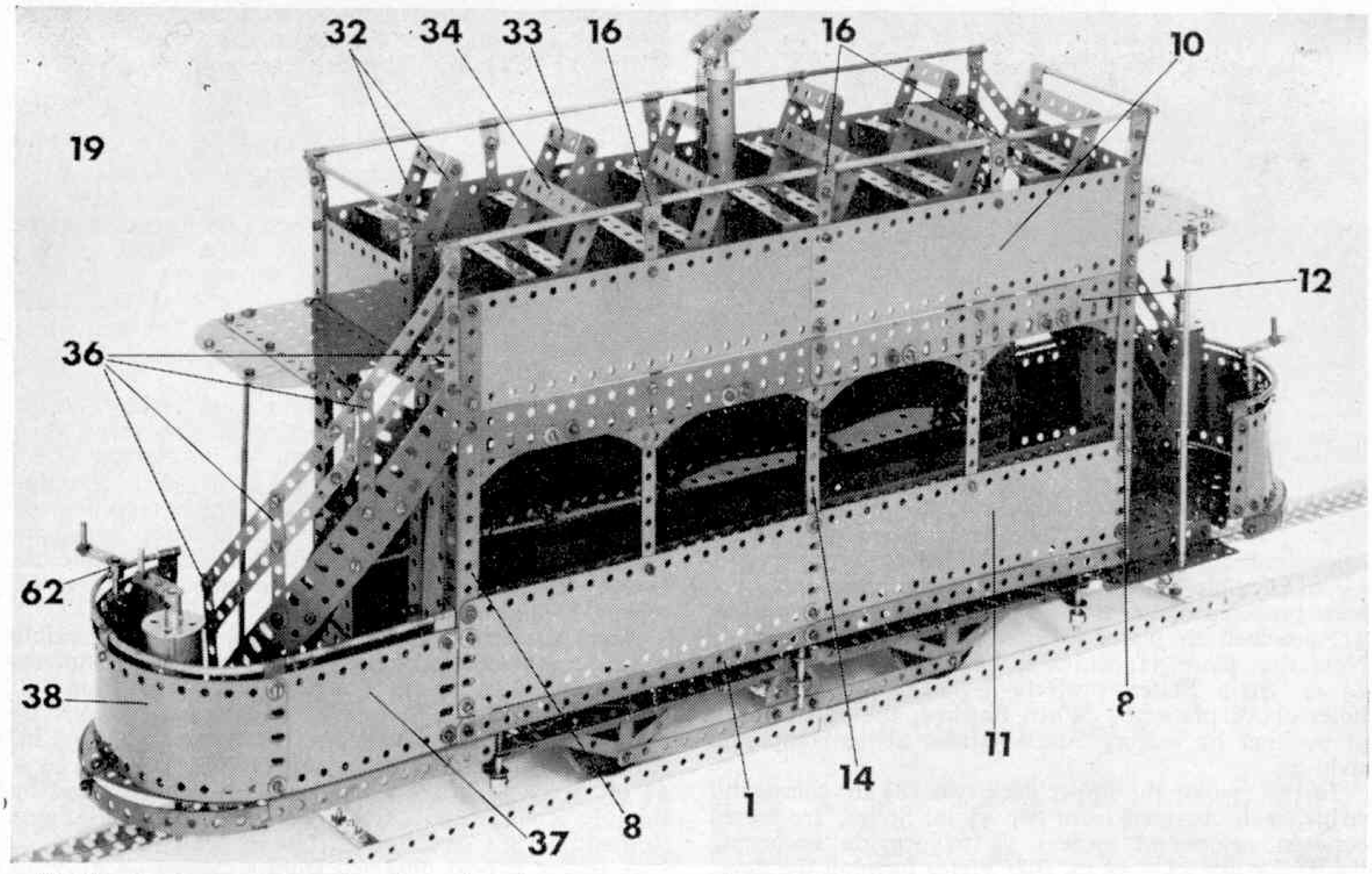
Although enclosing a fairly large area, the body is not at all difficult to build. Two 9½ in. Angle Girders 8 are fixed one to each end of each Girder 1, then Girders 8 are joined as shown by an 18½ in. Angle Girder 9 and two 10½ × 2½ in. compound strip plates 10 and 11, each obtained from two 9½ × 2½ in. Strip Plates overlapped one hole. Girder 9 coincides with the lower edge of plate 10.

Also bolted between Girders 8, immediately below plate 10, is an 18½ in. compound flat girder 12, built up from two 9½ in. Flat Girders. This compound flat girder is joined to compound strip plate 11 by two 4½ in. Narrow Strips 13 and a 10½ in. compound narrow strip 14 all equally spaced apart. Strip 14 is obtained from two 5½ in. Narrow Strips, overlapped one hole, and it can be seen that it extends from Angle Girder 1 upwards to project a distance of two holes above compound plate 10. Three 2½ in. Narrow Strips 15 are fixed to the plate, these also projecting a distance of two holes above the plate, and a right-angled Rod and Strip Connector 16 is added to the top of each one. Lower down, a curved top is given to each side window by two 2½ in. Curved Strips 17.

Girders 9 are now joined at each end by a 6½ in. compound angle girder 18, obtained from one 5½ in. and one 4½ in. Angle Girder. Attached to the outside of this compound girder are a 4½ in. Flexible Plate, edged by two 3½ in. Strips 19, and a 4½ in. Angle Girder to which a 4½ × 2½ in. Flat Plate 20 is bolted to serve as a canopy. Plate 20 is extended by two Semi-circular Plates and a 2½ × 1½ in. Flexible Plate.

At each end of the lower saloon, an entrance-way is left open, but to either side of this a vertical panel is built up. Both panels, however, are different, that beneath Plate 20 consisting of a 7½ in. Strip bolted to Angle Girder 18 and joined to nearby Girder 9 by two 2 in. Strips 21 and 22. The area above Strip 21 is enclosed by a 1½ × 1½ in. Flat Plate, while the area below Strip 22 is covered by a 2½ × 1½ in. Flexible Plate. The space between the Strips is left blank to represent a window.

The other panel at the opposite side of the entrance-way consists simply of a 5½ × 1½ in. Flexible Plate extended by a 2½ × 1½ in. Flexible Plate, both edged by a 7½ in. Strip 23. At the bottom, the two panels are connected by a 6½ in. compound Strip 24, obtained from two 4½ in. Strips and bolted between Angle Girders 8.

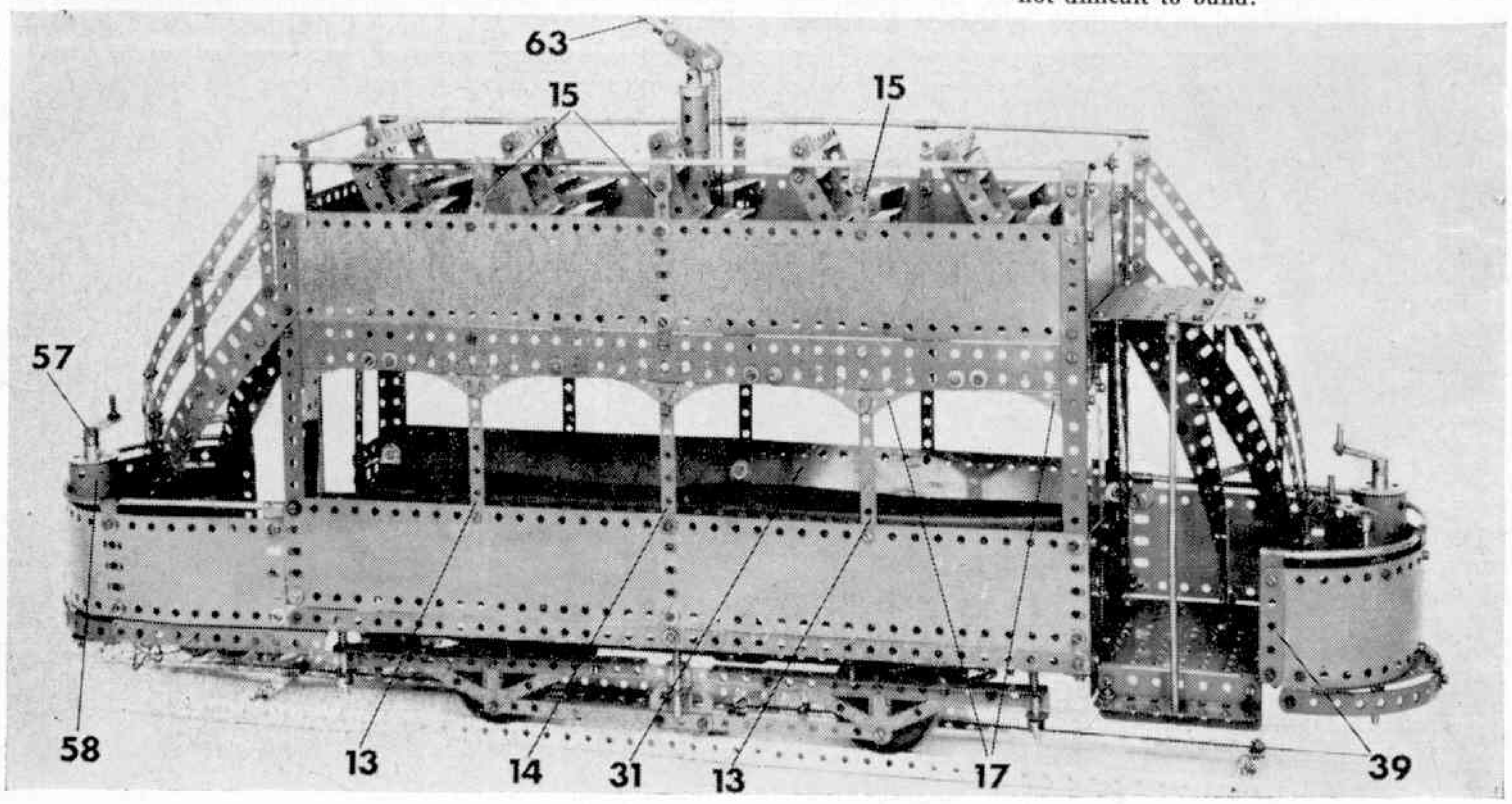


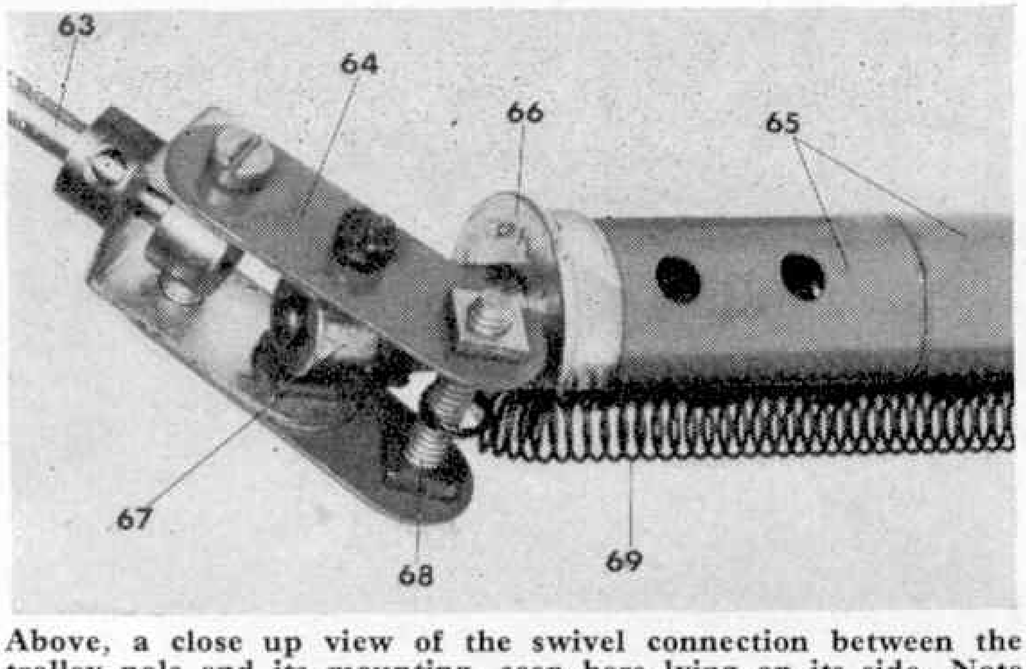
Inside the lower saloon two long bench seats running the full length are provided and these, together with the floor, can be built as a separate unit and fitted complete. Two 18½ in. Angle Girders 25, placed 2½ in. apart are joined at each end by a 3½ in. Angle Girder 26, the intervening space being enclosed by a 12½ × 2½ in. Strip Plate and a 5½ × 2½ in. Flat Plate 27, both bolted to the lower flanges of Girders 25.

Fixed to the vertical flange of each Girder 25 is an 18½ × 1½ in. compound flexible plate 28, built up from four 5½ × 1½ in. Flexible Plates, to the upper edge of which another 18½ in. Angle Girder 29 is bolted. This

Above, this superb Meccano-built model, is based on a 1903 tram of the type used by Bradford city tramways early this century. It is driven by a Power Drive Unit.

Below, if you are a tramway enthusiast, you will agree that this model has all the fascinating lines of a typical old-time tram. Despite its size—more than 24 in. long and 12 in. tall—it is not difficult to build.





Above, a close up view of the swivel connection between the trolley pole and its mounting, seen here lying on its side. Note the use made of the tapped bores in the Collars. Below, a close up view of the truck showing its suspension and wheel arrangement.

in turn has fixed to its free flange an 18½ × 1½ in. compound flexible plate 30 obtained from four 5½ × 1½ in. Flexible Plates, then each seat is completed by a back provided by an 18½ × 2½ in. compound strip plate 31, attached to plate 30 by Obtuse Angle Brackets. Note that plate 31, which is built up from two 9½ × 2½ in. Strip Plates, projects a distance of only two holes above plate 30. When finished, the seat is fixed in position by bolting Angle Girder 26 to compound strip 24.

In the case of the upper deck two 18½ in. compound strips, each obtained from two 9½ in. Strips, are bolted between compound girders 18 to provide anchoring points for five 5½ × 3½ in. Flat Plates forming the floor. To prevent the floor sagging in the middle, strengtheners are provided by one 5½ in. and one 4½ in. Angle Girder bolted in suitable positions to each compound girder 9 and projecting at right-angles under the floor. Each Angle Girder attached to one girder 9 coincides with its opposite number attached to the other girder 9, *but they are not bolted together.*

Two rows each of five seats are next added, one row consisting of single seats and the other of double seats. Both types are similarly built up from two 3½ in Strips 32, fixed to the floor by Angle Brackets. A 1½ in. Strip is bolted to each of the 3½ in. Strips, then the two sides are joined by three Double Angle Strips, 1½ × 1½ in. 33 in one case and 2½ × ½ in. 34 in the other.

Stairways

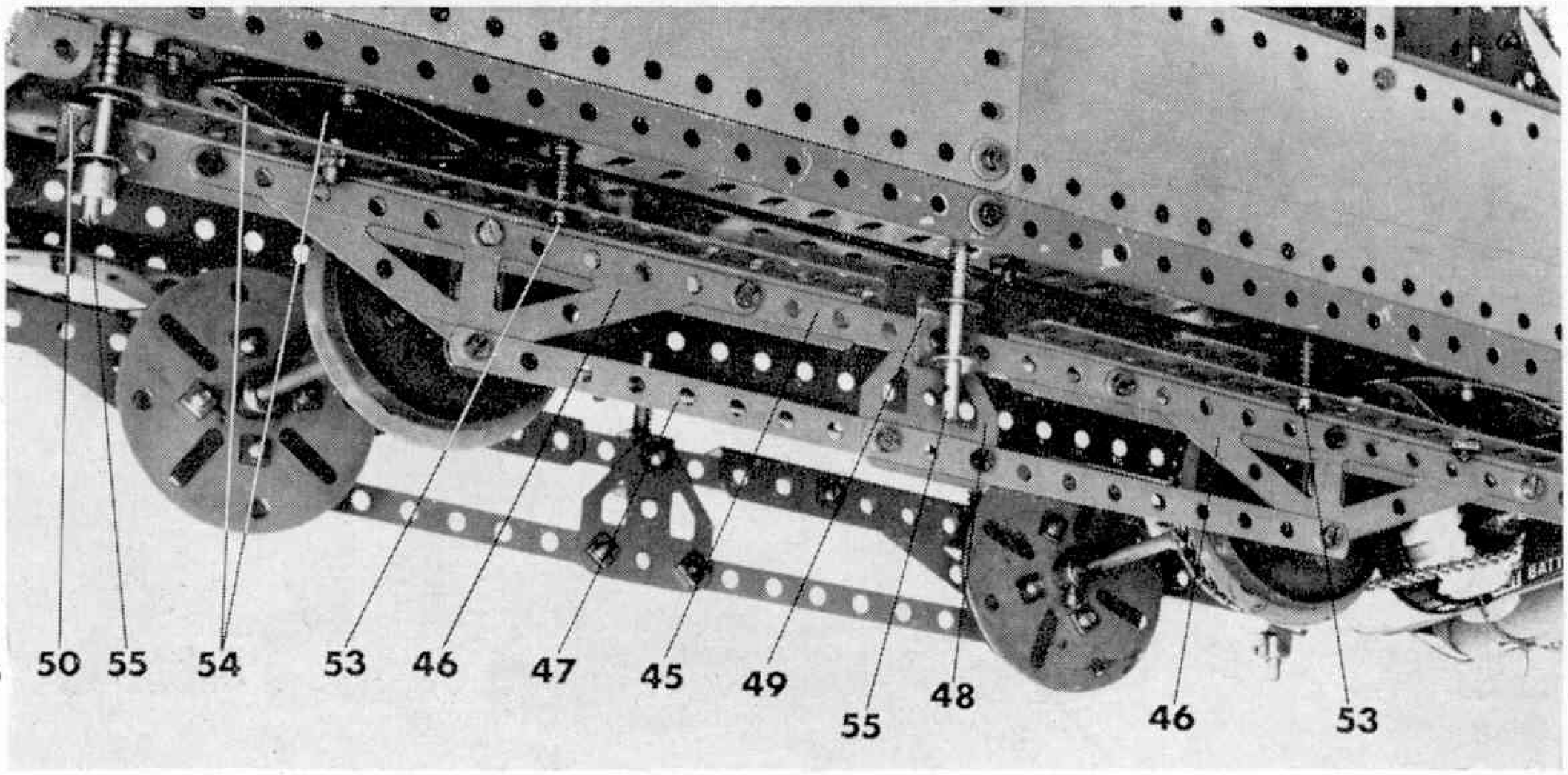
Like the full-size tram, our model has two curved external stairways, one at each end, running from the driving platform to the top deck. Both are similarly built from one 7½ in. and one 9½ in. Flat Girder, curved to shape and joined by six 1½ × ½ in. Double Angle Strips 35. At its lower end, the 7½ in. Girder is attached to the platform by an Angle Bracket, while the upper end of the 9½ in. Girder is bolted direct to Angle Girder 8.

