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FEBRUARY 1968

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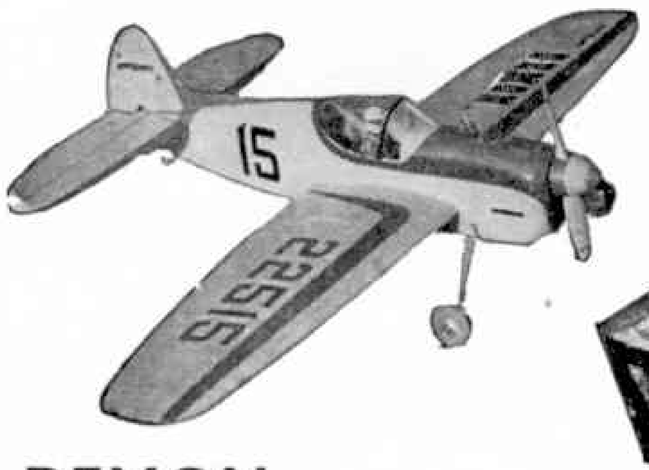
THE NEW Young Modellers' MAGAZINE

START OFF RIGHT with a KEILKRAFT KIT

FIREFLY

Stunt model with "profile" type fuselage, specially designed for engines under 1 c.c. Kit contains die-cut parts. Wingspan 20 in. **24/3**

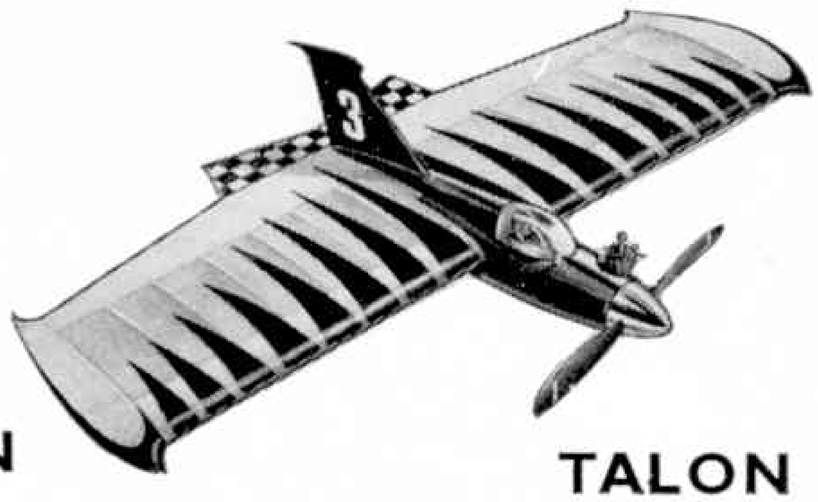


DEMON

Class A team racer to S.M.A.E. specification. Kit contains die-cut parts. For engines up to 2.5 c.c. Wingspan 30 in. **44/2**

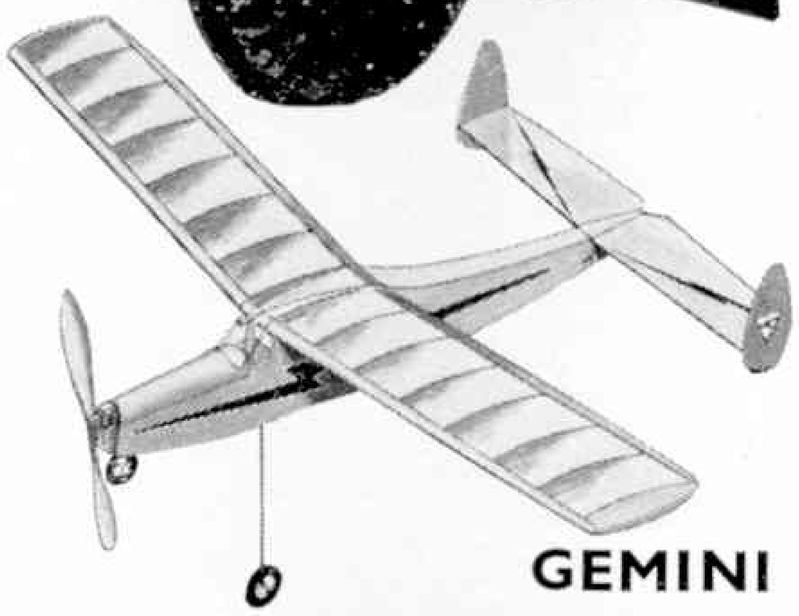
RADIAN

with coupled wing flaps and elevators For .049 motors. Kit contents include die-cut parts, stunt tank, preformed U/C, formed canopy, all hardware. Wingspan 22 in. **25/11**



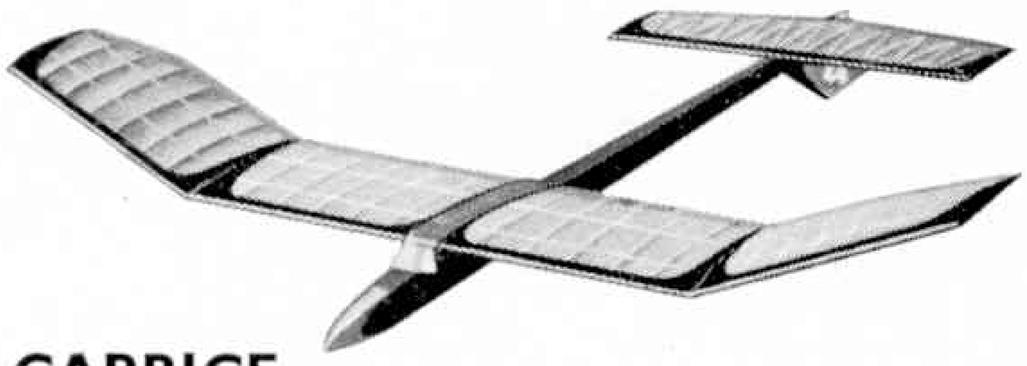
TALON

Combat design of considerable strength. Easy and quick to build. A fully aerobatic model that is great fun to fly. For 2.5 to 3.5 c.c. engines. Wingspan 32 in. **37/3**



GEMINI

Duration model with all fuselage parts, tailplane, and fins in pre-cut, pre-decorated sheet balsa. Wingspan 22 in. **12/6**



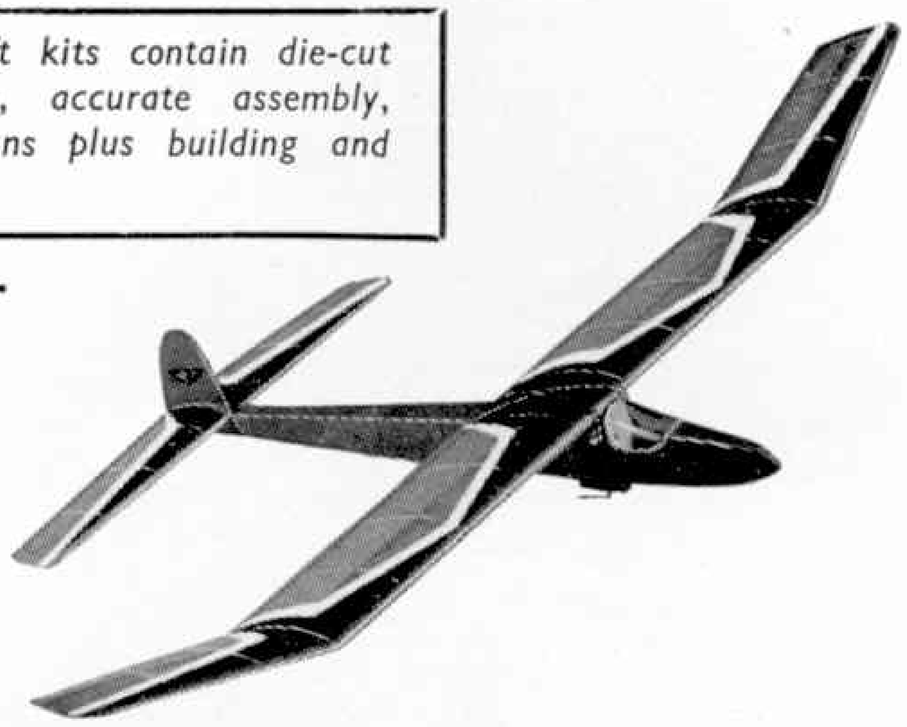
CAPRICE

High performance contest glider. Rugged and straightforward to build. Kit features die-cut parts for speedy assembly. 51 in. wingspan. **23/11**

All these Keilkraft kits contain die-cut parts for speedy, accurate assembly, and full size plans plus building and flying instructions.

CONQUEST

Towline glider for beginners, with a very good performance. Kit contains die-cut parts. Wingspan 30 in. **11/6**



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MECCANO® Magazine

FEBRUARY 1968 VOLUME 53 NUMBER 2

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MAP **HOBBY MAGAZINE**

FRONT COVER

Artist Laurie Bagley captures the action as General Ngkyen Cao Ky fires rockets from his Douglas A1-H Skyraider. In the Republic of Vietnam Air Force markings, the Skyraider makes a colourful plastic model. See pages 76-77 for details.

NEXT MONTH

Full size, free plans for a rubber powered, free flight, aircraft model, very easy to build; H.L.D. returns with Battle Gaming; Rolling Stock described in A.B.C. of Railways; part two of Trackside Construction, an OO Signal Box; New Meccano models for the novice and expert alike; Dinky Toy News; Electronics; Air News; Chemistry; Stamps; and How to Fly Control Line model aircraft. Watch out for the Caledonian Railway 4-2-2 locomotive cover, and "Railway Races" feature.

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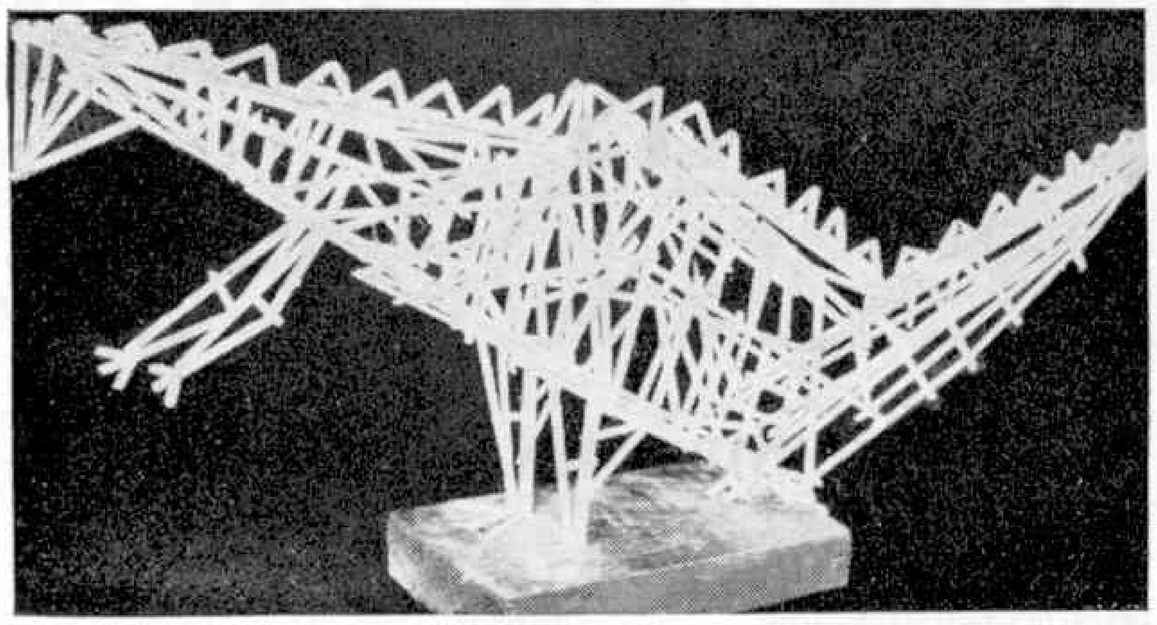
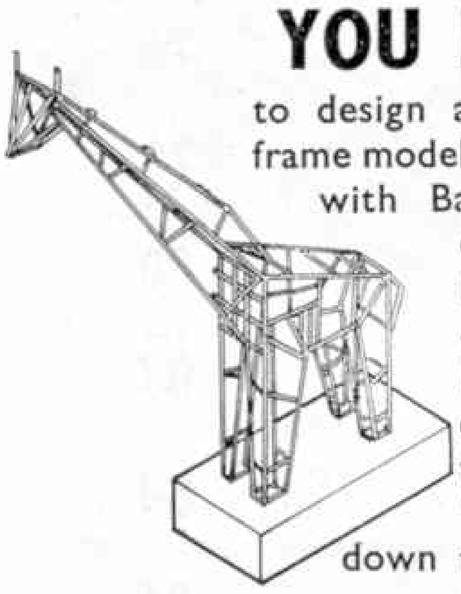
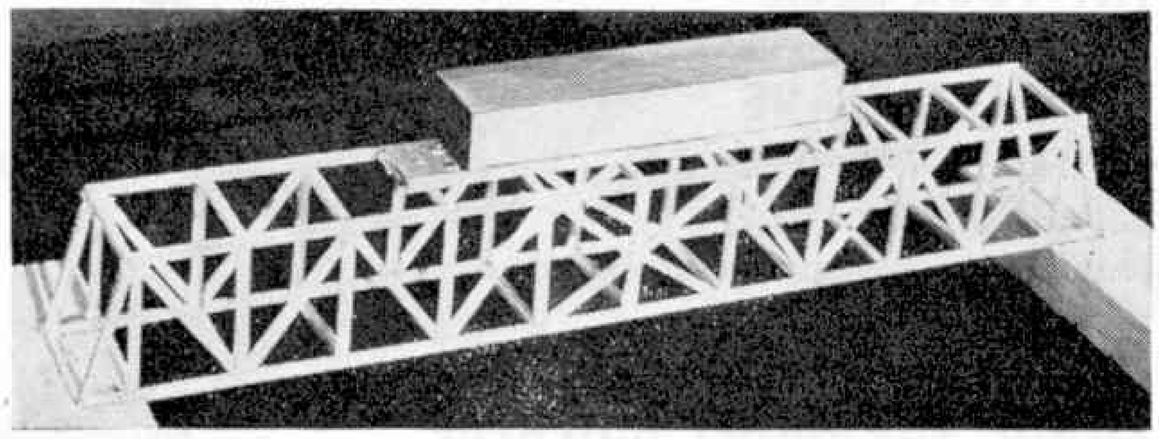


YOU DON'T NEED PLANS



to design and build models like these. Space-frame models, we call them—or perhaps "doodling" with Balsa strip would be a better description. Just start with a block of balsa for a base and build up figures or designs in balsa strip cut to suitable lengths and cemented in place. Work out the design as you go along—it's fun! What is more there is no waste. You can use up every piece of strip down to the last half-inch length left over!



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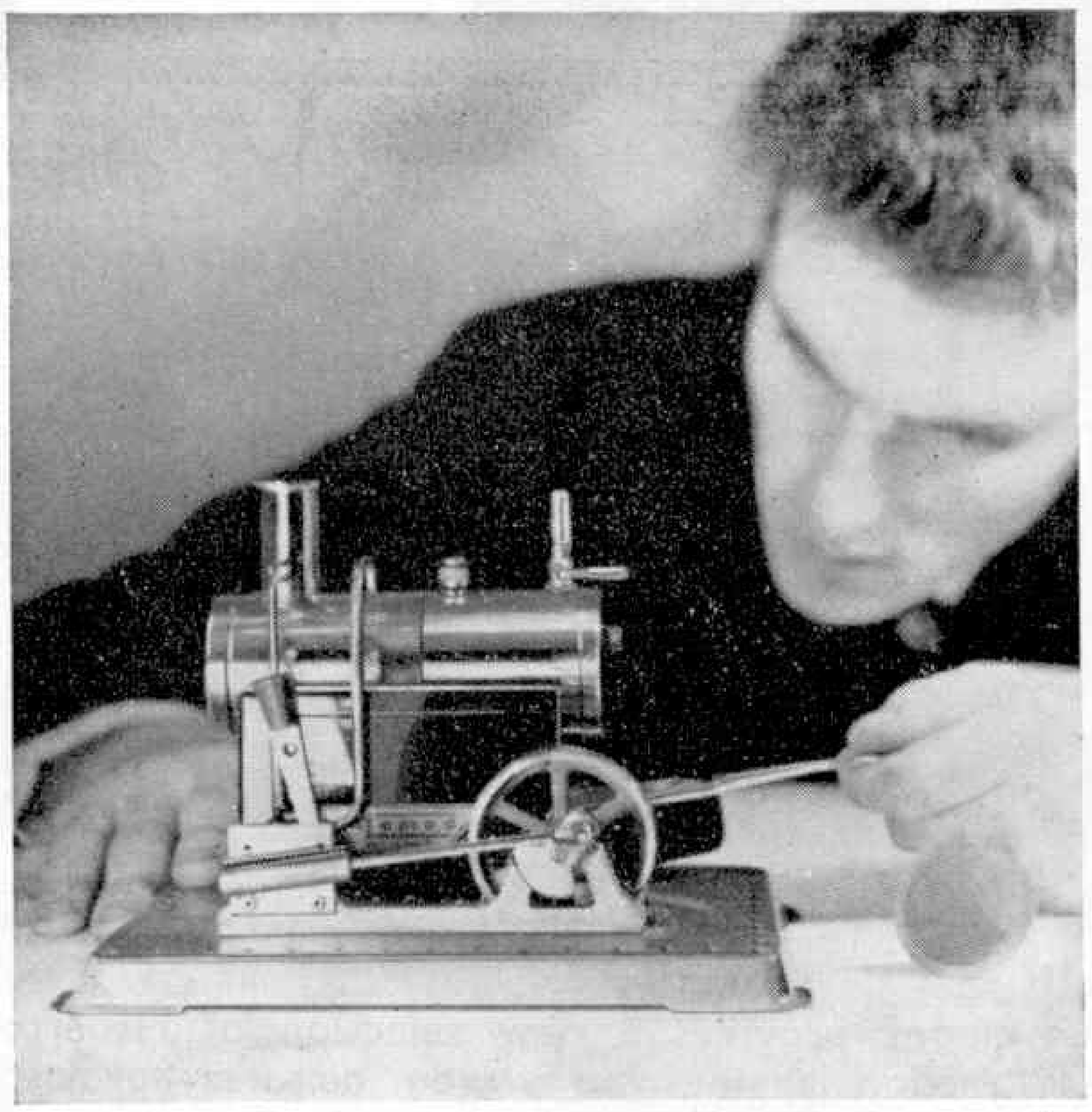

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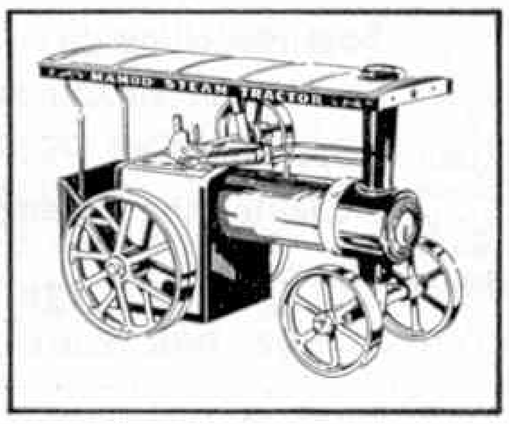

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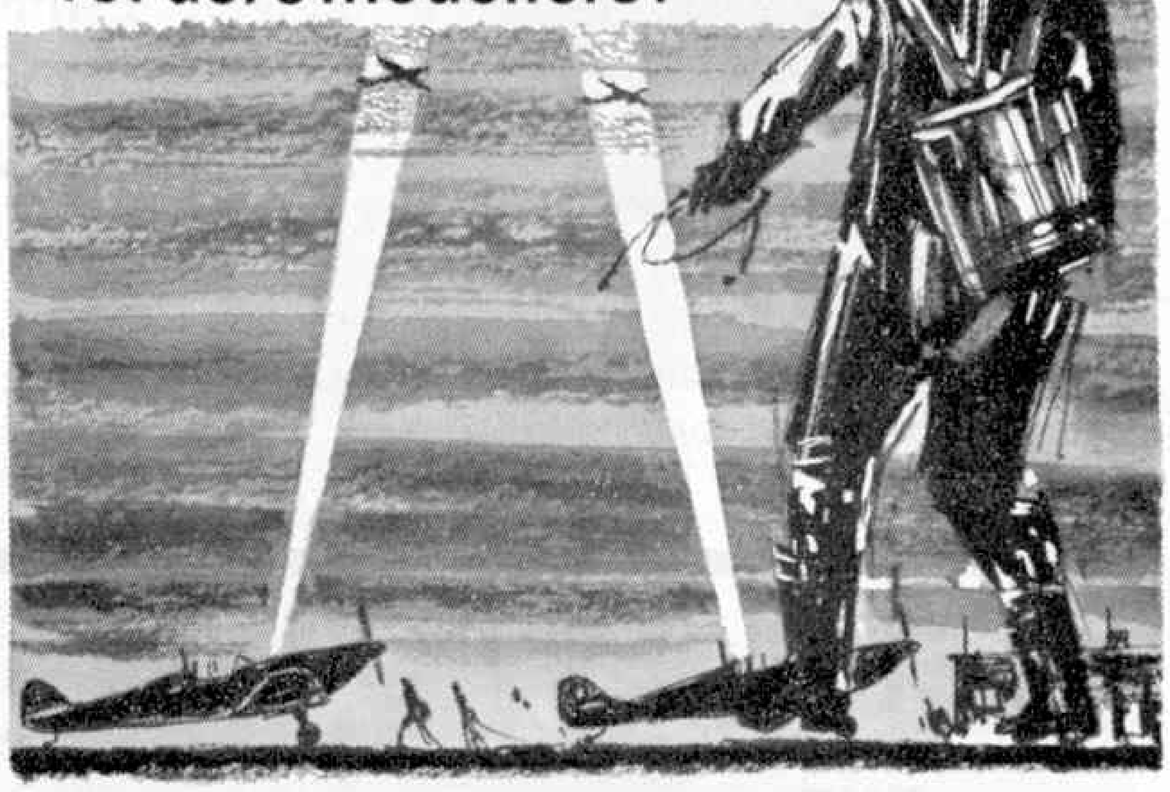

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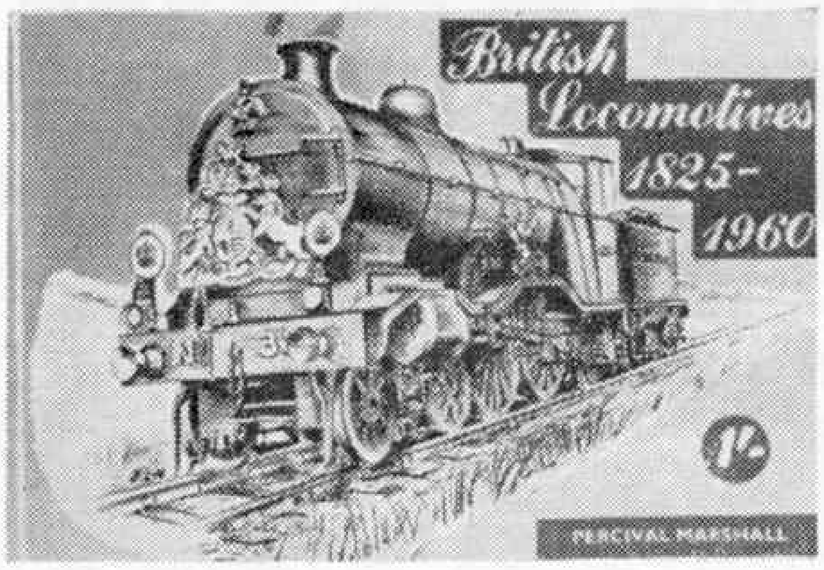

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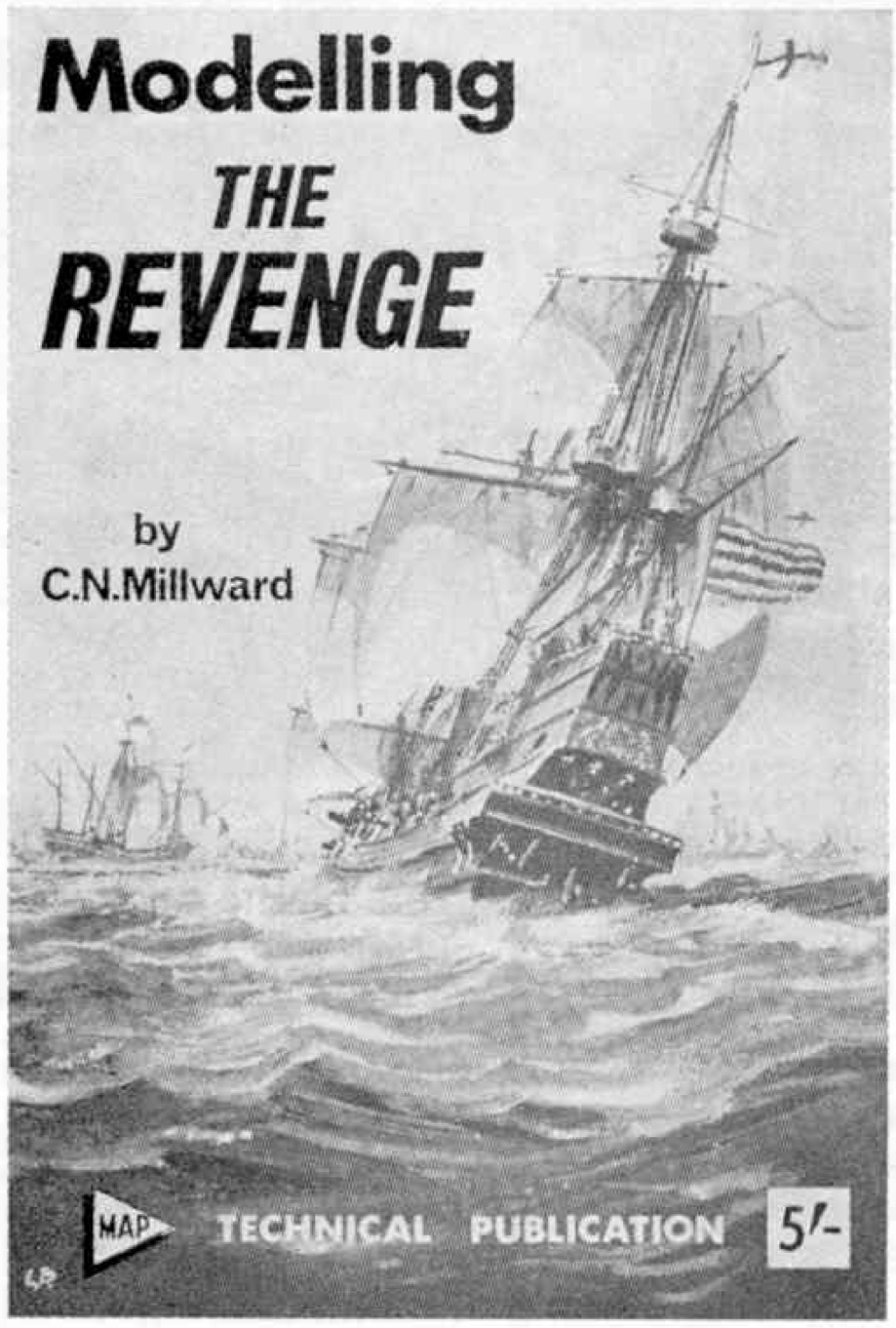

MODELLING THE REVENGE

The book is devoted to a detailed description of the famous Elizabethan ship-of-war *Revenge*, which carried Sir Francis Drake's flag in the Armada operations in 1588, and then went down so gallantly against great odds under the command of Sir Richard Grenville three years later.

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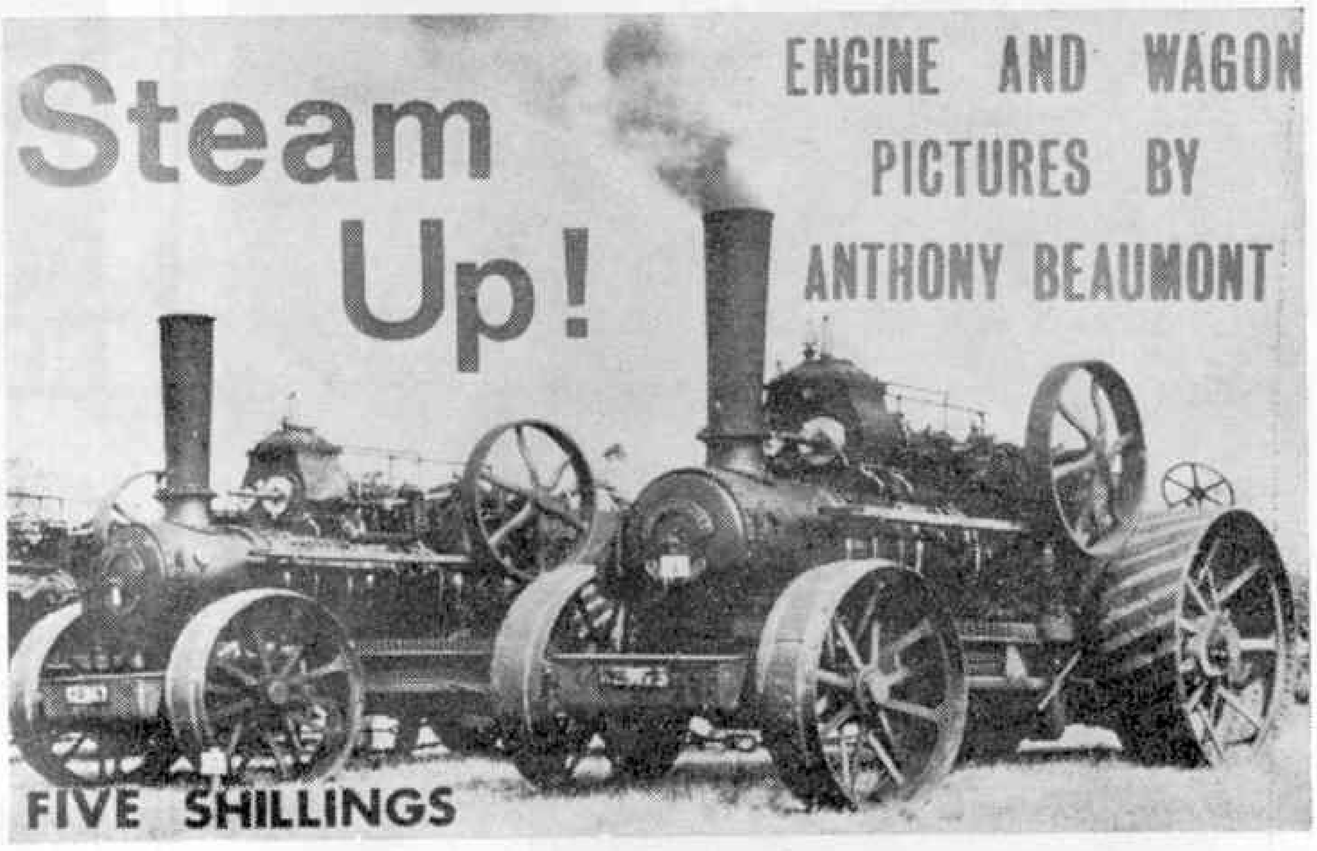

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AEROMODELLER ANNUAL 1967/68

Articles include world record holder Wisniewski on Tuned Exhaust Pipes; other speed flying articles; Fuel Tanks for Control liners; Dr. Hawkins on Jap WWII Colour Schemes; Prop Carving; Woodwork for Modellers; Flexwing flying models; plus drawings of the world's models of the year, including r/c, contest and sports power, Winter Cup, slope soarers, chuck gliders, helicopters, indoor . . .

128 pages, size 8½ x 5½ in.

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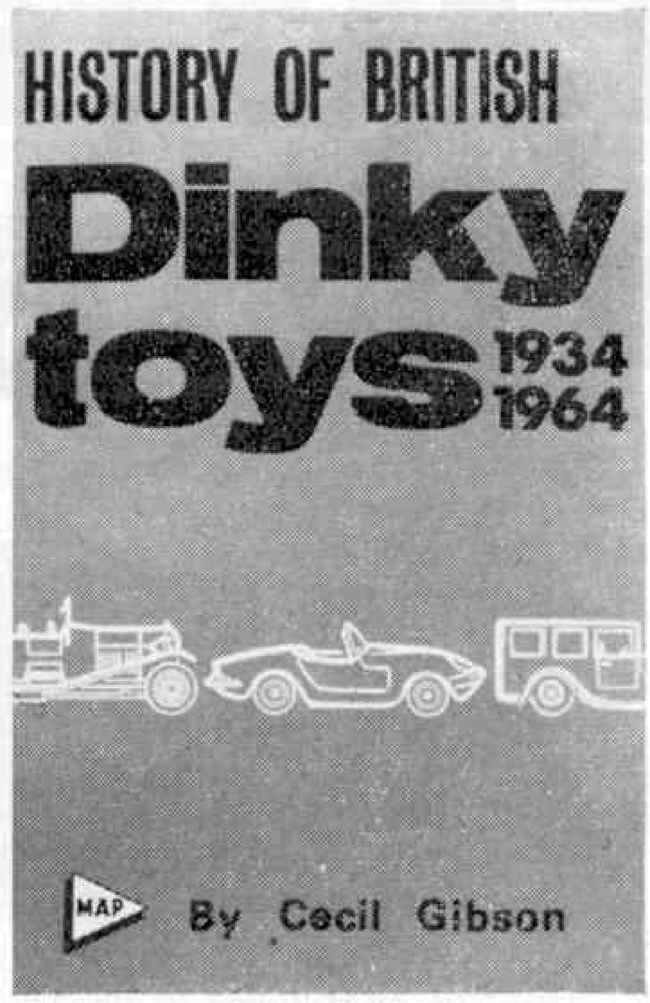
HISTORY OF BRITISH DINKY TOYS 1934-64

It contains not only a short history of the original company which produced Dinky Toys, but also a year-to-year description of the cars issued, with a fine selection of photographs devoted mainly to earlier examples, and a series of tables listing all Dinky Toys, 1934-64 in numerical order.

15/-

8½ x 5½ in., 152 pages. Cloth bound, gold blocked spine, Two-colour dust cover. 76 photo-illustrations.

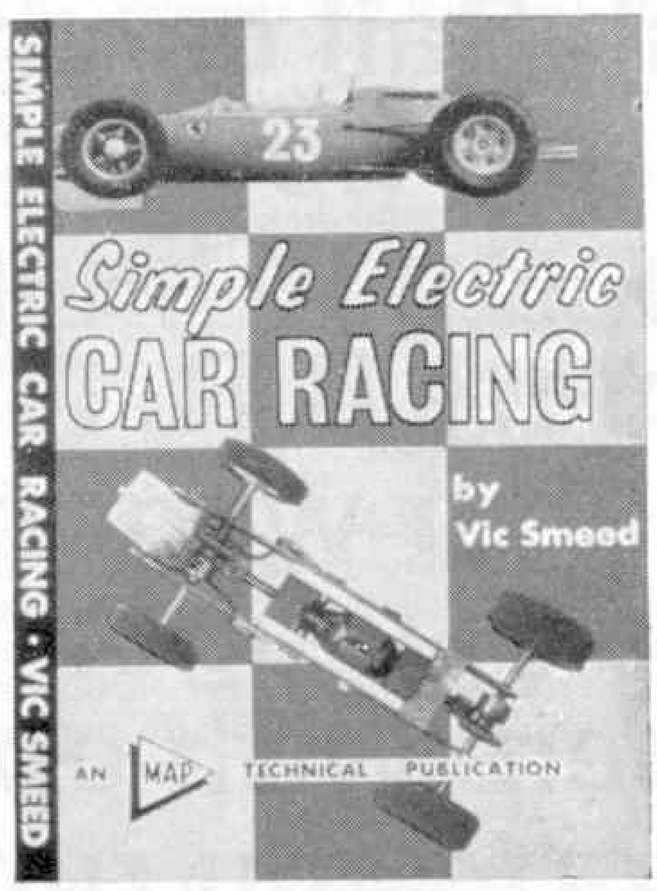


8½ x 5½ in., 96 pages. 223 line drawings and 8 pages of art plates showing 50 photographs.

5/-

BOAT MODELLING

A book for the not-so-expert modeller covering every aspect of model boat work from construction through to sailing. Author Vic Smeed provides a wealth of practical assistance. Chapters include: tools and materials, hard chine hulls, round bilge hulls, superstructure fittings, finishing, I.C. engines, electric motors, hydroplanes and special models operation, radio control.



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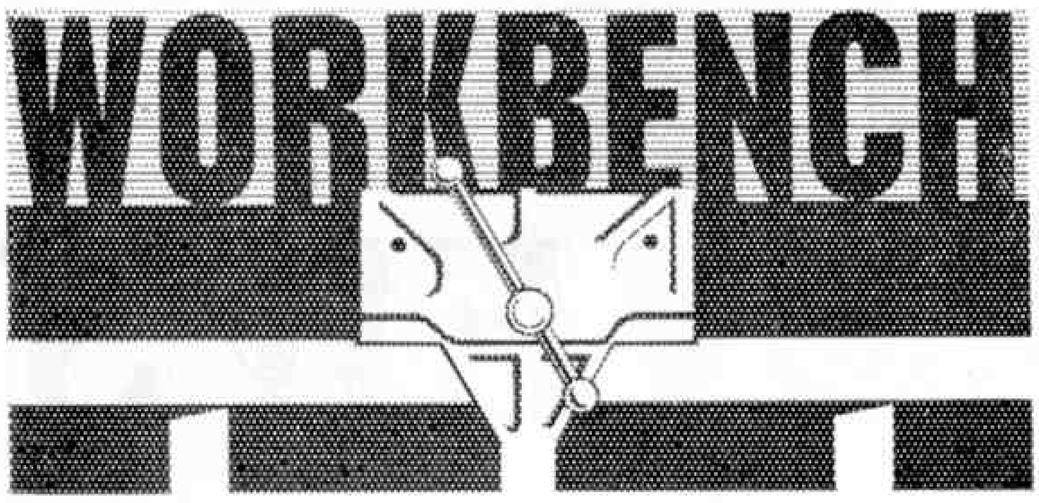


Can you help the Editor ?

Now our Hemel Hempstead offices have become used to the monthly production of *Meccano Magazine*, we are trying to complete our library of *Meccano Magazines*. Can you help? We need several volumes of vintage *Meccano Magazines* and some odd ones from the '40s. 1916-1925 inclusive, bound or in a clean unbound condition, comprise the largest gap, with March, September, December 1946 and all of 1941 the remaining missing copies.

You will appreciate how invaluable these are for Editorial reference and any *Meccano Magazine* collectors, who can be swayed to sell their copies, can be assured they will be going to a good home and serving a very useful purpose in the production of the new magazine.

Please do not send the magazines direct; write to the Editor listing the copies you would be prepared to part with, stating the price and true condition, i.e., torn covers, dog-eared, less advertisements, etc. Write to: The Editor, *Meccano Magazine*, 13-35 Bridge Street, Hemel Hempstead, Hertfordshire.

Your contribution

The Editor will be pleased to consider readers' contributions for *Meccano Magazine*. These can be on any subject that you feel will interest other readers. Ideally a feature should include a good balance of photo/line illustrations with the text double line spaced, and typewritten on foolscap sheet. We have artists on our staff to prepare your drawings for magazine use. If negatives are available, these are of great value. We pay well for any features used, but this depends on the quality. Please include a stamped and self-addressed envelope for the return of material.

How many miles ?

The Lucas "King of the Road" Cyclometer first introduced in 1903, to record all those pedalled miles, is the last remaining cycle product from an original range of dozens, of "King of the Road" accessories. Redesigned to its present form in 1936, they are still produced at a rate of 8,000 a week. Over eight million have now been sold and Lucas wonder how many miles they have covered. If you have a genuine 1903 one, with low mileage, and with box and instructions in mint condition, Lucas are offering up to four guineas for such a model, as museum pieces—an appreciation of 24 times the original 3/6d. purchase price. They only cost 10/0d. now!

From the Trenches to Festiniog

A petite but tough 50-year-old steam locomotive built in 1917 by the American Locomotive Company for World War 1 duty in France recently made a 200-mile journey by road. Her destination was Festiniog, Portmadoc, North Wales. The journey was made after two years of spare refitting work at Isleworth, Middlesex, and on arrival the historic little engine was prepared for hauling coaches for the holiday-makers next summer.

The locomotive was one of 100 built in America for the British War Department, which specified locomotives to travel "over curves of 30 metres radius at about 21 m.p.h. on tracks laid with rails weighing 20-lbs. per yard, or 9.5 kg. per metre,".

The 60 cm. gauge light railways carried ammunition and other supplies up to the trenches. Several pictures featuring the engine at work at Ypres, for example, are to be seen at the Imperial War Museum.

According to Mr. P. J. G. Ransom, a Director of the Festiniog Railway Society Limited, the Society decided to purchase the locomotive because she was one of three of this type of considerable historical interest.

Eastbourne Tramway

We have recently heard that the Eastbourne Tramway is to close. Tram enthusiasts who know this unique two-foot gauge line in Sussex will be very sorry to hear this news, as the tramway has become an entertaining and colourful object on an otherwise very ordinary coastline. The line runs from Princes Park, Eastbourne, for about a mile along a shingle beach called the Crumbles. The trams themselves are beautiful replicas of actual prototypes, both old and modern, and despite their small size can accommodate passengers on both upper and lower decks. The trams pick up electric current in the correct manner, from an overhead wire supported by ornamental poles, and much of the equipment used, such as control gear, has been obtained second-hand from obsolete, full-sized tramway systems. The Eastbourne Tramway even boasts its own depot and works, a large and substantial building where the trams are stored, repaired and built. It is a wonderful experience to ride on the swaying top deck of a half-size tram along this windy coast, with the trolley pole singing on the wire; in fact, it is an experience now almost unknown in the British Isles, as Blackpool is the only other town with a tramway system. However, the best place in England to go to, if you hanker after trams, is the Tramway Museum Society's wonderful working museum at Crich in Derbyshire. The T.M.S. owns a comprehensive collection of beautifully restored tramcars, from many different towns and these run along a stretch of track in the heart of the Derbyshire hills. We sincerely hope that the Eastbourne Tramway will find a new home; we are sure that Eastbourne will be that much less interesting without it.

The mini Eastbourne Tram at right with this typical group of holiday-makers is alas to close. A model may replace it.

AIR NEWS

by John W. R. Taylor

The SpADs of A Shau

YOU WON'T find A Shau on the map. It was never much more than a triangular fort in a valley, surrounded by 1,500 ft. hills, 60 miles west of the big American air base at Da Nang in Vietnam. Even the fort probably disappeared in March 1966, when the garrison, made up of South Vietnamese troops and members of a U.S. Special Forces team, was overrun by several thousand North Vietnamese soldiers.

This was a typical battle of that grim war; but one incident ensured that the name of A Shau will never be forgotten, even though the jungle may swallow up its ruins.

The hero of the story is a 40-year-old pilot of the U.S.A.F., named Major Bernard Fisher. As a boy, on a farm, he built *model aeroplanes* and dreamed of the day when he would fly real ones. It seemed that his chance had come in March 1945, when he joined the U.S. Navy as an air gunner; but the war ended a few months later and his naval career lasted only one year.

He went back into uniform during the Korean War, this time as a pilot in the U.S.A.F., and graduated eventually on to F-104 Starfighters. Twice while flying these trickly little stub-winged machines he suffered an engine failure and managed to land the aircraft intact. It might have seemed like a rest-cure when he found himself flying piston-engined A-1 Skyraiders in 1965—if his squadron had been based anywhere but in Vietnam!

As a volunteer with the 1st Air Commando Squadron, his main duty was to train new pilots of the Vietnamese A.F. to fly Skyraiders; but time after time his aircraft took off with a heavy load of bombs and auxiliary fuel tanks under its wings and fuselage to attack the Viet Cong or North Vietnamese.

The Skyraider had proved itself ideal for this kind of counter-insurgency (COIN) work. Designed back in 1944 as a single-seat carrier-based attack-bomber, it was built in seven different basic versions. Its main duties were day attack, all-weather attack, airborne early warning and countermeasures; but, with special equipment installed, it could serve also as a flight refuelling tanker, target tug, anti-submarine search, ambulance or transport aircraft.

Too late for World War 2, it made a great name for itself over Korea. In their book *The Sea War in Korea*, Commanders Cagle and Manson of the U.S. Navy went so far as to claim that " Only the Skyraider could carry and successfully deliver the 2,000 lb. bomb with dive-bombing precision against . . . the bridge abutment or span, the tunnel mouth, and the cave entrance. . . . Its versatility and weight-lifting capacity (as much as 5,000 lb. on a carrier mission) made it the war's outstanding performer."

Long after the Skyraider should have been replaced by jets, its ability to place its bomb precisely on target kept it in service. And when war broke out once again in Vietnam, it was clearly the most suitable aircraft for the Vietnamese Air Force.

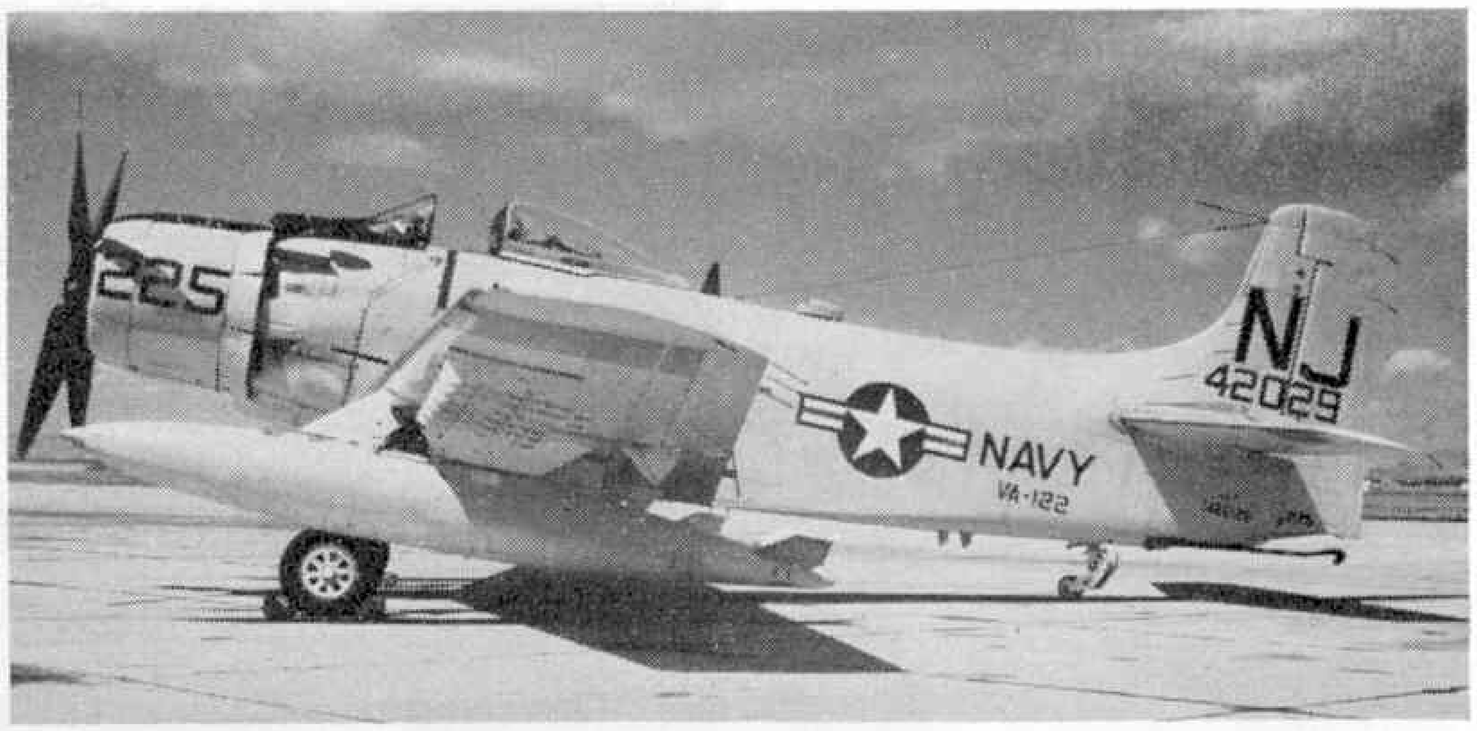
Its original U.S. Navy designation had been AD-1 to AD-7. So, American jet pilots who were given Skyraiders to fly usually called them Sp*AD*s, as they seemed almost as antique as the French Spad fighters of the 1914-18 War.

The particular type of Skyraider flown by Major Bernard Fisher was an AD-5 redesignated A-1E under the current system). Unlike most other versions, this had two seats side-by-side in front and room for further crew members, passengers, freight or equipment to the rear. It is ideal for operation in Vietnam, as it can be used as a two-seat trainer or single-seat combat aircraft without any modifications.

When Fisher took off from Pleiku airfield in Skyraider 649 on March 10, 1966, it had 14 100 lb. bombs under its wings and the usual fuel tank under the fuselage. It was Fisher's 173rd combat mission and there was no reason to expect that it would be any different from the others.

Over A Shau, the sky was full of jet aircraft, but none of them could get down into the valley to help the beleaguered garrison because the mountains were shrouded in thick cloud. One Skyhawk pilot made the attempt and flew slap into a hillside.

The heading photograph on opposite page shows an AD-5 Skyraider of the type flown by Major Bernard Fisher with the in line seating layout. Note the exhaust stains on fuselage.



At right, an AD-7 Skyraider with wing tanks, empty rocket racks, and looking remarkably clean. Note, the different cockpit canopy shape to the AD-5 opposite.

This was SpAD country. Fisher and his five colleagues flew slowly up and down until they found a tiny hole in the cloud, dived through it, rolled out just above the the ground and proceeded to knock daylight out of the enemy with their bombs and guns.

It was by no means one-sided. Tracer bullets from .50 calibre machine-guns on the ground came up so thickly that the pilots seemed to be flying through a firework display. Bigger guns on the hillside fired *down* at the twisting, turning aircraft. One of the Skyraiders soon began to trail smoke and flame. Unable to bale out, because of a fire outside his cockpit canopy, the pilot made a heavy wheels-up landing on the battered steel planking that had once been A Shau's airstrip, and then dived quickly out of the cockpit and into the cover of a ditch.

Fisher watched all this happening, with enemy bullets criss-crossing around his aircraft. He radioed to the jets circling out of sight above, asking them to call up a rescue helicopter, then joined the other SpAD pilots who were continuing to shoot up the enemy.

" Where are the helicopters? "

" Still 20 minutes away," came the answer.

Clearly, the crashed pilot could not remain undetected and safe for that long, even if he were not already burned or wounded. So Fisher made up his mind to perform the pick-up himself. Throttling back, he settled slowly towards the metal airstrip, but it was so short that he couldn't possibly get down safely. Opening up the engine with a roar, he climbed away and circled for another attempt. He almost wished he hadn't seen the jagged holes in the planking, surrounded by steel prongs, and the empty 55 gallon fuel drums and rocket pods that littered the strip!

At the second attempt he made it, with the old Skyraider almost stalling as he plonked it down and steered a crazy path between the debris. Not until the downed pilot crawled out of the ditch, dashed through a hail of bullets towards him and had been yanked head-first into the cockpit did he realise that it was his friend, Colonel " Jump " Myers.

That, briefly, is how Major Bernard Fisher became the first U.S.A.F. pilot to earn a Congressional Medal of Honor—the United States' V.C.—in Vietnam.

Russian hot-rod

Round about the time that Douglas Aircraft were designing the Skyraider, Russian pilots in Lavochkin La-7 fighter-planes were giving the *Luftwaffe* a rough time on the Eastern Front. With a top speed of 413 m.p.h. and armament of three 20 mm. cannons, bombs and rockets, the sturdy-looking La-7s must have seemed the most wonderful aircraft in the world to air-minded Soviet schoolboys.

