MECCANO® Magazine

MAY 1969

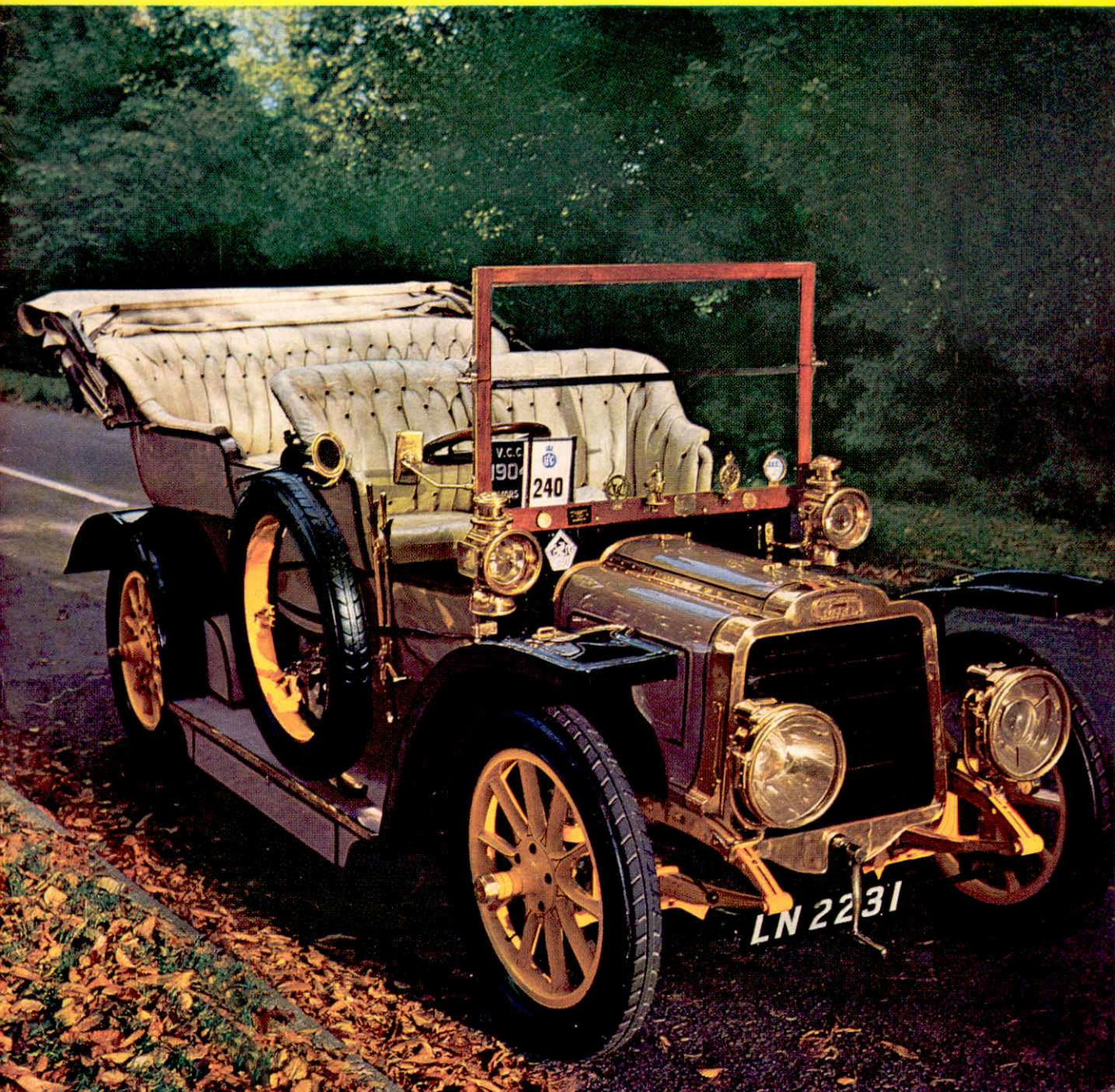
TWO SHILLINGS AND SIXPENCE

U.S.A. AND CANADA 60 CENTS.

MAP HOBBY MAGAZINE

★ VETERAN CARS ★ WINDMILLS ★
BATTLE ★ STEAM CARS ★ STAMPS
RO 80 DINKY MODEL ★ MECCANO LOCO

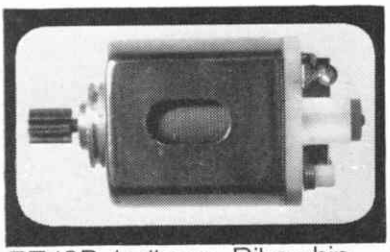
RAILWAYS PLASTICS AEROMODELLING BOATS CARS STAMPS MECCANO SCIENCE



WE'VE GONE MAD!

LOOK AT THIS FOR

RIKO regd. **49/11** RIKO regd.



FT16D ballrace Rikowhip

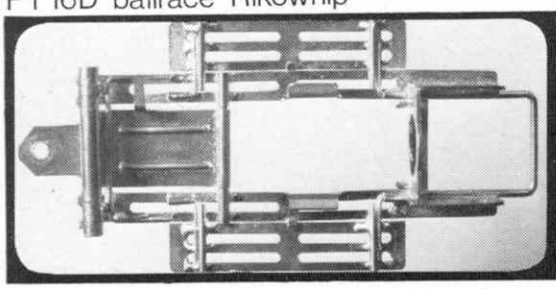
NEW! SUPER KITS

Ford GT MK IV | Ford GTP J

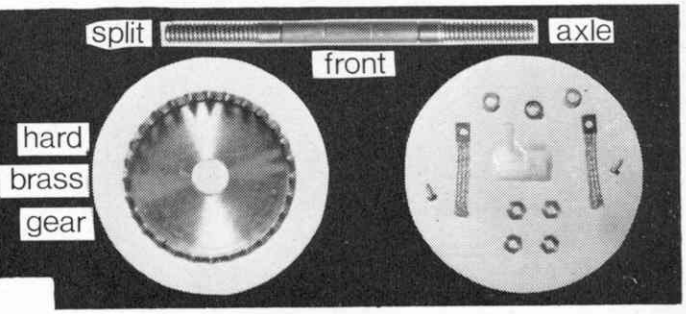
Ferrari 330 P4 | can-am Ferrari P4

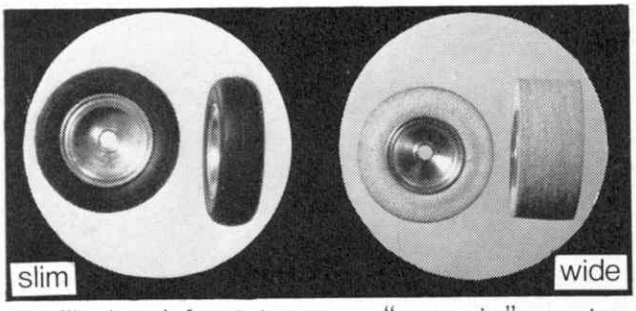
Iso-Grifo | Howmet TX Turbine

Mercedes 230 SL | Ford Mirage

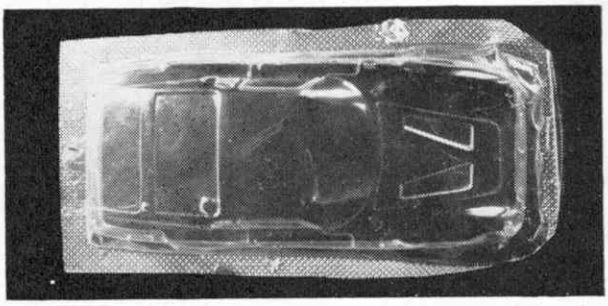


ultra-low slotted lightweight chassis





profile hard front tyres "spongie" rear tyres



Riko vac-formed body

HURRY TO YOUR LOCAL MODEL SHOP AND GET THIS KIT BEFORE WE COME TO OUR SENSES!

RIKO regd. RICHARD KOHNSTAM LIMITED RIKO regd.

13-15a High Street · Hemel Hempstead · Hertfordshire ·

MECCANO® Magazine

MAY 1969 VOLUME 54 NUMBER 5

Meccano Magazine, founded 1916.

Editorial Director
D. J. LAIDLAW-DICKSON

Editor
DAVE ROTHWELL

Consulting Editor for Meccano Ltd.
J. D. McHARD

Advertisement Manager
ROLAND SUTTON

MAP **HOBBY MAGAZINE**

FRONT COVER

Looking much as it must have done when it was driven gently out of the showroom 65 years ago, is the immaculate Veteran that graces our cover this month. The car is a 1904 Mors, with a Roi-des Belges body and was photographed by Stephen Goodger whilst its occupants were taking a short break, during last year's R.A.C. London to Brighton Veteran Car Run.

NEXT MONTH

A simple working model submarine, capable of diving to a depth of 5 ft., is the main feature of the June issue. The original model was built from a piece of firewood and is simple enough for most modellers to build in a couple of evenings. Traction and Showmans Engines form the basis for another interesting feature, written for us by enthusiast John Haining.

Meccano Models include a Telescopic Jib Crane for advanced builders, a Commutor Car for builders with a small amount of experience, and a Model of Stephenson's Rocket for Beginners. All the usual favourites are included, Battle, Air News, Great Engineers, Stamps, plus other interesting articles on various subjects.

Advertisement and Subscription Offices: Model & Allied Publications Ltd., 13-35 Bridge Street, Hemel Hempstead, Hertfordshire. Tel.: Hemel Hempstead 2501-2-3.

Second class postage rates paid at New York, N.Y. Registered at the G.P.O. for transmission by Canadian Post. American enquiries regarding subscriptions, news stand sales and advertising should be sent to MECCANO MAGAZINE, Eastern News Distributors Inc., 155 West 15th Street, New York, N.Y. 10011 U.S.A., U.S.A. and Canada direct subscription rates $5 including index.

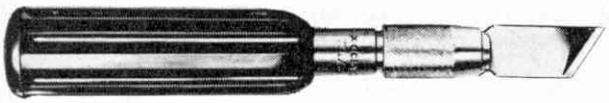
Publishers of Aeromodeller, Model Boats, Model Cars, Model Engineer, Radio Control Models, Model Railway News.

CONTENTS

MODEL & ALLIED PUBLICATIONS LTD.
13-35 BRIDGE STREET, HEMEL HEMPSTEAD, HERTFORDSHIRE

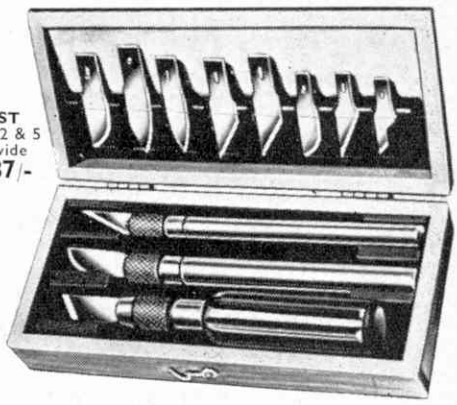
X-ACTO THE BEST IN KNIVES AND KNIFE SETS

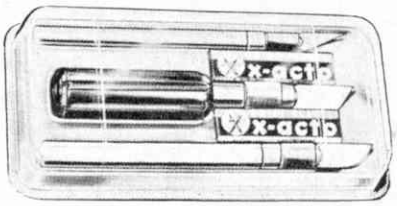
No. 2 Heavy aluminium handle (with blade) **4/9**



No. 5 For all heavy cutting (with blade) **8/10**

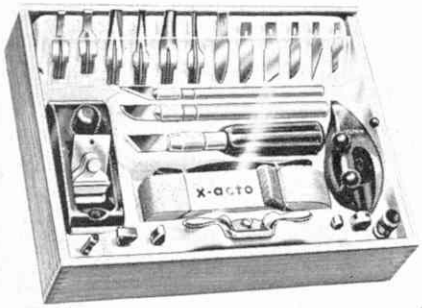
No. 82 KNIFE CHEST Contains Nos. 1, 2 & 5 Knives, plus a wide assortment of blades **37/-**





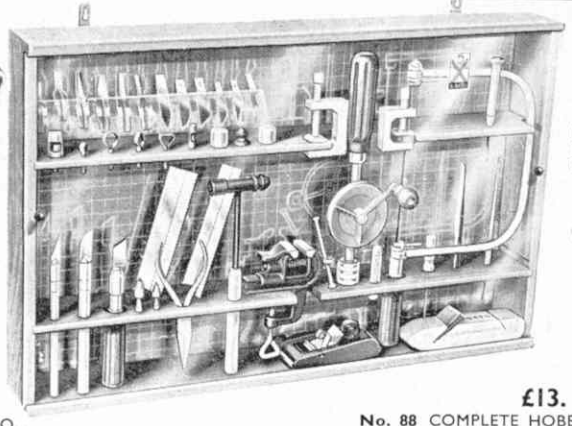
No. 81 KRYSTAL-PAK KNIFE SET – Nos. 1, 2 and 5 Knives with 10 extra assorted refill blades in clear plastic case which serves as permanent container **27/6**

TOOLS AND WOOD CARVING SETS



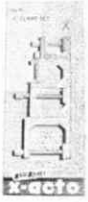
No. 84 KNIFE AND TOOL SET Contains Nos. 1, 2, 5 knives and an entire asst. of blades, gouges, routers, punches. Has X acto planer, 1" sander, spokeshave, balsa stripper. In wooden box, complete with see-thru cover and fitted plastic tray insert that holds and shows every tool. **£4. 7. 6**

No. 78 DE-LUXE WOODCARVING SET Nos. 1 and 5 knife handles with 6 gouges, 4 routers, 6 regular blades and 2 3" blades mounted on wooden base. ... **46/3**



No. 46 4 CLAMPS **17/9**

No. 40 BLOCK PLANER **7/9**



No. 41 SANDER **4/-**

No. 53 RAZOR SAW 2 Blades **13/9**

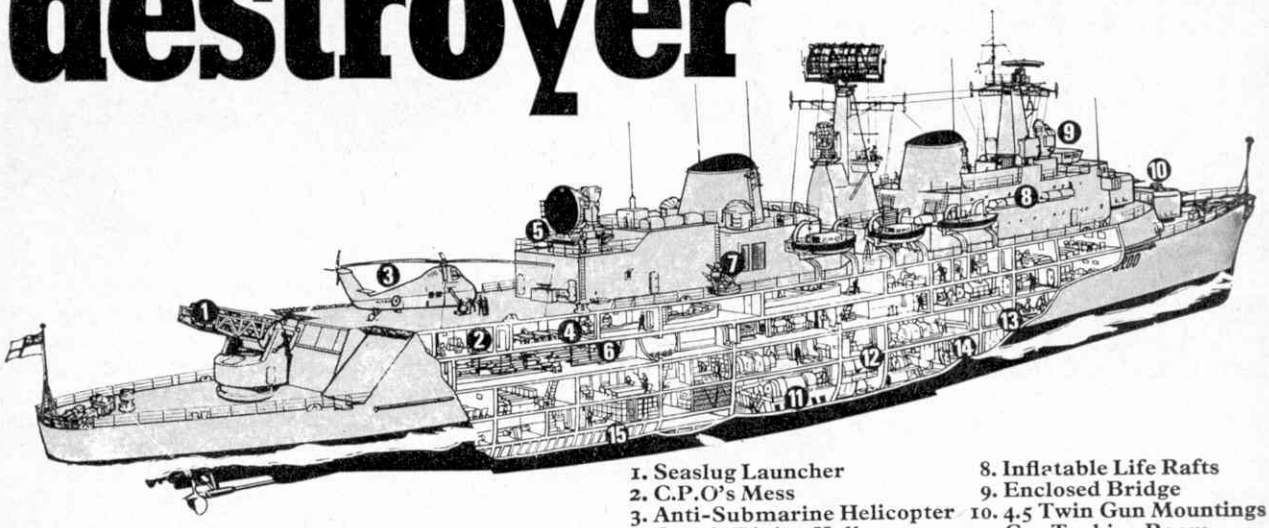
£13. 3. 0.

No. 88 COMPLETE HOBBY CHEST Modern, functional packing shows off the X-acto full assortment of hobby tools, knives and blades against a blueprint silhouette background of each tool, for easy replacement. Comes in a sturdy wooden fitted cabinet with new, sliding see-thru cover.

No. 86 BURLINGTO HOBBY CHEST Complete selection of tools in fitted cabinet **£5. 3. 0**

X-ACTO TOOLS ARE OBTAINABLE FROM KEILKRAFT AGENTS

The missile-age destroyer



1. Seaslug Launcher
2. C.P.O's Mess
3. Anti-Submarine Helicopter
4. Crew's Dining Hall
5. Missile-Guidance Radar
6. Missile Stowage
7. Close Range Anti-Aircraft Missiles
8. Inflatable Life Rafts
9. Enclosed Bridge
10. 4.5 Twin Gun Mountings
11. Gas Turbine Room
12. Gearing Room
13. Boiler Room
14. Steam Turbine Room
15. Fuel Tanks

She's large. Displacement 6,000 tons. Length 520 feet. She's more than a match for a squadron of wartime cruisers. And she has just about everything.

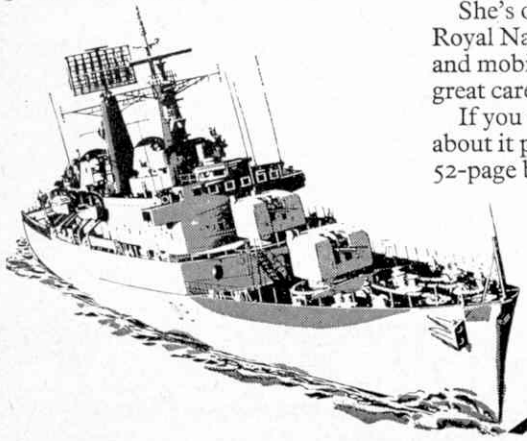
Her Seaslug missiles can blast distant aircraft out of the sky – before the eye can see them. Her Seacat missiles destroy any aircraft that come near to the ship. She has four radar controlled semi-automatic 4.5 inch guns. The latest anti-submarine weapons–including a Wessex helicopter armed with an underwater detection device and homing torpedoes.

She has stabilisers. Air conditioning. An automatic helmsman that can steer the ship. Even her own TV studio.

In the centre of the ship is the operations room. Here the Captain can 'fight the ship'. Here radar screens and sonar detect everything in the air, on the sea and underneath it – giving him an up-to-date tactical picture.

She's one of the new ships of the Royal Navy. A navy that is all muscle and mobility. A navy that offers a great career to keen young men.

If you would like to know more about it post the coupon for the free 52-page booklet.



Entry as an officer. Are you aiming for at least 5 G.C.E. 'O' levels – or equivalent? Then you could apply now, even at the age of 14, for entry between 17 and 19½ as an officer in the Royal Navy. Don't fill in the coupon, but write for full details to Captain W. J. Graham, R.N., Officer Entry Section (703YL4), Old Admiralty Building, London S.W.1.

Royal Naval Careers Service (703YL4), Old Admiralty Building, London, SW1.
Please send me, entirely without obligation, the 52-page booklet 'The Royal Navy as a Career'.

Name

Address

Date of birth
(Enquiries from U.K. residents only.)

Royal Navy

Jaguar air rifles come neatly packed with Pellets, Darts, Targets, Target Holders and Rifle Oil For only £7.7.4

Trust Webley to take care of young shots

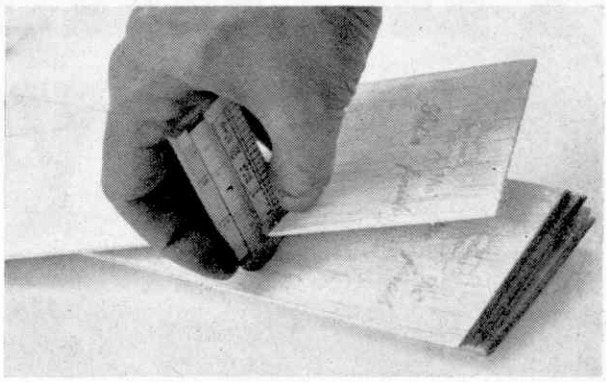
Young shots get shooting right away with the Jaguar kit. It's all there neatly packed with the .177 Calibre Jaguar air rifle. This attractively priced air rifle is precision built, and the barrel is machine-cut rifled for extra accuracy. Other fine air rifles from Webley include the Falcon, which is available in two power calibres, .177 for accurate target shooting and hard hitting, .22 for outdoor use. Trust Webley to take care of your young shot.

Webley Jaguar air rifle

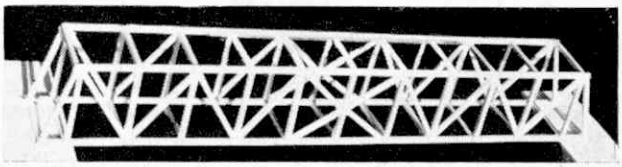
Write for illustrated brochure today, enclosing 4d stamp please, to:
Webley & Scott Ltd. (Inc. W. W. Greener Ltd.),
Dept. MM/AW4/4 Park Lane, Handsworth, Birmingham 21.
Tel: 021-553 3952

WEBLEY

MAKING MODELS WITH Solarbo BALSA



Solarbo Balsa is an *engineering material*—accurately machine finished to standard sizes, after being *kiln-dried* (that stabilises the wood), and meticulously *graded* by *density* and *quality*. We reckon model engineering requirements are more exacting than most 'full size' engineering applications of Solarbo Balsa, so that's why the Solarbo sheet, strip and block which you can buy at your local model shop is 'AA' or 'AAA', *the top grades* of balsa. And you can use it for 'engineering' jobs—like building model bridges, for example. That's what is special about Solarbo Balsa—it really is an *engineering material*.



Of course, you may not want to build bridges! But if you would like to try some other 'model engineering' projects with a difference, send for some of the plans listed below.

Please send me the plans marked. I enclose Postal Order value 1/-/2/6* as per your special Meccano Magazine offer. (Plan prices—Four for 1/- or all Twelve for 2/6 post free.)

- ☐ WORKING MICROMETER
- ☐ SLIDE RULE
- ☐ CALIPER RULE
- ☐ CIRCUMFERENCE MEASURE
- ☐ TWO-STROKE ENGINE
- ☐ EGYPTIAN SUNBAR
- ☐ CLINOMETER
- ☐ TEMPERATURE CONVERTER
- ☐ MODEL ACRE & HOUSES
- ☐ TIDE CALCULATOR
- ☐ CUBES
- ☐ UNIT COUNTER

NAME.....

ADDRESS .....

M/M .....

Solarbo LTD.
COMMERCE WAY, LANCING, SUSSEX

LOOK IT COSTS YOU NOTHING

To find out more about the many interesting products advertised in this issue of MECCANO Magazine, just tick the squares against the name of the advertiser from whom you would like to receive more product information and post it to: Advertisement Information, Meccano Magazine, 13/35 Bridge Street, Hemel Hempstead, Herts.

MAY COUPON

- ☐ Beatties
- ☐ A. N. Beck & Sons
- ☐ Humber Oil
- ☐ Keil Kraft
- ☐ R. Kohnstam
- ☐ Model Hobby Products
- ☐ Parker Hale
- ☐ Radio Control Supplies
- ☐ Radionic Products
- ☐ Royal Navy Recruiting
- ☐ Solarbo
- ☐ Subbuteo Sports
- ☐ Webley & Scott

Name.....

Address.....

.....

WORKBENCH

Tegestology

I wonder how many of you know what Tegestology is? We must admit that until the other day, no-one here at the office had any idea! This very unusual name is the official title given to the hobby of collecting beermats, so we are informed by "The British Beermat Collectors' Society". The name derives from the latin "Teges", which literally means "door-mat", but which the collectors have simply translated as "mat". Founded in 1960, and with comedians Morecambe and Wise as Honorary Joint Presidents, the society is rapidly growing in membership and has its own monthly magazine. If you are interested in learning more about this unusual hobby, contact the Hon. Secretary D. V. Preedy, 142, Leicester St., Wolverhampton, Staffs.

"Mini Copter Men"

Our photograph below shows Meccano Magazine readers David Heathcote and Phillip Bamber with their "Mini Copter" built from a Meccano Magazine Plan, featured in the May 1968 issue. David and Phillip built the model for a school craft lesson, and it looks as though they have made a splendid job of it.

Railway Exhibition

Readers living in, or near Sheffield will be interested to know that the Sheffield Model Railway Exhibition will be held from Thursday, 29th May to Sunday, 1st June in the Culters Hall, Church Street, Sheffield. Admission charges are: Adults 2s. 6d.; Children 1s. or 5s. for a family group. The Exhibition will be open from 10.00 a.m. to 9.30 p.m. daily apart from Sunday when it closes at 5.30 p.m.

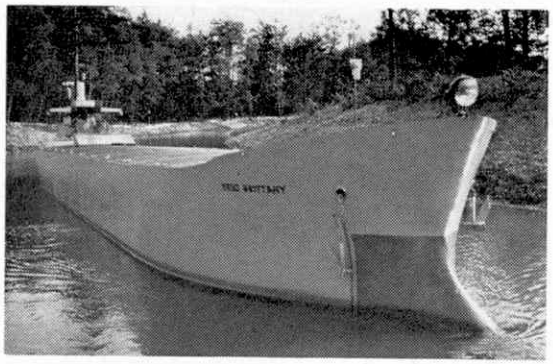
In the March issue we included a paragraph on the Meccano model building competition held at the Daily Mail New Year Show, and stated that the winner, Peter Blunden of Ealing received a No. 6 Meccano outfit for a prize. As Peter already owned such an outfit he was given the choice of selecting another from the Meccano range, and subsequently decided upon a Power Drive Set.
Our photograph shows Peter receiving his prize at Triang House, from the Managing Director of Meccano Ltd., Mr. H. J. Fallmann.

Your Contributions

We would like to remind readers that we are, as ever, pleased to consider contributions for possible publication in Meccano Magazine, particularly those describing outdoor activities, such as canoeing, hiking, scouting, etc. Ideally articles should be accompanied by a selection of good quality black and white prints, and whenever possible, complete with negatives. Payment for articles used is good, varying slightly according to quality and type of material submitted. Material for consideration should be addressed to the Editor and include a stamped, self addressed envelope.

Disappearing Miniatures

Still on the subject of magazine content, only five readers wrote in to enquire as to what had happened to the article "Introducing the Mammoth Miniatures," which although included in the contents list was not anywhere to be found inside last month's magazine! A last minute re-shuffle of the articles was carried out, during which, revision of the contents page was overlooked, also resulting in one or two other articles appearing on pages other than the ones shown. To put matters right we include "Introducing the Mammoth Miniatures" in this issue, with our sincere apologies for the errors.



Left: A 1/25th scale model of the 190,000 ton tanker ESSO BRITTANY gently negotiating a bend in the 'Suez Canal'.

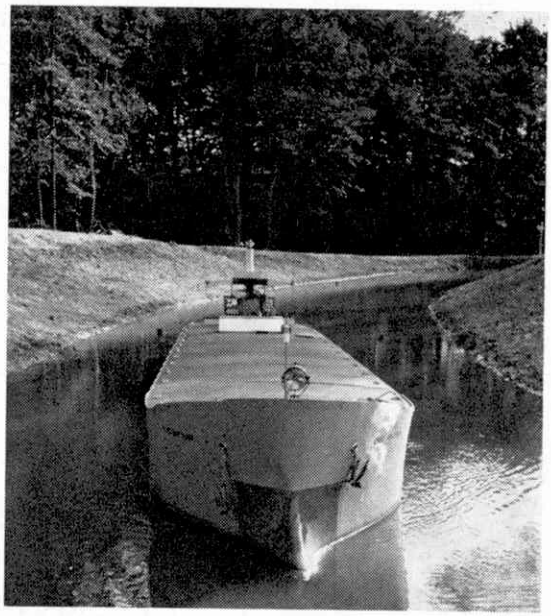
INTRODUCING THE MAMMOTH MINIATURES

The use of tanker models in training future captains

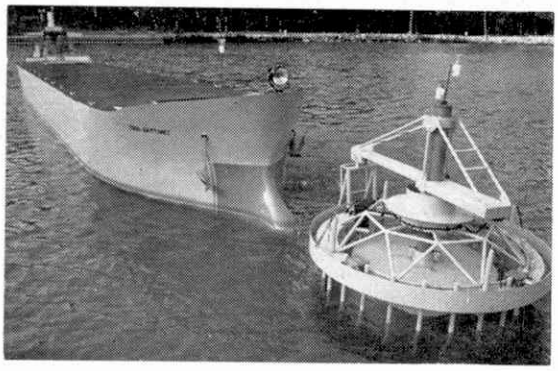
by I. S. BALDERSTONE

FLIGHT SIMULATORS have been in use with the World's Airlines and Air Forces for many years. They reduce the need for costly training flights and represent near-perfect procedure trainers. With Air Traffic Control becoming ever more complex and demanding higher levels of instrument flying skill, flight simulators are making a tremendous contribution to flight safety. On land, too, increasing use is being made of simulators for driving instruction. London Transport, British Rail and many other organisations have adopted simulators as a vital part of basic training and a necessary "tool" with which to maintain the highest operating standards.

In the light of such developments it is perhaps not surprising that one of the leading oil companies has recently introduced a form of simulation in their latest marine training scheme. When the Esso Company first ordered their mammoth 190,000 tonners, it was decided that a completely new form of training centre would be required at which masters of these huge vessels could get the most realistic training possible.



The centre, located at Port Revel, near Grenoble in the French Alps, is quite unlike any other marine research and training establishment in the world. On a small lake, in surrounding woodlands of striking natural beauty, accurate reproductions of actual operating conditions for tankers are being achieved by the ingenious use of greatly scaled-down models. Here exact replicas of very large vessels, reduced to scales of 1 : 40 and 1 : 25, can be made to negotiate a simulated Suez Canal bend, moor at bow-mooring devices modelled on the one at the oil terminal at Marsa el Brega in Libya, and generally carry out the complicated and precise manoeuvres required of a giant tanker more than a thousand feet long. The centre was opened last July, in time to allow a series of training sessions for the masters who are now taking command of the new breed of supertankers. Here at Port Revel, hundreds of miles from any sea or ocean, they can carry out conventional manoeuvres in simulated harbours, canals and the open sea, in many varied conditions by both day and night. It also provides them with the opportunity to discuss with their colleagues the problems of con-

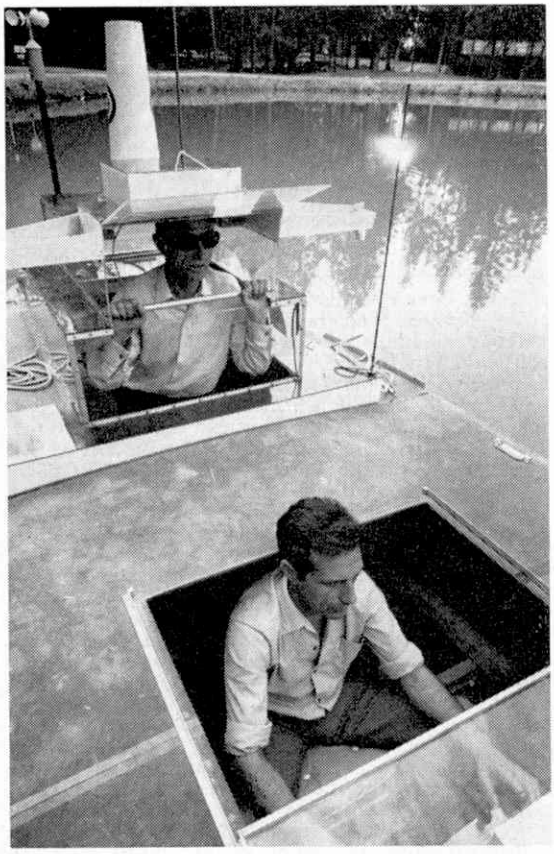


Above: A frontal view of the ESSO BRITTANY. Like the ship, the model of the Suez Canal is built exactly to scale.

Left: The ESSO BRITTANY approaches a scale model of the unique bow securing device in use at the Esso oil terminal at Marsa el Brega, Libya.

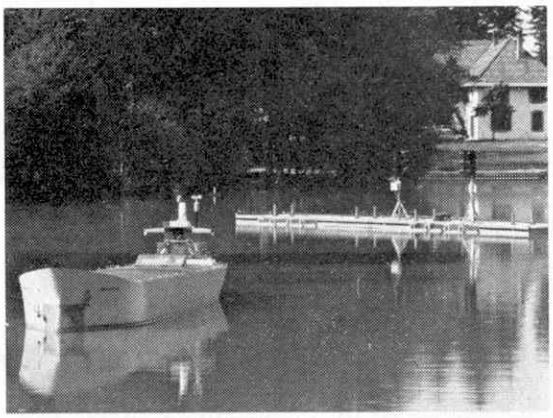
trolling very large ships and to practice coping with unexpected developments in their operation.

In all, there are four model tankers available for training. Two are 1 : 40 models of the Esso class of 80,000 and 190,000 d.w.t. vessels, the remaining two being 1 : 25 models of 38,000 and 190,000 deadweight tonners. The training facility was built for Esso by a French Company SOGREAH (Societe Genobloise d'Etudes et d'Application Hydrauliques). Among the equipment the company have developed for the Training Centre are a wave-making machine, a floating mooring buoy, two channels marked with conventional lighted buoys, and a harbour and dry dock for launching and docking exercises and for maintenance work. Additionally, there are two conventional buoyed sea berths to enable the use of the model's anchors, an observation tower, a rotatable pier with equipment for measuring the vessels' impact when mooring, and floodlights for night operations.



In the foreground of the photo above, the trainee helmsman manoeuvres the model into position. He is directed by the captain sitting at the rear of the model.

During a training course which lasts two weeks, masters spend some ten hours on discussion and study of the equipment used at the Centre. A further fifteen hours are devoted to the theory of ship-handling and accident prevention; while the remaining 45 hours are taken up by actual practice on board the miniature "fleet." In recognition of the vital importance of training and experience in the safe operation of tankers approaching a quarter of a million deadweight tons, the



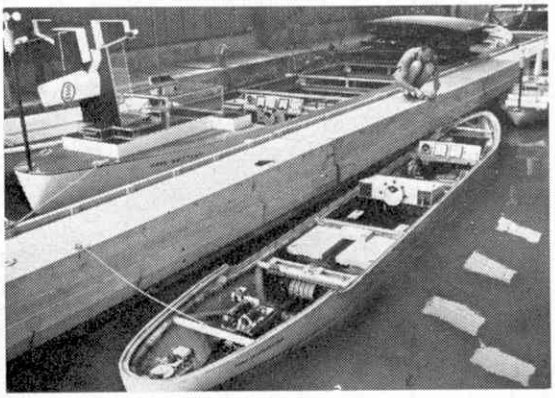
The ESSO BRITTANY leaves the mooring pier, which is equipped for measuring the ship's impact when moving alongside.

facilities available at Port Revel will, in due course, be offered to the masters of other oil companies' fleets. They have already been offered to, and accepted by, pilots whose duties, of course, include work on tankers other than those of the Esso Group.