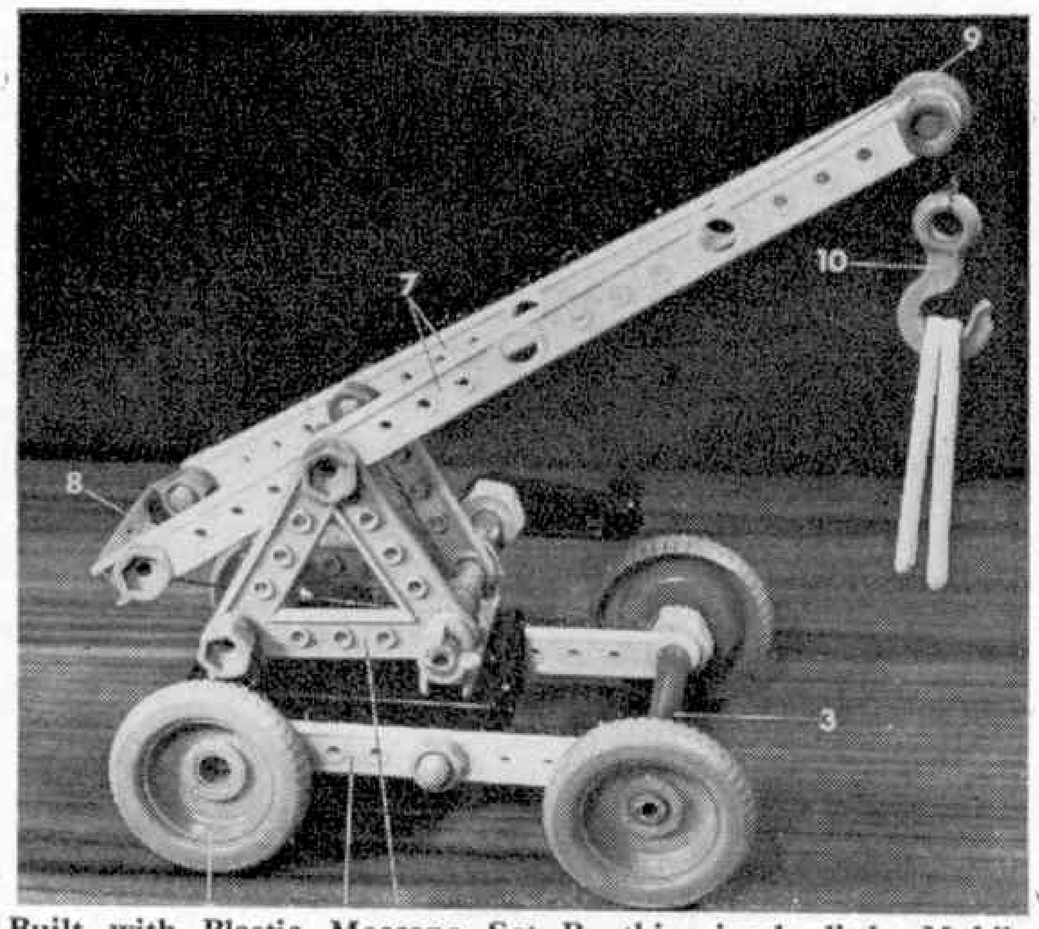
A handrail is provided by four 3 in. Narrow Strips 36 joined by two 9½ in. compound narrow strips, each obtained from one 4½ in. and one 5½ in. Narrow Strip. Fitted to the top of the upper Strip 36 is a right-angled Rod and Strip Connector which is connected to similar parts 16 by suitable Axle Rods joined by Rod Connectors. Right-angled Rod and Strip Connectors joined by a 4½ in. Rod are also bolted to the tops of Strips 19.

Each platform is enclosed by a 4½ × 2½ in. Flexible Plate 37 attached to one Angle Girder 8 by Fishplates and extended by a curved 9½ × 2½ in. Strip Plate 38. The latter is attached to the platform at its ends by 1 × ½ in. Angle Brackets and in the centre by a ½ × ½ in. Angle Bracket. In addition, one end is overlayed by a 2½ in. Strip 39, while a hand-rail is again supplied by suitable Rods, some curved, attached by right-angled Rod and Strip Connectors.

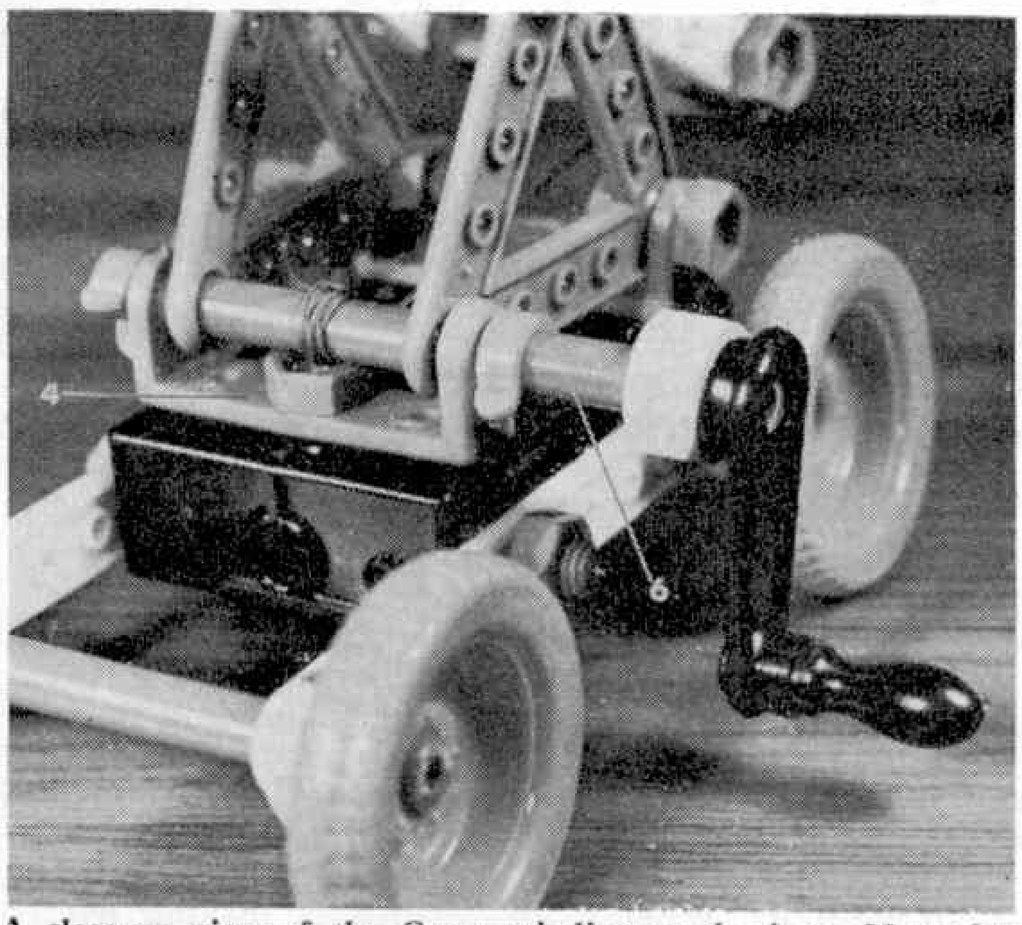
A fender is next obtained from a curved 9½ in Strip 40 wedged, at one end, behind Angle Girder 3 and attached, at the other end, to Plate 39 by a Fishplate. In the centre, it is attached to Flexible Plate 6 by a 1 × ½ in. Angle Bracket to the top of which two 4 in. Stepped Curved Strips 41 are bolted. To provide a step, a 3½ in. Flat Girder 42 is attached by Angle Brackets to another 3½ in. Flat Girder which is in turn fixed by Angle Brackets to the underside of the platform. A vertical rail runs from the step to the canopy, being held in a Rod Socket 43 fixed to Flat Plate 20.

Continued next month.





Built with Plastic Meccano Set B, this simple little Mobile Crane works extremely well and can be used to lift quite heavy weights.



A close-up view of the Crane winding mechanism. Note that the winding shaft is used as one of the anchoring points for the superstructure.

LIFT AND CARRY by Spanner

An easy to build Mobile Crane produced from Plastic Meccano Set B

AMONG THE most popular of all subjects for Meccano model-builders are cranes, be they new or old; large, small or in-between. I say this with authority, because our many years of experience with the standard system have proved it beyond doubt. We have not, on the other hand, had many years of experience with the comparatively new Plastic Meccano system, but I see no reason for thinking that the tastes of modellers in Plastic Meccano should be very much different from those of their more advanced relations. In fact, I am inclined to think that, if anything, the young owner of a Plastic Meccano Set is likely to be more interested in a crane model simply because it can usually be made to "work" and working models are particularly fascinating to young minds.

Anyway, believing this to be true, I am featuring here a simple but most effective model of a little Mobile Crane that can be built with Set B. And when I say simple, I *mean* simple ! The chassis consists of nothing more than a Base to each side of which a 3-hole Strip 1 is fixed. Attention must be given to the fixing Bolts, however, as the Bolt that passes through the centre hole of each Strip carries a Nut in the normal way, while the Bolt passed through the rear end hole carries a Road Wheel 2 held by a Collet Nut. Note that the Road Wheel must be fixed on the Bolt in such a position that it allows the Bolt to revolve. Journalled in the other end holes of the Strips is a $4\frac{1}{2}$ in. Axle 3 on each end of which further Road Wheels are mounted, as shown.

Bolted to the top of the Base are two Double Angle Strips 4, to which two 2-hole Triangular Girders 5 are fixed, by Nuts and Bolts in the case of the rear Double Angle Strip, and by a $4\frac{1}{2}$ in. Axle 6 held in place by Axle Clips in the case of the front Double Angle Strip. A Handle is mounted on one end of this Rod.

Two 5-hole Strips 7 are next attached one to the apex of each Triangular Girder, the securing Bolts passing through the second hole from the end of each Strip. The Strips themselves are connected at one end by a Double Angle Strip 8 and, at the other end, by a Bolt on which a Pulley Wheel 9 is mounted. Lastly, a length of Cord is taken from Axle 6, is passed through the centre hole in Double Angle Strip 8, is passed over Pulley Wheel 9 and is finally tied to a Hook 10.

PARTS REQUIRED

2—3-hole Strips	1—Pulley Wheel
2—5-hole Strips	2—Axle Clips
1—Base	1—Hook
13—Bolts	2—$4\frac{1}{2}$ in. Axles
11—Nuts	2—2-hole Triangular Girders
3—Double Angle Strips	1—Handle
4—Road Wheels	

Captain Cook on Stamps—*continued*

ately promoted to captain. His third and last voyage had the aim of finding the fabled North-West Passage. In June 1776 he set sail for the Pacific and after visiting New Zealand and Tasmania, discovered a number of islands in the Cook Archipelago before exploring Alaska and Hawaii, where he was killed by natives in February 1779. During his second voyage he had landed at Opahi in the island of Niue (depicted on the 1d. stamp of 1950) and charted the Hervey Islands in the North of the archipelago (shown on the 1d. stamp in the Cook Islands set of 1949). During his third voyage he visited Aitutaki and Mangaia and mapped other islands in this group. The landing of Cook's expedition was depicted on the $\frac{1}{2}$d. stamps issued by Rarotonga, Aitutaki, Niue and Penrhyn in 1920, while Cook's portrait appeared on the $1\frac{1}{2}$d. stamp of the same series. Another, though less accurate, version of the landing was shown on the $\frac{1}{2}$d. stamp of the 1932 series of the Cook Islands, showing the *Resolution* anchored under full sail ! Captain Cook, wearing a naval officer's hat, appeared on the 1d. stamp. The only other stamp to portray Captain Cook is the 1s. in the Cook Islands set of 1949 which depicts his statue erected in 1914 near Admiralty Arch in London.

SIMPLE MECHANISMS

Simplicity is the keynote of these model building hints supplied by Meccano Magazine readers for other followers of the hobby

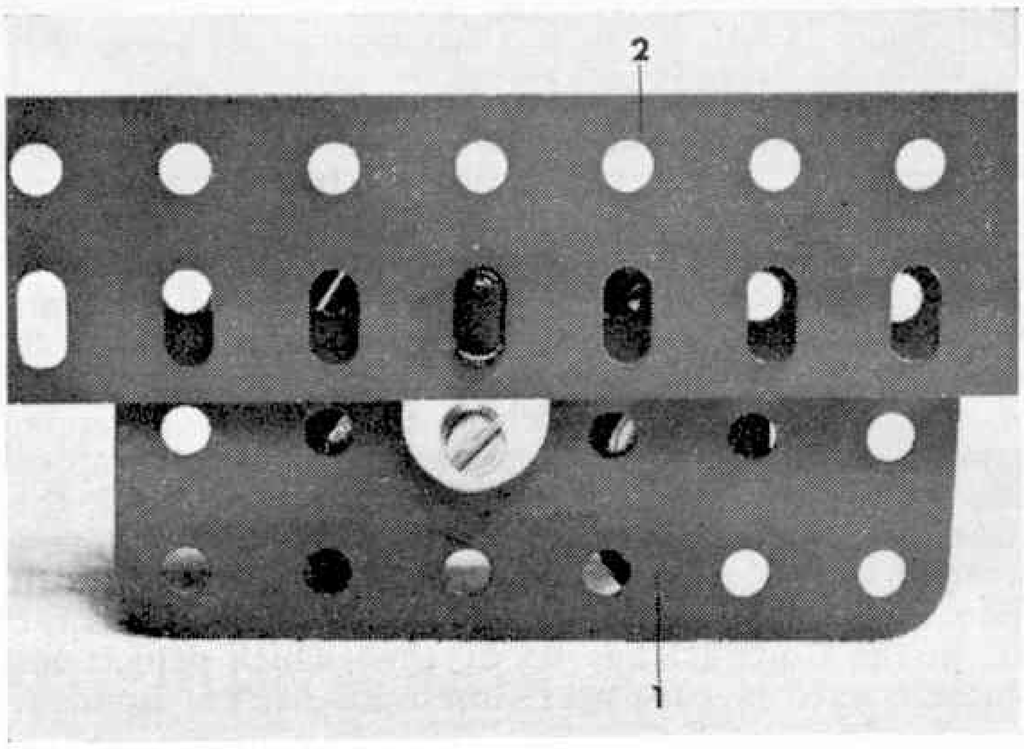
EVERY HOBBY has its pitfalls and Meccano is certainly no exception. I fear, though, that the fault in this case usually lies not with the system but with the user or, more particularly, with the enthusiasm of the user. By this I mean that many of us often get carried away with ourselves when building models. We fall into the trap of trying to introduce too much complexity and this, as you know, can be as much a bad habit as producing inadequate models.

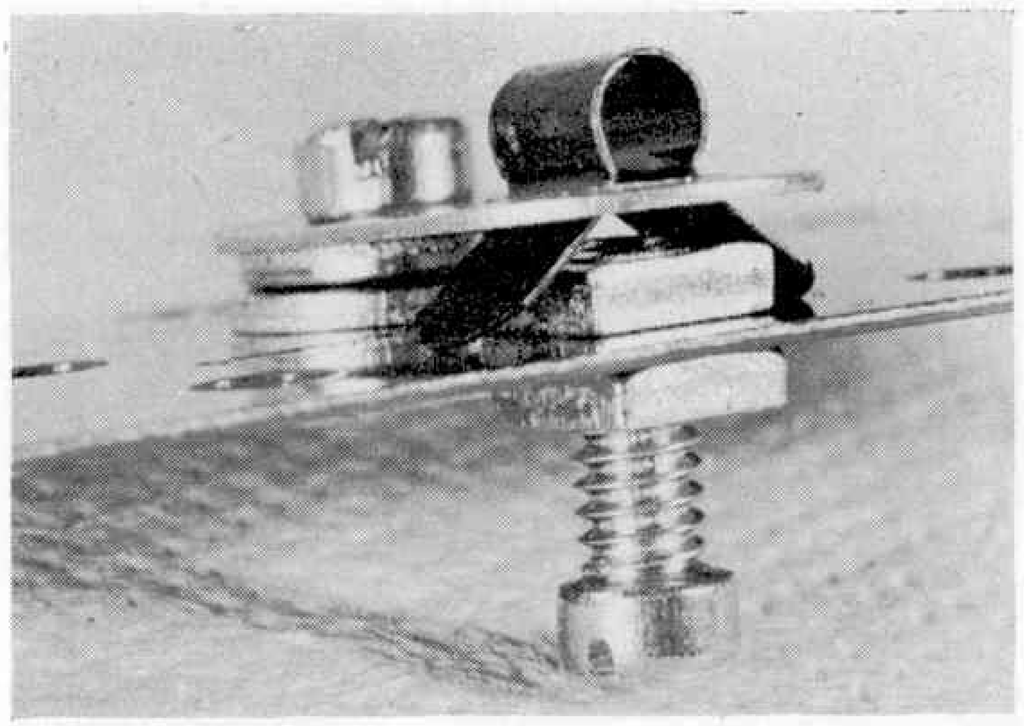
Don't think that I am decrying complicated models —far from it. What I am against is making overly complicated mechanisms just for the sake of complexity. When building models that have working movements, for example, the mechanisms controlling the movements should be made as simple as possible for the job on hand. This, you may think, is common sense, but it is surprising how many people come up with a fantastic unit bristling with Gears, Pinions, Rods and Worms when something quite simple would do the job just as well and probably more efficiently. In this article, therefore, I am featuring some ideas supplied by readers for items that are extremely useful and yet decidedly uncomplicated.

Doorcatch

First out of the bag is a little doorcatch (see Fig. 1) suggested by Mr. R. R. Hauton of Lincoln. From the accompanying illustration you will see that it consists of nothing more than a Spring Clip pressed through the elongated hole of a Fishplate. In operation, the Fishplate is attached to the door of the model being built, the doorframe of which must be so designed that another elongated hole in its outside edge coincides with the Spring Clip. When the door is shut, the "bulge" of the Spring Clip should also press into the latter elongated hole making, as Mr. Hauton says, "a good, firm catch."

Another view of the doorcatch as it would appear from the inside of a model. The Flat Plate 1 represents the door and the Flat Girder 2, the door frame.

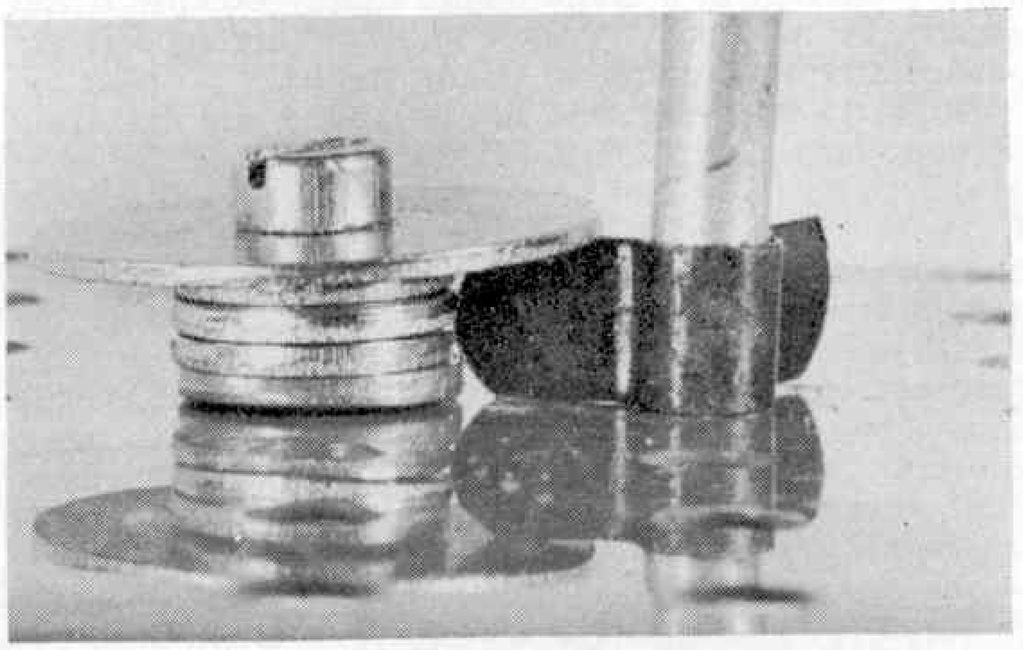




A very simple doorcatch for models designed by Mr. R. R. Hauton of Lincoln.