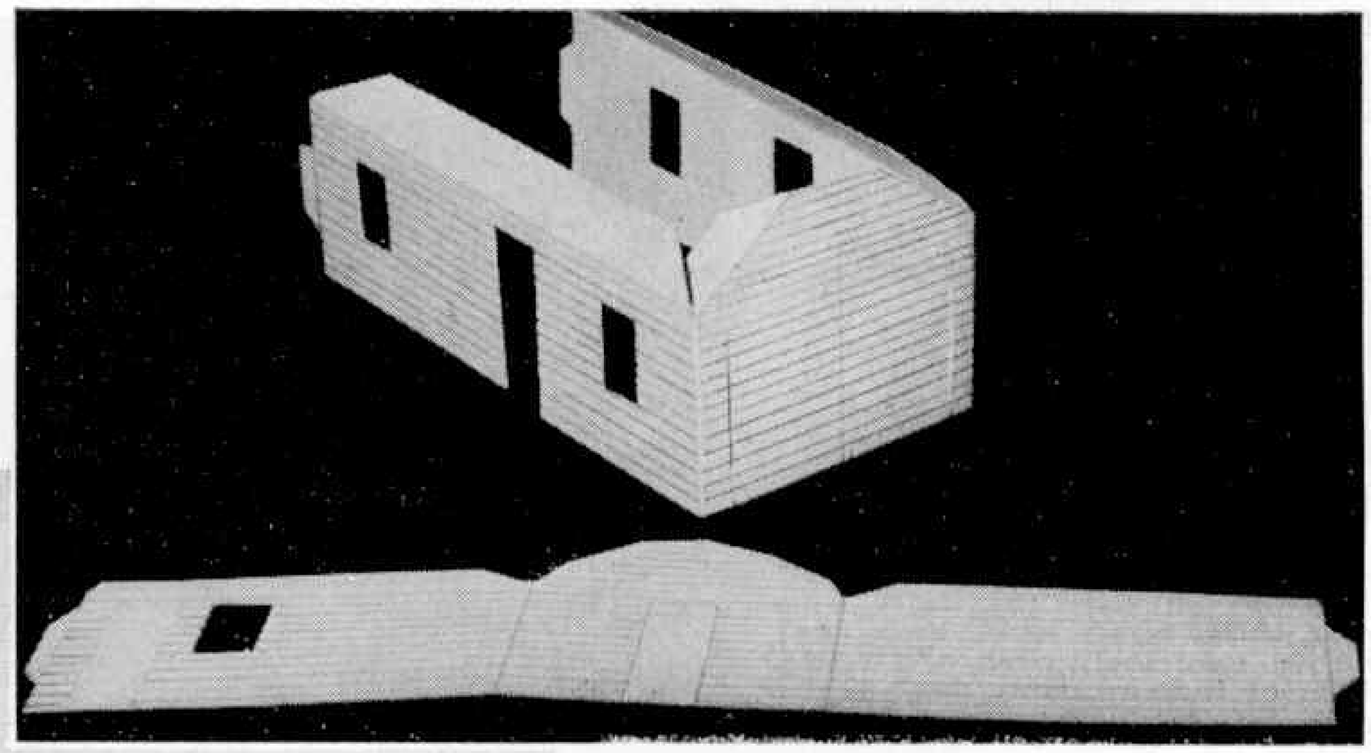
I was reminded of this when I received from Moscow a picture of a tiny all-metal single-seat aerobatic aircraft named the Quant which has been designed and built by students of the Moscow Aviation Institute. No details are available except that its 300 h.p. Ivchenko AI-14RF engine gives it a top speed of 275 m.p.h.—but it was clearly inspired by those La-7s of more than 20 years ago.

At left, on opposite page, a Skyraider takes off from a carrier with its 18 cylinder Cyclone engine on full power for this critical moment. Right, an AD-6 of Attack Squadron 85 in flight over the Mediterranean while operating from the U.S.S. Forestal aircraft carrier.

The 300 h.p. powered Quant monoplane designed and built by students of Moscow Aviation Institute is seen below.

OO gauge Trackside Construction

Building a simple card-and-balsa structure station



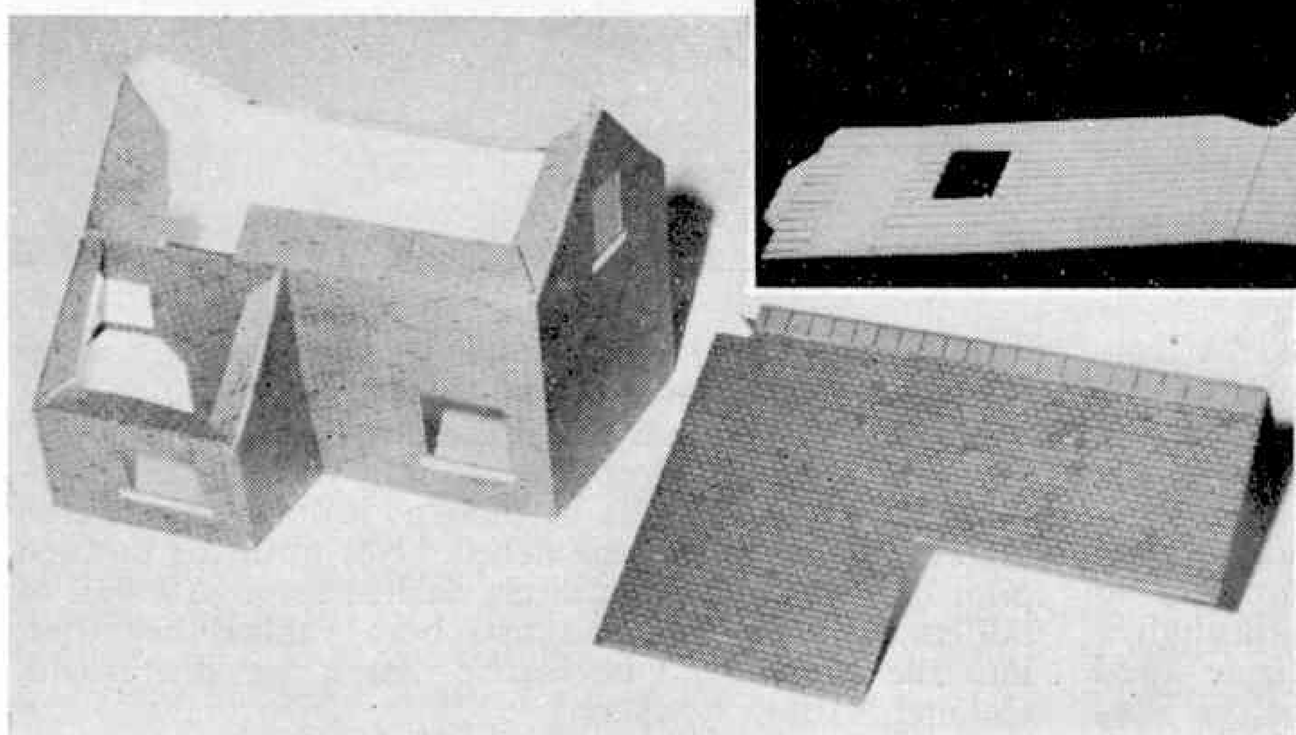


Photo. 1: The picture above gives a good idea of the basic card construction of the station. The waiting room corners have been bent round, by half cutting through with a knife, but the little lamp room is still "in the flat" just as it was cut out from the card.

Photo. 2: The Station Master's House in course of erection. The tabs to which the roof will be stuck can be clearly seen, and the balsa base of the building is just visible through the window openings. Note the cut-out in the end of the roof, which will house a chimney.

A Small Country Station

THE FOCAL points of any model railway are its stations. In fact, a model railway without any stations at all would be unthinkable, and very boring to operate. On a small layout, there will probably only be room for one reasonably interesting station; in fact, it is better to restrict the number of stations on any layout, however big, as too many, closely spaced, impart a "toy-like" atmosphere to even the most ambitious model railway. It is best, for a start, to settle for a small country station, with a single platform and perhaps a "bay," a run-round loop and a couple of sidings. The station can be a "through" station or a terminus, according to choice; each offers quite different forms of operation, which we shall look at in a later article.

Construction

Having established that the most important single part of a layout is the station, we now turn to the problem of building it. Building trackside structures is, in fact, a very enjoyable side to railway modelling; it does not demand the same standards of accuracy as locomotive and rolling stock construction, and yet it is just as interesting. Our station building represents a typical small branch line affair, with timber-built waiting room and brick Station Master's house. It is based upon a model designed by John Ahern, who was a pioneer of scenic railway modelling in the early post-war years. There is no reason why you should not design your own station buildings "from scratch" or build an exact replica of an existing structure—perhaps your local station. Either way, the best way to make the structure is from card. We used Bristol board, which can be easily obtained from artists' suppliers, but any good quality card with a nice smooth surface will do. Start by making a full-size drawing of the building, and then transfer the various "parts" to the card itself. Photo. 1 shows how the three sides of our waiting room were cut out in one piece, and the corners half cut through and bent round after cutting out. In the same picture, the little "lamp room" is shown "in the flat," just as it was cut out from the sheet of Bristol board. In the end wall of the main building are two slots, into which the tabs on the lamp room walls fit, thus joining the two buildings together. We used a Swan Morton Craft knife for all cutting operations.

Photo. 2 shows the Station Master's house under construction. Construction is of card once again, this time covered with brick paper. The tabs at the top of the walls will be used to support the roof, which, as can be seen in the picture, has a cutaway at one end to accommodate a chimney stack. Although the walls of our buildings are of card, we have used $\frac{3}{16}$ in. balsa as a base, which is cut accurately to exactly fit inside the walls; this balsa base is just visible through the window apertures in some of the pictures, and it adds greatly to the final rigidity of the model. Photo. 4 shows the waiting room, lamp room and Station Master's house joined together; our station is taking shape. The boarded timber walls of the waiting and lamp rooms are represented by scoring lines on the card, and filling these lines with ink. If the final coat of paint is not too thick, these lines will show through to give a passable "boarded" effect. If you are really meticulous, you can cut out individual boards, and stick them on separately; this will give a more realistic effect, and is really worth the trouble; we didn't have time!

All windows are glazed with thin perspex sheet, or any suitable transparent material; remember to glaze the windows before sticking on the roof. Chimney

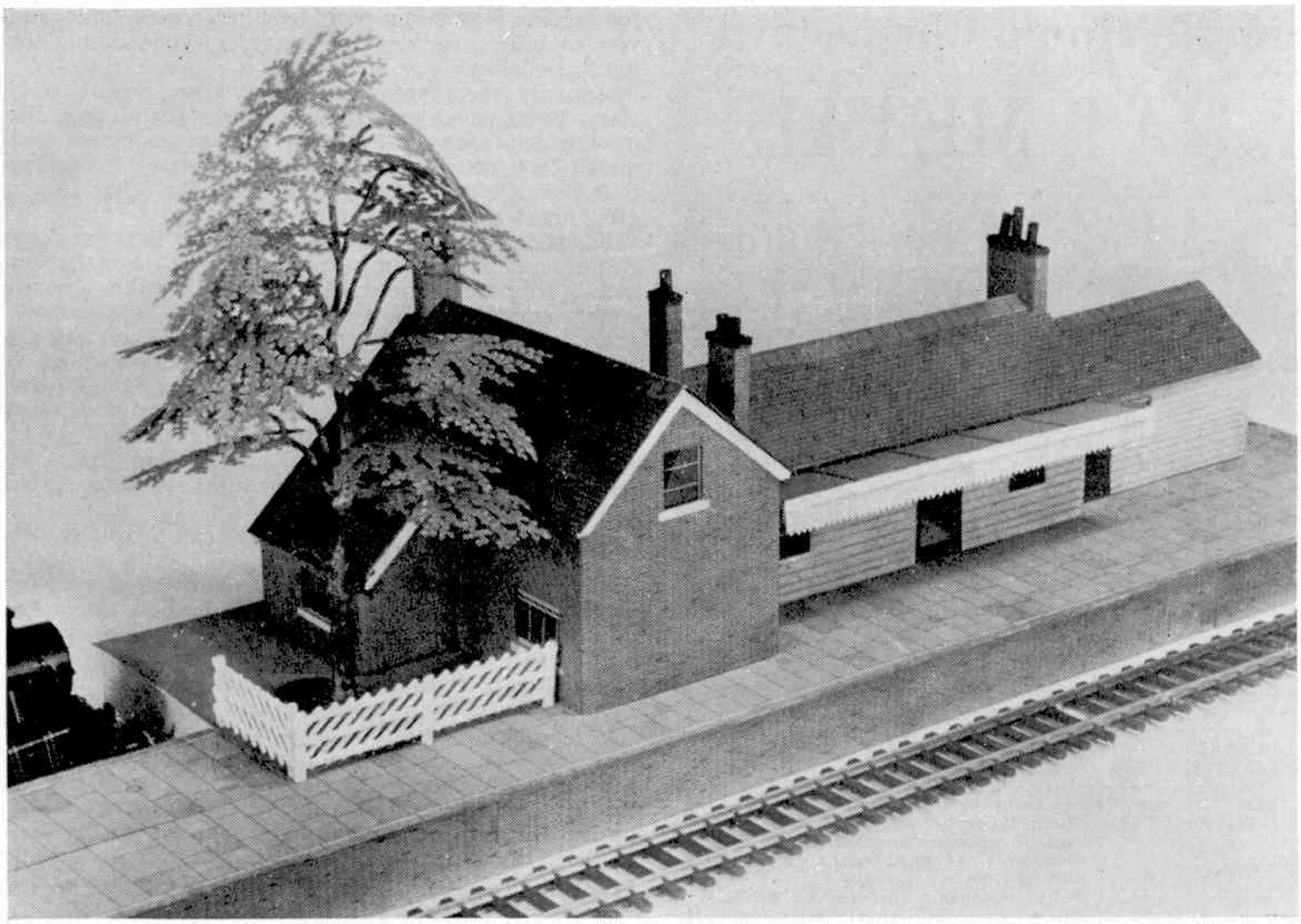


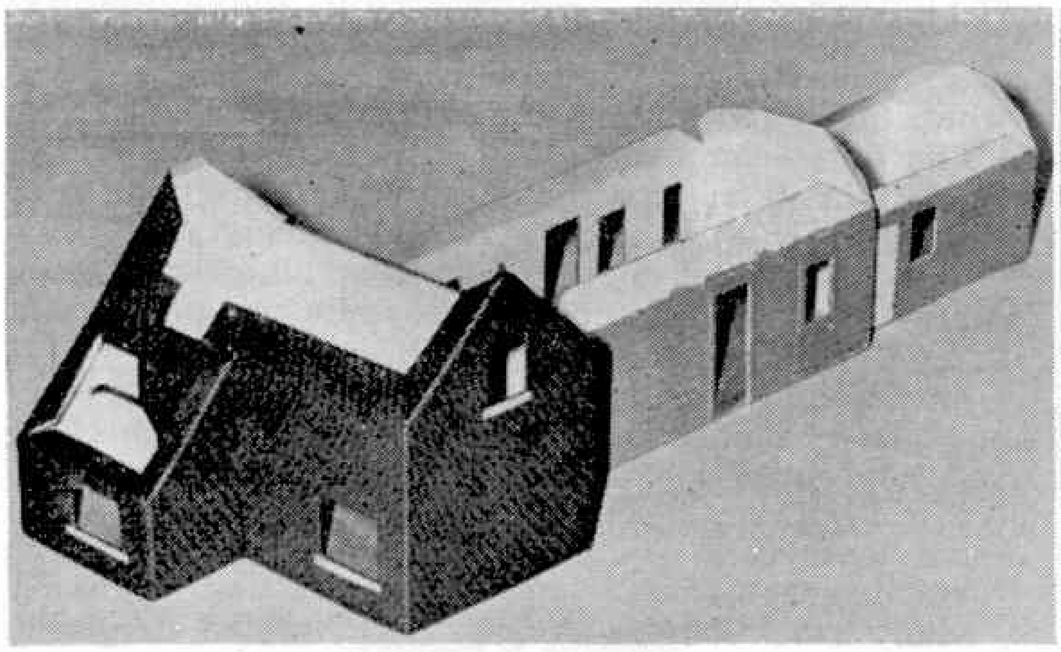
Photo. 3: A general view of the completed station. Detailing is as yet incomplete, but the fence and Britains' tree add much to the overall effect. The platform is from a length of 1 in. x 1½ in. hardwood, faced with brick paper, and pavement paper.

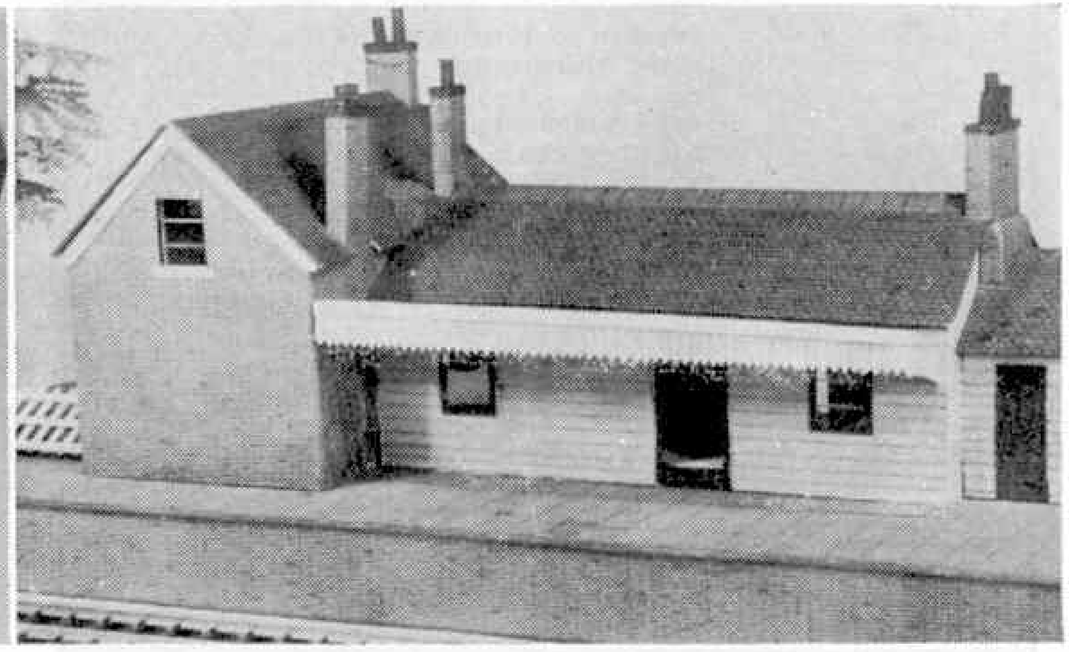
stacks are made from balsa, wrapped around with brick paper, and the pots are made from spent ball-point pen refills, which look most realistic when painted.

Painting and papering

The station buildings can be painted in any desired colour scheme, or in the colours of your favourite railway company. Always use matt paints, with a preference for rather austere colours. Our buildings are in buff and brown (rather like the old Great Western stations) with the house in yellow brick with a red-tiled roof. The short platform on which our building stands was made simply from 1 in. × 1½ in. hardwood, surfaced with brick paper. This simple method gives a really strong platform. The Britains Silver Birch in the Station Master's garden completes the rural effect. When the model is almost complete, you can really go to town adding details like timetables, name boards, posters, people, weighing machines, milk churns, trolleys and lamp-posts; we have not got around to embellishing our station yet, but when we do we'll show you some more photographs. Models like this have a habit of developing into complete layouts—now we just can't wait to build a signal box to match!

Photo. 4: The left-hand picture shows the three parts of the station building joined together. The " window sills " are simply strips of light coloured paper, stuck on. The picture on the right gives a low angle view of the buildings; note the boards.





Simple Home Chemistry

WHAT METAL IS IT?

by "Boffin"

METALS ARE not always easy to identify, particularly in these days when a large variety of *alloys* are used (mixtures of metals), and also different *finishes* are used on metal objects. Polished aluminium can look just like polished steel, or chrome plate (or perhaps it was nickel plate?), and so on. It *is* important to be able to discover what a metal is when it comes to repairs, repainting, soldering, or even just joining two pieces of metal together. Use brass bolts for holding aluminium parts together, for example, and you are asking for rapid corrosion to set in should the joint get damp!

IDENTIFYING METALS WITH A MAGNET AND APPEARANCE

METAL	TEST
IRON or STEEL	Attracted by a magnet (positive identification).
PLATED or COATED STEEL	Attracted by magnet (positive identification).
PLATING on OTHER METALS	See tests for metal platings. Note, however, that polished aluminium or vacuum deposited aluminium may have the appearance of a highly polished plated surface. Polished aluminium will be solid, so check by weight (lighter than a steel or brass article of the same bulk), then test for aluminium. Vacuum plated aluminium is normally applied to a plastic article. Identify by the fact that it will be much lighter than a metal article.
STAINLESS STEEL	Not attracted by a magnet. Very hard surface difficult to scratch with a knife. Duller in appearance than chrome plating.
ZINC ALLOY CASTINGS	Not attracted by a magnet. Distinguish from an aluminium alloy casting by the fact that it will be much heavier. Spot with test solution A—black discoloration indicates zinc.
ALUMINIUM ALLOY CASTINGS	Not attracted by a magnet. Lighter than zinc castings but may have similar appearance. Spot with test solution A. If the black spot which develops has a ring of copper colour around it, it is definitely aluminium.
MAGNESIUM ALLOY CASTINGS	Not attracted by a magnet. Lighter than aluminium castings. Has a greenish tinge compared with aluminium or zinc alloy.
LEAD ALLOYS	Not attracted by a magnet. Very much heavier than either zinc or aluminium. Will melt under the heat of a soldering iron.
COPPER ALLOYS	Not attracted by a magnet. Identify by colour. Brass is yellowish in colour. Bronze usually has a weaker yellow colour.
COPPER	Not attracted by a magnet. Identify by its reddish colour.

Actually there are some 70 different metals, only about 16 of which are fairly commonplace. Iron is the most widely used of the metals and so important that metals are usually grouped as "ferrous" (meaning that they are forms of iron) and all the other metals are "non ferrous."

There is one simple test to distinguish between these two groups. Ferrous metals are magnetic; non-ferrous metals are non-magnetic. Thus to test whether a metal is iron or steel, see if it will be attracted by a magnet. If so, it is *definitely* iron or steel—but one can still get caught out. Stainless steel, for instance (which is based mainly on chromium added to iron), is *non* magnetic. That is one of the tests to distinguish stainless steel from ordinary steel. And even then you can be wrong! Certain compositions of stainless steel *are* magnetic—like those used for stainless steel knives, for instance.

Again, it is common knowledge that a magnet will attract an ordinary tin—but tin is not a magnetic material. The answer here is that the material used for making cans and similar metal "boxes" is *tinplate*—not pure tin—and tinplate is thin steel sheet with a coating only of tin, to stop it rusting.

Tin is one of those metals which is rarely used on its own. It used to be employed in pure form in very thin sheets as tinfoil, but practically all "tinfoil" these days is, again, *aluminium* foil. If you want to make a quick check, dissolve a few crystals of ferrous sulphate in a test tube half filled with water, add a scrap of "tinfoil" and bring the solution to the boil. If the "tinfoil" is aluminium it will rapidly become coated with a black deposit. If it is true tinfoil there will be little or no discoloration.

"Spot" tests with an acid are another basic method of sorting out different metals—putting a spot of weak acid on the metal example and observing the results. Try dilute sulphuric acid for a start, for this will have a marked action on only three metals—magnesium, zinc and iron (or steel). If any of these three metals are involved, the acid "spot" will become filled with bubbles of gas and the surface of the metal will be eaten into.

This is another method of distinguishing aluminium from iron or steel. A spot of dilute sulphuric or hydrochloric acid on aluminium will produce a whitening of the surface of the metal but no "gassing" because the metal becomes "passivated" (or non-reacting). Iron or steel will "gas" under acid attack.

Other metals which will not "gas" under a "spot" acid test are copper and silver. You can distinguish between aluminium and silver by a "spot" test with hot ferrous sulphate solution (when aluminium will blacken and silver will not); or by moistening the metal surface and rubbing on a little flowers of sulphur (when silver will blacken but aluminium will not).

The other common "white" metal is zinc. Widely used originally as a rustproof coating for iron and steel (galvanised iron) it also has a tremendous application for die-castings of all types (a zinc alloy with small additions of aluminium and copper being used for castings as pure zinc is too brittle).

Zinc itself is readily identified by its dull, dead looking colour—compared with, say, steel or aluminium. And, of course, it will not show any signs of rusting, like iron or steel. It will also react violently to a "spot" acid test. You can also separate it from iron by the magnet test.

Many zinc castings are, however, plated to give a

bright surface—the plating normally being nickel or chrome. In this case it is difficult to separate from plated brass (also non-magnetic) without scraping away some of the plating on an unimportant spot to expose the underlying metal for identification by colour (brass) or acid " spot " (to verify zinc).

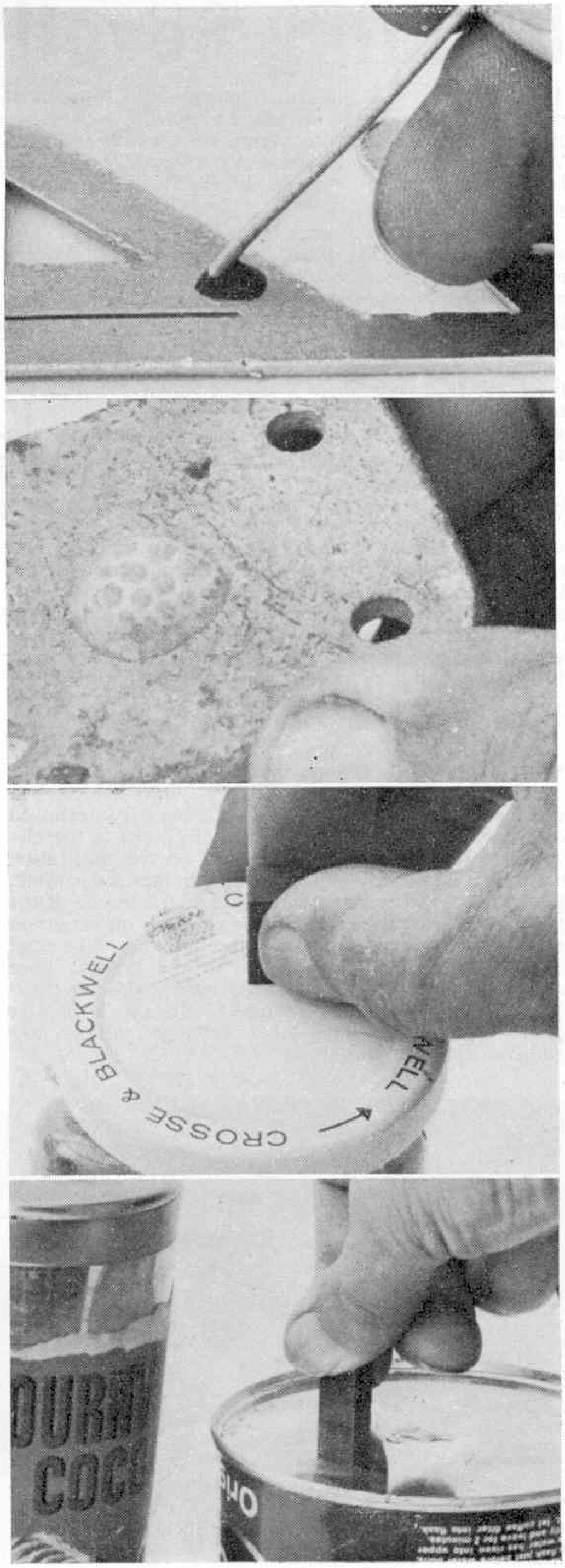
Lead is another dull looking " white " metal, but usually easily identified by its weight. Also it is a very soft metal, easily bent in sheet form, or scratched by a fingernail if a solid casting, or a surface coating (zinc will not scratch with a fingernail.

TEST FOR METAL PLATING

PLATING or COATING	TEST or CHECK
COPPER	Easily identified by colour. Check if magnetic. If so, will be copper plating on steel. If not, spot with solution A and observe the colour which develops as the copper surface is eaten away. A brownish-yellow spot will indicate brass as the metal underneath. A black spot will indicate zinc alloy. A black spot slightly tinged with copper will indicate aluminium.
NICKEL	Spot with solution A. If the plating is eaten away, then it is probably nickel. Identify underlying metal by methods above.
CADMIUM	Dull and whitish appearance. Spot with solution B. If eaten away, then the plating is either cadmium or zinc.
ZINC	Much greyer looking than cadmium. Spot with solution B. If eaten away, then the plating is either zinc or cadmium.
TIN	Spot with solution C. If eaten away then the plating is either tin or lead. Identify tin by its bright appearance and hardness.
LEAD	Very dull appearance. Spot with solution C. If eaten away, then the plating is either lead or tin. If you can scratch the surface with your thumbnail, the coating is lead.
SILVER	Bright and shiny surface, but if not clean and showing black tarnish marks or stains, probably silver. Spot with solution D. If eaten away, is silver.
CHROMIUM	Solutions A, B, C or D will have no effect. Spot with hydrochloric acid and then touch the spot with a piece of zinc or zinc wire. If the surface immediately blackens and "gasses" the plating is chromium.

Test solutions: A—3 parts ferric chloride, 1 part copper sulphate } dissolved in water
B—A little ammonium nitrate disolved in dilute hydrochloric acid.
C—Acetic acid.
D—Potassium iodide solution to which is added a crystal of iodine.

Note: all these "spot" tests will damage the coatings—so do not use on important articles.



Top right, testing chromium plating, spot tested with hydrochloric acid and touched with zinc wire, the surface turns black. Next the " gassing " reaction of iron when " spotted " with diluted sulphuric acid. Next, the lid of this jar looks and feels like white plastic, but as it is attracted by a magnet it must be tinplate. Right, use a small magnet to find out immediately whether a metal can is really tin (tinplate) or aluminium. Tinplate is attracted.

Building Revell's Skyraider Kit

EVERY PLASTIC modeller must at some time have the urge to tackle an advanced model on a large and impressive scale with plenty of working features. We chose the Revell Douglas A-1 Skyraider as much for its cost, 18/11d., as its topicality, due to press coverage of the Vietnam war.

Almost everything works on this model in 1/40 scale. It has moving flaps, ailerons, elevator, rudder, arrestor hook, three opening dive brakes, hinged cowling, revolving propeller, retracting undercarriage, retracting tailwheel, closable undercarriage doors, movable cockpit canopy and folding wings.

This is not a beginner's kit and only those who have built several "one piece" plastic models should attempt construction. Although the illustrated, step by step instructions are quite explicit, we can imagine the frustration of a novice going beyond his scope.

Our kit was impressive for its lack of "flash" and only the delicate engine front housing was damaged (Revell were only too pleased to replace parts, damaged in transit). Construction commences with the wing and retractable undercarriage. True scale retraction of the legs (turning and folding through 90 degrees) is achieved by a pushrod linked to the 500 lb. bomb under fuselage, turning a pinioned pushrod that is geared to each undercarriage leg with a matching bevel. When the bomb is pushed fore and aft, the undercarriage retracts and descends in a scale-like manner. The undercarriage doors are then shut manually.

After the wing constrution is completed, involving all door hanging and outer panel hinging, the fuselage construction is commenced. This is somewhat complicated as the three dive brake panels are all interlinked to a horn and pushrod that eventually links to the elevator, so the brakes can be extended on the application of "down elevator." When the dive brakes are painted, lubricated, and open and shut smoothly, one side of the tailplane is added, complete with elevator, an extension of which keys into the dive brake pushrod. The pilot and cockpit details are added to the cockpit floor moulding, including dashboard transfers, and the cockpit unit is cemented into the *half* fuselage with the dive brake mechanism. The other fuselage half is now added to complete this stage.

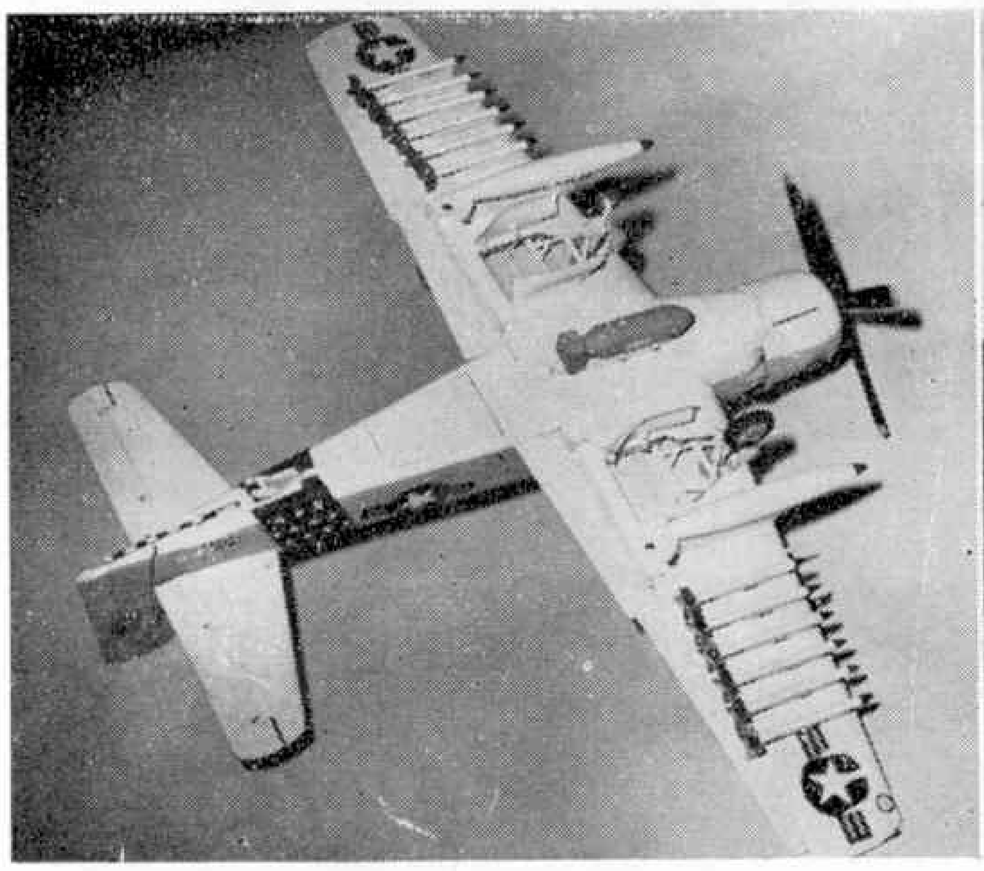
We used Slater's MEK PAK fluid cement exclusively on this model and can vouch for the extremely quick drying and neatness of this chemical. Applied with a fine brush, capillary action draws the cement into the join for a permanent weld, without affecting the surrounding area it's flowed over! No stringing or cement on fingers makes plastic model building a lot easier!

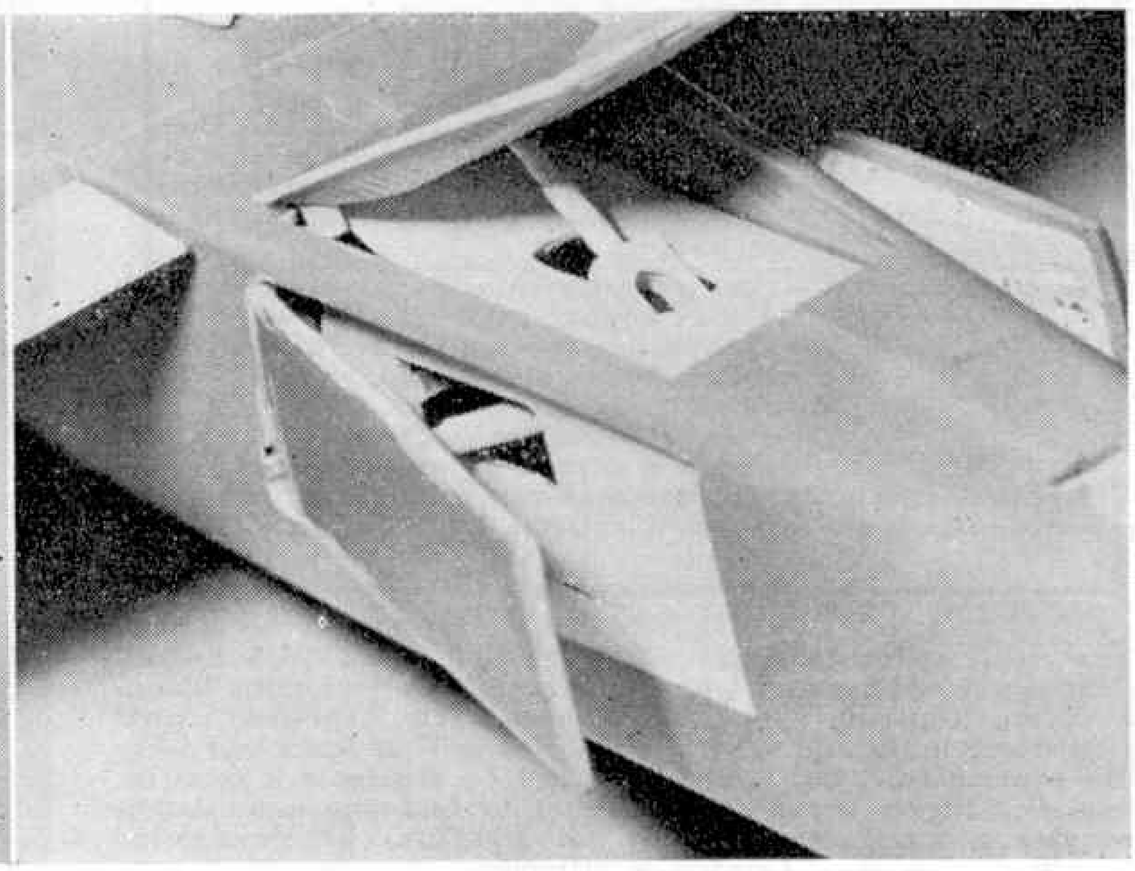
The other tailplane and elevator half are now added and you can start work on the Wright Cyclone 18 cylinder engine. This is one of the most pleasing aspects of this kit, the engine is quite a masterpiece and you almost feel it's the real thing as you add the exhausts, rows of radial cylinders and the crank case. One point did annoy us, the engine's rear bulk head. This was painted exactly as the instructions suggest, but it's completely concealed in the finished model, inner beauty no less. After completion of the engine, cowl ring, gill flaps and cowl panels, the wing is cemented in position and the major constructional work is finished.

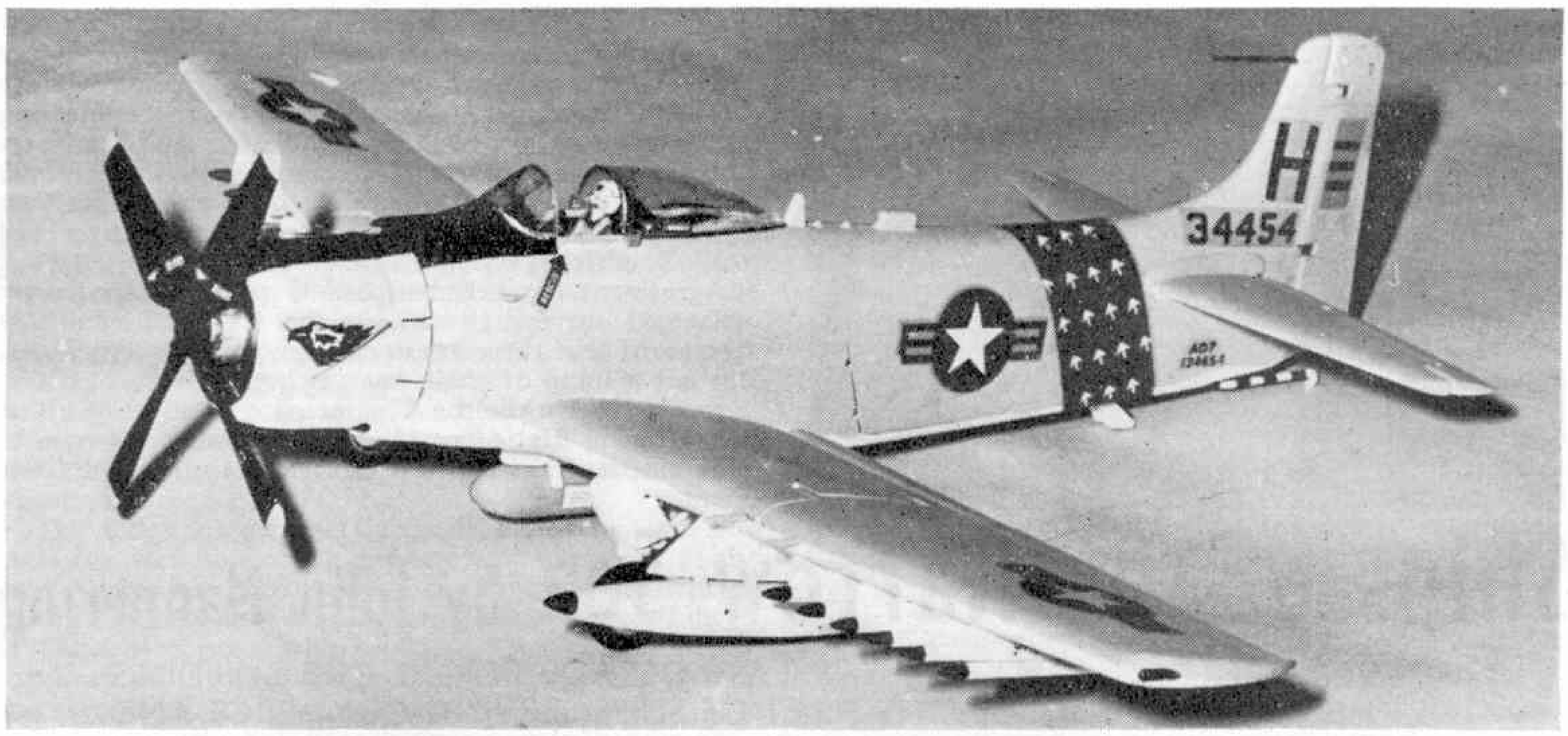
For those who want to use the alternative Vietnam Air Force markings, as we did, of the aircraft flown by General Nguyen Cao Ky from Bien Hoa in 1965, Profile Publications No. 60 aircraft booklet gives a little more marking information than the kit's instructions. The painting instructions with the kit are not really good enough for the novice and the box top illustration differs from these in minor details. We pre-painted many parts while they were still on the molding sprues, due to their small size and awkwardness to handle.

We also found it best to add the wing tanks, bombs and rockets, pre-painted, after final model painting and transfer addition.

This kit is excellent value for money at 18/11d., and for those who like an absorbing, up-to-the-minute, in the news model, the Skyraider is ideal. Converters could easily change it to any other mark, especially the AD-5N two seater, all weather aircraft, markings for which are also in Profile No. 60. For further Skyraider information see John W. R. Taylor's "Air News" on page 70 of this issue and the front cover painted by artist Laurie Bagley in the same markings as this plastic kit.







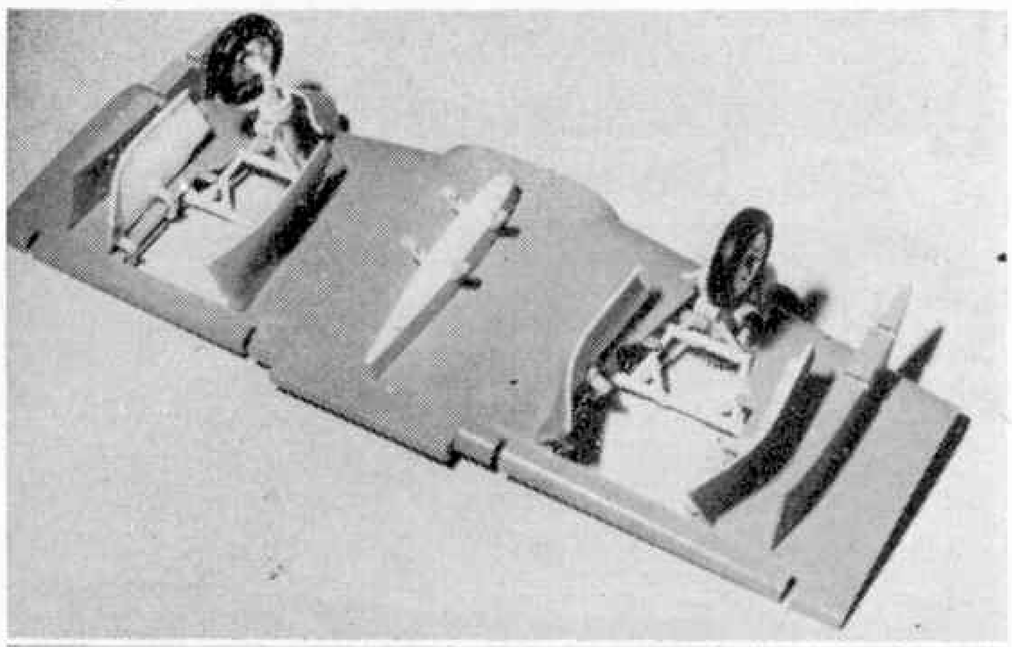
Above: Our completed Revell Skyraider in the alternative South Vietnamese markings supplied in the kit. Very bright decor on Humbrol matt medium grey enamel makes it an eye catcher on anyone's bookshelf.

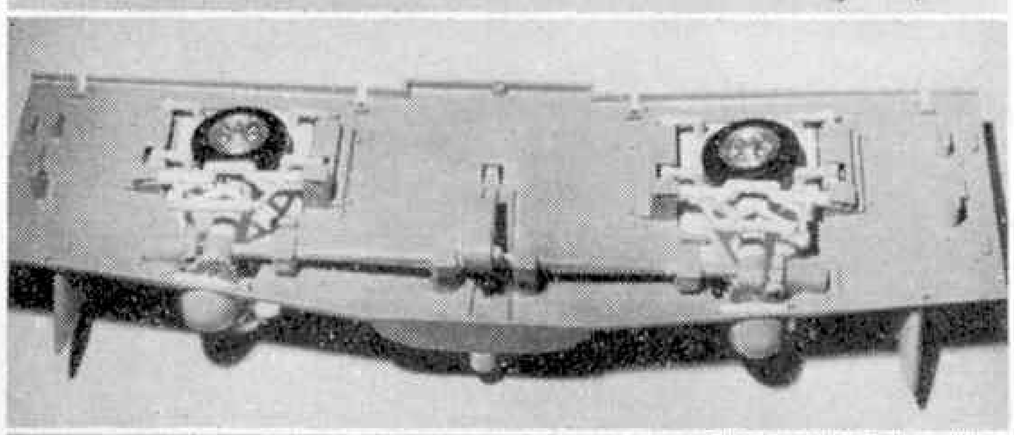
Right-hand column, top: The lower centre section's underside, showing hinged undercarriage door, retracting undercarriage legs and bomb rack with hangers. Note the pre-painted components; this is essential procedure.

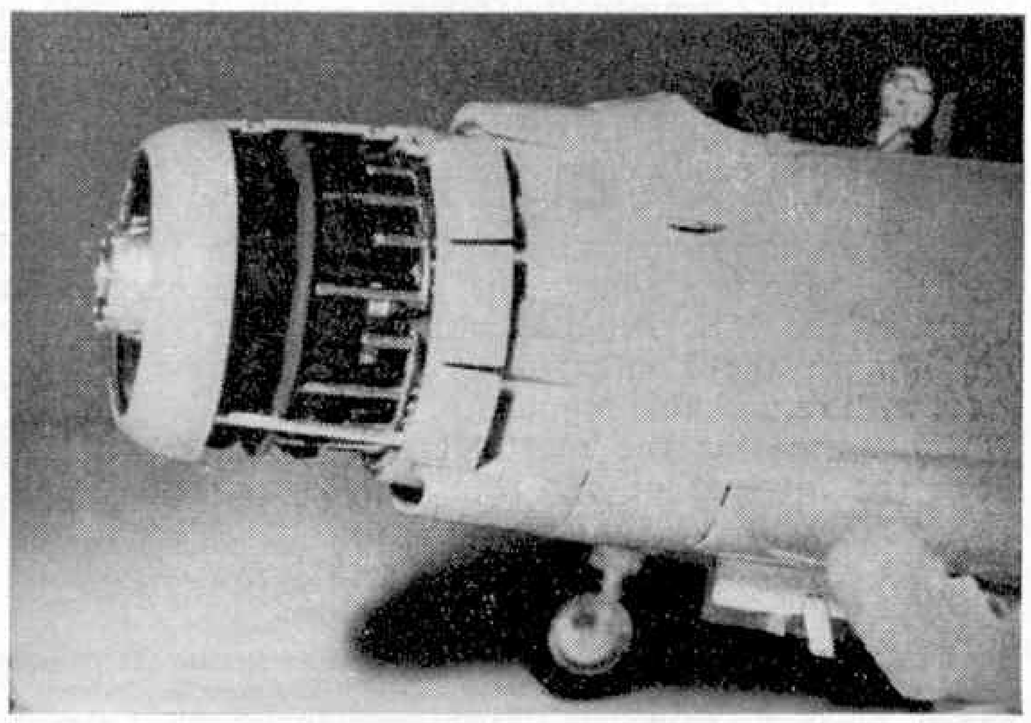
Centre: The inside of the lower centre section showing the undercarriage legs fully retracted. Note how they have turned through 90 degrees for true scale movement. This is made possible by bevel gearing on each leg.

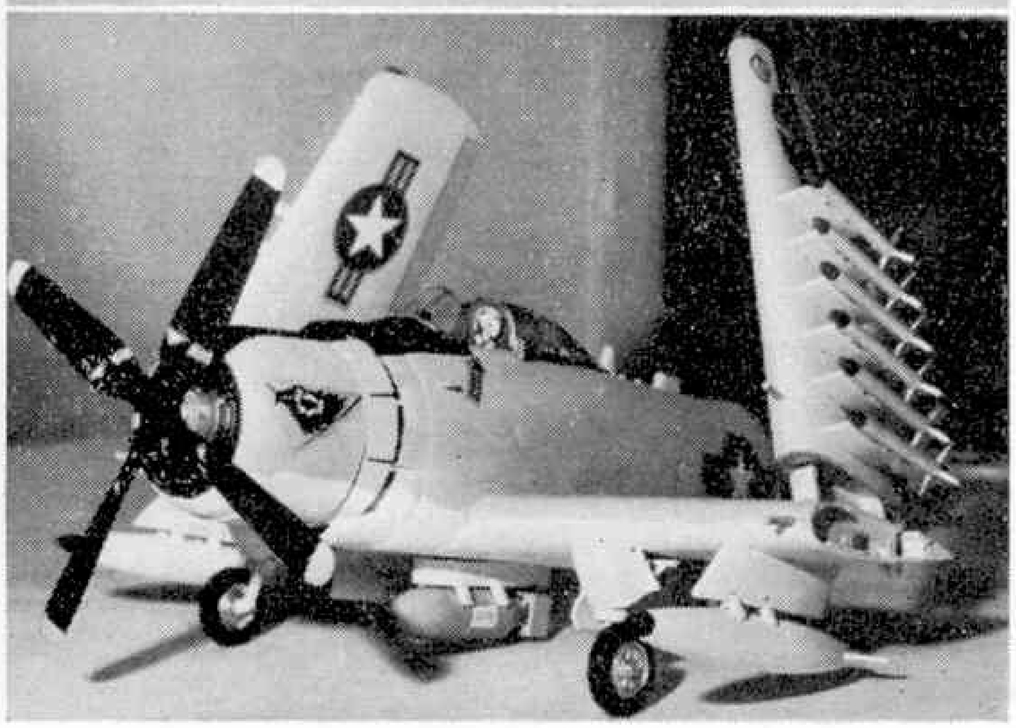
Lower right: The completed Skyraider with its wings in the folded position for close storage such as in Aircraft Carriers. They also taxi in this state on land for quicker ground handling on small aprons.

The engine is quite a work of art ! The scale Wright Cyclone R-3350-26WA of 2,700 h.p. and with 18 cylinders in two radial banks of 9 cylinders is faithfully reproduced with push rods and valve gear covers !

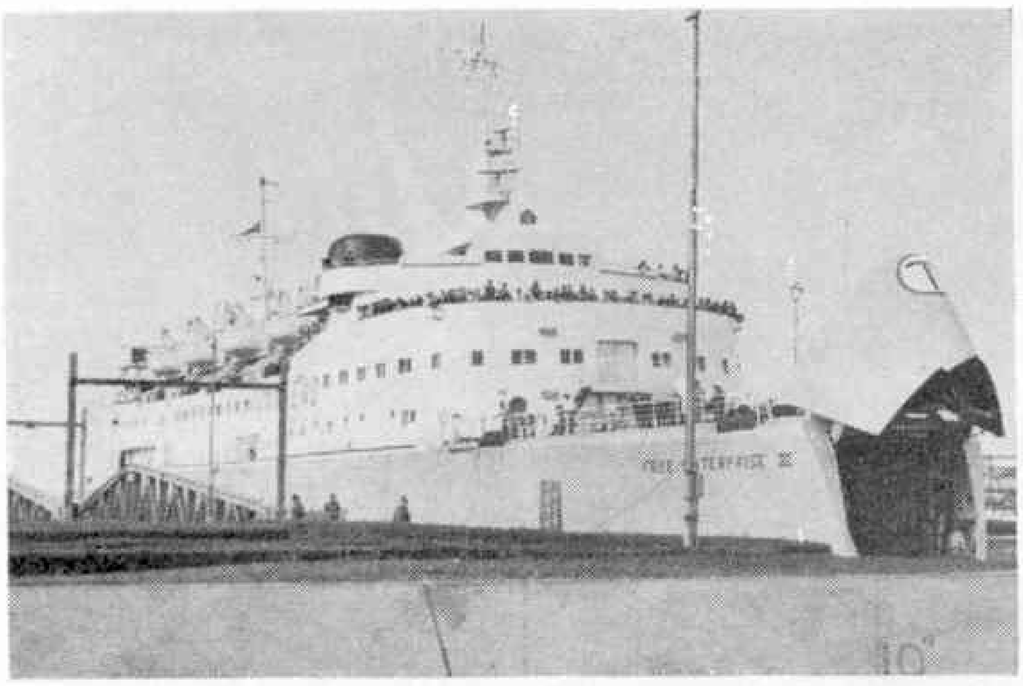








Left: An underside view shows the Skyraider's tremendous war load, all included in the kit. The opening dive brakes in the right-hand picture are linked to the elevator and open when " hard down " is applied.



