

1933

1936

21st Birthday Number

NEWNES

1/-

PRACTICAL MECHANICS

EDITOR : F. J. CAMM

OCTOBER 1954

1939

1937

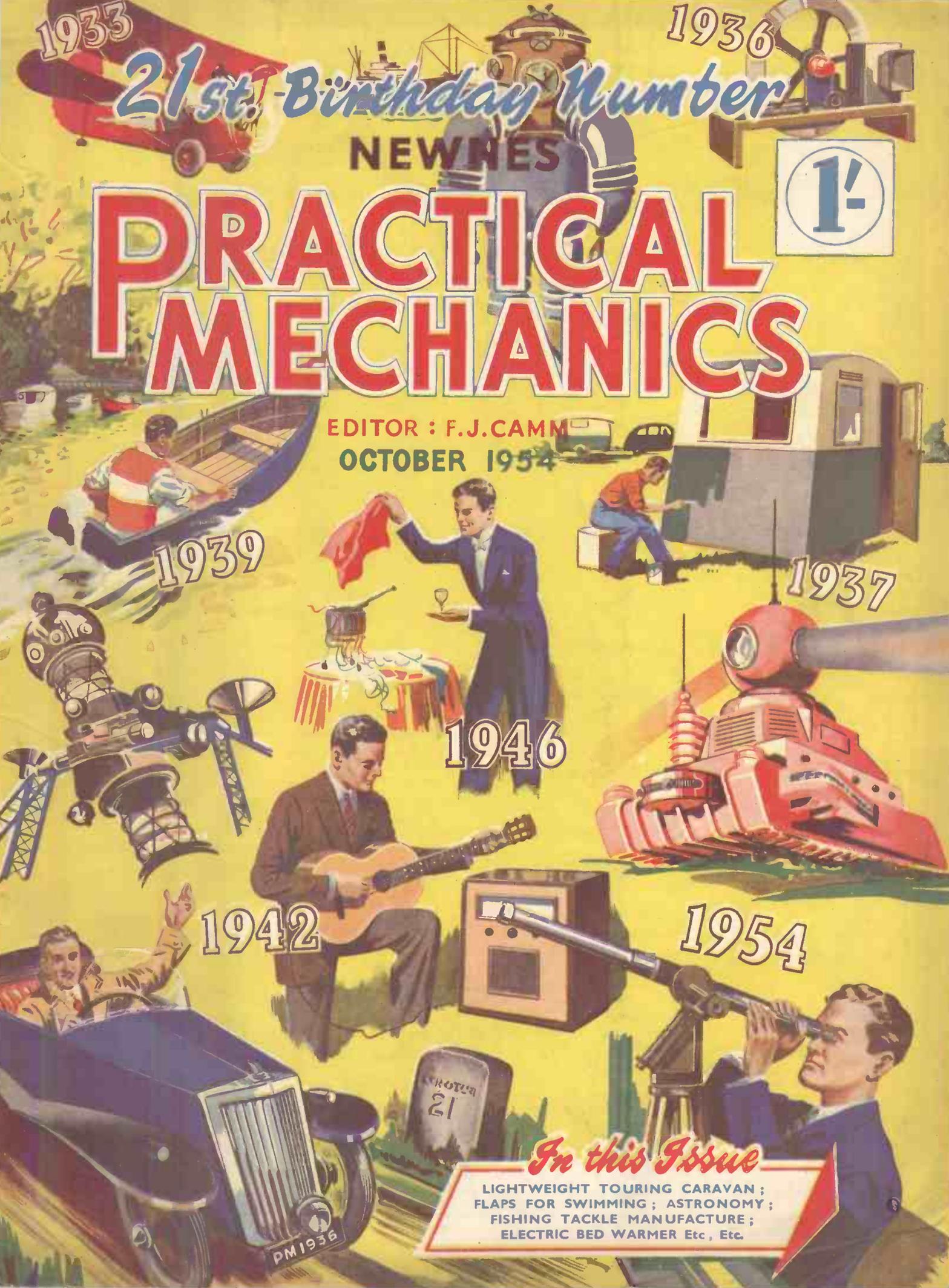
1946

1942

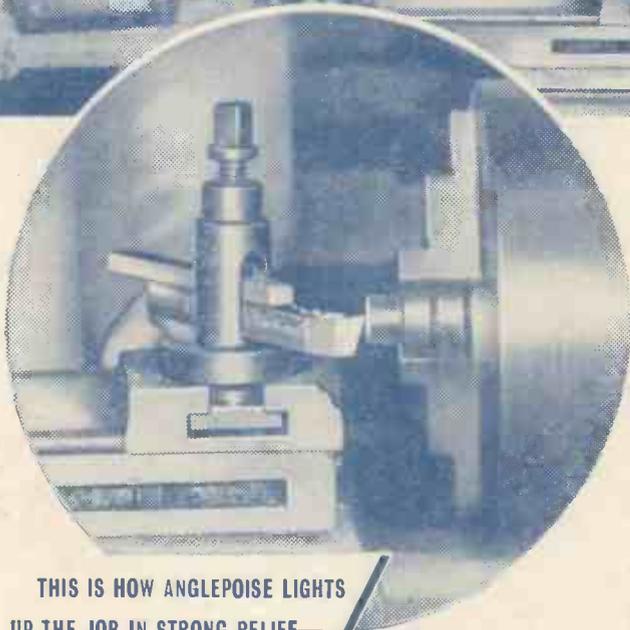
1954

In this Issue

LIGHTWEIGHT TOURING CARAVAN ;
 FLAPS FOR SWIMMING ; ASTRONOMY ;
 FISHING TACKLE MANUFACTURE ;
 ELECTRIC BED WARMER Etc, Etc.



LET THE WORKER *See*
... FOR A BETTER JOB



**THIS IS HOW ANGLEPOISE LIGHTS
 UP THE JOB IN STRONG RELIEF—
 SAVING EYESTRAIN AND FATIGUE**



Down a little!



Still nearer!



Right on the job!

Where a high degree of accuracy is called for, the call is equally for ANGLEPOISE. This fine lamp throws its clear, shadowless concentrated light right on the work only. This light 'follows' the job by the slowest of degrees by finger tip control. It takes any angle and 'stays put' until a finger touch moves it as required to a new position. Watch output go up with ANGLEPOISE in position.

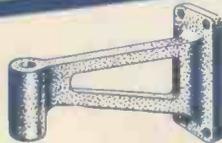
Every machine-room, every workshop, every drawing office should have its battery of Anglepoise Lamps, with its finger tip obedience, its 1001 angles, as an aid to accuracy. Write today for fully descriptive Booklet P.M.

Sole Makers: HERBERT TERRY & SONS LTD
 REDDITCH · WORCESTERSHIRE · ENGLAND

TERRY **ANGLEPOISE** LAMPS

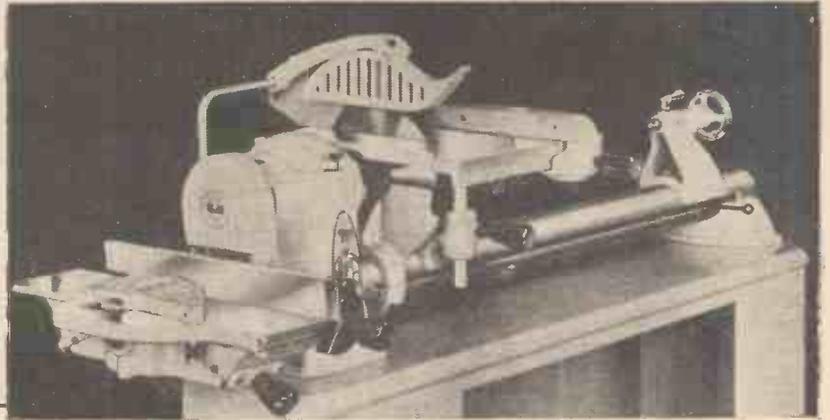
Pat. all countries

**SOME
 ALTERNATIVE
 BASES FOR
 ALL MODELS**



Let the ML8 COMPLETE WOODWORKER do it for you

The ML8 Multi-purpose Woodworker is a complete workshop on its own. It does by power all those time-taking jobs which are usually done by hand. It takes the hard work out of woodwork and enables SAWING (bandsaw or circular saw), PLANING (4½ in. wide), REBATING, SANDING, POLISHING, BUFFING, LARGE DIAMETER TURNING, LONG BORING (lamp standards etc.), PANEL SAWING, GROOVING, METAL SPINNING, METAL and PLASTIC TURNING, GRINDING.



The ML8 with Circular Saw and Planing Attachment mounted for operation

Woodworking is a fascinating occupation for young or old. It pays you over and over in pleasure and profit—and Myford Power tools for the woodworker are the finest in the world, give maximum value per £ of cost.

There is no need to buy the complete range of equipment at once. You can start off modestly with the ML8 Woodturning Lathe which is the basic power unit, and add to your workshop with the easily-fitted, multi-purpose attachments just as required.

The ML8 is sold through leading Tool Merchants. Your nearest shop? Write to Myford—and ask for the free ML8 folder, "Power Tools for the Woodworker" (Publication 808)



Finest Soldering? Always specify MULTIGORE to be precise

ERSIN MULTIGORE

Contains 3 cores of extra-active, non-corrosive Ersin Flux. Prevents oxidation and cleans surface oxides.

SIZE ONE CARTON

4 specifications for radio enthusiasts. 5/-



Wherever precision soldering is essential, manufacturers, engineers and handymen rely on MULTIGORE. There's a MULTIGORE SOLDER just made for the job you have in hand. Here are some of them.

ARAX MULTIGORE

FOR METAL FABRICATION

(Not wire to tag joints)
Contains 2 cores of Arax Flux—a flux so fast that even blued spring steel can be soldered without pre-cleaning. Flux residue is easily removed with water.

SIZE 8 CARTON

5/-



BIB WIRE STRIPPER AND CUTTER

The 3 in 1 tool. For stripping insulation without nicking wire, cutting without leaving rough edges and split-3/6 ting extruded flex.

HANDYMAN'S CARTON

6d. Sufficient for 200 average joints.



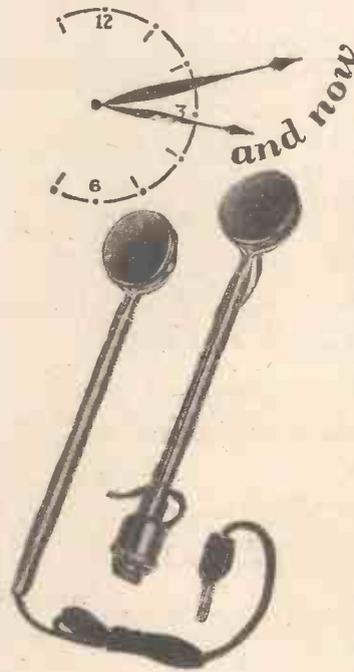
MANUFACTURERS ARE INVITED TO WRITE FOR DETAILS OF BULK PACKS AT BULK PRICES



MULTIGORE *Tape Solder*
Melts with a Match! 1/-
A real tin/lead solder containing cores of Ersin Flux. Needs no soldering iron or extra flux. PER CARD

MULTIGORE SOLDERS LTD.

MULTIGORE WORKS, NEMEL NEMPSTEAD, HERTS (BOXMOOR 3635)



S.G. Brown AUDIO AIDS

Handphones with individual volume control. Ideal for use with church and cinema deaf aid installations or for individuals with impaired hearing. They provide the essential clarity of reception when listening to Radio and T.V.

Send for Brochure 'P' of all types available. If desired, advice is given on selection of type most suited to individual needs.

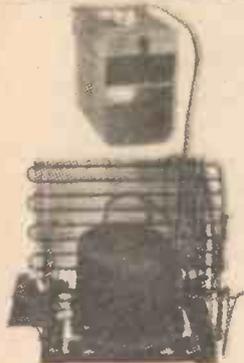
S. G. Brown provide Handphones and associated equipment for all known purposes.

S.G. Brown, Ltd.

SHAKESPEARE STREET, WATFORD, HERTS.

Telephone : Watford 7241.

WORN OUT REFRIGERATORS



GIVE YOURS A NEW LEASE OF LIFE

These silent running "Sealed Systems" will completely modernise that Pre War Refrigerator and are Covered by 5 years FREE

REPLACEMENT GUARANTEE by G.E.C.

SILENT. EFFICIENT. CHEAP. NO MORE SERVICING EXPENSES.

9 MODELS AVAILABLE, RANGING IN SIZE FROM 3 cu. ft. to 9 cu. ft.

Prices from £27/10/0 to £34/10/0.

Free Delivery in British Isles.

Send stamped addressed envelope for

"SEALED SYSTEMS." Free Reduced Price Leaflet.

Latest complete general catalogue with many 'Hints & Tips,' price 1/- post free. (Refunded on first order.)

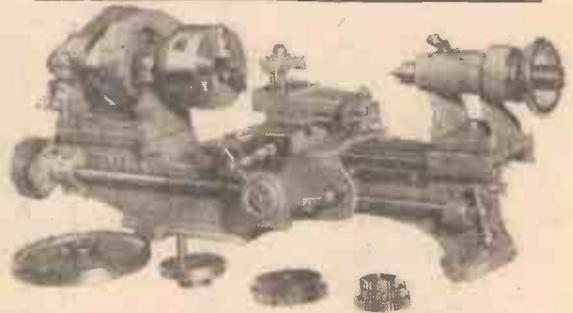
BRAID BROS.

For Home Refrigerator Construction.

50, Birchwood Ave., Hackbridge, Surrey Tel: Wallington 9309.

We do not wish to be associated with Scrapped Second-hand Ice-cream Components.

IMPORTANT NOTICE



By putting down the very latest machinery and reorganising the factory at the same time, we have made considerable economies. Greatly reducing the cost of manufacture, which we are passing on to our customers.

THE "ZYTO" B.G.S.C. LATHE

is now reduced to **£26 - 0 - 0** CHUCK EXTRA

or despatched on first payment of £7.0.0 (Same accuracy and perfect finish)

Height of centres ...	3 3/4 in.	Tailstock Barrel Admit ...	3 in.
Distance between centres ...	16 in.	Headstock Pulley, 3-speed 1/2 in. flatbelt	8 in.
Height from gap ...	4 1/2 in.	Faceplate, dia. ...	34 in.
Height from Saddle ...	2 in.	Overall length of Lathe ...	50, 55, 60, 65.
Guide Screw ...	8 T.P.I.	Change Wheels: 20, 25, 30, 35, 40, 45,	
Headstock Mandrel Admit ...	3 in.	50, 55, 60, 65.	
Complete Gear Guard.	Extra long Compound Sliderest.	Gear Chart included.	

S. TYZACK & SON LTD.

Telephone: SH0reditch 8301

341/5 OLD STREET, LONDON, E.C.1.

Train your mind to **SUCCESS**

FREE!

to you!
—if you seek **SUCCESS!**

WHAT'S YOUR LINE ?

Agriculture
Architecture
Aircraft Maintenance
Building
Carpentry
Chemistry
Commercial Art
Diesel Engines
Draughtsmanship
Electrical Engineering
Electric Wiring

Engineering Drawings
Fire Engineering
Forestry
Locomotive Engineering
Machine Design
Mechanical
Engineering
Motor Engineering
Plumbing
Power Station Eng.
Quantity Surveying

Accountancy Exams
Auctioneer's Exams
Auditing
Book-keeping
Civil Service
Commercial Arith.
Costing
English
General Education
Geography
Journalism

Languages
Mathematics
Modern Business Methods
Police Subjects
Salesmanship
Secretarial Exams
Shorthand
Short Story Writing
and many others

GENERAL CERT. OF EDUCATION. R.S.A. EXAMS

Radio Engineering
Road Making
Sanitary Science
Steam Engineering
Surveyor's Exams
Surveying
Telecommunications
Textiles
Wireless Telegraphy
Workshop Practice

TO THE **FAMOUS**

BENNETT COLLEGE

(DEPT. J.76.F), SHEFFIELD

Please send me, without obligation, a free copy of "Train your mind to SUCCESS" and the College Prospectus on:

SUBJECT

NAME

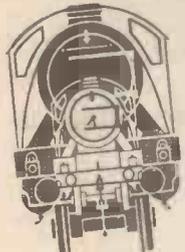
ADDRESS

Please write in Block Letters. AGE (if under 21)

THIS DAY
COULD BE THE TURNING-POINT IN YOUR LIFE.
THIS COUPON
COULD BE YOUR PERSONAL PASSPORT TO SUCCESS.
Send it NOW!



MODEL RAILWAYS
GAUGE 'O' & GAUGE 'OO'



BASSETT-LOWKE LTD.
NORTHAMPTON.
LONDON, MANCHESTER.

THE guide
to endless pleasure!



Here's the fullest guide yet to greater pleasure and interest for the Model Railway enthusiast. . . . In the systems offered in this New Gauge 'O' and 'OO' Catalogue, prepared train sets are now available in a variety of types: electric, steam or clockwork, passenger or goods. All the most popular classes of models may now be obtained in a wider range of types and prices than ever before.

Do you know what exciting prospects there are for owners of the Gauge 'O' and other Model Railways? If you possibly can, pay a visit to Bassett-Lowke's London Display Showrooms where all the latest models and layouts are freely demonstrated for you.

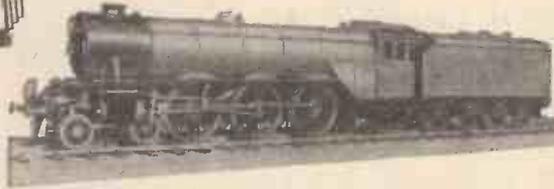


Illustration shows the popular "Flying Scotsman"—one of the range of moderately priced Gauge 'O' Locomotives fully described in our New Catalogue.

Write now to Dept. MR/12 for this 100 page fully illustrated Catalogue. Price 2/-. The most comprehensive ever issued by **BASSETT-LOWKE**. Its exciting suggestions include details of Gauge 'O' and 'OO' Railways.

BASSETT-LOWKE LTD.

Head Office and Works: **NORTHAMPTON.**

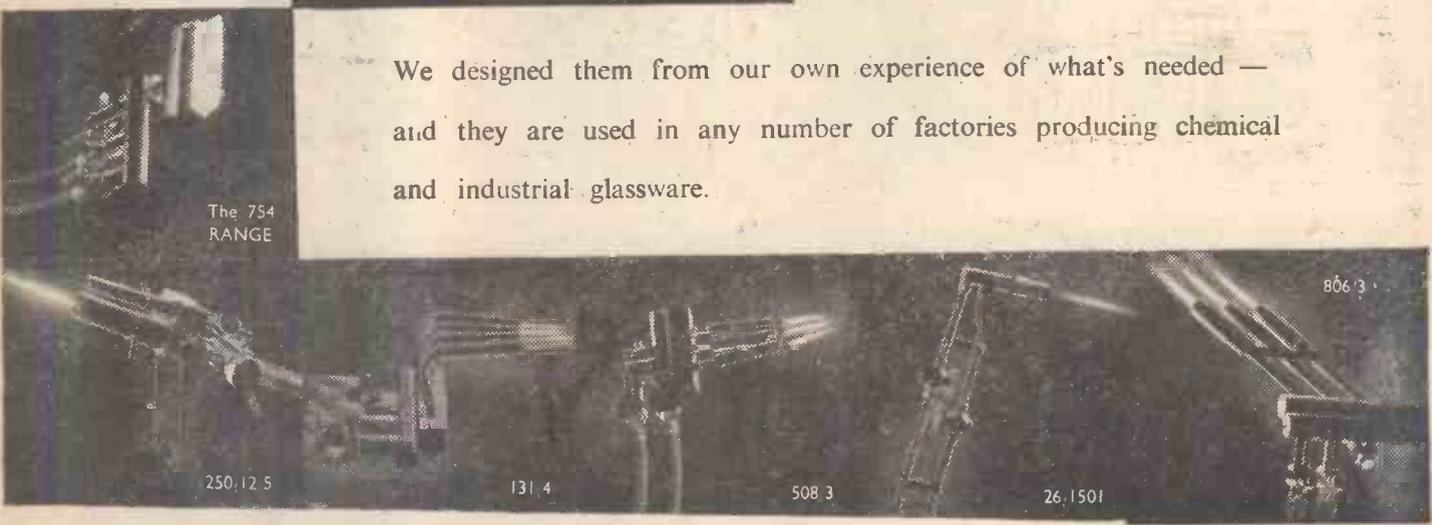
London Showrooms: 112, High Holborn, W.C.2. Manchester Showrooms: 28, Corporation St., 4

DO YOU PROCESS GLASS?

One of these **Bornkessel Burners** will make a better job of it.

We designed them from our own experience of what's needed — and they are used in any number of factories producing chemical and industrial glassware.

The 754 RANGE



250, 12 5

131 4

508 3

26, 1501

806 3

For full details write to:

STONE-CHANCE LIMITED, ★ Lighthouse Works, Smethwick 40, Birmingham.

★ *The same people who make the "Flamemaster".*

14 DAYS' FREE TRIAL



Send only £1 deposit—refunded if tool not approved.

1in. DRILL

Robust tool with trigger switch and self-centring chuck. Drills, sands, polishes, grinds, sharpens. Also, with attachments, drives: lathe, saw bench, rise and fall, grinder, buffer, etc. Price £5. 19. 6 cash, or 20/- deposit. Carriage and Packing 2/6.

Horizontal Stand
17/6, post 1/6

Vertical Bench Stand
£3.7.6, post 2/6.

Lathe Stand
£5. 5. 0, or 20/- deposit. Carriage and Packing 5/-.

The four items £15. 9. 6, or £3 deposit.

HANDY BATTERY THREE



Constructional data showing how to make useful portable loudspeaker set (total cost 70/-, including cabinet) is available. Price 1/6.

MULTI-METER KIT



The Multi-meter illustrated measures D.C. volts, D.C. m/amps and ohms. It has a sensitivity of 200 ohms per volt and is equally suitable for the keen experimenter, service engineer or student. All the essential parts including 2in. moving coil meter, selected resistors, wire for shunts, 8-point range selector, calibrated scale, stick on range indicator and full instructions for making are available as a kit, price 15/-, plus 9d. post and packing.

MAKE A RADIO

Using our parts in one evening you can make an all mains 4 valve radio with bakelite case. Then you will be giving a £12 present, which costs you only £5.15.0, or £2 deposit. (Carr. and insurance 5/-.) Data book 1/6.



ELECTRIC CLOTHES HORSE

Warms room as it dries clothes, towels, etc.—stove enamelled rails—A.C. or D.C.—650 watts. Size 3ft. x 3ft. x 5in. Made to sell at 12 gns., fully guaranteed only £3. 19. 6, carr. 7/6.



CONSTRUCTOR'S PARCEL

3 colour, 3 wave band scale covering standard Long, Medium, and Short wave bands, scale pan, chassis punched for standard 5 valve superhet, pulley, driving head, springs, etc., to suit. Scale size 14in. x 3in. Chassis size, 15in. x 5in. x 2in. deep. Price 15/-, plus 1/6 post. Note: We have a really excellent walnut veneered cabinet for this, price only 37/6.



ELECTRONIC PRECISION EQUIPMENT, Ltd.

Post Orders should be addressed to: DEPT. I, RUISLIP, MIDDLESEX. Personal shoppers, however, should call at any of our following branches: 42/46, WINDMILL HILL 29, STROUD GREEN 152/153, FLEET STREET RUISLIP, MIDDX. ROAD, FINSBURY LONDON, E.C.4 PARK Phone: Ruislip 5780 Phone: Archway 1049 Phone: Central 2833 and 249, KILBURN HIGH ROAD, KILBURN, LONDON, N.W.



BEETHOVEN 5-VALVE SUPERHET

Complete with valves and Rola loudspeaker, ready to work off A.C. mains—three waves (L, M. and S.)—large dial, slow motion drive, dust cored coils, etc. £8. 17. 6, or £2 deposit (balance over 12 months), carr. 7/6.



Fine walnut veneered and polished cabinet to take the Beethoven 5-valve Superhet with 6in. loudspeaker, thus making a really excellent table model—worth £16-20. Price 49/6, carr. and packing 5/- extra. If bought with the Beethoven chassis, the hire purchase deposit is £3, carr. 10/-.

THE SUPERIOR 15in.

up to the minute big picture TV for only £37. 10. 0. A 20-valve television for the amateur constructor, all components valves and 15in. Cossor Cathode Ray Tube costs £37.10.0, plus £1 carriage and insurance or £12. 10. 0 deposit and 12 monthly payments of £2. 11. 6. Constructor envelope giving full details and blueprint, 7/6. Returnable within 14 days if you think you cannot make the set.

MAINS MIDGET RADIO

This is an excellent little radio in an attractive cabinet to which can be affixed transfers, thus making it extra suitable for nursery or child's bedroom. The circuit is a T.R.F. for A.C. mains operation. All the parts—bakelite cabinet, valves, knobs, back-in fact everything will cost you only £3.15.0, plus 2/6 postage. Construction data free with the parts or available separately at 1/6.

MAGNETRON MAGNETS

The immense power of these magnets makes them ideal for a magnetic chuck and, of course, many other purposes. Price 30/- each, carriage 7/6.



The INSTANTUS Greenhouse Heater

4ft. long made from heavy gauge sheet steel (galvanised), 1 kW, suitable A.C. or D.C. Price £2, or with thermostat £3.15.0. Note: The thermostat mounts separately and will control up to three heaters.

CLEVELAND CAR BATTERY CHARGER

gives 1 1/2 amps. charge uses everlasting metal rectifier and robust double-wound mains transformer—in metal carrying case with leads and croc. clips. Price 6 volts 29/6; 6 to 12 volts 39/6. Post 2/6.



CONNECTING WIRE SNIP

P.V.C. insulated 23 s.w.g. copper wire in 100ft. coils, 2/9 each. Colours available: Black, Brown, Red, Orange, Pink, Yellow, White, Transparent. 4 coils for 10/-.

A NEW BRITISH RECORD!

PETE WRIGHT using an



2.46 c.c. diesel clocked **111.3** m.p.h. IN THE BRITISH NATIONALS



CHRIS MARSH using an E.D. 2.46 c.c. WON the SHORT CUP—PAA-LOAD.

P. SMITH using an E.D. 2.46 c.c. WON the GOLD TROPHY.

E.D. 2.46 c.c. RACER Price, inc. P. Tax, £3.18.5. Water cooled, £5.4.6.

SPAIN (National Competition) FREE FLIGHT RECORD, 2 hr. 43 min. with an E.D. 2.46 c.c.

OTHER RECENT SUCCESSES include . . .

BRITISH NATIONAL, RADIO CONTROLLED AIRCRAFT

TAPLIN TROPHY

1st: S. Allen. 2nd: G. Honnest-Redlich.

S.M.A.E. TROPHY

1st: G. Honnest-Redlich. 2nd: S. Allen.

POOLE RADIO REGATTA (for Power and Sailing Yachts)

SPEED CONTEST

1st: D. Rowe. 2nd: G. Honnest-Redlich. 3rd: S. Allen.

STEERING CONTEST

1st: W. Warne. 2nd: Colonel Bowden.

BRAVERY TROPHY (Sail)

1st: Colonel Bowden. 2nd: G. Honnest-Redlich.

TAPLIN TROPHY

1st: G. Honnest-Redlich. 2nd: Colonel Bowden.

- ALL Models used E.D. Tuned Reed Radio Equipment.
- ALL Engine Powered Models (except W. Warne) used E.D. Diesels.

Write for new illustrated list of all E.D. Equipment including KIT SETS, RADIO CONTROLS, ENGINES, ETC.

E.D. ELECTRONIC DEVELOPMENTS (SURREY) LTD
DEVELOPMENT ENGINEERS
KINGSTON 4411-2 18, VILLIERS ROAD, KINGSTON-ON-THAMES, SURREY, ENGLAND.

PLEASURE AND PROFIT

SILK SCREEN PRINTER with ALL SUPPLIES & FREE COURSE!

PRINTS IN SIX COLOURS This is the great new printing and colouring process for amateurs or professionals alike and all handcraft workers. Its versatility is enormous. It will print a few copies, or hundreds, to a professional standard, in solid colours, or intricate designs, on cloth, paper, wood, etc.—Print notices, greeting cards, drawings, paintings in full colour, photographs, type-script, Fluorescent colours, suede flock and novelty finishes, transfer papers for printing your own transfers also available. Can also be used as first-rate duplicator with any typewriter. Nowhere else is such a large and comprehensive outfit offered for so little money. Hundreds of customers testify to the quality and amazing value. Do not miss this opportunity.

—ON PAPER, WOOD, CLOTH, PLASTICS, etc.

AMERICAN PUBLISHERS SERVICE (Graphic Arts Div.), DOCKING ROAD, SEDGFORD, NORFOLK

This IS the **BARGAIN OF THE YEAR**

COMPARE THE VALUE SEE WHAT YOU GET!

Large 16in. x 12in. PRINTING FRAME. Stout Laminated WOODEN BASE. Patented ADJUSTABLE HINGES (for printing on material up to 1in. thick). Fine Quality SQUEEGEE. SIX CONTAINERS COLOURS—Red, Blue, Yellow, Green, Black, White. STENCIL FILM (design traced and applied with hot iron). STENCIL CUTTERS and HOLDER. Register Guides, Masking Tape, etc., etc. And FREE 10/- COURSE giving step by step procedure for every application of process, including PHOTO STENCILS, DAY GLO. FLOCK finishes, etc.

for 47/6 paid post REFUND GUARANTEED IF NOT APPROVED WITHIN 7 DAYS.

2 YEARS GUARANTEE with the **BURGOYNE**

8 VALVE Radiogram Chassis

With a push-pull output giving 8 watts undistorted quality reproduction and using negative feedback, this fine chassis is supplied for those connoisseurs wanting only the best, at a price within their means.

SPECIFICATION ★Illuminated full vision coloured tuning scale 11 1/2 in. x 6 1/2 in. ★Separate bass and treble controls for cut and lift. ★Wavebands 16-50 ; 190-550 ; 1000-2000 metres. ★Magic eye tuning indicator and precision fly-wheel tuning. ★Speech coil impedance 3 or 15 ohms. ★Extension speaker sockets. ★Size 9 1/2 in. high x 13 in. wide, 8 in. deep—chassis height 2 1/2 in.



22GNS. 200-250v. A.C. Carriage and packing 7/6

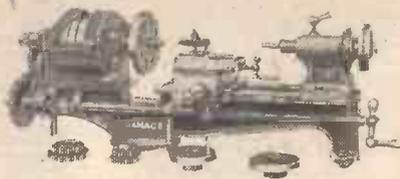
YOURS FOR ONLY £1 deposit balance over 12 months.

E & G MAIL ORDER SUPPLY CO. The Radio Centre 33 Tottenham Court Road, London, W.1. Phone: MUSEum 6667.

GAMAGES

SCREWCUTTING BACK GEARED PRECISION LATHE ON THE EASIEST EASY TERMS

Today's Finest Value. Brief details—Swing in gap of 3 in. models 7 1/2 in. 31 in. model 81 in. 10 change wheels. Equipment includes: faceplate, catchplate and extra backplate in rough screwed to fit mandrel nose. Net weight 1 cwt. 3 in. x 12 1/2 in. model. **£27.19.6**



Or £8.19.6 deposit & 12 payments of **38/6**

3 x 18 in. **£29.10**
or £7.8 Deposit & 12 m'thly Payments of **40/6**

31 x 18 in. **£31.10**
or £7.15 Deposit & 12 m'thly Payments of **43/6**

Carriage and Packing 17/6 England or Wales. 30/- Scotland. Send for full specification.

'CROMNA' Self Adjusting SPANNER SETS 32/8 OFF Usual Price!

Four Spanners complete in fitted roll. Ratchet action. Made from high grade steel with polished jaws. Length of spanners 5 1/2", 6 1/2", 9 1/2" and 12 1/2". **Gamages 30/-** Usually 62/8 Price

TOOLS AND MOTOR-CAR ACCESSORY LIST FREE ON REQUEST



Post & Pkg. 1/6 outside our van area.

BIAX' FLEXIBLE-SHAFT DRILLS

£5.10 Off List Price!

Ideal for light grinding operations on castings, pottery, sheet metal, welds and light metal. Takes plain profile wheels up to 3 in. diam. Shaft size 4 ft. x 8 m.m. 1/2 h.p. motor 230/250 volts A.C. 3,000 r.p.m. List Price £18.

£12.10 Or 83/- Deposit and 10 monthly Payments of **20/9**

Carr. & Pkg. 5/- Eng. & W.

GAMAGES, HOLBORN, E.C.1. HOLborn 8484.



Finest Quality Sheffield Steel

COLD CHISEL & PUNCH SETS

Can be sharpened with a file

Comprising 3 flat cold chisels. Sizes 4 1/2 x 1 in., 5 x 1 in. and 8 x 1 in. Cross cut chisel 4 1/2 x 1 in. Nail punch, 4 1/2 in. Centre punch, 4 1/2 in. Packed in a neat plastic wallet with press button fastener. **13/-** set COMPLETE

Post and Pkg. 1/-



Unique POWER WORKSHOP FOR HANDYMEN!

Wolf Cub HOME CONSTRUCTOR EQUIPMENT

100% INTERCHANGEABILITY OF PARTS...

Enables you to own Lathe, Bench Saw, Sander & Polisher, Fretsaw, etc., for the cost of a few inexpensive parts.

Sold by all good Tool Dealers

Write for folder 'PROFITABLE PLEASURE'

Here is the Wolf Cub 1/2" electric Drill—also the power unit that drives all Cub Equipment.



PRICE **£5.19.6**

WOLF ELECTRIC TOOLS LTD.
PIONEER WORKS, HANGER LANE, LONDON, W.5

RESPRAY YOUR CAR

For as little as **£5!** with the

SPRAYT SPRAY GUN

WORKS OFF TYRE PUMP

Gives a smooth, even spray. Tackles small jobs as efficiently as large. Cheapest, most efficient Spray Gun made. Kits including Gun and all materials 20/-. Double size 30/-.



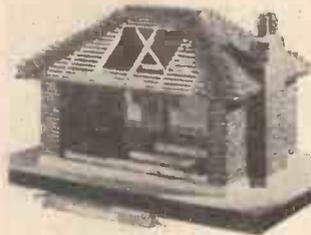
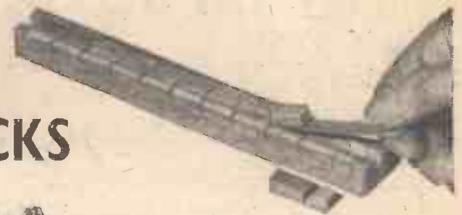
ONLY 7/6
Plus 1/- Postage



SPRAYT 2 YEARS' GUARANTEE

Send P.O. to SPRAYT (Dept. P.M. 2)
226 MUNSTER ROAD, LONDON, S.W.6

You MAKE THE BRICKS



TO BUILD THE HOUSE

—this simple way:

Just a simple wood mould with a tape or paper strip base—and there's your home-made brickworks, ready to supply you with "Pyruma" bricks for building houses, walls, farm buildings, model railway stations etc. Just one of the ways of modelling in Sankey's "Pyruma" plastic cement explained more fully in the Instruction Book offered below. Other and simpler ways of modelling are also described, showing how to make many useful, permanent stone-hard objects which can be painted in colour, from



Pyruma is ready for use from its airtight tin—to be modelled while plastic. It dries or bakes to stone hardness and, after treatment as instructed, can then be painted or enamelled.

Pyruma is ideal for modelling Houses, Railway and Airport Buildings, Farms, Docks, Figures and for making Ashtrays, Bookends, Plaques, Dolls Furniture, Relief Maps, Anima's, etc.

Sankey's PYRUMA and TILUMA are inexpensive and obtainable in air-tight tins from Ironmongers, Art Material Dealers, Hobbies Shops, etc.



POST THE COUPON TO-DAY

To:— **J.H. SANKEY & SON LTD** (Dept. P.M.)
ILFORD, ESSEX

Enclosed 4d. in stamps for PYRUMA MODELLING INSTRUCTION BOOK addressed to:

NAME (Block letters)

ADDRESS

MAKE LARGER PRINTS

with the JOHNSON
POSTCARD ENLARGERS

from 2½ x 3¼ in. or 35mm. negatives

Expense need no longer deter you from buying an enlarger. With the Johnson Exactum Postcard Enlarger you can make postcard-size prints from 2½ in. x 3¼ in. (box camera size) negatives. It is as simple to use as a contact printing frame. No focusing is required and there are no adjustments to make. Full instructions are enclosed with each Enlarger.

No. 1. 2½ x 3¼ in. negatives to POSTCARD 51/- each.
No. 2. 35mm. negatives to POSTCARD 51/- each.



Make better prints with JOHNSONS UNIVERSOL DEVELOPER

Johnson Universol Developer is highly concentrated and contains Johnson '142' for preventing fog and stains, and '326' wetting agent to promote even development. Universol is excellent for developing both contact and bromide papers, producing a rich image colour with a full range of tones. Full instructions accompany every bottle.

225 c.c. (8 oz.) size. . . 2/9d. each. 570 c.c. (20 oz.) size. . . 4/6d. each.



THE WORLD FAMOUS MANUFACTURERS OF PHOTOGRAPHIC CHEMICALS, APPARATUS AND ACCESSORIES

LONDON, N.W.4. ESTABLISHED 1743

SPARKS' DATA SHEETS

The Safest, The Finest, The Simplest TEN YEARS & OVER 100,000 SATISFIED USERS IN ALL PARTS OF THE WORLD PROVE THE CLAIM THAT THEY ARE

"SECOND TO NONE"

Here is further proof that Sparks does keep right up to date by continuous experimental work and the production of the Latest and Best in those designs the amateur needs.

SHORT WAVES

My Two Latest designs are for the newcomer to, and the enthusiast of, that thrilling and exciting hobby, packed with interest, the reception of Short waves.

No. S/W.DX.1—SINGLE VALVER.
No. S/W.DX.2—TWO VALVER.

All-dry Battery operation. Simplified Band-Spread Tuning. Latest Eddystone Plug-in Coils down to 10 Metres. High-Efficiency Pentode Detector Circuit with Dual Control Reaction Circuit. Thoroughly Proved and Tested.

SIMPLE CONSTRUCTION PLUS EFFICIENCY

Full-Size Simplified Data Sheet, showing every detail, plus Descriptive and Operational Instructions, 2/6 each, plus 21d. stamp.

AGAIN SPARKS LEADS

NEW MULLARD AMPLIFIER

Quality enthusiasts will welcome the new 10 watt A.C. 5-valve Amplifier by Mullard, Ltd., and I am happy to announce that I am publishing my version of a Tested, Practical Layout, etc., in my usual Data Sheet Form. Design No. MS/LO/44. Price of Data Sheet with Descriptive matter, etc., etc., 3/8, post free. The Frequency response of this circuit is truly exceptional.

MANY OTHER DESIGNS AVAILABLE
Send 21d. Stamp for Latest List.
COMPONENTS AND DRILLED
CHASSIS SUPPLIED

L. ORMOND SPARKS (M)
8, COURT ROAD, SWANAGE, DORSET.

JOHN M. PERKINS & SMITH, LTD., BRAUNSTON, Nr. RUGBY
Telephone: Braunston 230. Telegrams: Drills, Braunston Rugby.

EX-ADMIRALTY TELESCOPES. Highest quality single-draw Telescopes by Ross of London and Ottway of Ealing. 16 x 42mm. Length 16in. Weight 2½ lbs. Optically good—externally fair. Originally cost about £12. Post free 65/-

3in. ADMIRALTY COAST GUARD TELESCOPES. Suitable for Astronomical and Terrestrial use. Magnification 40X. Length 37in. Optically good. Complete with rigid garden tripod. Estimated original cost about £50. Price £10.15.0 to £14.10.0 according to external condition. Part carriage 5/- extra.

EX-AIR MINISTRY PRISM BINOCULARS. 6 x 30. Good used condition. Eyepiece focusing, with leather case. Post free £8.5.0

NEW 8 x 30 CENTRE FOCUSING PRISM BINOCULARS. Coated. With leather case. Post free £12.10.0

NEW 12 x 40 CENTRE FOCUSING PRISM BINOCULARS. Coated. With leather case. Post free £15.10.0

We guarantee satisfaction or full refund. Illustrated Brochure on request.

CHARLES FRANK
67-73, SALTMARKET, GLASGOW. C.I.
Phone: Bell 2106-7.

Prices slashed at Clydesdale

SUITABLE AS UNIVERSAL ELECTRIC MOTORS

For 200-250 v. A.C. or D.C. mains. By simple external wiring, full data supplied. New method gives better than 1/8th h.p. with M.G.29, or approx. ¼ h.p. with M.G.30.

MOTOR GENERATOR TYPE 29
As generator. Input 24 v. 16 a. Output 1,200 v. 200 mA. Dim.: 11in. x 5½in. x 5½in.
Ask for 17/6 each Carriage Paid.
A/E880

MOTOR GENERATOR TYPE 30
Ref. 10K/21. Input 9.3V. 23A. Output 7.2V. 13 amps. 255 volts. 110mA. Size: 12 x 5½ x 5ins.
Ask for 15/- each Carriage Paid.
A/H488

AIR POSITION INDICATOR MK. I
Ref. 6B/248

Contains: 4 rev. counters with reset knobs, each reading 0-9999 revs., also small Selsyn Motor. Dial lamp 24 v. 6 w. D.B.C. with holder. On/Off toggle switch, push switch, plus a host of gears and worm drives. Unit mounted on diecast aluminium frame with metal casing. Overall size 12in. x 8in. x 6in.
Ask for 22/6 each Carriage Paid.
A/H913

GUN SIGHT PROJECTOR UNIT
Type 30. Ref. 10D/16431

With spiral-slide focussing. 24 v. 12 w. lamp. This device projects images on to an opaque glass screen and then on to a 45 deg. reflector mirror, viewed at right angle through rubber eyepiece.

Ask for 19/11 each Post Paid.
A/H882

SELECTOR DRIVE UNIT. Ref. 10D/373

With platinum points, used in T.R.1106. Comprises: 24 v. relay, drive mechanism to operate Yaxley switch 2½ w. 10 ohm resistors, 1 mfd. 250 v. condenser, etc. Dim.: 4½in. x 4½in. x 1½in., weight 8 ozs.
Ask for 3/- each Post Paid.
A/H490

5 PUSH BUTTON UNIT

Controller Electric Type 1A. Ref. 10J/7. 4-SP/ST and off position, key switch 4M/4B

(Continued above.)

5 PB holders, etc., terminating in 12 pin Jones type chassis plug in metal case. Dim.: 5½in. x 4in. x 1½in.
Ask for 3/- each Post Paid.
A/E133

COOLANT PUMP by Packard, U.S.A.
A turbine type pump, directly driven from semi-ball joint splined socket (by motor NOT SUPPLIED), clockwise rotation. Dim.: overall 11½in. x 7½in. x 13in.
Ask for 39/6 each Carriage Paid.
A/H407

PLOTTER FIELD, MK. IV. Ref. OS739A

A precision made Protractor Unit, first-class condition. With 2 scales 0-180 deg., moving crossarms, scaled 21-65 each, 12in. long. Straight edge base scaled 0-3500, length 25in. fully extended. In soiled leather case 16in. x 5½in. x 2in.
Ask for 9/11 each Post Paid.
A/H364

MAGNETIC MARCHING COMPASS MK. I

Small hand compass. Can be used day and night. Complete with instructions, in plastic case, size 3in. x 2½in. x 1½in.
Ask for 12/6 each Post Paid.
A/H406

FUXMETER TYPE I WY0023

Designed to determine the polarity of magnets. Complete with probs, ranges 500/1000 gauss, 1,000/2,000 gauss, 2,000/4,000 gauss, M/C meter and instruction leaflet. Less battery (1.5 v.) in wood case with lid and handle. Dim.: 12½in. x 9in. x 6in.
Ask for 55/- each Carriage Paid.
A/H361

EX. R.N. DISTRIBUTION BOARDS,

250 volts, 15 amp., 3 way
Simplex. Ask for A/H949, 6/6 each. Post Paid.

Sandalite Duplex. Ask for A/H950, 6/6 each. Post Paid.

M.E.M. Kantark. Ask for A/H951, 6/6 each. Post Paid.

BRASS GLANDS, 1/3 each. Post Paid.

PLEASE NOTE.—Carriage and Postal Charges refer to the U.K. only. Overseas freight, etc., Extra.

Order direct from:—

CLYDESDALE

SUPPLY CO. LTD. 2, BRIDGE STREET GLASGOW C.5

Phone: South 2706/9

Making Models?

Then you will find the new Modelcraft Annual indispensable as a complete guide to the many fascinating aspects of your hobby, including

- SHIP KITS
- GALLEON & SHIP PLANS
- 'LINESIDE' KITS FOR '00' LAYOUTS
- BUILDING PAPERS
- MICROMODELS

PLUS 24 pages of Feature Articles by leading Experts, with numerous drawings and illustrations.

FREE MARQUETRY DESIGN
Printed on special translucent cutting sheet.

The price of 1/6 includes a Refund Voucher which can be used towards the purchase of Modelcraft goods.

Send for a copy now

MODEL-CRAFT

77(L), GROSVENOR RD., LONDON, S.W.1

RECOMMENDED TOOLS ON BETTER TERMS

	Cash Price	Deposit	12 mthly. Payments	Or 18 Payments
MYFORD M.L.7 bench lathe ...	£48 5 0	£12 1 7	65/5	45/9 C.P.
MYFORD SUPER 7 bench lathe ...	£73 5 0	£18 6 5	99/4	68/11 C.P.
MYFORD M.L.8 woodworking lathe with rear turning attachment ...	£21 15 0	£5 9 0	29/11	C.P.
MYFORD M.L.8. Bandsaw attachment	£23 15 0	£5 15 0	33/-	C.P.
MYFORD P.R.II. PLANNER with roller ext. arms ...	£20 7 6	£5 0 6	26/1	C.P.
BOXFORD 4 1/2 in. bench lathe, modal CSB, motorised ...	£95 17 6	£23 19 9	130/-	90/3 C.P.
FORBCO STAR 0.4in. BENCH DRILL with Jacobs chuck. A.C. single phase ...	£35 8 9	£8 17 9	49/3	C.P.
FORBCO STAR pedestal model ...	£40 6 9	£10 2 9	55/4	C.P.
PERFECTO 5in. stroke HAND SHAPER with auto. traverse ...	£17 17 6	£4 9 5	24/7	Carriage 7/6 extra.
WOLF CUB 1/2 in. ELECTRIC DRILL BLACK & DECKER 1/2 in. UTILITY DRILL ...	£5 19 6	£1 9 6	8/3	C.P.
SELECTA 6in. BENCH GRINDERS A.C.S.P. ...	£15 15 0	£3 8 9	23/9	C.P.
PROGRESS 0.0in. BENCH DRILL for belt drive, with chuck ...	£15 3 6	£3 13 6	23/-	C.P.
BROOK GRYPHON 1/3rd motors, A.C. single phase ...	£7 16 3	£1 19 0	10/9	C.P.
ZYTO 3 1/2 in. BENCH LATHE with C/S Unit ...	£33 5 6	£8 16 6	45/9	C.P.
BLACK AND DECKER "Utility" 5in. SANDER, POLISHER ...	£8 7 6	£2 2 6	11/5	C.P.

● A 1/- stamp will bring you a copy of our 1954 comprehensive illustrated catalogue with details of castings, blueprints and materials for many "L.B.S.C." designed small steam locomotives; carefully selected workshop equipment all of which is available on our OUT OF INCOME TERMS.

"THE CHOICE OF EXPERIENCE"

A. J. REEVES & CO.

416, MOSELEY ROAD, BIRMINGHAM, 12
Grams: Reevesco, Birmingham." Phone: CALthorpe 2554

PLASTIC FLOORS

YOU CAN APPLY YOURSELF!