Control rod damper

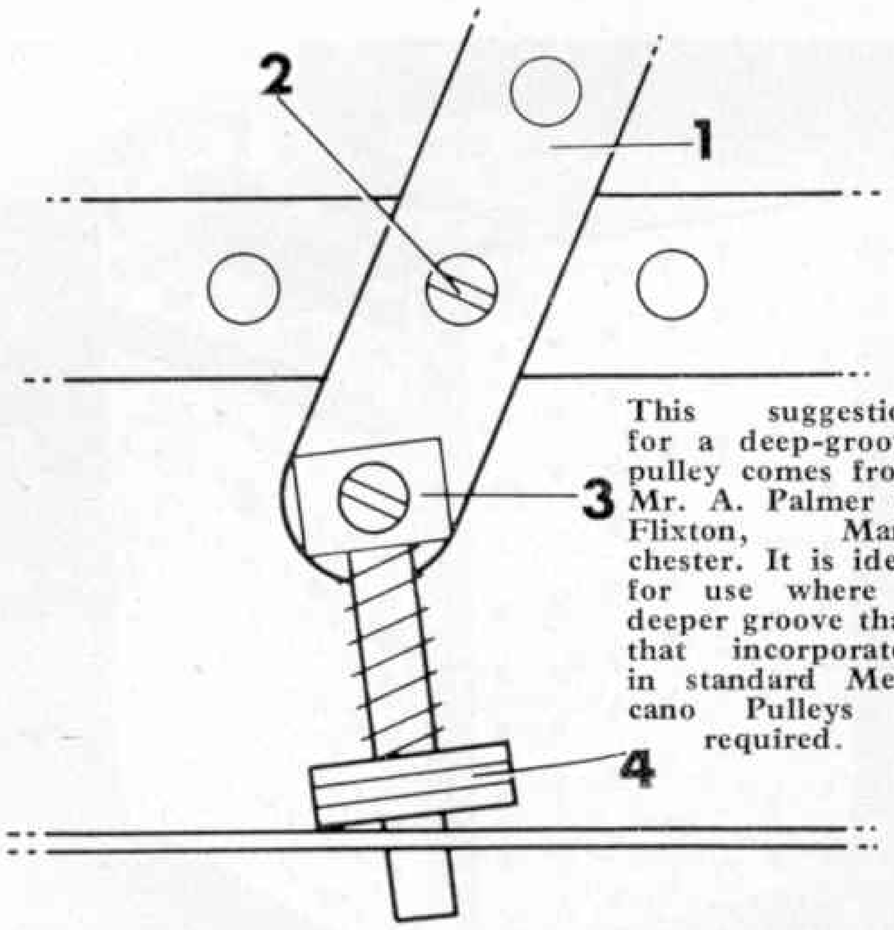
Another out-of-the-ordinary use for a Spring Clip has been suggested by Mr. L. R. Atkinson of Putney Heath in London, who produced a most effective damper (Fig. 2) for the control rod of a gearbox or, indeed, of any other mechanism actuated by the sliding movement of a Rod. You will know that when a gear arrangement or drive motion is controlled by a free-sliding Rod a certain amount of trouble can be caused by the Rod moving about on its own causing the drive to engage or disengage prematurely, as the case may be. Mr. Atkinson has overcome the problem in suitable cases by mounting a Spring Clip on the control Rod against the sideplate of the gearbox or model. An arm of the Spring Clip is trapped behind a $\frac{3}{4}$ in. Washer fixed to the sideplate, but spaced from it by three Washers on the shank of the securing Bolt. The grip of the Spring Clip prevents the Rod from sliding on its own, while allowing it to be moved by hand. It's a very simple idea, yet perfectly adequate.



In this mechanism, designed by Mr. L. R. Atkinson of Putney Heath, London, a Spring Clip is used as a damper to prevent the control rod of a gearbox or similar item from sliding of its own accord.

Self-locking lever

Equally simple is another idea from Mr. Atkinson— this time for a self-locking lever (Fig. 3) that makes an ideal gear shift. A Strip 1 serving as the actual lever is pivotally connected to a suitable mounting by a Bolt 2 lock-nutted through its second hole. Pivotally attached to the lower end of the Strip is a Collar 3 in which a short Rod is fixed. Mounted on the Rod is



This suggestion for a deep-groove pulley comes from Mr. A. Palmer of Flixton, Manchester. It is ideal for use where a deeper groove than that incorporated in standard Meccano Pulleys is required.

a Compression Spring followed by three Washers 4, after which the Rod is inserted into a hole in a Strip or other suitable part that is fixed in relation to the above-mentioned mounting.

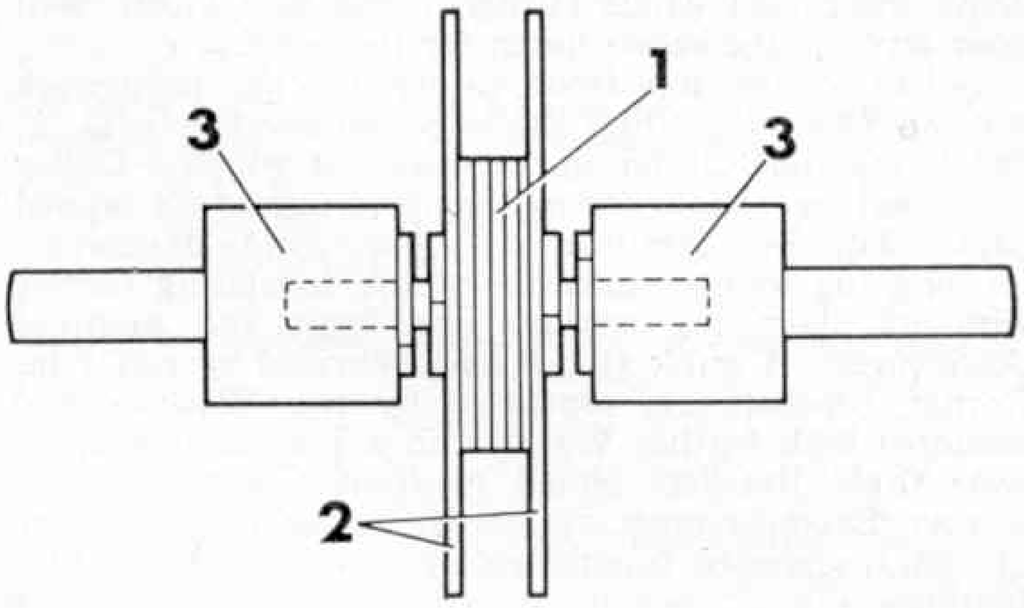
Using the method described the lever has only two steady positions—one way or the other—but the sprung action of the Rod certainly holds the lever firmly in the chosen position. Incidentally, Mr. Atkinson explains in a footnote that " This arrangement gives movement of about 1 in. at the second hole above the pivot point (of Strip 1)—enough for most gear changes ! It follows, of course, that the linkage actuating the gear-change would be coupled to this hole.

Deep-groove pulley

We come now to an item supplied by Mr. A. Palmer of Flixton, Manchester. Regular builders, especially of advanced models, will have found that there are occasions when standard Meccano Pulleys are inadequate, because the depth of the groove is not sufficient for the job on hand. Mr. Palmer has devised a built-up deep-groove pulley, illustrated in Fig. 4, to overcome the problem. Depending on the width required, five or more $\frac{3}{4}$ in. Washers 1 are trapped between two 6 or 8-hole Wheel Discs 2 held by Nuts in the centre of a 1 in. Screwed Rod. An Adaptor for Screwed Rod 3 (Part No. 173a) is mounted on each end of the Rod, being locked in positions by a Nut—that's all !

PARTS REQUIRED

2—24a	5—38d	2—173a
4—37a	1—82	



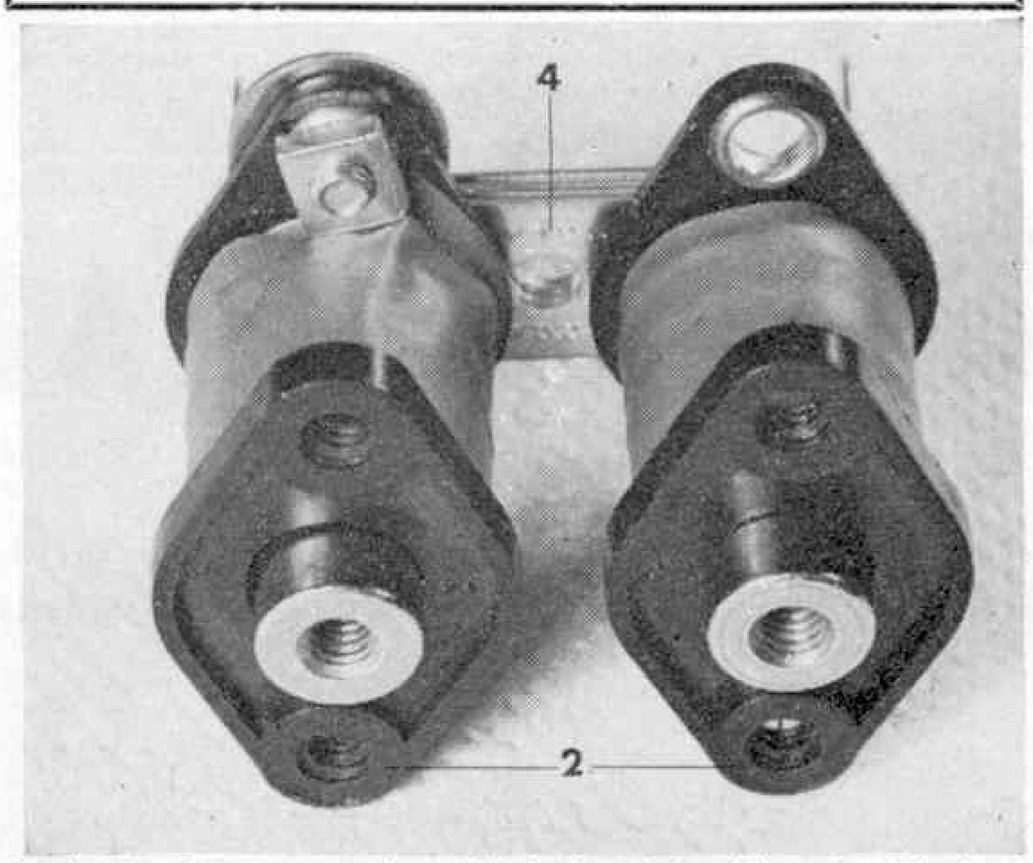
Electromagnetic grab

Turning from mechanics to electrics, we have a compact electromagnetic grab (Fig. 5) designed by Timothy Ward of Horfield, Bristol. It is intended, he tells me, " for use with smaller cranes where a pulley block is either unnecessary or too difficult to fit in." Mr. Ward is quite correct as far as he goes, but I would like to go even further and say that the grab would make a first-class and perhaps more interesting substitute for a hook even in cranes where hooks would normally be fitted.

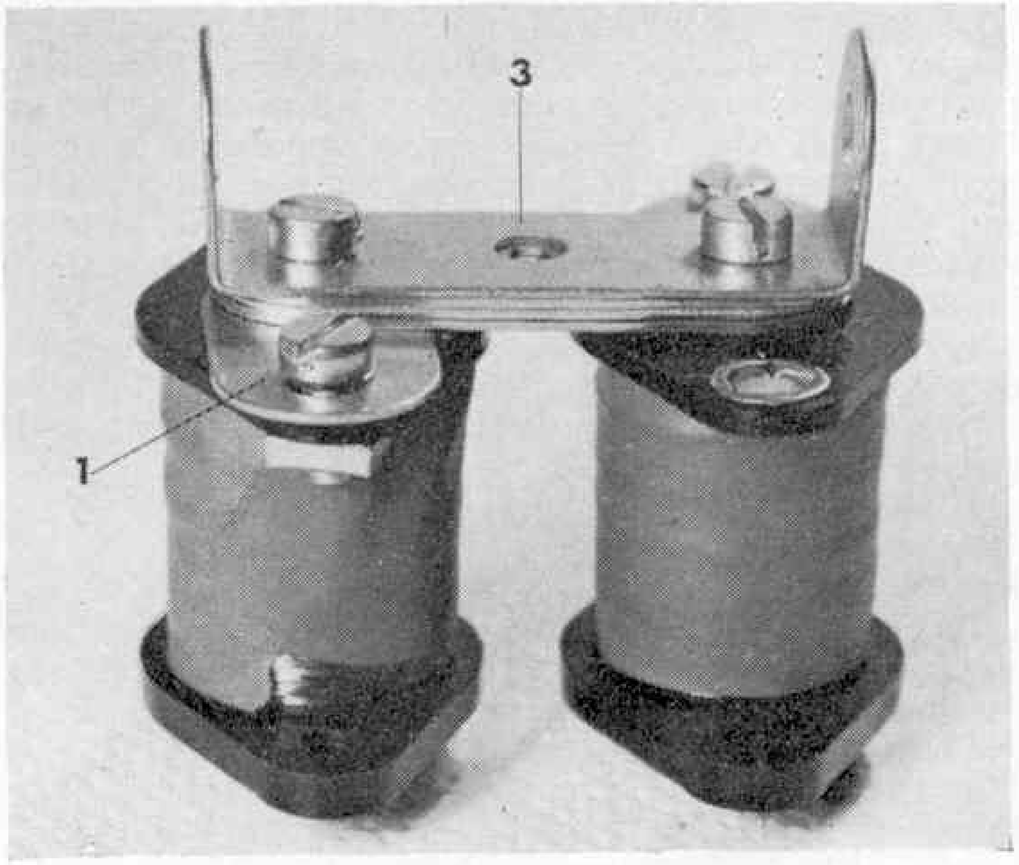
To build the grab, two Fishplates 1 are bolted one each to the S terminals of two Cylindrical Coils 2. Fixed to the top of the Fishplates by $\frac{3}{4}$ in. Bolts are a $1\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strip 3 and three $1\frac{1}{2}$ in. Strips 4, while the same Bolts fix three Washers and a 1 in. Core below each Fishplate. The hoist Cord of the model is tied to the lugs of Double Angle Strip 3 while the leads from the power-source are connected to the terminals of the Coils. The grab can be operated from a power source of anywhere between $4\frac{1}{2}$ and 15 volts A.C. or D.C.

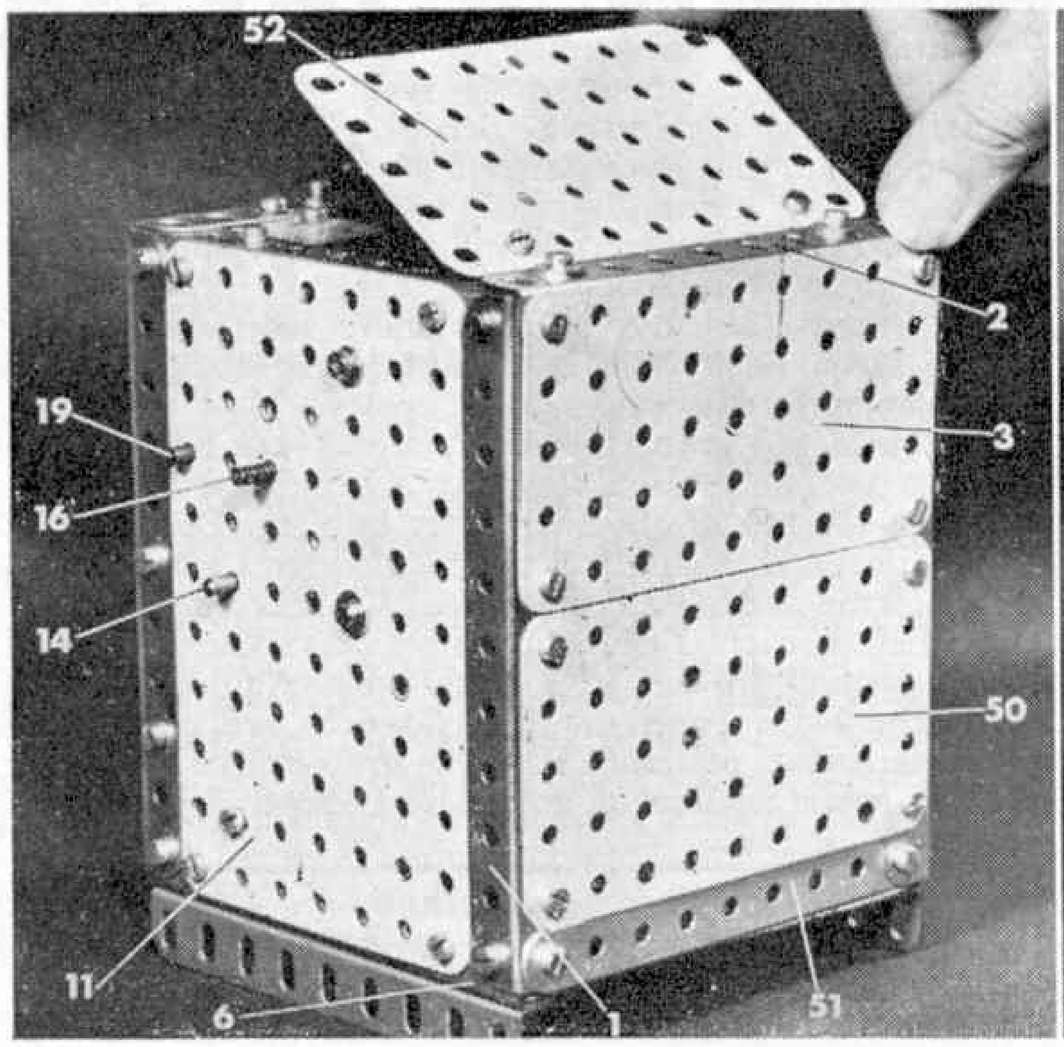
PARTS REQUIRED

3—6a	2—37b	2—111
2—10	6—38	2—522
2—37a	1—48	2—528

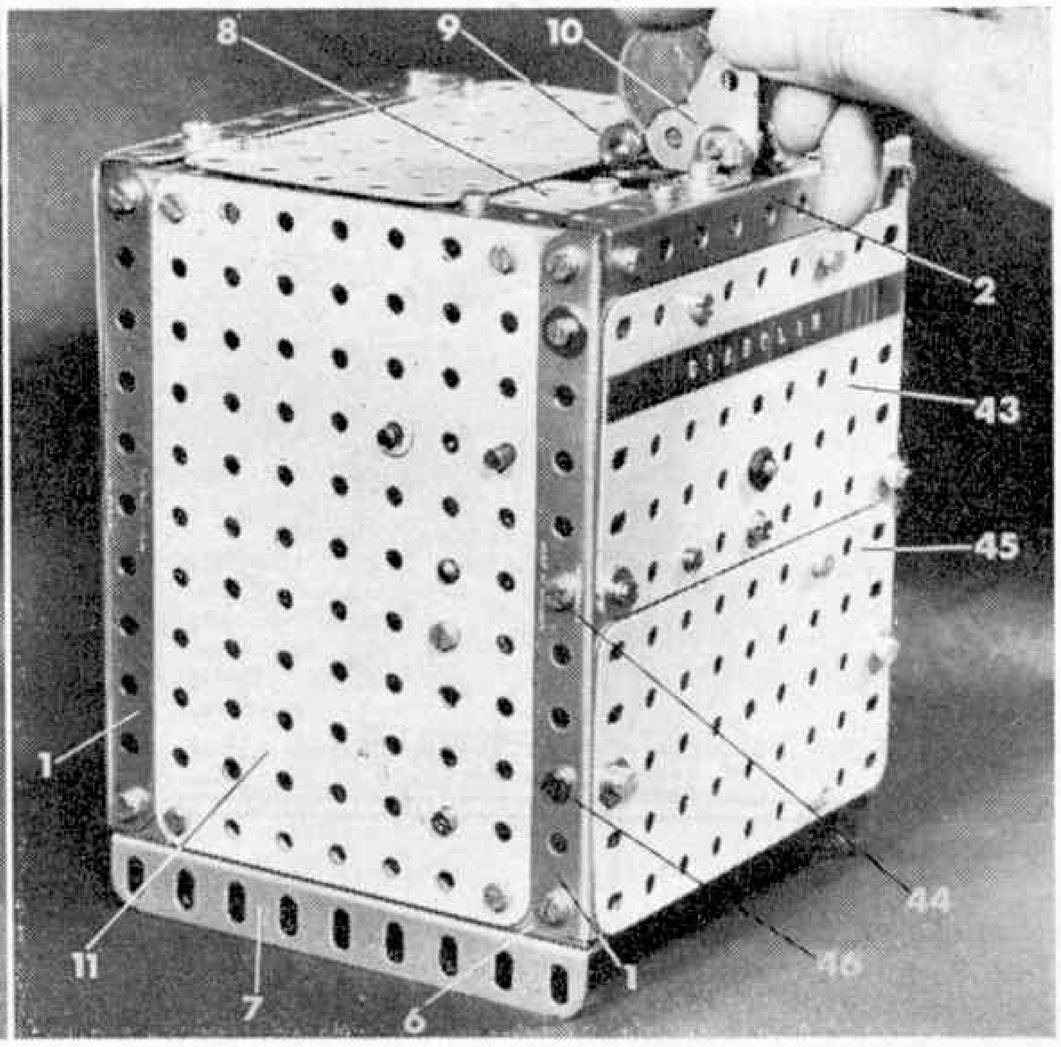


A simple electromagnetic grab designed by Timothy Ward of Horfield, Bristol for use with small crane models. It uses two Cylindrical Coils from the Elektrikit for the electro-magnets.