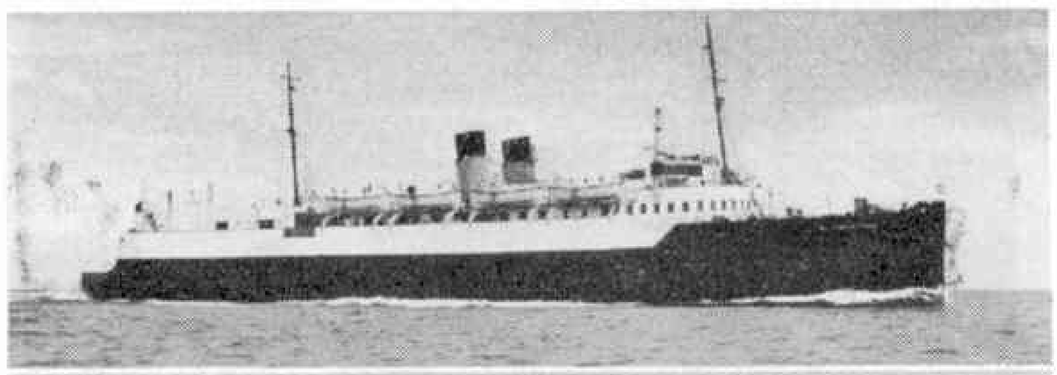
THE RECENTLY completed Tyne Tunnel, the new Forth Bridge, the Dartford Tunnel under the Thames, and the awe-inspiring suspension bridge across the Severn, are all superb works of engineering undertaken to improve communications and transport in these islands. But the greatest project of all, the Channel Tunnel, still remains an idea on the drawing board. The vastness of the undertaking seems to hold man's hand from action.

Agreement has been reached in principle, and after prolonged surveying work in the Channel, engineers are agreed that there are no insurmountable difficulties. But not a lump of chalk has yet been disturbed.

In the meanwhile the Channel is crossed daily by an ever-growing fleet of passenger ships and car ferries to maintain the links between Great Britain and the Continent.

Ships of the Narrow Sea by John Mannering

AS WE ENTER WHAT MAY BE THE LAST DECADE BEFORE THE BUILDING OF THE CHANNEL TUNNEL, THE FLEET OF SHIPS SERVING COMMERCE AND PASSENGERS ON THE SHORT CHANNEL CROSSING IS EXPANDING RAPIDLY



For obvious geographical reasons the ports of south-east Kent are the natural springboards for such traffic. This was even more so in the distant days of sail, but ever since 1821, when the little 90-ton *Rob Roy* laboured her way between Dover and Calais on the first steam boat passenger service the narrow Dover Strait has been the favourite crossing for travellers.

From Dover to Calais is about 21 miles; Dover to Boulogne 28 miles, and Folkestone to Boulogne just under 30. Although it is seldom achieved in fact, the idea of a 60 minute crossing has always been the objective of designers and builders of cross-Channel ships. From quay to quay the Dover-Calais crossing takes one hour 20 minutes, which has to allow for the vessel leaving and entering port at slow speed, working up to full speed (20 knots) and making a turn outside Calais or Dover and entering stern first. Pier head to pier head the passage does take about 60 minutes.

It is not without interest that the last and fastest paddle steamer on the Dover-Calais run, the *Empress I*, which was built in 1887 by Fairfields of Glasgow, was reputed to have made a pier head to pier head passage of 50 minutes. How true this is it is difficult to know, but certainly the fastest paddle boats had a turn of speed, in fair conditions, comparable with the latest turbine vessels. But it was very uneconomic to keep them steaming at their maximum speed and bad weather could easily delay them.

Today, with the advantages of modern turbines, oil firing, and improved ship design, conditions of wind and tide have less effect, and, except in the very worst weather, the S.S. *Invicta*, which normally makes the sea link in the London-Paris Golden Arrow service, runs with remarkable regularity.

Since the war the most startling development has been the increase of car shipments across the Strait.

Top to bottom: The Townsend "Free Enterprise III" with the bow loading door open. Next, the "Twickenham Ferry" owned by Soc. Anon. de Navigation Angleterre—Lorraine-Alsace carries trains. Next, the "Koningin Elizabeth" owned by the Belgian Government. Next, the Townsend "Free Enterprise I." Next, the "Chantilly" car ferry owned by the Soc. Nationale Chemins de Fer Francais. Lastly, the "Roi Leopold III" passenger ship owned by the Belgian Government.

Steadily over the years more and more people take their holidays abroad and an ever-increasing number take their cars. Up until 1939 one small converted mine-layer, the S.S. *Forde*, ran daily from Dover to Calais carrying about 30 cars. After the war the long-sighted Townsend Bros Ferries Ltd. purchased and converted the larger ex-naval vessel, and, as the S.S. *Halladale*, she, together with ships built for the same purpose by British Railways and vessels belonging to the Belgian Government on the Dover-Ostend run, as well as the very good looking car ferries run by the Soc. Nationale des Chemins de Fer Francais, coped with the ever-increasing traffic.

Today there are no less than 26 vessels engaged in cross Channel services from Dover at the height of the season: many of the car ferries make four return journeys in the 24 hours.

The laborious pre-war method of loading, whereby each car was hoisted by a crane and deposited in the ship's hold, has given way to the now universal practice of stern loading across a long ramp, which, hinged at point of contact with the land, can be adjusted to the level of the ship's stern according to the state of the tide.

Messrs. Townsend Bros Ferries have gone still further and on their two latest ships, *Free Enterprise II* and *Free Enterprise III*, have fitted doors at the bow as well, so that cars driven on at the stern at Dover can be driven straight off through the bows at Calais and vice versa. This practice demands very safe and strong water-tight doors at bow and stern, for should the car deck become flooded the ship could easily capsize and founder.

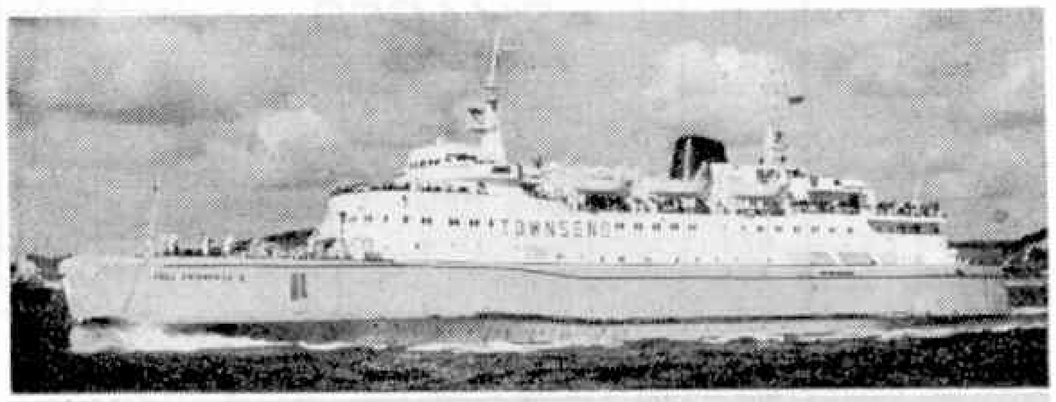
Another very fine service which runs, somewhat unheralded and unsung, because it is concerned with the less glamorous cargo trade, is the train ferry service running between Dover and Dunkirk, maintained by two British ferries and two French vessels. They operate from specially constructed locks at Dover and Dunkirk, into which the vessels can enter at any state of tide and be brought, by adjusting the level of the water in the lock, to the requisite position for running the trains onto the metals on the dockside.

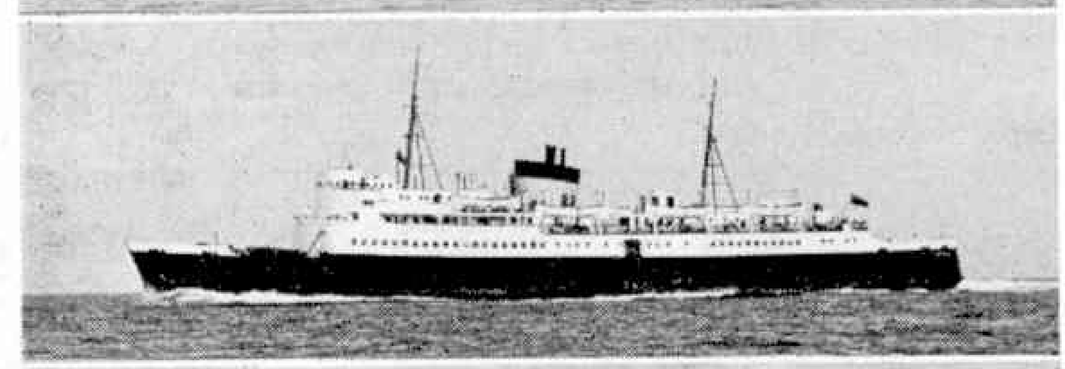
The container lorry trade is fast expanding, so much so that a ship carrying only lorries and trailer containers has commenced running this autumn between Dover and Zeebrugge. She is the Autocarrier, converted from the *Royal Sovereign*, a one-time pleasure passenger ship plying in the Thames estuary.

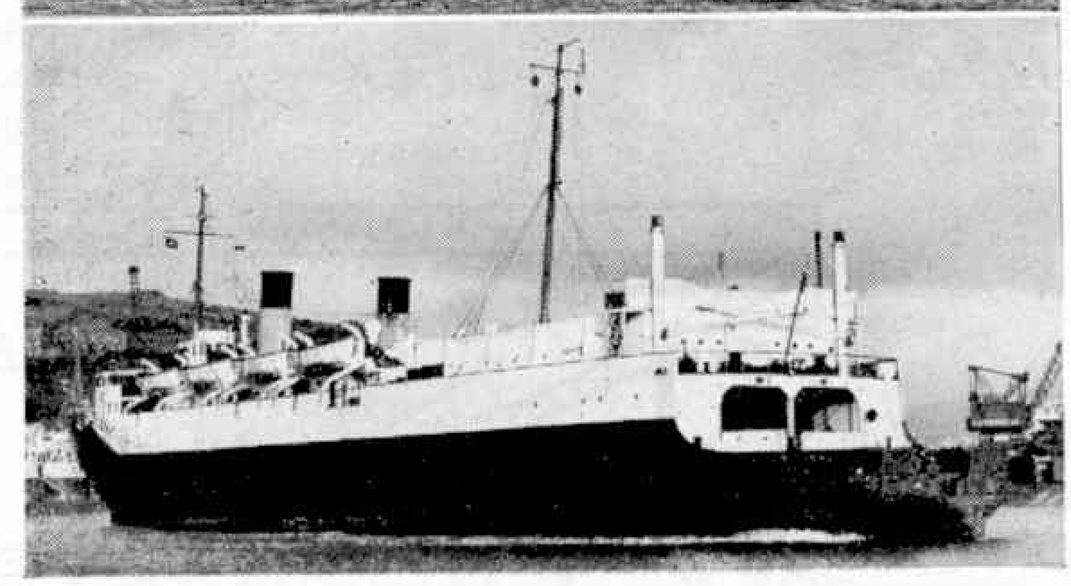
And so the cross-Channel traffic grows and becomes more specialised to suit the various needs of people and vehicles. Next year will see the introduction of the large Hovercraft which will take about 30 cars and several hundred passengers. She will be operated by British Railways on the Dover-Calais route.

It is hard to see where it would all end if it were not for the promise of the Channel Tunnel. Already Dover finds it difficult to accommodate the vessels now sailing from the port. The position in ten years time might be quite overwhelming. But probably before then, men, like industrious moles, will have completed the longest underwater tunnel in the world. In the immediate years ahead the cross-Channel fleet will reach its peak of efficiency and carrying capacity; for a number of veteran ships now running will need to be replaced by up-to-date vessels. But the writing is on the wall and when the tunnel is completed it is a bold man who will predict how many ships will be needed. Certainly in the summer months there will always be a call for a sea passage by holiday makers. But in the long off season, when the sea is unkindly, the delay in boarding and disembarking on wind-swept quays, the often uncomfortable hour or more on a heaving ship, will turn people to the swift trouble-free ride through the tunnel. And for goods the same freedom from expensive handling and delays at ports will attract most of the cross-Channel traffic.

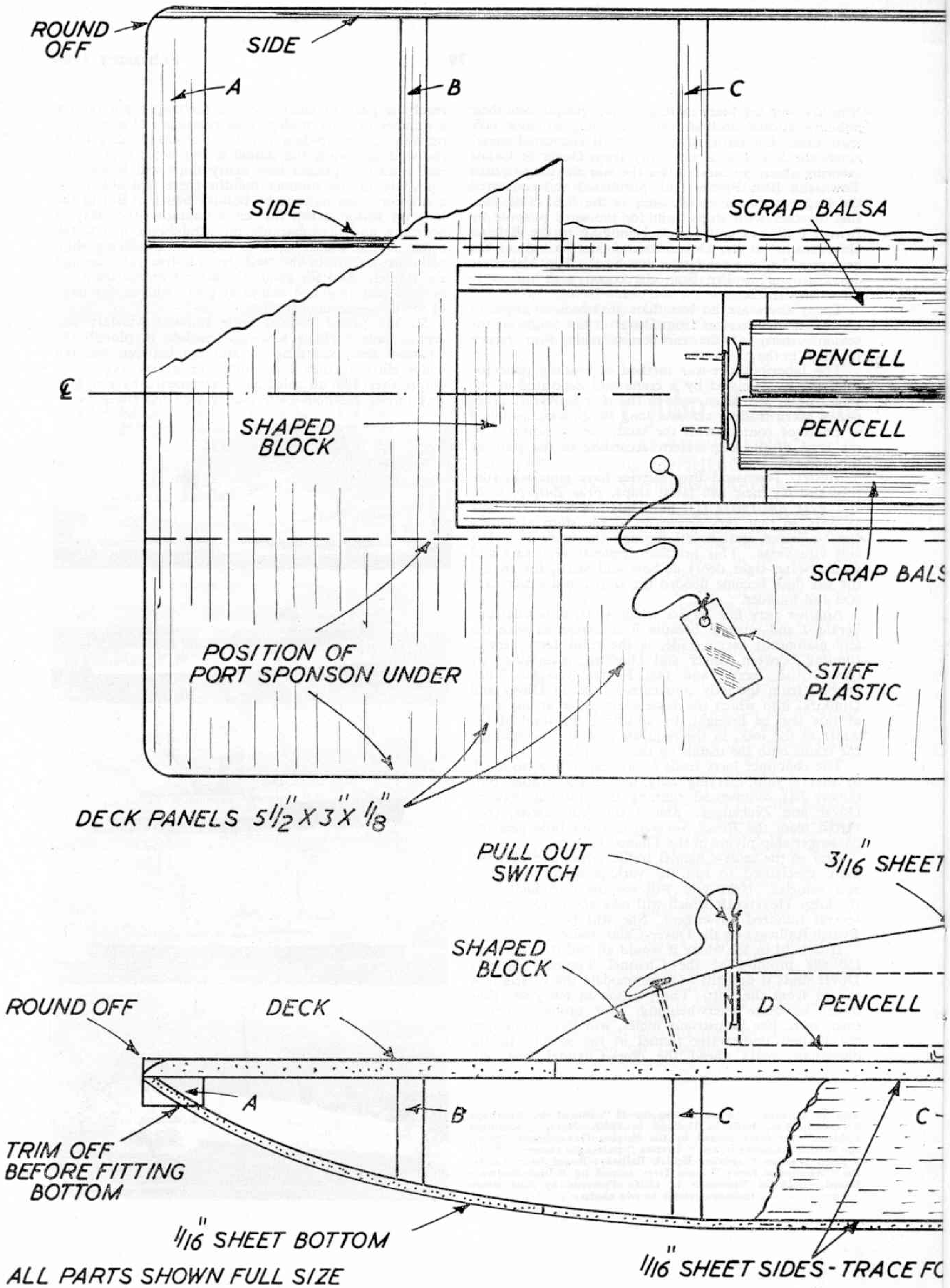
So the proud vessels, their stalwart Masters and crews, have perhaps a decade or less to plough the Channel seas, shuttling to and fro between the tall white cliffs as they have done for nearly 150 years, before they, like all splendid achievements, have to give way to new methods better suited to man's needs.







Top to bottom: "Free Enterprise II" owned by Stanhope Steamship Co., built in Holland in 1963. Next, "Koningin Fabiola" car ferry owned by the Belgian Government. Next, the British Railways Board "Invicta" passenger steamer. Next, "Lord Warden" another British Railways Board boat. Lastly, the "Hampton Ferry" train ferry owned by British Railways Board. Built in Newcastle in 1934. Powered by four steam turbines geared to two shafts.


ROUND OFF
SIDE
A
B
C
SIDE
SCRAP BALSA
PENCELL
PENCELL
℄
SHAPED BLOCK
SCRAP BALS
POSITION OF PORT SPONSON UNDER
STIFF PLASTIC
DECK PANELS 5 1/2" X 3" X 1/8"
PULL OUT SWITCH
3/16" SHEET
SHAPED BLOCK
ROUND OFF
DECK
D
PENCELL
A
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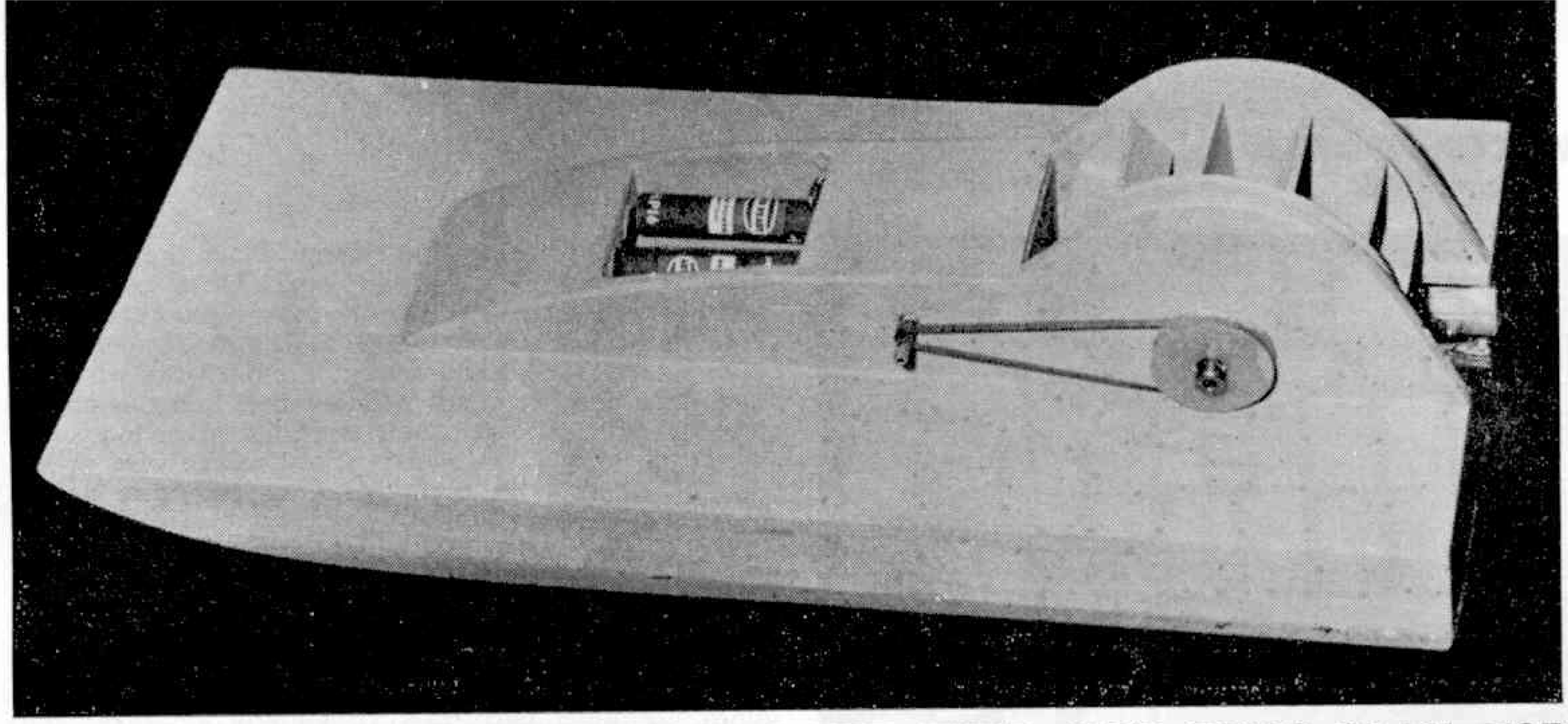
C
TRIM OFF BEFORE FITTING BOTTOM
1/16" SHEET BOTTOM
1/16" SHEET SIDES - TRACE FC
ALL PARTS SHOWN FULL SIZE



PADDLER ★ YOUR FULL SIZE FREE PLAN FOR A SIMPLE ELECTRIC POWERED BOAT

BY ADOPTING a single paddle wheel drive instead of a screw, this simple model can operate in shallow water and even run aground without "stalling" the motor (which is about the quickest way to ruin batteries!). We have given it modern lines and adopted a twin float layout for stability, so you need have no fears of it overturning in rough water. And, provided the two sponsons are not damaged, this model is unsinkable.

Materials

Rather than work to a specific material list—which always involves "odd" sizes of balsa sheet, etc., which you cannot buy (you usually have to get a whole sheet)—here are the basic "stock" materials you require: one sheet of $\frac{1}{8}$ in. balsa 3 in. wide; one sheet of $\frac{3}{16}$ in. balsa 2 in. or 3 in. wide; one sheet of $\frac{1}{16}$ in. balsa 3 in. wide. This will give you enough material for all the parts you require, and leave some over for further models.

In addition you will require: a small electric motor (any size will really do, provided it will run properly on three volts); one 1 in. diameter plastic pulley wheel; a 3 in. length of 16 s.w.g. piano wire; some scrap brass sheet—about 3 in. x 2 in. will be enough in 20 or 22 s.w.g; a 1 in. length of 16 s.w.g. brass tubing; two cup washers; a 1 in. length of $\frac{1}{2}$ in. sq. balsa; and balsa block 2 in. x $\frac{3}{4}$ in. x $1\frac{1}{2}$ in.

PLAN INSTRUCTIONS

To construct Paddler remove the full size plan spread on page 80 and 101 by opening the binding staples and gently removing all the pages down to 80 and 101. Replace the centre of the magazine and close the staples. Full size component parts are drawn out on page 100, the extension of this page.

Construction

Commence by cutting four $5\frac{1}{2}$ in. lengths from the 3 in. x $\frac{1}{8}$ in. balsa sheet. Cement these pieces edge to edge over a flat surface to make a panel 12 in. long by $5\frac{1}{2}$ in. wide. This forms the deck.

Make a tracing of the *side* from the full-size plan, transfer onto $\frac{1}{16}$ in. sheet balsa and cut out. Use this as a pattern to cut three more sides, so that you have four identical sides in all.

Now cut out the various bulkheads A, B and C from $\frac{3}{16}$ in. sheet balsa, noting the number required (see full-size parts drawing, page 100). You are now ready to start assembly.

With the deck still laid out on a flat surface, cement one side in place adjacent to one edge. Mark the bulkhead positions on the deck and cement in the bulkheads against that side. Then add the other side.

Repeat the operation on the other side of the deck, so that you have assembled the sides and bulkheads for both sponsons. Trim down the front bulkheads (A) when set and then proceed to cover the bottom of both sponsons with $1\frac{3}{4}$ in. lengths cut from 3 in. wide $\frac{1}{16}$ in. sheet balsa. Using strips in this manner instead of trying to cover the bottoms with one complete piece of sheet makes it easy to form the front curve and also gives a stronger assembly. Use plenty of cement and make sure that all joints are watertight.

Continued on next page.

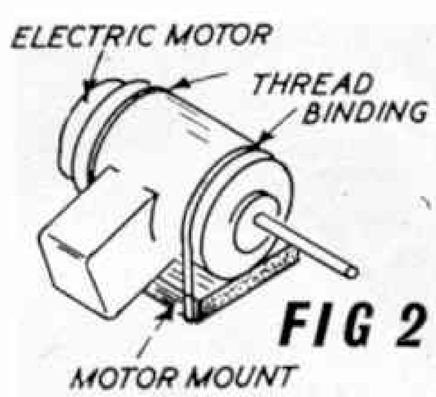


FIG 2

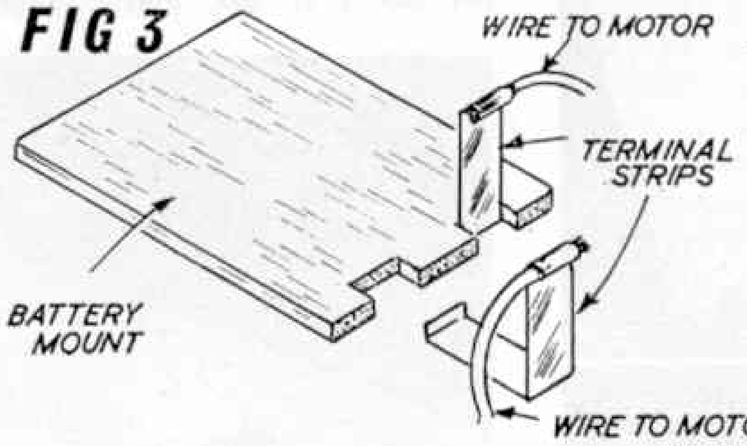


FIG 3

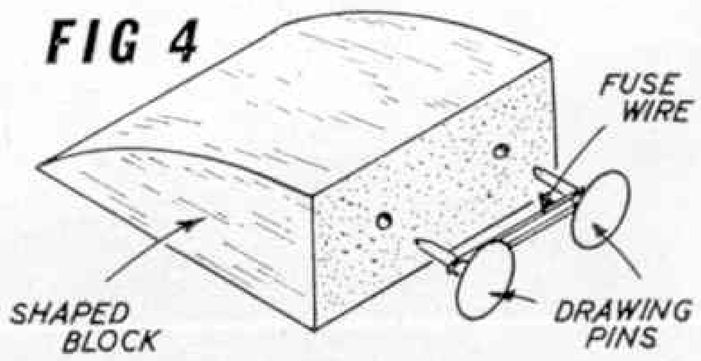


FIG 4

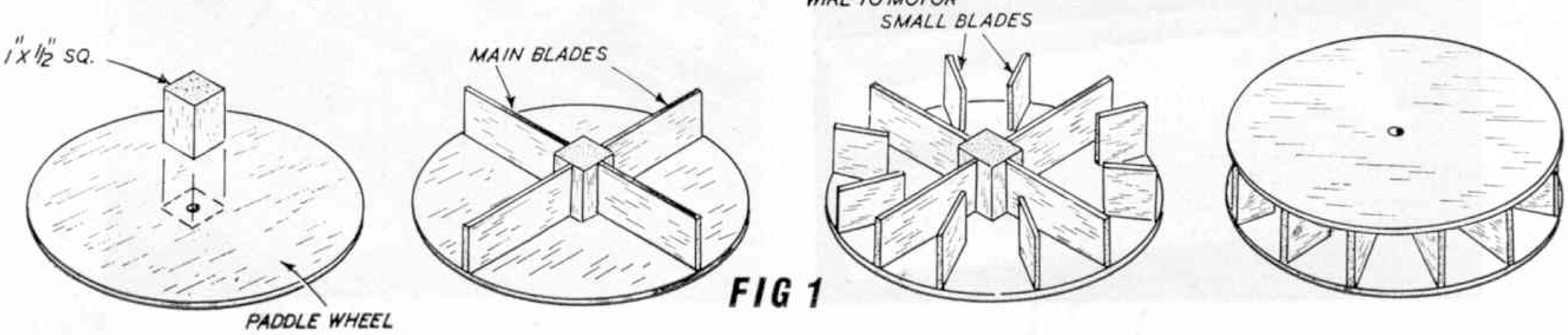
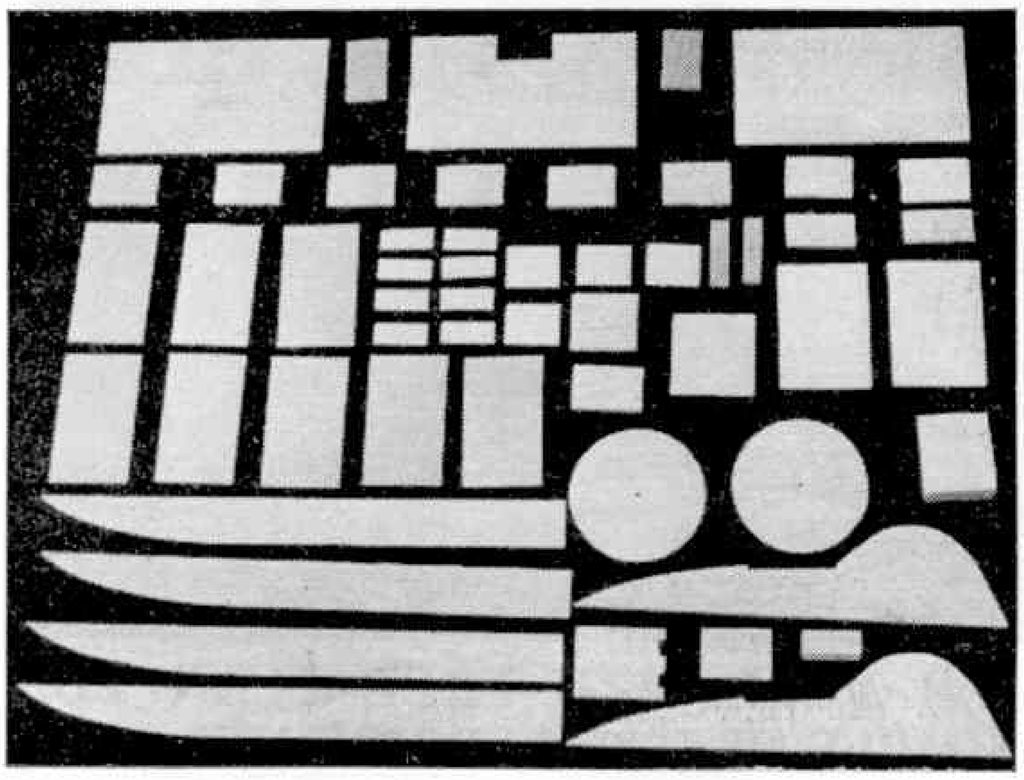


FIG 1



Now turn the hull the right way up. Trace the pattern for the deck cut-out given on the parts drawing and lay over the deck.

Cut the two main fairings from $\frac{3}{16}$ in. sheet balsa; and also bulkheads E and F from $\frac{3}{16}$ in. sheet balsa. Pierce a hole in each fairing where shown and into this hole glue a $\frac{1}{2}$ in. length of 16 s.w.g. brass tube to act as a bearing. It is best to use an epoxy resin glue for this job as this will give a very secure fixing. You can now cement the two fairings to the top of the hull, spaced apart by bulkheads E and F. The front end between the fairings is then filled in with a balsa block.

The next thing to make is the paddle wheel. Cut two plain paddle discs from $\frac{1}{16}$ in. sheet; four of the larger blades; and eight of the smaller blades—all from $\frac{1}{16}$ in. sheet again. Also cut *accurately* a 1 in. length of $\frac{1}{2}$ in. square balsa.

Pierce a centre hole *accurately* in each plain disc first, then proceed to cement on the hub piece, the main blades and then the small blades, as shown in Fig. 1. Finally cement on the other plain disc to complete the paddle wheel.

Pierce or drill a hole through the centre of the paddle, using a length of wire no bigger than 18 s.w.g. diameter (20 s.w.g. will be better). Place the paddle in position and then put the 3 in. length of 16 s.w.g. brass wire through the bearings in the fairing pieces to mount the paddle wheel in place, also locating cup washers on each side of the paddle wheel. Provided the wire is a nice tight push fit in the paddle wheel hub this should provide sufficient " grip." If the fit is rather loose, you will have to lock the paddle wheel to the wire with a dab of epoxy resin each side—but take care not to glue the wire to the bearings.

Check that the paddle wheel spins freely and truly, then fit a 1 in. diameter plastic pulley to the protruding length of shaft on the left-hand side. Cut off surplus wire on the right-hand side.

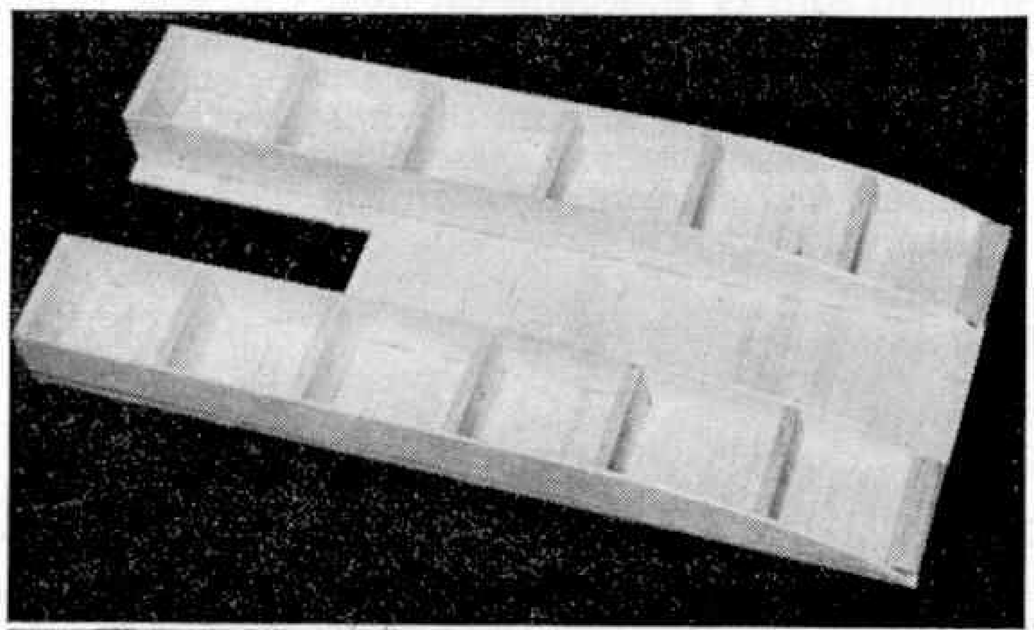
Having decided on which electric motor to use, cut a motor mount from scrap $\frac{1}{8}$ in. sheet balsa to match the width of the motor and then *bind* the motor to this mount with thread—see Fig. 2. Secure by coating the binding generously with cement.

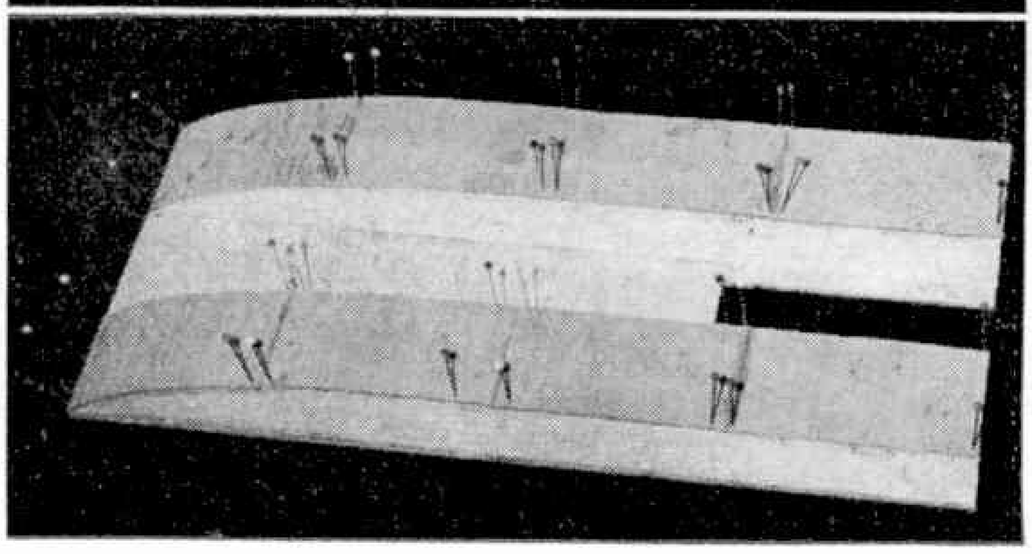
The motor is then dropped into position between bulkheads E and F, having first bored a hole or cut a slot in the left-hand fairing piece to let the motor shaft protrude. To secure, simply cement the motor mount to the deck.

The battery box comes next. Cut the battery mount from spare $\frac{1}{16}$ in. or $\frac{1}{8}$ in. sheet balsa to the shape shown. Cut the strips for the battery terminals from thin brass and bend to the shape shown. These fit into the notches in the end of the battery mount and are held in place when this mount is cemented in place to the deck. Note that the tops of the terminal strips are curled over to grip short lengths of wire to connect to the motor—Fig. 3.

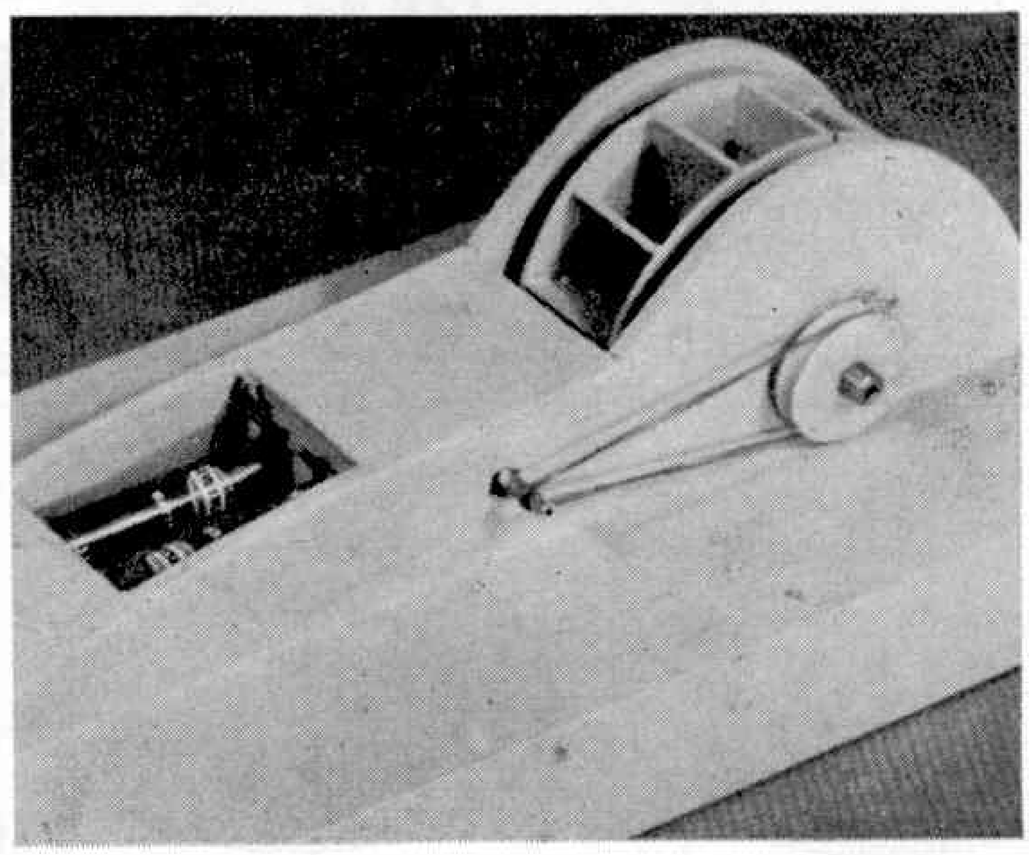
The front connections for the two pencells are made as shown in Fig. 4. Simply push two drawing pins into the face of the shaped block in line with the ends of the two pencells and connect the two drawing pins electrically by binding them with fuse wire.

A very simple " switch " is shown on the plan. This is a small piece of fairly stiff plastic sheet (or even thin ply will do) which is tied to a length of thread. Make " off " the other end of the thread on a pin and push into the shaped block. This will ensure that the plastic " switch plate " is not lost. To switch " off " simply push the plastic between the end of one battery and its terminal (drawing pin). To switch " on," simply pull out the switch plate. Happy paddling !





Very easy to construct, Paddler only uses simple balsa components as laid out at the head of this page; they can all be cut with a modelling knife. Left: the semi-complete hull showing 3/16 in. sheet pontoon formers and sheet sides. Lower left: glass headed modelling pins hold the cross grain pontoon bottom sheeting until the cement sets. Below: we used a Ripmax 1 in. dia. plastic pulley wheel and elastic band drive.



GREAT ENGINEERS No. I

ISAMBARD KINGDOM BRUNEL

(1802 - 1859)

by

A. W. Neal

THIS EXTRAORDINARY man was fortunate enough to be born into the profession of engineering, his father, Sir Marc Brunel, being a consulting engineer. Although this fact would have set him on the right road to success—and fame as well—he had his own outstanding courage and determination by which he would have achieved distinction. Yet, as some critics say, he lacked balance, judgement and self-criticism. Further, during the latter part of the 19th century, it was becoming abundantly clear that engineers would need to specialise—but not Brunel. He ranged over mechanical engineering, civil engineering, marine and railway engineering. Presumably if electricity was advanced enough during his time, he would have operated in that field as well.

He received his primary education at Brighton, and then attended the College of Caen in Normandy and the Lycée Henri Quatre, Paris. His practical training was received in Paris and with Maudslay's of Lambeth.

In 1824, Brunel senior was appointed Engineer to undertake the Thames Tunnel from Rotherhithe to Wapping, and I.B., then seventeen, became Resident Engineer. The task was a difficult one, the present-day techniques being quite unknown. During the course of the works the river broke in and they were flooded. The Resident Engineer's personal courage in this emergency was without question.

By 1829, I.B. had left his father and was working on his own account. He submitted a design for the Clifton Suspension Bridge, which was accepted, but it was not completed during his lifetime.

He became Engineer to the Great Western Railway company at the age of 27, a connection which continued until his death.

One of his most attractive bridges was the Hungerford Bridge in 1846. It spanned the Thames and was for pedestrians. It was eventually superseded by the Charing Cross Railway Bridge. He designed the Wharncliffe Viaduct at Hanwell, and then came his great work, the Royal Albert Bridge across the Tamar at Saltash, Cornwall. But railways were not his only love. There were large hotels and stations, including the Paddington terminus, engine sheds and so on, all of which I.B. supervised. Temple Meads Station, Bristol, was another of I.B.'s creations.

It was in 1846 that Brunel gave up his post as Chief Engineer to the Great Western Railway, but he was retained as Consulting Engineer. The following year he was advising the South Devon Railway to adopt an atmospheric railway system invented by Clegg and Samuda. No locomotive was needed, thus reducing the greater weight of a train. The scheme comprised a track in the usual way, but with a pipe between the rails. In the pipe was a piston which was attached to the coach by a rod passing through a longitudinal slot in the top of the pipe. This long slot was closed by a leather strip, opening as the rod moved forward and closing after it had passed. The tube in front of the piston was exhausted of air by stationary engines, and the atmospheric pressure on the backward side impelled the piston and the vehicle forward. After a fabulous amount of money was spent on this "freak," as one writer called it, the whole scheme was abandoned with great loss to the promoters.

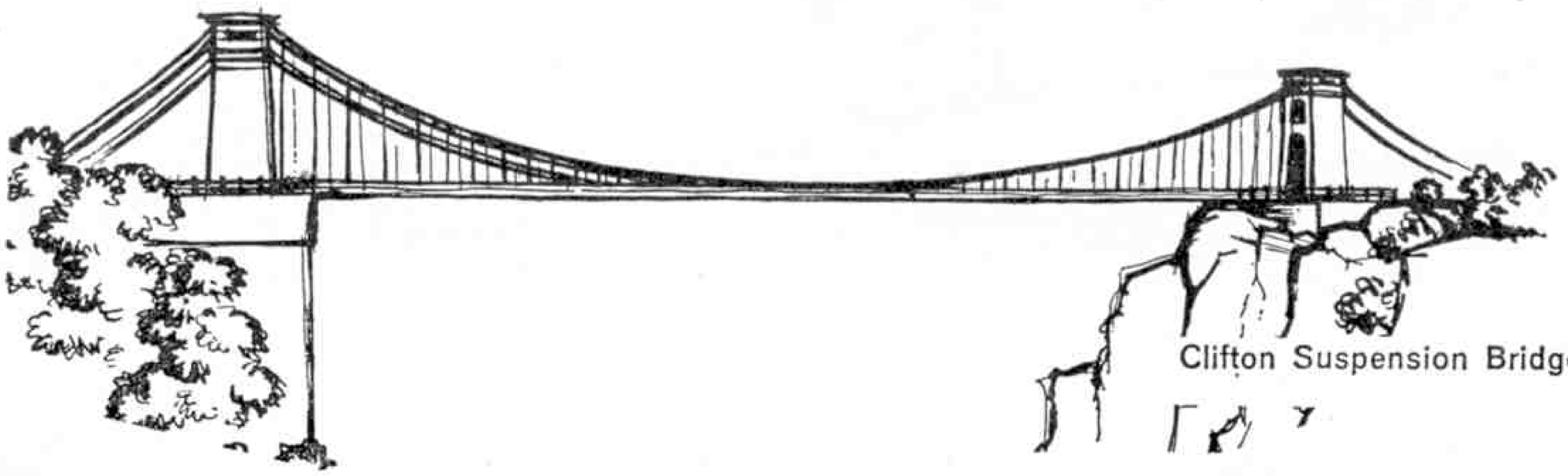
He became involved in the conflict of the gauges—the distance between rails. All the railways, other than the Great Western who adopted 7 ft., had their tracks laid with a gauge of 4 ft. 8½ in. One can imagine the confusion which ensued where the broad and the narrow met. A Royal Commission settled this problem by standardising the narrow gauge, and the Great Western rolling stock and tracks were converted to this, and that is how the matter stands today.

I.B. was responsible for much dock works, and he made improvements to those at Bristol, Plymouth, Milford Haven and Monk Wearmouth.

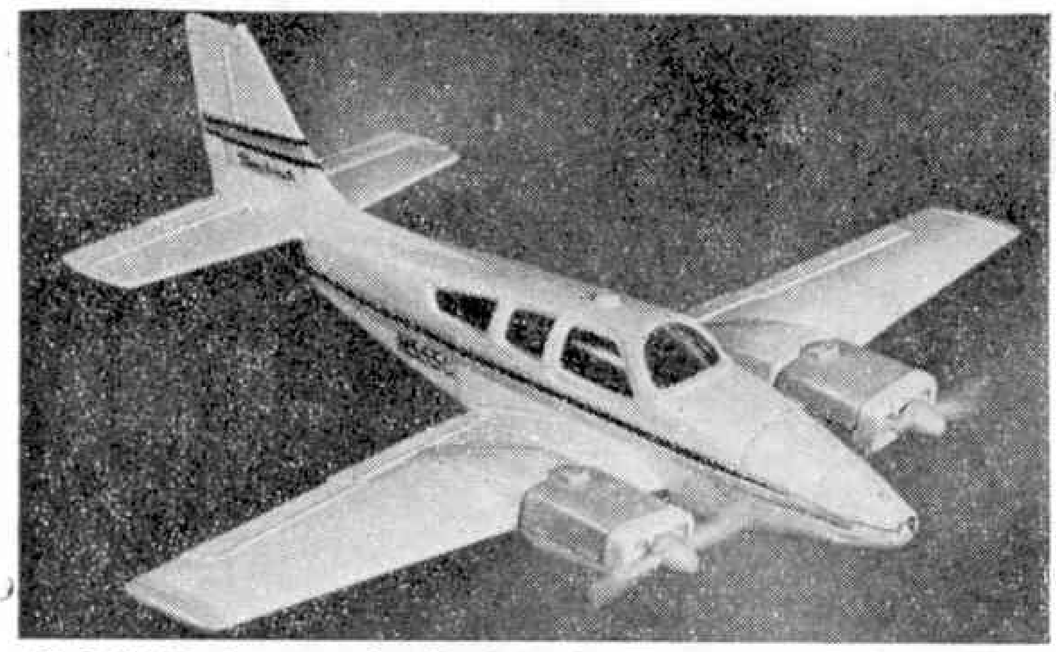
He entered the steamship field and was responsible for three great ships. Some critics dismiss all three as white elephants, and others, having regard to their technical merits, said his role was a passive one. But the man's character was anything but passive.

The first ship was the *Great Western*, named, presumably after the railway. It was a paddler and of great size. It was highly successful. The next was the *Great Britain*, a screw-propelled boat with an iron hull. The third was the *Great Eastern*. She also had paddle wheels, but a screw drive as well. A contemporary picture shows her to have had six masts and spread sails. The total engine capacity was 2,600 normal horsepower. The story of this vessel is far too long to tell here, but she ruined two companies, and cost upwards of £1,000,000. She laid the first Atlantic Telegraph Cable in 1866.

And what of Brunel? He died following a stroke in the September of 1859. His statue may be seen on the Victoria Embankment by Temple station.



Clifton Suspension Bridge



Quite a Crowd!

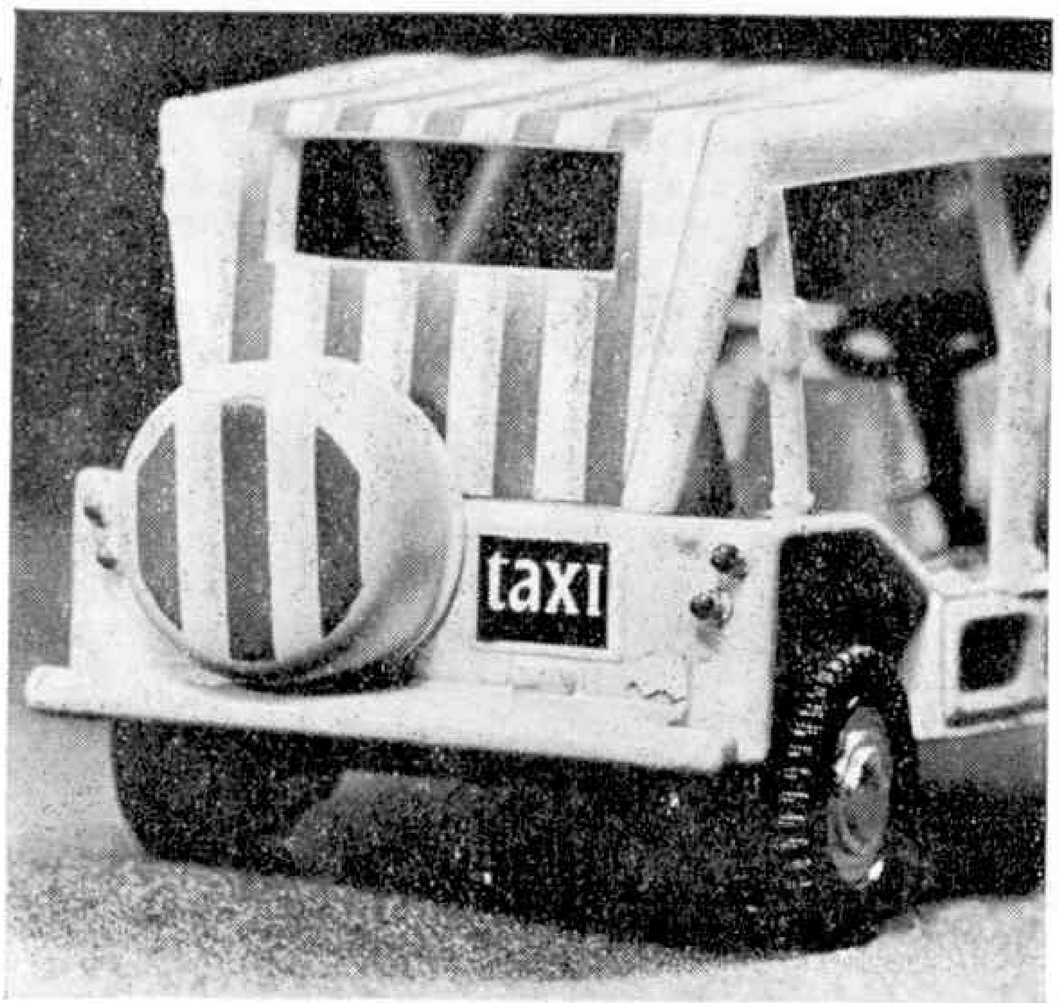
by Chris Jelley

QUITE A crowd all right ! Four new Dinky Toy releases for me to report on this month and those four releases include six models—seven if you count a truck and trailer as two !

Before you begin to wonder if I'm losing the grip on my senses, however, I should explain that one of the releases is a Gift Set, made up of three models, which accounts for the above apparent discrepancy. The item in question is No. 297 Police Vehicles Gift Set and, although the Set itself is new, the models contained in it have already been marketed individually. A glance at the accompanying picture will show you that they are the Police Mini Cooper, No. 250, the Ford Zodiac Police Car, No. 255, and the Police Accident Unit, No. 287.

As all three models were described in these pages last month, there seems little point in repeating the full description here, but some general comments are in order. For example, each model is packed with action features such as 4-wheel suspension, opening doors and bonnet, etc., and all have windows and full interior fittings as well as "Police" identification signs and fixtures. In addition the Accident Unit, based on the Ford Transit Van, comes complete with warning cones and folding notice boards.

When sold as a Set, the three models are mounted, in open order, on a special illustrated display platform inside a normal carton. As a whole, it makes an excellent present, but I am sure many of you will already have discovered this at Christmas !



Moving away, now, from vehicles that are often associated with crowded roads and traffic jams, we go to the opposite extreme, the uncluttered sky, with the Beechcraft C55 Baron, Sales No. 715. The natural sequel to the existing Beechcraft Bonanza aircraft, the twin-engined Baron is in no way inferior to its smaller single-engined relation. Like the Bonanza, it is fitted with windows and seats as well as detailed "engines," removable engine-cowls and revolving propellers. It also has a jewelled nose-light and a tricycle undercarriage which is where it gains the lead over the smaller model. Whereas the Bonanza's undercarriage is fixed in the lowered position, the Baron actually has a fully-retractable system !

Yes, both the nosewheel and the main landing wheels fold neatly away, into the fuselage in the case of the former, and into the wings in the latter's case. This, surely, is yet another example of how Dinky Toys lead the comparable die-cast modelling field in new features. Finish, incidentally, is in an overall white gloss with yellow wingtips, propellers and engine cowls. Running the whole length of the fuselage at each side is a black stripe, flanked by two yellow stripes; the word "Beechcraft" beneath a yellow stripe flanked by two black stripes appears on each side of the fin.