LOOK! You can now have REAL PLASTIC Flooring at less cost than lino or tiling. POLYFLO is the new wonder plastic that ANYONE can install without previous experience whatever. Requires no mixing or special tools. You merely pour it from its handy container and, 'Hey, Presto,' it finds its own level! Yes, here at last, is the answer to your flooring problems. POLYFLO is ideal for EVERY floor in the house as well as for Window Sills, Table Tops and Shelves. It's GUARANTEED not to crack, lift or discolour, and can be applied to ANY clean surface without mess or fuss! Send for full details NOW!



POST COUPON FOR FREE LEAFLET

Post to:- THE SURFEX FLOORING CO.,
48, HIGH STREET, CAMBERLEY, SURREY.

NAME (PLEASE PRINT).....
ADDRESS.....

A.C./D.C. MOTORS 24 v. 2a., 6in. x 2 1/2 in. dia. spindle 1in. x 1/2 in. New 18/6.
Time Delay Relays supplied to your requirements.
Powerful small Blower Motors, 24 v. A.C./D.C., 14/6. As used for the Hedge Trimmer.
Type 6C Oscilloscope Unit. With VCR138 3 1/2 in. Tube, and conversion circuit for standard "Scope." 58/6.
Transformers, Input 200/240 v. Sec. tapped 3-4-5-6-8-9-10-12-15-18-20-24-30 volts at 2 amps., 21/6. 17-11-5 volts, at 5 amps., 22/6. 17-11-5 volts at 1 1/2 amps., 16/6. 6.3 volts, 2 1/2 amps., 8/6. 12 months' guarantee.
Selenium Rectifiers F.W. 12-6 volt, 1 A., 8/6. 3 A., 14/6. 4 A., 23/6. 6 A., 30/- 24 v. 2 A., 30/- 250 v. 100 mA. H.W., 9/- 250 mA., 17/6. 60 mA., 6/6.
D.P.D.T. Relays. Operates at 200/300 volts D.C., 8/6. D.P. Make and Break, 8/6. Any combination or voltage can be supplied at varying prices.
0-5 amp. 2 1/2" Square M/c Ammeters, 11/-
Veeder Counters. P.O. Type, 24/50 v. D.C. 0.9999, 15/6.
M/c Microphones with matched transformer. 15/6.
6 volt Vibrator Packs. Self contained in steel box. Output 150 v. 30 mA., 22/6. Ideal for Battery Radios.
Rheostats, 12 v. 1 A., 2/6. 12 v. 5 A., 10/6.
Latest Car Lights Relay Assembly "Flasher" Unit, 6 or 12 v., 17/6; or with 2 lamps and switch, 50/- STATE BATTERY CONNECTION TO CHASSIS.
4 ft. Fishing Rod Aerials, Set 3, 7/6. Base, 3/6.
TR.1196. Transmitter Section. NEW and complete - less valves - 4.3-6.7 Mc/s. Easily converted, 15/-. Valves are EF50, TT11, EL32, set 25/-.
4 1/2 in. dia. 0-100 Micro-amp. Meters. Made by Ernest Turners, £3/12/6.
All Carriage Paid in U.K.

THE RADIO & ELECTRICAL MART
253, Portobello Rd., London, W.11
Park 6026

Plastics LTD
(MANCHESTER)
BRITAIN'S LEADING STOCKISTS OF
"PERSPEX"
SHEET - ROD - TUBE
11 WHITWORTH STREET · MANCHESTER, 1
Telephones: CENTral 7081-2 and 1000

EASY PAYMENTS WITH "LAFCO"

22/11 DEPOSIT
BLACK & DECKER

B & D 1/2 in. Electric Drill 14/8 deposit & 8 mthly payments of 14/8 (£5/19/6 cash). Craftsman Lathe 12/10 & 8 x 12/10 (£5/5/-). Horizontal Stand 2 1/2 & 8 x 2 1/2 (17/8). 1 1/2 in. Bench Drill Stand 8/3 & 8 x 8/3 (£3/7/6). No. 44 Sander 30/7 & 8 x 30/7 (£12/10/-) 5in. Sander Polisher Kit 24/2 & 8 x 24/2 (£9/17/6). 1in. Portable Elec. Drill 30/3 & 3 x 30/3 (£12/7/6). Buffing & Polishing Set 2/5 & 8 x 2/5 (19/6). Abrasive Kit 3/4 & 8 x 3/4 (27/6). Disc Sanding Table Attachment 3/11 & 8 x 3/11 (32/6). 1in. Bench Stand 13/6 & 8 x 13/6 (£5/10/-). 6in. H.D. Elec. Saw 42/2 & 8 x 42/2 (£17/5/-). We also supply Wolf tools, Solder Guns, Vibro tools, Vibro Sprayers, etc.

AND 8 MTHLY PAYMENTS OF 22/11. (CASH £9/7/-)

Send s.a.e. for leaflets. If you do not see the item you want do not hesitate to write us. We welcome all enquiries.

DESK 61 LAFCO COMPOUNDS LTD.
3, CORBETT'S PASSAGE, ROTHERHITHE NEW ROAD, S.E.16.

29/1
Dep. & 8 mthly payments of 29/1

Bean Nash modelled in 'Plasticine'

There are so many practical uses for

'Plasticine' Regd.

—always keep some of this handy modelling material on your bench.

From stores and stationers, in 16 attractive colours

HARBUTT'S PLASTICINE LTD.
Inventors and Sole Manufacturers
BATHAMPTON, BATH, SOMERSET

VALUABLE NEW HANDBOOK FREE TO AMBITIOUS ENGINEERS

Have you had your copy of "Engineering Opportunities"?

The new edition of "ENGINEERING OPPORTUNITIES" is now available—without charge—to all who are anxious for a worthwhile post in Engineering. Frank, informative and completely up to date, the new "ENGINEERING OPPORTUNITIES" should be in the hands of every person engaged in any branch of the Engineering industry, irrespective of age, experience or training.

**We definitely Guarantee
"NO PASS—NO FEE"**

This remarkable book gives details of examinations and courses in every branch of Engineering, Building, etc., outlines the openings available and the essential requirements to quick promotion and describes the advantages of our Special Appointments Department.

WHICH OF THESE IS YOUR PET SUBJECT?

MECHANICAL ENGINEERING
Gen. Mech. Eng.—Maintenance — Draughtsmanship—Heavy Diesel—Die & Press Tool Work—Welding—Production Eng.—Jig & Tool Design—Sheet Metal Work—Works Management—Mining — Refrigeration—Metallurgy.

ELECTRICAL ENGINEERING
Gen. Elec. Eng.—Elementary & Advanced Elec. Technology—Installations Draughtsmanship—Supply —Maintenance — Design —Electrical Traction — Mining Electrical Eng.—Power Station Equipment, etc.

RADIO ENGINEERING
Gen. Radio Eng.—Radio Servicing, Maintenance & Repairs—Sound Film Projection — Telegraphy — Telephony — Television — C. & G. Telecommunications.

AUTOMOBILE ENGINEERING
Gen. Automobile Eng.—Motor Maintenance & Repairs — High Speed Diesel—Garage Mngmt.

CIVIL ENGINEERING
Gen. Civil Eng.—Sanitary Eng.—Structural Eng.—Road Eng. — Reinforced Concrete—Geology.

BUILDING
Gen. Building—Heating & Ventilation—Architectural Draughtsmanship — Surveying — Clerk of Works — Carpentry and Joinery —Quantities — Valuations

WE HAVE A WIDE RANGE OF AERONAUTICAL COURSES AND COURSES IN FORESTRY, TIMBER TECHNOLOGY, PLASTICS, G.P.O. ENG., TEXTILE TECHNOLOGY, ETC., ETC.

One of these qualifications would increase your earning power WHICH ONE?

A.M.I.Mech.E., A.M.I.C.E., A.M.I.P.E., B.Sc., A.M.Brit.I.R.E., A.F.R.Ae.S., A.M.I.M.I., L.I.O.B., A.R.I.B.A., A.M.I.H. & V.E., M.R.San.I., F.R.I.C.S., A.M.I.E.D., CITY & GUILDS, COMMON PRELIM., GEN. CERT. OF EDUCATION, ETC.

THE BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY

410A, COLLEGE HOUSE,
29-31, WRIGHT'S LANE,
KENSINGTON, W.8.



Phone: WEstern 9661

WHAT THIS BOOK TELLS YOU

- ★ HOW to get a better paid, more interesting job.
- ★ HOW to qualify for rapid promotion.
- ★ HOW to put some valuable letters after your name and become a "key-man" . . . quickly and easily.
- ★ HOW to benefit from our free Advisory and Appointments Depts.
- ★ WHERE today's real opportunities are . . . and HOW you can take advantage of the chances you are now missing.
- ★ HOW, Irrespective of your age, education or experience, YOU can succeed in any branch of Engineering that appeals to you.

144 PAGES OF EXPERT CAREER-GUIDANCE

You are bound to benefit from reading "ENGINEERING OPPORTUNITIES," and if you are earning less than £15 a week you should send for your copy of this enlightening book now—FREE and without obligation.

POST NOW!

TO: B.I.E.T. 410A, COLLEGE HOUSE, 29-31, WRIGHT'S LANE, KENSINGTON, W.8.

Please send me FREE and without obligation, a copy of "ENGINEERING OPPORTUNITIES." I am interested in (state subject, exam., or career).....

NAME

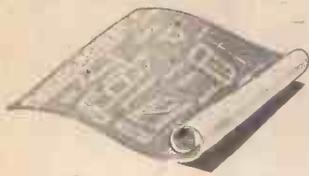
ADDRESS

WRITE IF YOU PREFER NOT TO CUT THIS PAGE



Only 1hd. stamp is needed if posted in an unsealed envelope.

THE B.I.E.T. IS THE LEADING INSTITUTE OF ITS KIND IN THE WORLD



PRACTICAL MECHANICS

The "Cyclist," and "Home Movies" are temporarily incorporated.



VOL. XXII. No. 250

Editor: F. J. CAMM

OCTOBER, 1954

"Twenty-one To-day"

THIS issue celebrates the passing of the 21st milestone in the history of this journal. Elsewhere in this issue I have dealt with the progress of PRACTICAL MECHANICS since October, 1933, when the first issue was launched, but I want here gratefully to acknowledge the large numbers of letters of congratulation which have reached me during the past few weeks. This journal was launched almost exactly a year after the publication of the first issue of our companion journal, *Practical Wireless*, and it is with some pride that we can look back on the past 21 years of continuous progress. No journal survives 21 years unless it has fulfilled the objects which inspired its foundation, and the most accurate method of assessing the success of that policy is to examine circulation figures. The sales of this journal have continued to rise month by month from its first issue, until to-day it can fairly claim to be a journal without a rival. Its reader service is unparalleled and its advice on a wide diversity of topics, as can be verified by an examination of our Questions and Answers pages, is eagerly sought by a vast readership drawn from every class of society and whose interests vary from astronomy and flying saucers to models, aircraft, chemistry, electricity, engineering, conjuring and in fact almost every subject within our sphere.

We enter our 22nd year with renewed zest and vigour and with the promise that we shall continue to expand our policy and to keep our readers abreast of the times in the latest developments in those spheres with which it treats.

A National Museum of Models?

IN view of the large space required for a museum of full-sized examples of particular objects it would be wise if either the State or the Science Museum considered the possibility of founding a National Museum of Models. A museum of all of the developments in bicycles, motor-cycles, motor-cars and horse-drawn carriages would occupy an enormous space, and even then full-sized examples of some early vehicles are no longer available. Illustrations, however, are, and it should be possible for such a museum as I suggest, equipped with

FAIR COMMENT

By

The Editor

workshops and a staff of professional modelmakers, to produce within a few years accurate models all to one scale of every known vehicle. This idea could be extended to other industries, crafts and sciences. This thought occurred to me when visiting the Science Museum at Kensington recently and noting the gaps in the chronology of some of the exhibits. Lone workers have produced splendid models of machine tools, carriages, steam engines, locomotives and even buildings. A national appeal for such models might provide the nucleus from which such an exhibition should spring. Thus, in one building could be housed models of prototypes which, in full-size form, would require several buildings.

The Flying Saucer Controversy

THE Australian *Daily Telegraph* has recently published pictures of flying saucers which are acknowledged fakes. They very closely resemble pictures already taken of flying saucers and which claim to be genuine. Whether the publication in the Australian newspaper is intended to suggest that those which claim to be genuine are also fakes is not clear. It would indeed be a dangerous argument to suggest that, because it is possible to simulate by faking that which is genuine, the genuine article is also a fake. Such would be a perfect example of the *non sequitur*.

The *Melbourne Argus* offered £1,000 for the first fully authentic picture of a flying saucer taken in Victoria. The first photograph submitted shows a weird object in the sky, but the photographer did not claim that it was of a flying saucer, although he did claim that it might be the answer to the flying saucer riddle. The Nuclear Physics Division of the United States Navy after months of intensive investigation tried unsuccessfully to kill the saucer stories, in spite of the continued reports from qualified observers that they had seen them. The Division gave as its opinion that they were nothing more phenomenal than plastic balloons. Yet the Chief of Staff of the United States Air Force, General Twining, in a statement said that 10 per cent. of saucer sighting cannot be discarded and that the best brains in the United States are working on the subject. Captain Rickenbacker, American pioneer aviator, stated that too many good men who do not have hallucinations have seen flying saucers. Well, the photographs in the Australian *Daily Telegraph* were fakes. But that does not mean that all similar photographs are fakes.

It is a pity that Mr. George Adamski had to cancel the lecture at the Albert Hall which he was scheduled to give this autumn. His English publisher tells me that he had been lecturing so much in America that his voice has gone and it was upon doctor's advice that he cancelled his English tour. I am disappointed, as I had hoped to be present as a representative of my readers.

Mr. Adamski's are not the only photographs which have been taken of flying saucers. One was recently published in a Finnish newspaper which shows something solid in the form of a wheel with a hub. It is reported that the Admiralty has files on this subject. Nor is Adamski the only man to give an account of a landing. There is Truman Bethurum's account and that of Mr. Pry, of Whitesands Station. There was also an account earlier in this century from South Wales and another a few years ago from just behind the Iron Curtain. The Astronomer Royal has recently dealt with the subject very cautiously. When shall we know the answer to the flying saucer problem?—F. J. C.

SUBSCRIPTION RATES

including postage for one year

Inland - - - - 14s. per annum.

Abroad - - - - 14s. per annum.

Editorial and Advertisement Office: "Practical

Mechanics," George Newnes, Ltd.,

Tower House, Southampton Street, Strand, W.C.2

Phone: Temple Bar 4363

Telegrams: Newnes, Rand, London.

Copyright in all drawings, photographs and articles published in "Practical Mechanics" is specially reserved throughout the countries signatory to the Berne Convention and the U.S.A. Reproductions or imitations of any of these are therefore expressly forbidden.

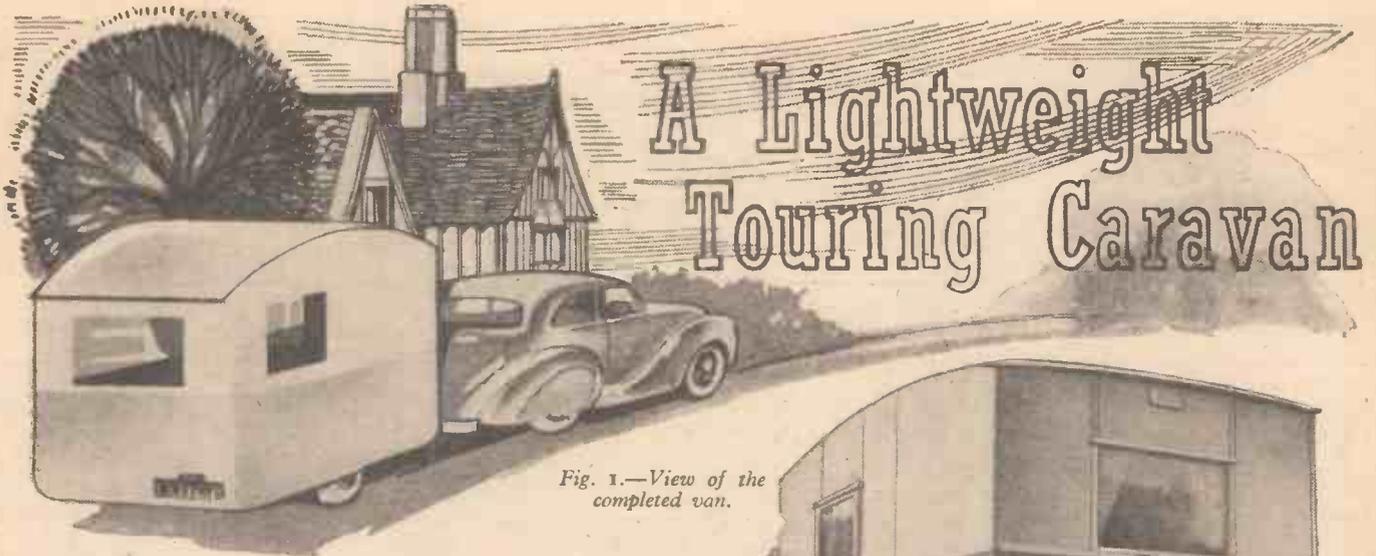


Fig. 1.—View of the completed van.

An Ideal Unit for the Small-car Owner

By J. E. GIBSON

THE caravan described was designed to meet my specific requirements in regard to lightness and mobility.

The usual width for a caravan is not less than 6ft., but in my case the driveway to my house limits the van described to 5ft. 3in. This is

freedom from roll and very good towing qualities.

The main through steel member consists of two 2in. x 2in. x 3/16in. angles welded together to form a box section, bolted to every other

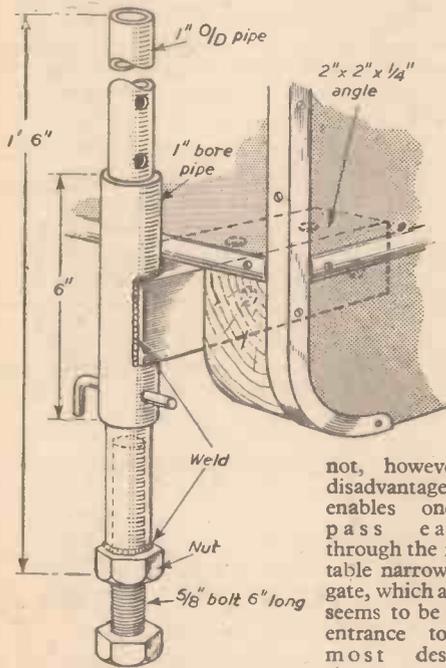


Fig. 4.—The front jack.

not, however, a disadvantage as it enables one to pass easily through the inevitable narrow farm gate, which always seems to be at the entrance to the most desirable site.

The interior layout has, therefore,

been arranged to suit the narrower than usual width, and has proved in practice very satisfactory.

Chassis

There is no separate chassis in this design. For a van of this size the floor and side members form a rigid structure and reference to Fig. 2 will show that, with the method of independent wheel suspension used, the weight is carried directly by the main 3in. x 2in. longitudinal members, attached to the 5in. x 1/2in. tongued and grooved floorboards.

Features of this design are the low overall weight, maximum rigidity for the minimum material, with a wide spring base, actually wider than the wheel track, which results in

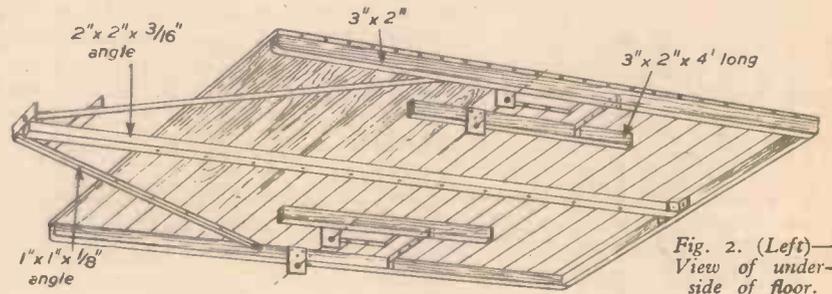


Fig. 2. (Left) View of underside of floor.

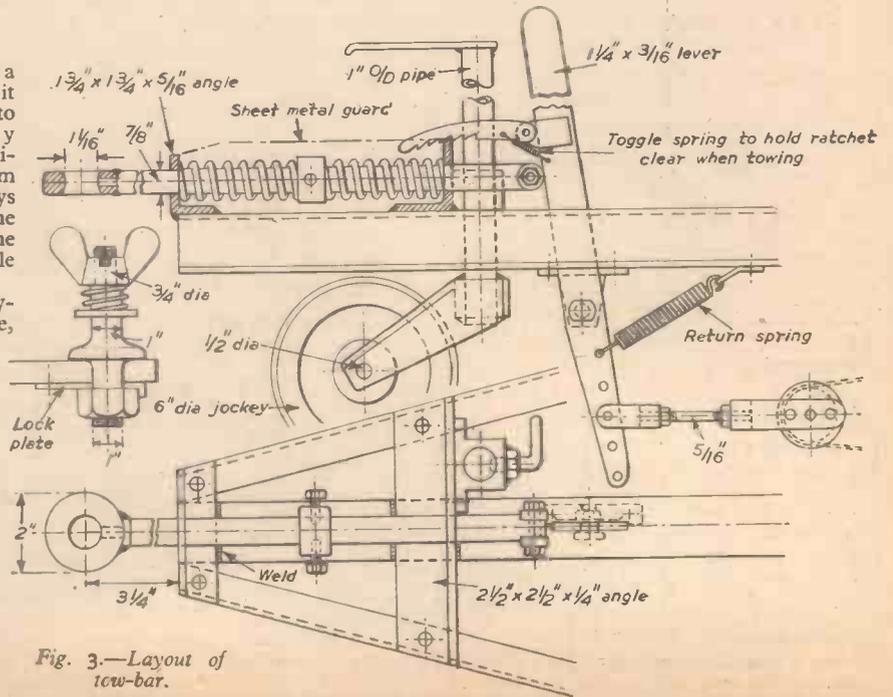


Fig. 3.—Layout of tow-bar.

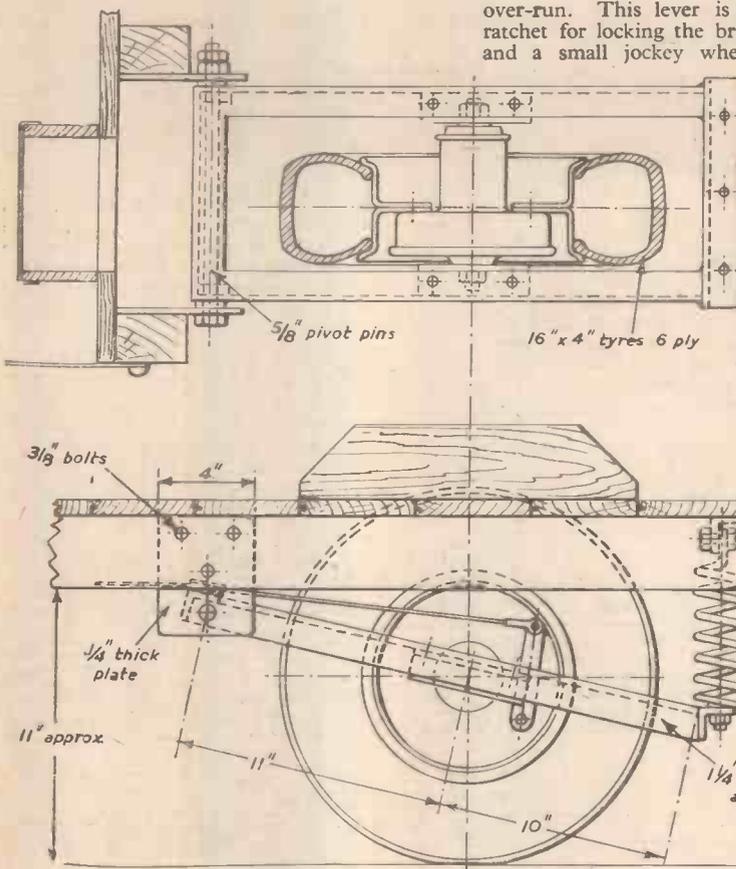


Fig. 6.—Details of wheel suspension.

floor board by 5/16 in. cup head bolts, and secured to the rear cross member by angles and bolts. Lateral stiffness is provided by 1 in. x 1 in. x 1/4 in. angles bolted to the front of the box

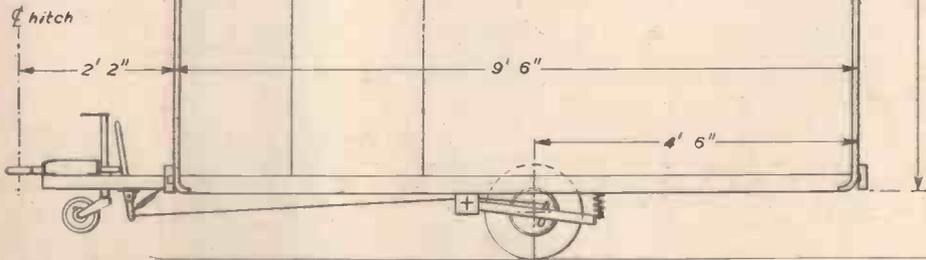


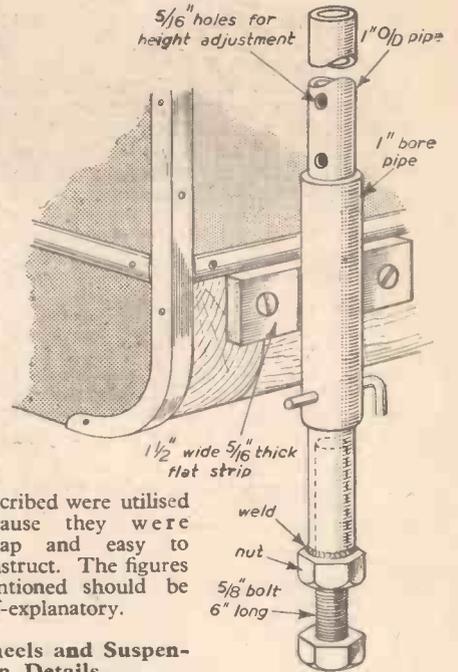
Fig. 7.—Overall dimensions and layout of interior.

section main member, and attached to the 3 in. x 2 in. side members, just in front of the wheel frame brackets.

A spring-loaded tow bar of the eye type is fitted, which, in the usual way operates the lever connected to the wheel brakes through the medium of an equalising pulley and wire rope during the

over-run. This lever is also fitted with a ratchet for locking the brakes when parking, and a small jockey wheel is provided for ease in manoeuvring. Details of the layout are given in Fig. 3.

A simple type of corner jack is shown in Figs. 4 and 5. These have the virtue of being light, and have proved satisfactory in use, provided a reasonably level pitch is found. No doubt the screw-operated type would be an advantage, but the type



Wheels and Suspension Details

A careful check on the estimated unladen weight showed that this could be expected to be in the region of 7 to 8 cwts., 1 cwt. of which would be on the tow bar. A total laden weight to be carried by the wheels was assumed to be 9 cwts., i.e. 4 1/2 cwts. per tyre. During one trip the van was checked on a weighbridge and the weight was found to be 9 cwts. 2 qrs. total, with all the equipment carried for a two weeks' holiday.

Tyres of 16 in. x 4 in. section, 6-ply quality are used, inflated to 45 lb. per sq. in., fitted on standard Dunlop split rims, and to date have given no trouble. These tyres and rims are capable of carrying 10 cwt. per tyre when inflated to 90 lb. per sq. in., but speed of revolution must be kept low to prevent overheating. For this reason the maximum towing speed is never allowed to exceed 30 miles per hour, which is, of course, also the maximum legal limit.

The wheel frames are constructed from 1 1/4 in. x 1 1/4 in. x 1/4 in. angles welded up, and the suspension is by heavy-duty motor cycle saddle springs, three on each frame. Only half the weight is carried by the springs, the other being carried by the frame pivot shafts which are 1/2 in. in diameter.

The wheel rims are bolted to second-hand motor cycle front wheel hubs, the actual ones used being 1936 B.S.A. These have $\frac{1}{2}$ in. diameter spindles, 6 in. diameter brakes and the hubs run on taper roller bearings. The bolts for the rims are $\frac{3}{8}$ in. diameter high tensile steel, with the heads reduced to $\frac{3}{16}$ in. thick. They are welded inside the brake drums, remaining in place in the event of wheel removal. The brake levers are connected to the operating rope by large-headed bolts as shown in Fig. 6, the rope end being in the form of an eye.

The rope passes over a brass diverter pulley attached to the wheel frame on the pivoting centre. This obviates brake snatch, which would occur if the rope was attached directly, due to the rise and fall of the wheels, thus lengthening or shortening the lever to wheel centres, as well as ensuring a good rope lead.

The hub spindles are supported by separate pieces of $1\frac{1}{2}$ in. \times $1\frac{1}{2}$ in. \times $\frac{1}{2}$ in. angles, 6 in. long, bolted to the wheel frames. The wheels complete with hubs can be removed readily, without disturbing the wheel frames or

springs. Constructional details and dimensions can be obtained from Fig. 6.

Bodywork

The body of the caravan is framed with $1\frac{1}{2}$ in. \times 1 in. hardwood throughout with the exception of the roof curves which are 1 in. \times 1 in. section. Details and dimensions are given in Fig. 7. The roof curves were bent in position without steaming as the camber is only $\frac{1}{2}$ in. in 10 ft., and are supported by door and wardrobe corner pillars. They have been quite satisfactory. Walls and roof are covered with hardboard, the roof also being covered with good quality cotton duck, stuck down with paint in the usual way, afterwards finished with four coats of white lead paint with a final coat of aluminium paint. The usual aluminium guttering is fitted to the edges.

The front and rear windows are of the fixed variety, the two side windows being arranged to open. Rain flaps are fitted over the opening windows, as well as over the door, which is of the stable type, each half hinged separately.

Ventilating louvres are provided at each

end, and also to the food cupboard which has six $1\frac{1}{2}$ in. diameter holes in the floor to promote good air circulation. All openings in the larder are covered with gauze to prevent entry of insects.

Furniture

This is, of course, a matter for individual choice, but the arrangement shown has proved very convenient and workable. The layout as shown sleeps two adults on the settee berths, and a child of 11 is accommodated on a canvas stretcher bunk at the rear of the van resting in brackets on a level with the lower edge of the windows.

As described the van is single skinned, no lining being fitted. Condensation has been slight as it is only used in the spring and summer months. If desired, the interior could be lined and the interior finish would be improved by so doing. The framing would be out of sight, and the van could be used in colder weather without discomfort.

The cost of all materials used in the construction has been carefully recorded, and the total has worked out at £40.

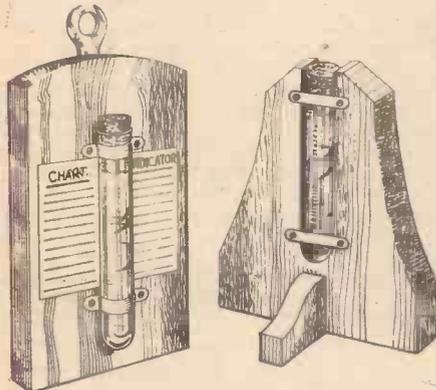


Fig. 1.—Two versions of the weather glass.

THERE are many instruments constructed to determine weather forecasts, and some of them are very expensive and intricate in their working and adjustment. Here you have a very simple yet reliable weather glass, requiring neither great skill nor delicate

THE WEATHER CHART	
When glass shows	Indication
Clear	Bright weather
Crystals at bottom	Thick air, frost in winter
Dim liquid	Rain
Dim liquid with small stars	Thunderstorms
Large flakes	Heavy air, overcast
Threads in upper portion	Windy weather
Small dots	Damp weather, fog
Rising flakes which remain high	Wind in upper air regions
Small stars in winter on bright, sunny days	Snow in 1 or 2 days

adjustment in the making, yet surprisingly accurate in its forecast when used in conjunction with its indicator or chart.

Materials Required

Few parts are required; they are a test tube or its equivalent, a cork to fit, some sealing wax or candle wax and two easily-made solutions.

The weather glass can be made to serve either as a hanging model as in Fig. 1 (left), or as a desk model as shown on the right.

A Simple Weather Glass

Further details of the desk model are given in Fig. 2.

It must be remembered that the fittings are dependent upon the size of the tube; it is, therefore, important that this should be procured first.

Next, you require the following solutions. Solution No. 1: 1 drm. of camphor in oz. of alcohol absolute; Solution No. 2: $\frac{1}{4}$ drm. potassium nitrate and $\frac{1}{4}$ drm. ammonium chloride in oz. distilled water. When these two solutions are dissolved, pour them into a cup or beaker, and place the beaker in a bowl of hot water. When cool, pour off the clear liquid into the test tube and seal up with candle wax or sealing wax. When reading

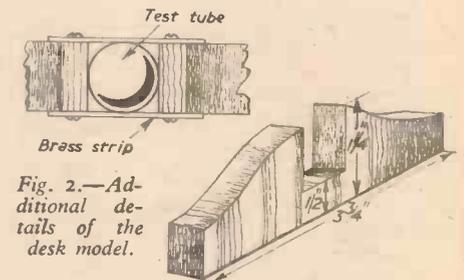


Fig. 2.—Additional details of the desk model.

the weather glass, the accompanying chart is necessary.

Microfilm Equipment

WE have received from the Recordak Division of Messrs. Kodak, Limited, 1 and 2, Beech Street, London, E.C.1, details of the microfilm equipment which they supply. The numerous advantages of photographic microfilm recording are now well known to business men: the accuracy of the photographic method, saving of filing space, increased efficiency of business routine, saving of time and labour.

The Recordak Micro-File Camera

This is a general-purpose camera for use on an ordinary table or desk, and is capable of dealing with a wide range of subjects of different sizes. In office and library it can be used to copy a variety of documents, such as ledgers, invoices, deeds, books, newspapers, etc. Reductions of subjects as large as 17 in. \times 25 $\frac{1}{2}$ in. are possible. On a 100 ft. length of 35 mm. film 800 originals can be recorded full frame size, or 1,600 originals half frame size.

A fixed aperture 2 in. Dallmeyer lens is used and exposure is controlled by varying the light intensity. Also incorporated is an exposure meter, an exposure counter, and a footage indicator.

The Recordak Microfilmer Desk Model

This aids the solving of accounting and record-keeping problems which concern such

documents as cheques, drafts, warrants, invoices, receipts, insurance policies, correspondence, etc. It is a dual-purpose instrument; a combined 16 mm. camera and film reading machine.

For use as a projector for 16 mm. microfilm records, a viewing screen is lowered into position over the area previously used for microfilming purposes. A 100ft. roll of microfilm is loaded into the projector head and is then passed through the projector. An image, 24 times the size of the film frame, appears on the viewing screen.

The Recordak Library Reader

This is an easily operated piece of apparatus which can be used as a companion-unit to a microfilm camera or for ordinary microfilm viewing. Thirty-five-millimetre film is accommodated and the reading screen is 18 in. square. Two lenses can be fitted, a 1 in. and 2 in., the former giving 24 \times magnification and the latter 12 \times . The 2 in. lens enables the whole of the frame to appear on the screen. A scanning device is also incorporated.

A special slow panchromatic film, "Micro-file," is also supplied by Kodak for this work. It is of extremely fine grain and is eminently suitable for making greatly reduced copies of finely printed documents.

All inquiries regarding this equipment or the undertaking of microfilming work should be sent to the above address.

THE P.M. Meteorite

A Power-driven Model Aeroplane for the Small Diesel Engine

By C. E. BOWDEN

(Concluded from the September issue)



The P.M. Meteorite, a stable, robust model of 45½ in. span.

INOW build in the wing-tip slots as shown in Fig. 12. These wing-tip slots are well worth while for super stability, and are really quite simple to make. The only thing to watch is that each slot opening has the same gap, or there may be more drag on one wing than the other in flight, which will cause yawing. Fig. 12 shows a slot from the top.

The Dihedral Angle

When each wing half has been completed with dowels, reinforced with plastic wood, the two halves should be joined together, with jigs placed under the tips as seen in

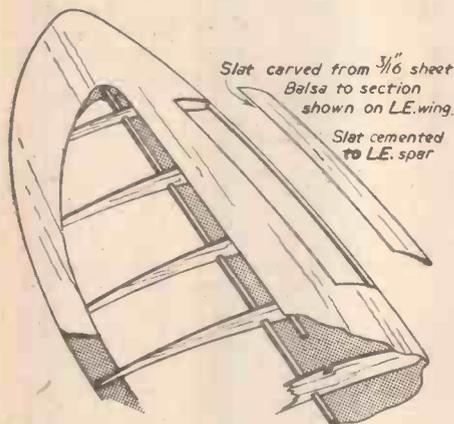


Fig. 12.—Wing-tip slots.

the small sketch (Fig. 13) so that each wing-tip is raised 4¼ in. above the table building board. Cement the wing halves together, allow to set, then cover top and bottom centre-section with 1/16 in. sheet balsa, reinforcing at the vee joint with plastic wood filleting (see Fig. 14).



Fig. 11.—Stiffening up the wing by covering L.E. and T.E. with sheet balsa.

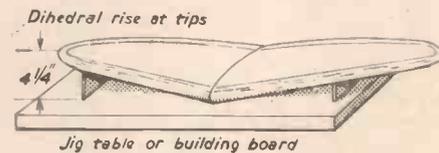


Fig. 13.—The dihedral angle.

Allow all to set hard, with the jigs again in position to ensure the correct dihedral angle, and finally cover the whole wing with silk as already described for the tailplane, the only difference being that the undercamber in the wing necessitates sewing the fabric to each rib *after covering the bottom first*. Thin white cotton is sewn through the covering when dry before water shrinking, around each rib, with wide stitches. This will keep the silk to the ribs when it is later shrunk by water and dope. Now cover the top of the wing without any stitches in the normal way. Water spray, dry, and then dope with the full strength dope. Watch for warping as it sets and, just before setting, weight each wing half down to a flat board to harden off. Should a wing or other doped unit warp, this can be heated in front of a radiator and the warp twisted out by hand. The unit is then taken away from the heat, and as the dope har-

dens again it sets in the new position whilst being held in that position. Be careful not to do this in front of a naked flame for dope is highly inflammable! Warped surfaces will ruin good flying.

Flying Instructions

We now arrive at the reason for all this work, the flying of the model. It is the first few trimming flights that are the dangerous ones. Assemble the whole aeroplane with the engine in position, but with propeller removed, and check the balance by balancing the aeroplane below the fuselage on the fingers. It should balance at about the centre of gravity position shown on the plan, or very near this. If the balance is out owing to building differences, it is possible to make minor adjustments to suit different weight engines, etc., by adding small pieces of lead to the tail or nose as required. Only a little lead is permissible. If there is much at the tail end it upsets the machine on turns,

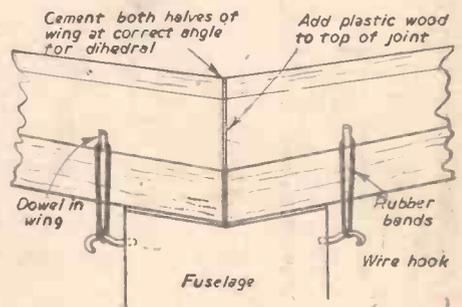


Fig. 14.—The method of wing retention.

because the main weights should be grouped. If there is any radical alteration to be made, it is possible on all my designs to make a longer or shorter engine nose piece, for this is detachable. It takes only a short time to make another nose piece, and this can also be done if the owner decides to fit another engine of a different weight.

Having got the point of balance correct, take the model out on a nice day with a slight wind blowing, and glide it by throwing the aircraft dead into the wind, like a dart, that is to say, you have to throw it at its flying speed in a forward and very slightly downward direction, just as you used to throw a paper dart in your school days. If the balance is correct and the wing and tail angles correct, the model should glide with a long, flat flight path in a floating glide. It is a good plan to carry out the first glides over long grass just

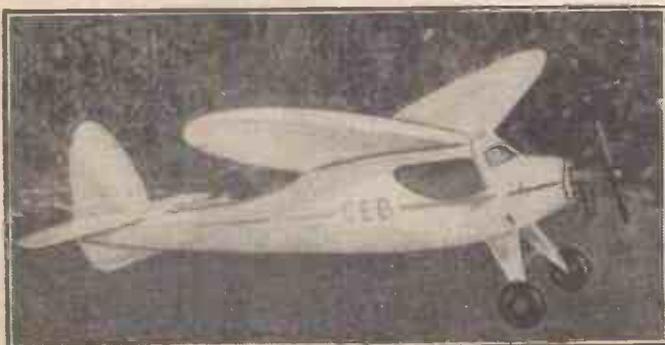
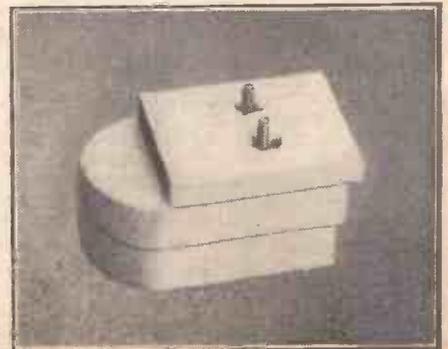


Fig. 15.—(Left) An alternative engine mount for engines with a circular backplate, such as the early Frog 1 c.c. diesel.

Fig. 16 (Right).—The nosepiece is made up of laminations of balsa wood for the circular backplate type of motor.



in case you have got things incorrect, or you throw the model too slowly and it stalls or dives.

The important thing is to get the glide correct, and then keep the settings, before you fly under power. *This glide setting must never be altered when flying under power, because it is vital that when the motor cuts, the model shall glide properly down to a good landing.* Power trim is done by altering thrust line.

During the gliding tests, if the model dives after a good dart like throw dead into the wind, put a 1/16in. packing under the rear of the tailplane. If this does not suffice, a further sixteenth packing may be used. If this is not satisfactory you have either made a mistake in the C.G. position of balance, or your wing is set on the fuselage at too low an angle and not as the drawing shows. Should the model balloon up, put a 1/16in. packing under the leading edge of the tailplane. Never more than a total of 1/4in. packing either way must be used, or the longitudinal vce for stability will be upset. The fault will be in bad balance or the wing at the wrong angle of attack, not in accordance with the plan.

First Power Flight

Now check up for the first power flight that there is a little side thrust, to the right looking from the top forward, to absorb the engine's torque reaction. If much is ultimately found to be necessary, it means you are employing an unsuitable propeller of too great pitch, or badly made with thick blades which offer too great resistance or drag. Also check up that the engine has some down thrust, by putting a safety 1/4in. packing to tilt the motor down. If the model climbs too steeply near the stall on its first flight you have not got sufficient down thrust. If it loses height on being hand launched under power like a dart, you must take off a little down thrust. All adjustments must be done a little at a time. The model should turn very gently in left-hand circles, controlled by side thrust. The engine torque tends to turn it left, and the right side packing resists this. Never let any model turn violently left or right under power. Right turns are more dangerous than left turns with torque. A violent turn will stop the model climbing, and in extreme cases will cause a spiral dive to destruction. The correct thing is to control the power flying by the correct side and down thrust

so that the model flies in easy left-hand circles and climbs steadily like a real aeroplane. Under no circumstances control the model by tailplane packing or fin packing under power. *You must not alter those glide settings, ready for a good glide when the engine cuts.*

If you see a model fly well under power, and then go into a phugoid switch back path when the engine cuts, you will know that the operator has not carried out these directions. He has trimmed his model by tail packing under power, or the design of the model is fundamentally bad with thrust line too low in relation to the centre of lift of the wing. In the case of the "Meteorite" the thrust line design is correct, and it will be your fault! Once you have trimmed for glide and then got good power flight by engine thrust packings, you can cement in the packings and cover them for keeps with doped silk. You will have an exceptionally stable model that will fly in almost any weather. Never be satisfied with a model that careers wildly about the sky, as is so often seen at competitions with overpowered models having the thrust line too far below the wing. A sport model should have a realistic and stable flight path followed by a good landing.

MAKING A XYLOPHONE

A Simple and Easily-made Version of a Popular Musical Instrument

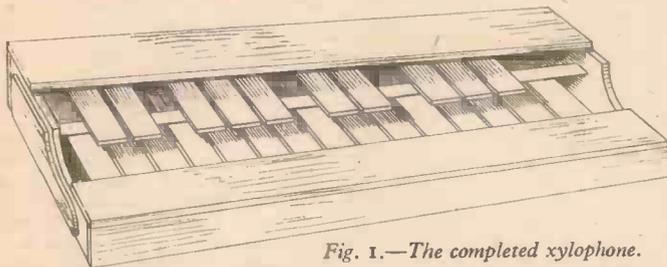


Fig. 1.—The completed xylophone.

THESE instruments are made up in various ways as regards the arrangement of the notes. That illustrated is as good as any, and has the advantage that the notes are grouped on the same plan as those of the piano.

Fig. 1 shows the complete instrument in perspective, as seen from the front. It will be noted that the wooden slips are in two series, those corresponding to the black notes on the piano being on the upper level (see also Fig. 2).

The Case

Before making the case it is well to determine the lengths of the slips. The instrument shown has a compass of two octaves, starting and ending with the note C. The slips may have



Fig. 2.—The upper and lower series of notes.

exact tune, which means shortening to sharpen, and if too sharp, substituting a longer slip.

The case may next be taken in hand. Its construction is made clear by Figs. 1 and 2, the latter being a cross-section. It may be made of 1/4in. stuff throughout, glued and pinned.

Slots must be cut in the ends for the tapes on which the slips are to rest. The positions of these tapes are shown in Fig. 2. Fig. 4 is an end view showing how the tapes are brought through the slots and glued down, after which an 1/4in. cover board may be glued over them as shown.

The Tapes

The tapes should be of linen, say, 1/4in. wide, and they must be stretched quite taut.

Various methods are employed to fix the slips to the tapes. A simple and quite effective one is to drive a fine gramophone needle through each end of the slip, so that its blunt end is flush with the upper surface of the slip, and then it is a simple matter to space the slips by pressing the needles through the tape. Another method is to use an adhesive to hold the slips in place.

How the Xylophone is Played

Fig. 5 shows the hammer with which the xylophone is played. Two of these will be required. The head is built up from three layers of sole leather, glued together. It is then pared to shape with a sharp knife and finished with glasspaper. A central hole is drilled and

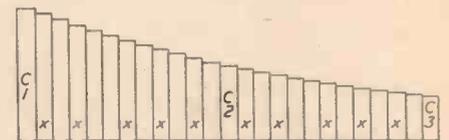


Fig. 3.—Details of the various sizes for the notes.



Fig. 4.—How the tapes are secured and the cover board.

the handle—a piece of 3/8in. dowel rod—glued into it.

Almost any kind of wood will serve for the notes, but a better tone is obtainable from the harder and denser woods, like rosewood. Good results, however, may be had with pitch pine, and quite a passable tone from ordinary deal.

Fig. 5 (Left).—The playing hammer.

the same section throughout, say, 1 1/4in. by 1/4in. Cut the longest to give the note C when struck, its two ends being supported. This, of course, is a matter of trial. Now construct a diagram as shown in Fig. 3, making C2 half the length of C1, and C3 half the length of C2. Join the ends of C1, C2 and C3 with a smooth curve, which will then give the lengths for all the other notes.

It will be noted that twelve slips go to the octave. Those starred will be the slips for the upper series.

BOOKS FOR ENGINEERS

By F. J. CAMM

- Screw Thread Tables, 5/-, by post 5/3.
- Refresher Course in Mathematics, 8/6, by post 9/-.
- Gears and Gear Cutting, 6/-, by post 6/6.
- Dictionary of Metals and Alloys, 10/6, by post 11/-.
- Wire and Wire Gauges (Vest Pocket Book), 3/6, by post 3/9.
- Newnes Metric and Decimal Tables, 3/6, by post 3/9.
- Practical Mechanics Handbook, 12/6, by post 13/-.
- Slide Rule Manual, 6/-, by post 6/6.
- Mathematical Tables and Formulae, 5/-, by post 5/3.