A rear view of the completed model showing construction of the basic " box."



The Meccano " Diabolik "—a mechanical money-box designed and built by Mr. Guiseppe Servetti of Piacenza, Italy.

MONEY GRABBER by Spanner

No problems in saving with this mechanical money-box. Put a coin in the slot and the mechanical hand grabs it tightly

FASCINATING GADGETS a-plenty have been built with Meccano, but few I have seen can match the particular example featured here. For reasons we shall see later it has been christened " Diabolik " by its Italian builder, Mr. Guiseppe Servetti of Piacenza, Italy. It is, in effect, a battery-powered, mechanical money-box, driven by a Junior Power Drive Motor and it's almost impossible to resist feeding it with coins ! Drop a coin in the slot provided and wait. Mysterious grinding noises and metallic rattles emanate from the dark interior of the box then, in due course, a lid in its top slowly opens and a " hand " appears. Almost gently it grasps the coin, pauses hesitantly then, without warning, suddenly whips the coin away to disappear inside the box with a bang—quite startling !

Framework

A rectangular box framework is constructed from four vertical $5\frac{1}{2}$ in. Angle Girders 1 joined at the top by four $4\frac{1}{2}$ in. Angle Girders 2, the securing Bolts holding the rear Girder also fixing a $4\frac{1}{2} \times 2\frac{1}{2}$ in. Flat Plate 3 in position. The side Girders 1 are joined at their lower ends by a special built-up base consisting of a $4\frac{1}{2} \times 2\frac{1}{2}$ in. Flat Plate and two $4\frac{1}{2}$ in. Flat Girders 4 and 5. Each end of these parts is sandwiched between the horizontal flanges of two $4\frac{1}{2}$ in. Angle Girders 6, placed one inside the other with their vertical flanges pointing upwards, while the securing Bolts fix a third $4\frac{1}{2}$ in. Angle Girder 7 in position with its vertical flange pointing downwards. Note that Flat Girder 5 is not bolted in position but must be left free to slide in the groove supplied by the horizontal flanges of the two above-mentioned Angle Girders. The Flat Girder will later serve as the access hatch for the battery.

Bolted in the top front corners of the framework are two $1\frac{1}{2} \times 1\frac{1}{2}$ in. Flat Plates 8 connected by a $2\frac{1}{2}$ in. Insulating Flat Girder to the centre of which a Collar 9 is fixed by a Bolt screwed up into one of its tapped bores. This Bolt also fixes a $1 \times \frac{1}{2}$ in. Angle Bracket by its long lug to the underside of the Insulating Girder with its short lug towards the front and pointing downwards. A guide slot is then provided by two 1 in. Corner Brackets 10, separated by two Washers and mounted with further Washers on a $\frac{1}{2}$ in. Bolt fixed in two Angle Brackets bolted to front Girder 2. The Corner Brackets must not touch Collar 9. Each side of the framework is enclosed by a $5\frac{1}{2} \times 3\frac{1}{2}$ in. Flat Plate 11.

Drive mechanism

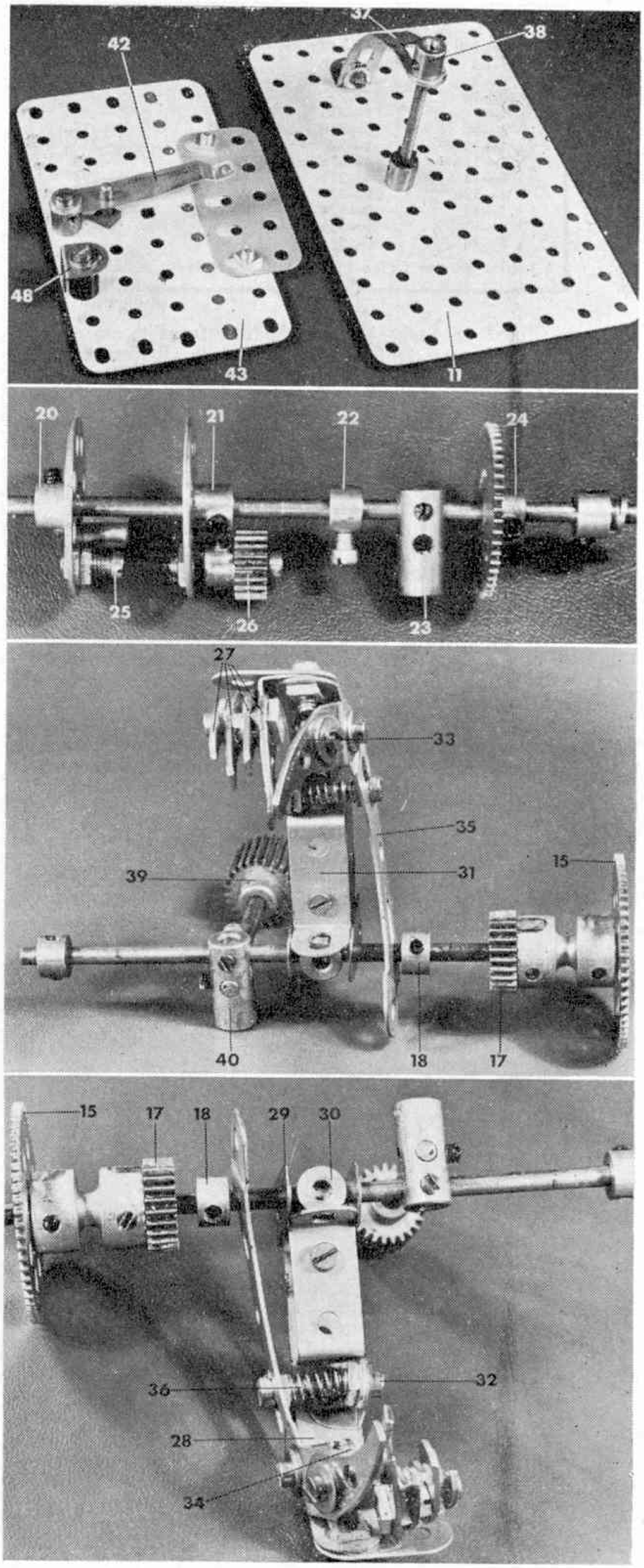
A Junior Power Drive Motor carrying a Worm on its output shaft is bolted to the base of the unit as shown. Engaging with the Worm is a 57-teeth Gear 12 fixed, together with a $\frac{3}{4}$ in. Pinion 13, on a 5 in. Rod 14 held by a Collar in Plates 11. In mesh with Pinion 13 is a second 57-teeth Gear 15 *loose* on an off-set 5 in. Rod 16, but with its boss fixed in one end of a Socket Coupling also loose on the Rod. Fixed in the other end of the Socket Coupling and loose on the Rod is another $\frac{3}{4}$ in. Pinion 17, the whole assembly being held in place by a Collar 18.

Mounted on a third 5 in. Rod 19 are two 8-hole Bush Wheels 20 and 21, a Collar 22, a Threaded Coupling 23, a 50-teeth Gear 24, in mesh with Pinion 17, and a second Collar which is spaced from Plate 11 by suitable small-diameter non-Meccano washers to prevent it catching on Gear Wheel 15. These washers are readily obtainable from most hardware stores and electrical-spares dealers. Held by Nuts in adjacent holes in the face of Bush Wheel 20 are a $\frac{3}{8}$ in. Bolt 25 and a Rod Socket, while a $\frac{1}{2}$ in. Pinion 26 is mounted loose on a $\frac{3}{4}$ in. Bolt held in the face of Bush Wheel 21. An ordinary Bolt is screwed into one tapped bore of Collar 22.

Hand and counterweight

Because it is equipped with four "fingers" and a "thumb," I feel I should call the actual coin-grabbing mechanism a "hand," although I must confess it looks more like the death-dealing claw of some diabolical monster. (Hence Mr. Servetti's title !) All the fingers are supplied by Pawls without boss 27, the middle, third and little fingers being mounted on a $\frac{1}{2}$ in. Bolt fixed to an Angle Bracket. A washer separates the middle finger from the lug of the Bracket while two Washers separate the third finger from the middle and the little from the third. Note, incidentally, that the securing Bolt passes through the second hole in the "little finger" Pawl, but the first hole in the other two Pawls. The "index finger" Pawl is fixed on a Bolt held by a Nut in the second hole of the middle finger.

The Angle Bracket is bolted to a 1 in. Corner Bracket which is in turn bolted to one end of a bent $3\frac{1}{2}$ in. Strip 28 forming the "arm." At its opposite end, this Strip is bolted, along with a $1 \times \frac{1}{2}$ in. Double Bracket 29, to a Threaded Coupling 30, the securing Bolt being screwed into its threaded longitudinal bore. (When the mechanism is finished, Rod 16 will be fixed in the opposite end transverse smooth bore of this Coupling.)



Top right; plates 11 and 43 removed from the model to show construction of "thumb" controlling guide and battery contact points.

Next; The movement operating rod or camshaft, removed from the model.

Lastly; Two views of the "arm" and "hand" with the mounting rod removed from the model. Note that, when the unit is in place, the Gear/Socket Coupling/Pinion arrangement is in contact with Collar 18.

PARTS REQUIRED

2—2a	2—25	3—63c	1—115
1—3	1—25b	1—63d	1—120b
4—9	1—26	13—64	1—124
10—9a	1—27	1—72	3—133d
1—9c	1—27a	2—74	5—147c
1—9d	1—27d	1—81	1—171
1—10	1—32	2—89a	1—212a
1—11a	60—37a	2—103c	1—215
6—12	54—37b	1—103f	1—507
1—12b	25—38	2—111	1—533
3—15	2—52a	2—111a	1—564
1—17	6—53a	1—111c	
2—24	6—59	2—114	

1 Junior Power Drive Motor. 1 2½ in. Strip adhesive tape.

Fixed to Strip 28, but spaced from it, as shown, by a Short Coupling, is a 1 × ½ in. Reversed Angle Bracket 31. This is not bolted to any other part, but it serves as a strengthener, being wedged between Threaded Coupling 30 and an Angle Bracket bolted to Strip 28. A Bolt 32 carrying a Washer and a Nut is fixed to the free lug of this Angle Bracket.

Turning to the thumb, this also is represented by a Pawl 33, but first a Threaded Boss 34 is mounted loose on the shank of the second Bolt securing the Corner Bracket to Strip 28, the Bolt passing into one transverse tapped bore of the Threaded Boss. The "thumb" Pawl is then bolted to a bent Fishplate which is in turn bolted, along with a 3 in. Stepped Curved Strip 35, to the end of the Threaded Boss. A Bolt is held by a Nut in the nearby elongated hole of Curved Strip 35, this Bolt lying opposite Bolt 32. A Compression Spring 36 is slipped onto the shanks of both these Bolts and the resulting pressure on Strip 35 causes the thumb to close against the index finger. With the mechanism in position, Rod 16 passes through the free elongated hole in Strip 35.

A curved guide controlling the sideways movement of Stepped Strip 35 as the "arm" is raised, is provided by a Formed Slotted Strip 37, one end of which is fixed by an Angle Bracket to appropriate Flat Plate 11. Its other end is held by a Threaded Boss 38 and a Nut on a 2 in. Screwed Rod locked by a Nut in a second Threaded Boss bolted to Plate 11.

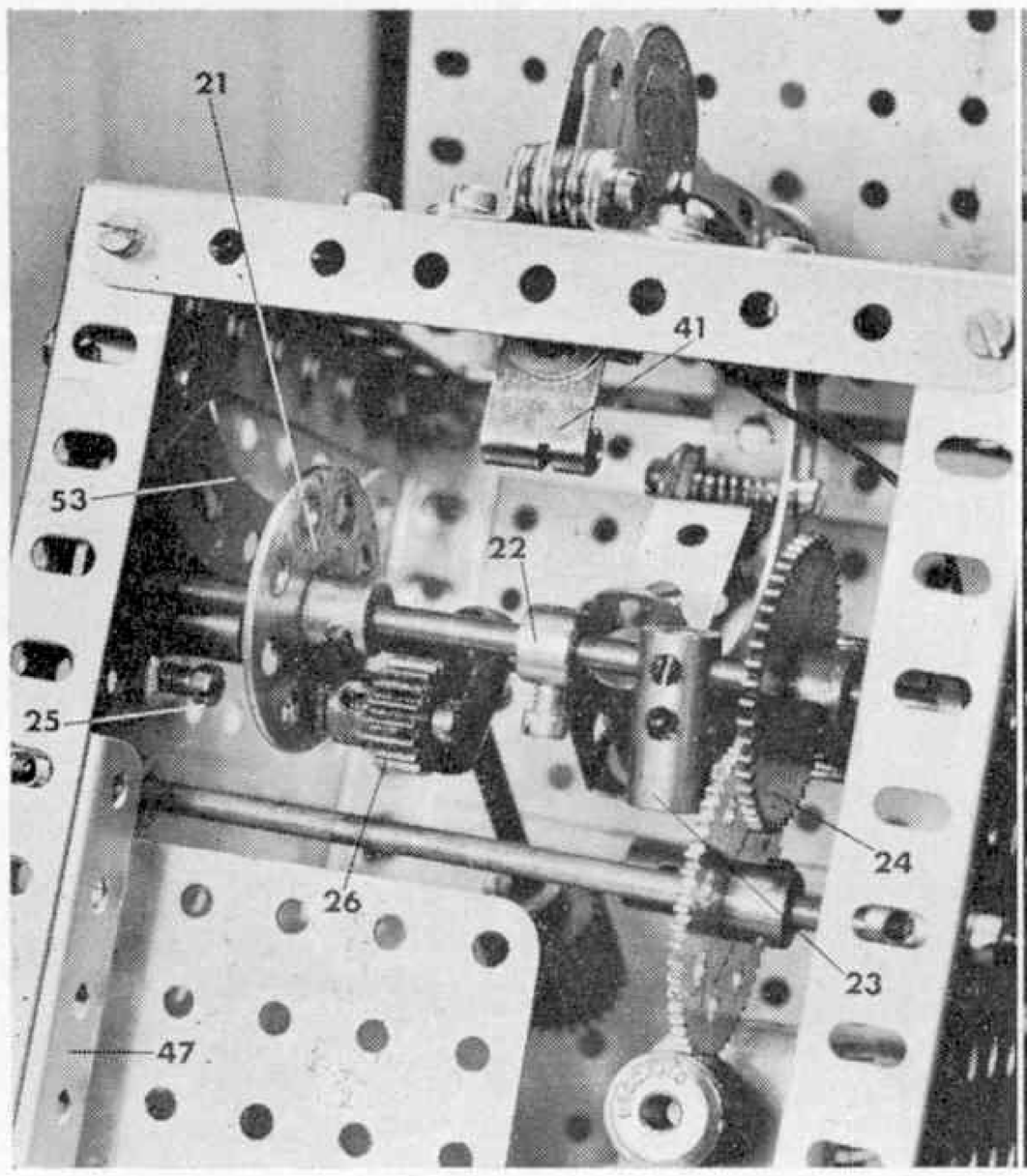
The counterweight for the hand consists of a ¾ in. Pinion 39, with a ¾ in. face, which is mounted on the end of a 2½ in. Rod, fixed in the central transverse smooth bore of a Threaded Coupling 40. This Coupling is mounted as shown on Rod 16.