Produced to the same scale as the Bonanza—1:77—the Baron is slightly larger, having a wingspan of 5 4/5 in. and an overall length of 4 3/10 in. Casting detail includes rudder, elevator and ailerons as well as a "non-slip" patch at the root of the starboard wing which, on the real aircraft, allows passengers to enter the cabin with a certain degree of safety. I know from experience how easy it is to slip off a smooth metal wing without a non-slip patch if you happen to be boarding an aircraft where access to the cockpit is via the wing, as in this case ! To sum up, however, anyone interested in aircraft cannot help but find this model fascinating.

Next we have one of the biggest Dinky Toys ever made—the Mercedes-Benz Truck and Trailer, Sales No. 917. Actually it is not strictly correct to refer to this new release in the singular as it is really two models in one, as the name implies, consisting of a large Mercedes-Benz Truck and an equally large (as far as capacity is concerned) detachable trailer. I must admit that, when I first saw an artist's rough drawing of the model, before the model itself was available, I was not greatly impressed. It did not seem to have a great deal to recommend it, I thought, but I changed my mind completely as soon as I saw the finished toy. The large size and two-in-one nature of the model is only the beginning of its good points.

The truck itself is built up on an excellent reproduction of the Mercedes-Benz LP 1920 cab and chassis, to which a 6 in. long truck body has been fitted. The

cab, however, is undoubtedly the star of the show, being the most sophisticated commercial vehicle cab ever produced by Meccano or, indeed, by anybody else to my knowledge. Not only is it fitted with windows, seats and steering wheel, but it also has an opening roof ventilator and opening upholstered doors—the very first die-cast on the market with this latter feature! The right-hand passenger seat, incidentally, has proper arm-rests.

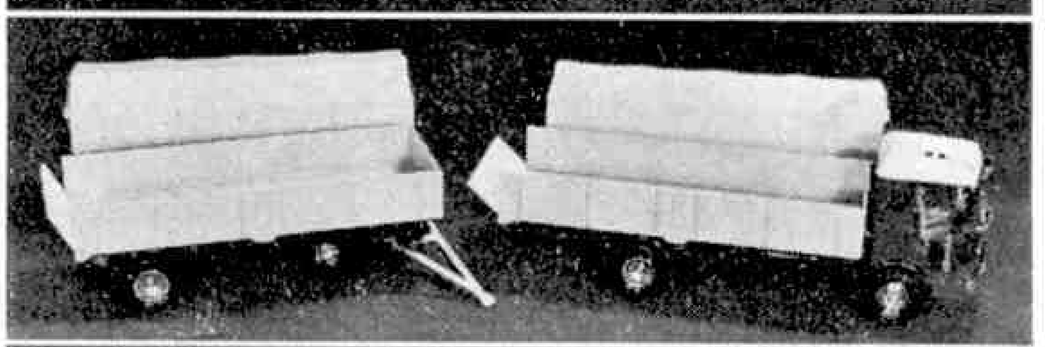
Others features present include wing mirrors, big oval jewelled headlamps and German-style number plates, but the thing I personally found most interesting of all is the superb suspension system fitted to *all* the wheels both of the truck and trailer. The fact that suspension at all is fitted to such a large model is, in itself, fairly unusual, but the actual system used has never before appeared on a Dinky Toy. It consists of a pair of sprung "plungers" acting on each axle, the axles being mounted in slotted bearings to allow vertical movement. The results are excellent.

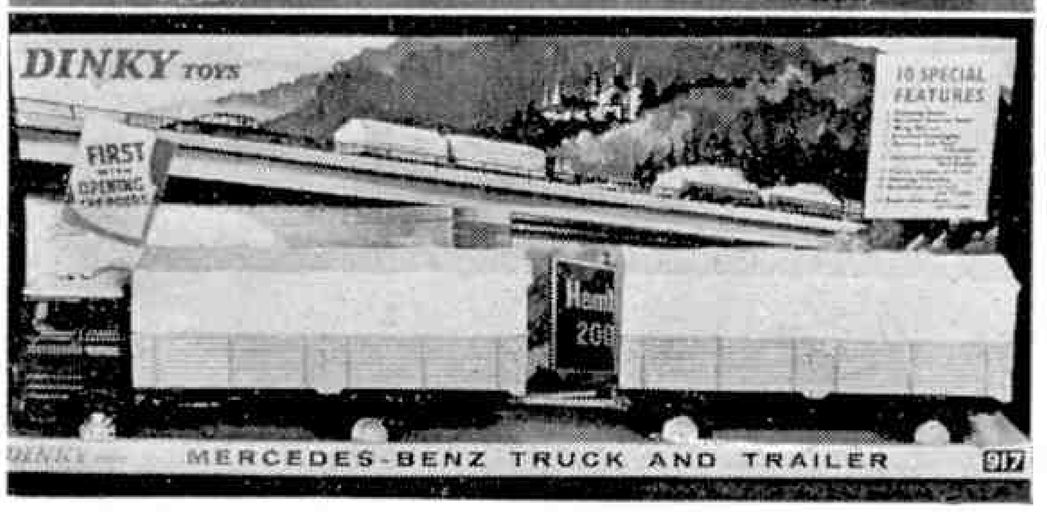
Both the truck and trailer bodies are identical, being large, detailed castings, equipped with opening tailgates and carrying detachable moulded canopies, shaped to represent tarpaulins. The swivelling bogey wheels at the front of the trailer are attached to a special towbar which slots into a recess in the back of the truck. Chassis finish is in blue with the truck and trailer bodies yellow and the cab roof and tarpaulins white. All in all, a very pleasing sight.

Finally, we come to the smallest and perhaps the most fascinating of all the new releases. To appreciate it fully, however, you need to have seen the current, highly popular television series "The Prisoner," starring Patrick McGoohan, famous for his role as John Drake of "Danger Man." All the action in "The Prisoner" takes place on an apparently escape-proof island inhabited by a colony of "prisoners" who, because the island is escape-proof, live a holiday camp-type existence. They are allowed to move about reasonably freely—under the constant surveillance of hidden cameras and various electronic gadgets—and even to organise and run their own village.

Ground transport on the island is limited almost entirely to Mini Mokes, these nippy little vehicles being used for practically everything from ambulance to electioneering wagon. They are most frequently seen in the role of taxi, however, and this is what provided the inspiriation for the new Dinky—No. 106, "The Prisoner" Mini Moke. Like the TV. series' taxis, the model is finished in white with brown running boards and gay red and white candy-striped canopy. "The Prisoner" emblem of a penny-farthing bicycle appears on the opening bonnet, while the identification "taxi" replaces the normal number plates. The canopy is, of course, removable as also is a little red and white striped cover which fits over the spare wheel at the back of the toy. Additional features are windscreen, steering wheel, radio aerial and detailed engine.

In closing, I should like to add that, whether you watch "The Prisoner" or not, I am sure you will find the Dinky Toy a tremendously appealing model.





Right-hand col., top to bottom: Straight from the T.V. Show, "The Prisoner," Mini Moke. Next, one of the main features of the Dinky Beechcraft C55 Baron is its retractable undercarriage, seen here in the lowered position. The Dinky Police Vehicles Gift Set in the next photo. consists of a Police Mini Cooper, the Ford Zodiac Police Car and Police Accident Unit. The set is sold with the models mounted on a special illustrated display platform. The last two photos show the Dinky Mercedes-Benz Truck and Trailer, sold mounted on an illustrated display platform. Note the many operating features.

TRY YOUR LUCK!!

A NOVEL MECCANO PENNY SLOT MACHINE FOR ADULTS AND YOUNGSTERS ALIKE. THE WHOLE FAMILY CAN PARTAKE.

by Spanner

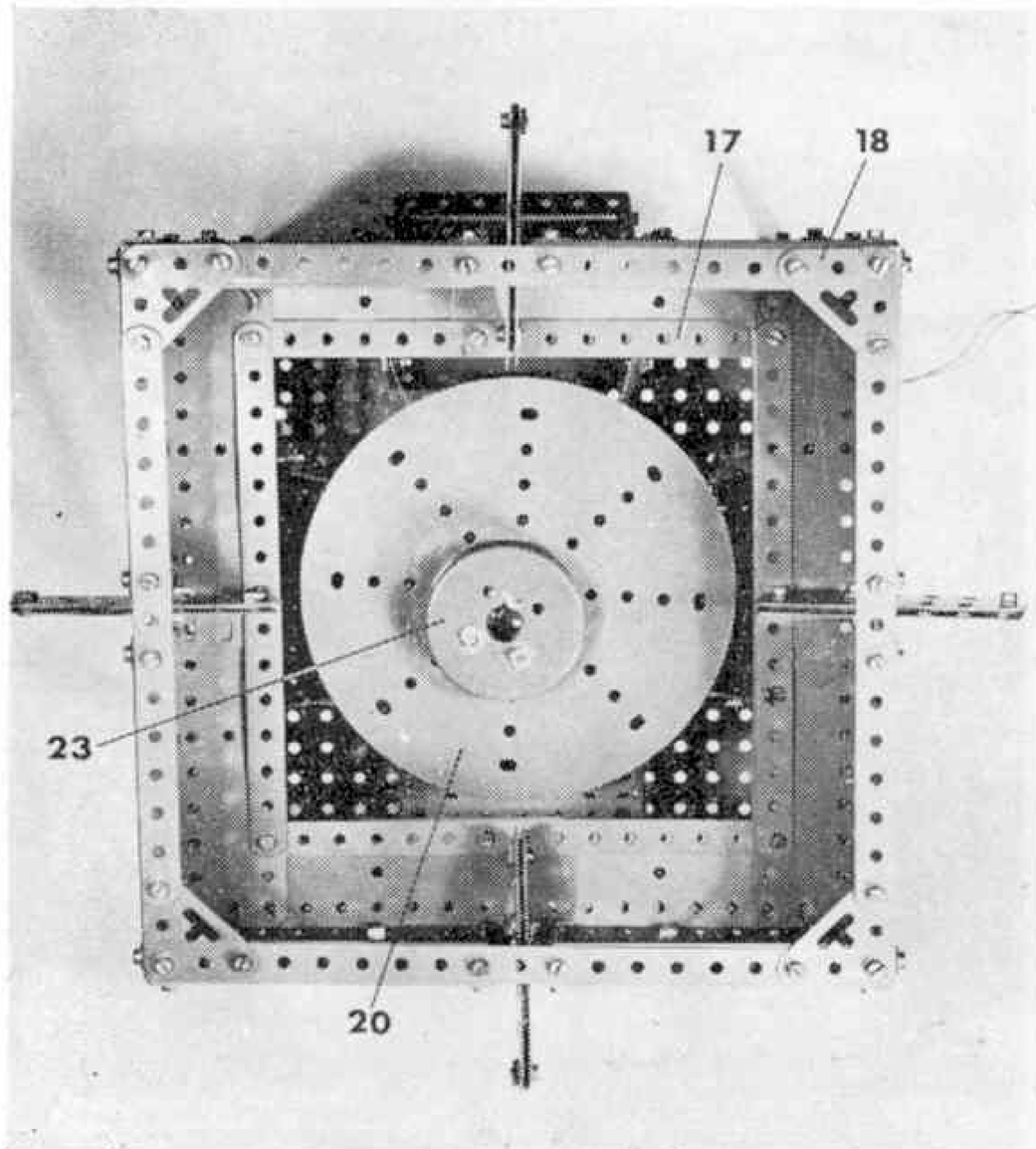
MAYBE IT'S the wrong time of year to think about fairgrounds, but I'm inclined to believe that anything which will take our minds off these long winter evenings is well worth investigating. And so, I have been thinking about fairgrounds!

If you have visited any of these fascinating places—dedicated to relieving us of our money as quickly as possible—you will have noticed that you are constantly being tempted to try your luck at the slot machines, be they one-arm bandits, ball games, mechanical grabs or whatever. The chances are, of course, that you will not win, but if you are anything like me, you'll have great fun trying to disprove it. Working on the theory that it should be possible to continue this fun at home, our model-builder has come up with the extremely novel slot machine featured here.

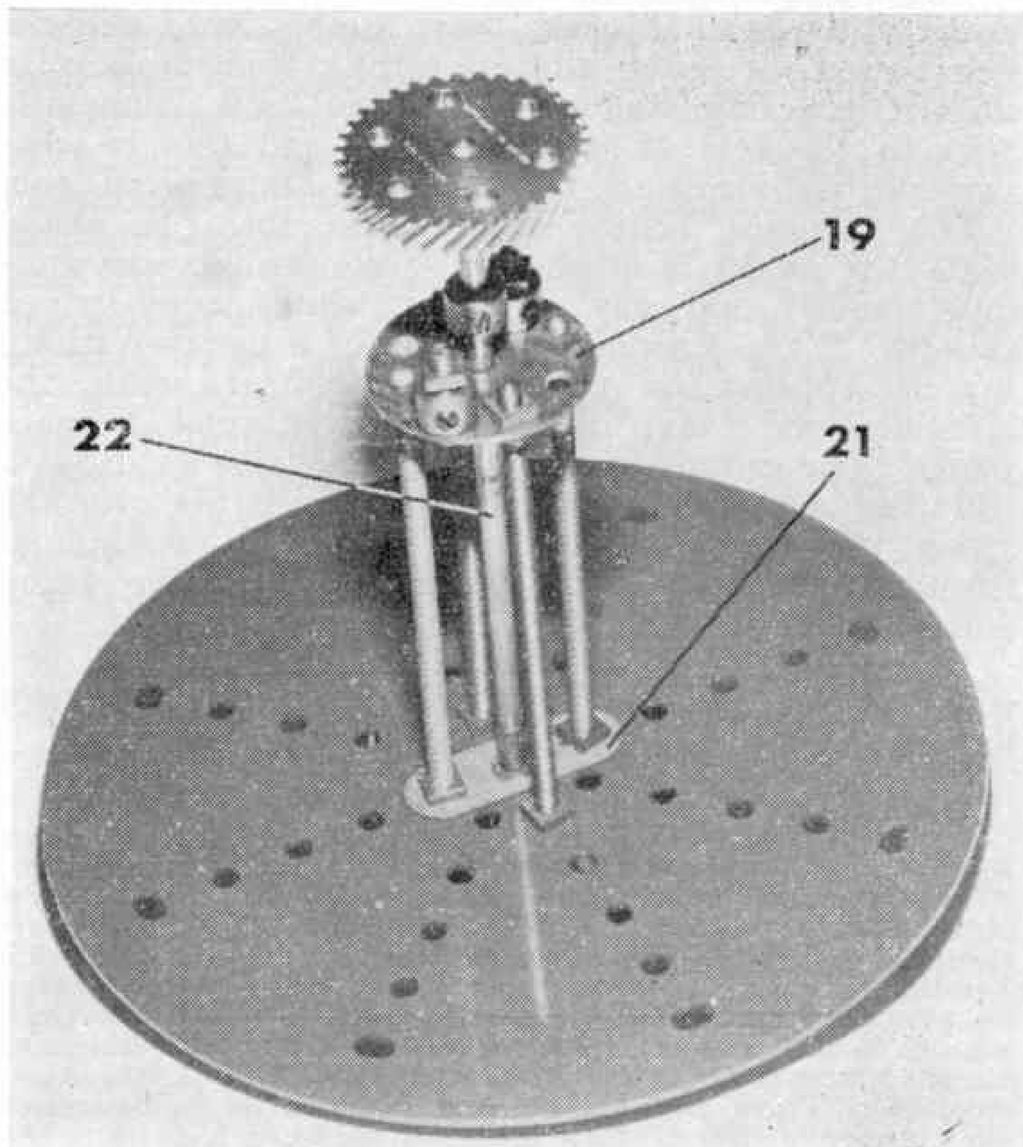
Intended for use by four people, it basically consists of a circular table, in the centre of which an eccentrically revolving "knocker" is mounted. The complete unit is fixed in a cabinet, fitted with four inlet guides and four outlet chutes. The idea is that each "contestant" rolls a penny down his inlet guide on to the circular table, off which it is knocked by the revolving "knocker." If the penny falls into an outlet chute, the "owner" of the chute claims it, but if it misses all the chutes and drops into the body of the machine, then everybody loses. It can become most interesting!

Construction, while being solid, is not difficult. The external framework is built up from four 12½ in. Angle Girders 1, connected, half-way up, by four 9½ in. Angle Girders 2 and, at the top at each side, by two 4½ in. Angle Girders 3, overlayed by a 9½ in. Strip 4.

A plan view of the Meccano Slot Machine showing the control table and the revolving "Knocker" which is designed to direct pennies rolled down the inlet guide into the outlet chutes.



The complete central table, removed from the Machine. Note the 1½ in. Strip 21, fixed across the centre of the Circular Plate to provide an extended bearing for the drive-shaft.



This latter arrangement leaves a gap of ½ in. between the two 4½ in. Angle Girders. Two opposite Angle Girders 2 are joined through their eleventh holes by a 9½ in. Strip 5, then the entire base of the machine is filled in by four 5½ × 3½ in. Flat Plates 6 and a 5½ × 2½ in. Flat Plate 7.

Angle Girders 1 at each side are now further joined by a 9½ in. Angle Girder 8, then each side is completed by two 4½ × 2½ in. Flexible Plates, edged by 2½ in. Strips 9, and two 4½ × 2½ in. Flat Plates 10, connected by two 4½ in. Strips 11. The large gap remaining accommodates the outlet chute, obtained from two 2½ × 2½ in. Triangular Flexible Plates 12 joined by a 3½ × 2½ in. Flat Plate 13 extended two holes by a 3½ × 2½ in. Flexible Plate 14. Attached by Angle Brackets to this last Plate is a 3½ × ½ in. Double Angle Strip 15, the lugs of which are extended by Fishplates. Also attached by Angle Brackets, to Strips 9, is the inlet guide, obtained from two 3½ in. Flat Girders 16 spaced apart by three 3½ in. Strips.

Inside the cabinet, a ledge is provided all round by bolting two 5½ × 1½ in. Flexible Plates to the horizontal flange of each Angle Girder 8, each pair of Flexible Plates being edged by a 7½ in. Strip 17. When the four 7½ in. Strips are in place, they should form a square, as shown. Note, incidentally, that the upper corners of the cabinet are strengthened by 1½ in. Corner Brackets 18.

Table and knocker

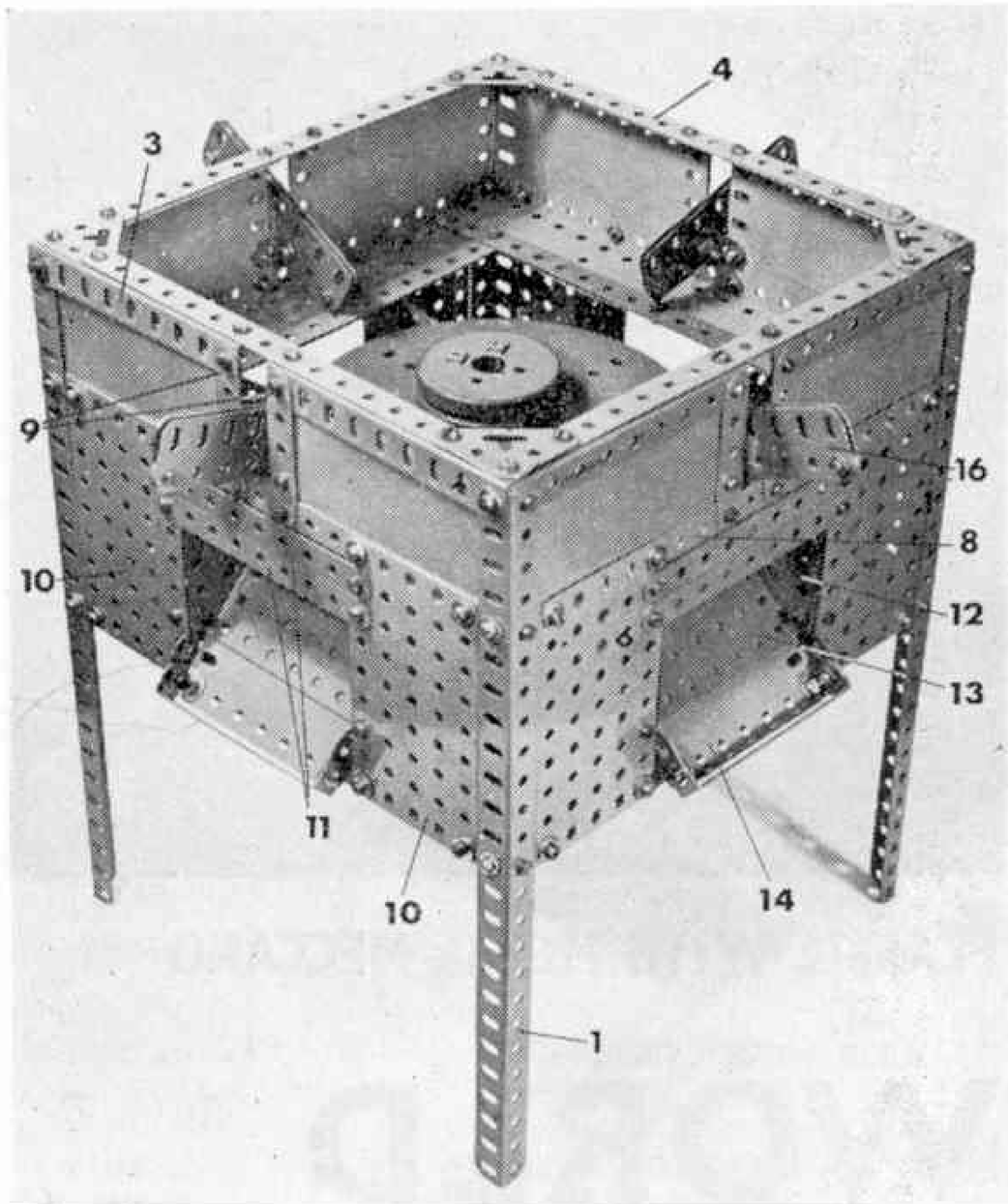
Coming now to the table and knocker, I must recommend that you follow the building sequence exactly. An 8-hole Wheel Disc 19 is fixed by two ½ in. Bolts to the inside of Flat Plate 7, a Collar on the shank of each Bolt acting as a spacer. Held by Nuts in this Wheel Disc are four 3½ in. Screwed Rods, to the top ends of which a 6 in. Circular Plate 20 is secured, also by Nuts, two of which fix a 1½ in. Strip 21 across the centre of the Plate. A Double Arm Crank is now tightly fixed by one Bolt to the back of a Wheel Flange, care being taken to see that the centre bore of the Crank coincides with the notch in the middle of the Wheel Flange. A 5½ in. Rod 22 is mounted tight in the boss of the Crank, then another Wheel Flange 23 is attached by ½ in. Bolts to the first Wheel Flange. Note that the Flanges of both these parts point in the same direction, i.e. down the length of Rod 22.

The Rod is now journalled in the centre hole of Strip 21 and in Wheel Disc 19, as well as in the corresponding hole of Flat Plate 7, to be held in place by a Collar beneath the Plate. Mounted on the end of the Rod is a 1½ in. Helical Gear 24 in mesh with a ½ in. Helical Gear on the output shaft of a Power Drive Unit. This Unit is bolted, along with a 1½ × 1½ in. Flat Plate, to a 1½ in. Angle Girder 25, fixed to one of the 5½ × 3½ in. Flat Plates forming the underside of the cabinet.

PARTS REQUIRED

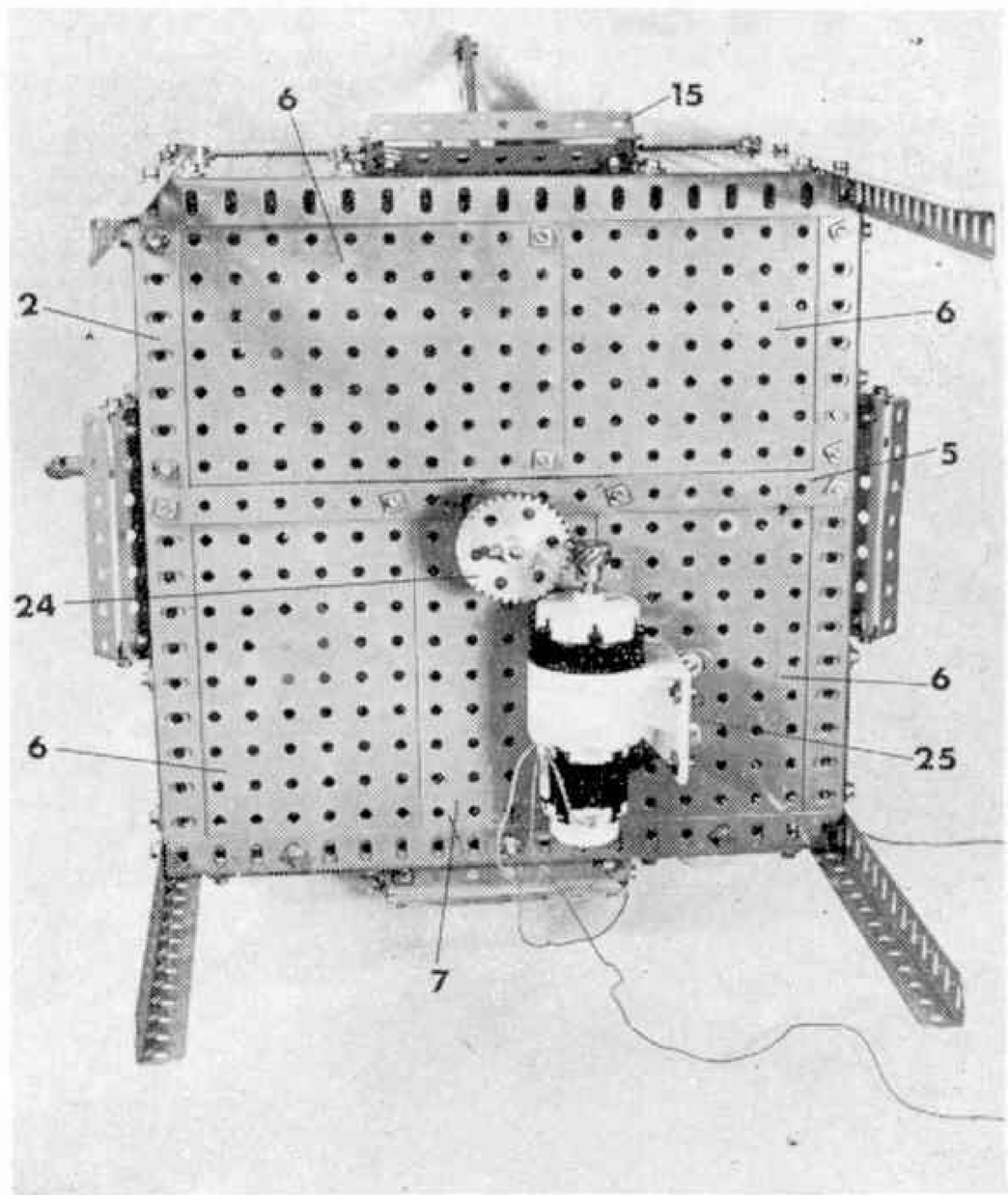
1—1a	1—14a	4—80c
4—1b	1—24a	8—103d
8—2a	232—37a	8—111a
12—3	208—37b	2—111c
8—5	60—38	4—133
1—6a	4—52a	1—137
4—8	4—53	1—146
8—8a	8—53a	8—189
8—9a	3—59	4—190a
1—9b	1—62b	8—191
8—10	1—70	1—211a
32—12	1—74	1—211b
		8—223

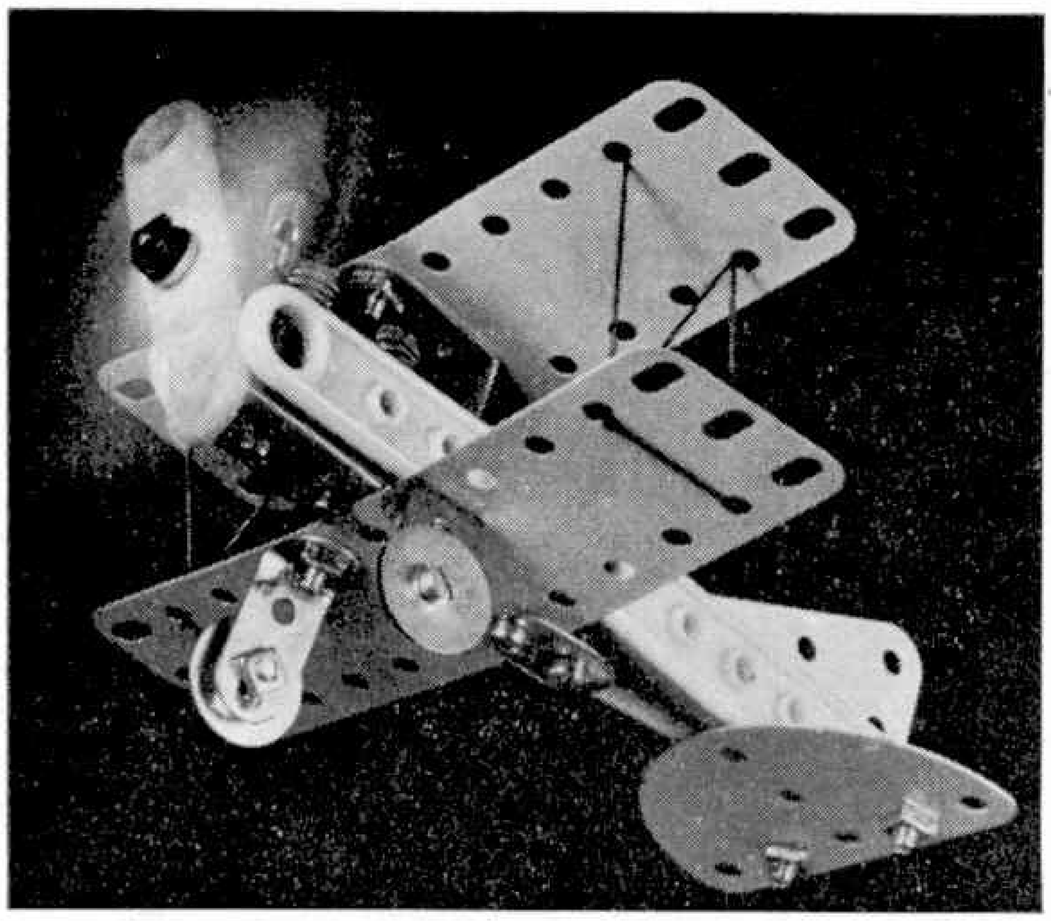
1 Power Drive Unit



In this general view of the Meccano Slot Machine, the strong exterior construction of the model is clearly shown. Note the "lip" on the outlet chutes.

An underside view of the model, with the Power Drive Unit in position. A pair of Bevel Gears transmits the drive from this Unit to the revolving Knocker.

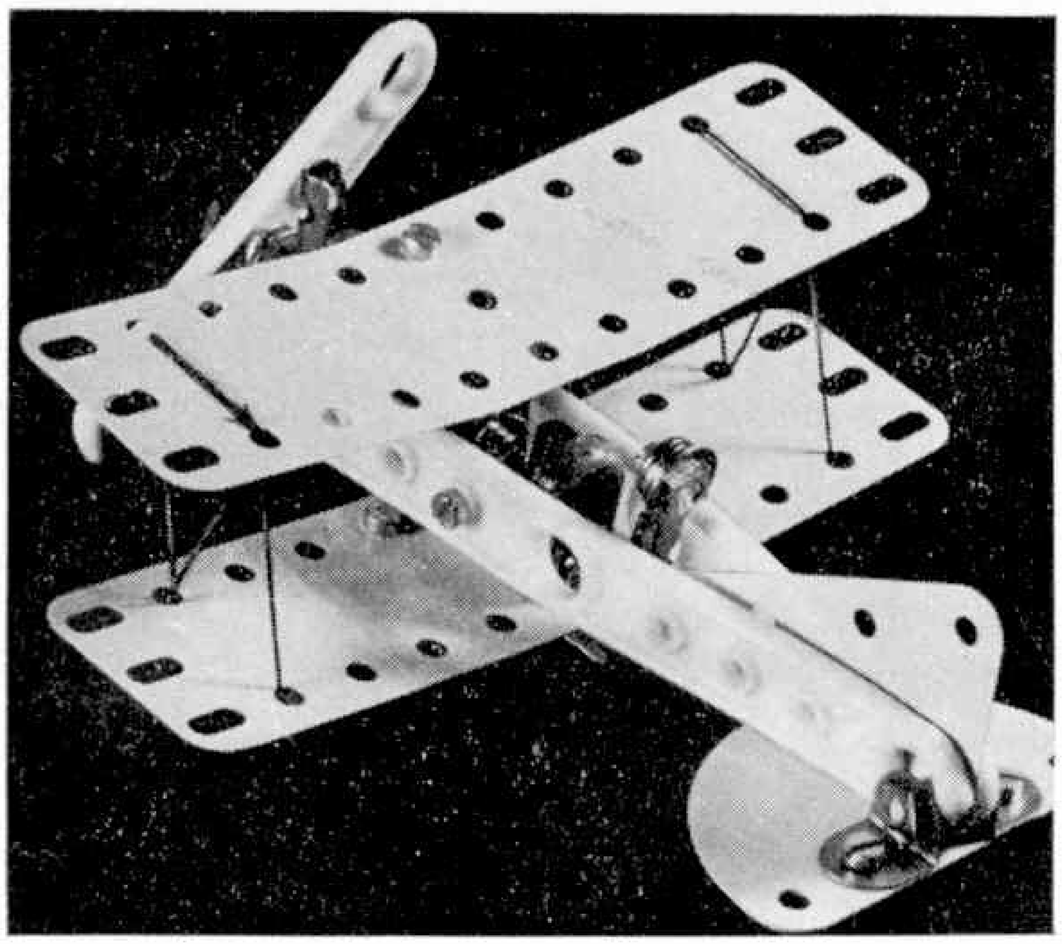




PLASTIC WITH METAL MECCANO

WORLD WAR ONE BIPLANE

by "SPANNER"



PLASTIC MECCANO, besides being a self-contained building system in its own right, is specially designed to enable it to be used with the standard Meccano system, produced in metal. We stressed this point last month and, this month, we prove the statement with the little Plastic-and-metal biplane, featured here. Although not based on any particular prototype, the model is very reminiscent of the aircraft used in the First World War.

Construction is quite straightforward, the fuselage consisting of two Plastic Meccano 3-hole Strips, attached by metal Angle Brackets to a Plastic Double Angle Strip. The $\frac{3}{8}$ in. Bolt securing the Angle Brackets also holds in place a third Angle Bracket, extended by a 1 × 1 in. Angle Bracket, and a $5\frac{1}{2} \times 1\frac{1}{2}$ in. Flexible Plate, the latter being beneath the Double Angle Strip. Another $5\frac{1}{2} \times 1\frac{1}{2}$ in. Flexible Plate is bolted to the upper lug of the 1 × 1 in. Angle Bracket.

Engine cylinders are now represented by two Plastic Meccano Bolts attached by $\frac{3}{4}$ in. standard Bolts to the inside of the Double Angle Strip. Strictly speaking, this method of assembly is a little unorthodox as the $\frac{3}{4}$ in. Bolts are passed through the Double Angle Strip and are then "screwed" into the *untapped* bore in the centre of the Plastic Bolts. They are, in effect, wedged in position, but the assembly is perfectly satisfactory provided you remember to use a $\frac{3}{4}$ in. Washer behind the head of the rear $\frac{3}{4}$ in. Bolt to enable it to be passed through the large hole in the centre of the Double Angle Strip.

Fixed by another $\frac{3}{4}$ in. Bolt to the forward lug of the Double Angle Strip is a Rod and Strip Connector and a Fishplate, the former behind the lug and the latter in front of it. Two Washers are placed on the shank of the Bolt, followed by a Plastic Meccano 2-hole Strip which is then lock-nutted in place to serve as the propeller. At the rear of the model, the three-hole Plastic Strips are brought together, with a metal $2\frac{1}{2} \times 1\frac{1}{2}$ in. Triangular Flexible Plate between them, and are joined by a $\frac{1}{2}$ in. Bolt, two Angle Brackets preventing the Bolt from slipping through the large holes in the Strips. A Semi-circular Plate is fixed to these Angle Brackets to act as a tailplane.

A "pilot" is now built up from a Rod and Strip Connector, mounted on a $\frac{3}{4}$ in. Bolt fixed to a Fishplate which is, in turn, fixed to the lower wing. Three Washers are bolted to the Rod and Strip Connector.

Finally, an undercarriage is provided by two 1 × $\frac{1}{2}$ in. Angle Brackets, to each of which a $\frac{3}{4}$ in. Washer is lock-nutted. The Angle Brackets are bolted to the lower wing, which, incidentally, together with the upper wing, is bent slightly in the centre so that the wings have dihedral or are angled upwards from the root to the wingtip.

PARTS REQUIRED

Standard Meccano

2—10	12—37b	1—111c
5—12	5—38	2—189
1—12a	3—38d	2—212
2—12b	4—111	1—214
20—37a	1—111a	1—221

Plastic Meccano

2—3-hole Strips	2—Bolts
1—2-hole Strip	1—Double Angle Strip

Really looking its part, this W.W.1 biplane model constructed from Plastic and Standard Meccano is just the job for "Blue Max" type dog fights.

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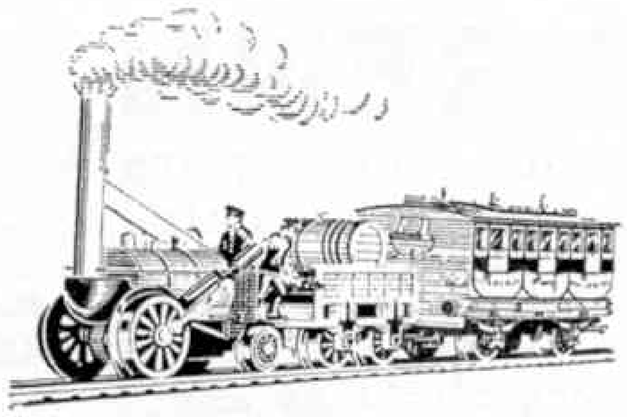

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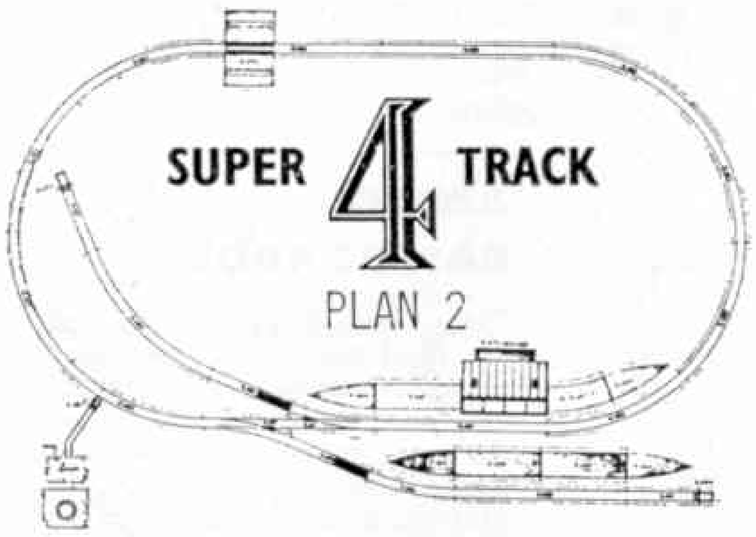

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by S.N. Beattie

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B327 Signal Box	4/-
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B342 House	4/-
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P863 Channel Ferry Car	10/8
P864 T.E.E. Coach	13/8
P865 T.E.E. Luggage Car	13/2
P454 Op. Mail Set	25/2
P660 Op. Hopper Wagon Set	12/8
P663 Op. Crane Wagon Set	58/3
P686 Girder Bridge	7/7
P681 Incline Pier Kit	3/7
P728 Engine Shed—2-rail	15/9
P7205 Goods Shed & Platform	19/2

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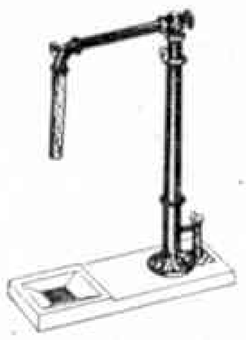

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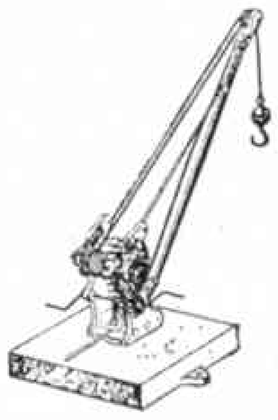

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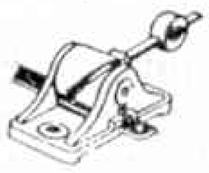

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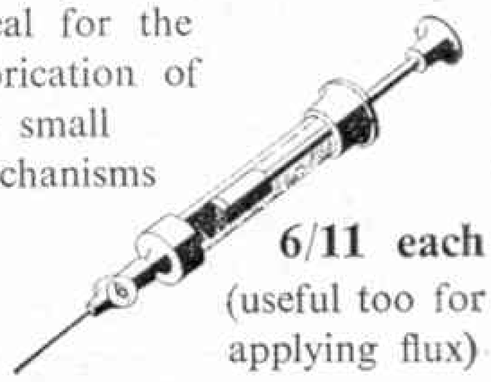

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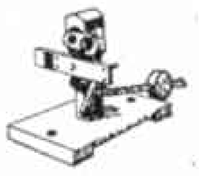

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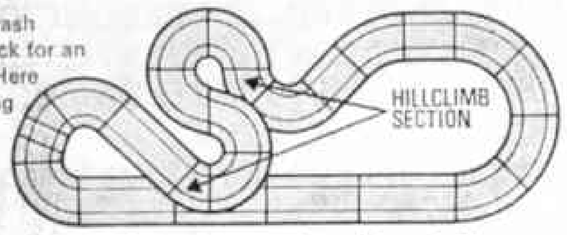

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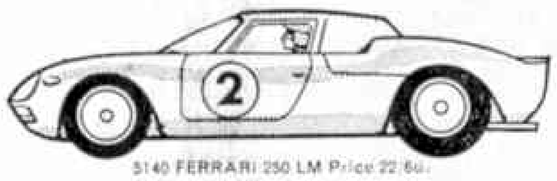

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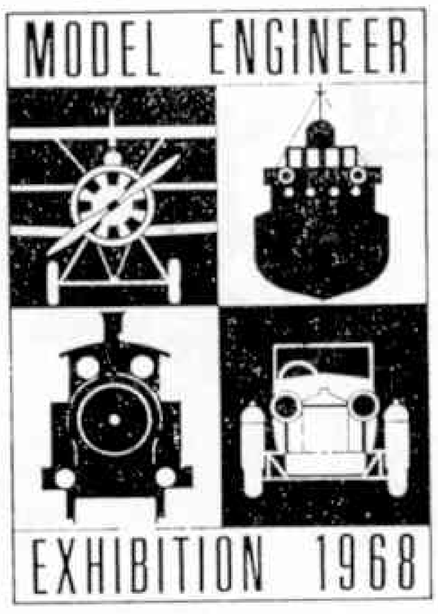

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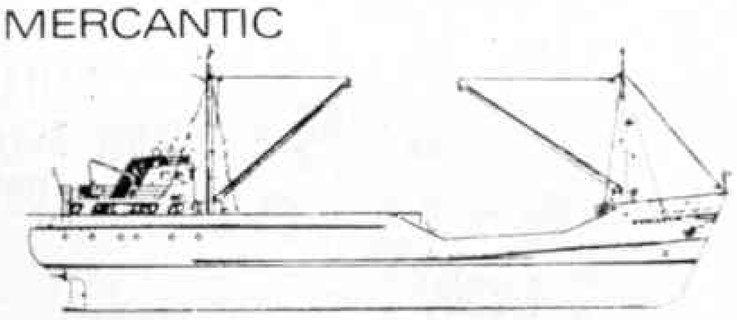

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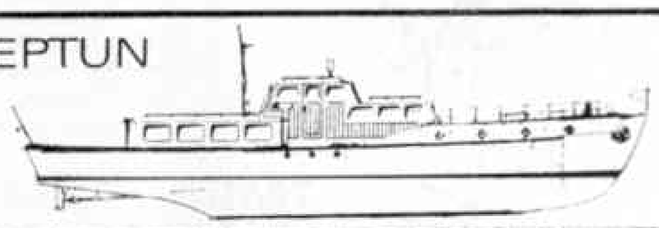

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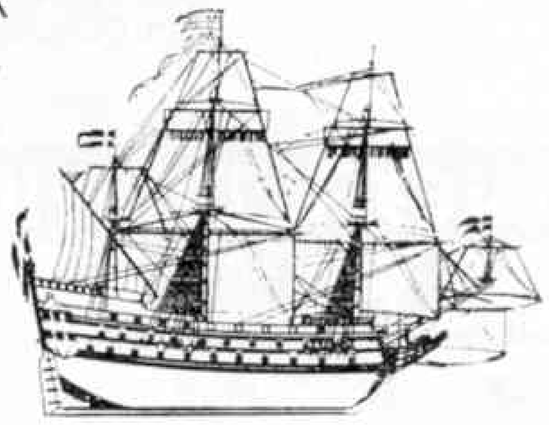

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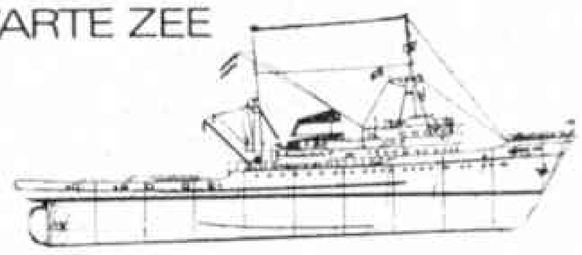

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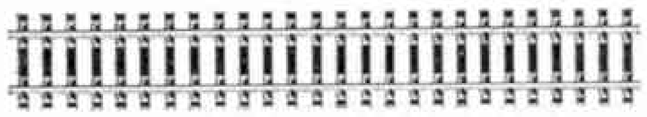

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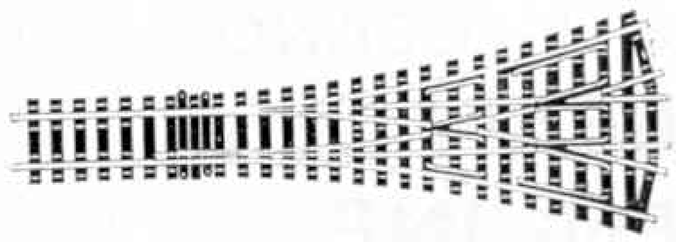

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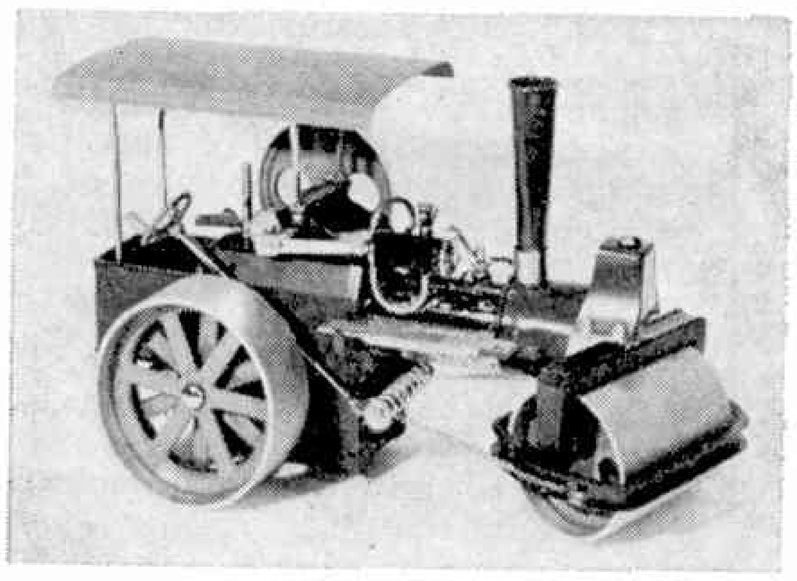

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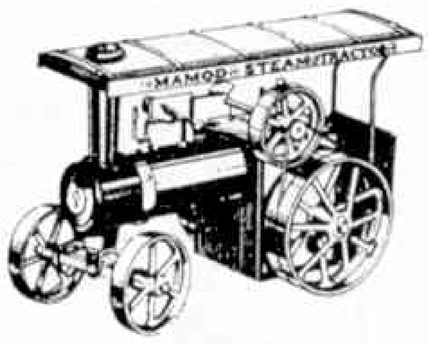

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207	Med: Tank	2/6
208	AA Gun M42	2/6
209	Carrier	2/6
210	Mortar Car.	2/6
211	Carrier	2/3
212	do	2/3
213	do	2/3
214	do	1/11
215	Ambulance	1/11
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STAMPS AND THE VIETNAM WAR

by James A. Mackay

IT IS a measure of the seriousness of the war in Vietnam that already far more stamps alluding to it have been issued throughout the world than there were to commemorate both the great world wars. Up to now no fewer than ten countries have issued stamps in connection with the war which has been raging off and on for more than twenty years now.

War between the Communist-controlled Viet Minh and the occupying French troops broke out late in 1945 after the Japanese had surrendered at the end of the Second World War. The struggle between the French and the Viet Minh was brought to a close nine years later after the Foreign Legion's heroic but futile stand in the beleaguered town of Dien Bien Phu. Three stamps were issued by North Vietnam that year to celebrate the victory. By the Geneva Agreement, signed in July 1954, the French withdrew from Indochina (as it was then known) north of the Seventeenth Parallel. This area became established as the Democratic Republic of Vietnam (North Vietnam). South of the line a republic was set up in 1955 under Ngo Dinh Diem whose dictatorship lasted until November 1963 when he was overthrown and executed.

After the French evacuated South Vietnam the Communists began to infiltrate from the North. These guerrillas, or Viet Cong, allied to the National Liberation Front, have attempted to convert the South to Communism and it is this civil war which has developed into the present-day war involving the Americans, South Koreans, Australians and New Zealanders who regard it as a grave threat to the peace and stability of South-East Asia and possibly the entire Pacific area as well. Of South Vietnam's allies only South Korea has so far issued stamps publicising the war effort. A stamp showing doves on the map of Vietnam symbolised Korean aid to the South in 1965 and last year another stamp showed Korean troops in action. North Korea, which supports the Communists, issued a stamp in 1964 showing a Viet Cong ambush. Communist China has released several sets in honour of the "Vietnam People's Struggle," while Nationalist China produced three stamps as long ago as 1954 in aid of Chinese refugees from North Vietnam. These stamps showed refugees fleeing across a pontoon bridge—not unlike a series issued by South Vietnam about the same time depicting refugees from the North crossing the River.

STAMPS

In spite of the divisions between Communism and the free world, few countries have as yet identified themselves with the war by issuing stamps. Among the Communist states, Cuba released a set of six stamps in 1964 campaigning for the unification of Vietnam, Russia issued a stamp in 1966 inscribed "Hands off Vietnam" and showing a crowd demonstrating against U.S. aggression, and East Germany overprinted a stamp to raise funds for North Vietnam, following this in 1966 by a charity stamp showing a militiawoman with the slogan "Vietnam is Invincible." Among the "uncommitted" nations only the African republic of Mali has issued a stamp, ambiguously asserting the solidarity of the workers of Mali with the workers of South Vietnam.

The majority of stamps connected with the war have come from Vietnam itself. South Vietnam has issued stamps in honour of the Strategic Villages, the Communal Defence Force (Home Guard) and the Army. North Vietnam's stamps have ranged from propaganda for the re-unification of the country to issues celebrating the 500th, 1,000th and 1,500th American aircraft destroyed in action.