From GEORGE NEWNES, LTD., TOWER HOUSE, SOUTHAMPTON STREET, STRAND, W.C.2



Home-made Fishing Tackle

A Series of Articles Dealing With the Construction of a General Purpose Fresh Water Rod : a Sea Rod and Reels in Wood and Light Alloy

2.—The Avon Rod

By C. W. TAYLOR, M.I.E.T.

THE general purpose fresh water rod which is to be described in this article is often referred to as the Avon type. This is because the rod was designed to meet the special requirements of the expert fishing on that notable river. It is an excellent type of rod for general coarse fishing and is 11ft. long, in three joints, with a 20in. cork handle.

The top and middle joints are of built cane, which can be bought in standard tapered lengths, or made by the process described in the first of these articles. The butt or bottom joint is of whole tonkin bamboo.

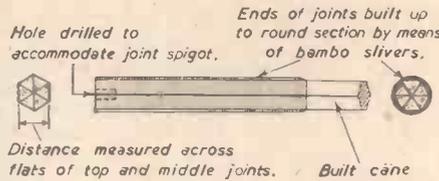


Fig. 1.—Measuring across the flats and building up the ends of the joints.

of the rod. The sizes for the flats must therefore be strictly adhered to if the rod design is not to be affected.

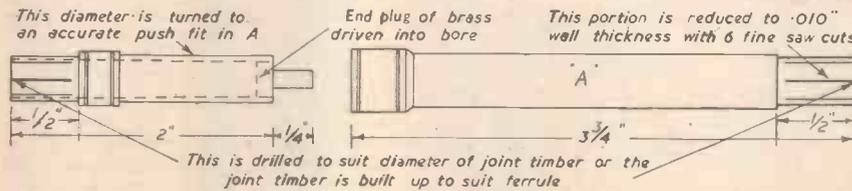
It should be mentioned at this point that the above joints *must not* be made over size,

required is 17/32in. diameter at the small end and 44in. long.

The bamboo can be simultaneously straightened and toughened by warming over a gas ring at the places where it needs straightening; this makes the timber pliable, which can then be pulled over straight. All the bends in the bamboo can be straightened by local heating and, having straightened a bend, the hot portion should be cooled at once with a wet rag.

Heat should not be applied to bamboo already in a very damp condition. Steam generated will cause splitting and only seasoned bamboo should be used.

The knots on the straightened bamboo should be filed off flush and the timber should be scraped and cleaned up with a penknife and sandpaper.



Strong whipping binds the end of ferrule to joint timber.

Whipping. Beech dowel glued into the end of butt timber.

Fig. 3.—The hard drawn brass joint ferrules and how they are bound to joint timber by whippings.

The Top Joint

This joint is 44in. long and measures slightly less than 1/2in. across the flats of the hexagon at the small end, and approximately 1/2in. across the flats of the hexagon at the large end. (See Fig. 1.)

To produce this joint by means of the process described in the first article, the flat, which must be planed on the jig or former, tapers from 1/16in. wide to 9/64in., in a length of 44in., and this is a straight taper.

The Middle Joint

This joint is also 44in. long, and measures approximately 9/32in. across the flats of the hexagon at the small end, and 13/32in. across the flats at the large end.

To make this joint a flat must be planed on the former which, in a length of 44in., tapers from 5/32in. wide to 7/32in. and this also is a straight taper.

These two joints are important, and the sizes given impart the correct flexing action

and reduced to the correct size, after the strips have been glued together, by filing or scraping the joint. This would remove the tough outer skin layers of the bamboo, and the toughness and resilience of the joints would be destroyed! Only the very lightest scraping to remove glue and a light sandpapering, using a fine grade, is permissible to clean up the joints.

Built-up Ends of the Joints

Eighteen thin strips or slivers of bamboo 2in. long, are next split from short pieces of 1/2in. diameter bamboo. Six pieces are glued to each end of the middle joint and six pieces to the large end of the top joint. The slivers are made the same width as the hexagon flats where they are to be glued, and are temporarily bound on with thread while the glue dries. These slivers are used to build up the diameters of the joints where the ferrules are to go. They also add strength where it is most required. (See Fig. 1.)

The Joint Ferrules

For those who have a lathe, first-class joint ferrules should be made from high-tensile brass tubing. The bore of the largest piece of tube should be 17/32in. diameter, so that the

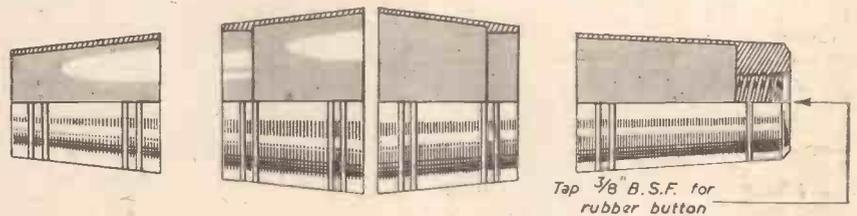


Fig. 4.—Half-sectioned collar, winch rings and butt cap, made from duralumin or tinted brass.

The Butt Joint

The butt or bottom joint is made from good quality tonkin bamboo, which is obtainable from many tackle stockists and sometimes from horticultural sundriesmen. The size

ferrule made from this tube can be warmed and shrunk on to the small end of the butt joint bamboo.

The two pieces of brass of each complete joint are turned and go together with an

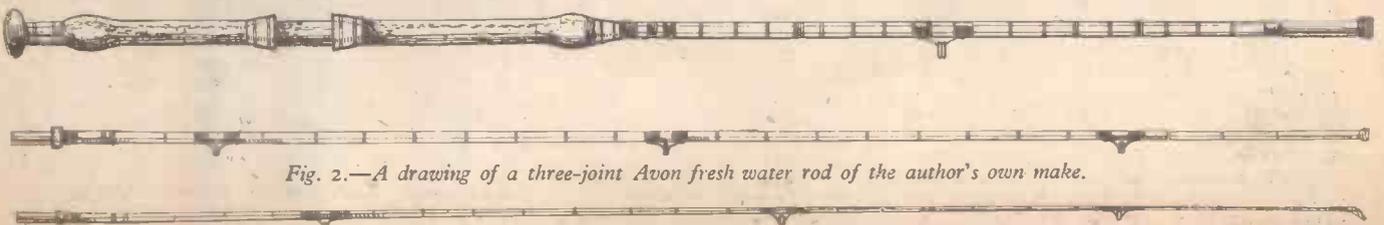


Fig. 2.—A drawing of a three-joint Avon fresh water rod of the author's own make.

accurate push fit. The ferrules should be made light; the walls of the tubes need not finish thicker than $1/32$ in.

The ends of the ferrules which go on the wood are turned down to about .020in. thickness for about $1/4$ in. length, and on this reduced portion six equidistant saw cuts are made. When the ferrules are in position on the joint timber, the reduced portion of the ferrule is bound tightly to the rod timber by a whipping of strong thread. (See Fig. 3.)

When the top and middle joints have been cleaned up, the ends of the joints (where the slivers are glued) should be warmed several times, and at intervals, to dry out the bamboo and shrink it to a more stable condition. The binding is best kept on the slivers while this is carried out. The slivers are next carefully filed round, so that the ends of the joints are a tight fit in the ferrules. The ferrules are driven on the joints with a block of wood, and the reduced portion is whipped down with thread.

The fit of the timber in the ferrules must be very accurate, and the final alignment of the three joints will depend on how straight the ferrules are mounted!

The Handle and Fittings

The handle is built up by gluing into position on the butt timber short lengths of solid cork which can be bought at many tackle shops. The corks should be a good, firm fit on the bamboo, and are glued into position with "Casco" cold water glue. A few of the corks near the bottom of the handle should not be glued, for obvious reasons, until the handle has been shaped and the winch rings are in position on the handle. The corks are reduced with a file and sandpaper to the desired shape. One of the usual shapes is shown in Fig. 5.

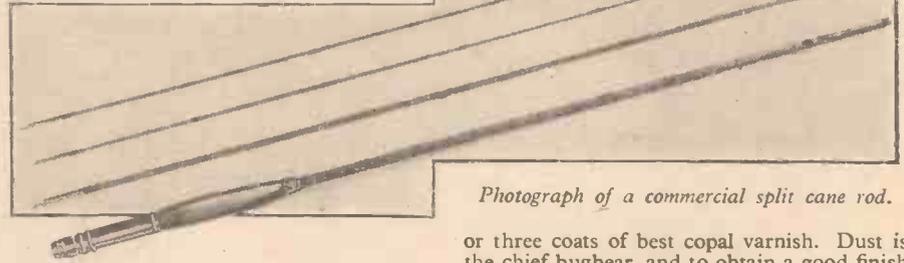
Fittings for the handle consist of a collar, winch rings and a butt cap (to which can be fitted a standard rubber button), as shown in Fig. 4. All of these can be bought at tackle shops as standard fittings in coloured brass or duralumin. The mechanic will prefer to turn his own high-class fittings.

The collar and butt cap are glued in position after the cork has been correctly tapered off to form a tight fit in the bores of the collar and butt cap.

The Rings

The line rings or runners should be of the type that stand away from the rod timber. On all good rods the tip ring and the butt ring are lined with agate, agate substitute or

rings should always be very light and rings lined with agate or porcelain should only be used at the tip and the butt to assist the free running of the line.



Photograph of a commercial split cane rod.

Whipping

The rings are whipped on to the joints with a fine gauge silk, or "Sylo" No. 40 gauge, and the method of whipping is shown in Fig. 7. Regularly spaced whippings (about $1\frac{1}{2}$ in. apart and $1/16$ in. wide) should be put on both built cane joints, while a few ornamental whippings, in perhaps two colours,

or three coats of best copal varnish. Dust is the chief bugbear, and to obtain a good finish a room which is seldom used and in which the windows are closed is a necessity. Absolutely clean brushes and a thorough wiping down of the joints goes a long way towards effecting a good finish.

The next article will detail the construction of a sea rod.

(To be continued.)

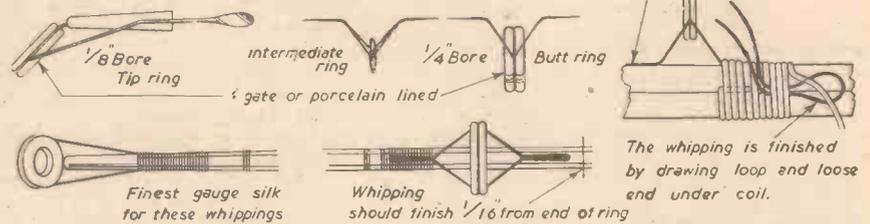


Fig. 6.—The line rings or runners, and Fig. 7.—How they are whipped on to the joints.

just above the collar will enhance the appearance of the rod.

Neat whippings can be achieved with a little patience; the coils of silk should butt closely and not be allowed to cross. When the loose end has been pulled under the coils to finish the whipping, it should be cut off closely with a sharp knife. Each ring can be temporarily held in the correct position on the timber by a band of sticky tape and in this manner perfect alignment of the rings is easily achieved.

The fine hairs of silk should be laid, and the whipping made smooth, by applying a little french polish to the silk, which, of course, will deepen the colour, or clear cellulose varnish may be used. After this has been applied, the finger should be held on

Mobile Blast Cleaning Equipment

A METHOD of blast cleaning metal, concrete, brick, stone or woodwork surfaces in which the round shot used to clean the surface is removed, along with the debris, has been developed by Vacu-Blast, Ltd., 4, Golden Square, London, W.1.

The process, which has been used in America and Australia and is now available in this country, depends on the use of a combined system of three units—a blast gun, a vacuum pump and dust collector, and a pressure-type generator and reclaimer.

Steel Abrasive

The steel abrasive is fired from the gun which is in effect a miniature blast cabinet. The wide circular nozzle of the gun, which has an outer ring of bristles, acts as a shield and prevents the abrasive from flying out and escaping. Immediately after the completion of the abrasive blast, both the abrasive and the debris are sucked back into a chamber formed by the outermost portion of the nozzle and enter the reclaimer. Here the abrasive steel and the debris are separated and the former is airwashed and returned to the supply chamber for reuse.

Because of this constant reclaiming of the abrasive shot the amount of abrasive material which need be used in treating even the largest surfaces is said to be remarkably small—little more than a handful for a day's work.

The equipment can be operated off the mains supply and can be wheeled to any part of a factory, and can be used without the need for special safety precautions, since the abrasive does not escape from the nozzle and the debris-laden air is filtered before being released. Operation of the machine is controlled by a switch located on the gun.

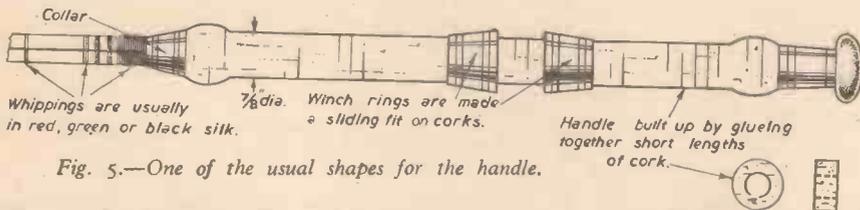


Fig. 5.—One of the usual shapes for the handle.

porcelain. (See Fig. 6.) Intermediate rings are plain wire.

The rings can be bought in complete sets on a card and individually. The intermediate

the silk and the joint rotated. This sticks down the fine hairs. The spacing of the rings is shown in Fig. 8.

The rod should be finished by applying two

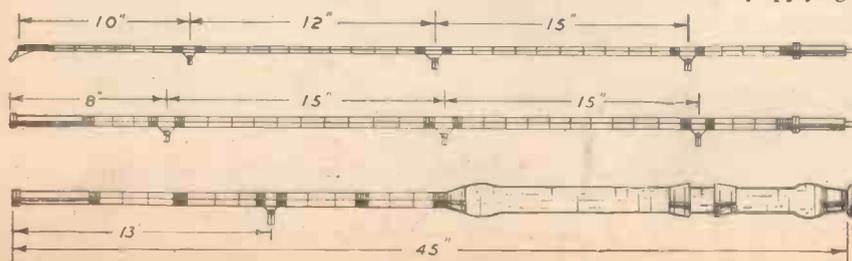


Fig. 8.—The spacing of the line rings.

MAKING MANUFACTURERS' PROTOTYPE MODELS

Model Locomotives : Railway Coaches : Ships and Cars

By "MODELMAKER"

THE speculative mind often wonders, in looking at a finished model which has been purchased over the counter, a model of which one could buy an exact duplicate if one wanted it, how much brain-work, scheming, organisation and machinery went into its production. The preliminary work involved before a model is put on the market is often enormous and the cost correspondingly high. The number of types and kinds of models which are mass-produced is so great that it would be hopeless to attempt to deal with them all in a single article, besides which many models are produced in different sizes and each size frequently calls for different methods of producing their component parts and the assembling of those parts.

The title which heads this article implies that it is the making of the master model, or prototype model, with which we are concerned, and although this is so one has, in designing the prototype, to bear in mind the limits of possibility set by the machine tools, the presses, stamping machines, dies and lathes which compose the plant which is available.

Preparation of Prototype

But the preparation of the prototype is a matter for hand making only; no machinery is wanted except a lathe or lathes. To some extent the hand-made prototype is an experiment to test out the ideas of the designer as regards the methods of manufacture, very largely the appearance of the model, and to weigh up the chances of the mass product making a remunerative appeal to the public.

The first thing which one does when a new production is contemplated is to prepare full size drawings of the model: side elevation, elevations of both ends and sometimes a plan view. Then, if it is to be a working model, the motor must be plotted in, full size on the drawing and the attachments to hold it, be it clockwork, electric or steam, arranged in convenient positions.

It is of the utmost importance, if the model is to be a reproduction in miniature of some particular full-size machine, that the scale copy shall follow the proportions of the original and be as nearly as possible true to scale, otherwise that it purports to be a copy of an original will not be recognised. In the case of ships this applies not so much to the lines of the hull as to the amount of sheer and to the height and proportions of tophammer and funnels, etc. In locomotives it applies to

the diameters and spacing of the wheels, the diameter and height of the boiler, and particularly to the shapes and proportions of the chimney and boiler mountings.

Model Locomotives

In connection with this matter of proportion in model locomotives, a badly designed

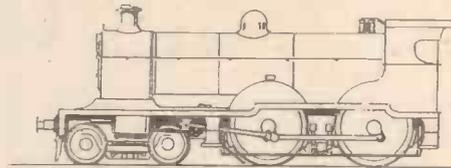


Fig. 1.—The British Railways prototype.

feature to the writer, in Model "O" gauge, is the smallness of the bogie wheels and the fact that one can see daylight all along under the front end of the engine, over the bogie, clearly showing that the bogie carries nothing beyond its own weight. In spite of the fact that these engines have to negotiate small

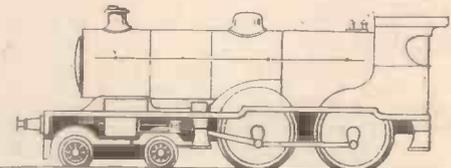


Fig. 2.—The production model.

radius curves it is obvious that the enormous clearances, equal to one-half of the wheel diameter, are not necessary. The daylight could be blocked out by a single black tinfoil brought down on the centre line of the engine or perhaps better still, a plate rising from the centre of the bogie.

Fig. 1 is a scale drawing of a British Railways (London Midland Region) compound engine showing how it should be reproduced in correct proportion and Fig. 2 shows how it is produced.

In preparing a hand-made sample, it is advisable to cut out all pieces of plate-work in duplicate, making tracings from the drawing for the purpose, in

order to get size and shape correct; such tracings should include the depth of flanges overlaps, etc. One set of plates is bent where bends are called for, and if slight modifications are found to be needed when building up, such modifications are made in the duplicate unbent plates. By this method we have by the time the sample model is completed a set of plates from which the dies can be made for stamping. The duplicates must not only be cut to outline but must be drilled and pierced exactly where holes come in the hand-made sample. The mass-produced model may have its sheet metal parts stamped from colour-lithographed tinfoil, but the hand-made sample will be hand-painted and lined. For the use of the lithographers either coloured drawings or hand-painted plates are usually supplied.

Certain portions of a model will be diecast: for instance, the chimney and boiler mountings and the smokebox front, but in the case of these the dies can be made from the drawings and castings used for the sample and afterwards be produced in quantities for the production line. The same thing applies to bogie wheels which, unless they are of cast-iron, will also call for dies. If like the driving wheels they are of iron they will be foundry-cast from a wooden or metal pattern. The chimney, dome and safety valve will be cast with a central, downwardly projecting pin which will pass through holes drilled and stamped in the top of the boiler and be secured by riveting over.

Railway Coaches

Railway coaches will follow the same line

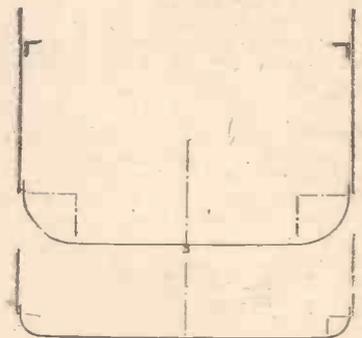


Fig. 3.—A method of constructing models of ship's hulls.

of procedure. If a corridor and seats are fitted these will be all of tinfoil and will have to be erected either before the sides are in place or before the roof is put on, and if the windows

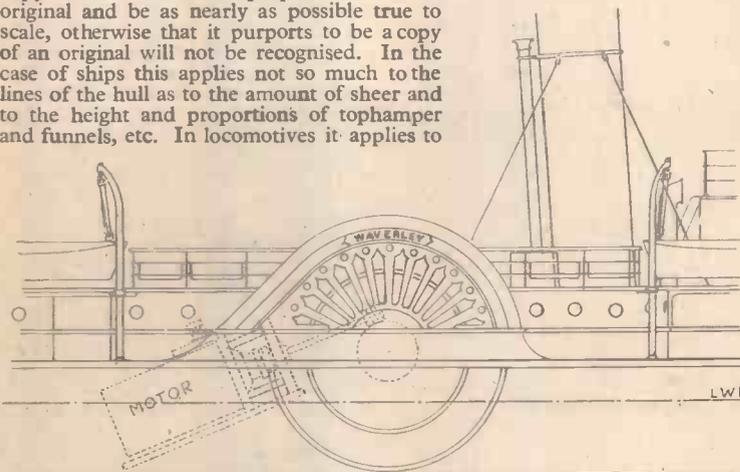
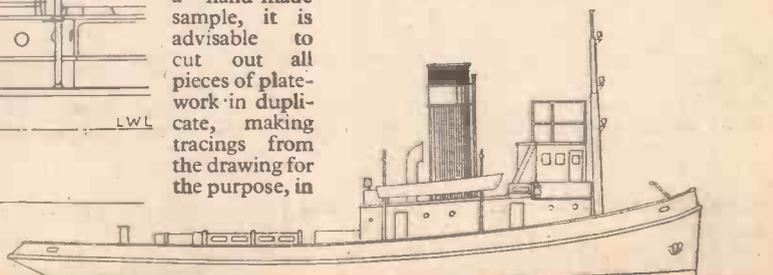


Fig. 4.—(Right) A model of a tug. Fig. 5.—(Above) A paddle steamer and its motor drive.



are to be glazed this, too, will have to be provided for by arranging for turnover clips in the metal stampings. Either glass can be used for the glazing or Perspex, and it can be in separate pieces for each window or in one long strip for all the windows on one side of the coach. The latter is the easier because fewer clips will be necessary, but much depends upon the scale of the model.

In a general way, the ends of coaches have more projecting detail than other parts of the body, therefore it is a good plan to make dies and cast these complete with vestibule couplers. Provision can be made on the inside for fixing by casting on lugs through which screws can pass into the floor, which floor is a wooden board. To the underside of this board all the parts, including the bogies, can be attached with small wood screws. Using wood as a foundation renders the fixing of the sides, ends and interior fittings a simple matter.

Wagons and vans are comparatively easy to deal with and call for no special comment beyond remarking that these are, even in "O" gauge and "H.O." gauge, frequently made, as regards the bodies, entirely of wood and with all diecast running gear. The making in wood on a quantity production basis is just as simple as in metal except for the fact that in wood the painting has to be done by hand or by spraying, but the lettering must be done either by hand or by transfers, whereas in metal all colour work, including the lettering, etc., can be lithographed.

Ships

The number of types of vessels in all sizes is so great that it is impossible to write more than a few general remarks about them.

Apart from yachts and other sailing craft, which come in a class of models which must be differently treated on a production basis because they are made of wood, the model ship is mostly built of metal and can be made up in the master model of either thin sheet brass or copper, three pieces being used. In

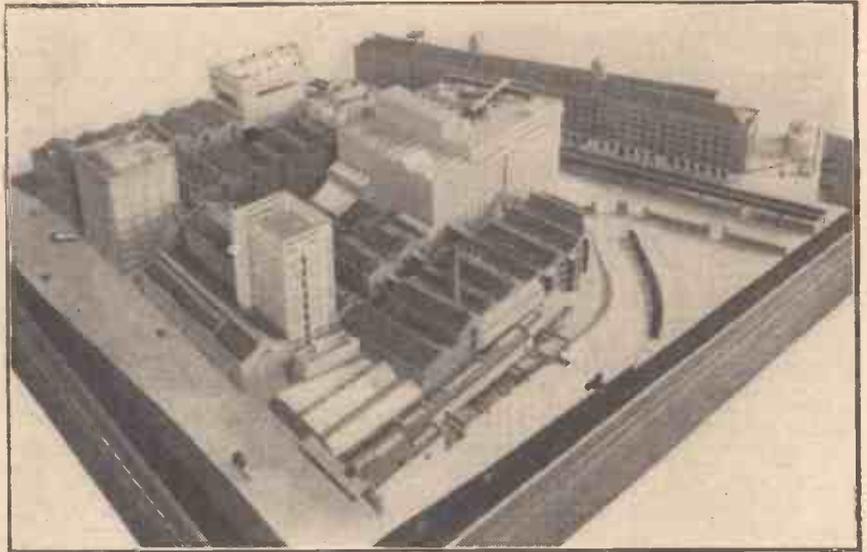


Fig. 6.—A model of a factory, showing the road frontage, with the administration offices at the extreme left.

motor could very well drive the paddle shaft through a worm and tangent gear in the manner shown in Fig. 5. The paddle-driven vessel is old, but is by no means obsolete and there are very many around our coast working in deep as well as shallow draught waters. They are beautiful in appearance, and in the model form have the advantage that the friction and consequent loss of power inseparable from the propeller shaft—set up by propeller thrust and packing in the stuffing-box—is absent. Of the two the friction from the packing is greater than that from thrust because the packing must be tight enough to keep out water. With the use of paddles the only friction is in the paddle shaft bearings; no packing is required because the shaft is

above the water-line even when fully loaded.

Cars

The treatment in modelling motor-cars would be much the same as that of railway coaches, especially if the model is small and clockwork is to be installed as a motive power. But if they are large—of the racing type and powered with little diesel type engines, although the master model may be hand-shaped and beaten in copper—the bodies in the production line will have to be moulded and pressure diecast, either in type metal alloy or in an aluminium alloy or possibly moulded in plastic. Of these the type metal is the best on the score of weight, though it is very fragile and easily fractures. If aluminium or plastic is employed and the adhesion at the driving wheels is insufficient, it is an easy matter to add a cast weight at some point under the car or else make the transmission heavier than it needs to be.

The mass production of model steam and other engines is a comparatively simple matter. It resolves itself into a question of deciding upon the type: whether it shall be horizontal or vertical and, if vertical, whether it shall have one or two cylinders. Then preparing a complete set of drawings and from these of making a set of foundry patterns. From these patterns a set of castings are obtained, machined and made up by hand and the engine tested under steam. After that it becomes purely a matter of organisation of how the castings are distributed for machining to gauges, boring, planing, milling, shaping, turning, assembling, painting and packing.



Fig. 7.—A K.L.M. "Skymaster" plane model, to a scale of $\frac{1}{16}$ in. to 1 ft. One side of the model is cut away to show the interior.

the mass-made product tinned steel plate can be employed, but in the hand-made first model the bottom of the hull should be of copper so that it can be beaten on a hardwood former, with rounded corners at the bilge so that you get a cross-section amidships as shown in Fig. 3; such a section for the bottom would be stamped or pressed for the production line. The deck can be of tinplate for steam-driven vessels and, if preferred, of wood for electric or clockwork propulsion. The same applies to the top hamper, the deck houses, skylights, etc. The funnel will obviously be a metal tube and the masts, if any, of wood. Fig. 4 shows a simplified drawing of a model steam tug which forms a popular and very pretty model. Two boats are shown hung from the davits; these can be little diecastings in production models.

Apparently, no one seems to have thought of producing a model of a paddle steamer: it would be ideal for electric propulsion. The

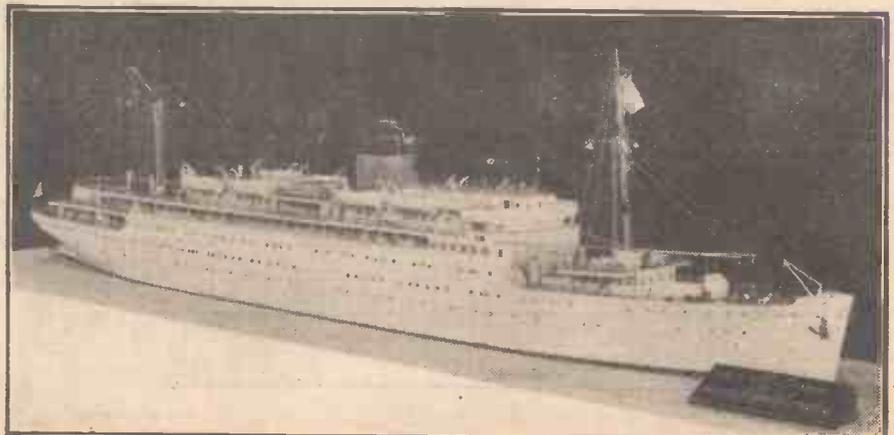


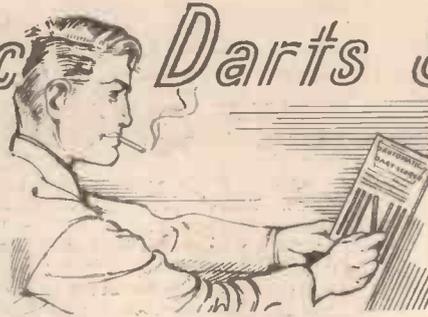
Fig. 8.—Model of the French Line ship, s.s. Colombic. Scale, $\frac{1}{16}$ in. to 1 ft.

An Automatic Darts Scorer



A Simple but Useful Device that Can be Made by the Handyman

By H. E. De R. BERRY



thread can be substituted for the wire staples keeping the parts together.

Apart from the ability to shape a few pieces of cardboard, all that is needed is a little skill in marking out some numbers and you will have a device that will do all the subtraction necessary in a game of darts and
(Continued on next page, column 2)

THE game of darts has gradually acquired an air of respectability becoming to a game of so much skill, which has lifted it from the tap-room into our own homes. The only thing that has prevented some of us from throwing open the door to it is the system of keeping score, whereby we have to subtract our score from the previous total to know how we stand in the game—say subtracting 47 from 301.

Because of this, I developed the automatic score board.

The device can be made in metal, plastic, wood or cardboard, but for simplicity of manufacture the latter will be described—leaving those who work in other mediums to make what modifications they wish to secure greater compactness and durability.

The completed score board measures 12 1/2 in. by 4 1/2 in. and requires for its manufacture a sheet of stiff white cardboard about three times that size. The tools—a sharp knife, a pair of scissors, a leather worker's punch, a pencil and rule, pen and ink, and a stapling machine, if available. The latter is not essential as a few stitches with needle and

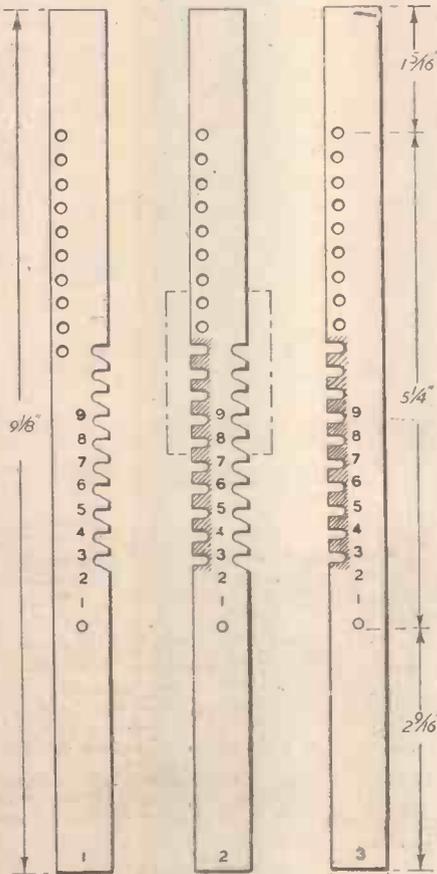
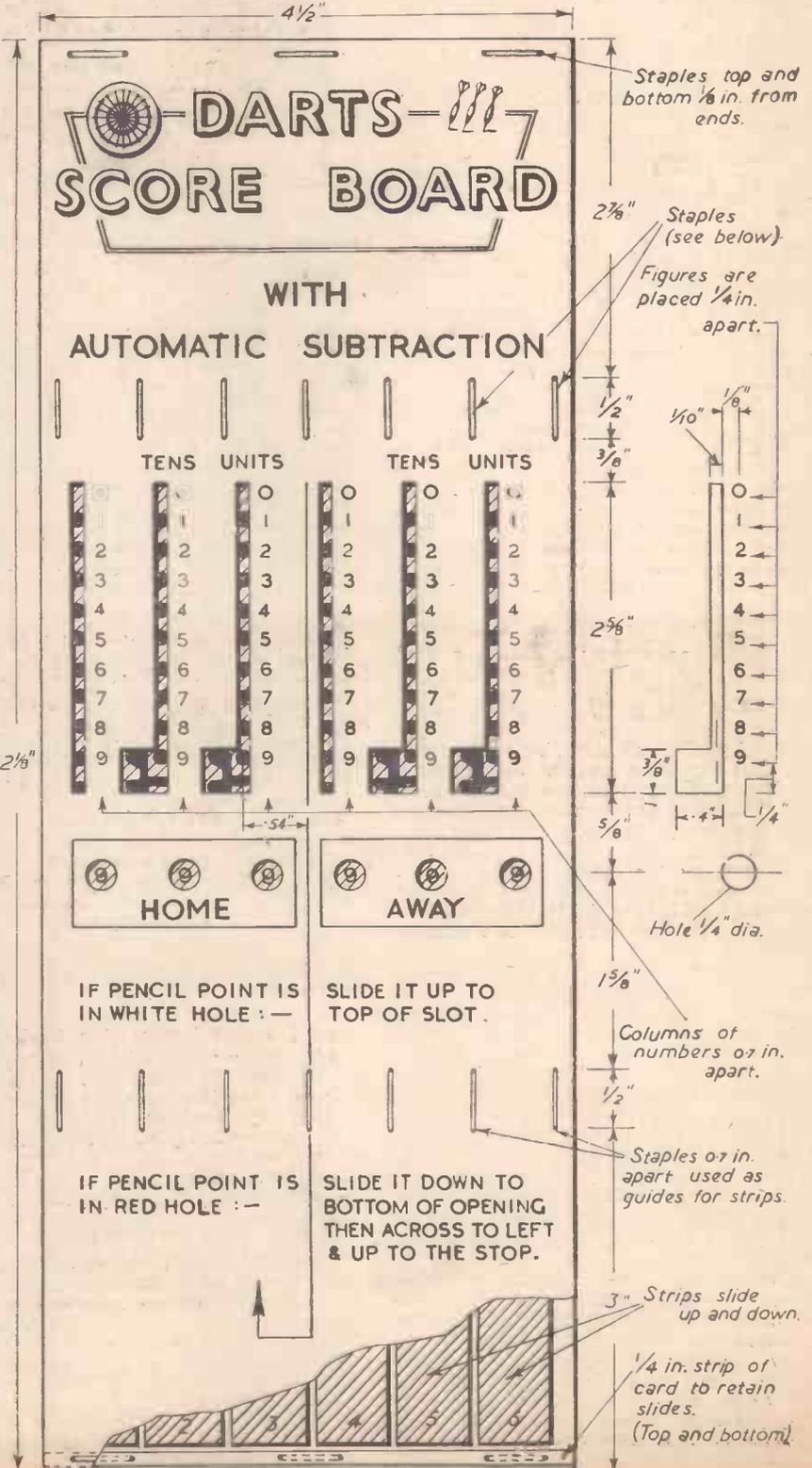


Fig. 1 (Right).—Details and dimensions of the front.

Fig. 2 (Above).—Details of the strips.



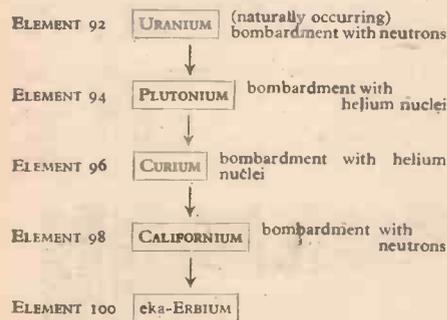
Element 100

THE discovery of element 100, the eighth man-made one, has recently been mentioned, very soon after the announcement of the production of element 99, by the same group of investigators at the University of California.

It has been made by bombarding element 98 (californium) by high-velocity uncharged particles (neutrons). Only a minute quantity of it has been prepared, and extremely delicate techniques have been evolved to detect its existence, for it is short lived, having a half-life period of approximately three hours. The particular variety of this element that has been detected is an isotope of atomic weight 253.

Californium

It will be recalled that in "Man-made Elements" (July 1954) the production of californium by a step-wise process of neutron capture by an isotope of the element plutonium, viz., plutonium 239, was described. The steps leading to the formation of element 100 are summarised below:



Novel methods of separation of these new elements have been devised. Since most of them are so unstable, separation must be quickly effected and ion exchange techniques and chemical precipitation are usually employed.

Element 100 has similar chemical characteristics to a rare-earth element, erbium, and if a method of naming similar to that used for element 99 is adopted, it should be tentatively called eka-erbium.

As previously pointed out this is not the last new element that will be discovered, for it is becoming increasingly apparent that, provided particles of sufficiently high energy can be generated, these will attach themselves to the nuclei of existing elements. The continuing improvements in the design of particle-accelerating machines, such as cyclotrons and synchrotrons, mean that higher velocities should be attained.

Unfortunately, most of the new elements are only short lived, the nucleus emitting particles within a short time of its creation and thus reverting to one or more of the simpler and stable elements.

Some investigators think that this nuclear instability will continue to increase as the size of the nucleus of the new elements grows and suggest that the total number of elements that can exist will be 110. On the other hand it is possible that amongst the elements yet to be discovered there may be some that are abnormally long lived and these could very well be starting points for whole series of elements, some of which may never have existed before.

An Automatic Darts Scorer

(Continued from page 19)

will show, at any time in the game, the points remaining to be scored for you or your opponent to win.

Method of Manufacture

First, cut two pieces of cardboard 12½ in. by 4½ in. One of these forms the back and remains plain. The other is marked out and lettered up as shown in Fig. 1. If you are not fond of printing, all but the vertical columns of numbers may be omitted. It is important, however, to place these exactly in the positions shown, and to adhere strictly to the dimensions of the areas which have to be cut out.

Next, cut six strips of cardboard 9½ in. by 0.6 in. to form slides. Mark out three of these as shown in Figs. 2 and 3, punch the holes and cut slots. Print in the figures and colour the shaded areas red. This completes slides Nos. 1, 2 and 3. Repeat for slides Nos. 4, 5 and 6.

Now secure the front of the score board to the back by two rows of staples in the positions shown in Fig. 1. These staples also provide vertical guides between which the slides move up and down. They must accordingly be placed accurately.

The slides should now be inserted in their respective slots with No. 1 on the left and No. 6 on the right (Fig. 1). The slides should be capable of being moved freely up and down, but should not be so loose as to move without effort. If a thin ruler is inserted in the slots before fitting the slides it will open them up sufficiently to provide this smooth, sliding fit.

To complete the score board, a cardboard strip ½ in. wide is inserted between back and front along the top and bottom edges and stapled in position. The one along the bottom edge is shown in Fig. 1, and is fitted after the slides have been pushed right home in their slots.

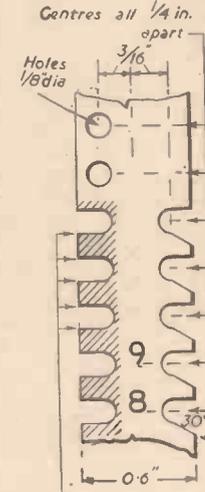
Instructions for Use

Hold score board in palm of left hand or rest it on a table, steadying it at the edges so as to avoid any pressure between the front and back which would prevent the slides moving freely.

Set the winning total, say 301, so that it appears in the windows above "Home" and "Away." This is done by inserting a pencil in each slot in turn so that the point engages in a hole in the slide, then move it up or down in the slot until the required number (301) appears in the windows.

Now to register a score of, say, 47. Insert

the pencil point in the hole opposite 4 in the "tens" column, move it right down to the bottom of the opening, then across to the left and up to the stop. Repeat, using the hole opposite 7 in the "units" column. The number in the windows will now be 254, which is the total remaining to be scored after 47 has been taken from 301.



All measurements this side 1/8 in.

Shaded portion red.

Fig. 3.—Measurements of the slots and holes.

Suppose now that 39 is scored at the next turn—insert the pencil point in the hole opposite 3 in the "tens" column and move it up to the top of the slot.

Then put the pencil in hole 9 of the "units" column and move it down to the bottom of the opening, then across to the left and up to the stop. The number now appearing in the windows will be 215—the result of taking 39 from 254.

The subtraction of the score from the previous total is entirely automatic.

It will be noticed that the movement of the pencil is either:

- (a) Down to the bottom of the opening, then across to the left and up to the stop, or
- (b) Up to the top of the slot.

The rule to follow is that if the pencil is inserted in a red hole the movement is as described at (a). If it is inserted in a white hole, the movement is as described at (b).

The score necessary to win is clearly shown at any stage of the game by a glance at the windows. The "Home" and "Away" teams use the left-hand and right-hand half of the board respectively.

Should a blank appear in a window during the course of play, it may be cleared to show the outstanding total by inserting the pencil in hole "0" at the top of the corresponding slot and moving it as described at (a).

Remember to hold the board lightly to allow the slides to move freely, and keep the pencil upright. Do not move the board violently, such as by throwing it down on the table, as this will cause the slides to alter position and thus give a false reading.

show. Hon. Sec., E. CHURCH, 14, St. Mildreds Avenue, Ramsgate, Kent.

Club Reports

Beaufoy Model Engineering Society

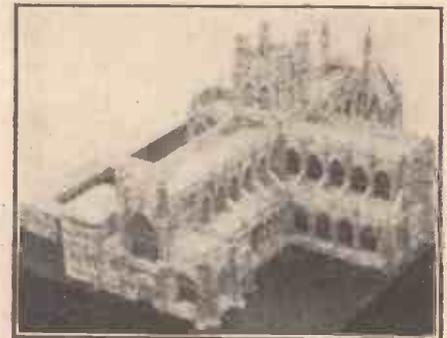
THIS society re-opened its workshops on Monday, September 27th. These well-equipped shops have every facility required by the keen modeller, including lathes, shapers, millers and grinders, both horizontal and cylindrical.

The Hon. Sec. is: S. T. HUNT, Beaufoy Model Engineering Society, 39, Black Prince Road, S.E.11.

Ramsgate and District Model Club

THE annual exhibition held from August 16th-21st was the most successful ever held by the club. A record number of people came to see the show, and without exception praised the high standard of workmanship and the varied interests of the many exhibits.

The presentation of the cups and trophies to the winners took place at the annual general meeting on September 22nd. A large number of new members enrolled during the



Some 13,500 matches were used in the construction of this fine model of Chester Cathedral. It measures 24in. long x 19in. wide and 10in. to the top of the tower. There are 121 coloured plastic windows, which are illuminated by four bulbs, powered by a concealed battery. Inside there is the high altar, choir stalls and pews.

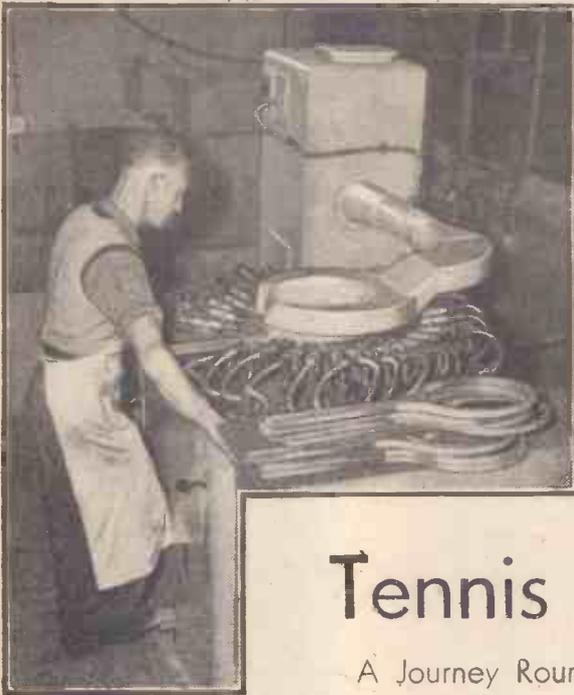


Fig. 2.—The drilling machine.

between five and ten minutes, depending on the thickness of the veneer, and the speed of the machine can be controlled to give a final moisture content of 10 per cent. To prevent stresses when the components are assembled into tennis frames, it is important that all timber is dried to this figure.

Another machine is employed to scarf-joint small pieces of veneer or plywood into larger units, the joints formed being just as strong as the original timber, so avoiding the waste of material merely because it may be undersized.

The various woods are next cut into the necessary lengths, planed and trimmed ready to form the frame laminations.

The strips of the various woods are then glued together to form one long laminated piece, then bent into shape, the centre of the piece forming the bow and the two ends being brought round and pressed together to form the central foundation of the handle.

After being roughly smoothed, the shape is passed to the drilling machine.

This machine drills a large number of holes simultaneously and replaced the machine which drilled each hole individually. The tennis racket drilling machines are operated entirely by air pressure and drill a frame in four movements. See Fig. 2.

The outer parts of the handle are next glued into place and this is done by high frequency glueing, a method of setting glue joints which is coming into increasing use to-day. The heat is generated by high frequency power oscillating at 18,000,000 cycles per second, which results in uniform heating in a matter of minutes. Other methods of heating are much slower, for the heating depends upon conduction through the wood.

Tennis Racket Manufacture

A Journey Round a Well-known Tennis Racket Factory. Details of a New Man-made String

MOST people have at one time or another owned or used a tennis racket, but how many realise the work and skill entailed in its production? The following is a brief account of the stage by stage production of a racket as it is carried on at the famous Dunlop factory at Waltham Abbey.

The basic frame or bow and the handle are of laminated construction and several types of wood are used in each racket. The timbers, which are kept in a wet timber store until required, are listed below in the order of their importance.

	Country	Where used	Remarks
Ash	England	Bow	The strongest and toughest timbers for their weight in the world.
Birch	Canada	Bow	
Hickory	U.S.A.	Bow	The world's toughest timber, but rather heavy.
Beech	S.E. Europe	Bow	A strong, tough timber with characteristic colours.
Sycamore	England	Wedges	Clean looking, moderately strong but medium weight timber.
Mahogany	W. Africa	Wedges	
Obechi	Africa	Handles	Light, straight grained, attractively coloured timbers.
Gaboon	Africa	Handles	

Cutting and Drying Veneer

The roughly trimmed logs are cut into lengths of approximately 5ft. and are placed in a steaming tank for 36 hours. The steam penetrates the centre of the log, softening the timber, giving a smoother cut, and making the bark easier to remove. The log is then placed on the rotary peeling machine where it is rotated against a knife moving at a fixed speed. Working on a similar process to a lathe, the machine converts the log into one continuous sheet of veneer. Veneers can be cut from .005in. to 3/16in. thick. By this method the sawdust waste in normal sawing methods is completely eliminated.

After peeling, the damp veneer is passed through the drying machine—a number of steam-heated platens alternatively gripping and releasing the veneer as it is fed through by rollers. This drying operation takes

This work is carried on in the component mill by various special machines, designed to deal with large quantities of wood daily. Here also is the Crescent Bending machine which deals with piece number 7, Fig. 1.

Battens of ash are steamed for one hour before bending in this machine. The bends are sliced on a circular-saw to form crescents for the rackets.

After laboratory research Dunlop have adopted a new glue of their own, based on synthetic resins.

The frame assembly is now complete and it is next passed through a long series of trimming and sanding operations which convert the frame to the shape that we know. The better quality rackets are hand finished by skilled craftsmen, some of whom were at

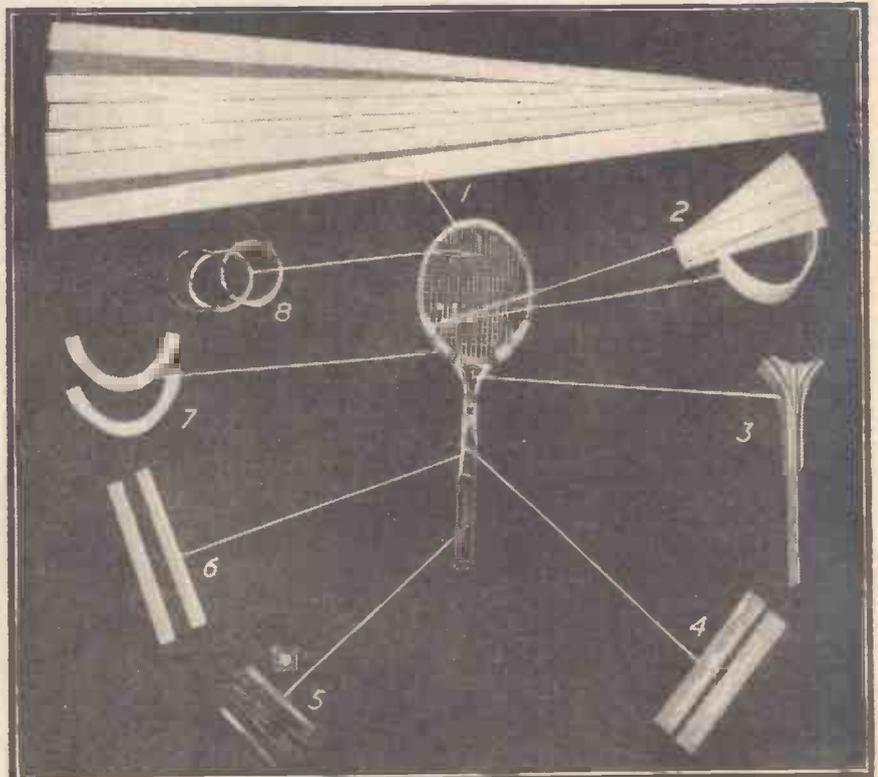


Fig. 1.—(1) Veneers of hickory, ash and beech. Two strips of fibre are also shown. (2)—Laminated insertion consisting of ash veneers and one strip of white fibre. (3)—Ash centre slip, wedges and strips of fibre. (4)—Handle faces of sycamore and mahogany. (5)—Leather grip, knobbing leather and end leather. (6)—Handle side pieces also sycamore and mahogany. (7)—Crescent made from steam-bent ash. (8)—Coils of natural gut and one coil of silk trebling.

one time responsible for making the entire frame. These operators also make their own tools.

