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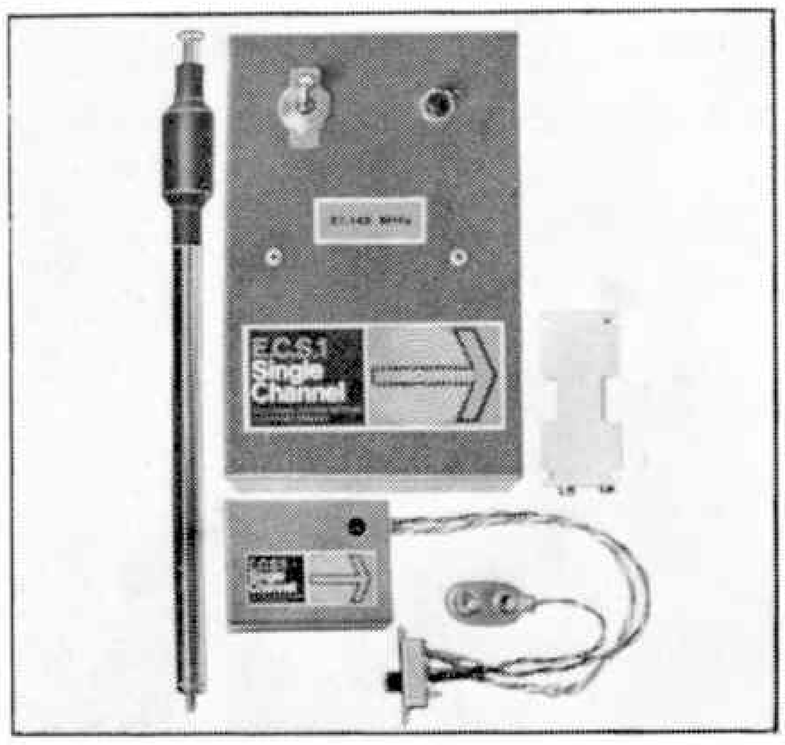

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OCTOBER 1969 VOLUME 54 NUMBER 10

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MAP **HOBBY MAGAZINE**

FRONT COVER

Twenty-four hours a day, 365 days a year: year after year after year, the crews and vessels of the Royal National Lifeboat Institute are always on call.

A calm sea and a sunny sky greet the crew of the R.N.L.B. *Mary Pullman*, the 37 ft. Orkney Lifeboat which forms our cover picture for this issue. Unfortunately perfect conditions are the exception rather than the rule and every year the Lifeboats scattered around our shores are launched into stormy seas, often at night to rescue human beings in distress. On page 502 in this issue popular contributor, W. H. Owens, describes the man and equipment that make the R.N.L.I. the efficient life saving force that it is.

Cover photograph by courtesy of the Royal National Lifeboat Institution.

NEXT MONTH

An article by Mrs. E. Harper forms the main feature of the issue and describes how lighthouses came into being and covers their development through the years. To tie in with the lighthouse theme, "Great Engineers" traces the life and work of John Smeaton, possibly the most famous lighthouse design and constructional engineer to date.

On a slightly lighter side, contributor, C. Redford, shows readers how to construct a simple working model of a lighthouse from a washing-up liquid bottle (a useful extra for followers of our Radio 4-2 feature, building the model boat "Corker").

All the regulars such as Air News, Battle, Among The Model Builders, Transport Topics, Stamps and *Meccano* features etc, are with us as usual.

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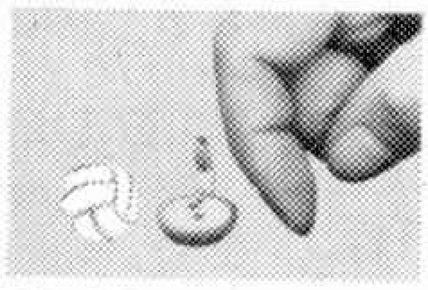

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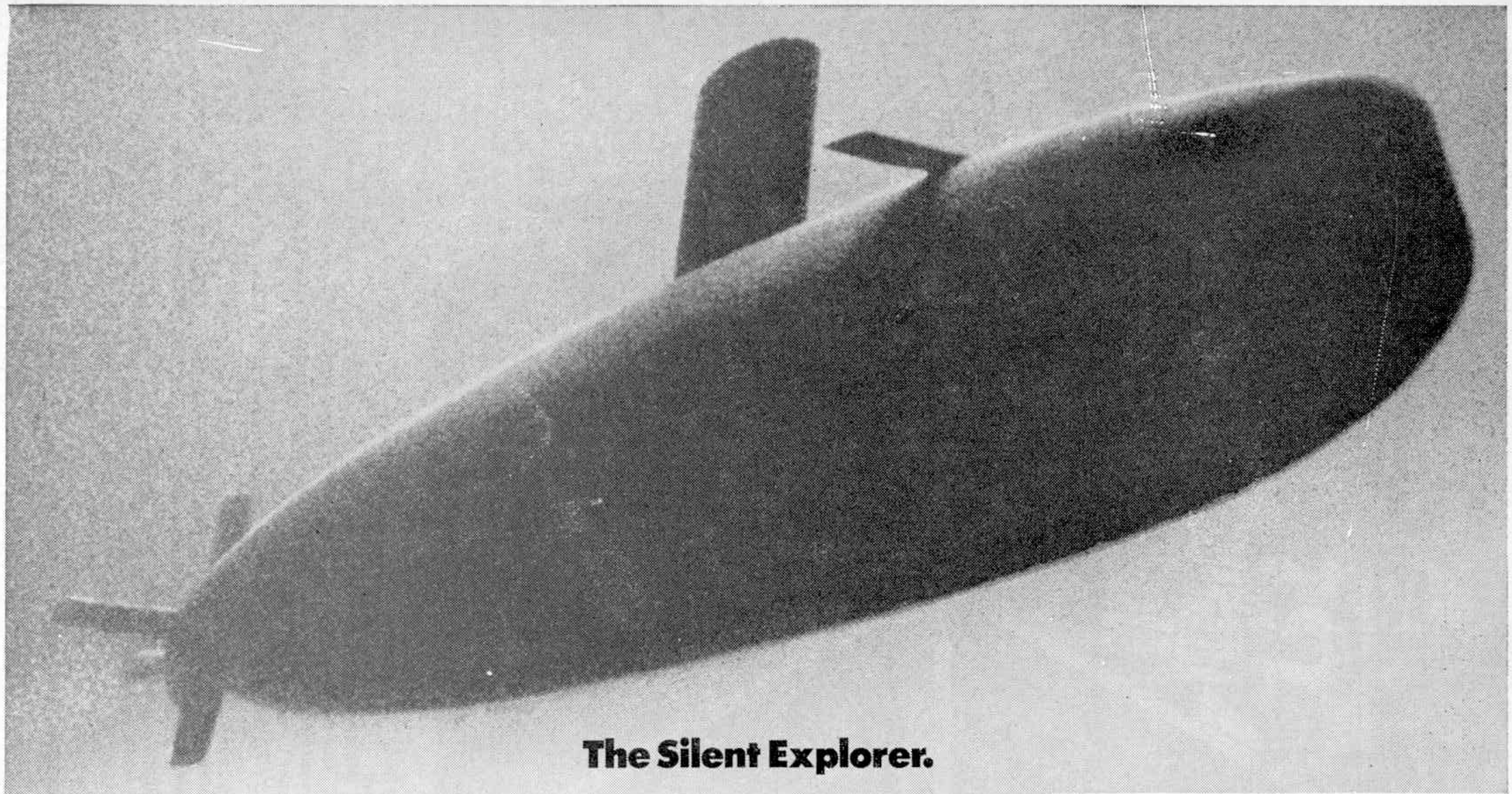

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Some time ago the Royal Navy's nuclear-powered submarine H.M.S. Valiant submerged in the Malacca Straits off the Malay Peninsula – and was not seen again until she re-appeared one month later off Northern Ireland.

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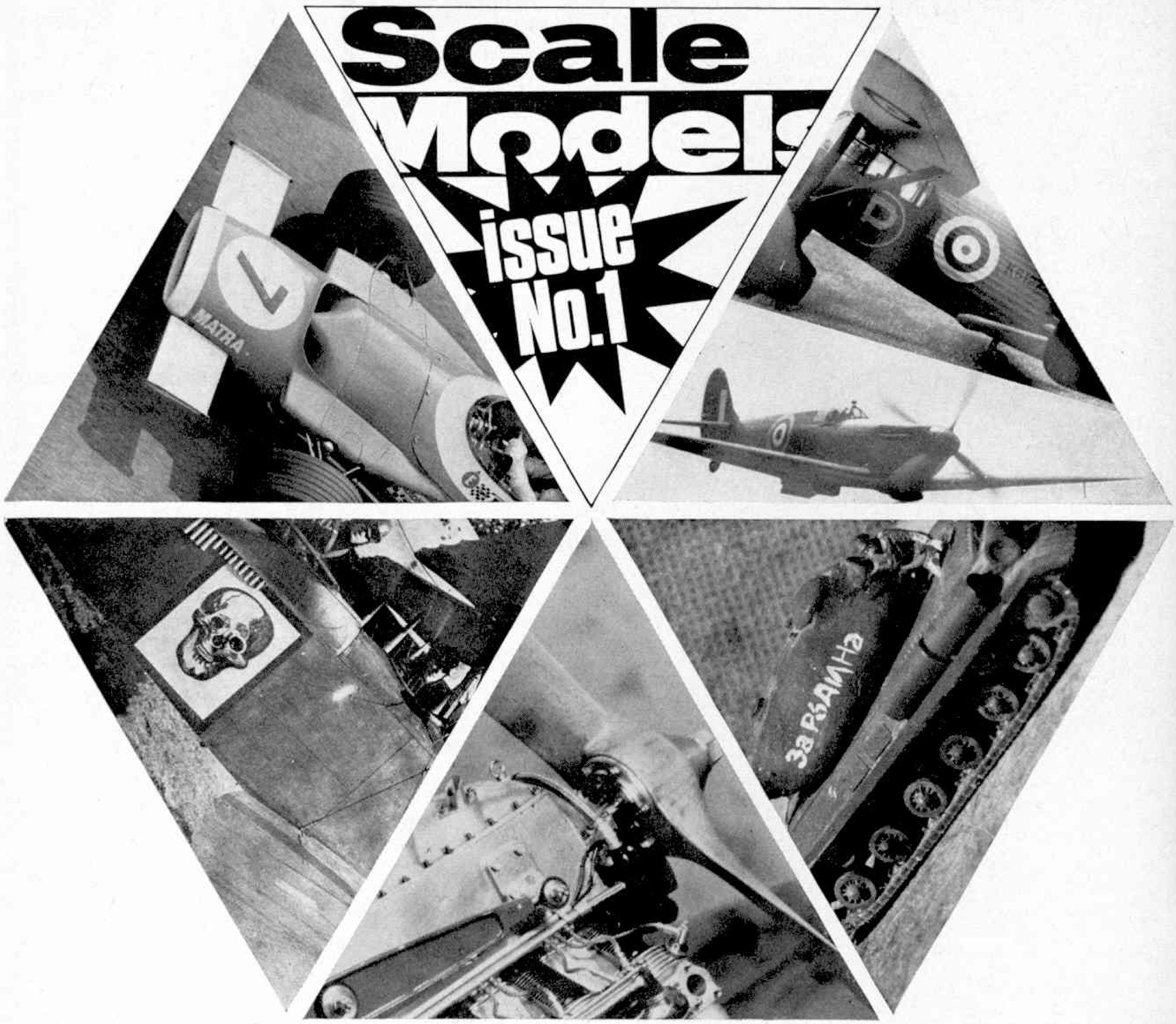

First issue of this entirely new modelling magazine, specially created to meet the demands of everyone interested in Scale Models will be on sale from September 12th, price 3/-. Never before has any hobby magazine received so enthusiastic a welcome. Response to a sample issue and questionnaire has provided the perfect blend of features to satisfy the most ardent enthusiasts. A small taste of what we have to offer is seen above. What we cannot show are the superbly detailed scale drawings, each a specific request, executed to the highest standards with full colouring data, interior information and photo details.

Highlights of issue number 1 include a special review of the Battle of Britain Spitfire Mk I and Mk II, also for aircraft fans, the " Twin Lizzy ", a kit conversion plus other Lysander data, and a radio controlled model. The famous Matra-Ford MS 80 racer to 1/24 scale with copious line and tone detail illustrations will aid car fans while for the nautically minded reader, plans for a Coaster and a historic "Cog" offering tempting modelling subjects. Remarkable figure mouldings, World War I and II from Napoleonic, Soviet tank markings, a 1/5 scale *working* air-cooled V-8 Argus engine, Plastic Kit news, Book Reviews and Tech Topics are but part of a pot-pourri to whet the scale appetite.

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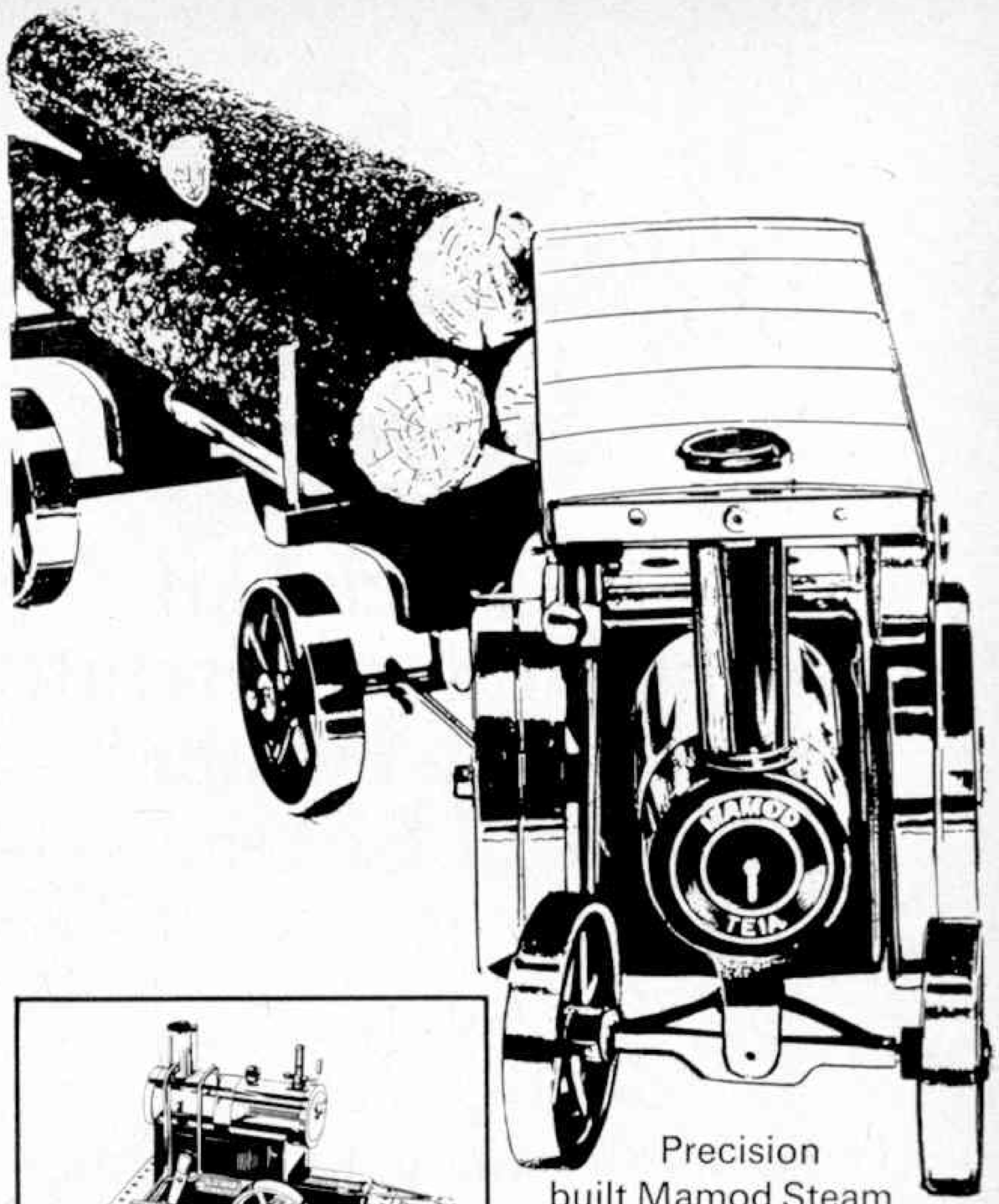

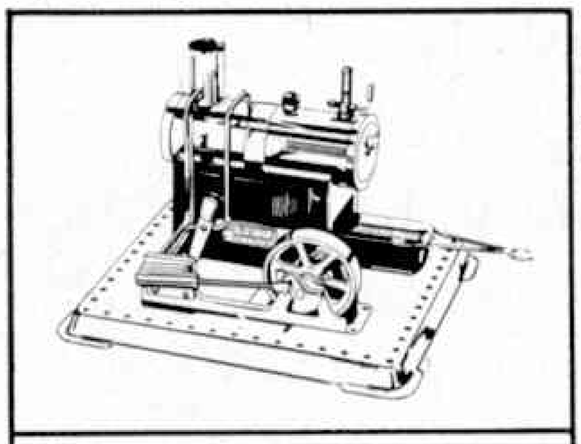

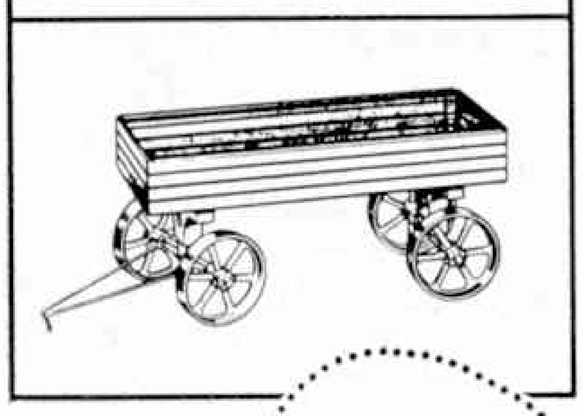

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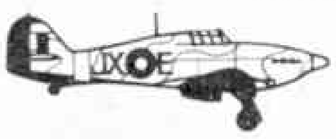

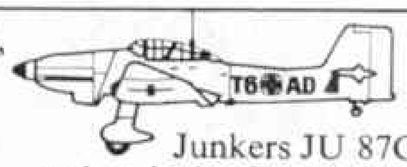

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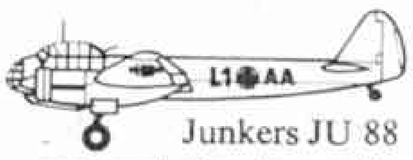

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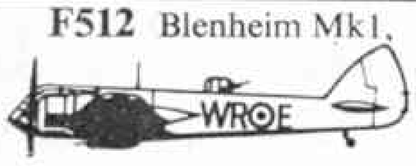

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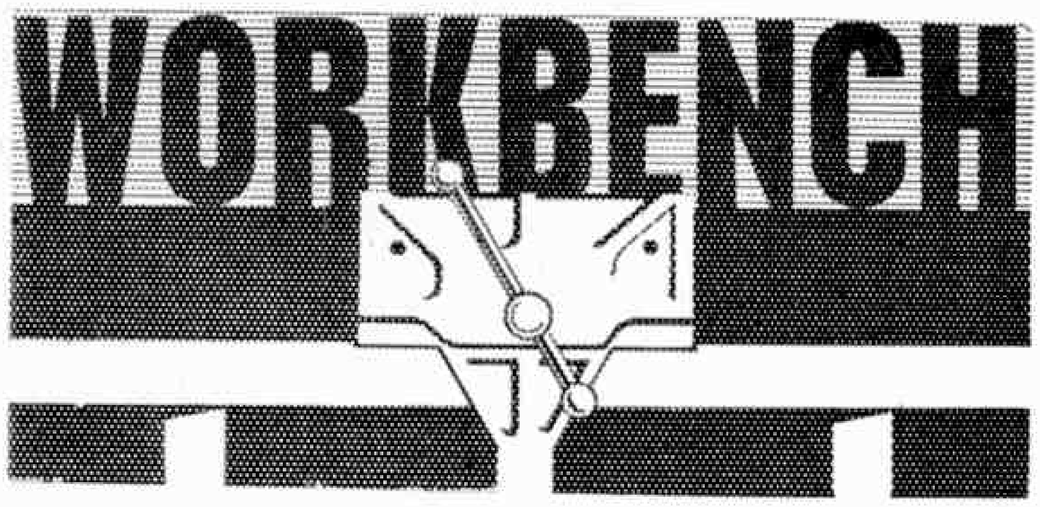


Photography Competition

It would seem that my plea for photographs for Group II entries for our competition has at last paid off, and the winner of this month's group is reproduced opposite.

Taken on Brecon Beacons by 15 year old Heith Pittman, it shows a young walker studying his map before continuing his travels down the hill. The points our judges liked in this particular entry were simplicity and naturalness, which brings home successfully the point that a photograph needn't necessarily be packed with detail to be a winner.

Second prize in Group II goes to Master L. Wadden for his photograph of a small sailing dinghy taken on the Norfolk Broads.

In Group I, first prize of £2 2s. goes to Mr. S. Chapman of Minehead, Somerset for his study of a Woodpecker taken at Stourbridge. Second prize of 10/6d. was awarded to J. Stewart of Rickmansworth for his photograph of young trees on National Trust Property on Dartmoor.

Readers are reminded that the Photographic Competition closes on the 29th August, and no further entries can be accepted after that date.

S.P.A.C.E.

Stanley Kent of Wolverhampton wrote us a long letter recently describing a society he is forming with some friends for children of 10 years upwards.

The purpose of S.P.A.C.E. (the letters stand for Space Project and Celestial Exploration) is to take an interest in the training of Astronauts and the equipment they use. Stanley and his friends have already built 1/3 full size models of " Charlie Brown " and " Snoopy ", and are at present engaged in producing a magazine on Space Projects called " Orbit ".

Not many boys still at school can say that they have built a full size car. Well these boys pictured above can. Their creation, in the picture, is a Beach Buggy based on a 1953 Volkswagen with cable brakes and a crash gear box. I bet they can't wait to get it on a track.

Young readers interested in getting together to share a common interest are invited to write for further details to: Stanley Kent, 503 Bushbury Avenue, Wolverhampton, Staffs.

COMPETITION WINNER

The simplicity and naturalness of this photograph is what caught the judges' eye. Winner of the Outdoor Activity Group, the picture shows a young lad contemplating what route to take while walking over the Brecon Beacons.

Supercar !

MR. P. HARRIS, Head of Science and Motor Engineering at Rotherham High School, sent in details and a photograph (opposite) of a car designed and built by pupils of his school. Named " Humble Bug ", this car has been built in a workshop which is no more than a converted pre-fabricated classroom. It even had to be dismantled each time it was moved in or out of the workshop ! Three groups of about fifteen boys worked on its construction since last October.

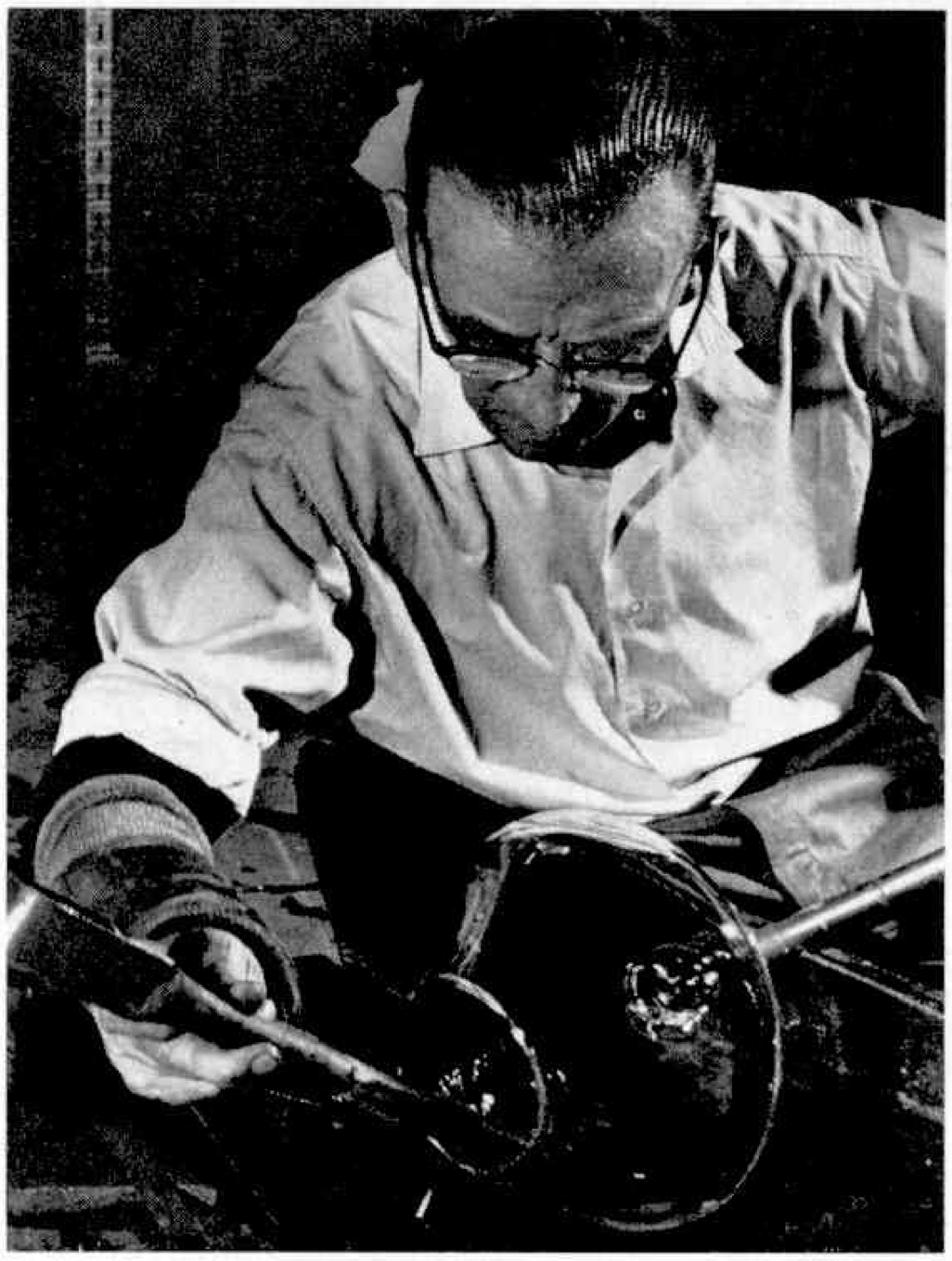
The car is basically a Beach Buggy, a type of vehicle which is gaining in popularity in this country and which is well established in the U.S.A. *Humble Bug* is based on a 1953 Volkswagen which has cable brakes and a crash gearbox. Every single part has been stripped and restored to Concours condition. This chassis was provided by the Volkswagen Owners' Club of Great Britain who also supplied the parts from which the boys built the 1,192 c.c. engine.

The *Humble Bug* has already been displayed at the National Volkswagen Convention in June here, accompanied by its crew of youthful mechanics, it created tremendous interest. It is hoped that it will be present at numerous exhibitions, displays and competition events in the future.

The building of this car is a group project which forms part of a Motor Mechanics course, leading to a Certificate of Secondary Education examination, and apart from further development of this vehicle, the boys aim to design and build a glass fibre sports car body on a similar chassis.

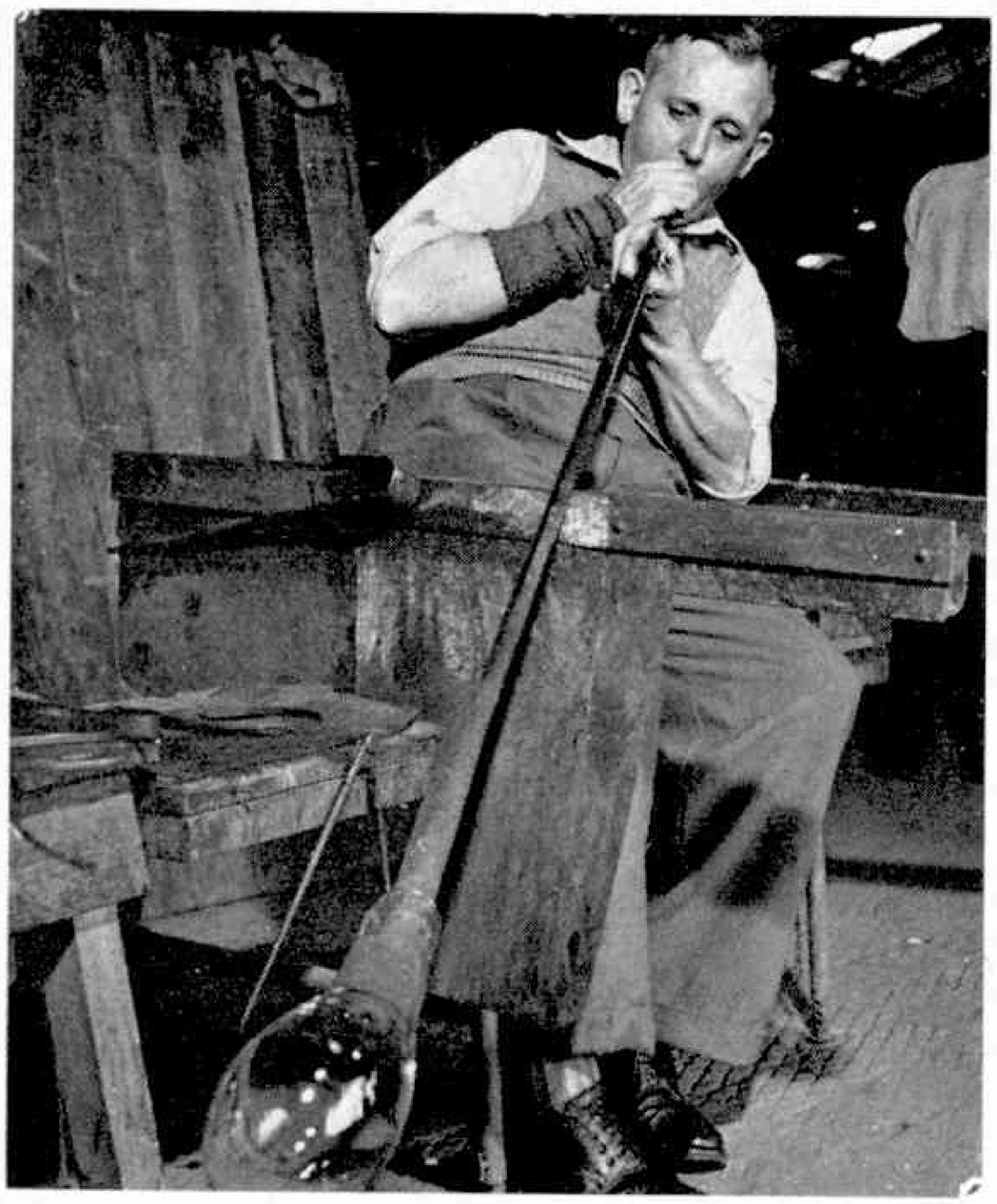
ARTISTS IN GLASS

Trevor Holloway describes the ancient craft of glass blowing and stained glass window making



EXACTLY WHEN glass was first discovered will probably never be known, but in the British Museum is a specimen of Egyptian blue glass in the form of a lion's head bearing hieroglyphics of Nuntef IX, who reigned about 2,400 B.C. So we may assume that glass has been an artist's material for well over 4,000 years.

Glass-blowing is an art which has been practised since Roman times, and one of the few industries which have not been completely dominated by the machine. Actually, it is still carried on in much the same way as that taught us by the Romans.



Even the tools of the skilled glass-blower have changed but little during the passing of the centuries. He still uses primitive-looking tongs and 'shapers', scissors and shears of differing types and, of course, the traditional 'blowing-iron'—a metal tube about 42 inches long and ¾ inch in diameter. The craftsman's rustic chair in which he sits before the furnace is of the type in use a thousand years and more ago.

First, a word about the raw materials. Flint glass, such as is used for the finest types of table and ornamental glass, is made from a skilfully-blended mixture of sand, red lead, potash and saltpetre, together with small quantities of borax and arsenic. To this mixture is added a certain proportion of broken glass (known as 'cullet') which aids the fusing process and makes for a crystal-clear product.

The 'batch', as the raw material is called, is shovelled into great earthenware pots, placed in the furnace and left to 'cook' for about 48 hours.

When the batch has been melted, or 'founded' to the glass-blower's satisfaction, he sits before the furnace in his rustic chair, which has arms sloping downward. He dips the end of his blowing-iron into the molten batch and gathers up a 'blob' of liquid glass in much the same way as we would take up a spoonful of treacle.

At this stage the 'blob' is irregular in shape, but the glass-blower proceeds to give it a more balanced form by rolling it to and fro on a polished steel plate.

Now comes the moment for the glass-blower to demonstrate his skill. Raising the mouthpiece of the blowing-iron to his lips, he exhales sharply and the air from his lungs travels down the stem of the blowing-iron into the heart of the glowing mass of molten glass. The intense heat causes the air to expand and a hollow space is formed. The shape of the 'bubble' of glass

the blower can regulate by skilful manipulation of his iron and by the force with which he blows. All the while the craftsman works with smooth, rhythmic movements, and therein lies much of his skill.

If a wine glass is being blown, the bowl is blown first. The foot of the glass is really a small glass ' bubble ' which has been cunningly opened and flattened out into disc form. Molten glass is of such a nature that any two pieces will adhere naturally, so the stem and the foot of the glass can be added after the bowl has been fashioned.

Up to this stage, the bowl of the glass is still attached to the end of the blowing-iron, but by merely touching it at the appropriate spot with a cold implement, the glass-blower easily detaches it. After holding the rim of the bowl for a short while in the mouth of the fusing-pot to soften, he deftly trims the edge with a pair of shears. An assistant then carries the finished glass away with the aid of a forked stick and places it in the annealing oven where it must be allowed to cool off very slowly.

Glass-blowers often work in teams of four or five around a circular furnace, whose white-hot glowing eye is all that is visible of the great heat within. The master craftsman is still known as the Gaffer. His next assistant is the Gatherer, who is helped by the Servitor and he, in turn, is looked after by the Boy. It may take anything up to ten years to acquire the skill demanded of a Gaffer.

Whether he is making artistic table glass, laboratory or scientific vessels, the glass-blower takes immense pride in his work. Many of our present-day craftsmen come from families who have been masters of the craft for generations past. There is great satisfaction to be had from taking crude raw materials and transforming them into things of delicate form and lasting beauty.

Stained Glass Windows

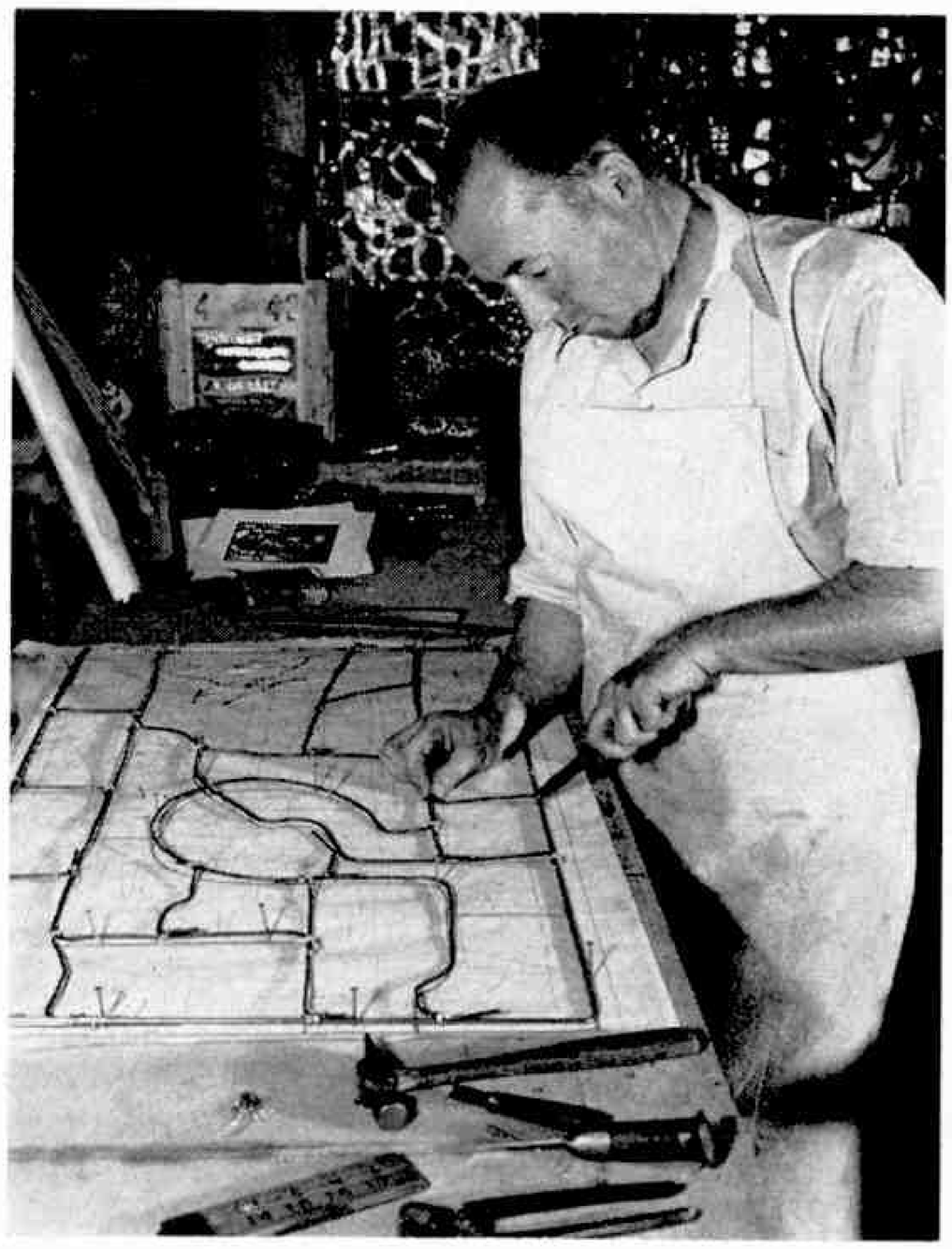
When admiring some fine example of stained glass work, have you ever wondered how such artistic windows are made and who were the early pioneers of this highly-skilled craft ?

The term ' stained glass,' often applied to present-day coloured windows, is not strictly correct because for past centuries both ' stained ' and ' painted ' glass have been used. Although the two techniques are quite distinct, a combination of both methods makes for a window of greater beauty and detail at less cost than would be the case if only stained glass was used.

Stained glass is glass that receives its colour ' in the pot,' as they say in the trade. In painted glass, on the other hand, the colour is not *in* the glass but *upon* it, firmly fused into the surface by the heat of the kiln.

It is interesting to note that the first we hear of an artist in glass concerns a craftsman named Edward, who was appointed Master Glazier at Windsor Castle in the year 1242. A document of the period records the rate of wages paid to craftsmen engaged in the making of coloured windows: " Those who work on the drawing of images, one shilling per day; for cutting and joining the glass 7 pence per day; to glazier boys (for grinding colour), 4 pence per day."

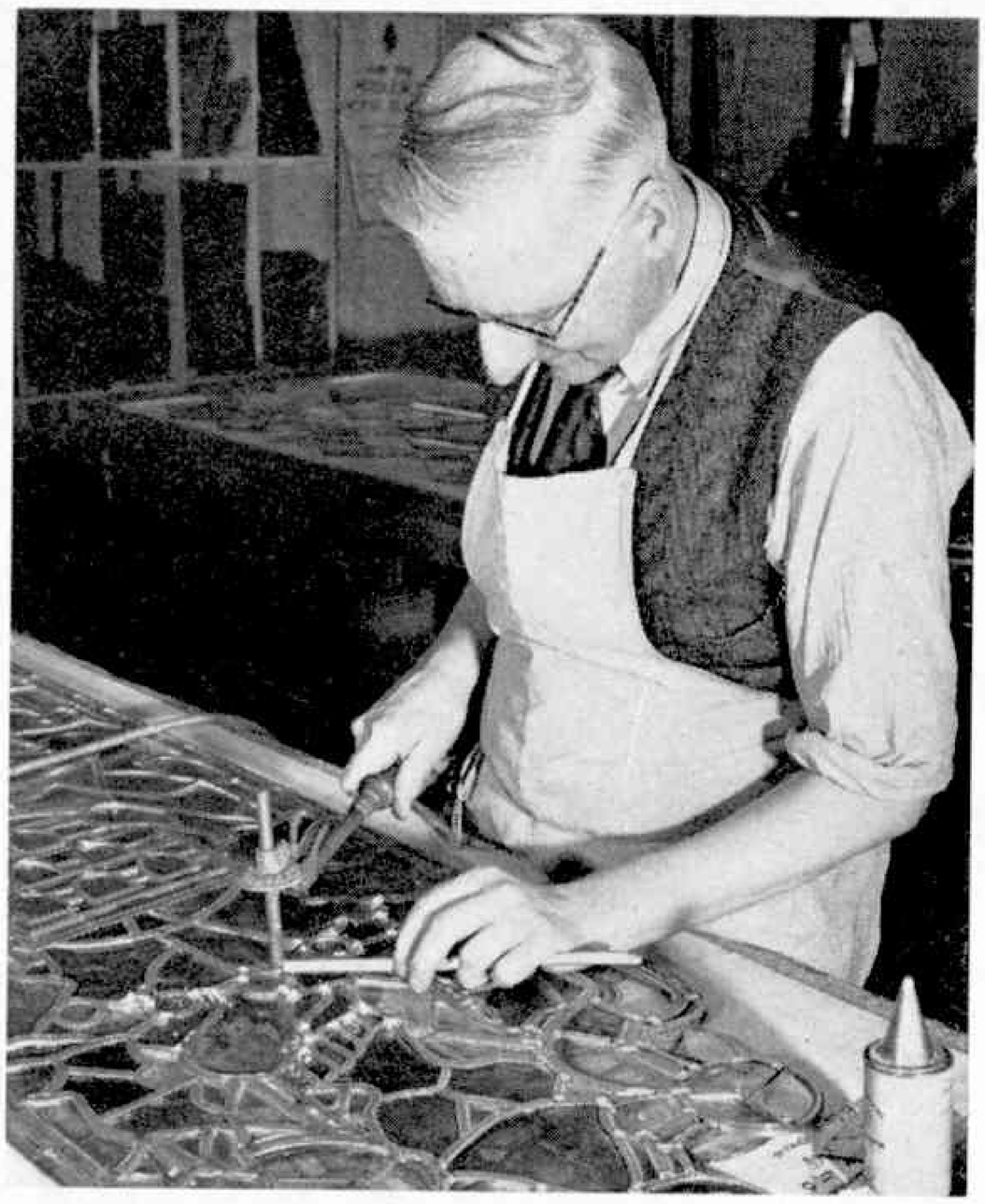
Let us suppose a church has decided to erect a coloured window in memory of some respected member of the congregation. The artist employed by the firm undertaking the work will first prepare and submit a small-scale water colour of the proposed window. If the design is approved, a full-scale copy is made in



monochrome (one colour). This cartoon, as it is called, is really a complete map, so to speak, indicating all the essential features of the design.