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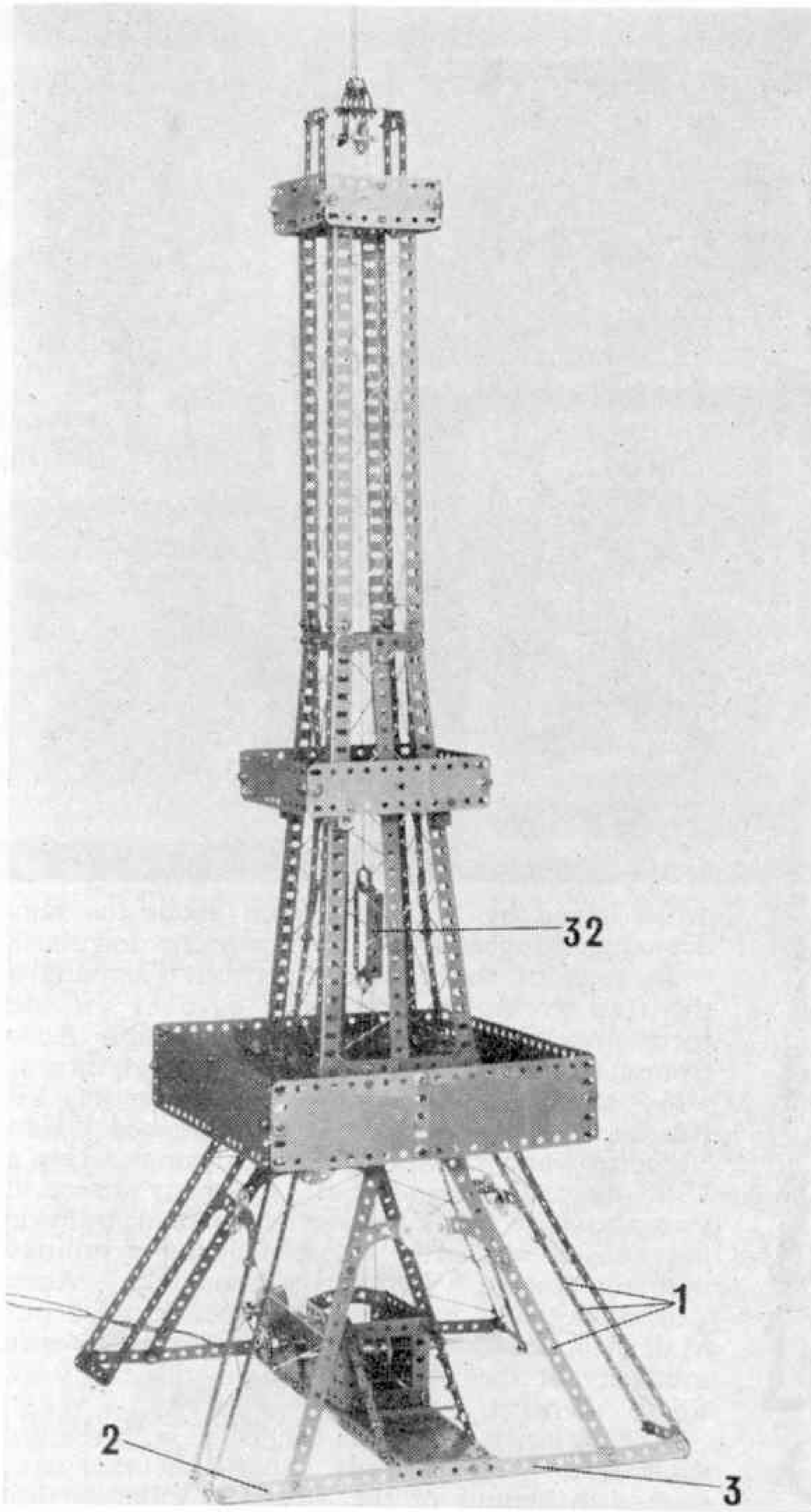


Towering High by Spanner

Meccano looks at Paris

You, too, can construct this replica of the famous Eiffel Tower in simplified form using the parts in a No. 7 Meccano Outfit with the addition of an Emebo Motor.

FOR OUR Outfit model this month we have been casting a practised eye at Paris—that cosmopolitan city of artists, laughter and culture. On the international scene, however, Paris is perhaps most widely known for its soaring engineering wonder of steel, the Eiffel Tower, and it is precisely this that we have been looking at. Because of its latticework girder construction the Eiffel Tower makes an ideal Meccano subject and so, to cut a long story short, we modelled it, in a simplified form, using the parts in Outfit No. 7.

Construction of the major part of the model is pretty obvious from the illustrations. Basically, the tower can be split into three sections, the lower section consisting of four legs, each built up from three 12½ in. Strips 1. In each leg, the 12½ in. Strips are connected by two 2½ in. Strips 2, while the legs, themselves, are connected in pairs by two 9½ in. compound strips 3, each obtained from two 5½ in. Strips. Higher up the section, the inside 12½ in. Strips of the legs at each side are joined by two 2½ in. Stepped Curved Strips bolted to a 6-hole Bush Wheel 4.

The centre section of the tower is built up from four 12½ in. Angle Girders 5 joined, at the top, by four 2½ in. Strips 6 and, at the bottom, by four 4½ in. compound strips 7, each obtained from a 3½ in. and a 1½ in. Strip. Bolted between Strips 6 and 7 are four 12½ in. compound strips 8, each obtained from three 5½ in. Strips. Strips 1 in the lower section of the tower are fixed to compound strip 7 and Angle Girders 5.

To obtain the upper section of the tower, Girders 5 are simply extended, with the use of Fishplates, by further 12½ in. Angle Girders 9. At the top, these latter Angle Girders are joined by two 3½ × ½ in. Double Angle Strips and two 2½ in. Strips, the Double Angle Strips being placed opposite each other as also are the 2½ in. Strips. Note that the Double Angle Strips must protrude a distance of one hole at each side to provide anchoring points for two 3½ × 1½ in. compound flexible plates 10, built up from 2½ × 1½ in. Flexible Plates. Another two 3½ × 1½ in. compound plates 11 are now each built up from one 2½ × 1½ in. Flexible Plate and one 2½ × 1½ in. Plastic Plate, after which they are attached to the tower by Angle Brackets fixed to the lugs of the Double Angle Strips.

At the top of the model, a pair of 3½ in. Strips 12 is bolted to each Double Angle Strip, then the pairs are connected by a 2½ × 1½ in. Flanged Plate, topped by two Trunnions 13. Fixed in the apex holes of these Trunnions is a ½ in. Bolt carrying six Washers and a Rod and Strip Connector in which a 2 in. Rod is mounted. Bolted to the underside of the Flanged Plate is a 1 × 1½ in. Double Bracket in the lugs of which a 1½ in. Rod is held by Spring Clips. Free on this Rod is a 1 in. loose Pulley 14.

The two intermediate floors of the real Tower are represented in our model by Flexible Plates. In the case of the smaller floor, four 5½ × 1½ in. Flexible Plates 15 are joined together by Angle Brackets to form a square and are attached to Girders 5 by Reversed Angle Brackets fixed to Double Brackets. For the larger floor, another square is formed from four 9½ × 2½ in. compound flexible plates 16, also joined by Angle Brackets. Two of these compound plates are each built up from two 5½ × 2½ in. Flexible Plates, while the other two each consist of one 5½ × 2½ in. and one 4½ × 2½ in. Flexible Plate. The "square" is fixed to the tower by four 2½ × ½ in. Double Angle Strips 17.

Next we come to the lift with its control mechanism. This arrangement, as fitted to our Meccano model, is

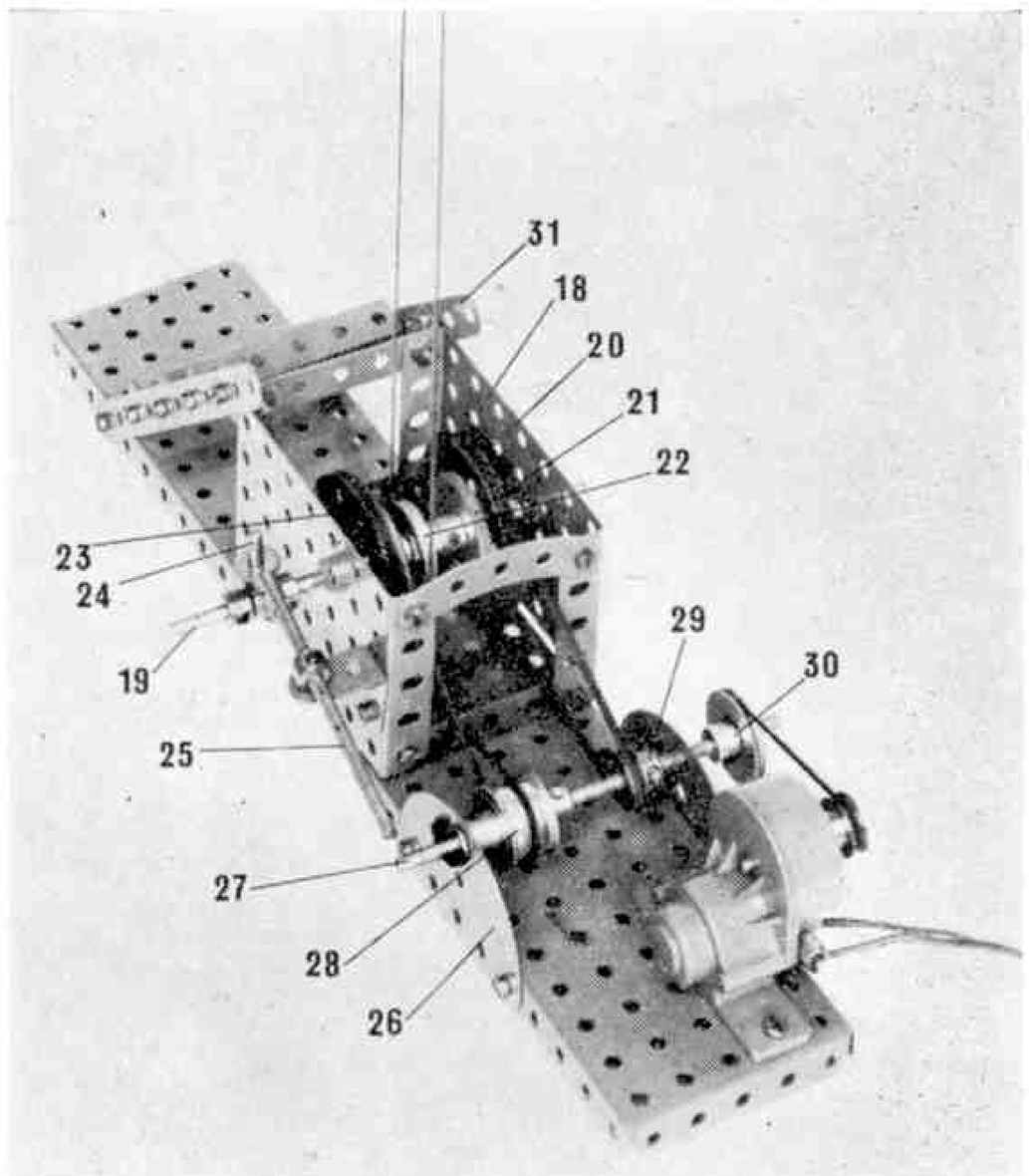
of course meant only as a representation of the real thing, being considerably removed from it. Two $5\frac{1}{2} \times 2\frac{1}{2}$ in. Flanged Plates, bolted to compound strips 3, are connected by a $3\frac{1}{2} \times 2\frac{1}{2}$ in. Flanged Plate to which two simliar Flanged Plates 18 are fixed. Journalled in these last Flanged Plates is a 5 in. Rod 19 carrying, in order between the Plates, a free Collar, a free 2 in. Pulley 20, a fixed 1 in. Pulley with Rubber Ring 21, a fixed 1 in. Pulley 22 on its own, another fixed 1 in. Pulley with Rubber Ring, a second free 2 in. Pulley 23 and another free Collar. Mounted on the Rod, outside the Plates, are a further three Collars, the first and last fixed and the centre one free, but carrying a Threaded Pin 24 in one threaded bore. The two free

PARTS REQUIRED

12—1	2—20b	8—90a
18—2	4—22	2—111a
6—3	1—22a	6—111c
2—4	1—23a	1—115
14—5	2—24	4—125
4—6a	2—24c	2—126
8—8	3—35	2—155
8—10	190—37a	1—186
4—11	186—37b	2—186a
1—11a	34—38	6—188
18—12	1—46	4—189
1—12a	10—48a	2—191
1—15	2—48b	6—192
1—15a	1—51	2—194
1—16	2—52	2—212
1—17	3—53	2—214
1—18a	6—59	1 Emebo Motor
2—20a	1—90	

Collars inside the Plates act as spacers, while Pulleys 21 serve as clutches.

Rod 19 should be able to slide about $\frac{1}{4}$ in. in its bearings and the parts it carries must be so arranged that, when the Rod is pushed inwards, the Rubber Ring on Pulley 21 makes contact with the face of Pulley 20 and, when the Rod is pulled outwards, the

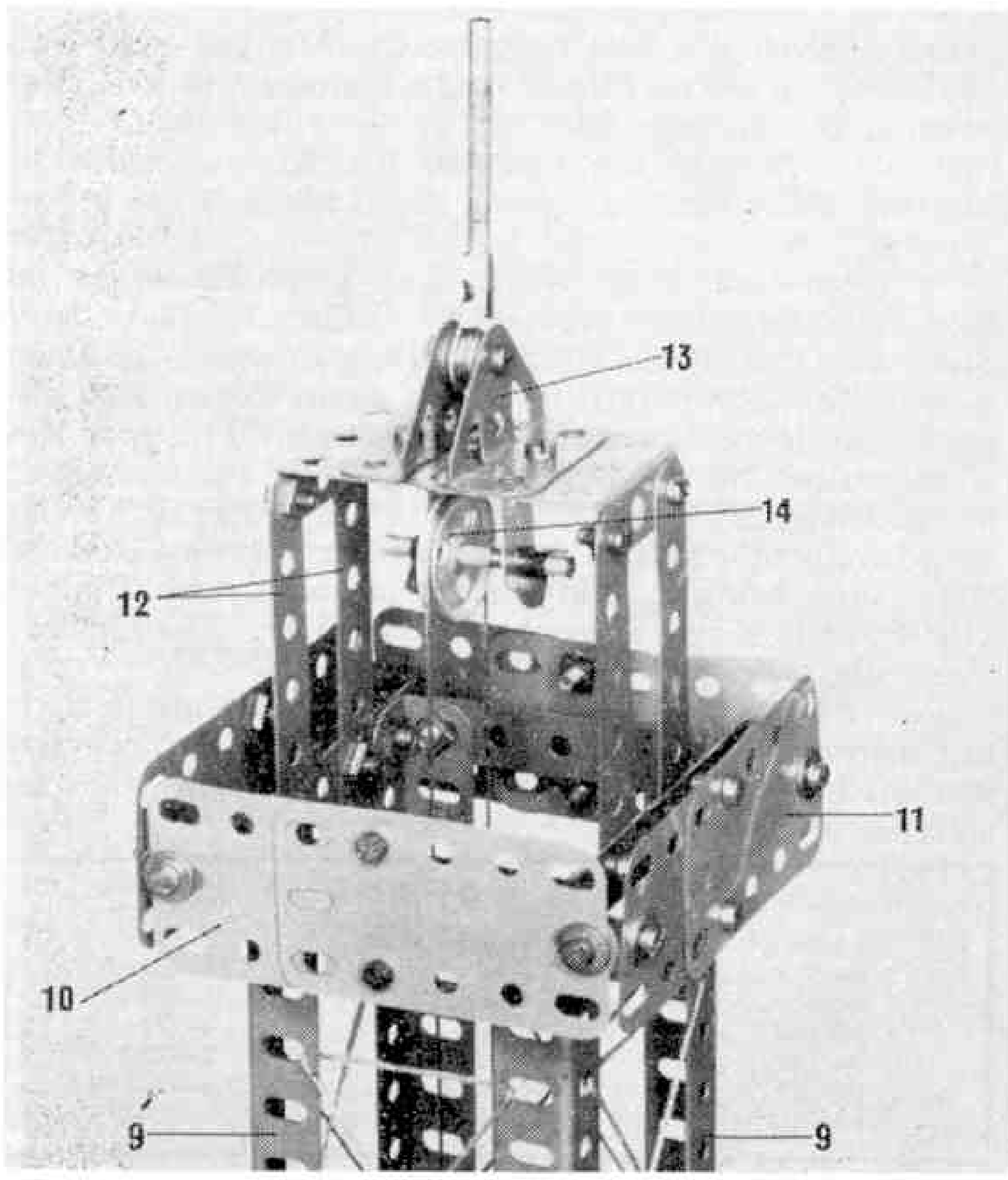


The control mechanism with the Emebo Motor and drive for the lift, which is suspended on a single continuous cord.

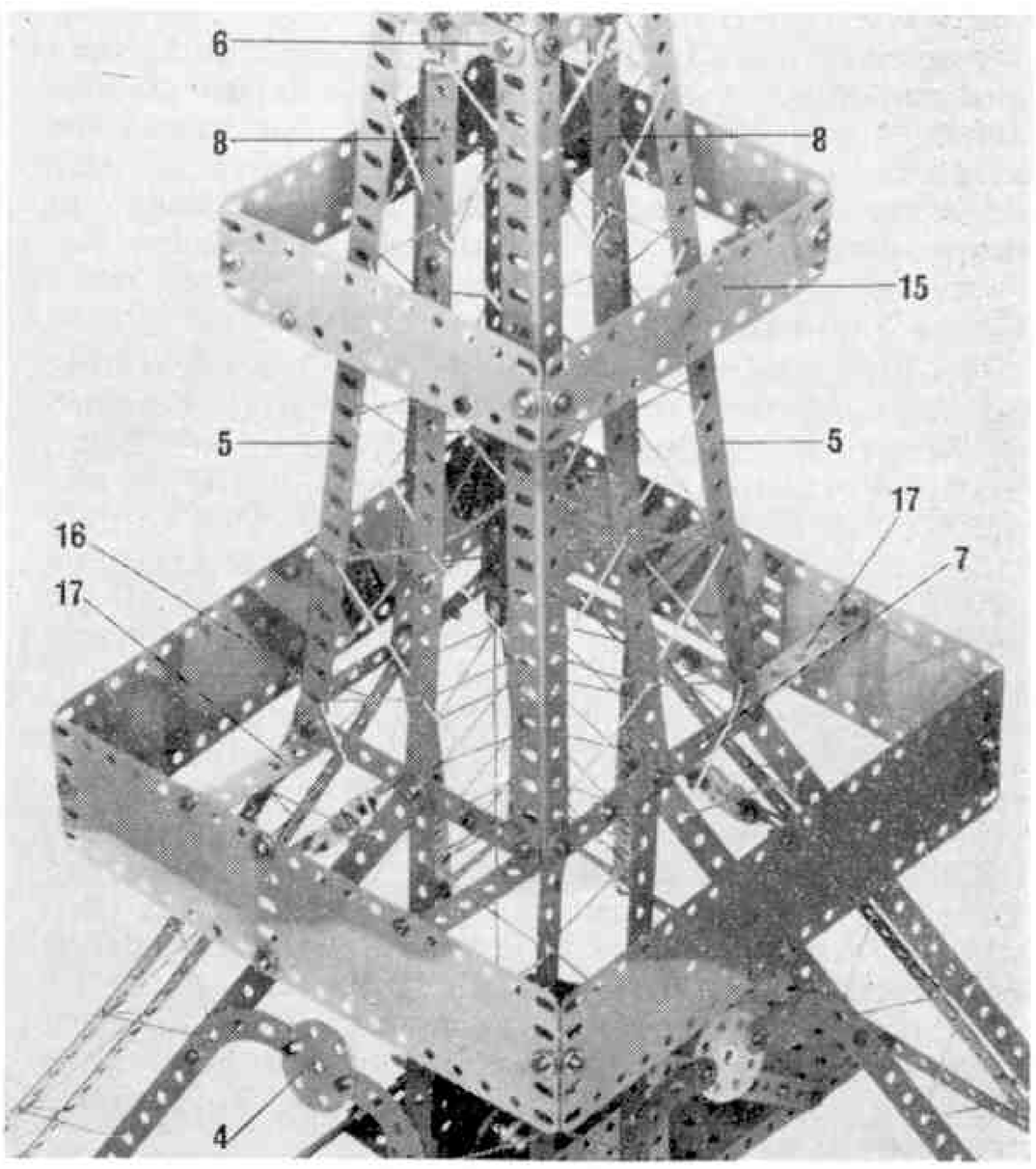
Ring on the other Pulley makes contact with the face of Pulley 23. Movement of the Rod is controlled by a Rod and Strip Connector on a $3\frac{1}{2}$ in. Rod 25 which is held in a Collar bolted to a 1×1 in. Angle Bracket

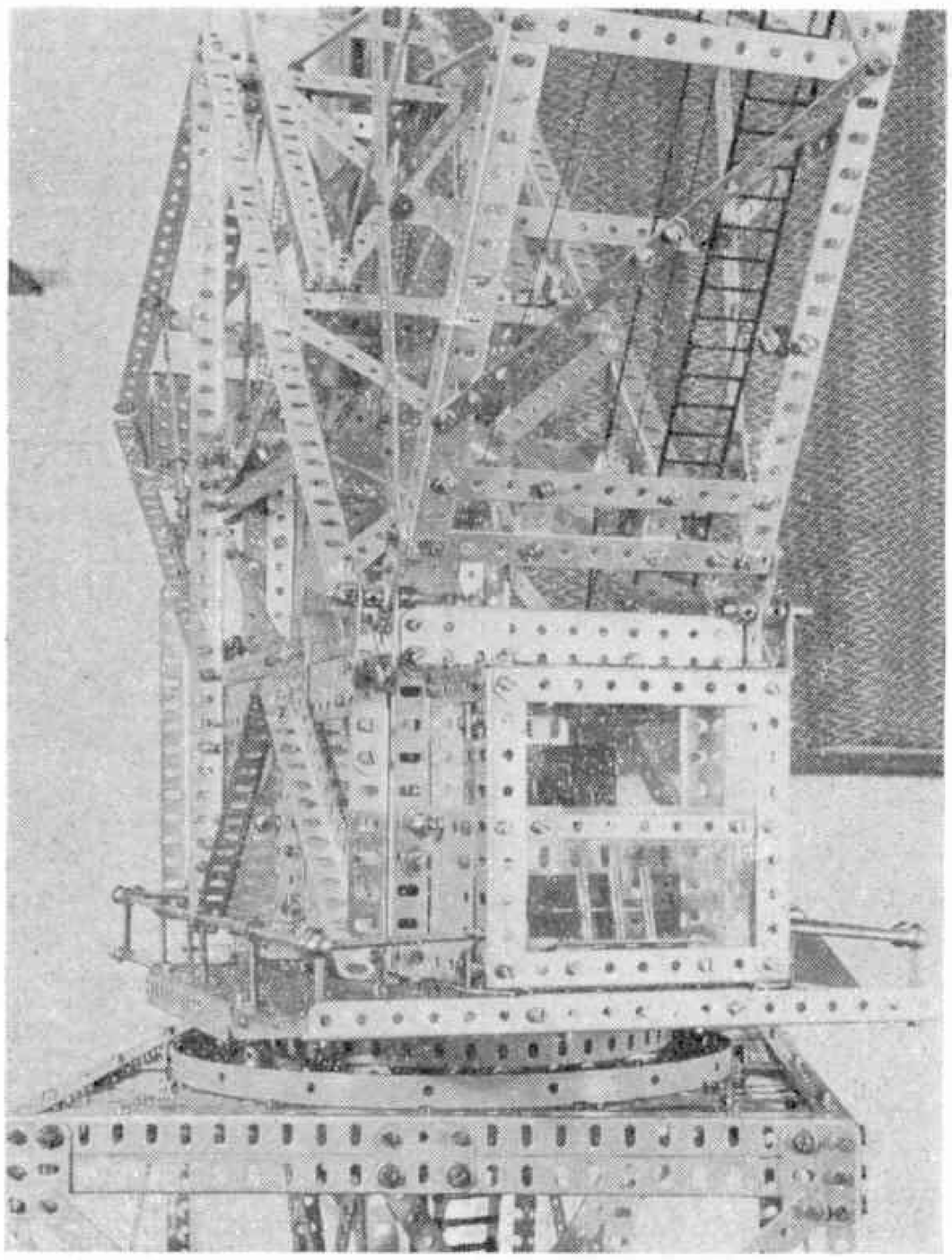
Continued on page 97

The top of Alexandre Gustave Eiffel's famous landmark; perhaps not a perfect model, but nonetheless an easily identified example.



A close-up view of the second section of the tower, including the two intermediate floors; note the latticework simulated with string.





AMONG THE MODEL-BUILDERS with Spanner

Eric Taylor, a member of the Midlands Meccano Guild, designed and built this Giant Level-Luffing Crane. Some idea of the complex nature of Eric's model can be obtained from this close-up view of the cab area.

I AM writing this, my first Among the Model-Builders article for the new *Meccano Magazine*, with strong feelings of gratitude to Meccano model-building readers everywhere. As you may know, one of the factors resulting in the resurrection of the magazine was the fantastic support offered by readers when the old *Meccano Magazine* finished last July. We received literally thousands of postcards and letters pledging support and, although there is no way of definitely proving it, I am convinced that it was the Meccano followers who were most active in this direction. I am pleased to be able to say "thanks" in the very publication you helped to bring back !

Crane Twin-drive Unit

To get down to more solid matters, I am featuring here an interesting twin-drive Crane Gearbox designed by Mr. F. C. Dolman of Winshill, Burton-on-Trent, Staffs. Fitted to a model, the unit enables the jib and the hook of a crane or dragline to be operated entirely independently of each other from a constant-running motor. Also it gives forward/reverse control of the separate winding drums without using the reversing switch of the motor, and even provides a fool-proof, non-slip brake for the jib and hook when disengaged.

In his letter to me, Mr. Dolman explained his reasons for producing his gear box. "Up to a few years ago," he wrote, "I was never very satisfied with the mechanical arrangement of the various Cranes and Draglines I had constructed. The difficulty was that, whilst it was fairly easy to arrange for different drives for propulsion, rotation and the operation of the jib and hook to be taken from one motor, it was a different matter when it came to, say, raising the hook while lowering the jib or raising and lowering both simultaneously as well as independently."

From experience, Mr. Dolman realised what was required, but, he said, "I could find no precedent in my collection of M.M.s and books. Although automatic brakes, reversing gears and twin drives have all been featured, I could find no instance of the three features having been incorporated in one mechanism." So, to cut a long story short, Mr. Dolman designed the not only small and simple but very efficient unit described below.

The framework consists of two $2\frac{1}{2} \times 1\frac{1}{2}$ in. Flanged Plates placed $2\frac{1}{2}$ in. apart and joined by two $4\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strips 1 and two $4\frac{1}{2}$ in. Strips 2. The lugs of the Double Angle Strips are connected by two $2\frac{1}{2}$ in. Strips 3, while bolted to each Flanged Plate are two 1 in. Triangular Plates, the apex holes of which are joined by a 2 in. Strip 4.

Journalled in one Strip 3 and in the Flanged Plates is the input shaft, the length of which, of course, depends entirely on the model incorporating the unit. Fixed on the shaft, between the Flanged Plates, are two $\frac{1}{2}$ in. Pinions ($\frac{1}{4}$ in. face) 5 and a $\frac{1}{2}$ in. Pinion ($\frac{3}{4}$ in. face) 6. Two $\frac{1}{2}$ in. Pinions ($\frac{1}{2}$ in. face) 7 and 8 are now fixed, one each on two $3\frac{1}{2}$ in. Rods, mounted in Strips 4 and held by Collars.

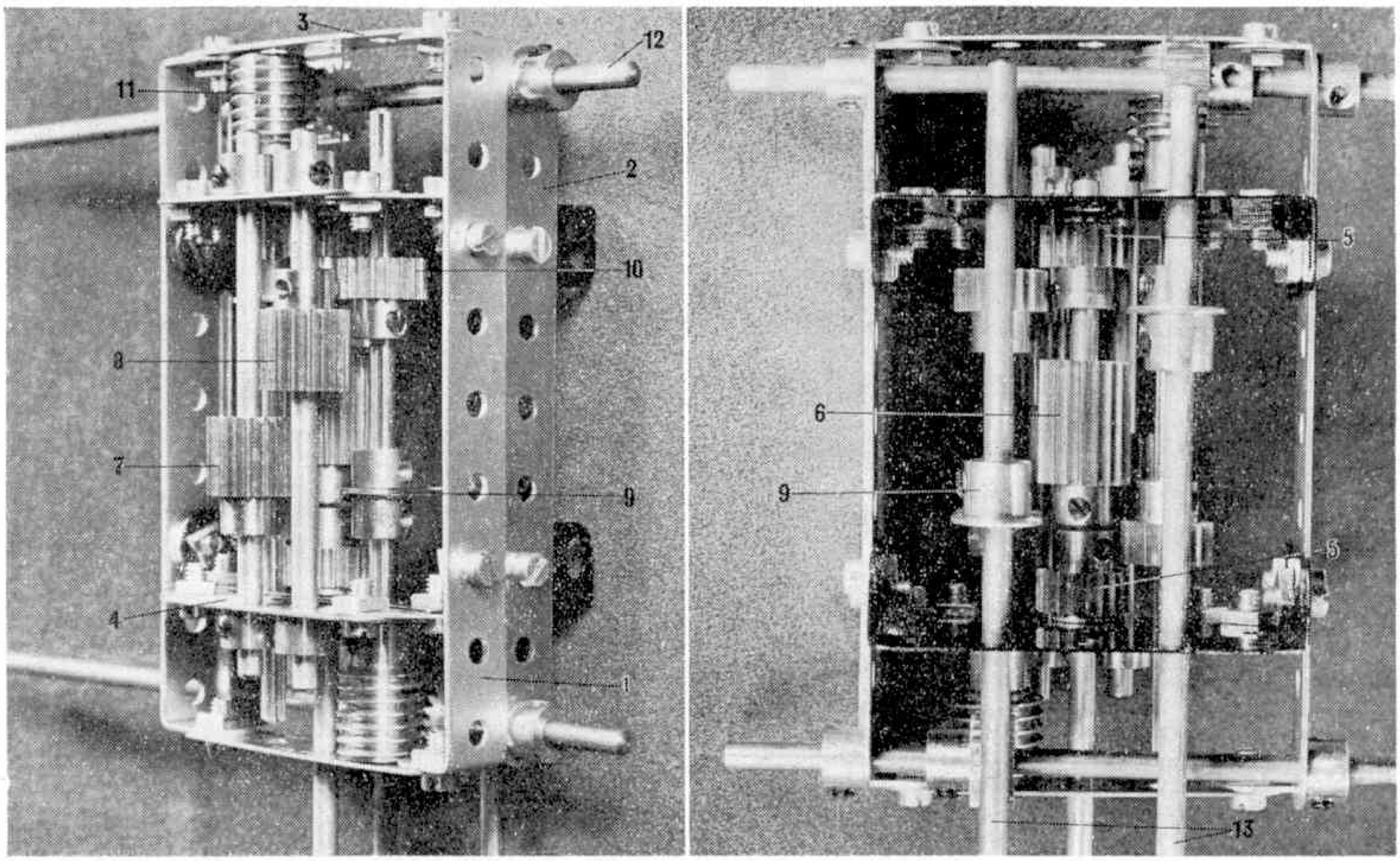
Next, two Keyway Rods are mounted in the Flanged Plates, on a level with and one each side of the input shaft. Fixed on each of these Rods are two Collars, with a Crank 9 between them, and a $\frac{1}{2}$ in. Pinion ($\frac{1}{4}$ in. face) 10. Mounted on the end of one of the Rods, between one Strip 3 and the adjacent Flanged Plate is a Worm 11, a second Worm being mounted in a similar position on the opposite end of the other Rod. Note that these Worms are held on the Keyway Rods by Keyway Bolts, thus allowing the Rods to slide in the Worms.

In mesh with each Worm is a $\frac{1}{2}$ in. Pinion ($\frac{1}{4}$ in. face) on a long Rod 12, held by Collars in the ends of Strip 2. One of the Crane winding drums is built on to this Rod, the length of which again depends on the particular model incorporating the unit. The gear box is controlled by another two long Rods 13, journalled in the Flanged Plates and fixed in the bosses of Cranks 9. Movement of Rods 13 causes the Keyway Rods to slide, thus bringing Pinions 10 in mesh with Pinions 5 or Pinions 7 and 8, as the case may be. *The Keyway Rods must slide freely in Worms 11.*

The following Parts List refers to the unit exactly as illustrated. As some Rods vary according to requirements, however, these have been marked with an asterisk (*).

PARTS REQUIRED

2—2a	6—26	2—51
2—5	2—26a	12—59
2—6	1—26b	2—62
2—13d*	2—32	4—77
2—14*	20—37a	2—230
1—15*	20—37b	2—231
2—16	2—48c	



This extremely well-thought-out, twin-drive unit for Meccano Cranes, designed and constructed by F. C. Dolman, illustrates the versatility of the Meccano system.

Midlands Meccano Guild

In "Workbench" last month the inaugural meeting of the Midlands Meccano Guild was reported, a highlight of which was the ceremonial cutting of a christening cake dedicated to the new *Meccano Magazine.* To avoid any possible misunderstanding, however, I should like to stress that the cake was by no means the only exhibit. Rather, a whole host of large and expertly produced Meccano models was shown and described by their respective builders. These included a Dragline built by Mr. Ernie Chandler, a traction engine from Mr. Arthur Locke, a Vertical Steam Engine from Mr. David Goodman, a Breakdown Lorry from Mr. Roger Lloyd and two Tramcars from the Guild President, Mr. Esmond Roden. Among other things, Mr. Alf Hindmarsh showed a most unusual display of aircraft, built from the old Meccano Aeroplane Constructor sets produced in the 1930's, while mechanisms were represented by a multi-speed Gear Box built by Mr. Bob Faulkner. Three first-rate Clocks timed the meeting, two from Mr. Pat Briggs and one from Mr. Ron Fail who has himself contributed to the M.M. in the past.

All models were received with enthusiasm by members, but as Mr. B. N. Love, the Secretary, said, "The focus of the meeting was centred on a magnificent Giant Level-luffing Crane designed and built by Mr. Eric Taylor. It was an absolute masterpiece! Eric claimed that the model was not original as a similar one appeared in a French Meccano Magazine some years ago, but, as the illustration was about the size of two postage stamps, the credit still goes to Eric for a wonderful model."

You will see from the accompanying picture of Mr. Taylor's model how perfectly justified are Mr. Love's comments. The model really is a masterpiece and stands more than six feet high.

Towering High—continued from page 95

fixed to one Flanged Plate 18. The Rod and Strip Connector engages with Threaded Pin 24.

Bolted to one of the $5\frac{1}{2} \times 2\frac{1}{2}$ in. Flanged Plates is an Emebo Motor and two Semi-circular Plates 26. The latter provide bearings for a $4\frac{1}{2}$ in. Rod 27 carrying two $\frac{3}{4}$ in. Flanged Wheels 28, face to face, a $\frac{1}{2}$ in. fixed Pulley 29 and a 1 in. fixed Pulley 30. A Spring Clip holds the Rod in place. Pulley 30 is connected to a $\frac{1}{2}$ in. Pulley on the Motor output shaft by a Driving Band, another Driving Band joining Pulleys 29 and 20. A third *crossed* Driving Band joins Flanged Wheels 28 and Pulley 23.

A set of steps is provided by two $5\frac{1}{2}$ in. Strips 31 connected by four $2\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strips, as shown.

A simple lift cage is now built up from one $2\frac{1}{2} \times 1$ in. Double Angle Strips 32 and two $2\frac{1}{2} \times 1$ in. Double Angle Strips together with two Angle Brackets, one at the top and one at the bottom of the cage. A long length of Cord is tied to the upper Angle Bracket, is taken over Pulley 14, is brought down and is threaded through the free holes in Double Angle Strip 32. From here, it is taken around Pulley 22, is brought up and is then tied to the lower Angle Bracket in the lift.

Finally, the latticework effect is given to the model by threading Cord between all the main Strips and Girders in "criss-cross" and zig-zag patterns as shown. Actually, although Meccano Cord does suffice for this job, a more realistic effect is obtained by using fairly thick string.

MECCANO TRACTOR AND TRAILER by Spanner. AN OUTFIT " NO. 3 PLUS " MODEL

Why not build yourself a complete set of farm vehicles and try your hand at model farming? Just the ideal model to start off with is this easy to construct Tractor and Trailer, essential equipment for any farmyard scene. Not just a static, the model really works with a Magic Motor.

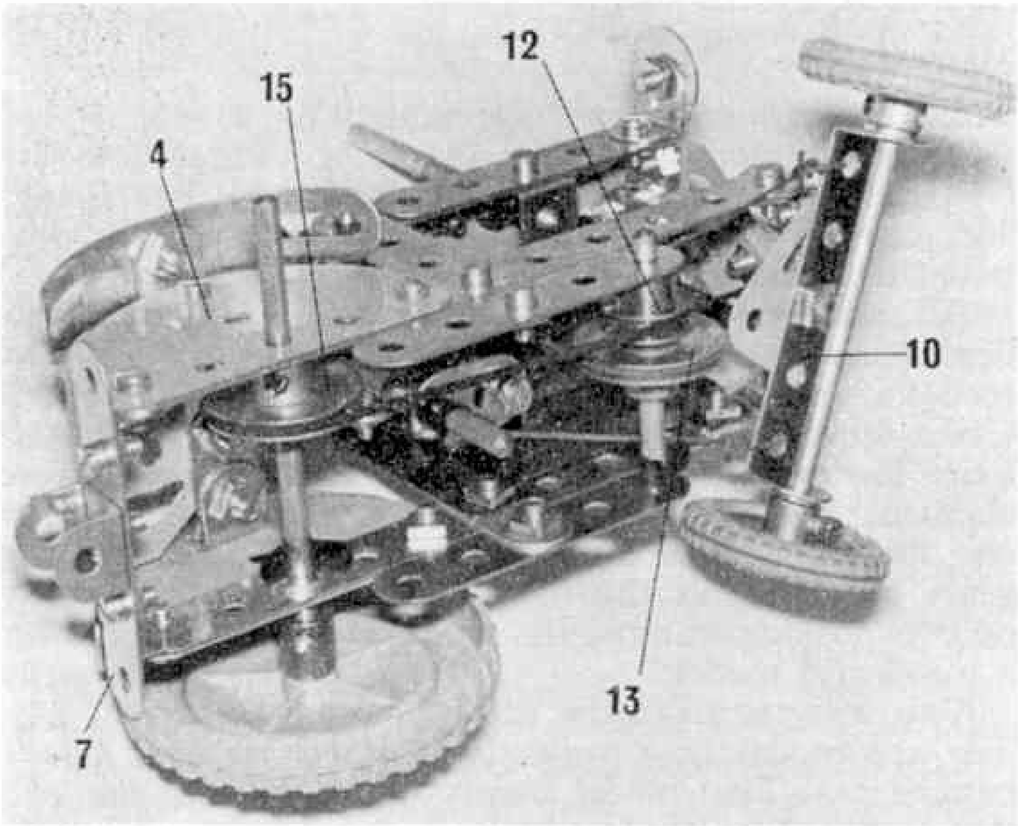
INSPIRATION FOR the simple but most effective Meccano Tractor and Trailer featured here came from the September 1952 issue of *Meccano Magazine*. Except for two 2½ in. Road Wheels, Outfit No. 3 contains all the parts used in the construction of the model itself, although the power plant—a Meccano Magic Clockwork Motor—is not, of course, included.

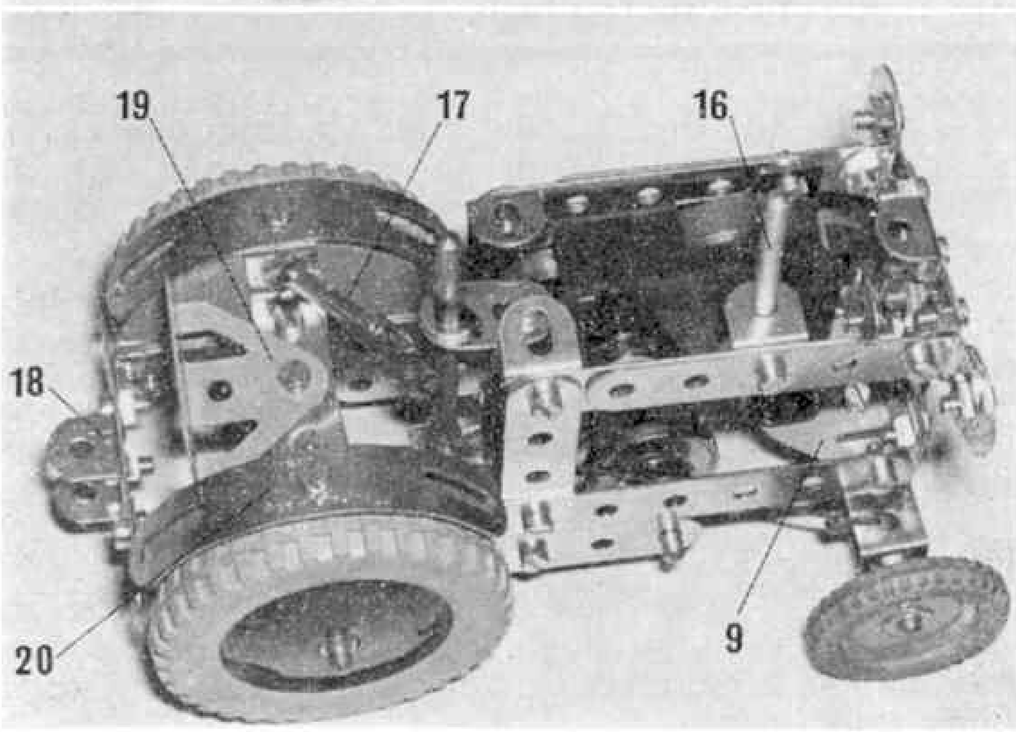
Before describing the model, however, I feel moved to make some general mention of past Meccano Magazines. In Liverpool we have bound volumes of the Magazine going back in an almost unbroken line to the earliest issues and, as you may have gathered, I like to browse through these when I have a few spare moments (which isn't too often!). I never cease to be amazed at the staggering number of new models that have been featured over the years—literally thousands, based on every prototype imaginable—yet perhaps the most astonishing realisation of all is that by far the great majority of them can be built today with the current system.

When you think about it, this a living tribute to the inventor of Meccano, the late Mr. Frank Hornby. The M.M. first appeared just over 50 years ago, by which time Meccano was an already established system, and the fact that the early models can still be reproduced indicates how little the system has changed over the years. It means, in other words, that Mr. Hornby designed and produced the almost perfect miniature engineering system right from the very beginning! There have, of course, been minor changes from time to time, such as the introduction of new components or the withdrawal of the occasional obsolete part, but there have never been any radical alterations to completely change the basic character of the system. In short, Meccano is as versatile now as it ever was and, in fact, is selling better than it has ever done in the past.

But to return now to our Tractor and Trailer, I would like to deal first with the Tractor section. A 5½ in. Strip 1, a 2½ in. Strip 2 and a 3 in. compound strip 3, obtained from two 2½ in. Strips, are bolted to one side of a Magic Motor. Strips 1 and 3 project forward a distance of one hole in front of the Motor, while Strip 2 projects a similar distance below Strip 1. A Semi-circular Plate 4 is fixed to Strip 1, as shown.

Another, identical, Strip-and-Plate arrangement is now built up and attached to the first construction by a 1½ × ½ in. Double Angle Strip 5 and two 2½ × 1½ in. Flexible Plates 6, overlapped four holes and fixed to the sides by Angle Brackets. Note that the Bolts securing the Double Angle Strip also hold two Angle Brackets in position. A ¾ in. Washer is fixed to each of these to represent headlamps. Strips 1 at the back are





At left, top, an underside view of the tractor showing the driving band. Lower left, the tractor with the engine cover removed to show the Magic Motor.

At right, the completed Tractor and Trailer would look most realistic in a farmyard setting. A clockwork Magic Motor provides the power.

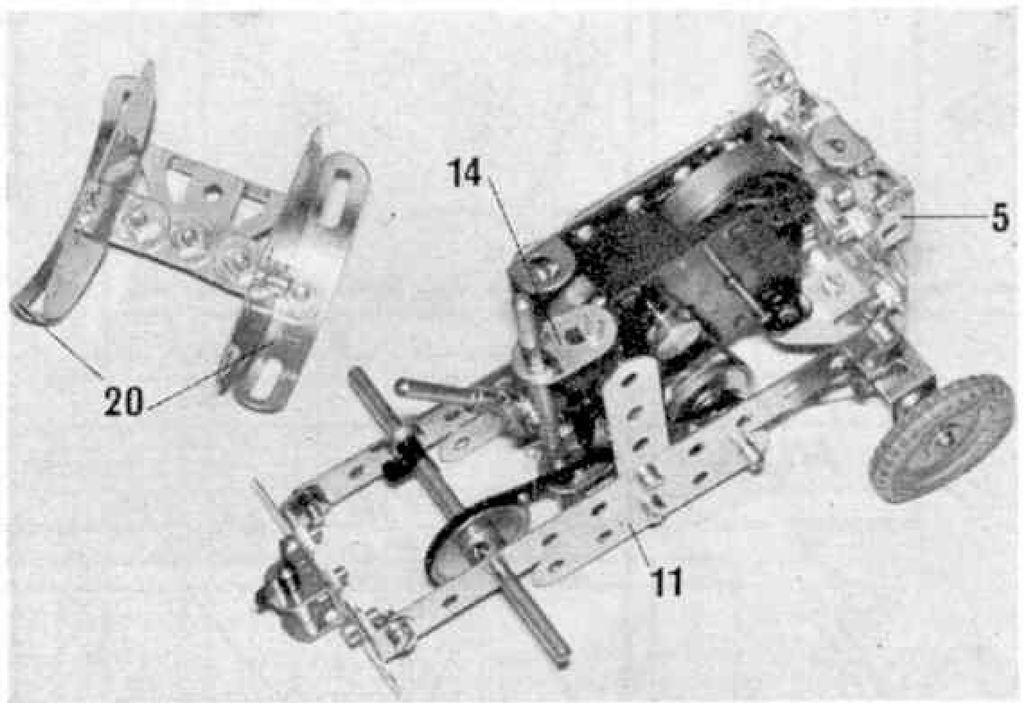
joined by a $2\frac{1}{2}$ in. Strip 7, attached by Angle Brackets.

Bolted to Double Angle Strip 5 at the front is a Flat Trunnion 8, extended by another Flat Trunnion which is, in turn, extended by an ordinary Trunnion 9, also fixed to Strips 1 by Angle Brackets. Lock-nutted to Trunnion 9 is a $2\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strip 10, the lugs of which will later form the bearings for the front axle.

Now bolted to the end of each Strip 2 is a $2\frac{1}{2}$ in. Strip 11 in which is journalled a $2\frac{1}{2}$ in. Rod carrying a $\frac{1}{2}$ in. fixed Pulley 12 and a 1 in. fixed Pulley 13. These will be used to transfer the drive to the rear wheels but, before completing the drive, the steering system should be added. Two Fishplates 14 are bolted, one to each of the rear right-hand anchoring points of the Motor, to provide bearings for a $3\frac{1}{2}$ in. Rod, held in place by Spring Clips and carrying an 8-hole Bush Wheel at its upper end. Mounted towards the lower end of the Rod, but above the lower Fishplate is a Cord Anchoring Spring. A length of Cord is now tied to one end of Double Angle Strip 10, is wrapped several times around the Rod, one of the turns passing through the loop of the Cord Anchoring Spring, and is then tied to the other end of Double Angle Strip 10. Once this has been done, care having been taken to see that the Cord remains as tight as possible, a $3\frac{1}{2}$ in. Rod is journalled in the Double Angle Strip to be held in place by 1 in. fixed Pulleys with Motor Tyres.

The Drive can now be completed. Pulley 13 is connected by a Driving Band to the Pulley on the Motor output shaft, while Pulley 12 is connected by another Driving Band to a 1 in. Pulley 15, fixed on a $3\frac{1}{2}$ in. Rod held by Spring Clips in Semi-circular Plates 4. The two $2\frac{1}{2}$ in. Road Wheels mentioned earlier are mounted on the ends of this Rod.

To complete the Tractor, a few minor operations still need to be carried out. Firstly, an exhaust pipe is represented by a 2 in. Rod 16 extended by a Rod Connector. It is held by a Spring Clip in the lugs of a Double Bracket bolted to the inside of compound strip 3. Secondly, the Motor brake lever is extended by a $1\frac{1}{2}$ in. Rod 17, fixed in a Rod and Strip Connector. Next a towing bracket is provided by a Double Bracket 18, bolted to Strip 7 and, lastly, a seat is obtained from a Trunnion 19, fixed to a $1\frac{1}{2}$ in. Strip. This Strip is, in turn, fixed to Semi-circular Plates 4 by two Reversed Angle Brackets, to the free lugs of which two Formed Slotted Strips 20 are bolted to act as mudguards.



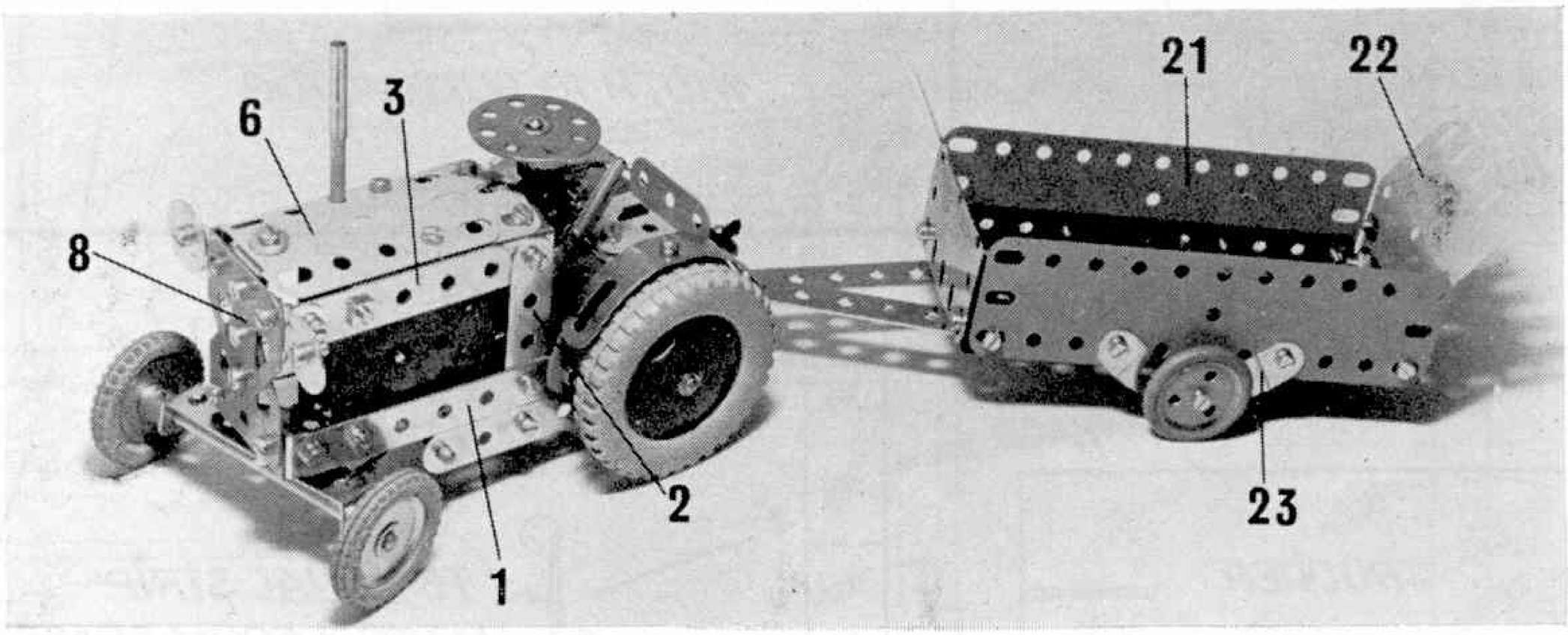
The tractor, partly assembled, clearly shows the drive band linking the Motor output shaft and back axle.

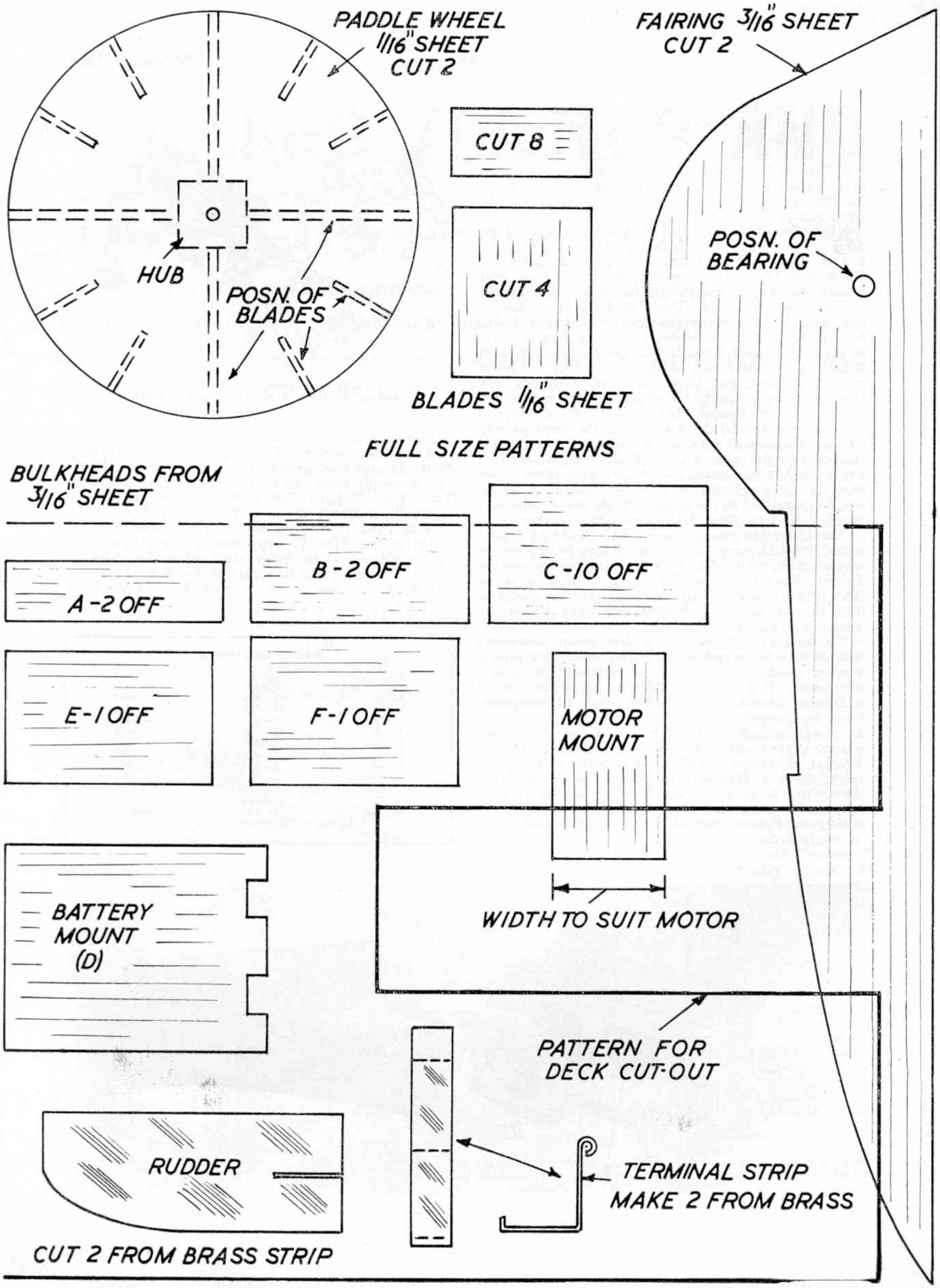
Turning now to the Trailer, this presents no problems whatsoever. Two $5\frac{1}{2} \times 1\frac{1}{2}$ in. Flexible Plates 21 and two shaped $2\frac{1}{2} \times 2\frac{1}{2}$ in. Flexible Plates 22 are simply bolted to a $5\frac{1}{2} \times 2\frac{1}{2}$ in. Flanged Plate. Two $2\frac{1}{2}$ in. Stepped Curved Strips 23 are added, one each side, and a 1 in. loose Pulley is lock-nutted to each of these for the wheels. A $\frac{1}{2}$ in. loose Pulley is bolted to rear Plate 22, representing a rear light, then two converging $5\frac{1}{2}$ in. Strips are fixed to the underside of the Flanged Plate to form the tow-bar. Finally a locking pin is provided by a 1 in. Rod topped by a Spring Clip.

