
Many Special Christmas Features
NEWNES
PRACTICAL MECHANICS
1/-
EDITOR : F.J. CAMM
DECEMBER, 1952
AUTO-SWITCH DECORATIVE LIGHTING

SURPLUS AIRCRAFT MATERIAL AND SUPPLIES FOR MODEL ENGINEERS.

RIVETS, SCREWS, BOLTS, WASHERS, NUTS, ETC.

Item No.		Per Gross
1	1/32" x 3/16" RH rivet copper ...	1/-
2	1/32" x 3/16" RH rivet steel ...	10d.
3	1/32" x ¼" csk. rivet steel ...	8d.
4	1/32" x ¼" csk. rivet steel ...	10d.
5	3/64" x 3/16" RH rivet copper ...	1/-
6	3/64" x 3/16" RH rivet steel ...	10d.
7	3/64" x 3/16" RH rivet brass ...	1/-
8	1/32" x 3/16" RH rivet brass ...	1/-
9	3/64" x 5/16" RH rivet copper ...	1/2
10	3/64" x 5/16" RH rivet steel ...	1/-
11	3/64" x 5/16" RH rivet brass ...	1/2
12	3/64" x 3/16" csk. rivet steel ...	10d.
13	3/64" x 5/16" csk. rivet steel ...	1/-
14	1/16" x ¼" RH rivet steel ...	1/-
18	1/16" x ⅜" RH rivet steel ...	1/2
22	1/16" x ½" RH rivet steel ...	1/4
23	1/16" x 3/16" RH rivet copper ...	1/6
24	1/16" x ¼" csk. rivet steel ...	10d.
25	1/16" x ⅜" rivet steel	1/-
26	1/16" x ½" csk. rivet steel ...	1/2
	The above are the famous "WHISTON" M.E. rivets.	
65	5/64" x ⅛" flat contact rivet silver plated copper	2/6
68	⅛" x ¼" RH rivet steel	7d.
76	⅛" x ½" RH rivet copper ...	4/-
91	3/16" x ⅜" RH rivet steel ...	1/9
99	3/16" x 1¼" RH rivet steel ...	3/9
100	3/16" x 1¼" RH rivet dural ...	4/-
41	¼" Whit x ¼" grub screw S ...	3/-
43	6 BA x 9/32" CH screw S ...	2/-
48	2 BA x 1¼" RH screw S	5/-
53	No. 4 x ⅜" RH self tap screw ...	4/-
55	5/32" Whit x 3/16" mush screw S	2/-
60	3 BA x 7/16" csk. screw stainless	6/-
109	¼" BSF x 1" stud S	6/-
116	6 BA x 1" csk. screw NP B ...	4/-
125	4 BA x ¼" csk. screw T ¼" LA	1/-
149	No. 4 x ½" RH self tap screw ...	4/-
150	7 BA x 1" RH screw S	3/-
153	6 BA x 5/16" csk. screw B ...	2/6
154	6 BA x ⅜" csk. screw B	2/6
162	4 BA x ⅜" RH screw S	3/6
164	2 BA x ½" csk. screw S	2/-
165	6 BA x 1¼" csk. screw S ...	4/6
171	6 BA x 3/16" Inst. H screw S ...	2/6
175	5 BA x 5/16" CH screw S ...	3/-
181	2 BA x 1½" stud S	4/-
192	4 BA x 5/16" CH screw stainless	4/-
194	2 BA x 3/16" grub screw S ...	3/-
197	No. 4 x ⅜" RH self tap screw ...	4/-
214	4 BA x ½" RH screw S	3/-
220	4 BA x 1" RH screw S	4/-
222	4 BA x ¼" CH screw NP S ...	2/-
224	4 BA x ⅜" CH screw stainless ...	5/-
234	4 BA x 1" csk. screw B	6/-
236	4 BA x ¼" csk. screw S	2/6

Item No.		Per Gross
245	4 BA x ⅜" stud S	3/-
252	4 BA x ⅜" mush screw S ...	3/-
275	5 BA x ⅜" RH screw S	2/6
279	⅛" Whit x ⅜" RH screw B ...	3/-
282	6 BA x ¼" RH screw S	2/6
283	6 BA x 1¼" RH screw S	4/-
303	6 BA x ¼" CH screw S	2/-
308	6 BA x ⅜" CH screw S	3/-
314	6 BA x ¼" csk. screw S	2/6
335	7 BA x ½" RH screw S	2/6
354	8 BA x 3/32" CH screw S ...	2/-
386	9 BA x ½" CH screw S	4/-
387	9 BA x ¼" CH screw S	3/-
388	No. 2 x ¼" csk. wood screw S...	6d.
389	10 BA x 1" mush screw S ...	3/-
392	No. 6 x ¼" csk. self tap screw ...	4/-
393	No. 6 x ⅜" csk. self tap screw ...	4/-
394	No. 4 x ½" csk. self tap screw ...	4/-
458	8 BA x ½" csk. screw S	2/-
461	8 BA x 7/32" csk. screw B ...	2/-
462	8 BA x 7/32" csk. screw S ...	2/-
521	¼" BSF x ½" mush screw S ...	4/6
545	2 BA x 11/16" mush screw T ¼" S	2/6
549	6 BA x ⅜" CH screw T 5/16" S ...	2/-
554	6 BA x ½" CH screw T 5/16" S ...	2/-
569	4 BA x ⅜" mush screw T ¼" S ...	2/-
572	⅛" Whit x ½" RH screw B ...	2/6
573	⅛" Whit x ½" csk. screw B ...	2/6
638	6 BA x ⅜" csk. screw B	2/-
646	7 BA x 9/32" CH screw S ...	2/-
649	8 BA x 7/16" RH screw S ...	2/-
655	5 BA x ⅜" RH screw B	1/6
661	2 BA x ½" mush screw S ...	3/-
667	5 BA x 1" CH screw NP B ...	3/-
668	5 BA x 1" RH screw NP B ...	3/-
671	6 BA x ¼" RH screw NP B ...	2/-
672	6 BA x ½" RH screw NP B ...	2/6
675	8 BA x 15/32" CH screw S ...	2/6
169	5 BA x ⅜" hex. bolt S	3/6
170	4 BA x ⅜" hex. bolt high tensile	6/-
347	2 BA x 1½" hex. bolt T ⅜" S ...	3/6
408	6 BA x ½" hex. bolt T ¼" S ...	2/-
425	2 BA x ⅝" hex. bolt T 7/16" S ...	3/-
541	4 BA x 1¼" hex. bolt T 5/16" S	3/-
659	8 BA x 9/16" slot hex. bolt S ...	2/-
85	4 BA x 5/16" washer, Tufnol ...	1/-
497	¼" x ½" thin washer S	6d.
498	¼" x 13/16" thin hard washer S	1/-
190	2 BA x ⅜" washer dural	6d.
511	¼" spring washer	1/6
513	2 BA spring washer	1/6
515	4 BA spring washer	1/6
531	2 BA shakeproof washer S ...	3/-
	2, 4, 5, 6, 7, 8, and 10 BA washers, brass or steel, 1/6 gross of one kind (not mixed).	
104	1/16" x 1" split pin monel ...	3/-
691	1/16" x ⅜" split taper pin S ...	3/-

Item No.		Per Gross
693	1/16" x 7/16" taper pin S ...	2/6
692	13/32" x ⅛" split taper pin S ...	3/-
694	1/16" x ⅜" taper pin S	2/-
695	1/16" x 5/16" taper pin S ...	2/-
696	5/32" x 1" taper pin stainless ...	4/-
704	⅛" x 1" split pin monel ...	3/6
46	8 BA full nut NP B	3/6
50	5/32" Whit nuts NP B	2/6
51	6 BA hank bush S	3/-
143	3 BA full nut B	5/-
146	5 BA full nut B	5/-
152	2 BA self lock nut S	3/6
160	⅜" BSF self lock nut S ...	5/-
313	2 BA castle nut S	3/-
379	¼" BSF full nut S	5/-
413	6 BA self lock nut S	2/6
524	6 BA full nut S	2/6
559	7 BA full nut B	4/-
596	⅛" Whit sq. nut S	2/-
602	¼" BSF castle nut S	5/-
612	2 BA full nut B	5/-
614	2 BA half nut B	4/-
616	2 BA self lock nut B	5/-
618	2 BA knurled nut S	6/-
622	4 BA full nut B	4/6
623	4 BA self lock nut B	4/6
624	4 BA half nut B	4/-
625	4 BA self lock nut S	3/6
642	6 BA full nut B	4/-
644	6 BA half nut B	3/6
652	8 BA full nut B	4/6
654	8 BA half nut B	4/-
662	9 BA full nut B	5/-
663	10 BA full nut B	5/6

1001, pressure gauge, 0-150 lb./sq. in., with capillary tube, 6/8 each.

1003, pressure gauge, 2" 0-2,000 lb./sq. in., 4/- each.

1011, spirit level, ⅜" x ⅜" x 5/16", fit one to your electric hand drill, 2/4 each.

1012, spirit level blob, 2¼", 1/1 each.

2001, shock absorbers, ⅜" dia. x ⅜", threaded 4 BA, 1/6 for 4. 4/- doz.

2020, 8 mm. chain sprocket, 30T, 1/7 each.

2021, 8 mm. chain sprocket, 12T, 1/2 each.

2050, 8 mm. chain, 3 ft. 2 in. long, 4/9 each.

2022, bevel gears, 1 to 1. ⅜", 2/6 pair.

2047, skew gears, 6½ to 1; 2/6 pair.

3010, spring flex, 1 ft. 10 in. to 13 ft., 3 way, 2/- each.

3041, A.C. ammeters, 2" 0-5 amp., 10/- each.

3044, electric motors, 24 v 21 A., 4,000 r.p.m., 13/3.

Item No.

3059, carbon brushes, 0.110" dia. x ⅜" with spring, 2/6 doz.

3065, 12 v. accumulators, 14 amp. hrs. Wt. 20 lb., 39/- each.

3067, heater, 12 v. 1 A., 1/3 each.

3071, extra strong crocodile clips, nickel plated, 3/6 doz.

3072, same again, lead plated, 3/3 doz.

3076, solenoid 1" dia. x 1", 24 v., 9d. each.

3077, solenoid valve, 24 v. ¼ A., ⅛" gas fittings, 2/6 each.

4001, Easy Flo No. 1 silver solder, 1/16" dia., 1/6 ft.

4003, Easy Flo No. 2 silver solder, 1/16" dia., 1/3 ft.

4004, Silbralloy silver solder, ⅛" dia., 11d. ft.

4011, C4 silver solder, 1/16" dia., 9d. ft.; ⅛" dia., 2/10 ft.

4005, Easy Flo flux, 6d. tin.

4006, Easy Flo stainless steel flux, 6d. tin.

4007, Tenacity No. 4A flux, 6d. tin.

4009, Easy Flo aluminium bronze flux, 6d. tin.

4019, 6 BA screwed rod, steel, 2/6 doz. ft.

4033, paxolin 21" x 2½" x ⅛", 7/6 doz.

4038, ebonite 11/32" dia., 3/6 doz. ft.

4050, plastic sleeving 2 mm. x 1 mm., 9d. doz. ft.

4065, synthetic resin adhesive, sealed tins, 3 lb., 6/3.

4066, copper sheet, 0.001" thick, 6" wide, 1/- ft.

4068, copper gauze, 100 mesh, 2/6 sq. ft.

Square silver steel, 13", 1/16", 6d., 3/32" 7d., ⅛" 10d., 5/32" 1/3, 3/16" 1/7, 7/32" 2/-, ¼" 2/6, 9/32" 3/-, 5/16" 3/9.

No. sizes, round, 13", 1 and 2 9d., 3, 4 and 5, 8d., 6 to 17 7d., 18 to 21 6d., 22 to 27 5d., 28 to 41 4d., 42 to 52 3d., 53 to 80 2d. Fractional sizes to ½" in stock.

5067, flexible steel rules 12" mm. and inches, 4 edges, 3/- each.

7002, ball race radial-thrust, 5⅛" x 7⅛" x 9/16" (53 ⅜" balls), 2/6 each.

7006, ball race ⅜" x ⅜" x 3/16", 1/9 each.

70012 ball race, 7 mm. x 22 mm. x 7 mm., 2/3 each.

8003, mixed ¼" nuts, bolts, screws and washers, 2/- lb.

8004, mixed 2, 4, and 6 BA nuts, bolts, screws and washers, 3/6 lb., over 300 to lb.

8007, mixed emery cloth and/or sand-paper, 5 lb, 5/-.

8015, mixed springs, all types over 100 for 5/-.

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Truvox Tape Desk...	23	2	0	Bradmatic Guide Pillars	5	0
Lane Tape Desk ...	16	10	0	Bradmatic 6 RP Heads...	75	0
Simon 2B	60	0	0	Bradmatic 5 RP Heads	65	0
Scophony	65	0	0	Bradmatic 5E Erase Head	65	0
Ferrograph	79	10	0	Spare Spools (600ft.) ...	4	6
C.J.R. Portable ...	119	10	0	Spare Spools (1,200ft.)...	6	6
Qualtape Recorder...	16	16	0	Tapes, G.E.C.	35	0
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Bradmatic Osc. Coil		9	0	Tapes, E.M.I.	35	0

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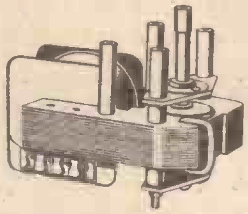
Heavy Duty 24 Volts Starter Motor, as used in Aircraft, with recessed splined spindle and mounting by 6 Bolts, Dim. : 8½in. long, 4½in. dia.

ASK FOR No. A/H870. **21/-** Each. CARRIAGE PAID



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Search Coil Pole, comprising : Control Box Pole and pivot-eye assembly. Pole (rear section) and Counter-weight assy.

Small Probe, Surface area 35 sq. ins. Dim. 9 x 5⅞ins. The whole contained in original fitted transit case, dim. : 52½ x 14 x 10½ in. Gross Wgt. 72lb. approx.

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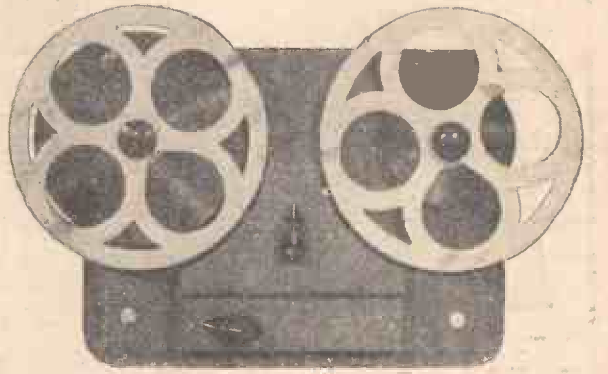

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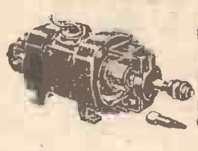

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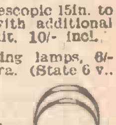
BATTERIES, unused, vehicle type. Size 10in. x 7in. x 8in. depth, 6 volt 90 amp., 75/- plus 5/- carr. ; 6 volt 100 amp., 90/- incl.; 6 volt 77 amp. storage type, 90/- incl.

WATERPROOF LEGGINGS, green, quality oilskin, snip, 5/- pair incl.

DINGHY MASTS taper telescopic 15in. to 8ft. 6in., 8/6 incl. ; ditto with additional 40in. taper extension to suit, 10/- incl.

LAMPS, brass ships hanging lamps, 6/- incl. ; Bulbs to suit, 1/- extra. (State 6 v., 12 v. or 24 volt.)



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DECEMBER, 1952
VOL. XX
No. 228

PRACTICAL MECHANICS

EDITOR
F. J. CAMM

Owing to the paper shortage "The Cyclist," "Practical Motorist," and "Home Movies" are temporarily incorporated.

FAIR COMMENT

By The Editor

NEW FEATURE—READERS' "SALES AND WANTS"

OUR invitation to readers in the October issue to suggest articles has met with an immediate and ready response. Many of those suggestions have been acted upon. A large number of readers suggested that we should devote space to a "Readers' Sales and Wants" feature; indeed, the number of suggestions along these lines is so large that we are prepared to give sympathetic consideration to it, and early in the New Year we shall introduce such a feature. Obviously, however, the amount of space which can be given to it will be limited, and readers who wish to take advantage of it must submit copy as soon as possible. We propose to introduce the feature in the February 1953 issue. Advertisements in this section must be prepaid at a cost of sixpence per word with a minimum of 6s., and box numbers 1s. 6d. extra. Advertisements, together with remittances, must be sent to The Advertisement Manager, PRACTICAL MECHANICS, Tower House, Southampton Street, Strand, W.C.2, not later than December 19th.

This feature is being introduced as part of our reader service for an experimental period. If it is found that it is well supported by readers it will be continued as a permanent service.

INSIGNIA AWARD IN TECHNOLOGY

THE City and Guilds of London Institute has, through its Department of Technology, hitherto discharged the duty laid upon it by Royal Charter to promote the advancement of technical education as an aid to industry through the medium of its certificates and awards at three levels. These are the well-known Intermediate, Final and Full Technological Certificates respectively.

The Institute considers that in certain branches of industry the time has now arrived when additional encouragement and recognition could usefully be given at a higher level than that represented by its Full Technological Certificates to those engaged in industry who continue to pursue their studies and to broaden their knowledge. In furtherance of this objective the Institute proposes to establish under its Royal Charter an *Insignia Award in Technology* which will lay emphasis upon technical training based primarily upon practical experience, supplemented by theoretical study, as distinct from the more academic approach to training for which many educational facilities and inducements already exist. This new Award is intended to be a mark of distinction for those who have combined with a sound practical training an adequate knowledge of the fundamental scientific principles of their industry, and who possess a capacity for leadership and administration.

The institution of this Award has two further objects. In the first place, it will encourage those who have completed a course of training in some branch of industry to extend their studies to its broader problems, and to widen their knowledge of the scientific principles upon which their industry is based. In this way they will become better able to apply new methods to their work, and to know when to seek the assistance of those with more advanced and specialised knowledge.

PLYWOOD BOATS

THE late John Cobb's *Crusader* was largely built of plywood. This fact is not generally known, and although plywood was used during the war for motor torpedo boats, their speeds were nothing like that which *Crusader* attained. The fact that the boat came to disaster under such tragic circumstances is not a criticism of plywood construction, for that did not fail. Rather did the disaster occur because of our lack of knowledge of high speeds on water, and the nature of the bow waves built up.

Timber, considered purely on its tensile properties, can equal most of the aluminium alloys on the basis of strength to weight ratio, and because panels can be thicker, weight for weight, there is less tendency to buckle.

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"THE PRACTICAL MOTORIST'S ENCYCLOPÆDIA"

A NEW edition of this standard work, which has been out of print for some time, has just been published at 17s. 6d. It contains 378 pages and nearly 500 illustrations. The contents are arranged in alphabetical order and there are sections on every aspect of the motor-car, even including car radio.

OUR NEW ROCKET WEAPON

THE announcement of the new British guided-rocket capable of a speed of 2,000 miles an hour is but a foretaste of what is going to happen in the world of space travel during the next half century. By that time it is confidently expected that we shall have visited the moon or some other near planet.

There is no scientific or practical reason why this should not be done. The only difficulty at present is one of finance. In America, however, a large sum of money has been donated for experimental work, and in this country the Interplanetary Society is developing plans. Although, at present, this country is applying its knowledge of rockets to the construction of guided missiles, a vast amount of valuable scientific data will be obtained without risk to human life. No doubt when the moment is propitious this knowledge will form the basis of the design of the first rocket ship.

This journal has always encouraged the science of astronautics and has published more about it than any other technical journal in this country. As information is released we shall continue to record it.

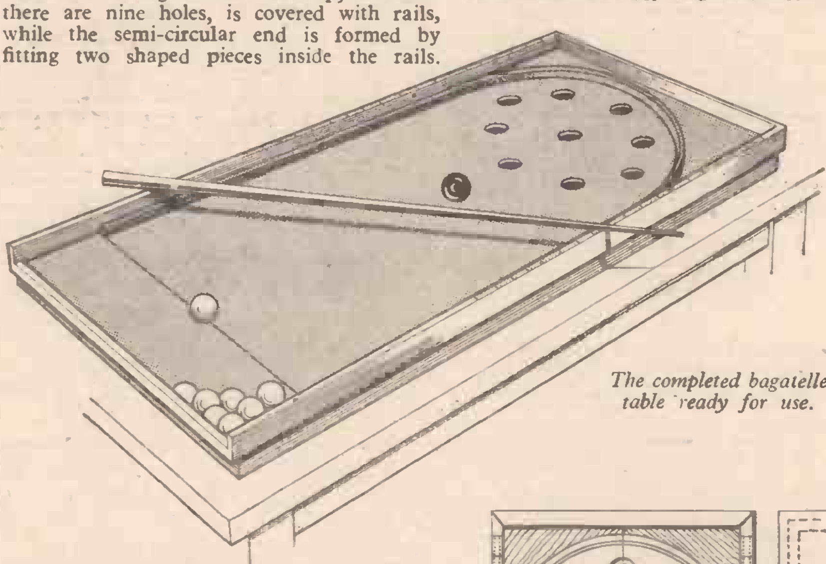
Astronautics was laughed at when it was first mooted some years ago, but then so was the aeroplane, radio and television. Undoubtedly high-speed travel through the stratosphere will come and dwarf even the highest speed known to-day.—F. J. C.

Making a BAGATELLE TABLE

A Table which will Provide Many Exciting Games Can Easily be Constructed by Anyone with a Slight Knowledge of Woodwork

BAGATELLE is an ideal game for winter evenings and even if readers have little knowledge of woodworking they need not have doubts of their ability to carry out the construction of a table on which this interesting game may be played.