Electrical system

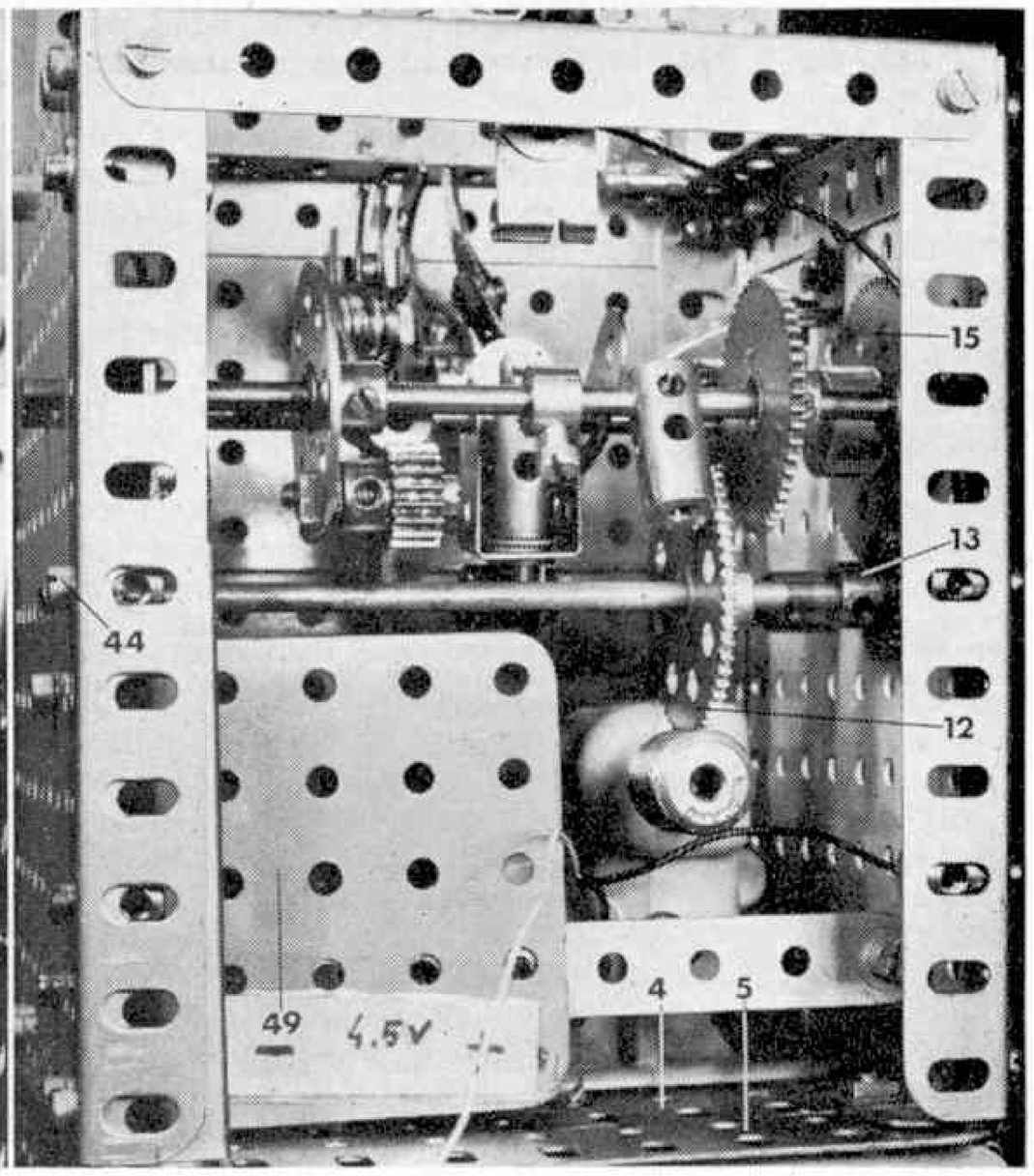
Before going any further with the Diabolik, it is best to complete the electrical system. A right-angled Rod and Strip Connector 41 is bolted to the short lug of the 1 × ½ in. Angle Bracket fixed to the underside of the earlier-mentioned Insulating Flat Girder. In contact with the front face of this is a 2 in. Wiper Arm 42 (Elektrikit Part No. 533) bolted to a Threaded Boss which is in turn fixed to a 4½ × 2½ in. Flat Plate 43. This Plate is removable and is held in position by Bolts screwed into the transverse bores of two Threaded Bosses fixed one to each front Girder 1 by Bolts 44. Another 4½ × 2½ in. Flat Plate 45 is similarly held in position, Bolts 46 securing the Threaded Bosses to Girders 1. Note that, with Plates 43 and 45 in position, the securing Bolts at one side fix a 3 in. Angle Girder 47 to one Angle Girder 1. This serves as a guide for the battery, another guide being provided by a second 3 in. Angle Girder bolted to the inside of Plate 45.

Secured to Plate 43, in addition to the Wiper Arm, is a 2½ in. Flat Girder, which slots behind front Girder 2, and an Insulating Spacer (Elektrikit Part No. 564) to which an Angle Bracket 48 is bolted. Wiper Arm

A close-up view of the movement controlling rod showing the positions of the parts when the arm is fully raised.



In this view of the model the front Plates have been removed to show the layout of the drive mechanism operated by a Junior Power Drive Motor.



42 is prevented from turning on its Threaded Boss by a Threaded Pin projecting through the second hole in the Wiper. This Threaded Boss and Angle Bracket 48 form the contacts for the Motor's power source which in this case is a $4\frac{1}{2}$ volt Ever Ready 1289 or equivalent "flat" torch battery. A backing plate for the battery is provided by a $2\frac{1}{2} \times 2\frac{1}{2}$ in. Flat Plate 49 attached to a $4\frac{1}{2}$ in. Strip which is in turn attached to Plates 11 by Threaded Bosses.

When fitting the battery, the positive (short) terminal must make contact with the Threaded Boss, while the negative (long) terminal makes contact with Angle Bracket 48. Actually, the Angle Bracket and Threaded Boss do not lie above the centre of the battery, therefore you will probably find it necessary to bend the battery terminals to the appropriate side so as to make good contact. The wiring of the model itself is simple. One Motor lead is connected to Angle Bracket 48, while the other lead is taken from the Motor and connected to the $1 \times \frac{1}{2}$ in. Angle Bracket to which Rod and Strip Connector 41 is bolted. The battery is held in position by Flat Girder 6.

To complete the model, the back is enclosed by a $4\frac{1}{2} \times 2\frac{1}{2}$ in. Flat Plate 50 and a $4\frac{1}{2}$ in. Strip 51. Another $4\frac{1}{2} \times 2\frac{1}{2}$ in. Flat Plate 52, attached to nearby Girder 2 by Hinges, acts as a lid for the box. It is controlled by a 3 in. Stepped Curved Strip 53 loosely attached to a Threaded Boss fixed to front, left-hand Girder 1. The forward movement of the hand also helps to open the lid, therefore it is very important that a strip of Sellotape be fixed to the underside of Plate 52 to provide a "slipway" for the hand.

Operation

When a coin is placed in the slot it makes contact with Collar 9 and Corner Brackets 10 thus completing the circuit to the Motor which begins to operate. The drive is transferred through the relevant Gears and Pinions to Rod 19 which rotates clockwise when viewed from the right. As Bush Wheel 20 revolves Bolt 25 acts against Curved Stepped Strip 53 which pushes open the lid. As this is taking place, Bush Wheel 21 is revolving so that Pinion 26 presses down on Threaded Coupling 40 causing the "arm" to rise As it does so, Threaded Coupling 23 acts against the side of Stepped Curved 35 keeping the "thumb" and "index finger" apart until, at the very top of the hand's movement when the thumb and finger are one each side of the coin, the Coupling disengages the Strip. Immediately, the action of Compression Spring 36 causes the thumb to close on the coin and, as the cycle continues, the arm pulls the coin from the slot.

While all this has been going on Collar 22 has been rotating. At the beginning of the operation, the Bolt in the Collar should have been holding Wiper Arm 42 away from Rod and Strip Connector 41 so that the coin was essential to complete the electrical circuit. However, as the Collar revolves, the Bolt eventually moves away from the Wiper Arm thus allowing it to make contact with Rod and Strip Connector 41 which in turn completes the circuit and enables the Motor to continue running. The arm begins to withdraw with the coin until, when Pinion 26 leaves Threaded Coupling 40 the counterweight comes free and drops causing the arm to shoot into the box. As it does so, guide 37 presses against the side of Strip 35 and opens the "thumb" to release the coin. Almost immediately the Bolt in Collar 22 contacts Wiper Arm 42 lifting it clear of Rod and Strip Connector 41 to break the circuit, and complete the cycle of operations.

GREAT ENGINEERS No. 5

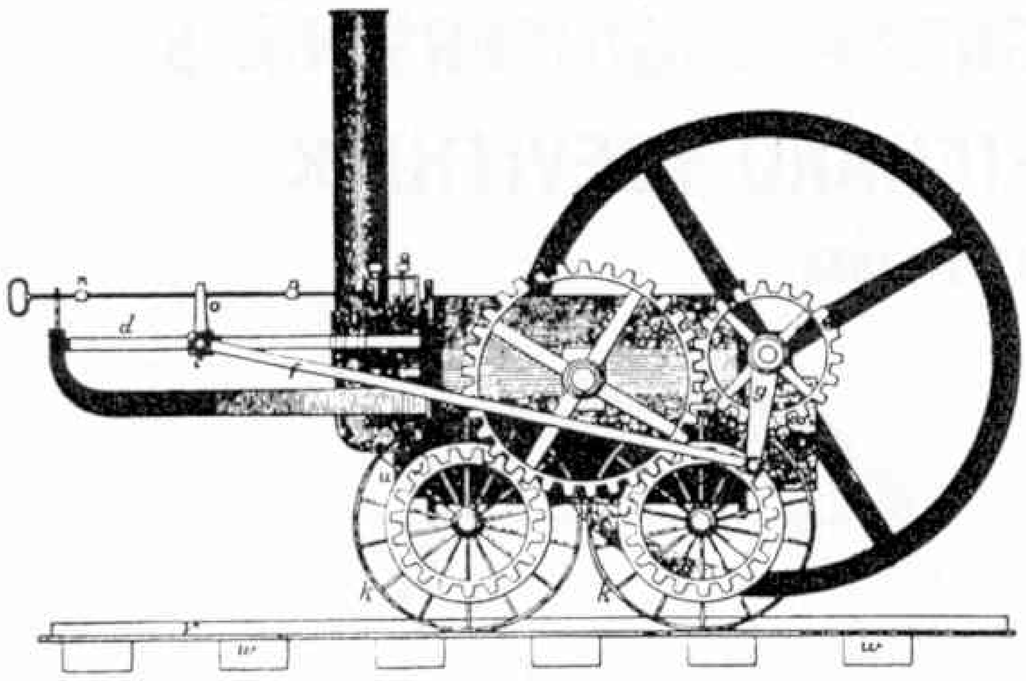
RICHARD TREVITHICK

(1771—1833)

THIS MECHANICAL inventor, almost unknown outside the engineering field, was a man with a consuming desire to achieve his objects, but a person with little ambition or ability as a business man. At school his teachers classed him as slow, obstinate or disobedient. Yet he developed an insatiable urge to achieve whatever he set out to do, and was a "veritable volcano" of inventions, some of his ideas predating engineering progress by years. He was born during early stages of the Industrial Revolution when steam was making its impact on the affairs of the country. This was due mostly to James Watt, as he improved the steam engine so much its power gave it a major "part" in the Industrial Revolution.

Watt's first engines were atmospheric engines, but later he employed low pressure steam. Trevithick's engines used high-pressure steam and they proved far more economical. Known as "puffers," they were applied to many duties, including passenger cage winding in mines.

William Murdock, one of Watt's mechanics and another great inventor, constructed a small steam-driven carriage in 1786, but for some reason this was not developed and his experiments were forgotten. Trevithick took up this subject and was trying out a steam carriage in late 1801, with some success, since he and his cousin, Andrew Vivian, took out a patent in 1802 for "Improvements in the Construction of Steam Engines." John Vivian,



son of Andrew, was about 19 at the time and drove one of these carriages in the streets of London during 1803. In his biography on Trevithick he said: ". . . the engine had one cylinder, and three wheels; the two driving wheels behind were about 8 feet in diameter. The boiler and engine were fixed just between those wheels. The steering wheel was smaller and placed in front. There were some gear wheels to connect the engine with the driving wheels. One or two were made in Tottenham Court Road, and in Euston Square. . . .

"I was steering, Captain Trevithick came alongside me and said 'She is going all right ?' 'Yes,' I said, 'I think we had better go on to Cornwall.' She was going along five or six miles an hour, and Captain Trevithick called out, 'Put the helm down, John,' and before I could tell what was up, we were tearing down six or seven yards of railings from a garden wall. A person put his head from a window, and called out 'What the devil are you doing here? What the devil is that thing!'"

During 1802 Trevithick constructed what was probably his first tramway locomotive, for the Pendarran Ironworks in Wales. This locomotive looked something like the line drawing illustration, although it may not be absolutely correct. Trevithick gives the following information: It weighed 5 tons. The cylinder was 8¼ in. diameter, with a stroke of 4½ ft. and it hauled a gross load of 25 tons at the rate of 4 miles an hour over a rough track with sharp curves and steep incline. Without load the locomotive could attain a speed of 16 m.p.h.

There is no direct evidence that Trevithick made any other locomotives until 1804 when he built one for Newcastle upon Tyne. In appearance it was similar to the Welsh locomotive, but more superior in detail. For some reason it did not attract much interest and was eventually relegated to the work of a stationary engine.

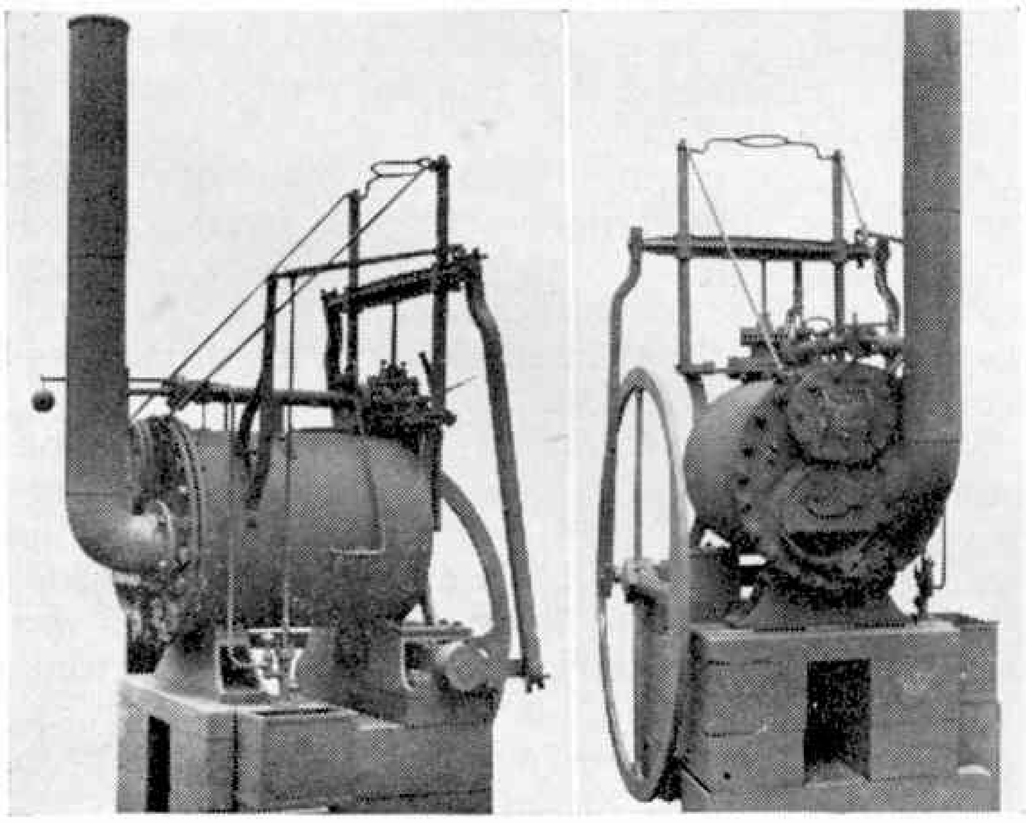
In 1808 he made his last attempt to popularise the steam locomotive, by building a circular railway track near the site of the present railway station at Euston. Admission, including a ride for those brave enough to risk it, was 1s. The show ran for a few weeks but the engine toppled over and brought the venture to a close.

Trevithick had many other activities and locomotives were but a side-line. At the time of the Napoleon scare (1804) he was suggesting a steam-driven fire ship to destroy the Emperor's invasion fleet at Boulogne, and he was prepared to captain it. Two years later he was offering the Trinity Board a steam-driven dredger to scoop ballast from the Thames. Then he became involved in another Thames scheme—the attempt being made to drive a tunnel across the Thames at Rotherhithe. The tale of the failure and ultimate success of this project is a long story. An unsuccessful attempt had already been made before Trevithick came on the scene, but it was he who almost completed a pilot tunnel before water burst in and flooded the workings. He then constructed iron tanks for the storage of cargo and water in ships, and set up a factory to make them at Limehouse. The project fell through and he returned to Cornwall in 1810, more or less a broken man, but he soon revived and was in great demand as a consulting engineer. He also developed a number of improvements for steam engines and boilers, and advocated steam-driven plant for agriculture.

In 1816 Trevithick sailed for Peru to manage the installation of steam engines in silver mines there. Unfortunately the area became involved in revolt, the mines rendered worthless and the machinery completely destroyed. He returned home without a thing, but the local church bells greeted his arrival.

Then followed a period of further inventions and patents, and his scheme for a cast-iron column 1,000 feet high to mark the passing of the Reform Bill, but his sudden death in 1833 put an end to this. At this time he was also pursuing an invention at Hall's Works, Dartford, Kent, where he now lies in a nameless grave.

So passed one of Britain's greatest engineers, a man who gave much for science and industry, yet received nothing in return!

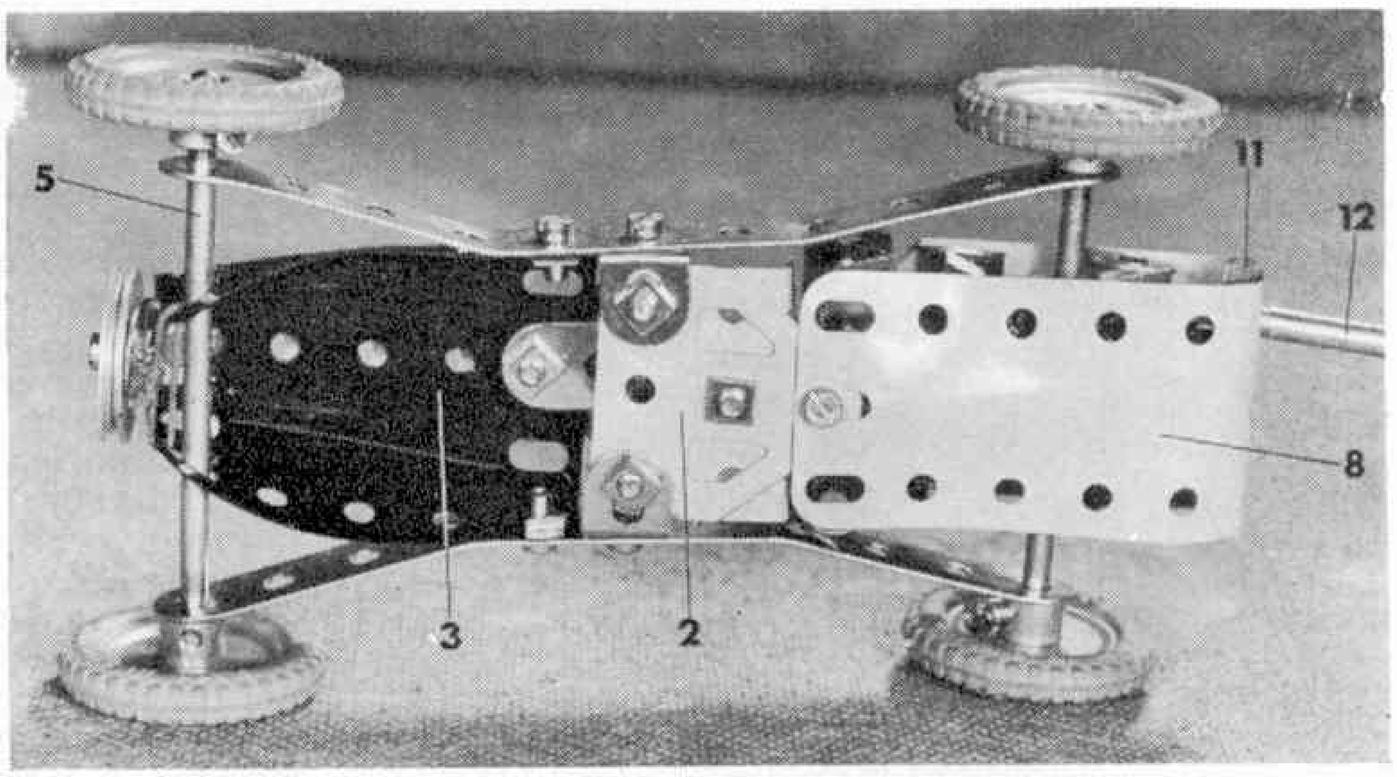


At top of page, Trevithick's Penydaren railway locomotive constructed during 1804. At left, two views of Trevithick's high pressure engine and boiler made during 1805. This is now preserved and on view in the Science Museum.