PARTS REQUIRED

4—2	1—24	2—126a
9—5	7—35	2—142c
4—10	63—37a	2—155
2—11	57—37b	1—176
9—12	7—38	1—186
3—16	2—38d	1—186a
2—17	1—40	2—188
1—18a	1—48a	2—189
1—18b	1—52	2—190
4—22	2—90a	1—212
2—22a	3—111c	1—213
1—23	2—125	2—214
1—23a	2—126	2—215

1 Magic Clockwork Motor




PADDLE WHEEL
1/16" SHEET
CUT 2
HUB
POSN. OF
BLADES
CUT 8
CUT 4
BLADES 1/16" SHEET
FAIRING 3/16" SHEET
CUT 2
POSN. OF
BEARING
FULL SIZE PATTERNS
BULKHEADS FROM
3/16" SHEET
A -2 OFF
B -2 OFF
C -10 OFF
E-1 OFF
F-1 OFF
MOTOR
MOUNT
WIDTH TO SUIT MOTOR
BATTERY
MOUNT
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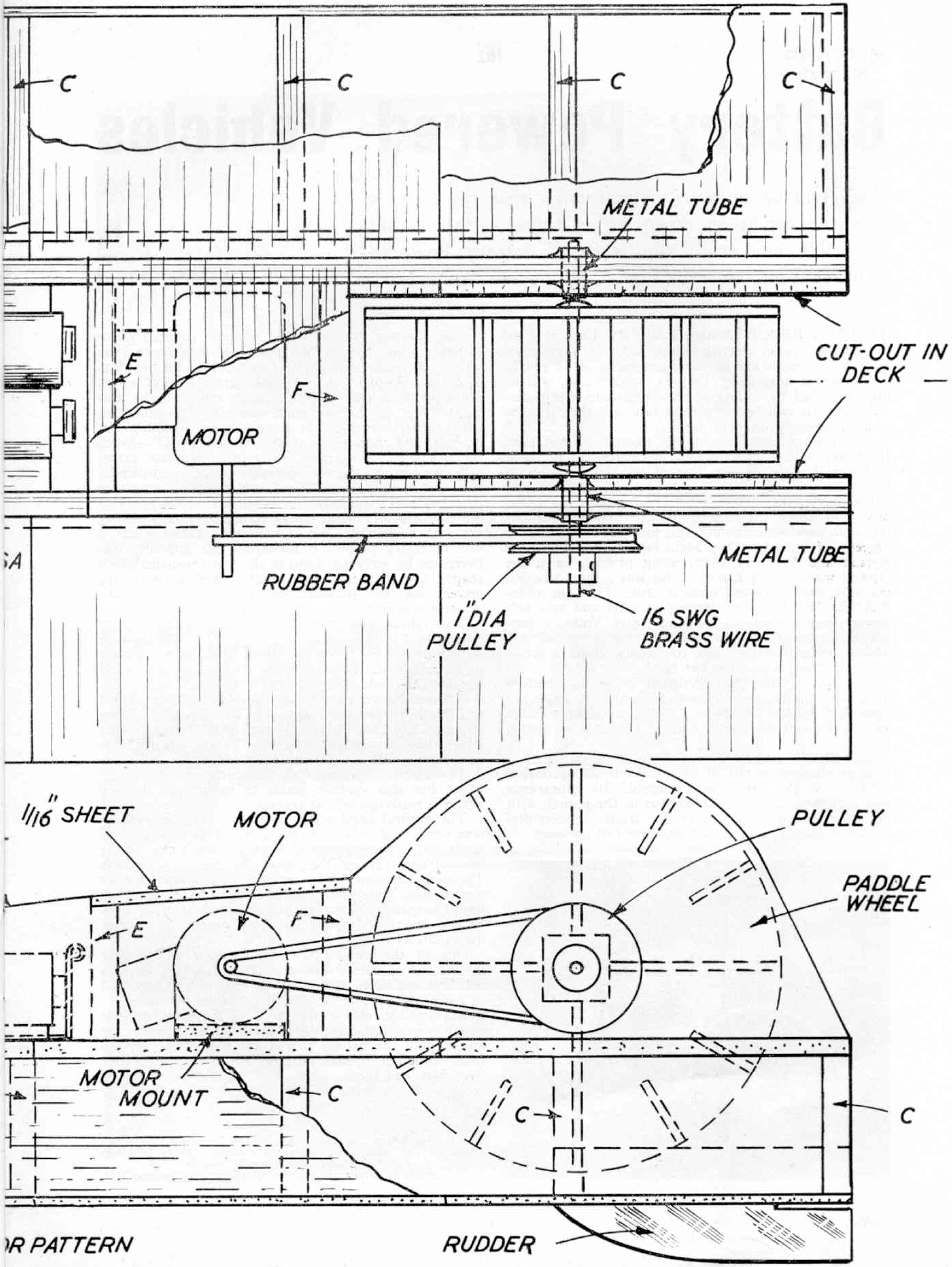
PATTERN FOR
DECK CUT-OUT
RUDDER
TERMINAL STRIP
MAKE 2 FROM BRASS
CUT 2 FROM BRASS STRIP


C
C
C
C
METAL TUBE
CUT-OUT IN DECK
E
F
MOTOR
METAL TUBE
RUBBER BAND
1" DIA PULLEY
16 SWG BRASS WIRE
1/16" SHEET
MOTOR
PULLEY
PADDLE WHEEL
E
F
MOTOR MOUNT
C
C
C
RUDDER

Battery Powered Vehicles

Many will be under the impression that the Battery powered car is an invention of today; this is not so. We can trace the start of Battery Powered Vehicles back to 1882, long before we were born

by A. W. Neal

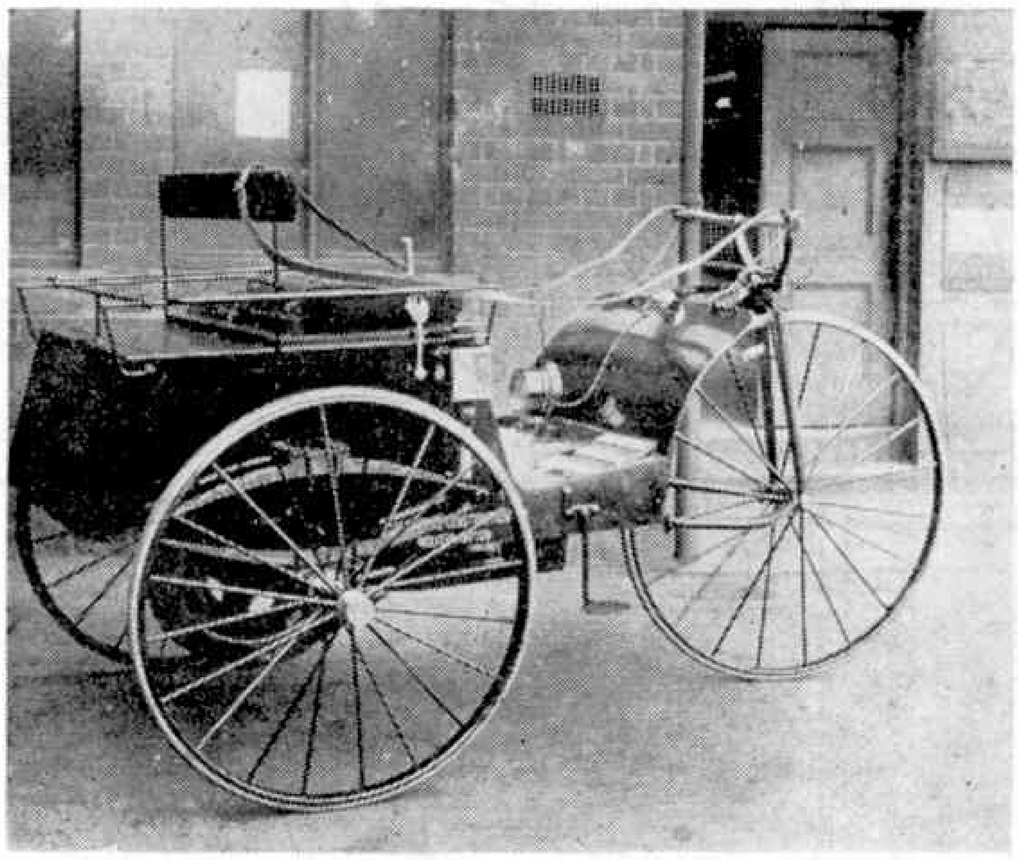
RECENT REPORTS suggest that it is likely that we shall have an electric battery car with a range of 120 to 250 miles and a maximum speed of 50 m.p.h. by spring of next year. Owners, we are told, will be able to refuel by calling at service stations where discharged cells will be replaced in less time than it takes to fill an ordinary car with petrol.

The greatest drawback of the electric car has been the heavy battery and the limited capacity of it. Now it is revealed that a new kind of cell—zinc-air—is to be used.

Of course, the idea of a battery car is by no means new, and about the turn of the century various enthusiasts were working upon this problem with different degrees of success. One such vehicle was made by Ayrton and Perry in 1882, using primary cells, the type of which is not known. This was a three-wheeled machine, but it proved unsuccessful. Then, in 1886, Radcliffe Ward's effort carried 28 cells and was belt driven from a motor. Sometime later Volks, a persistent pioneer of electric traction, built a 16 cell cart which, under suitable road conditions, could reach a speed of about nine miles per hour.

By 1889 Plante had designed a storage battery using lead plates, and this was subsequently improved upon by various inventors. Thus, a more suitable source of electrical energy became available in mobile form.

The Electric Motive Power Company Limited made a double-deck omnibus in 1894, and it was probably tried out in the streets of Liverpool. Its appearance was similar to the horse-drawn bus of the period, with the driver perched high up on the front. It soon disappeared from the scene and was heard of no more.



The battery driven dog cart, made by the Electric Construction Company Ltd. with horse-reins for steering. Made in about 1897 this cart could attain 12 m.p.h.
Photo Courtesy, the Electric Construction Company Ltd.

The Electric Construction Company Limited seems to have made a battery operated dog-cart in about 1897 which, curiously enough, had horse-reins for steering. With two people "up" it could attain a speed of 12 miles per hour on the flat. A press report of the time said: "Mr. A. B. Blackman, who was responsible for the vehicle, was fond of horses, used to follow the hounds, and rode to the works on horseback"—hence the steering arrangement of reins. Another extraordinary feature was the operation of the controller by means of a sliding seat. It was said by an old employee (E.C.C.) who frequently drove the car that "it operated quite satisfactory when manoeuvring by simply sliding the seat backwards, but not so well ahead when it was necessary to pull it forward. The difficulty was overcome by screwing down to the seat a wooden block shaped like half an egg, which rested between the driver's legs and provided the necessary lock between driver and seat."

The vehicle was entered for a 1,000 guineas prize offered by "The Engineer" in 1896 for a race between self-propelled road vehicles from the Crystal Palace to Birmingham. There were 72 entries, but since only five took the field, the race was abandoned.

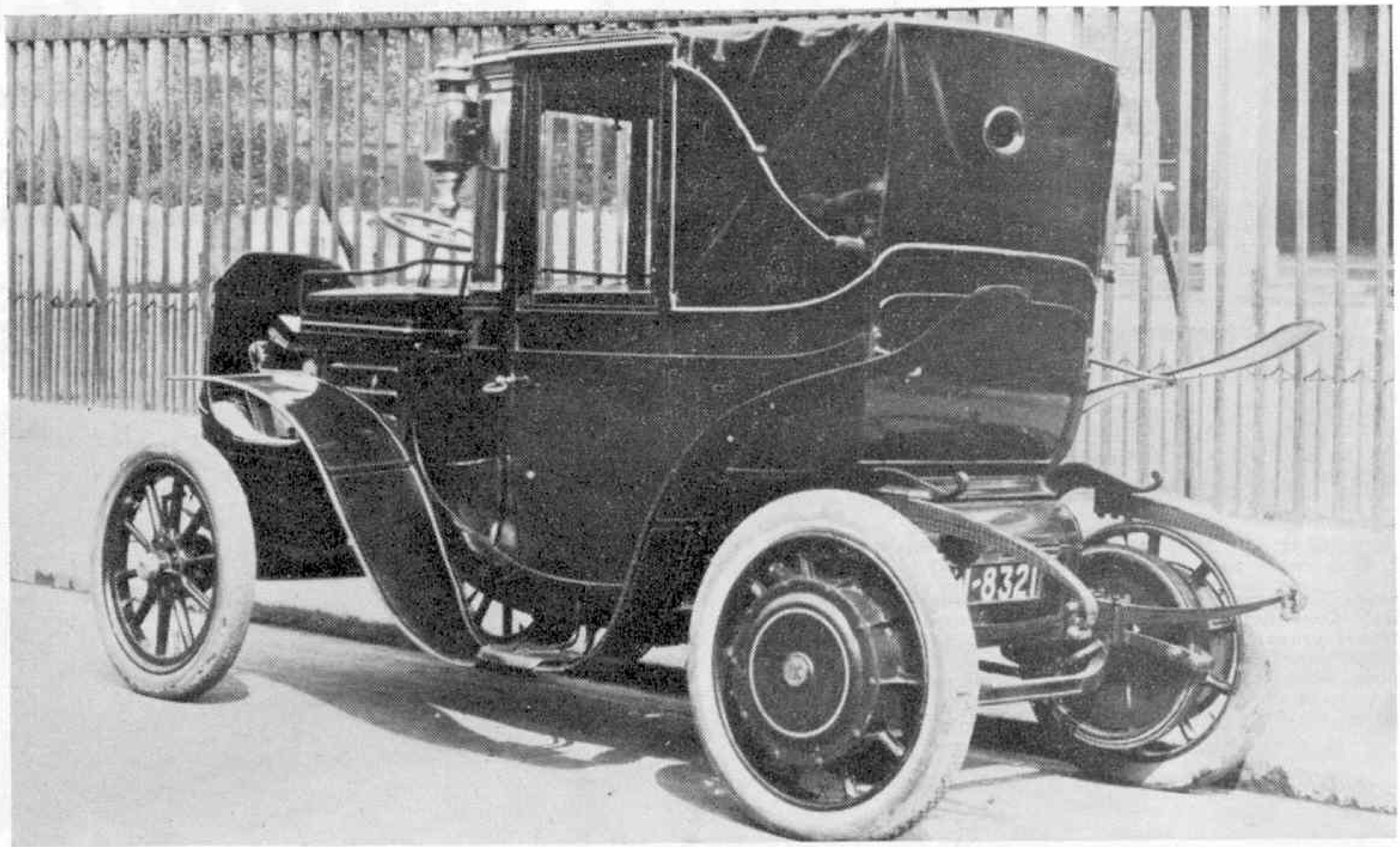
Thomas Parker next became involved in this subject and his car also was made by The Electrical Construction Co. Ltd. It was not until 1896 that the "Red Flag" law disappeared, otherwise Parker was ready to go forward with his vehicle years before.

The London Electric Cab Company was formed in 1897, but this venture seems to have been doomed before it really got off the ground.

The natural application of battery vehicles was for taxi work, and they took the form of broughams and landaulettes, their design of body following that of the horse-drawn cab of the time. In 1909 the British Thomson-Houston Company supplied motors for 32 electric cabs which were built for the Electric Landaulette Company. Their vehicles became a familiar sight on the streets of London for a few years, one remaining as late as 1927.

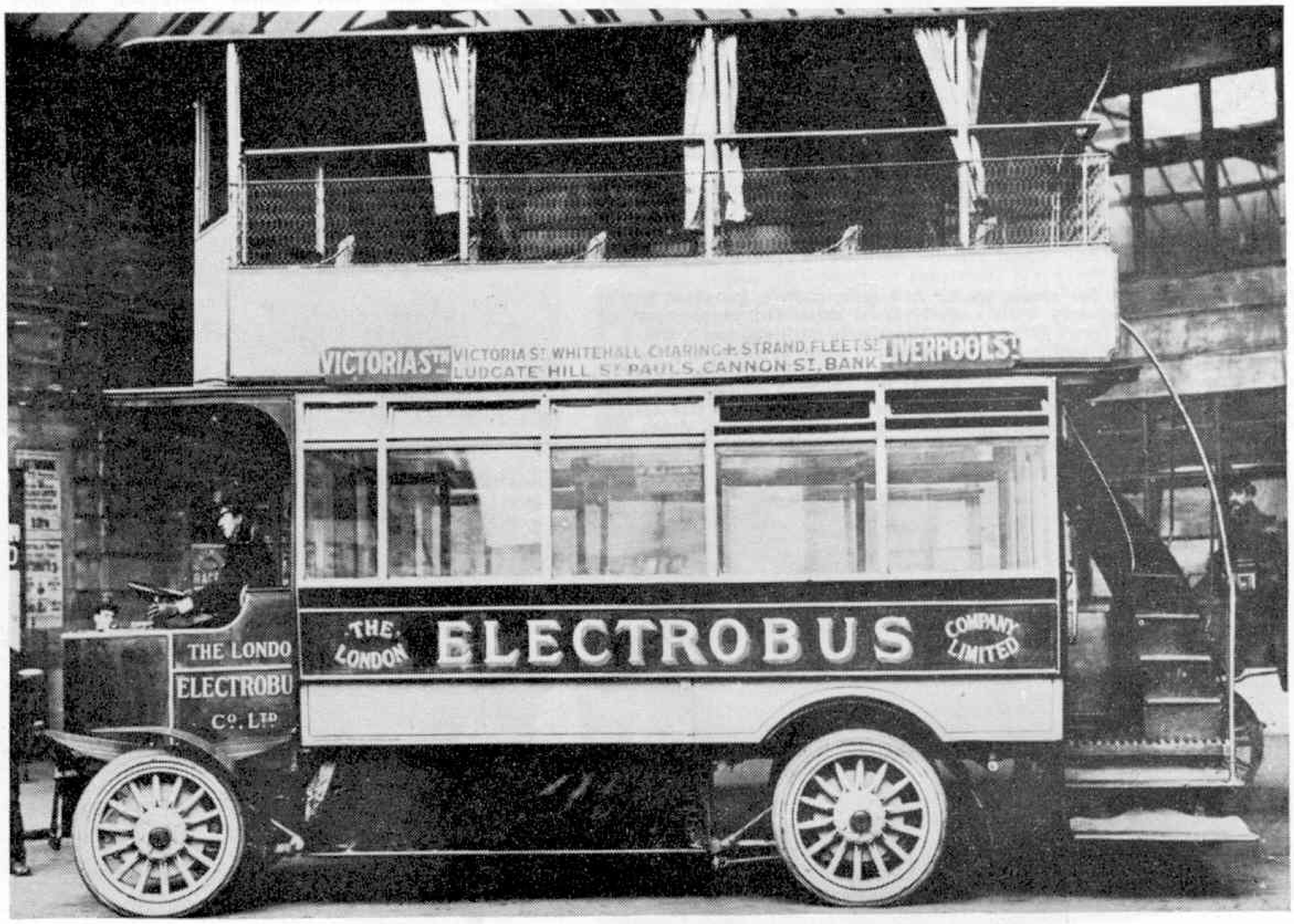
One of the present schemes involves two electric motors incorporated, one in each rear wheel, an idea which is not new. A landaulette taxi was so arranged as early as 1909, so the idea is by no means new.

But in due course the need of a really suitable battery was felt. No one came forward with the answer and the battery driven car was driven off the road, although special purpose electric vehicles were used here and there. Now, with the coming of a new cell it seems to have a useful purpose before it.



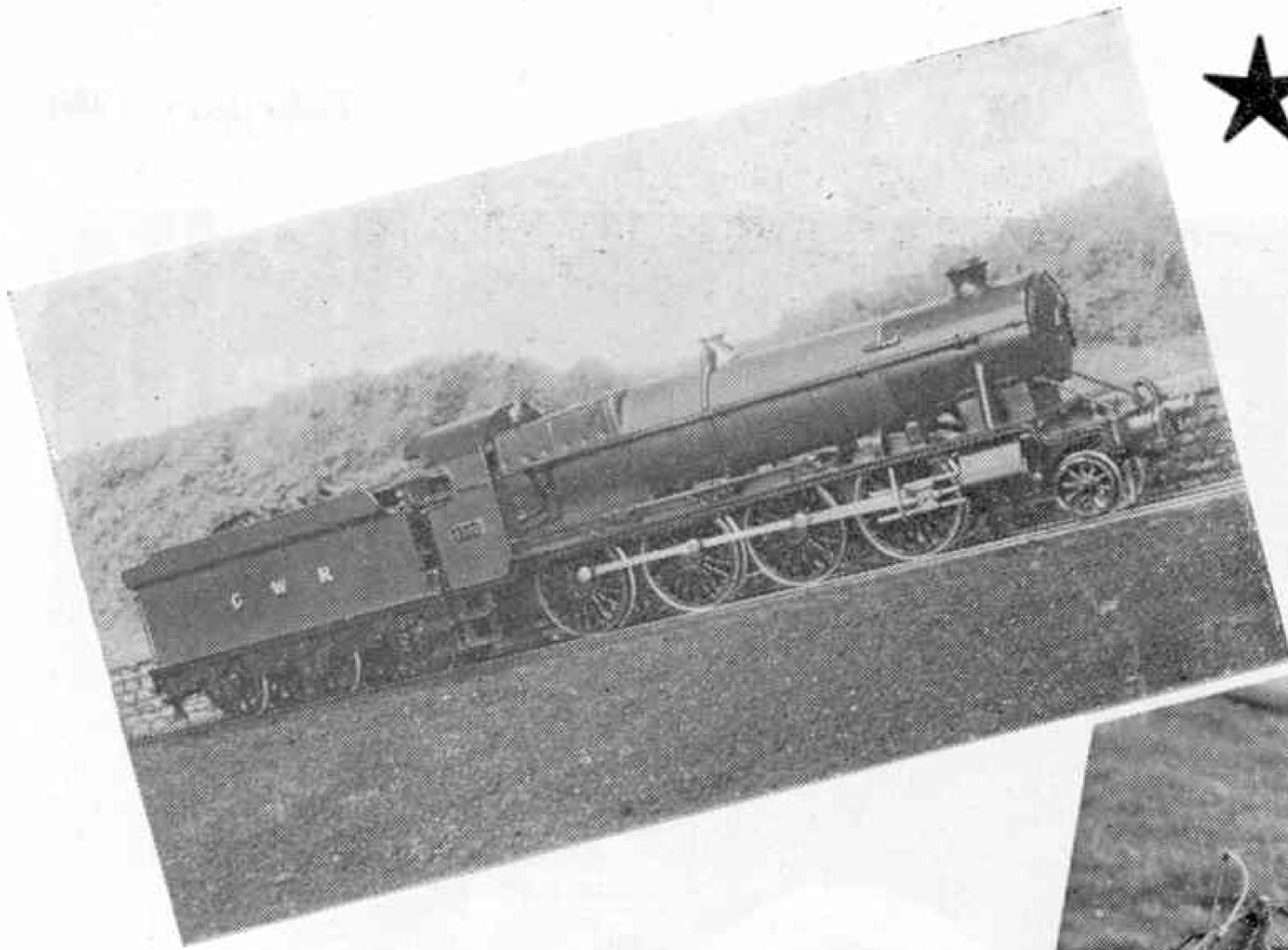
Above: A Landaulette with B.T.H. hubmotors; one of these cabs was in use in London as late as 1927.
Photo Courtesy, Associated Electrical Industries Ltd.

Below: A storage battery bus operated by the London Electrobus Co. Ltd., in 1909. Those wheels date it !
Photo Courtesy, London Transport Board.

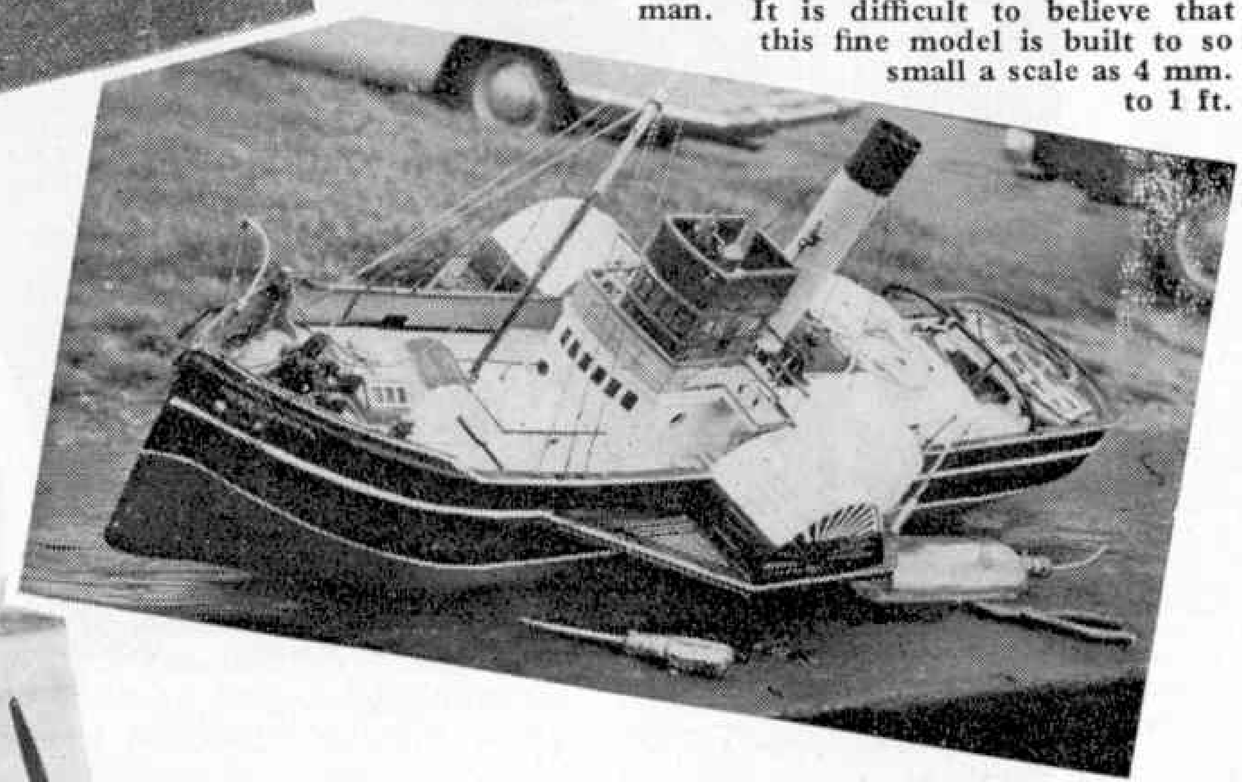


★ SUPER

A selection of magnificent sca sister publications at Model construct models like these, that is developed with cons

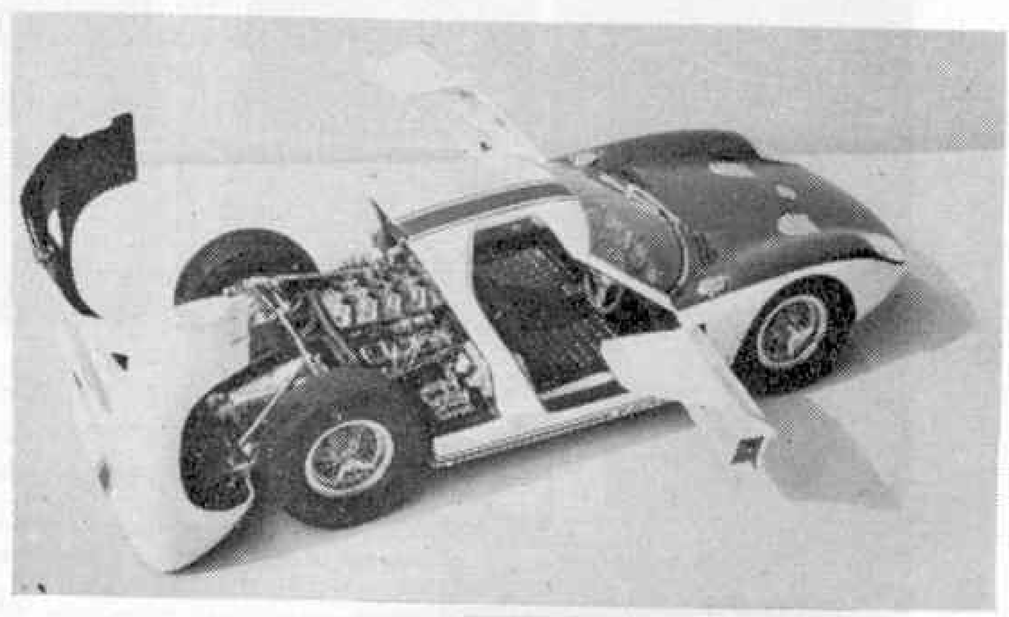


Left: This Great Western Railway 4700 class 2-8-0 was built from scratch by Mr. R. A. Cadman. It is difficult to believe that this fine model is built to so small a scale as 4 mm. to 1 ft.

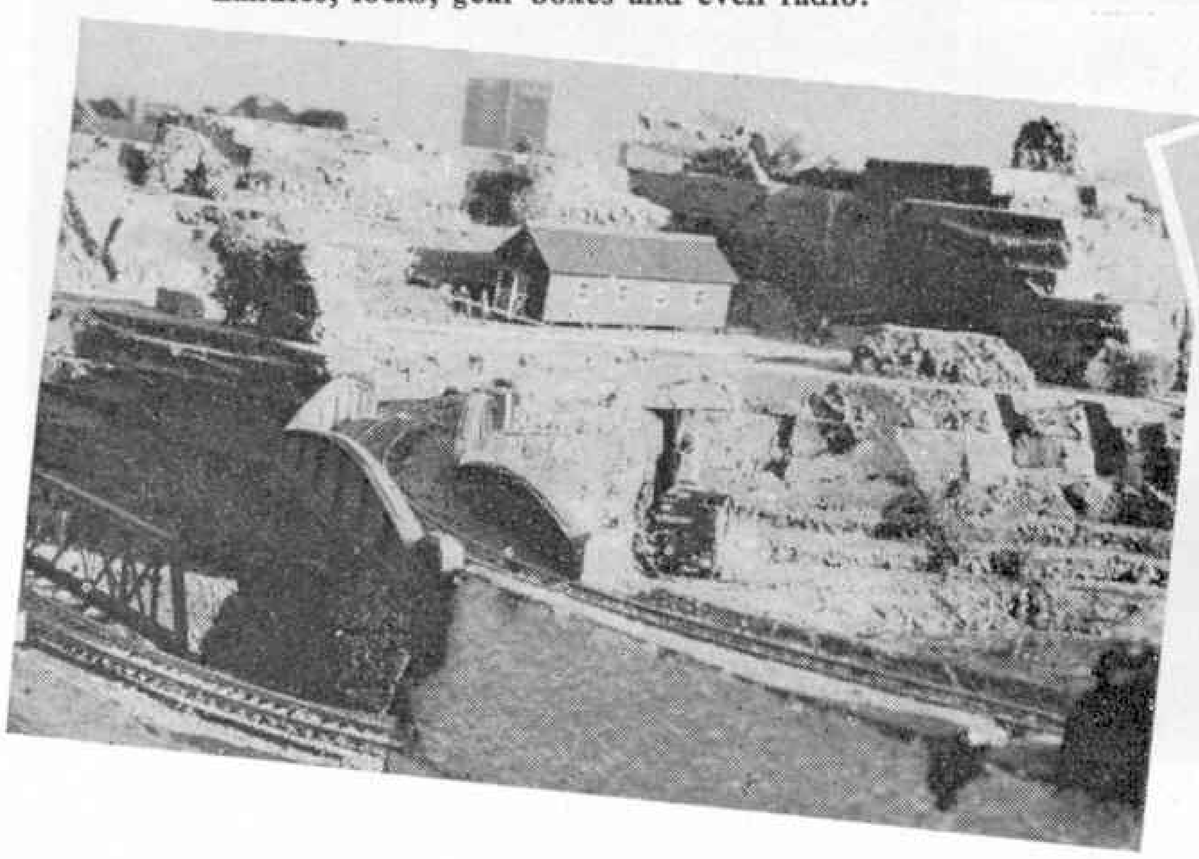


Above: A 48 in. long coastal paddle tug of the last century, "Victor II," by P. White. This model involved some three months' work and the slide valve steam engine, with steam whistle, is geared to turn the paddles at 50 r.p.m.!

Below: This exact scale Douglas SBD-5 Dauntless really flies! Constructed by Dave Platt it is controlled by 7-channel proportional radio control. An O.S.60 (10 cc.) engine provides plenty of power; note the realistic finish; wingspan is over 5 ft.! The engine speed is controllable in flight and the undercarriage can be lowered and raised; inside there's a super detailed cockpit.



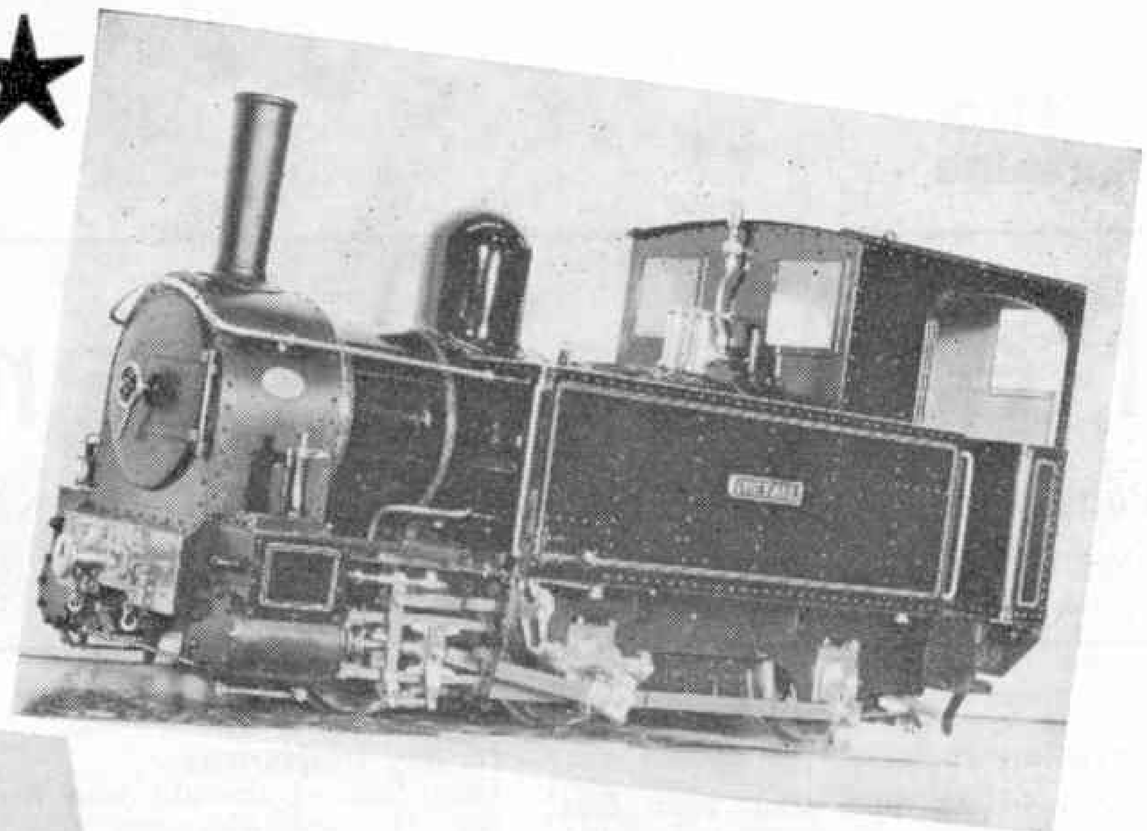
Below: How's this for scenic work? A 4 mm. narrow gauge, 3 ft. line running in a quarry built entirely from expanded polystyrene by Model Railway News Editor Jack Shortland. Bridges and buildings are also scratch built. The super model cars, at right, are the work of Michele Conti, Italian master model builder. The 1964 Ford G.T. in 1/12 scale and 1/11 Ferrie P.4 are both exactly accurate, the Ferrie model being made for Enzo Ferrari, the full size car constructor! In these models, Michele has working steering, doors, handles, locks, gear boxes and even radio!



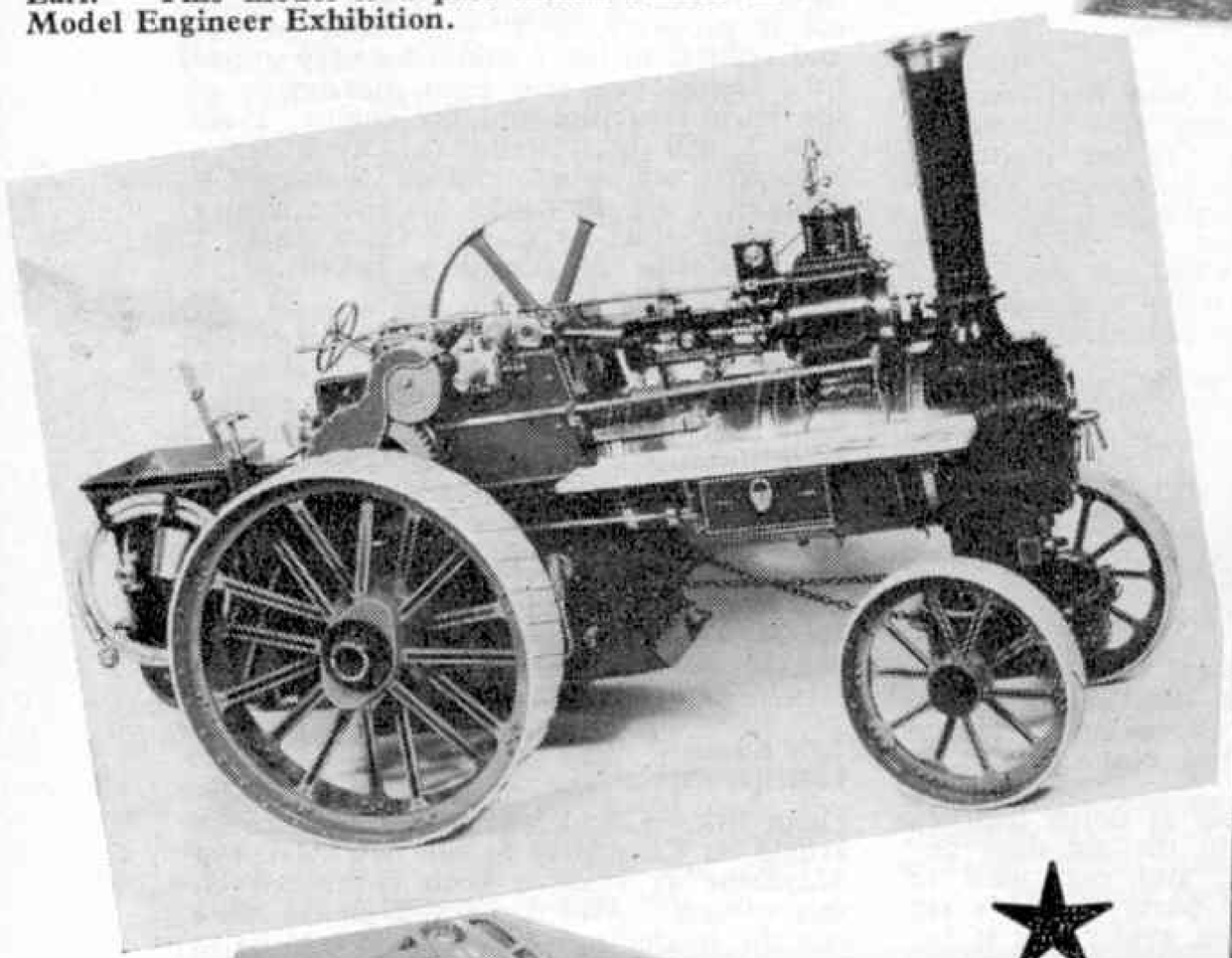
These two admiring children illustrate the size of Conti's Ferrie P.4 racer in authentic Ferrie red; look at that detail on the wheels and engine.

MODELS ★

le models, from Meccano Magazine's
Aeronautical Press. You too can
it's just a matter of craftsmanship
tant practice and patient working

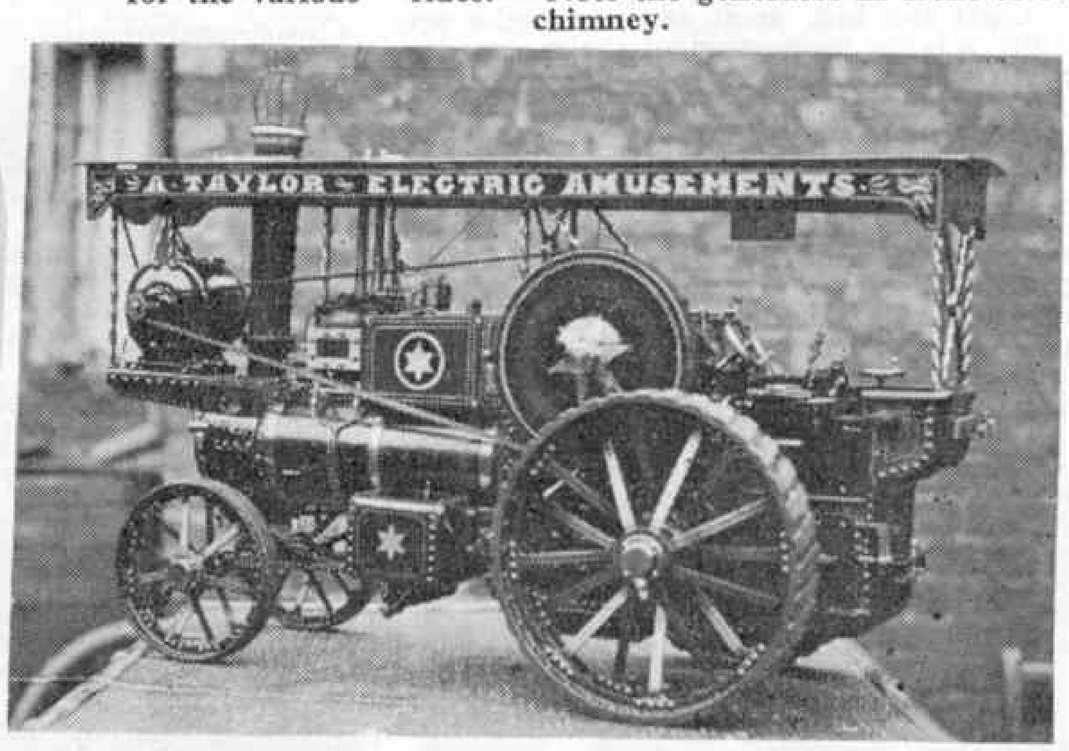


Right: A fine 1 in. scale model of the Welshpool and Llanfair Railway 0-6-0 narrow gauge tank engine "The Earl." This model is a past medal winner at the Model Engineer Exhibition.



Road locomotives of all kinds are popular subjects with model engineers. The model on the left is a magnificent Allchin steam tractor, made by Mr. P. Pucklidge of Belfast.

Below is a showman's engine, built by Mr. H. J. Roberts of Birkenhead. Full-size machines like this were used by travelling fairs to tow trailers and generate electricity on site for the various "rides." Note the generator in front of the chimney.



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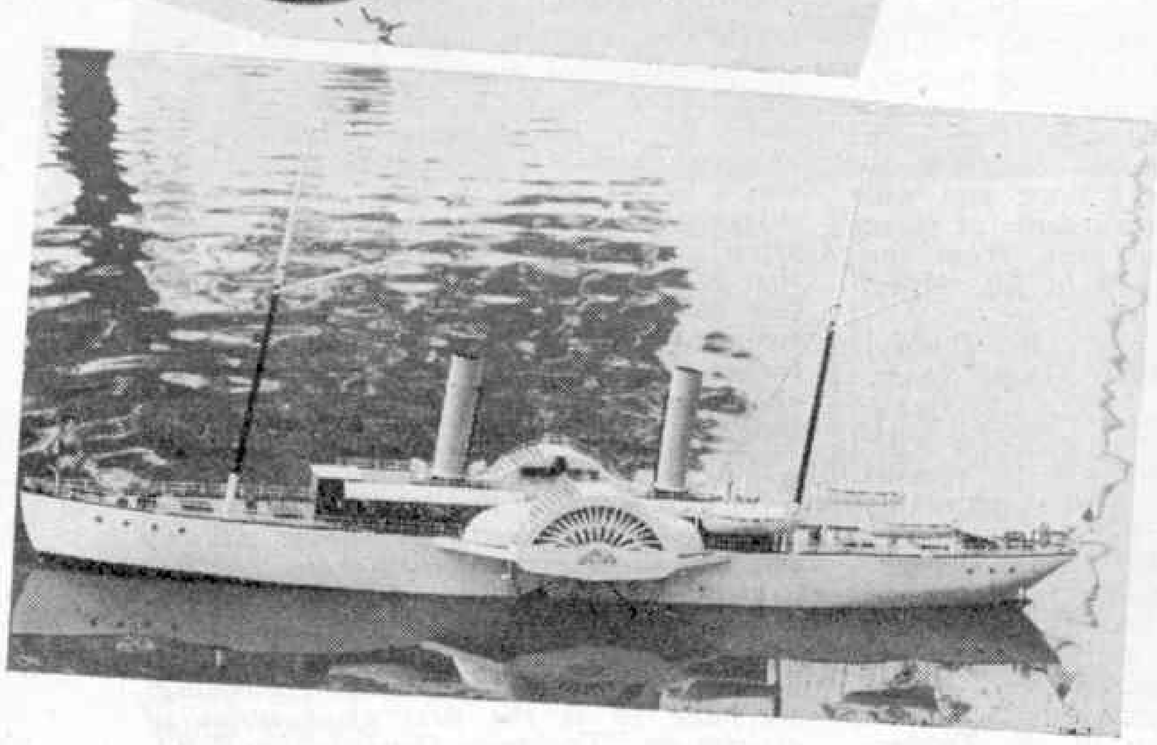
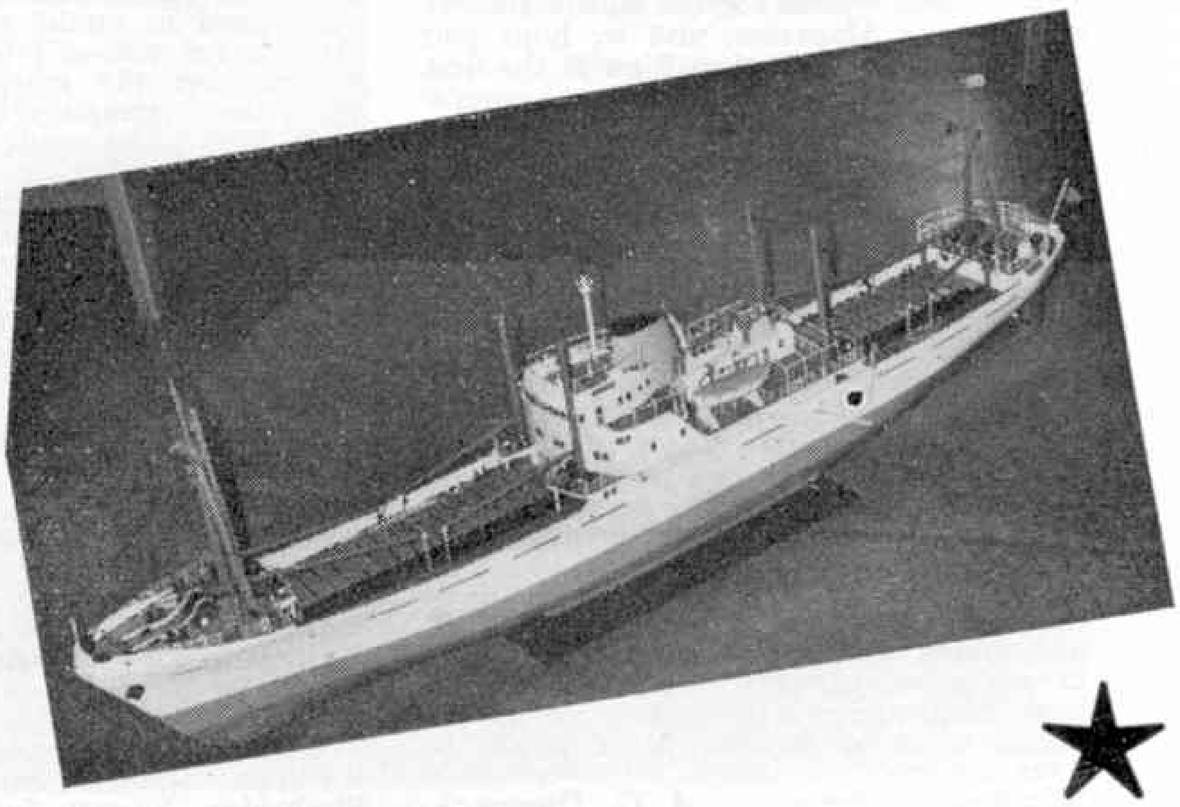
At left: Michele Conti's Ferrie P.4 with the engine cowling opened and the scale rear wheels off. Each component of this model is hand made. Below left: "Colonel Lamb," after an American Civil War blockade runner by V. Knight. 68 in. long this model is powered by a Taycol Torpedo electric motor and accumulator, geared 6:1. Taking two years to construct, it's a two-man job to lift her in and out of the water, for she contains 25 lb. of ballast in addition to her constructed weight. Below: A fine 42 in. fruit ship, designed and constructed by R. A. Sweet. "Velarde" is available in plan form from Model Aeronautical Press (plan MM 830, price 10s.). Powered by a 12 volt electric motor with 3:1 reduction gearing, "Velarde" weighs over 11 lb. A fine scale model for those who like to build from proven plans.





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Readers' Letters

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

Preservation societies

DEAR SIR,—Have just seen your first issue of *Meccano Magazine*; I must say that I was most agreeably surprised; it seems to be an excellent publication. Would it be possible to include a page every month giving details of the activities of the various railway (and other) preservation societies? I am sure that this would be of considerable interest to a lot of people. Also, please make sure that the Meccano building section does not get too big, as it seems to take up quite a large proportion of the magazine, particularly if one is not interested in Meccano.

I would also like to see articles on Military Modelling and Wargaming. I do not know a great deal about this subject, but would be extremely interested to find out more about it. Would it be possible to have a series on "Wars in Miniature"? This would be much more interesting than articles on slot car racing.

Golders Green. *J. Stanmore.*

We are doing our best to please "most of the people, most of the time," and feel that we must try to preserve a balance of interests. We feel that to do full justice to club reports would occupy much valuable space. A series of articles on "Battlegaming" will start shortly. Ed.

Fantastic improvement

DEAR SIR,—We are writing to tell you how much we like the new *Meccano Magazine*; it is certainly a fantastic improvement on the old one. We like articles like "Australia's Puffing Billy" and "Always Ready"—these are more like the ones we used to read in the "Good Old Days" back in the 'fifties. Can we have plenty of model railway features in the future, please? The old *Meccano Magazine* was very poor in this respect.

With best wishes for the future success of *Meccano Magazine*, and we hope you will keep the standard as high as the first "new" issue.

Skegness, Lincs. *Philip Quentin.*
Roger Quentin.

New ideas

DEAR SIR,—I have today received my copy of the new *Meccano Magazine*, and would like to congratulate you on a really first-class production—I was a reader of the old Magazine for many years and this new one reminds me of what it used to be like before the last publishers, who shall be nameless, took over in 1964. There were, however, one or two good features which they introduced and it is interesting to see how you have coupled these with the old familiar format and also added some new ideas of your own to make an extremely informative, 60-page magazine which is well worth the asking price of 2s. 6d. More power to your elbows!

Winchester, Hants. *A. G. Dimmock.*

In my bedroom

DEAR SIR,—I thought your first issue of the *Meccano Magazine* was absolutely fabulous! It's terrific to see plenty of trains in the *Meccano Magazine* again—the old publishers seemed to think that nobody was interested in railways any more. Well, they are! I am building a layout in OO gauge in my bedroom, and would like some ideas regarding scenery, etc.

Bexley Heath. *R. K. Saunders.*

Congratulations

DEAR SIR,—I would like, if I may, to add my congratulations to the many you have already received, on the re-appearance of the *Meccano Magazine*.

It is good to know that this magazine, which I remember almost from the original single-broadsheet editions, is not to join other defunct institutions of the past, such as the Brooklands Motor Course, biplanes, petrol costing 1/3d. a gallon, etc.