The table is made with a plywood top fixed to a strong frame. The top, in which there are nine holes, is covered with rails, while the semi-circular end is formed by fitting two shaped pieces inside the rails. Cushion slips and rubber cushions are fitted around the rails and the semi-circular end, and pegging or scoring holes for 100 up are drilled in the upper edges of the rails.



The completed bagatelle table ready for use.

The Top

For this it is advisable to use a piece of ¾in. plywood exactly 5ft. long by 1ft. 8in. wide. The holes, which are 1½in. diameter are set as shown in Figs. 1 and 2. First mark the centre line, then measure 10½in. from the top end to mark the position of the centre hole, set out the other holes as indicated and mark them with a compass. A fret or key-hole saw should be used to cut the holes.

The Frame

The frame to which the plywood top is fixed is shown in Fig. 3. It is made with two side rails 4ft. 10½in. long and four cross rails 1ft. 5½in. long by 2in. wide by ¾in. thick. Deal will be quite suitable, but a better wood such as mahogany or oak could be used if desired. Grooves ¼in. deep are cut in the side rails to receive the cross rails, which are fitted in and fixed with glue and nails. Care should be taken in making the frame to get it perfectly true, and after it has been allowed to stand on one side for the glue to dry, the edges to which the plywood will be fixed should be planed quite straight and true, a straight edge being used for testing. The top is fixed down to the frame with fine pins allowing a ¾in. overhang all round; the heads of the pins should be punched in and the holes stopped.

Glue is used to fix the baize or West of England cloth covering to the top. It should be cut slightly larger than the plywood; the latter is quickly coated with glue and the cloth is stretched tight. Place it down in the middle first and work towards the edges, taking care that there are no creases and that it is pressed down firmly, especially around the holes. A few short tacks could be used to hold it around the edges, as they will be covered by the side rails. It is advisable to have assistance in this operation as the quicker it is done the better, or the glue will begin to set before the cloth has been pressed down all over. When the glue is dry the cloth should be trimmed off level with the plywood and holes.

Rails and Semi-circular End

The side and top rails surrounding the board may be from 1½in. to 2in. high by ¾in. thick, rebated ⅜in. wide by ¼in. deep to fit over the edges of the plywood, but it will be more convenient if the rail at the bottom or playing end is only 1in. high. Two of the rails are shown fitted to the board at Fig. 4, and sections are shown at Fig. 5, that of A being of a plain rail and at B a moulded rail 2in. wide. The side and top rails are mitred together; the bottom rail fits between the side rails, and all are screwed up through the plywood.

The semi-circular end is formed with two

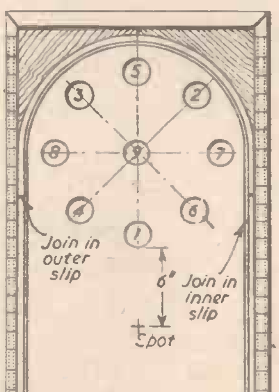


Fig. 1.—The top of the table.

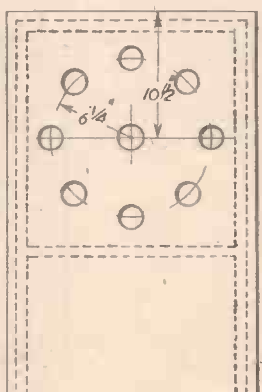


Fig. 2.—Details of the holes.

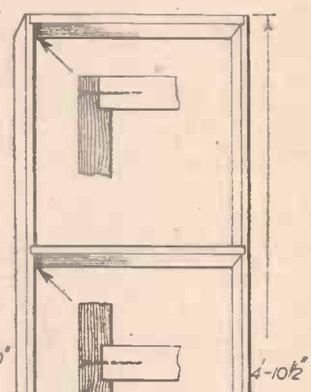


Fig. 3.—The frame to which the plywood top is attached.

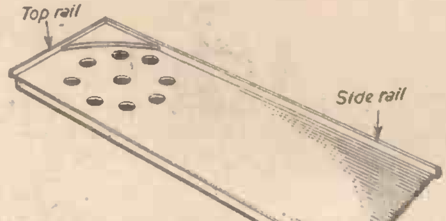


Fig. 4.—Showing how the rails are fixed.

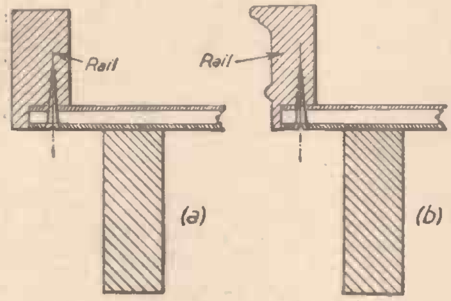


Fig. 5.—Sections of the side rails.

pieces of mahogany or oak ¾in. thick joined in the middle, and cut with the grain running in the direction shown in Fig. 1. The end is ½in. wide in the middle where the two pieces join, and it should be set out with a pair of compasses set at 9⅝in. Screw driven through the plywood are used to fix the end.

Cushion Slips and Cushion

The cushion slips are made with plywood. There are inner and outer slips, and for convenience in fitting each may be in three pieces. Reference to the plan, Fig. 1, will show the slips in place, and they may be joined in the positions indicated, while Fig. 7 shows sections of the slips and cushions. Plywood 3/16in. thick is used for the slips, and the outer or wider one it fitted first. Cut three strips of plywood roughly 3ft. long by exactly 1in. wide and preferably across the

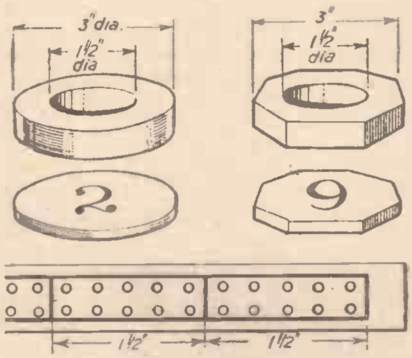


Fig. 8.—Details of the cups and pegging board.

grain to enable them to be bent easily. Start at the top and fit one strip around the semi-circular end, fixing it temporarily with a few screws driven near the bottom edge. Then fit a strip to each side rail and cut their ends level with the bulk line shown in the plan. Next prepare three inner strips ⅝in. wide and fit them inside the wider strips level at the top edges, arranging the joints in slightly different positions from those between the wider strips, as indicated in Fig. 1, and bore a number of screw holes for fixing. The rubber cushions should be of strip rubber ⅜in. wide by 3/16in. thick in section cemented inside the narrow strips level with the top edges. The strips could be removed for this, and the rubber held under pressure while the cement dries. At this stage the slips and cushions should be fixed in place, the meeting ends are carefully fitted, and cleaned off level. The cushions should now be covered with baize. The ideal method is to use one strip of cloth, but if it has to be joined once then it will be best to arrange it in the middle of the end, or if twice, then at the side near the joints in the slips and cushions. The joints should be well pressed to get them as flat as possible. One edge of the baize is first placed between the two plywood slips and the inner slip is screwed to the outer, as shown at A, Fig. 7. The baize is then brought up over the cushion, the screws which fix the outer slip to the rails and semi-circular end are loosened, the baize is tucked in under this slip, shown at B, Fig. 7, and the screws are tightened to hold it and the cushions firm.

Cups and Pegging Holes

Cups for the balls should be fitted under the holes in the board, as shown in Fig. 6, and they may be easily made, as shown in Fig 8. Pieces of wood 3in. by 3in. by ½in. thick are cut to octagonal or circular shapes, and holes 1½in. diameter are cut in them. A fretsaw will be useful for cutting the shape and the holes. Then plywood bases are prepared to cover the holes in the cups, and the numbers to correspond with those shown in Fig. 1 are painted on the bases to show through the holes in the cups. The bases are glued to the cups, and the latter are glued under the plywood board.

Details of the pegging holes which should be drilled in the top edges of the side rails are shown at Figs. 1 and 9. Lines should be incised or painted on the rails, and the holes drilled with a bradawl or drill to a depth of 2in.

Nine 1½in. balls will be needed, one being red and eight white. The baulk line and spots are marked on the cloth, as shown in Fig. 1, and a cue from 3ft. to 4ft. long by 1in. diameter at one end tapering to ⅜in. at the other must be provided. The table should be polished or varnished on completion, and if thought desirable the base could be covered in with another piece of plywood.

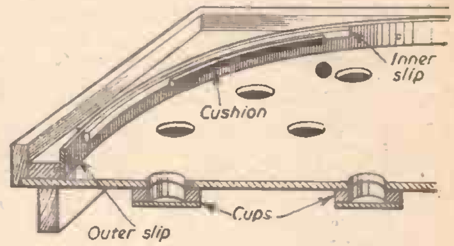


Fig. 6.—The cups for the balls.

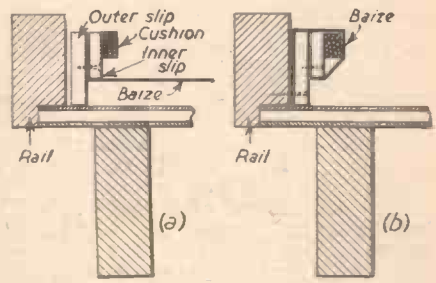


Fig. 7.—Sections of slips and cushions.

The World's Largest Helicopter

The United States Air Force's XH-17, the largest known helicopter in the world, made its first flight at Culver City, recently. Built by the Howard Hughes Company as a ground test model, it has been converted into a flight model following satisfactory tests of the jet-powered rotor mechanism. It is an experimental heavy-lift machine and is expected to be the forerunner of powerful cargo-carrying helicopters designed to lift and deliver such equipment as artillery bridge sections and trucks in areas inaccessible to conventional aircraft. The XH-17's rotor blades extend over 125ft. from tip to tip. The machine is 30ft. high and is powered by two modified turbo jets, built and developed by General Electric.

MAKING A FLOODLIGHT

Constructional Details of a Useful Appliance for the Amateur Photographer

By J. R. TYLDESLEY

PHOTOGRAPHY by artificial light is a very interesting and absorbing hobby but, at the same time, is expensive, because of the extra equipment necessary. Many luxury accessories can be dispensed with, but floodlights are an absolute necessity. A floodlight on a stand costs about £2 10s. minimum, and at least two are necessary for successful results. I have, however, constructed a complete floodlight unit, as shown in Fig. 1, quite cheaply, and have proved its efficiency. The construction is easy and quickly done, and the finished article is sturdy and is adaptable for different uses.

Reflector and Lampholder

The two main items to construct are the reflector and stand. For the stand I used an ex-R.A.F. telescopic dinghy mast, strong but light and costing only 5s. A reflector must give a soft diffused light in the form of a beam, and it was found that an ordinary aluminium basin proved ideal, giving excellent reflection, being correct in size, and costing only 2s. (Fig. 2). The dimensions of the basin were 3⅝in. diameter of the base, 5⅝in. diameter across the top, and depth 3¼in. These dimensions produced the desired 45 degrees beam.

A good quality bakelite bayonet lampholder with conical or H.O. type hood can be purchased from an electrical dealer and fastened to the basin (Fig. 3). The quality must be of the best since it will have to resist the high temperatures from the photographic lamps. A circular hole was cut in the base of the basin—a hole slightly less in diameter than the end of the conical hood. This hood was fastened to the basin, using Durofix glue which made a strong and heatproof joint.

Fig. 3. (Right)—Using the floodlight suspended from a picture rail.

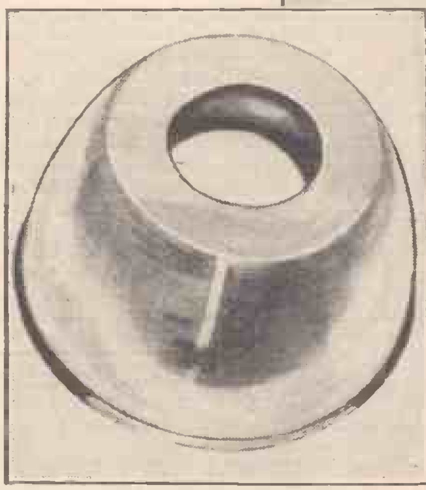


Fig. 2. (Below)—Showing the central hole made in the aluminium basin.

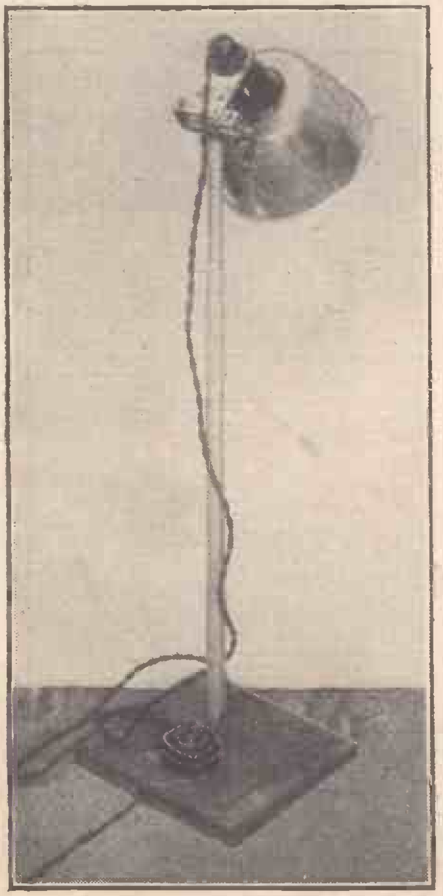


Fig. 1.—The complete floodlight unit.

Stand and Base

The base was constructed from a 9in. square piece of softwood, about 1in. thick. (See Fig. 1.) A ¾in. hole made in the centre was carefully filed a close fit for the dinghy mast. Four rubber stops were fitted to the bottom of the base to prevent slipping. A 5 amp. 230-volt switch was fastened to the base board with holes bored suitable for the wiring.

A hole was cut in a piece of ⅛in. plastic 3in. by 1in. and of such a diameter to suit the lampholder and this was fitted between the hood and the lampholder. A rough hinge was constructed, using drilled metal strip from a toy construction kit, one section bolted to the 2B.A. thread on the top of the dinghy mast, and the other to the strip of plastic, as shown in Fig. 4. The hinge can be locked in any position by means of a handle and a threaded 2B.A. rod. The lampholder and switch were wired in good quality flexible cord and a plug for attachment to the mains was fitted, and the lamp was ready for use.

Features

The reflector is very efficient, and the light intensity, 2ft. from a 100-watt bulb, is 22ft. candles without the reflector and approximately 51ft. candles with it. This is an increase of 130 per cent., which enables lamps of lower wattage to be used and is therefore economical.

As well as a stand lamp, the unit may be used as a " boom floodlight " using a chain or wire fastened about 12in. up the column, with a picture hook at the end for hooking on to the picture rail (Fig. 3). The rubber feet prevent slipping, and this horizontal position is ideal for photography needing overhead lamps.

The lamp will tilt through a vertical angle of about 130 degrees, and its height can be adjusted from 1ft. to 7ft., giving a wide range of positions.

It has clean lines and can be used for many domestic purposes such as reading, television, etc. It is easily and quickly made and it will be a welcome addition to any home, whether the owner is photographically minded or not.

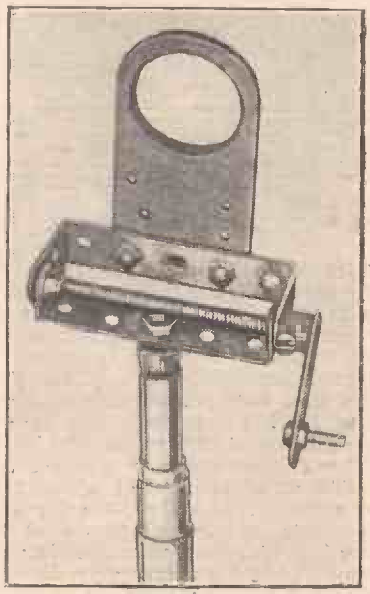


Fig. 4.—Detail of hinge fitment and plastic support for the lampholder.

RADIO GAMES *for* CHRISTMAS

Some Suggestions for Using the Standard Wireless Receiver as an Accessory to Various Games

THERE are dozens of interesting party games in which the wireless receiver may be introduced. No doubt many readers have already devised ideas of their own, and the following notes give some of the lines which may be followed during the festive season in adding to the enjoyment of your guests. First, it should be emphasised that any receiver, other than a simple crystal or one-valver which will not operate a loud-speaker, may be used. Secondly, if the following notes are followed there is no risk of damage to any part of the apparatus and no risk of electric shocks, even although a mains receiver is employed.

As a first essential in the employment of the ordinary receiver an output filter circuit must be used. This is standardised in receivers, and many home constructors, too, have fitted this in order to feed extension listening points.

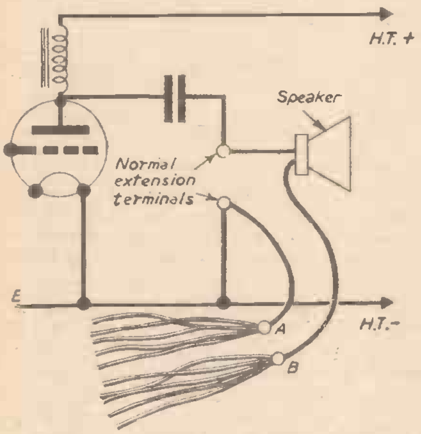


Fig. 1.—How to arrange the output circuit for radio games.

Completing the Circuit

As a basis for the majority of the games in which the receiver is used, the completion of the speaker circuit may be taken as standard. Instead of two leads from the speaker point a multiplicity of leads must be fitted as shown in Fig. 1. In some cases all of the leads on the earth side will be required, whilst in others only a single lead from this point will be employed. The simplest of games calling for no additional apparatus is a form of "Blind Man's Buff," where the players stand in a circle holding the leads from the point marked A in the diagram.

Interspersed in these leads are a number of blanks or dummies. These may be any odd pieces of wire, and it is obvious that the numbers of "live" and "dead" leads may be varied according to the requirements of the game. A single lead from point B (the earth side) is then held by another player who stands in the centre of the ring and proceeds from one player to another touching the bared end of the wire he carries against the bared end of one of the wires being held by the player. The receiver is switched on and tuned to a station, or if there is no broadcasting available a gramophone record may be played through the pick-up. Failing the use of a pick-up, the aerial may be disconnected and the reaction control tuned up until the set howls, the removal of the aerial acting as a safeguard in the prevention of interference with other listeners who may be attempting to receive some distant station. It is true that some circuits will not radiate such oscillations into the aerial system, but the simple precaution of removing the aerial avoids the necessity of studying the circuit in order to find out whether or not it is of a suitable type. If there is a self-contained speaker in the anode circuit of the valve this should be silenced by means of an appropriate switch, whilst if no switch is fitted the speaker should be replaced by an iron-core choke.

Other Schemes

It will now be obvious that when the single player completes the speaker circuit by touching the wire he carried against a "live" wire (from the point A) the signal being received by the receiver, or the reaction howl or gramophone record, will immediately be heard through the speaker. A time limit may be set upon the game, and the player finding the greatest number of "live" points in that time may be declared the winner. Alternatives will suggest themselves to the reader.

An alternative arrangement employing the same system may be built up upon a piece of plywood, covered by a piece of American cloth such as may be obtained from the popular stores at a very nominal figure. That marked in squares and used for shelves is preferable and the size of the square should be just larger than a penny. The cloth may be pinned to the board by ordinary drawing pins at the edges, and then drawing pins should be inserted at all the square centres. Now, going round the board, holes should be pierced at various adjacent pins, and through these holes the bared ends of the leads from the extension point already referred to should be threaded. A single loop should then be placed beneath the head of the drawing-pin and it should be pressed firmly home. In Fig. 2 it will be noted that various pins are left blank, but as the wire will no doubt show and indicate to the players the correct point, short lengths of wire should be placed beneath the remaining pins to act as a misdirection. The game is played with pennies or discs of metal of a similar size, and the board should be laid upon a table at a distance of about 3ft. from the player. The receiver is set into operation as already mentioned and the players throw the pennies on to the board. When a coin rests upon two adjacent drawing pins and these are connected respectively to the output terminals, the speaker will be brought into action. The game may be played with borrowed money or the banker may take all the coins which fail to operate

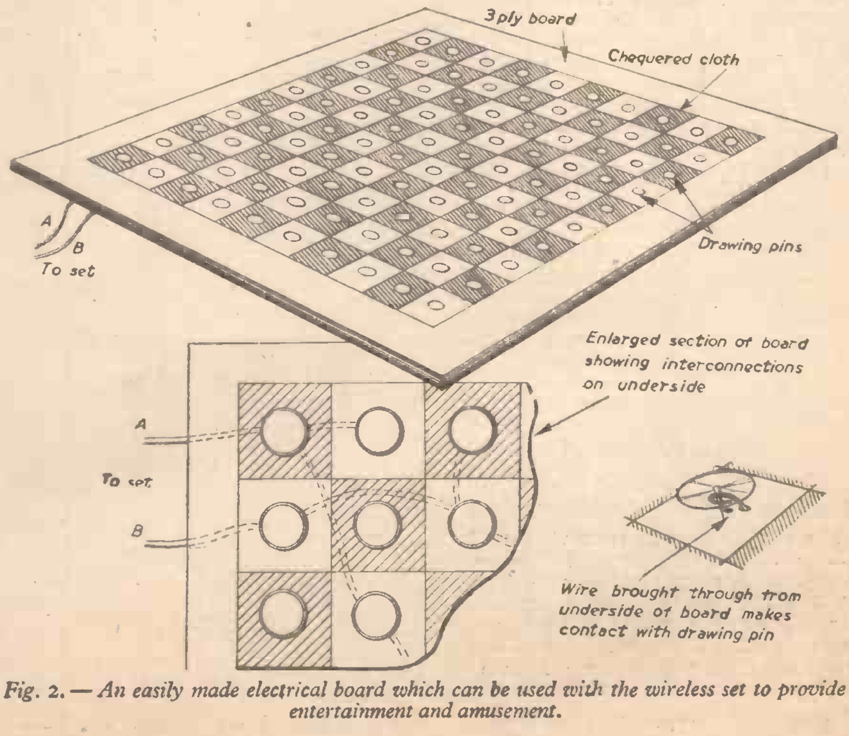


Fig. 2.—An easily made electrical board which can be used with the wireless set to provide entertainment and amusement.

the speaker. Alternatively, the squares may be marked in ink on white cloth and numbered to indicate the number of coins which are paid out in the event of a successful throw.