To familiarize an experienced master with the manoeuvring and operating characteristics of a 190,000 d.w. tonner takes a relatively short time. But in the case of the "operators" (which is the designation by which seamen working in integrated crews will in future be known) a much longer and more flexible period of training and familiarization is needed. Under a recent agreement with the National Union of Seamen, which has led to the formation of integrated crews, a seaman who has spent his seagoing career to date as a deckhand, may now carry out duties in the engine-room or catering department, and vice-versa. Preliminary training for these men is carried out at a Marine Training School adjoining the refinery at Fawley.

The havoc caused by the Torrey Canyon when she ran aground on the Seven Stones Reef off the Cornish Coast, gives even greater impetus to the need for training in the operation of the mammoth tankers of today. These huge ships place even more responsibility upon the shoulders of their masters and crews. That simulation is the newest tool to be enrolled by a leading oil company is proof, if any were needed, that no expense will be spared in securing maximum safety at sea.

In port are three of the scale model ships. Foreground: ESSO PEMBROKESHIRE. Top: ESSO GRENOBLE. Background: ESSO BRITTANY.



THE DISAPPEARING WINDMILLS

SOME INTERESTING DUTCH WINDMILLS DESCRIBED

By H. McDOUGALL

AT KINDERDIJK, near Rotterdam, nineteen windmills operate for a few hours every Saturday afternoon during the months of July and August. With their sails turning effortlessly in the breeze they present a majestic spectacle but the weekly performance is staged solely for the benefit of visitors. None of the windmills earns its keep; they are all museum pieces.

I recently spent several weeks windmill-hunting in the Netherlands, yet only rarely did I see one in operation doing an honest job of work. Of the hundreds that still dot the landscape the majority are ghost-like relics—artifacts of an era long past. But the Netherlands without windmills would be unthinkable and public spirited Dutch citizens are now making great efforts to preserve those that are left.

Although windmills are more closely associated with the Netherlands than any other country, they are believed to have first been used in Persia and to have been introduced into Europe by returning Crusaders. They were used in the Netherlands as early as the year 1200 but it was only when they were adapted to land drainage—about 1414—that they entered their Golden Age.

The Netherlands have always been ravaged by disastrous floods. The great inland sea that, prior to the commencement of the present reclamation programme, was known as the Zuider Zee (it is now a fresh water lake called the Ijselmeer) was formed about 1300, when the sea broke through the sand dunes along the coast and poured in a torrent across the land, inundating it for more than 600 years.

By 1400, the Dutch had begun to fight back, first by draining small lakes, then by building semi-circular dykes out from the shore. The enclosed areas, called polders, were drained by windmills and eventually could be used again for growing crops. Although drainage became the prime task of windmills, their use in industry gradually expanded. The first oil mill was built in 1582, a paper mill in 1586, a timber sawmill in 1592.

By the 17th Century, the Netherlands had become a land of whirling sails, and one project they made possible—the first major land reclamation programme to be planned scientifically—was the draining of the Deemster, a lake about ten feet deep. A group of 26 windmills accomplished the task in one year. The dyke subsequently collapsed and the work had to be done all over again but by then the capabilities of the windmill had been proved beyond all doubt. Lakes throughout

the country were eventually drained using substantially the same methods.

By the 19th Century, windmills were in operation throughout the Netherlands. In addition to helping the Dutch reclaim land from the ocean, they provided power for all the industries of the day—particularly paper works, sawmills and oil mills. By supplementing or displacing animal and water power they became so important that manorial rights always included that of prohibiting the construction of buildings or the planting of trees that would obstruct the free flow of wind across the country.

The largest number of windmills to operate in Holland was about 9,000. That was around the year 1850. A few more were built after that, but their death-knell had been sounded by the shrill whistle of the steam engine. Steam power had proven itself by pumping out the coal pits of England, operating by day and night regardless of weather.

The first steam engine arrived in the Netherlands from England about 1825 and was used in reclaiming the Zuidplaspolder. At first, Polder Boards planning this type of operation were dubious about using steam engines; there were considerable doubts about their reliability. In the Netherlands, a fault putting a steam pumping station out of commission for a prolonged period could be a matter of life and death. Moreover, coal consumption was high and the mechanism required expert attention of a kind quite different to that required by a windmill. Skilled engineers were difficult to find and retain in rural areas.

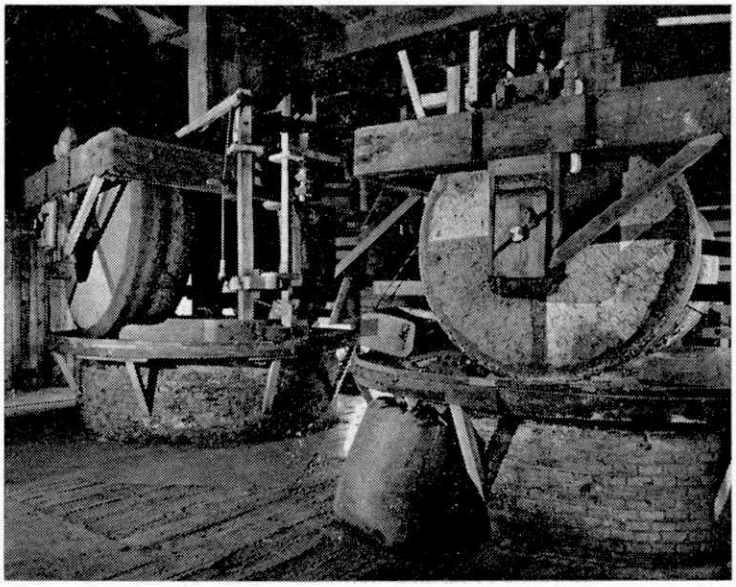
But the steam engine was gradually perfected and when a decision was made to reclaim the Haarlemmermeer it proved to be an important turning point because it was a task that was recognized as being far beyond the capabilities of windmills. Three 400 h.p. engines imported from England drained the lake by working steadily for about four years—from 1848 to 1852.

Thereafter axial flow turbine pumps driven by steam gradually replaced scoop wheels powered by windmills. The boilerhouse with its pointed gables and arched windows, and the engine house, coalshed, and accommodation for the engineman, became features of the Dutch countryside almost as typical as the windmill.

At Haarlemmermeer, I was able to inspect one of the engines that caused this revolution in thinking. Although it was, in turn, displaced by electrically powered pumping stations, the engine has been preserved almost intact and the building that houses it is now the Crucius Museum. The exhibits in the museum show very graphically how windmills were used to pump water upward by easy stages. Because they could not lift the water more than a few feet, it was necessary to operate them in groups whereas the steam engine could work alone because it could lift water to virtually any height in a single operation.

As Holland began to feel the effects of the industrial revolution then spreading throughout Europe, the steam engine, in addition to eliminating the need for drainage windmills, also gradually displaced industrial windmills.

The decline of the windmill was even further accelerated when electrical power was introduced. Some areas went directly from wind-power to electrical



Our heading photograph shows a Post Mill which is turned into the wind by means of a large tailpole, clearly seen extending from the base of the rotating body section to ground level.

Far left: This tower mill was introduced in the 16th century and is unusual in having a pedestrian arch at its base. Only the cap of this type of mill rotates, and is supported by rollers to make turning it easier.

Top right: A group of five tower mills used for pumping water. The lift power of a windmill is limited and so they worked in groups.

Right: An interior photograph of a windmill used for grinding corn. The corn was spread along a circular track and crushed by the large circular granite wheel. The time taken to grind flour in this manner was long, and the introduction of electrically powered grinding machines capable of doing the job in a fraction of the time sounded the death knell for the windmill.

power, by-passing the era of steam entirely, and throughout that period the destruction of the windmills continued. At the turn of the century, only about 4,000 were left. By 1923, the number had dwindled even further and the Dutch began to realise that unless some effort was made to preserve them, windmills would disappear forever. In that year De Hollandsche Molen, Vereeniging tot Behoud van Molens, in Nederland (Association for the Preservation of Windmills in the Netherlands—usually abbreviated to Dutch Windmill Society) was formed in Amsterdam. At first the Society's efforts met with little success. But the loss of the Schermerpolder windmills proved to be the catalyst that brought action. Fifty handsome windmills that had been used to drain the polder were no longer required and it was announced that all were to be demolished. The Dutch Windmill Society protested loudly and its members wrote many newspaper articles aimed at preventing this catastrophe. The destruction of the windmills was delayed until 1927 but it eventually went through as planned.

However, by then the public had become alerted to what was happening. The restrictions gradually introduced thereafter were so effective that the number of windmills surviving is now believed to have stabilised

Four more water pumping Windmills at Kinderdijk—preserved by the Dutch Windmill Society.

at about 1,000, of which approximately a third are still in operating condition. Many windmills were destroyed by town planners to make way for new or widened roads. Nowadays, the custom is to leave the windmills intact and make the highways swing around them.

Natural calamities still take their toll. Accidental fires claim a few windmills every year. But whenever a windmill becomes superfluous because of economic reasons the Dutch Windmill Society immediately offers advice and assistance. Since 1961, millers who maintain their windmills in operation have been able to claim Government grants to help cover the cost of upkeep.

A windmill that is abandoned is often taken over by the local municipality and preserved as a monument. Many are used as museums and some become homes or country cottages. The charms of living in a windmill are, to many Dutchmen, much greater than those of living in a modern apartment block.

The Netherlands Government keeps a few key drainage windmills in operating condition to serve in an emergency. If any major power failure occurred they would be returned to active service in a matter of hours.

There are five basic types of windmill still to be seen in the Netherlands. The Standard, or post mill, is the oldest—a design probably dating back to about 1300 but used only as a corn or oil mill. To catch the wind the entire mill house can be turned around a vertical shaft or post by means of a tail pole at the rear.

The Wipmolen, or composite mill, is similar but not as high. The millhouse is usually octagonal and, unlike the Standerd, it contains the miller's living quarters. It is the original drainage mill and is usually equipped with an iron scoop-wheel or a vertical screw which elevates the water about three feet. For sawing timber, the Paltrok mill is used. The name is derived from Palts-rokken, the flaring coats worn by Mennonites who settled in the Zaan district of the Netherlands and first introduced this type of mill. It has extensions at each side to permit long baulks of timber to be handled. Only three Paltrok mills are still in existence.

The need for some means of turning the sails into wind quickly and easily led to the development of the Bovenkruier or Upper Winder Mill—an exclusively Dutch invention. The cap on which the sails are mounted turns independently of the millhouse. The design was perfected about 1573 and almost all windmills built in the Netherlands since then are variations of this basic type. The Tower Mill is a stone structure which has a revolving cap, like the Upper Winder, but is more massive and is regarded as being in a different category.

I was able to study all these various types of windmill at the Arnhem Open Air Museum, which is a collection of more than sixty buildings, bridges and windmills brought from various parts of the Netherlands and reassembled to form a harmonious group representative of the Holland of bygone centuries. One of the restored buildings houses a collection of models of windmills partly dissected to show how they operate.

Although the Arnhem collection is unique, windmills are best seen in their natural surroundings. Those that remain are spread throughout the Netherlands but especially interesting groups can be found in six districts. In addition to the Kinderdijk complex, there are attractive windmills in the Zaan district, the province or Groningen, the island of Tholen, the western Betuwe, and the Graafschap with the Achterhoek.

For the benefit of visitors, the Dutch Windmill Society has plotted six routes that offer an opportunity of entering some of the mills, visiting the millers and their families and, in a few cases, of staying overnight at a windmill. Visits to windmills are not confined to summertime. Every winter, skating expeditions—groups of people gliding along the frozen canals following routes planned to take them to the maximum number of windmills—become more popular.

The windmill is as symbolic of the Netherlands as the Eiffel Tower is of Paris. Its sails may turn only intermittently but the Dutch have recognised the value of preserving the living history of their country. Although its numbers may be greatly depleted, the windmill is not likely to disappear entirely from the Dutch countryside.

TRANSPORT TOPICS by Mike Rickett

Right: M.S. *Winston Churchill* and bottom right, her sistership M.S. *England*, both run daily throughout the summer between Harwich and Esbjerg. Centre: M.S. *Winston Churchill* with its bow lifted to allow the cars to drive off.

CAR owners attracted by the land of the Vikings will no doubt already have heard about the North Sea car-ferry services operated by DFDS—the United Steamship Company Ltd. of Copenhagen who run two 10,000 ton ships, the "England" and the "Winston Churchill" from Harwich to Esbjerg on Denmark's picturesque west coast. In the summer an additional service operates between Newcastle and Esbjerg by means of the "Kronprinsesse Ingrid," which does the journey over the North Sea in about 19½ hours. From Harwich the journey takes only eighteen hours, but whichever town he sails from, the motorist arrives at a port that is ideal as a jumping off point for Norway or Sweden. Indeed, what better way to travel there than by the new 8,000-ton car/passenger boat, the "King Olav V" that regularly steams between Copenhagen and Oslo.

For the really adventurous traveller, that need only be the beginning of a journey that could well end in Iceland or the Faroe Islands. A little nearer home however is the new British Rail ferry which comes into service on the Portsmouth to Fishbourne—Isle of Wight—route this summer. A drive-past ticket window at the £24,000 Fishbourne terminal means that car drivers need not leave their cars to make or confirm bookings. As yet unnamed, the new ferry will carry 50 cars 400 passengers, and will take only 45 minutes to do the crossing. During 1968 the old ferry carried nearly half-a-million passengers and almost 175,000 cars. Although this figure may well increase during 1969, traffic flow through the new Isle of Wight terminal will be speeded up, thanks to an enlarged, four-lane marshalling area.

If you cannot manage a trip to Iceland, or even the Isle of Wight, then do make a date to visit Sudbury in Suffolk on June 28 or 29. Quite apart from the olde-worlde charm of this weaver's town, you will find these two days very fully occupied by the second Mammoth Olde Tyme Rallye, which promises to be an even greater success than the first, held about three years ago.

Included are sections for old steam engines, veteran cars, and motor cycles, historic commercial vehicles, old tractors, and farm implements, and the event will take place in the 150-acre park of Long Melford Hall. Proceeds are in aid of the restoration of Sudbury's 15th century Holy Trinity Church.

Old cars are well provided for by six classes with a separate class for vintage motor cycles, and for the first time this year, there will also be vintage aircraft from the world-famous Shuttleworth collection at Biggleswade, Beds. Two of the exhibits from this will be a Sopwith Pup and a 1780 fire engine. Without a doubt, one of the biggest collections of old machinery ever to be seen together in one place and certainly well worth a visit.

Despite the present arguments that rage, back and forth, about the advantages and disadvantages of a channel tunnel, if one does eventually materialise, it will almost certainly be in the form of a rail tunnel only. At the time of writing, it is estimated that a channel tunnel could be ready by 1976, starting from Folkestone to the town of Sangatte, near Calais, which would make it about 35 miles long. I understand that a great deal of discussion is now going on about the siting of the ferry terminal, which is reported as being planned to cover a 250 acre site, as the point where road vehicles drive on to special trains for the 35-minute run to France. There is still however a great deal of talking to be done in both languages before the planning is complete.

While everyone waits impatiently for the tunnel to finally appear, British Rail, among others, are running services over the channel by both ship and—the very latest in transport—Hovercraft. "Princess Margaret," B.R.'s new Hovercraft, commenced 1969 crossings on April 2 complete with reduction in fares for normal passengers. For short visits, the new mini-tour is the answer for hard-up holiday-makers. This allows four adults and two children to travel free providing they travel in the middle of the week or return within four or five days. The fare for this holiday deal has been cut by £4 to £24.

Certainly one of the most expensive, if one of the oldest, methods of travelling around London is the good old Hackney carriage, known to most of us as the taxi. Its cost works out at about two shillings a mile and yet there is rarely any shortage of "fares" for the London cabby. Did you know that the good old London taxi is something of an anachronism in that the laws governing its operations were first drawn up as long ago as 1831, when a horse was the most powerful thing on the roads. These laws admittedly have been added to from time-to-time since, but never have any of the original laws been removed from the statute book.

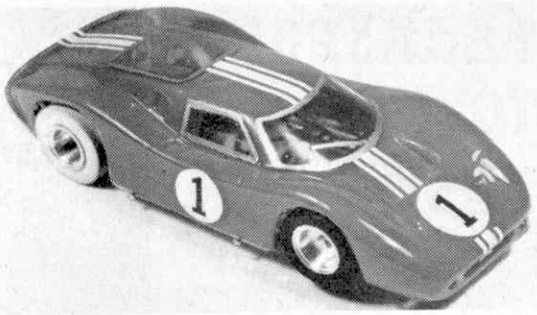
As I am sure you will appreciate, this has left one or two rather strange anomalies in existence, like for instance the cabby who is silly enough to set out in the morning without carrying a bale of hay with him! In fact he is breaking the law, for 137 years ago the cab was horse drawn and the law governing that a bale of hay was to be carried at all times, has in fact never been struck from the statute books.

It would be an offence for a cabby to leave his vehicle without first having obtained written permission from the police. The reason was that the horse might bolt and cause all manner of confusion. Ancient laws are also the reason why the cab has remained so unchanged throughout the years. After all, a gentleman wearing a top hat could never enter a modern car, and what about old ladies finding the step up to the rear door a little too high! These and a host of other considerations are why designers have been able to do very little about the familiar shape of the modern cab.

So whatever you do, never ask a cab driver to leave his cab. You would be encouraging him to break the law!

SLOT CAR REVIEW

A look at the latest slot car from RIKO



The finished car, looking every inch a winner, with bright red paintwork and white racing stripes. Its white rear tyres immediately identify it as something out of the ordinary.

THERE ARE very few hobbies which provide the thrills and excitement that are to be found in slot racing. Since its beginning in 1959 this highly competitive form of entertainment has been constantly increasing in popularity, and consequently become more sophisticated. Enthusiasts have constantly been searching for ways of improving the speed and road holding of their models, and during the last couple of years vast improvements have been made.

The first major advance in design was the introduction of the fall-away guide which enabled cars to get all four wheels off the ground, at the same time keeping electrical contact. One of the more recent theories advanced was that if a car's body was allowed to move up, down and sideways on the chassis this would prevent, to a greater extent, the possibility of a car being thrown off the track at the corners. The body could lift on the chassis but before it has time to pull the car from the track the car should have completed its trip round the bend and will be heading down the next straight. Early experiments proved that this system had a definite advantage over the direct and inflexible method of mounting the body to the chassis normally used. It would appear, however, that the reasons for the increased road holding are not completely understood at the moment and there are various opinions as to what really happens.

Until recently, if you wanted a chassis of this type you had to either build it yourself or be prepared to spend up to £5 on a commercially made one. It was then a very pleasant surprise to find that R. Kohnstam Ltd., better known to us all as Riko, are now producing in kit form, a series of $\frac{1}{32}$ scale slot cars using the new type of chassis. We have had the opportunity to build and test one of these new models and here is our report.

The kit, with Ford G.T. body, is very easy to construct. The building instructions are a bit vague, but by using a little common sense you can produce a good model. In fact, the model illustrated in the pictures is the builder's first attempt at slot car construction, and the hardest job, he found, was the painting of the body from the inside, making sure not to get paint on parts were it is not needed, i.e. windows.

Apart from the new chassis, there are a few more new features to the kit. A departure from the usual Rikochet motor used in other models, is the 16D Rikowhip, one of the fastest of the kit motors ever produced. A point to remember when fitting the pinion onto the motor shaft, is to make sure that at least $\frac{1}{16}$ in. of the shaft is protruding from the pinion, otherwise the gear wheel and the pinion will not make contact. Another new feature is the white soft sponge tyres at the back for better adhesion and the smaller tyres at the front.

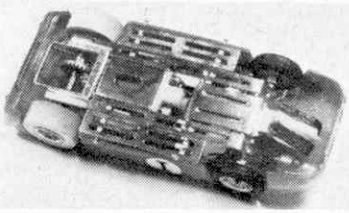
The most important feature of the car, is of course the new type of chassis. As explained earlier, the body can move freely up, down and sideways on its mounting. To achieve this the chassis has two hinged "panels", one either side to which the body shell is fastened. Four ordinary dress making pins (supplied) are pushed through the body beneath the doors into small brass tubes soldered to the chassis for this purpose. This system is now standard practice in the slot car world, and makes body removal quick and simple.

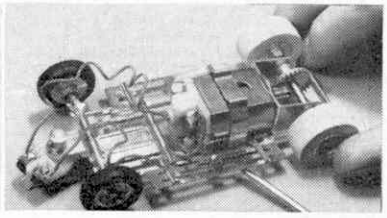
To allow the body to move freely, the wheel arches must be cut rather larger than is needed for a standard model, because at no time must the wheel arches foul the wheels.

To test the performance of our car we raced it against an earlier kit, substituting its Rikochet Mk II for the Rikowhip in order that power-wise both cars should have the same performance.

The first advantage that came to light concerned the new tyres. Adhesion was definitely superior with the new tyres, and acceleration was therefore better than before. It was, however, on the corners that the new car showed just what it was made of. Due to the flexible body mounts, it was able to corner far quicker, and only slight signs of "breakaway" were evident. Any attempt to corner both cars at the same speed always led to the earlier type spinning off the track.

To sum up. This new car is certainly one of the most superior in its price range, and should prove to be a serious competitor in any race. At 49/11d. it represents excellent value for money and can be thoroughly recommended for anyone with a modest amount of experience in slot car construction.





Far right: Photograph shows the completed chassis. The screwdriver blade shows the hinged section on one side. Coiling the wires round a pencil keeps them neatly out of the way. Right: Underside shot of the completed car showing clearly the new flat chassis and side hinged body mounts.

BUILD A SIMPLE DIMMER SWITCH

by J. R. Bates

YOU CAN make a solid-state continuously variable dimmer switch at home for only a fraction of the price normally paid for such items.

The switch is capable of controlling loads up to 1.2 KW at 240 volts but there is virtually no upper limit to the load capability of similar switches provided the correct choice of equipment is made and units are suitably paralleled—that is to say connected so that each part carries an equal fraction of the load current. The main advantages of electronic dimmed switches are compactness, the switch described can easily be put into a box of dimensions $3\frac{1}{2}$ in. × $3\frac{1}{2}$ in. × 1 in., and the fact that there is negligible unused power loss.

The circuit diagram is shown in Figure 1. The items necessary for the manufacture of the switch are:

250 KΩ, 1 Watt, midget volume control (linear)	**Price about 4/-**
0.1 μF capacitor	**Price about 2/-**
ST-2 diac	**Price about 6/6**
SC 40D triac	**Price about 38/6**
27 KΩ resistor	**Price about 2/-**

No detailed instructions are necessary. The above items should be connected up according to the diagrams, but please be careful and always be on guard to ensure that you have good insulation. Use a wooden or strong plastic box and put an insulated knob on the spindle of the volume control. Use two sections of a terminal strip to connect external wires as shown in Figure 2. This switch will only operate on alternating current.

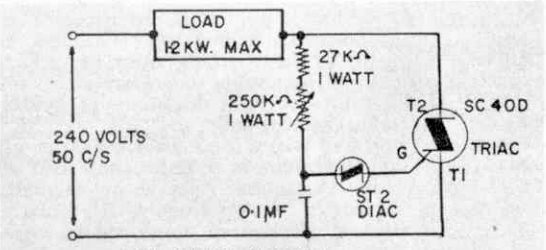


FIG 1 WIRING DIAGRAM

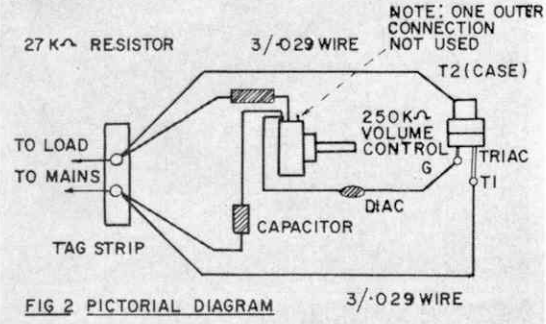
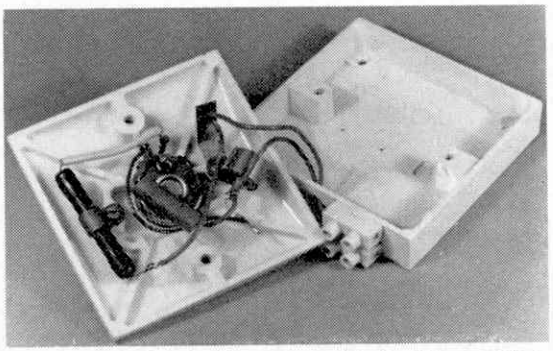


FIG 2 PICTORIAL DIAGRAM



The dimmer switch is shown here with the lid removed to reveal the method of installing the components.

Principle of Operation

For those who are interested in the operation of this dimmer switch, the load is switched on and off twice every cycle or 100 times per second. The filament of an electric light or the element of an electric fire cannot heat up and cool down at this frequency so the result is that the lamp or the heater averages itself out to a steady level which is the R.M.S. or root-mean-square level.

The triac is a bi-directional triode thyristor which can be triggered from a conducting to a non-conducting state by a voltage applied to the " gate ".

Referring to Figure 1, the capacitor is charged up at a rate depending on the current allowed to pass through the controlling resistor. If, for example, the resistor is set to the maximum 277KΩ only a small charging current flows into the capacitor but if the resistor is set at 27K ohms there is a large charging current. This means that we have control over the time taken to charge the capacitor to the level of voltage required to make the disc conduct. When this happens the diac passes a current through the triac and so switches it. The capacitor discharges, the diac stops conducting, and the whole cycle repeats itself. We therefore have control over the time duration, or fraction of a cycle of the mains alternating current, in which the load is actually switched on, thus giving the dimming action.

There is no unused power loss since there is no current flowing in the " off " condition.

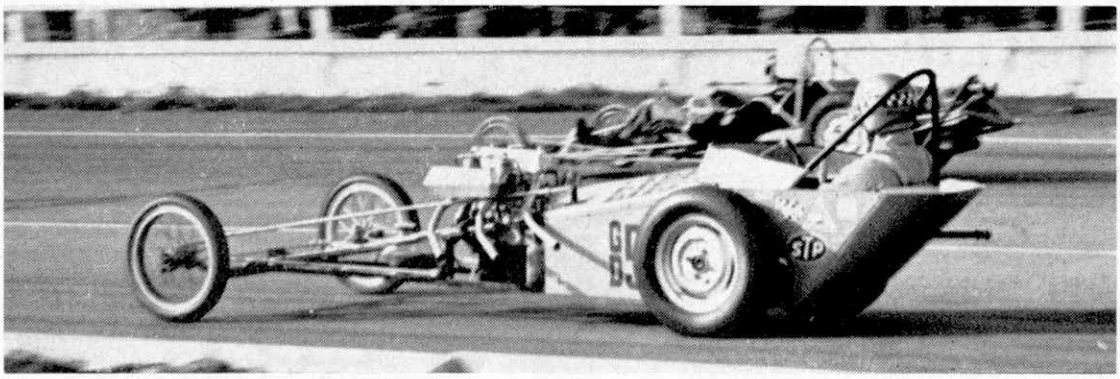
Applications

The dimmer switch can be used in many applications. Some suggestions are given as follows:

Lamp intensity control for T.V. viewing.
Lamp intensity control in photographic studios.
Heat control.
Motor speed control on universal motors.

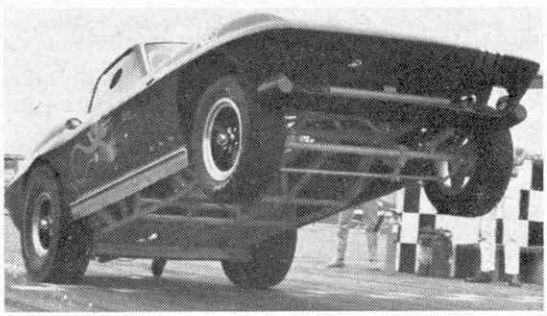
Should you have a requirement to control loads greater than 1.2 KW, this can be done. The correct triac to use may be found from the following table:

Type	*Maximum Load (KW)*	*Mounting*
SC40D	1.2	Stud
SC41D	1.2	Press-fit
SC45D	2.0	Stud
SC46D	2.0	Press-fit
SC50D	2.4	Stud
SC51D	2.4	Press-fit



DRAG RACING

Gordon Blackwell takes a look at Britain's newest sport



Our heading photograph shows a pair of Dragsters blasting off down the strip at Santa-Pod in Bedfordshire. Note the anti-roll bar which protects the drivers head should the dragster turn over.

Above: A worms eye view of a special lightweight Corvette Stingray built by the father and son team of Ray and Bob Phelps. The engine sits in the " passenger seat " for better weight distribution. This enables the car to lift its front wheels with ease, as shown in the photograph. Note the castors at the rear of the body to protect it from damage when the front end rises. This strange two-wheeled action is known as a " wheelie " in Dragging circles. To further lighten the car, the body is constructed of glass-fibre, finished with no less than thirty coats of paint. *Photo by courtesy of Drag Racing and Hot Rod Magazine.*

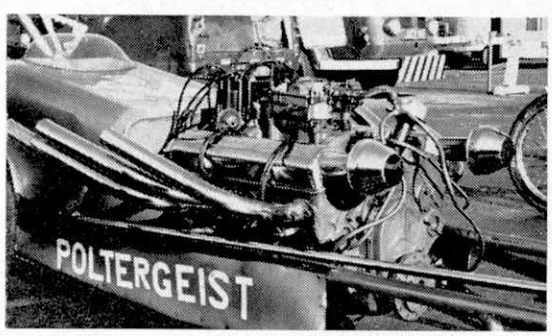
THE ground trembles, hands are clapped over ears in a vain attempt to shut out the terrifying roar of an 8-litre V8 engine. The smell of burning rubber tyres fills the air as a dragster accelerates down the quarter mile strip of Santa Pod Raceway. This is drag racing American style—now also British style.

Drag racing is probably the most exciting sport in Britain. It has become not just a sport but a way of living. In America hundreds of thousands swarm to the drag strips for every meet. Here in England, where it has just begun to take hold, every meet captures and enthralls new enthusiasts with the thrill and excitement of this wonderful sport.

It was only three years ago that the first drag strip was opened. Now Santa Pod Raceway in Bedfordshire has been specially surfaced, and computer-controlled timing installed to meet the ever increasing demand for its use.

Santa Pod, the nucleus of British's drag racing, is organised by the British Drag Racing and Hot Rod Association, which is rapidly becoming one of the largest motoring clubs in Britain. All that is needed to become a member is an R.A.C. Restricted Competition Licence, a crash helmet, £2 enrolment fee and a car, which can be anything from an ordinary standard road car to something like Tony Densham's record holding 8 litre dragster " Commuter," which we will be hearing more of later.

The object of drag racing is to cover a quarter of a mile from a standing start in a faster time than any other competitor. A familiar sight at the beginning of a race is a dragster with its front wheels lifted off the ground, and its rear wheels enveloped in smoke.



A close-up shot of a typical dragster engine. There are no silencers on these machines and the short exhaust pipes can be clearly seen. The noise has to be heard to be appreciated !

The cause of this is the rear wheels spinning at such a speed that the surface of the tyres melts and starts to burn. When the tyres finally grip the track and the dragster begins to accelerate the front of the car lifts and the front wheels loose contact with the ground.

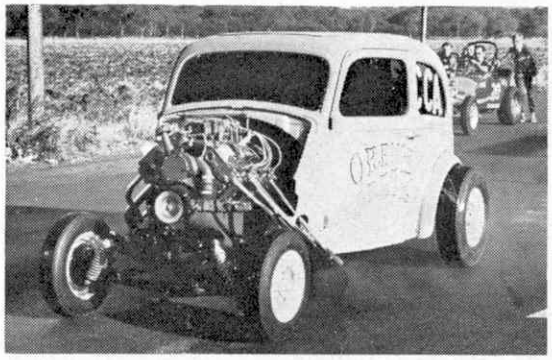
This peculiar situation is caused by the terrific acceleration rate of the dragster and, in effect the rear wheels are attempting to overtake the front ones! If the rear wheels on any dragsters were situated at the extreme end of the body work they could pass under the front wheels, causing the car to somersault. In fact many dragsters are fitted with small castor wheels at the rear to prevent this.

The cars are split up into eight divisions. These are: Production cars, Super Production, Sports, Modified Sports, Competition Altered, Street Altered and Dragsters.

Elimination runs are made until the fastest eliminator in each class is found. Then they compete with eliminators from other classes, so finding the top eliminator.

A race is started by means of a ' Christmas Tree ', which is virtually just coloured lights fitted to a pole. When the blue light on top of the tree flashes, the cars creep forward to the starting line, and as each car breaks a light beam, the next light down the tree shows that the car is ready. As long as the cars don't move forward at all, an orange ' steady ' light shows. Then the automatic starter begins. First one light under the ' steady ' glows, and then the one under that. The next light is the green GO! If either car makes a false start, a red ' fail ' light shows at the bottom of the tree.

If you are seriously thinking of taking up drag racing, and you want a cheap drag car, an old body/chassis can be obtained quite cheaply, and it is very easy to get hold of large American or British engines at reasonable prices.



This car, believe it or not, is an old Ford Popular. Finished in briliant orange with tinted windows, it bears little resemblance to the standard production car.

" Commuter " was built to try and give the performance the fans expected.

Its Ford engine was bored out from 427 inches to just under 8 litres to keep it within the International Class B category. The engine is mainly standard but with lighter racing pistons and high performance camshaft. A General Motors Corporation supercharger was fitted and fed by fuel injection. There is no gearbox, as the engine drives straight through a Schiefer clutch to a narrowed Oldsmobile rear axle.

The wheels are cast magnesium at the rear and wire spokes in front. Front suspension is by torsion bar with parallel radius arms. A twelve foot diameter parachute is used for braking.

The engine incorporates eight exhaust pipes which are pointing upwards and back to blow tyre smoke clear of the rear wheels thus helping the driver to see.

The Cortina on the right is only seconds away from the start of its run down the Santa-Pod strip. The two " Cowboys " are start officials, and ensure that cars are in position ready for the count-down.

Of course the fastest cars are the dragsters. These are cars specifically built for drag racing purposes. Nearly always, the dragsters are constructed with the engine fitted well back in the frame and the driver sitting behind the rear axle. The steering on dragsters is practically non-existent and braking is on the rear wheels only and by parachute.

These dragsters are quite easy to build yourself. A chassis frame can be obtained for as little as £58, or Allard Motor Co. will supply you with a 1,500 c.c. supercharged kit for just over £600.