I had much fun and as much instruction from Meccano, in the old days before it was coloured, and rust used to come from the older parts in one's set onto the hands that so avidly put it together. You may not believe it, but it is a fact that when each summer we went away for a month's holiday at the seaside, I used to insist that my Meccano went with me, and my widowed mother used to acquiesce.

The magic of those Meccano days comes back vividly—the Christmas toy bazaars, the Hornby gauge-O trains, the special leaflets describing the more complicated models, such as the longcase clock, the Meccano chassis, the loom that made real ties, etc., and the Meccano clockwork and electric motors which might appear in Christmas Day pillow-cases—stockings being too small to hold the latest outfit. I remember oiling my Meccano electric motor so enthusiastically that it had to go back to Binns Road to be resuscitated. I remember how thrilled I was to sometimes find Meccano parts used in model racing power boats or even for serious jobs in real factories. I remember the great moment when I read that miniature Meccano Dunlop tyres were to be available for the numerous motor-car models I made.

I will refrain from boring you with more memories, but would congratulate you again and say that I hope you will sometimes be able to recall some of these Meccano models of the past, from the days of the Meccano boy in his white, vee-neck sweater.

Fleet, Hampshire. *W. Boddy.*
Editor: *Motor Sport.*

Not a "Flipper"

DEAR SIR,—I was delighted to receive the first copy of the new magazine this morning. It certainly looks fine and I hope that it will meet with great success.

Looking now at the last sentence of my "Air News" feature, I realise that if Mr. Mikoyan did write to me, he would tell me that the E-266 is not "Flipper" but the Mig-23.

Elmbridge, Surrey. *John W. R. Taylor.*

Life and death

DEAR SIR,—Thank goodness you're back. I was just going to blow my top, it was a matter of life and death, but you came along. I think the new *Meccano Magazine* is well worthy of its name and price. The advertisements are more interesting to read, the stories even better, and that story about Stocker Racing is great; please give me details about how to make a 1/32 scale slot Stocker. Make it something American such as a Ford Galaxy, which I think is great, as my friend's Dad has one. I saw the picture in *Meccano Magazine* but it was too small to see it properly, so if you could enlarge and send it to me I would be very grateful. Could you also send me details of the basic structure and the engine; I am sure I will understand it. As I am a Scalextric set owner, and as Christmas is coming, I am trying to get more money for other slot car parts. Once again I say *Meccano Magazine* is fantastic, so please keep up the good work.

Beckenham, Kent. *Kenneth Turner.*

Full details of how to construct a 1/32 scale Mercury Comet slot "Stocker" were published in the May 1967 issue of our sister magazine "Model Cars." This used an M.R.R.C. three-pole motor and Aurora Mercury Comet body shell, from their static plastic kit. Unfortunately this back number is now out of stock, but a friend of yours may be able to lend you a copy. Thanks for your kind comments: they keep us going. Ed.

Compromise

DEAR SIR,—Could you please include an article on Chemistry in the new *Meccano Magazine* as I am a keen enthusiast on this subject? Also could you please leave out the modelling of such things as balsa aircraft, because there is already enough of this type of modelling in the new *Meccano Magazine*'s sister magazines? In place of these articles you could put something like more information on building Meccano models or replace it with an article on stamps.

Newport, I.O.W. *Philip Grenger.*

Producing a successful magazine always means a compromise between the varying interests of, in our case, 45,000 readers. To this end we are including Chemistry, Stamps and Meccano, as well as Balsa model making. Although our sister magazines do cover balsa model building quite extensively, Meccano Magazine *features the simpler type of model, designed for easiness of construction and operation.* Ed.

Family affair

DEAR SIR,—It was very pleasant to see the first issue of the new *Meccano Magazine*. It certainly looks as though it is going to be an excellent publication. I have read the *Meccano Magazine* since I was a lad at school in 1931, and now my eldest son is taking it—a real family affair! I was particularly pleased to see that Meccano model building is getting a fair coverage. I am sure that this particular hobby will never die. Don't forget model railways; these too have an enormous following, I am sure.

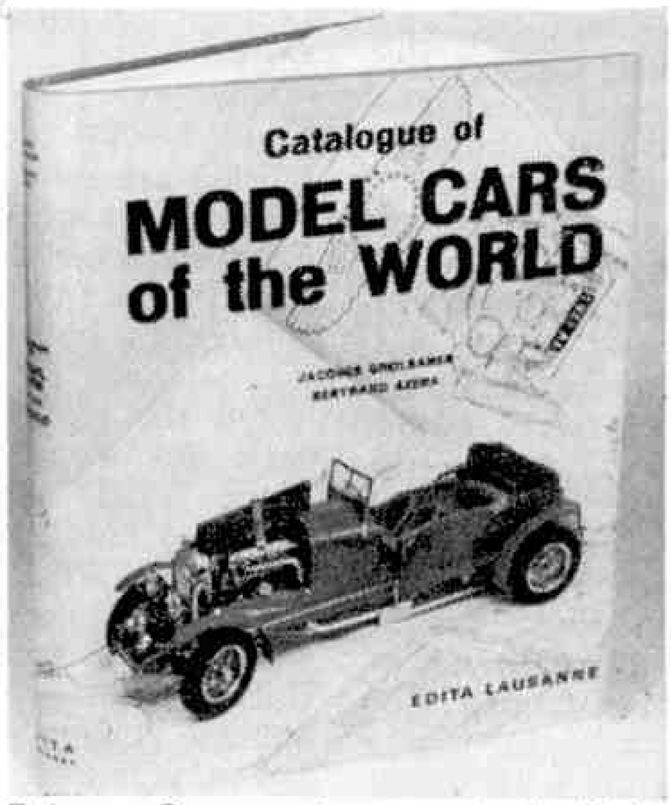
Reigate, Surrey. *Peter Jenkinson.*

Several readers have expressed wishes that we carry plenty of model railway articles, and we can assure them that this subject will be fully covered in all its aspects, including tracklaying, control, scenery, locomotives and rolling stock. The article on building station buildings on page 72 is the first of a series of articles on "Trackside Construction." Ed.

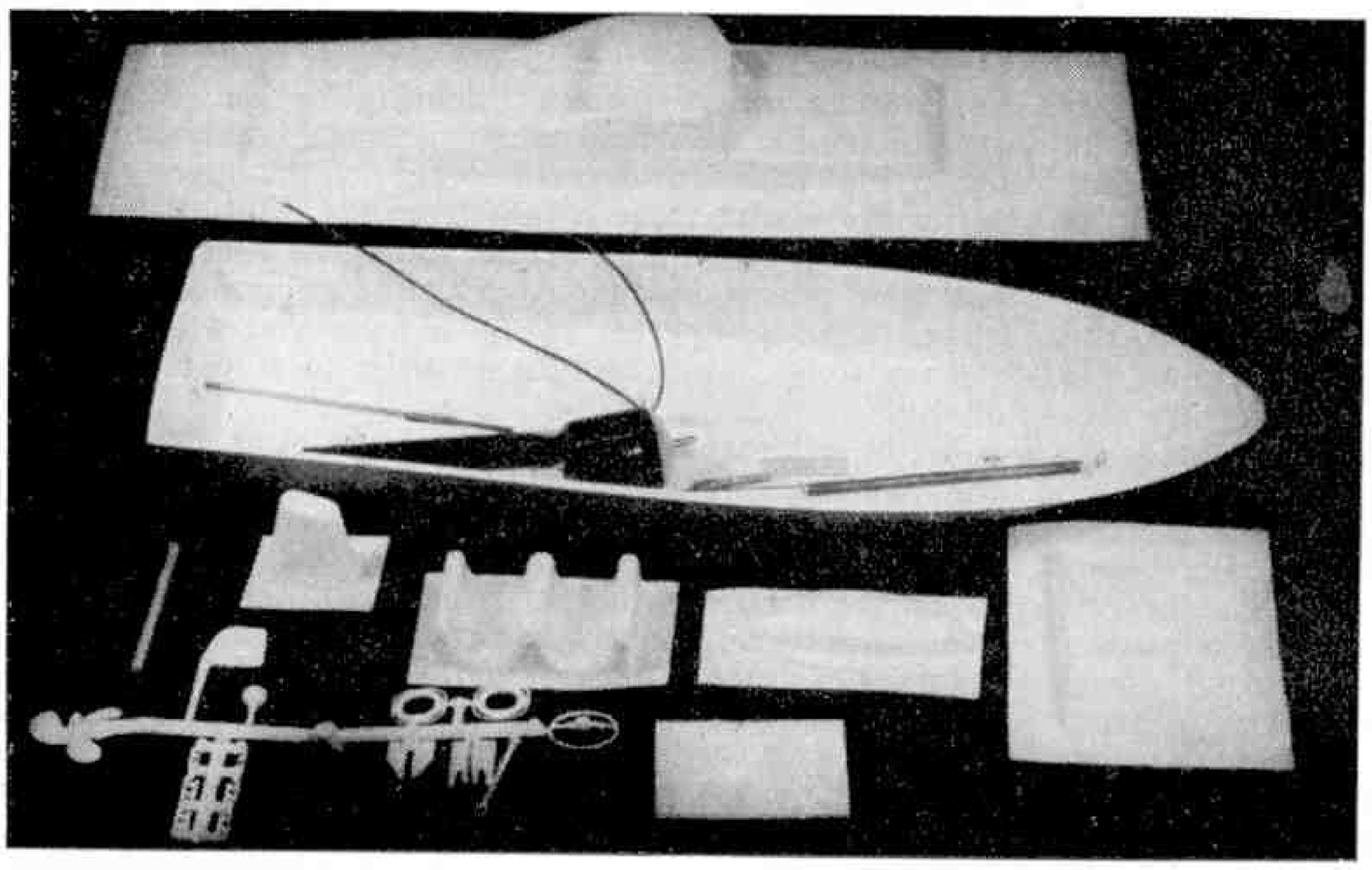
HAVE YOU SEEN ?

Hales Frogflite Marine Kits. Patrol Boat, Cabin Cruiser and M.T.B. Price £1 2s. 6d. each

These three elecric marine kits, all based on the same white injection-moulded plastic hull, 13⅛ in. long and approximately 3/32 in. thick, are really smart lookers. Powered by a Mabuchi three-volt motor, supplied in each kit, they have a realistic speed when run on two 1½ volt pencells. The rudder, propeller and deck fittings are also white injection mouldings like the hull, and free from excess flash. The decking and superstructure are vacuum-formed plastic sheet, that has to be joined to the hull with plastic cement. The propeller shaft is linked to the motor with a valve rubber coupling, to allow slight mounting errors. Very easy to construct, these kits would make an ideal junior first model boat project. The Patrol Boat superstructure has an enclosed and open cabin, funnel and rowing boat, while the Cabin Cruiser has an open cockpit and sunken cabin area, complete with handrails. A little more complex than the others, the M.T.B.-T52 has torpedo tubes, rocket racks, radar and guns—quite an impressive model, this.



Below: Component parts of the Hales Frogflite M.T.B.-T 52. Made almost entirely from plastic this model is extremely easy to construct.

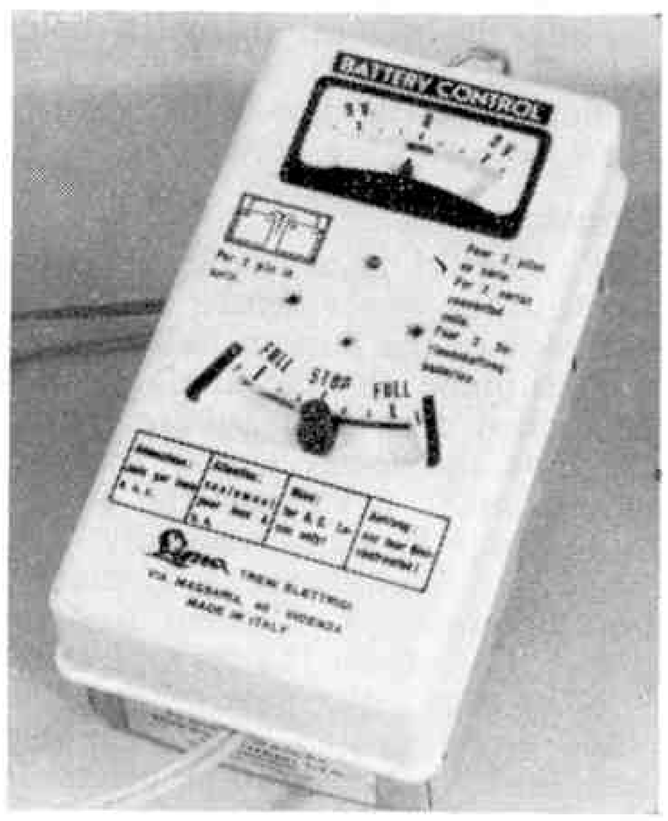


Catalogue of Model Cars of the World. Distributed by Patrick Stephens Ltd. Price £4 4s. 0d.

This extremely lavish publication, compiled by Jacques Greilsamer and Bertrand Azema, is in the expensive bracket at 4 gns. Printed and produced in Lausanne, Switzerland, this book contains 306 pages measuring 10 in. x 8½ in. and weighs nearly 3 lb. The contents include more than 500 illustrations, including 16 in full colour, and lists full details of 7,000 models made by more than 150 manufacturers in 18 different countries. This impressive total comprises 87 different makes of die-cast metal and plastic scale models, numbering over 4,000, made from 1917 to 1967, and 85 different makes of model car construction kits, listing 3,000 models manufactured up to 1967.

All lists are complete with details of country of origin, manufacturer's reference, designation, type, date of model and scale. Among the British makes listed are: Airfix, Auto-kits, Britains, Budgie Toys, Chad Valley, Charbons, Corgi Toys, Crescent Toys, DCMT, Dinky Toys, Frog, Hillco, Kleeware, Lone Star Roadmaster, Lesney Matchbox, Merit, Morestone, Scalextric, Scamold, Smec, Spot-On and Tri-ang-Minic.

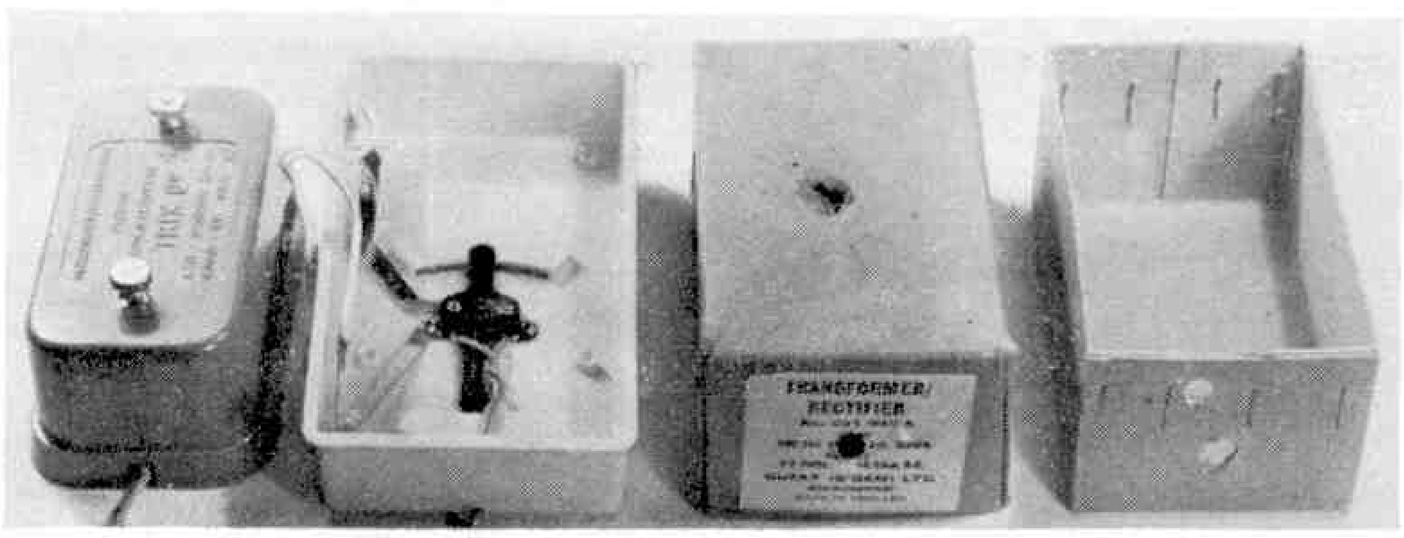
Left: The impressive Catalogue of Model Cars of the World printed in Switzerland. This is without doubt the most comprehensive listing of model cars ever produced and a must for really serious collectors.



Above: The Beattie conversion of the Wrenn-Lima battery control box. This incorporates a Trix transformer and Wrenn switching system most effectively giving variable speed, forward and reverse controls for only 10s.

Six-volt Transformer Conversion from Beatties. Price 10s.

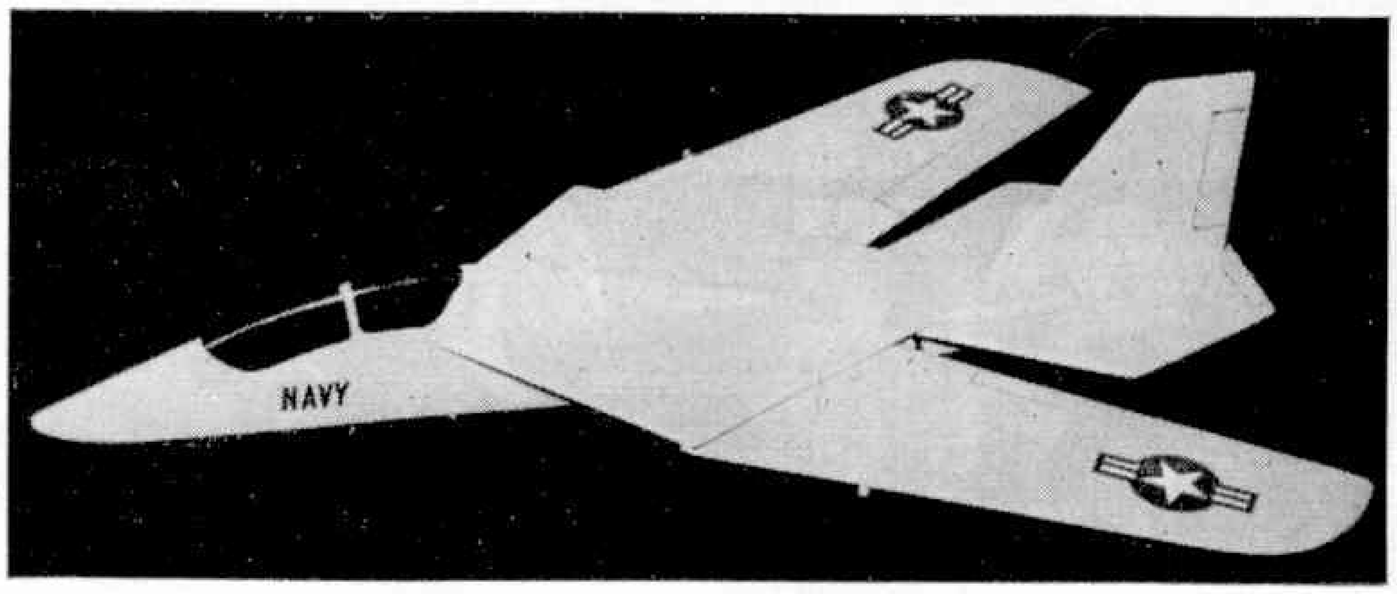
We have received from Beatties of London a very neat transformer, which has a most ingenious purpose. It is designed to convert the well-known Wrenn-Lima Battery Control Box into a fully fledged transformer/controller unit. The transformer itself is small enough to fit under the "lid" of the Wrenn-Lima Battery Unit, and as the transformer costs only 10/-, the conversion is much less expensive than the purchase of a conventional transformer/controller unit or the continual replacement of batteries if the set is in continual use by both father and son !



Build something different for a change

SWINGER

This model will never fail to attract interest wherever it is flown



HERE'S SOMETHING different in catapult gliders —a swing-wing model on which you can set the wings at six different sweep positions and check the effect on performance. It's quite easy to make, but the method of mounting the wing panels on a pivot pin (short length of $\frac{3}{16}$ in. dowel) is unusual, so study the plan, photograph and instructions carefully.

The plan is reproduced exactly half size, so you will have to scale up the patterns to twice size—or you can obtain a full-size plan if you prefer, price 2/6d., post free, from **Meccano Magazine Plans Service, 13-35 Bridge Street, Hemel Hempstead, Herts.** These are the parts you have to cut: two wing panels from $\frac{3}{32}$ in. sheet; tailplane from $\frac{3}{32}$ in. sheet (noting how two pieces of 3 in. wide sheet are joined together to give the required length); upper centre section from $\frac{3}{32}$ in. sheet (here you will have to join three pieces of sheet together edge to edge); lower centre section from $\frac{3}{32}$ in. sheet; fin from $\frac{3}{32}$ in. sheet; underfin from $\frac{3}{32}$ in. sheet; fuselage, the upper and lower shapes from $\frac{1}{4}$ in. sheet.

Note the $\frac{3}{16}$ in. diameter holes which have to be drilled in (i) each wing panel; (ii) the upper centre section; and (iii) the lower wing centre section. These *must* be positioned accurately.

Construction

The model is assembled in the following order: 1, Cement the lower centre section into the notch in the top edge of the bottom half of the fuselage; 2, Cement the tailplane to the fuselage, making sure that it is positioned true and square. Note that the tailplane overlaps the lower centre section which makes for a strong joint; 3, Cement the $\frac{1}{4}$ in. x $\frac{3}{32}$ in. strip to the top of the fuselage assembly, butting up against the front of the tailplane; 4, Cement the upper centre section in place; 5, Cement the top of the fuselage in place; 6, Cement the fin and underfin in position.

Now comes the part where you have to be careful. Slide the wing panels into the gap between the upper and lower centre section pieces and see that they fit snugly and that the pivot holes line up. Then push a short length—say $\frac{1}{2}$ in.—of $\frac{3}{16}$ in. hardwood dowel through the pivot holes and check that each wing panel will swing easily backwards to its full sweep position.

When satisfied that all is well, mark the exact length of the dowel required to fit flush, remove each dowel and cut off to this length, then reassemble permanently.

Wing sweep rigging

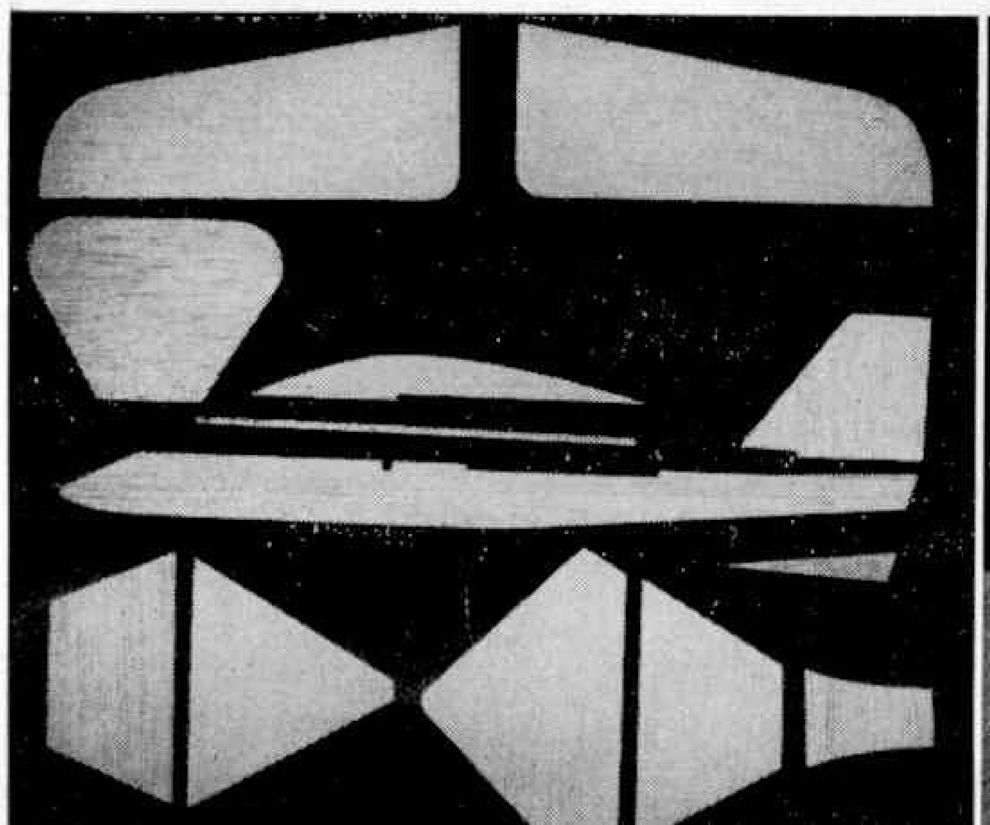
Pins are now pushed into the leading edge of each wing in the position shown on the plan and a rubber band stretched between the pins, passing through the hole in the fuselage. This band should only be strong enough to hold the wings in the full forward sweep position.

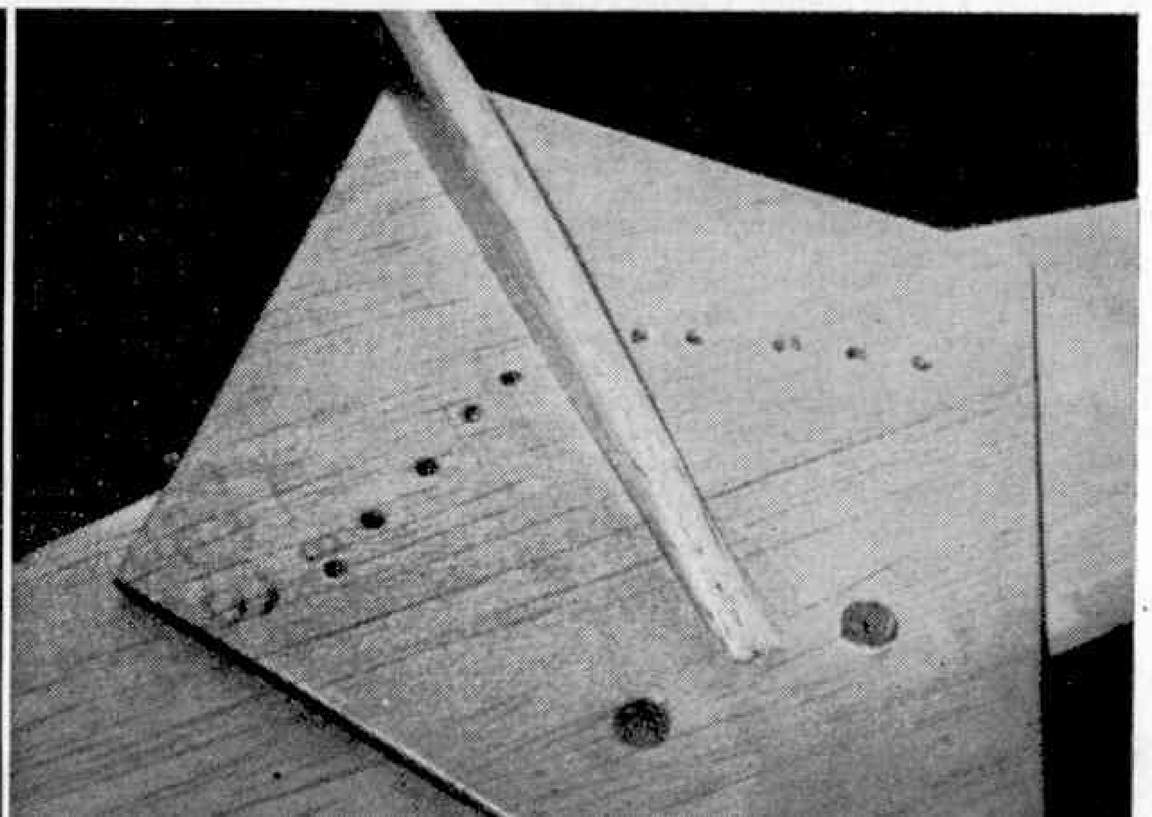
On the plan you will notice five holes marked on each side of the upper centre section for lock pin positions. These are the positions at which pins are inserted to hold the wings at any required angle of sweep other than the fully forward position. For instance, to set the wings for 20 degree sweep, pull back both wing panels and insert pins in the first hole each side. Releasing the wings will then allow them to pivot back against these "lock" pins to stop at the 20 degree sweep position. In a similar manner you can set the wings for 30 degrees, 45 degrees, 60 degrees or full (72 degrees) sweep.

Trimming for flight

For initial flight trimming use the full forward wing position and add ballast to the nose as necessary until your model will perform a "floating" glide. With this sort of trim it will loop when catapult launched. Now try flying with 20 degrees sweep. This gives you a faster flight with more height from the catapult launch, followed by a fast glide. The 30 degree sweep position will give you more height still, but an under-elevated glide. With 45 degrees sweep or more you will have to remove some ballast weight in order to stop the model diving.

With adjustable sweeps you can alter the flying characteristics of your model at will—e.g. from aerobatics to high-speed flight—but wouldn't it be nice to be able to launch the model with the wings at full sweep for maximum height from a catapult launch and then have them move forward to full forward sweep for a long, floating glide? Well, if you have made your model accurately and the wings are pivoting very smoothly and easily you *should* be able to achieve this, simply by cementing a 12 in. length of paper streamer to each wing tip.



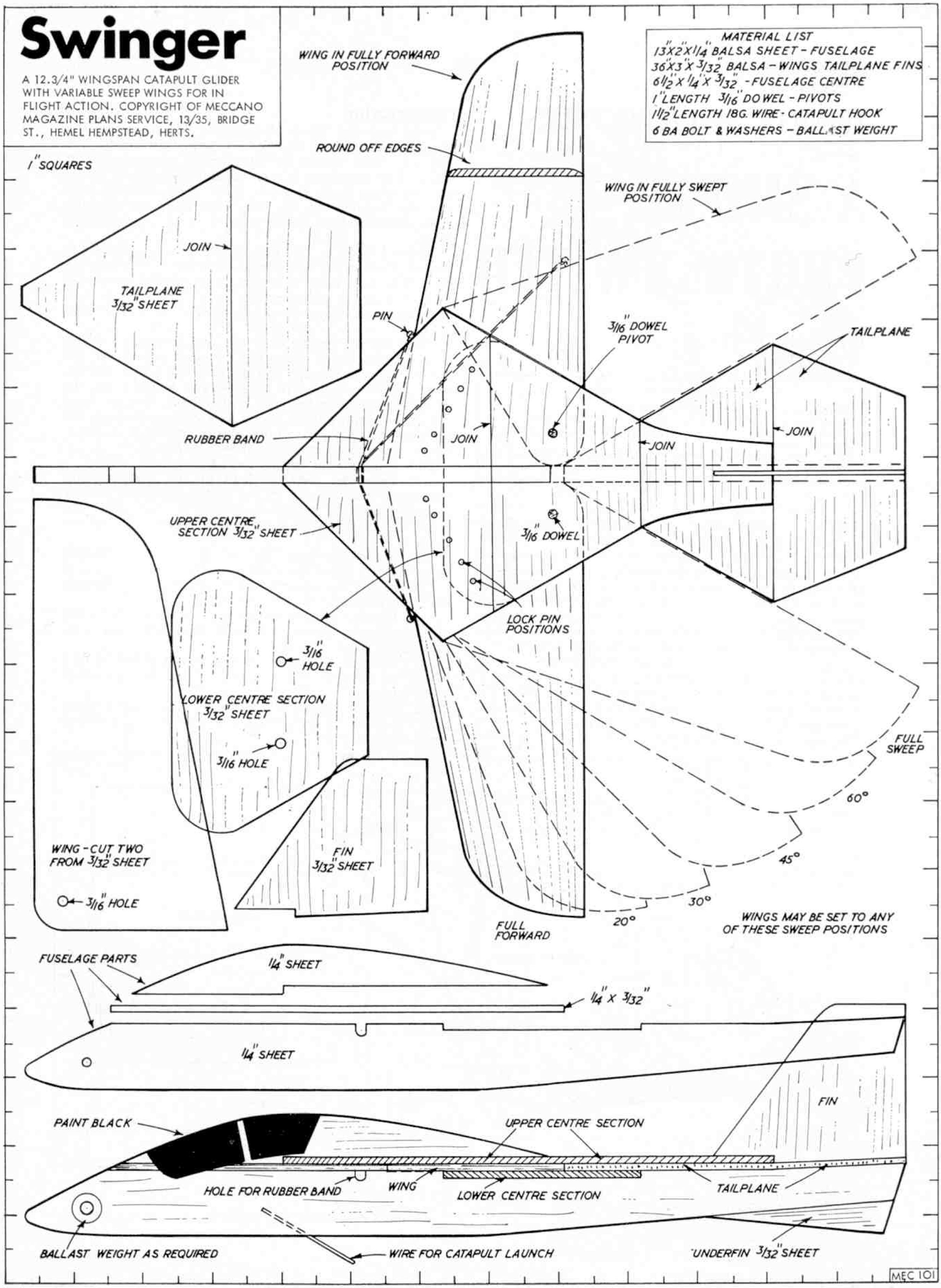


Swinger

A 12.3/4" WINGSPAN CATAPULT GLIDER WITH VARIABLE SWEEP WINGS FOR IN FLIGHT ACTION. COPYRIGHT OF MECCANO MAGAZINE PLANS SERVICE, 13/35, BRIDGE ST., HEMEL HEMPSTEAD, HERTS.

MATERIAL LIST

- 13"X2"X1/4" BALSA SHEET - FUSELAGE
- 36"X3"X3/32" BALSA - WINGS TAILPLANE FINS
- 6 1/2"X1/4"X3/32" - FUSELAGE CENTRE
- 1" LENGTH 3/16" DOWEL - PIVOTS
- 1 1/2" LENGTH 18G. WIRE - CATAPULT HOOK
- 6 BA BOLT & WASHERS - BALLAST WEIGHT



JUNIOR ELECTRONICS

A SIMPLE PHOTO SWITCH

By Ron Warring

COMPONENTS REQUIRED

Transistor—must be Mullard OCP 71.
Potentiometer—0-5 kilohms, about 1 in. diameter; or a 0-10 kilohm potentiometer for greater range of sensitivity control.
Relay—any small 5,000 ohm relay which will operate on about 2 milliamps.

THIS IS a very simple light-operated switch which can be used as a "burglar alarm," a photo-electric "counter" or similar applications where interruption of the source of light to the switch causes it to operate an external alarm circuit such as a small electric bell, or an indicator, such as a light bulb. It uses a minimum of electrical components and, basically, construction involves nothing more than making the balsa box to house the components and then wiring them up.

Fig. 1 shows the complete assembly, inside the box, actual size. Start by making up the box, as in *Fig 2*, which also shows all the material sizes required, e.g. 1 in. × ¼ in. balsa cut into two 4½ in. lengths, two 3 in. lengths, two 2½ in. lengths. Two panels 5 in. × 3 in. cut from $\frac{3}{16}$ in. sheet balsa.

Construction

Note how the 2¼ in. long piece which carries the transistor is pierced to take the transistor leads *(see Fig. 1)*. This should be done before cementing it in place. The transistor is then mounted simply by pushing the three leads through these holes, making sure that the number on the transistor faces towards the ½ in. diameter hole in the 3 in. × 1 in. × ¼ in. end piece.

Pierce a hole in the side of the box to mount the potentiometer with the spindle protruding through the side. You will have to notch the transistor mounting strip to clear the potentiometer tags. The relay is then mounted in position, as shown in *Fig. 1*, to one edge piece.

Mark off the positions of the two roundhead 6 BA brass screws which form the terminal points for the two pencells, drill holes and fit these two bolts. Do the same for the two 6 BA brass screws which form the terminals from the external connections. Finally bend a strip of springy brass to act as a base connection for the two pencells and attach to the end with a woodscrew. All these details are shown in *Fig. 1*.

Now complete the wiring up as follows:

(1) Take the *collector* lead of the transistor up through a hole pierced in the mounting piece. Solder a short length of insulated wire to it, and solder the other end of this wire to one of the relay coil connections.

(2) Solder the *base* lead of the transistor directly to the nearest tag on the potentiometer.

(3) Solder the *emitter* lead of the transistor directly to the centre tag of the potentiometer.

(4) Connect the bottom pencell terminal bolt to one of the external connection bolts with insulated wire, soldered in place.

(5) Connect the other pencell terminal bolt with a length of wire to the *normally closed* or uppermost relay contact.

(6) Solder another length of wire in place to connect the other external connection bolt to the *armature* contact of the relay.

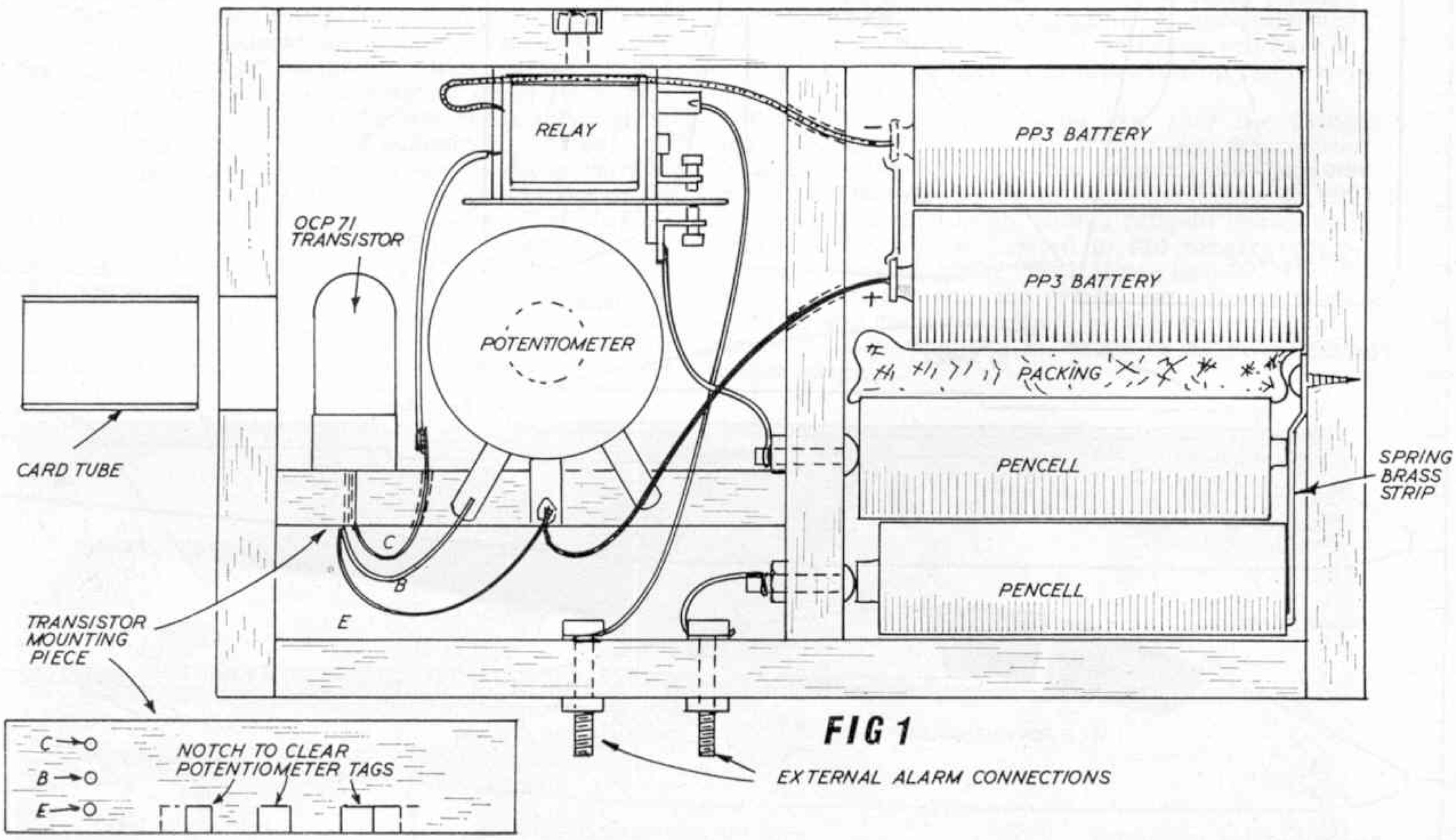


FIG 1

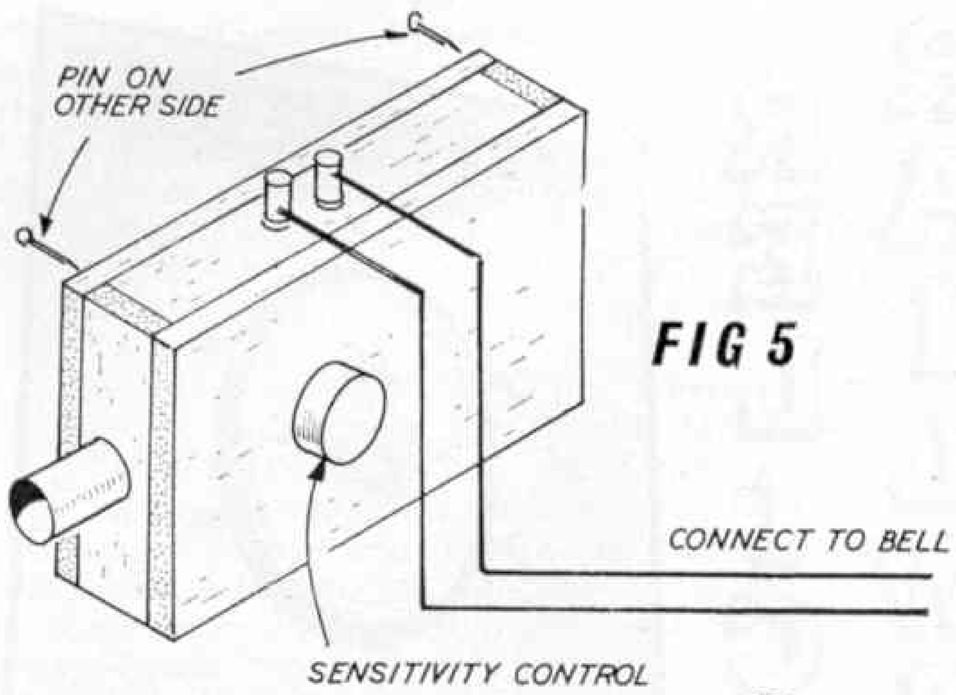


FIG 5

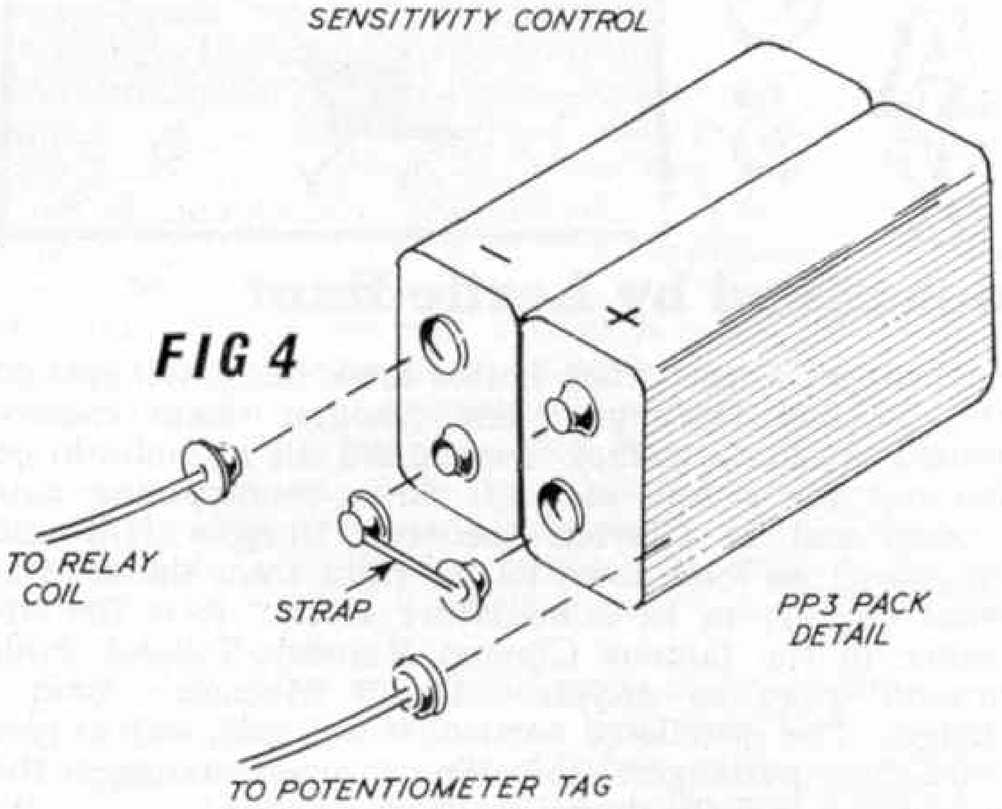


FIG 4

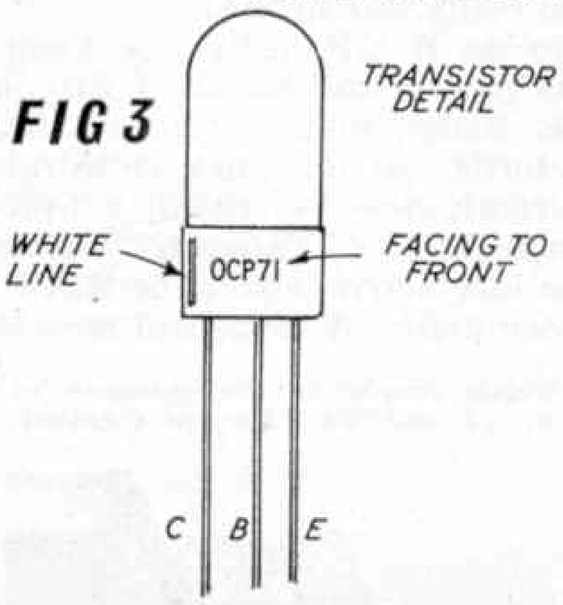
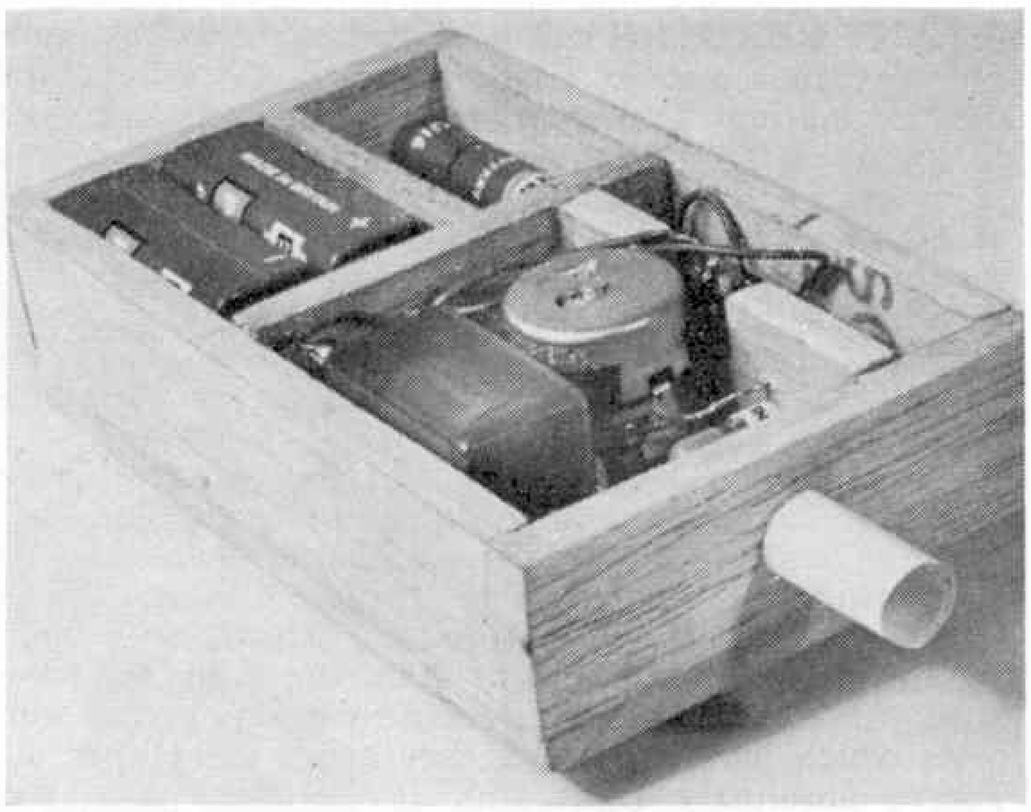


FIG 3

Above: Our prototype photo electric switch made up into a neat little unit with ¼ in. sheet balsa used to form the box. Note the rolled paper "light hood" directly in line with the OCP71 transistor. Below: The batteries wedged in firmly with scrap balsa to prevent possible movement. A simple sheet balsa lid is used to cover the switches and secured in place with glass headed modelling pins.



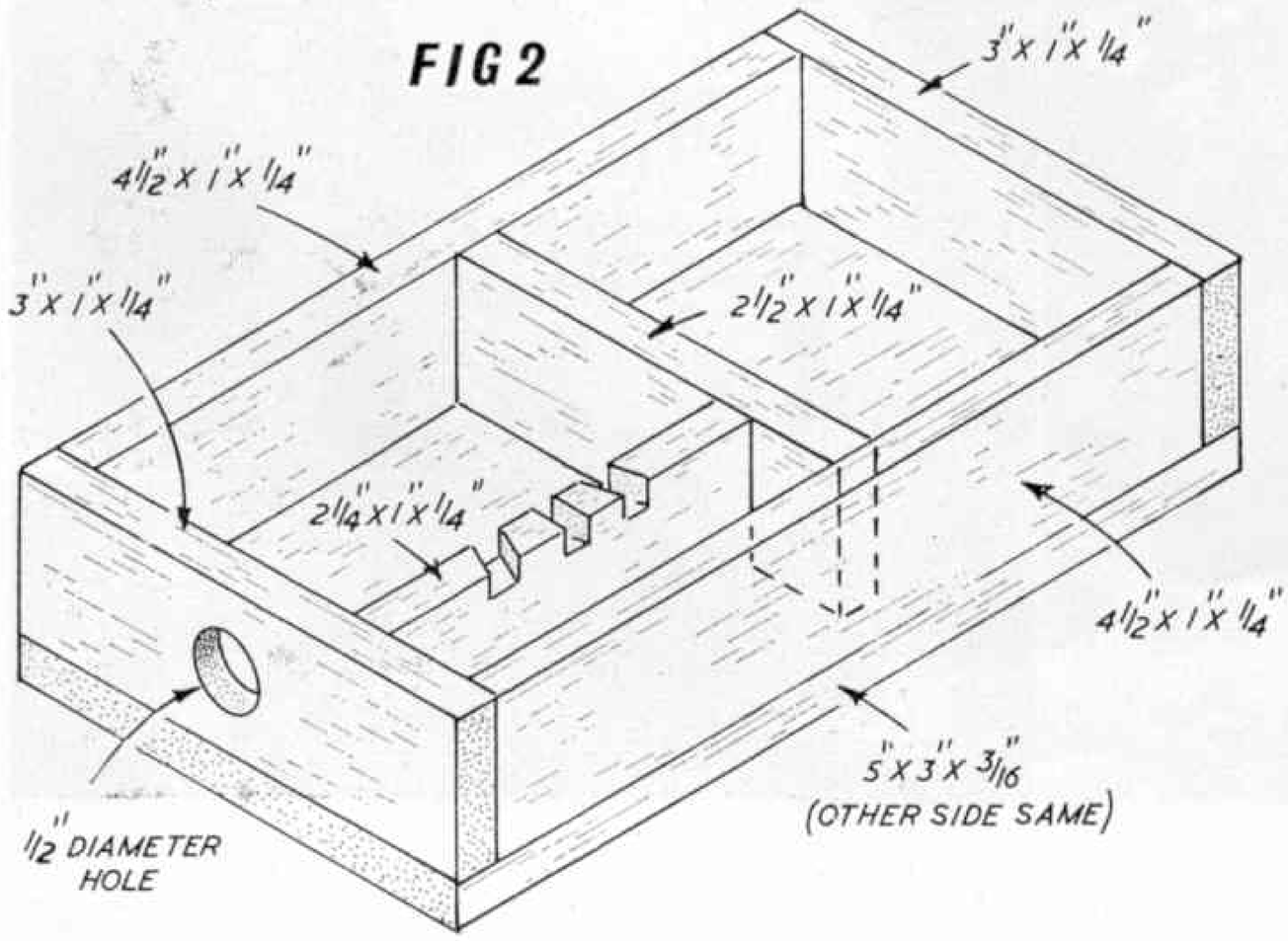
The two PP3 batteries are series connected to make an 18 volt battery "pack," as shown in *Fig. 4*. The *positive* lead from the battery pack then connects to the centre tag on the potentiometer; and the *negative* lead from the battery pack to the other *relay coil* connecting point.