Adding to the Fun

The interest of these two games and others in which the circuit to the speaker is completed is increased when a talk is being received, as the completion of the circuit results in a few words being heard from the speaker, and these disjointed sayings very often sound most incongruous, or may have some direct bearing upon something that has just happened or been said by the players. With musical items, of course, this additional fun does not enter into the game. Other modifications of these schemes will be obvious to the handyman, but there are other ideas which may now be mentioned in brief.

Fault Finding

For the gathering where a number of keen wireless fans are present, fault finding may be arranged. Here one player goes to the receiver and in a given time has to introduce some fault to prevent the receiver functioning. The other players then enter one at a time and are given a time period to locate the fault. The winner is the one who locates it in the shortest time. Alternatively, all the players may enter together and a scramble then ensues to endeavour to be the first to find the fault. In this case, of course, it should be some fairly obvious defect and not an obscure fault. For instance, a valve pulled out of the holder, or a wire removed from a component, but in the latter case care must be taken not to disconnect some point which may result in damage, such as the anode circuit of an output valve.

A Wool-winding Machine

Constructional Details of a Useful Appliance for Domestic Use

By W. BROOK

THE simple machine shown in Fig. 1, is for winding wool as purchased in hanks into a suitable form for knitting from. This is a necessary task disliked by all home knitters as it is such a lengthy operation.

The advantages of this machine after a trial for a period of a few months are:—

(1) Winding time cut by 80 per cent.

(2) Much easier to wind, only necessary to turn the handle after setting up.

(3) No possibility of stretching the wool as all tension is released when removed from the machine.

(4) For delicate shades the complete package can be wrapped in soft paper after winding and the wool withdrawn from the centre thus ensuring cleanliness during knitting.

(5) As the package remains stationary all the time wool is withdrawn there is no danger of it rolling about and getting into a tangle, as is often the case when wound on to a ball.

Description of Machine

The essentials are to gear the winding spindle up from the turning handle and down for the traverse mechanism. Any means can be adopted for this as the ratios are not critical, but the aim is to have as large a ratio between hand wheel and spindle as possible for speed of operation.

The basis of my machine centred round the hand grinder, obtainable at most cheap stores (price 5s. 6d.). This is ideal for the purpose, the rest of the parts being found in the junk box.

Constructional Details

The spindle consists of a length of copper tube 6in. x ½in. with a piece of brass 1in. long and a tight fit into the copper tube. Solder this in one end, and bore a hole down the centre of this brass 2BA tapping size. Follow this hole with a 2BA clearance drill for half the length of the brass and run a 2BA tap through the remaining ½in. This spindle will now screw on to the spindle where the emery wheel was removed on the grinder. (Fig. 1 will make this clear.)

Traverser

The brackets for this are made from brass valance rail, bent and secured as shown in Fig. 2. Another piece of valance rail is cut and bent to hold the traverser itself (Fig. 3). A piece of rail is bent at right-angles, bored and tapped 2BA and soldered as shown. The cam is made from a 2in. length of tube, 1in. diameter. Starting at ¼in. from one end saw the tube in two, to ¾in. from the other end, that is a diagonal cut through the tube. The edges must now be made perfectly smooth and free from sharp edges, etc. (Fig. 4.)

Two discs are now made to fit tight into the round ends one in each of the two halves of the cam and soldered in position. In the centre of each of the discs a 2BA clearance hole is drilled.

A distance piece is made from a piece of tube, the bore being large enough for a length of 2BA rod to go through, having an outside diameter of not more than ½in. The length of this tube is adjusted so that when inserted between the two halves of the cam there is a gap of ⅛in. all round.

A 5in. length of 2BA screwed rod is inserted through the two halves of the cam with the distance piece between. A nut at each side will hold the whole together.

Wool Traverse Guide

I found that an old toothbrush handle, about 6in. long, was ideal for this purpose. At one end a 2BA clearance hole is bored, the other end having a ⅛in. slot cut down the centre for a distance of 4in. It will be found that if two blades be placed together into an ordinary hacksaw frame, the desired width of cut will be obtained. This cut must now be made perfectly smooth with sand-paper.

At a position 1½in. from the hole in this guide a 1/16in. hole is drilled and a panel pin of a suitable thickness to be a tight fit is inserted. This is best done by warming the guide over a gas flame, thus softening the material so that the pin may be easily forced in. On cooling it will be found that the pin is held quite firmly. The pin is now cut off leaving ½in. protruding at one side (Fig. 5).

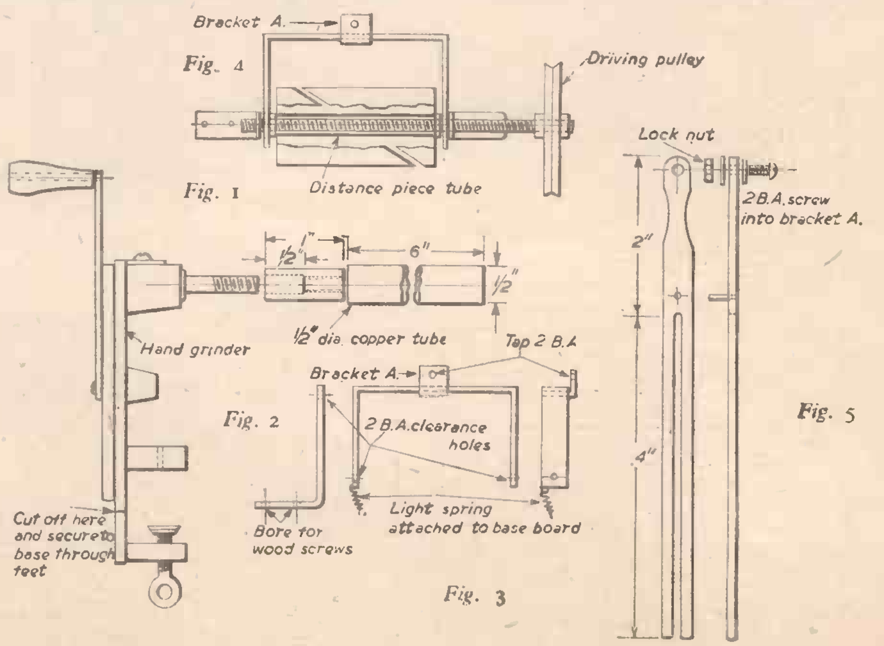
Driving Pulley

A pulley is now made from any suitable material; the diameter is not critical but should be as large as possible. This pulley has a centre hole bored and tapped 2BA and is grooved round the circumference for a round belt. All these parts can now be assembled, as in Fig 4.

Driving Belt

This is the drive for the traverse from the driving spindle and is made from a piece of spring curtain rod, just long enough to have a slight tension.

The last turn on each end is bent in



Details of the operating handle, traverser and brackets.

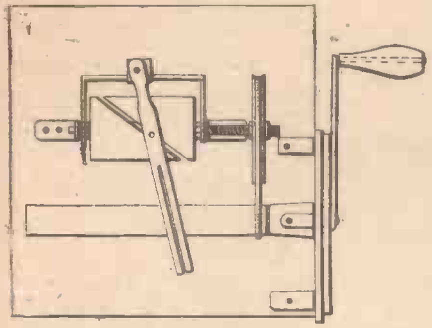


Fig. 6.—Plan of the complete machine.

line with the spring and hooked into each other.

Baseboard

For this a piece of wood ¾in. x 6in. x 6in. approximately, is used, planed and polished if required, on which all the parts may now be assembled, as in Fig. 6, to complete the machine.

Swift for Holding Hank

This is made from 3/16in. rod, two parts being required exactly alike and bent as shown in Fig. 7.

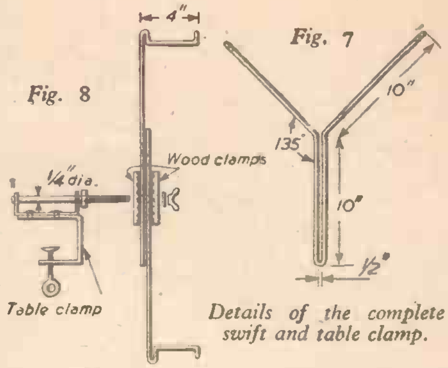
Two pieces of hard wood are cut ½in. x 4in. x 1in., a ¼in. clearance hole being drilled in the centre of each and two grooves cut down their length (see Fig. 8). These grooves are to hold the 3/16in. rod in position when clamped by a wing nut.

It will be apparent that any size of hank can be used by loosing the wing nut and adjusting the two holders in or out.

Operation

The hank swift is attached to a convenient chair or table and adjusted to hold the hank of wool firmly but not too tight, noting that the swift revolves evenly and not out of centre. It is an advantage to open the wool out to ensure that during winding the wool has not to pull from underneath the layers.

Next, break the knot joining start of hank to the finishing end. Take one of these ends, for preference the one coming from the top of the swift, and thread it through the guide on the machine, leaving a few inches of wool off the end of the winding spindle. Make a few turns round the spindle with the end coming from the hank in order to give the spindle a grip. Now turn the handle and see that the wool is being withdrawn from the swift and that the traverse is working back and forth. Continue turning to the end of the hank. It is an advantage to have as great a distance as possible between the hank and winder.



Details of the complete swift and table clamp.

When all the wool is wound on the spindle a piece of paper may, if necessary, be wrapped round the wool and secured with a rubber band.

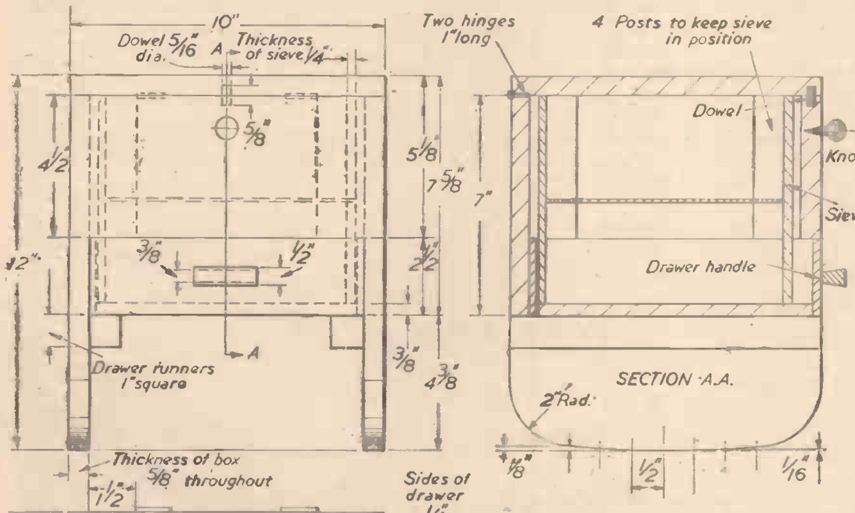
To remove wool from spindle place a finger at each side of the spindle (driving end) and pull off. When the "package" is pulled off, the centre will collapse, thus relieving any undue tension which may have been put on during winding.

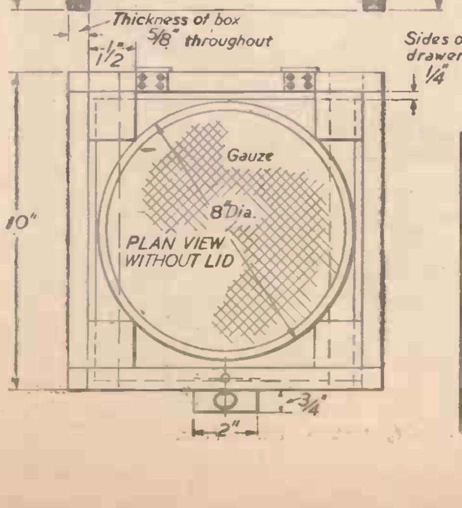
An Ash and Cinder Sifter

An Inexpensive Time- and Labour-saving Appliance

By D. V. PENDLETON

THIS idea for an ash and cinder sifter is to separate the ashes from the cinders without making a mess. The device is to be made of wood (deal) with a covering of tin-plate on the inside of the lid and all parts on the inside of the drawer or tray. This tin-plate can be screwed on and can be bought very cheaply; it costs about 1s. per sq. ft. To separate the ashes from the cinders a sieve or small riddle can be used, and these can be bought for about 5s. each. The woodwork can be painted on the outside. The four posts keep the sieve in position, while the sieve sits in the tray. The lid of the box is made to lay flush with the top of the sieve.





Front elevation, section and plan of the complete cinder sifter.

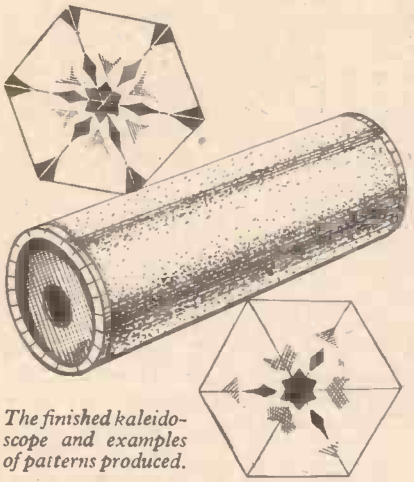
Method of Operation

The ashes and cinders are placed in the sieve and the lid of the box is fastened down with the use of a small dowel which is glued into the lid and is a tight fit in a hole in the front of the casing. By the use of the round knob at the front, the device is rocked to and fro, so that the contents hit against the inside of the lid, making the ashes fall through the gauze and leaving the cinders in the sieve. The sieve is then taken out of the box and the cinders used again: the tray, or drawer, is taken out and the ashes thrown away.

The device can be housed in the kitchen and the operation can be done in the house. For old people who cannot go out in all weathers, this is a great advantage, and the ashes can be put in a sand bin. In these days of high coal prices, the device is a big money saver and is, at the same time, easy to work. The complete appliance can be made for a total cost of about 15s., according to the materials used in its construction.

Making a KALEIDOSCOPE

Constructional Details of This Ever-popular Novelty



The finished kaleidoscope and examples of patterns produced.

THE kaleidoscope is a most attractive little toy, and the variety and number of charming coloured designs obtainable from one is really remarkable. The heading sketch shows a completed kaleidoscope with examples of the kind of designs that can be made.

Construction

First procure a piece of ordinary cardboard tubing, 6in. long and 2in. in diameter

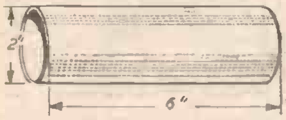


Fig. 1 (left).—The cardboard cylinder. Fig. 2.—The glass fitted into the cylinder.

(see Fig. 1), and into this slide three pieces of glass about 5¾in. long by 1¾in. wide to form a triangle, as shown in Fig. 2. One surface of each piece of glass must be painted over with black poster or other paint, and care must be taken when inserting them into the tube that the painted sides are innermost. Over one end of the tube lay a stout cardboard disc, in the centre of which is cut a ½in. diameter hole through which to look. To hold this disc to the tubing, cut a strip of stout brown paper about 7in. long and ½in. in width, and at one side of this form a series of niches, as Fig. 3, so that when the paper is glued round the tube, the tabs so formed will turn down on to the card disc and hold it firmly in place.

Inserting the Glass

Now turn your attention to the other end of the tube. The three pieces of glass having been inserted rest on the card disc just referred to, and leave a ¼in. or so clearance between the glasses and the top of the tube. Procure a circular clear glass, the same diameter as the inside of the tube, and lay

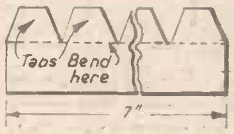


Fig. 3.—How the paper is cut to hold the disc in position. Fig. 4.—The flat ring of card placed on one end of the cylinder.

this on the three glasses. Cut a ring of stout card about ¼in. wide with an outside diameter the same as that of the glass disc and lay it on top of the clear glass. Now insert a piece of frosted glass of the same diameter as the clear piece, and see that this lies flush with the top of the tube. Remove this top (frosted) piece of glass and insert a number of pieces of coloured glass or clear coloured celluloid of any odd shape and size, afterwards replacing the top glass. Next cut a flat ring of card, lay this on top of the glass, and securely fix it to the tube in

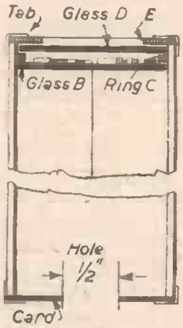


Fig. 5.—The position of all the parts.

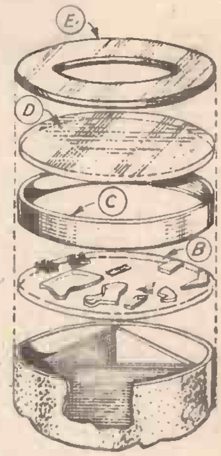


Fig. 6.—How each piece is inserted.

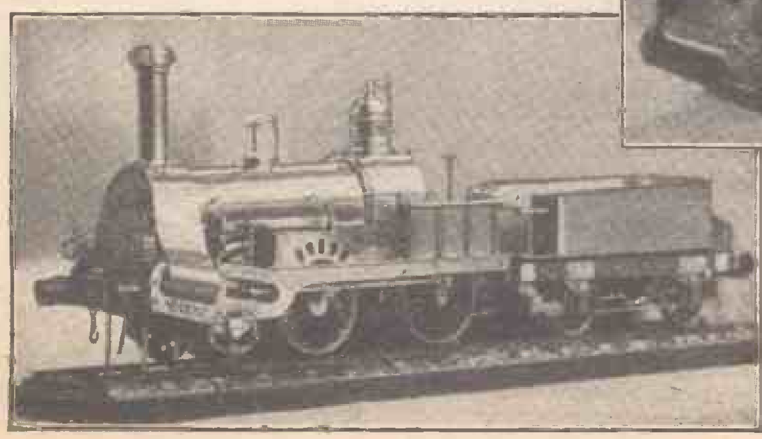
a manner similar to the opposite end, as shown in Fig. 4. The section Fig. 5 shows clearly the position of all parts, while Fig. 6 illustrates the manner of inserting each piece.

To use the kaleidoscope, hold it up to the light, look through the spy hole and then gently turn it.

Seen at the Model Engineer Exhibition

THIS year's exhibition was open from Monday, October 20th, to Wednesday, 29th, and the official opening ceremony was performed by H.R.H. The Duke of Edinburgh. It was held, as in previous years, in the New Hall of the Royal Horticultural Society, Westminster, London, S.W. Every phase of model-making was well represented, but the section with the largest number of exhibits was the maritime section; radio control was also to the fore.

The usual high standard of craftsmanship was found in the locomotive section and exhibits were in



many different scales, ranging from a 10¼in. gauge model of the "Royal Scot" down to the well-known 00 gauge. The left-hand photograph shows a working model of the 100-year-old goods tender engine "Crewe," made by Mr. D. H. Harris, of West Wickham, Kent.

Model car exhibits, this year, included both working and non-working models, and scale replicas of many well-known makes, including the B.R.M. and a 1/12th scale Jaguar XK120, were on show. The model illustrated in our photograph on the right is a non-working free-lance saloon touring car, built by Mr. L. W. Harrison, of Fulham, S.W.6, to a scale of 2 3/16in. to 1ft.

AUTO-SWITCH Decorative Lighting

Some Changing Colour and Flashing Circuits Mechanically Operated

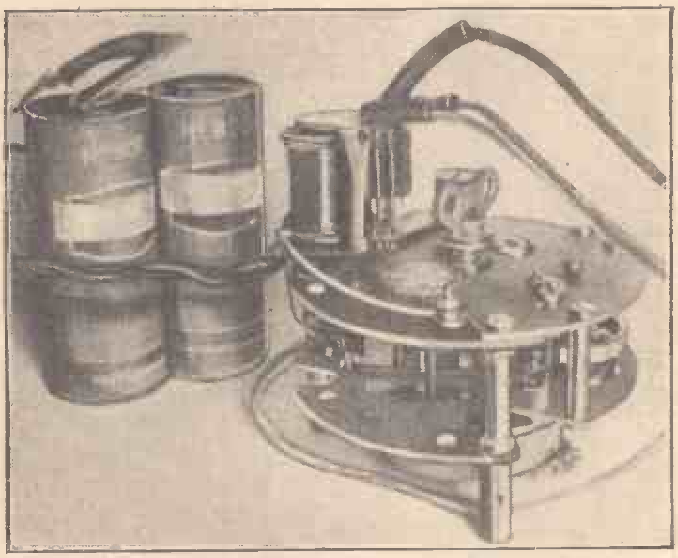
By F. G. RAYER

THOUGH decorative lighting is most frequently used in the home at Christmas and the early part of the New Year, other occasions for it arise. Children's parties are an obvious example, and small "fairy lights" can often be used even if there is no Christmas Tree upon which to place them. The attractiveness of such lighting is vastly increased if some form of automatic switching is added, and it is, therefore, proposed to describe some of the circuits which can be employed.

The clockwork switching unit used was that known as a "Master Contactor," and sold by numerous ex-service stores. However, it is possible to adapt almost any clock, as will be seen. Any cheap movement, in working order, would be satisfactory, though very small clocks are best avoided.