Polishing Department

A conveyor in the polishing department carries the frames through the strip-fitting and transfer-fitting operations into the electrostatic spray plant where the final coats of clear lacquer are applied. A great advantage of the conveyor is that it keeps the frames from touching each other at a time when the decorations are particularly delicate.

The electrostatic spray plant recently installed is one of the few in this country. It makes use of a revolutionary spraying technique. Instead of using conventional spray guns, the lacquer is forced through tubes into revolving bells which discharge the lacquer by centrifugal force, atomisation being achieved by supplying an electrostatic voltage of 100,000 volts direct to the metal bell. This results in a stationary cloud of positively charged lacquer particles through which the earthed frames pass on the conveyor.

The lacquered particles are attracted to the frames, and about 95 per cent. of the lacquer is actually deposited upon the frames.

Those with some knowledge of electricity may regard wood as a non-conductor, which, at ordinary voltages, it virtually is. At the high voltages (100,000 volts) at which this plant operates, however, there is sufficient moisture in the timber for it to act as a conductor. The frame therefore attracts the

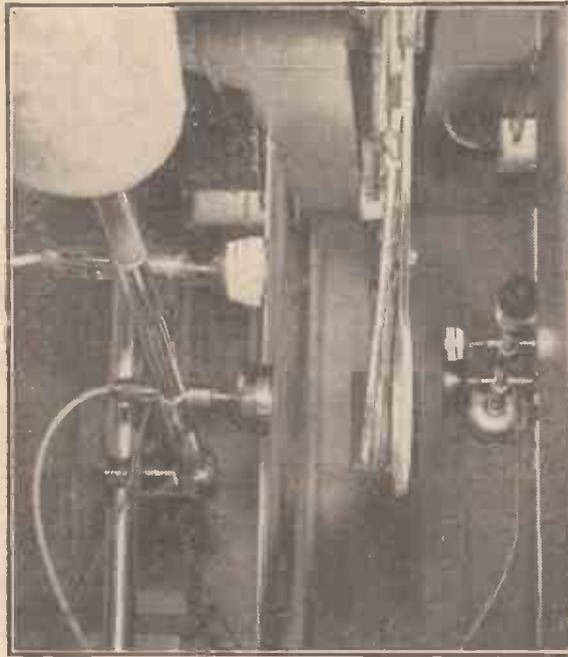


Fig. 3.—Electrostatic spraying of rackets.

lacquer particles from all directions; under ordinary hand-spraying conditions, much of the lacquer deposited on the tennis frames in the electrostatic plant would have passed by the frames, up through the extraction plant, and been wasted.

Stringing

Hand stringing which, in inexpert hands, can seriously damage a frame, has not yet

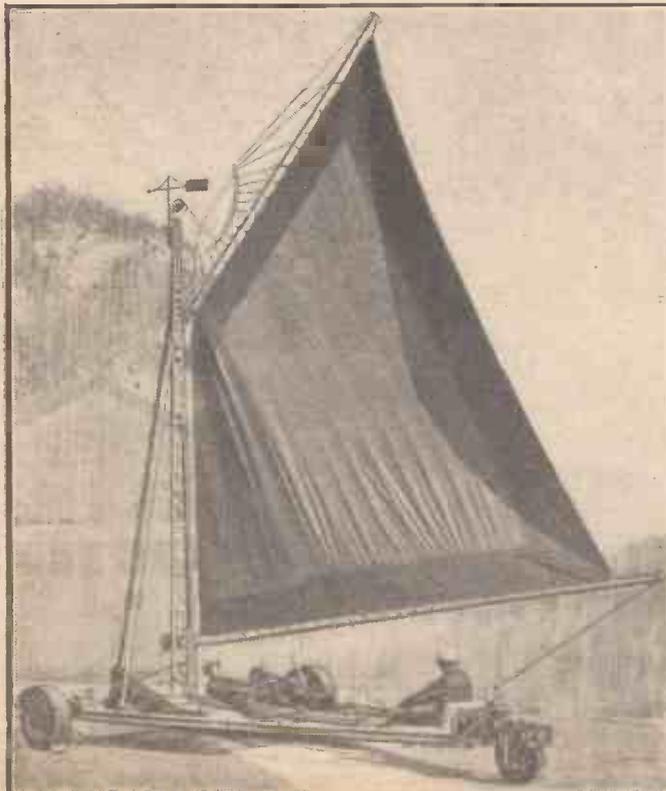
been replaced entirely by machine stringing. The racket head is held securely to prevent distortion during this operation and tension is applied by air cylinder, the air pressure in which can be adjusted to give any desired tension up to 85 lbs., but the actual weaving operation is still carried out by hand.

A Synthetic Gut

Natural gut is variable in quality; the intestines of about five sheep are needed to produce one set of strings for a racket and there may be a good deal of difference between the intestines of one sheep and another. To overcome this variation in natural gut, and at the same time to retain its good points, Dunlop set out 2½ years ago to build a string from man-made fibres. The result was "Durolastek," formed from spiral wrappings of nylon or terylene wound round a central nylon core.

This new string has been subjected to exhaustive tests in the laboratory, with the result that it was found to be as strong as the strongest natural gut; it is slightly more "stretchy," and it is completely unaffected by prolonged soaking in water. A racket with natural gut can be ruined on one damp afternoon. The new string is also unaffected by bacterial or fungal attack. Tests for wear showed that the new string should last from five to ten times as long as natural gut under normal playing and storing conditions. Many other ingenious tests have also been carried out, the apparatus used even including a cathode-ray oscillograph to measure the time the ball is in contact with the racket. In appearance the new fibre resembles the natural produce so closely that some 4,000 people have been using it in Dunlop rackets without knowing. These strings are cheaper than natural gut and will probably lower the price of tennis rackets. They should, owing to their great advantages become very popular with tennis enthusiasts.

Britain's Largest Sand Yacht



The "Coronation Year," Mark II.

BRITAIN'S largest sand yacht, whose attempt to establish the first British native speed record over the flying mile at Lytham St. Annes will be history by the time this issue is published, has been constructed mainly in light alloys, including duralumin supplied by James Booth & Co., Ltd., to meet the requirements of strength and lightness.

The yacht, known as the Coronation Year Mark II, was designed and built as a hobby by Mr. R. Millett Denning, a Hampstead man who became interested in the sport of sand yachting about 10 years ago. He designed the first yacht (Coronation Year Mark I) ever to be built of light alloys last year—it weighed 7 cwt. (unladen) with a sail area of 246 sq. ft. and reached a speed of 50 m.p.h.

The Mark II was developed from this. It has a sail area of 286

sq. ft., is 30ft. high, 26ft. long and 16ft. wide and weighs 9 cwt. unladen. It is expected to reach speeds of more than 75 m.p.h. and, while doing so, be able to turn in its own length.

At present there is a two-man crew—the mainsail operator and the tiller man—but subsequent developments will probably require a four-man crew as the installation of a port and starboard Genoa jib is under consideration.

The unique arrangement at the mast-head is designed to eliminate any undue stress in the duralumin gaff boom when the cotton mainsail is filled during racing. The entire yacht is assembled by a system of wing nuts and couplings and can be dismantled and transported on a Land Rover with ease.

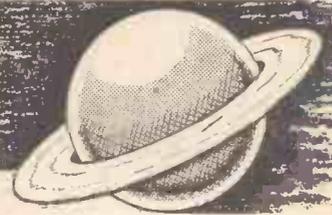
It is interesting to note that the first known sand yachts in this country were at Southport in 1895; they were mainly of timber construction and fell into disuse owing to the advent of the motor car. There has been a revival of interest in the sport of latter years in other countries, and Mr. Millett Denning maintains that there are numerous stretches of sand around our own coast which would be more than suitable, particularly as they are not used to any great extent during the winter, spring and late autumn. The Fylde International Sand Yacht Club has now been formed at Lytham St. Annes to popularise the sport over here and attempts on speed records will be held under their rules.

PRACTICAL MECHANICS HANDBOOK

By F. J. GAMM.

12/6d. or by post 13/-.

ASTRONOMY



2.—The Moon

By E. W. TWINING (Illustrated with drawings by the author)

THE Moon is a satellite of the Earth and revolves around our planet in an elliptical orbit at a mean distance of 239,000 miles. At times the distance reaches a maximum of 253,000 and is never less than 222,000 miles. Compared with the remoteness of the other planets and their satellites this space which separates us from the Moon is small and it is therefore not surprising that we know more of the physical appearance and formation of it than we do of certain parts of the Earth. That is to say, of the single pallid face that is ever turned towards us.

Powerful telescopes have been designed of late which are capable of bringing the Moon optically within a few miles of the Earth. Physicists have mathematically weighed it and found its mass to equal one-eightieth of that of the Earth, or seventy-three trillion tons. Its thousands of craters, mountain ranges and great dark plains have been studied, photographed and mapped in their entirety and in detail. The plains were, in ancient times, before the invention of the telescope, given the name of *maria*, or seas. For that is what the dark markings were thought to be, and each one was given a most inappropriate name, though for convenience these names are still retained by astronomers.

Moon Has No Water or Atmosphere

The origin of our Moon was explained in my previous article. It was formed, at the same time as the Earth, out of the planetary nebula of which the Sun was the nucleus. About fifty years, or more, ago it was thought that the Earth once revolved on its axis at a

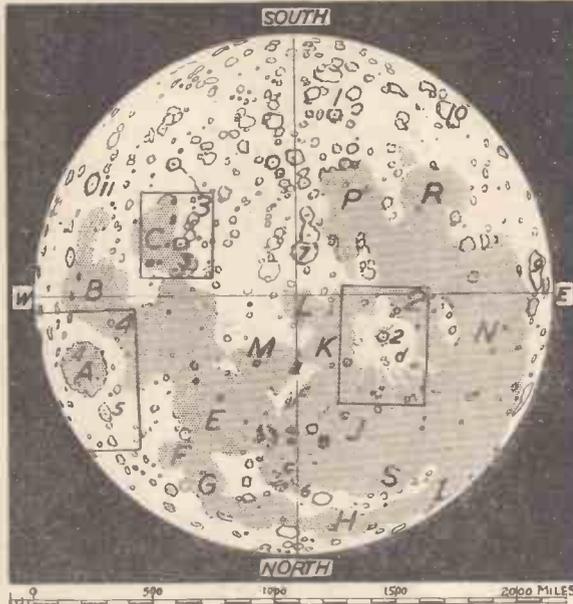


Fig. 1.— A map of the moon.

far higher revolutionary speed than it does to-day and that centrifugal force caused a great mass to be flung off, which mass became the Moon, but such flinging off was not necessary and it is much more reasonable to believe that a mass, or masses, were already there, in the nebula, which, by shrinkage, became respectively the Earth and the Moon.

Arising out of this shrinkage there is a very significant fact: we know that the Moon has no atmosphere surrounding it and no water on its surface. Much speculation and argument have been devoted to this. Some thinkers have put forward the idea that such water as once was on the surface has since gone into vast interior caverns. But what of the atmosphere? That cannot have gone to the interior, its bulk would be too great. Another hypothesis was that the water had gone to the face of the Moon which is always turned away from us, but this also is untenable: if water were present it would be much more likely to obey the attraction of the Earth and accumulate on

our visible side of the satellite. The conclusion that we are forced to come to is, to believe the evidence of our eyes, that the Moon has no water and no atmosphere, that these were both drawn off—or the elements that make them—as the nebula cooled, by the larger body of the Earth. I venture to think that the same thing happened with the satellites of all the other planets: Mars, Jupiter and Saturn. Our Moon is the largest of all the satellites in proportion to the planet about which it revolves, so that it is difficult to find out, owing to their smallness and distance, whether any of the satellites of, say, Jupiter and Saturn have any trace of atmosphere surrounding them, but it would be most interesting, with the biggest telescopes in America, to investigate this.

The Moon's Orbit

The Moon rotates on its axis in the same time as it takes to revolve around the Earth, roughly in 27.3 days. That this is not a coincidence is proved by what is known as its libration: that is to say, its rotation, or rotary movement, is not uniform. Sometimes it becomes accelerated and then it appears to have a brake put upon it. Actually there is a brake, and that brake is gravity. The

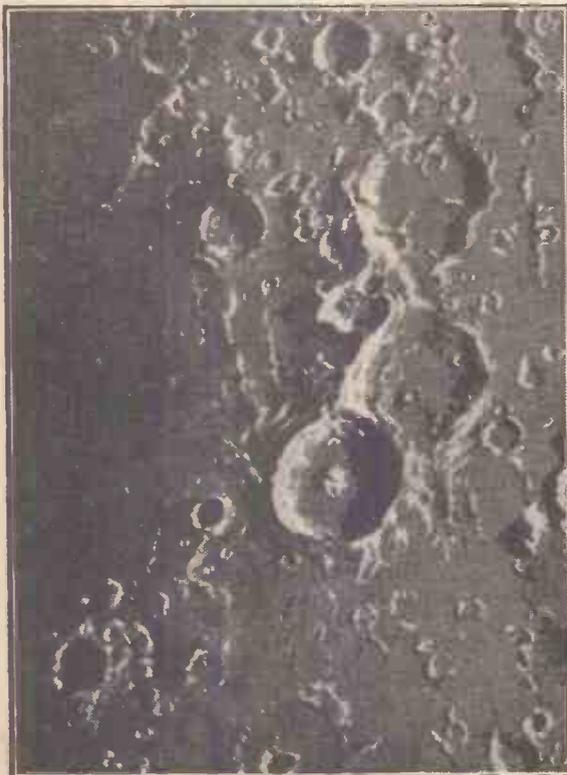


Fig. 2.—The crater Theophilus and surrounding region.

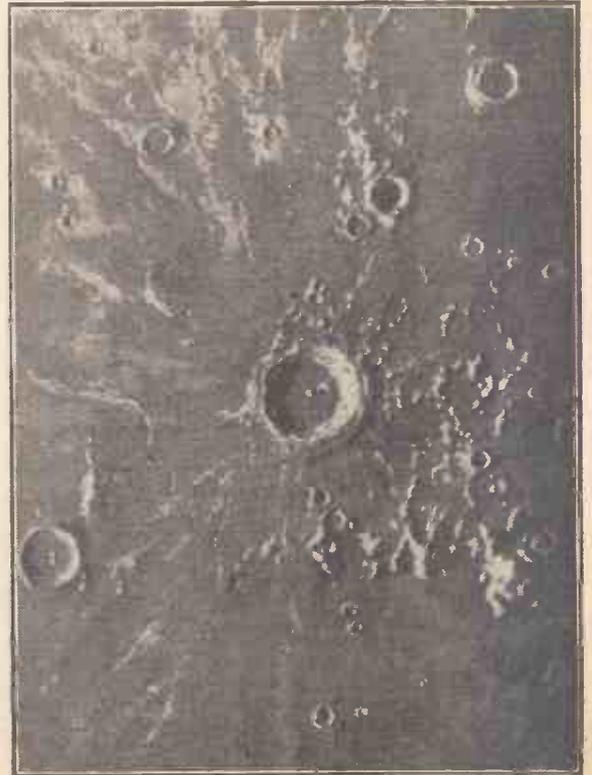


Fig. 3.—The crater Copernicus and surrounding region.

centre of gravity of the Moon is not in the centre of its mass; it is about thirty miles nearer to the Earth than the centre of its figure. This is not sufficient to keep it steady, but it is sufficient to keep always one side, more or less, turned towards us. The consequence is that its wobbling motion enables us to see, sometimes, a little more of its western side and at times more of its eastern limb. It is probable that if the centre of gravity coincided with the centre of its mass and figure we should see a slow procession of all the faces of the Moon's surface, although there is little doubt that the hidden portion does not differ much in appearance from the side with which we are familiar and, probably, not at all in character. There are, most probably, the same kind of dark plains and the same thickly pitted surface which we see on the side turned towards us. A map of this face is given in Fig. 1 and appended is a list of the chief features.

The so-called "Seas"	Mountain Ranges
A Mare Crisium	a The Lunar Apennines
B Mare Fecunditatis	b The Caucasus
C Mare Nectaris	c The Lunar Alps
D Mare Tranquilitatis	d The Carpathians
E Mare Serenitatis	
F Lacus Somniorum	Prominent Craters
G Lacus Mortis	1 Tycho
H Mare Frigoris	2 Copernicus
I Sinus Roris	3 Theophilus
J Mare Imbrium	4 Mare Crisium
K Sinus Aestuum	5 Cleomedes
L Sinus Medii	6 Plato
M Mare Vaporum	7 Ptolemy
N Oceanus Procellarum	8 Archimedes
P Mare Nubium	9 Grimaldi
R Mare Humorum	10 Schichard
S Sinus Iridum	11 Petavius

Theories About Moon-Crater Formation

To explain the cause and origin of the pitted surface of the Moon is my chief object in writing this article. There are, or were, three theories for accounting for the thousands of pits or craters which are visible—and doubtless there are thousands more which are too small to be resolved by the most powerful optical means. They vary in size from about 230 miles in diameter to only a few yards. The first and earliest theory is that the craters are the result of volcanic action. Now whilst such deep, circular and well-formed rings, averaging perhaps forty miles in diameter, might have the appearance of volcanoes, what explanation can there be for the many walled plains such as the prominent, dark-floored, Plato at the edge of the Mare Imbrium, having a diameter of about seventy miles, or the thousands of very small pits which are mere impressions in the comparatively smooth surface of the so-called "seas"? The volcanic theory is completely negated when we remember that volcanoes give off water and carbonic acid gas. What has become of the water? Water cannot exist without air, and what has become of the vast quantities of gas which must have been expelled from such an enormous number of volcanoes? If there had been such an evacuation of gas the quantity of it expelled would have left the Moon as an almost hollow shell. Then again, in very many cases, craters are overlapping craters and in certain places all are thickly crowded together.

Another theory is that when the surface was in a plastic state, ebullition of steam and gas caused enormous bubbles to form and burst. Now this would yield exactly the sort of formations which we see on the Moon. I have myself watched porridge boiling in a saucepan and have seen steam bubbles forming and bursting and leaving, for a few moments, exact replicas of the craters in the Moon, but in the Moon we have nothing to cause ebullition; no water, steam or gas. In any case, boiling porridge yielded bubbles and craters all of the same size as would have ebullition in the Moon.

Meteorite Bombardment Theory

Finally we come to the third theory, and I should like to know who first propounded it so that I might honour him by giving his name. I have myself held the theory for the last sixty years though I have never threshed it out thoroughly until comparatively recent years. It is undoubtedly the right one for it satisfies all the conditions which we know to exist. The theory, which I have never seen expounded to the full, is that the Moon, as



Fig. 4.—The Mare Crisium and large crater Cleomedes.

it cooled and its surface became in a plastic state was bombarded by thousands of bodies, large and small, from outer space. It is my belief that these bodies were either meteors and meteorites or, more probably, that between the Earth and Mars there was a belt of Asteroids similar to the Asteroids revolving between Mars and Jupiter. The latter are bodies which vary in size from perhaps 50 miles in diameter to others which may be no larger than good sized boulders. Their orbits are elliptical and some extend out nearly to the orbit of Jupiter whilst others actually enroach on the orbit of Mars. So far as we know, some of the shoals of meteors may be the remnants of a second and inner belt of Asteroids, the majority of the members of which, millions of years ago, may have been collected by the Earth and the Moon. It is certain that, whether they were Asteroids or meteoric bodies from outer space, the objects which bombarded our globe and the Moon varied in size similarly to the Asteroids. Our Earth had not then cooled sufficiently to retain any impressions of the impacts of the bodies as does the Moon and even on the Moon there are impressions which the surface was only just sufficiently solid to retain. Shown in Fig. 2, at the extreme bottom centre, there are two rings, each about forty miles in diameter, the right hand one of which is barely visible though both must have been formed by projectiles which struck thousands upon thousands of years before the missile which formed the giant crater Theophilus, which is the one nearly in the centre of my drawing. The two other craters adjoining Theophilus

were both formed earlier than Theophilus and the third one, which is named Catharina, has another impact ring, within it, which is only a little later, and the missile which formed it partly destroyed the ring wall of Catharina.

Age of Craters

In Fig. 3, the principal object of which is the noble crater Copernicus, there is, near the bottom right-hand corner, some dark irregularly formed circles, without any trace of walls, which mark the earliest traces left of impacts. All that the missiles could do was to break through the liquid crust which was slowly forming and bring to the surface the dark material of which the "seas" are composed. This material was later to become, probably, a darkly coloured sandstone. Almost in a horizontal line with Copernicus, on the left-hand side of him, there is a well-defined crater whose walls are so shallow that they are only just visible; this was another very early impact and it must be of somewhat the same period as those at the foot of Fig. 2.

The largest circular walled plain which we see on the visible side of the Moon, so large is it that it was named as one of the "seas," is the Mare Crisium. This measures about 230 miles across and, in spite of its dimensions, one is forced to the conclusion that it is a crater, caused by the impact of a body of tremendous size. Near it is a much smaller, but still a great, crater, Cleomedes, of later period than the Mare Crisium. Both of these are illustrated in Fig. 4.

It will have been observed by those who have made a close telescopic study of the surface of the Moon that, in the vast majority of cases, the projectiles which crashed down upon it did so vertically, or nearly so, and so made perfectly annular craters, such as Copernicus and Theophilus. But not all of the missiles struck fair and square. Quite close to Copernicus there are two long irregular lines of small pits each line of which must have been made by single projectiles, which bounced and ricocheted for many miles before coming to rest. As the first hit in each line is little or no bigger than the last the evidence is that the points of first impact were about tangential to the curved surface of the Moon.

Many instances of angular striking can be found by looking for them, but I think that the most remarkable is one that took place after the great mountain ranges were formed. The reader who has a good telescope can see the result of this impact for himself when the Moon is at the first or last quarter. It is to be found in the Lunar Alps (C in the map, Fig. 1) not far from the great crater Plato. A tremendous furrow, perfectly straight and smooth and of gradually increasing depth, has been ploughed into and nearly through the Alps. The whole length of the furrow extends for at least fifty miles. In appearance it looks as though a gigantic gouge had, ignoring irregularities, made a straight cut into a piece of soft material, just as might a woodcarving tool in pine. I have never been able to see any trace of the missile; probably it is buried in the mountains where the furrow terminates.

Between the earliest visible record of bombardment and the last many millions of years must have elapsed. Such craters as Theophilus, Copernicus, Tycho and many

others which I have not mentioned, must have been formed much later, when the Moon had reached such an age that the crust was solidifying, but the projectiles must still have been of great size and weight and have had tremendous velocities, for they broke through the more or less solid crust, raised mountain walls thousands of feet high, splashed outward crystallising material for great distances, and raised a cone, or conical mountain peak in the centre of the crater. I specially mention the crystallising material, which is possibly a form of spar, because of the bright streaks which radiate from several of the later craters, notably from Tycho; these last stretch for hundreds of miles in all directions. When illuminated obliquely they are invisible but shine brilliantly under direct rays of the sun at and about the period of full moon. Only

ice or a crystalline material such as spar could give such an effect.

With regard to the central mountain peaks it must be noticed that the large walled plains, such as Plato, whose walls, by the way, are comparatively low, have no central peak; neither have any craters with low walls. These all belong to the middle and early periods of bombardment. It is only in the later craters with higher walls, rising in some cases to heights of 15,000 ft. and over, that we find central peaks, and these peaks are the result of the non-subsidence of the recoil splash of the soft material which the missile broke through. The floor of the crater is formed around the central peak by the flooding up of the nearly liquid interior and this accounts for the fact that, in all the late formed craters, the floor is always much below the level of the

surface outside of the mountainous ring of the crater. It would be quite possible to reproduce one of these late craters by having a bath filled with some material whose viscosity gradually decreases from the surface downwards and dropping into it a missile of suitable size, weight and from a suitable height. Soft wax might be a suitable material, nearly cold at the surface and gradually increasing in temperature to the bottom, where it would be in a molten state.

I should like to point out that, apart from the bare theory that the craters of the Moon are the result of bombardment, all the arguments in support of the theory—the various periods of the formations of the craters, the effects produced by the impacts, the comments on the angle of striking, etc.—are original and have never been previously published.

A Small Workshop Forge

A Simply Made Piece of Equipment for the Handyman

By H. N. C. FIELDS

THE forge is based on a non-electric vacuum cleaner and the additional materials required are an old five-gallon drum, 3/4 in. of 1/2 in. water pipe, one 1/2 in. pipe elbow, 9ft. of electrical conduit tubing, 5ft. or 6ft. of 1 in. x 1/8 in. iron strip and a few nuts and bolts.

Details of Construction

First of all take an old five- or ten-gallon oil drum and cut off the bottom, leaving a 4 in.

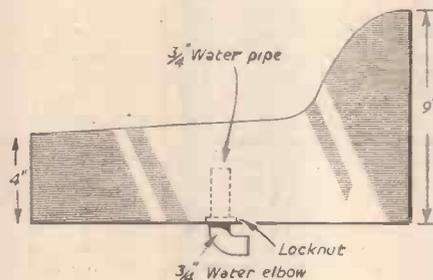


Fig. 1.—The converted oil drum.

wall for two-thirds of the circumference, the other third being 9 in. high, as in Fig. 1, rounding off the corners as shown.

Drill or cut a hole in the centre of the bottom to admit the 3 in. length of water pipe, which should have a thread cut for 1 in. and a locknut fitted. This is now passed through the hole in the bottom of the drum and the pipe elbow screwed on and locked up tight with the open end towards the 9 in. high part.

Next the blower unit from a "whirlwind" non-electric vacuum cleaner, or any other make, should be modified. First, remove the two large driving wheels and cut off the left-

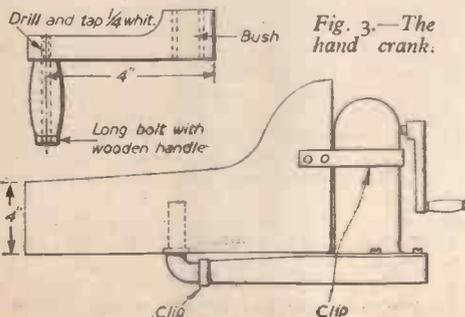


Fig. 3.—The hand crank.

hand spindle flush with the bearing (looking from top of unit in working position). Remove the handle bracket and fit a hand crank on the right-hand spindle.

My crank was made by turning a bush to fit inside a cycle crank and over the spindle, and then drilling right through and pinning. Next cut off the crank 4 in. from the spindle and drill and tap the sawn-off end 1/4 in. Whitworth and fit a wooden handle with a long bolt, see Fig. 3.

Remove the fan casing from the blower unit and secure the gearing behind the 9 in. high portion of the forge bottom. This is done by drilling two holes in blower back plate and bolting through forge bottom, with two 1/2 in. bolts (Fig. 4), now make a clip from 1 in. x 1/8 in. strip and pass it round the gear housing, bolting to back of forge, Fig. 2.

The Fan Casing

This is made from the remainder of the five-gallon drum. First, cut a long strip wide enough to clear the depth of fan blades by 1/2 in., the length will be determined by the diameter of the particular blower used. Fig. 5 shows the shape to be cut, which is bent up to form a square, tapered trough at the end, the long strip being bent round to the required diameter and riveted as shown in Fig. 6.

The top of the blower is made as in Fig. 7, and is a flat piece of metal 1/2 in. larger in diameter than the sides, Fig. 6, the small tabs and two long flanges are now bent at right angles and either riveted or soldered in position on to the fan casing, shown in Fig. 6. Now make a small clip from thin metal and fasten as shown in Fig. 2.

The complete casing can now be assembled

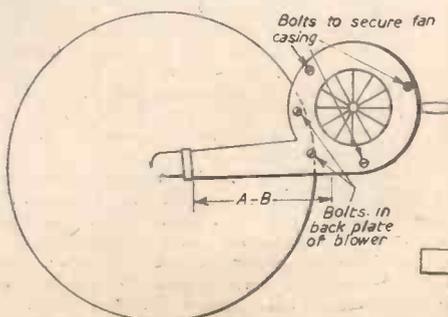


Fig. 4.—Fan casing bolted to forge bottom.

on to the fan by passing the end of the casing spout over the pipe elbow and bolting on to the fan back plate with three bolts, as shown in Fig. 4.

Finally, the legs are made from electrical

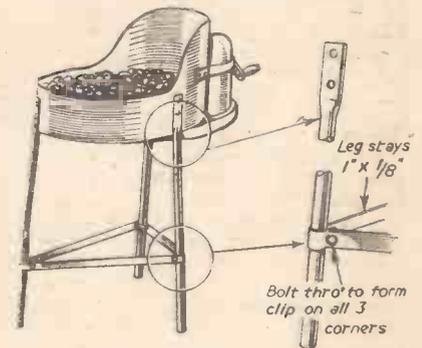


Fig. 8.—Details of the legs.

conduit. Three pieces 3ft. long are flattened for 4 in. at the end and bolted through the sides of the forge. The legs are now stayed 9 in. from the bottom by a length of 1 in. x 1/8 in. strip, passed round the legs and bolted, as shown in Fig. 8.

A 2 in. layer of fire-clay is laid in the bottom, lining the sides is optional. My own forge has proved very satisfactory, but no doubt an electric model could be used as effectively.

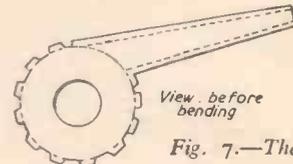


Fig. 7.—The fan cover.



Fig. 6.—The fan casing bent to shape.

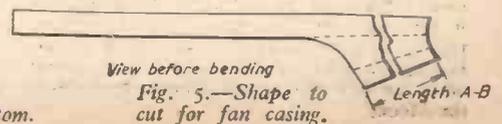


Fig. 5.—Shape to cut for fan casing.

Fig. 2.—Gear housing bolted to back of forge.



PM Co

This issue Celebrates

1933 — A RETROSPECT

slipways into the turbulent waters of Fleet Street, as to whether the ship is in trim, and whether alterations will be necessary. Even while these plans were reaching fruition I saw that a number of other journals would be necessary to cover the field I had in view. Thus "Practical Wireless," the first of the series of journals I founded for George Newnes, Limited, was launched exactly one year before PRACTICAL MECHANICS.

P.M., like P.W., was an instantaneous success and seemed fair set, as after 21 years has proved to be the case, for a long and successful career. It first saw the light of day on Friday, September 29th, 1933. It was out of print within a few hours and a heavy reprint was called for.

The first issue contained articles on the ray control of mechanism, building a televisior (Baird system), taking cinematograph pictures, astronomy, building a polariscope, engine-driven model aircraft, home broadcasting, microscopy, photography, building a three-valve receiver, wonders of the stratosphere, building a simple photo-electric cell, model railways, lathe work for amateurs, the fluid fly-wheel clutch, experiments in chemistry, electrical experiments, making accumulators, building an electrone, money-making ideas, patent advice, a review of the latest accessories, practical hints, to mention the main features only.

The launching was backed by our "First Number" commemoration offer of "Newnes Encyclopædia of Popular Mechanics," which I wrote specially for the purpose. Readers who had placed a regular order could obtain this 392-page book for a very nominal sum—a book which to-day would cost at least a guinea. It was a reference book covering all those subjects encompassed by the policy of the journal. Tens of thousands of readers availed themselves of this offer.

Readers were not slow to take advantage of our free advisory service and questions of the order of thousands a year steadily poured into our offices, covering such diverse subjects as astronomy and cycling, electricity and chemistry, house decoration and splitting the atom, caravan building and model making. In fact, to date our queries book shows that we have answered nearly 200,000 queries on a wide range of subjects.

Each issue reflected the energy and zeal with which my staff and I produced each issue. The circulation continued to rise issue by issue, as it still continues to do. Readers made valuable suggestions upon which we were not slow to act. Our suggestions file was drawn upon month by month to provide features which large numbers of readers required.

Some of the illustrations in these pages indicate the directions which the editorial policy followed. I produced designs on a number of subjects which hitherto had never been dealt with in the technical press, such as a small runabout car which could be built in those days for £20. It was built in its hundreds and rendered faithful service. All the readers will remember that we pioneered the home construction of light aeroplanes such as the Flying Flea and the Luton Minor, full-size motor boats and rowing boats, caravans, paint spraying plants, electronic brains,

THIS 250th issue celebrates 21 years of continuous publication under my Editorship, with only one minor break due to the printing strike. It is the second of the series of journals which I have founded under the aegis of George Newnes, Ltd. to pass the 21st milestone, for our companion journal "Practical Wireless" celebrated its 21st birthday in October last year. As with that journal the occasion affords me an opportunity for nostalgic retrospect and to review the progress of the paper from 1933 to date.

I do so with justifiable pride, for it was a bold venture on the part of the publishers to enter a field in the periodical market which was something in the nature of an uncharted ocean. For some years I had given thought to the new journal. As one who has been connected with the technical press for a considerable number of years and who can thus fairly lay claim to a knowledge of public demand, I had observed the changing tastes of the British public in the matter of hobbies. The advance of technical education, the development of the aeroplane, radio and television, as well as scientific discoveries and inventions in many other fields, had caused a radical change in reader interest, and in the minds of those who formerly followed only one hobby. The practical crafts up to the early 'twenties were confined to woodworking, lathe work, model boats and elastic-driven model aircraft, but I was aware from readers' queries that the public interest had become greatly enlarged, and so had the number of hobbyists with inquiring minds. Miniature petrol engines and diesels of 1 c.c. and smaller were being developed; radio had opened up interest in set construction and radio-control of mechanisms. People were becoming more interested in chemistry and electricity, they wanted to understand their motor cars and their motor cycles and to carry out their own repairs.

These are but a few directions to which the public mind was turned, and I therefore prepared plans for a new journal which catered for this diverse public interest in science and mechanics. As when launching a new ship, no matter how skilful the design there are always some doubts when a new periodical runs down the

Times of Age! Celebrates our 21ST Birthday

AN ANNUAL REVIEW By F. J. CAMM — 1954



mechanical robots, to mention but a few. We set, maintained and improved a very high standard of editorial contents, each article being lavishly illustrated by special drawings and photographs taken during the course of construction. Many of the devices were built by me in the P.M. workshop, and I was thus able to take note of the snags likely to be encountered by amateurs and to modify designs to suit the skill and the equipment of the home mechanic.

It was obvious from our correspondence that we were performing a national service. Heads of colleges, universities and technical institutes wrote to congratulate us. The journal was taken by all the leading libraries throughout the country and thus had a readership greatly in excess of its sales, which had steadily spread to a large number of overseas countries.

Constant inquiries for books on particular subjects drew my attention to the paucity of instruction books written in a style suitable for the non-technical and semi-technical, so notwithstanding the pressure of work which two highly successful journals brought, I embarked upon the writing of a large number of technical handbooks, by shunning delights, eschewing holidays, and devoting myself entirely to the service of my readers. I enjoy work in large doses, and am fortunately able to work seven days a week spurred by an almost unquenchable enthusiasm and a desire to serve my readers. I find it very satisfying, and a reward in itself.

Year by year the number of books to my credit increases. I do not think that there are many authors living or dead who have written more books or more words than I have I. To date my total of books greatly exceeds 200, and throughout those 21 years I have turned out regularly in the form of articles and books more than 20,000 words a week, making a total to date of over 21,000,000 words.

As I wrote in the Birthday Number of P.W., I suffer the penalty of versatility. Many have wondered how it is that one man could write with authority on so many topics. The answer of course, is that I am a trained engineer, and that my interests have always been wide, not only in academic study, but in practical applications. Visitors to exhibitions have seen examples of my work in the spheres of telescoping, radio, television, model-making, microscopy and invention. I have obtained patents for a large number of devices, all of which are on the market. One of my most recent was the automatic pump for inflating tyres whilst the vehicle was in motion. Three of my latest models are of the very first bicycle, the first motor cycle, and a working model of the lethal bed at the Ostrich Inn, Colnbrook, in which so many guests went to their doom. It is exhibited there to-day. What I write, therefore, is the result of personal experience; I do not employ ghost writers. Work bearing my name is my own.

I am encouraged to believe that part of my success is due to a natural gift for simplifying complicated matters, because so many readers tell me so.

There is plenty of evidence, in the form of printed matter and constructed apparatus of my

work during these past 21 years. As year succeeded year I developed the "Practical" series of journals in furtherance of our policy of catering for the amateur and handyman—the man who obtains joy from doing things himself and observing something come to life from raw material. In that space of time I have founded not only P.M. and P.W., but the "Practical Motorist," "The Cyclist," "Practical Television" and "Practical Engineering." I take pride in the fact that I was the only Editor to start a paper during the War ("Practical Engineering," January, 1940), and the first to start a new journal when paper rationing ceased ("Practical Television," April, 1950).

The "Practical Motorist" first appeared as a weekly in 1934, but suspended publication during the War for obvious reasons. It reappeared under the title of "Practical Motorist and Motor Cyclist" in April of this year as a monthly. I am glad to say that it has repeated the success of its stable companions. Apart from the launching of these periodicals I have produced in 21 years over 80 books, all of which have been published by the proprietors of this journal, and four others are on the way.

Older readers will know that we promptly deal with every subject within our scope which is of topical interest, often before any other journal. For example, in the wartime issues we dealt with the making of stirrup pumps, the principles of submarines, parachutes and radar. When shortages due to the War became acute we described how to make substitutes for various items of necessity. The petrol shortage saw us publishing articles on how to obtain more miles to a gallon. By means of competitions we endeavoured to improve on marketed apparatus, to wit, our competition for an improved fountain-pen. We have saved many would-be inventors from wasting their money, whilst others we have encouraged to go ahead. Some readers, indeed, have made fortunes as a result of our advice.

There are many to-day, occupying important positions both in industry and all of the Services, kind enough to say that they owe their success to the tuition they have received from my journal and books.

It is with pride and pleasure, justifiable I hope you will agree, that I look back on the past 21 years of creative work. I have said before that there has been no five-day week for me. Naturally, my large output could not

(Continued on page 29)



FLAPS FOR SWIMMING

Details and Dimensions of Flaps, and Some Aspects of Swimming Expressed in Figures

By C. W. TINSON

IT is sometimes suggested that the addition of hinged flaps to a man's feet and hands, the general idea of which is shown in Fig. 1, would improve his performance when swimming, giving him the equivalent of the webbed feet of some aquatic animals. A study of this matter shows that a considerable improvement in acceleration and in manoeuvrability is certainly possible.

The kind of flap illustrated in Fig. 2 is very

Man-power Available

Human beings vary enormously in the amount of power they can produce and the length of time they can keep on producing it. Under



Fig. 1.—The hinged flaps in use.

We cannot, therefore, draw a definite line on Fig. 3 to indicate any fixed quantity for man-power, but have to work backwards and find, from experimental evidence, the amount of power which must have been available as "thrust horse-power" to have made possible a particular achievement.

There is also the question of the efficiency of transmission, as it were. It is clear that in the case of swimming the efficiency is pretty low: there is a lot of power wasted in creating turbulence in the water and less of our effort actually appears as thrust horse-power. We must see, therefore, if we can get any idea of the useful power—the power which is labelled "Thrust horse-power" in Fig. 3.

In the recent Empire Games held at Vancouver, a speed of 4.72ft. per sec. was achieved in the Men's 440 yards Free-style swimming contest. The winner was an athlete apparently capable of developing so much power that there was actually about 0.3 thrust horse-power for 4½ mins., and it is also evident that he must have been making a very rapid number of strokes to be able to do this. This brings us to the next point, the rate of muscular response of the limbs. The number of strokes per second you are able to make will set a limit on the speed you can achieve through the water, and until you have trained yourself sufficiently it may not be possible to convert into useful thrust all of the power of which you are capable: in other words, your efficiency of transmission is lower again. For these reasons, the power available in Fig. 3 is associated with various numbers of strokes per second, the numbers outside brackets referring to the normal swimmer without flaps, and the numbers in the brackets to the flapped condition. The example given later on will make this clearer.

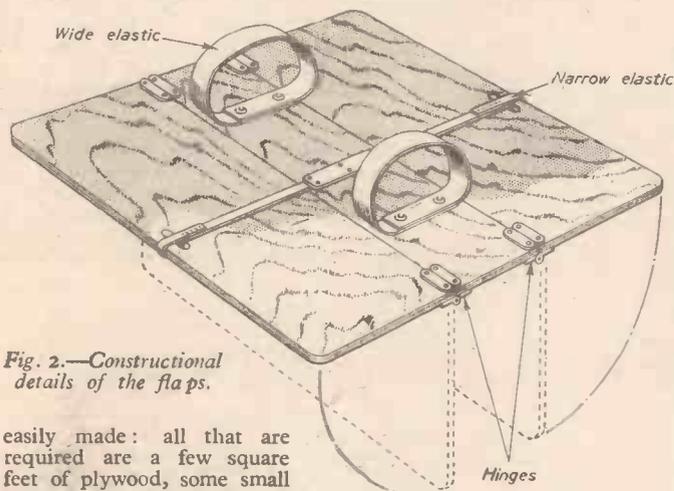


Fig. 2.—Constructional details of the flaps.

easily made: all that are required are a few square feet of plywood, some small brass butt hinges, a few rivets and washers, and some garter elastic. The drawing (Fig. 2) makes the construction clear. The middle piece, on to which the elastic loops are fixed to retain the flaps on the feet and hands respectively, is a piece of ply a little narrower than the foot or hands, and loops of wide elastic, previously sewn up to a suitable size, are attached by rivets and washers. To the middle-piece flaps are hinged, and a strip of narrow elastic is fixed across them to bias them statically into the spread position, for without this it is difficult to walk when entering or leaving the water. The tension in this piece of elastic should not be more than is just necessary to maintain the spread position against the weight of the articulated portions.

Using the Flaps

As Fig. 1 shows, during the thrusting stroke the water reaction opens out the flaps, while on the return stroke the back pressure folds them at right-angles so that they trail downstream and, to all intents and purposes, offer no more resistance during the return than do a swimmer's feet or hands when swimming without them. The left arm is shown moving backwards and is thrusting, the flaps being spread, while the right arm is shown recovering position for the next thrusting stroke and, as the movement is in the opposite direction, the flaps are folded. Both legs are shown moving backwards.

From the point of view of limiting the inconvenience of flaps, an overall opened size of 13in. by 8in. for the feet and 8in. by 7in. for the hands would be about the largest practicable size to wear.

As to their effect on the swimmer's performance, it is difficult to portray the position without the aid of graphs and Figs. 3 and 4, which will be discussed later on, are indicative of the results. Before examining these, however, it is necessary to say a word or two to explain their derivation.

the heading "Animal Power," reference books agree generally that an average man can develop and sustain for several hours about 1/10th h.p. and can develop a great deal more than this for a limited period. Now, 1 h.p. is the power required to move 550lb. through 1ft. in 1 sec., so 1/10th h.p. would lift an 11-stone man at the rate of 0.357ft. (4¼in.) per sec. A man could do much better than this output for a short time. For example, you

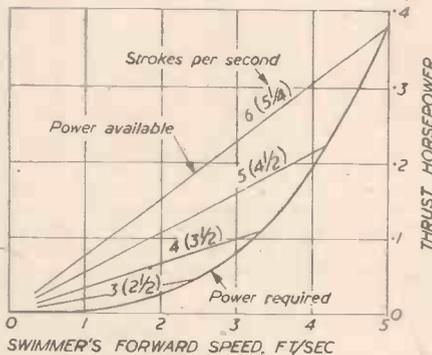


Fig. 3.—Graph showing thrust horsepower.

have only to run upstairs to find how much horse-power you can develop. There will be no difficulty in raising yourself 10ft. in 3½ sec., which is at the rate of 3ft. per sec., and if you weigh 11 stone you will then be developing 0.84 of a horse-power for that period of time. By doing this several times in quick succession you will learn something of the deterioration or decay of your power, either in relation to time or to distance, and if you plot the results against time, the shape of the resulting curve will resemble the curve of the torque of a twisted skein of model aeroplane elastic when plotted on a timebase: a terrific burst of initial power is quickly followed by a gently descending output and this is followed by a rapid fall-away at the end of the run. The final bit corresponds to the point where a man reaches the limit of his exertion and gives up through sheer exhaustion.

It is obvious that, unlike a motor, a man's power is a very variable quantity, depending on the type of operation, the length of time he is operating, and conditioned, of course, by other factors, such as the amount of practice he puts in on the particular operation.

Power Required

An article of this sort cannot go deeply into this matter of power required, which is

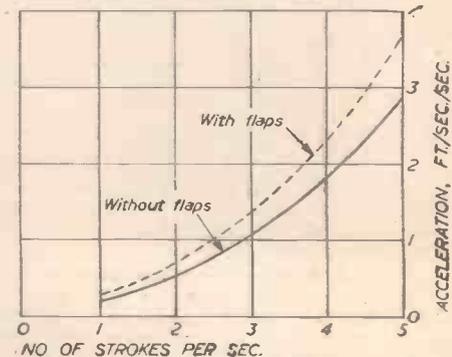


Fig. 4.—Graph showing acceleration.

involved, and it must suffice to say that the resistance to a swimmer depends mainly on the density of the water and to the square of the speed through it, or as $C \frac{W}{g} v^2$. There is little experimental data to go on, but for a

man in a prone position the value of C may be taken to be 0.85. Simplifying the expression we find that the resistance, in sea water, is equal to $1.69 v^2$ (pounds), v being in feet per second. The horse-power required is found by multiplying this by v and dividing by 550, so that the horse-power required curve for a man swimming will be given, to a fair degree

$$\text{of accuracy, by the formula } T.H.P. = \frac{1.69 v^3}{550}$$

The curved line of Fig. 3, gives this on a base of the speed v. The intersection of this curve with any of the power available lines will show, for a particular number of strokes per second, the maximum speed one is likely to reach. The numbers in brackets are for the flapped condition.

Acceleration

The space between the lines of power required and power available represents the amount of power which is available to accelerate from a low speed to a higher one and Fig. 4 shows the value of acceleration, with and without flaps, at various numbers of strokes per sec. The values shown do not represent the amount of acceleration to be obtained, instantaneously, by exerting oneself momentarily to the maximum extent, but rather the amount of acceleration which could be kept up over a period sufficient to enable the swimmer to reach his maximum speed.

We can now see the picture more clearly.

Take as an example a man who knows he can do four strokes per sec. when swimming normally, i.e., without flaps. Fig. 3 shows, at the intersection with the power required line, that he is unlikely to be able to exceed a speed of 3.3ft. per sec. The figure in brackets also shows that he would require to make only $3\frac{1}{2}$ strokes per sec., when wearing flaps, to produce that speed, and the inference is that he will tire less rapidly with the flaps and so be able to extend his range.