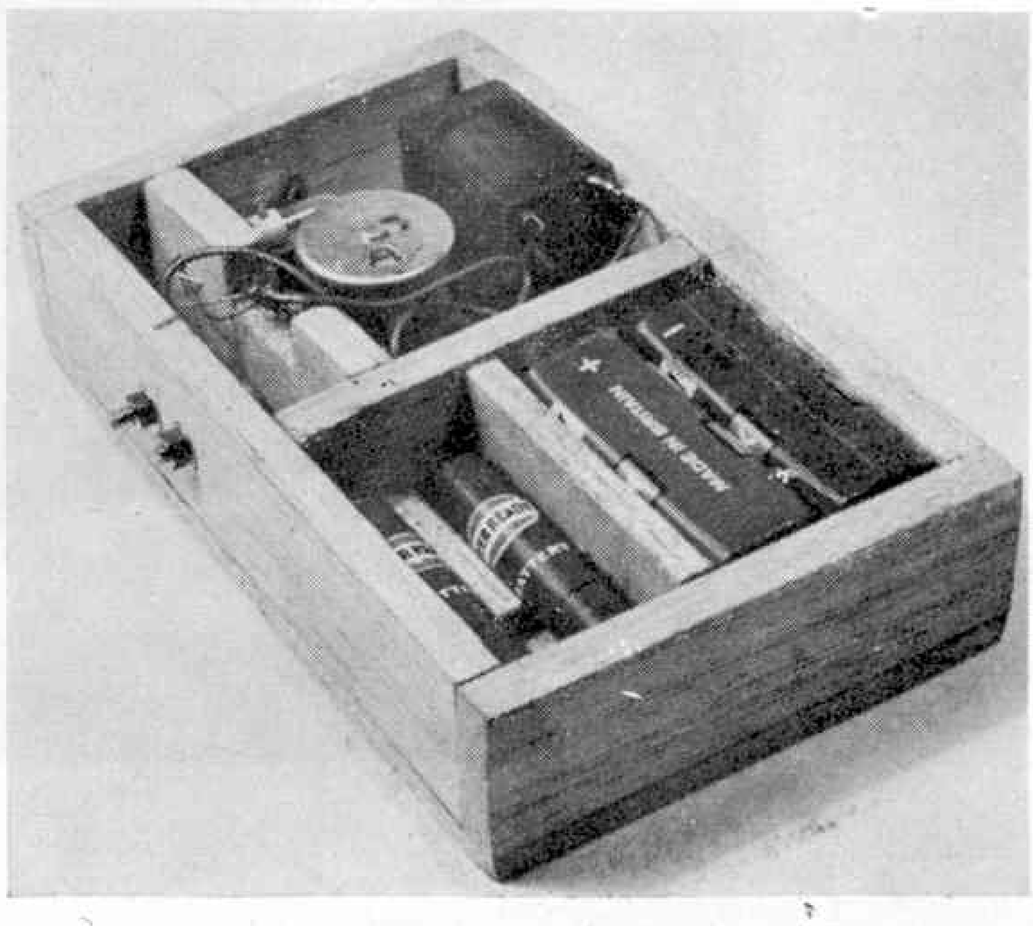
The circuit is now "live," so remember that as soon as you connect the PP3 battery the circuit is drawing current. You can, if you prefer, connect the PP3 pack positive lead through a switch to switch on and off, rather than having to open the case to pull off one of the battery leads to switch off.

To concentrate the light on the photo-transistor, fit a small tube into the opening in one end to act as a sort of lens hood. Point the unit towards a source of light—e.g. a window in daylight—and adjust the potentiometer control knob until the relay just pulls in. Interrupt the light—e.g. by placing your hand in front of the tube—and the relay should drop out. You can watch this movement, or listen to the relay "clicking" as it pulls in and drops out.

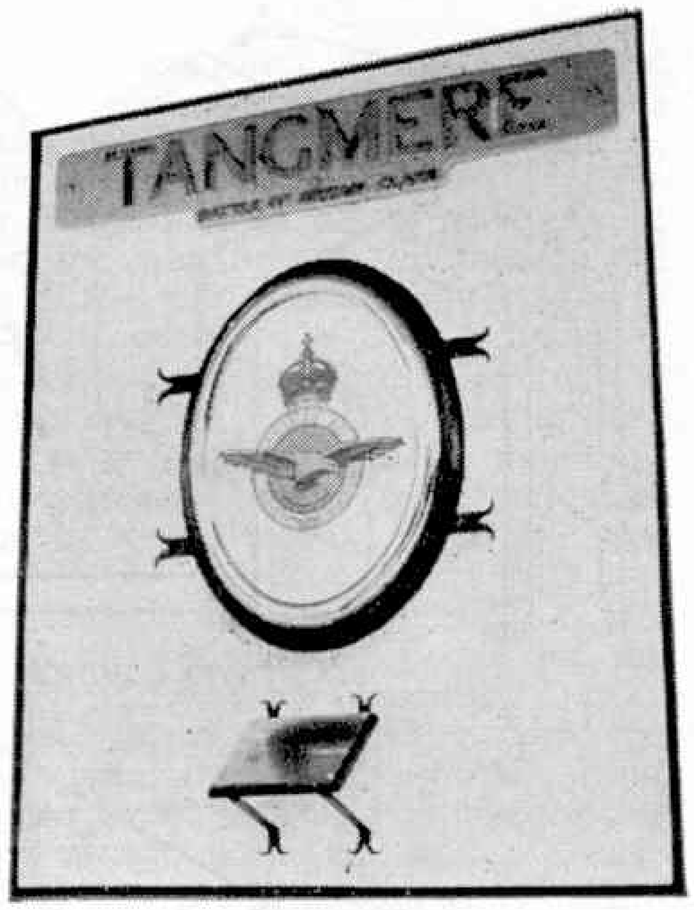
Fit on the other side with pins (or you can hold in place with rubber bands), and your photo-switch is ready to work. Just connect a 3 volt electric bell (or a 3 volt bulb) directly to the two external connection screws. Pointed towards the light source, the bell will remain silent (or the bulb will not light up). When the light is interrupted the bell rings (or the bulb lights up). Remember, too, that the potentiometer control enables you to adjust working to various sources of light.

FIG 2





RAILWAY RELICS



described by Leslie Hunt

MANY READERS will have visited the famous railway museums in Clapham, Swindon, York, and the fascinating Transport Museum in Belfast with complete platform, engines, carriages, signal box and many other delights for the enthusiasts, but how many of us, when we are travelling around the country, spot the links with trains, sometimes not obvious at first glance. Let us, then, take a little " circular tour " with camera and notebook, before some of these interesting associations are removed on account of so-called progress.

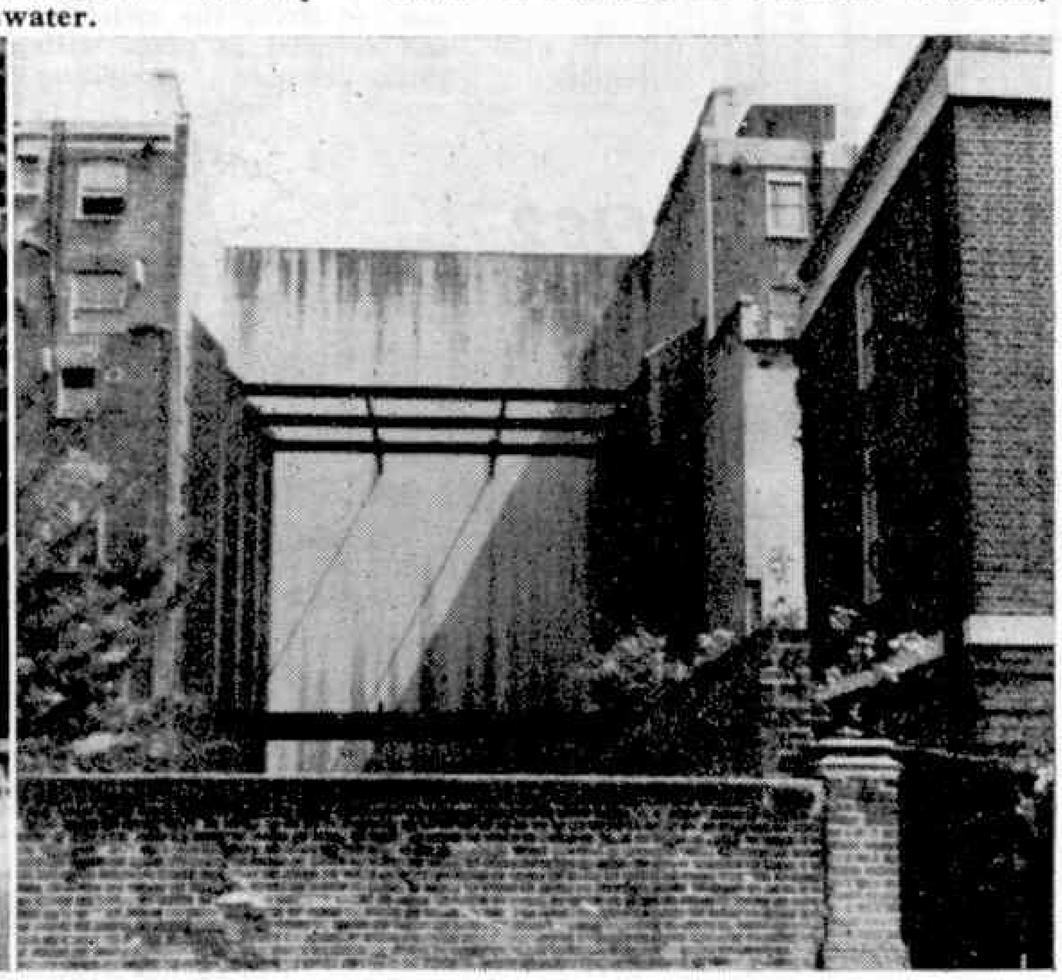
If we begin in London, those of you who live in the provinces can join us at your nearest point and then carry on until you have covered all the places back to your own area. First then to Leinster Gardens, Bayswater, to look at Nos. 23 and 24 which, at a quick scrutiny, appear no different from the other houses—until you notice that there are no curtains to the windows which look as though they aren't glass after all. You're absolutely right and, if you find your way around to the rear of these " houses," you'll see that Nos. 23 and 24 are, in fact, just a brick wall acting as a " fake front " to disguise the fact that a tunnel on the Circle Line has been cut through between Nos. 22 and 25. Over now to Wandsworth where, in the wall of the Ram Brewery, York Road, there are set some curious stones, above which is a plaque reading:

" Set below are stone sleepers from the Surrey Iron Railway, the first railway established by Act of Parliament. This railway, constructed in 1802-3 by William Jessop, famous engineer and canal builder, to the order of local industrialists and other subscribers who regularly met at the Spread Eagle Inn nearby, ran past this spot and carried in horse-drawn trains of up to 15 wagons, coal, raw materials and manufactured goods, between Croydon and Jessop's Basin, a Thames-side wharf at Wandsworth."

South-east now to Canterbury where, beside the old city walls, we find the old steam engine *Invicta* which, on 3rd May, 1830, brought the first regular steam railway passengers in the world through the first (Tyler Hill) railway tunnel in the world, on the Canterbury to Whitstable line. Robert Stephenson built the engine and the line was laid by George Stephenson four months before the Liverpool to Manchester line was opened—at a time when horses drew the *passengers* on the Stockton-Darlington line (though steam engines pulled the goods traffic). *Invicta* did the 6¼ miles in 40 minutes for a fare of 9d.! Cross-country now into Sussex and at Clayton (between Burgess Hill and Brighton) we look down to our right from the road at what appears to be a miniature castle. It is the entrance to the famous Clayton Railway Tunnel, built around 1840 to architect David Mocatta's unique design. The castellated portion, it was said, was to give third-class passengers (travelling in open carriages) the impression that the tunnel really was strong!

Along the coast now to the R.A.F. airfield at Tangmere—well known for its part in the Battle of Britain and from where Douglas Bader, famous legless pilot, flew his last operational sortie. At the entrance to this camp (from which no aircraft now fly) stands a Spitfire and, close by, the name-plate " Tangmere " from the Battle of Britain class locomotive, above the R.A.F. badge and the brass history plate. A long haul now to

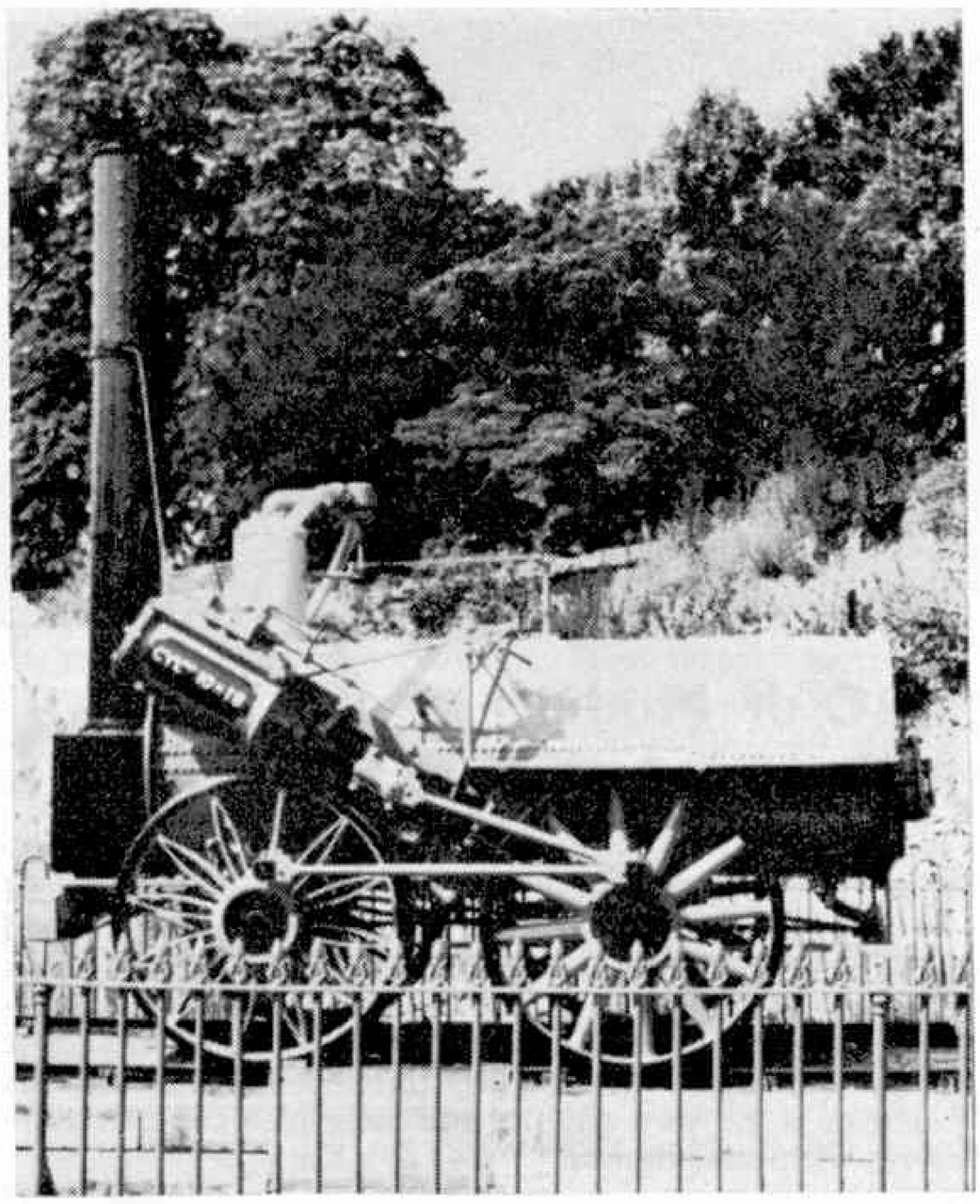
Heading picture: The nameplate from " Battle of Britain " class Pacific " Tangmere " which stands at the entrance to R.A.F. Tangmere. Below: Front and rear views of the famous " dummy " houses at 23 and 24 Leinster Gardens, Bayswater.



Farrington Gurney, Somerset, where you can still see where the old booking office was built into the side of the village inn, with a board above which announced "Passengers requiring tickets up to 7.0 pm on Weekdays are requested to ring the bell. After that time and on Sundays, passengers without tickets should notify the Guard on joining the train." The board has been moved but you may be lucky enough to get it brought out for photography.

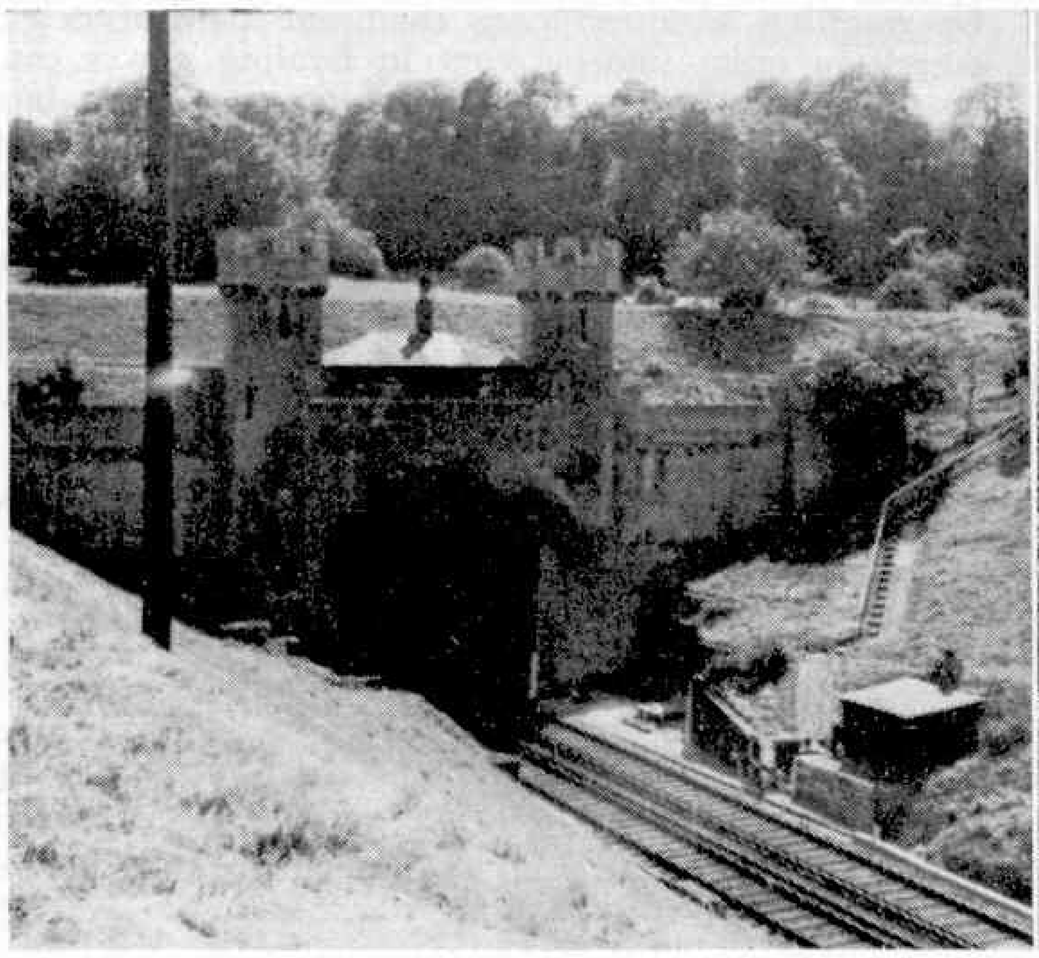
North-east to Tetbury, Glos., where, in 1960, the Western Region opened the Trouble House Halt beside the Trouble House inn on the Kemble-Tetbury line, said to be the only inn with its own railway station. The incidents connected with the old inn are all recorded on a fascinating signboard. But we cannot stay long as we are off to Warwick, one of several places where—near the railway station—you'll find old inns with signs illustrating railway history. Here, the Great Western Arms has the signboard showing the famous engine *North Star*, designed and built by Robert Stephenson in 1837 to haul the first passenger train from Paddington to Maidenhead. The engine was broken up in 1906 but a lifesize replica was made for the G.W.R. Museum, Swindon. At Bearwood, Birmingham, a surprise—over a shop is a full-size railway signal, brought from Stafford where it operated for 50 years and now a photographer's priority. Crossing towards Rugby, we see what look like turrets of ancient castles but, as we come up to them, smoke emanates, indicating that they are "dummies" over a long tunnel, though, with modern trains, we shall find some difficulty in tracing "smoke-signals" and maybe the castles will disappear?

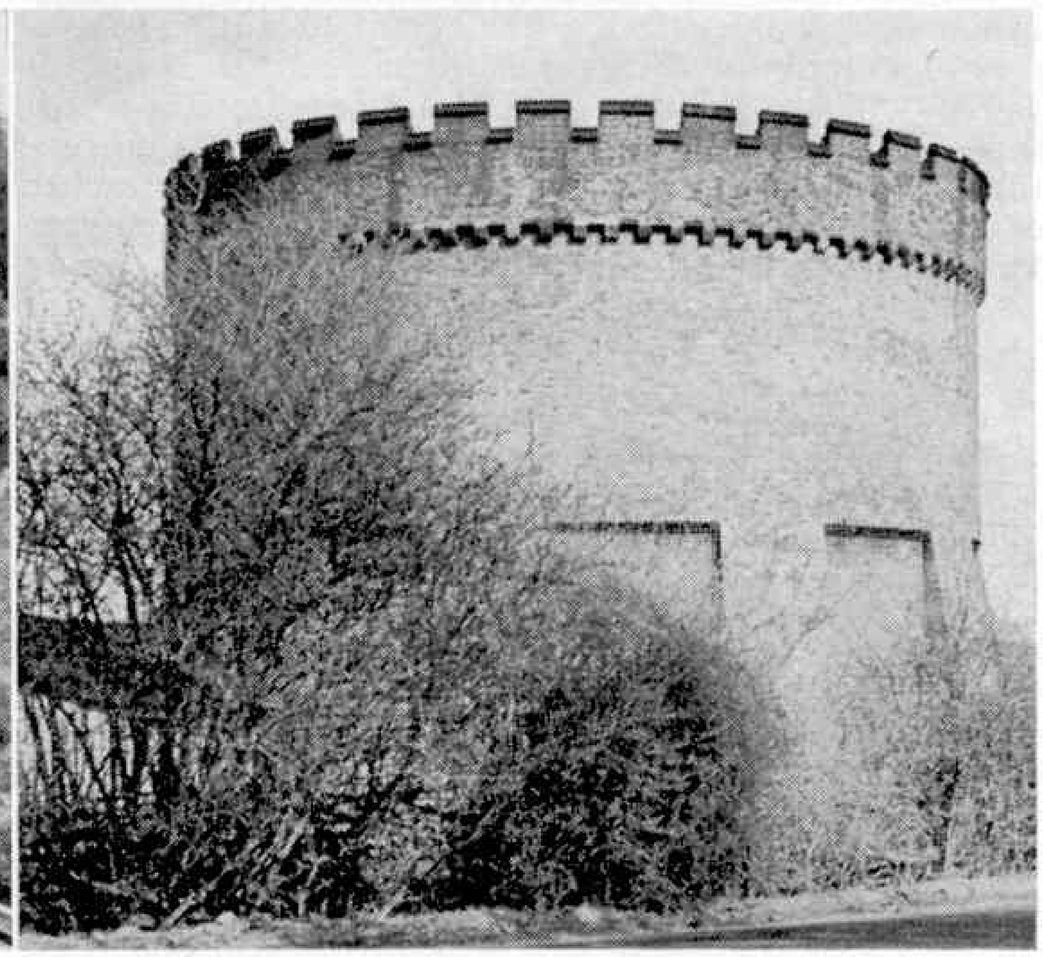
Many churches and churchyards contain epitaphs to railwaymen and doubtless you have seen both sad and amusing verses. One, in the fine cathedral at Ely, commemorates two men who died on 24th December, 1845, and since they are given a splendid stone headed "The Spiritual Railway" it is possible the men were railway servants—perhaps even involved in some accident. Out on the open road are still to be found illustrated level crossing signs, much older than today's continental-style roadsigns and it may be worthwhile snapping these before steam is a thing of the past. As we now approach London, coming from the eastern counties, the paltform at Rochford, Essex, is worth a brief call, with camera at the ready, to photograph a four-language sign placed there for the benefit of those using Southend Airport. Perhaps not the only such sign in England but—with discussions now in progress for a station actually on the airport, the sign may not remain indefinitely at Rochford. So we end the trip and I hope it has added a little to your knowledge of railway relics. Please let the Editor know of any others.

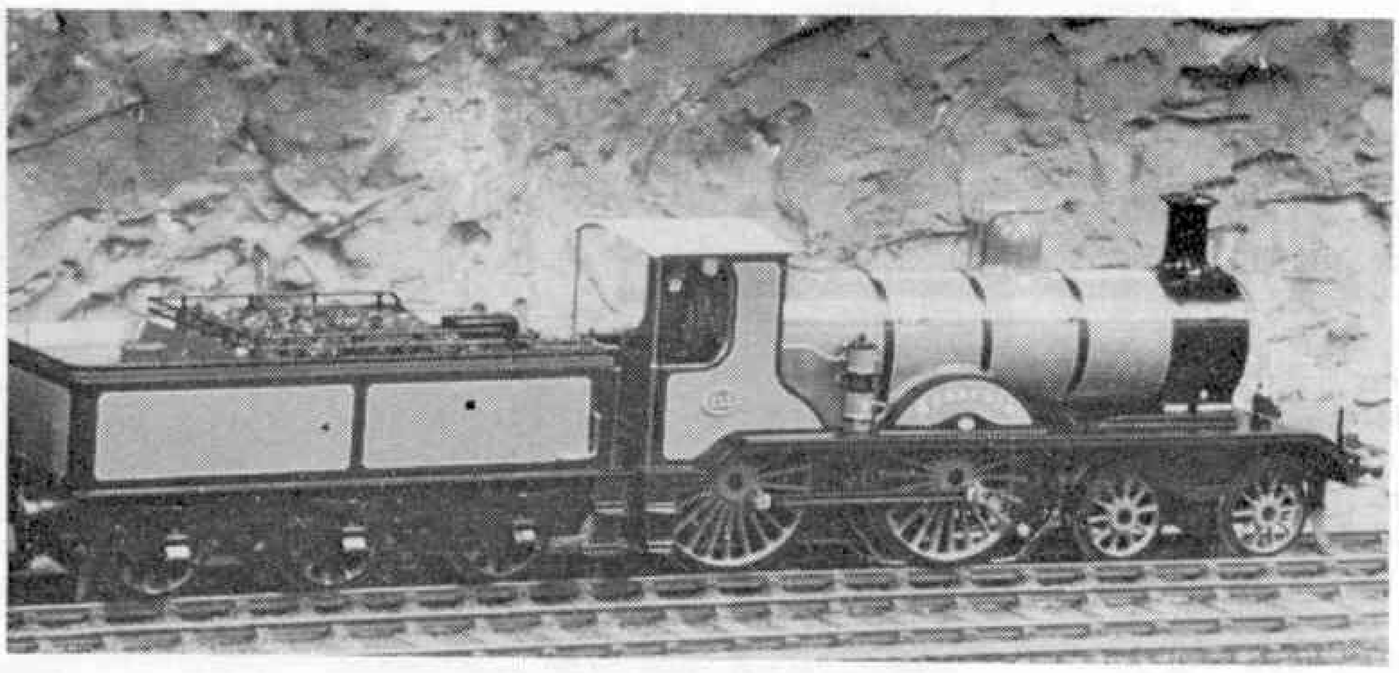


The Canterbury and Whitstable Railway "Invicta" of 1830, which worked the first passenger train through the first railway tunnel in the world. The locomotive is preserved to this day close to the Canterbury city walls.

The left-hand picture shows the magnificent "fortified" entrance to Clayton Tunnel on the London-Brighton line, between Burgess Hill and Brighton. There is a small house above the tunnel mouth, between the towers. The picture on the right shows one of the castle-like smoke ventilators of Kilsby Tunnel, near Rugby.







This very fine O gauge model represents one of the famous 4-4-0 express engines of the old London, Brighton and South Coast Railway. First introduced in the 1890's, they were very modern machines in their time. As the cylinders are inside the frames, only coupling rods are visible. The object alongside the boiler, between the driving wheel splashers, is the air pump, which supplied compressed air to the train braking system. The livery of the locomotive is mustard yellow.

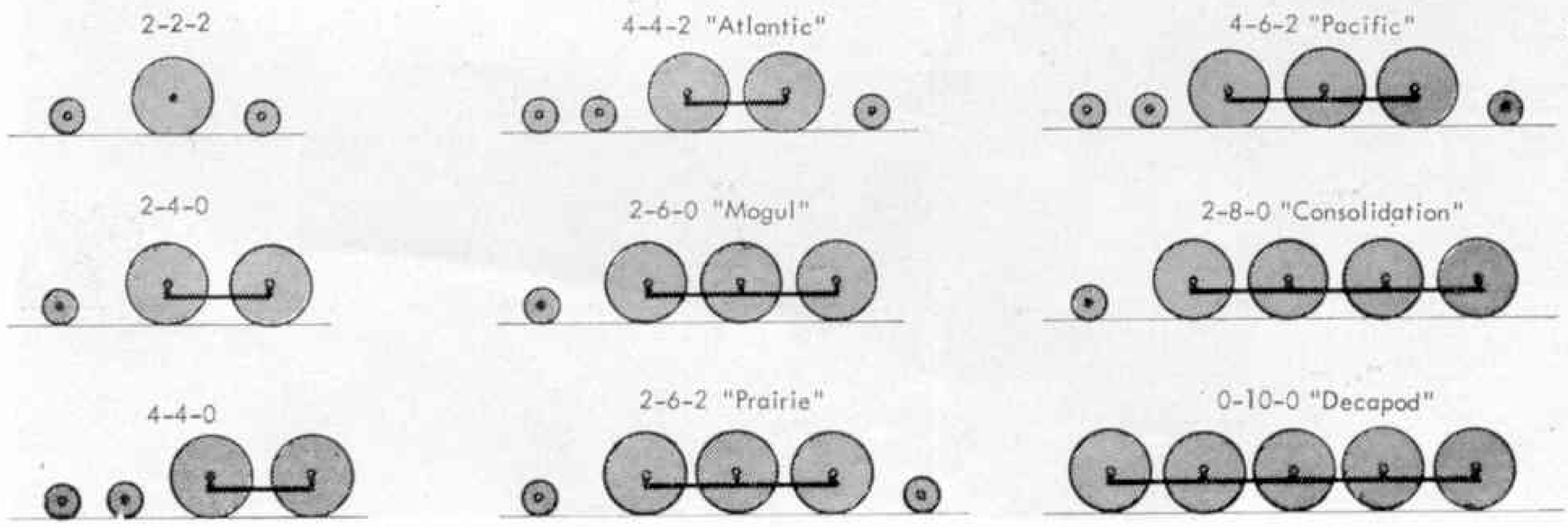
ABC of Model Railways Part 2 Steam Locomotives

LAST MONTH, we discussed the terms "scale" and "gauge" as applied to railways both real and model. In this article, we shall look at the various terms applied to locomotives, and perhaps dispel some common misunderstandings. For the moment, we shall not worry too much about the functions of the various parts of a railway engine, but will just concern ourselves with their names.

Wheel combinations

When describing a steam locomotive, a good place to start is with the wheels, which can be divided into two categories: "Driving" wheels, and "Carrying" or "Idle" wheels. The driving wheels, as the name implies, are the ones which are actually driven round, by direct connection with the cylinders, and propel the locomotive along the track. The carrying wheels do not transmit any power, but merely support part of the locomotive's weight, either in front of or behind the driving wheels. The driving wheels are always much larger in diameter than the carrying wheels; most modern express engines have driving wheels of well over 6 ft. in diameter, while the carrying wheels are usually half that size. The diagram shows some of the wheel arrangements which have been most common in the British Isles during the Age of Steam. The system of describing these wheel arrangements is known as the "Whyte Notation," an idea from America which first came into use here in the early years of this century. The first figure in the code stands for the number of carrying wheels (counting both sides of the engine) *forward* of the driving wheels. The second figure stands for the number of *coupled* driving wheels, and the last figure denotes the number of carrying wheels *behind* the driving wheels. Thus a 4-6-2 locomotive has four carrying wheels (two each side) followed by six coupled driving wheels (three each side), with two more carrying wheels (one each side) right at the back, under the cab. It is interesting to note that, on the Continent, a slight modification of the Whyte Notation is used; the number of *axles* is counted instead of the number of wheels. Thus a 4-6-2 becomes a 2-3-1.

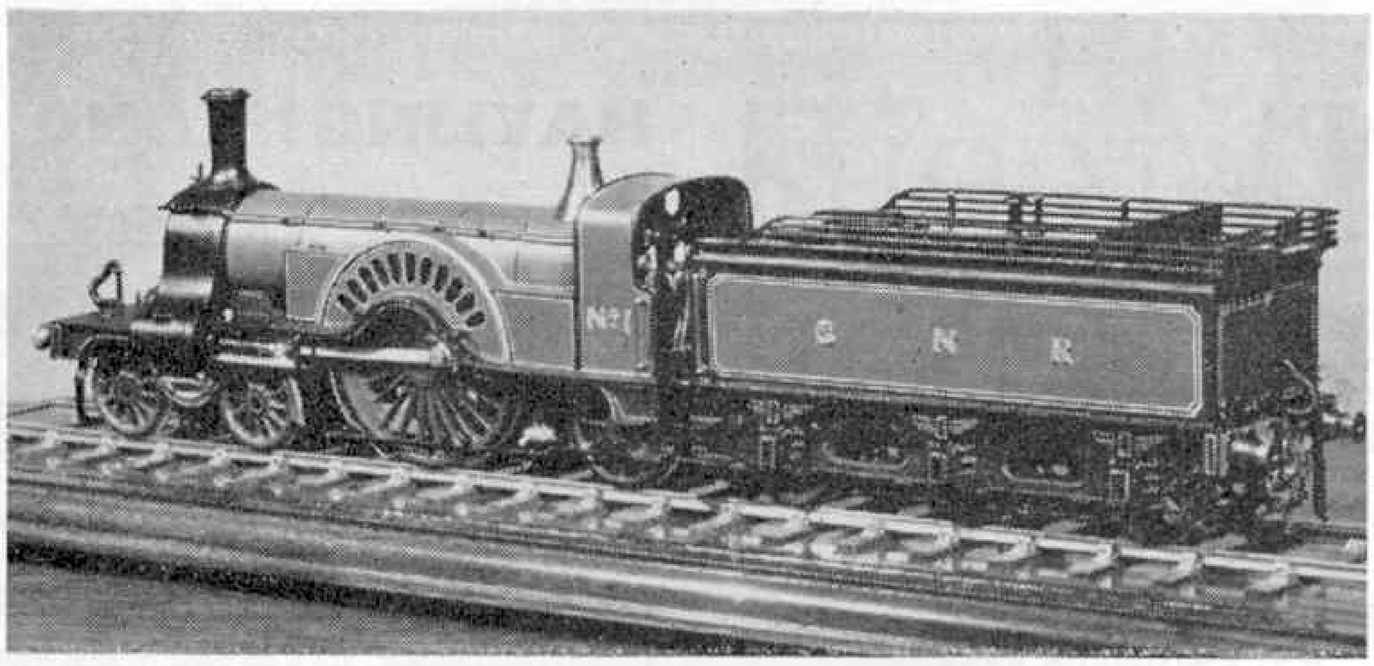
When four carrying wheels are arranged on a movable sub-frame, the whole unit, as most of you will know, is called a "bogie." However, when only two wheels are so arranged, the complete unit is correctly named a "truck"—a "two-wheeled bogie" is really a contradiction of terms. Some of the more common wheel arrangements have acquired names in addition to the usual code, and these names, which also originate in America, are widely used in railway circles. All 4-6-2's are "Pacifics," 4-4-2's are "Atlantics," 2-6-0's are "Moguls," 2-6-2's are "Prairies," 2-8-0's are "Consolidations" and the very rare 0-10-0's are "Decapods." In the very earliest days of railways, locomotives like Stephenson's "Rocket" had only one driving axle, but it was realised, even at that time, that by coupling together more than one pair of driving wheels, a great improvement in hauling power could be obtained. Strangely enough, some 60 years later, there was a revival of the use of engines with single driving wheels, which were used for hauling light, fast trains. Several types were built during the closing years of the 19th century, particularly by the London,



THE WHYTE NOTATION

One or two of the more common wheel arrangements of British steam locomotives.

The model on the right is a replica of one of the most famous "singles" ever to run in Britain. She was number one in the Great Northern Railway's fleet, and has outside cylinders and a domeless boiler. The large splashers have decorative perforations—a tricky task for the modeller! The picture below shows one of the perky little J69 class 0-6-0 tanks which were once a familiar sight at Liverpool Street station. A typical example of a small tank engine with inside cylinders.



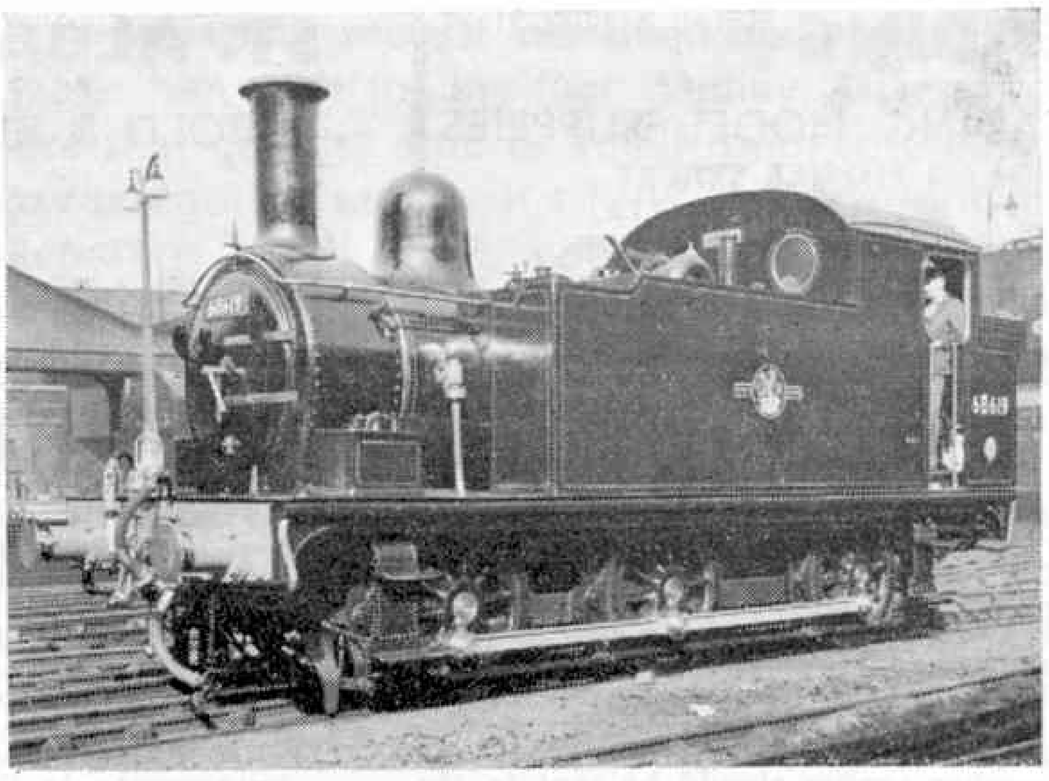
Brighton & South Coast and Midland Railways. With their large single driving wheels, unencumbered by coupling rods, they were very handsome engines indeed.

Cylinders

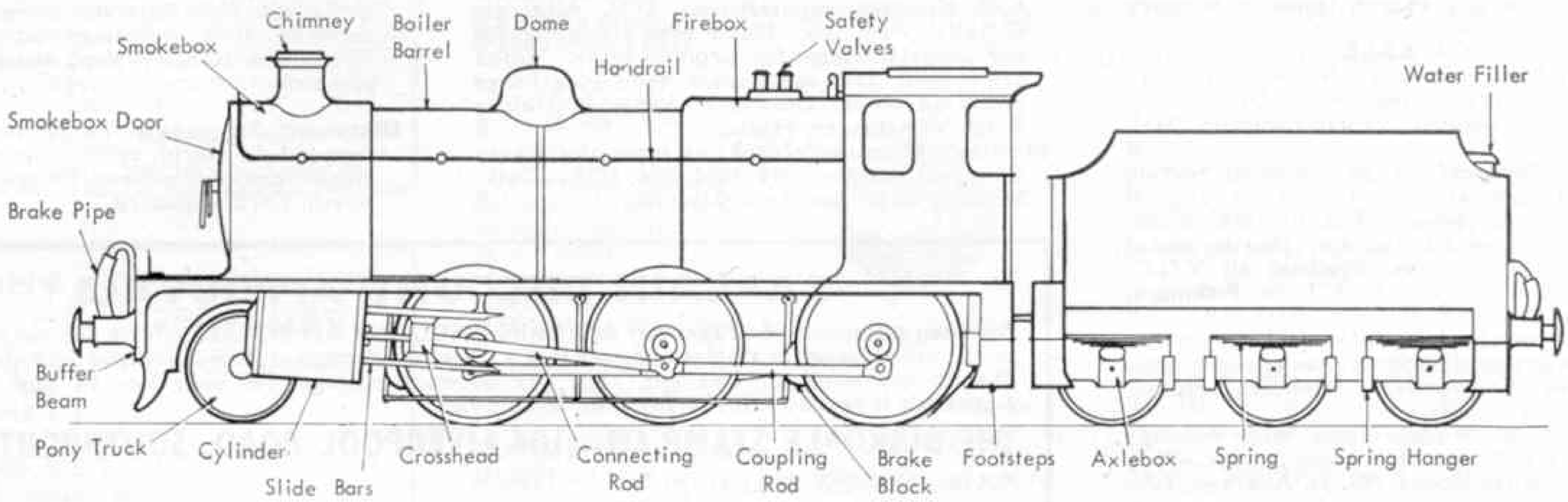
An aspect of locomotive design which has a great effect on the engine's outside appearance is the positioning of the cylinders. On the older engines, these were usually positioned between the frames, and so were quite invisible from the outside, coupling rods only connecting the driving wheels together. This meant, of course, that the connecting rods, which connect the pistons to the wheels, together with the complicated system of rods which operates the valves, all lay between the frames of the locomotive, under the boiler. This arrangement is wonderful from a modeller's point of view, as so many working parts are hidden from view, and need not be modelled; in actual practice, however, the system made maintenance difficult, and nearly all relatively modern steam locomotives have the cylinders, connecting rods and valve gear outside, and in full view. Valve gears themselves form a fascinating, but very complicated, subject, which we will talk about in a later article.

Superstructure

Having dealt with wheels and wheel arrangements, we now turn to what might be termed the "superstructure" of a steam locomotive. The time-honoured profile is so well known (we hope!) that we hardly need to describe it in detail here, and all railway-minded readers will be familiar with the difference between a tender engine and a tank engine. However, one or two terms do cause some confusion among newcomers to the hobby, and we hope to clarify these, with the aid of the drawing. The term "footplate" applies, not only to the space in the cab where the crew stands, but to the whole platform, from one end of the locomotive to the other, on which the cab and boiler rest. The boiler itself is always in three distinct parts; the smokebox at the front, the boiler "barrel" in between, and the firebox (in fact, the furnace) at the rear. The chimney is always called such, *never* a "funnel." The cab may have windows in the sides, but the circular windows in the front of the cab are always called "spectacles." The small mudguards over the driving wheels are known as "splashers." Most of the remaining terms will be made clear by referring to the drawing; they are all simple enough, but worth knowing.



Some of the more important components of a locomotive



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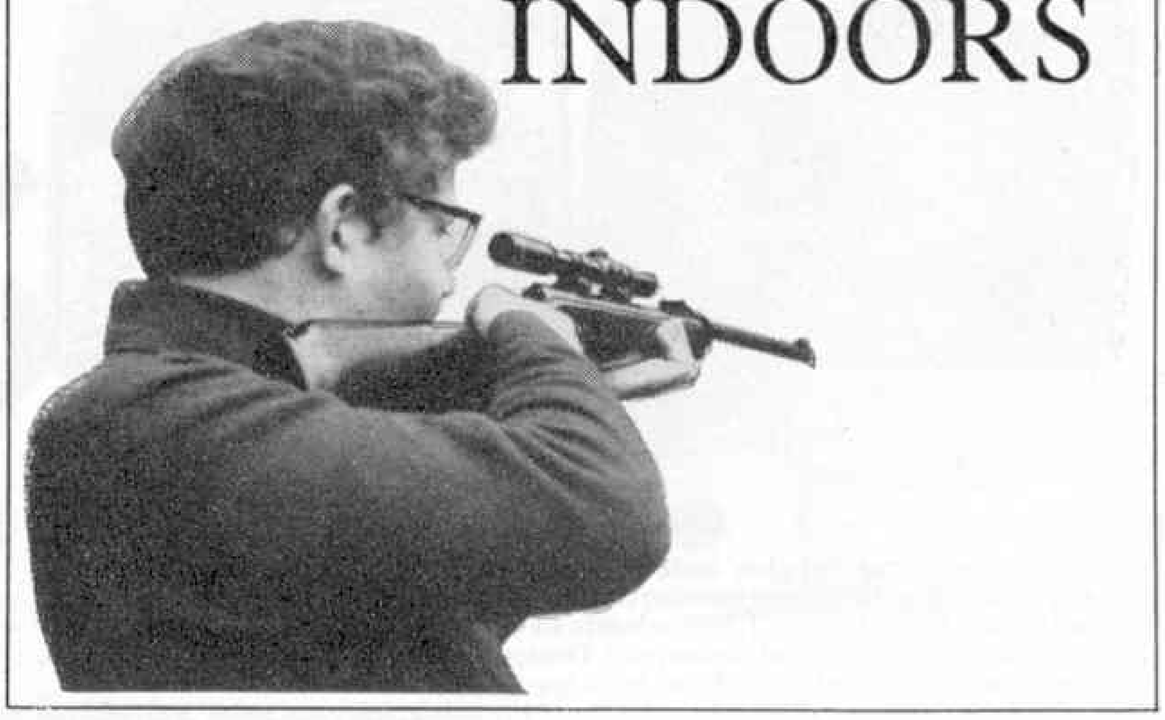

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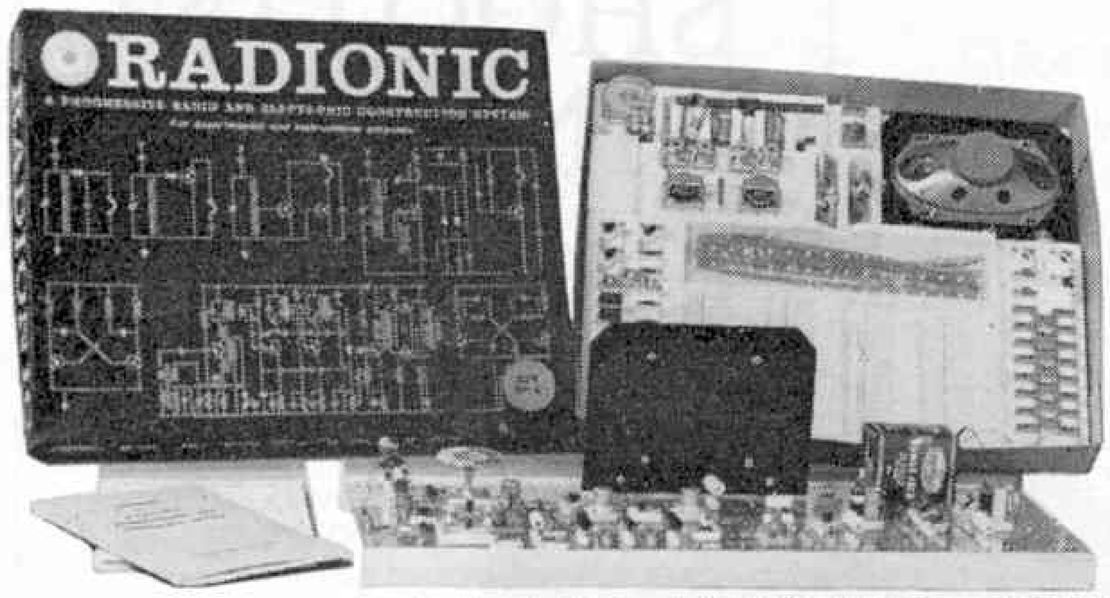

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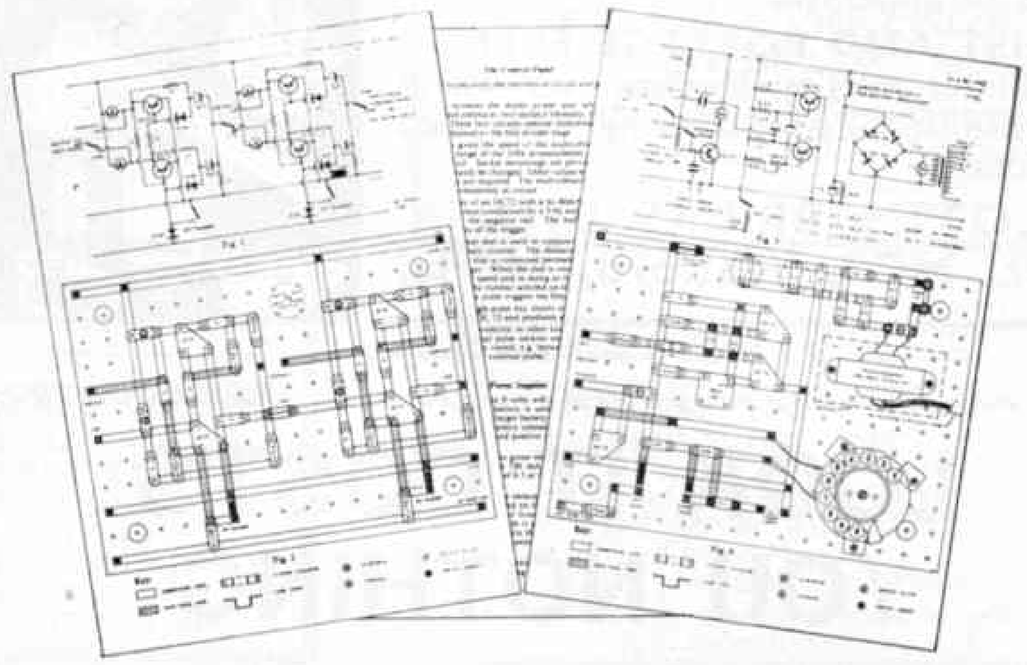

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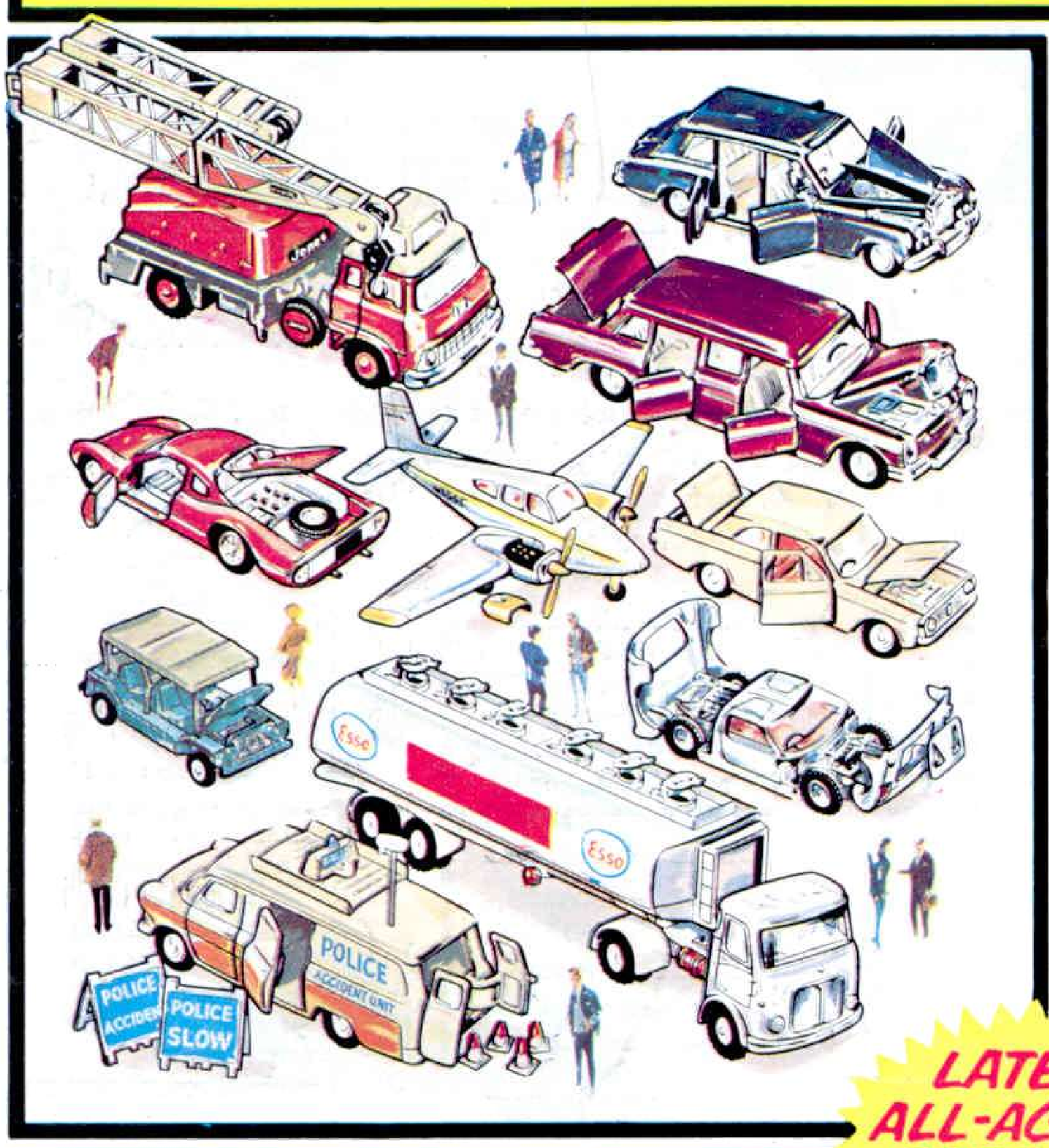

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