JUNIOR RACER IN MECCANO

by Spanner

Designed especially for young modellers, this little Racing Car can be built with an Outfit No. 1



ACCORDING TO the "Dismal Johnnies" of our society, British sport has "had it." We cannot, say the pessimists, get anywhere in international events—as big-time sportsmen we're useless! There can be little doubt that some people actually believe this nonsense. True, there are some branches of sport in which we do not exactly shine, but this applies to all countries. We, on the other hand, are holders of the World Cup for football—a mighty sport—and on top of that we are the undisputed leaders of the whole world in motor racing—one of the fastest, most dangerous sports in existence today.

Motor racing, in fact, has provided the inspiration for our outfit model this month, it being a little Racing Car built with the No. 1 Set. A glance at the accompanying pictures will show you that it is not a scale model based on a particular prototype, but I find it a very attractive offering and unmistakable in its general lines.

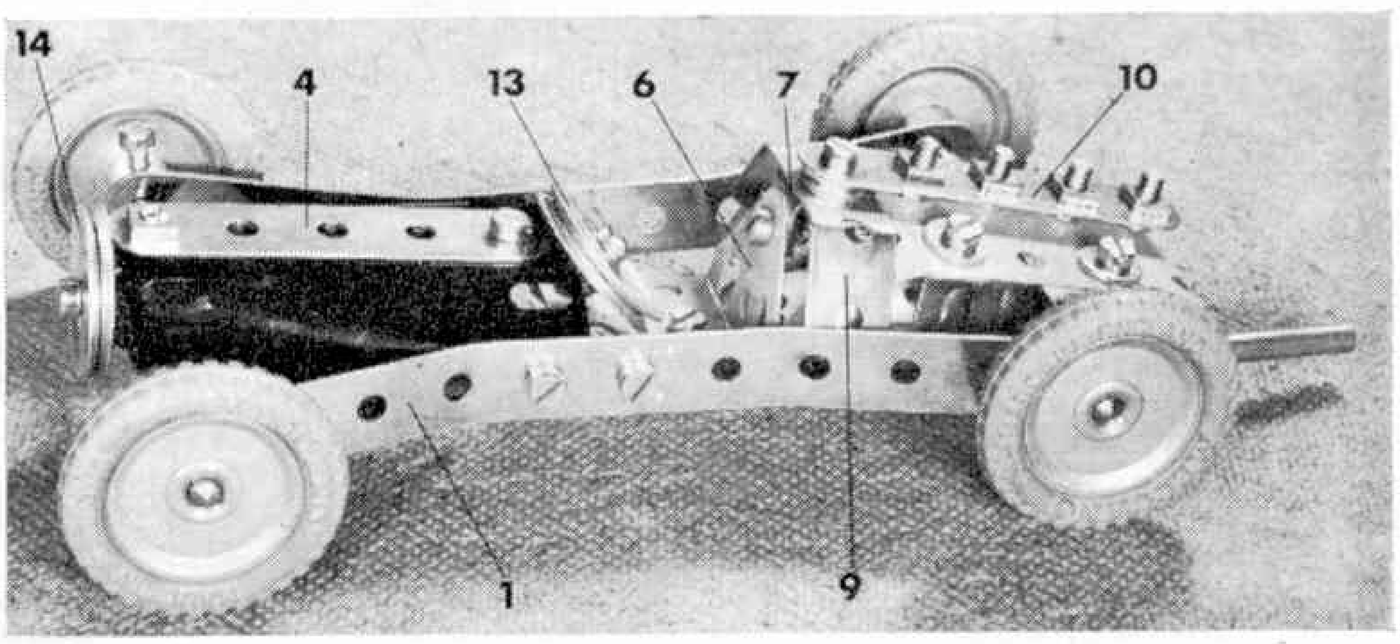
Construction is not difficult. Two $5\frac{1}{2}$ in. Strips 1 are shaped as shown and are attached by Angle Brackets to a Flat Trunnion 2, the Angle Brackets lying in the centres of the Strips. A $2\frac{1}{2} \times 2\frac{1}{2}$ in. compound plastic plate 3, obtained from two $2\frac{1}{2} \times 1\frac{1}{2}$ in. Plastic Plates, is overlaid by a $2\frac{1}{2}$ in. Strip 4 and is secured to Strips 1 by its rear corners. Its front edge is then curved round as shown, to be held in position by a length of Cord tied between the corners. Passed through the elongated holes in these corners of the plate is a $3\frac{1}{2}$ in. Axle 5, journalled in the end holes of Strips 1 and held in place by 1 in. Pulleys fitted with Motor Tyres.

Bolted to Flat Trunnion 2 is a Trunnion 6, to the apex of which a $2\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strip 7 is fixed by one lug. Secured to this Double Angle Strip by a $\frac{3}{8}$ in. Bolt is a $5\frac{1}{2} \times 2\frac{1}{2}$ in. Flexible Plate 8 overlaid by a shaped $2\frac{1}{2}$ in. Strip 9 and a straight $2\frac{1}{2}$ in. Strip 10, these two Strips separated by two Washers. Four Bolts are held by Nuts in Strip 10 to represent the cylinder head.

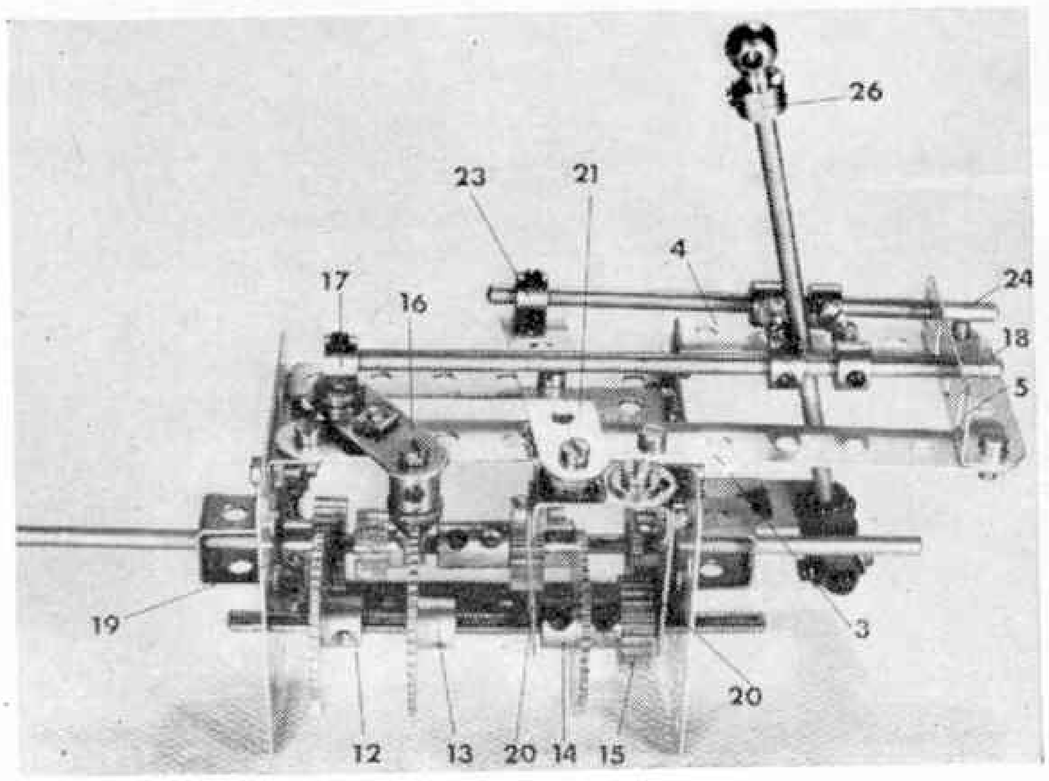
Flexible Plate 8 is now bent down and under in a deep "U" to be bolted to the apex of Flat Trunnion 2. Four Angle Brackets are attached beneath the upper section of the Plate, while a 1 in. Rod is held by a Spring Clip 11 and a Rod Connector 12 in the curve of the "U" to act as the exhaust pipe. Another $3\frac{1}{2}$ in. Rod carrying 1 in. Pulleys with Motor Tyres is journalled in the free ends of Strips 1, then the model is completed with a steering wheel 13 and a front grille 14, both supplied by 1 in. Pulleys without boss and both attached to compound plate 3, Pulley 13 by a Fishplate and Pulley 14 by an Angle Bracket. Note that the Fishplate fixing the steering wheel is bent to an obtuse angle.

PARTS REQUIRED

2—2	2—22a	1—126
3—5	1—35	1—126a
1—10	22—37a	4—142c
7—12	21—37b	1—189
2—16	6—38	2—194
1—18b	1—48a	1—213
4—22	1—111c	



Above and at right, built with a Meccano Outfit No. 1, this little Racing Car is not based on any particular prototype, but it is easily recognisable as a racer.



A 4-speed Gearbox with a gate change built by—we don't know who! Owing to internal reorganisation, all correspondence relating to the mechanism has been lost so, if you built it, please write to Spanner.

AMONG THE MODEL-BUILDERS

with Spanner

PICTURED HERE is an extremely useful gate-change four-speed gearbox that I am hoping somebody will recognise as his own. A rather strange statement, you may think, and one that needs a little explanation. Early last year, during an enforced absence because of illness, the gearbox arrived on my unattended desk. After my return to work, the earlier *Meccano Magazine* ceased publication (no connection, I assure you!) and in the resulting reorganisation all correspondence relating to the mechanism was lost.

Luckily the actual box remained safe and I have wanted to feature it ever since the M.M. returned at the beginning of the year. Without any details of the builder, however, I was a bit loath to do so, not being able to give the necessary credit, but it struck me that, unless I did feature it, I may never find the builder at all. Did you, therefore, build the gearbox illustrated? If you did, or you know who did, please write to me at *Meccano Magazine* Northern Office, Binns Road, Liverpool 13.

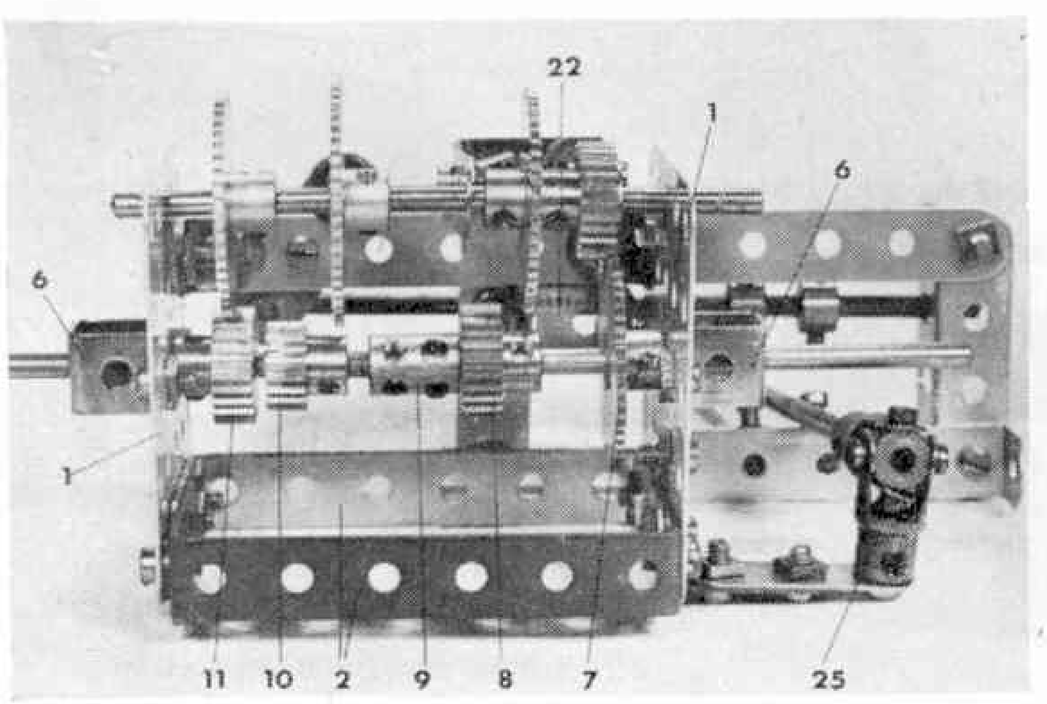
The gearbox itself presents no great problem from a constructional point of view, particularly as all the four ratios operate in one direction, no reverse gear being included. A framework is built up from two $2\frac{1}{2} \times 2\frac{1}{2}$ in. Flat Plates 1, joined together, at one side, by two $3 \times 1\frac{1}{2}$ in. Double Angle Strips 2 and, at the other, by a $5\frac{1}{2}$ in. Strip 3 attached by Angle Brackets. Strip 3 projects a distance of five holes past one Plate 1 and is connected to a $2\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strip 4, bolted to the Plate, by a 2 in. Angle Girder 5.

Bolted to the outside of each Plate 1, in the centre, is a Double Bent Strip 6. Journalled in one Flate Plate and its Double Bent Strip is a $3\frac{1}{2}$ in. Rod carrying a 50-teeth Gear Wheel 7, a $\frac{3}{4}$ in. Pinion 8 and a Short Coupling 9, the Rod being inserted only half-way into the Short Coupling, where it is fixed in place. Loose in the other half of the Coupling is another $3\frac{1}{2}$ in. Rod, journalled in the remaining Flat Plate and Double Bent Strip. Mounted on this Rod are a $\frac{1}{2}$ in. Pinion 10 and a $\frac{3}{4}$ in. Pinion 11.

A sliding layshaft is next provided by a 4 in. Keyway Rod, journalled in Plates 1 and carrying a 50-teeth Gear 12, a 57-teeth Gear 13, another 50-teeth Gear 14 and a $\frac{3}{4}$ in. Pinion 15. Gears 12 and 13 are fixed on the Rod, but Gear 14 and Pinion 15 are free to slide, being held by Key Bolts. This arrangement, in fact, results in a sort of two-in-one layshaft and for this reason requires a double control system, one operating the fixed gears and the other the sliding gears.

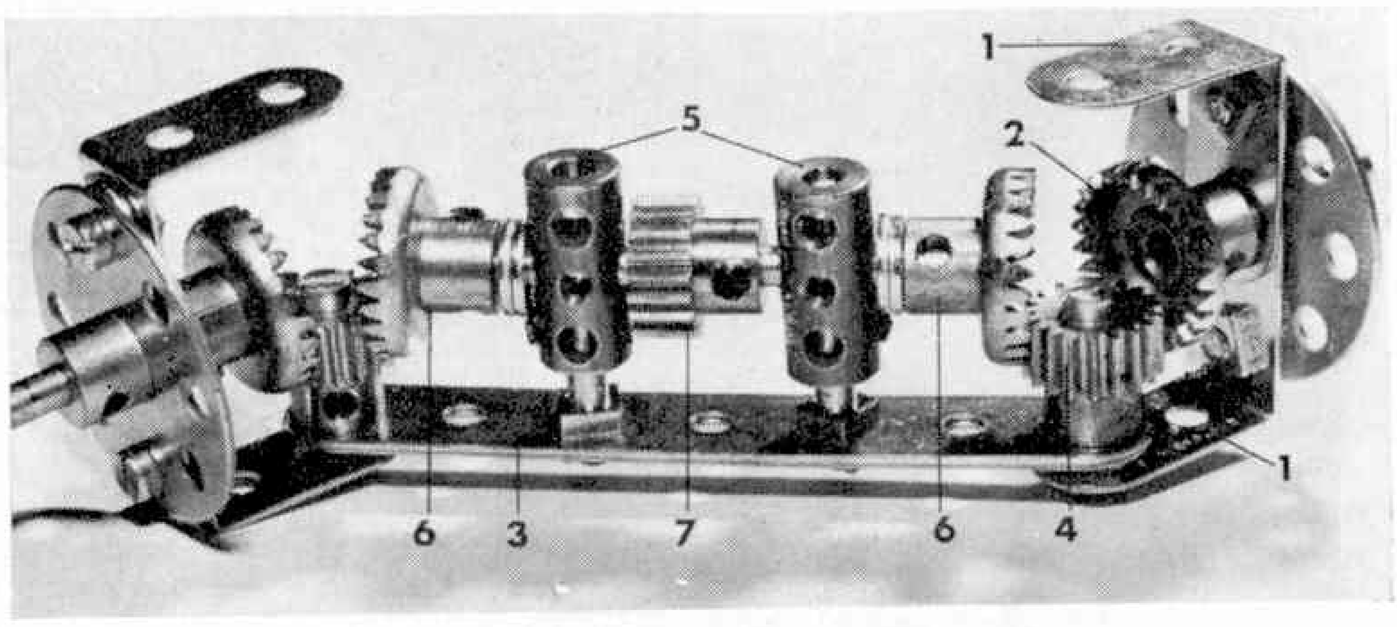
In the former case, a $1\frac{1}{2}$ in. Strip 16 is lock-nutted to Strip 3 through its second hole. A Collar 17 is pivotally attached to one end of this $1\frac{1}{2}$ in. Strip, but is spaced from it by two Washers on the shank of the securing Bolt. Held in the Collar is a 5 in. Rod 18, on which a further two Collars are mounted, approximately $\frac{1}{4}$ in. apart, with a Bolt screwed into one tapped bore, as shown. Pivotally attached to the other end of Strip 16 is an End Bearing 19, the arms of which are located over Gear Wheel 13. Note that they must not grip the Gear.

Pinion 14 and Gear 15 are moved by two $1\frac{1}{2}$ in. Strips 20, placed one each side of the parts and joined at the top by an ordinary Angle Bracket and a $1 \times \frac{1}{2}$ in. Angle Bracket. To the latter, a $2\frac{1}{2}$ in. Strip 21 is pivotally connected, but is spaced from it by two Washers and a Nut on the shank of the Bolt. The same Strip is also similarly connected to a second $1 \times \frac{1}{2}$ in. Angle Bracket 22, bolted to nearby Flat Plate 1, while a Collar 23 is itself pivotally connected to the free end of the Strip. Fixed in this Collar, as shown, is a 4 in. Rod 24 carrying two Collars fitted with Bolts, situated opposite the Collars on Rod 18.



An underside view of the Gearbox showing the input and output shafts as well as the layshaft.

Suggested by Mr. R. A. Dobson of Pudsey, Yorkshire, this interesting Front-Wheel Drive Unit is ideal for heavy-duty and commercial vehicles.



A gear-change lever is provided by a 4 in. Rod secured in one end of a Universal Coupling 25, pivotally connected to a 1½ in. Strip fixed to Plate 1 by a 1 × 1 in. Angle Bracket. The gear lever, carrying a Handrail Coupling 26 at its upper end, is located between the Bolts in the Collars on Rods 18 and 24.