At any point to the left of the maximum speed there is power in reserve and it is fair to assume that if he can make four strokes per sec. without flaps, he can do the same when using them. Fig. 4 shows us that if this assumption be correct, he is able to increase his acceleration from 1.8 to 2.3ft. per sec. per sec. by using the flaps; this is an increase of about 27½ per cent. It is clear, therefore, that his acceleration and manoeuvrability will benefit noticeably by their use.

While it is true that, for a given case, the maximum speed can only be increased by reducing the resistance of the swimmer, which flaps will not do, a certain amount of improvement in the efficiency of transmission might be reasonably expected as compared to propelling oneself with the bare hands and feet, in which case there would be a small increase in maximum speed also when using flaps. In addition, they will increase the tempo of aquatic amusements and bring a correspondingly

satisfactory increase in the excitement to be derived. For want of a better definition, flaps have an "amusement value" even though they may not get you anywhere appreciably faster. A spring-board or diving stage are also in this category, yet these certainly have considerable amusement value and are popular.

The Average Man

For those who are keen on swimming the following additional data regarding an average man may be of interest.

Component	Height 5ft. 8½in.	Weight 11 stone
	%	Cubic ft. Weight lb.
Head ...	6.0	.155 9.240
Neck ...	0.9	.023 1.386
Torso ...	57.9	1.499 89.166
Arms (2) ...	8.3	.215 12.782
Legs (2) ...	26.9	.698 41.426

The average density of a human being is about 60½lb. per cubic foot, so that when swimming normally the head will not be submerged. On diving beneath the surface there is, therefore, a force of approximately 9lb. upward, which produces an upward acceleration of about .19ft. per sec. per sec. with or without flaps. By swimming towards the surface with flaps this acceleration can be increased quite considerably, enabling the swimmer, who has been able to descend further by means of the flaps, to surface smartly.

A DARKROOM INTERVAL TIMER

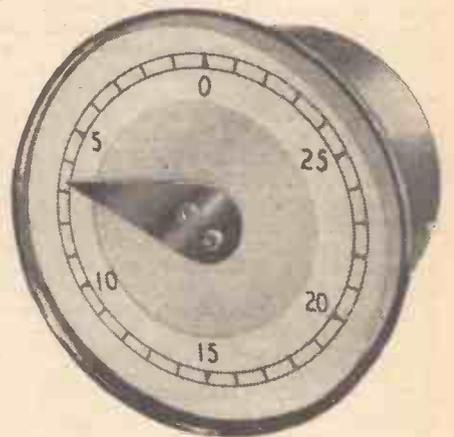
A Handy Accessory for the Photographer

THIS timer is a simple adaptation of an ex-service clockwork mechanism, the Master Contactor, Type 2, which is readily obtainable at low cost from advertisers in PRACTICAL MECHANICS. It consists of a high-class clock-type movement which opens and closes a pair of contacts twice each second. For the purpose in view, these contacts are not required and the associated electrical connections, etc., may be removed. This leaves a mechanism, with metal case, with a

held by small nuts. Further nuts under the hand space it slightly from the dial. Markings and hand should be of bold type so that they are readily visible in dim light.

In order that a warning buzzer may be operated, a brass finger is soldered to the winder at the back of the clock, as shown in Fig. 1. A small insulated block is bolted to the case, and a fixed contact bracket fitted to this so that there is no electrical contact between bracket and clock case. The brass finger is so positioned that when the hand reaches zero on the dial, the finger bears upon the bracket, thus completing the circuit and stopping the clock from unwinding further.

Electrical connections are very simple, and are shown in Fig. 2. If circumstances permit, a warning lamp may be used instead of the buzzer. Operation of bell, buzzer or lamp may also be from the



The completed darkroom timer.

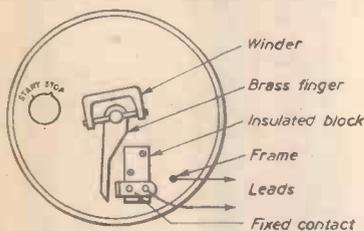


Fig. 1.—Contactor arrangement.

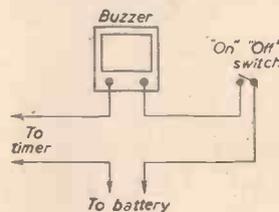


Fig. 2.—Circuit connections.

centre winder which revolves once in 30 minutes, and which can be started and stopped at will by means of the small knob provided.

Since all normal developing processes lie within the 30-minute period, a hand may be fitted directly to the winding spindle, as shown in the illustration. This may most readily be done by soldering two short 6 B.A. bolts to the gear which is fitted to prevent overwinding. A circular piece of wood or ebonite, or a canister lid of suitable diameter, is then bolted to the clock mechanism. The card dial is marked out in indian ink, divided into 30 equal sections, and glued in position. The hand, cut from any thin metal and suitably drilled, can then be fitted to the two bolts and

secondary of a mains transformer, but the contactor arrangement is not suitable for mains voltages.

In use, the required period for development is found by reference to the usual time and temperature tables issued by the developer manufacturer. The clock winder is then turned so that the hand indicates the required number of minutes. The developer is poured into the tank, and the timer started. When the required period has elapsed the hand will have reached the zero position, the buzzer will operate, and the developer is then poured from the tank.

P.M. COMES OF AGE

(Continued from page 27)

be achieved by handwriting alone. I dictate most of my copy and it is typed as I talk. Some of it is taken down in shorthand, some recorded on tape, and a small amount, such as mathematical matter, which is beyond the abilities of shorthand typists and outside the gramalogues of Mr. Pitman, is written in longhand.

I have acknowledged in P.W. and I hereby repeat that acknowledgment, the great encouragement I have always received from

the publishers, George Newnes, Ltd., who share and back my enthusiasm, and I also gratefully acknowledge the assistance I receive from an able staff, most of whom have been with me for the whole of the 21 years.

We are on the eve of great discoveries and great inventions, and this journal has an even greater duty to perform in keeping its readers abreast of these new developments. In thanking those tens of thousands of readers, many of whom can claim readership from No. 1, may I say that we enter our 22nd year rededicated to their service.

Gas From the Ground

Natural Gas in America and the Possibility of its Use in Britain

By BERNARD DIX

SIX months ago the Gas Council, faced with the ever-rising price of coal, the increasing scarcity of good carbonising coal, and the ultimate prospect of cheaper electricity produced by atomic energy, decided to launch a research and exploration programme to discover to what extent, if at all, there existed deposits of natural gas suitable for commercial exploitation in Great Britain. Preliminary surveys were carried out in Scotland, Lincolnshire, Yorkshire and Sussex with a view to test drillings being made in an effort to tap any potential sources of underground gas, and drillings were eventually made near Edinburgh and in a field between the chalk hills of Kent and Sussex on the outskirts of Ashdown Forest. The results in Edinburgh have not, so far, been encouraging; but the Gas Council has recently announced that after drilling to a depth of some 700ft. a source of natural gas has been initially located at the Sussex site.

The commercial use of natural gas is not new and for many years it has been successfully carried out in various parts of the world. This is nowhere more true than in the U.S.A., where at present natural gas accounts for more than 90 per cent. of the thermal gas sales of the American gas industry. This represents approximately one-quarter of the total energy derived from mineral fuels and water power in the United States and amounts to a yearly marketed production of nearly 7½ million cubic feet of gas, supplied to 16 million consumers in almost every State.

There are 27 States producing natural gas but by far the greater portion of the total is produced in Texas which accounts for 50 per cent. of the total output, and where the known reserves amount to some 54 per cent. of the total estimated reserves of the entire country; the other principal States producing natural gas are Louisiana, Kansas, California and Oklahoma.

The composition of natural gas varies slightly according to the different fields in which it is produced, a fairly typical analysis of the gas produced in America is as follows:

	per cent.
Carbon dioxide	0.8
Methane	91.0
Ethane	3.1
Propane	1.7
Butane	0.7
Nitrogen	2.7

Calorific value: 1,047 B.Th.U. per cubic foot. Specific gravity: 0.61.

Most of the natural gas, unlike coal gas, does not possess a characteristic odour and as a consequence the detection of leaks is rendered rather difficult; in order to assist such detection the normal practice is to add some easily distinguishable odorant. It will be noted that natural gas does not contain carbon monoxide and, therefore, the danger of gas poisoning from that source is non-existent—although carbon monoxide can be formed if complete combustion does not take place in the actual appliance which is burning the gas.

The distribution of natural gas from the actual source to the consumer creates considerable problems; particularly in a country which covers such a vast area as does America. With coal gas the producing point is built as close as possible to the immediate area of demand, but with natural gas it is necessary to convey the gas from the place where it is found to the place where it is required, very often these two points are many miles apart.

This is the case in the United States where some 149,000 miles of gas mains are used to facilitate the collection and long-distance transmission of natural gas supplies. The city of New York, for instance, is supplied with gas which is tapped in the Texas-Louisiana Gulf Coast, the world's greatest area of natural gas reserves, and which is piped through 1,840 miles of 30in. bore gas mains in order to reach New York; a further 500 miles of branch pipes of varying diameters are required in order to complete the distribution to the consumers.

The pipes in this pipe line are of high-carbon steel, electrically butt welded, and hydrostatically expanded in order to increase their hardness. The pipes are assembled by electric welding on site and are given a protective covering of hot coal tar and fibre glass. The company operating this pipe line, the Trans-Continental Gas Pipe Line Corporation, has 19 compressor stations, mainly using gas-fuelled reciprocating engine compressors, installed at various points along the pipe line. These stations are in constant communication with the company's headquarters in Texas by means of the company's own micro-wave system on high frequency radio and each hour they report to the headquarters the gas pressure at the station.

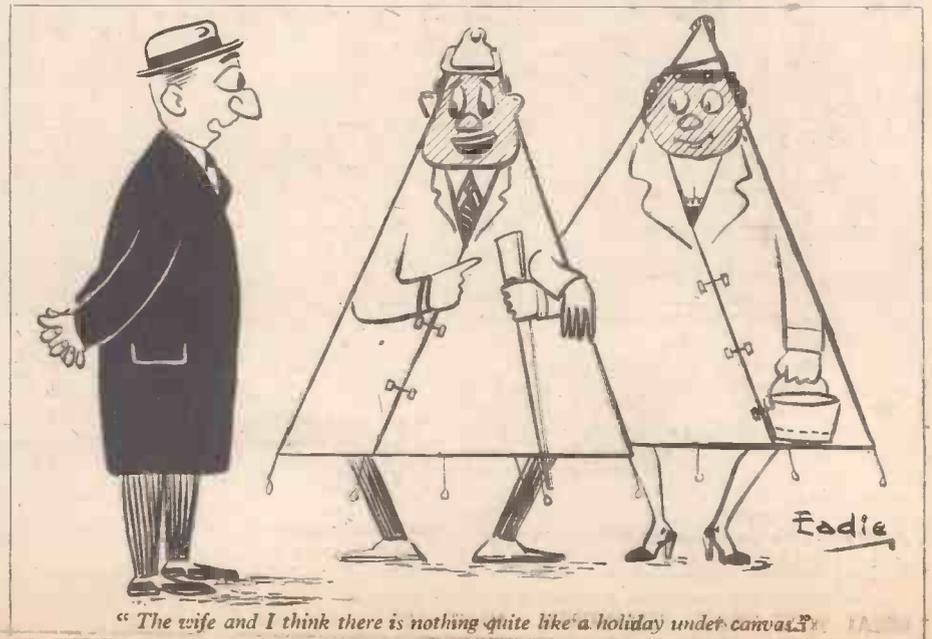
The whole of the pipe line is patrolled by air regularly twice each week and, in addition, periodic inspections are carried out by 27 skilled maintenance crews who are stationed at intervals along the pipe line. These maintenance crews are of a specialist character and are equipped with all the necessary appliances to deal with any situation which is likely to arise. The efficiency of these maintenance crews is such that the amount of gas unaccounted for between Texas and New York is said to be "of no consequence," for a gas main of 1,840 miles this is no mean feat.

One of the more recent developments which has taken place in the American natural gas industry is the extensive use of underground storage. As the original gas fields become exhausted it is necessary to seek further supplies elsewhere—as a consequence a

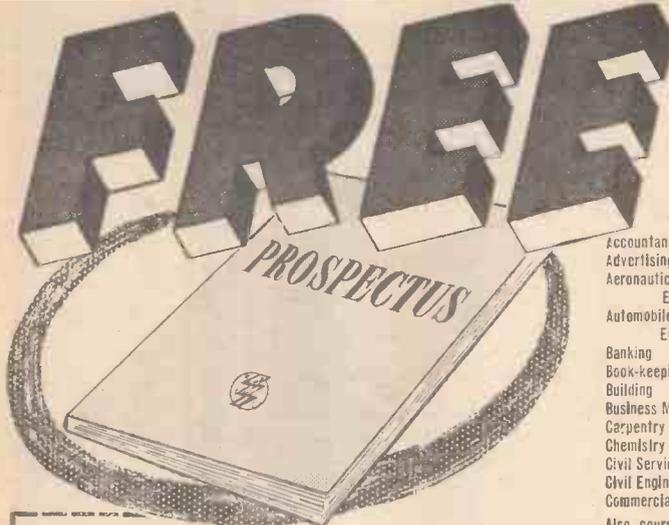
continual movement is taking place in the location of the supply points and they are moving farther away from the area of demand. In order to maintain an improved load factor on the long-distance pipe lines and to provide adequate reserves during the periods of peak demand increasing use is being made of the already exhausted underground chambers. By pumping gas into these chambers it is possible to store gas for use during the peak periods and during the winter months when the demand increases; some 100 exhausted gas fields, containing nearly 5 million cubic feet of gas, are now being used for this purpose.

The future of the industry is, of course, dependent upon the reserves of gas available. The position of the known-reserves is continually changing as the result of fresh fields being discovered and by extended knowledge of existing fields, but it is estimated, at the present rate of consumption, that the known reserves will be sufficient for the next 25 years, but this can possibly be extended by further developments in the utilisation of the gas. American authorities estimate that the total supply of natural gas, both known and unknown, will be sufficient for a further 50 years at the present rate of consumption, after this time the supplies will begin to decline.

It is too much to hope that natural gas will be discovered beneath the soil of Britain to the extent which it exists in America—in fact, geological considerations make this almost an impossibility—but if it is found even on a smaller scale it could cause considerable changes in the economic and industrial patterns of the country. The Gas Council plans to continue its research and exploration for a period of five years and anticipates spending at least £1 million in the process and, while Sir Harold Smith, the Chairman of the Gas Council, has stated that hopes are not being built on an early success, it is hoped that within the five years some satisfactory results will be achieved. Perhaps, in the not-too-distant future, there will be 30in. bore gas mains carrying natural gas from beneath the Downs of Sussex to the factories of the industrial Midlands.



"The wife and I think there is nothing quite like a holiday under canvas."



POST THE COUPON TODAY FOR OUR BROCHURE ON THE LATEST METHODS OF HOME TRAINING FOR OVER 150 CAREERS & HOBBIES

PRIVATE AND INDIVIDUAL TUITION IN YOUR OWN HOME

Accountancy
Advertising
Aeronautical
Engineering
Automobile
Engineering
Banking
Book-keeping
Building
Business Management
Carpentry
Chemistry
Civil Service
Civil Engineering
Commercial Subjects

Commercial Art &
Drawing
Customs & Excise Officer
Draughtsmanship
Economics
Electrical Engineering
Electronics
Fashion Drawing
Heating & Ventilating Eng.
Industrial Administration
Journalism
Languages
Marine Engineering
Mathematics

M.C.A. Licences
Mechanical Engineering
Motor Engineering
Photography
P.M.G. Licences
Police
Production Engineering
Public Speaking
Radar
Radio & Television
Service
Radio Engineering
Refrigeration
Retail Shop Management
Salesmanship

Sanitation
Secretaryship
Sheet Metal Work
Shorthand & Typing
Sound Recording
Structural Eng.
Telecommunications
Television
Time & Motion Study
Tracing
Welding
Writing
Works Management
Workshop Practice
and many others.

Also courses for University Degrees, General Certificate of Education, B.Sc.Eng., A.M.I.Mech.E., L.I.O.B., A.G.C.A., A.C.I.S., A.M.Brit.I.R.E., A.L.I.I.A., City & Guilds Examinations, R.S.A. Certificates, etc.

NEW!

LEARN THE PRACTICAL WAY
With many courses we supply actual equipment thus combining theory and practice in the correct educational sequence. This equipment, specially prepared and designed remains your property. Courses include: Radio, Television, Mechanics, Electricity, Draughtsmanship, Carpentry, Photography, Commercial Art, etc.

THE ADVANTAGES OF E.M.I. TRAINING

★ The teaching methods are planned to meet modern industrial requirements. ★ We offer training in all subjects which provide lucrative jobs or interesting hobbies. ★ A tutor is personally allotted by name to ensure private and individual tuition. ★ Free advice

covering all aspects of training is given to students before and after enrolment with us.

COURSES FROM 15/- PER MONTH

POST THIS COUPON TODAY

Please send without obligation your FREE book.

E.M.I. INSTITUTES (Dept. 144k)
43 Grove Park Road, London, W.4

NAME

ADDRESS

SUBJECT(S) OF INTEREST

October, 1954.

ICT8

EMI INSTITUTES
The only Postal College which is part of a world-wide Industrial Organisation

"Baker's"
Regd

SOLDERING FLUID



QUICK · CLEAN · CERTAIN · ECONOMICAL

PRODUCT OF SIR Wm. BURNETT & CO. (Chemicals) LTD.
GREAT WEST ROAD · ISLEWORTH · MIDDLESEX · ENGLAND

A MODEL GALLEON for only 5/11

That's all you pay for a kit for a splendid miniature model of the Elizabethan galleon "Bonaventure." The completed model is 8ins. long and easy to build with the tools of a fretwork outfit. The kit (No. 3014) contains a design sheet and instructions, planed panels of wood, round rod, material for sails and rigging cord. There are many other Hobbies galleon kits for models from 7ins. to 22ins. long. One of the larger models is the spectacular "Royal Sovereign," 17ins. long and built from kit No. 2157. It costs only 23/11. Other galleons are shown in Hobbies free booklet, and details of all Hobbies kits and tools are contained in the 1955 Handbook. Use form below to get your kit by post. Also obtainable from Hobbies stockists everywhere, and branches in London, Glasgow, Manchester, Sheffield, Leeds, Birmingham, Hull, Southampton and Bristol.



HOBBIES 1955 HANDBOOK

136 pages of how-to-make articles, details of model, toy, fretwork and furniture designs, etc. Free instructions for a working model tug. Price 2/- from newsagents, stockists and Hobbies branches, or 2/3 post free from Dereham.



To: **Hobbies Ltd., Dept. 7, Dereham, Norfolk**
Please send me your free 20-page 2-colour booklet and name and address of nearest stockist. Also send me items I have marked thus: X.

1955 Handbook 2/3, post free.

'Bonaventure' Kit (3014), 5/11, post free.

'Royal Sovereign' Kit (2157), 23/11, post free.

NAME

ADDRESS

I enclose P.O. for

HIGHSTONE UTILITIES

Soldering Irons. Our new stream-lined iron is fitted with a Pencil Bit, 200/250 v. 50 watts, 11/6, post 6d. Standard Iron with adjustable bit, 200/250 v., 60 watts, 13/6, post 6d. Heavy Duty Iron, 150 watts, 16/6, post 8d. All parts replaceable and fully guaranteed. Small Soldering Irons, for use on gas, 1/4, post 4d. Resin-cored solder for easy soldering 6d. packets or large reels 5/-, post 9d.

Bell Transformers. These guaranteed transformers work from any A.C. Mains, giving 3, 5, or 8 volts output at 1 amp., operate bulb, buzzer or bell. Will supply light in bedroom or lavatory, etc. PRICE 9/-, post 8d. Similar Transformer but with output of 4, 8 or 12 volts, 12/6, post 10d. Transformer with similar output, but with fused secondary and earth terminal, 18/-, post 1/-.

BELLS for use with either the above or batteries, 6/6, post 6d. "Big Ben" Chimes, housed in Cream Plastic Case. Easily connected to give Two-Note Chime from Front Door, and Single Note from Rear. Operated from 6-9 volt Batteries or Transformer (shown above). 21/2, post 1/-.

EX-R.A.F. 2-valve (2-volt) Microphone Amplifiers as used in plane inter-com. In self-contained metal case; can be used to make up a deaf-aid outfit, intercommunication system, or with crystal set; complete with valves and fitting instructions, 20/-, post 2/-. Useful wooden box with partitions to hold amplifier, 2/- extra. Ditto, less valves, 10/-.

Sparkling Plug Neon Testers, with vest-pocket clip, 3/3, and with gauge, 3/6, post 3d. **S.B.C. Neon Indicator Lamps**, for use on mains showing "live" side of switches, etc., 3/6, post 4d. **Neon Indicator**, complete with condenser (pencil type), with vest-pocket clip, indispensable for electricians, etc., 7/6, post 5d.

Crystal Sets. Our latest Model is a real radio receiver, which is fitted with a permanent crystal detector. Why not have a set in your own room? 12/6, post 8d. Spare Permanent Detectors, 2/- each. When ordered separately, 2/6. With clips and screws, 2/10, post 3d. Headphones, brand new, S. G. Brown, G.E.C. etc., 23/-, and super-sensitive, 30/- a pair, post 1/-.

Headphones in Good Order, 6/- Better quality, 7/6 and 10/6. Similar armature type (very sensitive), 13/6. All post 1/-.

New Single Earpieces, 3/6. Balanced armature type, 4/6 (two of these will make an intercom set). Ex R.A.F. earpiece, 2/6, all post 4d.

Headphones with moving coil mike, 15/6. Similar phones with throat mikes, 15/6, post 1/-.

Headphone Cords, 1/3 a pair, post 3d. **Replacement Bands**, 1/3, post 4d. **Wire Bands**, 6d. (All Headphones listed are suitable for use with our Crystal Sets.)

Hand Microphones, with switch in handle and lead, 5/6. Tannoy, 7/- Similar instrument, moving coil, 8/6. All post 1/-.

Mikew type with switch, 3/6, post 4d. **Mikew Buttons** (Carbon), 2/-.

Moving Coil, 4/6; **Transformers**, 5/-.

Rotary Transformers, 24 v. input: Output 1.20 v., 2 amp. in case with suppressors etc., easily converted to run as a high-voltage motor, 25/-, carr. 5/-.

Also 12 v. input: Output 6 v., .5 amp.; 150 v., 10 mA.; and 300 v., 20/240 mA., 22/6, carriage 5/-.

Morse Keys.—Standard size keys wired to work Buzzer or Lamp, 3/-, post 6d. Slightly smaller keys, 2/6, post 4d. **BUSERS**, 3/9, or heavy duty, 4/6, post 5d.

Terminals, brass, 2BA, mounted on strip 6d. pair. .0005 Airspaced Variable Condensers, 2/6, post 4d. .0003 twin gang with trimmers, 2/6, post 4d. 24 volt, 15 m/m. M.E.S. Bulbs for model railways, etc., 1/- each, 10/- doz., post 4d. **Wander Plugs**, Brass, 1/6 doz., post 4d. **Fuses**, .1 amp., 1 1/2 in. packet of 10, 2/6, post 3d. Also 150 mA. and 250 mA., same price. **Hydrometers**, Standard Type, 6/-, post 6d. Ex-G.P.O. Telephone Twin Bells, with box, 6/-, post 1/-.

Single Telephone Bell, 3/6, post 6d.

Bargain Parcels, of really useful equipment, containing Switches, Meters, Condensers, Resistances, Phones, etc., 10/- or double assortment, 17/6; triple 25/-.

All carriage 2/-.

Meters, 20 amp. 2 1/2 in. m.c., 12/6. 15 v., 2 1/2 in. m.c., 9/6. 150 v., 2 1/2 in. m.c., 10/-.

3.5 amp., 2 1/2 in. T.C., 6/-.

4 amp., 2 1/2 in. T.C., in case with switch, 9/6.

100 m.c., 2 1/2 in. m.c., 7/6.

Meter Units containing 2-500 microamp. movements, 7/-, post 1/-.

HIGHSTONE UTILITIES
58, New Winstead, London, E.11
Letters only.
New Illustrated List sent on request with 11d. stamp and S.A.E.

The New "GALA" **METEOR** WOOD TURNING LATHE

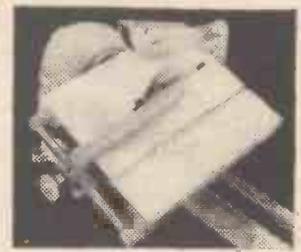


A Machine you will be proud of...

AND PROUDER STILL OF YOUR WORK ON IT

A precision lathe for quality work in wood and the lighter metals, made in 20in., 30in., 40in., and 50in. B.C. sizes. Rigidly built and beautifully finished. Additional equipment is available for :-

- SAWING METAL SPINNING
- POLISHING GRINDING SANDING



CIRCULAR SAW ATTACHMENT



REAR WHEEL ATTACHMENT

Full range of accessories available. Detailed specification list No. GMH on request.

SCOTTISH PRECISION ENGINEERING CO.
27, Cadogan Street, Glasgow, C.2.
Export enquiries to:
R. PROCTOR & CO. (LONDON) LTD.,
220-226, BISHOPSGATE, E.C.2.

MONEY BACK GUARANTEE **DUKE** 12" T.V. TUBES £5
621 ROMFORD RD. LONDON, E.12.

T.V. TUBES. 3 MONTHS' GUARANTEE

Mazda CRM121-A-B, and a few other types and makes. Picture shown to callers. Not Ex-W.D. Carriage and Insurance 15/6 extra. No catch. SPECIAL OFFER of tubes with burns and cathode to heater shorts 30/- (plus carr.).

REAR LIGHTS. 1/9. It's the law. Ideal side or tail light. Infra-red glass easily changed. Post 9d.

SPOTLIGHTS. 8/9. Butlers, new but ex-W.D. 7 1/2 in. dia., 6 1/2 in. deep. Pre-focus fitting. Post 1/3. Easily adapted.

BULBS for above, 4/6. 6 v. 36 watt., 12 v. 48 watt.

V.H.F. 1124 SETS. 17/6. Complete with valves in new condition. Drawings supplied. Post 2/6.

H.T. BATTERIES. 1/9. Alldry+L.T. 1 1/2 v. min. 40 volts. 60 volt+1 1/2 v. Alldry at 3/9, 67 1/2 volt personal portable type at 3/9, 60 volt at 3/9, 90 volt+1 1/2 v. at 6/9. 90 volt+1 1/2 v. new Ever Ready at 7/9. Inert cells G.E.C. twin 3 volt at 3/9. Post on all H.T. batts. 1/9 each.

L.T. BATTERIES. New Ever Ready L.T. or Bell battery 1/-, post 6d. (list price 3/6). Plugs for batteries 6d. each set. All batteries tested before despatch.

NICKEL CHROME wire 2/6 each spool in tins of .014 at 50 yds. and .032 at 25 yds., post 6d.

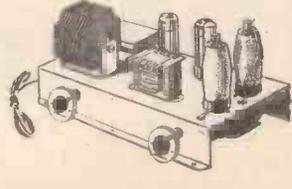
BURGLAR ALARMS. Brand new, self-contained unit. Made by Truvox. Consists of bell and trip device mounted in metal cover. Works off 4 1/2 volt battery. 3/9 only. Post 1/3.

PERSPEX SCREEN. Size 1 1/4 in. x 1 1/2 in. tinted. 3/16 in. thick. ONLY 10/9 (Cost 35/-), suitable for up to 14in. screens. Post 1/3.

AMPLIFIERS. 77/6. Push-pull, 4 valve and rec., full tone range variable. Output 3-7-15 ohms, matching. A.C. or Universal. Post 2/6.

AMPLIFIERS. 57/6. 4 watts, 3 valves. Switched tone range 3-5 ohms. Good quality. A.C. or Universal. Post 2/6.

AMPLIFIERS. 9/6. Ex-W.D. as new, one valve EF36. Complete with drawings and suggested uses. Post 1/6.



Send 21d. stamp for list of valves and other items.

TELEPHONE SETS

FOR PERFECT COMMUNICATION BETWEEN 2 OR MORE POSITIONS. EASY TO INSTALL.

1 Pair of Units £5 Post 2/6

Illustrated leaflet and wiring diagram for the set available on request.

TELEPHONE EARPIECES.—Sound powered, suitable as receiver or microphone. These self-energised units will provide perfect 2-way communication without the use of batteries. 6/- each. Post 6d.

ENLARGER TIMER.—A mechanically operated unit giving from 1 to 18 seconds exposure at each winding, dial calibrated in 1/2 seconds. Will work on any voltage from 6 to 250, A.C./D.C. Lamp automatically cuts out at end of each exposure. Separate switch fitted for focusing. Simple to use, will save its cost in Bromide paper in a few weeks. Improved model, still same price, 50/-, Post 2/6.

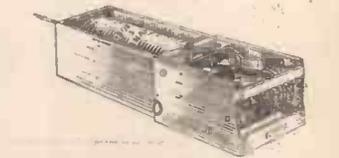
FIREMAN'S AXE.—One piece blade of finest drop forged steel. Insulated handle tested to 20,000 volts. Special curved blade for breaking through flat surfaces, with spike attachment. Brand new, 17/6. P. & P. 2/6.

ALKALUM LONG LIFE BATTERIES.—12-volt unit consisting of 10 cells in crate, each cell is 1.2 volts 45 ampere hours. Price complete, uncharged, £10, carriage 10/-.

BLOWER MOTORS.—Dual voltage, 12/24 volt. No. 10KB/115 recommended for car cooling or heating. 25/-, post 2/-.

HIGH-SPEED RELAYS.—Twin 1,700 ohm coils or twin 100 ohm coils. Stems. 15/-, post 6d.

GEARED MAINS MOTORS.—Universal Series Type for 230 volt A.C./D.C. 100 r.p.m., torque 7 lbs./ins. Klaxon No. EK3UB1-W3 complete with control box to enable speed to be varied. 115/-, complete.



ELECTRO MAGNETIC COUNTERS.—Post Office type 11A, counting up to 9,999, 2 to 6 volts D.C., 3 ohm coil, 12/6 each, post 1/-.

Many other types in stock. Lists sent with order or send S.A.E.

VEEDER COUNTERS to 9,999, also others up to 99,999 only 7/6 each. Post 6d.

ROTARY CONVERTERS.—From 24 volt D.C. to 230 volt A.C. 100 watts. 92/6 each; also available with 12 volt input, 102/6 each, carriage 7/6.

AUTO CABLE for car wiring and all electrical purposes, waterproof. Single doz. yds., 20/-; 100 yds., Twin 3 core or single heavy 5/- doz. yds., 37/6 100 yds., 5 core, 6/- doz. yds., 45/- 100 yds.

VACUUM PUMPS or Rotary Blowers.—Ex R.A.F. Brand new. 7 cu. ft. per min. 10 lbs. per sq. inch at 1,200 r.p.m. Ideal for a brazing torch, etc. Size 6in. x 4in. x 4in. 2 x 1/2 in. shaft. 22/6 each, post 2/-.

MASTER CONTACTOR.—A precision made clock movement, contact making and breaking twice per second, with regulator incorporating heating device working on 12 or 24 volt automatically controlled by thermostat. Brand new in soundproof oak case. Only 12/6, post 2/-.

PORTABLE ELECTRIC BLOWER.—This unit is a powerful 220 watts electric motor, operating on 220/230 volts. Enclosed type with handle. 8ft. of metallic flexible hose and nozzle is included, also 7 yds. C.T.S. flex for connection to the mains. These units are brand new and offered at about half the usual price, they have many uses where clean, dry air is required. 130/-, complete. Carriage 7/6.

INSPECTION LAMP.—Complete with Battery Case. Fits on forehead. Leaves both hands free. 7/6, post 1/-.

Takes a standard Ever Ready battery. No. 1215, 24/-, post 6d.

MICROAMMETERS. 250 F.S.D. 3 1/2 in. FLUSH, MODEL S37.

Specially scaled for test meters. Knife edge pointers, magnetic shield. Guaranteed. Brand new. Not Govt. surplus. Offered about half usual price. 55/-, post free.

VOLTMETERS.—0-300 volt A.C. 50 cycles. 2 1/2 in. flush moving coil, rectifier type, 30/-, post 1/-.

VOLTMETERS for A.C. Mains 50 cy. reading 0 to 300 volt with clear 5in. dial only 60/-; worth double.

VOLTMETERS.—0-300 Flush D.C. moving Coil, 10/6. 0-20, 2in. Flush Moving Coil, 7/6; 0-50 M.C., 10/6, post 1/-.

AMMETER.—2 1/2 in. Flush 0/25 amps. Moving Iron. D.C. 7/6, post 1/-.

MOVING COIL METER with 1 M/A movement, 2 1/2 in. flush, rectifier type, scaled 0/100 volts A.C. Resistance 100k. ohms. A very useful basic meter, 30/-, post free.

WILCO ELECTRONICS
DEPT. P.M.,
204, LOWER ADDISCOMBE ROAD,
CROYDON.

Thermostats and Their Application

Various Ways in Which These Handy Devices May be Used

THERMOSTATS are usually devices whereby a change in temperature causes an electrical circuit to be made or interrupted, and they have quite a large range of applications. Possibly the best known is found in the "thermostatically controlled" heater for domestic hot water supply, tropical fish tank, electric iron or other appliance where an equable temperature has to be maintained. There are, however, other uses—such as the interruption of

By F. G. RAYER

The arrangement shown in Fig. 1 is most suitable for the interruption of low-voltage circuits. With high voltages, severe sparking can arise as the contacts slowly open or close. This is overcome in some units by the addition of a bar, horseshoe, or electric magnet as illustrated in Fig. 2. Here the iron piece is outside the effective field of the magnet when the contacts are open. As they slowly approach, due to cooling of the strip, a point will be reached where the iron piece is abruptly attracted, thus closing the contacts. Similarly, when heating takes place the strip, now in the "Closed" position, will slowly increase its tension in the "Opening" direction, until the attraction of the magnet is overcome and the contacts abruptly open. This gives a quick snap action in both directions.

When very rapid action is required, the heating element may be wound round the bi-metal strip (but insulated from it) as shown in Fig. 3. Such a thermostat may act within a few seconds of the application of current. In the cases shown in Figs. 1 and 2, the heating element may be a coil especially provided for this purpose. Alternatively, the required heat may be provided from the main heating element (e.g., tank immersion heater), the bi-metal strip being enclosed in a tube immersed in the water, and thereby sensitive to changes in its temperature. For controlling the temperature of water, etc., where a heater is present, no additional heater is usual. A special heater, especially of the type shown in Fig. 3, is mostly used when the thermostat has an application other than temperature control—e.g., lamp flashing, buzzer circuit interruption, etc.

Construction

In order to obtain a sufficient degree of movement the bi-metal strip should be fairly long. About $\frac{1}{4}$ in. wide and 2 to 3 in. long is suitable, though much shorter strips can be used with success. The metal should be of thin gauge, anything stouter than about

"fairy light" or decorative lighting circuits, or the control of buzzer, bell and indicator light circuits of all kinds. A flashing indicator or signal lamp commands attention more readily than one steadily illuminated.

The manner in which electrical thermostats operate will become clear from Fig. 1, and their construction is quite feasible. The bi-metal strip consists of two thin strips of dissimilar metals which expand to different amounts for a given rise in temperature. As these strips are closely fixed together, such expansion causes the free end of the bi-metal strip, carrying a contact, to move appreciably, due to curvature of the metal (illustrated in Fig. 2). According to the method in which the thermostat is arranged, this movement may open or close the circuit, a fixed contact being provided for this purpose. Usually the contacts are closed when the bi-metal strip is cold, opening when a certain temperature is reached. It will thus be seen that the heating element will be operating whenever the temperature of the thermostat is below the required temperature, or switched off whenever the temperature is above that required. In the case of a water heater the water will thus be maintained at a stable temperature, irrespective of external conditions. If hot water is drawn off, and cold water replaces it, the heater will operate until the water again reaches its original temperature.

In practice a thermostat will maintain a temperature only within a given range; for example, 100 deg. C. plus or minus 5 deg. This is sufficient for many purposes. In industrial or other applications where more exact control is required sensitive thermostats of suitable type are used.

usable together. Bi-metal strips may also be purchased from some sources, and will be of more rare metals giving additional sensitivity.

The strips must be absolutely flat and in contact throughout the whole of their length; they may be joined by soldering. Due to the manner in which curving of the strip arises from undue expansion, a satisfactory movement is not particularly difficult to achieve.

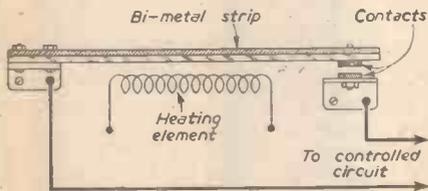


Fig. 1.—The simplest type of thermostat.

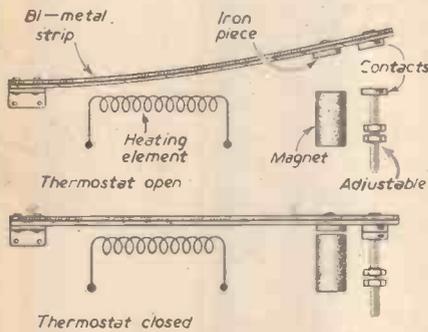


Fig. 2.—Thermostat with snap action.

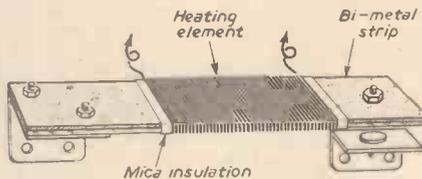


Fig. 3.—Rapid-acting thermostat.

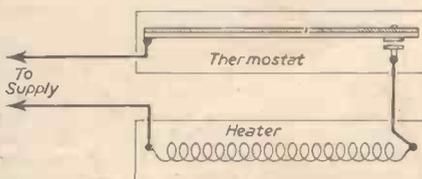


Fig. 4.—Circuit for thermostatic control.

30 s.w.g. being insufficiently flexible. Any metals with dissimilar coefficients of expansion will operate, but maximum movement arises when the metals are as dissimilar as possible in this respect. Copper and iron are the metals most easily to hand, and may be soldered readily. Zinc and iron are also

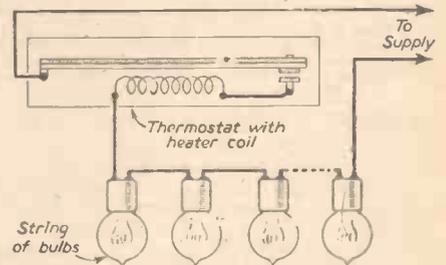


Fig. 5.—Flasher for lights.

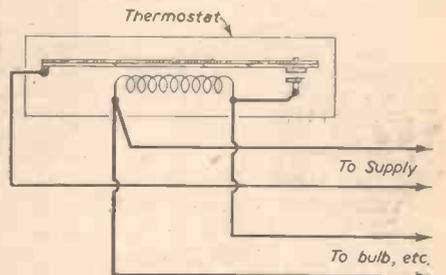


Fig. 6.—Parallel operation of heater.

Contacts taken from disused relays, or otherwise intended for continuous use, are most suitable. Failing these, brass contact screws are satisfactory for decorative "flashers" or other units not intended for continuous use over long periods. Suitable contacts may also be purchased or taken from ex-service equipment of many kinds.

When a separate heating element is required, it can best take the form shown in Fig. 3. The insulation should be thin, heat resistant and reliable, especially if a fairly large potential will exist between strip and winding, due to the method of use. For the winding itself, thin iron wire or any resistance wire is suitable. The gauge is such that the wire does not burn out even when the current passes for a long period. If the operating current is not known, a few trials with different wires can be made. Copper wire is best avoided as it fuses so readily.

Control Circuits

The simplest application, with a separate heater, is shown in Fig. 4. Here both heater and thermostat may be assumed to be enclosed in tubes and immersed in a water tank. The thermostat element should not be very near the heating element, or directly heated by it, or rapid making and breaking of the circuit will arise, without regard for the actual temperature of the water itself. The thermostat should be so placed that its operation depends upon the temperature of the water itself, which will thus need to reach the required temperature throughout before the heater circuit is interrupted.

One or two points arise when using inap-

voltage units, such as fitting a thermostatically controlled "topping up" heater in a domestic water boiler. With mains-operated devices, switches should be in the live or "Line" conductor, but this is not applicable to thermostats, where the method of installation may result in the contacts themselves being in the "Neutral" conductor. However, where "Line" and "Neutral" terminals are indicated on the appliance, these should be connected appropriately to the "Line" and "Neutral" poles of the house supply. Earthing is also usually required, to render the equipment safe in the event of a breakdown. The earth wire of the cable should be soundly connected to the mains earthing

point of the socket-outlet or power point used. In addition, provision should exist for the disconnection of the appliance. This is easily arranged by operating it from a plug inserted in a socket-outlet fitted at a convenient point. The leads from the thermostat or heater should not be connected permanently into the house wiring.

A typical "Flasher" circuit is shown in Fig. 5. Here, the contacts are closed when the bi-metal strip is cold, and the heating element is of the rapid-acting style, as explained. Upon connecting to the supply the bulbs light until heating of the strip interrupts the circuit. The bulbs are then extinguished and the strip cools, thereby restoring the circuit

so that the sequence is repeated. Various thermal flashers of this type may be purchased ready-made, both for mains voltages and low voltage operation. Some may be adjusted for cycles of operation as brief as one second, and are very compact, suitable for addition to any kind of indicator or signal lamp or similar device or circuit.

In Fig. 5 heater and bulbs are connected in series, so that the heater is operated by the current flowing. With very low voltages parallel connection may be necessary, so that the heater is voltage operated at the potential used. This type of circuit is shown in Fig. 6, and most thermostats may be used in either way, according to operating conditions.

An Electric Bedwarmer

A Useful Device for the Winter By B. G. PALMER

THE following description is of an appliance which is both efficient and safe, although perhaps a little cumbersome, but if the bed is to be completely warmed, then it must be large enough for the purpose. The apparatus has the advantage that it will stand in any odd corner out of sight. It can be made for the cost of five batten-type lampholders, five electric lamp bulbs, two 1 lb. coils of 12 s.w.g. galvanised iron wire, a few yards of flat twin lighting cable, about 100 staples and 20ft. of 1½ in. timber. This timber should be selected for its freedom from resinous knots, as these knots would discharge a sticky substance under the action of heat and be most objectionable.

or two staples and commence the second coil of wire where the first ended. If enough wire can be purchased in one length one continuous spiral can be made. Now take the opposite batten and fix on the opposite side of the spiral, leaving the wire loose in the staples. Make sure it is the right batten. Nos. 1 and 3 are opposites (Fig. 2). The frame should now begin to take shape. Fix the other two battens loosely. It may now be required to work some of the wire round in order to obtain a parallel frame, but if all the staples are loose this should not be difficult. When the spiral is the same diameter both ends and the battens

wiring and the frame, as shown at A, B and C, Fig. 3, in order to keep the cable from touching the wire frame, a few turns of which are shown. A piece of rubber tubing, fixed where the mains lead enters the appliance, will prevent the lead being bent too sharply at this point.

Dimensions are not given, as these will depend on the size of the batten lampholders, and the diameter the wire coil springs out to. This diameter should not be less than 8¼ in. to 9 in., otherwise the bed linen will come too close to the lamps.

Construction

The appliance will appear as shown in Fig. 1. In actual fact, this is the outer framework only; for clarity the interior is illustrated

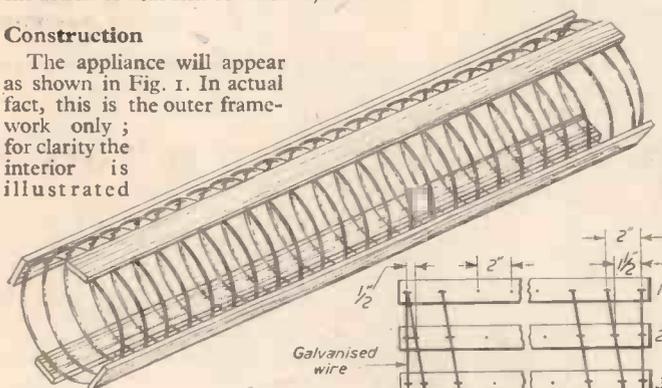


Fig. 1 (Above).—The outer spiral wire framework.

Fig. 2 (Right).—The spacing of the coils.

separately in Fig. 3. From the 1½ in. x ¾ in. timber cut 4 battens 3ft. 7in. long and smooth and round off the corners, which will be on the outside when the job is finished: On the inside mark off the whole length of the battens into 2in. divisions, commencing ¼ in. from one end. This will leave ¾ in. to spare at each end for a staple which will be driven in at this point. Take special note of Fig. 2, as the markings will have to be staggered to allow for the spiral shape of the wire frame. Next take the galvanised wire and wind it neatly round a saucerpan or other similar object about 6in. or 7in. in diameter. When removed, the coil will spring out to about 9in. diameter, which will be the size of the heater frame.

Now commence fixing the spiral to one batten. Do not start with the end of the wire, but fix it so that there will be about 2 turns to spare at the outer end. Do not drive the staples home. When the end of the spiral is reached, cut off the wire back to the batten and firmly fix the wire to the batten with one

equally spaced round the circumference, hammer the staples home. A small hammer will easily go between the turns of wire. The two end turns must be at right angles with the axis

in order to finish off the spiral. It will be found that the completed frame is quite rigid. Next cut and fix the lampholder battens; the positions of these are illustrated in Fig. 3. Screw on the lampholder bases, before fixing the battens in the frame with two screws at each end, well countersunk on the outside. The spacing of these battens is unequal, but this is in order to get the lamp filaments equally spaced along the heater. The filaments would be approximately in the centre of the frame if the lamps were all fixed on one batten along the whole length of the inside of the frame, but the method used was chosen because it adds strength to the construction.

Wiring

Wiring is carried out with the flat twin cable and reference to Fig. 3 should make clear how this is done. However, for those who are not familiar with parallel circuits, a diagram is given in Fig. 4. The lamp numbers correspond with the lamp numbers in Fig. 3. A light wood batten is fixed between the

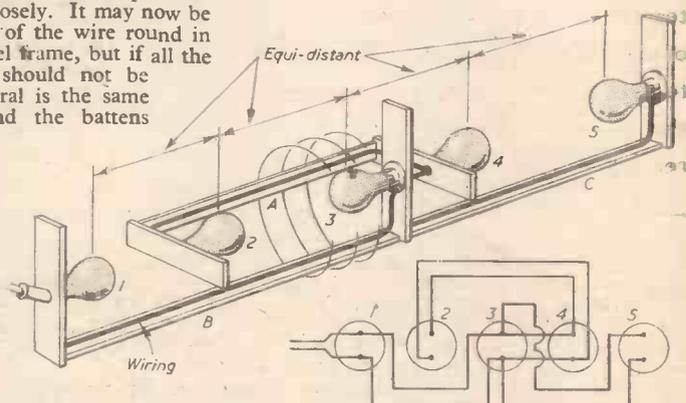


Fig. 3.—The position of the bulbs and, Fig. 4.—The wiring circuit.

The Appliance in Use

From the curves in Fig. 5 information regarding its performance can be obtained. The hottest spot was found to be directly over the centre lamp with the thermometer bulb in contact with the linen. The thermometer was used in this position for the tests.

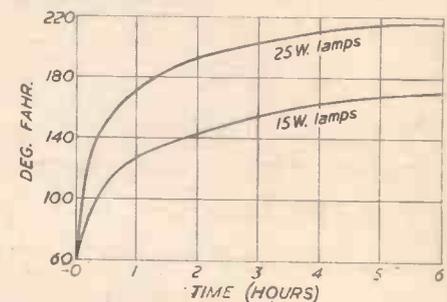


Fig. 5.—The performance of the appliance.

With 25-watt lamps the curve flattened out after four hours at about boiling point. Fifteen-watt lamps would be suitable for ordinary warming and airing purposes. Do not use lamps larger than 25 watts. As an experiment all lamps were removed and one 40-watt lamp put in the centre lampholder; the appliance was switched off when the temperature was 225 deg. F., and still slowly rising.