The cartoon is then passed on to the glass cutter. He places it down, fully opened flat, upon his bench,

Our heading photo shows a master glass-blower putting the finishing touches to a large bowl. Left: Forming the initial shape of a vase. Above: Strengthening wires are attached to give the work rigidity. Right: Lead strips are inserted between the glass to keep the pieces in place.



Left: Soldering the lead joints of the window after glazing. Below left: the work is temporarily assembled on a sheet of glass, and then an artist paints in the detail. Below: the glass cutter traces the design on a sheet of transparent linen, and then cuts the glass to the shape indicated

and then covers it with a sheet of transparent linen. Using a brush dipped in a special ink, he proceeds with infinite care to trace the lines of the cartoon beneath, which are visible through the linen. The lines he traces will indicate the various shapes the respective pieces of glass shall take, as well as the positions of the lead strips required to hold the sections of glass together. It will be appreciated that the slightest inaccuracy at this stage would cause grave complications later when the hundreds of pieces of 'jig-saw in glass' are ready for assembling. The sheet of traced linen is known as the 'cutline.'

The monochrome cartoon is now removed, leaving only the cutline on the bench. With the original small-scale water colour beside him, the glass cutter begins the delicate job of selecting appropriately coloured pieces of glass, cutting each piece to shape as indicated by the cutline. For a large window, many thousands of pieces of glass may have to be cut.

The work now passes to the glass painter, an artist of great skill. First he lays the cutline on his bench, then over it lays a framed easel of plain white glass. Slowly he builds the giant jig-saw together, following the lines of the cutline underneath the sheet of plain glass.

This done, the artist fixes each and every piece of shaped glass firmly to the sheet of plain glass by means of heated wax. This means that the easel and the pieces of coloured glass sticking to it can be raised into an upright position, thus enabling the artist to set to work painting in the details of the design.

When the painting is completed, the easel is laid flat once more and the pieces of glass are removed and placed in shallow trays. These trays of coloured glass pieces are then placed in an electric kiln where the heat causes the paint to fuse permanently with the glass.

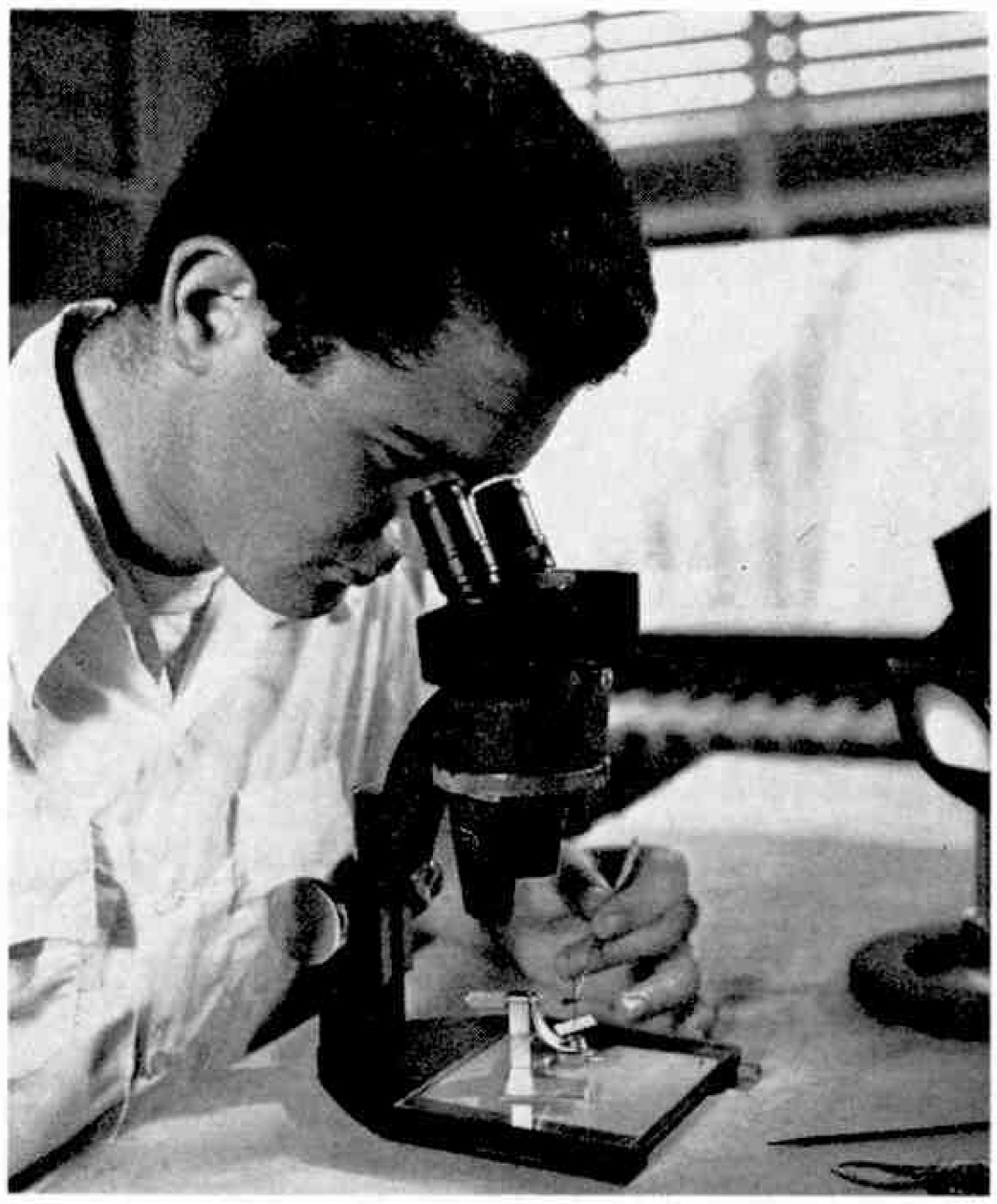
From the kiln, the work passes to the glazier. With the all-important cutline laid flat on his bench, he takes up each piece of coloured glass and places it in its exact position. Then, with a strip of lead grooved on each side, he fits all the pieces together, soldering all joints to keep them intact.

Finally, to make the work thoroughly sound, wind and weatherproof he works into all crevices of the lead and glass a special composition which, when it hardens, stiffens the work and makes it permanent for centuries to come.

It is interesting to note that the colours in a window never fade, but grow richer and more sparkling with the passing of time. This is partly due to the fact that with age the glass becomes corroded by various deposits from the lead, iron and stonework in which it is set, as well as by growths of minute lichens. Curiously enough, instead of dulling the glass, these deposits give it a greater beauty.

CHAMPION INSECT MODELLER

by Michael Lorant



CARL GAGE, a bright young man of Los Angeles, California, is excelling in a highly unusual pastime —" insect-modelling."

It began as a hobby when Carl made a large model of a house fly and another one of a locust for some experimental work in their chemistry class. He became curious, trying to find out the exact scientific names of these insects. He carefully wrapped up the models and called on Dr. Fred S. Truxal, famous entomologist of the Los Angeles County Museum. The scientist was so impressed by the high skill of Gage as well as the authenticity of the models that he commissioned him to create some additional insect models for the Museum's

collection. Dr. Truxal handed over to Carl a black ant and a termite to be modelled as ' test assignment ' at a price of fifty dollars a piece.

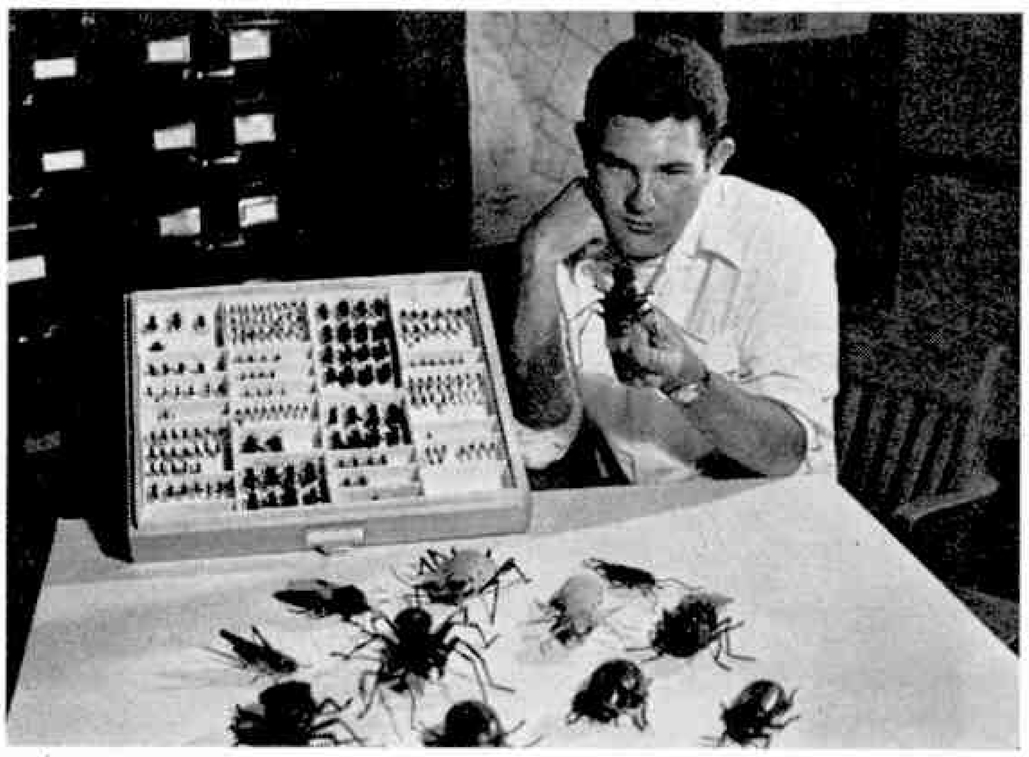
The young man returned to his kitchen workshop, collected his selected tools and instruments, book and scale drawings and started to ' design ' and ' create ' insects. When he completed all the necessary engineering work and applied the ' finishing touch ' to his creations, the Museum scientist gave a contract to him to make 35 models of various household and garden pests. For this assignment the modeller has received 550 dollars; also has been provided all the necessary materials.

This was the beginning of the career of the ' greatest insect model engineer ' in modern history. From then on, Carl Gage had a highly profitable hobby on his hands. Since completing his first assignment, research entomologists, school masters, etc., offered Carl new contracts that will keep him busy for a long time to come.

Carl Gage uses paper templates in his work and a spray gun to mark the main body of an insect model. The body is partially carved out of a balsa-wood block, the wings are made from plastics. In addition, he uses bits of wire, pieces of various woods, etc. One of his principal tools is an *electric grinder*. He also utilises a microscope to compare his models with actual insect specimens. (Some of his models are well over two hundred times the normal size of the insect portrayed.)

For the ' finishing touch,' Gage uses water-soluble paints, applying them to his ' insects ' with a delicate camel-hair brush.

It takes about one-and-a-half days to complete the model of an insect, apart from the careful research work and the job of ' experimental comparison ' with the original creature.

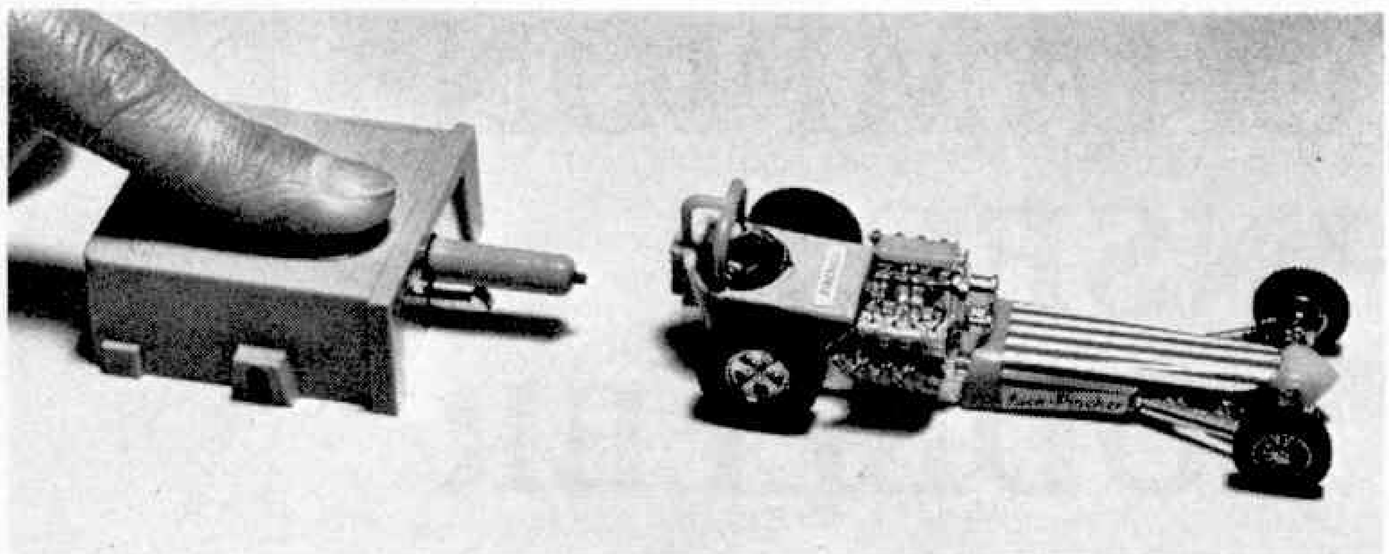


Above right: A microscope is used to discover intricate details of the insects. Above: Putting the finishing touches to an insect. Right: A display of some of Carl's models.

✱ SAM'S CAR!

✱ DRAGSTER!

✱ FORD CAPRI!



Chris Jelley describes these three brand new Dinky Toys in . . .

DINKY TOY NEWS

DINKY TOYS are really back in the new release game with a vengeance! Only last month I commented on the recent trickle of new releases from Liverpool, to find that this month Meccano Limited have passed all expectations and introduced not one, not two, but THREE brand new—I might say *revolutionary* new—and tremendously exciting Dinkys: Dinkys that wouldn't fail to score top marks if points were to be awarded for the best models on the market!

These revolutionary models—a *motorised* futuristic saloon car straight from the television puppet series, "Joe 90," a dragster which comes complete with a spring-start propulsion unit, and a beautiful reproduction of the sensational Ford Capri! Three models, not one of which can be claimed to be better than the others. They are all equally as good as each other, having, as they do, their own individual features to recommend them. One thing is certain, though—they are all winners! Look at Sam's Car, Sales No. 108, for example. Not only does this appeal because it is a true reproduction of another exotic space-age vehicle in T.V.'s "Joe 90" and a companion model to Dinky's existing and highly successful Joe's Car, but also because it revolutionises small-scale die-cast modelling by incorporating—believe it or not—a powerful motor!

Hold it! I can almost hear the groans of serious collectors thinking that Meccano have actually sunk to putting friction (push-and-go) motors into Dinky Toys. Relax. The motor isn't friction-operated at all. It's a marvellous *clockwork* unit which has the added attraction of being absolutely self-contained—keyless, in fact. It's wound by simply backing up the model, and only a very short distance is required to wind the motor fully. Mind you, this doesn't mean that the model will only run forward a short distance as well. On the contrary, it runs far and, I might add, plenty fast enough, too, thanks to a special free-wheel device, built into the motor, which allows the car to run on once the motor has unwound. It is easy to tell when the motor is fully wound, by the way, as the model becomes difficult to reverse further. As soon as this happens, stop. The model must never be forced back past this point, otherwise the motor spring might break and ruin your model.

I am not ashamed to admit that Sam's Car has captivated me, and everybody else on Meccano Magazine who has seen it. The motor is its main feature, of course, but the model itself appeals from a visual aspect alone, with its sleek, futuristic shape and its striking *plated* finish. Yes, plated. The model is not painted at all, except for a small red grille on the back, and red headlamp nacelles at the front. Instead, it is plated in a bright, shining silver colour which contrasts well with a black baseplate and pale yellow interior moulding. Windows are of course fitted as standard and serve to add a finishing touch to a great Dinky.

INCH-PINCHER

Equally great, although as ruggedly "chunky" as Sam's Car is sleek, is the Dinky Dragster which comes complete with a spring-loaded starter unit in the Dragster Set, Sales No. 370. The Dragster alone has more than enough to recommend it, but, combined with the starter unit, it becomes one of the best toys ever to have been made by Dinky.

Dragsters, in real-life, are not often standard production items. Kits are available, but owners frequently modify them to suit their own ideas. Many dragsters are completely home-made, in fact, and in the same way, the Dinky Dragster is not an exact reproduction of a full-size machine, but it is made to look like a typical dragster with its long, narrow shape, small front and huge rear wheels, enormous centrally-mounted V-8 engine, open to view, and a helmeted driver in a cramped little cockpit perched right at the back of the body. The cockpit, itself, is fitted with a windscreen while the driver is protected by a removable anti-roll bar.

Another particularly interesting feature is the large rear tyres, twice as wide as normal tyres and specially produced without tread for extra grip. From words in the moulding, each of these is identified as a "Super Sprint" which is particularly apt in this case as the model sports Dinky's latest high-speed feature, Speedwheels. Finish is as varied as on a real dragster. The chassis and engine are plated, except for the latter's twin banks of four chopped-off exhaust pipes which are gold in colour. The rear section of the body behind

the engine is a fluorescent red, while the anti-roll bar and long forward section of the body is yellow, although the latter is almost entirely covered by a red and white striped label including the typical dragster-type title " Inch-Pincher " in black lettering (a name chosen by Meccano's New Projects Manager). The further identification " Fireball " in red is carried on each side of the chassis beneath the engine and across the rear section of the body in front of the windscreen.

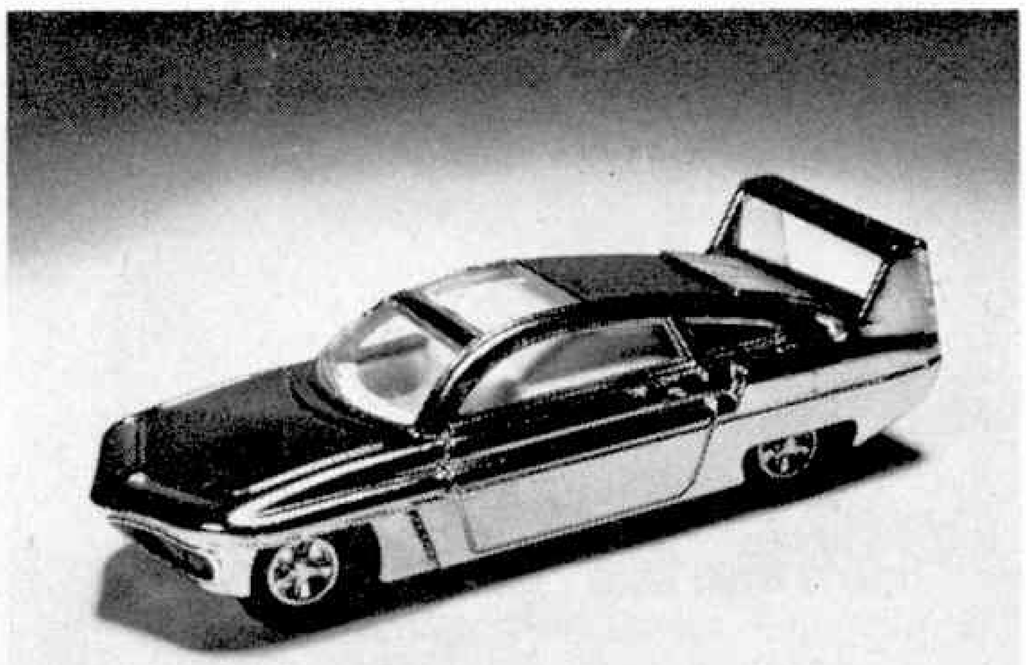
Right in the centre of the back of the Dragster is a circular hole. This isn't an extra exhaust pipe, but is, in fact, the location point for the starter unit, consisting of a small box from which projects a spring-loaded plunger running on a thin steel rod. To operate, the rod is located in the hole in the back of the Dragster, and the Dragster pushed back, forcing the plunger into the starter until a cam on the model engages with a catch on the starter to hold the two together. When a little button on the top of the starter unit is pressed—WHOOSH—away shoots the Dragster ! The fun you can have is fantastic !

BEAUTY ON WHEELS

Last, but by no means least, this month we have a model of one of the most attractive real-life cars on our roads: the beautiful Ford Capri, introduced for the first time earlier this year by the Ford Motor Company of Britain.

" The beautiful Ford Capri " I called it, and I do think it is beautiful. Externally, its utterly distinctive fastback lines are quite outstanding and, inside, it is amazingly comfortable and very tastefully " laid out " with many features it would be reasonable to expect only in a considerably more expensive " quality " car. It is available, believe it or not, in 26 basic versions, this number resulting from variations on six standard cars ranging from the Capri 1300, through 1600 and 2000 GT versions to the powerful 3000, both the 1300's and 1600's also being available in GT form. Space prohibits me from giving technical details of all these versions here, but I would like to mention the 1600 GT which I have driven. This is powered by a 4-cylinder in-line engine of 1599 c.c. capacity which develops a power output of 93 BHP at 5,400 r.p.m. to give the car a top speed of 100 m.p.h.

When I drove the 1600 GT at a pre-release press show at Ford's Halewood plant, I was tremendously



impressed by the general performance of the car, its road-holding and the control it allows, as well as its comfortable driving position—and the fact that it will accelerate from 0-60 m.p.h. in 12 seconds ! You know you've got some power to play with when a car will do that !

Ford's selling slogan for the Capri is, " The car you always promised yourself " and this simple sentence applies just as much to the new Dinky Toy. If anything, it applies even more to the Dinky, the model being a lot cheaper than the real thing ! It's a beautiful little car, reproducing all the lines of the original and including such action features as Speedwheels for performance, opening doors and tipping backs to the front seats. Other features present are jewelled head-lamps, windows, steering wheel, full interior fittings and, naturally, new style-number plates. Perhaps the most striking thing about the model, however, is its colour finish. This is a brand new and unashamed metallic purple gloss with plated baseplate, bumpers, radiator grille and front side-window frames.

You might think that purple is going a bit too far and I would have agreed with you if I hadn't seen the model. I have seen it, though, and I think the colour is nothing short of gorgeous, especially when viewed against the colour of the interior moulding—subdued orange ! It might *sound* horribly garish, but I can tell you it *looks* marvellous, so watch out for Dinky Toy No. 165 Ford Capri—you won't be able to resist it !

Our heading photograph shows the Dinky Dragster with its starter unit contained in No. 370 Dragster Set. Just a touch on the button and " Inch-Pincher " hurtles off down the track. Above right: Straight from television's " Joe 90 ", Dinky Toy No. 108—Sam's Car. Right: Three models of the beautiful Ford Capri—Dinky Toy No. 165.

AIR NEWS

John W. R. Taylor talks about . . .

Short's new Skyvans Beriev's Mini-Liner Supersonic helicopters

Shorts and shirts go by Short's Mini-Jumbo

THERE IS so little water on St Croix, in the US Virgin Islands, that laundries are non-existent. This caused quite a problem until the island's own airline, Caribbean Air Services, leased a Skyvan freighter from the American distributors of this British-built aircraft.

Now, every morning, the pale blue and white Skyvan takes off from St Croix with its cabin packed full of dirty linen. After hopping the 50 miles or so to San Juan in Puerto Rico, it returns with a load of laundered shirts, shorts and smalls.

Caribbean Air Services is one of 18 operators all over the world who have chosen Skyvans for their short-haul services. Powered by two 715 shp AiResearch TPE 331-201 turboprop engines, the Series 3 version of the Skyvan will carry a payload of more than two tons in its box-like 780 cubic ft. cabin. What is more, it can take off in under 375 yards, enabling it to operate into places without proper airfields.

Another satisfied customer is Cherokee Airlines of Los Angeles, which has four Skyvans flying in its war-paint and has taken options on twelve more. Cherokee calls them "Mini-Jumbos", so it may be significant that its recent aerial deliveries have included a baby elephant, as well as a shipment of worms, a plane-full of surf-boards and several loads of day-old chicks, 30,000 at a time.

These may seem strange cargoes for an aeroplane to carry, but the strangest of all must surely be those ferried between the coast of Queensland, Australia, and Keppel Island, one of the off-shore coral islands in the Great Barrier Reef, by Skyvan VH-FSG. On 4½-month lease to Trans-Australia Airlines, it made up to five return trips a day, carrying two tons of hardcore, water and asphalt each time. The water and asphalt went into the laying of a permanent runway on the island; but the Skyvan did not need such facilities, being able to land and take off quite happily on an existing strip of sand and coral.

It's cheaper by air

During 1969, the Russian airline Aeroflot expects to carry 68 million passengers. Eighty new services are being opened, mostly in the vast territories of the Soviet Union itself but others to places as far away as Singapore and Australia.

Some interesting facts and figures were issued recently to show why such emphasis is put on building up this huge network of air routes, which is already four times as long as the total route mileage of Soviet railways.

It costs about £150,000 to build each mile of new railway or road in the plains of central and southern Russia, and nearly ten times as much in the north-eastern and far north of the country. By comparison, the cost of a mile of air route averages only £17,000, including the airports, navigational and radio aids, airport vehicles and other equipment. Also, an air route connecting any two cities is usually 25 per cent shorter than a surface route.

Cherokee Airlines, of Los Angeles, has bought four Short Skyvan light Stol twin-turboprop transports for all-freight services over a network of Southern Californian routes radiating from Los Angeles. The services were instituted with a leased Skyvan, which Cherokee will continue to operate until the end of the year. Three of the company's new aircraft have already been delivered, with the fourth following in September.

Heading photograph shows the Russian Brewer—Be 30 twin engined passenger aircraft. Right: This light blue and white Short Skyvan 3 light Stol transport is now flying capacity payloads of dirty linen from St. Croix, in the US Virgin Islands, to San Juan in Puerto Rico which, unlike St. Croix, has ample water supplies and thus no lack of commercial laundries. On its return flights it carries laundered clothes. The aircraft, leased from Shorts' US distributors, is operated by Caribbean Air Services of St. Croix, which holds inter-island freight contracts from such concerns as Pan American, Eastern Airlines and Emery Air Freight. This aircraft, converted from an Astazou-powered Skyvan 2, replaces an earlier Series 2 with CAS.

The Russian Institute of Civil Aviation reckons that another 1,300 trains would have been needed if the railways had had to carry passengers who travelled by air last year. This would have meant cancelling about 2,000 goods trains at a time when the railways are already finding it difficult to cope with all the freight they are expected to handle.

No less important is that the speed of air travel will save about 70 million working days for Aeroflot passengers this year—an important factor in the nation's economy.

Beriev's Mini-Liner

Visitors to the recent Paris Air Show had their first opportunity to see the Beriev Be-30 airliner, which will soon begin to replace An-2 biplanes on hundreds of Aeroflot's internal services to places where airfields are too small for the An-24. It is a neat little fifteen-seater, powered by two 950 shp Glushenkov turboprops which, together with the big double-slotted wing flaps, enable it to take off in under 300 yards and land in less than 150 yards with a full load.

Georgi Beriev is best known for his flying boats; so the Be-30 came as something of a surprise when it was announced in 1967. Its appearance, and particularly the anhedral on the outer wings, lends support to the suggestion that it owes something to Oleg Antonov's design office. Whether or not this is so, the Be-30 looks a real winner and we can expect to see it operating in hundreds throughout eastern Europe and much of Asia in the years ahead.

Span of the Be-30 is 55 ft. 9¼ in. It is 51 ft. 6 in. long and has a take-off weight of 12,920 lb. It cruises at 285-298 m.p.h. on stage lengths of 370-800 miles and lands at a nice gentle 81 m.p.h.

Moustaches for Mirages

During a fly-past by a Dassault Mirage fighter at the Paris Air Show, everyone was surprised to see a pair of small foreplanes suddenly emerge from its nose. This particular machine is being used for test flying and is known as the Mirage Milan—why is not quite clear, as it was produced under a joint French/Swiss research programme.

Dassault call the foreplanes " moustaches ", which is easier to understand when you look at the photograph on this page. Each consists of a small aerofoil surface, with a fixed leading-edge slat and a fixed trailing-edge slotted flap. This sounds complicated, especially as the " moustaches " also form tiny swing-wings; but they develop considerable lift, reducing take-off and landing runs by 7 to 10 per cent and landing speed by 12 to 15 m.p.h.

In fact, the results have been so promising that French Concorde test pilot André Turcat has lost no time in trying out the Mirage Milan, and we may eventually see " moustaches " on the Concorde.

Are supersonic helicopters possible ?

Lockheed-California Company believe that it will be possible to build supersonic helicopters by the early 1980's. Under a U.S. Naval Air Systems Command contract, they are already testing in a wind tunnel special jet-flap rotors that convert into fixed wings for high-speed cruising flight.

Jet flaps are narrow deflectable " slots " running the entire length of the leading and trailing-edges of the rotor blades. Air is blown out of these slots at 700-800 m.p.h., giving a ten-fold increase in lift during vertical take-off and landing. A helicopter fitted with a jet-flap rotor would take off in the normal way with the rotor spinning. In the air, the rotor would be stopped in such a position that the blades would form a single fixed wing. Conventional jet engines would then be used to increase the aircraft's cruising speed to more than 1,000 m.p.h.

The " conversion " from helicopter to fixed-wing aircraft is much less alarming than it sounds, as the jet flaps would produce more than enough lift to keep the aircraft safely in the air during this period.

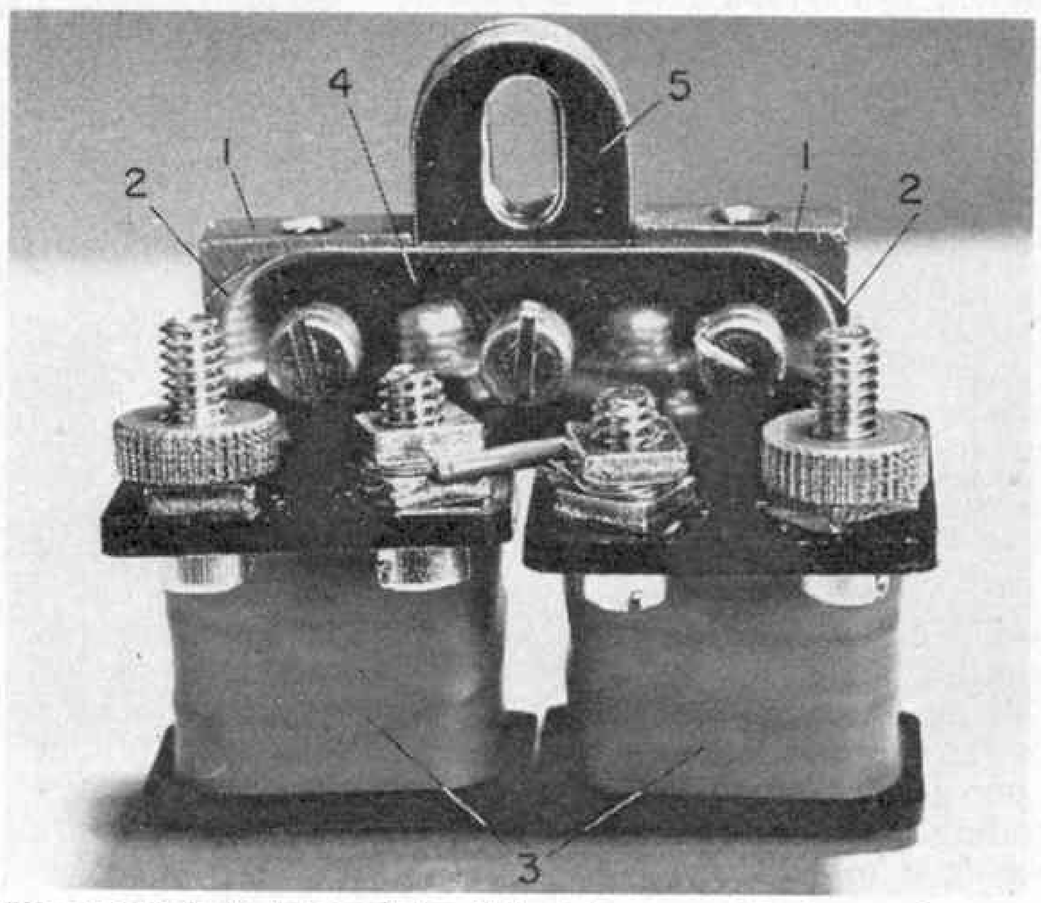
British research is contributing to this exciting programme. In May, NASA asked to borrow the BAC H.126 research aircraft, which was the first aeroplane ever to test a jet-flap in flight. The H.126 has been tested in the full-size wind tunnel at Ames Research Center, Moffett Field, California, where the Lockheed jet-flap rotor is being developed.

Right: The " New Look " for the Dassault Mirage fighter takes the form of small " Swing " wings, one either side of the nose. It is claimed that they develop considerable lift, reducing landing runs by 7 to 10 per cent, and landing speed by 12 to 15 m.p.h.

AMONG THE MODEL BUILDERS

with Spanner

★ Electromagnetic grab
★ Epicyclic reversing mech.
★ Gearbox from Hungary



If a crane is to be used for lifting ferrous objects an electromagnetic grab can be far more useful than an ordinary load hook. This small but powerful Electromagnetic Grab built with Elektrikit parts was designed by Mr. W. Palmer, of Bala, Merionethshire.

Electromagnetic grab

IT IS not very often that we have the chance to mention Wales in the Meccano modelling pages of *Meccano Magazine* and the sole reason for this is that we rarely receive material from enthusiasts in that part of Britain. This month, therefore, I am particularly pleased to kick off with an interesting Electromagnetic Grab which has come from Wales—from Mr. W. Palmer of Bala, Merionethshire, to be precise. Smaller and more simple in design than the Grab shown in the Elektrikit Manual, it is nonetheless just as powerful, but has the added advantage of being suitable for use with proportionately smaller models than would be possible in the case of the Manual example.

PARTS REQUIRED

2—6a	5—111a	2—520	5—526
9—10	2—111c	4—525	2—542
10—37a			

Construction is easy. Two Rectangular Cores 1, with Core Holders 2, are inserted, one each, into two Rectangular Coils 3. The Cores and Holders are then fixed together by two 1½ in. Strips 4, the centre space being filled in by nine Fishplates 5, locked to the Strips. The hoisting cord from the parent model would be tied to these Fishplates.

As regards wiring, the E terminal of the left-hand Coil in the accompanying photograph is connected to the S terminal of the right-hand Coil. Terminals to receive the wires from the power source are supplied by ½ in. Bolts carrying Terminal Nuts and held by ordinary Nuts in the remaining terminal holes of the Coils. A current supply of anything between 6 and 15 volts A.C. or D.C. would be suitable to energise the Grab.

Epicyclic reversing mechanism

Moving on from electrical equipment to something purely mechanical, we have an extremely interesting reversing mechanism, working on the epicyclic system, designed by W. Dixon of Ash Vale, Nr. Aldershot, Hampshire. The usefulness of this unit lies in the fact that it provides a reversed drive exactly in line with the input shaft without employing a system of gears on a parallel shaft, as happens in the more usual cases where in-line drive is required. When incorporated in a model, the mounting for the mechanism would of course depend entirely on the construction of the model, but in our demonstration unit it consists of a 2½ × 1½ in. Flanged Plate 1, to the flanges of which two Flat Trunnions 2 are bolted, these Trunnions being extended upwards by two 2½ in. Strips 3 and 4.

Held tightly by Nuts on ½ in. Bolts fixed in Strip 3 is a 1½ in. Contrate Wheel 5, in the boss of which the input shaft 6 is journalled, the shaft being free to turn in the boss. The inside end of the shaft is fixed part way in the longitudinal bore of a Short Coupling 7, in the free end transverse bore of which a 2 in. Rod, free to turn, is mounted. Secured on this Rod on opposite sides of the Coupling is a ½ in. Pinion 8 and a ¾ in. Pinion 9, the latter spaced from the Coupling by three Washers to allow it to mesh with Contrate 5. Note, however, that Pinion 8 does not mesh with this Contrate, but with a ¾ in. Contrate 10, fixed on the output shaft which is held by Collars in Strip 4 and in a Double Bent Strip 11 bolted to the Strip. The inner end of the shaft is inserted into what little free space remains in the longitudinal bore of Short Coupling 7.

In operation, when the input shaft 6 is turned, Pinion 9 rotates around Contrate 5, this movement in turn causing the 2 in. Rod on which the Pinion is fixed

PARTS REQUIRED

2—5	1—25	1—29	5—38	2—59
2—16	1—26	16—37a	1—45	1—63d
1—17	1—28	10—37b	1—51	2—126a

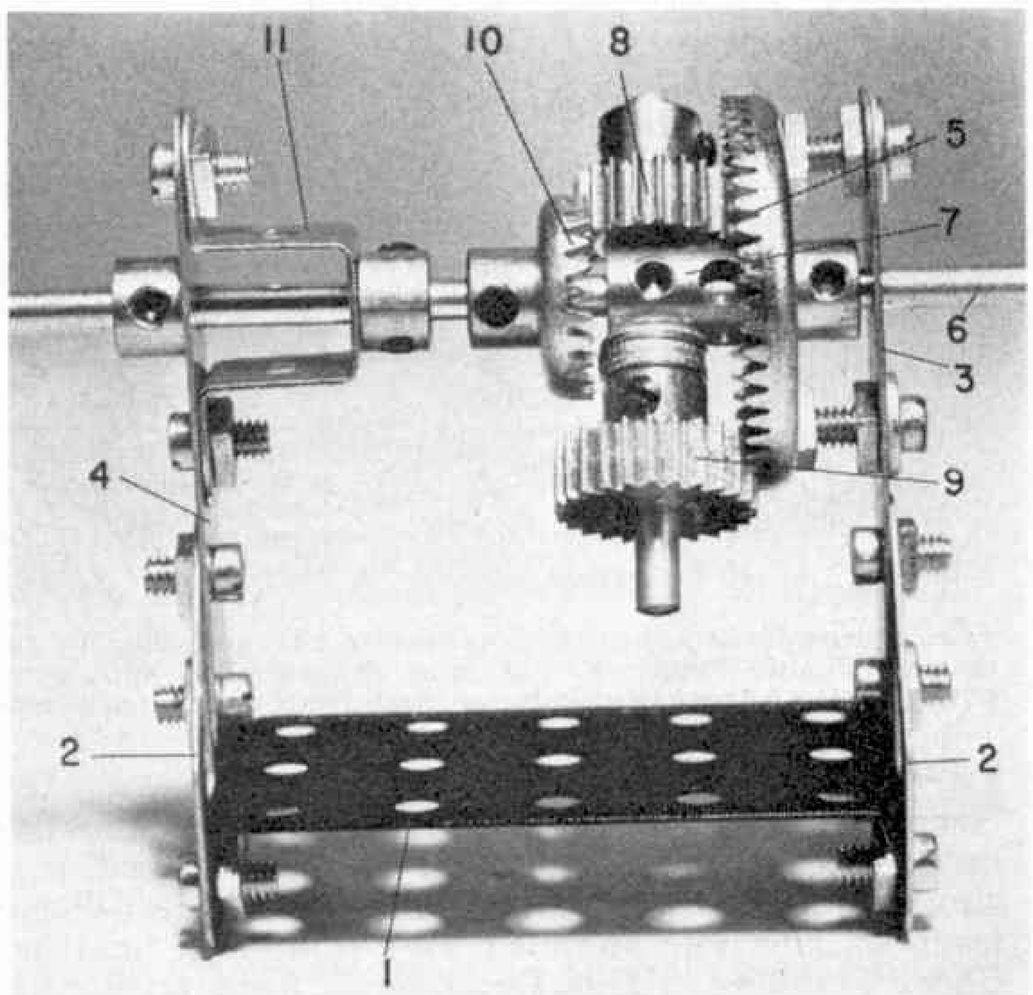
to rotate and, with it, ½ in. Pinion 8. This Pinion, as it rotates, runs around Contrate 10 causing the output shaft to turn as it does so. The input and output shafts, by the way, are shown in the following parts list as 3½ in. Rods, but, in a model their length would of course be dictated by requirements.

Gearbox from Hungary

For our final offering this month we again draw on the ideas of Hungarian modeller Andreas Konkoly of Budapest—a gentleman very well known in Meccano circles for his magnificent " Meccanograph " designing machines. The mechanism featured here, however, has nothing to do with this subject, but is, in fact, a gearbox which Mr. Konkoly tells me is " especially suitable to be built into Meccano motor car models ". With six forward and three reverse ratios it might well be used for inclusion in heavy vehicles, although it is a little out of the ordinary in that it includes two gear-change levers.

As far as construction is concerned, a framework is produced from two 7½ in. Strips, attached by Angle Brackets at one end to two 1½ in. Flat Girders 1 and, at the other end, also by Angle Brackets, to another 1½ in. Flat Girder 2 extended upwards by a Flat Trunnion 3. Two 1½ in. Angle Girders 4 are bolted one each to Flat Girder 2 and Lower Flat Girder 1, while two 1 × 1 in. Angle Brackets 5 and 6 are bolted to one of the 7½ in. Strips, the end securing Bolt in the case of Bracket 5 also helping to fix between the Strips a 1½ × ½ in. Double Angle Strip 7. The other Bolt holding this Double Angle Strip also fixes a left-hand Corner Angle Bracket 8 to the outside of the other 7½ in. Strip, while a 1½ in. Flat Girder 9 is bolted to the back of the Double Angle Strip. Bolted between the centres of the 7½ in. Strips are two Double Brackets, the lugs of which are joined by a 1½ in. Strip 10 and a Flat Trunnion 11, then a right-hand Corner Angle Bracket is secured to the appropriate 7½ in. Strip to complete the framework.