Changing Colour Circuit

Some of the most effective arrangements are obtained when a relay is used. The clockwork contactor units, which will be described, open and close contacts at regular intervals. By employing these contacts alone, a string of bulbs may be switched on and off. If a relay is used in a circuit such as that in Fig. 1, a further string of bulbs can be switched on when the first string is switched off. Here, red and green lights are shown. These would continually be illuminated and switched off in sequence, change-over switching being effected by the relay armature. For most effective results, none of the colours present in one string of bulbs should be repeated in the other, and the two strings may be close together so that the bulbs occupy near positions. A very pleasing result can then be obtained.



Contact mechanism with relay fitted.

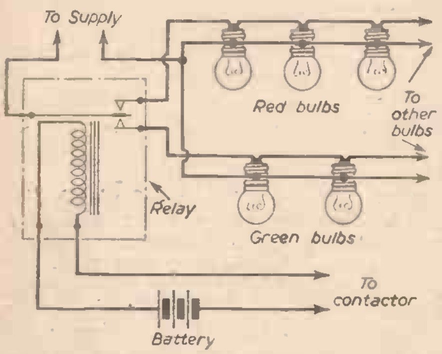


Fig. 1.—Relay circuit for changing colours.

A further advantage arises in using a relay, since the contacts can be used with higher currents and voltages than can the contacts in the clock itself. There is accordingly no need to keep the number of bulbs down.

The relay itself can be almost any small type, and will usually require to be operated from its own small dry battery. With the normal type of relay which has a resistance of about 100 to 500 ohms, a 1.5 to 6 volt dry battery is satisfactory. The current drain is small.

Powering the Bulbs

Fairly large dry batteries can be used with success for fairly short periods, with a limited number of bulbs. Here, .06 amp bulbs are most suitable. Ten or a dozen of these can be operated.

If more bulbs are required and no other source of power exists, a 6 or 12 volt accumulator may be pressed into service. Such an accumulator will run a large number of bulbs for many hours. The bulbs may be wired in parallel, or in series-parallel in twos or threes, to make up a suitable voltage. A number of 3.5 volt bulbs, wired in twos, could be used with a 6 volt accumulator, as example.

A small mains transformer forms the most suitable source of current, and is wired as illustrated in Fig. 2. A 6.3 volt receiver heater transformer would be suitable, or one may be to hand. The ordinary type of relay is not suitable for dealing with mains voltages, and it is for this purpose that a transformer is necessary. This also applies to the contacts in the clock itself. It should be noted that transformers may only be used with A.C. mains.

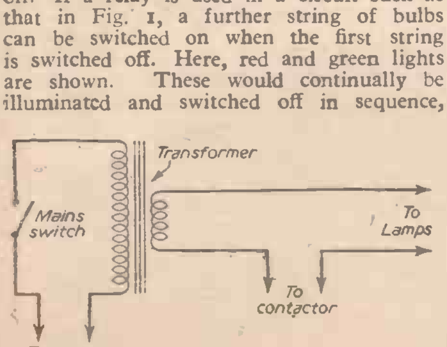


Fig. 2.—A simple circuit including transformer.

The Clockwork Mechanism

The unit mentioned already has contacts which open and close at short intervals, suitable for flashing lights. It is desirable to fit contacts which are operated at a longer interval, if only to enable more variety to be achieved, and this is easily done as in Fig. 3. A similar method could be employed with any clock.

The clock spring should be allowed to run down, and one end plate then removed. With the unit mentioned, a small cam can conveniently be fitted to the "seconds hand" spindle. This is done by drilling a hole in the paxolin which is a tight fit on the spindle, and pressing it into position. An ordinary clock could also be treated in this way.

If a flashing effect of higher frequency is required with the clock, a similar cam should be fitted to one of the axles which

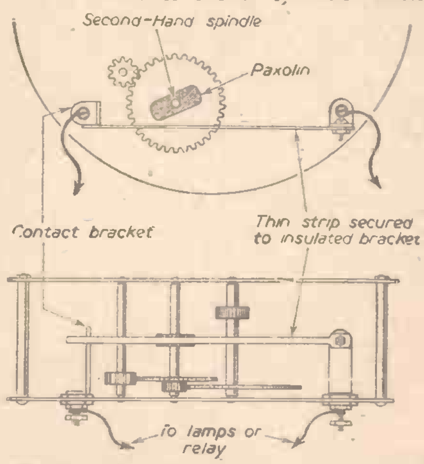


Fig. 3.—How the contacts are actuated.

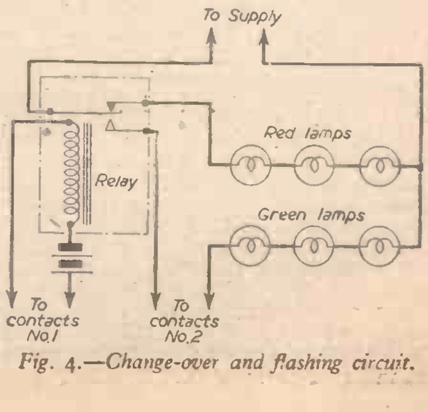


Fig. 4.—Change-over and flashing circuit.

rotate more rapidly. (With the Master Contactor Unit, this is not necessary.) The cams should be small (approx. $\frac{1}{4}$in. by $\frac{1}{8}$in.) and be filed smooth at the edges.

The contacts consist of springy strips of thin brass or similar material, each being screwed to a bracket which is insulated from the clock frame by fibre or other suitable washers. As the axle rotates, the strip is lifted clear of the contact bracket, as will become clear from Fig. 3. It is necessary to use a strip of thin material so that the mechanism is not halted.

A Change-over and Flashing Circuit

Many novel and attractive arrangements may be wired up when a number of contacts opening and closing at different speeds are present. In that shown in Fig. 4, contacts No. 1 open and close at approximately 15-second intervals, while contacts No. 2 open and close each second. Accordingly, the red lamps are on for 15 seconds, then replaced by the green lamps, which flash at second intervals until the red lamps are again illuminated, and so on. Other circuit arrangements can readily be devised.

Fig. 4 also shows the bulbs wired in series. When this is done, the operating voltage should be approximately the same as that obtained by adding together the voltage of all the bulbs in any one string. For example, ten to twelve 2.5 volt bulbs, in series, could be operated from a 25 volt transformer.

Flex Holder for Domestic Iron

This Device, Submitted by Mr. H. P. May, Won a Third Prize in Our Recent £200 Competition

THE purpose of the device shown in Fig. 1 is twofold. By virtue of its construction and operation it keeps the flex clear of the area of operation when ironing and thus prevents rucking of the material and ironing cloth by the flex. In addition, it holds the flex away from the table edge, thereby preventing chafing and consequent wear of the flex outer casing.

When in use it permits the free, unhampered use of the iron over the whole of the table area, following the movement of the iron in all directions, and gathering back the flex when the iron is returned to its stand position.

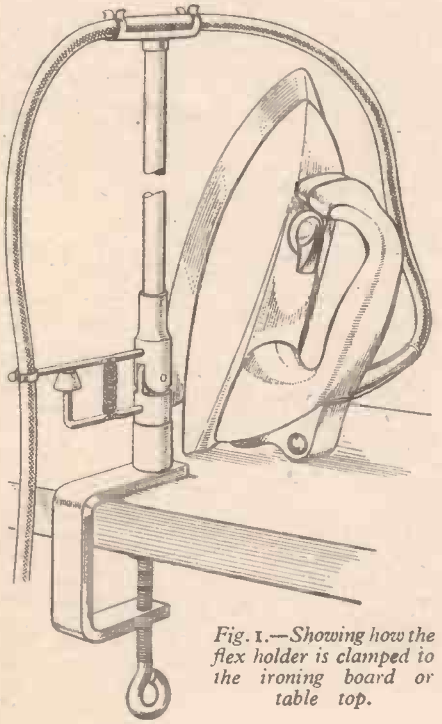


Fig. 1.—Showing how the flex holder is clamped to the ironing board or table top.

Construction

The device is simple in design and can be speedily attached to a table or ironing-board at any convenient point, operating equally well wherever fixed. It consists of a vertical rod or flex carrier with a double clip at its upper end in which the flex is held. The lower end of the rod is fitted into a socket on the main body of the attachment. The body itself is constructed in the form of a knuckle joint, which allows the rod to move forward as the iron flex is pulled. With the pull on the flex relaxed, a tension spring, fitted behind the body, restores the rod to its normal vertical position, further backward movement of the rod being prevented by a rubber buffer stop. The lower portion of the body terminates in a pointed spigot which fits loosely into a vertical hole drilled in a cylindrical-shaped base block, and permits the body to swivel about a vertical axis.

The combined functions of the spigot and the knuckle joint therefore ensure positive control of the flex at any position the iron may be in on the ironing-board or table.

The buffer bar, attached to the rear of the upper portion of the knuckle joint, is extended beyond the buffer rubber to terminate in a clip which thus holds the flex away from the table edge. The whole assembly is mounted on a simple, lightweight "G" clamp for fixing to the table, and if desired for the purpose of storage, by pulling the rod from its socket and lifting the body from the base block, can be reduced to three small, compact components. Further constructional details will be clear from the drawing, Fig. 2.

A prototype has already been constructed and is in constant use.

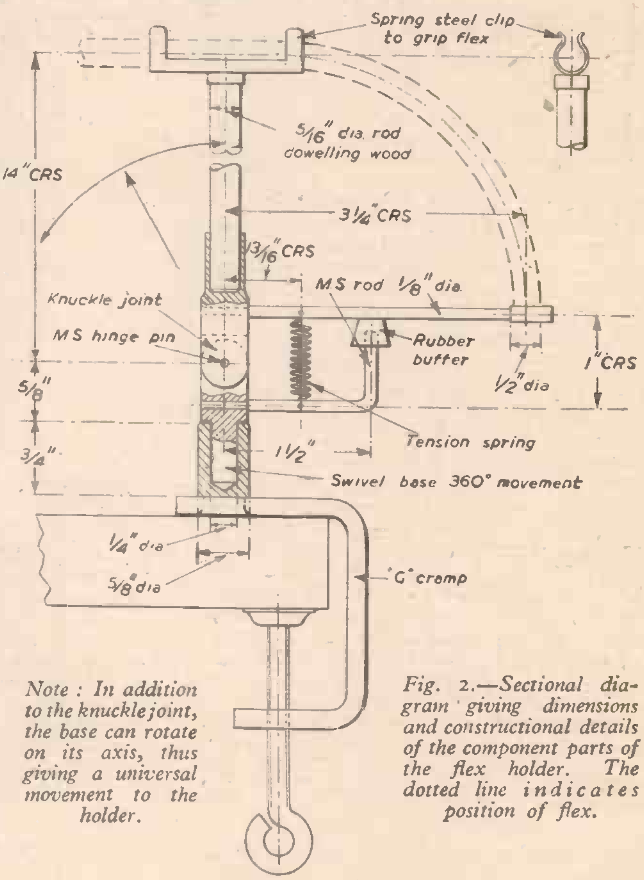


Fig. 2.—Sectional diagram giving dimensions and constructional details of the component parts of the flex holder. The dotted line indicates position of flex.

Metal Forming by Electro-deposition

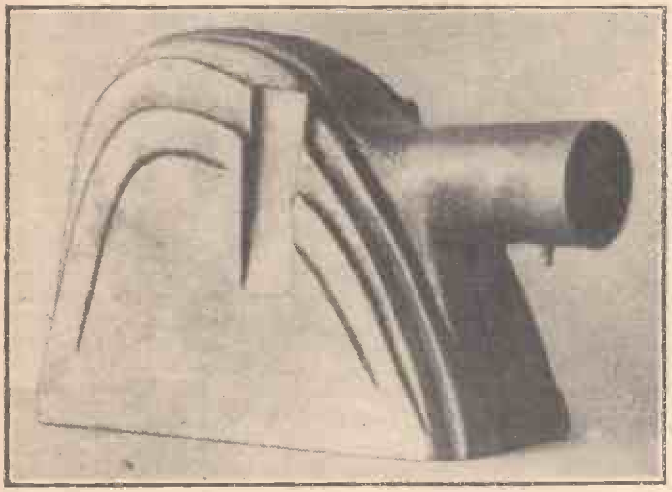


Fig. 1.—An electro-formed film-projector housing shown as removed from the plating bath. The former was made of paraffin wax, hand carved.

Forming Parts by Electroplating

By E. R. H.

READERS who prefer to construct their own enlargers, projectors and apparatus of all kinds, are often disappointed that they are unable to reproduce the rounded shapes and curves which add to the artistic appeal of the manufactured product. Model makers, too, have often to produce awkward shapes which are difficult to fabricate by the usual means. Electroforming is a process which enables these complicated shapes to be formed without the aid of expensive equipment, and it is one which can be carried out with the limited resources of the home constructor, and also has the advantage that it is inexpensive.

Principles of Electroforming

Briefly, the term electroforming describes a process whereby thick deposits of a metal are built up by electrodeposition. The process is not new, the basic principles having been used for many years in the production of gramophone records. It was not until the late war, however, that the process really came into being when it was used in forming complex wave guides for radar. Since then, the use of electroforming has greatly increased, especially in America, where the process is used not only for electroforming parts, but is frequently used in producing moulds for plastics, which play such a large part in the construction of the modern aircraft.

The process of electroforming requires the preparation of a master pattern having an external form similar to the internal shape of the required article. The pattern may be made of any suitable material, such as metal, wood, wax or plastics. The preparation of metal patterns is only justified where a large number of the same article is required. Also, the shape must be such that easy withdrawal from the master is possible. Obviously, an object having large undercuts cannot be produced from a metal former. This also applies to patterns of wood or plastic. Where the shape does not permit easy withdrawal of the finished article from its former, the pattern can be made of wax which may be easily melted out when the forming process is complete.

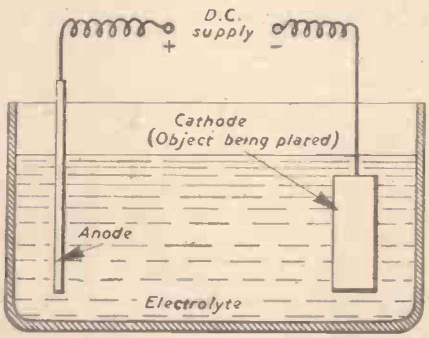


Fig. 3.—Diagram of connections to plating bath.

Producing the Master Pattern

Wax, then, is the most suitable material for making the master from the point of view of the amateur, as it can easily be worked and may be melted down and used again. Any type of wax would do, but the cheapest and most readily obtainable is ordinary paraffin wax. This should be shaped to the required form, which may be done with the aid of a knife or chisel. This was the method used in producing the master for the projector housing shown in Fig. 1.

Alternatively, the wax may be poured in a molten state into previously prepared plaster of paris moulds. This was how the spheres shown in Fig. 2 were produced. A rubber ball, having the required external diameter, was obtained and a female mould in two halves was made from this with plaster of paris. A hole was left to enable the wax to be poured in. Before doing this, the plaster mould was soaked in water until saturated. This prevented any tendency for the molten wax to soak into the plaster. When sufficient time had elapsed to enable the wax to solidify, the mould was separated and the wax spheres removed.

Treatment of the Master

When the master is completed, and in the required form, it is necessary to form a conducting coating on the surface before proceeding with the plating. This is, of course, not necessary where the master is of metal, but in this case to enable easy removal of the finished article the metal former is usually coated with a thin film of graphite. When the master is of wax or plastic (see Figs. 4 and 5), a conducting coating can be formed by several means, but the best way of doing this is by coating the surface with graphite. An easily obtainable graphite for this purpose is grate polish. The graphite should be applied all over the surface as evenly as possible, making sure that there are no missed patches. Where the master is of wax it may be difficult to wet the surface with the graphite. In this case the addition of a little wetting agent, such as photographers use, will enable this to be carried out with greater ease. In exceptional cases it may be necessary to coat the wax with spirit varnish such as shellac before applying the graphite. When the graphite is dry, an electrical connection has to be made

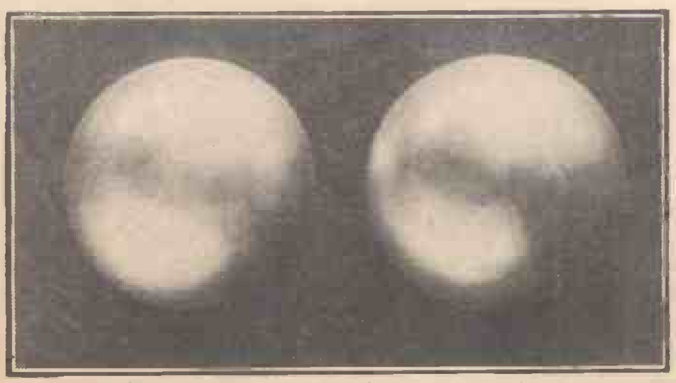


Fig. 2.—Copper spheres for high voltage measurements. Electroformed in copper on wax masters, produced in plaster of Paris moulds.

Fig. 4.—Stages in producing cups for viscosity measurements. From left to right : plastic former, electroformed shell, finished product.

to its surface. This should be carried out with copper wire preferably in a place where the wire marks will not show.

Electrodeposition

Metals are deposited by passing an electric current at low voltage through an electrolyte consisting of salts of the metal being plated. The positive side of the supply is connected to the anode which is usually, although not always, made of the metal being deposited ; the negative is connected to the work being plated, as shown in Fig. 3.

Practically all metals may be electrodeposited, but those used in electroforming are usually copper, nickel and iron Of these, copper is the most satisfactory for the home constructor, as a copper-plating bath is the simplest to make up, requires no attention, and the ingredients as well as being easily obtained are quite cheap. Copper, when deposited, is in a hard condition, and even in thin sections is quite rigid. It may, of course, be annealed by the usual means if so desired.

Composition of Bath

The composition of a copper bath used for electroforming is the same as that normally employed for plating metal objects. The following bath gives quite good results:—

Copper sulphate crystals, 24oz.

Pure concentrated sulphuric acid, 4 fluid ounces.

Water, 1 gallon.

Copper sulphate crystals may be obtained from most chemists and seedsmen under the name of Blue Vitrol. If concentrated sulphuric acid cannot be obtained, 10 fluid ounces of battery acid at a S.G. of 1.25 may be used instead. When made up, the solution should be filtered to remove particles of foreign matter which are usually present in ordinary commercial copper sulphate crystals.

Anodes

The anodes must be of copper and there should be at least two, one on either side of the object being formed. The metal may be in any shape or form, copper sheet, rod, bar, or even copper wire. A good plan is to mesh a basket with copper wire and place in it any pieces of scrap copper. The shape of the anodes is immaterial and the size is not important, but for the best results the anodes should have a surface area similar to the object being plated.

Containers

The copper-plating solution must be kept in non-metallic containers such as glass, earthenware, or may be plastic composition. Enamelled vessels may be used provided the enamelling is in perfect condition and not chipped in any way. It should be large enough to ensure that at least 6in. clearance exists between the object being plated and the anodes.

Current Supplies

The normal plating current for the type of copper bath described is 12 amps per sq. ft. of plated surface. At this current the copper is deposited at the rate of 0.0007in. per hour from which the time of plating to produce a given thickness of deposit may be calculated. Thus 1/32in. would require a plating time of 45 hours. The length of time is immaterial, however, as once started no attention has to be given to the process until the forming is complete.

The actual source of the D.C. supply depends largely on the facilities available in the constructor's workshop. The voltage required is only 1-2 volts, but this must be supplied for a lengthy period. Where the article to be formed is small, so that the current required is not great, this may be supplied from a battery charger. With larger articles, however, the current required may be greater than the capacity of the charger. In this case the plating current may either be reduced with a corresponding increase in plating time or it may be supplied from a car battery. In this case, it is suggested that one cell at a time be used, changing to the next when the first has discharged. With a copper-plating bath this interruption of the current does not matter—in fact, the article may be taken from the bath, inspected, and replaced without harm.

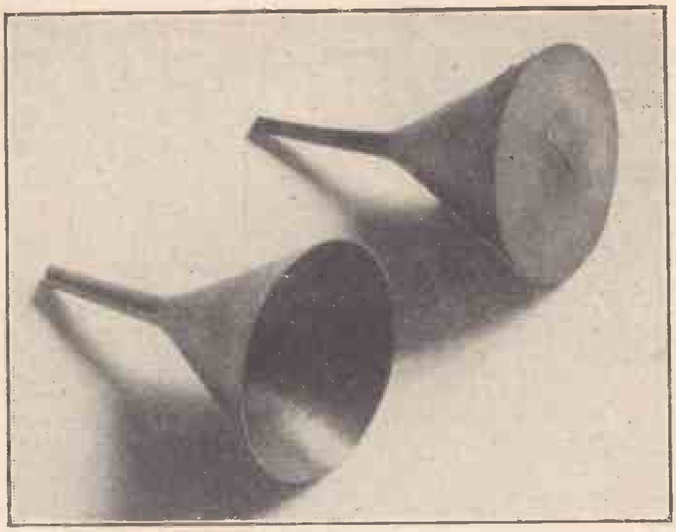


Fig. 5.—Copper funnel electroformed on plastic master shown above.

Electroplating Technique

When plating on graphite film it is necessary to slightly modify normal plating procedure. When plating a metal article, due to the fact that its resistance is low, immediate covering takes place when inserted in the plating bath. With graphite films, however, the resistance is comparatively high and immediate covering does not take place. The metal instead creeps slowly over the surface of the article from the point of contact. Where possible, a number of contact points should be used so as to reduce this time to a minimum. Once this initial coating is completed, and there are no missed patches, the plating may be safely left to continue for the required time.

When the desired thickness has been obtained the wax may be melted out and, after washing with white spirit or turpentine, the article is ready for painting, etc.

Canadian Mechanical Brain

Canada's first mechanical brain is nearing completion at the University of Toronto. Here, with a section representing about one-fiftieth of the thinking robot, is Dr. C. C. Gottlieb (left), director of the University Computation Centre, and Brian Pollard, chief engineer of the computing section of Ferranti's in England from where the machine was brought.