Tony Densham's Record Holding " Commuter "

Many drag racing enthusiasts going to Santa Pod are disappointed by the British cars. They expect, from reading American magazines, seven second runs, with terminal speeds of 200 m.p.h. Tony Densham's " Commuter's " first try-outs were not very successful. At first the engine wouldn't fire, then there were explosions in the sump and then magneto trouble. But after many months of testing and making adjustments everything began to run well. Finally all was ready for a World Record attempt at R.A.F. Elvington.

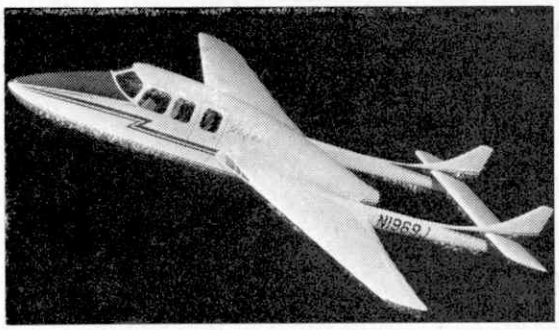
For a World Record, two consecutive runs must be made over the distance, one each way, within the hour. " Commuter's " first few runs were spoilt by tyre trouble. This was fixed, and the final two runs set an average time of 8.91 seconds over the ¼ mile distance to establish a new world record. They also tried two runs on the 500 metres, the second, just as it started to rain, set a new record of 11.2 seconds.

So, a very appropriate and satisfying end to a period which started with so much disappointment and frustration.

Continued on page 262

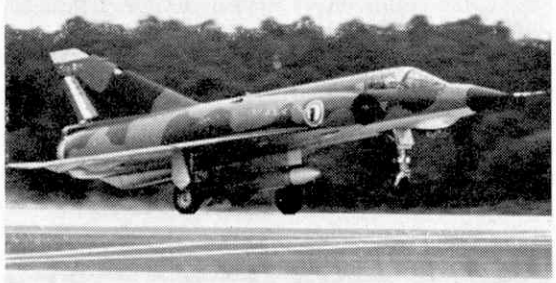
AIR NEWS

John W. R. Taylor



From Friendship to Fellowship

When Fokker announced that they intended to design and build a small twin-jet airliner named the F.27 Fellowship, many people predicted that this famous Dutch company would simply lose a lot of money. With hundreds of BAC One-Elevens, Douglas DC-9's and Boeing 737's already ordered, there seemed to be no room for another aircraft of this type; but Fokker have been in the airline business since it started and had studied the market very carefully before beginning work.



Their twin-turboprop F.27 Friendship has been in scheduled airline service for more than ten years, yet continues to sell steadily. Orders reached 500 in December 1968, making it the best-selling turboprop airliner ever built, beating even the Viscount in terms of numbers. What Fokker proposed in 1962 was to produce a jet successor to the Friendship, carrying much the same number of passengers. This meant that it would be smaller and less costly than its competitors and yet be able to bring to short-haul operators —the people who had already bought the Friendship— all the advantages of switching from turboprops to jets.

To minimise the financial risk, Fokker invited other European aircraft manufacturers to share in the design and development of the Fellowship at their own expense, with eventual sharing of production work and profits. Two German companies, VFW and HFB, were soon signed up to build large sections of the fuselage, the tail unit, the engine nacelles and the wings inboard of the engines. Short Brothers & Harland, of Belfast, agreed to finance and produce the outer wings and other components such as the undercarriage fairing doors. The Dutch government promised to pay half the cost of Fokker's own part of the programme.

Since then, the partner companies have worked together smoothly. The prototype Fellowship flew on May 8th, 1967, followed within three months by a second prototype. Two more aircraft joined in the flight test programme later and all testing was completed by the end of November 1968. Deliveries began in February of this year.

In its production form, the Fellowship carries up to 65 passengers, compared with 56 in the latest version of the Friendship. It is powered by two Rolls-Royce Spey Junior turbofans, each giving 9,850 lb. of thrust, and cruises at between 426 and 527 m.p.h., which represents a big advance on the 292-295 m.p.h. of its turboprop predecessor. Wing span is 77 ft. 4½ in., length 89 ft. 9 in. and take-off weight 56,700 lb.

Soon after Fellowship No. 3 arrived in Australia, at the start of a six-week demonstration tour in February, it was announced that MacRobertson Miller Airlines had ordered two for operation "down under". This brought airline orders to 12, including five for Braathens S.A.F.E. of Norway, two for L.T.U. (Germany), two for Itavia (Italy) and one for Martinair (Holland). Ten more will go to Fairchild Hiller Corporation, Fokker's U.S. agent.

Dogies by Douglas

If, like me, you enjoy Westerns, you will probably have seen dozens of films of cowboys driving herds of dogies through territory swarming with rustlers and redskins. Brave and skilful as they were, the cowboys of the Wild West would never have believed that, one day, somebody would deliver 7,000 American cattle to new owners 6,300 miles away, in another continent;

Heading photograph depicts the new JET CRAFT MJ2 experimental six-seat executive aircraft, which is based on the De-Havilland Vampire two seat military trainer.

Centre left: MARTEL anti-radar missile under MIRAGE 111-E aircraft.

Left: Trans-International-Airlines (TIA) DE-8 SUPER 63 provides a modern background for an 1879 version chuckwagon at Fort Worth, Texas, where young cattle are loaded aboard the jetliner for a 15 hour flight to Chile.

but, of course, there were no aeroplanes in those days to make the job easy.

The story began when Chile, faced with a serious beef shortage, decided to import thousands of young Hereford cattle from the U.S.A. to build up its herds. Transport by sea would have taken at least 20 days and animals are not always at ease on ships, especially in rough seas. Ten years ago, the task would have been beyond the capability of any airline, but the "jumbo-jet" size of the Douglas DC-8 Super 63 transport aircraft has changed our ideas on what is possible.

The company responsible for the cattle-lift, Trans International Airlines (TIA), divided the 187-ft.-long cabin of one of its Super 63's into nine padded compartments and found that these could accommodate a total of up to 270 young dogies in air-conditioned comfort. It then undertook to fly the first 3,500 cattle from Fort Worth, Texas, to Punta Arenas in southern Chile during January, followed by the other 3,500 in October of this year.

When the first consignment was loaded, a genuine 1879-type chuck-wagon was parked near the aircraft to dispense hot black coffee to anyone with a thirst. The rest of the operation was 1969-style, with a scheduled time of only 15 hours for each 6,300-mile flight, including intermediate stops at Panama City, Lima and Santiago. The DC-8 shuttled to and fro every two days until the job was finished.

Some of the 270 Hereford cattle making up a single DC-8 load inside the aircraft.

Mystery Jets

De Havilland built a total of 804 Vampire two-seat jet trainers for the R.A.F., Fleet Air Arm and the air forces of some 20 other countries. Most have now been retired and are sitting around in hangers, or parked on airfields, waiting for someone to take an interest in them. A new American company, named Jet Craft Ltd., is now doing so, in partnership with British aircraft and aero-engine manufacturers.

By the time you read this issue of *Meccano Magazine*, the prototype Jet Craft MJ-T1 two-seat trainer should have made its first flight. Except for its paint scheme, it will look little different from the standard Vampire T.11; but Marshall of Cambridge will have given it a thorough overhaul to make it suitable for use at civilian flying schools.

Meanwhile, at Southend, Aviation Traders (Engineering) Ltd. are building the more exciting MJ-2—the MJ standing for "Mystery Jet". This will combine Vampire wings, tail-booms and tail unit with a new all-metal fuselage, seating six people in a comfortable pressurised cabin. The original 3,500 lb. thrust Goblin turbojet will be replaced by a lighter and more efficient Rolls-Royce Viper 522 of 3,330 lb. thrust. As a result, the performance of the MJ-2 will be little different from that of the Vampire 11, which had a top speed of 538 m.p.h. and range of 840 miles. First flight is scheduled for the late Summer of this year.

Martel in Production

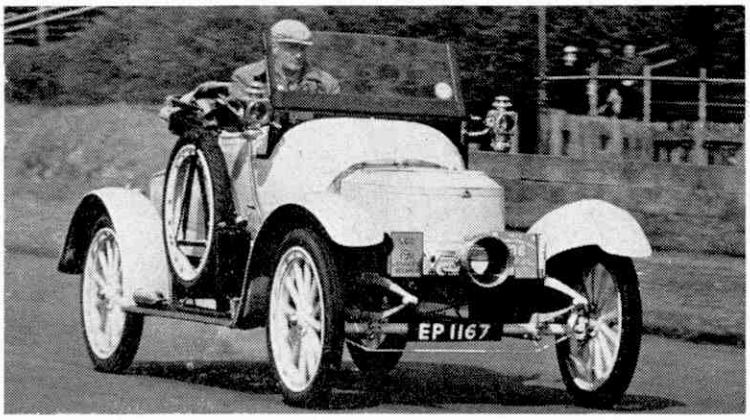
Those of you who are good at history will probably have heard of Charles Martel, the great eighth century Frankish king. His title of "Martel" meant "the Hammer" and he earned it by hammering his enemies in battle.

Martel is, therefore, a highly suitable name for the latest air-to-surface guided missile developed jointly by British and French companies, especially as it is also an abbreviation of "*M*issile *A*nti-*R*adar and *TEL*evision", which describes how the weapon operates.

There are two versions of Martel. One, designated AJ 168, has a radar "eye", which transmits to the pilot of the launch aircraft a picture of the ground towards which it is travelling. This enables the pilot to centre the TV camera on the target, by means of a miniature joystick which sends radio signals to the missile, after which Martel homes automatically on the target to destroy it. All of this can be done without the launch aircraft needing to approach closer than 20 to 30 miles from the target; and the pilot can continue to control the missile's flight path after he has turned for home.

The second version of Martel, designated AS.37, is even simpler to operate, as it homes automatically on radar signals transmitted by ground or airborne search radar, including the signals from enemy radar-homing missiles. It is able in this way to knock out a high proportion of any hostile defence system.

Martel has been in mass production since the end of last year and will be carried by many French and British aircraft, including the Phantom, Buccaneer, Nimrod, Mirage, Jaguar and Atlantic.



THE GREAT STEAM CARS

By B. DUMPLETON

BY THE end of the 19th century, inventors such as Karl Benz were starting to develop the internal combustion engine. For over a hundred years steam had been the only source of motive power. Previous engineers understood its capabilities and knew how to harness them, so it was natural therefore, that in the early days of the motor car, steam was considered by many to be the best means of propulsion. In 1760, Cugnot built the first vehicle to run on a public road under its own power. Driven by steam, and able to reach the speed of three miles an hour it was later used by the French Ministry of War for towing cannon.

In the early 1800s the Cornish engineer Richard Trevithick was building steam coaches and was followed by Hancock and Gurney both of whom designed successful steam coaches which were used on the English roads.

It was in America, however, that the steam car first became popular. This was due to the work of the twin brothers F. E. and F. O. Stanley who were partners in a photographic plate business in Newton, Massachusetts. In 1896 they saw a demonstration of a European automobile and were not very impressed.

Above: Perhaps the greatest of them all, a 1911 Stanley Steamer. Below: An 1897 Soame Steam carriage.

F. E. considered that he could make a better motor car and set out to do so. The car performed so well that they sold it and made two more. In 1899 they built 200 cars and sold them all, establishing themselves as the first successful car manufacturers in history. In that year they sold their patent to the Locomobile Company, but by 1902 the company had decided that the days of the steam car were numbered, so the Stanleys once more emerged upon the scene with a vastly improved model. Like many other manufacturers the Stanley brother realised the importance of publicity gained by speed records, and in 1906 they designed a car for an attempt on the record at Ormond Beach, Florida. The car, which was called 'Rocket', looked very much like an upturned boat and sat on narrow wire spoked wheels. The time recorded for the measured mile was 28.05 seconds, giving an overall speed of 127 m.p.h. The following year a further attempt was made with the same car, now running at a boiler pressure of 1,300 p.s.i. (twice that of the normal passenger car). At a speed of 197 miles per hour the car hit a bump, took off, and was airborne for 100 ft. breaking in two upon impact. The driver was severely injured and the accident discouraged the Stanleys from any further record attempts. In 1918 F. E. Stanley was killed in a road accident and his brother lost interest in the company, which, however continued to build cars until 1925.

Another important steam pioneer was the White Company. In 1899 Rollin White invented a flash boiler. The cars fitted with this distinguished themselves in competition. 1,500 were sold in 1906; but in 1909 the company started to take an interest in petrol-driven cars and by 1912 the White Steamer was no more.

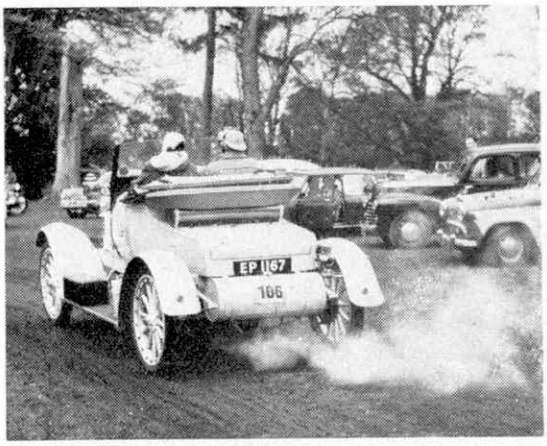
The efficiency of the steam-car cannot be denied. The Stanley was powered by a tiny two cylinder engine, with thirteen moving parts all running in ball-bearings. It would propel a car at 100 miles per hour in complete silence, no gearbox being required as a steam engine delivers maximum torque at all speeds. Fuel for these cars was paraffin delivered under pressure, as in a picnic stove. The boiler, situated at the front, was wound with two layers of piano wire to prevent it from expanding to a point where it might explode. Stories of boilers blowing up were completely untrue, as were the tales of fire danger. Why then did the steam car loose its popularity so suddenly? The answer lies in the time taken to get up steam. The Stanley car took from ten minutes to half an hour to obtain enough pressure to run on. Other cars such as the White used

a flash-steam boiler and could get up steam much quicker but the disadvantage of this system was that it would not produce steam after the fire was out, whereas the other type of boiler would.

The invention of the electric starter probably sounded the death knell of the steam car. Until the introduction of this device, petrol engines had to be started by hand cranking and there were many people who preferred the long wait for steam, to the rigorous hand swinging with its attendant risk of a sprained wrist or worse. The electric starter changed all that and the American motorist, in a hurry then as now, turned his back on the steamers.

There were, however, a few people who still believed in steam. One such man was Abner Doble. Although he had built several steam cars before, it was in the late twenties and early thirties that his best and most famous cars were built. These huge cars have been called the Rolls-Royce of steam. Not unlike the Rolls-Royce in appearance they were the ultimate in perfection. By the mere turn of a switch steam could be obtained in 22 seconds, they would climb any gradient where traction could be obtained, and all in complete silence.

For those who still believe in the power of steam there is, in America, a company that still builds steam cars. The Keen Steamliner is a good looking two seater possessing outstanding acceleration. The ultimate in steam cars, however, may still be in the future. The atomic car, if and when it comes, will surely be steam powered for the only way that we can use atomic energy for power is by converting it to steam.



Rear view of a Stanley. The exhaust is of course steam, and not a sign of excessive oil burning !

CLOCK STRIKING MECHANISM

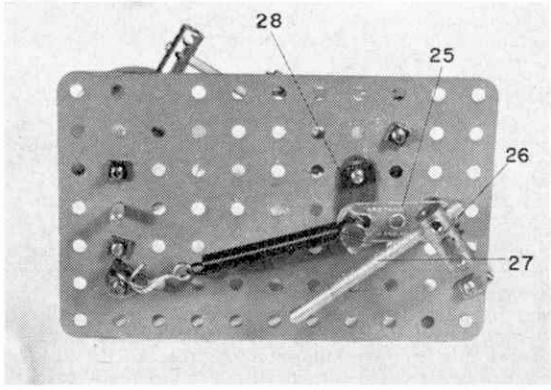
Continued from page 247

Rod passes through the end transverse bore of Coupling 41. Rod 11 on the locking plate and Rod 17 on the epicyclic carrier are connected by a Tension Spring 42 located by Collars, then the Wiper Arm on the carrier is adjusted to bear on the 180 deg. sector of the Commutator on the locking plate. The mechanism must be so arranged that, when the spring is relaxed, the Wiper is just on the conducting sector of the Commutator and, with a slight tension in the spring, the Wiper moves on to the insulating sector. Wiper Arm 4, on the other hand, is adjusted to bear on the continuous track of its commutator.

Journalled in Coupling 41 and Plate 8 is a 4 in. Rod carrying a ½ in. Bevel Gear and a 50-teeth Gear. Alongside Rod 43 is fitted an 8 in. Rod 44 fitted with a ¾ in. Pinion 45, a 1½ in. Helical Gear 46 and, near the top, a Bush Wheel 47 with a Threaded Pin fixed in one hole. This Pin actuates the manikin by acting on Rod 27.

Finally, a Power Drive Unit, fitted with a ½ in. Helical Gear on its output shaft, is bolted to the base. A 4½ volt battery is quite sufficient to drive the mechanism with a Power Drive gear ratio of 30 : 1 or 60 : 1. One Motor lead is connected to one battery terminal, the other motor lead being connected to Wiper Arm 4. The remaining battery terminal is connected to any convenient point on the main frame. It is important to remember, however, that the motor must be run only in the direction which causes the locking plate to revolve clockwise when viewed from the front, then it remains only to make the final adjustments to the brackets on the locking plate so that the correct number of strikes are obtained.

Postscript: The rather complicated epicyclic gear included in this Unit is necessary to obtain a ratio of 13 : 1 which, in combination with an additional 6 : 1 ratio, gives a final ratio of 78 : 1—the number of strikes a clock makes in 12 hours. Also, the electro-mechanical servo device included has other applications which unfortunately cannot be gone into here.



An underside view of the Flat Plate on the top of which the " manikin " is mounted. Note the use of the Tension Spring.

PARTS REQUIRED

2—1a	1—14a	127—37a	1—115
3—2	2—15b	118—37b	1—116
4—2a	2—16a	88—38	2—118
3—3	1—16b	2—38d	4—133a
2—5	1—17	2—43	2—136
2—6	4—18a	2—48a	1—147b
2—6a	1—18b	3—52	1—163
4—8a	2—22a	1—52a	2—164
6—8b	2—24	1—57d	1—171
2—9	4—24b	12—59	1—179
1—9f	2—25	3—62	1—211a
8—10	6—26	4—62b	1—211b
2—11	3—26c	5—63	1—508
25—12	2—27	1—70	1—531
1—12b	3—27a	2—90	1—533
2—12c	2—27d	1—111a	2—551
1—13a	1—30a	5—111c	1—562
5—14	1—30c	2—111d	4—564

1—Power Drive Unit.

GREAT ENGINEERS — No. 16

KARL BENZ

by A. W. Neal

KARL BENZ descended from a long line of skilled craftsmen from the Black Forest area of Germany. His father worked as a blacksmith in a village, later moving to Karlsruhe where he became an engine driver. Karl inherited his technical capability from his father, but he could hardly have known him as he died when Karl was only two years old.

Sacrifices by his mother enabled Karl to attend the local 'Gymnasium', where he showed a distinct interest in physics and chemistry. He was only 15 when he passed an examination which enabled him to attend the Karlsruhe 'Polytechnikem'. After completing the course successfully he left at the age of 20 to take up a position in an engineering factory as a fitter, at the same time, continuing his studies during his spare time. Two and a half years later he left and started a job on design work with the Schweizer technical bureau in Mannheim, and it was during this period that he was introduced to the horseless carriage. He acquired a pennyfarthing cycle and the hard work needed to propel this brought him round to the conclusion that there was a great future in power-driven road vehicles.

He married Bertha Ringer in 1871 and by her influence he set up business on his own account, concentrating on the manufacture of metal forming appliances. These activities do not appear to have satisfied him, but the arrival on the market of Nikolaus Otto's four-stroke-cycle engine in 1877 satisfied Benz that his dreams of a self propelled road vehicle could be changed into reality. Unfortunately for Karl, Otto's engine was covered by patents, so he began to develop a light weight two-stroke-cycle engine, completing it by New Year's Eve 1880. He was then ready for his great adventure.

With two partners he set up the Mannheim Gas Engine Factory, but the former were only interested in sales of the engine and not the development of the road vehicle, consequently the partnership was dissolved. In 1883 he took two other partners and established a new company—Benz and Co., with works once again at Mannheim. It prospered and fortunately for Karl, the engine patent taken out by Nikolaus Otto proved to be invalid, and Benz fitted an engine of this type in his 3 wheeled vehicle. The engine Benz developed was however very light in weight and ran at a higher speed than Otto's original. It was a single cylinder type with the flywheel on one side and driving belt wheel on the other. It had a 90-mm bore and 150-mm stroke and petrol was supplied by a carburettor designed by Karl. About the end of 1885 he installed his engine in a new vehicle, but he retained the three wheels because he could not think of a satisfactory way of steering a four-wheel machine. Its chassis was of tubular construction and wire-spoked rear road wheels were used. There were, of course, teething troubles, but these were overcome by mid-1886 when he took the machine out on the road.

The first long-distance journey was made in 1888, by his wife and her two sons. They travelled to Pforzheim, about 100 Km. distant. Karl evidently knew nothing about this until he received a telegram saying that they had arrived safely. The only troubles encountered during the trip, were problems in finding wayside Pharmacies which sold petrol.

Karl remained firm about not producing a four-wheeled vehicle, but his partners disagreed and they eventually left the company. Then came on the scene two replacement partners—von Fischer and Ganss, and Benz owed much to both for his eventual success.

Karl with a complete change of opinion, applied himself to the aggravating problem of steering a four-wheel vehicle, and in 1892 he produced a linkage which enabled both the inner and the outer wheel to turn about the same centre. The following year he brought out his 'Victoria' two-seater car. Then came his 'Velo' a low price car with a 1½ hp engine. Sales increased yearly and by 1900 his order book showed 605 vehicles sold in twelve months. Despite this rapid success, Karl was not without troubles. Maybach of the Daimler company put on the market a very advanced car—the Mercedes—that stole a considerable volume of the market. Mainly because of this Benz retired from his position of general manager of his company, although he remained on the board. The year was 1903 and the car industry was still very much in its infancy. Within three years Benz's company had re-established itself. In 1909 a Benz car captured a world speed record of 205.7 km/h, pushing this up to 228.09 km/h the following year. Eventually the firms of Daimler and Benz merged.

Karl Benz, the academically educated engineer, himself a craftsman, always remained close to the factory floor, and this was the core of his success. He died at the age of 84 at Ladenburg.

The latest addition to the Mercedes range; the new 2.5 litre 250 model. *Photographs by courtesy of Mercedes Benz Ltd.*

VETERAN CARS ON STAMPS

by

James A. Mackay

BEGINNING WITH Richard Trevithick in 1801 a great number of Englishmen were responsible for experiments in the manufacture of horseless carriages operated by steam but Acts of Parliament from 1831 onwards virtually killed this incentive and it was not, in fact, till 1896 when the iniquitous law—requiring a motorist to be preceded by a man waving a red flag was repealed—that motoring in this country could begin to catch up with the rest of the world.

On the Continent interest switched in the 1880s from steam to internal combustion engines. In 1885 the German, Gottlieb Daimler, patented his high-speed internal combustion engine and in the same year his fellow-countryman, Karl Benz produced a tricycle powered by a similar type of engine. Germany paid tribute to these men with two stamps in 1936 portraying them and marking the 50th anniversary of the invention of the motor car. Three stamps were issued in 1939 to publicise the Berlin Motor Show and the 6 pfennig value featured early Daimler and Benz cars with, by contrast, the famous Volkswagen on the 25 pfennig stamp. In 1961 West Germany released two stamps featuring the first Daimler and Benz cars respectively. Daimler's name is a household name to this day while Benz gave his name to benzine and benzol and immortalised his daughter, Fraulein Mercedes Benz by calling a motor car after her.

Probably the most motor-minded country in the world—for its size—is the Principality of Monaco, known to motorists the world over for the Monaco Grand Prix and the Monte Carlo Rally. It is appropriate therefore that Monaco should have given liberal attention to veteran cars on her stamps. The diamond-shaped stamp of 1961, commemorating the fiftieth anniversary of the Grand Prix, featured old and modern cars, but the old-timer, with its spare-wheel strapped to the roof, fails to qualify for the title of " veteran ", since this designation is confined to cars manufactured before 1906, those produced after that date (up to 1919) being known as " Edwardians ". The same year, however, Monaco brought out a beautiful set of stamps most of which showed veterans in every sense of the word. In chronological order there were a Peugeot of 1898, a Rochet-Schneider of 1894, a Panhard-Levassor of 1899, a Renault of 1898, a De Dion-Bouton of 1900, the Belgian FN-Herstal of 1901, a Fiat and a Delahaye of the same year, the first of the Mercedes produced in 1901, and a Cadillac of 1906. The 5c. stamp featured the first Royce car—a small two-cylinder job with a 1,800 c.c. engine which Sir Henry Royce produced for his own use in 1902. He made three cars, one of which was used by Henry Edmunds, a director of Royce Ltd. Edmunds proudly showed it to his friend, the Hon. Charles Rolls, one of the earliest racing motorists (and, incidentally, holder of Pilot's Licence No. 2 of the Royal Aero Club). Rolls was so enthusiastic about this car that he formed a partnership with Royce to market the car commercially. This partnership was formed in 1904 and today the name Rolls-Royce conjures up the very height of elegance and opulence in motoring. The Monaco stamp showed this first car and captioned it " Rolls-Royce 1903 "—a glaring error, since the partnership did not come into being till the following year!

In 1963 Monaco paid tribute to Henry Ford by issuing a stamp to mark the centenary of his birth. The 20c. stamp portrayed Ford and showed the Model A car of 1903. Oddly enough, the United States let this event pass unnoticed, but made amends recently by adding Henry Ford to the current Famous Americans series of stamps.

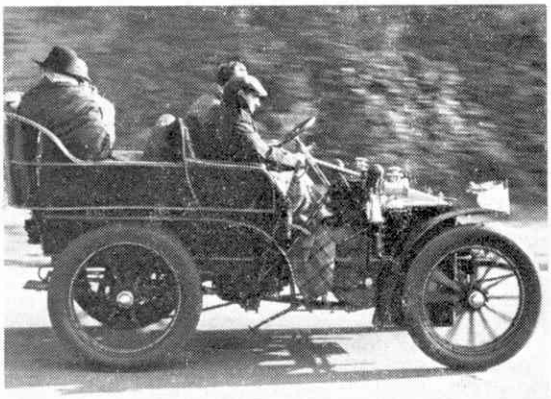
Not to be outdone by Monaco, the tiny Italian republic of San Marino released a long series of veteran car stamps in February 1962. The stamps, in ascending order of value and chronological order by cars, showed a Duryea of 1892 (1L), Panhard-Levassor of 1895 (2L.), a Peugeot " Vis-a-Vis " of 1895 (3L.), Daimler of 1899 (4L.), Fiat of 1899 (5L.), Decauville of 1900 (10L.), Wolseley of 1901 (15L.), Benz of 1902 (20L.), Napier of 1903 (25L.), White of 1903 (30L.), Oldsmobile of 1904 (50L.), Renault of 1904 (70L.), while the three top values showed Italian cars (Isotta Fraschini, Bianchi and Alfa) which, unfortunately, came just too late to qualify as veterans.

It is surprising, and rather disappointing, that in spite of its impact on the civilised world, the motor car has been depicted on relatively few stamps. The United States, which has the largest car industry in the world and the greatest number of cars per head of population, has given scant attention to this subject on stamps. Yet it is interesting to note that the very first stamp ever to depict a motor car came from that country as long ago as 1901—so it definitely qualifies as a veteran. A set of six stamps was released in May 1901 to commemorate the Pan-American Exposition held in Buffalo, New York and the 4c. showed a Duryea automobile of the period.

THE LONDON TO BRIGHTON VETERAN CAR RUN . . . . . .

The interesting history behind this popular event and a typical run described

Photographs by S. GOODGER



THE LONDON to Brighton Veteran Car Run is probably the most famous event of its type in the World and was originally held in 1896. The next run was not organised for 20 years, but since then apart from the war years, and with difficulties due to petrol rationing, it has been held ever since. The history leading to the decision to hold the first Run provides interesting, even humorous reading to us now, some 70 years later.

Motor vehicles as a means of transport began to develop in the early 1860's and by 1865 were sufficiently advanced to make headline news in most of the newspapers. Names which in later years were to become World famous in motoring started to appear in print. Men such as Benz, Daimler and Bolle were developing motor vehicles which when compared with earlier types were reasonably reliable. The development of motor vehicles in Great Britain suffered a serious set back in 1865 when the notorious "Red Flag Act" was introduced limiting the speed of mechanically propelled vehicles through the towns to a mere 2 m.p.h. and 4 m.p.h. in the open country. At all times the vehicle had to be proceeded by a footman carrying a red flag, and it was 13 years before the need to carry a red flag was no longer law, although the footman and low speed limits were still in force. It was not until 1896 that these absurd restrictions were removed thus allowing the development of motor vehicles in this country to progress unimpared. In order to celebrate the abolition of the Act an event was held which became the first of the London to Brighton Veteran Car Runs. It can be safely said that the only good point to come about as a result of the Red Flag Act was this run, which today gives us a chance to see in running order these remarkable machines of the

Heading photograph: Oldest car in the 1968 event was this 1894 Benz.

Top left: On their way to the sea. One of the Veterans on the Brighton Road during the 1968 run.

Left: A satisfied competitor driving a 1904 6 H.P. De Dion Bouton along the Brighton sea front at the end of the run.

past, all of which are over 60 years old.

The Run is held annually on the first Sunday in November, starting from Regents Park at 8 a.m. and arriving at Brighton anytime up to 8 hours later. Preparations for most competitors start many weeks in advance and even on the morning of the Run, cars have to be prepared long before the actual time of departure. Starting a veteran car involves skillful handling on the part of the driver. It must be remembered that these cars were built long before self starters and automatic chokes came into being. Throttle and mixture controllers have to be set with careful consideration of the weather taken into account. The petrol has to be pumped up to the carburettor by hand, and on a very cold morning neat petrol may have to be squirted into the cylinder or cylinders with a syringe. Some cars were without starting handles, the engines being turned over by revolving the flywheel by hand ! Once the engine has started and settled down to a reasonable idle (usually a noisy clatter) the ignition has to be advanced and the drip feed oil supply to the engine carefully checked.

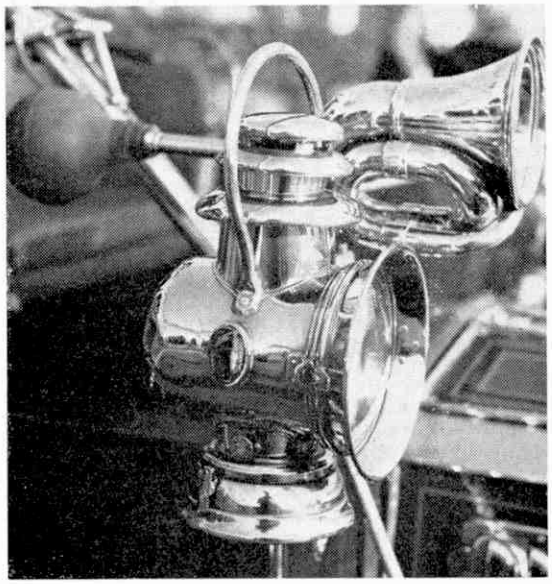
The first car is flagged away from Hyde Park at 8 a.m. and to gain a finishers medal (which is every entrant's aim) Brighton must be reached by four in the

afternoon. All the cars taking part in the run must have been built before 1904, and the oldest in the 1968 run was an 1894 Benz Sociable.

These days veteran cars are becoming more difficult to find, and the purchasing prices are very high; but bargains still do sometimes come to light. A Peugeot for example, that was found two years ago on a scrap heap in Andover, was purchased for the sum of seventy shillings. And a 1904 Swift, a survivor of 29 Brighton runs, only cost £10 when purchased for restoration, some years ago.

It is interesting to note, that in the first run only 14 of the original 39 starters finished; the rate now is a good deal higher, as indeed is the entry. The race now draws over 200 competitors, and of these less than 20 normally fail to start. Entrants come from all parts of Great Britain, from Australia, New Zealand and a large entry from America. In the last year's Run Prince Rainier and Princess Grace from Monaco completed the run in a 1903 de Dion Bouton.

The route the veterans take is that of the normal A23 across Westminster Bridge, Streatham, Croydon, Redhill, Gatwick, Crawley (by-pass), Pycombe, and on



to the finish at Madiera Drive, Brighton where the first car is usually expected at around 11 a.m.

The police show great consideration to the veterans taking part, by giving them a clear run through, often waving them through on the wrong side of traffic islands, over red lights and across solid white lines; but any modern day motorist in his car following their example is in for trouble.

There must be some form of magic about this event, which can draw on a cold, and sometimes wet November morning, about three million or so people, who turn out to line the road from London to Brighton to watch the R.A.C. Veteran Car Run.

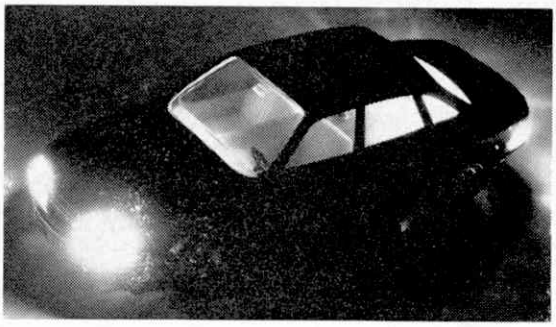
Top right: Brass lamps and horns. Two of the symbols of a Veteran car.

Above: Heading out of Hyde Park at the start of the 1968 event.

Right: A proud owner giving his 1903 Panhard a last minute polish.

COMPETITION GIVES DINKY ANOTHER FIRST

by Chris Jelley



This is not a case of trick photography but is a genuine photograph, taken in the dark, and showing the Dinky N.S.U. Ro 80 with its head and tail lamps on. Note the luminous glow from the seats which gives the impression that an interior courtesy light is fitted to the model.

WHAT SINGLE factor would you say has been responsible for the highest number of improvements, advancements and inventions in the manufacturing side of industry, at least in the free world? If you can't guess, I can tell you—Competition.

It stands to reason, doesn't it? Without competition, a manufacturer has an easy time of it. Provided he markets a reasonable product that sells reasonably well, he can go on turning out the same old thing year after year with nothing to trouble him. Introduce competition, however, and the whole position changes overnight. If you have several different companies producing the same type of product, then each one of those companies will do its utmost to make the best possible version of the product and it will go on trying to improve the product even further, to enable it to stay ahead of its competitors. From the manufacturer's point of view this can involve a great deal of work and expense, but it certainly means that the customer is on the winning side, no matter which company is on top.