Now mounted in Flat Girder 2 and Angle Bracket 6 is a 3 in. Rod serving as the input shaft and carrying in the positions shown a 1 in. Gear 12, a ¾ in. Pinion 13 and a ½ in. Pinion 14. This latter Pinion, together with a Collar 15, holds the Rod in place. The Rod is next inserted, free, part way into the bore of a ½ × ¾ in. Pinion 16 fixed on one end of a 4 in. Rod 17 journalled in Flat Trunnion 11, Strip 10 and Double Angle Strip 7. Fixed on this Rod are a ¾ in. Pinion 18 and a ½ in. Pinion 19, positioned as shown, the Rod then being inserted, free, part way into the bore of another ½ in. Pinion 20, fixed on the end of the output shaft. This output shaft, supplied by a 2 in. Rod journalled in Flat Girders 1 and Angle Bracket 5, also carries a ¾ in. Pinion 21 and is held in place by a Collar outside the framework.



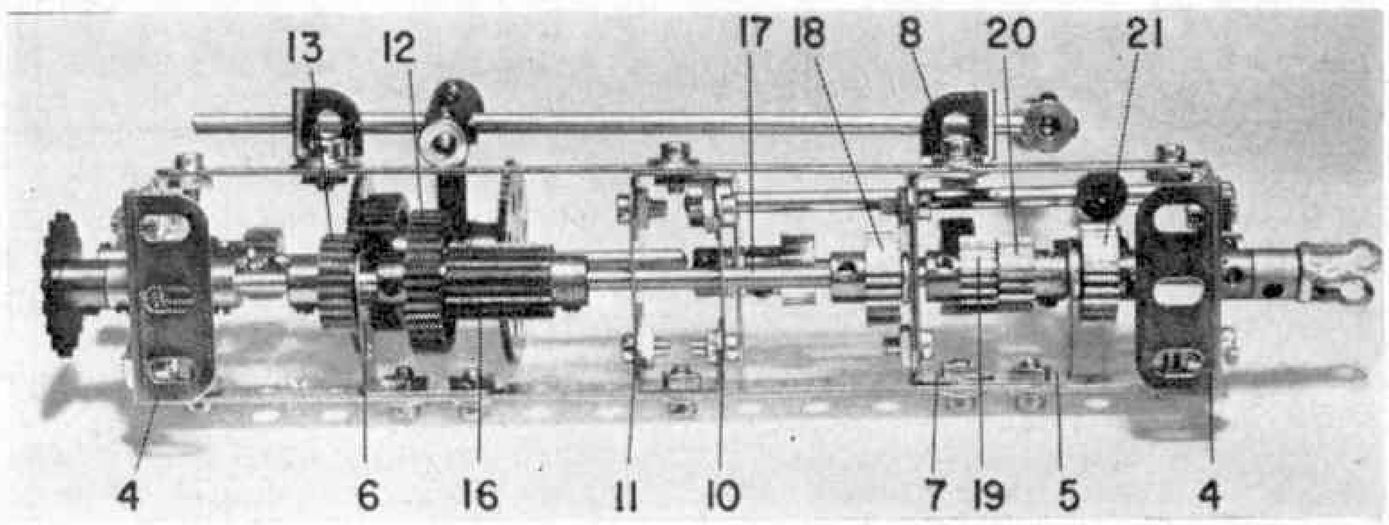
At this stage the sliding layshafts can be added, but, first, an " idler " ½ in. Pinion 22 for the reverse gears is mounted loose on a ¾ in. Bolt held by two Nuts in Flat Trunnion 3, the Pinion meshing with Pinion 14 on the input shaft. With this done, the associated layshaft, supplied by a 4½ in. Rod 23, is mounted in Flat Trunnions 3 and 11. Fixed on this Rod are a ½ in. Pinion 24, a 50-teeth Gear Wheel 25, a 1 in. Gear 26, a Socket Coupling 27 and a 57-teeth Gear 28, Gears 26 and 28 being fixed in opposite ends of the Socket Coupling as well as to the Rod. A Collar 29 outside Flat Trunnion 3 prevents the Rod from sliding too far during gear change.

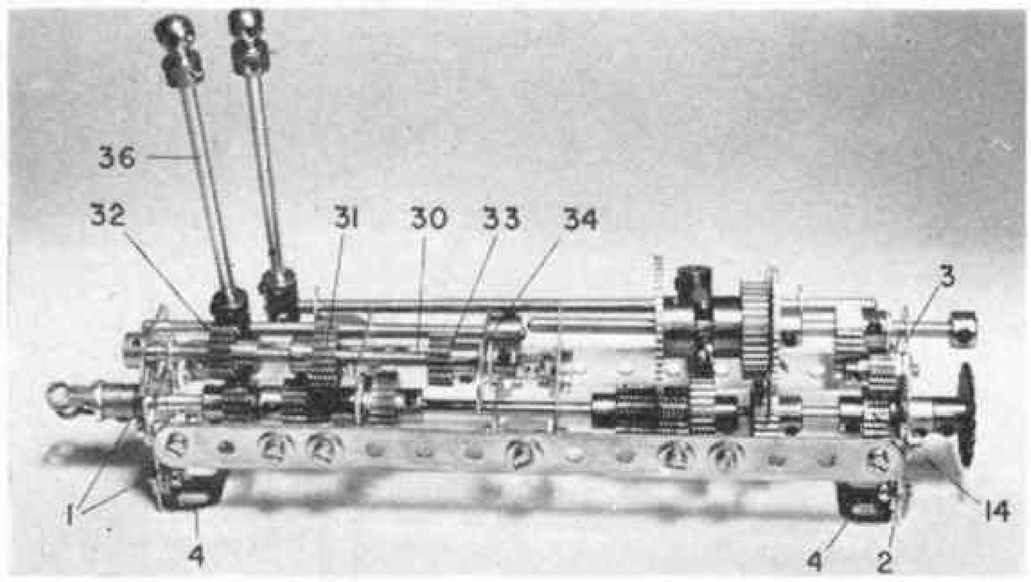
For the other sliding layshaft a 4 in. Rod 30 is used, this being journalled in upper Flat Girder 1 and Flat Girder 9. Mounted on the Rod between the Girders are a ¾ in. Pinion 31 and a ½ in. Pinion 32, a second ½ in. Pinion 33 being mounted on the Rod outside the Girders. Clamped against this Pinion by a Collar is a Crank 34 between two Washers, the Rod passing through the centre hole in the arm of the Crank. Note that the Pinions on this layshaft must, in due sequence, mesh with the Pinions on the Rods beneath them and for this reason full use must be made of the elongated holes in the Flat Girders to ensure that there is sufficient room for the Pinions to mesh.

Fixed in the boss of Crank 34 is a 4 in. Rod 35, sliding in the end holes of Flat Girders 1 and 9. Secured on this Rod is a Short Coupling, in the longitudinal bore of which a 3 in. Rod 36, forming one gear-

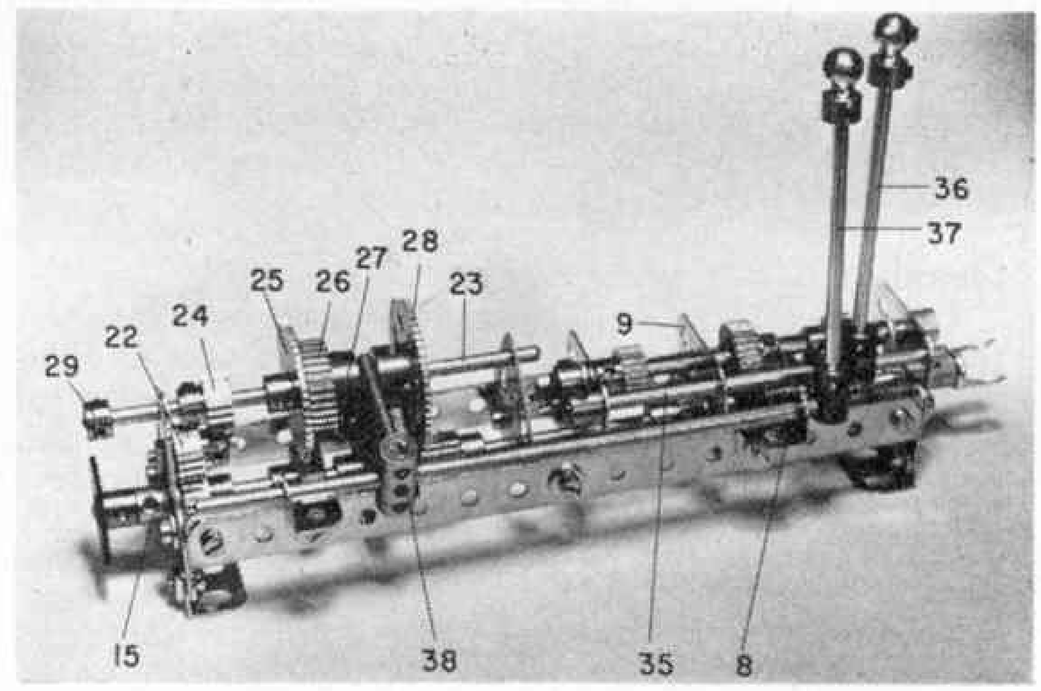
Above right:
W. Dixon of Ash Vale, nr Aldershot, Hampshire, takes full credit for this interesting Epicyclic Reversing Mechanism. The advantage of this type is that it does not employ a system of gears on a parallel shaft as is often the case when in-line drive is required.

Right.
An underside view of Mr. Konkoly's Gearbox showing the composite input/intermediate/output shafts.





The international appeal of Meccano is characterised by this comprehensive Gearbox. It was designed by Hungarian enthusiast Andreas Konkoly of Budapest and incorporates six forward and three reverse speeds.



Another view of the remarkable gearbox. Looking at its comparative simplicity it becomes rather hard to believe that there are no less than nine operating speeds enclosed in its narrow frame!

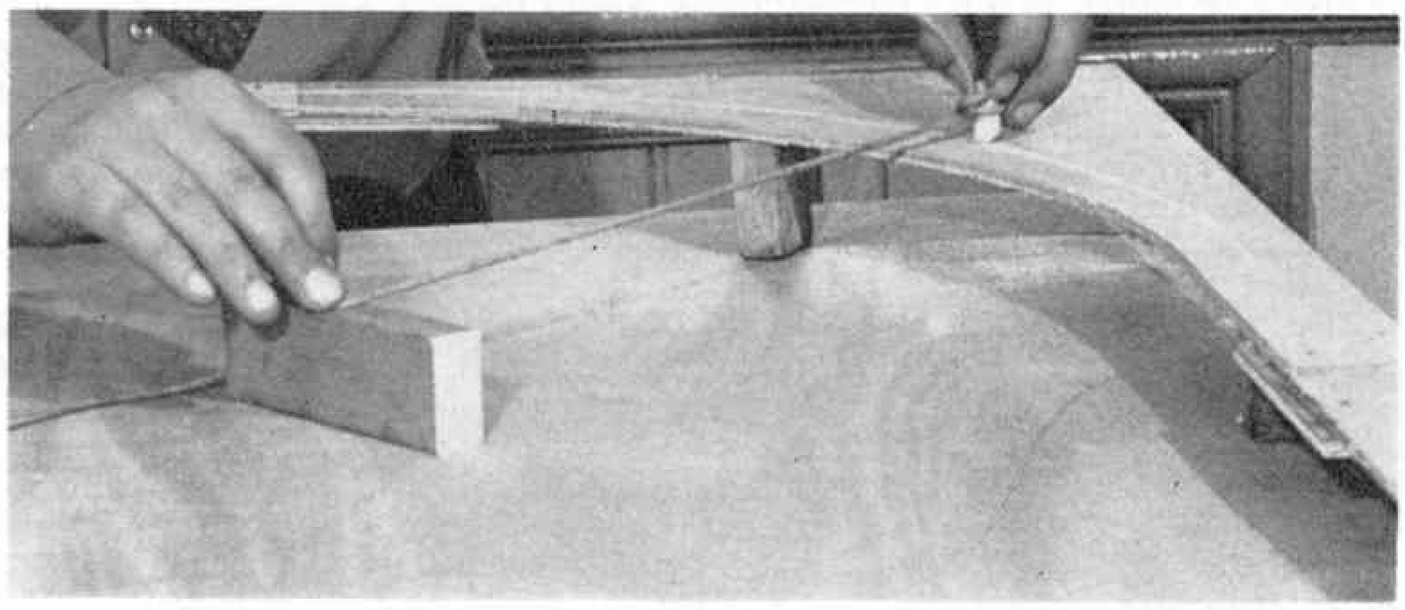
change lever, is held. A Handrail Coupling is mounted on the upper end of the Rod to improve realism, a similar part being mounted on the other gear-change lever 37, this also supplied by a 3 in. Rod held in a Short Coupling. This Coupling is fixed on a 6½ in. Rod sliding in the Corner Angle Brackets bolted to the framework. A Coupling 38, carrying two 1½ in. Rods in its end transverse bores, is secured on the Rod, the smaller Rods locating in the waist of Socket Coupling 27, then, finally, a 1 in. Sprocket Wheel is mounted on the end of the input shaft to receive the drive, while a Small Fork Piece is mounted on the end of the output shaft to take the drive elsewhere.

In a sense, Mr. Konkoly's gearbox is two units in one, the first stage giving one reverse and two forward speeds and the second stage giving three speeds for each gear engaged in the first stage. This of course results in an overall range of three reverse speeds and three forward speeds for each of the two first-stage gears, making six forward speeds in all.

PARTS REQUIRED

2—1b	3—15b	1—27a	2—63d
1—6a	3—16b	2—31	1—96
2—9f	1—17	27—37a	4—103h
2—11	2—18a	27—37b	1—116a
4—12	4—25	18—38	2—126a
2—12a	7—26	1—48	2—136a
1—14	1—26b	5—59	1—154a
1—15a	1—27	1—63	1—154b
			1—171

BUILDING AN 'N' GAUGE LAYOUT PART IV



GRADIENTS AND BASEBOARD PLAN

SHOULD YOU design a layout that includes a high level section of track, you will naturally find that an incline and a raised baseboard will be required. Construction of high level baseboards is, in fact, similar to that of the baseboard proper, with the top surface cut exactly to size and strengthened by one inch square timber cross-members screwed to the underside about nine inches apart. The distance between the baseboard and the top of the high level section should be about three inches. If it is any less, you will find it awkward to retrieve derailed rolling stock from underneath. If on the other hand, it is any higher, the gradients on a small layout will be too steep.

Offcuts of 2 inch by 1 inch timber, cut to length, are used to support the raised baseboard, and these should be positioned so that they do not interfere with any trackwork underneath. These supports are screwed

down to the main baseboard surface from underneath, and then the high level section is laid in position on top, and in turn screwed to the supports. This however must be made easily removeable for access to tracks beneath—assuming that there are tracks underneath—although it is better to keep it fixed down until the incline has been built.

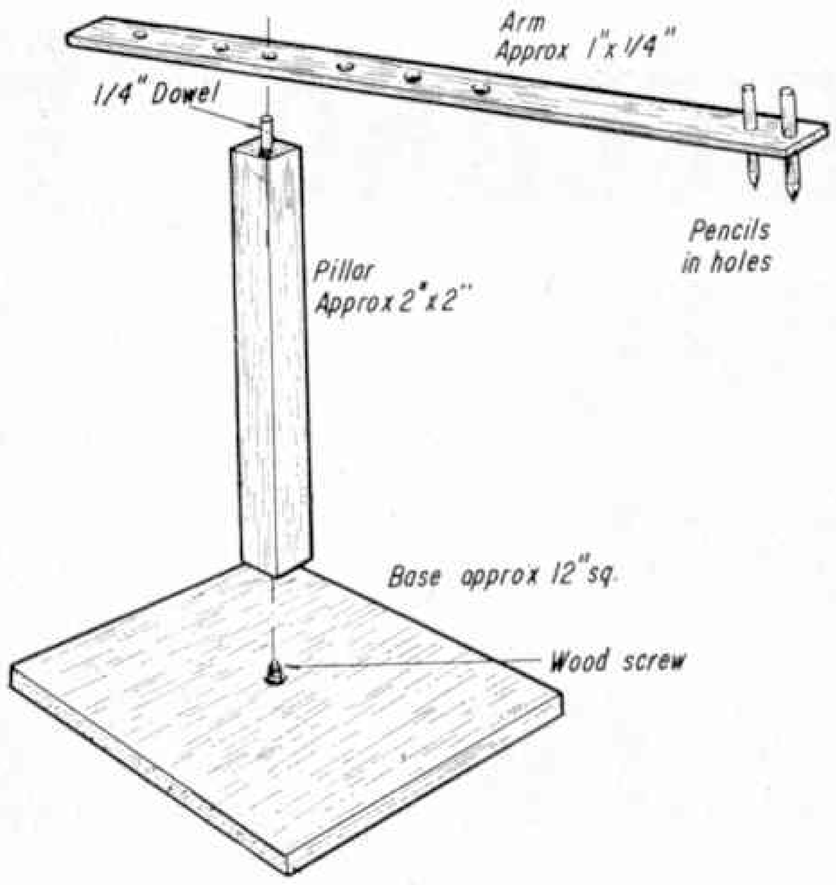
In my opinion, it is better to make the incline as long as possible, and certainly not any steeper than a gradient of 1 in 25, which even so, will be over six feet long to climb three inches. Even this gradient will severely limit the length of trains you can run up to it.

The incline track bed should be made from fairly rigid material such as ⅜ inch or ½ inch thick plywood, cut into strips about 2 inches wide for single track and 3 inches for double track. These strips should be as long as possible to reduce the number of joins needed. The various incline sections should be butt-jointed with a similar piece of plywood about 6 inches long, glued and screwed firmly underneath so that the joint does not twist or stretch while the incline is being fixed in position. The bottom edge must be chamfered or planed down so that it lies flush with the main baseboard without a step.

The supports for the incline are made from 2 inch by 1 inch offcuts, with the top one fixed in position to the baseboard first. The incline is laid in place with the top end against the high level board, and then nailed lightly to the first support. A long piece of timber, as straight as possible, is now laid on top of the incline trackbed, and the remaining supports positioned underneath so that the length of timber lies perfectly flat on the trackbed. The supports can then be glued and screwed down.

Having finished the baseboard construction the next step—one of the most important—is to transfer the track plan from paper to the board itself. Equip yourself with a steel rule marked in inches and millimetres, a length of wood with at least one straight edge, pencils, a rubber, and of course your layout drawing.

When transferring the track plan on to the baseboard, you may find difficulty doing accurate drawings of the pointwork and curves. To solve this problem, I used a simple home-made gadget called a " trammel ", shown in Fig. 1. The sketch should be self explanatory, showing how the parts fit together. The sizes shown are only approximate, as odd pieces of timber can be used, but the length of the pillar depends on the height of the baseboard from the floor. I have used two pencils 27 mm. apart at the end of the arm to draw the centre lines of parallel tracks, and I simply removed the outer pencil for single track. The arm is drilled with $\frac{5}{16}$ inch



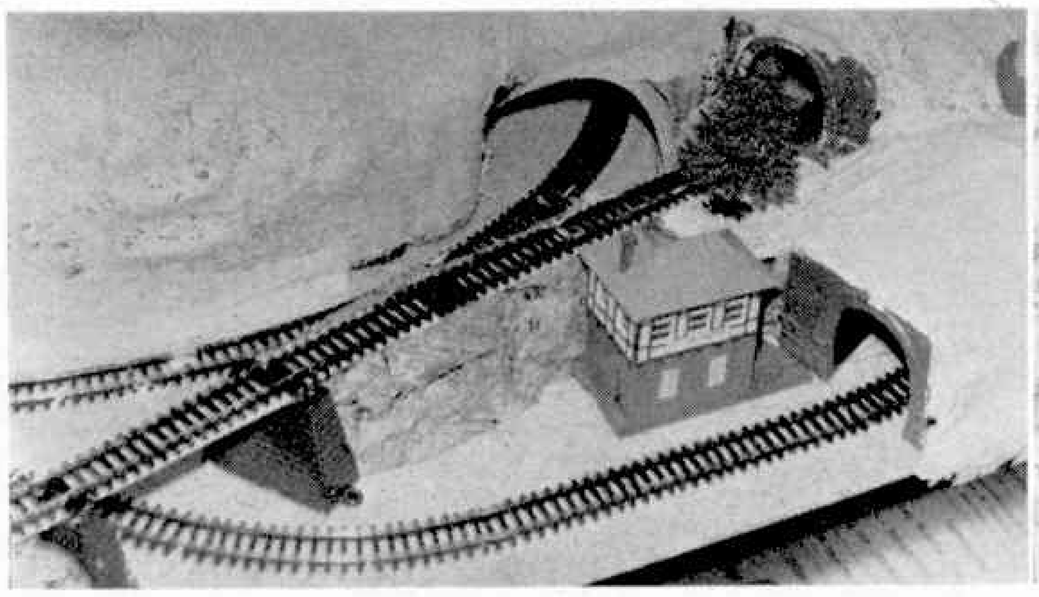
holes at 3 inch spacings, so that curves of different radii may be drawn, the smallest being nine inches, and the longest two feet, measured from the inner pencil.

To mark off the position of the track on the baseboard, just place one of the holes in the trammel arm over the ¼ inch dowel in the top of the pillar and mark off a suitable radius on the baseboard. I always find it easier to draw the curved tracks on the board first and then join them up using the straight edge to draw along. If you are unable to use the trammel with the pillar standing on the floor, place the arm on the baseboard and use a short length of ¼ inch dowel as the pivot, placed through the appropriate hole and held firmly down on the baseboard top.

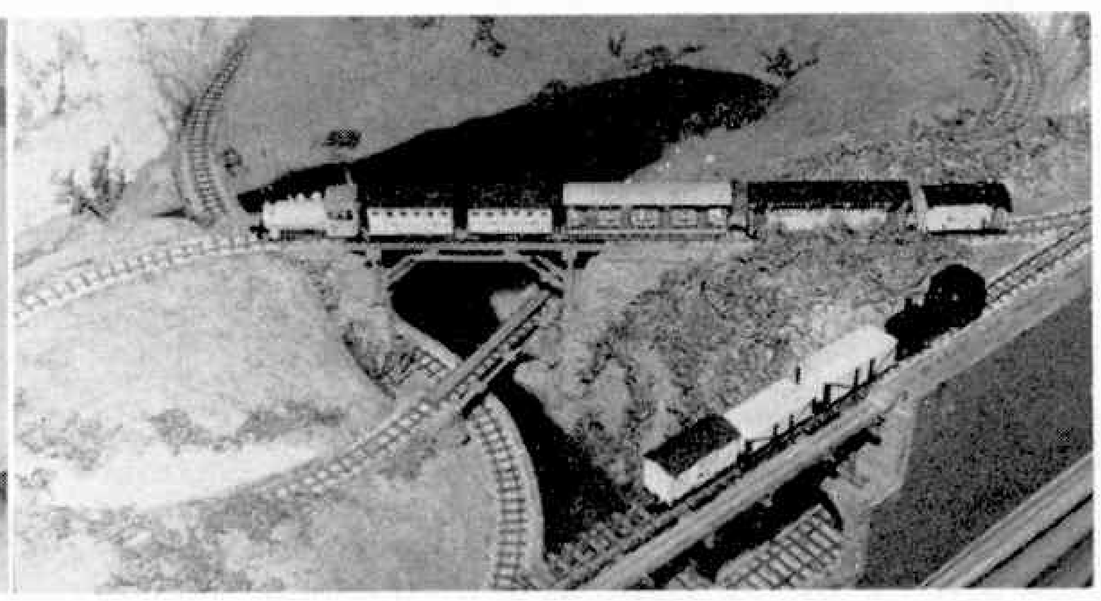
Some people prefer to use a cardboard template to draw the position of the points, although it is just as easy to use the actual point itself. This is laid in position over the pencil line previously drawn—preferably the straight one—and using a sharp pencil, the centre of the diverging track is marked on the baseboard between the sleepers of the point. The point is then removed and the pencil marks joined up with a single line.

All the trackwork on the baseboard should be drawn in position with no sharp bends or kinks. If a mistake has been made the pencil line can easily be rubbed out and re-drawn. When you are completely satisfied with the result, the pencil line can be inked over with a black fibre tipped pen.

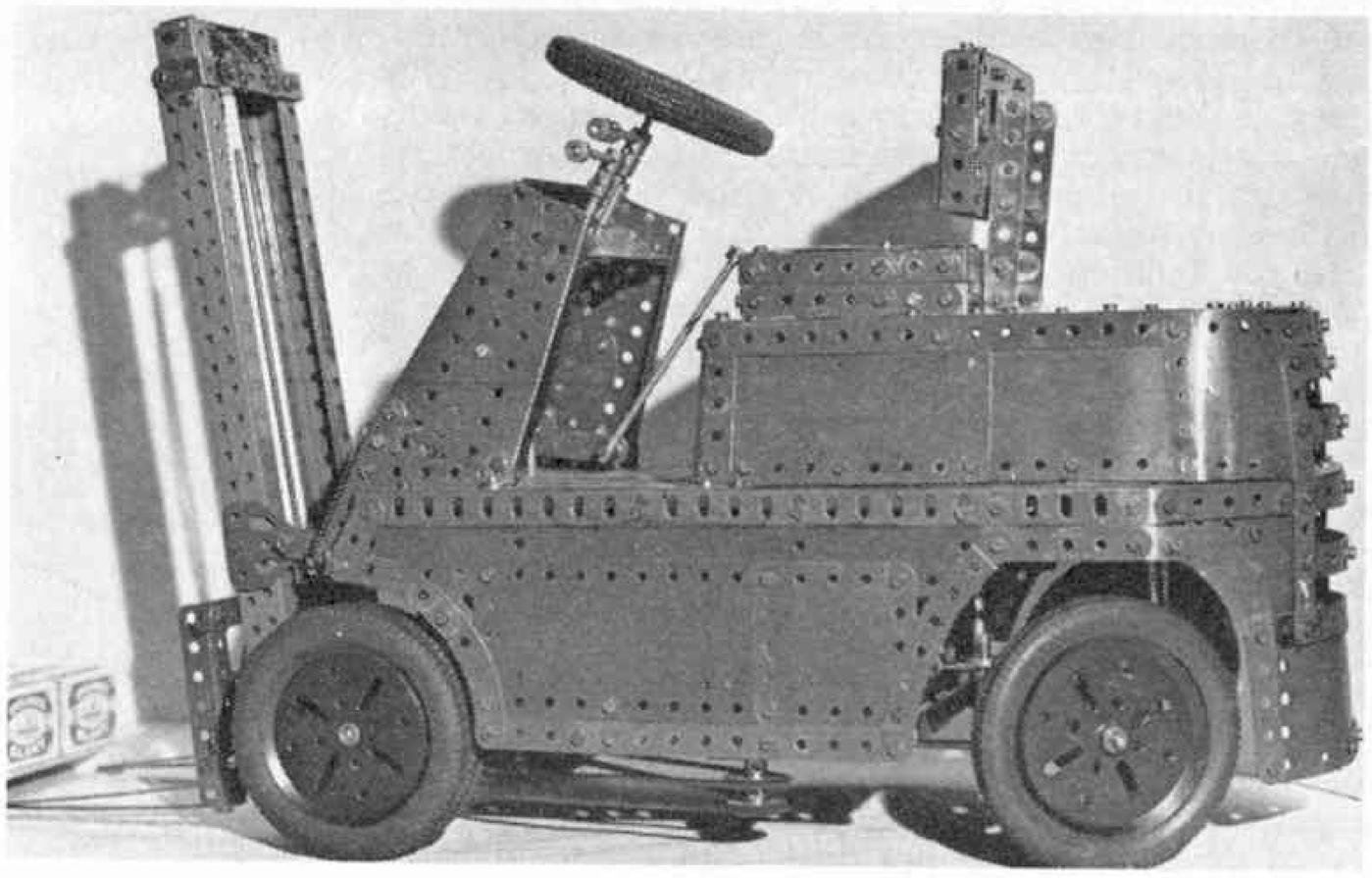
Tracks at different levels on the *Model Railway News* " Coffee Table " N gauge layout.



A very complex narrow gauge layout in 4 mm scale, with gradients and different levels galore!



MECCANO FORK LIFT TRUCK



M.M. reader Roland Brown describes his model

IN THE world of full-size industry, one of the most common pieces of essential equipment is the Fork Lift Truck. Fork Lifts are found everywhere; in every branch of industry; in every part of the world, yet, despite their tremendous popularity in real-life, the modelling fraternity does not appear to give them a great deal of attention—judging, at least, by their rather infrequent appearances in the M.M. I am sure that modellers' interest in Fork Lifts is considerable, however, and this was one of the contributory reasons for my attempting the model illustrated here.

Fork Lift Trucks are available in a wide range from very small pedestrian-controlled units to large trucks capable of handling loads of many tons and, in some cases, able to travel over rough ground. The type of truck used as a basis for my model is a Hyster S40B which is capable of handling loads of up to 4,000 lb. but, with its small wheels, it is confined to well-laid surfaces such as can be expected in most factories and warehouses. This particular vehicle is diesel-powered, although petrol, L.P.G. and electrically-powered versions of trucks of a similar size are often available.

My model performs all the functions of the real truck:—

(a) the forks can be raised and lowered on sliding masts.
(b) the masts can be tilted both forward and backward.
(c) the model has two road speeds both in forward and reverse.
(d) the steering lock is specially large.

GENERAL ARRANGEMENT

All the road wheels are supplied by 3 in. Pulleys with Motor Tyres—a size which works out just right for the wheel base of 11½ in. The front axle, carrying a differential unit driven by a Worm Gear, is journalled in four chassis bearings to ensure rigidity of the assembly, while the rear axle, which incorporates Ackermann steering linkage, is pivoted at the centre allowing each wheel to lift and fall at least three-quarters of an inch from the central position. The lock of the steerable wheels is such that the inside front wheel will describe a circle of about 3 in. diameter.

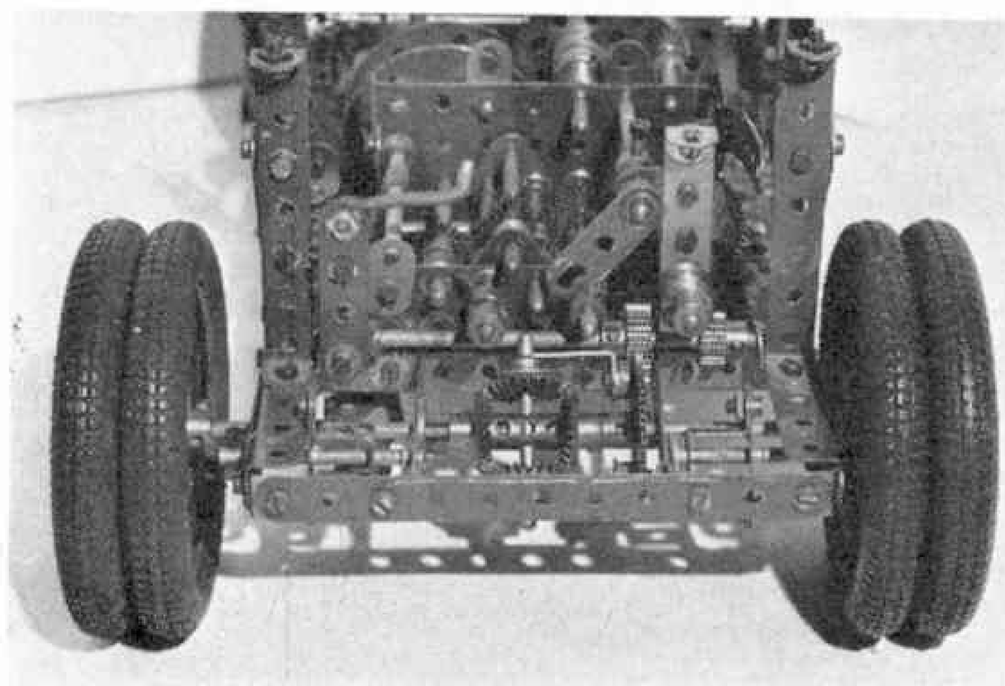
Power for all movements comes from two obsolete E20R Electric Motors mounted in front of and over the rear axle. These Motors, which could be replaced by two current E15R Motors, are connected together by a Chain drive, the transmission to the road wheels being taken directly from the forward Motor through a clutch and the gearing system described later.

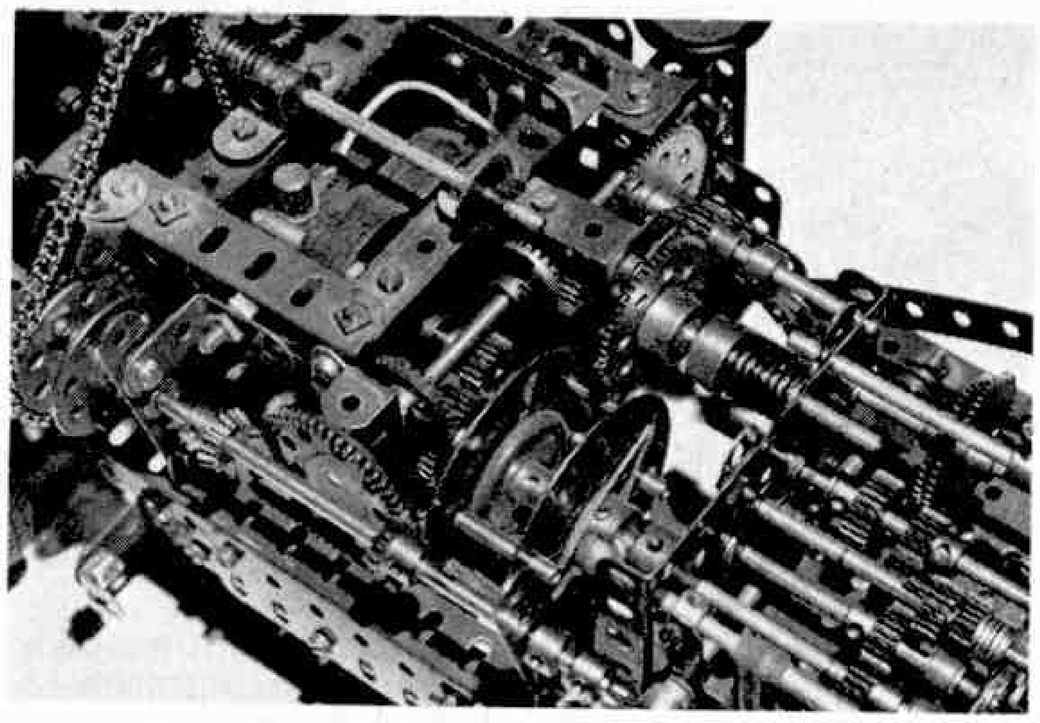
An auxiliary drive is taken from the Chain drive connecting the Motors through gearing and a double belt system to a Screwed Rod actuating the lifting movement of the fork. A cross shaft fitted with Cranks and connecting Strips and working through high reduction gearing operates the tilting movement of the mast.

Gear levers are situated to the left of the steering column and a single lever on the right-hand side, operating through an "H" pattern gate, controls the mast tilt and fork hoist/lower movements. A hand-brake lever on the right-hand side is used to engage and disengage the Worm drive to the Road Wheels. The clutch pedal for the road transmission is to the left-hand side of the steering column.

MAST AND HOIST

In the case of the mast itself, this is constructed in two channel sections, one sliding inside the other. Within the inner channel the carriage for the fork runs on four ¾ in. Flanged Wheels. Each inner channel section is produced from two 12½ in. Angle Girders





arranged so that the flange carrying the circular holes of one girder is secured to the flange carrying the elongated holes of the other girder. The outer channel section allows the inner section to slide freely within it, but without undue clearance. The 12½ in. Angle Girders forming the outer section of the mast are fastened together with Fishplates angled to give the correct spacing between the girders. The mast is pivoted at the bottom stub axles just ahead of the front axle.

As mentioned earlier the fork hoist is actuated by an 11½ in. Screwed Rod running through two opposite tapped bores in a Universal Coupling "spider" secured to the bottom of the inner section, the Rod itself being journalled at the base of the outer section of the mast. Chains fastened to the top brace of this outer section are passed over loose Sprockets mounted in the top of the inner moving section and are attached to the fork carriage. The drive to the Screwed Rods is through an auxiliary pair of ½ in. Bevel Gears, engaging with a 1½ in. Bevel Gear to give the raising and lowering movements (this reversing gear is also the initial part of the drive to the tilt mechanism of the mast), and then through a ½ in. Pinion which meshes with a ¾ in. Contrate Wheels on a shaft driving the twin belts. The selector lever engages one or other of the ½ in. Bevels; pushing forward with the lever held over to the left lowers the fork; pulling backwards with the lever to the left raises the fork.

This same selector lever controls the tilt mechanism. When the lever is held over to the right it disengages the drive to the twin belts for the hoist and engages the high reduction gears for the mast tilt mechanism. Pushing the lever forward engages one of the ½ in. Bevels causing the mast to tilt forward, whereas pulling the lever backwards while still held over to the right causes the mast to tilt backwards. The tilt arms are attached to the mast 4 in. above its bottom end, being pivoted on a cross beam clamped—not bolted—to the mast so as to avoid interference with the inner sliding section of the mast.

TRANSMISSION TO ROAD WHEELS

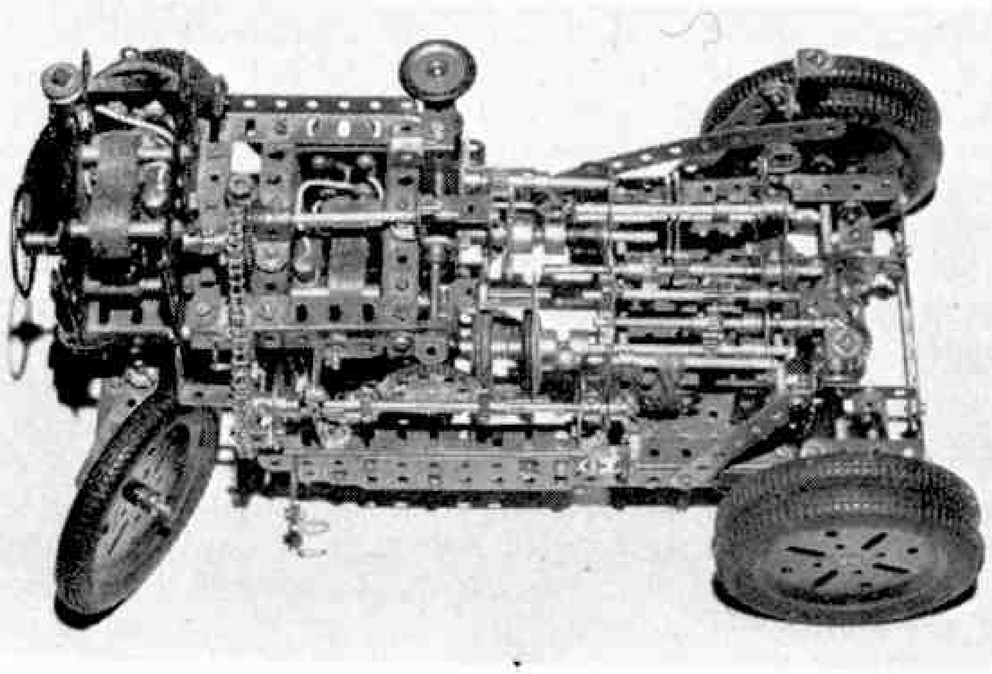
Transmission to the Road Wheels is first taken to a 2-plate clutch driven at half the motor speed. The driving plates are supplied by two Face Plates, one locked to the input shaft and the other free to move axially but driven by the first Plate via two short Screwed Rods fixed to the first Plate and projecting into Rod Connectors fitted into the slotted holes of the second Plate. Secured to the boss of this second Plate is a Socket Coupling which provides a withdrawal facility. A Rubber Band passed round the two Plates provides the necessary spring pressure to give a positive drive. The driven plates, on the other hand, are 1 in Pulleys, fitted with Tyres and locked boss to boss on the output shaft which is allowed a little end float to ensure complete disengagement of the clutch

From the clutch, the drive is taken through a reversing gearbox, made up of ½ in Pinions, to the main 2-speed gearbox. It then travels through a Worm Gear on to a cross shaft behind the front axle, this shaft being free to slide under the control of the handbrake lever. A ¾ in. Pinion on the shaft meshes with a 57-teeth Gear incorporated in the differential, this carrying the drive to the front axle. When the handbrake is moved to the "off" position the Pinion and Gear Wheel disengage, allowing the model to run "free."

BODYWORK AND CONTROLS

The bodywork of the model is produced as a separate complete item from various Strips, Girders and Plates and is fixed to the chassis by four Bolts. The stub shafts for the gear selectors and steering gear are located in a Girder Bracket fixed to the chassis and are aligned so that the bodywork drops over them, this also applying to the handbrake. The mast/fork control lever projects through a hole in the toe-board of the bodywork, the lever being fixed through the centre transverse bore of a Coupling. Projecting rearwards from the longitudinal bore of the Coupling is the Rod actuating the reversing movement, while, fixed in the front transverse bore of the Coupling, at right angles to the control lever, is the Rod which actually engages the tilt or hoist drive. The Coupling pivot is very simple indeed being merely the shank of a Bolt projecting into the forward end of the longitudinal bore of the Coupling. A Compression Spring on the rear projecting Rod bears on the lever to which it is connected, thus ensuring that the Coupling is always forced on to the Bolt forming the pivot point. The arrangement of the Rods connected to the Coupling results in the control lever moving in an "H" pattern.

As regards the steering and gear selector Rods, these are journalled on the dash panel being connected to further Rods, projecting through the bodywork, by Universal Couplings. Removal of these controls and the four fixing Bolts allows the complete body to be lifted clear of the chassis for easy access to the interior mechanisms. With the body in place, operation of the various working features of the model is most realistic and highly satisfying.