NEW!

RADIO & T.V. OUTFITS

LEARN THE PRACTICAL WAY



1

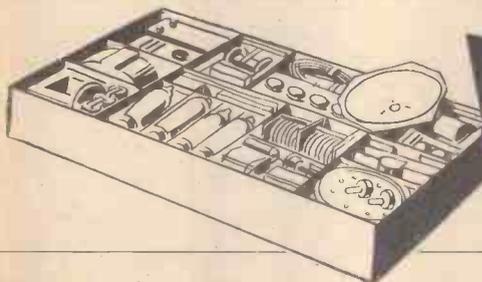
BEGINNERS RADIO OUTFITS—For carrying out basic practical work in Radio and Electronics, from first principles and leading to the design and building of simple Receivers.

ALL EQUIPMENT SUPPLIED IMMEDIATELY AND REMAINS YOUR PROPERTY.

Whether you are a student for an examination; starting a new hobby; intent upon a career in industry or running your own business — these practical courses are intended for YOU and may be yours at a very moderate cost.

EASY TERMS FROM 15/- A MONTH

With these outfits, which you receive upon enrolment, you are given instructions which teach you in easy stages the basic principles of the subject concerned. A tutor is available to give individual help and guidance during the Course. The specially prepared equipment remains your property.



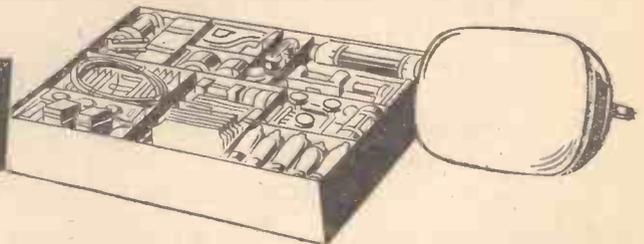
2

ADVANCED RADIO OUTFITS

—With this equipment, you are instructed in the design construction, testing and servicing of complete modern T.R.F. Superhet Radio Receivers.

TELEVISION—With this equipment you are instructed in the design, construction, servicing and testing of a modern high-quality Television Receiver.

3



OTHER COURSES WITH EQUIPMENT INCLUDE:

**MECHANICS · ELECTRICITY
CHEMISTRY · PHOTOGRAPHY
CARPENTRY**

**ALSO DRAUGHTSMANSHIP · COMMERCIAL ART
AMATEUR S.W. RADIO · LANGUAGES · ETC.**

POST THIS COUPON TODAY

Please send me your FREE book on Practical Courses:

I am interested in Radio 1 , Radio 2 , Television .

Subject(s) of interest

To: E.M.I. INSTITUTES, Dept. 144x, 43 Grove Park Road, Chiswick, London, W.4.

NAME

ADDRESS

October, 1954.

(We shall not worry you with personal visits)



E.M.I. INSTITUTES The only Postal College which is part of a world-wide Industrial Organisation

HERE'S VALUE!

GENUINE NEW and PERFECT EX-GOV'T. SIGNAL LAMPS

Adaptable as Workshop Spotlight For day or night use, 34in. lamp. Morse key, view finder, mirror reflector, fully wired in strong waterproof case. Swivel base, metal screw-in stand. Complete with spare parts, tin and coloured discs. Includes Map Reading Lamp. Free Morse Code Leaf-let given with Lamp. **13/6.** Post and packing 2/3. Spare bulbs 1/3. Battery 1/8 extra.



Post and packing 2/3. Spare bulbs 1/3. Battery 1/8 extra.

NEW EX-W.D. 12-VOLT STORAGE BATTERIES

New ex-w.d. and portable in strong wood case (similar to illustration but 12 v.). Heavy duty. 75 amp. 13 plates per cell. Size 15 1/2 in. x 8 in. x 11 in.

SPECIAL OFFER. Worth double. **79/6** Carr. P/Pk. 10/6.



1 AMP BATTERY CHARGERS

Also useful as Eliminator New and fully guaranteed in leading maker's original carton. 200-250 v. A.C. With Warning Indicator Light. Charges 6v. and 12v. batteries & maintains 1 amp. output at all voltages. **52/6** Export surplus. Usual price 95/- P/Pk. 1/11

Also 2 AMP. DE LUXE MODEL **89/6** WITH AMMETER (Usual 126/6). Carr. P/Pk. 2/9.

VOLTMETERS
Ex-Gov't. Moving Coil. 0-20v., 2in. square dial. **8/6** Post/Pk. 1/-



EASY TERMS
25/- SECURES DELIVERY OF GOODS VALUE £5
Balance payable over 6 months.

SEND FOR FREE ILLUS. CATALOGUE
PRIDE & CLARKE Ltd.
(Dept. P.M.) 158, STOCKWELL ROAD, LONDON, S.W.9 BRI 6251

RADIO SUPPLY CO. (Leeds) Ltd. 32, The Calls, Leeds, 2 (DEPT. S).

Terms: C.W.O. or C.O.D. over £1. Postage 1/1 extra under £1; 2/- extra under £3.

All Goods guaranteed. Catalogue 6d. S.A.E. enquiries.

CONVERT YOUR BATTERY RECEIVER TO A.C. MAINS.

R.S.C. BATTERY CONVERTER KIT. A complete kit of parts for the construction of a unit which will replace both H.T. Battery and L.T. Accumulator where 200-250 v. A.C. Mains supply is available. Outputs fully smoothed are 120 v., 90 v., 60 v., 40 mA. and 2 v. at 0.4 a. to 1 amp. for all normal Battery Receivers. Only 48/9. Or assembled ready for use 8/9 extra.

R.S.C. BATTERY SUPERSEDER KIT.—All parts to assemble a unit (housed in metal case approx. 5 1/2 x 4 x 1 1/2 in.) to replace H.T. and L.T. Batteries in ALL DRY RECEIVERS when mains supply of 200-250 v. A.C. is available. Outputs fully smoothed 90 v. 10 mA., 1.4 v. 250 mA. For 4 valve sets only 35/9, or ready for use 42/6.

H.M.V. LONG PLAYING RECORD TURNTABLE WITH CRYSTAL PICK-UP.—(Sapphire Stylus.) Speed 33 1/3 r.p.m. For A.C. mains 200-250 v. Brand New Cartoned and Perfect. Only £3/19/6, plus Carr. 5/-. Limited number only. (Normal price £8 approx.)

PLESSEY 3-SPEED AUTOMATIC RECORD CHANGER.—Plays 8 records, 10in. and 12in. Intermixed at 78 r.p.m. or 10 records 10in. and 12in. Int. at 33 1/3 r.p.m. or 10 records 7in. at 33 1/3 r.p.m. or 8 records 7in. at 45 r.p.m. Complete with Crystal Pick-up with duo-point alloy stylus. Plays approx 2,000 records on each stylus. 2 years' average use. For mains 200-250 v. supply. Brand New, cartoned. Limited supply at under half list price. Buy now at £9/19/6, plus S/- carr.

CONNOISSEUR HIGH FIDELITY MAGNETIC PICK-UPS COMPLETE WITH MATCHING TRANSFORMER.—Brand New, Boxed, and Perfect. Limited number at fraction of maker's list price. Only 26/6.

R.S.C. BATTERY CHARGER KITS.—For A.C. mains 200-230-250 v. operation. Kit comprises Mains Transformer, F.W. Selenium Rectifier Fuses, Fuseholders, etc., and Louvred Black Crackle Case.

6 v. 2 a. 26/9
6 v. or 12 v. 2 a. 31/9
6 v. or 12 v. 4 a. 49/9
Supplied assembled and tested, 6/9 ex. AMMETER.—G.E.C. 2in., M/c 0-5 amp., 11/9.

SELENIUM RECTIFIERS:
2/6 v. 1 a. H.W. 1/9
6/12 v. 1 a. H.W. 2/9
6/12 v. 1 a. F.W. (Bridge) 5/9
6/12 v. 2 a. F.W. (Bridge) 9/9
6/12 v. 4 a. F.W. (Bridge) 14/9
6/12 v. 6 a. F.W. (Bridge) 19/9
150 v. 40 mA. H.W. 3/9
250 v. 50 mA. H.W. 5/9
250 v. 100 mA. H.W. 8/9

VARIABLE RESISTORS.—2 ohms 5 amps., 7/9; 10 ohms 3 amps., 8/9; 0.4 ohm 25 amps., 8/9; 50 ohms 1.5 amps., 11/9; suitable for speed control, battery chargers, etc. All complete with Knob.

R.S.C. FILAMENT TRANSFORMERS.—Primaries 200-250 v. A.C. 50 c/s 6.3 v. 1.5 a., 5/9; 12 v. 1 a., 7/11; 6.3 v. 2 a., 7/6; 12 v. 3 a., 17/6; 6.3 v. 3 a., 9/9; 24 v. 1.5 a., 17/6; 0-4-6.3 v. 2 a., 7/9; 6.3 v. 6 a., 17/6.

R.S.C. CHARGER TRANSFORMERS. Primaries 200-230-250 v. A.C. 50 c/s 0.9-15 v. 1.5 a., 12/9; 0.9-15 v. 6 a., 22/9; 0.9-15 v. 3 a., 16/9; 0.9-15 v. 4 a., 18/9; 0.4-9-15-24 v. 3 a., 22/9; 0-11-22 v. 15 a., 45/-.

EX GOV. ACCUMULATORS (NEW).—2 v. 16 A.H. with Non-spill Vents, 5/9.
EX. GOV. AUTO-TRANSFORMERS.—50 c/s. Double wound 10-0-200-220-240v. to 15-10-5-0-195-215-235v. or reverse 200 watts, 27/9. Many Auto Trans. in stock (up to 5 kVA) at very low prices.

All items carriage paid and Money back guarantee.

TWIST DRILL SET

9 drills 1/16in. to 1in. complete with plastic case and stand. Brand new. **4/6**

MODEL MAKER'S MOTOR

Extremely powerful and robustly designed motor measuring 3in. x 1 1/2 in. x 1 1/2 in. Built-in variable resistor and centrifugal governor. 12v. d.c. Will operate on 15/- a.c. Unrepeatable at **15/-**

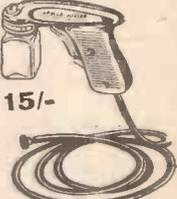


ALL STEEL TOOL BOX

With removable inner tray. Strong hasp and carrying handles. Size 1. 14 x 8 x 8in., **25/-**
Size 2. 17 x 8 x 8in., **30/-**
Size 3. 24 x 8 x 8in. **36/6**

APOLLO SPRAY GUN

Ideal for model maker & handyman. Sprays paints, insecticides, etc. Will work from foot pump, spare car tyre, compressor, etc. New and boxed. **15/-**
C.O.D. 1/- extra.



Cash with Order. Send 3d. for bargain list. Phone orders accepted. (PM12) 479 HARROW RD., LONDON, W10 LADbroke 1718
HIGH ST., HARLESDEN, N.W.10.

SHERMAN'S SUPPLY COMPANY

WATSON'S SPECIAL OFFERS

CHORE HORSE 12/15v. 300 w. £17.10.0 Carr. 12/6

Fine Generating Sets ready for use. Also Briggs & Stratton to same specification. £17.10.0, carr. 12/6. Both sets slightly used, tested and with Three Months' Same-as-Makers' Guarantee.

"NEE" NICKEL ALKALINE BATTERIES.—Unused and uncharged. Nine cells in hardwood crate. 12 volt 45 ampere-hour. £13.10.0, carr. 7/6.

CLOCKWORK MOTORS.—Exceptionally well made, heavy brass double spring motors taken from gun predictors. 37/8, post 2/-.

EDWARDS "SPEEDIVAC" VACUUM PUMPS.—Type "2," each complete with 8in. Vee Pulley. A precision built and very substantially made laboratory instrument. Size 12in. x 8in. x 10in. Much below cost. £14/10/-, Carr. 10/-.

ALTERNATOR.—Special 2,000 cycle 80 v. 12.5 amp. units, extremely well made. 75/-, Carr. 4/6.

SERVO MOTORS.—Suitable for hydraulic or vacuum operation. Approx. 1 1/2 x 4in. overall. Price 14/6 each. Post 2/-.

CONSTANT SPEED UNITS.—Designed for hydraulically controlling the speed of aircraft engines. 12/6. Post 2/-.

SOLENOIDS.—Fine heavy duty units 24 v. Approx. 5 1/2 in. x 2 1/2 in., with 3/8 in. pull. Exceptional value. 18/6. Post 1/6.

BATTERY JUMPER LEADS.—Comprising 25 amp. universal clip, 8ft. wire and spade terminal. 3/6 per pair. Post 6d.

SLIDING RESISTANCE.—1 ohm. 12 amp. 8 1/2 in. long. 10/6. Post 1/10.

HIGH PRESSURE FLEXIBLE TUBING.—To 300lb. 3/8 in. bore. 22in. long 4in. B.S.P. unions. Price 8/9. Post 1/3. Hundreds of other Bargains available. Send stamp for list.

EASTERN MOTORS, ALDBURGH, SUFFOLK Phone: 51

'MARLCO' KNURLING TOOL

Range 0-4in. All steel, case-hardened. Can be assembled to operate in front or behind work. Will exert great pressure without strain to light lathe. Floating jaws will follow workpiece and enable knurling to be started in its middle. Diamond and straight cut knurls available. Full particulars on request.



W. H. MARLEY & CO., LTD.,
Eng. T Dept., New Southgate Works,
105 High Rd., London, N.11.
Telephone: ENTerprise 5234/5578



FOR TOOL POWER

THE POWER TOOLS THAT

speed the job

IF IT'S POWER TOOLS—IT'S BRIDGES

1/4" TOOL POWER GENERAL DRILL This is it! Bridges newest drill with twice the power and 4 times the life of any other drill in its class! Faster penetration, easier handling, bags of guts. Like all 'Tool Power' tools it's built to last a lifetime.

S. N. BRIDGES & CO. LTD., BRIDGES PLACE, PARSONS GREEN LANE, S.W.6 (REN 1177/8)

THIS MONTH'S OFFER of Electradix Bargains

SLOTTED ANGLE. The newest, handiest form of steel strip and angle. 14 gauge mild steel 4 1/2 in. wide strip, cut in 10 ft. lengths and formed to a 90 deg. angle. 3in. x 1 1/2 in. double slotting on the 3in. angle, gives instant 4-point boltability. Slotted angle has hundreds of uses in the Home, Office, Works or Garage. Pretreated by zinc phosphate to protect against rust and painted with one coat stove oil. Price 1/5d. per foot for 10 ft. lengths. Shelves, Hinges and Castors also supplied. Write for ILLUSTRATED LIST.

MAGNETS. D.C. Electric Magnets, 6 volts twin coil, weight 10 ozs., lift 4 lb. 5/- ea., post 9d. Circular Horseshoe Instrument type Magnet 1 1/2 in. dia., 1/2 in. thick, with 1in. polar gap drilled poles, 2/6, post 6d. Alni disc Magnets 1 1/2 in. dia. x 1/4 in. thick, with 3/16 in. centre hole, 3/6, post 6d.

DYNAMOS. 12 volts, 10 amp. D.C. shunt wound totally enclosed, 1,400 r.p.m., ball bearings shaft, extension one end only. Ideal for WIND CHARGES. 6/6, carr. 5/-. G.E.C. Cutout 12 volts, 15 amps., 6/6, post 1/-. S.P.D.T. Knife Switch on porcelain for generator control, 2/6, post 6d. D.C. Moving Coil Ammeter 0-20 amps., 7/6. Voltmeter, 0-25 volts, 7/6.

SOLDERING IRONS, new, 110 volts workshop type, 7/6, post 1/6.

BATTERY CHARGERS. Keep your battery in good condition during the winter months with the Electradix "WINDAY" Battery Charger, for 230 volt A.C. Input. 6 volt 2amps. D.C. output in vent. Metal Case. Input and output terminals new, 55/-, guaranteed, carr. 3/6.

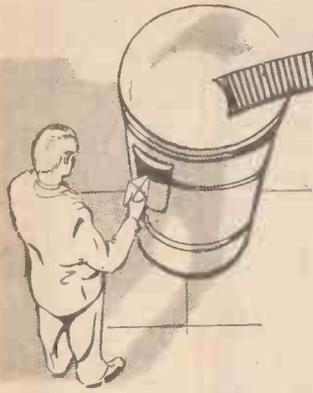
HAND MAGNETO GENERATORS. New P.M. Steel Magnets wound armature, driven by gearing in handle, approx. output 75 volts 25 m.a., A.C. 12/6, post 1/6.

MAGNETO BELLS, telephone type, twin coil driven by hand mag. gen. 3/6, post 1/-. **ENGINE.** SPARES. G.P. 1 h.p. engine metal box with hinged lid contains valves, springs, piston rings, gaskets, petrol pipe, etc. 20 parts for 21/-, post free.

SUNDRIES. Indicator Lamp Holder and Bulb, panel type with red glass, 1/6, post 6d. Bulgin non-reversible 2-pin plug and socket 1/3, post 6d. Bulgin twin-fuse hole with fuses, 2/-, post 6d. Condensers, Dubilier 16 mfd., 800 volts test, 5/-, post 1/-. Choke Coil, 290 ohms, 7/6, post 1/6.

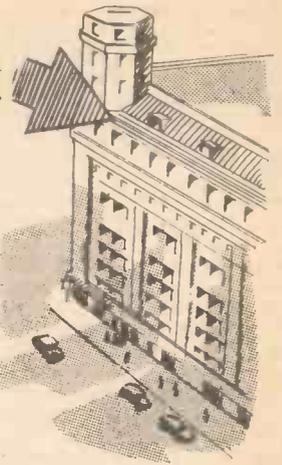
ELECTRADIX RADIOS

Dept. H,
214, Queenstown Road, London, S.W.6
Telephone: MACaulay 2159



Letters to the Editor

The Editor Does not Necessarily Agree with the Views of his Correspondents



Flying Saucers

SIR,—May I comment on your Editorial in the August issue of PRACTICAL MECHANICS? Your comment on the Labrador sighting was fair, but Lord Dowding as Air Chief Marshal and Air Chief Officer in charge of Fighter Command would be in a position to know facts that were unknown to the general public. Neither the Air Ministry nor the Americans have released their secret information, so what he said may be true.

Regarding your statement about the absence of photographs other than Adamski's, you have not produced or commented on the saucer photograph taken near the slopes of Coniston Old Man. This has been proved by photographic experts to be identical to Adamski's saucers. There are numerous other photographs in *Flying Saucers on the Moon*, by Mr. H. J. Wilkins, also in a recently released film. The fact that things are going on behind locked doors does not alter certain facts. Namely: (1) Canadian experts have stated that the "Avro Saucer" has nothing to do with "Flying Saucers"; (2) American experts would hardly allow one of their pilots to lose his life chasing one of their own secret weapons; (3) No country on earth would waste millions of pounds on jets that were obsolete—saucers have been recorded doing 25,000 m.p.h. Experts have stated that these saucers are at least 200 years ahead of anything existing on earth. May I suggest that readers should read the book *Flying Saucers From Outer Space*, by Major Donald Keyhoe, who was Chief of Information for the Aeronautics Branch, Department of Commerce, who has the backing of the American Air Force Intelligence. Evidence in this book shows that there are numerous photographs not yet released by the Air Force. No evidence has been produced or exists to disprove either "Flying Saucers" or Adamski's story.—R. ANSTEE (Bristol, 2).

SIR,—I have been reading PRACTICAL MECHANICS regularly and have found the letters of other readers about "Flying Saucers" of particular interest. The following information may prove of interest to some readers. It is taken from *Voyages in Cloudland*, by T. C. Hepworth, a paper appearing in *Science For All*, published by Cassell and Co. in 1890.

"The first suggested flying machine worthy of note was the idea of a Jesuit, Francis Lana, in 1670. This machine, which was to be built on large spheres, apparently was not made. Note: 1619 seems to be the earliest recorded appearance of flying objects. In 1782 the Montgolfier brothers of Annoray built the first recorded successful machine, which measured 40ft. in diameter and weighed 400 lbs. This machine was a balloon-like affair of linen and paper, and was made to ascend by hot air, which was supplied from a furnace of burning straw placed beneath a wide orifice in the bottom of the balloon. Mr. Hepworth states he witnessed two ascents of a large machine of this type in London in

1864. The capacity of the balloon was half a million cubic feet.

In the same year (1782) Cavendish, Cavallo and Dr. Black were experimenting with hydrogen-filled balloons. From this time onwards ballooning was extensively carried on in England, France and America." Whether "Flying Saucers" are of our world or another, I don't think from such pictures as I have seen of them that it needs much imagination to convert the outline of a balloon to that of a "Flying Saucer."—F. COSGRAVE (Dublin).

Making Holes in Rubber Corks

SIR,—I was interested in your advice to a correspondent on how to bore holes in rubber rollers. Some years ago, whilst a research student at Oxford, I was confronted with the same problem, as must very many chemists have been. Curiously enough, all the advice one finds in the literature on this topic appears to be about of the same order of usefulness as the old chestnut about cutting glass under water with scissors. Anyway, we were unable to make any of them work, even with the resources of a very well-equipped machine shop at hand.

In the end I solved the problem in the following way: The rubber bung is simply frozen in a freezing mixture of solid CO₂ (Drikold, Cardice) and acetone. When thoroughly frozen, it can be drilled with an ordinary twist drill using a power drill. The speed can be such that the swarf comes off in a continuous strip (which makes an intriguing object when thawed out!). When the rubber begins to thaw, the drill sticks, but no harm is done if one is proceeding cautiously, and one merely refreezes the cork and goes on. Afterwards, the rubber thaws out and is unaffected.

In this way we were able to drill holes in the largest sizes of bung (3½in. diameter, 2½in. thick), using drills up to ½in. The main thing was that these holes were perfectly smooth inside—this was the only method we found which gave this smoothness.

Of course, the method depends on the low thermal conductivity of frozen rubber. With a small size drill one can go right through a large cork in one go without refreezing! Incidentally, everyone said the method would not work, however, *experientia docet!* Which is why one experiments after all. If one were to use liquid air, I believe it would be possible to work a frozen rubber block on a lathe. CO₂ is not cold enough, and it heats up too quickly.—D. P. H. TUDOR WILLIAMS (Teddington).

Soft Soldering, Silver Soldering and Brazing

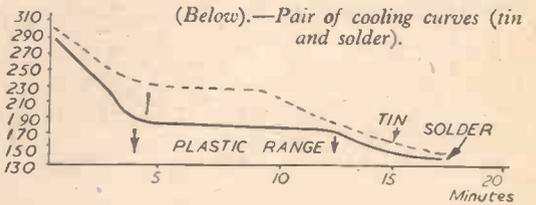
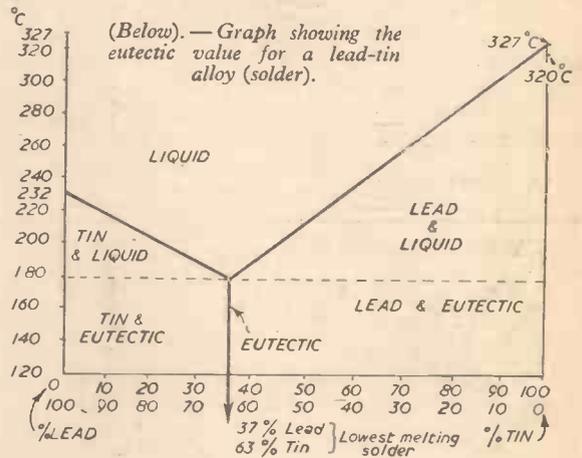
SIR,—I would like to correct a statement made by E. W. Twining in his excellent article "Soft Soldering, Silver Soldering and Brazing," in the August issue.

The statement was that lead has a fusing point of 620 deg. F. and tin 446 deg. F., so

that solder will melt at a temperature between these two.

In actual fact, the fusing point of solder is well below these temperatures, as will be seen from the graph, which shows the eutectic value for a lead-tin alloy (solder).

Another important fact is that by mixing these two metals you greatly lengthen the "plastic range" of the alloy. This is of great help to plumbers when wiping a joint. I also enclose a graph showing a comparison between the plastic ranges of tin and solder.—M. H. FERRY (Lancs).



Ancient Egyptians' Tools

SIR,—The paragraph in "Fair Comment" in August PRACTICAL MECHANICS, dealing with our lack of knowledge of the Ancient Egyptians' tools and their use of them, was of great interest to me.

Whilst in the Middle East during the war, being of an inquiring frame of mind, I purposely sought evidence of their skill and knowledge of tools on the monuments, etc.

One difficulty for the layman to overcome is the vast periods of time represented in Egyptian history—some equivalent to the period between Alfred the Great and ourselves. How could Canute visualise the Boulder Dam or Nile Barrage?

There are many inexplicable contrasts evident. I enclose a postcard illustrating two. (Unfortunately we cannot reproduce this.—ED.) At the extreme left of the upper panel can be seen part of a familiar motif in this theme of design. Consisting of two uprights—presumably of wood, bound together

with a wooden lever passed through the binding and weighted at the end by a hanging weight. This was a vice for sawing large planks. A perfect use of the lever and fulcrum in practice—but where is the knowledge that would have produced the screw and later the vice that we know?

Again, on the right is the still familiar bow drill—exactly as one might see it to-day in Cairo—yet where was the lathe in those far-off days? I cannot recall seeing any example illustrated in these wall decorations.

The skills that could sculpt colossi in granite, still with a glasslike finish, yet hewed their obelisks in the quarry itself with all the attendant risks of fracture and damage in the hundreds of miles travel to their destinations, are difficult for us to understand.

The lack of knowledge of the screw did not prevent the Egyptians using a clever double wedge to seal their pyramids—an inclined plane lock on an inclined plane!

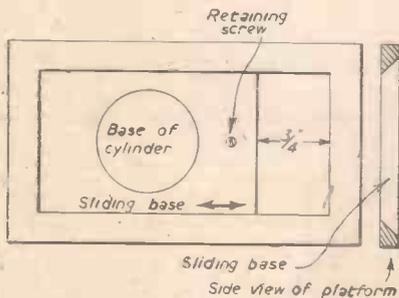
I think that perhaps the reason for these seeming contradictions lies in a fact pointed out by H. G. Wells in his *History of the World*, in words similar to these: "There was in Egypt a difference between the artist and artisan. The philosophers and designers, mathematicians and scientists did not work . . . the worker in stone, wood and metal did not meet the knowledge that was available; so the impulse that Egypt had, faltered, stagnated and died out. . . ." The skill was there, the knowledge was there, but they did not meet.

I think a series of articles on the history of some of our skills, knowledge, crafts and tools would prove of great interest.—J. WARD (E.12).

Parallax Corrector

SIR,—Mr. Bensusan's interesting article in this month's PRACTICAL MECHANICS on a parallax corrector induced me to make one for my son, who is the possessor of a Paxette camera. This camera, however, is provided with two viewfinders, the additional one being required for a second lens. It is fixed to the side of the camera and somewhat lower than the other, which is in the centre at the top. If the corrector was to be of any value for the two viewfinders I had to provide something additional to meet this need.

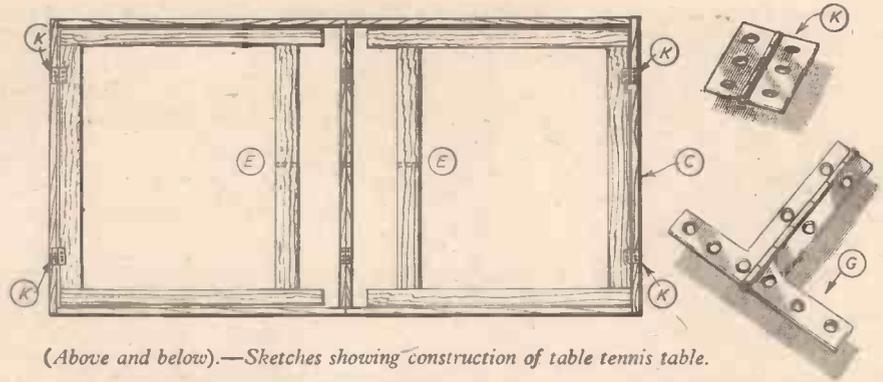
This I did by mounting the cylinder on a sliding base with bevelled edges, working on a platform into which the tripod is secured. This is similar to the sliding arrangement on most sewing machines to allow access to the shuttle. See sketch. The side viewfinder is 3/4 in. from the centre of the lens and accordingly the base has a lateral movement of 3/4 in. It can be secured by a retaining screw. To enable the camera to be adjusted to move



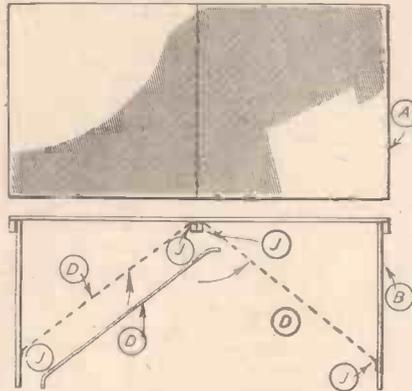
Mr. E. Gilfillan's modification.

parallel to the front of the platform I have constructed its base at the top of the inner tube to move with the camera. It is kept in position by a retaining screw.

I, of course, had, as far as the second viewfinder was concerned, to arrange for the vertical raising of the camera to a height corresponding to the parallel distance between the lens and the second viewfinder. This I

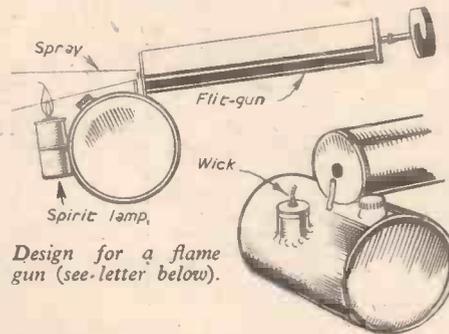


(Above and below).—Sketches showing construction of table tennis table.



did by making a mark (actually 1 1/2 in. from the bottom) at the required altitude on the outer cylinder, at which point rigidity can be secured by tightening the winged nut.

Mr Bensusan suggests a diameter of 2 in. for the outer cylinder. I, however, found 1 in. to be more suitable.—E. GILFILLAN (Belfast).



A Flame Gun

SIR, Regarding a query from Mr. S. Scott on page 412 of your June, 1954, issue, about constructing a flame gun for dealing with weeds, here is one that can be constructed in less than an hour.

Any insecticide spray—such as the old Flit-spray—is used as a sprayer. A small spirit lamp is either strapped or soldered to the tank of the Flit-spray so that its wick will come up to an inch or so ahead of the spray hole and slightly (1/2 in.) below its level. The tank is three-quarters filled with kerosene (not petrol) and the spirit lamp is lighted. When the spray-gun is worked a 3ft. atomised column of burning fuel issues and is found most effective for killing weeds. The flame is smokeless and no oil residue is left on the target. For permanent use, the lamp could be formed from the tank itself, as shown in the sketches above.—MAJOR H. S. APTE (Poona, 4).

A Table Tennis Table

SIR,—Re the request of Mr. Loudon ("Information Sought," August issue) for particulars of a table tennis table, the following may be useful.

Two frames are constructed, 4ft. by 4ft., made of planed batten 2 in. by 3/4 in. The joints at the corners are half cut and screwed as shown at (C). The two sections of the top are covered in suitable hardboard and fastened with panel pins, see (A). These sections could be hinged in the centre with either "butt" hinges (K), say 2 1/2 in., or double H.L. hinges as pattern (G).

For the supports, two frames are made from 2 in. by 3/4 in. batten, with a cross-bar as top sketch; these should lay inside the table-top frame and be hinged as shown at (H) and suitable height for legs. In centre of cross-bar (E) drill a hole and another (J) in frame of table to take two iron bars 7/16 in. or 1/2 in. to keep table rigid, bar to be bent as at (D). Insert at points marked (J) and (E). The table-top should be painted matt green and lines set off in white as required to represent a court.

The remainder could be either painted or stained as preferred.

The whole is designed to be folded for storage purposes.—R. B. GARNISH (Ilfracombe).

Drying Cupboard

SIR,—Re Mr. Hart, of Derbyshire (July "Information Sought"), who was planning to build a drying cupboard, there is a special four-tray electric oven designed by Messrs. May and Baker for drying laboratory apparatus. This was mentioned in No. 2 of "M. and B. Laboratory Bulletin," on page 18, and I wrote for a drawing from Dr. B. J. Heywood, Chemical Research Division C, May and Baker, Ltd., Dagenham, Essex.

The blueprint is No. 6334 and should be easily converted to a drying cupboard in a house if only the smaller elements are used. These elements are supplied by Mr. McLelland of Mc. and B. Control, Ltd., Heaton Works, Potter Street, Essex.

I suggest that Mr. Hart writes for a drawing, mentioning the Bulletin, and he will probably have no difficulty in converting it to household use.—JOHN WRIGLEY (London, N.10).

—FOR THE MODEL MAKER—

THE MODEL AEROPLANE HANDBOOK
Construction and Principles of all Types.
12/6 (13/- by post)

MODEL BOAT BUILDING
Constructional details of Model Sailing and Power Boats.
5/- (5/6 by post)

THE HOW-TO-MAKE-IT BOOK
13/- (13/6 by post)

From George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

Get the Thrills of Enlarging NOW!



GNOME 'MINOR'

Enjoy making enlargements with famous **GNOME 'MINOR'** £6/9/6 enlarger. Supplied complete with f8 Doublet enlarging lens. Takes 120, 620, 127 and 35-mm. negatives. Makes any size of enlargement from postcard to 16in. x 20in. Operating instructions supplied.

How to Get *GNOME 'MINOR'*
All you have to do to get the *GNOME 'MINOR'* is to fill in the Coupon. If you want to take advantage of our easy terms just indicate. Money Back Guarantee.

..... **Post This Coupon**
To New Trading House, Dept. N16, Primrose Hill, Preston, Lancs.
Please send — *GNOME 'MINOR'* ENLARGER with lens.
* I enclose £6/9/6 in full payment.
* I enclose 10/- and will send 13 further weekly payments of 10/- to complete payment.
Signed _____
Please PRINT name and address in margin
* Cross out if not applicable.

GENERAL CERT. OF EDUCATION

THE KEY TO SUCCESS & SECURITY
Essential to success in any walk of life! Whatever your age, you can now prepare at home for the important new General Cert. of Education Exam, on "NO PASS—NO FEE" terms. You choose your own subjects—Educational, Commercial or Technical. Recently announced big extension of subjects gives everyone chance to get this valuable Certificate.

SEND FOR FREE 134 PAGE BOOK
Full details of how you can obtain the General Cert. are given in our 134-page Guide—Free and without obligation. Personal advice on request. Write today. Dept. 160, S.O.C., 29-31, Wright's Lane, London, W.8. "NO PASS—NO FEE"

THE FAMOUS HARRIS ELECTRIC WELDER

and Complete Kit
For Welding, Soldering, Brazing and metal construction & repairs in the home, on the car or cycle. Instant heat 6,000° F. Works from 6v. or 12v. car battery or transformer from A.C. mains. Complete kit of Welding Tool, 9 ft. cable, clip carbons, cleansing fluid, fluxes, filler rods, goggles, instructions, hints. Thousands in daily use. As supplied to Dept. of H.M. Government, I.O.I., Standard Telephones, etc. Welds all Metals. Up to one-eighth inch. **53/6**
C.O.D. IF REQUIRED.
Obtainable only from: Post Free HARRIS ENGINEERING CO. (Dept. P.M.) 269 Kingsland Road, London, E.2.

CHEMISTRY APPARATUS

Send 2jd. stamp for COMPLETE PRICE LIST
Booklets:
"Experiments" 10jd.
"Formulas" 10jd.
"Home Chemistry" 2/3
Post Paid.

BECK (Scientific Dept. A) 60-HIGH STREET, Stoke Newington, London, N.16

POTTERY KILNS

3kW. Electric kilns for the Home, School, or Studio potter. Prices from £12 to £50. Also clays, glazes and all materials required for pottery making.
MILLS & HUBBALL, Ltd., 244, Borough High St., London, S.E.1

CABLE/FLEX CHEAPER IN VARIED LENGTH COILS

No coil under 25 yds. unless requested. Prices per 100 yd. lot, less supplied, just add 6%. Full lists on request.

Twin Flat	1/044	3/029	Do. W/E	3/036	Do. W/E	7/029W/E	7/043	Do. W/E
RUBBER ...	39/-	49/-	59/-	68/-	78/-	101/-	156/-	198/-
PLASTIC ...	36/-	46/-	57/-	67/-	77/-	99/-	154/-	196/-
SINGLE V.L.R. ...	17/-	21/-	—	27/-	—	38/-	86/-	—
SINGLE PLASTIC ...	13/-	22/-	—	29/-	—	38/-	72/-	—

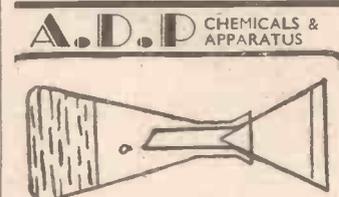
Circular
Twin 14/36 22/36 40/36 3 Core 23/36 40/36 70/36
RUBBER ... 54/- 61/- 78/- 75/- 100/- 140/-
PLASTIC ... 41/- 54/- 76/- 63/- 89/- 133/-

FLEX—Plastic, T.T. or flat, 13/9; Maroon, 24/- (in 10-20 yd. coils, 20/-). EARTH WIRE 7/029 tinned, 7/3 per 100 ft. lot. Please add part carriage to small orders. Full 100 yd. coils can be supplied, add 1/6 in £1. **BRITISH DISTRIBUTING (PM), 591, Green Lanes, London, N.8. MOU. 0055/6.**

MAIL ORDER BARGAINS

INTER COMMUNICATION SETS for Motor Cyclists to Sidecar, comprising two microphones, two head sets fitted with instant release plugs and connecting leads and batteries, easily installed, circuits supplied with every set. 39/6 Post free.
SPECIAL OFFER! of **DISPENSING SCALES**, lacquered brass, capacity 2 ozs. all well-known makes in excellent condition, totally enclosed in own polished teak box. Original Price £7.16.0. Our Price while stocks last 35/- P. and P. free.
24v. WATER PUMPS, self-contained with motor. Ideal for ponds and boats, will lift 150 gallons per hour approx. Easy mounting and self-priming. Will run on 12 and 24v. or on mains with transformer. 39/6. P.P. 2/6.
ALL-PURPOSE MAINS TRANSFORMERS. Suitable for use with the above pumps. All-purpose low-voltage input 210/250. Output 3, 4, 5, 6, 8, 9, 10, 12, 15, 18, 20, 24, 30 volts. Rating 2 amps. Brand new, fully guaranteed. 22/6. P.P. 1/6.
ENGLISH HIGH SPEED DRILLS, 40 drills of assorted sizes, 1 to 60 for 30/- post free.
P.P. free on orders over £2.
Please Print Name and Address when ordering.
SEND WITH CONFIDENCE FOR GOODS. MONEY BACK GUARANTEE. CASH WITH ORDER.
C.O.D. and Phone Orders Accepted.
UNIVERSAL TRADERS (PM2), 44, LONDON RD., TWICKENHAM, MIDDLESEX. POPesrove 54.10.

A.D.P. CHEMICALS & APPARATUS
WE CAN OFFER A WIDE SELECTION OF EQUIPMENT SUITABLE FOR STUDENTS AND ENGINEERS.
Send stamp for lists to: 14 (D/P/M) SURREY ROAD, BARKING, ESSEX.
SAVE YOUR BREATH
"2,000" AUTOMATIC BLOWLAMP
Burns methylated spirit. Completely Automatic. Absolutely safe. Suitable for all kinds of tinman's and silver soldering, glass bending, etc. 2,000 deg. Fahrenheit flame. Post 9d. 12/6.
Unsolicited testimonial:
"I have been a Gas Fitter for the past 30 years but now find my work a pleasure. I have recommended it to all my workmates and all are delighted with it."
John Bull (PM9), 246, High Street, Harlesden, N.W.10.



ACCURATE HARDHITTING Webley AIR PISTOLS AIR RIFLES - ACCESSORIES
Write for catalogue WEBLEY A SCOTT LTD. 106, WEAMAN ST., BIRMINGHAM 4, ENGLAND
RATCHET & REVOLUTION COUNTERS
Ask for Leaflet No. 18/1 Speed up to 6,000 r.p.m. B. & F. CARTER & Co., Ltd., Bolton 5

THE LOW TEMP METHOD OF ALUMINIUM BRAZING
MAKES PERFECT UNBREAKABLE JOINTS IN ALUMINIUM. COMPLETE OUTFIT, INCLUDING PRECISION MADE BLOWPIPE (PLUS BLOWING) FOR USE WITH HOUSEHOLD GAS SUPPLY, PLUS 1000S ETC. WITH FULL DETAILED INSTRUCTIONS 8/6 POST FREE.
A.C.S. EQUIPMENTS 23 WESTERN ROAD COWLESLY HUDDERSFIELD

MOVING COIL METERS
0-5 M.A. Meters moving coil 2 1/2 in. square flush type.
0-50 M.A. Meters moving coil.
0-20 Volt Meters moving coil, exp. equipment.
0-40 Volt Meters moving coil.
All brand new and boxed (unless otherwise stated). Price 10/- each, postage 1/3.
ARTHUR T. SALLIS (P.M.), 93 NORTH ROAD, BRIGHTON, SUSSEX. Tel.: Brighton 25806

THAMES VALLEY PRODUCTS (P) "Orari," Eleanor Rd., Chalfont St. Peter, Bucks.

GOVERNMENT SURPLUS BARGAINS

1/3rd H.P. MOTORS. New, 230 volt A.C. single phase, 50 cycles, 1.425 r.p.m., 1 shaft. CAPACITOR START. usual price 179/6. OUR PRICE. 119/6, carr. 8/6.
ELECTRIC FANS. New in maker's boxes. 230/250 v. A.C. 7 1/2 in. blades, suitable circulation or extraction. Bargain at 50/-, post 2/-.
HAND GENERATORS. Complete with handle and 72/1 gearbox. Output 23 volts and 300 volts. As described for WASHING MACHINE in PRACTICAL MECHANICS, Aug. '53 and WRINGER, Mar. '54. Each 25/-, post 1/9.
LANDING LAMP MOTORS. Drive via reduction gear operating quadrant giving powerful lateral movement of about 2in. and reverse. 12 1/4 v. D.C. also 30 v. A.C. Exactly as described in *Practical Motorist*, Aug. '54 for SELF OPENING GARAGE DOORS. Each 25/-, post 1/6.
TELEPHONE HANDSETS. Streamlined P.O. type, suitable intercom. system. Each 17/6, post 1/6.
PRESSURE TANKS. (R.A.F. Oil Reservoirs). Each 5/-, post 1/6.
Send 3d. stamp for List of MOTORS, TELEPHONES, TRANSFORMERS, PUMPS, LAMPS, SWITCHES, CABLE, BOXES, etc., etc. Hundreds of Bargains.
MILLIGANS 24, HARFORD STREET, LIVERPOOL 3. Money Back Guarantee

The Finest Clip in the World
Jubilee
Make SURE it's a genuine "Jubilee!"
JUBILEE
L. ROBINSON & CO. (GILLINGHAM) LTD. London Chambers, GILLINGHAM, KENT. Phone 5282

WIRING ACCESSORIES
All goods are of a well-known manufacture and carry a money-back guarantee. All cables are manufactured to the latest British Standard Specification. C.O.D. or C.W.O. All carriage paid.
CABLE TRS.—Flat Twin, 1.044, 46/-, 3.029, 58/-, 7.029, 97/6. PVC Sheathed. Flat Twin, 1.044, 40/-, 3.029, 57/6. All per 100 yds. Our PVC cables are suitable for interior or exterior use and may even be buried in concrete. All types and sizes of cables available in 25, 50 or 100 yd. lengths. Heavy cables out to desired length at no extra charge. Switches, 16. 2 Way, 2/-; Ceiling Roses, 10d. Lampholders, 10d. 3-pin Sw. Sockets, 5 A., 4/6. 15 A., 6/6. Send for Price Lists of other accessories.
HUNT & CO., West Street, Exeter. Phone: Exeter 50687

MUST BE SEEN TO BE BELIEVED **GREATEST BARGAIN EVER!**
EX-USA PILOTS OFFICIAL SUPER QUALITY Brown Leather FLYING JACKETS
ONLY **105/-** P./P. 2/-
Beautiful luxurious warm Natural sheepskin. Full zips. 2 pockets and deep real lambswool storm collar.
INDISTINGUISHABLE FROM NEW OFFERING A LIFETIME OF WEAR Money Refund Guarantee.
MARCUS STORES (51), GRAVESEND

HIGH QUALITY TOOLS For the Craftsman
Terms as low as 2/6 per week. Send 1/- for catalogue containing over 400 items
H. J. BOULTING LTD. 21, Wellington Street, Leicester

PORTASS 4 1/2" x 37" S.C. LATHE
Cast Iron Tray and Peds in 2 lengths.
Charles Portass & Son, Dept. P.M. Buttermere Works, Sheff. 8.

1/4" Black & Decker
PORTABLE ELECTRIC DRILL
200V. OR 250V. A.C. COMPLETELY SUPPRESSED FOR RADIO AND TV INTERFERENCE FULLY GUARANTEED
MANY ACCESSORIES ALSO AVAILABLE
SENT POST FREE FOR **£1**
DEPOSIT AND NINE FURTHER MONTHLY PAYMENTS OF 12/6. CASH PRICE £5 9/6.
Frith RADIOCRAFT Ltd PHONE 58927 69-71 CHURCH GATE LEICESTER

"I NEVER THOUGHT THAT I COULD MAKE A RADIO SET"
say Satisfied Customers. Yet by using our Home Constructor Booklet (Price 2/6 only) YOU too can build superb sets. Crammed with Circuits, **Supra-Simplified** wiring diagrams, constructional details and "Know-How." (State if free RADIO CONTROL gen. wanted too.) SUPACOILS, Dept. M.10. 21 Markhouse Road, London, E.17.

Build your own air compressor
BRAND NEW Heywood Bendix Compressors, with Driving Shaft, 40/- each, 2/6 Carr. Approx. 2c. ft. at 600 r.p.m. & 100 lbs. per sq. in.
TANKS, complete with gauge, taps, etc. Tested to 400 lb. per sq. in. on platform. 40/-, Carr. 2/-
C. H. VINCENT 47/49 Essex Road, Islington, London, N.1. Canonbury 3720

BATTERY CHARGERS
Reliable, easily installed, economical Selector switch for 2, 6 and 12 volts 1 amp. In Black Crackle Steel Case with Ammeter, Mains-switch, fuses, etc. 200-250 volt A.C. Guaranteed. 55/-, 2 amp. model, 70/-. Post 2/6. from manufacturers.
THAMES VALLEY PRODUCTS (P) "Orari," Eleanor Rd., Chalfont St. Peter, Bucks.

Trade Notes

The Spray Spraying Outfit

A RANGE of small, inexpensive spraying outfits is being marketed by The Munster Developments Co. (Fulham), Ltd., 226, Munster Road, London, S.W.6. They are designed to suit the needs of the car or



The "Spray" spray gun connected to a car pump.

motor-cycle owner and the home handyman. The "Car kit" consists of the "Spray" spray gun, designed to work off a tyre pump, black high gloss finish, anti-rust primer surfacer, thinners stopper and polish; the price is 30s. The "Motor Cycle Kit" contains the same items in smaller sizes, and retails at £1. The "Handyman Kit," containing spray gun, black finish, primer and thinners, costs 14s. 6d. A "Chrome Preservation Kit," containing "water white" lacquer, special thinners, chrome cleaner and brush, costs 5s. 6d. Kits are supplied with black finish, but at a slightly extra cost most of the standard car colours may be supplied. The "Spray" finishes are special combination lacquers for use in the "Spray" spray guns and the chrome preservation lacquer is impervious to all weather conditions, being applied either by brush or spray. All the individual items may be purchased separately and if they are not available at one of the local accessory stores, readers should apply direct to the makers' address, above.