A prime example of the way competition has improved a product beyond all recognition lies in the die-cast model business. Dinky Toys, for example, were the first mass-produced die-casts in this country. From 1934 until the last war and for years after the war they had a monopoly. There was no competition, and in the whole of that time Dinkys hardly progressed at all, remaining little more than body castings with baseplates, axles and wheels. Nowadays, however, there are several companies throughout the world making similar-type die-casts and all of them competing with each other for a share of the market with the result that the models produced have improved beyond all recognition. After a couple of decades of those rough-and-ready models, for example, Dinky have taken only a fraction of the time to introduce to their models such things as windows, suspension, interior fittings, steering, opening bonnets, boots and doors, tipping seats, jewelled head and tail lamps—even working trafficators and brake lights—and many of these things before any other competing manufacturer!

Undoubtedly, the list of Dinky Toy successes is long and impressive, so much so, in fact, that you might well think that they had reached the limit of what it is possible to do with a model so small as a Dinky Toy. If you believe this, though, you've a surprise coming because Meccano have just released another superb creation with not one, but two features entirely new to Dinky Toys and one of which has never before appeared on any similar die-cast model—head and tail lamps that really light and luminous seats!

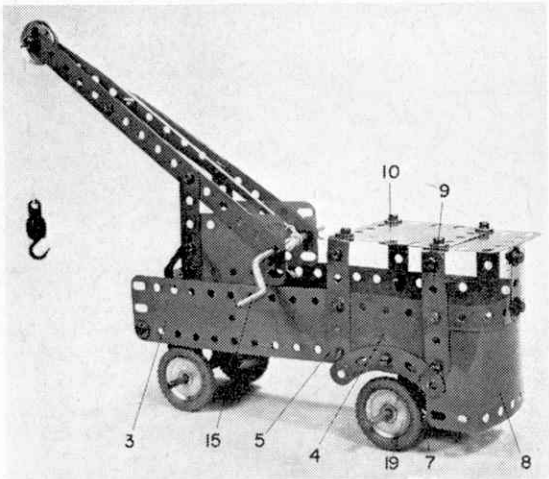
Model No. 176, based on the German N.S.U. Ro 80, will go down in history as being the first Dinky Toy to be equipped with both these features, and a really splendid model it is, too. Even before I tested the lighting, though, I was impressed by the clear-cut casting which seems to include much more than ordinary detail, and this despite the fact that the model does not sport any "opening" features such as bonnet and boot lids, etc. I was also immediately struck by the beautifully-rich colour-scheme of deep burgundy which, thanks to the special spraying process used in the manufacture of the model, reflects the light so well that you would think it had actually been polished!

However, the things which really set the model apart are, of course, the new features, yet, strangely enough, these are not even evident at first glance. The head and tail lamps, for example, are so well designed that they look no more than the almost-normal "glass" lamps with which many Dinky Toys have been fitted in the past two or three years. It is not until you press the model down on its well-sprung suspension that the lights flash into life, powered by a Vidor V16 or equivalent battery that slots into a cavity built into the base. Incidentally, the Dinky has a strong advantage over other models fitted with working lights in that the lights are so bright that they can be readily seen in daylight. It also has the advantage over real cars of having separate switches for the head and tail lamps, the headlamps being brought into operation by pressing down the front of the model, and the tail lamps by presing down on the back. This system allows the headlamps to be flashed on and off just like a real car, while the rear lamps can be used as brake lights when stopping. For night driving, both the head and tail lamps can be illuminated simultaneously by pressing the front and the back down together. The battery by the way is not sold with the model because of storage difficulties.

Although rare, working head and tail lamps on models are not unique, but, to the best of my knowledge, the luminous seats incorporated in the Dinky are entirely new. When viewed in darkness or even semi-darkness their effect is startling, glowing as they do with an eerie greenish-white light which illuminates the whole of the car interior to give the impression that the model is fitted with an interior courtesy light. In fact, it is amazing how much light they do give off—enough to make it almost impossible for the Dinky to be lost in the dark. In broad daylight, the seats appear a normal off-white colour, set off by a black steering wheel and all enclosed by the usual window moulding, incorporating rear-view mirror and windscreen wiper representations. German-style number plates are present at front and rear to add to the already impressive authenticity of the model.

BREAKDOWN TRUCK

by Spanner

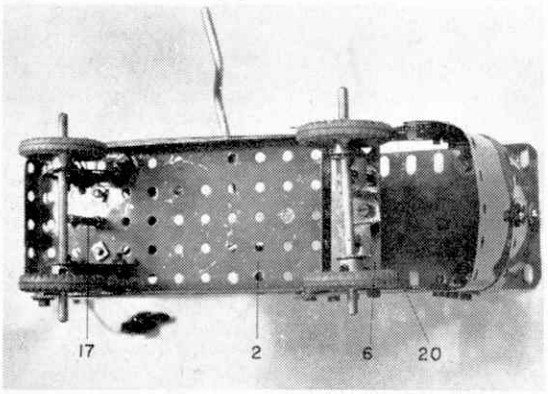


SIMPLICITY IN Meccano model-building is often just as important as complexity. It is no use expecting youngsters new to the hobby to be able to produce a large and complicated construction, even if they have sufficient parts at their disposal. Considerable experience is needed before such things can be successfully built and it is for this reason that we always feature a goodly selection of simple models in these pages. Described below is another example to add to the list, the model in question being a Breakdown Truck built with Outfit No. 2.

Assemblywise, two Flat Trunnions 1 are attached by Angle Brackets to an inverted $5\frac{1}{2} \times 2\frac{1}{2}$ in. Flanged Plate 2. Bolted to each side flange of this Plate is a $5\frac{1}{2} \times 1\frac{1}{2}$ in. Flexible Plate 3, extended by a $2\frac{1}{2} \times 1\frac{1}{2}$ in. Flexible Plate 4, the join being overlaid by a $2\frac{1}{2}$ in. Strip 5. Plates 4 at each side are joined by a $2\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strip 6, the securing Bolts also fixing a $2\frac{1}{2}$ in. Stepped Curved Strip 7 to the outside of each Plate.

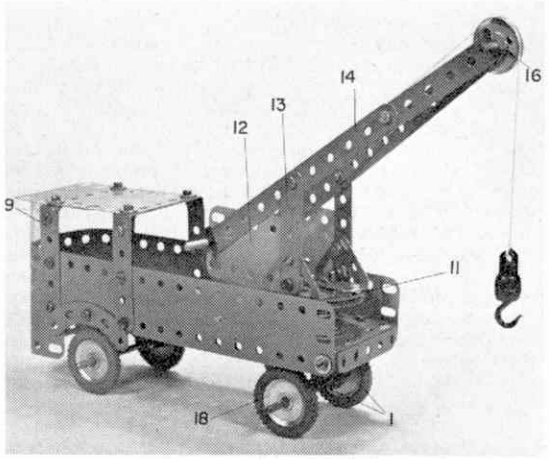
Also bolted between Plates 4 to form the cab front is a $4\frac{1}{2} \times 2\frac{1}{2}$ in. Flexible Plate 8, the joins being overlaid by $2\frac{1}{2}$ in. Strips 9, while two $2\frac{1}{2} \times 1\frac{1}{2}$ in. Transparent Plastic Plates serve as the windscreen. The cab roof consists of a $3\frac{1}{2} \times 2\frac{1}{2}$ in. compound flexible plate 10 bolted to a $2\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strip fixed to Strips 4 and attached by Angle Brackets to Strips 9. Compound plate 10 is built up from two $2\frac{1}{2} \times 2\frac{1}{2}$ in. Flexible Plates overlapped three holes.

Coming to the actual crane section of the truck, two Trunnions are fixed by $\frac{3}{8}$ in. Bolts to a 2 in. Pulley 11.



Bolted to each Trunnion is a $2\frac{1}{2} \times 1\frac{1}{2}$ in. Plastic Plate 12 and a $2\frac{1}{2}$ in. Strip 13 to the top of which an 8 in. compound strip 14, obtained from two $5\frac{1}{2}$ in. Strips, is secured. The lower end of this compound strip coincides with the centre hole in the forward end of Plastic Plate 12 and provides the bearing for a $3\frac{1}{2}$ in. Crank Handle 15, held in place by Spring Clips. Held in place by Spring Clips in the upper ends of strips 14 is a 1 in. Rod carrying a 1 in. Pulley without boss 16.

Pulley 11 is now fixed on a 2 in. Rod 17. A 1 in. loose Pulley is added, then the Rod is journalled free in the boss of an 8-hole Bush Wheel bolted to the top of Flanged Plate 2. A Cord Anchoring Spring beneath the Flanged Plate holds the Rod in place.



Journalled in the apex holes of Flat Trunnions 1 is a $3\frac{1}{2}$ in. Rod on which two 1 in. Pulleys 18, fitted with Motor Tyres, are fixed. Two similar Pulleys with Motor Tyres 19 are fixed on another $3\frac{1}{2}$ in. Rod mounted in two Angle Brackets, one bolted to a Reversed Angle Bracket 20 and the other bolted to a Double Bracket, both the Double Bracket and Reversed Angle Bracket being themselves bolted to Double Angle Strip 6. Finally, a length of Cord is wound round Crank Handle 15, the end being taken over Pulley 16 and tied to a Loaded Hook.

PARTS REQUIRED

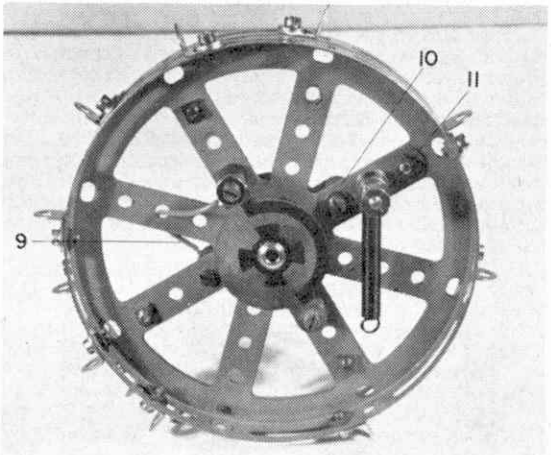
4—2	1—20a	2—48a	4—142c
6—5	4—22	1—52	1—176
1—11	2—22a	1—57c	2—188
8—12	1—24	2—90a	2—189
2—16	6—35	2—111c	2—190
1—17	46—37a	1—125	1—191
1—18b	44—37b	2—126	2—193
1—19s	10—38	2—126a	2—194

STRIKE OUT

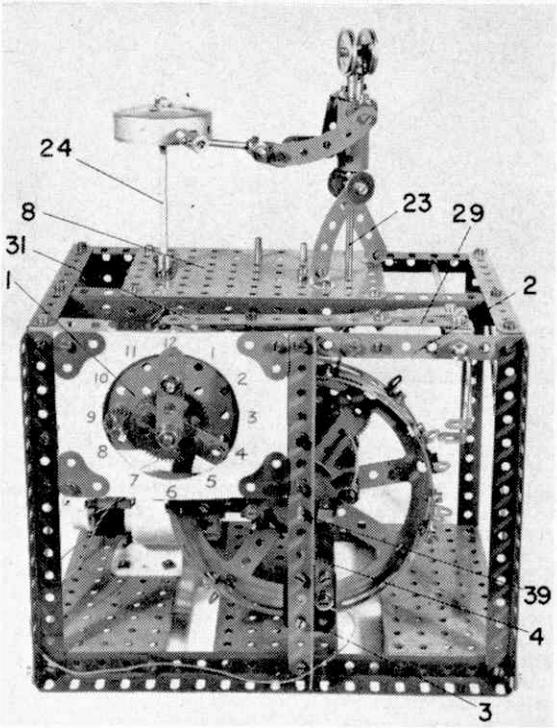
. . . with this ingenious Clock-striking unit designed and built by RON FAIL. Photos by BERT LOVE

CLOCK-BUILDING in Meccano (writes Spanner) is a section of the hobby with a large and extremely keen following. Meccano Limited, themselves, have produced a considerable number of clocks over the years, many of which have been featured in the M.M. Few of these, however, have been striking or chiming examples simply because it has always been difficult to build-up the necessary strike-mechanism with standard Meccano parts and what striking clocks we have featured in these pages have usually included a specially-made "snail" cam. Now, though, this unfortunate state of affairs has at last finished, thanks to the designing skill of Mr. Ron Fail of Bedford, who has invented the completely-standard Meccano Clock-striking Unit described here.

Although he would be first to disagree with me, Ron, to my mind, is one of the foremost Meccano clock-builders in the world in that he aims at simplicity combined with reliability and accurate time-keeping. He has not deviated far from this policy in his Striking Unit, which has the added advantage of being so designed that its principles can be easily incorporated in most other Meccano Clocks, be they simple or highly complex in design. To avoid any misunderstanding, incidentally, I must stress at this point that I have nothing but admiration for the skill of those builders who specialise in highly complex clocks and, to be quite honest, few things hold my interest more than the sight of such a clock in action. To enable us to be of help to the majority of readers, however, simplicity in models comes second only to realism and Ron is an expert in both these fields. Having said this, it leaves us only to reprint the detailed building instructions Ron has supplied.



The composite locking plate as it appears when removed from the mechanism. Note the use of Elektrikit Commutators.



Clock-builders can ring out the hours with this clock-striking mechanism designed and built by Ron Fail of Bedford.

Main frame

Beginning with the main frame, a base is built up from a pair of 9½ in. Angle Girders joined by three 5½ × 2½ in. Flanged Plates. Six vertically-mounted 7½ in. Angle Girders are then attached to this base, four at the corners and two more in the positions shown, the top itself consisting of 5½ in. Angle Girders connected by 9½ in. Angle Girders, the former braced by 9½ in. Strips, fitted diagonally. Note however that the top front member of the framework is not an Angle Girder but is produced from a 5½ × 2½ in. Flat Plate 1 extended by Strips 2. A 1½ in. Insulating Flat Girder 3 carrying a 2 in. radius Wiper Arm 4 is also fixed to one of the front 7½ in. Girders, while, to the back are fitted two 5½ in. Strips 5 and 6 and a Double Arm Crank 7. A 5½ × 3½ in. Flat Plate 8 will be fitted later.

Locking plate

Moving onto the locking plate, this consists of a pair of 5½ in. Hub Discs bolted together, with a 1⅜ in. Bush Wheel positioned at the centre. Flat Commutators are attached to both sides of the assembly by means of Insulating Spacers and suitable Bolts and Washers, then the conducting surfaces of the two Commutators are connected by a short piece of Connecting Wire 9. A Double Arm Crank 10, carrying a 1 in. Rod 11, is bolted to one spoke of the Hub Discs whereas twelve ½ × ½ in. Angle Brackets are bolted to the rims of the Discs. These Brackets control the striking and must be fitted in a special way: they are arranged alternately on the rims of the two Hub Discs at intervals of 1/78, 2/78, 3/78, etc., up to 12/78 of the circumference. In practice, final

adjustment of the positions is done after the mechanism has been assembled.

Epicyclic gear

An epicyclic carrier is made from two 6-hole Bush Wheels 12 connected rigidly by two 1⅛ in. Bolts 13, these bolts also holding two 3½ in. Strips 14 spaced from the Bush Wheels by one Washer. Eight Fishplates 15 are bolted to the remaining holes in the Bush Wheels, using the slotted holes in the Fishplates to adjust their positions so that the gearing meshes properly. A Crank 16 carrying a 2½ in. Rod 17 is secured to the end of one 3½ in. Strip, to the other end of which, a 1½ in. radius Wiper Arm 18 is attached by a ½ in. Bolt and Nuts (no insulation is needed). Journalled in one pair of Fishplates is a 1½ in. Rod carrying a $\frac{7}{16}$ in. Pinion 19, on the same side of the carrier as the Wiper Arm, and a ½ in. Pinion 20. A second 1½ in. Rod is journalled in the adjacent pair of Fishplates, this Rod carrying a ½ in. Pinion 21 and a 1½ in. Gear Wheel 22. An identical set of gears is fitted in the diametrically opposite holes in the other Fishplates.

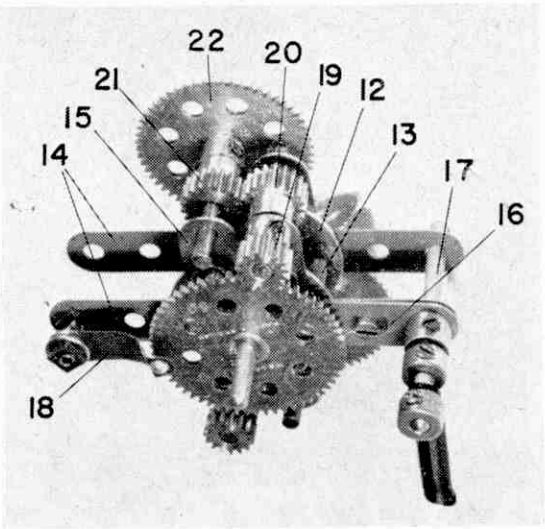
Manikin

The actual striking motion is performed by a hammer-weilding "strong man" produced from one 2½ in. Strip and one 2½ in. Curved Strip attached to Flat Plate 8 by Angle Brackets to serve as legs, the tops being joined by a Large Fork Piece. Journalled in this Fork Piece and in Plate 8 is a 6½ in. Rod 23 to which a Double Arm Crank is secured to form the shoulders. Arms are supplied by a 2½ in. Curved Strip and a couple of 1½ in. Strips, attached to the shoulders by Angle Brackets. The head consists of a Coupling with two 1 in. loose Pulleys bolted to it, while the body is simply a Sleeve Piece located by two Chimney Adaptors. Attached to the arms by Handrail Supports is the hammer, consisting of a 3 in. Rod on which a Coupling is fixed.

Next, a 4 in. Rod 24 carrying a Rod Socket is mounted in the boss of a Double Arm Crank bolted to Plate 8. An Elektrikit Bell is secured to the Rod Socket, as can be seen. Beneath Plate 8, Rod 23 is fitted with a Crank 25 and a Coupling 26, the latter holding a 3 in. Rod 27. A Tension Spring is attached to the Crank by means of a Pivot Bolt, the free end of the Spring being hooked to an Angle Bracket. A 1 × ½ in. Angle Bracket 28 is bolted to the Plate to act as a stop for the crank, holding the hammer about ⅛ in. from the Bell.

Release mechanism

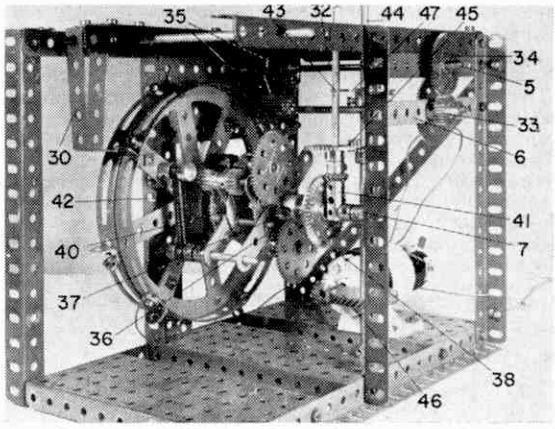
Each of the two release levers is made by bolting a 4½ in. Strip 29 to the end of a 2½ × ½ in. Double Angle Strip 30, the securing Bolt also holding a Double Bracket in place. Each 4½ in. Strip is then extended three holes by another 4½ in. Strip 31, after which the levers are mounted, by means of the Double Brackets, on a 6½ in. Rod in the main frame, being located by Washers and Collars. Although it is not strictly part of the striking mechanism it is an advantage to fit clock hands and, if desired, a cardboard face. The necessary gearing has been described many times in *Meccano Magazine*, but returning to the present mechanism, a 6½ in. Rod 32 is arranged to turn at half the speed of the minute hand by means of a ¾ in. Pinion 33 and 50-teeth Gear Wheel 34. Rod 32 also carries a pair of identical cams 35, each made by bolting three ½ × ½ in. Angle Brackets to adjoining holes in a 6-hole Bush Wheel. The ends of the release levers rest on these cams which should be adjusted so that the levers drop alternately each time the minute hand is moved up to the hour.



The epicyclic gear unit used in the mechanism to obtain the necessary ratio of 78 : 1, seventy-eight being the number of times a clock strikes in 12 hours.

Assembly

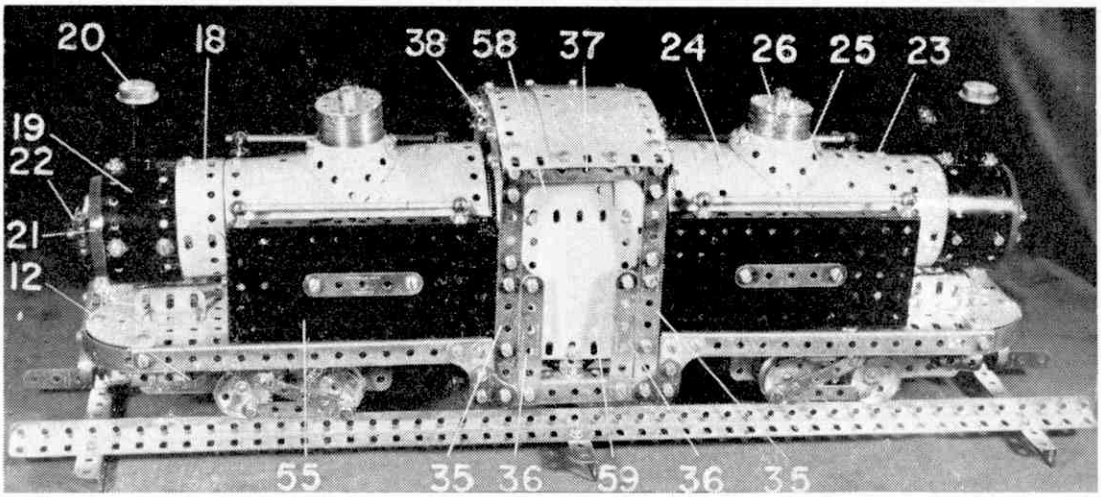
Before commencing assembly, one more small unit should be made, this consisting of a Socket Coupling 36 holding, at one end, a ½ in. Pinion 37 and, at the other end, a 1½ in. Bevel Gear 38, then most of the various sections of the mechanism are mounted on a 6½ in. Rod 39, fixed in Double Arm Crank 7 and



In this rear view of Ron Fail's clock-striking mechanism, the end structure has been removed to show the locking plate and epicyclic gear unit in position.

supported in the front 7½ in. Angle Girder of the framework. Starting at the front, the following items are fitted, in order, on the Rod: first, four Washers, then the locking plate, followed by five Washers and a 60-teeth Gear 40 (with its boss to the rear). This Gear is the only component which is fixed to the Rod. Next comes the epicyclic gear, then two Washers and the Socket Coupling described above, followed by one Washer, a Coupling 41, and a Collar. Note that the

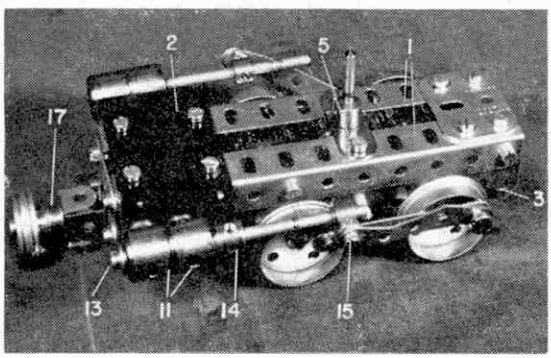
Continued on page 239



STEAM LOCO WITH A DIFFERENCE by Spanner

RAILWAY LOCOMOTIVES or, more particularly, steam railway locomotives have always held a fascination for me. The trouble is, however, that steam locomotives—at least in Britain—are virtually things of the past. You just don't see them any more, except on very rare occasions, unless, that is, you live near one of the privately-owned, narrow-gauge lines that have been specially preserved by independent organisations.

These small lines deserve our undying gratitude. They are undoubtedly the last bastions of steam in this country and I firmly believe that they have every intention of continuing with steam-power as long as they remain in existence. Their fame, though, is not due to their use of steam power alone. Even before the final withdrawal of steam services by British Rail, the independent narrow-gauge railways had long been tourist attractions, not only because they were "independent narrow-gauge railways", but particularly because they nearly all use unique equipment and rolling stock. Most unique of all, however, are the two highly distinctive, double-ended locomotives operated by the Festiniog Railway in North Wales.



A close-up view of one of the bogies showing its strong framework and imitation pistons. The pistons themselves are fixed but a moving effect is obtained by Coupling 15 sliding on its Rod.

Known as a "Double Fairlie" each of these two locomotives is a genuine "double-ender" with two complete boilers and smoke boxes separated by a single centrally-situated cab. The cab itself is fitted with two sets of controls—one for each boiler—so that, no matter which way the engine is working, it is always pointing in the right direction! Frankly, for a long time now I have been intrigued by "Iarll Meirionnyd" (Earl of Merioneth) and "Merddin Emrys", as the two locomotives are named and so I was particularly pleased when I received details and photographs of a first-class Meccano model, based on these splendid machines. It had been built by M.M. reader **Dr. Stephen Lacey**, of Hinckley, Leicestershire, and I left bound to include it in the M.M. The following article was supplied by Dr. Lacey, himself, while Bert Love of Birmingham took the photos.

Festiniog Double Fairlie

This model is based on the two locomotives "Iarll Meirionnyd" and "Merddin Emrys", owned by the Festiniog Railway in North Wales. Built more than 80 years ago at the Railway's own Boston Lodge Works, both locomotives are still very much in use today, working on the 9½-mile narrow gauge line now running from Portmadoc to Ddaullt, although, until a year or so ago, the line was only open between Portmadoc and Tan-y-Bwlch—a distance of some 7½ miles. The model, for ease of assembly, is built in five separate units: two power bogies, two boiler-smokeboxes and one main frame with cab and side-tanks.

Power bogies

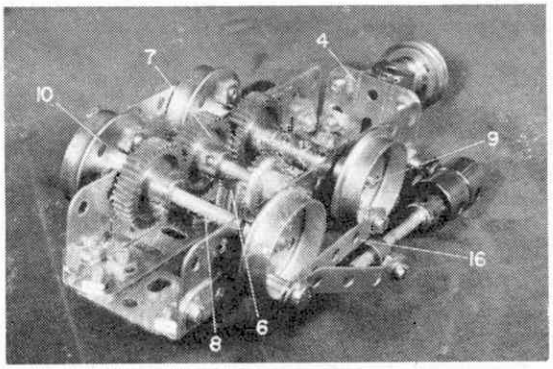
Beginning with the power bogies, two 5½ in. Angle

Girders 1 are joined, at one end, by a 1½ in. Flat Girder and, at the other end, by a 2½ × 1½ in. Flanged Plate 2, the latter being spaced from the Angle Girders by a 2½ in. Strip in each case. Note the use of the elongated holes in the Girders. The vertical flange of each Girder 1 is extended by a 5½ in. Flat Girder 3, use again being made of its elongated holes, then one end of the arrangement is enclosed by a 1½ in. Flat Girder 4, attached to Girders 1 by Angle Brackets.

A Double Arm Crank 5, boss uppermost, is next bolted between the horizontal flanges of Girders 1 through their seventh holes from the Flanged Plate end. Journalled free in the boss of this Crank is a 1½ in. Rod, in the case of one bogey, and a 3 in. Rod, in the case of the second bogey, on the lower end of which is fixed a ½ in. Pinion 6 spaced from the Crank by a Washer. This Pinion meshes with a ¾ in. Contrate Wheel on a 2 in. Rod mounted in the seventh holes of Flat Girders 3. Also fixed on the Rod is a 1 in. Gear 7 which meshes with two further 1 in. Gears, fixed one each side of it on a 2½ in. Rod 8 and a 2½ in. compound rod 9, built up from a 1 in. and a 1½ in. Rod joined by a Coupling. These Rods are journalled in the fifth and ninth holes respectively of Flat Girders 3. A 1¼ in. Flanged Wheel 10 is mounted on each end of each of the Rods.

Two cylinders for both bogies each consist of two Chimney Adaptors 11 bolted through the first and second holes of the flange of Flanged Plate 2. In one of the bogies, a Large Fork Piece 12 is fixed through the third hole in the Flanged Plate's flange, being spaced from the flange by Washers and arranged with its boss inside the second Chimney Adaptor, its bore in line with the holes in the ends of the Adaptors. In the other bogey, the Fork Piece is omitted and replaced by a Rod Socket fixed by Bolt 13 to the end of the first Chimney Adaptor. (The bogey illustrated in close-up here uses this latter method.) Mounted in the Rod Socket or in the boss of the Fork Piece, as the case may be, is a 2½ in. Rod, on which a Coupling 14 is fixed.

Free to slide on the same Rod is a Collar 15, to which is lock-nutted a 2½ in. Narrow Strip, bent as shown to represent the connecting rod. The other end of the Strip is mounted, along with another 2½ in. Narrow Strip 16, on a Pivot Bolt fixed to the rear 1¼ in. Flanged Wheel. The other end of Narrow Strip 16, representing the coupling rod, is mounted on a ½ in. Bolt secured to the forward Flanged Wheel. The bogey is then completed by a single central buffer 17 supplied by two 1 in. Pulleys, two ½ in. Pulleys and a Double Bracket on a ¾ in. Bolt fixed in a Double Bent Strip bolted to Flat Girder 4.

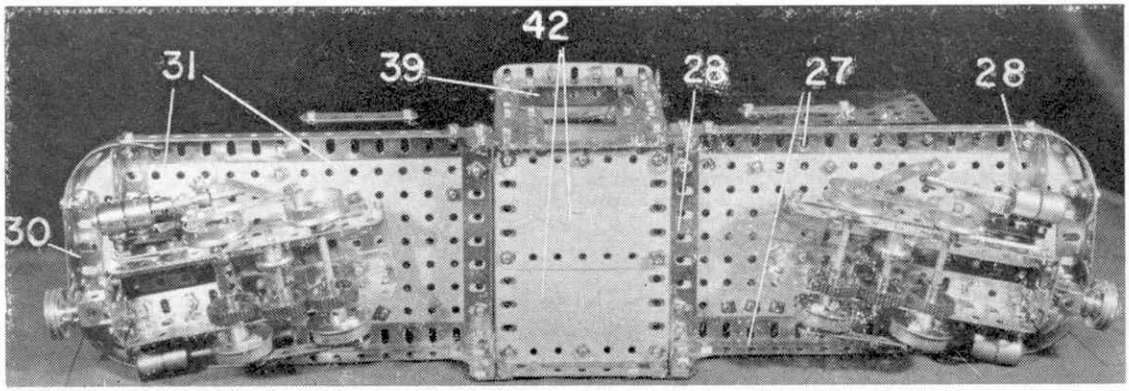


An underside view of the bogey showing the gear arrangements which transfer the drive to both sets of wheels.

Smokebox/boiler units

In the case of each of the two smokebox/boiler assemblies, four 2½ × ½ in. Double Angle Strips are fixed by their lugs to the non-boss side of a Face Plate in such positions that they lie just inside the edge of the Face Plate, the securing Bolts passing through the elongated holes of the Plate. To the backs of these Double Angle Strips are bolted four 2½ × 2½ in. Curved Plates 18 overlaid as shown by two 5½ × 1½ in. Plastic Plates 19, the latter forming the smokebox. Fixed to the top of the smokebox is the chimney, supplied by a Sleeve Piece topped by an inverted ¾ in. Flanged Wheel 20 on a 2 in. Screwed Rod inserted in the centre hole of upper Plate 19 and secured internally by a Nut. A Wheel Flange 21 serves as the smokebox door, through the centre of which runs a 1⅛ in. Bolt, holding a ¾ in. Washer and a Collar. The Wheel Flange is secured to the earlier-mentioned Face Plate by a second ¾ in. Bolt, carrying a Coupling 22, the Bolt passing through the centre threaded bore of the Coupling. Locked by Nuts in the end threaded bores of the Coupling are two further 1⅛ in. Bolts, representing hinges.

Returning to the above 2½ × ½ in. Double Angle Strips, Bolts are fixed by Nuts in the free rear lugs of the upper and two side of these, then three 5½ × ½ in. Double Angle Strips are secured on the Bolts by further Nuts. Attached, in turn, to the free lugs of these latter Double Angle Strips is a semi-circular construction consisting of two 3 in. Stepped Curved Strips, their



In this general underside view of the model the layout of the bogies in relation to the chassis is clearly shown.

ends joined by a 4½ in. Strip. Note that the joining Bolts pass through the *second* holes from each end of the 4½ in. Strip (to give a tapered effect to the 5½ × ½ in. Double Angle Strips), and that, in every case, ¾ in. Bolts are used with their heads pointing towards the chimney. The boiler is then completed by, from the front, backwards, two 2½ × 2½ in. Curved Plates 23, overlapping a laterally-mounted 4½ × 2½ in. Flexible Plate by two holes, and finally three 2½ × 2½ in. Curved Plates 24 also overlapping the 4½ × 2½ in. Plate by two holes. A dome is of course added, this consisting of two Flexible Gusset Plates 25 bolted together and enclosing a 1½ in. Pulley surmounted by twelve Wheel Discs fixed on a 2 in. Screwed Rod, topped by an 8-hole Bush Wheel 26.

Chassis

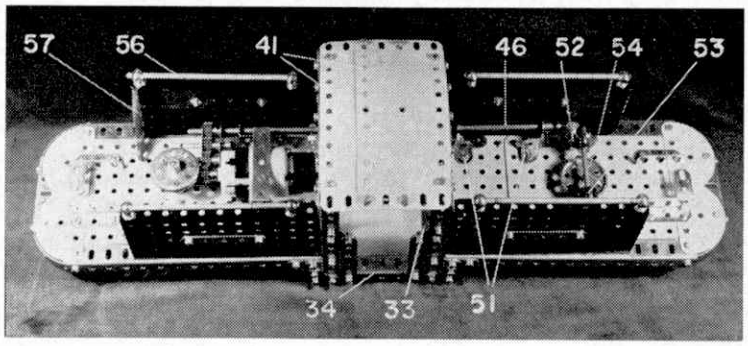
In construction of the chassis, two similar arrangements are first each built up from two 7½ in. Angle Girders 27 joined at each end, through their elongated holes, by a 4½ in. Angle Girder 28, at the same time fixing in place at one end as shown, two overlapping Semi-circular Plates 29. Bolted between the front holes of these Plates is a 2½ in. Angle Girder 30, its ends connected to Girders 27 by Formed Slotted Strips, while two 5½ × 3½ in. Flat Plates 31, suitably overlapped, are fixed between Girders 28. Bolted to these Plates and to Semi-circular Plates 29 are two 1½ in. Angle Girders, to one of which a 1 × ½ in. Angle Bracket 32 is secured to form a saddle for the smokebox. (Alternatively, here, a 1½ × ½ in. Double Angle Strip could be bolted between the Angle Girders.)