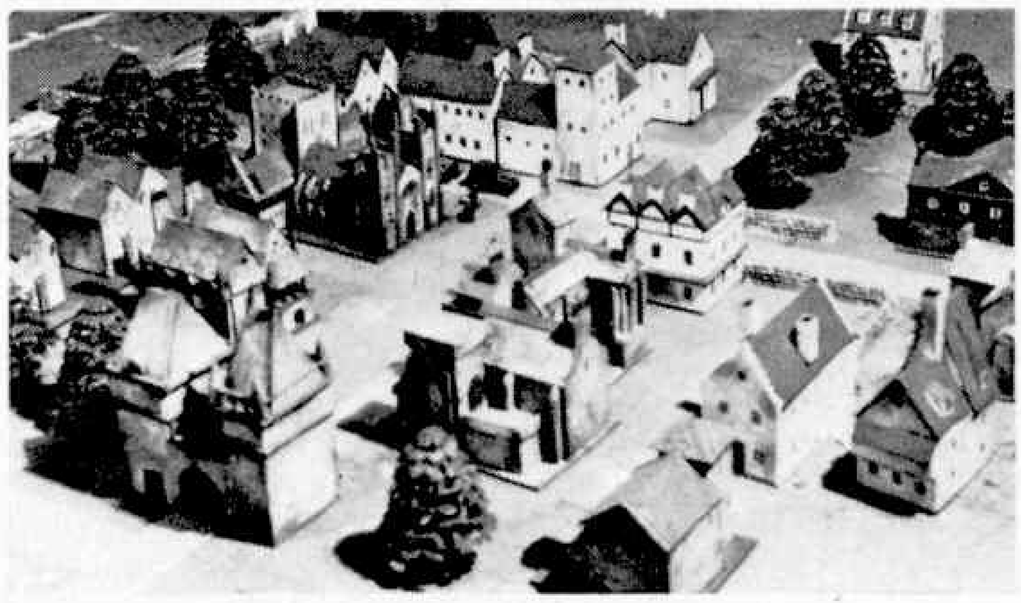


Heading photograph shows the truck ready to lift a load. Left: A close-up view of the final drive system. Above: A close-up view of the clutch and gearbox. Right: A general view of the model showing the complex interior.

BATTLE

Part XVIII—Artillery Fire

by Charles Grant



HAVING MENTIONED very briefly in the previous Part the artillery Forward Observation Officer and his radio contact with the guns he controls, we shall for the time being continue on this line and say something about the use of field artillery in the wargame and elaborate a little on the notes given in Part V on the use of field guns in action.

It may be remembered that we decided to consider only field artillery, which had an actual range representing an unlimited distance on the normal wargame table. I refer particularly to field guns—a good example being the British 25-pounder—because I feel that in our type of game which, generally speaking, is designed to revolve round nothing larger than encounters at battalion level—or maybe less—we are not likely to have to consider the bigger stuff—medium guns such as the 5.5 in. or the 155 mm. and so on. As far as we need envisage it, the role of artillery is that of offering immediate and close tactical support, such as might be called for by the commander of a battalion group when an attack he is attempting to mount has stalled for some reason or another, or he is obliged to 'winkle' stubborn opposition out of a previously prepared defensive position.

First, as we have earlier pointed out, with a wargame range averaging something like 12,000 yards—the equivalent of 30 feet (!) in our scale—the guns need not be physically on the table, but may be located in some theoretical position to the rear of one's base line and their fire directed by one's F.O.O.—who naturally would have to be actually present—by map references, bearings and so on. Obviously though, if the playing area is of any size at all—and even if it is not—the keen player will almost always wish to have the satisfaction of seeing his guns in battery, plugging away steadily at the enemy. If your adversary's own F.O.O. should perchance be daring or fortunate enough to get a look at your guns and plot their position, he—the opposing wargamer—may well descend to such a base practice as laying down counter-battery fire on your cherished field guns. This is a contingency which must be faced, but even so it is better fun and more exciting to have to watch for such a threat and when necessary to take the appropriate action to counter it.

Anyway, a few words about the technique employed by artillerymen to get their guns into action on a particular target, this not being materially different whether fire was direct—i.e. the target was actually visible to the gunners themselves—or whether it could be seen only by the F.O.O. who directed the fire by radio. Modern guns—and in the present context I mean those of 1939-45—are very accurate compared with weapons of former years, but even so, despite improvements in the standards of ordnance and ammunition, there were imperfections, and direct hits were far from being inevitable. What is done is really a simple sort of thing, and by no means a modern idea. It is termed 'bracketing', which means that the first 'ranging' shot would be a deliberate 'overshoot' and the second an equally deliberate 'undershoot'. Calculations would be made to correct the two extreme errors and the third shot would, theoretically, be bang on the target. However, even in this day and age, nothing is without flaw and few shells ever fall precisely where they are supposed to land, and even when a target has been properly ranged there can be errors, due to minute differences in the charge, atmospheric conditions and so on.

This procedure is reproduced in the wargame in almost exactly the same way as for mortar ranging as we described it in Part XIV. The player, having decided that shell fire is called for upon some particular target, and provided it is visible either to his gunners or to the F.O.O., throws one die for the 'ranging' throw. If he gets 5 or 6, he has obtained the correct range with his first round and now has to determine whether it was a direct hit, or if not, just how close it was to the Point of Aim. To do this we employ yet another 'device', a simple one, again constructed from the ever useful perspex or acetate sheet (I don't know what we should do without the stuff!). The idea is similar to that governing the mortar fire device but with one important difference. The explosion area of a mortar bomb—which more or less drops vertically—is roughly circular, but the shell fired from a gun is travelling at high speed, and its burst pattern is rather elongated—a sort of pear-shaped area in fact. I have no intention of inflicting the construction of a pear-shaped device upon the patient wargamer, and for the sake of simplicity we shall employ the device shown in the diagram. To simulate the elongated explosion areas in this piece of apparatus we use rectangles, each of which gives an area approximating to that of the shell burst. Obviously, longish ovals would be more accurate but the rectangles, I believe, will be found perfectly adequate. Each measures 3 in by 1½ in., which is equivalent to 100 yards by 50 yards, or the maximum area 'beaten' by the explosion of one field artillery shell (for the present we shall not concern ourselves with differences between explosion areas of different types of field gun shell—let us content ourselves with this standard or average area).

To continue, then, the "burst area" relating to each round of shellfire is decided by dice throw—5 or 6 indicating the central rectangle (the equivalent of a direct hit), 1, 2, 3 and 4, the others as shown. When the 'ranging shot' has been successful, the device is placed with its centre on the Point of Aim and lined up

in the direction of fire (when guns are in action in an 'off the table' position their location would have to be determined in advance). The dice are thrown—if more than one gun is firing then as many dice as there are guns are thrown simultaneously. There will be differences in the fall of shot areas even when the guns are trained on the same target—as the dice fall, so do the shells.

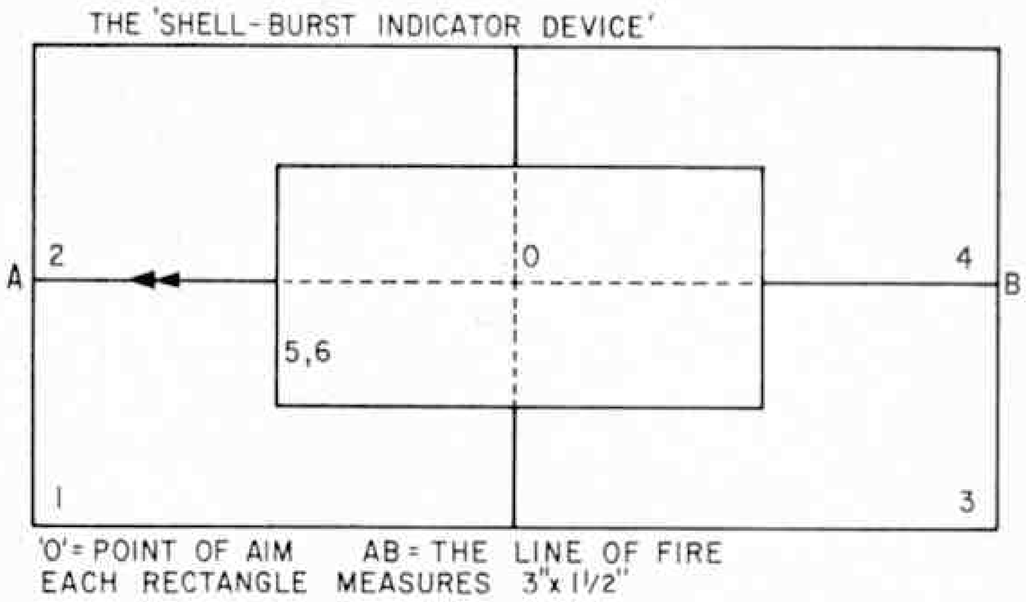
Any personnel seen to be in the area shown by the dice throw must be reckoned to be possible casualties, and effect dice throws made accordingly. One die is thrown for each man, 4, 5 and 6 rating as casualties. If the throw shows 1, 2 or 3, then the chap is lucky enough to have escaped the blast. Depending upon the player's inclination, the throw for a 'team'—i.e. machine gun, bazooka or mortar, can be for the whole team or throws may be made for the individual members.

So far so good, then, we pass on to any vehicles which may be in the burst area. First, we deal with the soft-skinned type, by which I mean the truck, jeep or wagon with absolutely no pretensions to having any armour protection at all. They are obviously very vulnerable to high explosive shells. For convenience let us divide the possible effect into three stages—ranging from the maximum to the minimum. The first will of course be complete destruction, and the third will leave the vehicle untouched, with maybe a scar or two, but nothing to impede its function. The degree of damage will be determined by the customary dice

Target vehicle	Dice Throws		
	To destroy	To immobilise	No effect
Tank	—	5, 6	1, 2, 3, 4
Half-track or armoured car	6	4, 5	1, 2, 3
Soft-skinned	5, 6	3, 4	1, 2

throw, one for each vehicle. The attacking player throws his die—if he gets 5 or 6, happily for him, the target is totally destroyed, or if 1 or 2 be thrown, no damage has resulted and the truck, or whatever, goes merrily on its way. This leaves 3 and 4, a sort of intermediate degree of damage, not enough to destroy, but enough to ensure the immobilisation of the vehicle, while leaving it capable of being repaired—more of this at a later stage—and the personnel within unscathed. If the throw was 5 or 6, then any troops carried in the vehicle have to be considered as possible casualties. Dice throws of 4, 5 or 6 ensure their removal from the scene of operations as being no longer in shape to fight.

Now for the armoured chaps, and first the 'heavies', the tanks. Again we shall not attempt to make any difference between the various tanks in use in our game, but shall adopt one simple rule to cover all the varieties we shall commonly use—the German Mark IV, the Sherman, the T.34 and other tanks of roughly the same class. Completely to destroy any one of these in one fell swoop with a high explosive shell would really require an inordinate amount of luck, and to do so is



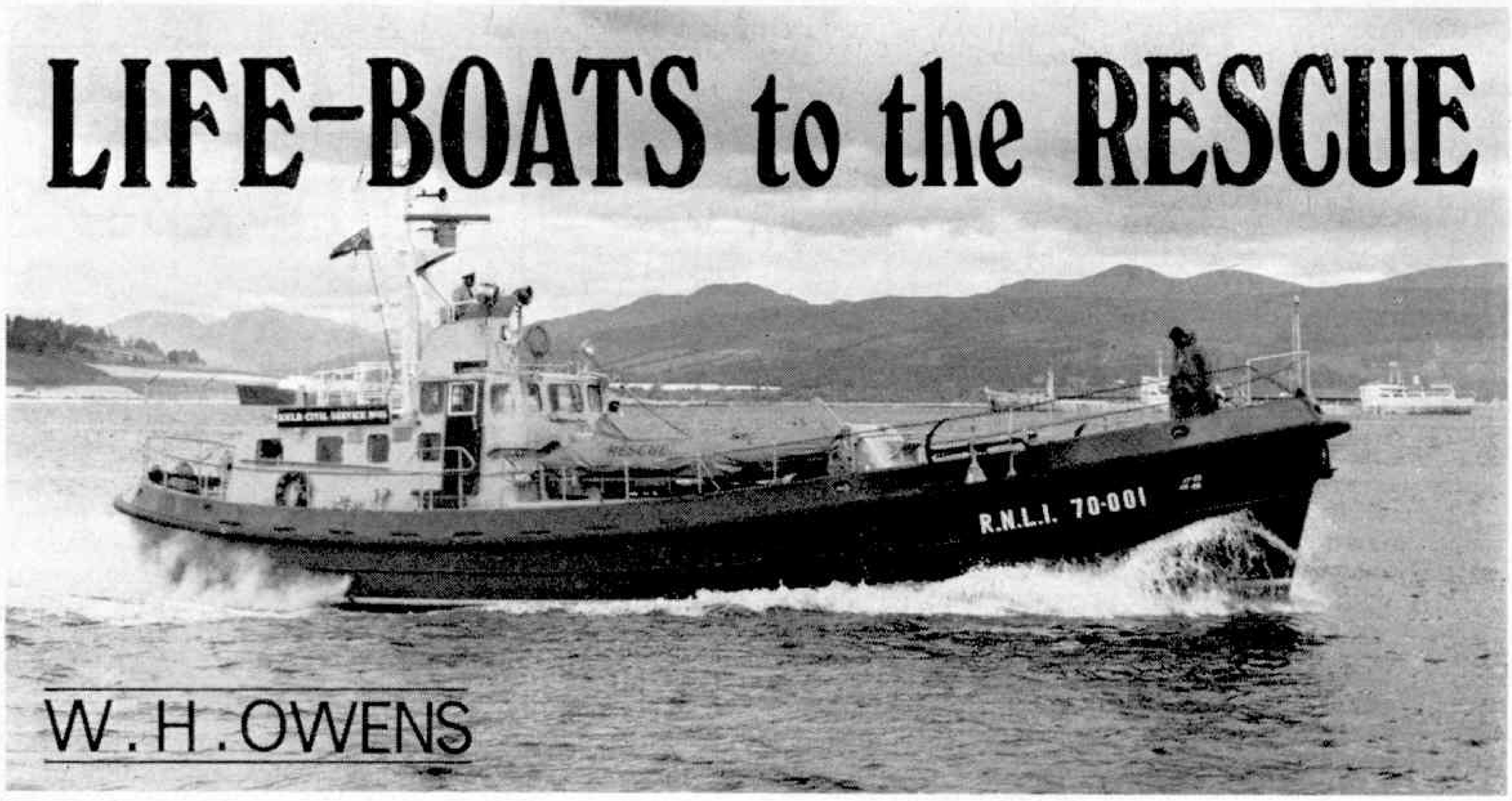
not the easiest thing with long range fire. It did happen, of course, but only rarely, and certainly a 25-pounder shell bursting squarely on say a Mark IV would do it and its crew no good whatsoever. A near miss would also have a fairly good chance of rendering it unservicable by blowing off a track, for example, and this would have a much greater chance of happening. Indeed the likelihood of the first—the direct hit on an individual tank—is so small that it would be unfair at this stage to make a rule including this possibility. The chances of partial damage are far greater, and we shall reflect these in the rule which lays it down that, if the effect throw is 5 or 6, then the tank is immobilised (until it can be repaired). 1 to 4 have no effect. No separate dice throws are required for the crew of the stricken tank which, although rendered incapable of movement, is still fightable and can use its gun on any target in sight.

The third and final category of vehicle we have to consider is that which comes between the tanks and the soft-skinned lot, and this is comprised of such things as armoured half-trucks and armoured cars. For them we say that—if within the lethal area—they will be destroyed by a 6, immobilised by 4 and 5, and unaffected by 1, 2 or 3. Personnel in the half-tracks have to be thrown for if their vehicle is destroyed (as was done at "Twin Farms")—4, 5 or 6 sufficing to 'kill'. If the half-track is immobilised, the chaps within are O.K.

Briefly then, we recapitulate the procedure for artillery. First, we have the F.O.O. who races ahead of his guns and who, once he gets a target in his sights, radios its position back to his battery which opens fire. In wargame terms the player throws a die in an endeavour to get his 'ranging' shot—when this is obtained, the shell-burst device is placed on the target and a dice throw made to show the position of the shell burst. This is followed by effect throws for whatever, or whoever is in the relevant rectangle. This is a pretty straightforward process, and we need only summarise the necessary effect throws on the various types of target vehicle.

Our photo overpage shows a wargame 'town'—just about the size and type suitable for some hectic street fighting. Above right: The shell burst indicator. Right: Motorised infantry have just 'dismounted' preparatory to moving into built up area.

LIFE-BOATS to the RESCUE



The voluntary organisation which every year is responsible for saving literally hundreds of lives

WHENEVER A human life is in danger on the seas anywhere around the British Isles, a life-boat crew goes swiftly to the rescue. This merciful work has been carried on continuously, through wars as in peacetime, for the past 145 years. During nearly a century and a half more than 90,000 lives—or about 50 lives every month—have been saved by the life-boat service.

Last year was the busiest ever, in the way of calls, in the history of the Royal National Life-Boat Institution since its foundation in 1824. Station life-boats and inshore rescue boats were launched 2,294 times—a new annual record—and 1,003 lives were saved. Like every previous year, 1968 brought many dramatic stories of rescue and of the selfless heroism and bravery of the life-boat crews.

Just as the R.N.L.I. began and still remains as a wholly voluntary organisation, so every life-boatman is a volunteer. Most of them earn their living in other ways, for usually there is just one full-time member of the crew (the motor mechanic) at each station. But when the call comes to save life, they leave whatever they are doing to serve in the life-boat.

S.O.S. calls from fishing vessels and other ships in distress keep the life-boat crews busy in spells of bad weather. But increasingly heavy demand is made on the rescue services by yachtsmen and other pleasure sailors whose numbers continue to grow all around our coasts year by year. Nowadays the spring and summer months are the busiest for the life-boatmen who,

Our heading photograph is of one of the two 70-foot steel life-boats. They are designed to remain at sea for several days, and are the only life-boats with sleeping quarters. Left: One of the many Inshore Rescue Boats speeding to a rescue. These "nippy" little craft each do well over 20 knots. Above right: The 48½ foot Oakley life-boat that automatically rights itself if it capsizes. Right: The latest in experimental boats—this 40 foot life-boat has a glass reinforced plastic hull and deck.

apart from rescue work at sea, also go to the aid of people stranded at the bottom of cliffs or cut off by the tide.

It was because of the huge growth of pleasure boating that the R.N.L.I. introduced the inshore rescue boat service in 1963. There are now about 100 IRB's in operation on the coasts, and these were alone responsible for saving over 500 lives last year. The small, very fast and highly manoeuvrable craft, driven by an outboard engine, can do well over 20 knots. They can strike rocks, piers or other craft without serious damage, and have proved their worth in rescue situations near the shoreline where the much larger station life-boats could not easily operate. An IRB and equipment costs £1,000.

During the last few years the R.N.L.I. has also been modernising its standard life-boat fleet which is based at nearly 150 stations round the British and Irish coasts. New types of life-boat, capable of greater speed and range, are now coming into service. All the modern boats are powered by twin diesel engines and carry the latest electronic communications equipment.

The largest type of life-boat in service is the 70-foot class. It is built of steel and designed as an all-weather rescue craft able to stay at sea, if necessary, for days at a time. The first two boats in this class were launched in 1965-66. One of them is based in the Bristol Channel area and the other at Kirkwall, in the Orkney Islands. At the maximum speed of 11.14 knots, the 70-foot life-boat has a range of 650 nautical miles (or 860 nautical miles at the cruising speed of 10.4 knots), and this gives the craft a wider range than any of the R.N.L.I.'s standard life-boats.

These 70-foot boats, unlike the rest of the fleet, have sleeping facilities aboard for members of the crew. There is also good accommodation for people who have been rescued. At the aft end of the wheel-house is a small messing cabin and galley equipped with an electric cooker and refrigerator. Each life-boat carries two additional rescue craft on board. One is an IRB stowed, ready inflated, on the engine casing for-ward of the wheelhouse; the other, a smaller deflated boat of similar type stowed in the forward cabin.

The R.N.L.I. now has two standard types of life-boat which will right themselves automatically if they capsize. The newest and largest self-righter is the 48-foot 6-inch Oakley life-boat, the first of which was put into service in 1963 and stationed at Cromer, Norfolk. In the next year or two ten more of the same type will be built. Present cost is £72,000.

The other self-righting boat is the earlier 37-foot Oakley class. When this was first introduced into service in 1959 it was in some respects of revolutionary design. One-and-a-half tons of water are placed in a ballast tank, and should the boat capsize most of this water is speedily transferred through rectangular pipes into a righting tank on the port side. Thus the boat (which costs £38,500 to build) will automatically right itself again in five or six seconds.

While there is nothing new about the self-righting principle—the idea was incorporated into a life-boat model as long ago as 1790—the really remarkable feature of the Oakley life boat is that she has greater initial stability than non self-righting boats of the same class. This was not so in the case of earlier self-righters.

Another of the recent additions to the R.N.L.I. standard fleet is the 44-foot steel life-boat. Based on a design of the United States Coast Guard, the first of a fleet of six was completed in 1966 and named after the late U.S. President, John F. Kennedy. The 44-foot class is faster than any other standard life-boat and is

capable of a maximum speed of 14 knots. Its range is 205 miles at 12 knots or 305 miles at 10 knots.

Throughout its history the R.N.L.I. has striven constantly to improve the safety and efficiency of life-boats to provide the volunteer crews with the best boats and the best equipment available. So the develop-ment of the life-boat from the early days is a record of continuous improvement in design, construction and equipment—from boats propelled with oars, through a brief experiment with steam, and then by way of petrol engines to the twin-screw diesels of the present day.

Life-boat communications, which naturally play a vital part in the task of saving lives at sea, have similarly kept abreast of invention. Over the years they have steadily advanced from visual signalling methods to the equipping of the life-boat fleet with medium frequency ship-to-ship and very high frequency ship-to-shore radio telephones. Ultra high frequency radio telephony is also installed in all the new boats and others to improve communications with helicopters and other aircraft which nowadays assist to an ever increasing degree with offshore rescue operations.

The life-boat service also works in close co-operation with H.M. Coastguards who man more than 300 look-out stations at vantage points all round the coasts of Britain. Very often it is a local coastguard on watching duty who first reports a vessel in distress to the local life-boat station. The coast radio stations of the Post Office also play their part in handling distress calls from ships and passing them on speedily to the rescue organisations. Through the means of radio-telephony a chain of operations can be set in motion in the shortest possible time, which may mean all the difference between life and death at sea.

Above: The other Oakley self-righter is a little smaller—only 37 foot. This one utilises ballast tanks to right it. Below: This 44 footer has a maximum speed of 14 knots, which is faster than any other standard life-boat in the R.N.L.I. fleet.

All the great advances of the twentieth century—in life-boat design and equipment, telecommunications and co-operation with aircraft—have made the arduous work of the gallant life-boat crews very much more efficient than in the past. But their tasks are still carried out, nevertheless, in the face of the unpredictable hazards of the sea tides and the weather. The Longhope life-boat disaster of March, 1969, is a reminder, so when all is said and done, the essential qualities of the life-boat service are those human virtues of courage, fine seamanship and the readiness at all times to go out and face unknown dangers to rescue the lives of others when in peril. Britain's life-boatmen, who give us a supreme example of voluntary service to the community, possess those qualities in the fullest measure.

Help Launch a Lifeboat

Now you have read the article you will have a greater understanding of the vital work performed by the R.N.L.I. and will also have an idea of the tremendous amount of money needed to keep this organisation equipped with all the latest scientific devices. Naturally the most essential piece of equipment needed is the lifeboat itself, an item which can cost over £30,000, all of which must be raised by charity. Birds-Eye the famous frozen foods company have introduced a scheme of "Tokens", given free with every packet of frozen fish fingers, which when posted to the company will be changed into hard cash and saved until there is enough money to purchase a brand new lifeboat, which will then be donated to the R.N.L.I.

We thought it might be a good idea to see just how many tokens, in conjunction with our readers we could save and hope you will co-operate with us by sending in your tokens to the address given below. Every month at the foot of the "Workbench" page we will print the number of coupons received at time of publication, so tell Mum not to throw away those Fish Finger wrappers, but send them in to us!

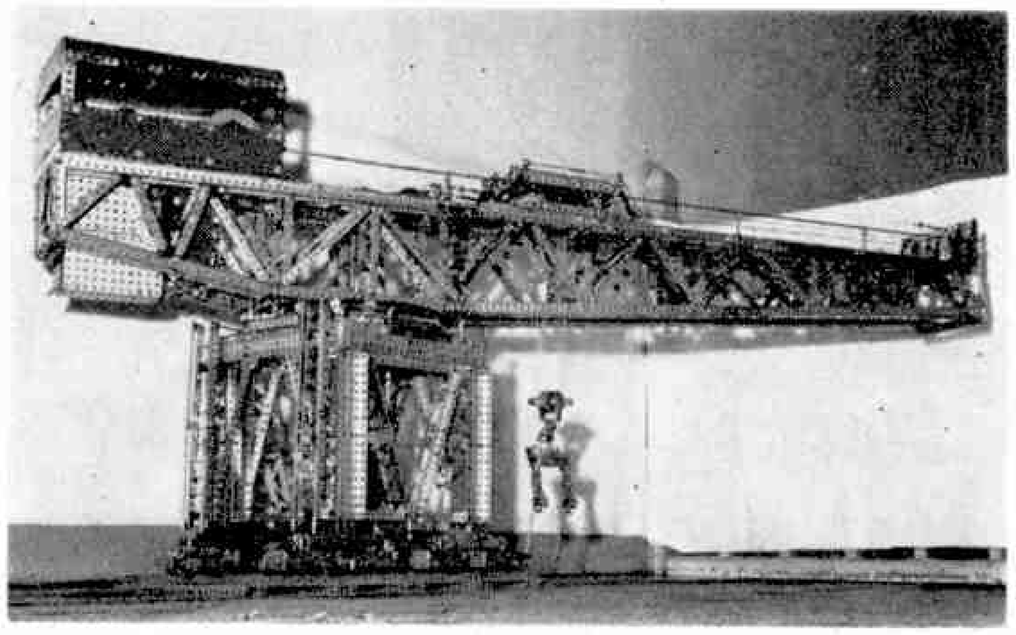
Birds-Eye Lifeboat Fund, c/o Meccano Magazine, 13/35 Bridge Street, Hemel Hempstead, Herts.

MORE PRIZE-WINNING MODELS

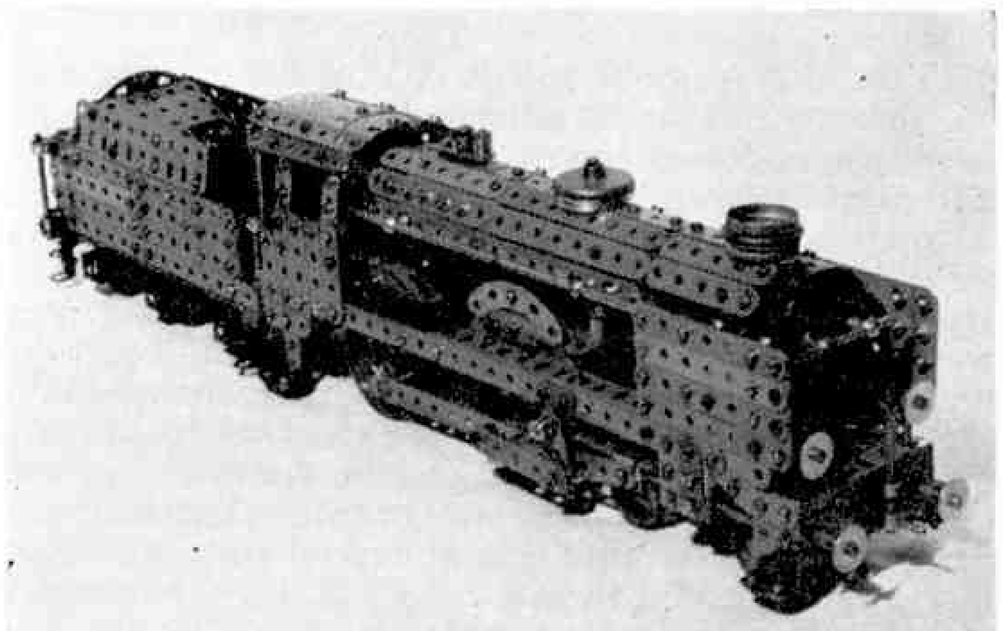
by Spanner

JUDGING BY the number of letters we have received since photographs of winning models in the last Meccano Model-building Contest appeared in the June issue of the M.M., Meccano modellers are keenly interested in the work of their fellow hobbyists. By popular demand, therefore, we feature here most of the remaining prize-winning entries which were accompanied by photographs suitable for reproduction. Not shown is a first-class Naval ship which we plan to feature in greater detail next month.

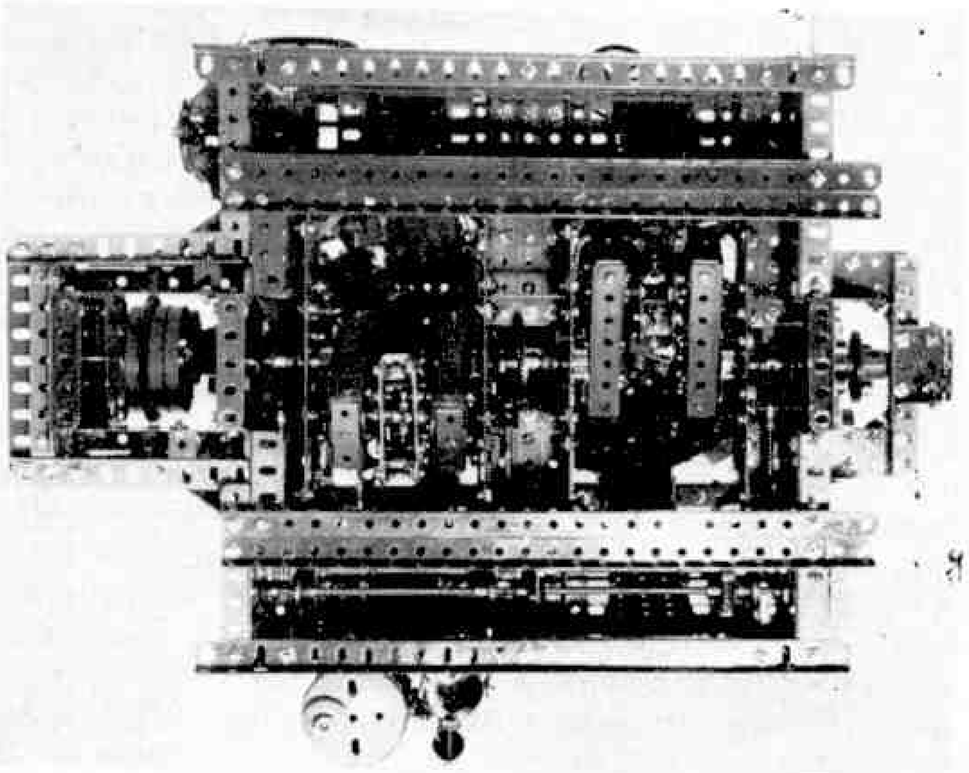
As a matter of interest, when we have published photographs of prize-winning models in the past, unsuccessful entrants have been known to write to us complaining that their particular entry was better than one or more of the winning models illustrated. In case anybody is already composing a similar letter now, I must stress that the competition judges take many things into account when choosing the winners and often their reasons for awarding a prize are not fully evident from one small photograph reproduced in the Magazine. In any case, the judges' decisions are final, and, by entering the Contest, competitors automatically agree to accept the decisions of the judges which, for this very reason, are always stated in the competition announcements to be final. Consequently, no complaints of this type can be answered.



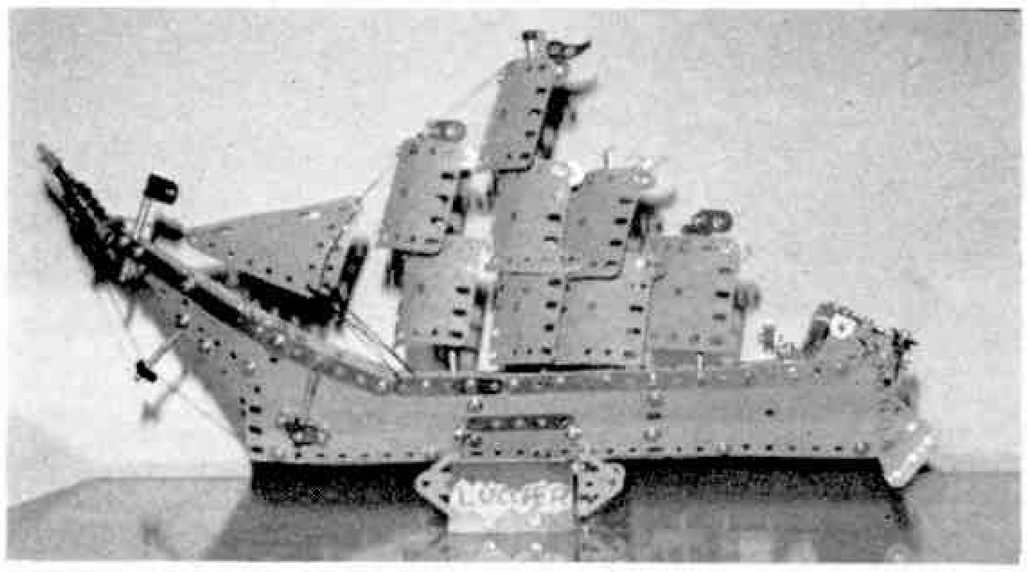
Section B entries included a generous number of really large, detailed models covering every conceivable subject and the difficulties involved in judging them were considerable. Winners were finally chosen, however, and among them was J. van Dyk of Apeldoorn, Holland who netted a one guinea consolation prize with the Giant Black-setting Crane shown in the illustration (above). The model is minutely detailed and accurately reproduces all the many movements of a full-size Block-setter.



Railway locomotives, especially steam locomotives, are always entered in considerable numbers in every "open" model-building competition and at least one of them usually carries off a prize. The last contest was no exception as can be verified by Stanley Jones of Chester who won £1. 1. 0. with this model which closely resembles a 4-4-0 Class V locomotive designed in 1930 by R. E. Maunsell for the Southern Railway. The model is particularly interesting because of its predominant Strip and Girder construction, resulting in a very strong and rigid reproduction. Very little use is made of Flexible Plates which makes the Locomotive rather reminiscent of pre- and early post-war models when Flexible Plates did not exist. No doubt many older readers will already have noticed the resemblance.



Meccano enthusiasts can be found in almost every country throughout the world and Holland, particularly, is the home of many first-rate modellers. The photograph (above) shows the work of another Dutch enthusiast, Mr. H. Groen of Badhoeve Dorp who, like his countryman Mr. van Dyk, gained a £1. 1. 0. prize in Section B of the Contest. His model was based on a 2-cylinder Compound Steam Engine, of the type used for ship propulsion, and incorporated just about everything to be found on an original engine. The above is an underside view of Mr. Groen's 2-cylinder Compound Steam Engine showing the entire crankshaft. Notice the complexity of the build-up cranks.



Entries in the Contest included many "old faithfuls"—types of models which frequently appear—but there were a number of models which stood out because of their originality of subject. One such example was this Sailing Clipper, built by Peter Spiers of Walsall, Staffs, which collected third prize in Section A.

ON TWO WHEELS

Meccano Staff test and report on one of the new breed of lightweight Motorcycles

WITHOUT A doubt the most impressive feature of this machine is its outstanding comfort. Well designed suspension accounts largely for this, but most credit must be given to the large, wide, dual-seat. In fact the *Suzy* is the most comfortable light weight we've ever ridden. Vibration through the handle bars is virtually non-existent, mainly due to the fact that they are mounted on hard resilient rubber mountings—the handlebars are straight and flat and are panelled in with a plastic cover. The speedometer (complete with mileage recorder) is situated in the centre of the handlebars and is extremely easy to read. Also included in the speedometer unit are a neutral gear indicator lamp (a rather useful device, especially for a beginner), and a direction indicator warning lamp. This one had us rather puzzled. During the day it was impossible to see it, due to its low power and poor positioning, and at night the indicator lamps themselves were plainly visible when in operation thus rendering the warning lamp useless!

Layout of the controls on the handlebars is good, switches being easily reached by the thumbs of either hand and possibly more important, easily operated.

The left hand controls the choke lever, horn button and main beam dip lighting switch, and the right hand throttle, front brake lever, and direction indicators.

Lighting on the *Suzy* is good and both main and dipped beam are more than adequate for its modest speed. The on/off switch for the lights is achieved by turning the ignition key (located centrally inside the centre of the legshield) a further $\frac{1}{8}$th of a turn clockwise.

The Bodywork

Extensive use is made of plastics on the machine and there are many advantages in using this material for components. Plastics are virtually unbreakable, and certainly won't dent or show scratches as do their metal counterparts. They are also less prone to rattle, and are lighter in weight than metal ones.

The list of plastic parts on the machine is as follows:—

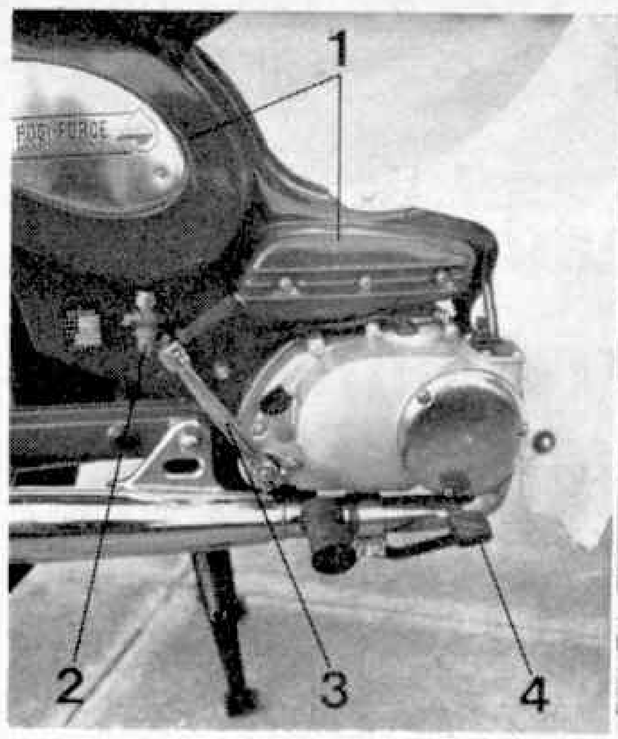
Front and rear mudguards; oil tank cover; chainguard; toolbox lid; legshields; headlamp and horn cowling.

Colour matching between plastic and metal parts is superb; it being almost impossible to detect one from the other by appearance.

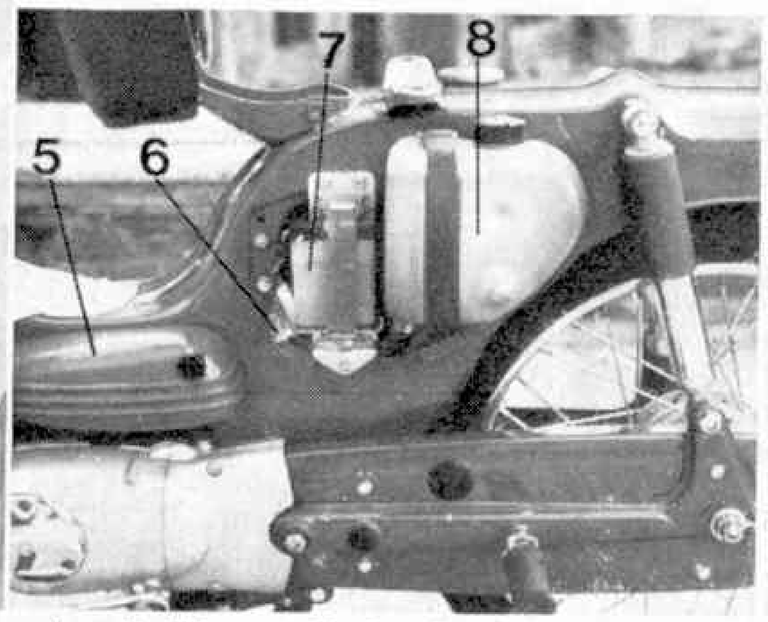
The lines of the *Suzy* are clean and smart without being over fussy, and on overall looks creates the impression that it is a larger machine engine than it really is. The legshields provide adequate weather protection, even for a six-footer, but the light ivory colour easily shows the dirt. As you will have seen from the accompanying photographs, the colour scheme is two-tone. It is in fact ivory and dark grey: a pleasing combination.

The Engine

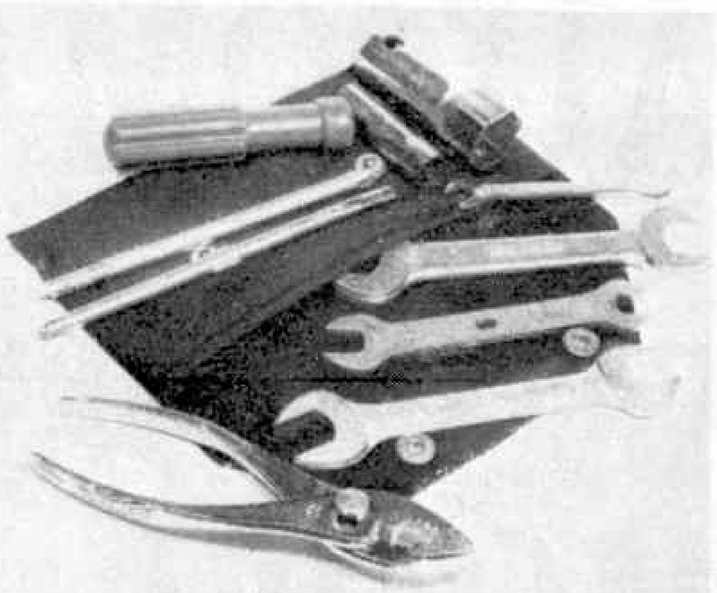
Power unit for the *Suzy* is a 49 cc two-stroke with "Posi-force" lubrication. In this system the fuel is supplied separately from the oil unlike most two-strokes, and the manufacturers claim that this system reduces engine wear by ensuring that the engine determines for itself exactly how much oil it needs for any given conditions. Certainly it makes for cleaner running, the *Suzy* being without the usual smoky cloud which is the trade mark of the normal two stroke. We



1. On the left is shown the fuel tank, and centrally below the air cleaner. 2. The fuel tap has three positions, ON/OFF/RESERVE. 3. The folding kickstart lever folds neatly out of the way when not in use. 4. The footbrake lever situated forward of the footrest.