3D-2D Polarising Spectacles

A USEFUL and ingenious pair of spectacles has been invented by Mr. Dennis Searle, 626, Brighton Road, Croydon, Surrey. They have the appearance of sunglasses, a function which they perform efficiently, and may in addition be used as 3D viewing spectacles or for viewing 3D films in 2D. Each lens, consisting of a polarising filter, cemented between two glasses, is rotatable, and it is by this means that the spectacles are adapted for their various purposes. In one position the spectacles are suitable for 3D viewing; by rotating one of the glasses through 90 deg. the same picture is seen by both eyes, thereby losing the 3D effect. Thus, if eyestrain is experienced due to a 3D film, the viewer can switch to 2D for relief, without missing any of the film. Rotating both the lenses through 45 deg. from the 3D position converts the glasses to ordinary polarising sunglasses, with the additional advantage that they may be adjusted, according to the position of the sun,

for maximum glare elimination. For television viewing the lenses are set as for flat film viewing. The price of the spectacles is 40s.

Ever Ready Penlight

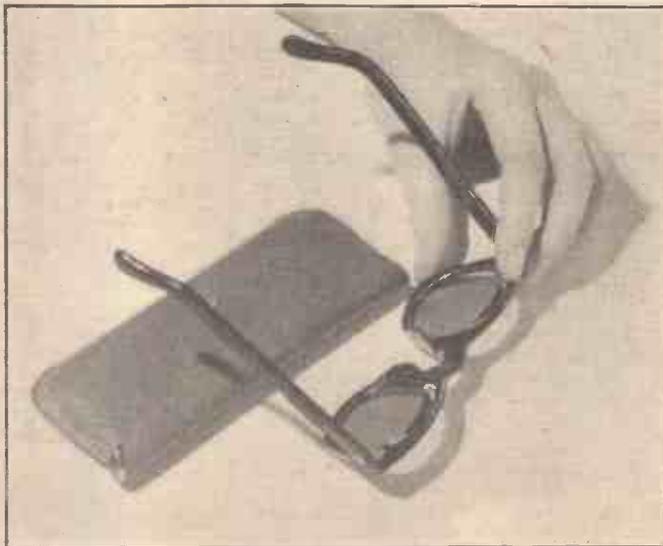
THIS is a new streamlined "pocket-model" torch, which is now being produced by The Ever Ready Co. (Great Britain), Ltd.

The Penlight is under 5in. in length, weighs 1½ oz., complete with batteries, and is styled and finished like a fountain pen. It clips easily to the breast-pocket or fits comfortably into a handbag. Apart from more general use for which it is so handy, it could prove invaluable for medical, dental and veterinary purposes.

This flashlight is a smooth brass tube, either chrome plated or gilt lacquered with a



The Ever Ready penlight.



Multi-purpose polarised spectacles.

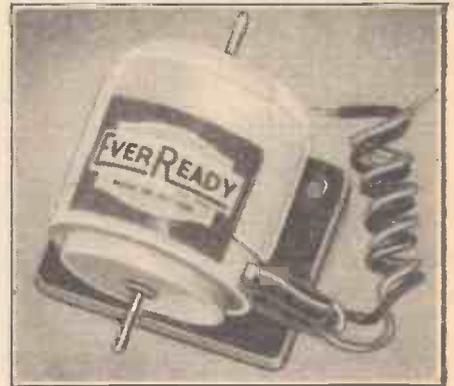
high polish. The bulb housing is made of threaded metal on to which is spun a translucent plastic top cap, modern in design and ridged for finger-tip grip.

The switch is the sliding, positive action type incorporated into the clip. A Lens End Bulb fits snugly into the plastic top cap housing, voltage 2.2 and amperage 0.25; and the Penlight operates on two Ever Ready U.16 batteries in series, giving three volts. Retail price, including bulb and battery, is 5/-.

Ever Ready Miniature Motor

A NEW-STYLE, redesigned and improved miniature Electric Motor for models and toys is being marketed by The Ever Ready Co. (Gt. Britain), Ltd.

This efficient little motor is completely self-starting and has been designed to operate primarily from a six-volt Ever Ready dry



Every Ready miniature electric motor.

battery, but will, in fact, run satisfactorily on any Ever Ready dry battery from three to six volts. The choice of battery depends on the load and on the desired length of battery life. B.H.P. of the motor at maximum efficiency is .001 at 6,000 r.p.m.

Bearings are bronze and self-lubricating. The retail price is 9/11.

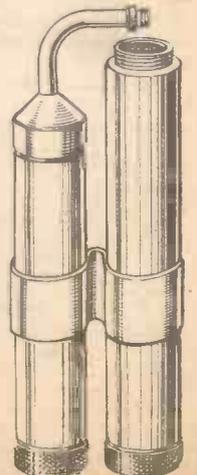
Drawing of the Royal Yacht

FROM Messrs. Bassett-Lowke, Ltd., 18-25, Kingswell Street, Northampton, comes the news that they have produced for sale an accurate drawing of the Royal Yacht *Britannia* for a waterline model to a scale 25ft. : 1in. In addition to the elevation and sectional details, plans are given of the decks and superstructure, ship's boats, etc. The overall length is 16½in. and the drawing, which is full size, costs 6s., postage 6d., from Bassett-Lowke, Ltd.

The Valtock Automatic Blowlamp

A NEW entirely automatic miniature blowlamp has come on to the market; it is being manufactured by Messrs. Valtock, Ltd., 5-6, Sherwood Street, Piccadilly Circus, London, W.1. It is compact and small, measuring 5½in. in height and weighing 7 oz., is made from solid brass tube, with a chrome finish, has no soldered joints and may be carried in the pocket with safety. Ideal for soft soldering work, it can be used in conjunction with a small hearth for silver soldering jobs. The lamp gives a small but very hot flame (2,000 deg. F. is the makers' figure) making it ideal for model-making or jewellery repairs; it can also be used for localised paint stripping, glass bending and drawings, etc.

The lamp is self-presurising and no pumping is required, the fuel is methylated spirit and there are no working parts to go wrong. It is available by post from Messrs. John Bull and Sons, 246, High Street, Harlesden, N.W.10.



Your Queries Answered



RULES

A stamped, addressed envelope, a sixpenny, crossed postal order, and the query coupon from the current issue, which appears on the inside of back cover, must be enclosed with every letter containing a query. Every query and drawing which is sent must bear the name and address of the reader. Send your queries to the Editor, PRACTICAL MECHANICS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

Battery Lighting for Enlarger

I WISH to build a photographic enlarger, but my house is lit by gas. Would it be possible for me to run the enlarger lighting system from a six- or 12-volt car battery?—G. Yeoman (Leeds, 8).

IT would be quite practicable to use a battery for current supply and a small bulb inside a silvered reflector. Even ordinary cycle lamps are used for enlarging (electric, of course). These battery-fed lamps have the advantage of keeping cool, which high-wattage electric light bulbs do not.

Instead of giving exposures of say three seconds in the normal way, you have, with a small battery-fed lamp, to give two minutes. We speak figuratively, of course. You will also have the advantage of greater latitude in the timing. It is more difficult to lengthen or shorten by a definite fraction an exposure in seconds than it is in minutes.

Peat as a Boiler Fuel

I AM anxious to try using peat for boiler fuel and wonder if you could tell me anything at all about it, whether it has good heating qualities, is a slow burner, or whether it needs a good quantity of other fuel, such as coal or wood, to start it burning and to keep it alight?

Do you know if it has any effect on chimney pots? Could you give me the name and address of any firm who could supply me with about 14 lb. of peat for trial? It seems to be unobtainable in southern England.—O. C. Wiltshire (Watford).

(I) PEAT or turf is a rapid-burning material and burns with a glow rather than with a large flame. It gives out plenty of heat, but produces a large amount of a voluminous ash, which renders it a "dirty," and an uneconomic, fuel for industrial use. The peat lights readily enough by the ordinary methods, using paper and wood to start it. A peat fire is recognised as being a hot one, provided the grate admits adequate air. There are, of course, different grades of peat, just as there are different grades of coal. At peats contain, in addition to woody and fibrous

matters, small amounts of bituminous oils, tarry matters and lignite materials which aid the combustion of the fuel.

Chimney pots are never injured by chemical action alone. Cracking is due to sudden expansion of the pot or to some other thermal influence. Chemical action (as, for example, that of acid gases) would corrode rather than crack a chimney pot. Most pots are of a refractory nature and are well able to withstand such corrosive injuries. Hence, the replacement of coal or coke as a fuel by peat or turf would not result in the chimney pot cracking.

(2) Peat is a rather expensive commodity in England. Its price varies in different parts of the country according to its availability and the local demand which arises for it. An average price for domestic peat is about 10/- per 1,000 peat blocks.

Peat suppliers in southern England are: The Eclipse Peat Co., Ltd., Ashcroft, Bridgwater, Somerset; Messrs. L. Garvin & Co., Ltd., Garvin House, Isleworth, Middlesex; Messrs. Ben Smith, Ltd., Brasted, Kent.

We are not aware of the minimum quantity which these firms will supply.

weather) and have found it keeps fats firm but it does not keep the fats or uncooked meat (bacon) fresh. After a few days the contents of the box have a peculiar twang and become uneatable.

Can you tell me please how to remedy this trouble, or better still, could I rebuild the box so as to even improve its efficiency?—L. G. Stone (Ashford).

THE only way in which you could increase the efficiency of your frost box would be to place it in a forced draught, such, for instance, as that which would be provided by placing one or two electric fans in its vicinity, or by standing it between two open doors. You will, of course, realise that the porous bricks must be kept well saturated with water in hot summer weather. This "watering" of the bricks should be done every day at least,

Readers are asked to note that we have discontinued our electrical query service. Replies that appear in these pages from time to time are old ones and are published as being of general interest. Will readers requiring information on other subjects please be as brief as possible with their enquiries.

Improving "Frost Box" Efficiency

I HAVE a "frost box" consisting of porous tiles (like firebrick) in a light zinc frame and a lay-on lid. It is also zinc lined.

I have periodically soaked it in cold water (every five or six days in very hot

not once every five or six days as you mention.

The greater the draught the greater the evaporation-rate of the moisture, and the greater this evaporation-rate the greater the degree of cooling.

Perishable foodstuffs are very liable actually to absorb impurities and smells, which influence their taste very strongly. Now, in your instance, we can only suggest that the odours come from the use of an impure water. Many tap waters are slightly impure, or contain traces of impurities which become entrapped in the pores of the absorbent material and accumulate therein. We suggest that you fill a clean bucket with water and that you stir into the bucket of water one teaspoonful of chloride of lime, afterwards reserving the water exclusively for the frost box. This treatment will neutralise any odour and prevent the slow development of odour within the box. If, as a result of this treatment, the foodstuffs acquire a metallic "disinfectant" taste, it is a sign that too much chloride of lime has been used in the water, and the amount should be reduced until the chloride taste and smell has vanished.

Provided that the firebrick material is adequately porous, it is doubtful whether you could improve the performance of the box in any way. Whatever you can do in the way of speeding up the draught to which the box is exposed will be beneficial because any such action will increase the temperature-drop of the box. But it is always necessary to remember that all these devices are only intended to give relatively small degrees of cooling. They are never in any sense substitutes for the orthodox domestic refrigerators.

Making Flexible Moulds

WOULD you please give me the formula for making flexible moulds?—E. Boyd (Dundee).

A SATISFACTORY material for making flexible moulds may be obtained by melting down ordinary cake glue and adding a small quantity of glycerine. On cooling, it then becomes rubbery instead of brittle. The precise quantity of glycerine must be determined by experiment, as it largely

(Continued on page 44)

THE P.M. BLUE-PRINT SERVICE

12FT. ALL-WOOD CANOE. New Series. No. 1, 3s. 6d.*

10-WATT MOTOR. New Series. No. 2, 3s. 6d.*

COMPRESSED-AIR MODEL AERO ENGINE. New Series. No. 3, 5s.*

AIR RESERVOIR FOR COMPRESSED-AIR AERO ENGINE. New Series. No. 3a, 1s.

"SPORTS" PEDAL CAR. New Series. No. 4, 5s.*

F. J. CAMM'S FLASH STEAM PLANT. New Series. No. 5, 5s.*

SYNCHRONOUS ELECTRIC CLOCK. New Series. No. 6, 5s.*

ELECTRIC DOOR-CHIME. No. 7, 3s. 6d.*

ASTRONOMICAL TELESCOPE. New Series. Refractor. Object glass 3in. diam. Magnification X 80. No. 8 (2 sheets), 7s.*

CANYAS CANOE. New Series. No. 9, 3s. 6d.*

DIASCOPE. New Series. No. 10, 3s. 6d.*

EPISCOPE. New Series. No. 11, 3s. 6d.*

PANTOGRAPH. New Series. No. 12, 1s. 6d.*

COMPRESSED-AIR PAINT SPRAYING PLANT. New Series. No. 13, 7s. 6d.*

MASTER BATTERY CLOCK.*

Blue-prints (2 sheets), 3s. 6d.*

Art board dial for above clock, 1s.

OUTBOARD SPEEDBOAT.

10s. 6d. per set of three sheets.

LIGHTWEIGHT MODEL MONOPLANE.

Full-size blue-print, 3s. 6d.

P.M. TRAILER CARAVAN.

Complete set, 10s. 6d.*

P.M. BATTERY SLAVE CLOCK, 2s.

"PRACTICAL TELEVISION" RECEIVER.

(3 sheets), 10s. 6d.

P.M. CABIN-HIGHWING MONOPLANE.

1s.*

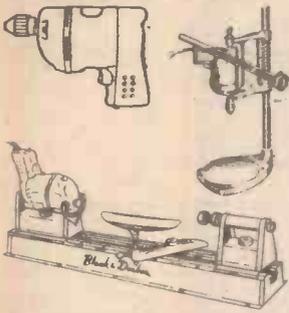
P.M. TAPE RECORDER

(2 sheets), 5s.

The above blue-prints are obtainable, post free, from Messrs. George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

An.* denotes constructional details are available free with the blue-prints.

**BLACK & DECKER
ELECTRIC TOOLS**
on EASY TERMS



Build up your home workshop stage by stage on easy terms. The 1/2 in. drill shown drills, polishes, sands and grinds and can be used with the vertical stand and lathe, besides other attachments. Write for free full catalogue and easy terms schedule.

As Illustrated.	Cash Price	Dep. of	8 Mthly.
1/2 in. Drill	£5-19-6	20/-	14/6
Lathe only	£5-5-0	18/6	12/6
Stand only	£3-7-6	12/-	9/3
Items not illustrated.			
1/2 in. Drill	£12-7-6	29/3	30/6
1/2 in. Drill and Stand	£17-17-6	49/3	43/3
5 in. Sander and Polisher	£8-7-6	22/-	20/6
6 in. Elect. Saw	£17-5-0	51/-	41/3

When ordering please send Cash Price or Deposit and state Mains Voltage. All items are post free.

**THE "I & G"
UNIVERSAL SAW**

Fits any electric hand drill. Will Jig saw, Cross cut, Rip Saw, Hack saw etc. Complete with attachments and two extra saw blades. Send for leaflet.

Cash Price
49/6
(Postage 1/6)
or EASY TERMS

If purchased with any Black & Decker equipment, 10/- deposit and eight monthly payments of 5/8.

**BURGESS
PAINT SPRAYER**

For spraying Paint, Varnish, Lacquer, Light Oils, Insecticides, etc. As easy to handle as a brush. Just plug in and spray. A.C. mains only. State Voltage.



**YOURS
FOR 16/6
DEPOSIT!!**
Cash Price

75/-

Post Free
or
16/6 Deposit and 4 monthly payments of 16/6.

Send for Leaflet.

AUTOMATIC MINIATURE BLOWLAMP

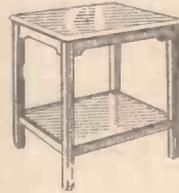
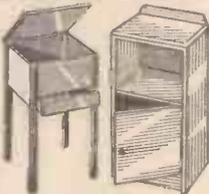
No pumping—it's self-pressurising. No working parts to go wrong. Burns methylated spirits. Weighs only 7 ounces and is 5 1/2 in. in height. All parts are interchangeable and spares obtainable. Attains temperature of 2,000 deg. F. Ideal for SOFT SOLDERING, SILVER SOLDERING, PAINT STRIPPING, GLASS BENDING and DRAWING. This pocket size blowlamp is a valuable addition to every tool kit. Made of solid brass without soldered joints. SEND FOR ILLUSTRATED LEAFLET.

ALL PARCELS ARE INSURED.
KINGSWOOD SUPPLIES (Dept. PM.2.) 2, 3 & 4, SALE PLACE, LONDON, W.2. Telephone P.A.D. 8139

**NEW! AMAZING "SELF-BUILD"
SUPERB QUALITY EASY TO ASSEMBLE FURNITURE**



**NO SKILL NEEDED!
NO SPECIAL TOOLS!**
Anyone can easily assemble one of these kits and **SAVE POUNDS!**



Think of it! Quality furniture—mainly in SOLID Oak, Walnut or Mahogany—so cleverly designed that you can easily put it together yourself and save pounds. Positively no skill needed. Everything tongued, grooved, dovetailed and satin-finished, ready for instant assembly. It's easy, it's fascinating, and you get superb quality furniture at really astonishing prices.

This Book Will Tell You

Find out about this exciting new idea by sending for illustrated book, "I Made It Myself!" Full specifications of the timber used and details of 30 kits, including ideal gifts like Occasional Tables, Book-cases, Cots, Child's Desk and Chair, Tea Trolleys, Nest of Tables, Bathroom Furniture, Needlework Cabinets (every woman wants one!), Kitchen Cabinets, etc., real photos, dimensions, and 100% Satisfaction or No Charge Guarantee. Send for this intriguing book now—FREE and without obligation.

FREE! SEND NOW!

YES... please send me Free Book and details of Easy Payments.

Write if you prefer not to cut page.

NAME.....

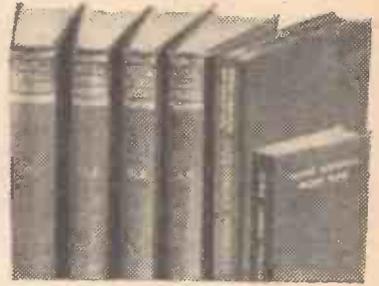
ADDRESS.....

FURNI-KIT (Dept. PM/7)
29/31, WRIGHT'S LANE, LONDON, W.8.

Parts fit like magic! No skill needed!

ELECTRICAL ENGINEERS

**NOW YOU CAN
PROFIT FROM THE
KNOWLEDGE OF
80 EXPERTS**



NEWNES

Practical Electrical Engineering

This up-to-date and authoritative work has been produced to serve the keen electrical engineer. It is for you—the man who has the foresight to equip himself with the broad basis of essential knowledge. To-day the opportunities for electrical engineers are enormous—with highly-paid jobs everywhere for those who want to gain positions of responsibility and the high pay that goes with them. PRACTICAL ELECTRICAL ENGINEERING gives you the knowledge you need, and covers every facet in a thoroughly practical manner. 80 experts and the big electrical firms have co-operated to help YOU.

**THIS WEALTH OF KNOWLEDGE
COMPRISES:**

- 4 Volumes strongly bound in Maroon Cloth, 9 1/2 in. x 6 1/2 in. Dealing with: Installation work of all kinds. Instruments, Machines, Equipment. Operation, Maintenance, Repair. Generation, Transmission, Distribution.

2,224 Pages of instructive information on latest practice.

1,340 Photographs, many showing actual operations being carried out in works and manufacturing plants.

1,000 Diagrams, Perspective and Working Drawings, Electrical Circuits and Data on test procedure, etc.

24 Special Copyright Data Sheets, each 11 1/2 in. x 8 1/2 in., containing wanted information not readily obtainable from other sources.

12 Quick-reference Blueprint Charts, each in the large size of 16 1/2 in. x 11 1/2 in.

1 Strong Chart Case, 9 1/2 in. x 6 1/2 in., with pockets for Data Sheets and Blueprint Charts. Bound in Maroon cloth to match volumes.

FREE Newnes Electrical Pocket Book (value 8s. 6d.). Nearly 400 pages. Many illustrations. Presented free to every purchaser of PRACTICAL ELECTRICAL ENGINEERING.

FREE—Two years' Technical Advisory Service

**ENTHUSIASTIC
OWNERS WRITE:**

"Without doubt a tremendous aid to all electrical engineers in modern workshop practice and education."—E. H. C.

"A most valuable asset with nearly every phase of the trade mentioned, and wiring diagrams clearly laid out. Something no tradesman should miss."—J. V. L.

"It is impossible to improve it. It is packed full of all the information I require."—G. W.

"I could not wish for anything better."
—W. B. W.

POST THIS COUPON NOW FOR

FREE BROCHURE



To: George Newnes, Ltd. (Dept. A), 66-69, Great Queen St., London, W.C.2.

Please send me, without cost or obligation, your illustrated brochure of Newnes PRACTICAL ELECTRICAL ENGINEERING and details of the easy monthly subscription payments.

Name

Address

Occupation..... PEE 33

depends upon the quality of the glue, which varies considerably.

A tougher mould is obtained if about 6oz. of brown sugar is added to each pound of glue and thoroughly dissolved. The mould faces must be lubricated with petroleum jelly so that water from the plaster is not absorbed. The mould material can, however, be made insoluble by adding a few crystals of di-chromate of potash, dissolved in a teaspoonful of hot water, to the glue and sugar mixture. Until you have acquired some experience in judging the required consistency of the liquid mix, it is best to omit the di-chromate. Without this ingredient, the mould can be melted down if too hard and made more flexible by adding a little water and/or glycerine.

Novel Lighting Effect

I HAVE a set of fairy lights and each bulb supports a glass tube in which there is a coloured liquid to within $\frac{1}{2}$ in. of the top; when warm, coloured bubbles are actuated in the liquid. Could you please tell me the principle employed, the formula for the liquid and what prevents the glass from breaking?
—W. Hollingshead (Aldershot).

WE have not had an opportunity to examine the lamps in question, but it would appear that the tube contains a liquid or a mixture of liquids, one of which has a fairly low boiling point. The pressure in the tube may be below atmospheric. Bubbles of vapour formed by heating of the liquid will then rise and be condensed to liquid again near the top of the tube. The tube will probably be designed so that its surface area is sufficient to dissipate heat from the surface of the tube at the same rate as it is generated, without much rise of temperature or pressure. Thus the lamp tube would not have to withstand much pressure, unless, possibly, it was placed in a very confined place and switched on for a very long period.

Repairing and Proofing Tents

COULD you advise me on a method of patching tents other than stitching, and a suitable mixture for reproofing? We hope to spray the reproofing solution.
—K. Brown (St. Helens).

YOU can purchase from most sports outfitters pieces of fabric ready coated with self-adhesive material. These can be used satisfactorily for tent-patching purposes. But if, as we surmise, you want to keep down costs and, at the same time, to make a good job of the repairs, you should use part of an old tent for the patches or else obtain a quantity of new tent cloth, heavy, fine woven canvas or heavy sailcloth for the purpose. These pieces should be pre-waterproofed by immersing them for an hour in a solution of one part of aluminium naphthenate in six or seven parts of white spirit. Aluminium naphthenate is obtainable, price about 5s. per lb., from Messrs. Thomas Tyrer & Co. Ltd., Stratford, London, E.15, or from a firm of chemical and laboratory suppliers such as Messrs. Griffin & Tatlock, Ltd., Kemble Street, Kingsway, London, W.C.2.

After immersion in the aluminium naphthenate solution, the repair patches are hung up to dry, after which they should be applied to the tent material by stitching, NOT by adhesive. It is advisable to apply a little white paint to the fabric surfaces which are stitched together because this improves the waterproofing of the join as the paint dries and hardens and prevents the percolation of water through the thread holes made in the fabric.

After, but not before, stitching, the entire tent can be waterproofed with the above solution. This is best done by erecting the tent and by applying the solution by

spray or brush to both sides of the canvas. Sufficient of the solution should be applied to penetrate the cloth. More than this is a mere waste.

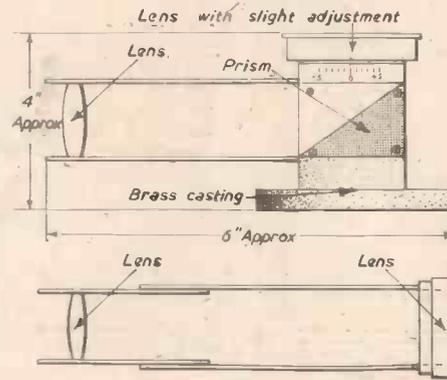
Making a Telescope

I HAVE a piece of ex-army equipment which appears to be part of a range-finder, or some similar instrument. I intend to make this into a telescope.

The lenses work quite well in line as far as magnification is concerned but the image is upside down.

How can I correct this? The original arrangement was as shown in the sketch.
—W. T. J. Dorman (Wimbledon).

BY abandoning the prism you have inverted the image; it would have been better to have retained the prism and merely taken the telescope off the heavy casting. You would then have looked through the instrument by holding the long tube vertically instead of horizontally. You do not show what shape the lenses are; if the eye lens is a double convex then you can either add two or three more lenses to it, or you can substitute one double concave lens. The latter would give



The original arrangement of the ex-army range-finder.

much less magnification. Our advice is that you restore the instrument to its original form by using the prism.

Pig Sty Heating

I UNDERSTAND that there is a way of heating floors of pig sties by installing corrugated asbestos sheeting wrapped round with electric cabling, underneath a concrete floor.

Can you give me any information about this system and the approximate cost?—J. Moxon (Nr. Bradford).

THERE are two possible methods which might be employed. The floor could be heated by means of galvanised iron or resistance wire fed from the low voltage output of a step-down transformer from an A.C. supply. This is the method employed for soil heating, and details of heating elements and transformers are given in the Technical Report Ref. W/T7, "Simplified Electrically Heated Hotbeds," issued by The British Electrical and Allied Industries Research Association of 15, Savoy Street, London, W.C.2.

Another possible method would be to use mineral-insulated copper-sheathed Pyrotex cables operated at high current density and fed direct from the mains. Details of such cables could be obtained from Messrs. Pyrotex Ltd., of 7, Victoria Street, London, S.W.1.

More conventional methods of heating farrowing pens are by the provision of space heaters on the walls, or by the use of "creeps," strong low-built hutches at floor level which allow the piglets to enter, and which are

heated by means of lamps or by thermostatically-controlled low-temperature heaters near the top of the hutch. We regret that we are unable to advise you of present-day costs.

Information Sought

Readers are invited to supply the required information to answer the following queries.

Mr. L. A. Fantozzi asks: 1. What is the chemical composition and formula of ammonium reineckate?
2. Can you give an effective recipe for a depression garden (often called "coal flowers")?

Mr. D. Day writes: I wish to make a large insulating box to use on a van to carry ice cream. Please could you give me some advice on this? The probable size will be, two containers, each 2ft. by 2ft. by 1ft. 6in.

From Mr. E. Ratcliffe comes the following request: Can you forward details of materials and method of construction of a tiled fire-place?

Mr. W. E. Rickards writes: I should like to make small objects from glass—animals, flowers, etc., as sometimes seen in gift shops.

Could you give me any information on this matter?

The following request was received from **Mr. H. G. Roberts:** I would like to make a simple electric fire with or without a reflector. Can you supply me with drawings and details of construction?

Mr. R. Heney writes: I keep budgerigars, and quite an amount of seed wastage occurs due to the birds spilling it. Can you tell me how to make a winnower operated by a vacuum cleaner?

L/Cpl. Blighton of B.A.O.R. 32 writes as follows: I am interested in the construction of heat pumps (refrigeration principle) with heat delivery in the range of 400 B.Th.U.'s per minute.

Theory states that 73 units of energy are required to move 1,000 units of heat.

Such efficiency, of course, cannot be obtained, and I understand depends to a large extent on the delivery temperature level required.

As I am more concerned with obtaining a high heat transference efficiency than a high temperature I would be very grateful if you could furnish me with the necessary mathematical data required to calculate the energy absorbed by a compressor pump for any temperature delivery at the condenser with the evaporator temperature maintained at approaching 32 deg. F. Also information for calculating the surface area of condenser and evaporator required.

Mr. W. R. Field asks: Can you give me constructional details of an instrument for recording barometric pressure in connection with weather "outlooks"—the type in a glass case with a revolving graph-covered drum, on which is drawn the line of varying pressure via a long arm with a pen, attached at the other end to a vacuum capsule?

Mr. P. Williams' problem is: I wish to make a viewer for viewing 35 mm. colour transparencies, lit by electricity and giving slight enlargement. I shall appreciate any information you can give me, particularly as to type of magnifier and from where it can be obtained.

Mr. L. Webb's letter says: I have a "vibrator" pump supplying air to a filter and two diffusers in a goldfish aquarium. I should like to substitute it with a "rotary" (or similar) type of pump.
Please give me a design using ex-W.D. parts.

Mr. T. Brown says in his letter: I have a two manual pedal organ to which I would like to add a discus blower. Can you give me any information? I have a $\frac{1}{2}$ h.p. motor.

R. N. A. Underwood writes: Please supply me with a formula for making-up a liquid to be used in an electric model locomotive smoke producing unit.

An electric element heats the liquid and smoke so formed is blown to the chimney. This element is to work on 24 volts.

An extract from **Mr. J. Baxter's letter** is as follows: I have a 5-pint blowlamp with flexible extension, which I would like to use for weed destruction on my garden paths. What modification would be necessary to enable this lamp to be so used?

Mr. A. H. Lutman asks the following: I wish to construct a home knitting machine. Can you give me any information?

A request has also been received for details of the "Walton Mole." This is a cleaner made from brass, swivels and a brush, which will clean straight lengths of pipe and shallow bends. It is forced along by water pressure.

Mr. L. J. Buckingham's query is: I wish to build a coffee mill for use at home. It will be required to grind only 1 oz. of beans at a time and I wish to drive it by means of a small electric motor. I want the axis of the mill to be horizontal and to be able to grind the coffee very finely, but it is not necessary to have the adjustment continuously variable; it could be pre-set. Please, therefore, give me a sketch of a suitable design.

MIDLAND INSTRUMENT CO. OFFER:—

SELSYN TRANSMITTERS (Magslips), 3in. type, pure synchro x-y-1-2-3, suitable as master or slave, 50 v. 50-cycle single phase A.C. operated. When two or more of these are wired up, the rotation by hand (or other means) of one, will result in a 100 per cent. follow in the other(s), both clockwise or anti-clockwise, supplied brand new with test report, in tropicalised sealed cartons, value 88 each, our price 25/-, post 2/-; 2 for 50/-, post paid with wiring diagram. **SIEMENS HIGH SPEED RELAYS**, coil res. 145 ohms, single-pole changeover platinum contacts, adjustable armature tension and contact gap, well worth 35/-, our price, new, unused, 5/-, post 6d.; 50/- doz., post 2/-.

ELECTRO-MAGNETIC COUNTERS, 0-9999 repeating, 3-ohm coil, operates down to 11 v., size 1 1/2 in. x 1 1/2 in. x 4 1/2 in. long, perfect order, 5/-, post 1/-.

DEWAR FLASKS (vacuum flasks), 10-litre capacity, internal dia. 8in., depth 2 1/2 in., fitted metal base, German manufacture, for storing liquid oxygen, etc., 50/- each, callers only, we cannot dispatch.

PROJECTION UNITS, consists of an optical mount fitted with a bloomed F.2.2 achromatic lens, 3 1/2 in. focal length at one end, and a concave/convex ground glass at the other, attached to an enclosed lamp-house fitted with a 24 v. 15-watt lamp, with polished reflector, fraction of original cost, 10/-, post 1/-.

VENNER AUTO TIME DELAY SWITCHES, 12/24 v. operation, consists of a high-grade clockwork mechanism, with external wind, 2 electro-magnets with cam-operated contacts, in smart metal cases fitted 4-way terminal block, size 3 1/2 in. x 2 1/2 in. x 2 1/2 in., new boxed, cost 8s., our price 7/6, post 1/3.

HOOVER BLOWER MOTORS, dual voltage, with terminations for 12 or 24 v. D.C. alternatively 20 or 40 v. A.C. length 5 1/2 in., blower casing 4 1/2 in. dia., 1 1/2 in. dia. inlet and outlet ports, thousands of these have been fitted for car heaters, new, unused, complete with 2 hose connectors, 25/-, post 1/6.

TELEPHONE SETS, consists of 2 combined receivers and microphones, connected by 20ft. twin flexible, provides perfect 2-way communication (up to 1 mile with extra flex), self-energised no battery required, complete ready for use, new boxed, 12/6, post 1/-.

"K" TYPE CYLINDER LOCKS, deadlocking and thieftproof, has 7 concentric tumblers instead of the usual 5 in line, interchangeable with ordinary cylinder locks, or right-or-left-hand doors, complete with 2 keys and all fittings, instruction booklet, list price 18/9, our price new boxed, 5/-, post 1/1; 2 for 10/-, post paid.

VARIABLE RHEOSTATS, wire-wound on ceramic, 50 ohms at 1 amp., laminated wiper, bakelite control knob, in metal cases size 5 1/2 in. x 4 1/2 in. x 2 1/2 in., fitted on/off toggle switch and 2 cannon plugs, new boxed 7/6, post, 1/6.

LIGHTER PARTS, cartons of 60 brand new parts, includes fine cut wheels, springs, stems, frames, bearings, etc., enough parts to nearly complete 2 high-grade lighters, easily worth 15/-, our price, 2/6, post 4d.

D.C. SERIES MOTORS, 12-24 v. 15/20 amps., size 6 1/2 in. long 3 1/2 in. dia., fitted tin. dia. shaft, weight 9 lbs., a very superior motor, originally cost £10, our price, new unused, 7/6, post and packing 2/6.

SPIRIT DUPLICATING CARBONS, size 16in. x 13in., cartons of 100 sheets, tissue interleaved, worth 15/-, our price, brand new, 2/6, post 1/8.

MAINS MOTORS, 200/250 v. A.C./D.C., one end fitted enclosed fan blower, the other fitted enclosed reduction drive gearbox, with 2 final drive shafts giving 30 and 175 r.p.m., also another drive revolves in 1/2 steps at 8 r.p.m., length 11in., width and height approx. 4in., perfect condition, 20/-, post 2/4.

T.R.S. FLEXIBLE CABLE, twin 16/0/2 circular rubber covered, 250 v. insulation, at approx. one-third to-day's price; 25 yds., 15/-, post 1/8; 50 yds., 27/6, post 2/-; 100 yds., 50/-, carriage 5/-.

WIRE STRIPPERS, strips the insulation from flexes and cables up to tin. dia., micrometer adjustment, brand new boxed, usual toolshop price 15/-, our price, 3/6, post 6d.; 3 for 10/-, post paid.

BURGESS MICRO SWITCHES, make or break, size 2 1/2 in. x 1 1/2 in. x 1 1/2 in., many applications, new unused, 1/9, post 3d.; 18/- doz., post 1/-.

BUZZERS, 3-6 v. high note, platinum contacts, variable note control knob, very high grade type worth 40/-, our price new unused, 5/-, post 1/-.

AIR COMPRESSORS, Romec rotary vane, develops 20/30 lbs. sq. in., size 6in. long, 4in. x 4in. dia., brand new in sealed cartons, 20/-, post 2/-.

GUN CLEANING OUTFITS, for 12 or 16 bore, consists of 2 screw-in rods 18in. long, 6 lambswool mops, 3 wire brushes, all brand new, 3/6 set, post 1/-.

Also hundreds of other interesting items. Send 3d. with s.a.e. for current lists.

MIDLAND INSTRUMENT CO.,

Moorpool Circle, Birmingham, 17.

Tel. HAR 1308.

the BURGESS vibro-tool

the ideal engraving tool for the handyman!



YOU will be really amazed by the Vibro-Tool—the power hand-tool that is as easy to handle as a pencil. With it you can write on steel, engrave jewellery, glass and plastics, tool leather, carve wood and cut stencils—and a host of other handicraft and workshop jobs . . . with speed and facility you never dreamed possible.

The V.250 Vibro-Tool complete with standard engraving point.

Operating on the vibratory principle, the Vibro-Tool works off 230/250 volts, 200/220 volts, and 110 volts for A.C. supplies only. Just connect to any electric light socket or plug point.

52/6

97/6

Vibro-Tool De Luxe Kit



Write for Brochure V.T.1 to: BURGESS PRODUCTS Co. LTD. (Vibro-Tool Dept.), HINCKLEY, LEICESTERSHIRE.

MAKE MONEY — making casts

with VINAMOLD

A grand spare-time occupation

WITHOUT any previous experience you can mass-produce any object, from a chessman to a candlestick, statuette or model ship, in plaster, resin, concrete, etc. . . . with "VINAMOLD" the flexible mould that gives the BEST results. Easy to work, can be used over and over again. Needs NO special equipment, provides a profitable and enjoyable spare-time occupation with minimum outlay.

Write for full details and instructions. Also available: Illustrated booklet describing "VINAMOLD," methods of heating and melting, preparation of moulds and moulds, etc. Price 1/6 post free, from:—

VINATEX LTD. (Dept. P.M.3), CARSHALTON, SURREY



THE ULTRA LENS AIDS PRODUCTION

This unequalled electric magnifier is of the most modern design and has proved its extreme and sustained usefulness to countless industrial firms engaged on minute examination of surfaces of every conceivable object.

The ULTRA LENS has won the enthusiasm of technical experts especially in the field of engineering, and is used extensively in collieries, foundries, electricity works, tool shops, forges, motor works, and practically every branch of the engineering trade.

Whether you are manufacturing, buying or selling, there are occasions when you have to submit some objects to a very close scrutiny. At these times the ULTRA LENS becomes indispensable.

Triple lenses ensure distortion-free magnification and eliminate the necessity for adjustment of focus. The focus is always perfect.

The ULTRA LENS achieves a six-fold magnification in a brilliantly lit field which is shadowless.



Write today for full particulars and price list to

THE ULTRA LENS COMPANY

Tel.: TRAFalgar 2055

17c, Oxendon Street, London, S.W.1.

Lay Your Own Floors

Oak Flooring Blocks Free of Licence

PRICE
19/6
PER
SQ. YD.
Plus 4/8d.
per sq. yd.
Purchase
tax.



FULL
DETAILS,
SAMPLE
AND
LAYING
INSTRUC-
TIONS
ON
APPLICA-
TION

Hardwood floors are not difficult to lay on concrete or wooden sub-floors. We supply kiln dried flooring blocks accurately manufactured from Prime quality Scandinavian Oak ready for laying with full instructions. At a modest cost you can transform concrete or wooden surfaces into a beautiful polished Oak Parquet floor that will last a lifetime, and add to the value of your property.

THE SURREYBOARD CO. LTD.

(DEPT. P.M.),

72, HIGH STREET, CROYDON, SURREY

TAKE UP PELMANISM

And Overcome Worry

WORRY uses an immense amount of vital force. People who worry not only use up their energy during the day by worrying but they rob themselves of that greatest of all restoratives, sleep. People who worry can't sleep. They lose their appetite. They often end up by getting really ill. How often have you heard it said, "I am worried to death"?

What do you suppose would happen if a person who was putting himself into mental, moral, and physical bankruptcy by worrying, were to convert all this worry energy into constructive action? In no time at all he would have accomplished so much that he would have nothing to worry about.

Nothing is more discouraging to a worrying person than to have someone say, "Oh, don't worry; it will all come out right"!

This is not reassuring at all. The worrying one can't see how it is going to come out all right. But if the men and women who worry could be shown how to overcome the troubles and difficulties that cause worry, they soon would cease wasting their very life-blood in worrying. Instead, they would begin devoting their energies to a constructive effort that would gain them freedom from worry for the rest of their lives.

You say that sounds plausible, but can it be done?

Reduced fees for members of
Her Majesty's Forces.
(Apply for Services Form.)

It can be done, and is being done, by Pelmanism every day in the year. This is all the more remarkable because to-day the whole world is in an upset condition and people are worrying to an unusual extent. Yet, every mail brings letters to the Pelman Institute from grateful Pelmanists who have ceased to worry.

People to-day are all too prone to complain that they just have to worry. But once they become Pelmanists they cease this negative form of thought.

Remember—Everything you do is preceded by your attitude of mind.

The general effect of the training is to induce an attitude of mind and a personal efficiency favourable to the happy management of life.

Send for the Free Book

The Pelman Course is simple and interesting, and takes up very little time; you can enrol on the most convenient terms. The Course is fully described in a book entitled "The Science of Success," which will be sent you, gratis and post free, on application to:—

Pelman Institute

130, Norfolk Mansions,
Wigmore Street, London, W.1.

(Established over 50 years)

PELMAN (OVERSEAS) INSTITUTES:
DELHI: 10 Alipore Ave. MELBOURNE:
396 Flinders Lane. DUBLIN: Natal Bank
Chambers (P.O. Box 1493). PARIS: 176
Boulevard Haussmann. AMSTERDAM:
Prinsengracht 102L.



To Young
Engineers
with
Ambition

A CAREER IN THE MERCHANT NAVY. Here is an attractive opportunity for young and ambitious engineers.

The British Tanker Company (the shipping organisation of Anglo-Iranian Oil Company) operates one of the largest privately-owned tanker fleets in the world and offers young engineers every opportunity of reaching the highest ranks in the marine engineering profession.

If you are interested in ships and prepared, after qualifying periods of sea service, to take the necessary examinations, an extremely well-paid career is open to you in this vital branch of Britain's Merchant Navy.

TO QUALIFY: (1) You should be nearing the completion of your apprenticeship as a fitter or fitter and turner and must have had some experience on heavy machinery or power plant maintenance.

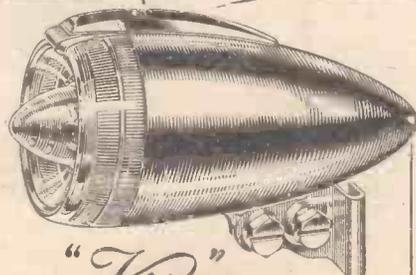
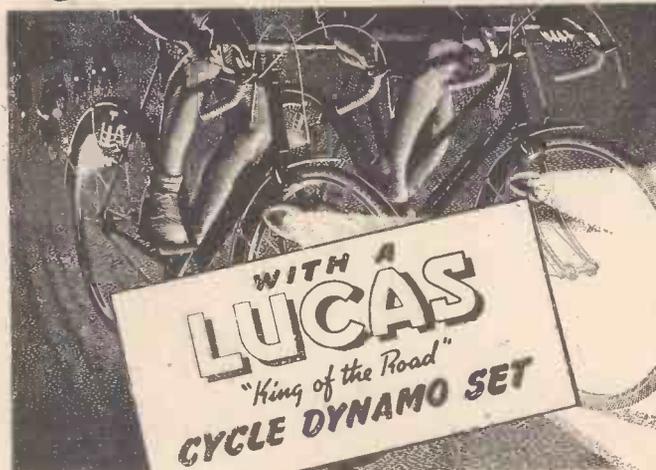
(2) You must have obtained your Ordinary National Certificate or be likely to obtain this before the completion of your apprenticeship.

If you are interested please write for further details to:—

The British Tanker Co. Ltd., Dept. PM.3

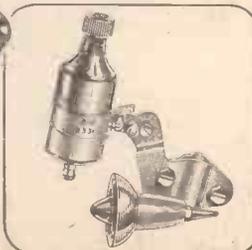
BRITANNIC HOUSE, FINSBURY CIRCUS, LONDON, E.C.2

BE IN THE LEAD ...



"King"
SPORTS

Weights only 6½ ozs., has a single bulb light unit which projects an intense spot beam yet gives ample local light. 36/6 complete.



JOSEPH LUCAS (CYCLE ACCESSORIES) LTD · CHESTER ST · BIRMINGHAM 6.

GALPIN'S

ELECTRICAL STORES

408, HIGH STREET, LEWISHAM,
S.E.13

Tel.: Lee Green 0309. Nr. Lewisham Hospital.

TERMS: CASH WITH ORDER. NO
C.O.D.

All goods sent on 7 days' approval against
cash.

EARLY CLOSING DAY THURSDAY

EX-U.S.A. ROTARY CONVERTERS. 12 volts D.C. input, outputs 500 volts 50 mA., 275 v. 100 mA. Complete with smoothing, 22/6 each, carriage 2/6. As new.
EX-NAVAL ROTARY CONVERTERS. 110 v. D.C. input 230 volts A.C. 50 cy., 1 ph. 250 watts output. Weight approx. 100 lb. £12/10/-, c/forward.

CONVERTERS. 400 watts output, 24 volts D.C. input, 50 volts 50 cycles 1 phase output. Complete with step-up transformer from 50 volts to 230 volts at 400 watts. £12/10/- each C/F.
Ditto 200 watts. £9/10/- each C/F, fully guaranteed.

ROTARY CONVERTERS. 230 volts D.C. input, 230 volts A.C. output, 50 cycles 1 phase at 250 watts. £15 each. C/F.

HEAVY DUTY CHARGERS. 200-250 volts A.C. Input 36 volts at 36 amps. Output D.C. £25. C/F.

METERS. Moving coil, 0 to 14 amps., 18/6 each.

Ditto, Moving iron, suitable for A.C. 0 to 30 amps., 25/- each. Another moving coil, 100 to 250 amps., D.C. 35/- each, all 4 in. scale.

ELECTRIC LIGHT CHECK METERS, useful for sub-letting, garages, etc., all for 200/250 volts A.C. mains, 5 amp. load, 19/- each; 10 amps., 22/6; 20 amps., 27/-; 25 amps., 32/6.

MAINS TRANSFORMERS (NEW), input 200/250 volts in steps of 10 volts, output 350/0/350 volts, 180 m/amps, 4 volts 4 amps., 5 volts 3 amps., 6.3 volts 4 amps., 45/- each, post 1/6; another 350/0/350 volts 180 m/amps., 6.3 volts 8 amps., 0/4/5 volts 4 amps., 45/- each, post 1/6; another 500/0/500 volts 150 amps., 4 volts 4 amps. C.T., 6.3 volts 4 amps., C.T., 5 volts 3 amps., 47/6 each, post 1/6; another 425/0/425 volts 160 m/amps., 6.3 volts 4 amps. C.T., twice 5 volts 3 amps., 47/6 each, post 1/6.

MAINS TRANSFORMERS, 200-250 volts input, output 400/0/400 volts, 280 m/amps., 6.3 v. 8 a., 2 v. 3 a., 5 v. 3 a., 4 v. 2 a., 4 v. 2 a., the last two heaters insulated at 8,000 volts, 85/- each; another 200/230 volts input, output tapped 0, 9, 18 volts at 4 amps., 25/- each, post 1/-.

EX-RADAR MAINS TRANSFORMERS. Input 230 volts. Output 4 or 5 Kilo-volts at 30 min., also 3 L.T. windings 4 v. 2 a., 6.3 v. 2 a., 2 v. 2 a., these transformers are capable of a larger output than stated and are immersed in oil. £3/15/- each, carriage 5/-.

HEAVY DUTY L.T. OUTPUT TRANSFORMERS 200/250 volts input. Output a combination of 6, 12, 18 and 24 volts at 30 amps. £4/2/6 each. C/paid.

Another input as above. Output 0, 6, 12, 18, 24 volts at 12 amps., 55/- each, post 2/-.
Another input as above. OUTPUT 0, 6, 12, 18, 24 volts 6/8 amps., 46/6 each.

HEAVY DUTY L.T. TRANSFORMERS suitable for rectifiers, soil heating, etc. Input 200/250 volts. Output a combination of 6, 12, 18, 24, 30, 36 volts at 15 amps., 67/6 each, post 2/6. Another input and output as above but at 6 amps., 47/6, post 2/-.
Another input and output as above but at 4 amps., 36/6 each.

HEAVY DUTY SPOT WELDER TRANSFORMERS, input 200/250 volts. OUTPUT a combination of 2, 4, 6, 8, 10, 12 volts at 120/150 amps. New £6/15/- each, carriage 6/-.

LIGHT ARC WELDING TRANSFORMERS, 200/250 volts input. Output 40/60 volts. 30/40 amps., £7/5/- each.