Now attached at right-angles to the inside end of each Girder 27 is a 1½ in. Angle Girder, the join being strengthened by a 1 in. Corner Bracket. The 1½ in. Girders are themselves joined through their centre holes by a 4½ in. Angle Girder 33, then the two identical assemblies are fixed together by 3½ in. Angle Girders 34 bolted between the 1½ in. Angle Girders, the joins again being strengthened by 1 in. Corner Brackets, at the same time fixing two 5½ in. Strips 35 to Girders 34. Also fixed to each Girder, alongside Strips 35 are two 3 in. Strips 36, their upper ends connected to Strips 35 by 1 in. Corner Brackets, while the upper ends of Strips 35 are themselves connected by a 3½ in. Strip 37, 1 in. Corner Brackets again strengthening the join.

Attached by Angle Brackets between the top of each pair of Strips 35 *at opposite sides* are two 4 in. Stepped Curved Strips 38 overlapped five holes, the Angle Brackets being secured through the second holes from the ends of the Curved Strips. The securing Bolts, here, also fix a 3½ × ½ in. Double Angle Strip 39 between each pair of Strips 35 *at the same side*. A 2½ in. Curved Strip 40 is suspended from the centre of Curved Strips 39 by Fishplates to enclose the space above the boiler.

Three further 3½ × ½ in. Double Angle Strips are also bolted between Curved Strips 39 to support the cab roof which is supplied by two 5½ × 2½ in. Flexible Plates 41, overlapped three holes. The roof, however, should not be fitted at this stage, but after the boilers and side tanks have been built onto the chassis. The cab floor, on the other hand, can be fitted, and this is simply built up from two 3½ × 2½ in. Flexible Plates 42, overlapped two holes.

Coming to the driving system, a Power Drive Unit, on its side, is fixed as shown to 1 × 1 in. Angle Brackets, bolted to the edge of Flat Plates 31 and extended vertically by 1½ in. Strips. A 2½ × ½ in. Double Angle Strip 43 is attached by its lug to the Strip nearest the output shaft of the Power Drive Unit, is extended over the Unit and attached by its other lug to a Fishplate bolted, together with another 2½ × ½ in. Double Angle Strip 44, to a Girder Bracket 45, that is in turn bolted to Flat Plates 31. The lugs of Double Angle Strips 44 serve as the bearings for the drive shaft—an 11½ in. Rod 46—linking the two bogies.



In this view of the loco, the twin boilers have been removed to show the method of transferring the drive from the motor through geared shafts to both bogies.

Mounted on the output shaft of the Power Drive Unit is a ½ × ½ in. Pinion that meshes with a ½ × ¼ in. Pinion 47 on a 1 in. Rod journalled in a Channel Bearing 48. Pinion 47 meshes with another ½ in. Pinion on a 1½ in. Rod, while this Pinion, in turn, meshes with a further ½ in. Pinion 49, fixed on Rod 46. Also in mesh with the Pinion on the output shaft of the Unit is a 1½ in. Contrate Wheel 50, mounted, inverted, on the vertically-situated 3 in. Rod included in one of the bogies, this Rod turning freely in the boss of an 8-hole Bush Wheel bolted to the underside of Flat Plates 31. A Collar fixed on the Rod above the Plates holds the bogey in place.

Additional bearings for Rod 46 are supplied by two 1 × 1 in. Angle Brackets secured to the other set of Plates 31 by Corner Angle Brackets 51 spaced from the Plates by Washers. The Corner Angle Brackets are used to allow lateral movement of the Angle Brackets, this being achieved by using the elongated holes in the lugs of the Corner Angle Brackets. Fixed on the end of the Rod is a ¾ in. Bevel Gear which meshes with another similar Bevel 52 on a transversely-mounted 3½ in. Rod, held by a Collar and a ½ in. Pinion 53 in two 1 × 1 in. Angle Brackets bolted to Plates 31. Pinion 53 engages with another 1½ in. Contrate Wheel 54 secured to the top of the 1½ in. Rod included in the remaining bogey. As in the case of the first bogey, this Rod is journalled free in an 8-hole Bush Wheel bolted to the underside of Plates 31.

Continued on page 253

HAVE YOU SEEN ?

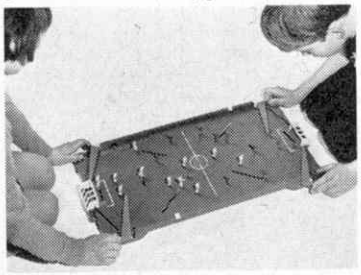
Airfix Q.E.2

Still very much in the news, although not in use, is Cunard's *Queen Elizabeth II*. This, the latest Cunard passenger liner can carry 1,400 passengers when cruising in the peak holiday season, and accommodates 2,025 passengers, and up to eighty cars when running between London and New York. By the time it is in commission, thousands of Q.E.2's will have already been built; this is because Airfix have produced a 50 ft. to 1 inch scale model of the new 65,000 ton liner, and it is in the shops now.

The kit containing nearly 150 parts is well detailed without being too fragile. The boat decks contain six motor launches, two small and four large motor boats and eight lifeboats. The distinctive funnel, rising high above, is complete with plenum air vent. The fore-deck is fitted with movable crane towers and a telescopic mast. Full assembly and painting instructions are included plus two cradles to support the finished 9¼ in. model, which costs 13/9d.

Humbrol Craft Knife

Whenever you need a really sharp cutting edge, just reach for a Humbrol Craft Knife. This excellent tool is ideal for modelling, marquetry, biology, artwork, and many other tasks. The knife's plastic handle fits snugly into the hand, allowing finger-tip control to be obtained. Three differently shaped blades are available, costing 5d., that fit into the handle and are locked into position by a knurled thumb-screw. The three types of cutting edges are concave, convex, and diagonal-straight, the latter giving an extremely fine point. The knife is supplied complete with two blades, price 2/6d.



Corgi's MGC GT

The latest addition to Corgi's range of sports cars is the MGC GT in full competition trim. This 120 m.p.h., 2.9 litre car is easily distinguished from the MGB by a distinctive bulge situated over the carburettors, on the bonnet.

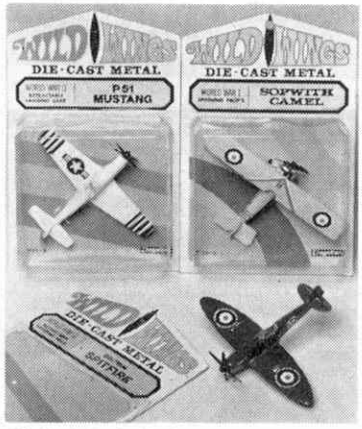
The Corgi model, measuring only 3¾ inches, is finished in brilliant yellow, with black bonnet and black rear window surround. Special features include chrome plated bumpers, jewelled headlights and authentic wire wheels. Also, the doors open to give full access to the black trimmed interior, and the tailgate can be lifted up to disclose a large, opening suitcase. Competition numbers are included, which can be fitted to the bonnet and doors, if so desired. Altogether the MGC GT, costing only 7/6d., is a very pleasing model.

The New Cragstan Wild Wings

A new range of die-cast models has just been introduced by Cragstan. This series of twenty metal aircraft, many with retractable undercarriages, are certain to become collector's pieces, though are primarily intended as toys. The aircraft, called Wild-Wings, are all types from the 1914-18 war; U.S. jet fighters; airliners and helicopters. Those that are available from the shops now are:—

French Spad XIII; British S.E.5; British Camel; German Fokker DVII; U.S. P51-Mustang; Japanese Zero; British Spitfire; German Messerschmitt Me109; U.S. F105-Thunderchief; U.S. FIII-Swing-Wing fighter; U.S. F.86-Sabre; U.S. F.104-Starfighter; British V.C.10; U.S. Boeing 707; U.S. Boeing 727; Anglo-French Concorde.

Not yet available are the Piaseki Workhorse, the Huey Cobra, Piaseki Twin Jet and the Sikorsky HO 4S—all helicopters. All these models can be obtained for a standard price of 8/9d.

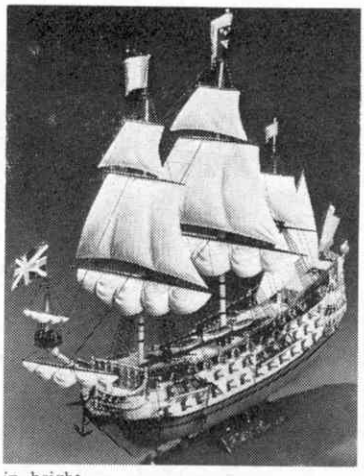


Airfix Football Game

To obtain all the thrills and excitement of a football match, the miniature football game by Airfix is ideal. For two to four players, the game consists of two teams set out (3-2-3-2-1) on a 22¾ in. by 11½ in. plastic field surrounded by a retaining wall, and two goal nets. The only movable players are the half-backs and the goalies, the remainder of the teams are fixed obstructions. The movable men and extending triggers situated at each corner of the field provide the means of attack and defence.

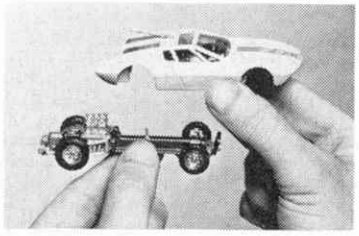
Corgi's de Tomaso Mangusta

Close co-operation between two Italian car companies resulted in the production of the Mangusta. De Tomaso, the sports car specialists, produced the box-section tubular backbone chassis with a V8 engine at the rear, while Ghia came up with the futuristic, streamlined, two-seater body, measuring only 3 ft. 4 in. in height.



The two-tone body of the Corgi model is complete with racing stripes and radio aerial, and can be removed to reveal the whole of the chassis layout. This includes wishbone trailing arm suspension, engine and gearbox unit at the rear, twin exhaust pipes and a movable gear lever. To add realism, Corgi have incorporated big fat tyres at the back and small tyres at the front with authentic magnesium wheels.

The paint finish on our model was not to the usual high standard, but otherwise, the Corgi de Tomaso Mangusta is an excellent model.



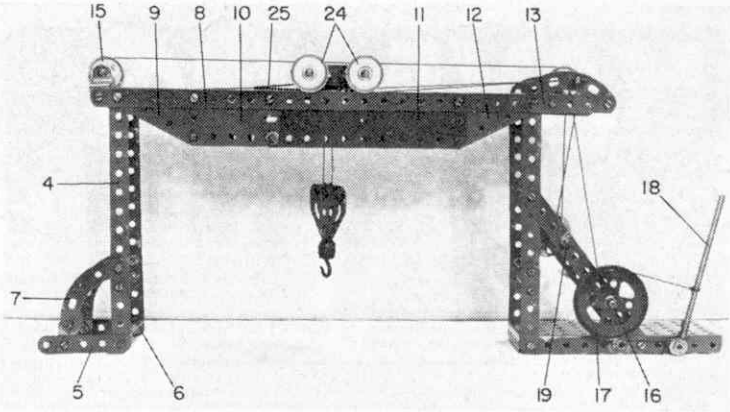
H.M.S. Prince

The Prince, launched in 1670, was one of the finest English ships in the Seventeenth century. Under war conditions she carried 780 men, and was armed with 100 guns ranging from the 42 pdr. cannon on the lower deck, to the 3 pdrs on the poop. A large ship, the Prince had a burden of 1,463 tons and a keel length of 131 ft. Unfortunately in 1692 she was broken up and the timber that was salvaged from her, was used to build the Royal William.

The Airfix kit has nearly 400 parts, all finely detailed. The blown out sails and the rigging add to its authenticity. From the two hulls that fit together perfectly, to the assembly of the masts, the Prince is an extremely enjoyable model to build. The painting of the model is probably the most tedious job and special care should be taken with the gilded detail. For modellers who prefer to paint their models with the correct colours, there are several books available showing good colour photographs of the Prince.

Top right: The beautiful Airfix H.M.S. Prince costing 21/6d. Above: The Corgi de Tomaso Mangusta showing the detachable chassis. Centre: The die cast aeroplanes produced by Cragstan. Left: Airfix's exciting football game for two to four players.

BUILD A GANTRY CRANE by Spanner



A new Outfit No. 3-plus model

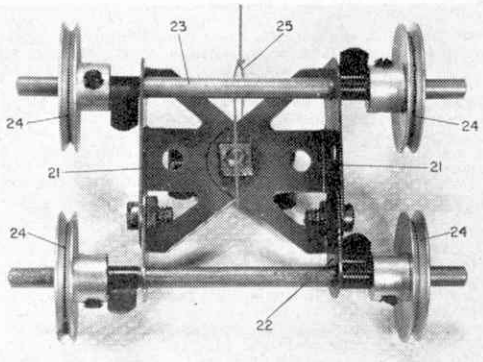
AN INDISPUTABLE fact of Meccano life is that cranes are among the most popular model-building subjects with followers of the Meccano hobby. There are, I think, two major reasons for this: (1) a crane in Meccano looks perhaps more realistic than any other type of construction and (2) there are so many different types of cranes in existence that it is possible to reproduce fairly accurately at least one type no matter what size of Outfit is used, from the smallest to the largest. Illustrated here, for example, is a Gantry Crane which, except for three additional Spring Clips, is built with Outfit No. 3. It is an extremely simple model, using very few parts, yet it not only " looks " like a gantry crane, but also " works " like one, as well. Of course, being a very simple model, it does not reproduce *all* the features of its prototype, but it certainly includes the *main* features and is ideal for younger builders to attempt.

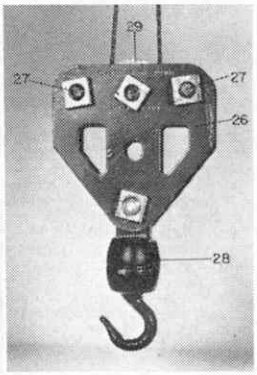
Construction should present no difficulty. Two 7 in. compound strips 1, each consisting of one 5½ in. and one 2½ in. Strip overlapped two holes, are bolted one to each side flange of a 5½ × 2½ in. Flanged Plate 2, supporting Strips being provided by two 5½ in. Strips 3 bolted, as shown, between compound strips 1 and Flanged Plate 2. Another pair of similar 7 in. compound strips 4 are built up and their lower ends secured to a 2½ in. Strip 5, the securing Bolts also fixing Angle Brackets in position. These Angle Brackets are joined by a 2½ in. Strip 6, while a 2½ in. Stepped Curved Strip 7, extended by a Fishplate, is bolted between each compound strip 4 and respective 2½ in. Strip 5 to act as a bracer.

Now fixed to each of two 12½ in. Strips 8 in the positions shown are a 2½ × 1½ in. Triangular Flexible Plate 9, a 2½ × 1½ in. Flexible Plate 10, a 5½ × 1½ in. Flexible Plate 11 and a second 2½ × 1½ in. Triangular Flexible Plate 12. When completed, the two assemblies are bolted to the tops of compound strips 1 and 4, at the same time fixing two 2½ × ½ in. Double Angle Strips between the sides and extending one end of each Strip 8 with a 2½ in. Strip 13, overlapped two holes. A 2½ in. Stepped Curved Strip is bolted as shown to each Strip 13, the centre holes in these Curved Strips providing the bearings for a 3½ in. Rod, carrying a 1 in. loose Pulley 14 and held in place by Spring Clips. Another 1 in. loose Pulley 15 is mounted on a 2 in. Rod held by Spring Clips in the free lugs of ½ in. Reversed Angle Brackets bolted to the opposite end of the gantry.

A 3½ in. Crank Handle 16 is next journalled in Strips 3 and held in place by a 2 in. Pulley 17, then a 3½ in. Rod 18 is fixed in a Rod and Strip Connector which is in turn lock-nutted to Flanged Plate 2. A length of Cord is tied to the locking Bolt, is passed round Pulley 17 and secured to Rod 18 to result in a band brake. Another 3½ in. Rod 19 is mounted in Strips 3 and held in place by an 8-hole Bush Wheel 20 and a Cord Anchoring Spring. A ⅜ in. Bolt is held by a Nut in the Bush Wheel to act as a handle.

The gantry trolley is produced from two Trunnions 21 bolted together, the securing Bolt also fixing a Double Bracket in place. A 1 in. Rod is held by Spring





Far right: Construction of the built-up pulley block is clearly shown in the photograph.

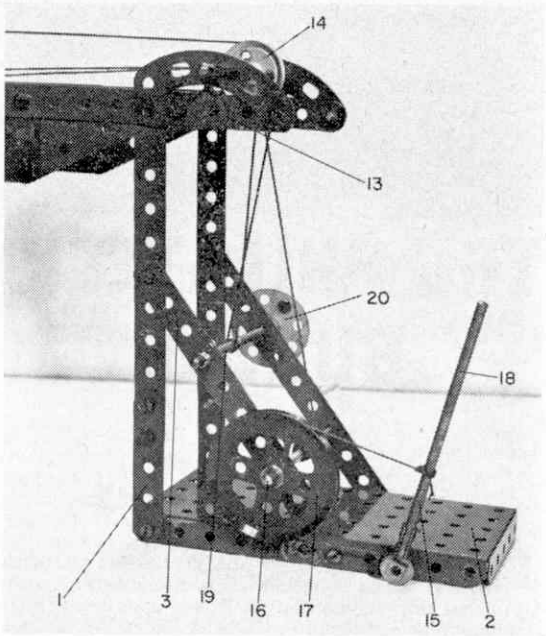
Right: The gantry trolley. Note that, before the 3½ in. rods 24 are fitted, a 2½ in. Driving Band is slipped over the centre of Trunnions 21.

Clips in the lugs of this Double Bracket. At one end, the flanges of the Trunnions are extended by Fishplates 22, in which a 3½ in. Rod is held by Spring Clips. Another 3½ in. Rod 23 is similarly held in the flanges of the Trunnions, then four 1 in. Pulleys 24 are fixed on the Rods, being so spaced that they will run on the edges of Strips 8. Note, however, that, before the 3½ in. Rods are positioned, a 2½ in. Driving Band 25 is slipped over the centre of the Trunnions. A length of Cord is tied to this Driving Band, is passed round Pulley 15, is brought back and taken over Pulley 14. From there it is wrapped tightly a few times round Rod 19, is taken over the 3½ in. Rod carrying Pulley 14 and is finally tied to Trunnions 21. The slack in the Cord is taken up by Driving Band 25.

PARTS REQUIRED

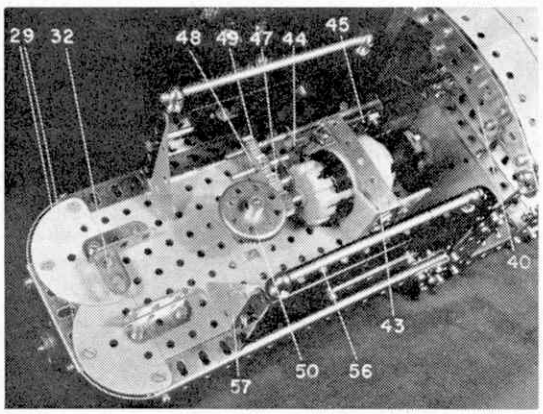
2—1	1—17	11—35	2—125
6—2	1—18b	56—37a	2—126
9—5	1—19s	47—37b	2—126
4—10	1—20a	10—38	1—176
1—11	4—22	2—48a	1—186
2—12	1—22a	1—52	2—188
2—15b	1—23	1—57c	2—189
3—16	1—24	4—90a	1—212
		6—111c	4—221

Finally, a pulley block is provided by two Flat Trunnions 26 fixed together but spaced apart by four Washers on the shank of each securing ⅜ in. Bolt 27. A Hook 28 is mounted on another ⅜ in. Bolt held in the apex of the Flat Trunnions, while a ½ in. loose Pulley 29 is positioned in the top centre of the pulley block. A length of Cord is tied to the Double Angle Strip adjacent to Pulley 15, is passed over the 1 in. Rod in the Gantry Trolley and taken round Pulley 29 in the pulley block. It is then passed again over the 1 in. Rod in the trolley, taken along and over the Rod carrying 14 and is at last attached to Crank Handle 16.



A close-up of the main gantry support showing the two control wheels and the break for the load hook.

LOCO WITH A DIFFERENCE—continued from p.250



Dr. Lacey's Double Fairlie Locomotive is driven by a Power Drive Unit, the mounting of which is evident from this illustration.

Side tanks for the boilers are now each supplied by a 5½ × 2½ in. Flanged Plate 55, to the centre of which a 2½ in. Strip is bolted to represent a nameplate. A 5½ in. Rod 56 is mounted in Handrail Supports fixed to the upper side flange of the Plate, while a 2½ × 1½ in. Triangular Flexible Plate 57 is secured to the front end flange to enclose the space which would otherwise remain around the boiler. The boilers, themselves, are now attached by bolting the earlier-mentioned 5½ in. Strips, fixed across their open ends, through the second holes from the top in the inside end flanges of Plates 55, the smoke boxes resting (not fixed) on their saddles. The protruding ¾ in. Bolts at the end of each boiler is joined across the cab to their opposite numbers by 3½ × ½ in. Double Angle Strips, to which are bolted two 4½ × 2½ in. Flexible Plates 58 overlapped three holes over the peak of the boilers and extended to the floor by two 3½ × 2½ in. Flexible Plates 59, one at each side, these Plates being attached to the floor by Angle Brackets. The motor leads can be brought out under one of these Plates to complete the model. It now remains for me only to stress that all the drive shafts must be very carefully aligned to ensure free running, and I must add that the original model did run extremely well.

PARTS REQUIRED

4—2	6—16a	2—38d	8—136
2—2a	1—16b	2—45	2—137
2—3	5—17	10—48a	1—154a
4—4	1—18a	8—48b	1—154b
4—5	8—20	6—48d	1—160
6—6a	2—20b	2—51	1—161
4—8b	2—21	4—52	2—163
4—9	4—22a	4—52a	8—164
6—9a	4—23	9—59	4—190a
2—9b	4—24	2—62b	3—191
2—9d	4—24a	2—63	3—192
8—9f	6—26	4—81	2—194
5—10	1—26a	4—89b	3—194d
2—11	2—28	2—90	17—200
13—12	2—29	4—90a	4—201
6—12a	2—30	4—103	4—214
2—12b	6—31	4—103h	4—215
1—13	362—37a	2—109	4—221
4—15	294—37b	4—116	8—235
1—16	46—38	16—133a	

1—Power Drive Unit.

THE PHILATELIC BUREAU

by

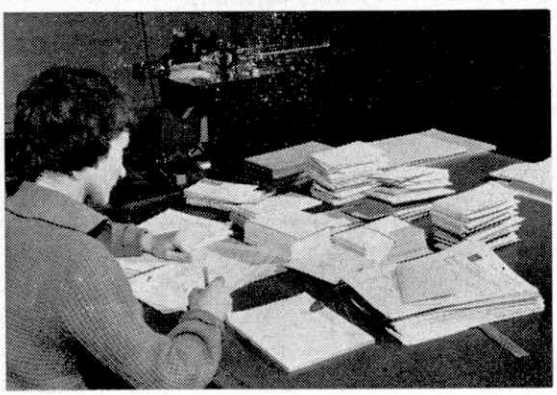
James A. Mackay

THE TURNING point in the Post Office's attitude towards stamp collectors came at the end of 1962. Until that time the authorities looked upon the postage stamp purely and simply as a label indicating the pre-payment of postage. That a stamp could have any other significance or value was quite incidental. Thus stamp collectors were regarded as a nuisance and new issues were kept to the bare minimum. Between 1924, when the first commemoratives, the British Empire Exhibition pair, were released, and the end of 1962, only 21 special issues of stamps were made in this country. Since the beginning of 1963, up to the time of writing, there have been a further 38 sets and during 1969 no fewer than eight sets are scheduled for release marking famous ships, historic anniversaries, British architecture, the investiture of the Prince of Wales, landmarks in Post Office history, the maiden flight of Concorde, the birth centenary of Mahatma Gandhi and the annual Christmas issue.

Thus it has become obvious that the Post Office now regards stamps as a useful means of raising revenue and, at the same time, an excellent way of publicising Britain, her history and achievements. At long last the stamp collector was being wooed instead of rejected

Above: Separating stamps to make up a customer's order. Great care is taken to avoid damaging perforations.

Below: The mail desk. Recording money from incoming orders.



and in May 1963 a Philatelic Bureau was established in temporary premises in the General Post Office in London. Those who remember the original Bureau will recall the maze of gloomy passageways in the old Central Telegraph Office (now demolished) which led one eventually to the counter. Even the placards sign-posting the way to the Bureau were regarded as collectors' pieces, and were stolen regularly, with the result that many visitors to the Bureau frequently lost their way! However, the struggle was usually worthwhile and the staff were never failing in courtesy and helpfulness.

Naturally the counter clerks who manned the pioneer Bureau had to learn about the foibles and idiosyncrasies of collectors as they went along. The old Bureau had a certain amateurish, old-world charm but obviously it could only have been a stop-gap. In its first year of operation (1963-4) sales at the Bureau were around £100,000. In 1964-5 they rose to £175,900 and in 1965-66 rose sharply to £455,000. Clearly something had to be done to cope with the astonishing demand as more and more people of all ages discovered that British stamps could be interesting and well-designed after all.

The General Post Office began to look around for a new site for the Bureau. It so happened that on two occasions special issues of stamps had been made with a peculiar Scottish slant—one depicting Forth Road Bridge in September 1964, and one in honour of Robert Burns in January 1966. On both occasions a temporary bureau had been set up in the Head Post Office in Edinburgh. The publicity surrounding these two issues was handled extremely efficiently by the local people and the resulting sales had been most gratifying. Thus Edinburgh seemed the natural choice for the re-housing of the Philatelic Bureau and during 1966 it was moved to Scotland's capital.

The move was fully justified; in its first year in operation the Edinburgh Bureau doubled the previous year's turnover, achieving a sales figure of £844,500. The following year sales topped the million-mark; in the current year sales at the Bureau are estimated at about £2,588,000 and next year a figure of three and a quarter million pounds is forecast.

It should be borne in mind that these sums represent the money actually paid into the Bureau in Edinburgh (and the Philatelic counters recently established in London, Blackpool, Glasgow and Liverpool), but do not take into account the vast revenue accruing from sales to collectors in the 25,000 post offices up and down the country. The total revenue from stamp collectors must run into many millions of pounds.

Philately, long despised by the General Post Office, is now big business. The Post Office has even gone into the export market, and opened subsidiaries in New York, Frankfurt and Tokio in a bid to sell British stamps in the three most stamp-conscious countries of the world, America, Germany and Japan.

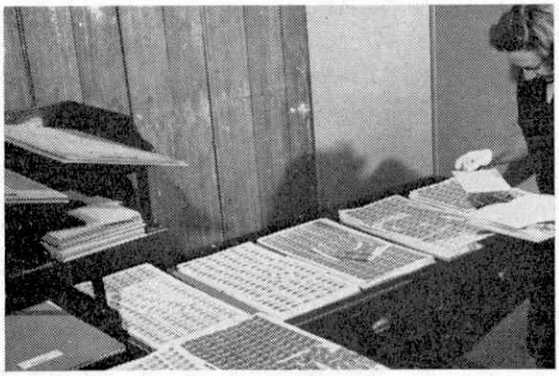
But philatelic sales, like charity, begin at home and the Bureau in Edinburgh is primarily concerned with filling orders for British collectors, although a surprisingly large volume of business is done with collectors in every part of the globe. When the Bureau was set up less than three years ago it had a staff of fifty; now it employs over 150 people to process the orders, service First Day Covers and despatch mint stamps to its customers. About 25 per cent of the sales from the Bureau go abroad and at the moment the Post Office is exploring ways of selling British stamps through department stores in the United States.

Unfortunately, in spite of the good work being done by the Edinburgh Bureau its praises have largely gone

unsung. In order to redress the balance, therefore, the General Post Office chartered an aircraft last January and flew a party of journalist from London to Edinburgh for a trip round the Bureau to see its work in progress. The visit coincided with the day of issue of the Ships series so we were able to see the Bureau rising admirably to the occasion. Addressing us over an excellent luncheon, the Postmaster General, John Stonehouse, M.P., stated that the Ships set had a special meaning for him, since he was born in Southampton where the great Cunarders berthed. He felt that at long last we were using attractive pictorial stamps to project a better image of Britain abroad. Some would argue that, having neglected to commemorate British achievement for so long, we were now going to the other extreme and being a trifle premature about it. The 5d. stamp featuring the new *Queen Elizabeh 2* was one embarrassing example. Later in the afternoon we saw about a dozen clerks sticking sets of Concorde stamps on First Day Covers in preparation for the great day when this aircraft eventually gets off the ground. The Concorde stamps were actually printed about a year ago and the Post Office has been sitting on vast stocks of them for some considerable time.

Judging by advance orders the demand for the Ships set was about 25 per cent higher than for any previous issue and the long queues at the three positions in the Bureau's public counter certainly demonstrated the extraordinary interest being taken in them. The customer who happened to be at the counter when we arrived got an unexpected bonus, in the form of covers personally autographed by the Postmaster General. In the gallery above the sales counter the Bureau had organised a small exhibition to launch the Ships set. A great deal of thought and imagination had gone into the mounting of the display. The artists' sketches and rejected designs as well as sheets of the issued stamps were mounted alongside three-dimensional material of a nautical flavour—telescopes, fishing-nets, ship models and charts. This lively approach gave the issue the right atmosphere and undoubtedly helps to promote stamp sales. I can only wish that this experiment, so successful in Edinburgh, could be repeated elsewhere. Perhaps this is something which the recently re-opened National Postal Museum in London could tackle.

The bulk of the Bureau's business lies not so much in a new issue such as the Ships set, but in the current definitives, the various regional stamps and the commemorative sets of the past year. At the moment the Bureau is handling something approaching a hundred different stamps (including postage due labels)—not to mention postal stationary, coils and booklets. Miscellaneous orders for stamps are dealt with in a large room housing about twenty clerks (compared with the four who were employed on this job three years ago). Each clerk sits at a desk surrounded with ten large pigeon holes, which means that he can deal with up to ten orders simultaneously. Many of the Bureau's customers are regulars—over 36,000 of them have a deposit account with the Bureau. Another important facet of the Bureau's work is the servicing of First Day Covers. In 1966 the Bureau handled some 358,000 FDCs; last year the figure rose to over 800,000. after a brief experiment a few years ago with machine postmarking for FDCs, the Bureau has now reverted to the much slower, though more satisfactory policy of hand-stamping covers. This entails a tremendous amount of manpower and, in some cases, covers bearing commemorative issues are postmarked anything up to a month before the stamps are actually released. So long as the date of release is not altered, all is well. Many of the covers bearing the Ships stamps were actually prepared and postmarked by hand before Christmas, though all 50,000 covers handled by the Bureau were despatched on 15th January. The uncertainty over Concorde means that although the covers have had the stamps stuck on them it is not possible till the last minute to postmark them—just one more headache which the men and women of the Philatelic Bureau will meet with customary coolness.

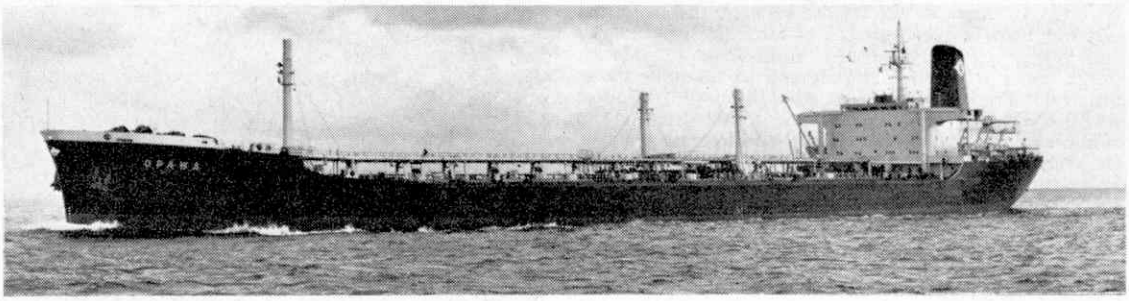


An accountant selecting stamps for batches of orders for issue to the despatching desk.

In another part of the Bureau enquiries from the public were being dealt with. Apart from actual philatelic orders the Bureau copes with more than 30,000 letters from collectors seeking information. On a bookshelf were the various standard catalogues and works of reference and I was very flattered to notice a rather battered and dog-eared copy of my own book, *The Story of Great Britain and her Stamps*.

During lunch everyone was presented with a little album containing a specimen of every stamp at present on sale at the Bureau, including a set of the Ships issued that day. My one regret is that, having travelled almost a thousand miles that day, I was unable to send any First Day Covers to myself—the first time since 1951 (when I began collecting British stamps) that I have not been able to do so. We were whisked round the Bureau at breakneck speed and no time was allowed for us to attend to our own requirements. Of course, if I had subscribed to the Bureau's service, all this would have been taken care of for me. There is a moral in this somewhere!

Customer service. A customer takes a keen interest in the packing of his order.



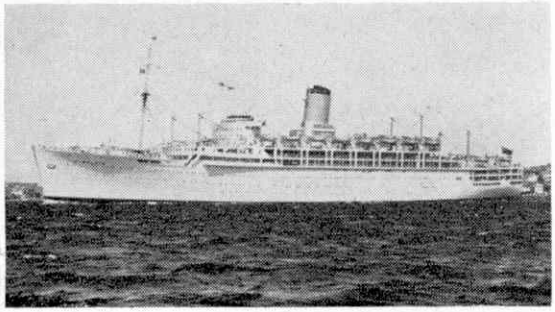
APPRENTICED TO A PILOT

by
Suzanne Twiston Davis

UNTIL I first visited the West Indies some fifteen years ago, I did not even know what a pilot was—apart from the kind who fly aeroplanes. So I was fascinated as we sailed through the lush green islands at the mouth of the channel leading into Port-of-Spain harbour, in Trinidad, to see the liner on which I was a passenger slowing down to take aboard a uniformed man, who climbed from a launch up a rope ladder and over the side of the ship and disappeared onto the bridge. Later, I learned that he took over the navigation from the Captain until our ship was safely berthed alongside the wharf in Port-of-Spain. When I innocently asked why a ship could not be brought in by its own Captain, it was explained to me that every harbour has a different approach, probably with a narrow channel, and that the Captain of a ship which may call at 30 or more ports in a year cannot possibly be expected to know the layout and peculiarities of each harbour approach. He needs the guidance of a local expert: thus were formed the various Pilots' Associations (consisting of these same experts) which exist all over the world. Remembering this, I was interested when I recently revisited Trinidad, to meet a pilot who told me all about his training, life, and daily work on that island.

The pilot, it seems, will probably have been in the Merchant Navy, or else in the Royal Naval Reserve during the war. He must have had at least four years at sea on a cargo ship, and be entitled to be Master (Captain) of a ship, i.e. he must have passed an examination to qualify for a Master's Ticket. Important though he may have been on his own ship, the new pilot first has to serve six months as an apprentice, learning to handle every size and class of ship, before he can become fully qualified.