An example of German etching work. The glass mug illustrated is over 80 years old.

Methods Of Etching On Glass

What Glass Etching is and How to Carry it Out Safely

By "TECHNICUS"

THE etching of patterns on glass can provide a fascinating hobby, especially for those who have an artistic bent and are able to execute their own designs. Furthermore, there is nothing complicated about the job, but it is strongly emphasised that the liquids for etching are both dangerous to the skin and to the lungs. Adequate precautions must therefore be taken to avoid slopping the liquids about or against inhaling their vapours. Lock away your etching fluids as if they were as valuable—and dangerous—as radium, if you have children about. They are great experimenters and will try anything once.

Etching at home is no more dangerous than lighting fireworks on Guy Fawkes Day if you take the elementary precautions. If you know how to do something methodically and with common sense you will find glass etching interesting and, maybe, profitable.

The Nature of Glass

Glass is made from silica, a colourless crystalline material which is abundant in nature, known as quartz. There are many varieties of silica, usually coloured with impurities, sand being one form. When fused with potassium or sodium carbonate and lime, silica forms what we know as glass, a colourless material, when free from colouring impurities. Glass is, in effect, a mixture of potassium and sodium silicates. When it contains a maximum amount of sodium silicate, or, to be exact, of soda-lime silicate, the glass is of the soft variety; that is to say, it melts at a lower temperature than the harder variety which results from a high potassium-lime silicate.

When the glass is composed mainly of silica it has a high fusing temperature and a low coefficient of expansion. Pyrex, Monax and the well-known Phoenix glassware are examples of high silica content materials. They are heat-resisting and because of their low coefficient of expansion do not crack like ordinary glass when brought from a high temperature to a low one.

Because glass looks crystalline, especially when fractured, there is a widespread notion that it is crystalline, but the material is amorphous; that is to say, there is no apparent regularity of atomic structure, as in real crystal. This is an important point, for this amorphous state accounts for some of the properties of glass. Unlike most materials in nature, the surface of glass is, for all practical purposes, smooth and free from porosity. That is why it can be used to hold gases and most liquids, which can neither penetrate the surface nor react with the atoms of silica. The inertness of glass is so obvious, indeed, that one need hardly mention the fact; but it is not completely inert, which leads us to the subject of etching.

There is a sister element to silicon called fluorine, which is one of the very few substances that will attack the former. Fluorine is an element, and when combined with hydrogen forms hydrofluoric acid. It is this hydrofluoric acid which forms the basis for etching fluids. For those who like their explanations in chemical terms, the action of hydrofluoric acid on glass can be expressed thus:

$$\underset{\text{(Glass)}}{SiO_2} + \underset{\text{(Hydrofluoric acid)}}{2H_2F_2} = \underset{\text{(Silicon fluoride)}}{SiF_4} + \underset{\text{(Water)}}{2H_2O}$$

$$SiF_4 + H_2F_2 = \underset{\text{(hydrofluosilicic acid)}}{H_2SiF_6}$$

Hydrofluosilicic acid is a soluble substance which can be washed off the glass surface, taking with it glass in combined form. Hence the etching action.

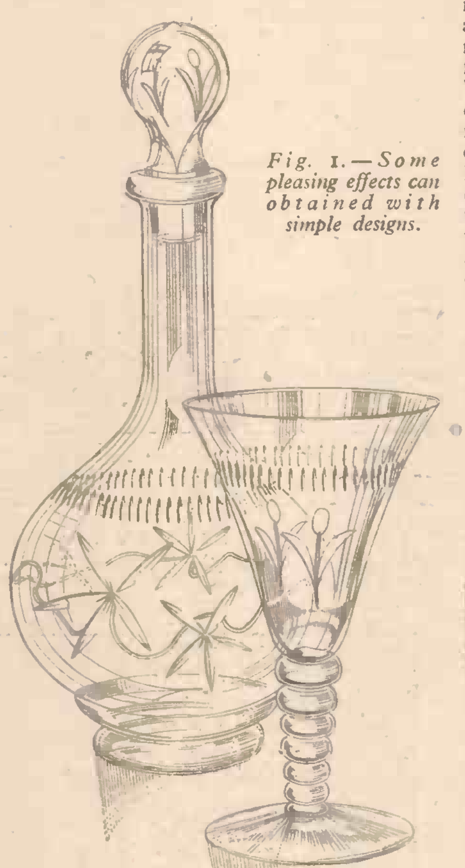


Fig. 1.—Some pleasing effects can obtained with simple designs.

Practice

As liquids containing hydrofluoric acid will attack any glass surface with which they come into contact, it is necessary to mask those areas which are not to be etched. The glass is first of all covered with a thin layer of a wax or acid-resisting composition called the "resist." There are two ways of applying the resist to the glass: painting on or by printing. As the amateur will be concerned mainly with the application by painting, the following composition is given as a suitable resist:

Ingredients	Parts: Thin Paint	Parts: Thick Paint
Asphalt	500	500
Tallow	100	—
Resin	200	300
Turpentine (venetian)	200	100
Turpentine (rectified)	1,200	800
Beeswax	—	150

The solid ingredients are mixed together and melted, carefully, for they are inflammable, during which the turpentine is added slowly, until a homogeneous liquid is obtained. This is then cooled and stored in a suitable container, like varnish. To apply it to the glass a soft brush of good quality is used, care being taken to see that no hairs are left on the glass.

For shallow etching, a coating of beeswax in turpentine or white spirit, or hot wax alone, will sometimes suffice, but this does not offer the same adherence and strength for scribing as the composition given above. When the coating is quite dry and hard the design is scribed out, so that the glass underneath is exposed. Ensure that no small bits of resist are left in the scribed marks. The latter should be quite clean and have a well-defined edge. Good advice to the beginner who has never attempted this thing before is to keep your designs simple, at least when you are beginning. Too much etching on a glass can be as lacking in taste as a lurid-coloured wallpaper or picture.

Etching Solutions

The composition of the solution will vary to a certain extent, according to the type of glass, but those given below will generally cover all glasses met with in everyday life. Here are two which should deal effectively with soda-lime glass, the commonest of all, and with lead glass used for table-ware. The lead content of the latter, incidentally, gives the glass its lustre, making it popular for cut glassware.

	Soda-Lime Glass	Lead Glass
Hydrofluoric acid (concentrated)	1 part	1 part
Water	4-5 parts	3-10 parts
Nitric acid (technical)	Nil	1 part

The above solutions are for bath treatment and the glass to be etched is lowered into the bath. During etching it is advisable to keep the liquid stirred gently, so that the reaction products are carried away from the etched area. If this is not done, etching may be uneven. As to the time required for the glass to be in the bath, it is perhaps best to decide this by trial with an experimental piece of the glass to be etched. The depth of etch and the type of glass will, of course, determine the time, which can usually be reckoned in minutes.

The above procedure will generally yield a clear etch, but if a matt etch is required a fluoride should be added to the etching liquid. The following is one mixture which can be used:

Hydrofluoric acid	2 parts
Ammonium fluoride	5 parts
Water	5 parts

When the glass is removed from the bath and washed with water, a precaution which must be adopted after all etching operations, it will be found that a coarse matt etch has been obtained in a few minutes. Such an etch can be as attractive as the smooth type of etch and resembles sandblasted cuts.

Stamp Etching

One can, as it were, print a design on to glass, instead of scribing the design. An ordinary rubber stamp can be employed, the stamp carrying the design required. The etching ink is poured on to an inking pad and then transferred to the rubber stamp as would an ordinary ink. The following is one composition for such an etching ink :

Ammonium fluoride, 5 parts.
Sulphuric acid (concentrated), ½ part.
Gelatinous silica, sufficient to form paste.

The gelatinous silica is formed when some sulphuric acid is stirred carefully into water-glass. The resulting etching paste formed from the above is then stamped on to the glass to be etched and left to stand for 24 hours in a warm atmosphere, after which it is washed with water. Some artistic results can be obtained by this method, which lends itself to the treatment of many items.

Needle Etching

Mention has been made above of an adherent resist, but for many types of work simpler materials can be employed, as, for example, beeswax, resin, or pitch, these being melted and the glass dipped into the molten substance. When the coating has hardened the glass is placed on a revolving table, held in a chuck, and a square-tipped needle held against the glass, so that the coating is removed in a particular design. It is not necessary to have a mechanical table, and provided the glass article is held firmly a good design can be executed, the glass being turned by hand as required.

The above etching fluids can be applied with a brush, if a light etch is desired, or the article is immersed for 10 minutes or longer if a deep etch is required.

Plate Etching

This form of etching is recommended for the advanced student only. It can yield lovely results, especially if the etcher is an artist, although it is also a laborious technique. The design to be transferred to glass is put on to a steel plate by conventional photo-engraving methods and the metal between the proud surface of the plate is acid-etched to a depth of about 1 millimetre. After this a layer of resist is applied to the plate, which has been warmed to permit spreading. By working over the plate with a straight-edged tool, surplus resist is scraped off, to leave a flat surface, on to which is pressed thin tissue

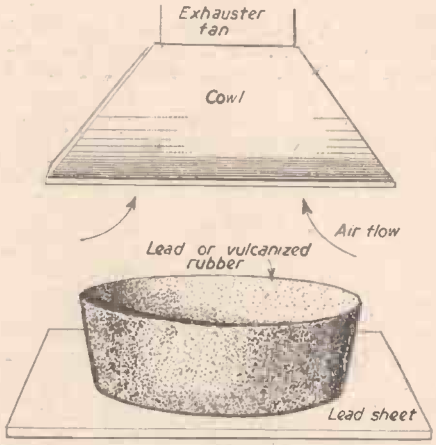


Fig. 2.—Simple equipment for etching. The fan can be replaced with a chimney stove pipe if the up-draught is sufficiently strong.

paper, care being taken to see that the whole sheet adheres at all points to the resist. If now the paper is stripped off carefully it will bring the resist with it, the latter carrying the imprint of the design on the plate.

The layer of resist, backed with paper, is laid on to the glass on which the design is to be etched, again making sure that it lies against the whole surface of the glass. By working over the resist gently with cotton-wool wetted with water or alcohol, the tissue paper can be removed. There is left the resist carrying the design, and etching is carried out after covering the rest of the glass with hot resist by means of a brush.

Precautions

Hydrofluoric and nitric acids are highly corrosive on the skin and also harmful when breathed in, so that the etcher must take adequate precautions. Rubber gloves should be worn, and work carried out either in a good draught or under a cowl which is exhausted with an electric fan or a chimney of good height. As hydrofluoric acid corrodes most metals it must be kept in a gutta percha bottle with a tight stopper. Lead is also resistant to the acid, so that one can use a bowl of that metal or of vulcanised rubber for carrying out the etching operation.

As shown in the diagram, Fig. 2, it is suggested that the bowl for etching is stood upon a sheet of lead, just in case some of the acid drips over the edge. After all etching operations the glass should be washed thoroughly with warm water to remove traces of hydrofluoric acid.

Some Applications for Etching

As the time of etching varies from about one minute to 10 minutes or more, it is as well to try out specimen pieces of glass in the made-up acid, noting the depth of etch in various times. Window-pane glass lends itself to treatment, being flat, and if the article or sheet is too big for a bath of etching fluid a paste of acid and barium sulphate can be brushed on to the areas not covered by the resist. Glasses can be marked with graduations or designs. Glass plates can be made to receive, for example, animals in outline, and as one becomes adept at etching, various depths of etch can be achieved in the same area by successive etching.

For occasional use an etching ink can be prepared by mixing four ounces of ammonium fluoride with 12 ounces of barium sulphate (precipitated), to which is added 15 ounces of water. This is kept in a stoppered bottle until required, when an equal part of the solution is added to concentrated sulphuric acid, the latter liberating hydrofluoric acid.

Bristol Helicopter in New Rôle

A BRISTOL Type 171 helicopter undertook a new and vitally important rôle in the Bristol district recently, when directors and executives of the Bristol Waterworks Company flew over the area in the aircraft to make a rapid and up-to-the-minute survey of work in progress under their current development programme.

The helicopter made two flights from Filton, each lasting rather less than an hour and covering some 70 miles over Filton, Knowle, Barrow, Chew Stoke, Bishop Sutton, Blagdon, Portishead, Redcliffe Bay and Shirehampton.

Among those on board when the aircraft took off from Filton for its first flight were Mr. C. Cyril Clarke (deputy chairman), Sir Robert Sinclair (director) and Mr. R. W. Melvin (general manager). On landing, Mr. Clarke said : "We were away for only an hour on a journey which would have taken us days by road. We had a splendid view of work in progress—it was like having a map at our feet—and the flight will provide information of great value to our technical experts. Part of the area would have been difficult to inspect on foot."

In all parts of the area the directors saw below them a scene of considerable activity. At Chew Stoke work is in progress on a £1,500,000 reservoir scheme which will be one of the largest in the country. It will contain some 4,500 million gallons of water with a surface area of 1,200 acres, and will supply Bath, South Gloucestershire and North Somerset, including Weston-super-Mare.

The flights are considered particularly significant in that they may foreshadow widespread use of helicopters for this kind of work within a few years' time. The illustration shows a view of the Blagdon reservoir as seen through the side window of the Bristol Type 171 helicopter.

A Wheatstone Bridge Testing Instrument

Constructional Details of a Slide-wire Unit

(*Concluded from page 72, November issue.*)

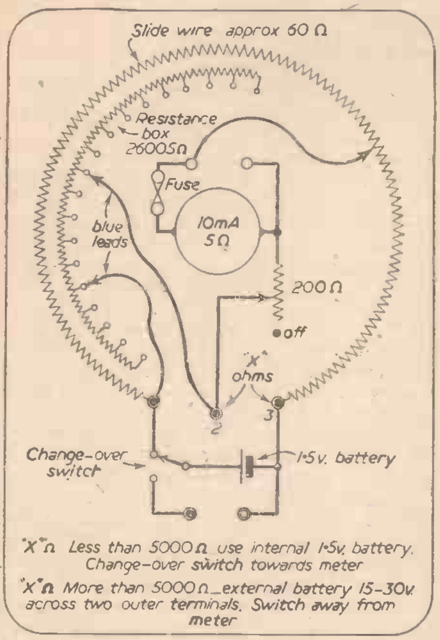


Fig. 8.—Circuit diagram which is stuck on back of lead box.

WITH unknown resistances up to the value of about 5,000 ohms the 1.5-volt internal battery will give adequate deflections. Where the unknown is much more than this figure, then an external battery of greater EMF should be used. In this case throw the battery switch over *away* from the meter and connect the battery across the *right and left black terminals.* Fig. 8 shows the circuit diagram drawn on a card which is attached to the back of the lead box.

Always commence the test with the rheostat at the "off" position. The value of the unknown in this test will be the value of resistance included in the resistance-arm *multiplied or divided* by the *ratio read off at the position of the slider.* The ratio can be read off directly from the figures shown and the increase or decrease depends upon the position of balance whether in the *right- or left-hand halves* of the slide-wire. Multiplication and division signs are shown.

(2) *To compare two resistances.*

Disconnect the resistance-box. Connect one resistance *between the left-hand and centre black terminals;* connect the other resistance *between the right-hand and the centre black terminals.* The position of balance gives the ratio between the two resistances under test. In this case *the left-hand resistance* is replacing the resistance box and the given ratio is in respect of the *left-hand resistance.* As a check upon the result, the two resistances can be reversed (interchanging left and right), and the position of balance should now be at the corresponding ratio on the opposite half of the slide-wire.

(3) *Loop Tests.*

A demonstration set-up can be made to illustrate the location of a fault in a run of cable which has failed to earth (Fig. 9). Two conductors, one good and the other faulty, are connected together at the far end and the two near ends are connected to the outer black terminals on the instrument. An earth fault is simulated on one conductor by "earthing it" with the aid of a metal spike solidly stuck in the ground and connected by a wire to the position of the supposed fault. The resistance-box arm is left disconnected, the slider is plunged into the *red* socket and the centre black terminal is solidly connected to earth by a spike stuck into the ground near the instrument position.

When a balance is obtained, the ratio shown represents the fractions of the total length of cable—lead and return included on each side of the fault. One length is the whole of the good conductor plus part of the faulty one and the other length is the remaining part of the faulty conductor. If both good and faulty conductors are of equal size and length then the balance gives the proportions into which *twice* the length of *run* must be divided in order to determine the position of the fault. This method is only an approximation to the correct Murray loop test. It will be noticed that in the foregoing arrangement the circuit through the meter was completed via the ground. Errors are liable to be serious. In the Murray loop test, however, it is the battery that has its circuit completed through the ground. In this case the galvanometer is connected direct across the slide-wire ends.

If this is to be shown on the present instrument some modification must be made to the connections.

Murray Loop Test

Connect the *left-hand blue lead* direct into the *red meter socket.* The other blue lead is not used. Connect the *centre black terminal* to the *right hand black terminal* by a short length of wire. Connect the two near ends of the conductors under test to the outer black terminals as was done in the previous case.

The slider is now connected to an external battery (Fig. 10), and the other battery terminal is solidly connected, via the ground spike, to earth. A balance is now taken by moving the slider round the slide-wire and having reached a balance, the calculation is made in a similar manner to that in the previous case.

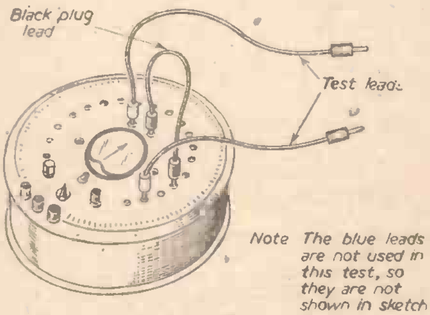


Fig. 11.—Using the instrument as a D.C. voltmeter.

A fair approximation should be obtained by this test as compared with the result got by direct measurement with a tape measure.

Used as a Voltmeter

The internal resistance of the meter used is 5 ohms, and a full scale deflection is given

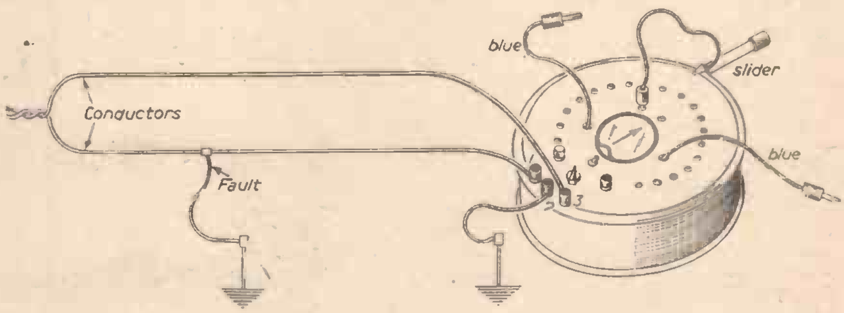


Fig. 9.—Set-up for loop test experiment.

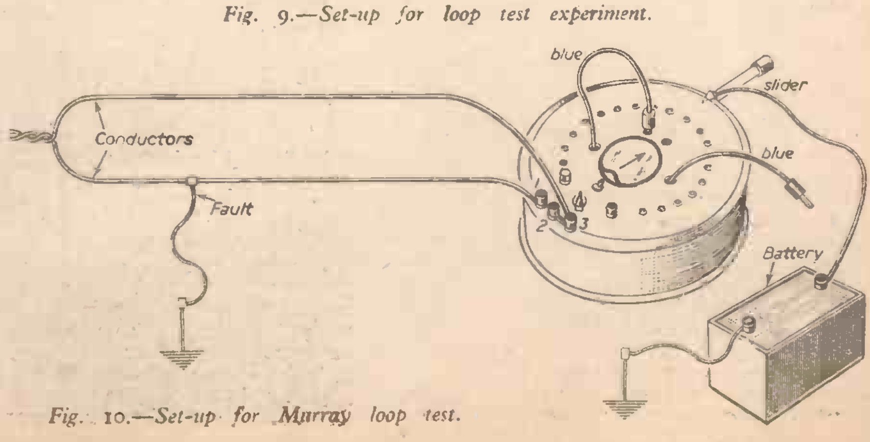


Fig. 10.—Set-up for Murray loop test.

by 1/20 volt across the meter terminals.

This gives a sensitivity of 100 ohms per volt. If, therefore, a swamping resistance be added of 95 ohms, a full scale deflection of 1 volt would be obtained. There is no provision for 95 ohms in the resistance box used, and the nearest value is 100 ohms—5 ohms too high. If this be used as the swamp, the meter will read low on the one volt range. For higher ranges, the error becomes less and for *ranges above* 10 *volts can be disregarded.*

Insert a *black lead* (Fig. 11) in the *black meter socket* and the other end of the black lead in any one of the sockets on the resistance box. Insert one testing lead in the *red terminal socket* of the meter and the second testing lead in any one of the available sockets of the resistance box. The value of the swamping resistance in use is the sum of all the resistances included between the two leads plugged into the resistance box arm. Each 100 ohms represents an increment of one volt to the full scale reading of the meter.

Select, for preference, multiples of 100 ohms which will give easy values to the divisions on the meter scale. Thus 1,000 ohms for 10 volts, 20,000 ohms for a full scale reading of 200 volts, etc.

Note:—A swamp value of 5 ohms inserted in the meter circuit will give a full scale deflection of 1/10 *volt without error* due to the value of the swamp.

Used as an Ammeter

If suitable shunts are made up and connected direct across the meter socket terminals and test leads taken from either end, the meter can be used to read higher values of *current.*

Making a Garden Pool

Preparing the Site, Arranging the Formwork and Mixing the Concrete

By W. P. MATTHEW

THE construction of a garden pool is one of the most satisfying of the major jobs to be undertaken in a garden, and it is a comparatively simple one, too. It does, however, call for a little planning before work is commenced.