MEDIUM SPOT WELDING TRANSFORMERS, input 200/250 volts, OUTPUT a combination of 2, 4, 6, 8, 10, 12 volts at 50/70 amps., new £5/2/6, C/paid.

1,000 WATT AUTO WOUND VOLT-AGE CHANGER TRANSFORMER tapped 0/110/200/230/250 volts. £5/15/- each, carriage 4/6. 1,500 watt ditto, £7/15/-, carriage 7/6.

350 watt 55/-. 500 watt 75/-. 200 watt 45/-.
RICH & BUNDY TRANSFORMERS, 200/250 volts input 350/0/350 volts 150 mA 4 v. 2 a., 6.3 v. 4 a., 35/- each.

Clients in Eire, please allow at least double the carriage stated to allow for customs clearance charges.



VOL. XXIII

OCTOBER, 1954

No. 389

All letters should be addressed to the Editor, "THE CYCLIST," George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

Phone: Temple Bar 4363

Telegrams: Newnes, Rand, London

COMMENTS OF THE MONTH

By F. J. C.

The National Committee and Rospa

THE National Committee on cycling has decided to become a member of the Royal Society for the Prevention of Accidents for a test period, and its chairman, Major H. R. Watling, has been nominated to represent it on the Executive Committee of Rospa. We congratulate it on this decision, but we should like to know whether it was unanimous; for the C.T.C., which is represented on the National Committee itself, withdrew from Rospa a year or so ago on the grounds that it was pro-motorist and/or anti-cyclist. Does the new decision mean that the C.T.C. will rejoin?

We do not consider that Rospa is anything but an impartial body and if, after investigation, impartially undertaken, it finds that a particular section of road users is blame-worthy, that is not tantamount to saying that it is anti that particular section of road users. The truth is always unpopular to that person or section of persons to whom it applies. The C.T.C. in our view resigned out of pique. It has always represented the cycling community as haloed saints, and motorists as the wicked uncles of the piece. We are second to none in our support of the cause of cycling, but we have not and shall not indulge in the blind advocacy of a cause, supporting as the paid advocates support a cause whether it is right or wrong. Our policy is: cyclists, right or wrong—right to keep them so, wrong to help them right. Disservice to the cause of cycling was done by the withdrawal of the C.T.C. from membership of Rospa.

R. C. Shaw, in a statement to the Press concerning withdrawal of membership of the C.T.C., stated that accidents "had reached the dimensions of a national scandal." That is a nice-sounding phrase, but surely only a national body such as Rospa, representative of all sections of road users could help to solve the problem. The C.T.C. is not in a position to investigate causes of road accidents even though it may suggest impracticable cures, as it often has done.

Britain Leads

BRTAIN has every reason to be proud of the performances of Harris, Peacock and Brotherton in the World Championships, of which there are seven. During the last week of August in the World Championship Britain gained two world championships, one second and two thirds—10 points plus the omnium.

Reg. Harris becomes professional Sprint Champion of the world for the fourth time, while Cyril Peacock becomes the Amateur Sprint Champion, with Peter Brotherton as runner-up and Norman Shiel third in the Amateur Pursuit. J. Bunker was third in the Professional Motor Paced 100 km. raced.

It will be remembered that W. Bailey and Reg. Harris were holders of the Amateur Sprint Championship, Harris taking the title in 1947. In the Amateur Road Championship, E. van Cauter (Belgium) was first, H. E. Andresen (Denmark) second, and J. M. van der Borgh (Holland) third. In the

Professional Road Championship, L. Bobet (France) was first, F. Schaer (Switzerland) second, and C. Gaul (Luxembourg) third. In the Motor-paced Championship, A. Verschuere (Belgium) was first, J. Pronk (Holland) second, and J. Bunker (Great Britain) third. In the Amateur Sprint Championship, C. Peacock (Great Britain) was first, J. Tressider (Australia) second, and R. Gaignard (France) third. As regards the Professional Sprint, R. H. Harris (Great Britain) was first, A. van Vliet (Holland) second, and E. Sacchi (Italy) third. In the Amateur Pursuit, L. Faggin (Italy) was first, P. Brotherton (Great Britain) second, and N. Shiel (Great Britain) third. The Professional Pursuit was won by G. Messina (Italy), with H. Koblet (Switzerland) second and L. Gillen (Luxembourg) third.

The Social Round

THE closure of the racing season presages the opening of the social season, the annual dinners and luncheons and the prize-giving. Where the annual function is a mixed affair, the dinner being followed by a dance, we urge club secretaries to arrange for the prize-giving as a separate function. It is boring to the ladies, having wine and dined and anxious for the dancing, to listen to a catalogue of times, interspersed with racing jokes they do not understand. A dinner, a dance and a prize presentation are altogether too much to crowd into one evening.

Very shortly, clubs will be holding their annual general meetings and appointing delegates. We hope this year that they will exercise extreme care in their selection. They should take heed of the events of the past year in the unclean sphere of cycling politics, and see that they select delegates free from bias and that they are adequately instructed on what to say and how to vote at national meetings. We urge those clubs known to harbour firebrands to get rid of them.

Social secretaries are generally remiss in their selection of proposers and responders to toasts. Select speakers known to be good, who know how to stand up, speak up and shut up, who can be witty without offence, and who can leave an audience, when they sit down, wishing for more. How often is it said "He's a nice chap, but when he opens his mouth..." Good speech is of great value. Ask yourself the following questions:

Can you hold a worthwhile conversation? When you do introduce people you do it clearly? Can you move a resolution promptly? Are your instructions plain and unmistakable? Can you give a toast or move a vote of thanks? Are you able to make a compact report? Can you talk for a minute on a subject? Can you open a debate with 15 minutes of persuasive talk? Is your explanation of an idea or a change of methods attractive? There is more behind good speech than mere words. One needs to know the meaning of words and their degrees of meaning. That does not call for an almighty range of long words—simple words are nearly always best.

The Cycle Show

AT the time of going to press there are no indications of great surprises or radical changes in design. We forecast that attendances will be up and that trade will reach a higher level than last year as a result of the dropping of hire purchase restrictions. No doubt most machines will have their lighting modified to comply with the revised law. Will manufacturers this year state the weights of their various models? I know that they agreed some years ago not to do so, but now that the stress is on weight (no pun intended) and so many manufacturers list lightweight models, the public is entitled to know what the weight really is. What is a lightweight? If it is defined as a machine weighing from 20lb. to 25lb., why cannot the weight be stated? If it is not a lightweight within those limits it should not be described as such. Every cyclist to-day knows that a couple of pounds extra weight on a bicycle is of no importance and he is not likely to make his choice on weight alone.



Wayside Thoughts

By F. J. URRY, M.B.E.

A Short Cut

FOR the first time in my life I cut a cycling holiday short and went back to work because of the weather. I had been looking forward to a Welsh run round the haunts of my youth in the company of an old friend near my years, the type of holiday involving moderate mileage and immoderate periods of sun-lounging amid delectable scenes, just the kind of roaming to fit the slower energy of the over-seventies. But we were disappointed, and were not the only ones by many a thousand during these stormy, fitful days of summer. We went one evening in late July to Bala by car, with a couple of bicycles slung on the back, a more comfortable method of penetrating to real countryside than train travel, and all the way thither it rained and blew as if the October gales had anticipated the calendar. Scattered leaves and twigs hit the windscreen and the ramrod rain danced a jig along the hard roads. We comforted ourselves with the notion such tantrums could not last and that this violence presaged a period when summer would bask on the hills and we should be the lucky ones to enjoy its beauty in freedom. I think it rained most of that night by the torrents' indication, but the morning was just fine, although the torn clouds were racing eastward and the light was grim and grey.

We unhitched our machines and made a couple of miles along the Ffestiniog road into the cool gale, and then quite suddenly the straight rain ran down the road with a hiss. An overhanging rock gave us temporary shelter, but the long wait did not bring the hoped-for let-up, indeed the deluge made a 36-hours' visit which ended on the evening of our second day. In the meantime we scurried to Bala, bolted on the bicycles and went dry, comfortable but disgruntled into the rain and mist, looking for the blue beyond the grey line of sky.

The New Dam

TWO evenings later we were at Llangurig in the lap of Plinlimmon, and it was then the rain ceased. Meanwhile we had wandered round much of North Wales without seeing it except through a damp, dismal, depressing mist. At Beddgelert on our second night out, our host told us that his houseful of people, who had come to walk and climb, had not seen the summit of Snowdon for 10 days! That Tuesday morning was fine, chill and windy, but by the time dawn had rubbed its eyes the sun was casting shadows and it seemed as if summer had at last found the way to push up the temperature and assume a shining aspect. So down we went with the Wye to Rhayader, flowing with the gale, but we did not find how cool it was until we tried a smoke at the bend of the river three miles from the entrance to Elan Valley, and then after five minutes, we were glad to push on in order to keep our blood atingle.

A cup of tea and biscuit at the deserted Elan Valley Hotel evoked the information that holiday-makers were forlorn, and the further suggestion we were a couple of unwise ancients to climb to Clearwen Dam into that heavy wind. We ordered a late lunch to await our return and cheerfully set about the six miles climb, following up the sparkling joyous river that comes singing down the hills to an arm of the lowest of the Elan Lakes. We were warm enough when round a bend the fan-like shape of the water-laced dam came in view, a fine sight it was too and one which we had all to ourselves. It is a grand bit of



Low Tide

Coverack

A corner of this delightful little Cornish fishing village.

J. GORDON RAMMELL

work, where man has certainly improved the otherwise rather sombre valley of the Clearwen, and I'm glad to have seen that last addition to the Elan Scheme, for as a youth I rode that vale before the first dam was built.

The One Fine Day

THE power of the sun had by now warmed the air, but we were too hungry to greatly heed the cheerful change and used the wind and the slope to hurtle to our lunch. Then, finding a sheltered nook, we smoked and talked sleepily, looked at the blue sky—so novel a sight this summer—and finally in the late afternoon scanned the map deciding Newbridge-on-Wye would suit us. The New Inn could accommodate us and did so very well, so well indeed that we booked for the next night in the hope the weather would give us a gracious smile. On the way to Builth next morning a skither of rain swept over, from which we hid under a sloping rock, and when we turned to climb towards Llandrindod we found the edge of the wind cool and slightly damp. The hills were misted and the shut visions grey and wringing wet, with never a cheery call to sit and smoke and rest awhile; and in these days that is how I like to go cycle touring.

After lunch at Llandrindod we found a nook in the park by the little lake, into which the sunshine peeped for a kindly hour, and here we browsed and watched the duck flight in and the local lads at fishing. Idle? Yes, but that's how we intended it. It is only about five miles to Newbridge but we used an hour for the journey rather than don capes to ward off the switching storm passing over and smudging what visibility the dull morning had given.

After a cheerful meal we strolled to the Wye to find a trout—and did—and then the rain drove us to shelter for the rest of the night. The morning was fine but still cool and windy as we climbed quietly to Llangurig, which we reached just before the weather broke. Another deluge made our conviction that it was more comfortable at home, so home we went. It was the first time I have ever cut a cycling holiday in half.

The Way Down

A WEEK later my family prevailed on me to go camping on the Pembroke coast. There was not enough time to cycle, so I went on the truck—a new one with a high cab from which I could look over the hedges and far away; and it was confined to 30 m.p.h. by law, although on clear ways and downhill I'm afraid it trespassed.

Early on the Wednesday morning before Bank Holiday that truck was climbing Bromyard Downs through golden slants of sunshine, and all was merry. Forty miles farther on the "summer" opened up and once we had to stay awhile for want of vision until the violence had passed over. I could foresee our camping party of ten having a glorious tussle with the big tent which weighs half a ton, to say nothing of four smaller ones and a great tarpaulin that covered the truck and spread itself into a wide eve carried on poles from the truckside to make a convenient cooking and dining space. However, we were fortunate, as it happened. At Carmarthen we bought petrol and were told it hadn't stopped raining and blowing for three weeks; but that fellow must have been asleep some of the time. Ten miles out from St. Clears the rain ceased, and when an hour later we reached our lonely field the wind had dried the freshly mown grass and by eight o'clock that night the camp was as tight as a drum.

The meal we ate under the awning—a proper reward for a job well undertaken. It was as well, for in the noisy watches of the night the rain deluged in storm-driven spasms, and I began to think our Carmarthen pessimist was not twisting the truth beyond the picturesque. We were dry and comfortable, the most valuable assets of camp life, and gumboots kept our soles warm, particularly after porridge and bacon and eggs.

Those Ten Days

THERE were ten days of this. We were a merry party and no member ever lost temper for a moment: an ideal camp company. But then we have been at this game for over forty years: time enough to have experienced and overcome all kinds of conditions. This venture, however, was the wettest and stormiest of the series, and how other campers fared with their light equipment and dog-kennel tents I cannot guess. Of the ten days, we enjoyed two completely fine, one of which was a real summer's day. The others were either drenched or smeared with storm.

When we broke camp on the Saturday morning the weather did its best to drown us. Fortunately, we had packed the big tent on the Friday evening, but everything else was soaked, and the truckload heavier than when we arrived, for all the provender we had meanwhile eaten.

I came home on the truck; I like that high seat from which you can look over the hedges and away into the rain-washed distance. For no sooner had we cleared the field about midday than the rain ceased, and for 180 miles we chased the storms across the land, continually running over drenched roads with the rain but a mile in front, yet no spot fell on us until within 12 miles of home. It was a beautiful journey: the sparkling air, sun-slashed and rain-splashed, magnifying the hills; the ever-changing colours of field and fell bright and dour as the sun and storm went on ahead; and all the way the rainbows were with us, leaning on the hills and dipping into the vales.

Our friends felt sorry for us and wrote sympathetic postcards, but the kindly feelings were wasted, for there was never a camp party more joyously composed or more impervious to the damp and often weather-dismal conditions. Perhaps this was due to the old cycling tradition and outlook, for there is no better training for an individual to make the best of things.

STOP!!

Pull up in time
by fitting



Fibrax

BRAKE BLOCKS

You brake gently, but firmly with FIBRAX brakes. The great thing is they are SURE in emergency. And they spell S-A-F-E-T-Y on the steepest gradients. For Steel rims, Fibrax Black Blocks; for alloy rims, Soft Red Blocks.

**FOR SAFETY'S SAKE
- FIT A SET NOW**

FIBRAX LIMITED
2 Tudor Street, London, E.C.4.

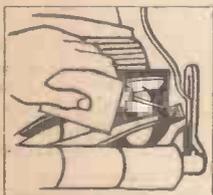
F454

RUSTED FITTINGS?

Free them quickly with



Shell Easing Oil



Shell Easing Oil comes in a handy 8 oz. tin with special pourer spout—very good value at 2/6.

Here's the way to free those rusted fittings! Free them quickly, too. Shell Easing Oil is sure and swift, penetrates deeply to loosen and free.

From nuts and bolts to taps and pipe joints, from bicycle frames to window catches, Shell Easing Oil is the answer to your rusted parts problem.

SHELL EASING OIL is very handy in the house—and very good value at 2/6! Buy some to-day—good ironmongers stock Shell Easing Oil.



HALFORDS

The shop for

the CYCLIST

special values in
CYCLE ACCESSORIES



TOURING BAGS

Leather cloth, wedge shaped, 9in. x 6in. x 6in.

4/8

PEDALS

Rubber

5/6



Rat-reap

5/9



FREE - WHEELS

from 5/-



CYCLE CHAINS

Blue Steel, 1 1/2in. x 1/8in. x 114 links

5/9

CAPES

Strong plastic, 42in. length, 120in. skirt.

14/11



PUMPS

Black metal, 15in. x 7/8in.

2/11



MUDGUARDS

White plastic, ribbed sports with reflector,

7/11 Pair

Steel with white tail,

3/3 Pair

HANDLEBAR BENDS

All Rounder, Light Tourist, chromium plated,

6/6 Pair



SADDLES

Spring Seat with waterproof leather clothtop.

9/11



FREE! For Cyclists—Halford 1954 Catalogue—48 pages of Cycles and Accessories.

For Motorists and Motor Cyclists—Halfords Catalogue of Accessories and Fittings

Ask for these catalogues at your nearest Halford branch, or post this coupon now!

To:

THE HALFORD CYCLE CO. LTD
(Dept. P.Me.) 239 Corporation St., Birmingham 4

Cyclists

Motorists and Motor Cyclists

Tick Catalogue required.

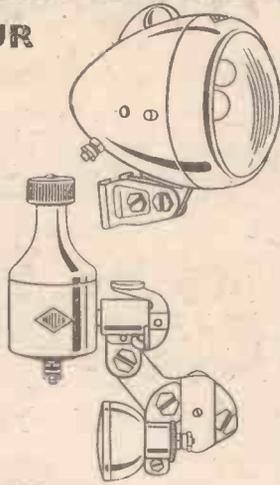
Name

Address

CHOOSE YOUR DYNAMO LIGHTING

—WITH THE SAME CARE YOU CHOSE YOUR CYCLE

No cycle is complete without efficient Dynamo Lighting. Make absolutely sure you get the best by choosing Miller. For with Miller you buy much more than a set—you also get years of unfailing service—in terms of thoroughly reliable Cycle Dynamo Lighting at all speeds.



H. MILLER & CO., LTD., BIRMINGHAM, 6

Your Third Hand

The Improved MOLE TRADE MARK Self-Grip WRENCH

Give yourself that extra hand you are always wishing for—the Mole Self-Grip Wrench. This versatile tool can be used as a vice, wrench, clamp, super-pliers and so on. It locks on to work with tremendous power, leaving both hands free, yet can be released by just a flick of the centre lever. Sturdy and compact, the Mole Wrench is a MUST for all handymen and mechanics.

Obtainable from your local Ironmonger, Motor or Motorcycles Accessory Dealer.

**7"-12 1/2"
10"-15 1/2"**

If any difficulty, write to:—

M·MOLE & SON·LTD·BIRMINGHAM·3

I.C.S TRAINED MEN are in Greater Demand than ever—Maximum production depends on high technical skill, such as that acquired by I.C.S. Students

TENS OF THOUSANDS MORE TRAINED MEN ARE URGENTLY NEEDED NOW —BUT THERE IS NO WORTH-WHILE PLACE FOR THE UNTRAINED

Ambitious men everywhere have succeeded through I.C.S. Home-Study Courses. So also can you.

The man with an I.C.S. Training in any one of the subjects listed below knows it thoroughly, completely, practically. And he knows how to apply it in his everyday work.

- | | | |
|-------------------------|--|-----------------------------------|
| Accountancy | Electric Power, Lighting, Transmission, Traction | Motor Vehicle Elec. |
| Air Conditioning | Eng. Shop Practice | Municipal Engineering |
| Architecture | Fire Engineering | Planning |
| Architectural Drawing | Foremanship | Production Engineering |
| Boiler Engineering | Fuel Technology | Quantity Surveying |
| Book-keeping | Heating and Ventilation | Radio Engineering |
| Building Construction | Hydraulic Engineering | Radio Service Eng. |
| Building Specifications | Illumination Eng. | Refrigeration |
| Business Training | Industrial Management | Salesmanship |
| Business Management | Machine Designing | Sanitary and Domestic Engineering |
| Carpentry and Joinery | Machine-Tool Work | Sheet-Metal Work |
| Chemistry, I. & O. | Maintenance Eng. | Short-Story Writing |
| Civil Engineering | Marine Engineering | Steam Engineering |
| Clerk of Works | Mechanical Drawing | Structural Steelwork |
| Coal Mining | Mechanical Engineering | Surveying |
| Concrete Engineering | Mining Engineering | Television Technology |
| Diesel Engines | Motor Engineering | Welding, Gas and Elec. |
| Draughtsmanship | Motor Mechanics | Woodwork Drawing |
| Drawing Office Practice | | Works Engineering |
| Electrical Engineering | | |

Students intending to sit for examinations in Architecture, Quantities, Civil Eng., Mech. Eng., and others, should enrol NOW for preparatory Courses. Using a specially prepared Study Programme, the student studies in his spare time, at his own pace and, with time for revision, sits with full confidence of success.

Courses are also available for General Certif. of Education and most other Technical, Professional, Commercial, Civil Service Exams.

(I.C.S. Examination Students are coached until successful.)

Moderate fees include ALL books required.
REDUCED TERMS TO H.M. FORCES.

If you need technical training, our advice concerning your work and your career is yours for the asking—without obligation. Let us send our special free booklet on the subject in which you are specially interested.

The successful man DOES to-day what the failure INTENDS doing to-morrow. Write to us TO-DAY Dept. 169A, I.C.S., 71, KINGSWAY, W.C.2.

INTERNATIONAL CORRESPONDENCE SCHOOLS

Dept. 169A, International Buildings, Kingsway, London, W.C.2.

Please send me the free booklet on.....

Name..... Age.....
(USE BLOCK LETTERS)

Address.....

Addresses for Overseas Readers

Australia : 140, Elizabeth Street, Sydney, Egypt : 40, Sharia Abdel Khalek Sarwat Pasha Cairo. Eire : 3, North Earl Street, Dublin. India : Lakshmi Bldg., Sir Pheroosh Mehta Rd., Fort, Bombay. New Zealand : 182, Wakefield Street, Wellington. N. Ireland : 26, Howard Street, Belfast. South Africa : Dept. L., 45, Shortmarket Street, Cape Town.

AROUND THE WHEELWORLD

By ICARUS

The Age of Clubs

A READER who tells me that he is writing a history of cycling asks a number of questions, the answers to which may be of interest to other readers. I wish him well in this monumental task, for only two others have attempted to record the development of the bicycle: H. H. Griffin, whose classic work entitled "Cycling," published by George Bell in the "All England" series, is still very much sought after, having been out of print after many editions for over 20 years (incidentally the copyright is now owned by George Newnes, Ltd.); and H. O. Duncan, who wrote a voluminous tome entitled "The World on Wheels." The latter is not entirely devoted to cycling, for it deals with motor cycles and motor cars as well. The former book is a very exhaustive treatise on the history of the bicycle. Duncan's book is a heterogeny and does not seem to follow any chronological order. For such a vast book, an index surely is necessary, and there should have been some date sequence in the editorial treatment. To find any particular fact occupies a complete search of the pages. However, the first question my reader asks was, when were the various national associations formed. Although I had a fair notion of those dates I had to look up "Every Cyclist's Pocket Book" to verify them. That book is a mine of information on cycles and cycling and from it I find that the N.C.U. was founded in 1878. At its A.G.M. in 1888 the following resolution was passed: "The N.C.U. as a public body desires to discourage road racing, and calls upon clubs to assist it by refusing to hold races upon the roads, and it prohibits any of its officials from officiating or assisting in any road races, and refuses to recognise any records made on the road and that this be added to the rules." As a result of this, the Road Records Association came into being, largely as a result of the efforts of A. J. Wilson (Faed) and F. T. Bidlake. It is true to say that the N.C.U. lost its prestige with the clubs from that date and has never entirely recovered it.

The C.T.C. was founded in 1878 as a result of an announcement which appeared in *Bicycling News*. It was originally known as the Bicycling Touring Club, which was changed to the present title as a result of a proposition at the A.G.M. in 1882.

The Road Records Association was founded in 1888, as I have said, by A. J. Wilson, then president of the North Road Cycling Club Ltd.

The Women's Road Record Association was founded in October, 1934, under rules similar to those of the R.R.A. The Road Time Trials Council was founded in 1937 to secure uniformity in the conduct of road time trials which had formerly been controlled by the Road Racing Council, which thus went out of existence in that year. The first chairman was the late F. T. Bidlake.

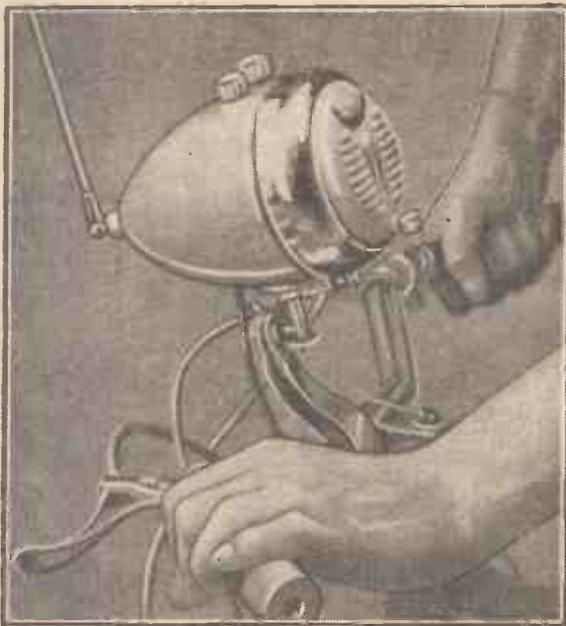
Coming to more recent times, the last National body to be formed was the British League of Racing Cyclists,

founded in 1942 to control mass start and other forms of road racing. The first and oldest cycling club is the Pickwick Bicycling Club, which was founded on June 22nd, 1870. It does not function as a cycling club, and is now only a knife-and-fork club.

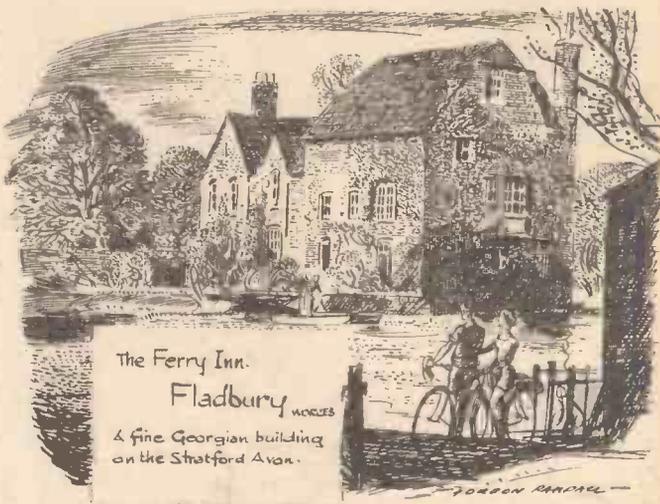
In 1870 there was only one club—the Pickwick B.C.; in 1871-2 there were four; 1873, five; 1874, seven; 1875, nine; 1876, 31; 1877, 38; 1878, 40; 1879, 55; 1880, 213. To-day there are approximately 3,000 N.C.U. and R.T.T.C. clubs, exclusive of the B.L.R.C.

The Hour Pace Record

ONE of the queries "to settle an argument" which I continually receive concerns the record for one hour's motor-pace cycling. It is 76 miles 504 yards, ridden in 60 minutes on a bicycle behind motor cycle pace, by Leon Vanderstuyft, the Belgian, at the Montelheré Track, Paris, on September 30th, 1938. Albert Marouet, the Frenchman, covered one mile at a speed of 88.95 m.p.h., paced by a car with a special windshield. Whilst I am dealing with feats of endurance, it is well to recall that on May 17th, 1941, Alfred Letourner, a former six-day racer, pedalled one mile in 33.05 seconds, or at the rate of 108.92 miles an hour, on a highway near Bakersfield, California. He rode behind a shield attached to the rear of a racing car,



A Portable Radio for Cyclists.—This new invention of German origin has just been brought on to the market. The gadget is like an inverted bicycle lamp and is fixed to the handlebars, it is battery-run and waterproof and the cost is £15. It is being distributed in this country by a British concern.



The Ferry Inn.
Fladbury
A fine Georgian building
on the Stratford Avon.

driven by R. Householder. His bicycle was equipped with the highest gear ever fitted to a bicycle. The chain wheel had 57 teeth, and the rear sprocket six, giving a gear of 252! The first English cyclist to cover 20 miles in the hour, unpaced, was H. L. Courtis, and the first to cover 60 miles in an hour paced was an Englishman, A. E. Wills.

The Cycle Show

THE Cycle Show, which this year takes place in November, originated from the old Stanley Show, which was first put on in 1889, when 1,201 machines were exhibited, all equipped with solid tyres. The following year there were 1,564 bicycles, 20 of which had pneumatic tyres, one with cushion tyres and the remainder solids. By 1891 solids had dropped to 307, cushioned had risen to 571, and the pneumatics to 148. I hope these few facts will help my would-be historian of cycling and cycles. He can put me down as a purchaser if and when the book sees print.

How Many Cyclists?

ACCORDING to Hulton Readership Survey there are more cyclists to-day than ever before, although many of them use their cycles less frequently than they did in the pre-motorised-bicycle era. According to this survey, the number of cyclists aged 16 or over is 9,150,000, and of this total 6,150,000 use their bicycles regularly. If we add cyclists under the age of 16, which the survey does not take into account, the estimated total of 12,000,000 which has been so often quoted is not so far out.

It is difficult to understand why a census of cyclists has not been undertaken by the Ministry of Transport. Is it because of the fear that the staggering figures might reach the eye of the Chancellor of the Exchequer?

Every Cyclist's Pocket Book

3rd Edition

By F. J. Camm

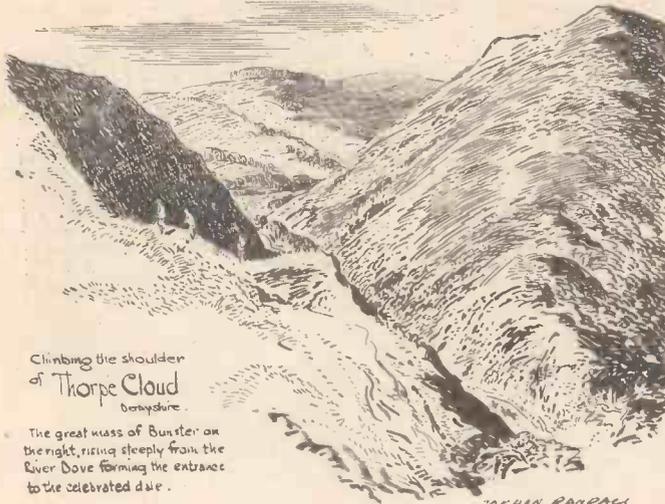
400 Pages. 84pp. Indexed Road Routes

7/6 (by post, 7/10)

From George Newnes Ltd., Tower House,
Southampton Street, Strand, W.C.2

CYCLORAMA

By H. W. ELEY



Climbing the shoulder
of Thorpe Cloud
Derbyshire

The great mass of Bunster on
the right, rising steeply from the
River Dove forming the entrance
to the celebrated dale.

Russet and Brown

IN late October, it is good to ride out into wooded country, and revel in the autumnal tints of the trees, for there is a veritable riot of russet and gold and brown, and at no season of the year is the English countryside more inviting. On Tullard Ridge, there are beeches, and oaks, and elms, and in the tangled, ragged hedge-rows the hawthorns are starred with red hips, and the wild roses with haws. Not yet is the season of decay, but there is a wistful sadness about the scene, for when October is out, King Winter will soon ascend his throne, and the glory of foliage will be gone. But there is time yet to enjoy rich beauty and the air is keen, and the roads good for a long ride. I cycle through Long Datcham and Fursley, and finally come out at Brendon Cross, where there is a good inn—and as everyone knows, there is no brew like an October brew! The lordly pheasant struts through the glades of Watton Woods; the rabbits are at their best, and it is time I went for a day's shooting with Tom Hodden, and revelled in the delights of rabbit-pie!

A Son of Sussex

ALMOST every week, my post contains a friendly letter from some cyclist who reads these rambling notes, and is good enough to write me with information about some place he loves, or to tell me of interesting and historic facts about towns, and villages, and churches and taverns. A letter the other morning from a cyclist from Sussex-by-the-Sea, and in it a lot of interesting information about ancient Winchelsea. My correspondent mentions that it was here that old John Wesley preached his last sermon in the open air . . . on October 7th, 1790. I gather that one can still see the big ash-tree under the friendly shade of which the great evangelist spoke and pleaded. Winchelsea has a certain sadness, for it possesses the ruins of a great church which was never completed. This church was part of a fine and ambitious plan for the complete rebuilding of the town, following destruction by tempest in the year 1287. Old admirals of the Cinque Ports are commemorated by monuments in the church,

and I am sure that my cycling correspondent is right when he urges me to go to Sussex, and revel in the loveliness of the immemorial Downs, and capture the spirit of the county so ably and lovingly portrayed by that great interpreter of Sussex, Sheila Kay-Smith. One of these days I will go . . . but there are so many invitations to journey into lands of delight, and one's day is crowded . . .

Never Too Old to Cycle

MET an old man in a lane the other day, riding an ancient bicycle, and together we dismounted, and leant over a field gate, and chatted about cycles and cycling and the delights of the October countryside, and reminded each other of tours of the long-ago. He had been an ardent rider for many years, and had cycled all over England. He told me his age was seventy-six, and I do not think I ever met a fitter or more youthful man for his age. "A daily spin on the old bike, a pint of ale at some village inn, early to bed and up early in the mornings . . . that's my recipe for long life and good health!" And not at all a bad recipe I thought as I looked at his pink cheeks, and clear eyes. He told me that he was a native of Dorsetshire, and he talked, with love and pride, of Poole Harbour, where he had spent a happy boyhood. He talked, too, of the famous Walls of Wareham and of Chesil Beach and the Isle of Portland, and, as a true son of Dorset should be, was an enthusiast for the novels of Thomas Hardy. We drank ale together in the "Three Magpies" and I felt that in this old man who still found his greatest joy a wheel, I had made a new friend.

Preparing for Winter

BY the time October comes round, I always feel that it is time to give my cycle a thorough overhaul, and make all the essential preparations for winter riding. I am an enthusiast for cycling during the winter period, but I do firmly believe in making my machine "weather-proof" and seeing to it that all the necessary adjustments are made, oiling and cleaning done, and my clothing gear in order. A long ride in November, or in bleak January, can be much more pleasant if one feels that everything is "ship-shape" to meet all the weather conditions one may encounter . . . and here in grey Derbyshire, one may meet some pretty severe conditions! So, one or two evenings spent on putting everything in order . . . and I face the winter with a good heart. Particularly, I see that my tyres are in good fettle, and, in fact, usually invest in a couple of new covers about this time of the year.

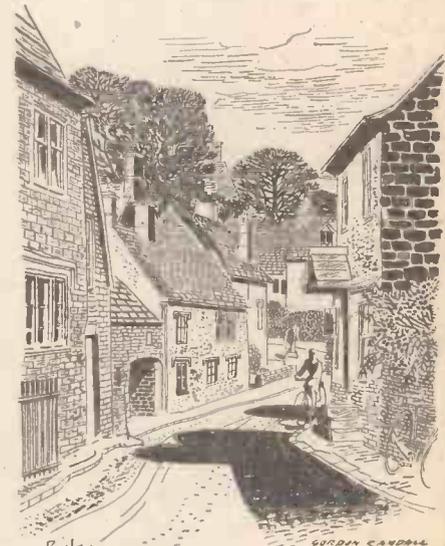
Dance of the Deermen

I AM not too far from the Staffordshire border, and this year, in early September,

I journeyed to ancient Abbots Bromley, not far from Lichfield, and there witnessed that age-old ceremony, the "Dance of the Deermen." In this curious old survival, twelve Staffordshire yeomen each take a pair of deer's antlers from the Parish Church, and, holding them aloft, dance through the district. The dancers are clad in gay garb, with colourful breeches, and the whole effect of the ancient ceremony is weird indeed. I have often endeavoured to get at the authentic origin of this custom, but I am afraid that only garbled accounts are available. Cycling around the Derbyshire and Staffordshire villages, one comes across many ancient customs and I am collecting quite a lot of useful data on the subject . . . possibly, some time in the dim and distant future, I may compile a book on the customs and ceremonies still kept up in these parts.

The Magic of the Morning

GOOD it is, on these crisp, October mornings, to be "up with the lark," have a substantial breakfast, and set off for a cycle ride before the roads bear their burden of traffic, and when the air is at its sweetest. I find that by making an early start to a fairish long ride, it is possible to be far afield by noon . . . just at the magic moment when an inn door opens, and one may enter and take welcome refreshment from a tankard or a mug. The wispy cobwebs are on the hedge-rows when I start; the air is keen to the face; rooks are flying low over the wide fields, and one has the long, winding road to oneself. It is a magic hour, and one to be made the most of, for come November, and the fogs may come, and the

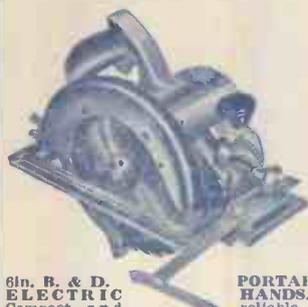


Bisley Gloucestershire

Quiet and remote among the
hills near Stroud

landscape be blotted out, and no fruit-filled orchards will greet one down the lanes. A pause at Long Staunton about ten o'clock, a look round the ancient grey church, and then on to Harkley End, where there is an old forge by the road-side, and I hear the music of the hammer on the anvil, and smell the acrid smell of burning hoof. A word with the "Smithy" and then on to my journey's end . . . for my pipe and ale, and a quiet half-hour in an inn in front of which the Michaelmas daisies bloom gaily, and there is a vase of bronze chrysanthemums on the bar-counter, and a canary chirps merrily to me as I sit and muse . . . yes, October is a good month, and especially good if you are out on the road early!

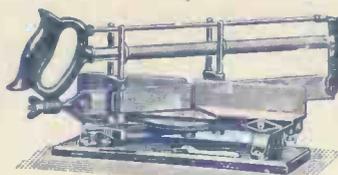
HIGH CLASS TOOLS & MACHINES FOR THE PRACTICAL MECHANIC



6in. B. & D. ELECTRIC HANDSAW
Compact and reliable. Price £17/5/0. Deferred payments available. List free on request.



THE NEW ORBITAL PORTABLE ELECTRIC SANDER
An amazing new machine for sanding all materials. Price £12/10/-. Deferred payments available. Full details free on request.



The New "Ulma" Mitre and Square Sawing Machine for Wood
Will cut with precision mitres, half mitres, squares and quarter mitres.
No. 2 cuts 4in. x 4in. ... £11/7/-
No. 3 cuts 4in. x 6in. ... £14/1/-
Baby size cuts 2in. x 2in. ... £5/5/-
★ Foreign

We have stocks of tools and machinery for all trades. Please let us quote you for any tool or machine you require.



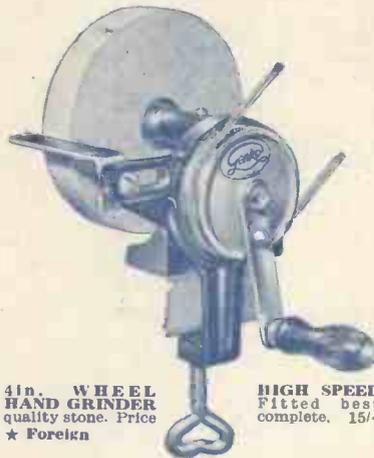
PORTABLE ELECTRIC MORTISE MACHINE
Will drill up to 1in. in steel.
Will drill up to 1in. in wood.
Will mortise up to 1in. in wood.
Can also be used as a bench drill or a portable electric drill.
Price £33/0/0.
Deferred payments available. List free on request.



Best Quality Circular Stocks and Dies, in fitted polished case.
Whitworth or B.S.F. 1/2in. to 1in. ... 89/6
B.A. 0 to 6 ... 55/6
0 to 10 ... 81/-
All with taper and plug tap to each size. List free on request.



THE NEW "ZYT0 10in."
Precision saw bench with rise and fall and canting table. A high class machine for all woodwork. Price £20/12/-. Deferred payments available.



4in. WHEEL HAND GRINDER
quality stone. Price £15/-.
★ Foreign

HIGH SPEED
Fitted best complete. 15/-.

S. TYZACK & SON LTD.
341-345, OLD ST., LONDON, E.C.1.

Tel. **SHOREDITCH 8301**
(Ten lines)



THORNTON'S DRAWING INSTRUMENTS

PIC SLIDE RULES

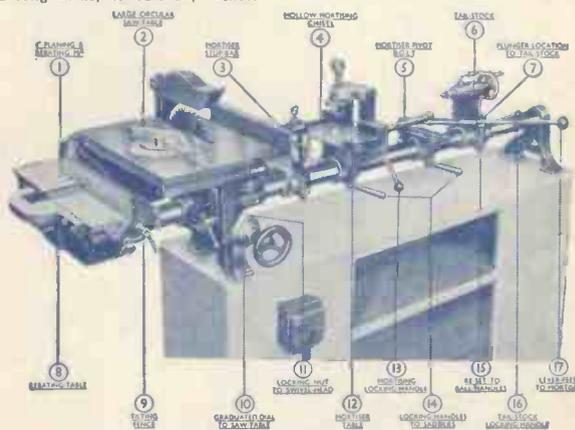
We are the largest manufacturers of high-grade Drawing Instruments and Slide Rules in the British Empire, and our Kinwest Drawing Materials have gained a reputation throughout the world for superb quality and accuracy. Insist on using only Thornton's for complete satisfaction.

Our illustrated Catalogue, which includes particulars of Drawing Instruments, Drawing Boards, Tee and Set Squares, Scales, Curves, etc., is sent Post Free on request.

A. G. THORNTON LTD
Drawing Instrument Specialists
WYTHENSHAWE, MANCHESTER.
Tel: WYTHenshawe 2277 (4 lines)

Send Now

for New Brochure detailing all points and interesting features; answered questions you would ask, showing machines in use and articles such as toys, patterns and turnery made on these machines. Ask also for details of fittings to the "Coronet" range and other makes. Is long hole drilling a problem to you? Send now for details of BORING ATTACHMENT and long drills, to suit any lathes.



FITMENTS AND ACCESSORIES FOR ALL LATHES:

- CUP CENTRE** No. 1 Morse Taper Shank.
- 4 Prong DRIVING CENTRE** (Positive Drive for large or small work).
- GRINDING WHEEL ARBOR** No. 1 Morse Taper—suit any machine with No. 1 Morse Taper.
- REVOLVING CENTRE**
- 5" WOBBLE SAW**—Ploughs $\frac{1}{8}$ " to $\frac{1}{4}$ ". Index for quick setting and fine adjustment.
- TURNING TOOLS**, set of six 18" overall, beautifully handled.
- WOODSCREW CHUCK** to suit any machine No. 1 or 2 Morse.
- 3 Jaw CHUCK** and Self Centering 4 jaw Independent Chuck.
- COMPOUND SLIDEREST**—for wood and metal turning.
- ELECTRIC MOTORS**, Brook $\frac{1}{2}$ and $\frac{3}{4}$ h.p.
- GRINDING WHEELS, SLIPTONES**, etc.

Write: Dept. P.M., enclosing stamp, for Catalogues showing photographs and price, etc.

CORONET TOOL CO. 8, MANSFIELD ROAD, DERBY.
Also at CITY ROAD MILLS, DERBY.

"Practical Mechanics" Advice Bureau. **COUPON**
This coupon is available until October 30th, 1954, and must be attached to all letters containing queries, together with 6d. Postal Order. A stamped, addressed envelope must also be enclosed.
Practical Mechanics. October, 1954.

Free Guide — SUCCESS IN ENGINEERING

One of the following Courses taken quietly at home in your spare time can be the means of securing substantial well-paid promotion in your present calling, or entry into a more congenial career with better prospects.

**132-PAGE BOOK FREE!
SEND FOR YOUR COPY**

ENGINEERING, RADIO, AERO, ETC.

Aero. Draughtsmanship	Elec. Draughtsmanship
Jig & Tool Design	Machine " "
Press Tool & Die Design	Automobile " "
Sheet Metalwork	Structural " "
Automobile Repairs	R/F Concrete " "
Garage Management	Structural Engineering
Works M'gmt. & Admin.	Mathematics (all stages)
Practical Foremanship	Radio Technology
Ratfixing & Estimating	Telecommunications
Time & Motion Study	Wiring & Installation
Engineering Inspection	Television
Metallurgy	Radio Servicing
Refrigeration	Gen. Elec. Engineering
Welding (all branches)	Generators & Motors
Maintenance Engineering	Generation & Supply
Steam Engine Technology	Aircraft Mainten. Licences
I.C. Engine Technology	Aerodynamics
Diesel Engine Technology	Electrical Design
Ordnance Survey Dr'ship.	

BUILDING AND STRUCTURAL

L.I.O.B.	A.I.A.S.	A.R.San.I.	M.R.San.I.
A.M.I.San.E.	A.A.L.P.A.	L.A.B.S.S.	A.R.I.C.S.
Building Construction	Builders' Quantities		
Costs & Accounts	Carpentry & Joinery		
Surveying & Levelling	Building Inspector		
Clerk of Works	Building Draughtsmanship		
Quantity Surveying	Heating and Ventilating		

GENERAL, LOCAL GOVERNMENT, ETC

Gen. Cert. of Education	Common. Prelim. Exam
Book-keeping (all stages)	A.C.I.S., A.C.C.S.
College of Preceptors	A.C.W.A. (Costing)
Woodwork Teacher	School Attendance Officer
Metalwork Teacher	Sanitary Inspector
Housing Manager (A.I.Hsg.)	Civil Service Exams.

BECOME A DRAUGHTSMAN—LEARN AT HOME AND EARN BIG MONEY

Men and Youths urgently wanted for well paid positions as Draughtsmen, Inspectors, etc., in Aero, Jig and Tool, Press Tool, Electrical, Mechanical and other Branches of Engineering. Practical experience is unnecessary for those who are willing to learn—our Guaranteed "Home Study" courses will get you in. Those already engaged in the General Drawing Office should study some specialised Branch such as Jig and Tool or Press Tool Work and so considerably increase their scope and earning capacity.



★ OVER SIXTY YEARS OF
CONTINUOUS SUCCESS ★

NATIONAL INSTITUTE OF ENGINEERING

(Dept. 29)

148, HOLBORN, LONDON, E.C.1

SOUTH AFRICA: E.C.S.A., P.O. BOX NO. 8417, JOHANNESBURG

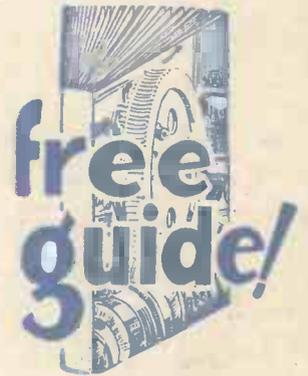
This remarkable **FREE GUIDE** explains :

- ★ Openings, prospects, salaries, etc., in Draughtsmanship and in all other branches of Engineering and Building.
- ★ How to obtain money-making technical qualifications through special **RAPID FULLY-GUARANTEED COURSES**.

MANY INTERESTING COURSES TO SELECT FROM!

A.M.I.Mech.E., A.M.I.M.I.,
A.M.Brit.I.R.E., A.M.I.P.E.,
A.M.I.C.E., A.M.I.Struct.E.,
A.M.I.Mun.E., M.R.San.I.,
A.M.I.E.D., A.F.R.Ae.S.,
London B.Sc., Degrees.

Fully guaranteed postal courses for all the above and many other examinations and careers. Fully described in the *New Free Guide*



THE ACID TEST OF TUTORIAL EFFICIENCY SUCCESS—OR NO FEE

We definitely guarantee that if you fail to pass the examination for which you are preparing under our guidance, or if you are not satisfied in every way with our tutorial service—then your **Tuition Fee will be returned** in full and without question. This is surely the acid test of tutorial efficiency.

If you have ambition you must investigate the Tutorial and Employment services we offer. Founded in 1885, our success record is unapproachable.

**ALL TEXTBOOKS ARE SUPPLIED FREE
PROMPT TUTORIAL SERVICE GUARANTEED
NO AGENTS OR TRAVELLERS EMPLOYED**



Free Coupon

To NATIONAL INSTITUTE OF ENGINEERING
(Dept. 29), 148-150, Holborn, London, E.C.1.

Please Forward your Free Guide to

NAME

ADDRESS

My general interest is in : (1) ENGINEERING
(2) AERO (3) RADIO (4) BUILDING
(5) MUNICIPAL WORK

SEND OFF
THIS COUPON
NOW AND BE
ALL SET FOR
SUCCESS

(Place a cross against the branches in which you are interested.)

The subject of examination in which I am especially interested is

To be filled in where you already have a special preference.
(1½d. stamp only required if unsealed envelope used.)

FOUNDED 1885 - FOREMOST TODAY