Heading photograph shows the 65,819 ton tanker OPAWA of Trident Tankers Ltd. Bottom right: The immense length (868 ft.) of the OPAWA is clearly shown. Below: The 28,000 ton P. & O. passenger liner HIMALAYA.



Trinidad, tiny though it is, has nine different ports for its pilots to service—Port-of-Spain (where the passenger liners come in), Tembladora (where bauxite is loaded), Brighton, Pointe-à-Pierre, Port Lisas, Point Fortin, Sobo, Chaguaramas, and Kronstadt. Every year, 22,000,000 registered tons of shipping visit these ports. To cope with this traffic, there are twenty-three pilots, most of them British or of British descent, with a few Negroes and Chinese—all now Trinidadians.

The biggest passenger ship which ever comes alongside is the *Himalaya*, a P. & O. liner of 28,000 tons. By "coming alongside", I mean she is able to tie up at a wharf. Ships like the *Queens* and the *United States* on their rare visits have to anchor some three or four miles out to sea, and send their passengers ashore by tender.

The land in the south of Trinidad is largely taken up by oil-fields. At Pointe-à-Pierre is a huge refinery where 300,000 barrels of oil (there are 34.97 barrels to a ton) are refined per day. When refined, the oil takes many different forms: it can be made into such by-products as gasolene, kerosene, gas-oil, diesel oil, jet-fuel, bunker "C" (the black oil used on steamships), oil for spraying banana plantations, bitumen, and safaniya (a crude oil which has to be kept at a temperature of 140 deg. or else it will turn into wax and have to be dug out of the tanks!) In spite of the huge Trinidad oil-fields, however, a great deal of crude oil is brought over from other countries, refined on the island, and re-exported. One of the pilot's main jobs is to bring in the huge tankers carrying this oil. They number among the biggest ships in the world. The largest British ship which comes to Trinidad is the 65,819 ton S.S. *Opawa* of our own P. & O. Line. You can see here a picture of the *Opawa*, and perhaps you will try to make a model of her. She comes alongside to load or unload at No. 6 Berth at Pointe-à-Pierre, where there is a draught of 48 feet. If tankers of this size are coming from the Middle East, they have to take a circuitous route round the Cape of Good Hope, for the draught of the Suez Canal is limited to 38 feet.

The cargoes of the ships with which the pilots deal

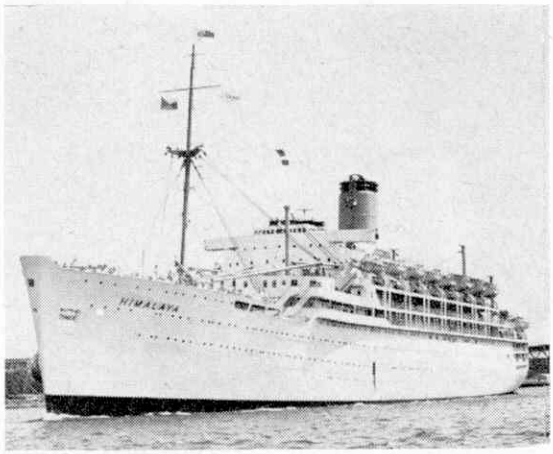
are very varied. Not only are there the huge passenger liners like the one on which I arrived, but there are large and small cargo-boats bringing machinery and pipes from Britain and Canada; motor cars from Britain, the U.S.A., Italy and Germany; sulphur and grain from Texas; tinned foods, shoes and silks from Britain, the U.S.A. and Europe; meat and butter from Australia and New Zealand. In turn, they take away such things as coffee, cocoa, bananas, the various products obtained from coconuts, asphalt from the Great Pitch Lake, and sugar from the cane-fields.

The pilot's life is a complicated one, and in many ways rather frustrating. Having been accepted as an apprentice, he spends the first four months of his apprenticeship under the guidance of an Open Licence Pilot, who teaches him all there is to know about the job. He must learn about the currents and tides around each of the nine ports, and about the various navigational aids such as lighthouses and buoys that guide the ships in and out of the harbour. Even when he is fully trained, he must keep on familiarizing himself with the lay-out of the various channels: for instance, at Brighton, where they drill for crude oil, there are twenty-two oil-rigs in the sea constanly changing position; and at Port-of-Spain, the harbour becomes silted up by the Caroni River which empties into it, so that a dredger has to work there all the year round to keep the channel open for shipping.

The apprentice pilot starts on ships up to 2,000 tons, then progresses to 5,000 tons, then 10,000; at last, if he has made no bad mistakes and has passed all his tests, he becomes an Open Licence Pilot.

Because of the hard life he leads, the pilot has one whole week off every month. But for the other three weeks, he is "on call" for twenty-four hours a day. He never knows exactly when a ship is coming in—the E.T.A. (estimated time of arrival) may be 5.0 a.m., but instead he may be called out hours earlier because the ship has beaten the tide. For his wife, the life must be exasperating at times, for she rarely knows whether she can expect her husband home for dinner, or whether he may be called out before he has had his breakfast.

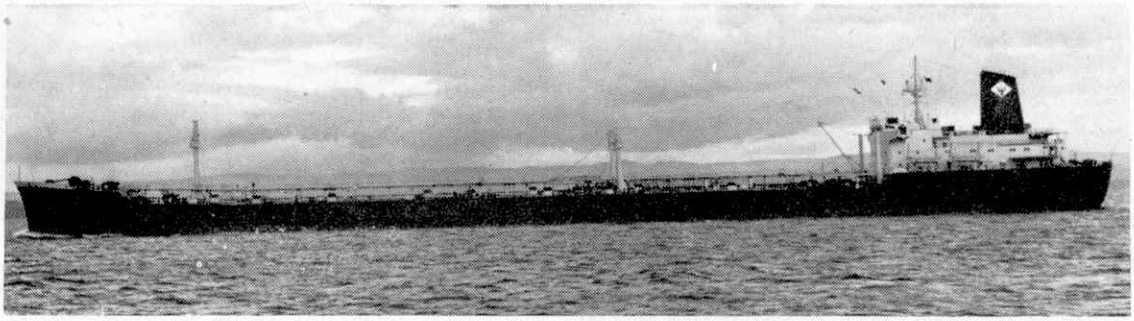
Once he has received his call, saying that the ship is expected at a certain port at a certain time, the pilot sets off to meet it. He may drive straight from home, or he may have slept overnight in the accommodation provided at the appropriate port. Dressed neatly in his uniform of white shirt, grey trousers and white Naval peaked cap (with the red and white emblem of Flag "H", meaning "I have a pilot on board", set in the middle of the Merchant Navy badge) he is collected by launch from the Pilot's Wharf and taken about two miles out to sea to meet the ship. The launch comes alongside, and the pilot climbs up a rope ladder which has been let down the side of the ship—not always the easiest of climbs in a rough sea, when both the launch and the larger vessel are tossing about!



Finished in white, the HIMALAYA is one of the most attractive liners in service today.

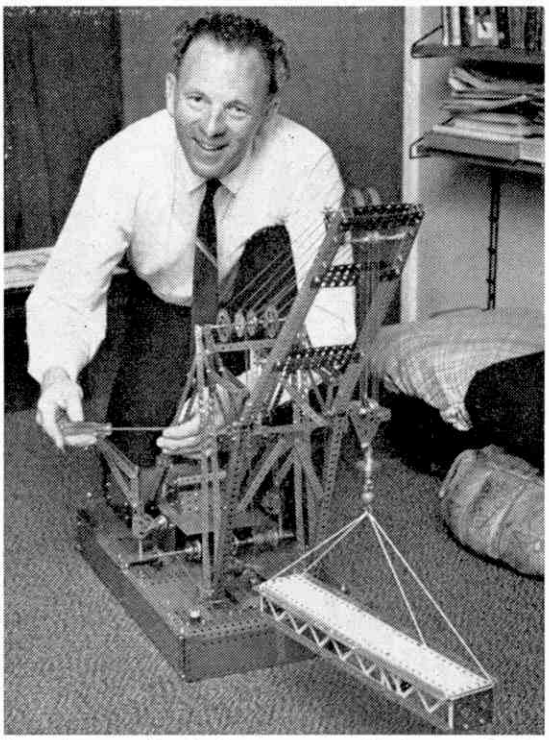
He goes up to the bridge, and from now on navigates the ship until she has berthed: for once the Master really takes guidance or even orders from another man. As they approach the quay where they are to tie up, the pilot will use his portable radio, and speaking from ship-to-shore, he communicates with the tugs and launches who are helping to manoeuvre the ship into position, and to the dock-master who tells him whether he is in a suitable position for landing cargo, or for taking on an oil pipe-line. The whole berthing operation may take up to two hours—sometimes even longer at night—for a ship of average size; but I am told that manoeuvring one of the giant tankers close to an oil-pipe connection is rather like trying to put the whole of Brighton Pier into the correct position beside a parking-meter, and an enormous amount of time and patience is needed.

You may have been as surprised as I was to learn just how much goes into the training of a ship's pilot; and not only does he have to be experienced, tough and quick-witted, but he must also have some linguistic ability so that he can master the bridge-to-engine-room jargon in the language of the ship's crew, for he is dealing with ships from all over the world. He should also be calm and adaptable, and forceful enough to deal with the frequently excitable skippers of different nationalities; the latter sometimes think that a pilot is unnecessary, and they hate seeing someone else in control of their own beloved ship. In fact it is not unknown for a Master to try and interfere in the middle of a tricky manoeuvre!



AMONG THE MODEL BUILDERS

with Spanner



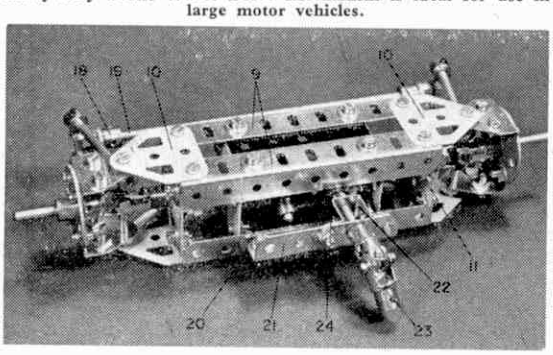
Pictured here making final adjustments to his Japanese Floating Crane model is Mr. Ben Oostewegel of Western Springs, Auckland, New Zealand.

Front-wheel Drive Unit

OUR FIRST and, in fact, our only constructional offering this month, is a front wheel drive unit, designed by Edward Pritchard of Poleshill, Sarratt, Herts. It is, as can be seen from the accompanying photographs, a reasonably large and pretty rugged example of this type of mechanism which consequently makes it suitable for inclusion in complicated models.

A differential is first built up from two 2½ × 1½ in. Flanged Plates 1, joined at each end by a 1½ × 1½ in. Flat Plate 2. A 2½ in. Rod is mounted in the centre of one of these Plates and fitted with two Washers and a ¾ in. Contrate Wheel 3 after which it is inserted, loose, part-way into the longitudinal bore of a Coupling 4. Mounted in the other Flat Plate is a 3 in. Rod fitted with another two Washers, a 1½ in. Contrate Wheel 5, loose on the Rod but held in place by a Collar, and a second ¾ in. Contrate Wheel 6, the Rod then being inserted free into the other end of Coupling 4. Note that the centre transverse bore of the Coupling must be left clear as, fixed in this, is a 1½ in. Rod on each end of which a Collar 7 is secured. Each of these Collars is connected to Contrate Wheel 5 by a 1½ in. Bolt held by a Nut in the face of the Contrate and screwed into one tapped bore of the Collar. The 1½ in. Rod, incidentally, is secured by two Pivot Bolts screwed into the central tapped bores of Coupling 4, each Pivot Bolt being fitted with a free-running ¾ in. Pinion 8, in constant mesh with Contrates 3 and 6.

Designed by Edward Pritchard of Poleshill, Sarratt, Herts, this heavy-duty Front Wheel Drive Mechanism is ideal for use in large motor vehicles.



Now fixed to each Flanged Plate are two 4½ in. Angle Girders 9, joined at each end by a 1½ in. Angle Girder and a Flat Trunnion 10. The 1½ in. Girders are in turn joined by 1½ × 1½ in. Flat Plates 11, the above-mentioned 2½ and 3 in. Rods passing through the centre holes of these Plates. The Rods are each fitted with a Universal Coupling 12, in the other boss of which a 1½ in. Rod 13 is fixed. A Threaded Pin 14 is secured to lower Flat Trunnions 10.

Two identical arrangements are next each built up from a 6-hole Bush Wheel 15, to which four Angle Brackets are bolted, the Angle Brackets being arranged in pairs placed diametrically opposite each other. A 1 in. Triangular Plate 16 is fixed to each pair of Angle Brackets, then the arrangements are mounted loose on Rods 13, Threaded Pins 14 engaging with the apex holes of the Triangular Plates. The apexes of Flat Trunnions 10 and the upper Triangular Plates, on the other hand, are lock-nutted together, the place of the lower lock-nuts being taken by Short Couplings 17, in each of which a 2 in. Rod is fixed. These Rods are joined, via Collars and Small Fork Pieces 18, by a 6½ in. Rod 19.

PARTS REQUIRED

4—5	2—17	58—37b	4—77
4—9a	4—18a	29—38	2—111d
2—9d	2—24b	1—45	2—115
4—9f	2—25	2—51	2—116a
8—12	1—26	5—59	4—126a
1—14	1—28	1—63	3—140
1—16a	2—29	2—63d	4—147b
1—16b	61—37a	4—74	

To complete the mechanism, a 2½ in. Angle Girder 20 is bolted to lower rear Girder 9, the two Girders being spaced apart by two 2½ in. Strips. Another two 2½ in. Strips are used to space a second 2½ in. Angle

Girder 21 from the horizontal flange of Girder 20, then a Double Bent Strip 22 is secured to the vertical flange of the latter Girder. Journalled in this Double Bent Strip and Girder 21 is a 1½ in. Rod, held in place by another Universal Coupling 23 and a ½ in. Pinion 24. Pinion 24 meshes with Contrate 5.

News from New Zealand

Passing onto a different subject, I have often stressed the world-wide appeal of Meccano in these pages, but I must confess that overseas enthusiasts do not seem to appear too often in *Meccano Magazine*. Recently, we have been trying to rectify the situation and already have managed to mention Australia in the February issue with Switzerland following in March. Now it is the turn of New Zealand—a beautiful country with a large and extremely keen Meccano following. One of the keenest enthusiasts out there is Mr. Ben J. Oostewegel of Western Springs, Auckland, seen in one of the accompanying photographs with a model of a Japanese Floating Crane he has built.

Ben was actually born in Holland where he took up Meccano as a hobby when he was 9 years old. However, like so many other people, he was forced to abandon it during the last war and was unable to take it up again until some years after he had emigrated to New Zealand, via Indonesia. Take it up again he did, though, and has been at it ever since. The model appearing in the photo is based on one of several large Japanese-built floating cranes that were being used in Auckland Harbour to help in the construction of an extension to the Auckland Harbour Bridge when Mr. Oostewegel saw them. It took him some 50 hours and more than 1,000 parts to complete the model which is built up on a "hull" measuring 25 in. long by 12½ in. wide by 3 in. deep. The height of the jib support is 12½ in., while the jib itself is 18½ in. long. Total height is 3 ft. 2 in. with the jib fully raised.

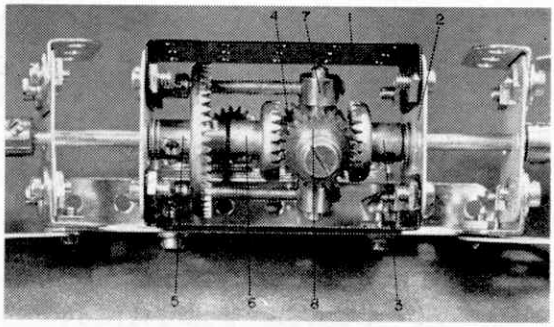
Authentic luffing and hoisting movements are incorporated, both the controlling winches being driven by a Power Drive Unit through a twin-branch gearbox incorporating a clutch and automatic brake. The motor is housed at one end of the crane, under the roof of the "cabins", and is connected by a Universal Coupling to the gearbox situated under the "deck-house". Bevel gearing transfers the drive from the gearbox to the winches.

It is an interesting fact, incidentally, that Mr. Oostewegel built his model up from plans of the full-size crane, kindly supplied by I.H.I. Ltd., the bridge firm, on the strict understanding that they would be allowed to see the finished model. See it, they did, and were so impressed with it that they have commissioned Mr. Oostewegel to build another one specially for them! We offer you our sincere congratulations, Mr. Oostewegel.

Christchurch Meccano Club

While we are in New Zealand, mention must be made of the highly successful Christchurch Meccano Club, the first and now the only club of its type in New Zealand. Its history actually goes as far back as 1929 when Whales's Meccano Club was formed at Whales' shop on the corner of High and Manchester Streets in Christchurch. Eearly in 1930, the name was changed to the present Christchurch Meccano Club although, by this time, the club was not exactly alone as several similar organisations had been formed in different parts of the country.

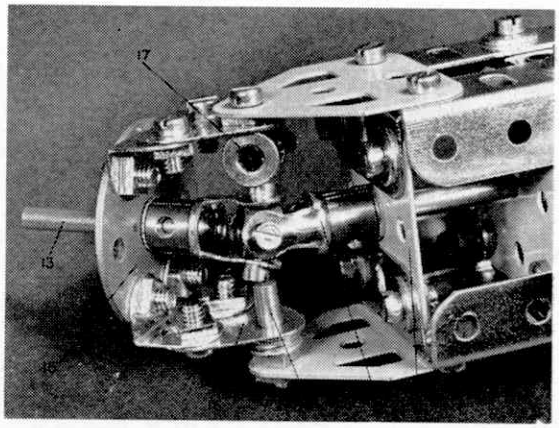
Like Meccano Clubs everywhere, however, the New Zealand bodies were hard-hit during the last war—so much so, in fact, that, when the war ended, only the Christchurch Club remained in existence. Other clubs have subsequently been formed, unfortunately without a great deal of success, but the Christchurch Club has flourished until, today, it can boast a keen, dedicated membership. A sure sign of success is the fact that the Club had its own stand at the last New Zealand Industries Fair which is one of the most attended public exhibitions in the country. It would be impossible to mention all the exhibits here, so I must content myself with a few words about one of the models which excited particular interest, although all the members of the Club who helped to make the Stand a success are to be congratulated.



A close-up view of the differential incorporated in the Front Wheel Drive unit. Space for the 1½ in. Rod carrying Collars 7 is obtained by making full use of the elongated holes in Flanged Plates 1.

The model in question is a ⅛th scale reproduction of a New Zealand Railways Ec Locomotive as used on the Christchurch-Lyttelton line. It was built by draughtsman, Mr. Sid Kennedy in something like 200 working hours which time will give you some idea of just how much care and work can go into building an advanced Meccano model. An estimated 7,100 parts were used in its construction, Nuts, Bolts and Washers accounting for no less than 4,500 of them. Because of its size—4 ft. 10 in. long—it has been possible to include authentic detail, not only in general lines, but also in such items as doors, pipes, handrails, leaf-spring suspension and automatic couplings, etc. For what it's worth, my verdict is a superb, true-to-scale, solid model—and solid it certainly is. It weighs a staggering 62 lb!

The stub axle and Universal Coupling of Mr. Edward's mechanism in close-up. All Rods must be entirely free-running in their bearings.



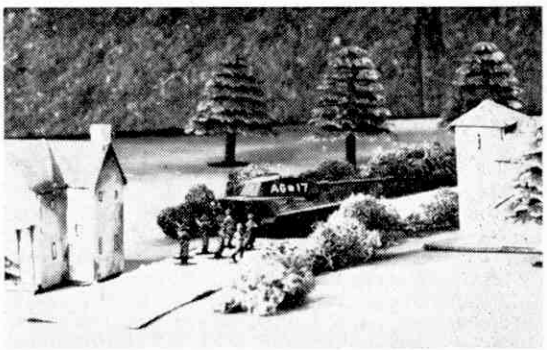
BATTLE

Part XIII

More Infantry Weapons

by

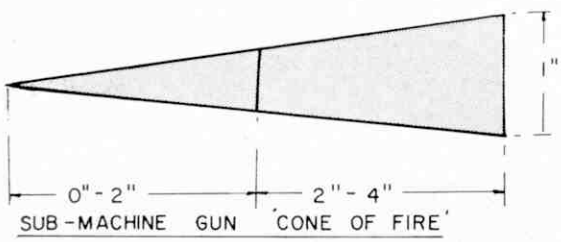
Charles Grant



Another combined op.—a 'Tiger' moves into a village with attendant infantry discreetly in the rear.

CONTINUING WITH our discussion of the effectiveness of the infantryman's weapons, we now drop down the scale from the heavy machine gun to its smaller brother, the sub-machine gun, which proved to be so effective for close range fighting. It may be remembered that we decreed the practical range of this weapon to be 4 in. (or the rough equivalent of what we considered to be its maximum effective range of 140 yards) and that we pointed out that it was used in great numbers by the Russian Army in World War II.

Quite simply, we go about assessing its fire power in the same way as we did for the heavy machine gun by constructing a cone of fire. This will be much smaller than the previous one, naturally, but will have, in proportion to its length, a rather wider "spread", partially due to its being hand held, rather than fixed in a rigid mounting, and to the consequently increased "waver". The diagram shows the SMG "cone of fire" and, as we said, it is 4 in. in length and 1 in. wide at the extreme end, or its base, if we think of it as a triangle. This would give an actual spread of over 30 yards at 140 yards range, probably somewhat excessive, but it is better to err a little in this direction rather than to make the device too narrow—its true tactical effect in the latter case would be pretty well lost.



It would be a trifle pendantic as well as impractical to divide it as we did HMG range and rifle range—that is, into three subdivisions—and it will be seen that the SMG "cone" consists of only two sections—you might call them close (or point blank) and distant range respectively. Once again we have to allow for the possible presence of both 'hard' and 'soft' cover and these factors are included in the Table relative to the weapon. In practice, just as for the HMG the "cone" is placed with its apex on the firing SMG and laid in the desired direction of fire. Whatever is within the area of the "cone" has to be thrown for as a possible casualty, and if the dice shows that a hit has been made, the victim is summarily removed from the field of operations.

On to the next weapon, then, this being a highly specialised not to say deadly one, namely the infantry anti-tank weapon, the rocket launcher. This will probably be the 'bazooka' or the 'Panzerfaust' depending on your choice of army. Let us for the time being simply refer to it as the 'bazooka'—the battle-gamer will, I doubt not, make his own choice as to which to use. Now, as will be speedily discovered, if not already known, this is pretty much a one-shot weapon, with the operating crew doing a very 'dicey' and dangerous job. By which I mean that it pays to make the first shot tell, as the opportunity for a second, let alone a third, will not be too great. The range, it will be recalled, is short—a maximum of 6 in.—and for the team to get so close to its quarry, almost always a tank, the latter had to be stalked with great cunning, and if possible approached from the rear, or at least the side, this to ensure that the projectile would hit the less heavily armoured sections of the tank. The risk of being seen more quickly if a frontal attack was considered is obvious. One round from a bazooka, if a hit, was usually extremely effective—its strike value at this close range being high—and the chances of 'brewing up' a tank very favourable. If the first shot missed, it was then a question of the bazooka operators making themselves scarce with the minimum loss of time before the tank's MG's swung round to pour a stream of bullets at the presumptuous attackers, with unhappy results for the latter. The thing then, if it were found impossible to follow up a tank—it would usually be moving more rapidly than men on foot—was to lurk around in a position which the enemy would be likely to pass at close range and, at the appropriate moment, to let fly. Hiding in a house or ruin was just the thing, but the player is earnestly counselled to remember just where he conceals his bazookas if he is laying on an ambush.

In a very recent game I supervised—'umpired' if you like—one player had secreted, unobserved by his opponent, no less than two bazookas in a certain house. Some moves later an enemy tank came up and for two moves occupied a stationary position, almost touching the house in question. Wargamer No. 1, in the heat of the action and with his attention concentrated on another section of the 'front' completely overlooked his bazookas until the enemy tank had moved off 'way out of range. When it did occur to him what an opportunity he had missed, his scream of pain must have rattled the tracks of every tank on the table. He was later seen kicking himself all round the room—he'd lost the game, in fact.

Enough of reminiscence, though, and back to the

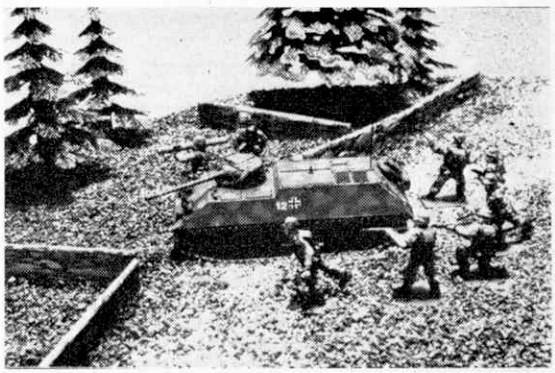
business of the bazooka. Maximum range, as we have seen, is 6 in. and again we divide into two—0 in.-3 in., and 3 in.-6 in., and for these the Strike Values are 7 and 6 respectively. You will see that, at close range, it requires only a throw of 8 with two dice to knock out a Russian T.34 or a German Mark IV and one less if the hit is on the rear of these vehicles. Of course, it must not be overlooked that two dice must first be thrown to score a hit, but at 0 in. to 6 in. only a 6 is required. This is not too difficult, but it does make the necessary allowance for the nervy chap—as who wouldn't be?—when a cracking great tank is lumbering past only a couple of dozen yards away.

A point arises here—as it did with the two men operating the heavy machine gun—and its solution will depend upon how the battlegamer organises his army. What happens when one of the bazooka team becomes a casualty, say from rifle or machine gun fire? It is probably true that each member of the team is pretty much of a specialist and could not be replaced by an ordinary infantryman, or not with much success at least. One can consider the bazooka team to be a single unit, enacting the rule that should one fall the whole team is out of action. On the other hand, as with the machine gun crew mentioned in Part XII the player can opt that the casualty may be replaced by an ordinary infantryman, when the latter can get to the spot. This, though, is a personal matter and the wargamer can decide that all his infantrymen can double as bazooka operators.

Again, if I'm allowed, I shall digress just a little, since we are dealing with bazookas. For the simple reason that they were the only troops not claimed by other wargamers of my local group, I took the Airfix 20 mm. Russians for my forces and it was not long before I discovered that, although equipped with mortar and machine gun, they had no rocket launchers. This was a problem which was easily resolved by what is known in model soldier circles as conversion. The present undertaking involved the kneeling Russian rifleman and the one advancing with his rifle held close to his body—a sort of half-crouching position. With a sharp knife—there is a multitude of suitable craft knives which can be used for this sort of thing—the rifle was removed from the first, leaving the arms still in the firing position, and replaced by a length of wire cut to a length representing that of a bazooka.

SUB-MACHINE GUN FIRE	Dice throws to cause casualties		
Range	In open	Soft cover	Hard cover
0"-2"	3, 4, 5, 6	4, 5, 6	5,6
2"-4"	4, 5, 6	5, 6	6

The rifle is likewise cut away from the second man and replaced by a very short length of wire, of slightly smaller diameter than the first, to represent the projectile. This is the briefest of descriptions of an operation which can be far more elaborate. The 'bazooka' can be furnished with sights and other gadgets, and the rocket filed to a more realistic shape, but all this is optional. In my case, the process was simple but functional, its purpose being basically to provide myself with a force of rocket-launchers. Finally, the two figures—another foible of mine—are carefully cut from their original stands and replaced on new ones cut from thin card, using Evostick as the adhesive. One hears all sorts of tales about how difficult Airfix figures are to glue, but this stuff seems to work splendidly. By the way, all my Airfix troops are on my own stands—they are slightly larger than those provided by the manufacturer and the figures stand more securely on a rough or sloping surface.



Infantry in attack, with the support of an armoured personnel carrier.

We might as well, before finishing with this weapon, deal with the move on the battlegame table of the bazooka crew. As we know, our infantry move is 3 in., and so will be the move of the crew. Query? Can it move the full 3 in. and fire in the same game move? I should say yes! It seems to me to be a fairly quick matter for the two men to get into position, load, aim and fire the weapon. On the other hand, the HMG would take longer to get into firing order—to get the gun set up, ammo. belt ready and so on. So the HMG cannot move and fire in the same game move—if it is moved any distance by its team, the player must await the next game before it can be operated. Fair enough?

On we go then, to deal briefly with two widely differing weapons, their only similarity being in their shortness of range. The first is the pistol/revolver, referred to in the first instalment on infantry weapons, and to which we gave a range of 1 in. To all intents and purposes it is practically a melee weapon, and when two 20 mm. figures are within an inch of each other it does look as though they were close enough to swap punches. The pistol is still useful, though, although not as much as it would appear from what takes place in the main streets of Tombstone or Dodge City or whatever. It is possible, too, to have one of the men behind cover—a wall could just be squeezed into the 1 in. range—so we shall have to allow for this. One dice is thrown, then, if the target is in the open, 5 or 6 puts him 'hors de combat', if he is behind any sort of cover, then a 6 is necessary to make him a casualty.

Finally, there is the man-carried flame thrower, a fearfully effective weapon under the proper conditions. Again, limited by range, we shall initially use it as an ambush weapon against tanks and the like, but it can be used for 'flushing out' bunkers and strong points. As far as vehicles are concerned, once the stream of flame had hit, that was almost invariably enough. At the close range of the weapon, it was difficult to miss—its range of 1 in. being about 33 yards in the 'real thing'. A dice throw then—one dice only—with the target within range—a tank, say—anything except a 1 and it goes up in flames, and no messing.

This leaves only a couple of infantry weapons to consider, both high explosive ones, although at opposite ends of the scale—the hand grenade and the mortar—and concerning them, more anon.

DRAG RACING: *Continued from page 235*

Very much as popular as car racing, is motorcycle dragging. Meetings of such are held every third Sunday in a month. The racing procedure is much the same as that used for cars, but the rules governing clothing and the conditions of the vehicles are far more strict.

Firstly, a standard machine must be a current production model. The bike must be taxed and insured and have all parts and accessories in full working order, i.e. dynamo and alternator lights, stop lights, horn, brakes, etc.

At every meeting, the bike must be thoroughly examined by the Scrutineer. It is his job to make sure that your bike is in good working order. When presenting your machine, the following must be noted. All light glasses must be taped up, or covered completely with a rubber cover. The tax holder removed, the front number plate removed. Clutch and brake levers must have ball ends. Centre prop or rear stands must be tied up or completely removed. Footrests should be ball ended or covered with a foot rest sleeve. Brakes and cables must be sound. The throttle must be self closing. Spokes should be unbroken and taut, and rims true. Sump and drainage plugs should be locked up with wire. But above all, the bike must look respectable.

As far as clothing is concerned, the right 'gear' must be worn or you will not be allowed to race. Your helmet must be A.C.U. approved and in good condition. Leathers must be worn, and any metal badges, etc., must be removed. Boots should be sound with no studs in the soles or heels. Gloves must be leather, not plastic or string backed. Strangely enough it is not compulsory to wear goggles but it is wise to do so for your own protection.

Upper photo shows two triumph Vitesse cars scorching down the strip. Both cars are completely standard. Lower pic. shows two specially modified cars in action. The wheel arches have been cut away to allow the fitting of extra large tyres.

All these foregoing rules are designed to protect not only you but everyone else present.

One of the most outstanding competitors in this field is Alf Hagon, who in 1967 made his historic run of 9.93 seconds on his 1260 c.c. J.A.P. In April of 1968, he broke that record when he covered the distance in 9.644 secs. which was the fastest yet, but unfortunately was only a demonstration run and so did not count.

Classified Advertisements

Meccano Magazines Readers Bargain page

PRIVATE: Minimum 18 words 6s. and 4d. per word for each subsequent word.
TRADE: Minimum 18 words 12s. and 8d. per word for each subsequent word.
Box numbers count as six words when costing the advertisement. When addresses are included, these are chargeable at the same rate (4d. or 8d.) per word as the remainder of the advertisement. Copy and box number replies should be sent to the Classified Advertisement Department, MECCANO Magazine, 13-35 Bridge Street, Hemel Hempstead, Herts. Latest copy date for insertion in the June issue is April 3rd.