To begin with, is the pool to be a formal one of regular shape, or an informal one which simulates as far as possible a miniature natural pond? The answer is that it must agree in character with the nature and planning of the garden, or that part of the garden of which it is to form a feature. A garden of a regular outline defined by walls or trimly-clipped hedges needs a formal pool; one in which there are a number of trees and in which large areas are left under rough grass would make a framework for an informal pool. Generally speaking, the smaller the garden the more suitable is the formal pool. Only the garden owner will be able to assess the suitability of either type.

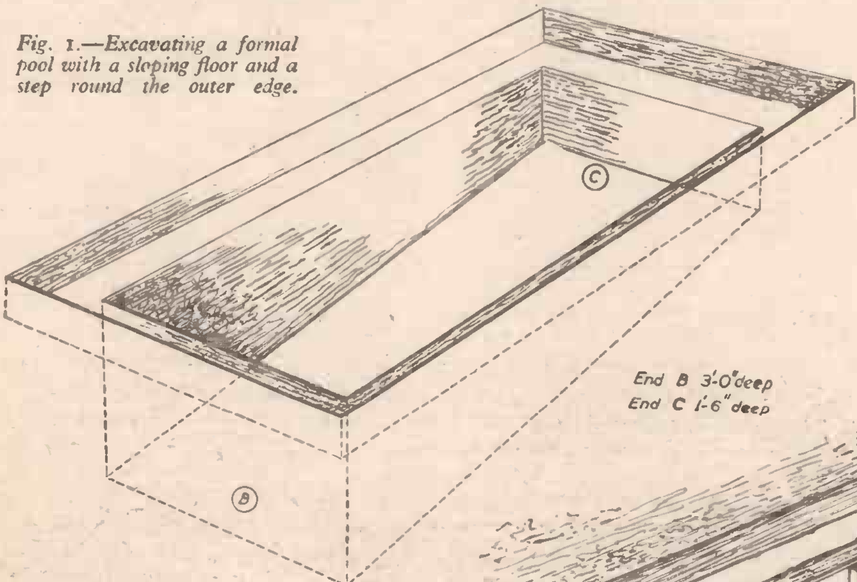


Fig. 1.—Excavating a formal pool with a sloping floor and a step round the outer edge.

Making a Formal Pool

The site having been chosen, the ground is excavated to a depth and width that will allow for a wall and floor thickness of six inches. Therefore the excavation will be 6in. deeper and 1ft. wider than the internal dimensions of the finished pool.

It is best, especially if fish are to be kept, to make provision for varying depths of water. In the breeding season the fry will thrive in water of a depth of 4in. to 6in. In the hot summer days the fish will seek the deeper parts of the pool.

The shallowest levels are best arranged by providing a sort of step round the outer edge of the pool, as is seen in Fig. 1, and the floor of the pool may slope from a depth of 1ft. 6in. to a depth of 3ft.

The floor is formed first, pegs being driven into the ground at suitable intervals to indicate the finished level of the floor. These pegs are removed as the concreting proceeds.

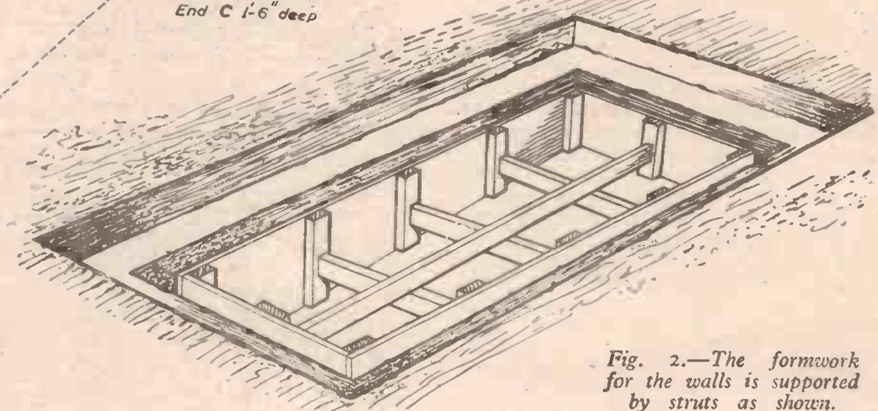


Fig. 2.—The formwork for the walls is supported by struts as shown.

Concrete Mix

The concrete mix for this kind of work is the "One-two-three mix," which consists of one part cement, two parts sand and three parts shingle; or, alternatively, if you have difficulty in obtaining shingle, one part cement to four parts mixed ballast. Remove from the ballast the few stones there may be which are more than 2in. in diameter.

Mix the concrete on clean boards or a swept, paved area, laying out the shingle and sand or the ballast in a flat heap and then spreading the cement evenly over it. The whole heap is then turned over with a shovel until it is thoroughly mixed. Water is added from a watering can with a rose nozzle, stopping frequently to turn over the mix. This continues until all the materials are thoroughly incorporated. The concrete should be of a consistency which will hold its shape when squeezed in the hand and will become damp on the surface without actually dripping. It must be placed within half an hour of being mixed and roughly levelled with the flat of the shovel. The outer 6in. at the edge of the floor concrete should be left rough, indeed, if necessary, roughened, so that the wall concrete will form a good bond.

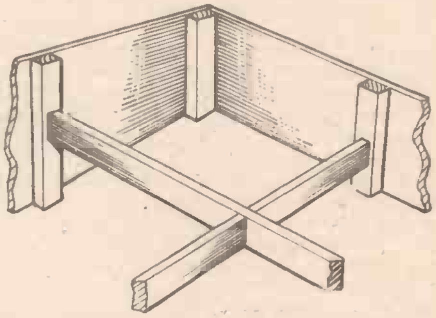


Fig. 3.—Alternative method of fixing the cross struts.

In three or four days the floor will be sufficiently hard to walk on and the framework for the walls may be erected. This is made out of 1in.-thick boards, strongly nailed to braces of 2in. x 3in. timber at intervals of about 2ft. It is set up 6in. from the sides of the excavation and firmly strutted in place. Lengths of old quartering bought at the local secondhand yard do very well for the strutting, and usually 4in. x 2in. wood is stout enough for the purpose, although it must be remembered when fixing the struts that they will have to resist a considerable pressure.

If the pool is not a large one, the struts may be arranged to cross the width and length and be secured to the 3in. x 2in. braces of the formwork, as shown in Fig. 2. Where the pool is too long for this the lengthwise struts may be cut in their length and fitted tightly between the cross struts, as shown in Fig. 3.

Before final placing, the inside of the formwork should be coated with either oil or whitewash to prevent the concrete from adhering to it. Just before filling in the walls, the bottom of the space between the forms should be coated with grout. This is a mixture of equal parts of cement and sand mixed with water to a thick cream, and it ensures perfect adhesion and a complete bond between the wall and floor concrete. These precautions are necessary to prevent leakages at this point.

Forming the Walls

The wall concrete is placed in layers, working all round the formwork. It will be found convenient to pour it from a bucket, working along each side and end. After completing each circuit of the pool take a length of timber and consolidate the concrete by vigorous poking up and down. The formwork should be carefully removed after four or five days and the pool half-filled with water. This will prevent the concrete from drying out too rapidly. There may be a considerable drop in the water level at this stage, because a fair amount of water will be absorbed by the concrete, and also losses by evaporation must be taken into account if the weather is hot.

The edges of the pool are best laid in precast concrete slabs made as described in the last article, and it is best to allow the slabs to project over the side of the pool to hide any irregularities in the walls (Fig. 4). Alternatively the walls may be built up for a few inches with thin slabs and the whole surmounted by a coping, as shown in Fig. 5.

Before plants are introduced into the pool it should be treated in the following manner. Fill it and then add potassium permanganate crystals until the water is a deep pink, and then leave it for ten days. It is then emptied and the process repeated. At the end of the second ten days it is emptied and then finally filled. Obtain reliable advice before planting with aquatic plants and stocking with fish, to avoid losses and disappointment.

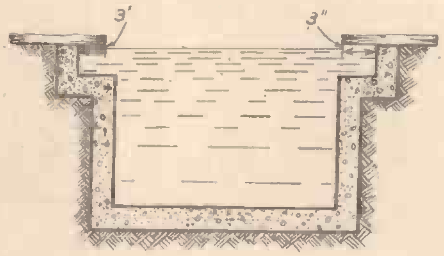


Fig. 4.—Using concrete slabs to cover the edges of the pool walls.

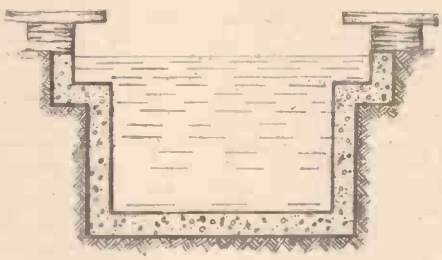


Fig. 5.—Method of arranging dwarf walls surmounted by projecting coping slabs.

The Informal Pool

The informal pool is made irregular both in plan and depth. In section the hole should be saucer shaped, with the same flat sloping sides as has a saucer. The bottom is left irregular—in fact fish will appreciate one or two quite deep holes. These, too, will make convenient planting places for plants such as water lilies.

No formwork is required for the informal pool and the concrete is mixed in the proportion of one part cement to three parts sand. This is merely spread over the excavation with a trowel to a depth of about 3in. It is kept from drying out too quickly by frequent sprinkling with water, or by covering with wet sacks. After two or three days it may be filled with water. It will, of course, need the same treatment as the formal pool before planting and stocking.

Using Rocks and Boulders

The edges of the informal pool may be defined by rocks and boulders between which may be set moisture-loving plants. These rocks are easily made out of concrete. An irregular hole is dug in firm soil, in size and shape equal to those of the rock required. The bottom and sides of the hole are then thickly sprinkled with sand, brick dust or similar material to give the surface of the rock colour and texture. Concrete is then mixed in the proportion of one part cement to four parts sand, mixed with water to a stiff consistency, and placed in the hole. Take a number of old tins, jam jars, etc., and thrust them into the centre of the concrete. This gives both lightness and economy of concrete. Place more concrete on top and sprinkle with sand. Leave the rock to harden for four or five days according to the weather and then remove the soil around it and lift it out.

Coloured Concrete

Rocks and boulders made in this way may also be made of coloured concrete and used to form rockeries or to support shelving banks in the garden.

Items of Interest

Record-breaking Canberra

THE Canberra jet bomber recently made history by crossing the Atlantic twice in one day. The starting and finishing point was the Royal Air Force station at Aldergrove, in County Antrim, Northern Ireland. The Canberra's flying time was 7 hours 59 minutes, an average speed of 531 miles an hour. To Gander (Newfoundland) and back from Aldergrove the distance is 4,144 miles. It is interesting to note that preparations are going forward for the production of Canberras at the Belfast factory of Short Brothers and Harland Ltd.

New Dutch 'Plane

ACCORDING to a recent report from Holland the Fokker Aircraft factories hope to start production soon of a twin-engined turbo-prop commercial 'plane, to succeed the Douglas Dakota.

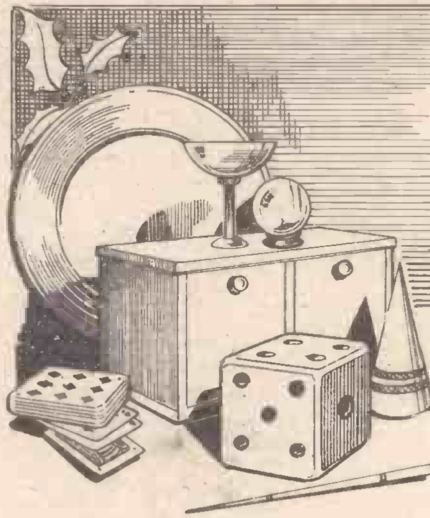
The new aeroplane will have Rolls-Royce Dart turbo-prop engines and carry 28 passengers at a cruising speed of 250 miles per hour.

Australian Blast Furnace

A NEW blast furnace capable of handling 1,500 tons of pig-iron daily, and ranking among the biggest production units in the world, is now operating at Port Kembla.

Gloster Javelin Delta Fighter

The Gloster GA5 all-weather delta fighter which has been designed for speed, high altitude flying, rapid climbing and manoeuvrability. The machine was seen at the S.B.A.C. Air Display, at Farnborough.



Magic Ch

Some Simple Illusions and Hints on

By "PRESTI

THERE is an old saying that "There is nothing new under the sun," and this applies as much to magic as to anything else. Basically, all magical effects may be brought down to the fundamental of the apparent disappearance of an object, and its reappearance unexpectedly. Even the popular illusion of "sawing a woman in half" consists in the main of the apparent disappearance of the woman after she is placed in a box, the passing of a saw through it merely being an added operation, the woman eventually reappearing in the box. If these facts are borne in mind it is possible for the would-be magician to produce endless effects which may be termed "original," using merely the basis of old effects and dressing them up.

Dice Box

As an instance, take the popular dice box, which is used as a "catch" illusion, either to get an audience in a good frame of mind, or for children. For those who do not know the effect it may be explained as consisting of a box made up in dimensions of two cubes side by side. Doors are fitted at the front and rear and a dice is produced which just fits into either compartment. This is placed into one compartment, the doors closed, and the box visibly tipped. A "thud" is heard as the dice apparently slides from one side to the other and a request is soon forthcoming to "Open the

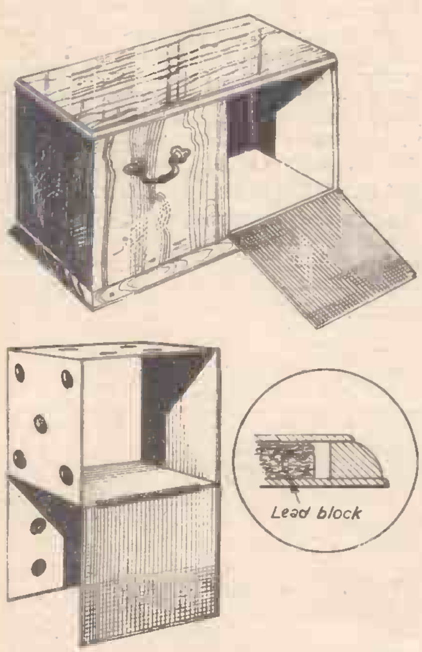


Fig. 1.—The sliding dice box, which lends itself admirably to modernisation. See Fig. 2.

other side." The box is tipped in the opposite direction and the "upper" door opened. Nothing can be seen, of course, and the door is closed, the box tipped in the opposite direction and the other door opened. This is kept up whilst the audience shout at the magician, until all four doors are finally opened to show the box "empty." In this trick the dice is a shell with a hinged front and back, and by tipping it appropriately the front or back opens, with the doors of the box giving the effect of an empty box. The trick is sometimes combined with another cylindrical box into which the dice may be made to appear or from which it may vanish. The noise of the apparent sliding compartment is obtained by a piece of lead sliding inside the lid of the box, which is hollow. This basic effect lends itself admirably to adaptation, a form which I used myself for a long time, having a drop-down floor to one section of the box, and it was used in conjunction with a projecting bag at the rear of the conjuring table. In place of the dice an egg was used, and it could be made to appear in either side of the box (in this case a sliding compartment with no bottom being fitted), and eventually it disappeared in the action of placing the box on the table; the falling bottom permitting the egg to drop on to the projecting tray. Made on a large scale, this could be used to cause the disappearance of a portable radio set, the latter being made as a hollow shell, with the dials and control knob painted on the front, and a real set at the side of the "stage" could be switched on by a confederate when the imitation set is apparently switched on, and at the appropriate moment the set could be switched off to simulate the apparent vanishment of the set in the box. Opening the doors, with the hinged front, as in the dice effect just mentioned, would show the set apparently gone. The radio would preferably be made in sheet tin to avoid the thickness of the sides of wood being seen, and the front and back should be hinged with cloth hinges so that they will fall down flat with the front and back of the cabinet, as shown in Fig. 2.

Production Effect

At a Christmas party the production of sweets or small gifts is an essential wherever children are present, and one of the simplest production effects to make up is illustrated in Fig. 3. A wooden box is made without a top or front. The size will depend upon the type of production which is required. A front for the box is made from thin ply or hardboard and a cut-out with some suitable pattern—a question mark, lightning flash, etc., is made to occupy as large an area as possible. In the centre of the box a tapered cylindrical box is fixed. This may be made from stout cardboard or tinplate and is tapered only very slightly towards the top. The *inside* of the box and the *outer* surface of the cylinder are painted with camera black, or covered with black velvet. A second cylinder is then made which will fit snugly over the cylinder in the box and a few inches taller than the box. The outside of this is covered with fancy paper or painted with gold paint, so that it will show up clearly when placed inside the square box. The cylinder in the square box is loaded with the gifts or sweets and a thin, elastic-mouthed black cap put over the top. The box may then be picked up and turned upside down and shown all round, the inner cylinder being indistinguishable from the inside of the box, and it thus appears empty. The hand may be placed behind the cut-out front and moved about to give the appearance of showing the box empty. The cylinder is then picked up and shown end on to prove that it also is empty, and it is then placed down into the centre of the square box, fitting over the inner tapered cylinder. The hands may then be placed inside the cylinder, the elastic-mouthed cap removed, and the goods produced as required.

Electrical Effects

There are several effects which can be carried out by means of electricity, although in these enlightened days nothing "mystic" can ordinarily be applied to some every-day experiences. However, with a little ingenuity it is possible to fool the knowing ones. For instance, an electric light bulb which lights with no apparent connection will arouse interest and may be included as

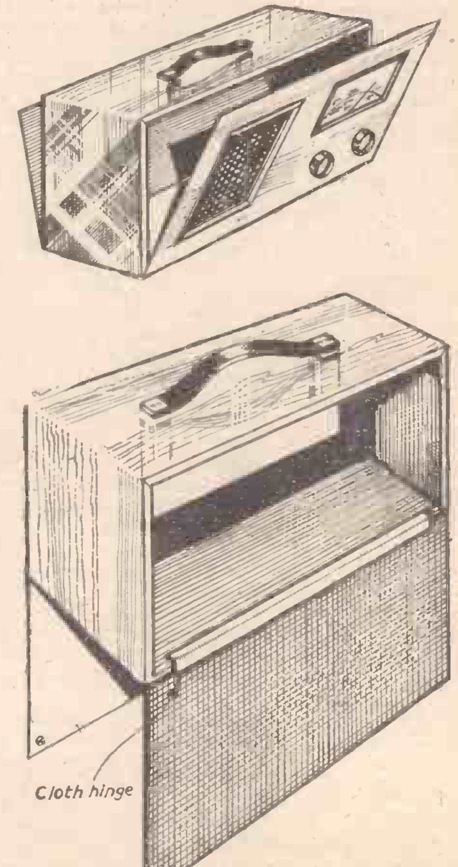


Fig. 2.—The vanishing radio set—a modern version of the dice box.

Inventing Your Own Magical Effects

IGITATEUR"

a magical effect with suitable patter. A sheet of glass about 14in. by 10in. is shown and stood upright in a clip mounted on a small pedestal. To the top another clip is affixed carrying a small motor-car lamp holder. A bulb is inserted in the holder and immediately lights up. The stand may be made or adapted from a child's skittle, but should have a flat, circular top about 3ins. in diameter. Through the skittle two insulated wires are passed, ordinary silk-covered 30 s.w.g. will be satisfactory. At the underside of the foot the ends of the wires are terminated with two soldered washers, and the spacing should be set so that two similarly spaced washers may be affixed to the table top from where they are taken to a battery fitted to the under side of the table top. A curved piece of stout wire should be fitted to the table top and adjusted so that the foot of the small pedestal may be placed without apparent effect against the curved wire and the washers on pedestal

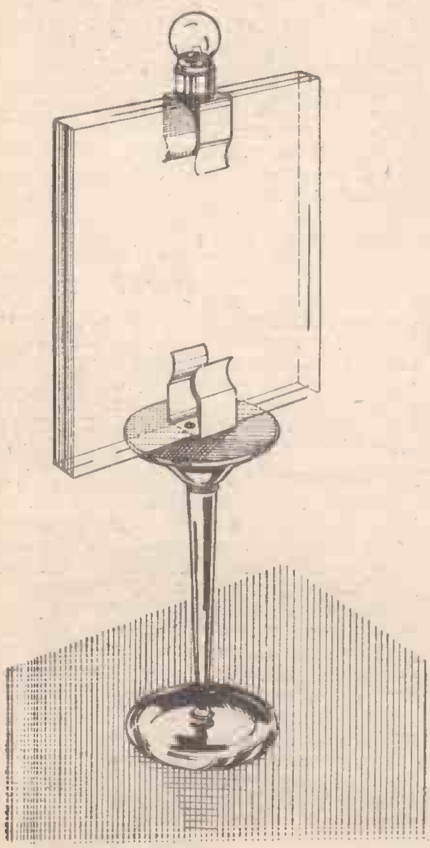


Fig. 4.—The magic lamp—a modern Christmas idea.

and table-top accurately registered against each other. A meter attached to the two projecting wires will enable the exact position to be found and the wire shaped so that the pedestal may be placed into position accurately every time.