5. The small plastic tool compartment. 6. Spare fuses for the electrical circuits. 7. Lead/acid accumulator. 8. Oil tank for the engine oiling "Posiforce" system. (Both battery and oil tank are shown with the cover removed.)



A comprehensive tool kit supplied with the machine contains the following tools: Screwdriver, with combination of four blade types. Four assorted open-ended spanners. Pair of pliers. Two box spanners: one for cylinder head and one for the sparking plug.

found being able to fuel up from an ordinary petrol pump far less bother than having to seek out a two-stroke type.

However back to the engine proper. Our test machine never failed to start after at the most the second prod of the kickstart, and providing the choke was progressively opened as it warmed up, it never missed a beat. The unit is fairly quiet until it reaches around 35 m.p.h. when a distinct vibration is apparent. This disappeared however upon reaching approximately 38 m.p.h. For its size the engine is powerful and easily pulled a pillion passenger on all but the steepest gradients when a "hill start" was attempted.

The Gearbox

The gearbox is a three speed semi-automatic. There is no manually operated clutch on the *Suzy*, gear changes are made by simply giving the foot operated gearchange a firm prod with the left foot. Take up in all gears is very smooth, and of course with an automatic clutch the engine is impossible to stall.

The gearchange itself when changes at low speed are made is extremely smooth, but if changes are made with the engine running rather more quickly tend to be a bit "clonky" and are best tackled by shutting the throttle momentarily whilst a change is made. We had fears for its safety at first, but the Suzuki is a very forgiving little machine, and was as happy at the end of our test, some 60 miles later, as it was at the start.

Summary

All of our test riders liked the machine, and were unanimous in their opinions that as a cheap—easily managed mount it was first class. All commented on the high degree of comfort and the powerful, smooth brakes. Some commented on the rear lamp size, they would have preferred it to be larger and include a reflector, whilst at present it is a separate item fitted below the number plate. But to criticise such a small point is perhaps a bit churlish.

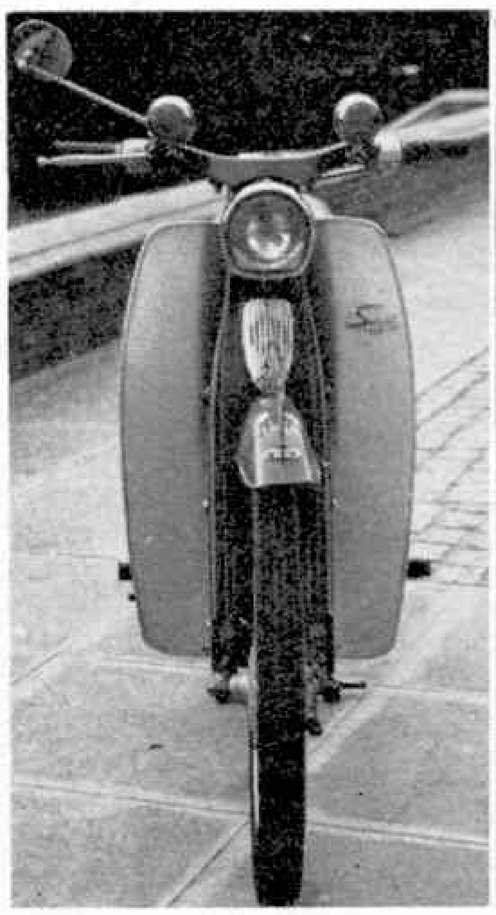
A small auxiliary light in the headlamp would have been useful for well-illuminated town driving at night. Although oncoming drivers gave our riders no sign that they disapproved of a dipped headlight.

Accessories

Available extras for the *Suzy* include a carrier and a windscreen.

FOR THE TECHNICALLY MINDED

Cubic capacity:	49 ccs
Maximum power:	4.1 b.h.p. at 6,000 r.p.m.
Consumption (per gal.):	180 m.p.g. at 40 m.p.h.
Weight:	154 lbs
Gear ratios:	1st—36.76 : 1 2nd—18.55 : 1 3rd—12.57 : 1
Tyres:	2.25 × 17 ins
Lubrication:	By separate oil tank using Posi-Force system
Common dimensions:	Length 70.9 in. Width 24.2 in. at handlebars. Height 38.8 in. Wheelbase 46.5 in.
Available colours:	Two-tone ivory or dark grey/red/blue/or black
Price:	£98.19.6 inc. tax



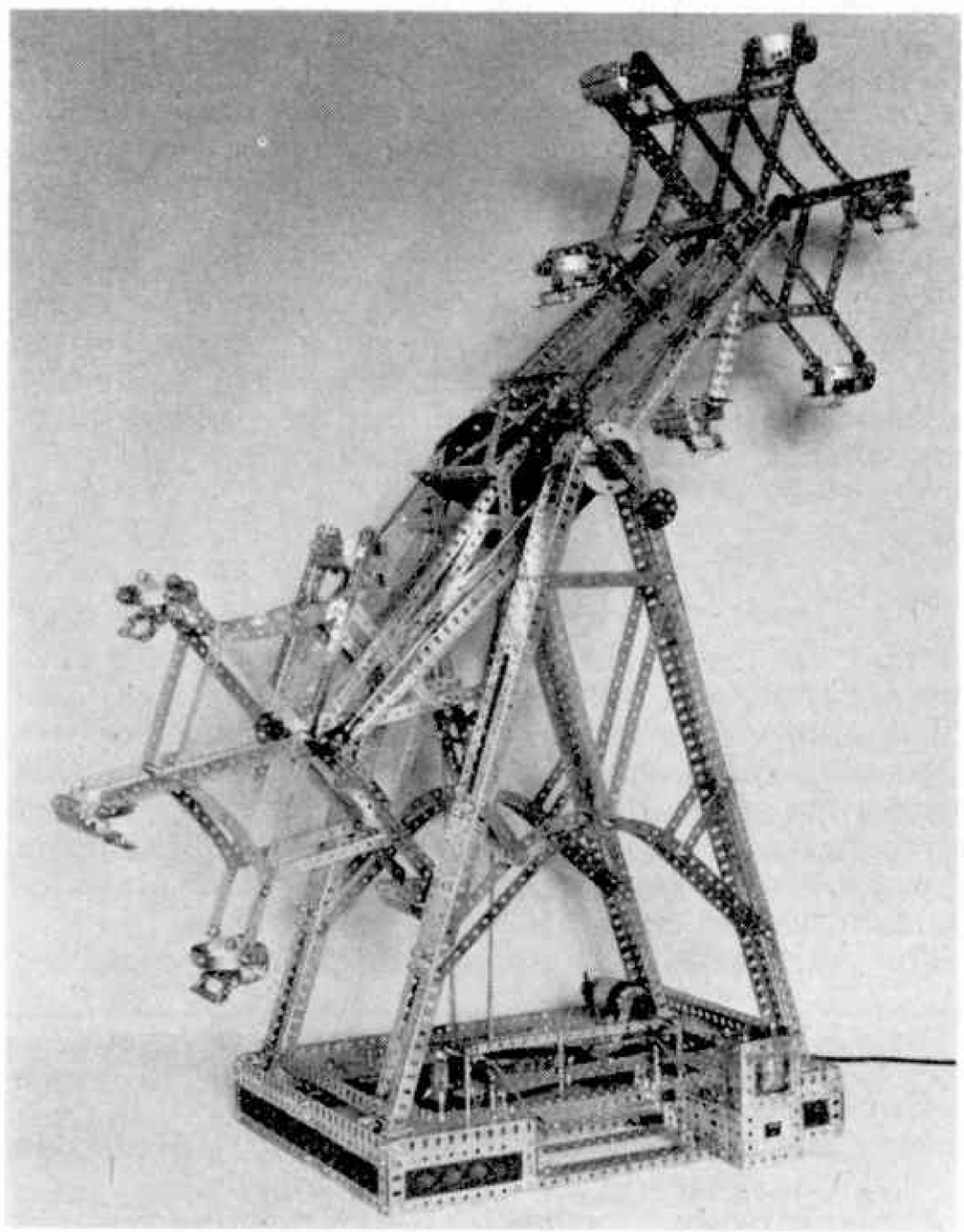
AUTOMATED FAIRGROUND MODEL

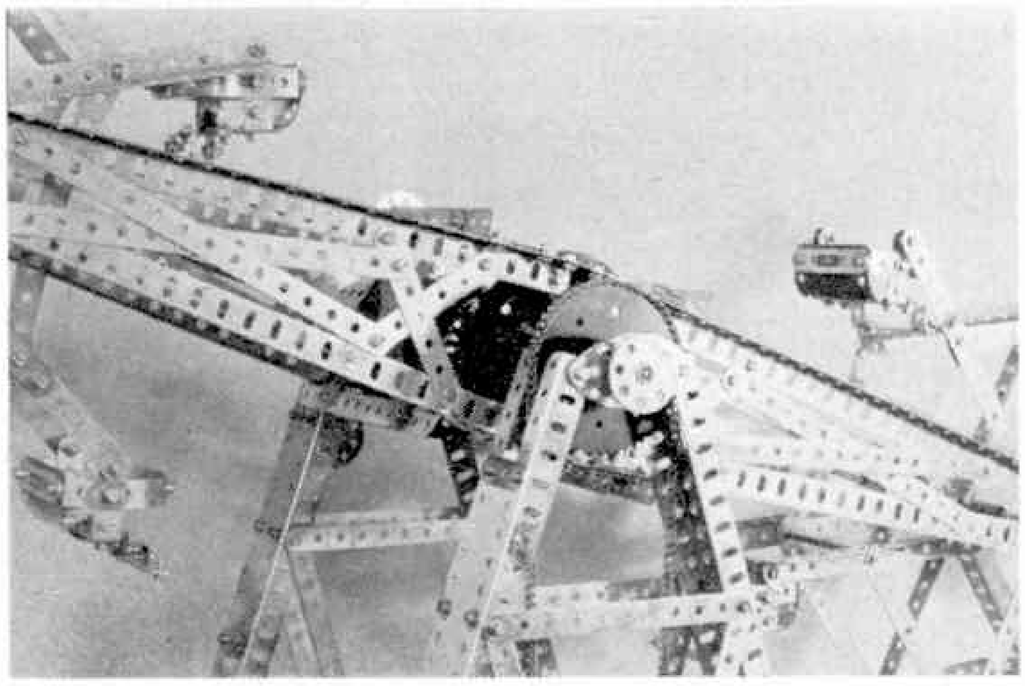
A reader's self-programming fairground model, photographed and described by B. N. Love

FAIRGROUND TOPICS provide a rich source for the Meccano modeller who " loves to watch the wheels go round " and, as a result, plenty of fairground models have taken shape under the hands of Meccano modellers. Roundabouts, swings, dodgems, ferris wheels, jets, flying cigars—all sorts have been produced over the years and examples of most of them have appeared in Meccano Magazine at some time. A model which to the best of my knowledge is new to Meccano Mag., however, is this advanced and extremely fascinating construction designed and built by P. V. Ashworth of Hull, Yorkshire. Belonging to the Ferris or Big Wheel family, it is, in fact, a contra-rotating Double Ferris Wheel based on a novel machine which is to be found from time to time in the larger and well established fairgrounds such as the one in the Festival Gardens at Battersea. Phil Ashworth has gone two stages further than usual in presenting his model for not only do the wheels and passenger cars revolve in correct sequence for loading, riding and unloading but the model is completely self-programming and hence fully automatic. It has already proved its reliability at exhibitions and fund-raising activities for charities where it has run for long periods without attention.

A general view of the model appears in one of the accompanying photographs and it will be seen from this that the contra-rotating wheels are mounted at the extreme ends of a stout cross arm made from Angle Girders braced with Strips and Brackets. This cross arm receives its motion through a Chain and Sprocket drive from the machinery platform below, and is supported at the top of two rugged ' A ' frames made from eight 24½ in. Angle Girders bolted up in pairs and securely braced to form rigid supports for the revolving structure. The foot of each ' A ' frame is then firmly attached to the base by 1½ in. Angle Girders.

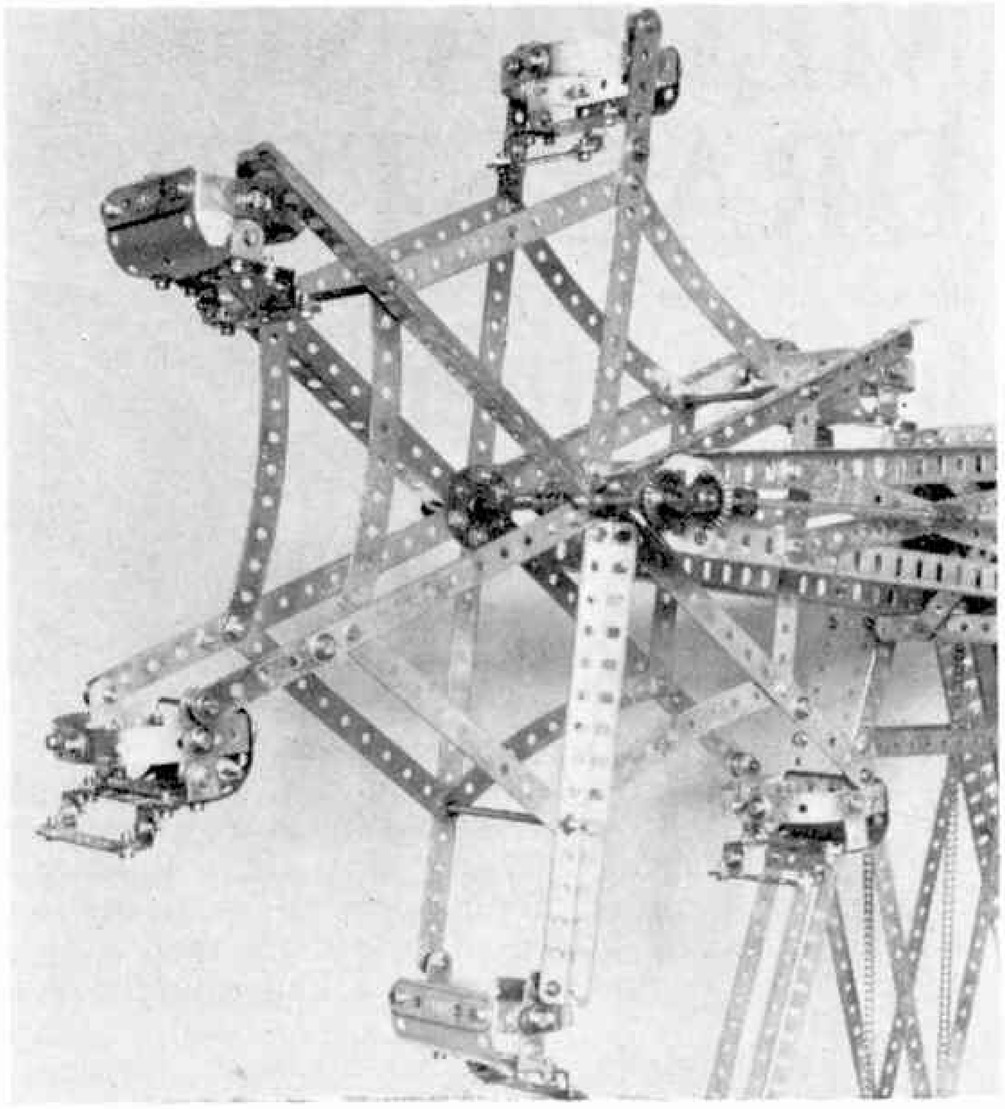
Motion is transmitted to the two contra-rotating wheels by bevel gearing driven through an ingenious epicyclic reduction box mounted on the main pivot rod





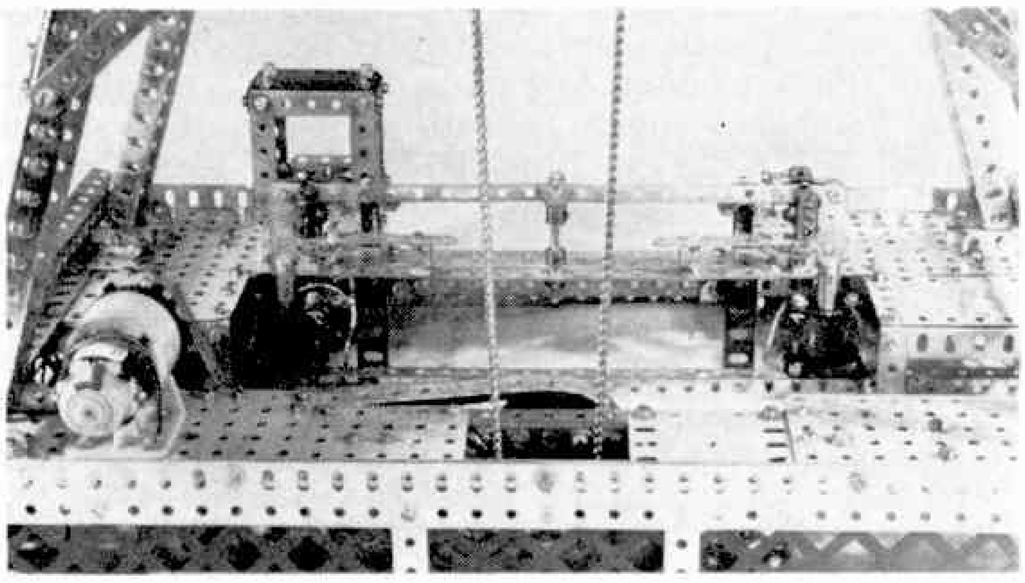
Above: This outstanding model of a contra-rotating Double Ferris wheel was designed and built by M.M. Reader P. V. Ashworth of Hull, Yorkshire. Not only do the wheels and passenger cars rotate in correct sequence, but the model is completely self-programming and thus fully automatic. Left: A close up view at the top of the ' A ' frames showing the main pivot as well as most of the cross-arm bracing.

Right: This photograph shows one of the two Ferris Wheels incorporated in the model. The construction of the wheel and the passenger cars is clearly shown. Note the Bevel drive to the wheel's axle.



at the centre of the cross arm. This is arranged to drive the two wheels in opposite directions but keeps the passenger cars in strict phase so that when the cross arm is in the vertical position, the lower wheel presents two of the passenger cars parallel with the base for loading the cars in pairs.

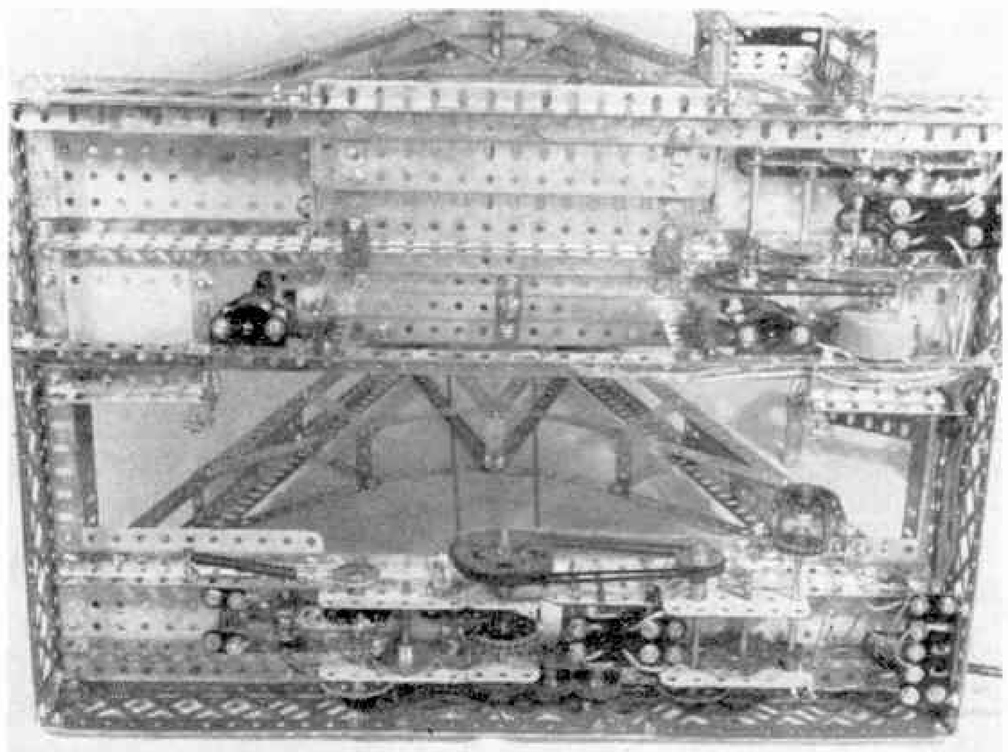
When the first two cars have been loaded, the cross arm makes half a revolution thus bringing the upper wheel down to the loading platform. This operation is repeated, wheel by wheel, until all cars are loaded. At this stage the machine goes into a 'ride' motion for a pre-determined length of time and then stops itself and automatically goes through the unloading operation which is a repetition of the first sequence of operations. It is interesting to note that the locus, or path drawn out in space, of any one passenger car is that of an equilateral triangle so that passengers are not given a 'circular' ride as one might suppose at first glance but a rather more exhilarating motion similar to that provided by the Fairground 'Whip' but in a vertical plane rather than a horizontal one. Automatic safety barriers, actuated by solenoids, built up from Elektrikit parts, open and close during the loading/unloading operation. In fact it is perfectly true to say that the entire sophisticated programme switching mechanism depends upon the outstanding versatility of the Elektrikit system.



Main drive comes from a Power Drive Unit mounted on the machinery platform and this operates the main gear-box which provides the Sprocket drive to the cross arm. Twin rubber belt drive is used after the first reduction gears from the Power Drive Unit to facilitate a strong, quiet drive, but, from that stage onwards, all drives are directly geared to ensure synchronisation of the various motions and their controlling switch gear, The main gear box is also responsible for operating the primary switches which cut off the main motor at the appropriate stage of operation, but, as the main motor would then be 'dead,' an Emebo Motor is automatically switched on to operate the secondary switches which re-energise the main motor after a pre-set pause. The safety gates are also wired into the switching circuits to operate at the correct time.

The general layout of the gear boxes and switching mechanism is shown in the illustration below. The mechanism for switching each circuit is in the form of a simple cam made from ordinary Bush Wheels or Elektrikit Bush Wheels fitted with standard Meccano Bolts. These raise the contact arms made from $2\frac{1}{2}$ in. Insulating Strips which are in turn fitted with $\frac{1}{2}$ in. or $\frac{3}{4}$ in. Meccano Bolts acting as contacts. Each contact arm is attached by a locking Bolt and a Washer to a Collar mounted on a short Axle Rod, on which it pivots. The rear end of each Insulating Strip is sprung by a Compression Spring on the shanks of opposing Bolts. This is an excellent example of the sound combination of Elektrikit parts with standard parts.

A full description of the mechanics and electrical circuits could not be given here in the space available, but for the benefit of readers who are interested in constructing this advanced model, full building instructions, wiring diagrams and additional whole plate photographs have been prepared by the Midlands Meccano Guild. Details of how to obtain these may be had by sending an S.A.E. (9 × 4 in. foolscap) to B. N. Love, Hon. Sec., 61 Southam Road, Hall Green, Birmingham 28.

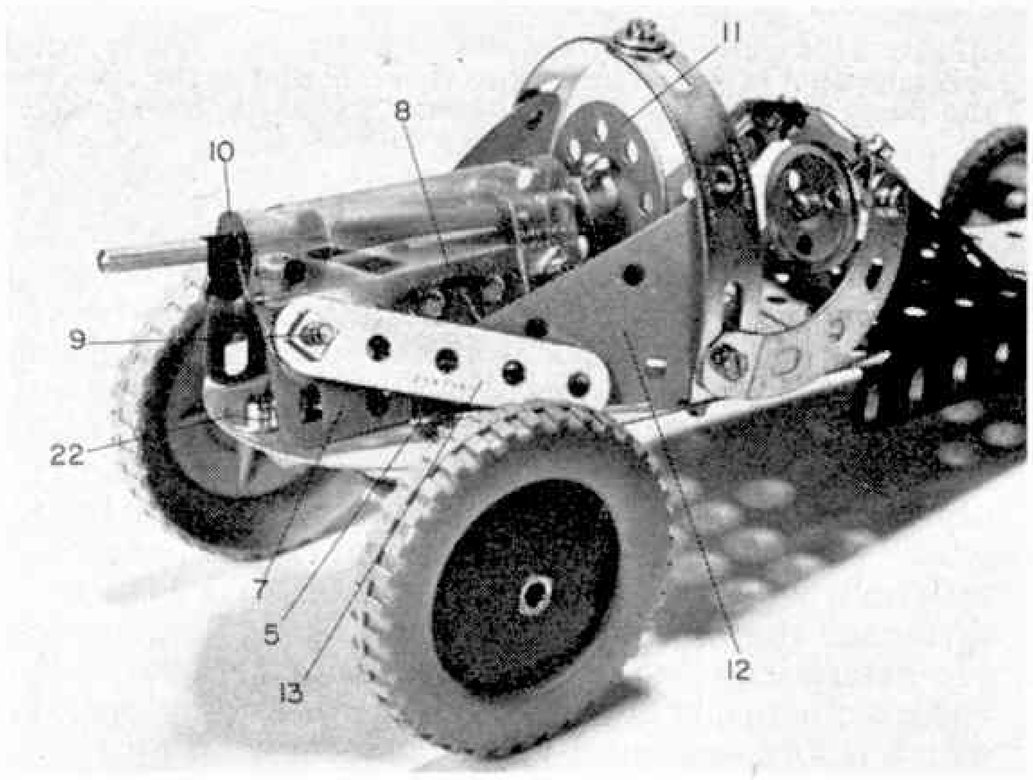


Above: This rear view of the base of the model shows the Power Drive Unit mounting, the safety barriers and their controlling solenoids. These solenoids are built up from parts of an Elektrikit set. Right: Some idea of the complexity of the Drive and programming systems can be had from this underside view of the model. Note the secondary Emebo Motor which is necessary for successful operation.

MECCANO DRAGSTERS

by Spanner

Two man fun from a No. 4 set



NOUGHT TO two-hundred m.p.h. from a standing start over a quarter-of-a-mile in eight seconds—that's performance! That's also Drag Racing, the latest, most exciting motor sport to thrill the speed fans and the one that uses little more than a mighty supercharged engine carried in a long spindly chassis to do it!

Not all dragsters can clock-up such phenominal speeds in such a short distance as the above example, of course, but most of them can manage considerably more than 150 m.p.h. in less than ten seconds over the ¼ mile. That's still travelling.

Drag racing is becoming increasingly popular in this country, although it still has a long way to go before it reaches the stage of popularity it has attained in America—the country which invented the sport. This may take some time but, in the meantime, owners of a No. 4 Meccano Set can at least experience some of the excitement of Drag Racing in miniature with the models featured here—two identical little Dragsters! Both models are built from the one Outfit, as also are two simple propulsion catapults which shoot the Dragsters forward in a good racing manner. An alternative "built-in" drive system is also available, as I will describe later.

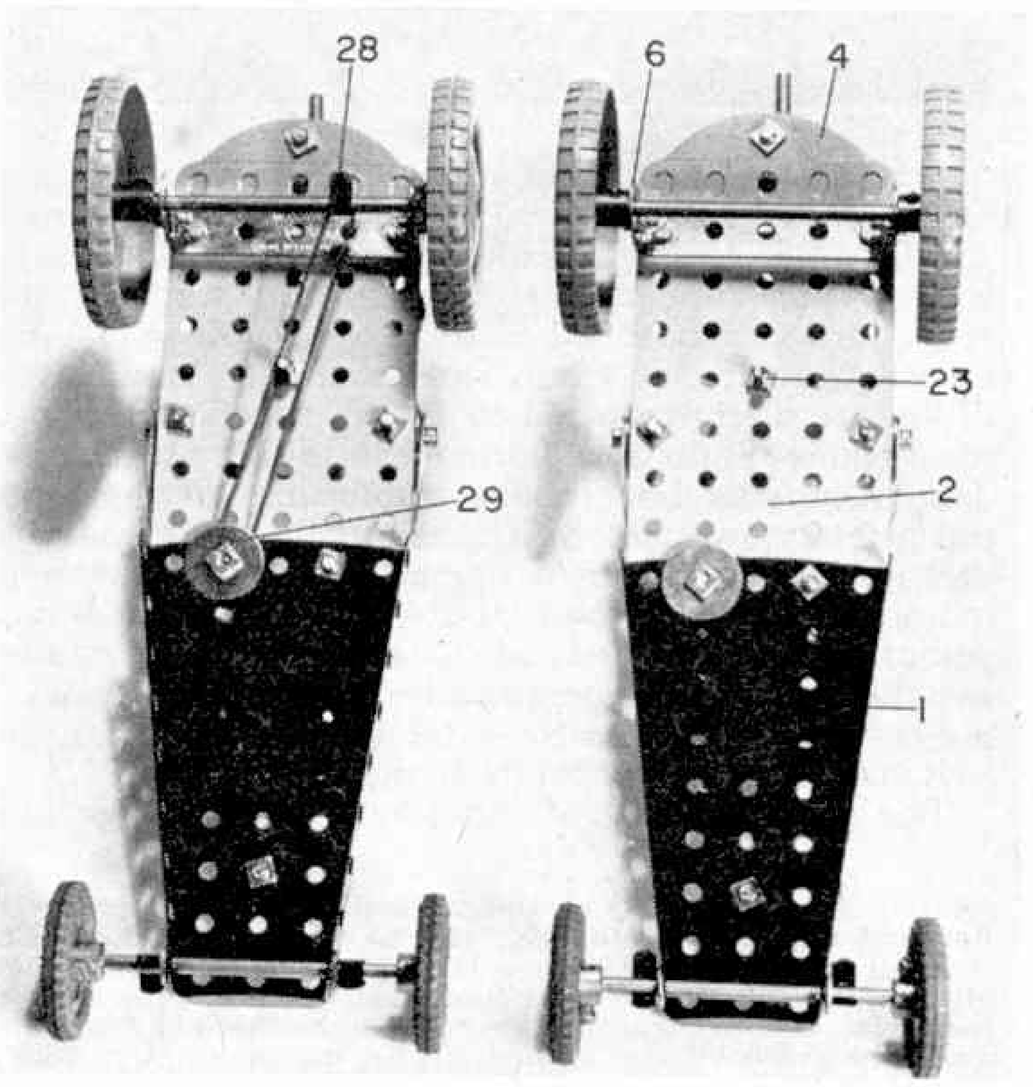
Starting with the basic models, both of these are similarly built from a Flanged Sector Plate 1 extended rearwards by a 4½ × 2½ in. Flat Plate 2, the securing Bolts holding a Trunnion 3 in place. Plate 2 is itself extended one hole rearwards by a Semi-Circular Plate 4, the joining Bolts also fixing a 2½ × ½ in. Double Angle Strip to the underside of the Plate, and two Angle Brackets 5 to the top of the Plate. Two Fishplates 6 are bolted one to each lug of the Double Angle Strip, as shown.

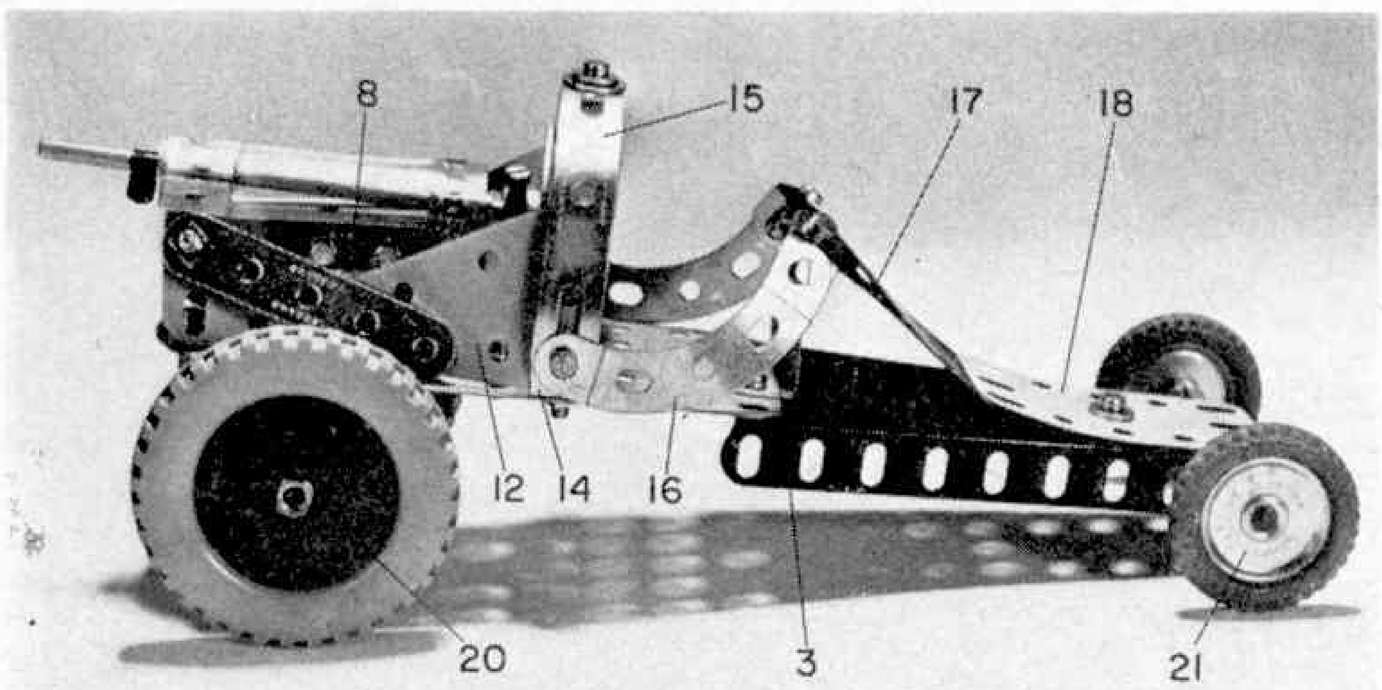
An engine representation is next produced in one of the models from a "U" section Curved Plate 7, this Plate on the other model being replaced by a 2½ × 2½ in. Curved Plate bent further to form a "U" shape. Bolted to Plate 7 in the positions shown are two 2½ in. Strips 8, the shanks of the securing Bolts pointing outwards. Note that ⅜ in. Bolts 9 are used to make the connection at the rear and that the front right-hand securing Bolt also holds a right-angled Rod and Strip Connector in position. Journalled in this Rod and Strip Connector and in a Double Bracket 10 bolted to the rear of Plate 7 is a 4 in. Rod held in place by an 8-hole Bush Wheel 11 at the front and by a Spring Clip at the rear.

The Plate is now bolted between Angle Brackets 5, the securing Bolts also fixing two 2½ × 1½ in. Triangular Flexible Plates 12 in position, one at each side. Once in place, a 2½ × 2½ in. Transparent Plastic Plate is curved over the 4 in. Rod and Double Bracket, to be secured by Nuts on the protruding shanks of Bolts 9, along with two 2½ in. Strips 13, angled as shown. The forward section of the Plate is held behind Triangular Flexible Plates 12.

Two Angle Brackets 14 are now bolted one through the fourth hole down each side of Flat Plate 2. The lower front corner of appropriate Triangular Flexible Plate 12 is attached to the free lug of each of these Angle Brackets, along with a Formed Slotted Strip 15 and a 2½ in. Stepped Curved Strip 16. Formed Slotted Strips 15 at each side are bolted together, while the front end of each Curved Strip is fixed to an Obtuse Angle Bracket bolted to a 2½ × 1½ in. Plastic Plate 17. This Plate is wedged beneath one end of a slightly curved 2½ × 1½ in. Flexible Plate 18 fixed by one centrally-mounted Bolt to Flanged Sector Plate 1.

Both the front and rear axles are supplied by 3½ in. Rods, that at the rear being held in Fishplates 6 by 2½ in. Road Wheels 20 and that at the front being held by Spring Clips in the forward end holes in the flanges of Flanged Sector Plate 1, a Washer separating each





Our heading photograph overpage is a close-up view showing construction of the simulated engine. The picture below shows the underside view of the two models. The one on the left is fitted with the special drive system. Left: The simple but effective construction of the Dragsters can be seen in this view. Below: The two catapult starters used to propel the models.

Clip from the Plate. Two 1 in. Pulleys with boss 21, fitted with Motor Tyres, serve as the front road wheels, while a 1 in. Pulley without boss is bolted to the apex of Trunnion 3 to represent the steering wheel.

Finally, a ½ in. Reversed Angle Bracket 22 is bolted to the top of the Semi-Circular Plate fixed to Flat Plate 2, the securing Bolt passing through the rearmost hole in the Semi-Circular Plate, then a ½ in. Bolt 23 is secured, with its shank pointing downwards, in the centre hole of Plate 2. This Bolt serves as the anchoring point for the propulsion catapult, two of which are each produced from two diverging 12½ in. Strips 24, bolted together at one end, but separated through their thirteenth holes by a Flat Trunnion 25. One or more elastic bands are secured between the open ends of the Strips by Washers on Bolts.

In operation, Bolt 23 on the Dragster engages with the elastic band. The catapult is placed on the ground and the Dragster backed up over it until the band is sufficiently stretched. When the model is released, away it goes!

As two Dragsters and catapults can be built up with the No. 4 Set, a couple of people can have a good deal of fun racing them. A long track is not needed, bearing in mind the idea of full-size Drag Racing is to run a very short straight course in the fastest time possible. All you need are " start " and " finish " posts and the first past the finish post is the winner. The two posts shown here can both be built with the parts still remaining in the No. 4 Set, each consisting of two 5½ in. Strips 26 bolted to the boss of a 3 in. Pulley. Fixed to the upper end of the Strips are another 5½ in. Strip 27 and a 5½ × 1½ in. Flexible Plate, to which a piece of paper or card, carrying the word " start " or " finish ", is attached.

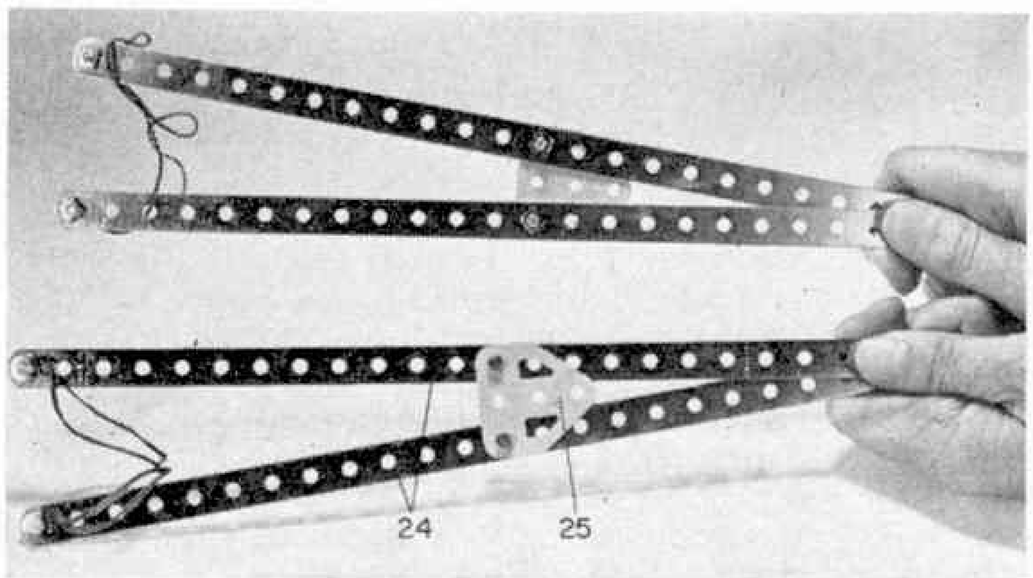
One of the joys of the game, if you like to call it that, is that some interesting " conversions " can be carried out by using different bands on the catapult: trying bands of different sizes and thicknesses as well as using different quantities until the best results are achieved. Added road " grip " can be given to the cars, too, by sticking tape round the rear wheels. It all increases the fun!

At the beginning of this article I mentioned a built-in drive unit. This consists of an elastic band, one end of which is attached by a Spring Clip 28 (see photo) to the rear axle of the Dragster, the other end being held on one of the Bolts fixing Trunnion 3 to Flat Plate 2 by a ¾ in. Washer 29 secured on the Bolt by a Nut. To work it, the Dragster is backed up, thus stretching the band and winding it round the rear axle. When fully wound, the model is released, which allows the band to unwind by turning the axle, and this drives the model forward. The only set-back to this method of propulsion is that, as soon as the band has unwound fully, it tends to rewind in the opposite direction and this, of course, acts as a brake on the model. However, over a short racing distance no problem arises as the band will not have unwound fully by the time the model crosses the finishing line.