PLANS

Plans Enlarged or Reduced and additional copies made. Send for details from—Causer & Co., 216 Goldhawk Road, London W.12. SHE 2366. O-T

EXCHANGE

Enthusiast has geared roller bearing complete and in excellent condition. Will swop for M.M.'s 1916-1924 or pre-war Meccano steam engine in working order. Please write s.a.e.—J. Gamble, 17 Midland Avenue, Lenton, Nottingham NG7-2FD. Q

STAMPS

Discount Approvals at prices from quarter catalogue. Whole world or Commonwealth. —E. Taylor 1 Highbank Avenue, Stalybridge, Cheshire. Q

GENERAL

Rewinding and Repairs on miniature electric motors. Send s.a.e.—Martyn Gale, 27 Hadley Gardens, Norwood Green, Southall. 574-4967. Q

UFO Detector Circuits, data, 10s. (refundable). —Paraphysical Laboratory (UFO Observatory), Downton, Wilts. PQR

WANTED

Wanted. Hornby O gauge 3-rail electric, steam or diesel engines and passenger coaches.—P. Crabtree, 15 Park Avenue, Chapeltown, Sheffield. Q

Model Barrage Balloons. Inflatable fabric R.A.F. balloon and/or winch chassis (any scale). Also Britain's 1939 model (2 sizes) and accessories. In addition photographs of actual balloons, sites and equipment (1936 to 1963). —Phillips, 53 Three But Lane, Liverpool 12. Q

Erector Sets Wanted by collector, numbers 8½ 9, 10, 12 and B in wooden boxes, made between 1927 and 1933. Highest prices paid for sets in good condition.—R. Gates, Round Top Road, Bernardsville, N.J. 07924, U.S.A. Q

Hornby or Bassett-Lowke, etc. gauge O trains wanted by private model railway enthusiast.—Box No. 25 (Surrey), "Meccano" Offices, Hemel Hempstead Herts. OPQ

Pre-war and Early Post-war Dinkys, Tootsietoys Minics, etc. High prices paid.—D. Pinnock, 10 Hurstville Drive, Waterlooville, Hants. Tel: 2958 (evenings). N-X

Coins Wanted. Mixed. World. School-boy collections. £1 per 100. No zinc or aluminium. —Williams, 41 Garnetts, Takeley, Essex. P-A

Collector Seeks obsolete Dinky buses and military equipment. Write—P. W. Ross, Chelford, Road Manchester. M16 OBJ. OPQ

Model Cars of all sorts wanted. Good prices (or exchange) for early die-cast models, tinplate toys, obsolete kits, etc., which will be incorporated in a permanent display.—Dr. Gibson, The Green, Anstey, Leicester. G-R

Collector Seeks old trains and other toys, anything repairable considered. Write details, prices.—14 Wren Avenue, Southall, Middx. H-S

Pre-War model trains sought by Lowke, Marklin, Bing, etc., O or larger, also tinplate toys.—Church 10 Hill, Patcham Village, Brighton. 53940. T/C

Wanted. Mint Dinky's, 934 Leyland, Bedford Articulated Lorry, 282, 283 Coaches and 941, 942 Foden Tankers.—Box No. 28 (Surrey), "Meccano" Offices, Hemel Hempstead, Herts. Q

FOR SALE

Fifty Obsolete Corgi and Dinky models for sale. You name the price. S.A.E. list or tell me your requirements.—Paul Honeywell, 39 Grassmere Avenue, Northampton, NN3 3DD, or telephone 42659 evenings. Q

For Sale. A complete set of Meccano Magazines from November 1952 to March 1953 inclusive, in good condition—offers invited.—Box No. 27 (Shrewsbury), "Meccano" Offices, Hemel Hempstead, Herts. Q

Discontinued Models. Early post-war to recent Dinky, Corgi, Spot-on, Matchbox, Budgie, Frog Kits, Hornby O, Hornby 3-rail, Trix original, Meccano spares. All new, unused. Please state your exact requirement. Specification with s.a.e to—W. J. Bache, 14 Stourbridge Road, Lye, Stourbridge, Worcs. (Overseas enquiries welcomed.) Q

For Sale. Meccano Magazines, January 1954-March 1959. Any offers?—M. Hammestone, 13 Alba Gardens, London, N.W.11. Q

Obsolete Dinky Toys for sale, reasonable prices. s.a.e. for lists.—White, 123 Fairfield Road, Stockton Heath, Warrington. Q

Current and Obsolete Meccano parts for sale, large s.a.e for lists.—Bailey, 11 Newlands Road, Stockton Heath, Warrington. Q

Battle of Britain. D-Day. Afrika Korps. Trafalgar and many more fascinating wargames. Also the exciting American STRATEGY & TACTICS War-gaming Magazine. Rush just 1s. 6d. for full lists to—Iain H. McLellan, Dept. M, 12 South Road, Wick, Caithness, Scotland, U.K. P-A

Live Steam Model Boats. Send s.a.e. for illustrated list to—Perico Models, 104 Tenniswood Road, Enfield, Middx. OPQ

Meccano Parts, nickel, red/green, blue/gold. Pre-war magazines, Dinky Toys. S.A.E. list.—516 Blackpool Road, Ashton, Preston. Q

These shops stock all the goods Meccano Magazine readers need.

M denotes Meccano accessory and spare parts specialists

AUSTRALIA
Tel: 61-3603

HEARNS HOBBIES
Mail Order Service
303 FLINDERS STREET, MELBOURNE 3000

Suppliers of Aeromodeller Plans and Books, Model Aircraft - Boats - Cars - Railways - Engines - Accessories - R/C Equipment. Write for Price List.

BATH
Tel: 60444

CYRIL HOWE'S
CHEAP STREET,
BATH, SOMERSET.

The Model Shop of the West for all your modelling requirements. Aircraft, Boats, Engines, Radio Control. Expert advice available. M.A.P., Meccano Sets, spares, etc

BEACONSFIELD
Tel: 4092

C. G. MARSHALL,
MAXWELL ROAD,
BEACONSFIELD, BUCKS.

M

BIRMINGHAM
Highbury 3237

KINGS HEATH MODELS
5 York Road, Birmingham 14.

Everything for the modeller: Boats, Cars, Planes, Railways, Kits, etc. Meccano sets and reasonable stocks of spares.

BLACKPOOL
Tel: Blackpool 24061

BATESON'S SPORTS DEPOT LTD..
56 ABINGDON STREET,
BLACKPOOL.

Complete Stocks all through the Year.

BOURNEMOUTH
Tel: Bournemouth 23248

BRUCES TOYS LTD.,
87-89 OLD CHRISTCHURCH ROAD, BOURNEMOUTH.

We stock a wide range of Meccano Toys and outfits with adequate spares for expanding outfits.

BRISTOL
Tel: 38534

M. H. B. DAWSON,
96 WHITELADIES ROAD,
BRISTOL, 8.

M

BRISTOL
Tel: 557527

MAX WILLIAMS,
LAWRENCE HILL,
BRISTOL 5.

Meccano Model Railways, Peco Wills, Slot Racing, Hobby Kits, Dinky, Corgi and all spares.

CARLISLE
Tel: Carlisle 23142

PALACE CYCLE STORES,
122 BOTCHERGATE,
CARLISLE.

Meccano Stockists for Airfix, Dinky, Matchbox, etc.

CHATHAM
Tel: Medway 45215

W. PAINE & CO. LTD.,
168 HIGH STREET,
CHATHAM.

M

CREWE
Tel: Crewe 55643

EVELYN WILSON,
86-88 MARKET STREET,
CREWE, CHESHIRE.

Meccano Sets — Accessories and Spares — Hornby Trains Sets—Accessories and Spares—Frog Kits.

DORCHESTER
Tel: 300

BRAGG'S SPORTS DEPOT,
15 HIGH WEST STREET,
DORCHESTER, DORSET.

Stockists for whole range of Meccano, Trains, etc., also Travel Goods, Toys and Games.

ELGIN
Tel: Elgin 2569

GEO. A. SMITH,
10 BATCHEN STREET,
ELGIN.

All your Meccano and Dinky requirements are in stock always.

FRIMLEY
Tel: Camberley 5926

JOYLAND,
56 HIGH STREET,
FRIMLEY, SURREY.

M

GLASGOW
Tel: 041-332-7040

COPLANDS,
SAUCHIEHALL STREET,
GLASGOW, C.2.

Meccano Plastic and traditional sets, Playdon sets, etc.

GUILDFORD
Tel: 61331

THE GUILDFORD DOLL'S HOSPITAL LTD.,
13 SWAN LANE,
GUILDFORD.

M

HEMEL HEMPSTEAD
Tel: Hemel Hempstead 53691

TAYLOR & McKENNA
(Hemel) LTD.
203 MARLOWES,
HEMEL HEMPSTEAD, HERTS.

For Model Boats Aircraft, Railways, Racing Cars and Accessories. Metal and Plastic Meccano

KENT
Tel: Erith 32339

DERRETT (TOYS) LTD.
52/54 ERITH HIGH STREET,
ERITH, KENT

Aircraft, Boats, Fibreglass Hulls, Tri-ang Hornby, Lima H.O., H. & M. Units, Scalextric, Airfix, Riko, Pactra, Plastic kits, Minitanks, Marquetry. Prompt Mail Order Service.

KENT
Tel: Dartford 24155

MODERN MODELS LTD.
49/51 LOWFIELD STREET,
DARTFORD, KENT.

For all your modelling requirements. Radio/Control, Aircraft, Boats, Cars, Railways. All leading makes from The Shop with the Stock. Prompt mail order service.

LEEDS
Tel: 0532-26611

KING CHARLES SPORTS CENTRE,
RAILWAY HOUSE,
KING CHARLES STREET, LEEDS, 1
Specialists and stockists in all model railway equipment and accessories. Tri-ang-Hornby, Trix, Fleischmann, Gem, Hammant & Morgan, Sommerfeldt.
Cat. service 25/- home, £2 overseas.

LEEDS, 1
Tel: 25739

THE MODEL RAILWAY CENTRE,
23 ALBION PLACE,
(Off Briggate).
The North's Leading Model Railway stockists in OO and N gauges. Branches at Cloth Hall Street, Huddersfield and Frizinghall, Bradford

LEICESTER
Tel: Leicester 21935

RADIO CONTROL SUPPLIES LTD.
52 LONDON ROAD.
Mail Order Specialists.
Closed Monday.
Open until 8.30 p.m. Friday.
The Showroom of the Midlands with full R/C service facilities

LIVERPOOL
Tel: 709-7562

LUCAS'S (HOBBIES) LTD.,
7 TARLETON STREET,
LIVERPOOL 1.
HOBBIES for everything the model make requires. Aeroplanes, Cars, Chemistry Sets Railways, Meccano Building Kits, Instructiona Toys, also a selection of Games, Dolls an Soft Toys.

LONDON
Tel: HOL 6285

BEATTIES OF LONDON,
112 & 112A HIGH HOLBORN,
LONDON W.C.1.
M

LONDON
Tel: Lee Green 2637

LEWISHAM MODEL CENTRE
45 LEE HIGH ROAD, LEWISHAM, S.E.13
Everything for the Modeller. Aircraft Boats, Radio Control, Railways, Cars Spares and Repairs our speciality.
Mail Order a pleasure

LONDON
Tel: Regent 1846

JEREMY,
16 PRINCES ARCADE,
PICCADILLY, LONDON, S.W.1.
M

LONDON
Tel: CHE 4887

RADIO CONTROL SUPPLIES
154 MERTON ROAD,
WIMBLEDON S.W.19
Closed all day Monday.
Open until 8.30 p.m. Friday.
Largest R/C stockists in the country.

LONDON
Tel: ISLeworth 0743

RADIO CONTROL SUPPLIES LTD.
581 LONDON RD., ISLEWORTH, MIDDX. **Mail Order Specialists**
Open each weekday and until 8.30 p.m. Fridays.
Largest R/C stockists in the country.
Own R/C service centre.

LONDON
Tel: Mill Hill 2877

H. A. BLUNT & SONS LTD.,
133 THE BROADWAY,
MILL HILL, LONDON N.W.7.
M

LONDON
Tel: 578-2299

BENNETTS SPORTS & TOYS
3 RUISLIP ROAD,
GREENFORD, MIDDX.
Radio Control stockists, Kits, Boats and Aircraft Popular range. Secondhand Engines and Radios bought and sold.
Tri-ang stockists.
Closed Wednesday 1 p.m. Mail Order Specialists.

LONDON
Tel: 01-529 1250

"LEISURE TIME"
4 STATION ROAD, CHINGFORD, LONDON E.4.
Aircraft, Electric Cars, Boats, Railways and Accessories, Plastic Kits, Modelling Activities.

MAIDSTONE
Tel: 51213

MODELCRAFT
40 UNION STREET,
MAIDSTONE, KENT.
Everything for the average modeller. Cars, Aircraft, Boats, Railways.
SPARES AND REPAIRS. MAIL ORDER.

MANCHESTER
Tel: Blackfriars 3972

THE MODEL SHOP
7-13 BOOTLE STREET,
OFF DEANSGATE,
MANCHESTER 2.
THE NORTH'S LEADING MODEL, HOBBY AND TOY SHOP. MECCANO SETS AND SPARE PARTS A SPECIALITY.

NEW ZEALAND

BUNKERS LTD.,
P.O. BOX 58,
HASTINGS
(Mail orders from all countries welcomed.)
M

READING
Tel: Reading 51558

READING MODEL SUPPLIES
1 HOSIER STREET,
ST. MARY'S BUTTS,
READING, BERKSHIRE.
BERKSHIRE'S MODELLING CENTRE

ST. ALBANS
Tel: 59234

BOLD & BURROWS LTD.
12-22 VERULAM ROAD,
ST. ALBANS, HERTS.
Meccano Sets and Spares

SCARBOROUGH
Tel: Scarborough 3223

"WALKERS,"
15 ST. THOMAS STREET,
SCARBOROUGH, YORKS.
(Mail orders welcomed.)
M

STAFFORD
Tel: 3420

JOHN W. BAGNALL LTD.,
18 SALTER STREET,
STAFFORD.
M

STOCKTON-ON-TEES
Tel: 67616

LESLIE BROWN,
Super Toy and Model Store,
95 HIGH STREET,
STOCKTON-ON-TEES.
M

WATFORD
Tel: Watford 44222

CLEMENTS,
THE PARADE, WATFORD.
Always a comprehensive range of Meccano Sets, Accessories and Dinky Toys.

WESTON-SUPER-MARE
Tel: Weston 6600

RADIO CONTROL SUPPLIES LTD.,
1 THE CENTRE,
WESTON-SUPER-MARE, SOMERSET.
Open until 8.30 p.m. Friday.
Largest R/C stockists in the country.
Own R/C service centre.

WOOLWICH
Tel: WOO 2212

CUFF & COMPANY LTD.,
98 POWIS STREET,
WOOLWICH, S.E.18.
Stockists for all Meccano Products including all Meccano accessories.

WORTHING
Tel: Worthing 9530

J. H. MILLER (CYCLES) LTD.,
21-23 HIGH STREET,
WORTHING, SUSSEX.
Everything for the Modeller. Meccano, Tri-ang/Hornby, Keil Kraft, Minic, Scalextric, Airfix, etc.

Humbrol brushes & Humbrol enamel...

...the perfect modellers finish!

A COMPREHENSIVE RANGE OF MODELLING BRUSHES

Sizes 00,0 & 1	9d. each	6	1/3	each
" 2 & 3	10d. "	7	1/6	"
" 4 & 5	1/- "	8	1/9	"

CAMEL MOPS

Size	2 a	2/6 each
"	3 b	3/- "
"	4 c	3/6 "

GOAT MOP 9d. "

ALWAYS DEMAND A

HUMBROL

PRODUCT

HUMBROL · HULL · YORKSHIRE

30th Anniversary 1939 – 1969

Prices shown are those recommended in U.K.

Printed in Great Britain by Electrical Press Ltd., Maidenhead, Berks., for the Proprietors, Model & Allied Publications Ltd., 13/35 Bridge Street, Hemel Hempstead, Herts. Published by the Argus Press Ltd., 12/18 Paul Street, London, E.C.2, to whom all trade enquiries should be addressed.
Registered for transmission by Magazine Post to Canada.

BE FIRST IN YOUR GANG WITH JOE'S car

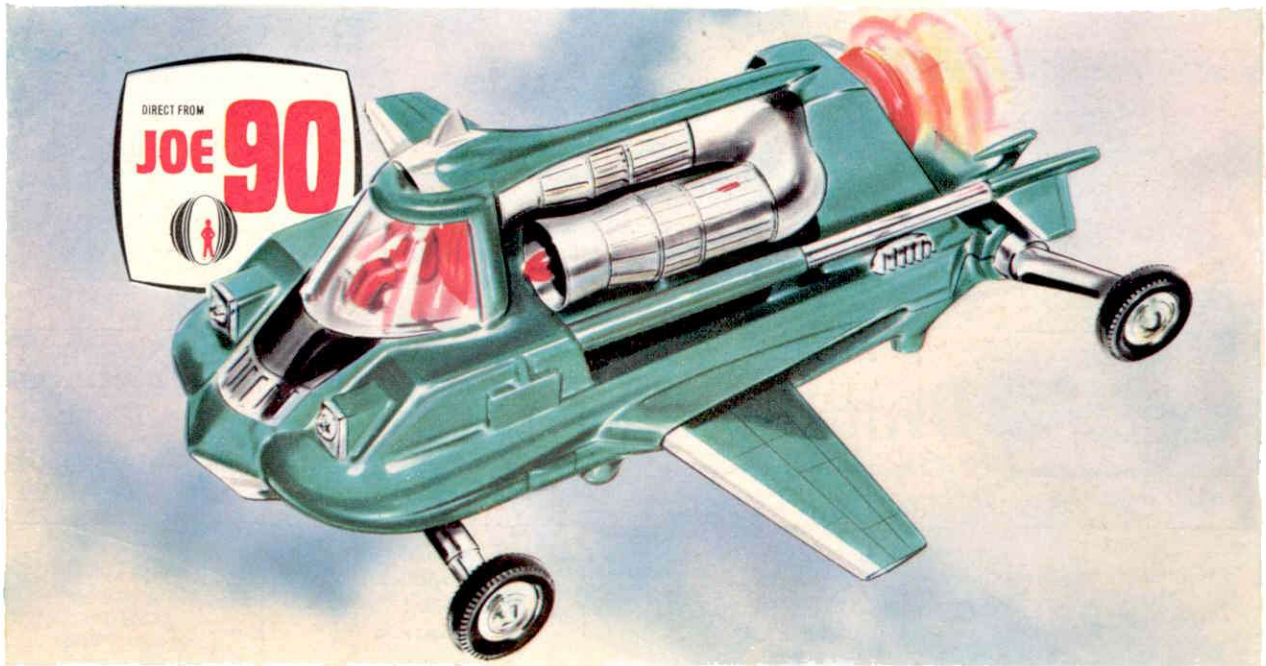
✳ ANOTHER WINNER FROM

DINKY TOYS®

UNIQUE ACTION FEATURES IN JOE'S CAR

1 Automatic opening wings
2 Extending tail fins
3 Flashing engine exhaust
4 Independent super suspension
5 Plated twin aero turbine engines.
6 Jewelled headlights

IN YOUR TOYSHOPS NOW! MODEL No.102



MORE DINKY TOYS FROM YOUR TV FAVOURITES

CAPTAIN SCARLET'S TERRIFIC TRIO

DIRECT FROM CAPTAIN SCARLET AND THE MYSTERONS

Spectrum Pursuit Vehicle. Model No. 104

Spectrum Patrol Car. Model No. 103

Maximum Security Vehicle. Model No. 105

Lady Penelope's Fab 1 Model No. 100

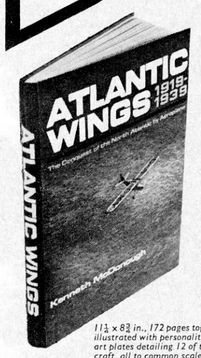
Two fabulous models from THUNDERBIRDS

Thunderbird 2. Model No. 101

leaders go for DINKY TOYS®

the tough, action-packed models

MAP The Finest Range of Model Technical Books in the World! The Finest Range of Model Technical Books in the World!



6 ATLANTIC WINGS

Man's greatest exploratory efforts have always centred upon the conquest of the Atlantic ocean. Author Ken McDonough traces the authentic history of North Atlantic aerial crossing. 1919-1939 with positively complete factual data and vivid description of each pioneer effort. His superb artwork which introduces every chapter with fascinating wash drawings of outstanding flights, extends to fine-wash sketches of mechanical details of the aircraft.

The twenty full colour paintings have been produced with closest possible adherence to true colour tones of the real machines and are in themselves a treasure for collectors of all things historical in aviation. Here for the first time between one set of covers is the truly complete story. The Sopwith 'Atlantic'; Lindbergh's 'Spirit'; Balbo's 'Savoia Marchetti'; Kingsford Smith's 'Southern Cross' and the famous French aircraft, the Breguet XIX 'Point d'Interrogation'; Levasseur 'L'Oiseau Blanc'; and Bernard 'L'Oiseau Canari' are naturally included in these fine colour plates. Appendices give tabular data on engines employed. Atlantic bibliography and a fascinating tabular summary of all attempts and successful aerial crossings.

11¼ x 8½ in., 172 pages top quality art paper. Large format, liberally illustrated with personality photographs and including 20 full colour art plates detailing 12 of the most famous transatlantic pioneer aircraft, all to common scale of 1/72nd full size. Cloth and heavy card bound cover with appealing full-colour art jacket which carries different paintings front and rear. Published at 90/–. Now ($11.95) **59/6**

AEROMODELLING

1 ALL ABOUT MODEL AIRCRAFT

A detailed book for the beginner . . . the author is world famous for his clear descriptions and in 21 comprehensive chapters with a wealth of photo illustrations, covers this wide subject.

All about rubber- or power-driven models – free flight, control line; including building instructions for a trailer, model aero engines and fuels. Completely reset 1968 and with 30 additional illustrations, revisions. Over 50,000 sold of earlier editions.

160 pages, 8½ x 5½ in., profusely illustrated throughout.
Full colour hard cover. ($3.00) **15/-**

59 SINGLE CHANNEL RADIO CONTROL

By R. H. Warring

A 'must' for beginners, this book covers in simple language all that the newcomer should know on single channel equipment – the route by which most enthusiasts find their way to radio control. Chapters cover general definitions, simple receivers and transmitters and then go on to cover actuators, escapements and servos. Suitable aircraft types and their power plants plus consideration of possible manoeuvres. Control systems for single channel – mainly rudder, but also engine control, and brief thoughts on more elaborate methods. Then boat and vehicle systems, installation of equipment, operation, testing, fault-finding and trouble shooting are covered. Finally, valuable tables deal with available equipment, receivers, transmitters, servos, actuators, escapements.

7¼ x 4¾ in. 80 pages with 50 diagrams, plus 12 art pages of photo-pictures. Numerous tables. Drawn on card photo cover in two colours. ($1.25c) **6/-**

12 POWER MODEL BOATS

V. E. Smeed

Guides the enthusiast happily through the pitfalls of his progress. Within its covers will be found a wealth of information on all forms of hull construction, materials in common use, suitable tools; the different types of motor and their best employment; simple approach to radio control, boat fittings, couplings, shafts and propellers, superstructure, painting and finishing; unorthodox models, including submarines; and a valuable selection of 'Do's and Don'ts'.

8½ x 5½ in. 128 pages. 250 photo-illustration and line-drawings. Bound in hard boards, linson covered with gold foil title on spine. ($2.50c) **12/6**

10 SEVENTEENTH CENTURY RIGGING

R. C. Anderson

The true atmosphere of early sailing craft can only be captured by authentic rigging detail. A really comprehensive study of the subject that could hardly be bettered, and written with special consideration of the needs of modellers.

Two books of wider interest for all who love the sea and who need historical reference for their modelling.

8½ x 5½ in. 146 pages. Two-colour drawn on card cover. 9 photo-illustrations. 250 figures comprised in 23 fold-out drawings. ($2.50c) **12/6**

9 THE ANATOMY OF NELSON'S SHIPS

C. Nepean Longridge

A fantastic tour-de-force embracing the most complete information ever for the benefit of the ship modeller intent on building a wooden ship of Nelson's time. Its very completeness makes it also of special interest to the naval historian. Drawings, illustrations, plans are all superb.

9½ x 7 in. Gold blocked title on red panel on spine and on front. 183 drawings, 12 fold-out plans, 76 plates. Decorative dust cover. ($12.50c) **63/-**

RADIO CONTROL

58 MULTI CHANNEL RADIO CONTROL

R. H. Warring

Multi channel control is probably what most radio control enthusiasts seek, eventually, to achieve. But all too often, introduction to this more advanced stage of the radio control hobby is fraught with problems brought about by sheer lack of knowledge of the subject. It is for this reason, to help the beginner over his problems, that Multi Channel Radio Control has been introduced. Here the beginner will find explained in simple terms the working of multi channel equipment.

8½ x 5½ in. 112 pages. Bright, full colour photo dust cover, hard bound with gold blocked title on spine. Numerous line and photo illustrations on high-quality gloss paper. ($2.50c) **12/6**

8 FLYING SCALE MODELS

R. G. Moulton

All types of scale flying models are described in turn - glider, free-flight and control line; Jetex, diesel, rubber or ducted-fan types. Much useful information is given on achieving highly realistic finished and detailed parts and there is a useful set of tables listing camouflage and insignia from 1914 up to date. Very large number of illustrations, including photographs, diagrams and scale plans.

8½ x 5½ in. Hard bound. Chapter headings by cartoonist Roland, over 300 diagrams, sketches, photo-illustrations. 74,000 words. ($2.00) **10/-**

107 RADIO CONTROL MANUAL 2

This is the second Radio Control Manual, bringing news and information on all the latest developments within the R/C hobby. From the simplest single channel systems, up to the most sophisticated, there is something for everyone. Ron Warring discusses control surface design. Peter Chinn on R/C engine developments. He completes the tabular data on over 100 current R/C power-plants. For R/C boat enthusiasts Don Careless provides expert advice on the art of multi model racing. Don Baxter provides hints and tips on the operation of R/C water planes. Britain's ace pylon racer Peter Waters, passes on the secrets for successes in R/C Goodyear racing. 17 scale drawings of some of the world's leading model designs which, in all, make Radio Control Manual No. 2 an invaluable reference work for all radio control enthusiasts.

8½ x 5½ in. 128 pages. 83 photo-illustrations, 49 diagrams, 17 model plans. Bound in hard boards with full colour cover photo. ($2.75c) **13/6**

3 AEROMODELLER POCKET DATA BOOK

Simply packed with clear sketches and useful tables to help modellers in every branch of aero modelling.

7¼ x 4¾ in. 64 pages. With 61 pages of detailed explanatory sketches and text, based on Flying Models Reference Handbook. ($1.00) **5/-**

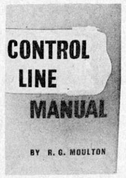
2 AIRCRAFT IN MINIATURE

W. O. Doylend

The art of science of static scale model aircraft construction demands only the modest tools and the simplest of materials so that no high initial expenditure is required to make a start.

8½ x 5½ in. 130 pages, including 50,000 words of text, 244 detailed drawings, over 30 models and art plates. Fully bound with gold-blocked title on spine. ($2.50c) **12/6**

7 CONTROL LINE MANUAL



R. G. Moulton

Main chapter headings: Why Control Line?; Basic U-Control; Basic Monoline; Basic Flight Control; Learning to Fly; Aerobatics; Speed; Team Racing; Combat; Carrier; Cargo and Endurance; Scale Models; Jet. The Engine in Control Line; Towards the Indestructible; Looking after the Lines; Variations on the Theme. Plus appendix. The manual represents the accumulation of 16 years' experience by the author in the flying control line models, including the pioneering of aerobatics, team racing and combat in Great Britain.

8½ x 5½ in. Hard bound, Chapter headings by cartoonist Roland, over 300 diagrams, sketches, photo-illustrations. 74,000 words. ($3.00) **15/-**

4 MODEL AERO ENGINE ENCYCLOPAEDIA

All the known world's engines are detailed in tabular summary with principal dimensions and advised propellers. Three extensive chapters deal with initial operation of a first engine, whether it be coil ignition, diesel or glowplug. Advanced data on fuels, horsepower, speed controls, silencers and tuning of racing engines. Fully updated and revised.

8½ x 5½ in. 208 pages. Full bound in plastic cloth, with three-colour dust jacket, over 300 sketches, photos, data tables. ($3.00) **15/-**

114 AEROMODELLER ANNUAL 1968/9

This year's Annual is the 21st and our 'coming-of-age' edition brings no less than 47 of the world's most interesting model designs ranging from an actual size indoor flyer to world champs winner. 'Milestone' features include George Aldrich on Secrets of Speed, engine tuning and fuels; Theory of Model Flight; Aeromodellers who've made their own full-size aircraft; Noise explained; The new Foam Plastic techniques, by Erich Heimann; How to use Epoxy, and how to keep control line tension. Designs include Coupe d'Hiver, Wakefield, A/2, F.A.I. and ½A Power, Open Rubber, Chuck Glider, Hydro, Team Race, Stunt, R/C Multi, Sport, Scale, Tailless. Full cover colour by Lauri Bagley portrays 'Breezy' – a home-built light aircraft built by aeromodellers.

Size 8½ x 6½ in. 128 pages.

STOCKS LIMITED **10/6**

125 VANE STEERING GEARS

A. Wilcock

First of a new series of Specialist Booklets this is reprinted from a series titled 'Notes for the Novice Model Yachtsman' and contains the only modern text on the design and operation of Vane Steering Gears applied to model yachts. At a time when their full-size use for Trans-Atlantic and other long distance racing is attracting attention this is a specially interesting little work.

9¾ x 7¼ in. 24 pages with 42 line illustrations. ($1.00) **5/-**

61 INVERNESS TO CREWE

Martin Evans needs no introduction as an expert on locomotives, and in this, the third in a series of books which will ultimately cover all main-line locomotives in Great Britain, he discusses 4-6-0 locomotives from their introduction in 1894 to the great exchanges of 1948 and after. Every class of 4-6-0 engine is illustrated and there are tables of performance and profuse details of design and construction to round out the story. Invaluable to students of steam locomotive history and development.

Size 8½ x 5½ in., case bound, 164 art pages, 124 photographs and attractive dust jacket. ($5.00) **25/-**

RAILWAYS

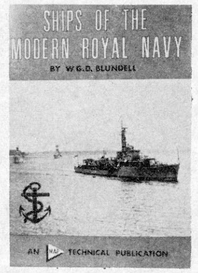
57 MODEL BOILERS AND BOILERMAKING

K. N. Harris

The author has assembled in one book all the essentials of the subject so that ignorance of source material will no longer be an excuse for scamping work on boilers. Model boilermaking can indeed be considered a vital part of model engineering, no whit less important than other constructional work, demanding skill in design and manufacture. In nine chapters the subject is adequately covered dealing with general considerations and principles, efficiency, design features and scale effect. Materials and their properties, calculations for safe working pressures and general proportions are discussed. Chapters are also devoted to types of boilers, methods of construction, flanging and forming plates, setting out, annealing and riveting. Then we have details of boiler mountings and fittings, safety valves, gauges, clack valves, regulators and all the other detail parts inherent to good boilers. Fuels and firing methods are discussed, as are test pressures, testing, superheaters, feed-water heaters and the like. Many useful tables are provided and a wide selection of detail drawings covering every type of model boiler in use today.

8½ x 5½ in. 185 pages. Bound in linson covers with two-colour photo dust covers. 27 photo-illustration plates. 109 line drawings. 16 detailed boiler drawings. ($5.00) **25/-**

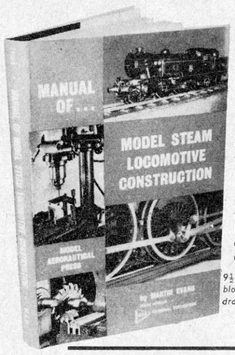
103 SHIPS OF THE MODERN ROYAL NAVY



This book covers the ships of the present-day Navy in photographs, drawings, and words. Nearly 100 photographs, the majority full-page of ships and details of ships, accompany 20 pages of plans – Ton, Triumph, Battle, Salisbury, Eagle, Bulwark, Tide, Forth, Range, County, Manxman, Daring, Bar, Mull, Reliant, Ham, Ford, Agile and Tiger – with descriptive text, plus several tabulated pages listing and detailing all other ships, to provide a comprehensive survey of the vessels in current use. For all ship-lovers, naval enthusiasts, and model builders.

128 pages, size 9¾ x 7¾ in., art paper and first-class reproduction throughout. In linson and board covers, gold block spine, colourful dust jacket. Publication. ($7.00) **35/-**

66 MANUAL OF MODEL STEAM LOCOMOTIVE CONSTRUCTION



Martin Evans

Acclaimed all over the world, this is earning a reputation as the standard work on the subject. Author for many years, Technical Editor and now editing *Model Engineer*, has not only a 'full-size' steam background, but very many years of practical modelling, plus an intimate knowledge through readers' correspondence of the things that the amateur would like to know. For armchair pleasure, or as a definite investment to save its cost many times over!

9½ x 6 in. 172 pages. Cloth bound, gold blocked spine, 2-colour dust cover. 132 line drawings, 36 plates with 96 photo illustrations. ($6.00) **30/-**

11 MODELLING THE REVENGE

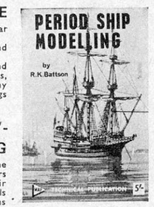
Detailed description of an Elizabethan ship-of-war and how to model it.

Part I: The Hull, covers first stages, fitting and painting.

Part II: Deals with Rigging, including masts and spars, standing rigging, running rigging, sails, finishing touches. Guns, deck details and many other details well illustrated. Working drawings by the author also available.

7¼ x 4¾ in. 85 pages. Two-colour drawn on card cover. 83 line drawings, ½ half-tone picture. ($1.00) **5/-**

18 PERIOD SHIP MODELLING



Constructional notes with 65 diagrams on the making of an Elizabethan Galleon. Seven chapters cover: Introduction, Hull, Masts, Spars and their Fittings, Standing Rigging, Running Rigging, Sails and their Gear, Finishing and General Notes. Plans available in our Plans Service.

7¼ x 4¾ in. 80 pages, two-colour card cover, illustrated line drawings. ($1.00) **5/-**

MODEL BOATS

14 BOAT MODELLING

Vic Smeed

A comprehensive 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; operations; radio control.

In successive editions nearly 30,000 model boat builders have been introduced to the hobby via this little book.

8½ x 5½ in. 96 pages. Text illustrated with 223 line drawings and 8 pages of art plates showing 50 photographs of models. ($1.00) **5/-**

19 SECRETS OF SHIPS IN BOTTLES

P. Thorne

Of all the fascinating models, perhaps the ship-in-a-bottle is the most intriguing. Such models, made by old seadogs, have for generations puzzled the landlubber; now you have the chance to share the secret.

7¾ x 4¾ in. 72 pages. Profusely illustrated with line drawings, photo plates (65 figs.). Bound in drawn on card cover. ($1.00) **4/6**

TRACTION ENGINES

75 GARRETTS OF LEISTON

R. A. Whitehead

A study of the growth and development of 'Garretts of Leiston', the family business which has been running for nearly two hundred years, and which has built every type of steam road engine.

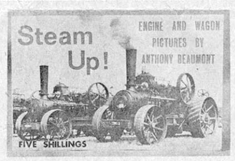
The history and vicissitudes of this famous concern and the men who ran it and the development of the numerous Leiston engines, from the earliest types to the end of steam. Technical descriptions are leavened by stories and anecdotes of engines, designers and the old family proprietors, and of the interesting trials and experiments which took place.

Chapters include:

1. The Family. 2. The Works and Firm. 3. Leiston Products up to the Great Exhibition 1851. 4. Between Two Exhibitions, 1842-1862. 5. Thousands of Portables and a few Traction Engines, 1862-1894. 6. The Years of Adventure 1895-1919. 7. The Post-War Years, 1919-1930. 8. A Knight to the Rescue. 9. Garrett's Place in the Scene.

Size 9½ x 6½ in. Case-bound. 319 pages. 155 photographs, drawings and reproductions of old prints. ($8.50c) **42/-**

108 STEAM UP



Anthony Beaumont provides a new selection of traction engine and wagon pictures – printed lithographically to do justice to the fine photographs. There are 50 page pictures, plus cover illustration.

4¾ x 7¼ in. Two-colour drawn-on card cover, index, introductory notes. ($1.00) **5/-**

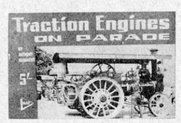
79 TRACTION ENGINE PICTURES

A. Beaumont

Sixty traction engine pictures of all shapes and sizes.

4⅞ x 7¼ in. landscape. 64 pages. Two-colour drawn on card cover. 60 photo-illustrations. (75c.) **3/6**

76 TRACTION ENGINES ON PARADE

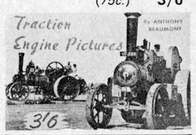


A. Beaumont

A captioned selection of showman's road locomotives, tractors, traction engines and steam motor tractors, wagons, portable engines, ploughing engines and rollers.