At the pedestal top a brass clip about 1in. wide and just over 2in. high is fixed, the gauge of brass being such that it will hold the glass plate upright. Four holes are drilled in the bottom of the clip, those marked A and B being sufficiently far apart to permit the glass sheet to go between them, and round-headed screws should be used so that the glass will always go between them. The wires are terminated inside holes C and D. Now round the edge of the glass attach some bare copper wire, again of 30 s.w.g., using a cellulose cement for fixing purposes. If carried out carefully this will be invisible from all angles. At the lower edge a gap of $\frac{3}{4}$in. is left and at the upper edge the ends are terminated with small blobs of solder. They must be very small in order not to show. A metal clip is then made similar to that at the bottom, but a bulb-holder is soldered to the end of it, with a strip of thin paxolin between the two, and two wires are fed from the contacts of the lamp-holder down through the paxolin sheet and terminated similarly in two small solder blobs. The finished clip should be tested with a battery and meter and there should be no leakage between the wires and the holder. These instructions are for a bulb and holder of the two-contact type. If, of course, a single-contact bulb is employed, only one lead will be required, the return circuit being via the metal clip. It will now be seen that if the glass sheet is inserted into the lower clip and properly positioned, the two wire ends will contact the two ends of the leads coming up from the pedestal foot. When the upper clip is placed over the top edge of the glass the wire ends will again make contact and complete the circuit, and if the bulb is then inserted it will light up. The battery underneath the table may, of course, be switched on and off by a confederate with a length of thread attached to a suitable spring contact. In place of the thin wire round the edge of the glass a strip of aluminium foil may be used, and this should be cut exactly the same width as the thickness of the glass, and after attachment with cellulose or similar cement it should be polished, when it will bear inspection at fairly close quarters. No solder would be necessary at the ends if foil is used. No attempt should, of course, be made to adapt this idea to the use of mains lamps or to use mains power as it would be highly dangerous.

A Simple Rising Card

Finally, a simple way of performing the rising card trick may be mentioned. Two playing-cards are taken and a $1\frac{1}{2}$in. to 2in. length of thin elastic or rubber band is stuck to the centre of the back of one and to the centre of the front of the other. A good cellulose cement should be used. The two prepared cards are placed in the centre of the rest of the pack and they may be

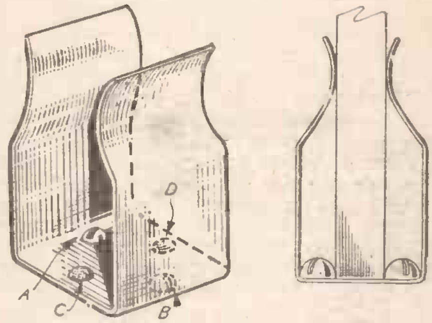


Fig. 5.—How to make the glass clip for Fig. 4. C and D are soldered ends of the contacting wires.

shuffled and generally handled as a normal pack of cards. A card is chosen by one of the audience and the rest of the cards are fanned out (backs uppermost) whilst the chosen card is being examined, and the fan is carefully held with the prepared cards "split" to form an opening in the centre of the fan. Carried out carefully the elastic should not be seen. The fan is held out and the chosen card inserted at the opening, the pack closed and gripped and the chosen card pushed down level with the rest of the pack. Squared up and held tightly, with the thumb at the back and the fingers at the front, the pack presents a normal appearance, but, as the pressure of the fingers is gradually released, the chosen card will slowly rise from the pack.

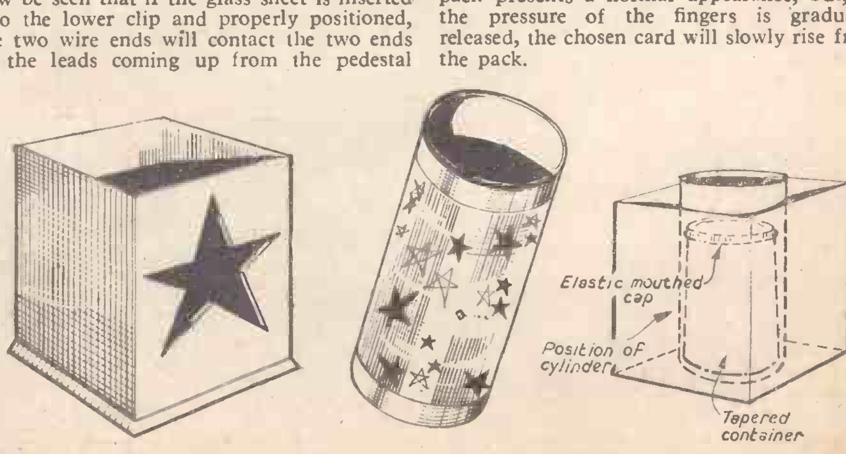


Fig. 3.—A production idea which is simple to make and operate.

Sun Spots and You

How They are Caused and Their Effects on the Earth's Inhabitants

By Prof. A. M. LOW

THE flying saucers which many people claim they have seen may be due to "spots before their eyes," but sun spots are real enough and have now been observed for many years. These observations suggest that the spots, really gigantic tornadoes perhaps 50,000 miles across, come and go with a periodic rhythm. There may be sun spots in any year, but the spots are more numerous, and perhaps bigger, in some years than in others. The intervals between the period of maximum sun spot activity appears to be about eleven years, and hence we talk about the sun spot cycle.

To the naked eye looking through smoked glass for protection, a sun spot appears only as an insignificant dark mark on the face of the sun. It is in fact probably larger than the earth, a sort of continuously exploding H-bomb representing activity and energy that make the atom bomb like a pop-gun. It is fortunate that the activity is taking place 93,000,000 miles away or the effects on the earth would be very great. As it is, a period of great sun spot activity is extremely bad for radio and television and may interrupt long-distance radio-communication altogether for hours and even days together. The visible effects of sun spot activity on the earth may be unusually brilliant displays of the "northern lights," signs of violent magnetic storms.

Sun spots are a nuisance to radio engineers, but do they have an effect on the earth more important than the spoiling of wireless reception? There are people who believe that sun spots profoundly influence every sort of human activity, either directly or indirectly. The speculation has been so extensive that it is difficult to separate the facts for which there is some evidence over a long period and the speculations which are logical or plausible, but are not firmly established by independent evidence. The subject is a fascinating one and as evidence is gathered over the course of decades the people to-day who suggest that sun spots virtually control the destiny of the world may be less foolish than they seem.

Affecting Weather Conditions

Sun spots could affect the earth and its inhabitants in a number of ways. We do not really understand how "weather" originates. We can forecast the way cyclones and anticyclones develop, but know little of their time and origin. There is some evidence that they originate far up in the earth's atmosphere and if this is the case they may depend on magnetic forces, the disturbance of which by sun spots is firmly established. In a nutshell, sun spots may cause great variations in the amount of rainfall, cloud and sunshine. Working on this thesis many scientists have produced evidence that the sun spot cycle coincides with the rainfall cycle. They have shown over a course of years, for instance, that the rise and fall in the level of Lake Victoria Nyanza can be correlated with sun spot activity. The variations of plant growth in many different places have also been stated to coincide with variations in sun spot activity.

Enthusiastic statisticians have proved that sun spots both increase and decrease the birth rate, improve and ruin the crops, cause both war and peace and generally control the moon and ourselves. It seems unlikely that these tidal waves of flames and vaporised elements in the sun are so potent after all.

Variations in rainfall, surface temperature (averaging about one degree less during periods of sun spot activity) and cloudiness can have far-reaching effects on all kinds of activities and, therefore, sun spots may, indirectly, affect human beings. For instance, some years ago an expert in Ceylon said that he had found a correlation between sun spot cycles and epidemics of malaria. Sun spots produce conditions favourable to the breeding of the malarial mosquito. Malaria saps the energy and health of hundreds of millions in the East and, therefore, there may be a cycle of activity and prosperity based on the sun spot cycle.

Certainly these weather conditions affect the breeding and migration of animals and naturalists have traced all types of cycle in this connection which might be attributed to conditions resulting from sun spot activity. They have measured the numbers of rabbits in given areas, the number of fur-bearing animals trapped, the catches of salmon and many other tests of activity amongst animals and have built up examples showing there are cycles which, if they do not coincide exactly with the sun spot cycle, are dependent upon it.

Photograph of the great sun spot group taken by the Mount Wilson Observatory.

Ultra-violet Radiation

Others argue that sun spot activity means very much more than mere difference in the weather. Sun spots cause variations in the amount of ultra-violet and other radiation reaching the surface of the earth. These variations have been examined spectroscopically, and may have a far greater effect than is generally believed. We know the relationship of sunshine with rickets, that fruit can be ripened more quickly under ultra-violet rays and that the quality of food, as distinct from the quantity, is affected by sunshine. Now it is argued that the effect of variations in the amount of radiation must have far-reaching effects on the quality of crops of every kind even more important than on the quantity. It is suggested that these variations cause changes in the moods and temperaments of human beings, difficult to trace in a single person, perhaps, but confirmed by past events.

1870 (the Franco-Prussian War), 1892 (beginning of a world slump), 1903 (Russo-Japanese War), and other dates allowing maximum sun spot activity are quoted in support of this theory. It is interesting to note that a book, published in 1937, said, almost unbelievingly, that if we considered sun spots as a cause of wars, then we must expect trouble in the latter half of 1939!

Others have gone further and have offered detailed statistics to prove that sun spot activity produces more trouble from the incidence of appendicitis to the number of suicides. The basis is that meteorological disturbances, in the widest sense, put an increased strain on the human body, which is reflected in an increase in the mortality and disease rate. This, it is said, does not mean that death and disease rates reach a "peak" every 11¼ years, but rather that improvements are temporarily checked. And, of course, the invention of a drug such as pencillin might well produce good effects far outweighing the harmful influence of sun spot activity. It is the many factors involved that make it difficult to produce really acceptable scientific evidence. Mere coincidence is not sufficient proof. We must have evidence that the effect not only coincides with the cause, but that it cannot be attributed to any other cause.

Psychological Aspect

Some scientists have endeavoured to establish some relationship between business cycles and sun spot activity. Their argument is that economics prosperity is ultimately dependent upon crops of many different kinds and might be therefore expected to wax and wane in sympathy with sun spots. There is also a psychological aspect—sunshine makes men cheerful and optimistic, dull days and a "heavy electrically" charged atmosphere depresses them and influences their business decisions.

Statistics have been produced to show the world's major trade depressions in the past coinciding with the sun spot cycle. Unfortunately there are one or two awkward "slumps" and "booms" that do not fit neatly into the picture and most people will accept the conclusions with great reserve.

SMALL ELECTRIC FURNACES

By A. H. AVERY, A.M.I.E.E.

Every Fitting Bench Should Have a Small Furnace of its Own, Ready for Instant Use, Similar to Those Described in the Article

THE employment of large electric furnaces in the iron and steel industry is well known and plays an ever-increasing part at the present time in our production of munitions. As a supplement or even a rival to the more or less familiar gas and oil-fired furnaces used by tool-makers and many other mechanical trades the small electric furnace is now becoming much more popular than formerly. Even in the smallest establishments more and more uses for this handy and reliable source of heat production is beginning to find favour, as well as in the amateur workshop. Its simplicity, flexibility and freedom from fire risks makes a strong

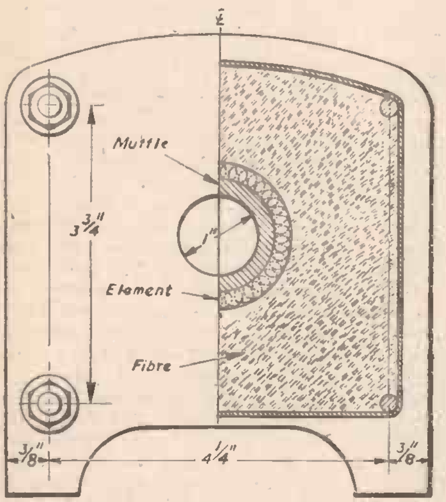


Fig. 1.—An end elevation in part section of a 200-watt electric furnace.

appeal, and although its first cost may be slightly higher as compared with coal gas and blowpipe methods, it has everything else in its favour, particularly on the point of certainty of results, since temperatures can be controlled to a nicety and regulated to any predetermined degree.

Hardening Tools

The application of the small electric furnace to a variety of different industries is almost unlimited, now that public electric supply is available so universally, but the one purpose for which it is pre-eminently fitted, namely hardening, annealing, or tempering small tools is alone sufficient to commend it to the attention of all engineering and practical mechanics for the variety of repair jobs which are sure to arise in their daily work. Turners, fitters, and tool-makers all know the need for the quick-repair of "casualities" that occur, even in the most careful hands, such as drills, taps, lathe tools, screwdrivers, etc. An urgent job often gets held up inconveniently awaiting the issue of replacements from the stores, many of which are a quite unnecessary expense when the breakages could be reconditioned so easily on the spot.

Materials

At a moderate cost it is within the ability of any mechanic to build up a perfectly serviceable electric furnace of sufficient size to deal with the heat treatment of either carbon or high-speed steels up to ¾in. diameter rounds, or ½in. squares. The necessary material used in its construction is tabulated in the following list:

2 pieces of "Sindanyo" electric arc and heat-resisting board, ⅝in. thick for the ends.
1 piece sheet iron 22 S.W.G. for the body.
4 lengths of ¼in. diameter bright round mild steel for bolting up studs.
8 hexagon nuts and washers for ¼in. studs.
1 fireclay former or muffle, as used in 500-watt electric bowl fires, with 1in. central hole 3in. long, grooved externally to receive the resistor winding.
60ft. of No. 32 S.W.G. nickel-chrome 80/20 per cent. wire for the spiral heating element or resistor.
1 3-terminal china connector, 5 amp size.
4ft. of 3-core 23/.0076 "Varnoflex" flexible for external connection to plug point.
2lb. of "Newtempheit" fibre for heat insulation or lagging.
1lb. "Tringle V" No. 29 Alumina cement for covering the resistance spiral when wound.
1lb. "Pyruma" putty for sealing any apertures not wanted.

The above materials are suitable for furnaces where the maximum temperature required does not exceed 850 or 900 deg. C. such as required for hardening carbon steels. But if special high-speed steels are likely to be dealth with, the heat treatment is on a higher scale needing a more refractory type of muffle and resistor winding. In such cases the specification for the muffle is "Sillimanite," a highly resistant form of Alumina, while the use of "Kanthal" wire is necessary in place of 80/20 per cent. nickel-chrome. Temperatures up to 1,200 deg. C. can then be obtained with safety.

Arrangement of Parts

A general idea of the construction and arrangement of parts is given in Figs. 1 and 2, representing end and side elevations of the furnace in part section. The Sindanyo asbestos cement compound used for the ends will no doubt be familiar to many as a favourite material for small switchboard panels, in place of the enamelled slate and marble formerly in vogue. It is a material quite easy to drill, can be cut to shape with a hacksaw, filed and turned, and is very resistant to high temperatures. The sheet-iron body has an overlapping seam at the bottom, where it is riveted or spot-welded according to facilities at hand. The long bolts nutted and washered at either end call for no comment, the dimension being taken from the drawing. The holes in the end frames drilled to receive them are marked out in such position as to locate the sheet-iron body against which the end frames butt.

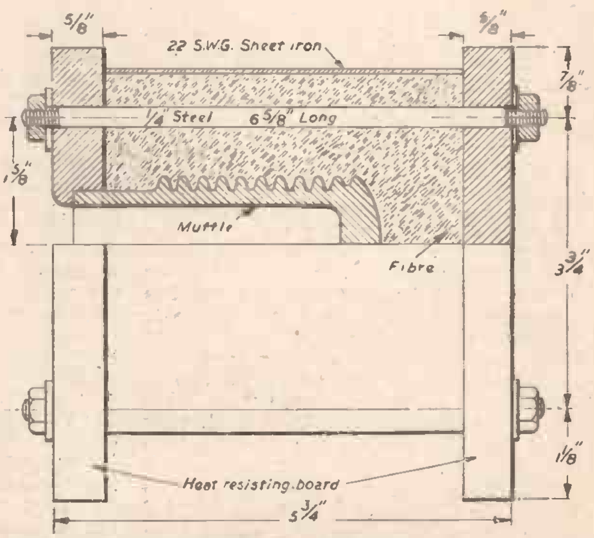


Fig. 2.—A side elevation in part section of a 200-watt electric furnace.

So far the work is of a very simple character. The part requiring considerable care is the preparation of the wire spiral or "resistor" which forms the heating element, and lies embedded in the grooves on the exterior of the muffle. The gauge and length of wire used for this depends, of course, upon the voltage of the circuit upon which it will be used. In the majority of cases this will lie somewhere within the limits of 200 and 250 volts, and separate specifications to cover this range are given below. In practice it is found that with heat insulation of the thickness and material here adopted a final temperature of 850 to 900 deg. C. results with a loading of 180 to 200 watts on the resistor coil. This is the equivalent of a current consumption between 0.78 and 0.87 amperes on the standard 230 volt service. The final temperature of embedded conductors is a very difficult matter, either to calculate or to estimate, as in the furnace the radiation of heat is determined by the immediate environment and the nature of the lagging employed. The figures recommended above, however, have been obtained from actual extensive running tests, and can be relied upon. The results, too, will be unaffected by the nature of the current, the windings being "universal" in the sense of being equally suitable for either alternating or direct current service, provided the voltage is similar.

Heating Coil

The special alloy of nickel and chrome used for the heating coil contains 80 per cent. of nickel and 20 per cent. of chromium which resists to a high degree oxidisation and scaling at high temperatures. Like most other resistance materials it possesses a positive temperature co-efficient, the resistance for a given length increasing as the temperature rises, so that allowance for this feature has to be made in the calculations of length required to result in a definite loading in watts. Unfortunately, this rise in resistance is not constant for equal increments of heat, but follows a rather erratic course which is indicated by the curve plotted out in Fig. 3. Here the percentage increase in resistance between temperatures of 20 and 1,000 deg. C. is shown. To apply the curve in practice the cold resistance is first obtained from makers' tables for the wire in use, and this figure added to by the appropriate percentage-increase as set out in the curve, for the final working temperature. For example, to find the resistance of 50ft. of No. 19 S.W.G. 80/20 per cent. nickel-chrome at a temperature of 900 deg. C. first ascertain the resistance per ft. cold (i.e., at 20 deg. C.) from tables, and multiply by the length in feet. Thus, No. 19 S.W.G. has a cold resistance of 0.387 ohms per foot, so that 50ft. would have a resistance of 0.387 x 50 = 19.35 ohms at 20 deg. C. Reference to the chart in Fig. 3 now shows that there is an increase in resistance of 4.15 per cent. at 900 deg. C., thus the original value of 19.35 ohms when cold becomes 20.15 ohms when heated to 900 deg. C. since:

$$19.35 + \frac{19.35 \times 4.15}{100} = 20.15 \text{ ohms}$$

Any other gauges or temperatures can be dealt with, of course, in the same way making the necessary correction with the aid of the percentage increase in resistance shown by the above curve.

Fireclay Muffle

The form of fireclay muffle employed in this furnace has an external groove or thread to receive the spiral heating coil. This coil is close-wound on a mandrel consisting of an 18in. length of No. 12 S.W.G. silver steel wire, the overall length of the spiral being determined by the voltage of the circuit it is used upon. For circuits of 200 to 210 volts the overall length required is 14⅝in.; for 220 to 230 volts 16in. long; and for 240 to 250 volts 17⅜in. long. In each case the gauge of the resistance wire is the same, namely, No. 32 S.W.G. nickel-chrome—known in the trade as "Brightray." When "Kanthal" wire is used for the higher temperatures one gauge larger will be called for, namely, No. 31 S.W.G. Winding this spiral is not a difficult matter when due precautions are taken. The wire is extremely hard and springy, so that it will need winding under considerable and constant tension, and above all it must be free from any kinks or other defects. If the tension is varied during the winding the turns of the spiral will not be all of the same diameter, so that the safest plan is to make a spring tension-head through which the wire passes on its way to the mandrel. Usually the winding is done in a lathe, and when the coil has been completed the two ends on either side of the cut portion must be held firmly, or a tangle will result when the wire is divided. Holding the coil on the mandrel at the free end, allow it to revolve slowly until it has relieved its own tendency to unwind, after which it is slipped off the mandrel with care, so that the turns are not distorted. It is next pulled out by stretching the ends apart until about 3ft. long, ready to wind in the grooves on the muffle. The end-to-end length of the groove is rather more than 3ft., so the coils will be still under a slight end tension when they are laid down, which ensures their even and close contact with the muffle.

Anchoring the Spiral

Provision has now to be made for anchoring the ends of the spiral. Twist up a couple of nickel-chrome wires of the same gauge into two pigtails about a foot long, and secure them with one turn round each end of the muffle to make the leads in and out. Straighten out a foot or so of the heating spiral at each end, and, giving one of these a few turns round the twisted pigtail to anchor it, lay the spiral heating element carefully in the grooves with even tension, so that individual turns all lie the same distance apart. The finishing end of the spiral is then anchored to the other twisted lead in the same manner as at the start. Each double lead with the straightened end of the spiral attached to it should then form a 3-strand connection for attachment ultimately to the china connector and flexible lead-in wire. Be particularly careful to keep the individual turns of wire in the heating spiral as evenly spaced as possible, otherwise those closest together will get hotter than the others.

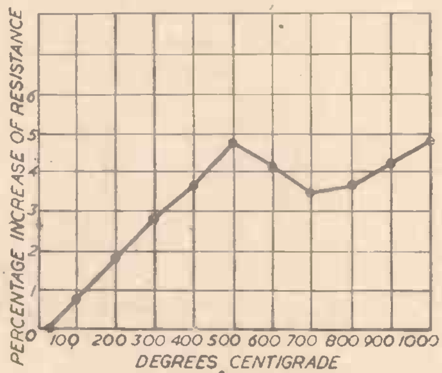


Fig. 3.—Curve relating temperature to percentage increase of resistance for 80/20 per cent. nickel-chrome alloy.