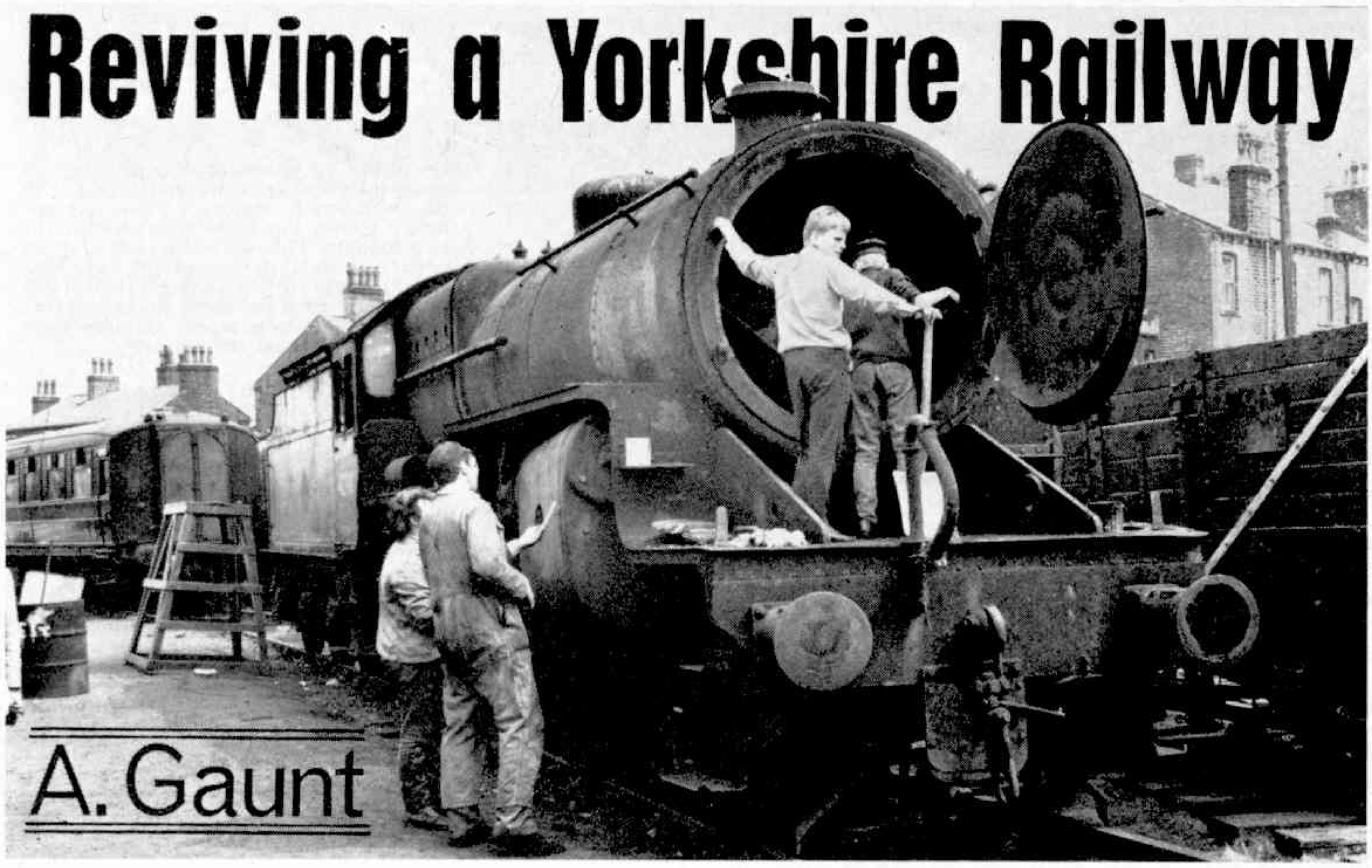
PARTS REQUIRED

4—1	4—22	2—54	2—189
8—2	2—22a	4—90a	2—193a
8—5	2—24	2—111a	2—194
4—10	8—35	4—111c	1—199
2—11	74—37a	2—125	1—200
10—12	66—37b	2—126	2—212a
4—12c	12—38	2—126a	2—214
2—15b	2—38d	4—142c	4—215
4—16	2—48a	4—187	4—221
2—19b	2—53a	2—188	

Actually, this built-in drive method lends itself particularly well to " tuning-up " as the choice of elastic band used can make all the difference to the model's performance. Also, as the drive is direct to the rear wheels, the better these wheels grip, the faster the Dragster will travel and, because of this, wrapping tape around the rear wheel rims could improve things considerably. All in all, therefore, these models not only supply the enjoyment of building them, but also the added fun of " tuning " and racing them. The above parts list, by the way, applies to both Dragsters, both catapults and both the " start " and " finish " posts.



Reviving a Yorkshire Railway



A. Gaunt

ODD THOUGH it may seem, the pruning of railway services up and down Britain, in accordance with the Beeching Plan, has not been entirely detrimental to railroad "fans." A number of closed lines have been earmarked for restoration and re-opening with passenger and freight services by interested bodies.

Yorkshire's contribution towards this trend is the revival of the Worth Valley branch line from Keighley to Haworth and Oxenhope. This line was originally opened in 1867 by a nominally independent company and was taken over by the Midland Railway in 1881. It was closed to passengers by British Railways at the end of 1961, and freight services were withdrawn in June 1962.

Few people foresaw that within seven years the line would be in use again, or that it would be a magnet for students of railroad history and "preservationists" eager to safeguard some sections of Britain's railway system affected by the Beeching axe.

Even fewer people expected the Worth Valley railway to become something more than just a museum and a demonstration line, if it was restored.

A few visionaries had different ideas, however. Even before the last B.R. train ran on this branch route, a Keighley and Worth Valley Railway Preservation Society was formed, and the possibility of restoring regular train services was being investigated.

Early supporters of the idea included not only railway diehards but local people eager to resuscitate the line as an amenity to the district. Among the first members of the Society were doctors, solicitors, school teachers, engineers, railway personnel, local government officers, and civil servants. Over 300 people attended the inaugural meeting.

In 1966 the project was carried a stage further, a limited company being formed to operate the railway, with the Preservation Society holding a controlling interest. But by this time the track and its immediate surroundings had deteriorated. Tangled weeds obstructed the route. and much hard work was needed to remove them. The track itself needed relaying to bring it up to the safety standard demanded before a Light Railway Order could be obtained. Negotiations for acquiring the line from British Railways were also protracted.

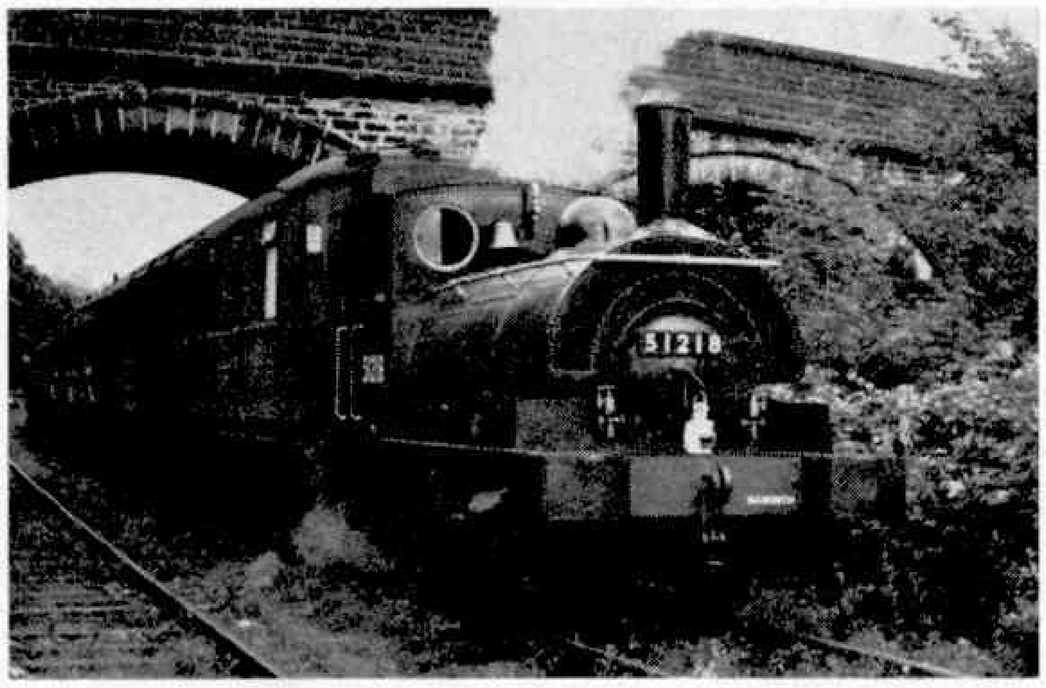
To put the line into workable condition, teams of supporters converged on it at weekends. They repaired the track, mended the fences, restored the stations, and cleared away the weeds and other growths which would have impeded train operations. Bridges and level-crossings had also to receive attention.

Some enthusiasts painstakingly restored and re-painted the rolling stock which was being brought together. One of the attractions of the re-born Worth Valley Railway, indeed, is the variety of locomotives and coaches used. They have been collected from widespread sources—by purchase, gift, or long-term loan.

At the present time the society has more than twenty locos, and all but one are steam-driven. The odd-one-out is a diesel. There are two four-wheel diesel railbuses, seventeen full-length bogie coaches, six smaller coaches or saloons, one tank wagon, one brake van, and sundry wagons and trolleys.

The preservation society has its own insignia and livery, but most engines and coaches are painted in their old colours. This idea increases public interest in the line.

Among the coaches are three Metropolitan Railway ones of high capacity. On loan to the society, they were originally intended for the Westerham Valley line in Kent. They were made available to the restored Yorkshire line when part of the Kent trackbed was needed for incorporation into a motorway, causing the



Westerham railway scheme to be abandoned.

Some of the engines in the Worth Valley sheds have been rescued from scrapyards and skilfully renovated to make them operational again. An example is a Midland Railway 0-6-0 locomotive salvaged from a scrap depot at Barry, South Wales. This engine had lain there among some 200 condemned to be broken up.

After protracted negotiations with British Railways the 0-6-0 was obtained by the Worth Valley line for restoration to running order.

Another locomotive brought to the Yorkshire railway, after being destined for a breaker's yard, is an 0-6-2 tank engine built in 1921. Weighing more than 71 tons, it represents a class which used to haul the Bradford-Wakefield portion of expresses to King's Cross.

This fine steam locomotive was withdrawn from the British Railways service in 1963 and was transferred to Haworth in March, 1965. It has since been overhauled and re-painted in the livery familiar before the grouping of the railways in Britain.

The Worth Valley Railway now has an 0-6-0 engine formerly used by the National Coal Board. Bearing the name "Fred" it has various devices for preventing the emission of black smoke, and is fitted with a mechanical stoker.

A further acquisition is an 0-6-0 U.S.A. engine, and this has been repainted in American railroad colours. It has also been fitted with a chime whistle.

A "pug" engine on permanent loan to the Society is more than sixty years old and was built for shunting on dockyard tracks. At the time of its construction it was the smallest class used on standard gauge in this country and was never intended to haul passenger trains.

Nevertheless, improvements made at Haworth have made it suitable for drawing two-coach trains. The "pug" has also been restored to British Railways livery because that is how most people know it.

The Sir Berkeley, another addition to the Worth Valley sheds, is a saddletank built in 1891 for the contractors carrying the Great Central line into London. Originally starting out as plain No. 30, this engine became the property of the Cranford Ironstone Co. in 1934, and received its present name by being given the name-plate of an earlier locomotive called the Sir Berkeley.

Until 1957 the engine was in its original state, with a brass-rimmed weatherboard as the driver's only protection from the elements. After being completely overhauled in that year, however, the owners fitted a better cab. Other improvements included a mechanical lubricator.

Later transferred to another quarry, the Sir Berkeley was relegated to the status of a spare engine there, although still in sound condition. Then the Narrow Gauge and Light Railway Society took an interest in the loco, ultimately saving it from the scrap pile. The N.G. and L.R.S. obtained this useful engine and transferred it to the Worth Valley sheds on permanent loan.

The most auspicious date in the revival of the Yorkshire branch line was June 29, 1968. On that day regular passenger services were re-introduced, and a cherished dream became a reality. Some special trains had operated earlier on the line, but on this occasion a public rail service was restored.

Interest in the revival, moreover, has not been limited to railway "fans." The five-mile track goes from Keighley to the heart of Bronteland, and runs through pleasant surroundings.

There are services on Saturdays, Sundays, and Bank Holidays, and the trip has become so popular that a Wednesday time-table was introduced (with lower fares to attract midweek travellers) on June 4 this year.

The rail journey is not the only lure which brings railway enthusiasts to Haworth. Besides operating a privately preserved railroad in the best traditions of the old railway companies, the Worth Valley railway society has the largest private museum of standard gauge locomotives in the country.

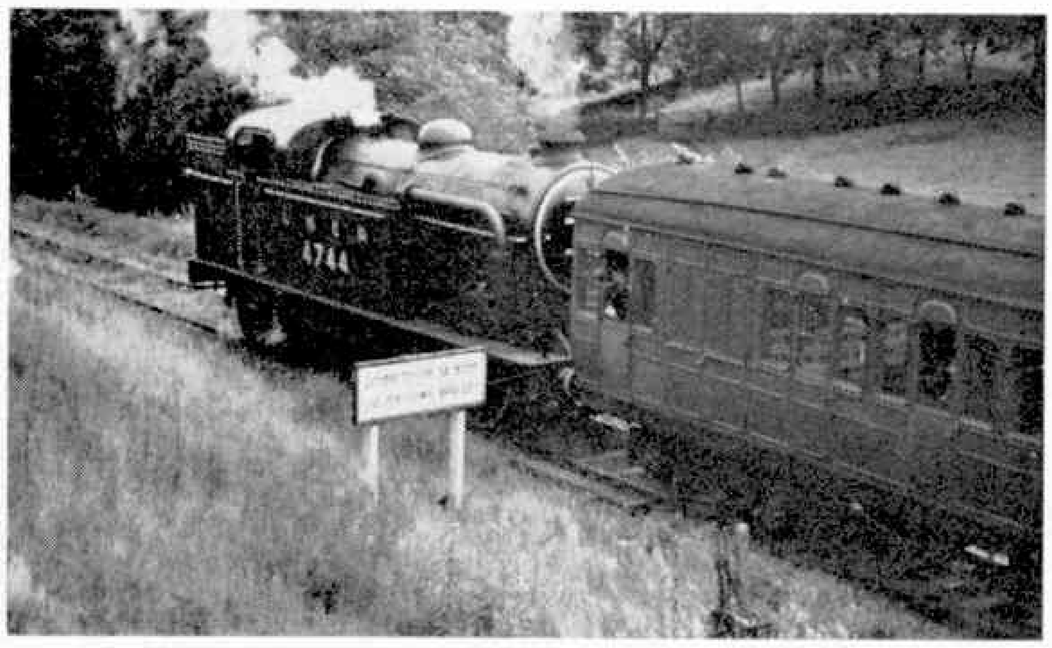
They are on show at Haworth station and can be inspected by visitors on Saturdays, Sundays, and Bank Holidays.

Although services for shoppers and travellers are run with railbuses, most of the afternoon journeys are operated with steam engines.

The diesel railbuses are driven by members of the preservation society who have undergone a lengthy course of training and practice to fit them for handling such technically complex vehicles. The steam train footplate crews are recruited from British Railways personnel.

The line has carried over 1,000 passengers in a single day. During the Whitsuntide period more than 3,500 made the trip, and the need to keep the stations and trains manned, and to see that the rolling stock and locomotives are in a good state of repair, has presented a constant challenge to the members of the K. & W.V.R.P.S.

It is gratifying that so much interest has been created for the "iron horse," and that the preservation of steam locomotives is receiving such strong support. The steps ensure that future generations will be able to understand what is meant by the Steam Age of travel in Britain.



Above: This "pug" engine was first built for dockyard shunting. Right: One of the Stalwarts leaves Oxenhope for the run back to Keighley.

TRANSPORT TOPICS

by Mike Rickett

IF YOU are one of those fortunate people to have travelled on the new Cunarder, "Q.E.II", you may also have sampled a new service that came into operation last July on the Southern Region of B.R. specially for "Q.E.II" passengers. On these special trains travelling between Southampton and Waterloo is now, amongst other things, a full meal service for passengers and included on the train are two restaurant coaches, a buffet, and for the very first time on B.R. to my knowledge, a corridor service of snacks and drinks, complete with a British Rail hostess with every train.

Not content with this, B.R. and the Cunard Company promise further improvements, that next year will include full restaurant facilities for *ALL* passengers, at any stage of the journey. If only this marvellous service was extended to other main line services, B.R. would indeed be in a formidable competitive position and in line with services such as the "Mistral", run by French Railways, which we covered in "M.M." a few months back.

How many of you, I wonder, are aware of the open days organised from time-to-time by British Rail in different parts of the country? Having visited one recently on behalf of the "M.M.", I can tell you that they are invariably full of interest. At the open day recently held at Allerton Depot in Liverpool, B.R. had on display a whole range of equipment and visitors were able to inspect for themselves a wide variety of track tamping machines, circuit breakers, demonstrations of rail fault detecting equipment, an exhibition train and several diesel locomotives. The event also included a sale of railway relics, and featured a fascinating working steam locomotive model of "Lion." Built by Mr. J. Mercer of Newton-Le-Willows, Lancs., this took eight years to build as a spare time task whilst busily attending to a more ambitious project. It was put to work pulling seven children at a time along a fifty foot section of specially made track. The real "Lion", star of the film "Titfield Thunderbolt", is now awaiting its entrance into Liverpool Museum.

Of considerable interest was the preserved G.W.R. "Clun Castle", and

also L.M.S. 5XP "Kolhapur" No. 5593, and L.M.S. "Eric Treacy" No. 5428, which were steamed at intervals up and down a section of track. Visitors were able to go aboard and examine the controls of these magnificent locomotives for themselves.

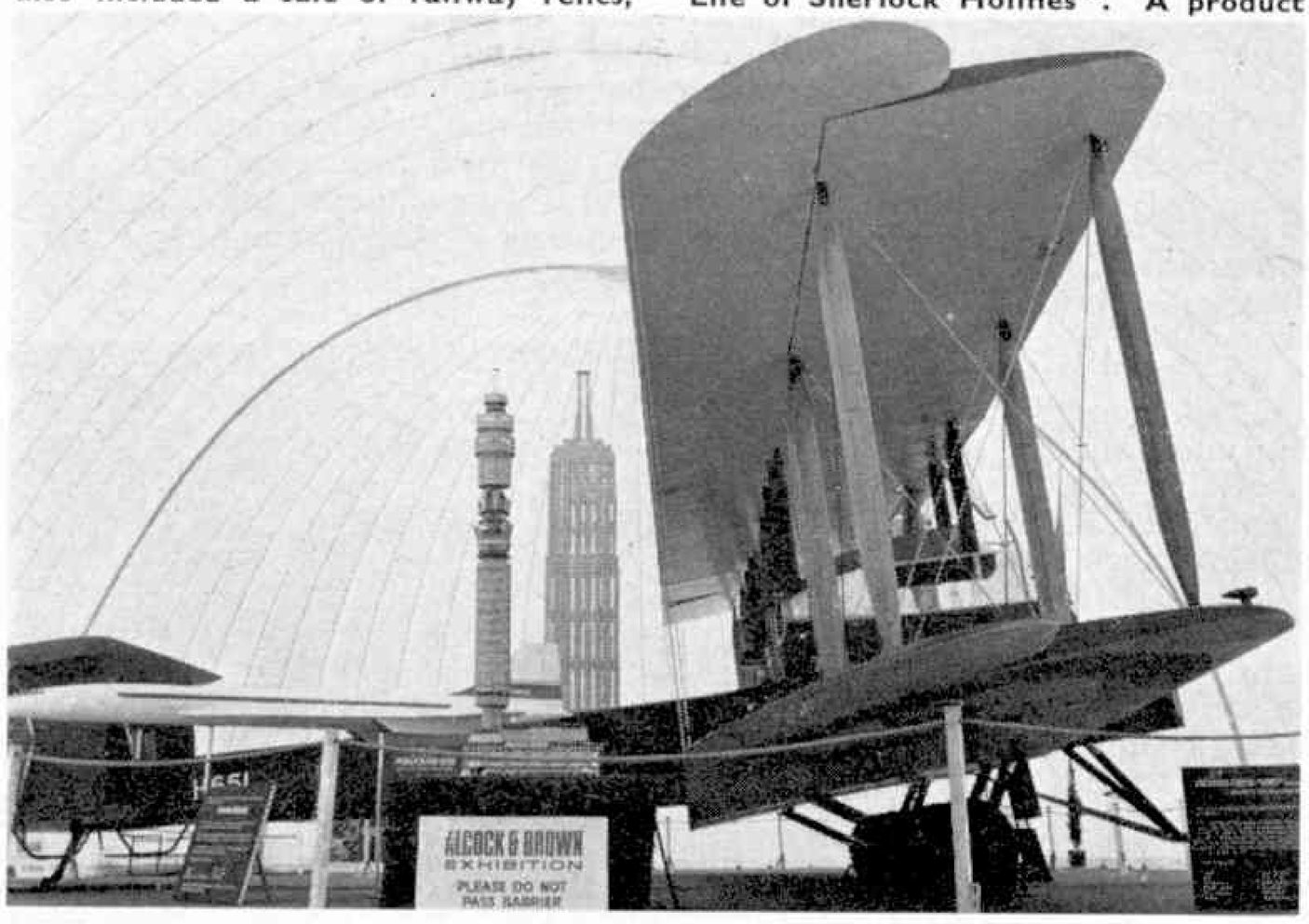
In a rather different sphere is the new mini-submarine built by Vickers, which has been in the news because of its recently announced hunt for the Loch Ness Monster. Called "Pisces," the sub has previously been under charter on Loch Ness for Marisch Films to make sequences in the new film, "The Private Life of Sherlock Holmes". A product of both the Vickers Company and the International Hydrodynamics of Vancouver Ltd., the craft has already been down to 2,400 feet and her operational range is down to 3,500 feet. She operates with a two or three man crew and is powered by two electric motors driving twin screws to give a top speed of four knots. She is equipped with sonar, a two-way telephone link and 1,000 watt lamps for underwater illumination. She also has a remotely controlled mechanical arm and "claw" for underwater work like torpedo recovery. Look out Nessy!

Ending their days are the two former P. & O. liners "Strathmore" and "Strathedon" which are being broken up in a Spezia shipbuilding yard. They were both sold to Greek shipping interests in 1963 and the "Stratheden" became "Henrietta Litsi" and the "Strathmore" the "Marianna Litsi". Later, their owner switched the names round for some reason.

"Strathmore" was launched at Barrow on April 4, 1935, which turned out to be a significant date in the town's history, for the ship's sponsor was none other than HRH The Duchess of York—now HM Queen Elizabeth the Queen Mother. "Stratheden" was launched on June 10, 1937 by the Duchess of Buccleuch.

Mentioning royalty reminds me that one result of Prince Charles Investiture as Prince of Wales was the inauguration on the Tal-y-Llyn Railway, of a specially named train which will run every day from Towyn Wharf to Abergynolwyn. Called the "Welsh Prince", the train carries the name in both English and Welsh on its headboards. The Railway has also issued a set of railway stamps, including an Investiture issue, that are available from Towyn Wharf Station.

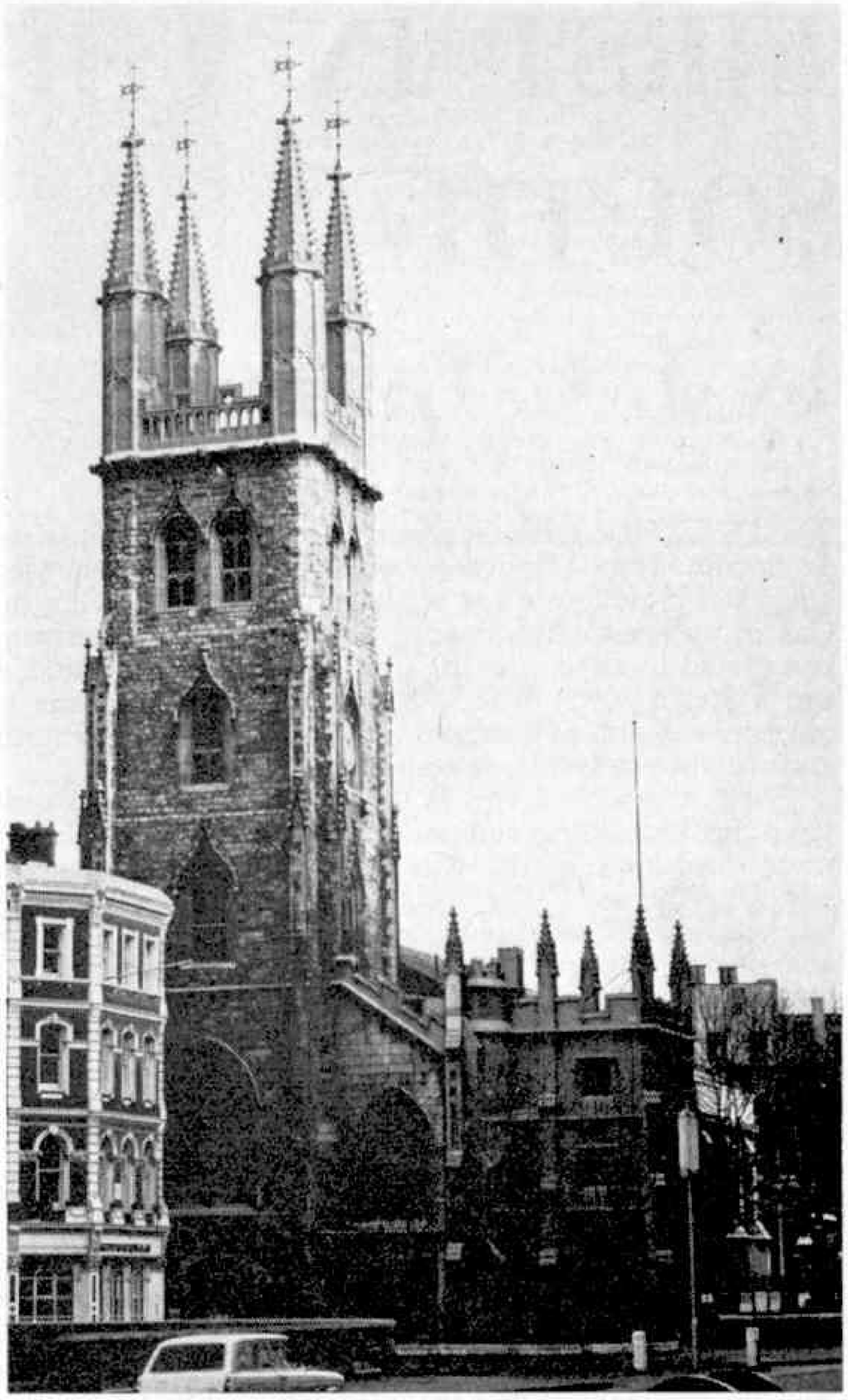
Finally, readers may be interested in the Vickers Vimy that visited both the Paris Air Show and the Alcock and Brown Exhibition in Manchester last June. Built by Vintage Aircraft Ltd., the Vimy is a replica that took two years to build and is powered by two original Eagle engines, rescued by Rolls Royce from pumping water in the Netherlands. It is the largest bi-plane still flying in the World and the pilot told me that on the journey up to Manchester, his co-pilot had found it necessary, whilst in the air, to climb out on the wings five times to de-ice them! How sad it is however, that this beautiful aircraft should have been so badly damaged during the fire at the Exhibition. Altogether, £20,000 worth of damage resulted.



Above: the Lord Mayor of Liverpool tries the driver's view from the cab of the preserved L.M.S. "Eric Treacy" No. 5428. Above centre: the submersible Pisces on Loch Ness where she is undergoing fresh water trials. Left: the replica of the Vickers Vimy at the Alcock and Brown exhibition. In the rear are Meccano models of the Empire State and the G.P.O. Tower.

WHERE THEY BURIED JOHN SMITH

The tales and origins behind the church of St. Sepulchre by E. Harper



THE STORY of how Capt. John Smith, Governor of Virginia in the early 17th century, was saved by the Indian Chief's daughter, Pocahontas, is well known.

What is less well known is the story of the church of St. Sepulchre, Holborn, where John Smith lies buried. It was already old when the young soldier worshipped there before sailing in April 1606 with 105 men to found Jamestown.

As long ago as 1178 the church on this site was given by Roger, Bishop of Sarum, to the Prior of St. Bartholomew nearby. The Great Fire of London in 1666 destroyed nearly all the buildings which had only been re-built a few decades earlier.

Fortunately, however, the charge of re-creating St. Sepulchres was given to Wren, who restored it in four years. In the 15th century St. Pulchie, or St. Pulcharia, had been the patron saint. Then it became known as St. Edmund, and the Holy Sepulchre also St. Edmund-without-Newgate. Finally it passed into history as St. Sepulchres.

During mediaeval times the roadway before the church was so narrow there was hardly room for two carriages to pass. As London's traffic increased, part of the churchyard was sacrificed to make a wider road. Few people passing St. Sepulchres realise they are walking over an old cemetery.

The church being sited so near Newgate Prison naturally caused it to have connections with the gaol. St. Sepulchres' bells tolled for every execution and were " The Bells of Old Bailey " in the nursery rhyme " Oranges and Lemons." In fact, when the bell tolled, it was the signal to the hangman to carry out his unpleasant task.

On the eve of an execution the sacristan of St. Sepulchres walked down a tunnel connecting church and prison, ringing a handbell and reciting:—

" All you that in the condemned hold do be,
Prepare you, for tomorrow you shall die;
Watch all, and pray, the hour is drawing near,
That you, before Almighty must appear.
Examine well yourselves, in time repent,
That you may not to eternal flames be sent.
And when St. Sepulchres bell tomorrow tolls
The Lord above have mercy on your souls."

Originally this custom was in accordance with a will of John Dowe, a Merchant Taylor, who left a bequest of £50 to the church on condition that the sacristan rang his handbell and recited a prayer when prisoners were taken to execution.

Should they go to Tyburn to be hanged, they were given a nosegay of flowers at the church door, a curious gift to a condemned man. The last to receive such a gift was John Rann, a highwayman nicknamed " Sixteen-String Jack." He was hanged in 1774.

Inside the church is a beautiful window dedicated to Sir Henry Wood, who was baptised here and learned to play the organ in St. Sepulchres.

For trans-Atlantic visitors, however, the chief object to notice will be the stone over the grave of Capt. John Smith. A plaque states simply:—

" Captain John Smith sometime Governor of Virginia."

Near Cheapside stands his statue, but the body of this brave man of Yeoman stock lies in the church he loved as a youth.

Our photograph shows the beautiful church of St. Sepulchre as it is today.

FIRST IN THE SOUTH

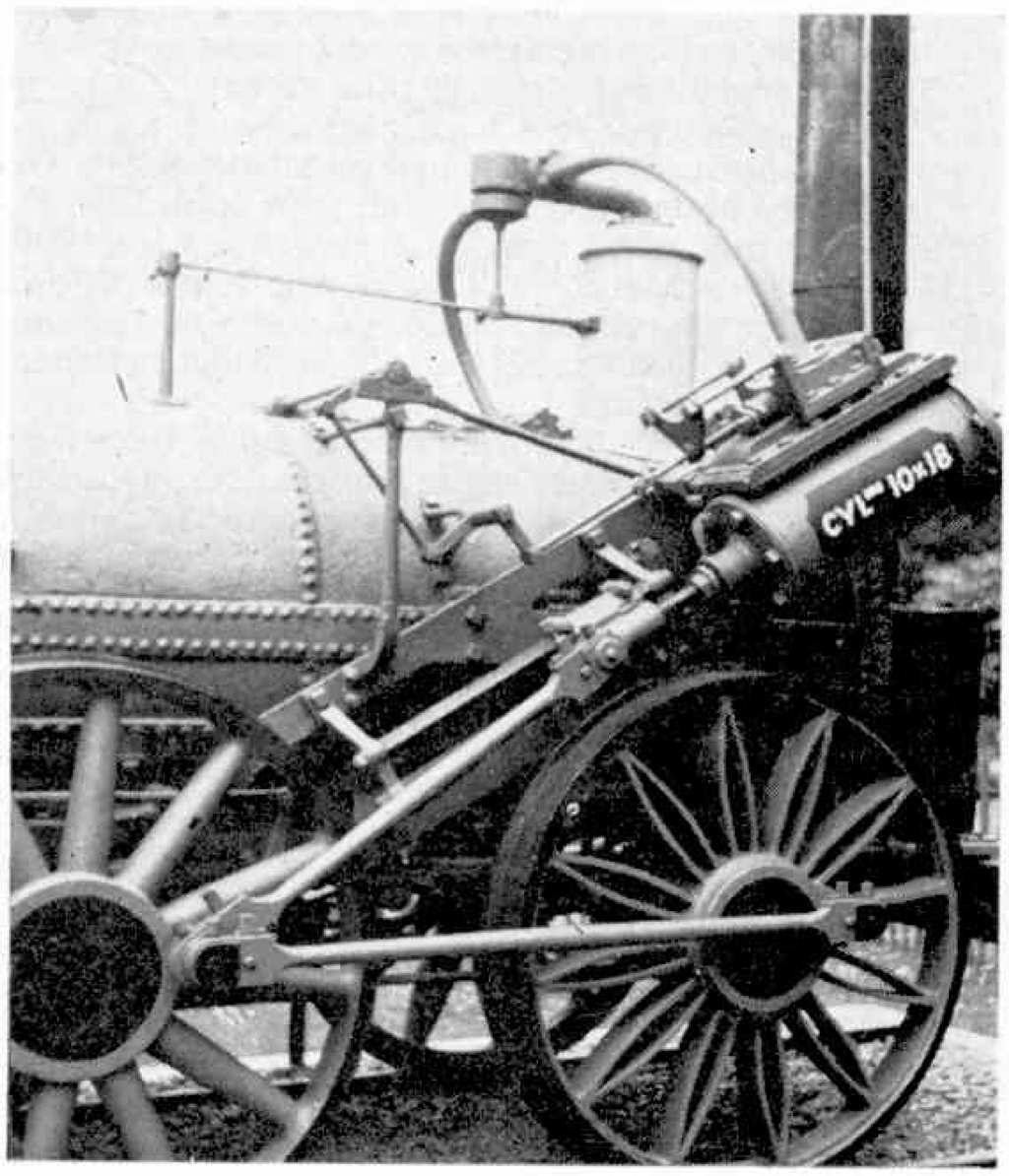
by J. C. Geater

Above: The Invicta as it stands, a monument, at Canterbury. The photographs below show the sharply inclined cylinders, on the left, and the firebox, on the right.

IN THE Dane John Gardens at Canterbury stands the locomotive, " Invicta," built by Robert Stephenson and Co., which was for a short period in use on the Canterbury and Whitstable Railway. This railway, completed in 1830, was the first in Southern England to use a steam locomotive. It was also the first line to operate a regular locomotive-drawn passenger service, and the first to issue season tickets.

The " Oyster " Line, as it was nicknamed, was only six miles long, but even so the six mile stretch was too much for the Invicta, which could not cope with the steep gradients. For this reason the Invicta only worked on the relatively level track near Whitstable, and on the rest of the line the trains were hauled by stationary engines.

Ten trains a day ran on the single track. The trains were hauled up the gradients on ropes wound in by the stationary engines. At the top of the slope the passenger coaches were uncoupled and allowed to run down the reverse slope two or three together. Brakes working on the circumference of the wheels were used to check the speed, which reached a maximum of about 30 m.p.h. Now the goods wagons—for each train was mixed—followed, and these came down attached to the rope, which provided a brake and was also then available for hauling up the next train in the opposite direction. To enable up and down trains to pass a section of double track was laid at Clowes Wood about half way along the line.



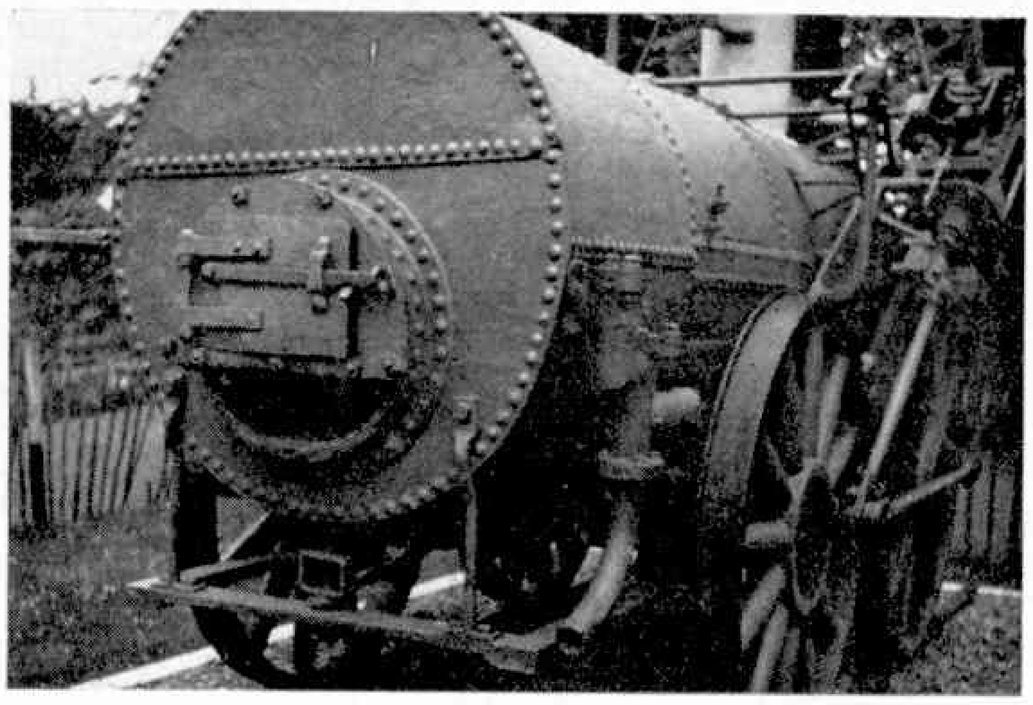
This short line, which provided Canterbury with an outlet to the sea now that the River Stour was silting up, must have been exciting to travel on. For a fare of ninepence—later reduced to sixpence—passengers had the thrill of a switchback ride in open coaches, during part of which they negotiated a tunnel about 1,000 yards long under Tyler Hill.

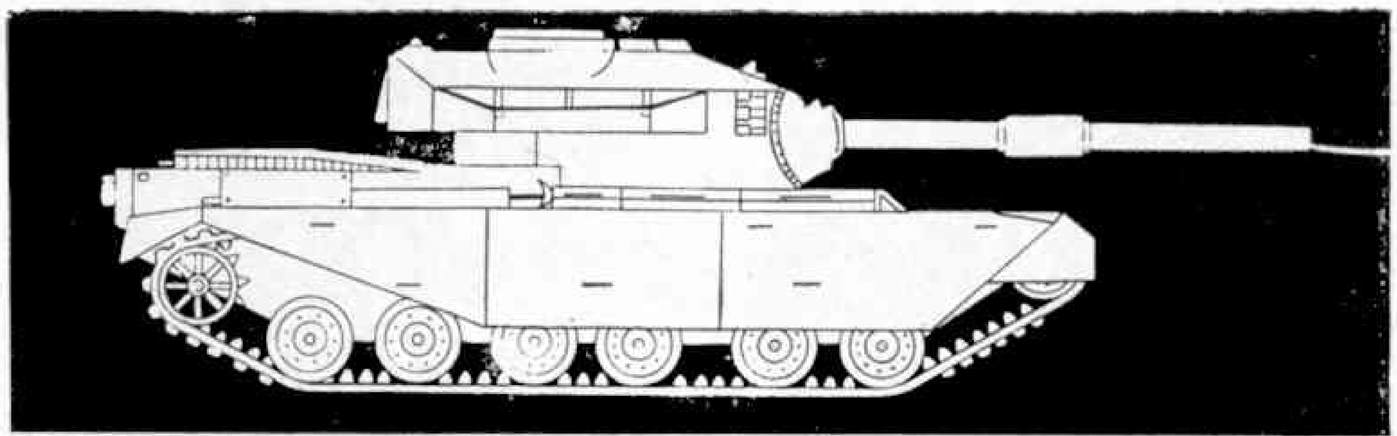
Despite efforts to improve her performance the Invicta was never capable of working along more than about two miles of the six, so in September 1839 she was offered for sale. The section she had previously worked was now worked by horses. No buyer came forward, so the Invicta was stored under cover.

In 1844 the South Eastern Railway leased the line, and in 1846 they converted the line for locomotive traction all along its length. In 1853 this company bought the line and one of the directors bought the Invicta and presented it to the City of Canterbury. She now stands in the gardens, not only a memorial to that early railway, but a landmark in railway history, the first locomotive designed with the outside cylinders at the front.

The Invicta

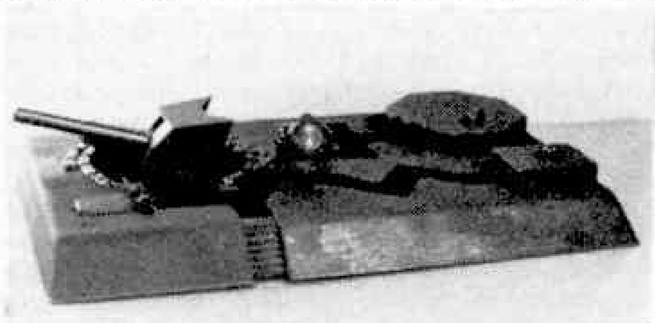
0-4-0 with outside cylinders at the leading end. Cylinders 10½ by 18 inches, wheels 4 feet. Boiler 3 ft. 4 in. diameter and 8 ft. long. Multitubular—heating surface 157 sq. ft. in the tubes and 39 sq. ft. in the fire-box. Pressure 40 to 50 pounds per sq. in. Weight, without tender, 6¼ tons.





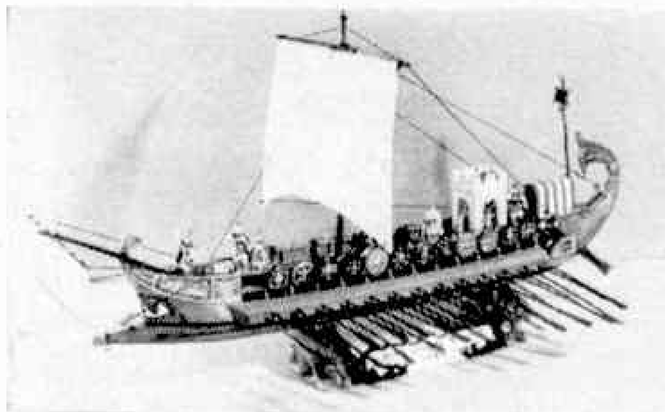
MILITARIA A REVIEW BY CHARLES GRANT

For the first time the National Wargames Championships, to be held in Worthing in October this year, feature a section devoted to mediaeval games (The Hundred Years War) and a recent series of figures from HINTON HUNT (Marcus Hinton, Rowsley, River Road, Taplow Bucks.) devoted to the period are consequently most timely. The Middle Ages is not the most popular period in wargaming by any means, but any interested party will find Marcus Hinton's new figures just what he wants. The types we illustrate show an excellent variety of fighting men from the ferocious-looking character wielding the pole-axe (I'm no mediaevalist, but this is what it looks like to me) to the archer just about to loose off a shaft from behind the protection of the stake driven into the ground (memories of that great film "Henry V"). I also like the cross-bowman in the act of winding up his rather cumbersome weapon. All the figures are well detailed and offer great opportunities for painting—think of the wonderful variety of shield devices, for instance. Prices are as before—1/10 for infantry figures and 4/- for cavalry, although buying in quantity reduces these prices considerably. By the way, the firm has also a London shop—at 2



Pierrepont Arcade, Camden Passage, Islington—certainly worth a visit.