4¾ x 7¼ in. landscape. 58 pages. Two-colour drawn on cover, 58 photo-illustrations. ($1.00) **5/-**

78 PLOUGHING ENGINES AT WORK



Barry J. Finch

A fine photo collection of ploughing engines and their ancillary equipment at work.

4⅞ x 7¼ in. landscape. 58 pages. Two-colour drawn on card cover. 58 photo-illustrations. (75c.) **5/-**

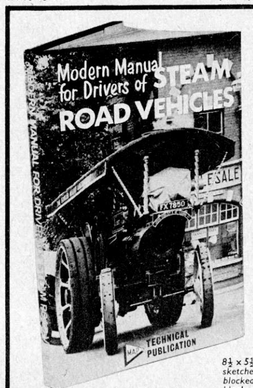
113 FAIR ORGANS

A. Beaumont

This book contains many illustrations of beautifully restored Fair Organs of bygone years. Fascinating for the younger reader whilst arousing pleasant memories in those who remember the era of Fair Organs.

4¾ x 7¼ in. Two-colour drawn-on card cover. 56 pages. 50 photo-illustrations, index, introductory notes. ($1.00) **5/-**

80 MODERN MANUAL FOR DRIVERS OF STEAM ROAD VEHICLES



W. Michael Salmon

A 'must' for every steam road vehicle enthusiast, be it traction engine, steam wagon, ploughing machine or any other fascinating variant . . . it embodies all that could be gleaned from surviving professionals on the subject of driving, maintaining, servicing and operating all classes of steam road vehicles. It is no technical tome but a completely practical work written from the novice's point of view by a non-engineering author, who has nevertheless had the benefit of the advice of a number of real experts. For those who drive, would like to drive, or are content to watch others at work, this is a book to read and enjoy . .

8½ x 5½ in. 133 pages, plus eight pages of plates, well illustrated with sketches and drawings. Bound in Balacron with title blocked on spine, plus halftone photo dust cover in black and yellow. ($4.25c) **21/-**

126 ELECTRIC R.T.P. FLYING

A M.A.P. Staff production produced in record time to explain the construction and operation of the popular electric round-the-pole flying so successfully shown at the 1969 Model Engineer Exhibition. Not an 'elegant' booklet but crammed with exclusive information.

8 x 6 in. 16 pages. 12 illustrations. Photo-litho duplicated. (75c.) **3/6**

74 THE BRITISH TRAM

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

7¼ x 4¾ in. 87 pages. Two-colour drawn on card cover. 59 mainly photo illustrations (many rare). ($1.00) **5/-**

117 SOLARBO BOOK OF BALSA MODELS

About Balsa and Working with Balsa; Making a Building Board . . . Then we go on to many, many dimensioned and often full-size drawings to cover: Boxes and Cabinets, Racks . . . a Birdhouse; Solid Balsa Carved Figures; Space Frame Models; Balsa Bridges; Carved solid models – aircraft, cars, ships; Carving Propellers; Chuck and Catapult Gliders; Whip Control Models; Boomerangs; Kites, Helicopters, Helikite; Simple Ship Models, water lineship models, power models; Prop-Hydro; Round Bilge Hulls; Submarine; Kon Tiki Raft and other historic models; Catamaran; Scale Car and Roadside Models; Trackside Models (slot cars); Airport Buildings; Other Scale Buildings; Architectural Models; Military Models; Puppets and Puppet Theatres; Airspeed Indicator/Beam Balance; Slide Rule, Micrometer; Caliper rule; Two-stroke engine; Picture sequence on finishing Balsa Models . . . Text and Photos.

10¼ x 8¼ in. 112 pages ($3.00) **15/-**

127 INTRODUCTION TO RAILWAY MODELLING

John Brewer

Another specialist booklet which makes available the author's series of articles for the newcomer to small scale railway modelling. Basic introductory information of model and full-size practice.

9¾ x 7¼ in. 20 pages. Profusely illustrated. ($1.00) **5/-**

NEW IN AUTUMN

AIRCRAFT CARRIERS · LIVE STEAM BOOK
RADIO CONTROL MANUAL No. 3 · DAYS OF STEAM · BATTLE GAMING · ETC.

121 ENGINE TESTS

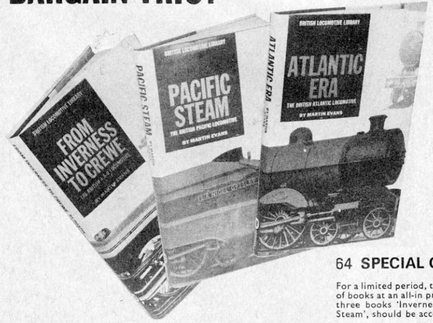
7¼ x 4¾ in. 96 pages. 1960 Drawings, graphs, photos, 23 engines. Published at 5/– Special price **1/3**

111 MODEL RAILWAY HANDBOOK

Indispensable guide for all who are interested in small-gauge scenic and proprietary railways. Contents include Scales and Gauges, Standard Dimensions, Methods of Electrification, Club Directory, Trade Guide, Modern and Historic Notes.

7¼ x 4¾ in. 68 pages. Two-colour cover. Illustrated numerous diagrams, tables. (50c) **2/6**

BARGAIN TRIO!



BY THE SAME AUTHOR

62 ATLANTIC ERA

The story of the 4-4-2 locomotive, in use by many of the great railways as an express passenger engine, 1900-1925. Complete with dimensions, design and construction details, performance data, and many photographs. New edition now available with redesigned dust jacket, etc.

94 pages, case bound, size 8½ x 5½ in. Price ($2.50c) **12/6**

63 PACIFIC STEAM

The 4-6-2 locomotive hauled many of the famous expresses such as 'The Coronation Scot', 'The Flying Scotsman' and 'The Golden Arrow'. The full story of their development, including experiments and tribulations, is told in detail in this fascinating book.

80 pages, case bound, size 8½ x 5½ in. Price ($2.50c) **12/6**

64 SPECIAL OFFER . . . .

For a limited period, the publishers are offering this superb trio of books at an all-in price of 45/– – that is, a single order for the three books 'Inverness to Crewe', 'Atlantic Era' and 'Pacific Steam', should be accompanied by a remittance of 45/-. **45/-**

69 NARROW GAUGE RAILWAY MODELLING

D. A. Boreham

Narrow gauge railways make most attractive models, either as the basis of a complete layout or as a 'feeder' line to a standard gauge layout, adding depth and imagination to proprietary units. The book is practical and authoritative, written by an acknowledged expert. Matters covered include trackwork, wheels, rolling-stock bodies, metal work with useful tips on sources of information, exhibition layouts plus excellent drawings.

8½ x 5½ in. Cloth bound, blocked title on spine, 30 photo-illustrations. 57 line drawings. 26 pages locomotive, rolling stock and other drawings. ($4.25c) **21/-**

67 MODEL LOCOMOTIVE VALVE GEARS

Martin Evans

Gears covered include single-eccentric, slip eccentric, Stephenson Link, Gooch and Allan Straight Link, radial valve gears, poppet valve gears, gears for 3- and 4-cylinder engines, cab reversing gears, valve setting and the indicator.

8½ x 5½ in. 98 pages. Cloth bound, gold blocked spine. 2-colour dust cover, 64 line drawings, 34 photo illustrations. ($3.00) **15/-**

112 CHRONICLES OF A GARDEN RAILWAY

This is the story of a father-and-son partnership over a period of 16 years, and records their trials, tribulations and successes in building and operating a garden railway in the back garden of their London suburban house. This was no robust garden giant, but a simple 00 gauge layout that passed through many changes of plan, and now is about to start a new lease of life as a narrow gauge railway.

7¼ x 4¾ in. 93 pages. 19 line drawings, 32 photo-illustrations. Bound in hard covers, linson cloth, gold-blocked on spine, full colour dust jacket. ($3.00) **15/-**

72 PAINTING AND LINING MODELS

A reprint of R. C. Rogers' handy little work on an all-important subject. No longer is there any need for models to be spoiled for lack of expert finish – or to be sent away for 'professional' and expensive attention . . . not even a steady hand is essential!

7¼ x 4¾ in. 64 pages. 17 drawings. Drawn on two-colour card cover. ($1.00) **5/-**

124 MINIATURE LOCOMOTIVE CONSTRUCTION

J. A. Ahern

A further supply of this 'classic' on the construction of small scale working model locomotives will meet the continuing demand. The author in his lifetime achieved great eminence in his hobby and in this exhaustive work covers the subject extensively in seventeen well illustrated chapters. The book is essential to the novice, of immense value to the most expert.

9 x 6 in. 172 pages. 126 line illustrations, 16 photo-illustrations. Hard bound with two colour photo-dustcover. ($2.75) **13/6**

122 SHIPS OF LONDON RIVER

Arthur Pollard

A captioned selection of craft to be seen from the Port of London down to the sea, from fussy tugs to stately merchant vessels and liners.

4¾ x 7¼ in. 60 pages. Landscape. Two colour card cover. Fifty photo-illustrations. ($1.00) **5/-**

200 SIMPLE MODEL STEAM LOCOMOTIVE BUILDING INTRODUCING LBSC'S TICH

One of LBSC's best-known 3½ in. gauge locomotives, 'Tich' is the subject of the 'words and music' which serve as an introduction (as they have done so often before!) to the ordinary man's best home-built model locomotive. A small lathe, little or no prior knowledge, a minimum of skill and strict adherence to the simple instructions can lead to years of pleasurable hobby hours.

Seventeen fact-packed chapters cover every aspect of construction, up to steaming and driving. Profusely illustrated with diagrams and photo-plates.

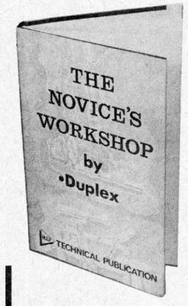
9¾ x 6 in. 268 pages, plus 29 pages of plates. Hard bound, gold-blocked on spine, full colour dust cover. ($8.50c) **42/-**

21 SIMPLE ELECTRIC CAR RACING

V. E. Smeed

With this book Vic Smeed has produced the ideal introduction to electric cars – practical survey giving the facts of successful car and track construction in full detail and all based on personal experience. Anyone coming new to the hobby will find in its pages the answers to all the questions likely to arise in building cars and tracks from scratch; a great proportion of its content will also be invaluable to those who are content to buy commercial cars and track but who are anxious to get the very best out of their purchases.

7¼ × 4⅞ in. 104 pages. 65 photos. 37 line drawings. Cloth and board cover with attractive dust jacket. ($2.00) **10/6**



106 THE NOVICE'S WORKSHOP

Duplex, now known to be Ian Bradley and Norman Hallows in partnership, enjoys a high reputation amongst model and light engineers for wide knowledge of the subject and a happy knack of explaining quite involved operations in a clear and logical manner. This work, which originally appeared as a series of articles in *Model Engineer*, is designed to assist and instruct the newcomer to the craft in the all-important matters of planning and layout of the home workshop, the selection of handtools, their correct use, and, finally, shows the reader how to apply his newly-developed skill to the making of additional items for his workshop. The book then goes on to deal with the selection, installation, maintenance, and practical uses of machine tools. Primarily for beginners this is a book which even the most experienced worker will find abounding in useful hints and tips.

7¼ × 4⅞ in. 236 pages cartridge paper, 218 drawings, diagrams and illustrations. Bound in linson cloth, hard boards, two-colour dust jacket. ($4.00) **21/-**

32 USING THE SMALL LATHE

L. C. Mason

A book of guidance and data for modeller and engineer . . . Typical chapter headings: A First Lathe; Chucking; Driving and Turning; Parting Problems; Holding the Job; The Tailstock and Drilling; Boring Working; Fine Finish; Form Tools, Cutters and Mills; Milling Operations; Screws and Screwcutting; The Art of Dividing; Benefits of Calibration; Work in the Round; Drilling Spindles and Collets; Filing and Knurling; Gears, Worms, Bevels, Coils, Springs, Spinning; The Next Lathe.

8½ × 5½ in. 112 pages. 60 photo-pictures. 19 drawings. Two-colour photo cover. ($1.75c) **8/6**

36 MODEL MAKER ANNUAL

Compiled by Vic Smeed

Model engineering may seem a difficult starting point for beginners . . . this Annual enables one to make a start from simple materials and many interesting models of all kinds are shown. Some of the principal features: Rebuilding Bucentaur Venetian Barge; Submarines; B.R.M. and Porsche Car Models from commercial parts; H.M.S. *Royal Sovereign* and *Dreadnought* miniatures; Photographing Models, Multi from Single Channel – R/C Features; Scale Car Construction; How to Sail Your First Model Boats; Model Boats from Cardboard; Hovering Craft; Ships' Guns; Over 30 Model Plans.

8½ × 5½ in. 160 pages. Covering every aspect of modeldom (except aircraft). Printed on good quality paper with coloured dust jacket and coloured boards. ($2.00) **10/6**

25 SHARPENING SMALL TOOLS

Duplex

Sharpened materials, appliances, metalworking tools, woodworking knives, scissors, razors and drawing instruments. Sharpening of tools in general use is described in detail, including those used in carpentry and metalworking, as well as a short account of sharpening such domestic appliances as scissors and the like, as well as razors and drawing instruments.

7¼ × 4⅜ in. 106 pages. Two-colour drawn on card cover. 106 line drawings. ($1.00) **5/-**

20 HISTORY OF BRITISH DINKY TOYS 1934-64

Cecil Gibson

A book devoted to the products of one toy factory. 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 and less commonly seen examples, and a very valuable series of tables listing all Dinky Toys, 1934-64 in numerical order with a special numbering system which is designed to smooth the way for collectors. This "Collectors' Piece" of a book should be in the hands of every single Dinky Toy fan.

8½ × 5½ in. 152 pages. Cloth bound, gold blocked spine. Two-colour dust cover. 76 photo-illustrations, numerous tables. ($3.00) **15/-**

50 BEARING DESIGN & FITTING

Duplex (Ian Bradley & Norman Hallows)

A valuable small book on plain, roller and ball bearings, with details of materials used, lubrication, mounting, protection, aligning, thrust bearings, re-lining, needle roller bearings, applications to machine tools, design of bearings, ideal dimensions.

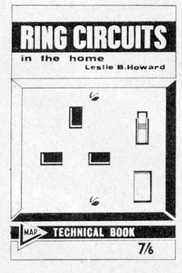
7½ × 4⅞ in. 80 pages. Two-colour cover illustrated line drawings. ($1.00) **5/-**

37 MILLING IN THE LATHE

Edgar T. Westbury

One of the most useful ways in which a lathe can be used outside plain turning is that of using it as simple milling machine. In this well-illustrated book the author explains the use of milling cutters of various types; milling without special appliances by use of ordinary lathe movements; the vertical slide, port cutting, end slotting; squaring and levelling; rotary spindle attachments and their use, copying and planetary milling; means of driving cutter-spindles; indexing gear; divided headstock, division plates; application of lathe milling processes.

7¼ × 4⅞ in. 160 pages. Two-colour drawn on card cover. Profusely illustrated with line drawings and half-tone pictures. ($1.50c) **7/6**

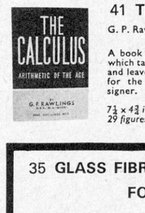


53 RING CIRCUITS IN THE HOME

L. B. Howard. Completely revised and enlarged.

The wider use of electrical appliances demands that the home handyman extends the existing wiring of his home or workshop in a safe and simple way. Ring Circuits in the Home provides the answer to all the questions likely to arise in planning, fitting, testing and checking the new installation. There are also chapters on re-wiring and changing existing systems to comply with modern standards whether it be power or lighting.

7¼ × 4⅞ in. 54 pages 54 illustrations. Drawn on card cover ($1.50) **7/6**



41 THE CALCULUS

G. P. Rawlings

A book on 'arithmetic of the age' which takes all the mystery out of it and leaves a modern 'working tool' for the model engineer and designer.

7¾ × 4⅞ in. 84 pages. 29 figures. ($1.00) **5/-**

38 HOW TO PREVENT ELECTRICAL TROUBLES

E. B. Watton

A practical book on maintenance of domestic and industrial electric apparatus.

7¼ × 4⅜ in. 126 pages. Two-colour cover, flush boards. 42 figures. ($1.00) **5/-**

29 BUILDING A STEAM ENGINE FROM CASTINGS

Edgar T. Westbury

Building a Stuart 10V engine, from casting to testing, with details of machining bedplate castings, trunk column and cylinder, steam chest covers and flywheel, crankshaft, crosshead and bearings, piston and con-rod, eccentric rod and valve gear, valve timing.

7¼ × 4⅜ in. 36 pages. Card covered, wire stitched, 37 photo-illustrations. 12 line drawings. (50c) **2/-**

55 MODEL STATIONARY & MARINE STEAM ENGINES

K. N. Harris

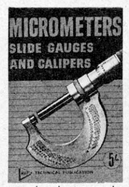
The author brings practical full-size experience to bear on the design and building of models.

9 × 6 in. 153 pages. Hard bound, black blocked title. Decorative dust jacket. 60 line drawings. 15 photo-illustrations. ($3.00) **15/-**

104 MOTOR RACING TEAM COLOURS & MARKINGS

Provides in a simply-followed manner details of the various works and private motor racing teams on British and some foreign circuits. Cars used, their colour and marking are arranged in alphabetical order of teams. Notes on many of the better-known drivers, helmet markings and insignia of makers and teams. A section deals with historic teams and marques of the past. It is a book that will be of value to the car modeller.

7¼ × 4⅜ in. 125 pages profusely illustrated with line drawings, plus 12 pages plates. ($1.76c) **8/6**



123 MICROMETERS SLIDE GAUGES & CALIPERS

A. W. Marshall & G. Gentry. Revised E. T. Westbury.

In eight chapters covering simple and registering calipers; slide gauges; Vernier scales and their use; micrometer slide gauges; micrometer construction; how to read a micrometer; examples of modern micrometers; use of measuring instruments.

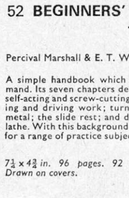
7¼ × 4⅜ in. 71 pages, 59 line and photo-illustrations. Two colour card cover. ($1.00) **5/-**

MODEL CARS

23 MODEL CARS ENCYCLOPAEDIA

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

7¼ × 4⅜ in. 151 pages. 104 illustrations. 45,000 words. Half-price bargain (Published 10/6) ($1.00) *Now* **5/-**



51 LATHE & SHAPING MACHINE TOOLS

Duplex (Ian Bradley and Norman Hallows)

Covers material for making tools; formation of the tool's cutting edge, clearance angles, rake, relief angles, machining all types of metals and plastic; lathe tools, holders, forms of tools, boring, screwcutting, square threads, acme threads, hand turning tools, mounting tools, back tool post; tools for use in the shaping and and planing machine, design, special tools, form tools, different metals worked; sharpening lathe and shaping machine tools.

7¼ × 4⅜ in. 80 pages. Two-colour card cover. Illustrated line drawings. ($1.00) **5/-**

LATHEWORK

109 WOODTURNING FOR THE BEGINNER

A. Macbeth

The simple way of going about woodturning, including setting up the workshop, tools, materials, attachments, finishing and polishing, safety first.

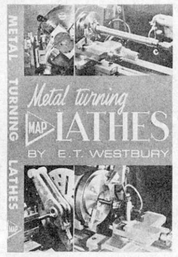
7¼ × 4⅜ in. 92 pages. Decorative cover, wire stitched, 74 drawings, appendices. (25c) *(Pub. 3/6)* **1/-**

52 BEGINNERS' GUIDE TO THE LATHE

Percival Marshall & E. T. Westbury

A simple handbook which enjoys considerable demand. Its seven chapters deal with the simple lathe; self-acting and screw-cutting lathes; methods of holding and driving work; turning in wood; turning in metal; the slide rest; and drilling and boring in the lathe. With this background the tyro should be ready for a range of practice subjects.

7¾ × 4⅜ in. 96 pages. 92 illustrations. Drawn on covers. ($1.00) **5/-**



105 METAL TURNING LATHES

A comprehensive range of sizes of lathes is covered, and embraces all those used in general engineering from the smallest to about 6 in. centre height, but excluding watchmakers' lathes at the one extreme and heavy industrial lathes at the other.

This latest work embraces the latest practice and covers the evolution of the lathe, details a number of the latest models on the market, and goes on to discuss elements of lathe design.

Installation and driving equipment, accessory equipment and tools and tool holders. Operations that may be performed upon a modern lathe, including turning between centres, chuck and face-plate work, boring and internal turning, screwcutting and die threading and other miscellaneous lathe operations.

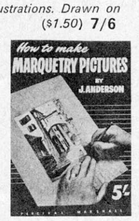
Measurement, marking-out and testing.

8½ × 5½ in. 154 pages. 160 line drawings and photo illustrations, 9 appendices. Bound in hard covers with linson cloth, gold blocked title on spine. Two-colour dust jacket. ($5.00) **25/-**

24 HOW TO WORK SHEET METAL

Metal working practice straight from the bench. Practical chapters embrace: Equipment; Metals used; Hollowing and Blocking; Flanging; Edging and Seaming; Wiring Edges by Hand; Jennies and Wiring Machines; Beading and Swaging Machines; Conical Work; Pipes, Patterns and Joints; Planishing; Riveting; Brazing; Tank Construction.

7¼ × 4⅜ in. 142 pages. Drawn on two-colour card cover. 39 line drawings. ($1.25) **6/-**

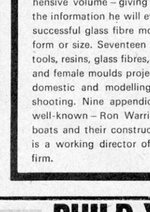


94 MARQUETRY PICTURES

J. Anderson

How to make marquetry pictures in wood veneers, surely one of the most fascinating of all creative hobbies.

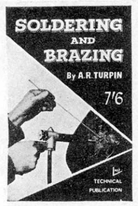
7¼ × 4⅜ in. 68 pages. Two-colour drawn on card cover. 15 plates. 28 line plates. ($1.00) **5/-**



35 GLASS FIBRE FOR AMATEURS

This is essentially a practical book for all who are interested in making things with reinforced glass plastics, or using this most versatile material for repair work, etc. It is the first work of its kind to cover materials, techniques and a vast range of applications in a single comprehensive volume – giving the reader literally all the information he will ever need for producing successful glass fibre mouldings of any shape, form or size. Seventeen chapters on materials, tools, resins, glass fibres, castings, design, male and female moulds projects, car bodies, marine domestic and modelling applications, trouble shooting. Nine appendices. Joint authors are well-known – Ron Warring is an authority on boats and their construction and Geoff Lewis is a working director of a leading glass fibre firm.

8½ × 5½ in. 122 pages. Printed litho with 120 illustrations and diagrams. Hardbound. Library edition. ($2.00) **10/6**



27 SOLDERING AND BRAZING

A. R. Turpin

Covers soft solders, hard solder, brazing strip, fluxes, heating devices hard and soft soldering and brazing. Useful tables. Suitable for all purposes from domestic and metalwork to the more delicate needs of the radio technician.

7¼ × 4⅜ in. 88 pages. Two-colour drawn on card cover. 3 figures. 13 plates. ($1.50c) **7/6**

47 HARDENING & TEMPERING ENGINEERS' TOOLS

George Gentry. Revised Edgar T. Westbury

A valuable workshop book for expert and beginner alike, contains colour scale diagram. Chapters on principles, annealing, hardening, tempering, special tools, forging light tools, case-hardening, tungsten carbide and hard alloy, gas and electric furnaces.

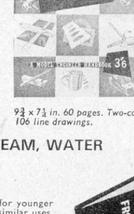
7¼ × 4⅜ in. 95 pages. 55 illustrations. Colour scale diagram. Drawn on coloured card cover. ($1.25c) **6/-**

45 LATHE ACCESSORIES

Edgar T. Westbury

How to make and use a wide variety of useful accessories, many of which cannot be bought, or only somewhat expensively. Selection includes devices for centring work, chucking accessories; tool-holders and cutter bars; dividing appliances; simple milling attachments; steadying appliances; various forms of cutters; aids to screwcutting; and other miscellaneous accessories. Saves its cost many times over in next to no time.

7¾ × 4⅜ in. 109 pages. Two-colour drawn on card cover, 87 photo figures. ($1.00) **5/-**



30 WORKSHOP HINTS & TIPS

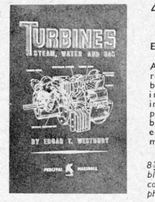
A 'must' to be beside every enthusiast's lathe! Workshop mysteries are revealed, there are quick tips and easy dodges to show that there is sometimes some easier way . . . thoroughly recommended.

9¾ × 7½ in. 60 pages. Two-colour card cover. 106 line drawings. (75c) **3/6**

44 GEAR WHEELS AND GEAR CUTTING

Principles and methods of production of toothed gearing. Proportions and form of teeth of gear wheels covered; there are chapters on pin wheels, bevel gears, worm gears. Other pages cover helical gears, spiral gears, chain gearing, epicyclic gears and special forms. Definitions and calculations for gear cutting are dealt with; also the use of the dividing head; plus gear cutting in milling machines and in the lathe.

7¼ × 4⅜ in. 92 pages. Two-colour drawn on cover. 83 figures, mainly line, some photos. ($1.25c) **6/-**



46 TURBINES, STEAM, WATER AND GAS

Edgar T. Westbury

A simple approach designed for younger readers, school libraries and similar uses, but equally interesting to lay adults desiring information on the subject. Chapters include: Early forms of turbine; working principles of water turbines; steam turbine; internal combustion turbine; hydro-electric generating plants; future developments. Glossary.

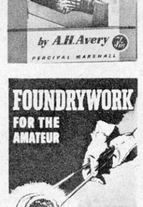
8½ × 5½ in. 107 pages. Cloth bound, gold blocked title. Decorative dust cover. 34 line illustrations. 16 photo-pictures. ($3.00) **15/-**

54 FROM SMOKE SIGNALS TO TELSTAR

S. Hilder

A simple approach to the development of communications, from early time to the present day, and of special value to younger readers, school libraries and the lay adult. Early Telegraph apparatus; telegraph cables; telephone; radio telegraphy; thermionic valve and transistors; developments; sound and television broadcasting, satellites, P.O. tower, lasers.

8½ × 5½ in. 80 pages. Cloth bound gold blocked title. Decorative dust cover. 15 pages plates. ($3.00) **15/-**

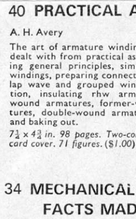


43 FOUNDRYWORK FOR THE AMATEUR

B. T. Aspin

A really exhaustive book on mould and pattern making, and pouring metals to produce castings for model making or other purposes. Author's easy style and drawings take the novice easily through all stages. Today when small casting and moulding works are hard to find, a degree of independance is highly desirable.

7¼ × 4⅜ in. 108 pages. Two-colour drawn on card cover. 12 photo-illustrations. 94 line drawings. ($1.25c) **6/-**



40 PRACTICAL ARMATURE WINDING

A. H. Avery

The art of armature winding in all sizes dealt with from practical aspects, including general principles, simple theory of windings, preparing connection diagrams, lap wave and grouped windings, insulation, insulating rhw armature, hand-wound armatures, former-wound armatures, double-wound armatures, doping and baking out.

7¼ × 4⅜ in. 98 pages. Two-colour drawn on card cover. 71 figures. ($1.00) **5/-**

34 MECHANICAL FACTS MADE EASY

P. Marshall and R. B. Wray

Claimed 1001 facts, this is a handbook of simple mechanical knowledge for everyone interested in model or general engineering. For browsing, instruction or fact-finding the book is divided into fourteen sections and provides answers to very nearly every workshop question.

7¼ × 4⅜ in. 103 pages. Two-colour drawn on card cover. 90 line drawings and numerous photo-pictures. ($1.00) **5/-**

BUILD YOUR OWN CARAVAN

97 MAKE YOURSELF A FAMILY CARAVAN

I. W. Green

8½ × 6½ in. 39 pages. 36 line and photo illustrations. 7¼ × 4⅜ in. Cloth bound in dust jacket, gold blocked title. **2/6**

86 DESIGN & BUILD YOUR OWN CARAVAN

I. W. Green

(Hard flush boards.) 59 pages. 6 plates, 21 line drawings. Published at 6/-. Special price **2/6**

PUBLISHED PRICES 8/6

119 SPECIAL OFFER!

BARGAIN – THE TWO 2/6

28 WELDING AND CUTTING

J. A. Oates

A practical handbook describing the welding and cutting of metals by the oxy-acetylene and metallic arc processes. Chapters include: Prevention of Distortion; Gas Welding Equipment; Gas Welding techniques; Gas Welding Various Metals; Flame cutting methods; Types of Electric Arc Welding; Equipment for Metallic Arc Welding; Procedure and Techniques.

7¼ × 4⅜ in. 93 pages. Two-colour drawn on card cover. 44 line drawings. ($1.00) **5/-**

42 ELECTRO-PLATING FOR THE AMATEUR

L. Warburton

Useful information about small-scale electroplating, and the essentials needed to produce successful work, ncluding details of simple plant which can be made by the amateur to enhance his models. The subject is adequately covered and deals with equipment needed for home working, current supply, plating tank, preparation of the base, electrolytes, chromium plating, plating of non-conductors and electro forming, anodising.

7¼ × 4⅜ in. 106 pages. Two-colour drawn on card cover. 26 line drawings. ($2.00) **9/6**

115 MODEL BOATS RADIO CONTROL HANDBOOK

Introductory booklet for boat r/c enthusiasts. Equipment maintenance, fault-finding, r/c in yachts etc.

7¼ × 4⅜ in. 36 pages. Two-colour cover. Useful pictures and diagrams. (50c) **2/6**

116 MODEL CARS SLOT MOTORS

Most useful up-to-date review (Autumn 1968) of available slot motors for electric car racing, plus articles on basic hot-up, re-winding, gears.

7¼ × 4⅜ in. 64 pages. Coloured cover, illustrated. (50c.) **2/6**

128 MECCANO MAGAZINE HANDBOOK

Essential to every Meccano user is this comprehensive booklet. Deals with manufacture, general hints, mechanisms, motors and special outfits, spares, clubs and history. Dealers' directory.

7¼ × 4⅜ in. 66 pages. Profusely illustrated. (50c.) **2/6**

EXTRA VALUE

83 LOCOMOTIVE LIBRARY

Sixty locomotives illustrations. *4¼ × 7¼ -n. landscape. 60 pages.* (50c) **2/6**

90 BRITISH LOCOMOTIVES 1825-1960

Paper cover. 4⅜ × 7¼ in., landscape. 25 pages. (15c) **1/-**

92 FAMOUS RAILWAY ENGINES OF THE WORLD

Seventeen famous railway engines described. Paper cover, *4⅜ × 7¼ in. landscape. 32 pages.* (15c) **1/-**

110 SPECIAL OFFER!!!

Three Locomotive books, value 4/6, as above, at post free price of **3/6**

39 THREE DIMENSIONAL PROJECTION DRAWING

R. J. Booker

A simple introduction to the subject of interest to students and others. A basic knowledge of three dimensional projection drawing is of special assistance to the model maker and model engineer. It helps to clarify shapes and dimensions of normal working drawings and prevents time wasting or costly errors of interpretation. It completes the range of solid drawing that is normally embraced by isometric and orthographic drawing.

7¼ × 4⅜ in. 64 pages. Two-colour draw on card cover. 34 figures. ($1.00) **5/-**

118 THE AMATEUR ROD MAKER

C. W. Taylor

How many model makers go fishing? The handyman can develop the popular 'do-it-yourself' cult and make his own rods and other fishing accessories to the highest professional standards, without the use of any elaborate workshop or special tools.

7¼ × 4⅜ in. 64 pages. Bound in stiff card with bright two-colour cover. 28 large line drawings. ($1.00) **4/6**

31 HOW TO READ WORKSHOP DRAWINGS

W. Longland

Any model engineer needs to be able to interpret drawings correctly. This book explains the subject clearly for modeller and full-scale engineer alike. Aspects covered include plan; elevation; perspective; conventional signs and indications; hatching, shading and blocking-in; use of sectional views; screws and threads; gear wheels; use of part sections; crankshaft bearing; connecting rod; working limits and tolerances; electrical work.

7¼ × 4⅜ in. 63 pages. Drawn on two-colour card cover. 34 line drawings. ($1.00) **5/-**

68 MINIATURE LANDSCAPE MODELLING

John H. Ahearn

Profusely illustrated railways or car tracks can be transformed into something *live* when you add scenic landscaping. Find just how easy it can be in this vital volume, packed with practical know-how.

9 × 6 in. 133 pages. Cloth bound ($2.50c) **12/6**

ORDER NOW on handy coupon . .

HOW TO ORDER Ring round the reference number of the titles you have chosen. Carry out totals to cash column and then total up at the bottom POSTAGE free on orders over 12/6.

	1	2	3	4	6	7	8	9	10	11
	12	14	15	18	19	20	21	23	24	25
	26	27	28	29	30	31	32	34	35	36
	37	38	39	40	41	42	43	44	45	46
	47	50	51	52	53	54	55	57	58	59
	60	61	62	63	64	66	67	68	69	72
	74	75	76	78	79	80	83	86	90	92
	94	97	99	100	101	103	104	105	106	107
	108	109	110	111	112	113	114	115	116	117
	118	119	121	122	123	124	125	126	127	128
	200									

Name .....

Address .....

.....

.....

£ REF: SPR. 69

Please add 1/- packing & postage for orders of 12/6 and below. Above this orders are POST FREE.

Model & Allied Publications Ltd., 13/35 Bridge St., Hemel Hempstead, Herts.

FAMOUS PLANS HANDBOOKS

1,000's OF PLANS

99 PLANS HANDBOOK No. 1

Hundreds of aeromodelling plans, covering every type of model, are described and illustrated. In addition to flying models our famous three-views drawings are also listed. For the first time, too, a complete *Aeromodeller/Model Aircraft* Plans list is available. The best of each series have been included to provide an unequalled choice anywhere in the world. Useful articles of special interest to the beginner, plus a trade advertisement section complete the book.

7¼ × 4⅜ in. Contains 128 pages. **2/6**

100 PLANS HANDBOOK No. 2

For the first time Model Boats, Cars have 'hived off' to provide a separate handbook catalogue. Again hundreds of working model boats are illustrated and described, our wonderful range of yacht drawings have hull elevations. Former Percival Marshall boat plans have been included in this list. A number of useful and informative articles will be of help to the newcomer. The Prototype Parade list of scale car drawings now numbers several hundreds.

7¼ × 4⅜ in. Contains 96 pages. **2/-**

101 PLANS HANDBOOK No. 3

Covers Working Model Drawings of Locomotives, Traction Engines, Workshop Equipment, Miscellaneous Models, from *Model Engineer, Model Railway News* and *Model Maker.*

7¼ × 4⅜ in. 48 pages. **1/6**

1 2 3

MAP **The Finest Range of Model Technical Books in the World!**

For Office Use