Although equipped with gate-change, this gearbox is unlike the type found in real cars in that the movement of the gear level in the gate is different to that found in a car. In a typical car, movement of the gear lever usually follows an "H" pattern, the gears being changed by moving the gear lever direct from one position to the next. It is never necessary to move the lever from one position to the next and then to a third position just to change one gear, but it can be necessary in the Meccano gearbox. This is because there are two positions for each control shaft 18 and 24, therefore, to obtain four gears, both shafts must sometimes be moved. Nonetheless it is still an extremely useful gearbox. The following parts list, incidentally, applies to the mechanism exactly as illustrated.

PARTS REQUIRED:

1—2	1—15	1—27a	6—59
1—5	1—15a	30—37a	1—63d
4—6a	1—15b	33—37b	2—72
1—9e	2—16	12—38	2—111c
3—12	3—25	2—45	1—136a
1—12a	1—26	2—47a	1—140
2—12b	3—27	1—48a	1—230

Front-wheel drive

Staying with mechanisms, but moving away from gearboxes, we come to a Front-wheel Drive system suggested by Mr. R. A. Dobson of Pudsey, Yorkshire. Front-wheel drive, of course, has frequently proved invaluable, particularly when fitted to heavy-haulage tractors and "cross-country" vehicles such as Land-Rovers, etc. It does, however, result in the added difficulty of having to incorporate a variable direction drive —necessary because the front wheels of most vehicles provide the steering and are, therefore, constantly changing direction. This difficulty is especially present in Meccano models because of the understandable limitations of a miniature system compared to the real thing, but Mr. Dobson has overcome the problem extremely well. All the same, he does stress that his method, rather than being for general use, is more suited to "commercial and other heavy-duty vehicles, where haulage power is more important than speed."

Construction of the mechanism is fairly obvious from the accompanying illustration which, by the way, shows it in partly dismantled form. Each stub axle consists of two 1 × 1 in. Angle Brackets 1 bolted to an 8-hole Bush Wheel mounted, along with a ¾ in. Contrate Wheel 2, on a short Axle Rod. The road wheel would also be mounted on this Rod. Lock-nutted between the free lugs of each lower Angle Bracket are two 3½ in. Strips 3, one on top of the other, the securing ¾ in. Bolt in each case also holding a ½ in. Pinion 4.

Next, two Threaded Pins are fixed in Strips 3 and on them are mounted two Couplings 5. Journalled in the centre transverse smooth bores of these Couplings is a 2½ in. Rod carrying a ⅜ in. Contrate Wheel 6 at each end and a ½ in. Pinion 7 in the centre. Contrates 6 engage with Pinions 4, while the drive from the Motor is taken to Pinion 7.

When fitted to a model, the free lugs of upper Angle Brackets 1 would be joined and the whole assembly would be fixed to the chassis in some way. A steering linkage would also be provided, probably by Strips bolted to one of the Angle Brackets and, finally, the drive would be taken to Pinion 7 either by a Worm or a Gear Wheel.

PARTS REQUIRED:
(For Unit as illustrated)

1—3	2—18b	4—29	8—38
4—12a	2—24	8—37a	2—63
1—17	3—26	4—37b	2—111
		2—115	

AIR NEWS continued from page 336

ment of eight machine-guns, represented the first of a whole new generation of modern, heavily-armed monoplane fighters.

When Sir Robert Watson-Watt discovered the possibilities of radar, the R.A.F. was quick to put it to use and this, as much as anything, ensured victory in the Battle of Britain in 1940. When peace returned, the radar aids employed by Bomber Command to improve its navigation and bombing accuracy during the great night offensive against Germany, became available to make airline flying safer and more reliable than ever before.

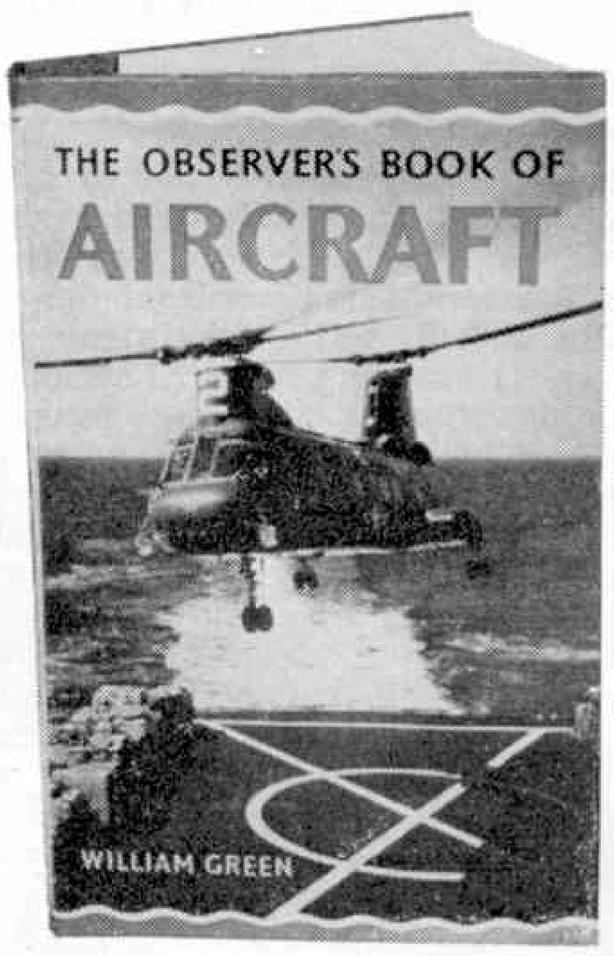
It cannot be claimed that the Air Ministry showed much enthusiasm when one of its young officers, named Frank Whittle, said that he believed he could design and build a practical jet-engine in the 'thirties and asked for official support. But it was not alone in its scepticism, and when Whittle proved his claim the Air Ministry was so quick off the mark in ordering jet fighters that the Meteor became the first jet to be used in action, in July 1944.

As we know, the jet-engine went on to revolutionise airline flying. It will be surprising if, one day, the airlines do not benefit just as greatly from the vertical take-off capability that the R.A.F. is pioneering, with the Harrier, at the beginning of its second 50 years.

RECOMMENDED READING

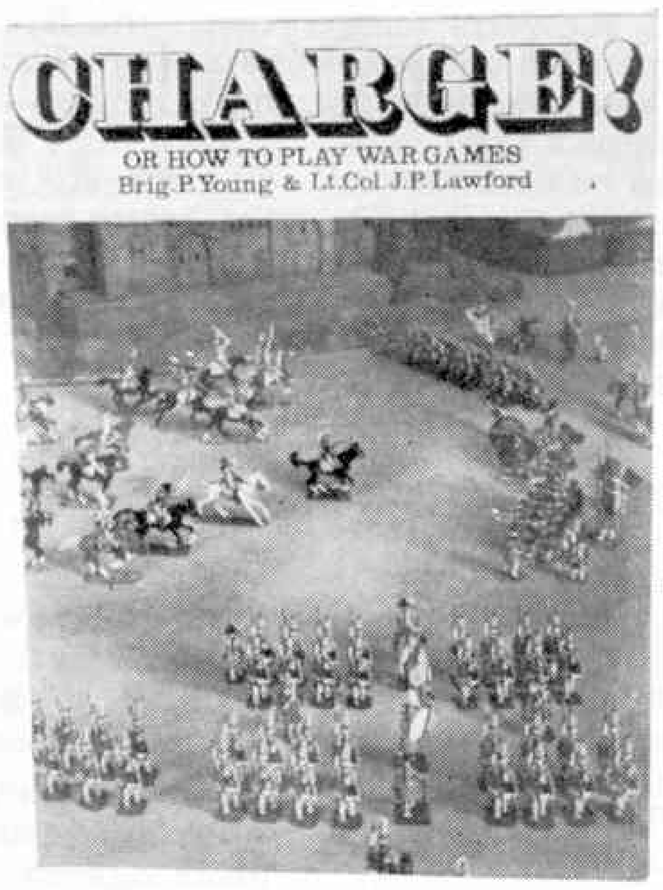
Bayonets. Published by Arms and Armour Press. Price 30s.

It is surprising how many people collect bayonets and you will probably have seen them on sale in antique shops and junk shops. Some of these instruments are worth a great deal of money, and are very rare. Bayonets, written by Frederick J. Stephens has 76, 9 in. x 5¾ in. size pages and includes 132 photographs. It is the first illustrated general historical survey of bayonets ever published and has been prepared with the keen collector in mind. The colourful history of bayonets spans more than 300 years and it is therefore remarkable that there has hitherto been very little serious study and documentation of the weapon. The bayonets in this book are classified by the main kinds of method of fitment to the gun barrel: plug, socket and spring. Plug bayonets from the 17th century to the middle of the 19tth century are shown as examples. Socket bayonets cover the period 1720-1800 and the main bulk of illustrations are in the 1795-1949 era. We were most interested in a lecture paper reproduced in this book. The lecture by Captain Sir Sibbald David Scott, Bart, F.S.A., on the History of the Bayonet was delivered during 1863 even traces the origin of the word *dagger* to William I of Scotland as early as the 12th century ! A specialists book that will have instant appeal to arms collectors.



Observer's Book of Aircraft, 1968 Edition. Price 6s.

This, the latest edition of the Observer's Book of Aircraft is entirely revised. It contains 124 three-view silhouettes of high accuracy and 155 photographs. The up-to-the-minute information is written clearly and concisely on the world's most modern aircraft from countries like the U.S.A., U.S.S.R., France, Germany and Britain. This pocket reference book is recommended by many organisations including the Boy Scouts Association and is exceptional value at 6s. The full colour dust jacket illustrates a Boeing-Vertol UH-46A Sea Knight helicopter employed by the U.S. Navy for the transfer of supplies, ammunition, missiles and aviation spares from combat supply ships to combatant vessels at sea.

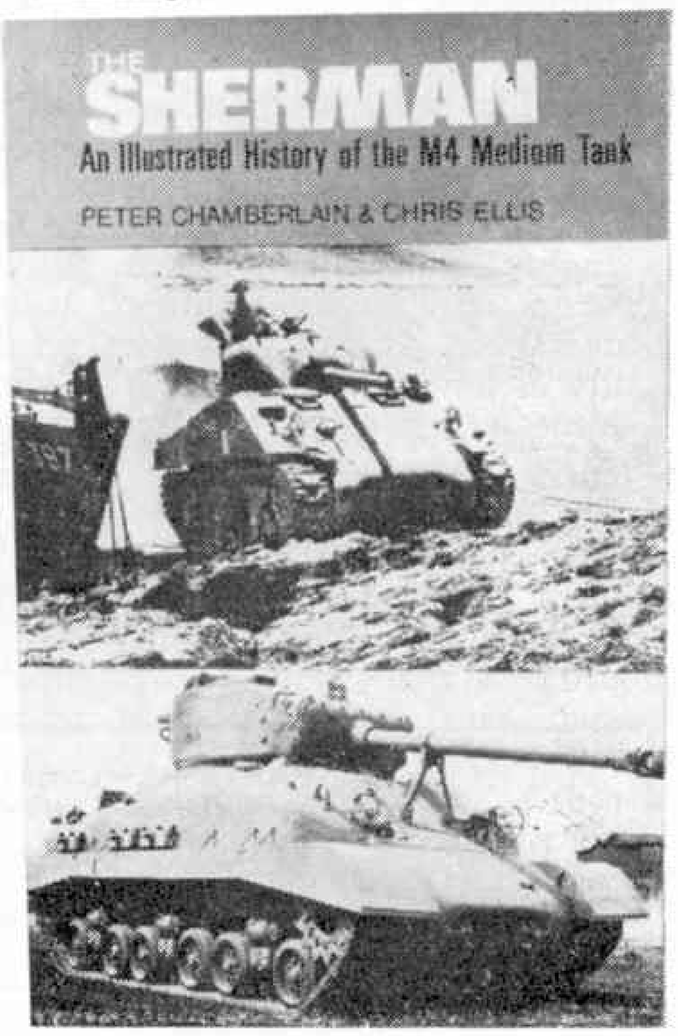


Charge. Published by Morgan-Grampian Books. Price 55s.

A luxury production, Charge will be of great interest to all battle gaming fans as it is just packed with information. The battle game rules the book revolves around have been devised by Brig. P. Young and Lt.-Col. J. P. Lawford, the co-authors, as the result of a long series of battle games, usually based on the reconstruction of actual operations. They have chosen the period 1756-1815 because troops for the most part still fought in close order and few battle game tables are big enough to deploy armies of modern times. Rules are given and explained for both elementary and advanced games. The photographic illustrations are very good indeed and pictorial stages of troop movements really put you right into the battle. There are 122 pages in the 9¾ in. x 7¼ in. page size book and its ten chapters deal with the origins of battle gaming through to firing and playing the game. Very enjoyable reading in fact and no battle game fans should miss reading Charge. Charles Grant, the author of Table Top Battles, in this issue of *Meccano Magazine*, has written a very interesting appendix on how to create an army; this in itself is almost worth the book's 55s. price tag.

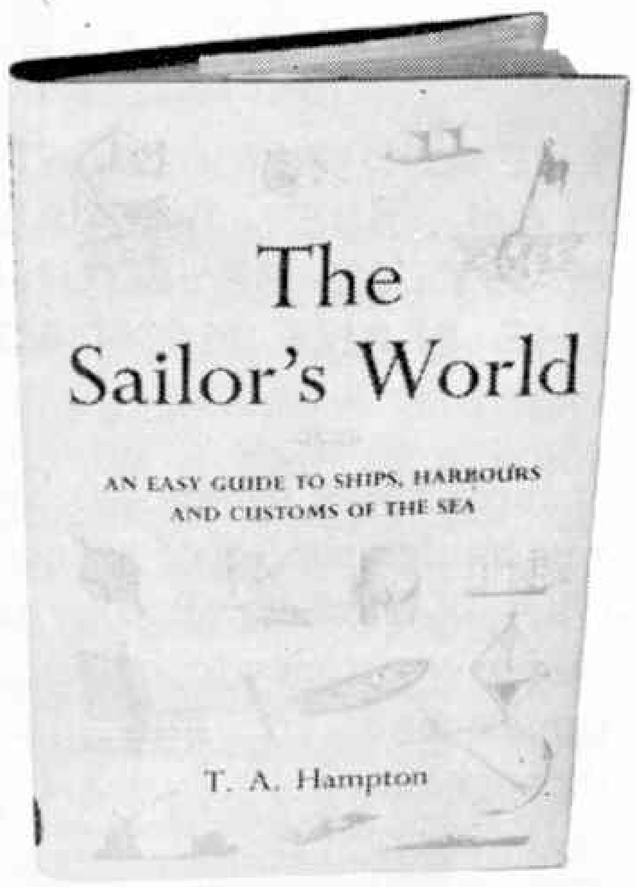
The Sherman. Published by Arms and Armour Press. Price 30s.

This 80 page, 5¾ in. x 9 in. page size book is an illustrated History of the M4 Medium tank, written by Peter Chamberlain and Chris Ellis. No less than 89 photographs (two on the cover), all very clear, nice and large, are contained in this book with eight fine line darwings. The U.S. Sherman (or M4 Medium tank) was built in greater numbers than any other tank in the history of armoured warfare and appeared in many more variants than any other design. It remains the best known and longest-lived of any W.W.2 type, many remaining in service—and sometimes in action—today, and most armies of the Western World have used it at some time or another. It was one of the first armoured vehicles to be virtually mass produced, designed for rapid manufacture by the automotive and engineering industries of a nation which found itself embroiled in a war where the tank had proved to be the most important land weapon from the very earliest stages. For this reason the Sherman was simple, unsophisticated, rugged, easy to repair, and easy to service and maintain. This book has been cleverly prepared with text in the first half set in a narrow column down the centre of the page. Nearly every paragraph has a large photograph reference number to draw your attention to the correct photograph in the rear of the book. These photographs are large and clear with concise captions, but some suffer from wartime censorship.



Manchester's Trolleybuses. Published by the Manchester Transport Museum Society. Price 10s.

Anyone who longs for the trolleybus era, just can't afford to miss this 72-page, 6½ in. × 9½ in. page size book, published by a really authoritative body. The history of the trolleybus during the years when it was a familiar feature on Manchester streets is recorded fully and accurately in this book with plenty of large photographs, route maps, route timetables and many interesting stories. For instance: did you know shields had to be fitted to prevent the blue flashes giving away the tram's position to German aircraft during World War Two, or that the Transport Committee investigated the possibilities of either motor buses or trackless trams, as trolley buses were then known, in 1908? Well written and prepared, we, as non-Manchester residents, found this book really interesting to read.



The Sailor's World. Published by David & Charles. Price 25s.

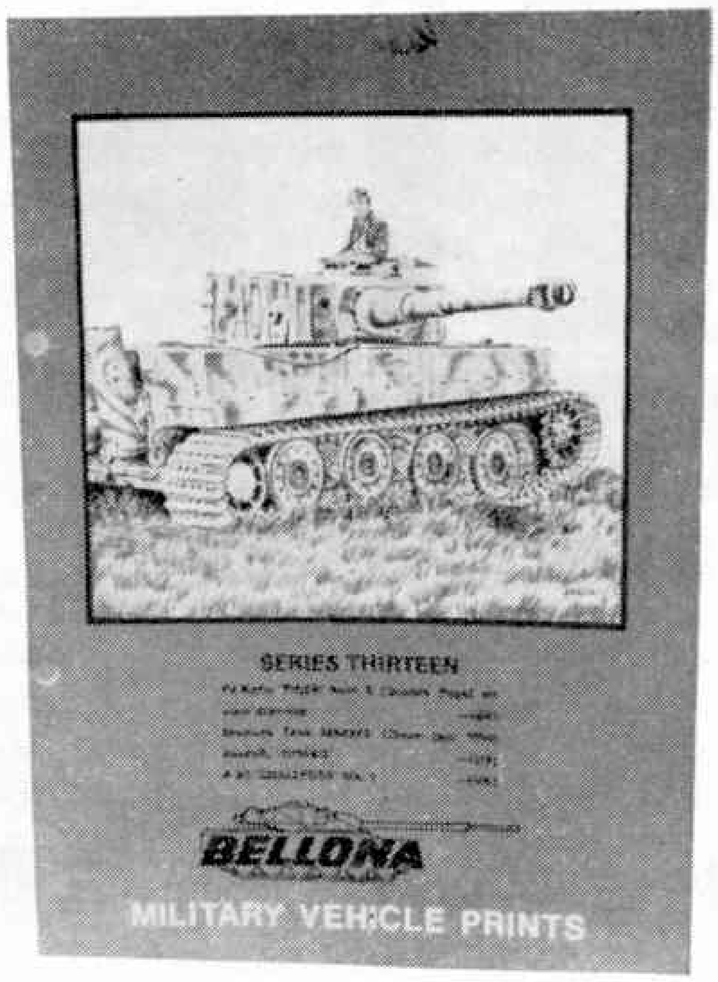
As a seafaring nation, we all know about ships and the sea—or do we? Who controls the pilot service and the lightships around our coast? When is a ship not a ship but a barque or barquentine? Can a lifeboat claim salvage? Why are there groynes on our beaches? These and hundreds of other questions asked by those who live or go to spend a holiday in coastal resorts are fully answered in this 128-page 8½ in. × 5¼ in. size book. More than 125 illustrations of nautical subjects grace the book's pages and written in a straightforward, easy-to-read style, this informative guide to the sailor's world can be relied upon to add much to your appreciation and understanding of the sea. For those technically minded types amongst us, there are also chapters on: A Ship's Equipment; Navigation; Safety at Sea; The Morse Code and Flag Signals.