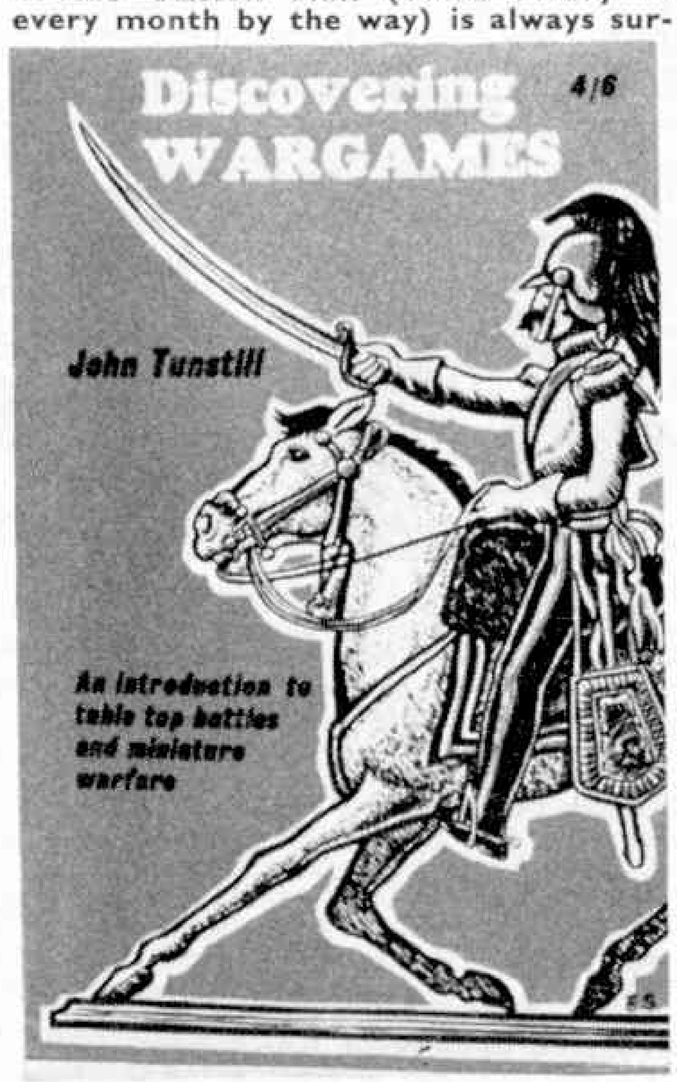
Zooming forward some five hundred or so years in time, we come to a couple of splendid books from ARMS AND ARMOUR PRESS (677 Finchley Road, London N.W.2)—these being "British and German Tanks of World War I," by Peter Chamberlain and Chris Ellis, and "German Infantry Weapons of



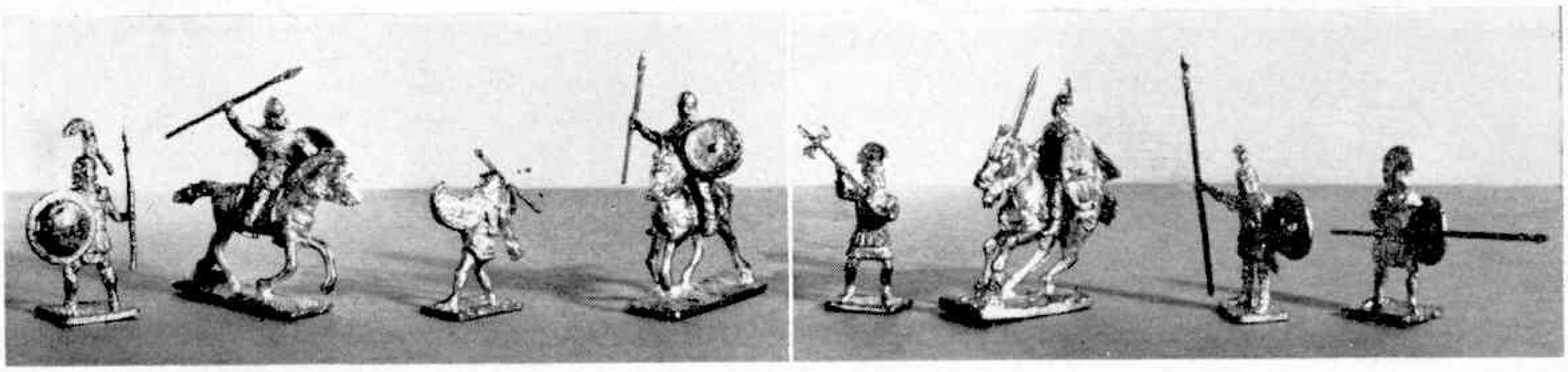
World War 2" by Colonel A. J. Barker. At 25/- each they are particularly good value. With two such authors as Chamberlain and Ellis, you can be sure that the World War I volume is completely authoritative, and replete with tactical and technical data, but I have to admit that, as a wargamer, I prefer the other book. For the player of the modern wargame, it is a boon, above all naturally for him who operates a German type army. In point of fact, though, comparative details are given for infantry weapons of Germany, Britain and the U.S.A. as well as the most detailed performance figures for the German ones. These are particularly useful in that they give the practical weapon capabilities rather than the theoretical ones—just what you need for checking your wargame rules. My only complaint is that I wish Colonel Barker, with his great experience as a soldier, did not enlarge the book to include more on the tactical use of the weapons he describes so admirably, this being the stuff the wargamer laps up avidly. Anyhow, both volumes are highly commended.

We are really whizzing round in time, as back we go to the days of the Caesars for a 1/32 plastic kit of a Roman 'bireme' by AURORA PLASTICS LTD., (Green Dragon House, 64/70 High Street, Croydon, Surrey). As the reader will see from the photograph, this is a very fine model indeed, and constructed with care, will be an ornament to any model maker's shelf, and indeed, the photo does not give any idea of the vessel's colourful quality. At 35/-, it is a little expensive for the wargamer to remove it from its stand and cut it down to a waterline model for use in an ancient naval wargame, but certainly it will give the enthusiast bags of inspiration to construct his own fleet—balsa would seem to be the ideal medium. Two small criticisms only—I feel that the figures supplied, while reasonably detailed, are a shade larger than the scale warrants, especially when one thinks of the hordes of oarsmen concealed below decks, and second—this being a matter of personal taste—I should prefer a less elaborate stand. A plain block, say would be less likely to take the eye off the ship itself than the mythological animals and what not forming the present support. Nevertheless a first rate model, if you want a bit of 'ancient' atmosphere. Possibly because it is a little specialised, not all hobby shops seem to stock it, but I have seen it in Hamleys, Regent Street, London.

I don't think many people would argue very much if I stuck my neck out and said that ROSE MINIATURES (Russell Gammage, 45 Sundorne Road, London S.E.2) are presently the best 54 mm. metal figures on the market, and the British Peninsular infantrymen and World War II German infantry in the photographs should help to support my contention. I cannot remember when Mr. Gammage produced a figure which could be commented upon adversely and his stand at the monthly meetings of the British Model Soldiers Society at the Caxton Hall (Third Friday of every month by the way) is always sur-

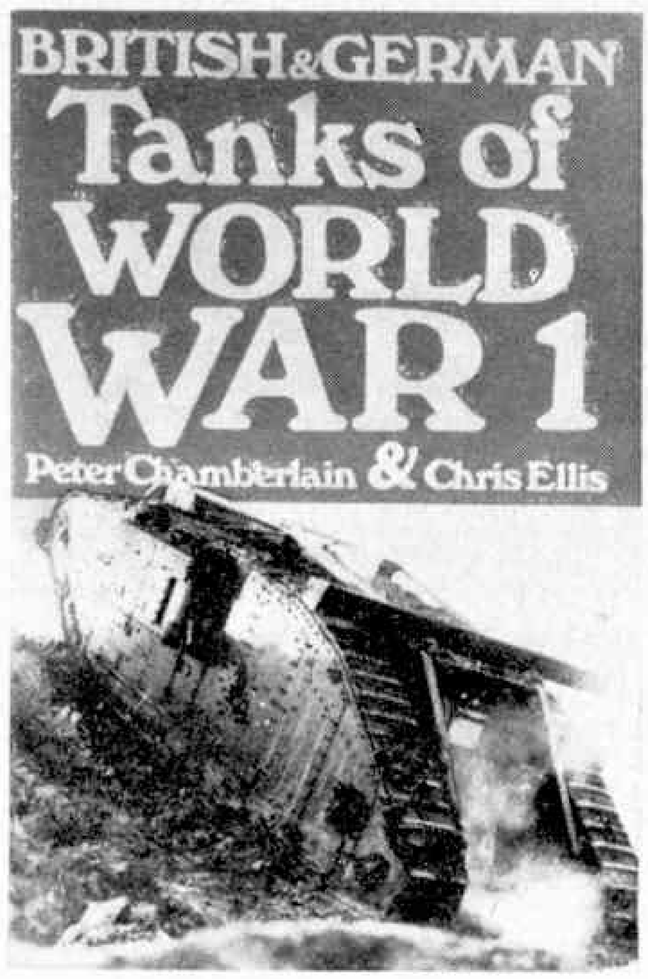


Above right: the latest from Shire Publishing Co., "Discovering Wargames" which gives a detailed introduction to miniature warfare. Above centre: the colourful Roman Bireme by Aurora. Above: a useful piece of equipment from Airfix—a gun emplacement, with dugouts and trenches. Below: Garrison 'ancient' types—a variety of Greeks and Persians in 20 mm scale.



rounded by enthusiasts. He and Mrs. Gammage are frequently hard-pressed to satisfy the demand. The two points I myself find outstanding about Rose Miniatures are the consistently high quality of detail in the casting and the natural quality of the pose of each figure. As to the former, this is sometimes so good that it seems a shame to paint them. Latest addition to the range include, as well as those shown herewith, further figures in the Ancient Egyptian series (including a striking seated Pharoh), British historical personages including Wellington and Nelson, French Imperial Guard officers, and German S.S. and tank troops. Prices per unpainted figure range around 25/-. It is always an exciting moment when the collector receives the supplementary pages to his Rose Miniature catalogue—they come twice a year.

Latest in the "Discovering" series of booklets (Shire Publishing Co., Tring, Herts.) is "DISCOVERING WARGAMES" by John Tunstill, editor of "Miniature Warfare" and President of the London Wargames Club. At the modest price of 4/6 it is excellent value. Purporting to be an introduction to the hobby it deals briefly with the history of wargaming (although confusing the two Livermores—William who compiled "An American Kriegsspiel" and Thomas who wrote "Casualties in the American Civil War)—and goes on to deal with the most popular periods for wargaming, obviously concentrating on the writer's favourite, the American Civil War. In such small compass (64 pages) it is not possible to deal in depth with any particular epoch, modern warfare being summarily dismissed in a few lines as being "really only suitable for little above platoon-sized skirmishes" (what's wrong with a platoon sized skirmish anyway? This is where one can get tremendous realism and tactical accuracy). Little or nothing is said about the 18th Century—a period of great change and innovation in the history of war, and splendid games can be based on the Seven Years War. Even so, for less than 5/- one can't expect everything, and it is worth while getting, my main criticism being that it is an unashamed 'plug' for the London Wargames Club and "Miniature Warfare", which we are by implication led to believe are the ultimate authorities. No mention is made of "Wargamer's Newsletter", "Bayonet" (organ of the Horse and Musket Society), and "Slingshot" (journal of the Society of Ancients), all of which are devoted to wargaming in one form or another. The only other magazine spoken of is "The Bulletin" of the British Model Soldier Society, which has a wargaming article about once in a blue moon.

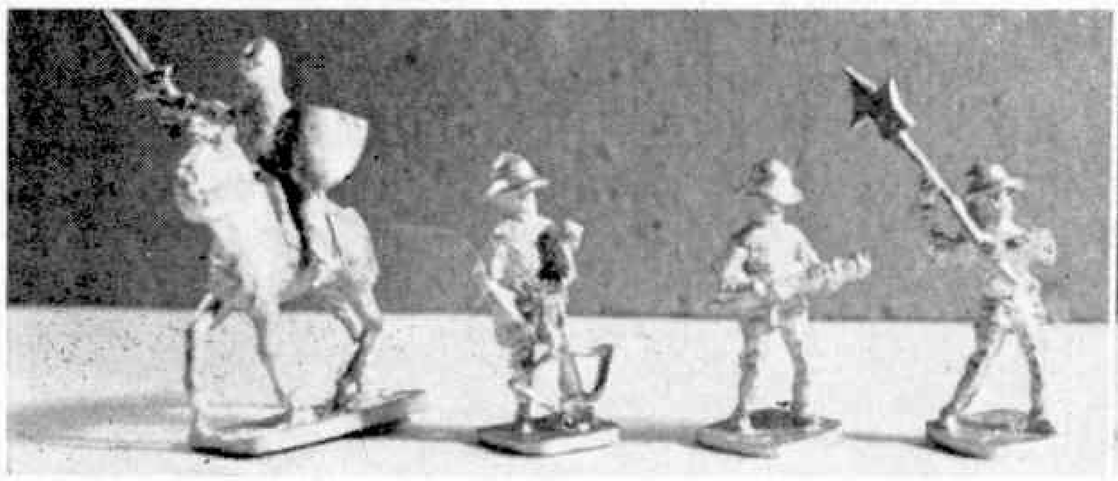


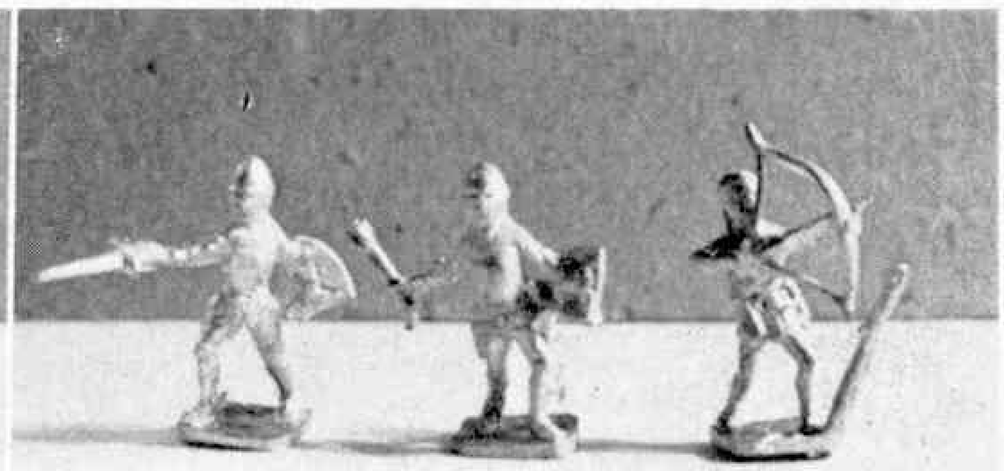
From THE GARRISON (Castlegate, Knaresborough, near Harrogate, Yorks.) comes a further splendid selection of 20 mm. 'ancients', all of the usual high standard of detail and finish one expects from the firm. Mostly Greeks and Persians (some of which are illustrated), they include cavalry and a magnificent Phrygian axeman. Notable, too, is the Greek light infantryman, the 'peltast', in a vigorous action pose with javelin and characteristic crescent-shaped shield. One feels that a conspicuous number of GARRISON 'ancients' will be taking the field at Worthing in the October National Championships (dare I whisper that my own recruiting is proceeding with unabated enthusiasm?). Prices remain at 1/- per infantryman and 2/6 for the horsed figure. I understand that a number of other figures are practically ready and should be in production by the time these lines are in print. If their quality continues to measure up to the standard already set by THE GARRISON, I can't wait to see them.

The latest in the AIRFIX "Play Forts" series is a useful little gun emplacement in the HO-OO scale. It is a 'snap together' model, and basically I suppose is more of a toy than a piece of wargame terrain, and the serious minded wargamer is likely to look askance at the large gun which acutally fires plastic shells by means of a spring-loaded trigger affair. However, if this is removed and replaced by—for example—an Airfix 88 mm. gun, then you have something worth while. The piece includes several dugouts with communicating trenches and removable roofs. It can be used as it comes or, better still, will paint up—following the colourful illustration on the lid of the box it comes in—into something quite realistic. It is good value at 7/6 and you can always give the spring gun to kid brother!

Also from AIRFIX is the latest in the Series 2 Construction Kits. This set consists of two vehicles—an ambulance and a crash tender, which together make up an R.A.F. Emergency Team, for use in connection with crashed aircraft, fires etc. The kit consists of no less than 121 pieces, and includes 11 R.A.F. personnel, all up to the usual Airfix high standard of detail. Obviously being such a specialised one, the set will be of somewhat limited use and consequently might not appeal to everyone, but the vehicles are subject to conversion and the figures of course are of great use. Price of the kit is 3/9 and this is particularly good value, when one thinks of the pleasure to be obtained in making up the two fine vehicles.

Above: Two excellent books from "Arms and Armour" press. Above left: German figures from World War II by Rose Miniatures, in the 54 mm scale. Below: Some realistic figures in the 20 mm scale from Hinton Hunt.





GREAT ENGINEERS—No. 21

HERBERT AUSTIN (1866–1941)

by A. W. Neal

THE RISE of the automobile industry is the result of the skill and persistency of many engineers, and the names of some still remain to designate modern vehicles which are the outcome of their pioneering. Lord Austin is one of these.

Herbert Austin was the second son of Giles Austin, a farmer, and he was born at Grange Farm, Deep Mill Lane, Missenden, Buckinghamshire. He was educated at Wentworth and at Rotherham Grammar School. His aptitude for drawing became apparent at a very early age and it remained a great asset all of his life. Upon leaving Rotherham he attended Brompton Commercial College. After a spell there he was bound to an architect, but he seems to have taken a dislike for this kind of work. Wisely his father allowed him to follow his own wishes and he became an engineering apprentice in the shops of the north-country railways.

This over he joined the staff of Mephan Ferguson, engineers of North Melbourne, Australia, his uncle being the manager there. The firm were engaged in the manufacture of steel pipes for water supply. Then he moved to Cowan's who were agents for printing machinery and gas engines. It was during this time, young as he was, that he entered a competition for the design of a swing bridge to span the Yarra River, Melbourne. Of course he was not successful, but it goes to illustrate things to come.

Always with his eye to the future he, in 1887, took a post as manager with Richard Pick-up Parks who were then developing and exploiting a sheep-shearing machine for its inventor Frederick Wolseley. Two years later the Wolseley Sheep-Shearing Company was formed in Sidney to take over the sheep-shearing business, and Austin was appointed to the managership. One presumes that he did all of the donkey-work. This firm, however, was wound up in 1889 and re-started in this country, and Austin returned to England to take control of it.

Working in his spare time, he produced his first car, a tiller-steered three-wheeler, which was exhibited at the Crystal Palace in 1896. In 1900 he constructed a four-wheeler which won a prize in the Automobile Club of Great Britain's 1,000-mile Trial.

In the following year the Wolseley Tool and Motor Car Co. was formed with Austin as Manager. The outcome was a whole family of Wolseley cars—the Landaulette (1904), the Wagonette (1904), the Baby (1905) and so on.

But Austin was not a man to be satisfied with being an employee. Ever since he became interested in motor-cars he had nursed the idea of establishing his own business, and he resigned his post with Wolseley to do this. So, in 1905, the Austin Motor Co. Ltd. came into being at Longbridge, Birmingham, with a capital of £37,500. By 1910 about a thousand workers were employed, and six different types of vehicle were offered to the public. There was, also, a wide range of coachwork to suit most requirements.

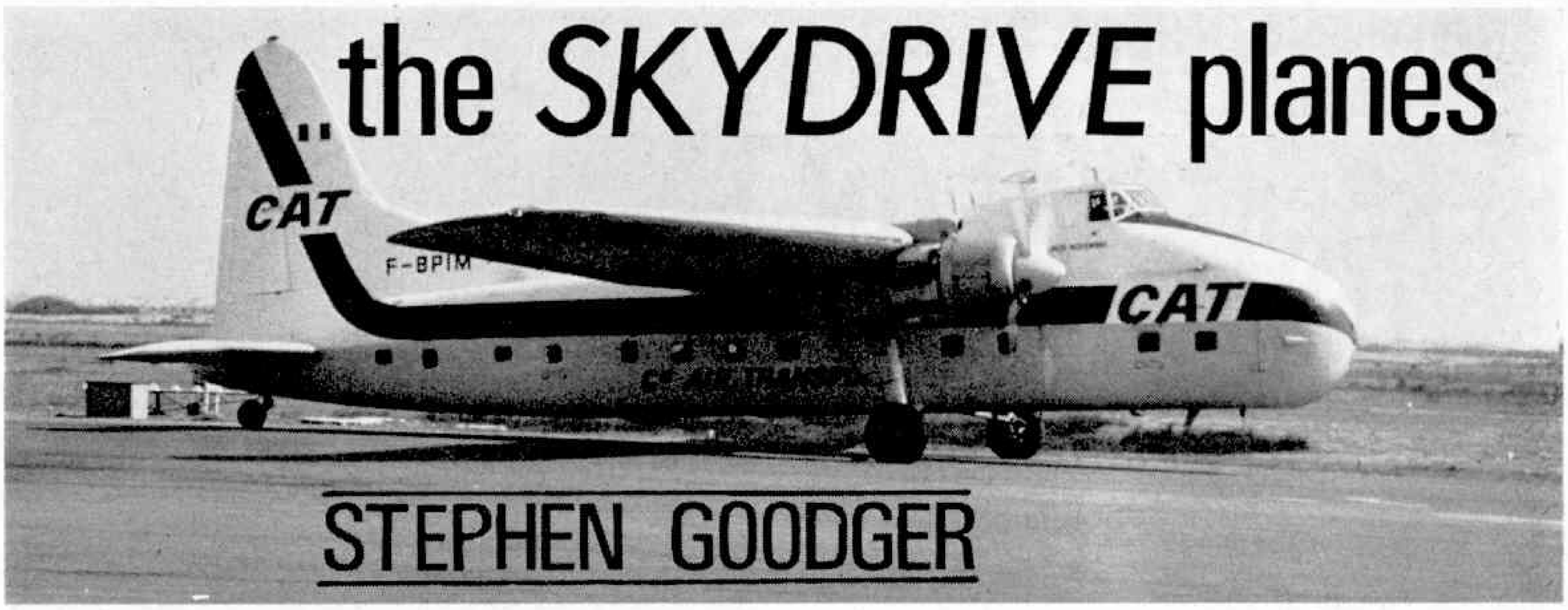
During the 1914-18 war the factory was turned over to wartime production, and aeroplanes and aero-engines were made. The Austin car became an armoured vehicle.

There were, of course, troubles to be met during the after-war years when the great slump set in. These were weathered through and by 1922 the famous Austin Seven was produced and selling well. Probably this was his greatest achievement since its success restored the company's fortunes.

During the second World War Longbridge made, in addition to vehicles, aircraft products, engines for ships, ships' lifeboats, machine-gun parts, fire pumps and steel helmets. In 1940 the works were attacked from the air by the Germans and some casualities and damage to plant were sustained. In spite of this, work continued. On a cold day when the dead were buried Lord Austin insisted on attending the funeral service, much against the wishes of those near to him. The result was that he contracted a chill which later turned to pneumonia. Four months later he died. So passed a great man who did not waste a moment of his life—the secret of his success.

He was knighted in 1917 (K.B.E.) and he also received the Order of Leopold II as a tribute to his employment of 3,000 Belgian refugees. He was created Baron Austin of Longbridge in 1936. The Birmingham University conferred upon him the degree of Doctor of Laws in 1937. Other recognitions for his efforts have come from various scientific and other bodies.

..the SKYDRIVE planes



STEPHEN GOODGER

BRITISH AIR Ferries Ltd., operating from Lydd on the Kent coast, and Southend in Essex, are the main company providing the car driver, and his passengers with a method of flying across the channel with his car.

Air Ferries operate two types of aircraft on their cross channel services, An ATL-98 Carvair, and the Bristol 170 M.K. 32 Superfreighter.

The Carvair aircraft is a conversion of the standard Douglas D.C.4, and was built to British Air Ferries own specification: it has the nose cut away and the flight deck raised to allow cars to be loaded. This modification was carried out by Aviation Traders Ltd. an associate company of British United. The Carvair came into service with the company at Southend in 1962; it can carry 5 cars, and 22 passengers.

The main work horse of the service is the Bristol Freighter, the current model The Bristol 170 M.K. 32 Superfreighter is now in operation with the company. The superfreighter has a pay load of 3 cars, and 14 passengers. At the height of the summer season they can be seen taking off at 20 minute intervals on route to Le Touquet, Ostend, and Deauville, from Lydd.

In July 1948 Silver City Airways began operating the world's first scheduled car-ferry service, from Lympe to Le Touquet, with a single Bristol Freighter Aircraft. In that first year 70 cars were flown across the channel, last year over 74,000 vehicles, and 183,000 passengers were carried, a staggering increase.

By 1953 it had become clear that the grass airfield at Lympne was inadequate to handle the fast-growing volume of traffic. It was necessary to select a new site, this was found on the Romney Marsh, near the town of Lydd. So in 1954 the Ferryfield airport was built, it was the first British Airport to be designed and built by an airline; and the first in the world designed specifically to deal with the vehicle air-ferry traffic. It covers an area of 246 acres, and cost £250,000 to build; it has two principal runways one of nearly five thousand feet in length, and the other just over three thousand feet, both have full approach light facilities. The airport also has spectator enclosures, and full passenger buildings.

Also in 1954, Channel Air Bridge commenced operations from Southend with routes to Calais, these proved to be immediately popular, and new routes to Ostend and Rotterdam were of equal success.

Silver City Airways was acquired by the British United Airway group in 1962, and was joined with Channel Air Bridge making Lydd and Southend the main operating points for the company. This company in turn became British Air Ferries Ltd. on the 1st November 1967.

With the Introduction of the Carvair four engined aircraft, longer routes into Europe could be opened to Basle, Geneva, Strasbourg, and Liege. Runway extensions had to be carried out at Lydd to enable the Carvair to operate from there, these were carried out in 1964.

With flying times of only 20 mins. to France, 40 mins. to Belgium, and 1 hour to the Netherlands it is not hard to understand why the air ferry has proved to be such a popular way to cross the channel during the last 20 years. It enables the businessman to reach an appointment quickly on the continent, and the holiday maker more time in the sun. On a typical day during the peak season at Lydd, 1,300 passengers, and 400 cars pass through the airport.

Our heading photograph shows a Bristol Superfreighter in the livery of the French Airways Compagnie Air Transport. When loading a Superfreighter, cars are driven straight into the nose area, with no lifting mechanism employed. Right: A car on the unloading platform in front of a Carvair.

THE COMMONWEALTH PARLIAMENTARY CONFERENCE

by James A. Mackay

THE COMMONWEALTH Parliamentary Association, whose aim is to promote mutual understanding between parliamentarians of Commonwealth countries, was founded in 1911 and has evolved with the Commonwealth itself. Originally it was known as the Empire Parliamentary Association but its name changed in 1948. It has 86 branches throughout the Commonwealth and Associated Groups in the Congress of the United States and the Dail in Ireland.

Since 1948 the Association has held regular conferences and since 1961 these have been at annual intervals. The first conference to be honoured with stamps was the Seventh, held in London in 1961. The 6d. showed a detail of the fine hammer-beam roof in Westminster Hall where William Rufus held court in 1099. The roof, described as "a miracle of Gothic carpentry, easily the most remarkable timber structure in any age in any country," was erected by King Richard II in 1394. The delicate tracery of the beams was reproduced in gold metallic ink and a few specimens have been recorded with the gold missing. The 1s. 3d. showed the outline of the Houses of Parliament. Both stamps featured the emblems of the Association, the crossed parliamentary mace and staff. Pictorial slogan postmarks depicting the Houses of Parliament were in general use at the time of the Conference.

The Eighth Conference was held in Lagos, Nigeria in 1962 and on this occasion a set of three stamps was issued. The 2½d., designed by S. Akosile, bore a symbolic representation of the delegates arriving from all parts of the globe. The 4d. and 1s. 3d., designed by Michael Goaman, featured National Hall in Lagos and a mace set in a palm tree respectively.

Kuala Lumpur in Malaysia was the venue for the Ninth Conference held in 1963. Two large diamond-shaped stamps designed by Victor Whiteley were released on November 4th and depicted Parliament House in Kuala Lumpur above the emblem of the Association. The stamps, in denominations of 20c and 30c had the inscriptions in gold. For the Tenth Conference the Association moved to Jamaica. Three stamps, designed by Victor Whiteley and printed by Harrison and Sons, were issued on November 16th, 1964. The 3d. depicted Gordon House, the present parliament building in Kingston, named after William Gordon who was hanged for his alleged part in the Morant Bay rebellion of 1865. Headquarters House, one of the most impressive examples of colonial architecture in Jamaica, was featured on the 6d. The 1s. 6d. stamp depicted the old House of Assembly in Spanish Town, the former capital.

The year 1965 marked the centenary of Wellington as the seat of the government of New Zealand and appropriately this city was chosen as the venue for the Eleventh Conference. Three stamps, photogravure printed by De La Rue, were released on November 30th. The 4d. bore a recent portrait of the Queen and the coat of arms of New Zealand. The 9d. showed the badge of the Association and the splendid facade of the Parliament House in Wellington. The 2s. stamp featured a general panorama of Wellington. The Association went to Canada for the Twelfth Conference, held in 1966 at Ottawa. A 5c stamp was released on September 8th and depicted the Parliamentary Library, a curiously conical-shaped building in the Gothic style which was so fashionable a century ago.

The Thirteenth Conference was staged in Kampala, Uganda in 1967 and was honoured by a set of four stamps designed by Mrs. Rena Fennessy and photogravure printed by Harrisons. The 30c depicted part of the murals which adorn the entrance to the Parliament Buildings, opened in 1964. The 50c featured the coat of arms of Uganda and the 1s. 30 bore a general view of the Parliament Buildings, with the legislative chamber in the foreground and the offices of the Government departments behind. Surmounting the block is a tower 180 ft. high. The sh. 2.60 stamp showed the interior of the legislative assembly.

Nassau, Bahamas was the venue for the Fourteenth Conference, held in 1968. The Legislative Building, site of the Bahamas Parliament since 1728, was featured on the 3c. The Bahamas parliamentary mace, with London's Big Ben in the background, appeared on the 10c. Local straw manufacturing (12c) and a horse-drawn surrey (15c) were the subjects of the other two stamps. All four stamps, which were designed by John Cooter and lithographed by Format International, included the Association emblem and a profile of the Queen.

For the first time a set of stamps has been issued in connection with the Association other than for the annual Conference. Gibraltar released three stamps in May to mark the holding of the Committee meeting of the General Council. The stamps, designed by Fred Ryman and photogravure printed by Harrisons featured the Gibraltar parliament, with the London Houses of Parliament in the background (4d.) the outline of the Rock of Gibraltar and the Association emblem (9d.) and the coat of arms of Gibraltar beside Big Ben (2s.). The Fifteenth Conference is scheduled for October this year—a month earlier than usual—and is being held in Port of Spain, the capital of Trinidad. I understand that a set of three stamps will be issued for the occasion but so far the details have not been divulged.

HAVE YOU SEEN ?

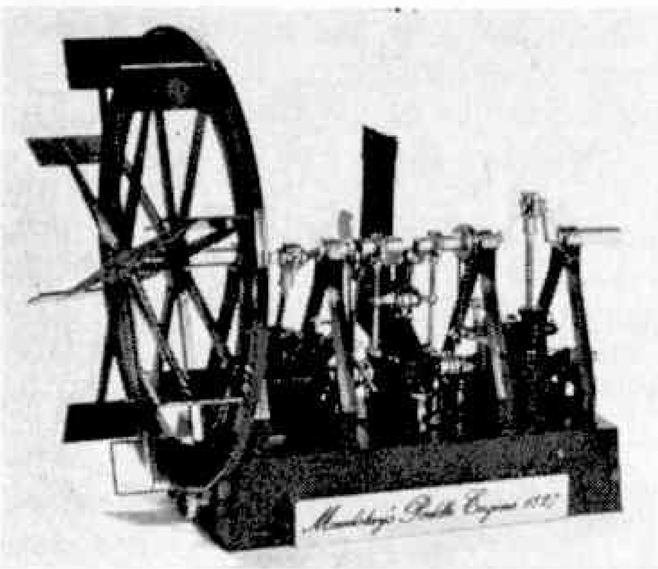
Historic Paddle Engine by Airfix

The latest release in AIRFIX's Museum Models Construction Kit Series is Joseph Maudsley's 1827 oscillating engine. Just after the fall of the Napleonic Europe, this engine was used extensively to power side-wheel paddle ships, and later, developments of the design were installed in Brunel's famous "Great Eastern."

The 109 pieces of the AIRFIX kit make up a fully detailed working model of Maudsley's engine. The kit is powered by a D.C. motor and drive system acting on a 6½ in. diameter wheel fitted with eight paddles. The crank shaft has properly assembled bearings and straps for the moving piston, valve rods and reversing gear. Also, the steam pipes from the central steam chest have detailed flanges and studs.

The motor, battery (this is not included in the kit) and switch are positioned out of sight under the base which supports excellent representations of the four cast iron frames.

The kit, costing 13s. 9d., includes an instruction leaflet with six exploded drawings and painting instructions.



Airfix B.M.W. R69

One of the latest releases from AIRFIX, is the first of a new series of construction kits. This kit being the B.M.W. R69 motor cycle—the most popular machine made by the Munich based German company in over forty years of motor cycle manufacturing.

This 76 piece kit, which costs 8/3d., makes a detailed model 8 in. long, almost twice the size of earlier AIRFIX motor cycle models! The 590 c.c., 35 b.h.p. horizontally opposed twin-cylinder engine is undoubtedly the main feature, but that's not all. Also included is the air filter in its distinctive inclined position, the B.M.W. drive shaft and the welded double tube frame first introduced in the 1920's. The brake drums, brake linkage, suspension, exhaust pipes and mufflers are all "real" looking. The foot and hand controls, transparent front and rear lights and speedometer are all there, of course. Just by looking at the accompanying photograph, you can see how well detailed this model is, and only by seeing the kit can you distinguish it from the real thing.

Above left: The beautiful Airfix model of Joseph Maudsley's oscillating engine. Above: The colourful Bathtub Buggy by Monogram. Above right: Airfix's detailed model of the B.M.W. R69. Right: A family should never be without this product—Burneze by Potter & Clarke.

Monogram's Bathtub Buggy

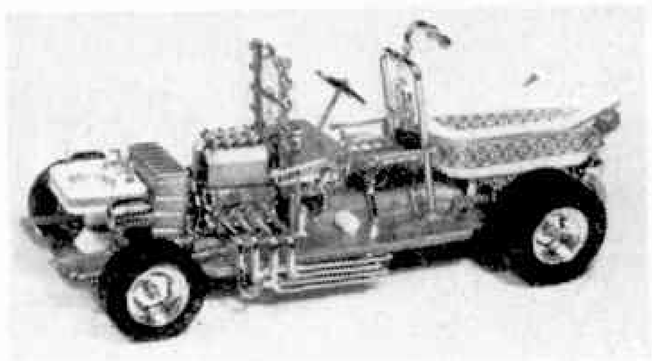
MONOGRAM have really outdone themselves with this kit. You won't believe it until you have seen it. But believe it or not, this machine does actually exist. George Barris, the creator of such famous vehicles as the "Batmobile" and the "Munster Koach", joined forces with Bob Larivee of Promotions Inc., the producers of International Champion Auto Shows, and together they developed the "Bathtub Buggy".

The MONOGRAM model is an exact replica of the original creation, which is comprised of all the essentials and accessories found in a bathroom, such as a handsink, a bathtub, a shower, etc. All the metal parts, which are made from plumbing materials, are brass plated, and the rest are moulded in white. The tyres are Goodyear drag slicks fitted onto Keystone mag wheels. There are no comic transfers as with previous models, but the candy red leaf design on the bathtub and sink are quite adequate.

The 48 piece kit fitted together well, each part fitting perfectly into the next, making the model a joy to build. The finished product is very colourful and definitely way-out, which gives it the right to take its place in the line of MONOGRAM'S "Instant Fun Cars".

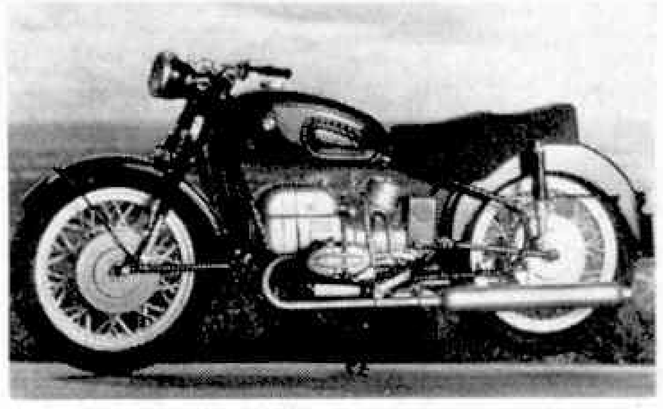
Burneze by Potter & Clarke

At one time or another, someone in your family will have burnt themselves. It might have been your mum, when she was cooking and the water boiled over. Or your dad who was working on the car when the engine was still hot. You might even have burnt yourself, perhaps when you were heating that test tube with the bunsen-burner? When these things happen, what do you do? Do you smother the burn in butter or baking



powder, or put it under the cold water tap? These methods do lessen the pain somewhat, but they don't do anything towards healing the skin. What you need here is a medically designed preparation such as BURNEZE. This not only stops the pain, but it also acts as a healing agent. Produced in a handy aerosol can, to apply, just spray the affected area for about 8-10 seconds, when a white frost appears, the pain will then diminish and finally disappear.

If you have the misfortune to burn yourself, apply BURNEZE as soon as possible. Within seconds BURNEZE will have cooled the temperature of the skin and stopped that burning sensation. The local surface anaesthetic contained



in the spray will ensure that the freedom from pain will continue long after you have finished spraying. Also, the anti-histamine ingredient in BURNEZE stops swelling and unsightly blistering.

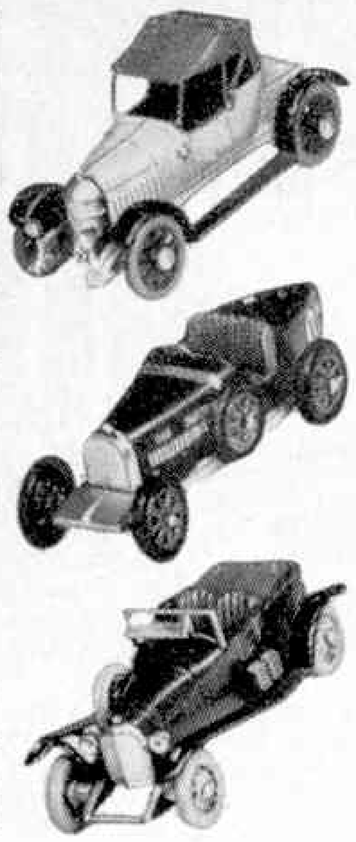
BURNEZE is available at all chemists and stores for, we think, the rather high price of 7/3d., but where the relief from an irritating pain is concerned, we don't think many people will grumble.

Corgi Car Transporter

One of the latest releases from CORGI is a Car Transporter set, comprised of a Carrimore Mk IV trailer unit, large enough to carry six CORGI model cars, and a Scammell Handyman Mk 3 as the tractor unit. This, incidentally is fully detachable from the trailer. When the tractor is detached, two small jockey wheels are lowered from the underside of the trailer to ensure stability. On re-attaching the tractor, the wheels are automatically retracted.

To the rear of the trailer is a hinged loading ramp which is locked onto the top deck of the carrier. To lower the top deck simply push forward the two supports on either side of the trailer. Reverse this operation to raise the deck.

All round suspension on both tractor and trailer unit, and jewelled headlamps for the tractor, complete the model.



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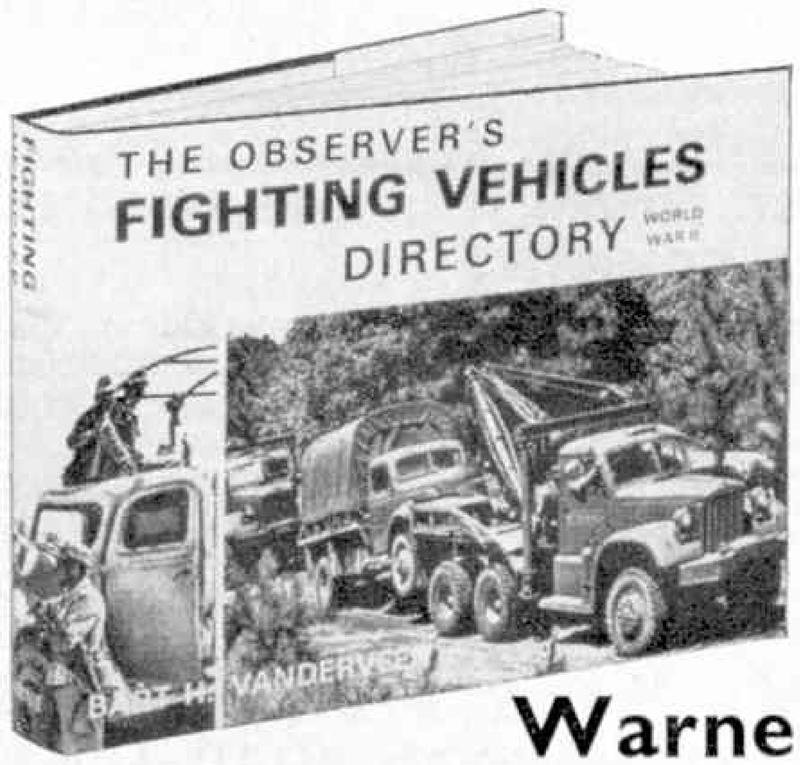

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SUPPLEMENT WITH MECCANO MAGAZINE,
OCTOBER 1969

RADIO 4-2

SIMPLE RADIO CONTROL FOR AIRCRAFT

So, . . . Radio 4 – 2 gets airborne. Radio Controlled model aircraft are, inevitably more complex to control than model boats, since the aircraft adds another dimension to the operating environment.

With model aircraft, there is rather more that can go wrong, than is the case with model boats, and this is accompanied by the risk that the results may be much more final. To be as sure as possible that your first radio controlled model aircraft will be a success, we will be presenting, next month, a purpose designed, easy to fly trainer aircraft, this is the Cracker, specifically designed for the R/C 4–2 series by Vic Smeed.

Any of the transmitter/receiver combinations indicated under *Available Radio Equipment* is Part 1 of our series as suitable for aircraft use. We will be recommending a rubber driven escapement type actuator. Wiring details in the instructions with each of the Radio 4–2 recommended equipments show how to interwire receiver and escapement.

As with the 'Corker' model boat is Part 2, we are going to use only rudder control. Limited as this form of control may appear, it is surprising just how much control can be achieved simply with a rudder command. In fact, a simple rudder control is just about as much as any beginner can expect to handle.

The basic rules for operation of a radio controlled model aircraft go like this.

1. Build your model reasonably light.
2. Be sure to build the model true, with a straight fuselage and wing and tailplane devoid of warps.
3. Install your equipment carefully, with particular emphasis on neatness and accessibility.
4. Be sure that the linkage between the escapement actuator and the rudder control is absolutely free.
5. Run the motor and check that the equipment operation is not affected by vibration. If so make sure that the motor is properly bolted to its bearers and that the receiver is loosely mounted.
6. At the first hint of radio trouble – CHANGE THE BATTERIES.

RADIO INSTALLATION

With all simple single channel systems the primary control must be rudder. An escapement is entirely adequate for driving the rudder, even on the largest size of model. If the model is fast flying, or the rudder area relatively large, the rudder can be aerodynamically balanced to relieve the escapement of excessive load and ensure positive operation of the rudder control under the power available from the escapement rubber motor. A motor-driven servo is not usually successful for single-channel rudder only control because of the greater time lag between signal on and the completion of movement of the rudder to the right or left rudder position. For complete control, and maximum manoeuvrability using rudder-only, virtually instantaneous control movement is required. Whatever form of actuator is used it must also be self-neutralising.

The scope, even with rudder-only control, is considerable. Basically the rudder provides only a turn control, usually very powerful in effect and so must only be applied in moderation – i.e., for short periods If a rudder control position is held on, the turn initiated will rapidly develop into a spiral dive. Hence a flat turn with minimum loss of height is accomplished by blipping on the appropriate rudder signal. In effect, the model is made to complete a turn through a series of partial turns and intermediate recoveries. The result may be a fairly smooth turn or a jerky turn with the model rolling from side to side – depending on the aerodynamic characteristics of the model and the manner in which the control is blipped. Technique, as regards the latter has to be matched with the behaviour of the model.

Various other manoeuvres can be performed with rudder-only, although for some it may be necessary to re-trim the model.

The chief limitation with rudder-only control is apparent lack of ability to control climbing effects. Models coming out of a turn, for example, will naturally tend to zoom. Likewise, a model headed into wind to keep it from losing ground downwind will normally tend to climb strongly and lack penetration. Lack of penetration and zoom effects can be offset to some extent by trimming the model slightly underelevated (compared with normal free flight trim). There is a limit to which this can be carried, however. If the under-elevation is too drastic the model may tend to dive and lose a lot of height on every turn and may even tuck under and dive straight in if the nose drops following a manoeuvre.

Rudder can, however, be used to impart a down elevator effect by blipping on alternate rudder signals. This will produce a weaving motion, resulting from the start of a turn, recover, start of a turn in the opposite direction, recovery, and so on. The weave will be accompanied by loss of height. Such a manoeuvre needs practice to master without losing the model in a complete 180 degrees turn, but can be most effective in providing a means of losing height at the same time as increasing penetration and holding a definite course. It may call for a large number of rudder actions in a single flight, hence a relatively long escapement motor is necessary. Momentary rudder

Fault	Cause	Action
Control surface of actuator sticks "on"	Escapement motor too strong—locks escapement	Replace with smaller section motor or use less turns.
	Escapement motor unwound	Enough power for one movement but not return.
	Escapement fault	May be burr on pawl or detent. Check and adjust for proper action.
	Excessive friction	Check linkage for freedom of movement.
Control surface of actuator sticks "off"	Escapement motor unwound	Check that it is rewound the **correct** way.
	Escapement motor too weak.	May stick "on" or "off."
	Weak actuator batteries	Insufficient to energise coil. Replace.
	Excessive friction	Too much "binding" for escapement motor to move linkage—so free up.
	Excessive aerodynamic load	Use aerodynamic balance to cure. Note : Excessive aerodynamic load at high speeds may equally well lock a control position "on" by distorting the linkage and causing binding.
Controls do not operate	Weak actuator batteries	Check voltage under load.
	Actuator circuit fault	Isolate actuator circuit and check operation independently. (i) Possible wiring faults or disconnections. (ii) "Dry" solder joints. (iii) Actuator coil fault.
	Dirty contacts	Check and clean as necessary. Re-adjust contact pressure.
	Damaged contacts	Contacts may be pitted, burnt or even welded by using excessive actuator voltages (this also includes relay contacts)
	Mechanical failure	Check for binding linkages, broken or seized hinges, etc.
Controls inter-act	Electrical interference	Suppression or bonding may be needed, if not already used.
	Weak batteries	Additional load to second actuator too much for battery capacity.

TROUBLE SHOOTING CHART—TRANSMITTERS

If possible, the source of the fault should be isolated—e.g., in the receiver circuit, actuator circuit or mechanical linkage. All the faults listed may be caused by a receiver fault and if confirmed can be traced through the receiver Trouble-Shooting Chart. The remaining possible sources of trouble then refer to common faults which may develop in the escapement or mechanical linkage systems.

Fault	Cause	Action
Apparently no signal (No reading on field strength meter)	Faulty adjustments	Check against manufacturer's specifications.
	Circuit disconnection	Check for broken or disconnected wiring, fault in keying lead or switch.
	Circuit fault	(i) valve may be displaced from its holder, or broken. (ii) component failure (more difficult to trace without specialised knowledge—return transmitter for check and service if necessary).
Weak signal or lack of range (Low reading on field strength meter and short range)	Faulty adjustments	Receiver may not be correctly tuned to transmitter.
	Aerial fault	(i) Check that aerial is proper length (also that the loading coil is incorporated, where specified). (ii) Check that aerial is properly mounted (e.g. good connection at base). (iii) Check that joints are not oily or dirty on telescopic aerial. (iv) Check that aerial is not earthing through faulty socket or moisture on socket.
	Weak batteries	Check batteries under load. Load-voltages should never be less than 0.8 times nominal battery voltage.
	Unfavourable operating conditions	(i) Transmitter on damp ground with variable "ground coupling" effect. (ii) Output affected by presence of overhead wires, etc.
Control surface of actuator "chatters"	Fugitive vibration and excessive slack in linkages	Change propeller or balance propeller to reduce vibration. Reduce "Free" movement in linkages.
	Escapement motor too strong—causes escapement to 'skip' under vibration.	Replace with smaller section motor or reduce number of turns supplied.
	Escapement motor wound wrong way	Immediately apparent as it occurs on winding the escapement motor.
	Escapement faulty	Pawl or detent not properly raked or set.

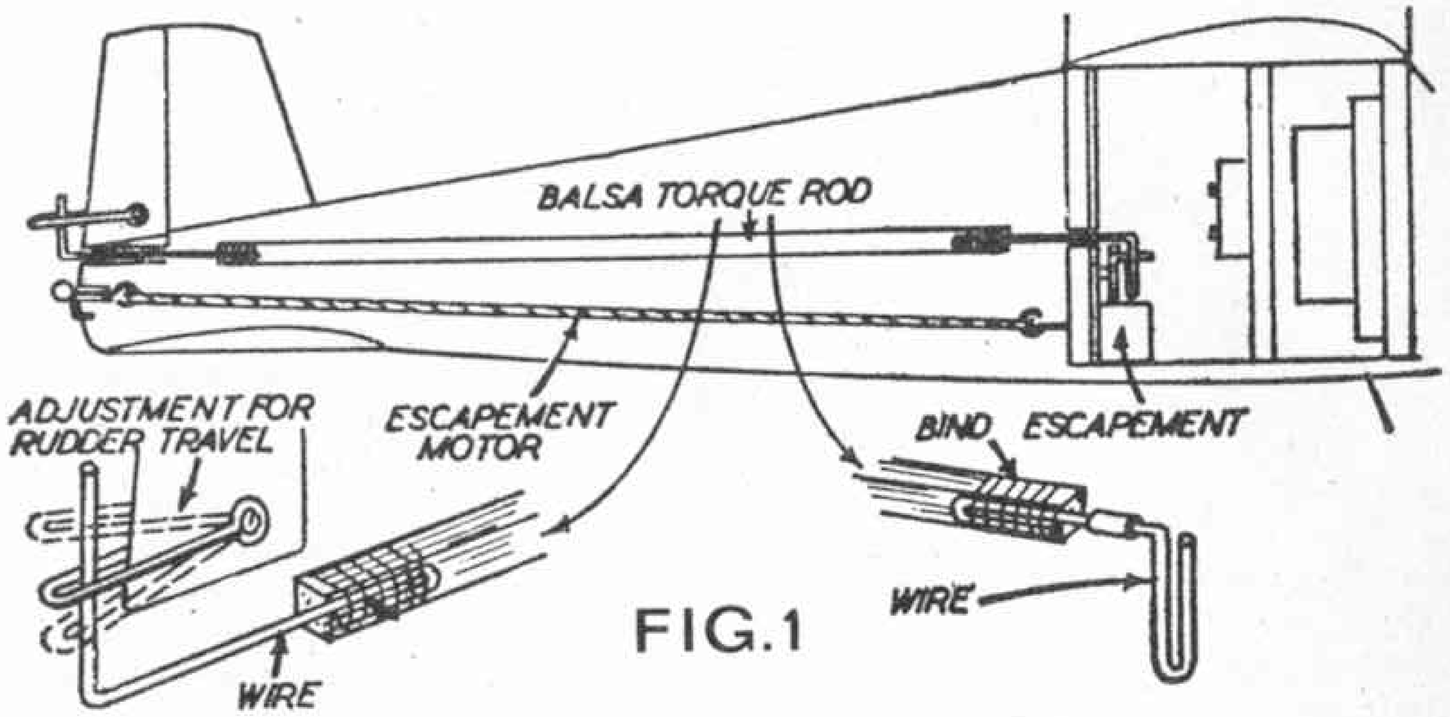


FIG.1

blipping is also a way of combatting a zoom.

A typical installation is shown in fig 1 utilising a standard escapement mounted in the middle of the fuselage – the best position for weight distribution. This also allows the escapement rubber motor to be brought to a convenient point at the rear, for withdrawal for winding with a wire hook fitted in a hand drill, or a simple mechanical winder. The escapement should be bolted to a ply bulkhead and the driven wire loop connecting with the crank connected by a rigid rod to the rear crank. This long length of connecting rod should never be wire, as this is both unnecessarily heavy and too prone to vibration effects. Hard balsa strip about 3/16 or $\frac{1}{4}$ in. square is the best material for the rod, with wire fittings bound to each end as shown.

Operation of the linkage is self-evident. The rocking motion of the loop engaging the escapement crank (or pin) is translated into a similar rocking motion of the end wire crank. This engages in a hairpin loop of wire secured to the rudder. There should be enough clearance for the wire to slide in the hairpin loop without binding, but no excessive clearance so that the rudder can chatter. The same applies to the loop fitting at the front end.

The actual degree of rudder movement produced can be varied by adjusting the attitude of the hairpin loop – and thus the effective moment arm of the wire crank-reducing the moment arm to reduce rudder movement and vice versa. The rubber motor-winding plug can be fitted in the rear of the fuselage or on one side, as most convenient.

There are, of course, many possible variations on this theme. The main thing to bear in mind is that the simpler and more direct the linkage is the more foolproof it is likely to be; the less the slop and friction in the system, the more positive the control action.

There is another disadvantage of all-wire linkages. Any appreciable length of wire tends to act as an aerial and thus pick up R.F. signals Although these may be extremely minute, the rubbing of an electrically active wire part over another (as in movement of the linkage) can generate electrical noise or interference which can be picked up by the receiver and cause it to

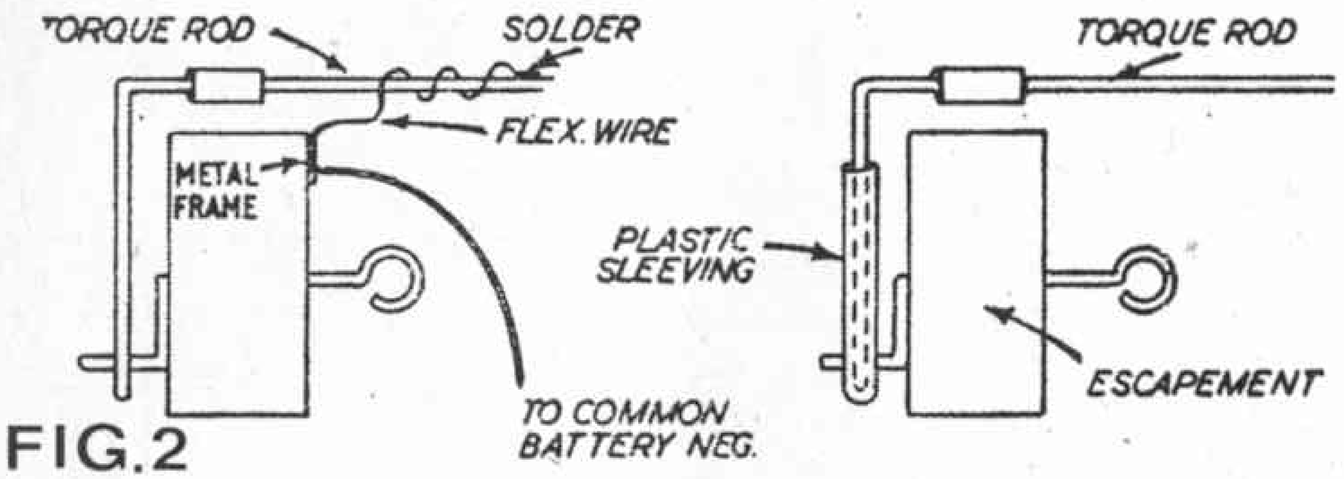


FIG.2

chatter. There are two methods by which such noise' can be eliminated. The simplest is to insulate all rubbing wire (or metallic) parts from electrical contact with a piece of plastic tubing or radio sleeving over the wire. The other is to bond all the wire parts with a flexible lead soldered in place as shown in Fig. 2. This effectively shorts out the source of interference. For proper bonding this lead should theoretically also be connected to an earth point relative to the receiver – e.g. the common battery negative. This may cause more trouble than it is worth, however, if the bonding is not complete, so is not recommended as a general practice.

Receiver and battery mounting is, of course, quite independent of the actuator system. The receiver should always be mounted behind the batteries so that in the event of a crash landing the batteries cannot be projected against the receiver and possibly damage it. The receiver should also be soft mounted to minimise the transmission of vibration to it from the engine, and to provide a measure of shock protection in a crash or heavy landing.

There are many possible systems. Most methods are to strap the receiver down with rubber bands (or cement directly) to foam rubber pads either on the bottom of the fuselage or the back of a main ply bulkhead (Fig. 3). Alternatively the receiver may be mounted on a plywood tray which slides into grooves formed in the fuselage sides, making the whole unit ready to remove as required. In this case the batteries may be strapped to the front of the ply tray (Fig. 4). Yet another method is to mount the batteries independently in a separate compartment in front of the

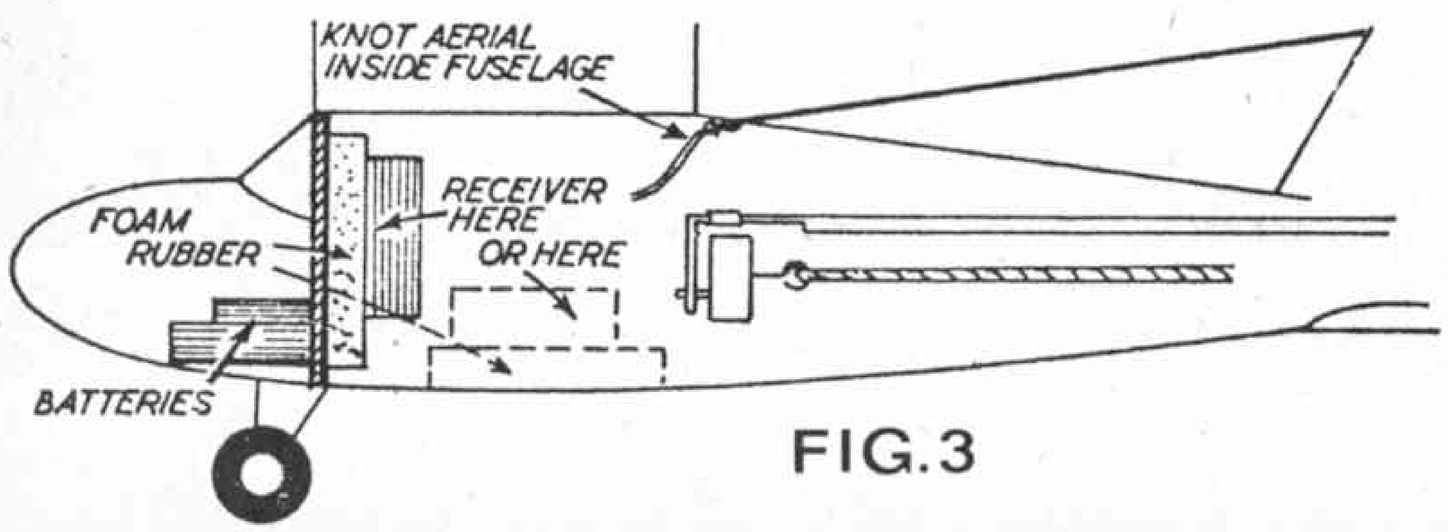


FIG.3

FAULTS AND "TROUBLE-SHOOTING"

Fault	Cause	Action
	Relay adjustment faulty	Check that relay *is* working—e.g. by switching receiver on and off. If working, readjust to circuit specification or manufacturer's recommended 'pull in' and 'drop out.' If not working, suspect mechanical fault in relay.
	Transmitter fault	Transmitter batteries may be weak or transmitter faulty, transmitter aerial not connected or extended, or poor connection.
Relay or escapement "chatters" (Motor not running)	Faulty relay adjustment	Check relay adjustment.
	Critical tuning	Check tuning at range.
	Faulty tuning	Re-tune as above.
	Transmitter fault	Check transmitter for correct operation, e.g. from another transmitter.
	Outside interference	
Relay or escapement "chatters" (Motor running)	Engine/propeller combination	Check propeller balance or change propeller.
	Receiver mounting	Improve shock-resistant mounting of receiver or mount in a different attitude.
	Faulty adjustment	Relay adjustment may be faulty or weak batteries giving poor 'hold in.'
	Electrical 'noise'	Insulate or bond metallic linkages.
Lack of range	Faulty adjustments	Check relay operating points and differentials against recommendations. Specifically check top current at range (batteries may be weak).
	Critical tuning	Re-check tuning.
	Weak batteries	Check receiver and transmitter batteries under load.
	Charge of aeria	Check that aerial charge is correct.
	Transmitter fault	Check transmitter operation independently.

TROUBLE-SHOOTING CHART—RECEIVERS

Manufacturers instructions should always be followed regarding wiring connections, setting up and tuning, battery sizes. etc. In a majority of cases faults will be found due to (i) low batteries (ii) poor wiring, poor soldered connections, or poor plug and socket connections. On *new* installations a common cause of faulty operation (or lack of operation) is *incorrect connection.* Wiring circuits should always be checked *thoroughly* before switching on as otherwise damage to valve, transistors or other components may result.

Fault	Cause	Action
Does not work when switched on (No idling current shown on meter)	Connection fault	(i) Check actual wiring to see if it agrees with instructions. (ii) Check for broken wires or poor soldered joints. (iii) Check battery connections (especially spring pressure in battery boxes). (iv) Check that switch is working properly and not defective due to dirt, etc. (v) Check that shorting plugs are in position (where used).
	Circuit fault (component)	Faulty component. Faulty valve. Note: it may be a faulty valve connection due to valve having been displaced from its base.
Does not respond to transmitter (Idling current shown on meter when switched on)	Weak batteries	Check actual battery under load with suitable voltmeter—preferably after the battery has been on for 2–3 minutes. An absolute minimum load voltage for satisfactory operation is 0.8 times the nominal battery voltage (e.g. in the case of a 22½ volt battery, 0.8 × 22½=18 volts as measured on load). Replace batteries if approaching this minimum load voltage figure.
	Faulty tuning	Re-tune against transmitter (transmitter on) at short distance and at range. Do not attempt to tune near possible sources of interference—e.g., an iron shed, fence, etc. In the case of aircraft : tune at range with the model held at shoulder height. In the case of boats : tune at range with the model in the water. In both cases the transmitter should be used in the normal operating position (i.e. hand held or standing on the ground).

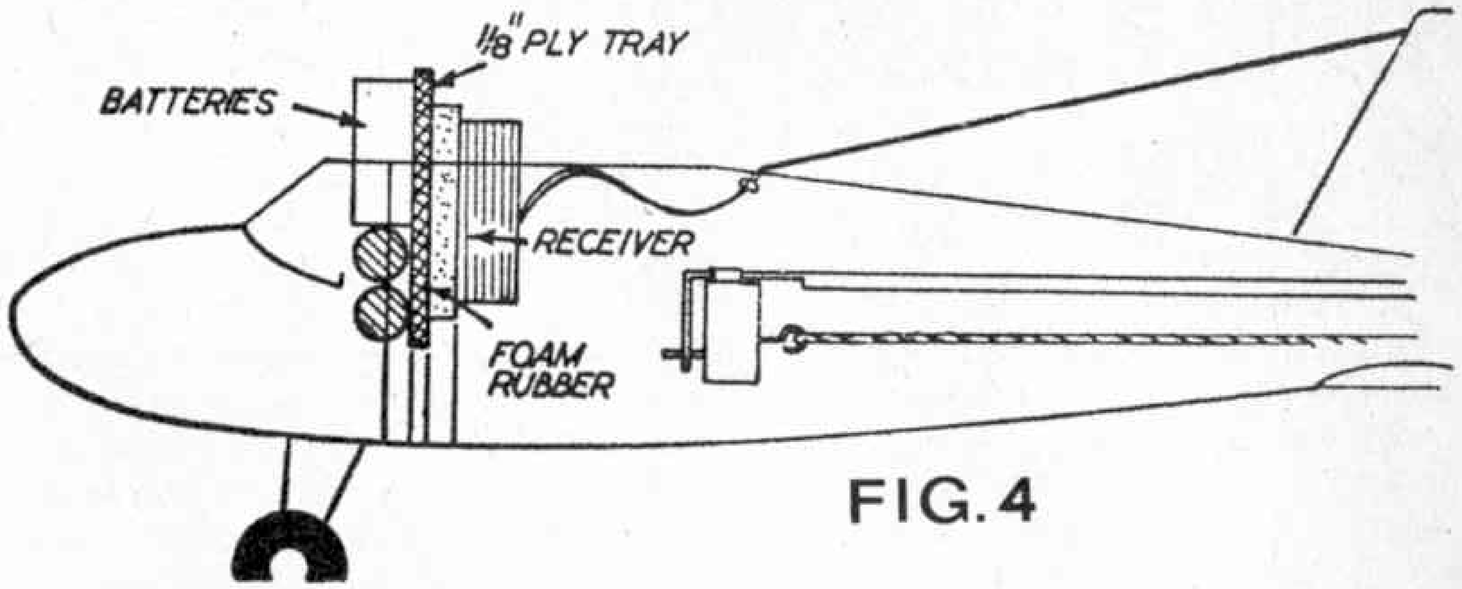


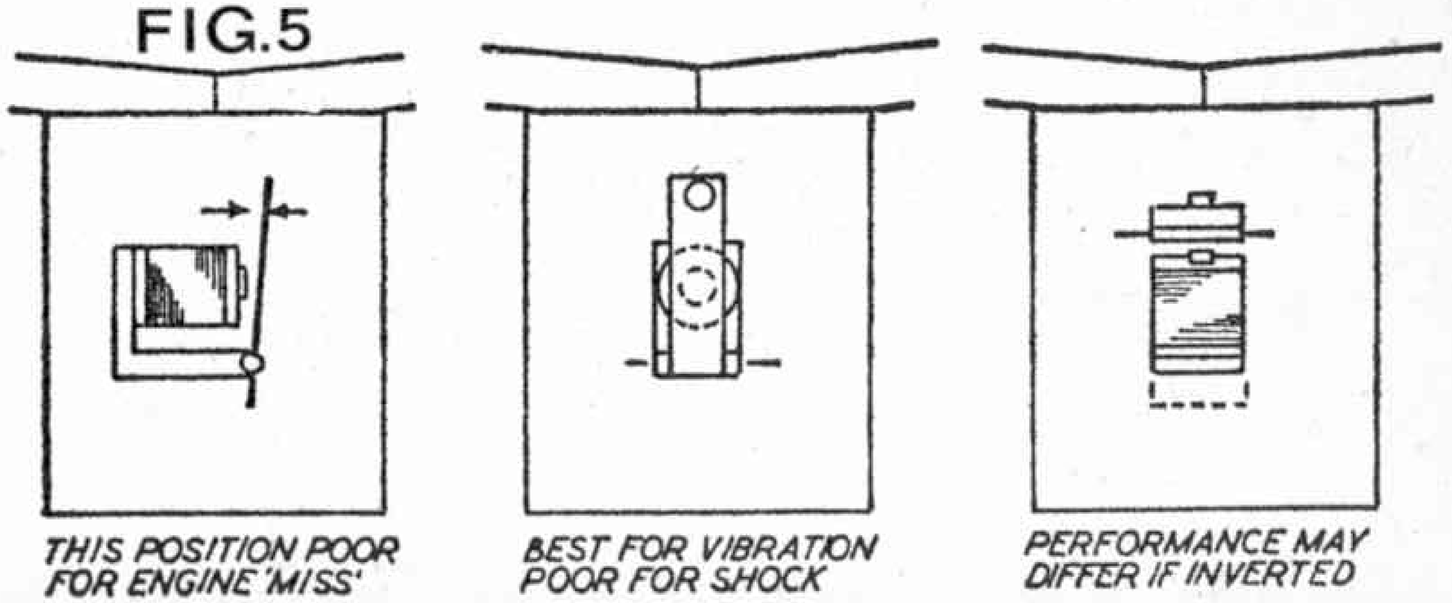
FIG. 4

forward cabin bulkhead – particularly advantageous in bringing the battery weight well forward but making the batteries rather more difficult to get at. No shock absorbing mount is normally used for the batteries, the main requirement being that they should be anchored in place securely and with all connections positively made.

A further point regarding receiver mounting. The foam rubber (or more usually, foam plastic) used should not be too stiff and rigid, nor too flexible. Foamed plastic, in fact, is not the best material for the job, although commonly used. The right degree of sponginess required is that given by about 1 in. thickness of foam rubber of the type used for mattresses.

There is also the question of the best way round to mount a receiver which employs a relay type output. The source of engine vibration is the up-and-down movement of the piston. An engine which misfires, however, will give a sideways kick to the fuselage. To minimise the effect on the relay it is therefore desirable that the relay armature movement should lie in a plane at 90 degrees to these vibration movements. This means that the best theoretical position for the relay armature is vertical when mounted with the armature pivot at right angles to the fuselage (see Fig. 5). This, incidentally, also minimises gravity effects on a non-balanced armature but renders the relay most liable to damage in a crash landing.

FIG. 5



SINGLE CHANNEL FLYING

Before flying your model there are several things you can do to assure success.

Before you leave home for the flying field, follow the manufacturers instructions, and check your transmitter and receiver batteries under load to be sure that the voltages are at safe operating strength because battery complements vary with individual makes of radio equipment, you can make sure all batteries are under load by turning on both receiver and transmitter and holding a signal while the voltage is measured. Take the reading over a period of at least 15 seconds to make sure that, in the case of well-used batteries, no fast and continuous falling off of voltage is noticeable.

To make a reliable range check when the receiver has not been tuned, have a helper hold the transmitter while you walk out the model for tuning (Fig. 6). Tuning close by is not enough because the transmitted signal is relatively strong for the short distance involved and tuning will seem 'broad' and easy. However, as distance is increased between transmitter and receiver, tuning will become narrower (less turning movement of your tuning tool) until reception is good only at one precise position of the tuning device in your receiver. So moving the receiver away by several hundred feet enables you to tune more precisely, avoiding the risk of lost control to poor tuning.

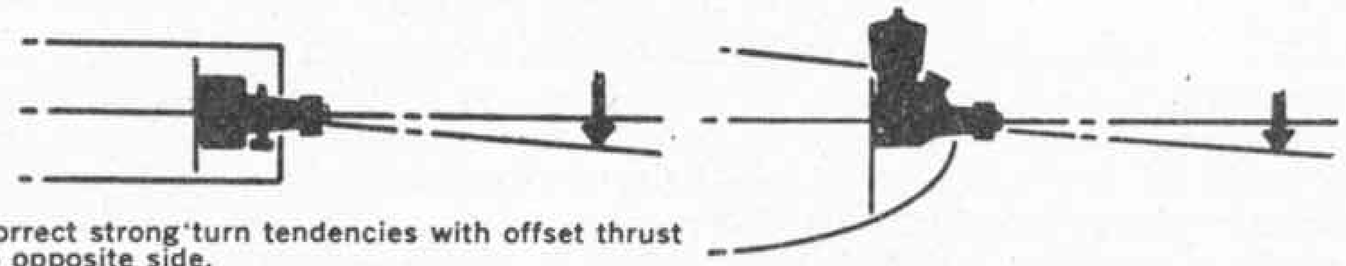
You will need a system of hand signals to indicate to the helper what you wish him to do. An upraised arm (held overhead) means hold signal on while I tune (Fig. 7.) After that, an arm raised to shoulder height indicates put signal on;

FIG.6

FIG.7

FIG.8

FIG.9



Correct strong turn tendencies with offset thrust to opposite side.

FIG.14

Add downthrust to correct looping tendencies.

action, but release the signal as the model goes into the right turn or the nose will drop. Let the model recover by itself into the gentle climbing turn to the left. Now you can experiment a little – a couple of right rudder commands in sequence, may be enough to complete a right hand circle. Try not to hold any signal so long that the model drops its nose down too far and picks up speed. This usually confuses the beginner and he tries to correct, only to make it worse.

If, when you give right rudder command, the model rocks violently over then let it alone. This is where that short motor run comes in handy – you did meter the fuel didn't you? Chase it à-la-free flight, and when it glides to earth, take it back to the launch area and reduce the rudder throw even more (if this cannot be done, then cut down the rudder area a bit, although this will be an extreme case) and try another short flight.

It could happen that, due to small variation in your construction, your model takes off in a right turn. This is not serious, unless the turn tightens up. If it does, you will have to let it circle down until it hits the ground to try to correct with left rudder. This is a little hard for the beginner, because the excitement usually is too much, and instead of pushing the button twice, he hits it once – and that is pretty hard to bungle.

Perhaps the most conservative way for someone who has never pushed a transmitter button in earnest before, but has flown free flight, is to make all flight adjustments with short free flights. (In this case limit the fuel to suit your field, perhaps as little as 15–30 seconds). Keep your radio on anyway, but do not use it except in dire emergency. Make short flights until you get the flight pattern set – left turn under power, right turn on glide. Most of you know how to do this adjusting the thrust line (Fig. 9) or rudder, but here is a brief summary anyway.

1. Model climbs to left, glides left. Adjust rudder slightly to right.
2. Model climbs to right, glides to right. Adjust with slight left rudder
3. Model circles tightly to left under power, glides straight or go right. Put in slightly more right thrust.
4. Model circles to right under power, glides straight or to left. Take out a little of the right thrust.
5. Model glided fine, but swoops, under power and tends to stall. Add a little down thrust.
6. Model glides correctly, but dives in under power. Take out some down thrust (this is rare with small models).

All the above adjustments assume that you have removed any warps, and your wing, tailplane and fin are properly aligned, This is very important, particularly for small models because an eighth of an inch misalignment in a small job is equal to perhaps half an inch in a larger one.

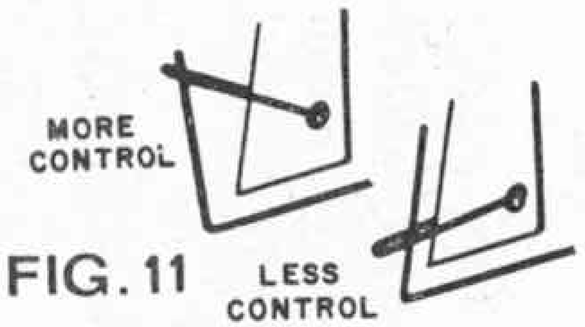


FIG. 11

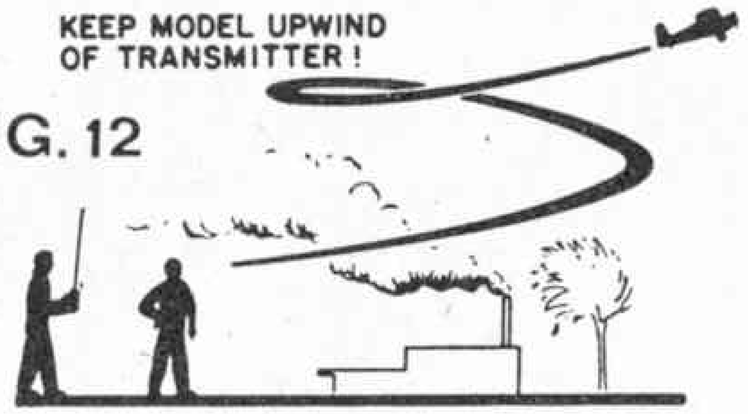


FIG. 12

you achieve ideal pattern.

Now you have finished the glide tests it is time for the first power flight. Set the rudder yoke down to minimum travel (Fig. 11), also the elevator yoke if you are using one. (The elevator ordinarily is not required except when you want to stunt the model). Check out the radio range. Put in enough fuel for a short flight – about a minute or so.

As a novice you should avoid windy days. A model can drift with a strong wind for long distances if you lose control through inexperience. Since the glide speed of the model is in the vicinity of 15-18 mph it is obvious that for a small model, a 15 mph wind is quite strong (too strong for the novice). As you gain experience you will note that it is always much harder to control the model properly when it gets downwind from you and therefore it is always best to endeavour to position the model upwind (Fig. 12) where mistakes will not put pressure on the pilot. If too far downwind, a mistake can mean lost control despite perfect operation of the radio.

After starting the engine and adjusting for peak power, turn on your receiver and transmitter and make a final control check. When doing this you may require help. When switched on and at very close range, some transmitter/receiver combinations tend to 'swamp' the receiver so that it does not work properly, often causing the receiver to 'lock-on', resulting in locked control. If this happens you have to move the transmitter away from the receiver far enough to overcome this tendency. In any event, before launching your model, key the transmitter and be sure the control surfaces respond properly. Yes, you did it at home – but do it before every flight. Once you have made absolutely sure everything is working, launch the model – or let it take off. If the former is the case, launch it straight ahead and level into wind. Do not heave it up!

If you have carried out your glide tests carefully, the model should go into a very slight left turn and start climbing – just like a sport free flight model. If it does – and in most cases it will, then allow it to climb in free flight until it is about 60 or 70 ft. up, then give it a short rudder command (Fig. 13). This should straighten the flight path out and steer the model into a right turn. It should be a gentle

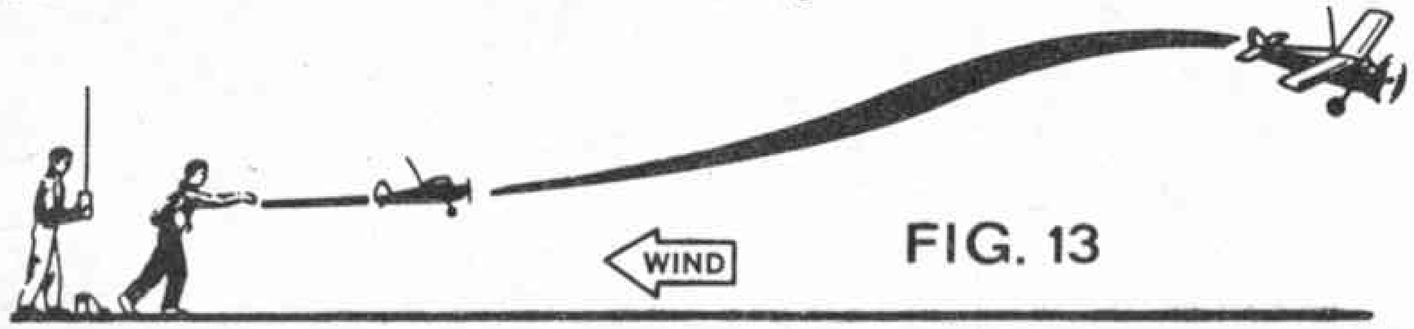


FIG. 13

when arm drops, signal off. (Figs. 8 and 9). This permits you to order rapid signals as required. Wave your arm from side to side to indicate when to shut off transmitter.

Incorrect size of rubber escapement problems. Be sure to use the recommended size of rubber, and allow at least 10 per cent extra length to avoid excessive tension between hooks. Treat the rubber with rubber lubricant or, if unobtainable, try caster oil. (Never use motor or mineral type oils), then wipe off excess.

When winding the rubber, note that it first twists for its entire length, then begins to build a row of knots from hook to hook. Count the turns as you wind (the gear ratio of your winder, such as 4 to 1, will help you count) and check to see if the escapement continues to operate at, say 20 per cent more turns after the row of knots has been attained. If so, limit yourself to somewhat less turns than this excess. Between flying sessions it is a good idea to unwind the rubber motor.

FLYING

Find yourself a large vacant space of field overgrown with tall grass. I know this is the same advice you have been told since you started building models, but this time I am suggesting it from the viewpoint of radio jobs rather than free flight. Remember, tall grass is not much of a cushion for a 5 lb. model, but it will save a good deal of minor repair work on a 10oz. job.

Let's go through the test gliding sequence. Launch the model into into wind (and do not carry out this test unless the wind is light). Launch the model level, or even with the nose slightly down, but never heave it up into the air! Try to estimate the speed of release to roughly equal the normal gliding speed of the model (somewhere around 15-18 m.p.h.). Launch the model slowly at first and gradually build up the launch speed. As you come up to glide speed the ideal reaction of the model is to glide straight ahead for a short distance, then the nose should drop slightly and assume a gentle glide angle, at which angle the model should sink to the ground. (Fig. 10).

If the model noses up, stalls, and drops, then check two things. First, is your C.G. where it belongs? If not, move the batteries forward as required. If however, the G.C. is correct then check your elevator. Correct by bending the adjustment wire, or by shimming (1/64th in. at a time). It may take a combination of both corrective actions.

If the model dives into the ground, even though you launch it faster than glide speed, then move the batteries back, or bend the elevator adjustment spring a little – 1/32 in. at a time.

If any tendency to turn is noted on the glide, check wing, tailplane and fin for warps. Also make sure the rudder is straight. Do not try to overcome any warps by using opposite rudder – this could be fatal when you apply power. Go home and straighten out the warps over a hot plate, then come back and continue the glide testing until

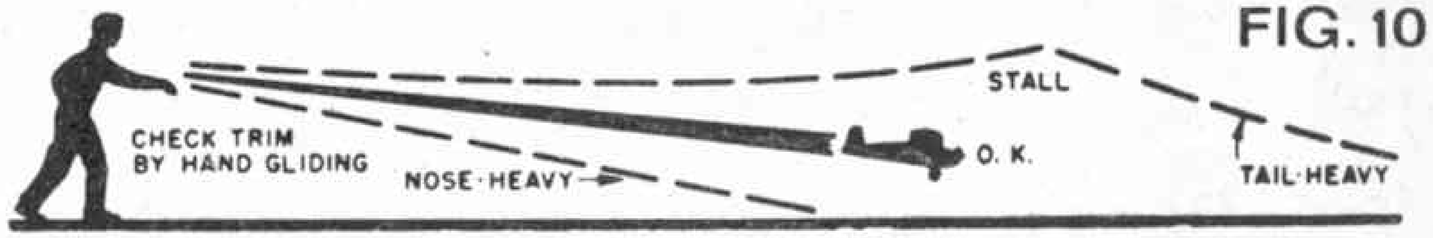


FIG. 10

Filling in your licence application form...

WIRELESS TELEGRAPHY ACT, 1949

MODEL CONTROL LICENCE

PLEASE USE BLOCK CAPITALS

Applicant's surname .....BROWN.....

Christian names .....JOHN.....

Address ...14, BELLWOOD RD.,...

.....LONDON.....

.....

Type of model ~~Vehicle~~/~~Vessel~~/Aircraft ø

Central point of Station from which 5 mile radius will apply. .....EPSOM DOWNS.....

PRINT ON YOUR NAME AND ADDRESS

CROSS OUT WHICH IS NOT APPROPRIATE

USUAL FLYING FIELD OR OPERATING AREA

To the COMPTROLLER AND ACCOUNTANT GENERAL, CASHIER'S BRANCH
G.P.O. LONDON, E.C.1.

I enclose Cheque / Money Order / Postal Order / Bank Notes ø for £1 10s. 0d. in respect of my application for a Model Control Licence.

Signature .....

Date ..... 19 ..

Notes

1. øDelete as appropriate.
2. Cheques, Money Orders and Postal Orders should be made payable to "The Postmaster General" and crossed "A/C Payee."
3. Bank notes should be registered.
4. A receipt will not be issued for a payment by cheque unless it is specially asked for.

FOR OFFICE USE

In A.G.D.	In R.S.D.
£ ..... Withdrawn	..... Licence issued
..... acknowledged	£1 10s. 0d. ..... Issue fee
..... No. on Schedule (CB 165)	
..... Date	

Your very first action when taking up radio control must be to obtain the necessary licence as detailed in Part 1 of our series. A licence costs 30/- for 5 years (6/- per year) and application forms are available from

G.P.O. RADIO and BROADCASTING DEPT., WATERLOO BRIDGE HOUSE, WATERLOO ROAD, LONDON, S.E.1.