Navies of the Second World War; American Battleships, Carriers and Cruisers and the Royal Netherlands Navy. Published by Macdonald & Co. Ltd. Price 15s. each

These two very interesting books, each with an attractive dust jacket, contain 160 pages of the 6 in. × 4 in. size and are really enjoyable reading. Both contain a goodly array of photographs and line drawings of the ships described, with tables describing the hull number, name, launching date and eventual fate amongst many interesting details. Both books deal with the Second World War and the American one describes the greatest fleet the world has ever seen after the U.S.A. enacted the "two oceans navy" bill which authorised the construction of 1¼ million tons of combatant ships. The story of each ship is well written and highly interesting. The Royal Netherlands Navy was in apparent decline when war broke out, though hers was an Empire founded essentially upon maritime strength. Her efforts to construct all kinds of new ships just before 1940 came too late and the majority of the Dutch fleet, including some uncompleted, withdrew undamaged as her war was mainly a land action. The Dutch ships proved to be a most welcome ally to the hard-pressed British forces. In the long process of Allied recovery the Dutch Navy won high praise and although they emerged from World War Two poor in number, they were rich in reputation and experience. This book is a very comprehensive survey and enlightening reading to anyone interested in marine matters.

Handbook No. 1 and Series Thirteen—Military Vehicle Prints. Published by Bellona Publications Ltd. Price 8s. and 4s. respectively.

The Bellona Handbook No. 1 is 24, 5 in. x 11 in. page summary of the Self-Propelled Weapons of the German Army 1939-45 and weapons built on fully-tracked chassis. In addition to the Armed vehicles, modified specialist types are also covered as they are more akin to the self-propelled vehicles than the tanks from which they originate. Whilst this book is a gem for facts and the glossary of terms superb, normal term in German, full term, and English translation it is rather hard to read due to the very small type size used. Series Thirteen of the Bellona Military Vehicle Prints has four superb line plates of Pz Kpfw "Tiger" Ausf, Medium Tank M4A3E2, Assault Jumbo and A30 Challenger Mk I. Each of these is backed up with photograhps, a historical feature and technical specifications.



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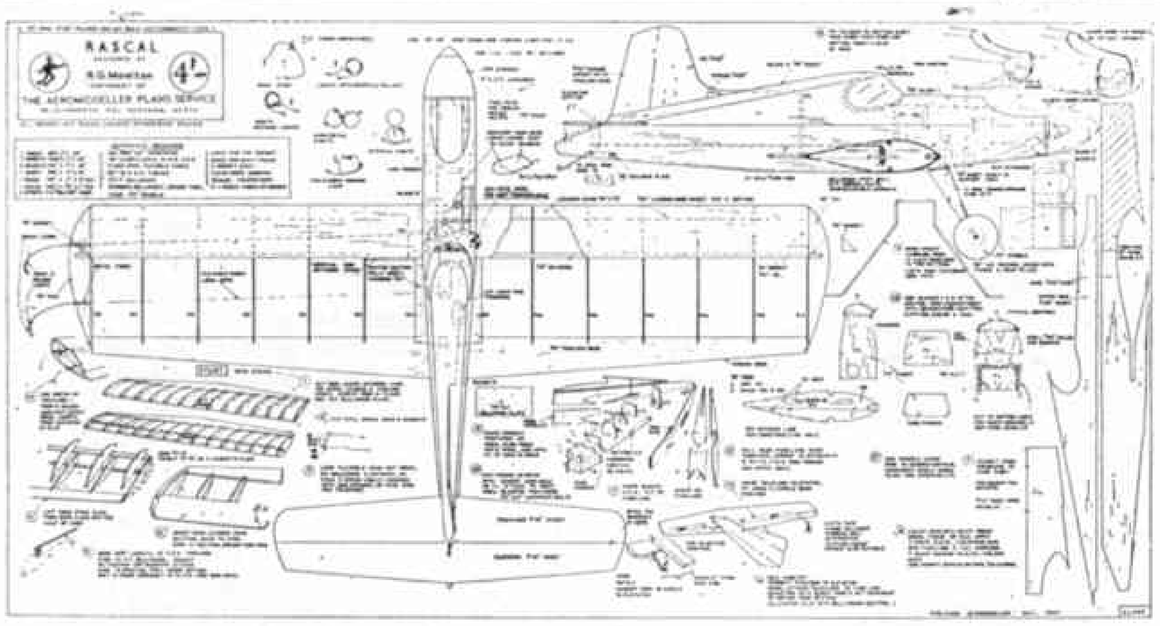

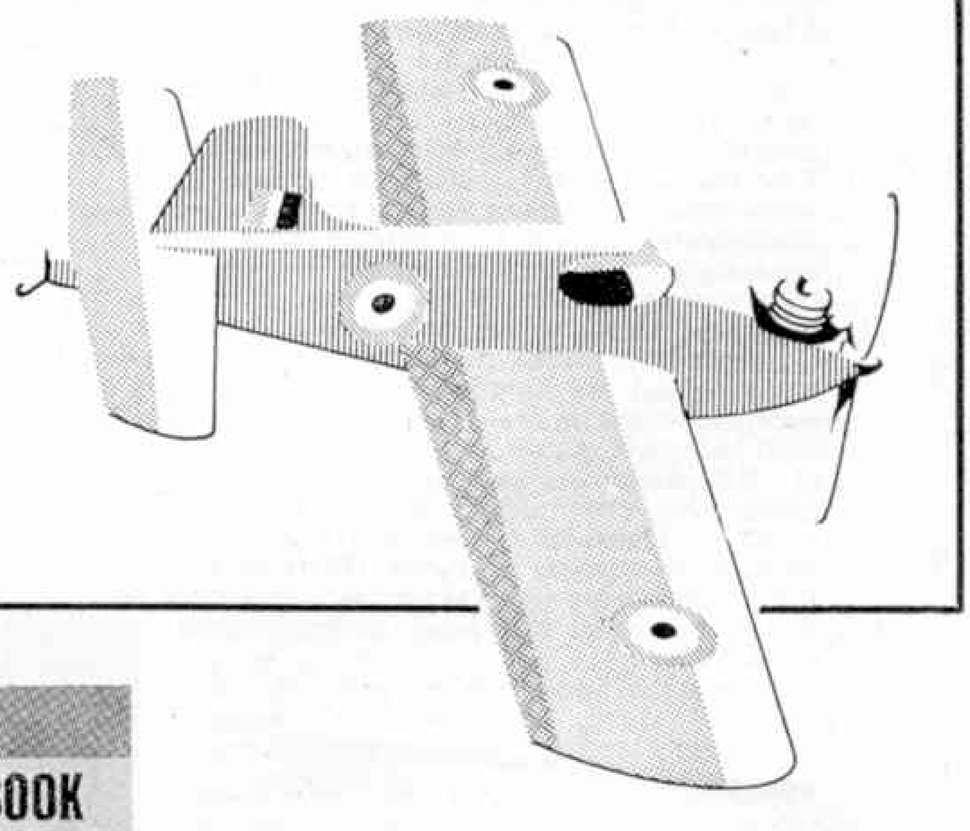

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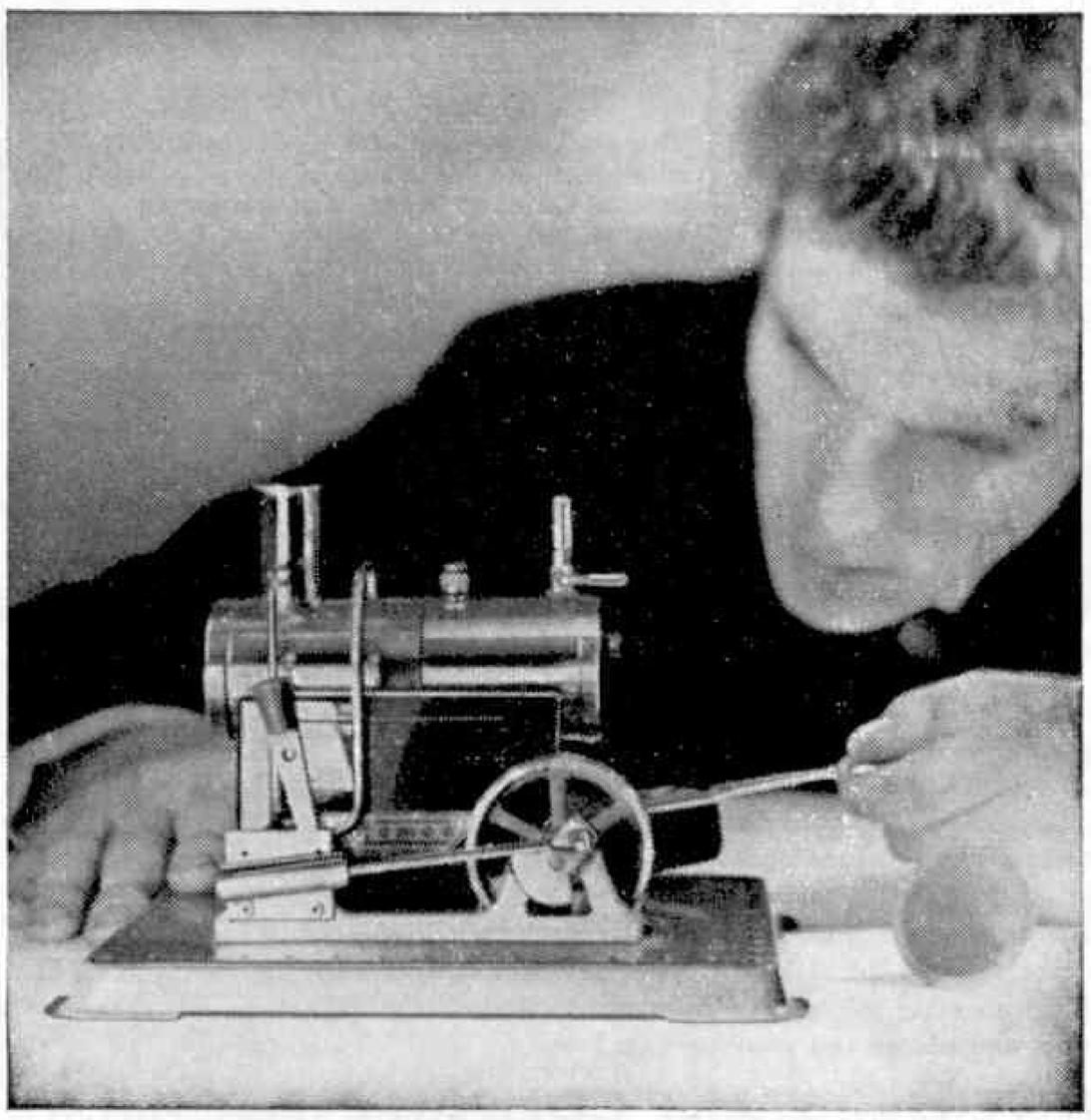

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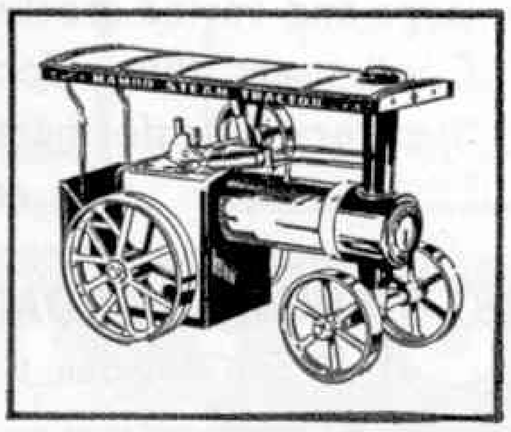

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Wanted. Top prices paid for old Meccano publications, 1901-40's. American, French M.M., catalogues, manuals, parts, outfits Hornby trains ext. Pay cash or exchange surplus items. Write air-mail overseas, all letters answered, any language. Details—Daniels, 12 Leeson House, Haggard Road, Twickenham, Middx. EF

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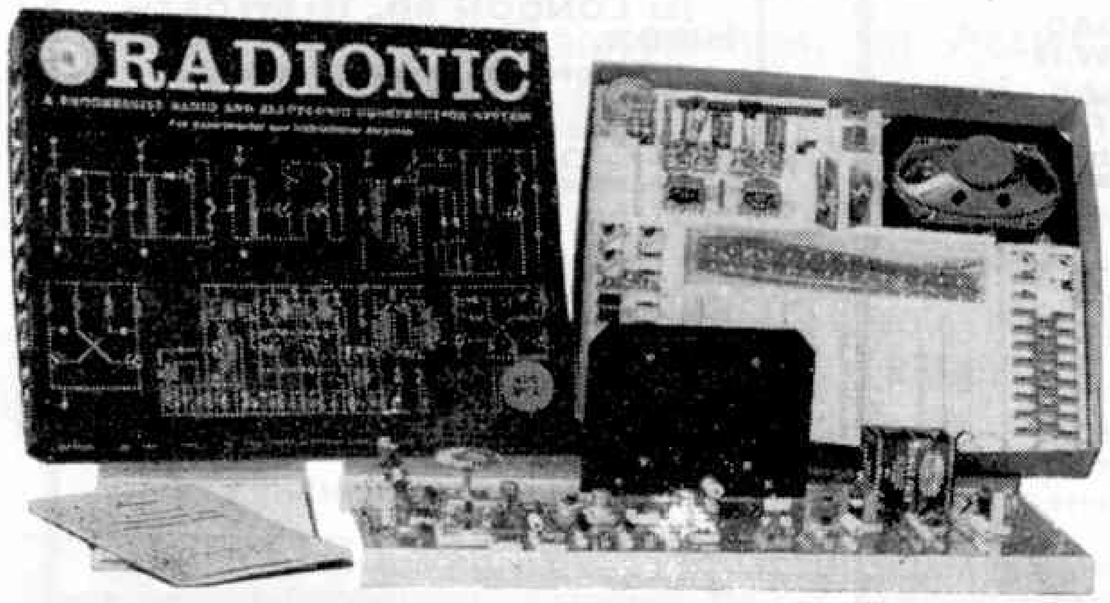

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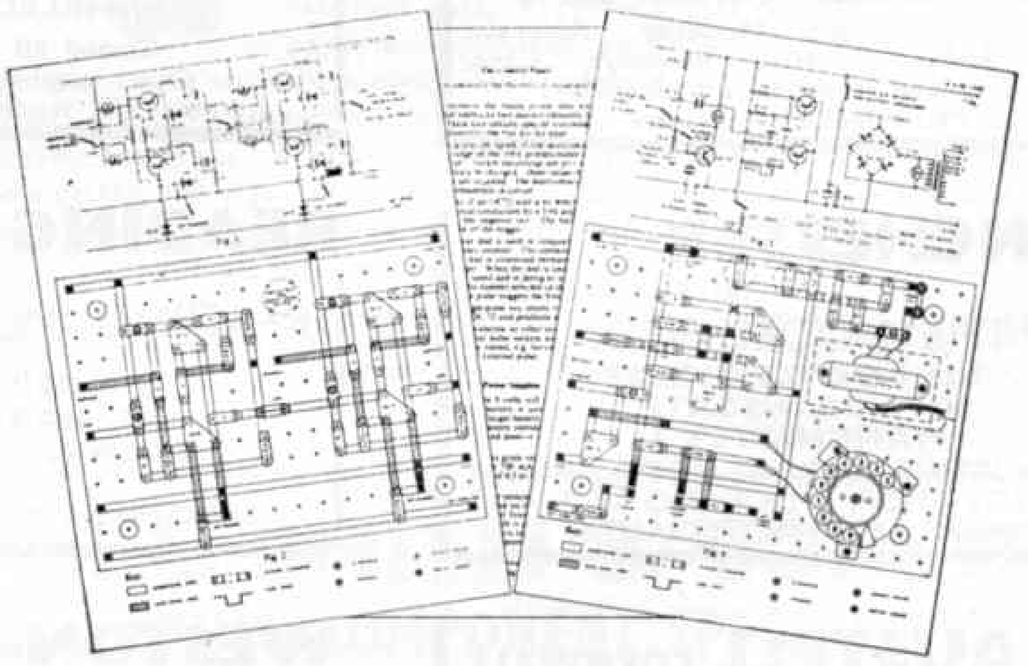

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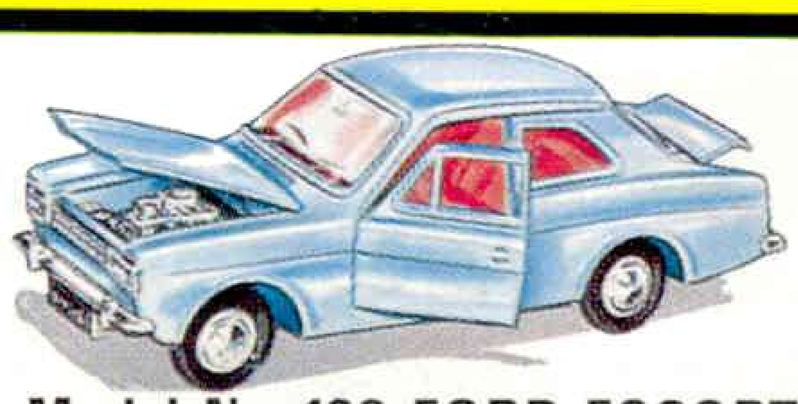

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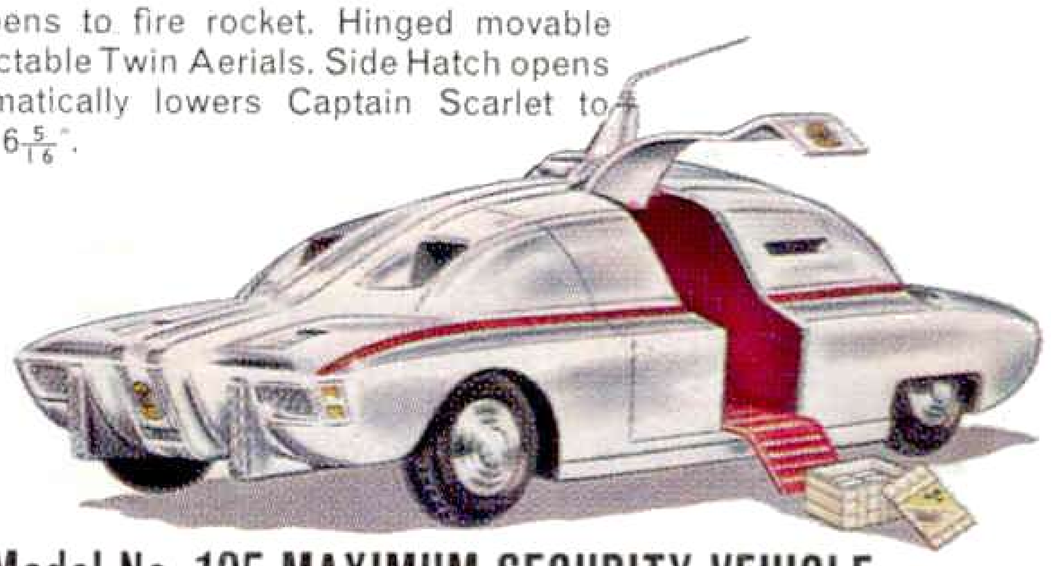

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