Cement Coating

Two good coats of the Alumina cement are then to be given to the whole of the exterior, after previously closing any holes in the fireclay former with Pyruma putty. The cement coating is necessary to prevent the lagging from coming into actual contact with the hot resistance wire, which might otherwise fuse it or set up chemical action. Mix the dry cement powder into a thin paste with clean cold water, and work it well in between the spirals with a brush until the whole is thoroughly covered. It should stand in a warm place for a day or two and can then be finally dried out by passing current through the winding itself until a red heat is reached. The 3-strand leads coming from each end of the winding are further protected by stringing over them "Fishspine" or "Ballsok" insulating beads to the point where their ends are finally twisted up with the copper flexible from the outer circuit, the junctions being pinched by the screws of the china connector. The joint is made just inside the rear end cover through which the outer connection passes to the plug point. Varnoflex or asbestos-covered heat-resisting flex is better to use for this purpose than rubber insulated flex as it will be subject to a certain amount of heat. Either 2-core or 3-core flex can be used, the latter being necessary if Home Office requirements are complied with; in the latter case the third strand is attached to the iron body of the furnace by a small screw and nut.

For the lagging between muffle and outer body there is choice of several materials, all of which are serviceable to a certain point. The risk of fusion at high temperatures must be guarded against, however, and the electrical insulating properties of some are not too good. The material recommended here, known as "Newtempheit" appears to be as satisfactory as any and better than most. No chemical corrosion has been noticeable upon the wire resistor windings, a point which needs carefully guarding against, hence the cement covering to the spiral as an additional precaution. To apply the lagging mount the front end frame flat on a bench, having previously inserted the four long studs and placed the metal body over them. The open end of the muffle, with its resistor winding, is then socketed into its recess, the bead-insulated leads being brought up along the sides next to the metal body, as far away from the muffle as possible. The lagging can then be dropped into the casing a little at a time and pressed firmly down without disturbing the position of the muffle or the bolts. When the casing is nearly full, cut the excess from the leads and joint them to the outer flexible by twisting tightly together. The pinch screws in the china connector will then make a firm joint. Finish packing with lagging until level with the end of the metal body, thread the rear end plate over the studs, and pull the whole firmly together with the end nuts. A standard 2-pin or 3-pin 5-ampere plug enables connection to be made between the furnace and the service by an appropriate wall socket. Even a lampholder adapter may be used if preferred, as the current is so small, amounting to little more than the requirements of three ordinary 60-watt lamps.

In Use

For the first time or two when put into use there may be a slight amount of moisture ooze from the interior, as the lagging is slightly hygroscopic. This, however, soon dries out and gives no trouble in practice. Remember when using the furnace, that time must be allowed for it to acquire its full heat, as the temperature rises gradually from the moment when it is first switched in, until a point is reached where loss of heat by radiation balances gain of heat from the coil. In a furnace of this size full heat is usually reached in 20 to 25 minutes from first switching in, after which tools of ¼in. diameter will take only about three minutes to bring up to hardening temperature, or five to six minutes for tools ½in. square.

In carrying out repairs to carbon-steel tools, such as ordinary taps, drills, or other sundries the steel must be first softened to a degree enabling it to be easily shaped up. It is placed, therefore, in the muffle when fully hot and current switched off and left until cold. The gradual cooling-down which then takes place slowly and steadily, while protected from draughts of cold air by the closed end of the muffle, ensures the steel being reduced to its softest possible condition. After the necessary work has been carried out on it the furnace is again heated up to a bright cherry red, the tool inserted until the same colour is reached, removed and immediately plunged vertically into clean cold water. The condition of the steel should then be glass hard, but too brittle for use, and to give it the necessary strength the temper must be drawn to a point suited to the duty it is intended for. This temper, that is ultimate hardness, will be indicated by the colour of the oxide film formed on the surface of a portion that has been prepared by removing scale etc., until the bright metal is exposed. Clean one side of the tool, therefore, with perfectly dry emery paper, free from any trace of oil, and do not even finger the brightened portion or the colour effects will be obscured. After this brightening, the tool is then inserted into the cold furnace, and current switched on, watching closely for the first appearance of any colour effects. In a few minutes a pale yellow colour will appear, followed progressively by dark straw, red, dark blue, light blue, and finally white. The colours will be an indication of the hardness and, therefore, the suitability of the tool for the work it is to perform, yellow being the hardest, and blue the softest.

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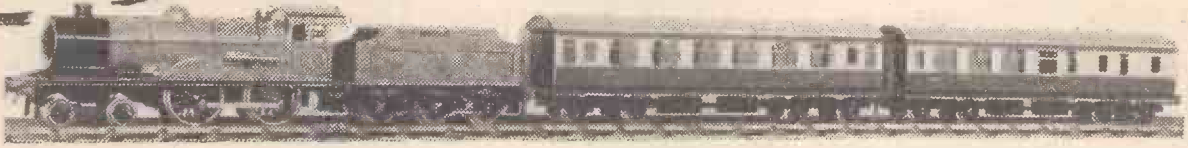

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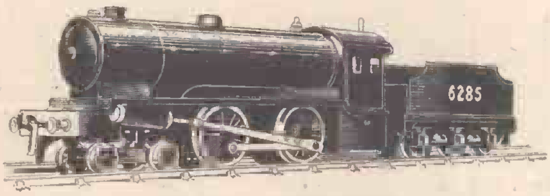

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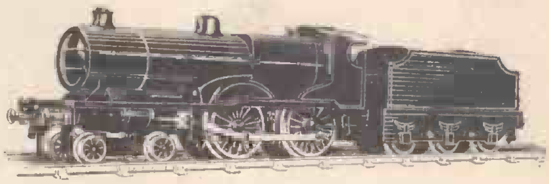

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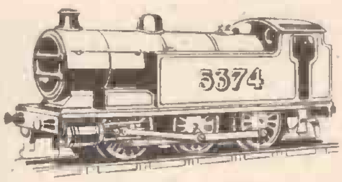

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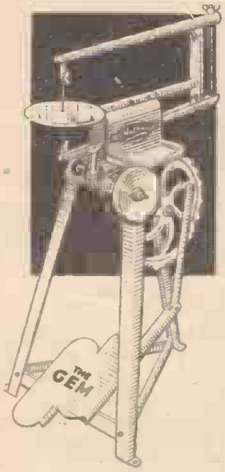

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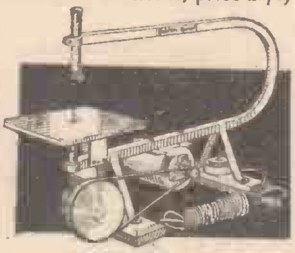

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LETTERS TO THE EDITOR

The Editor does not necessarily agree with correspondents' views

Einstein's Theory : Michelson-Morley Experiment

SIR,—As a layman I have endeavoured, by reading various books on the subject, to obtain a mental picture of Einstein's Theory of Relativity, but without success. My experience is that, where a theory is difficult or impossible to be imparted to a reasonably intelligent mind, there is likely to be a flaw or fallacy in it. Most books on the subject set out with an account of the Michelson - Morley experiment which endeavoured — by despatching from a common point two rays of light over equal distances; one in the direction of the earth's orbit round the sun and the other at right angles thereto, both rays being reflected back by mirrors to meet at their point of origin —to ascertain, by interference between the light waves of the two rays at the receiving end, whether the earth is flowing through space which possesses wave-transmission qualities. As all students of the subject know the result of the experiment was negative. A tangible analogy within the comprehension of the ordinary intellect can be used to illustrate the principles involved in the Michelson-Morley experiment, viz., by assuming two objects moving, as in the experiment, one in the direction of an air wind or flowing river and the other at right angles thereto. One book I have read quotes the example of two aeroplanes each capable of a speed of 200 yards a second operating in a wind of the same speed. In order to show that the 'plane setting out directly against the wind will take longer for the out and back journey, the author points out, quite understandably, that it will never get away from the starting post, i.e., eternity will not be long enough to accomplish the out and back journey. Thus the inference is that the 'plane taking the cross-wind journey has "all the time in the world" to complete its task and must therefore complete the journey in less time. The cross-wind 'plane will be carried 200 yards down wind for every 200 yards flight at right angles to the wind and will continue in this manner all the way out and back. The author puts the case of this 'plane as reaching a point at the end of its outward journey as far down wind as it has travelled at right angles to the wind, and that thus the real distance travelled is equal to the diagonal of the square thus formed.

This may be true *as to distance travelled*, but where will the 'plane finish at the end of its return journey? It will be as far down wind from its point of departure as it has travelled out and back at right angles to the wind.

I suggest that the example of a 'plane travelling in a wind blowing at a speed equal to that of the 'plane is an impossible one as an analogy of the Michelson-Morley experiment, but as soon as one assumes speeds which permit *some* headway to be made directly against the wind one quickly sees that in the cross-wind flight the 'plane has to cope with a lesser head resistance of the wind than if it were flying directly into the wind, but pays the price of having to face the lesser resistance for a longer time (as this resistance endures on both the outward and the return journey) *to get back to the starting point*. The result is, I suggest, that the wind has the same total net effect in both cases.

I am not a mathematician but, with some non-professional knowledge of mechanics, I suggest that assuming a given speed of travel and a steady wind blowing in a given direction it would take a 'plane *exactly* the same time to fly from the centre of a circle to and back from *any* point on its periphery no matter whether it flew on the line of the wind, at right angles to it or at any other angle. I suggest that such a result conforms with what I believe is a natural law, viz., that the total resultant forces acting on the 'plane in going out and returning to the *same starting point* (which process is what the Michelson-Morley experiment was designed to represent) are exactly the same whatever the orientation of the journey, and thus the time occupied in the double journey would be exactly the same in every direction. If this is true it provides a good reason why the Michelson-Morley experiment proved "negative" and thus there would be no need to invoke the Fitzgerald-Lorentz contraction theory to account for the result.

In the above remarks it has of course been assumed that the speeds of the 'planes and wind are mathematically exact and that the 'planes reverse instantaneously at their turning points.

I put forward the above suggestions with temerity as it is difficult to believe that the able scientists who conducted the mentioned experiment were not completely satisfied that the principles involved *would* result in different times for the two journeys. The views of any of your readers who have given thought to the problem would be interesting.—C. W. CARR (Eastbourne).

Frosting Electric-light Bulbs

SIR,—With reference to the query of Mr. G. W. Eyre, of Cleethorpes, regarding the frosting of electric lamps. As hydrofluoric acid could be dangerous in the hands of an inexperienced person, and as the glass of an electric lamp is extremely thin, I would hesitate to recommend, or even use, acid.

A safer way to frost a small number of lamps would be with a mixture of water and carborundum powder "F" grade. A little of the mixture should be applied to the lamp, and gently rubbed with a small piece of brass, or any reasonably light and smooth metal, using a circular motion. Rinse off and dry to judge progress.

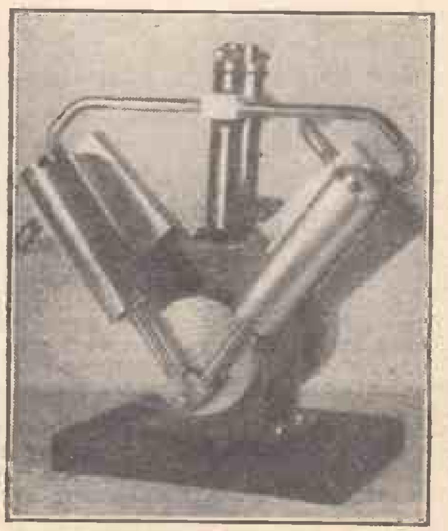
Sandblasting is a quicker method, but more costly, with again, the risk of breaking the thin glass.—J. W. DAWES (Ealing, W.5).

Drilling Ports in Oscillating Cylinders

SIR,—In connection with the articles by "J.E.J." on a Model Steam Launch in the August and September issues, constructors may be interested in a method I have used on many occasions for drilling the steam ports of oscillating single- and double-acting engines which is quick and certain.

Briefly, the procedure is as follows : Mark off the cylinder block for pivot and single steam port and drill right through to required size; tap for pivot and sweat block to cylinder. Sweat cylinder head cover in position and fit pivot. Build up the engine but *do not drill* the mounting block for the steam passages. Now take the cylinder, set it up in a "V" block and drill through the steam port into cylinder right through *both sides*. Lightly countersink the hole where the drill came through the outside of the cylinder.

Assemble the engine, using a distance tube in place of the spring, set the crank as explained, and nut-up the cylinder fairly tightly. Now using the same drill as used for the steam passage, drill through the cylinder and cylinder block into the mounting block for about 1/32in. Turn the crank 180



Pair of oscillating cylinders referred to by Mr. Court.

degrees and repeat for the other port. Finish the ports in the mounting block as explained. Lightly solder the countersunk hole in the cylinder and clean up.

I find that 3/64in. is a good size for inlet and 1/16in. for exhaust for a ⅜in. bore engine.

In the accompanying photograph the soldered holes are just visible.—C. L. COURT (Walsall).

Largest Aeroplane Hangar Doors

SIR,—We notice in your issue of September among the "Items of Interest," a report of doors for London Airport. We note that Messrs. Head, Wrightson Aluminium, Ltd., are the manufacturers of what are claimed to be "the largest aeroplane hangar doors ever made."

The memory of the public must indeed be short and that of reporters of such events even shorter. In 1947 the doors for the Bristol Brabazon Assembly Hall at Filton were completed by our company, and we were justly proud of the fact that we had then constructed what we claimed to be, and still claim to be, the largest hangar doors ever constructed in this country or elsewhere.

Basing it on overall sizes the doors for the Brabazon were, 345ft. over each bay wide by 65ft. 9in. high, and the total overall size of opening was 1,045ft. by 65ft. 9in. high.

As pioneers in the use of aluminium for hangar door construction, and with our friends, Messrs. Northern Aluminium, the originators of the idea for its use in such a way, we trust you will bring this matter to your readers' attention.

Incidentally, we are at the moment constructing a further two sets of larger doors than those mentioned in your paper for the Air Ministry, so that we feel our claim is doubly justified. — ESAVIAN LIMITED (Stevenage, Herts.).

Westminster Door Chimes

SIR,—The continued interest in my article on Westminster door chimes, as shown by the letters from readers in your recent issues, is gratifying. I wonder whether it would be possible to find out how many readers have made them?

With regard to the letter on page 429, September, I think it would be well to publish a warning that if the weights are increased, as required by suggestion No. 3, it will be advisable to stiffen the supporting frame by suitably arranged brackets.

Incidentally, I have already incorporated all these suggestions in a new model which I completed a few months ago, and which rings two alternate tunes: "Westminster Chimes" and "Oranges and Lemons."—G. MURRAY (West Wickham).

[*Readers who have constructed these chimes are invited to notify us.*—ED.]

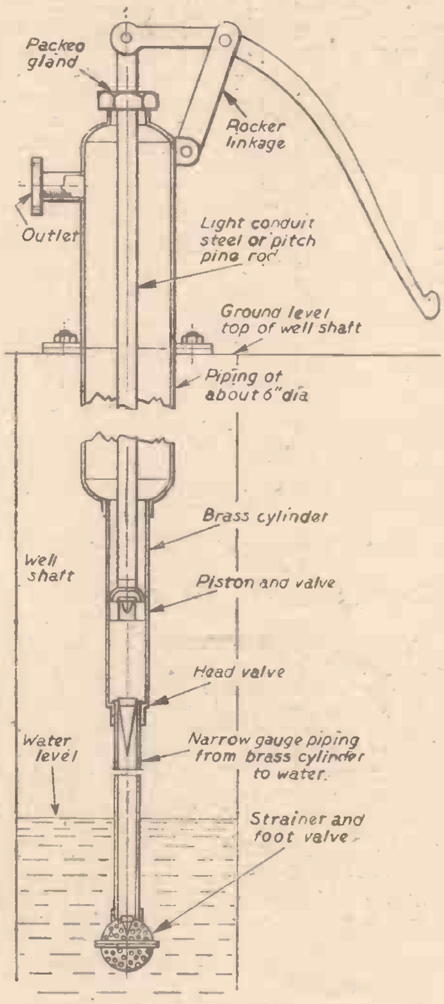
Treatment of Damp Walls

SIR,—Regarding the query of Mr. K. L. Peers, in PRACTICAL MECHANICS, re the trouble of condensation on smoothly trowelled plaster walls, this appears to be the fault in the trowelling of the plaster, and to save the labour and expense of chipping out this plaster and renewing, as suggested, I would offer the following advice which has proved very satisfactory on many occasions.

First of all, ensure the plaster is perfectly clean, and then mix one gallon of medium strength concentrated size, and add two to three pounds of Granotex and thoroughly mix. Apply evenly to the plaster walls and allow to dry and set really hard for at least 48 hours. Proceed by cross lining with a very absorbent lining paper, using either paperhangers' ready mixed paste or one of the other varieties, mixed very round or stout, the coarser and more absorbent the lining paper is the better will be the job. After lining, proceed in the normal manner with necessary wallpaper as desired.
—E. A. GREGORY (Charlton).

Deep Well Pump

SIR,—I think a more suitable solution to M. Senior's, Sheffield, deep well pump problem, in PRACTICAL MECHANICS, September issue, would be a lift and force pump of the Godwin type. In this type of pump the cylinder and piston which does the water raising is down a considerable distance in the well shaft, a rod reaches down to the piston through the pump body and through piping



A lift and force pump of the Godwin type.

of about 6in. dia. The length required of this wide bore piping will depend on whether the water level keeps about the same or varies in dry spells. A considerable safety margin must be allowed for, so that the end of the narrow bore piping is always well covered with water. The rod reaching to the piston may be solid steel, light conduit in screwed sections, or rods of pitch pine connected by fishplates. The wooden rods are supposed to be the best for easy pumping on account of the buoyancy floating in the water gives them, with metal rods a counterweight has to be used on the end of the handle to give balance. It must be understood that all deep well pumps, especially of the lift and force type, are considerably harder to pump than those for shallow wells. This type of pump does away with the necessity of having a second pump to help out, and gets over the problem of a pump not being efficient to lift water higher than from 25 to 28ft.—J. GIBSON (Ballynahinch, Co. Down).

Re-covering Top of Car

SIR,—May I take this opportunity of criticising your query reply on page 434, September issue, on re-roofing a car. I venture to suggest that the writer has never done the job—I have. A "leather" top saloon is now either a rarity or non-existent. The material used is a synthetic. "Bostic 321" is specially prepared for this job.—G. E. CRAWSHAW (Market Harborough.)

Interplanetary Space Travel

SIR,—I have read Mr. A. J. Bull's letter in your October issue concerning the Theory of Relativity and space-flight at speeds approaching that of light. Mr. Bull's conclusion that such speeds would not shorten the time of travel is incorrect, and his conclusion fallacious as he has overlooked a fundamental point in the example he gives. The moving rocket and the equally moving Earth are *not* equivalent, as the rocket has to undergo four periods of acceleration on its journey out to the stars and back (i.e. speeding up and slowing down on the outward journey, and the same on the return).

As a result of this it has been shown by McCrea (*Nature*, 167, 680, April 28th, 1951) and Tolman (*Relativity, Thermodynamics and Cosmology*, 194) that time *would* appear to travel more slowly to the passengers in a spaceship moving near the speed of light. A fuller resolution of this so-called "clock paradox" will be found in the November issue of the *Journal of the British Interplanetary Society*. It follows, therefore, that it would, in theory at least, be possible to travel many hundreds of light-years and return to Earth after a lapse of only a few years.—ARTHUR C. CLARKE, B.Sc., F.R.A.S. (Bounds Green).

Nickel-ferrous Batteries

SIR,—In the article in the October issue of PRACTICAL MECHANICS on "Improved Cycle Lighting," by P. J. Pullar-Strecker, there appears to be a slight error.

In the paragraph, "The Accumulator," Mr. Pullar-Strecker states that nickel-ferrous batteries are fitted with an electrolyte consisting of KOH (caustic potash) and distilled water. So it is, *plus* lithium hydrate. The addition of this greatly increases the capacity of the cell, surely a vital point to a cyclist carrying such a battery. The electrolyte is a 21 per cent. solution of KOH plus lithium hydrate, having a specific gravity of 1.22, falling to about 1.16 after one year's use, after which it is replaced by fresh electrolyte having a density of 1.25.

The E.M.F. is 1.4 volts when fully charged, falling to 1.1 before recharging. The cells are 60 per cent. efficient in respect of energy, and about 80 per cent. for quantity efficiency. I am told that for every 1lb. of the cell, 10 ampere hours can be expected. If two cells, or units, are used, giving "30 amp. hours," the weight should be somewhere in the region of 3lb. for batteries alone.

The plates consist of nickel oxide positive, and iron oxide negative. The formula of the nickel oxide is unknown to me, but it can be followed by assuming the Ni, O_2, or its hydrated form $Ni(OH)_4$, the action is then as follows:

$$Ni(OH)_4 + KOH + F_E \rightleftharpoons Ni(OH)_2 + KOH + F_E(OH)_2$$

—D. OZENBROOK (Nottingham).

(*Continued on page 126*)

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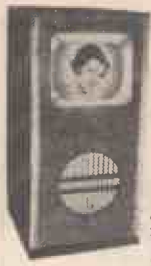


THE ARGUS TELEVISION RECEIVER

A 21-Valve Televisor for the Amateur. All components valves and Cathode Ray Tube cost only £20 10s. Constructor's envelope giving full details and blueprints 5/-, returnable if you think you can't make the set.

ELECTRIC CLOTHES HORSE

Warms room as it dries clothes—chrome plated rails—A.C. or D.C.—650 watts. Size 3ft. x 3ft. x 5in. Normally 12 gns., our price only £4 19s. 6d., carriage 7/6.

29 GNS. — AUTO RADIOGRAM — 29 GNS.

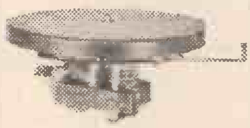
Full size walnut console cabinet. £11 10s. 0d., plus 15/- carriage.

Five valve all mains superhet radio, 3 waveband coloured illuminated scale, fully guaranteed. £8 19s. 6d., plus 7/6 carriage and insurance.

Autochange Unit by Collaro or Decca with pick-up for long playing and standard records, £11 10s., plus 7/6 carriage and insurance.

Special Offer. Three units for 29 gns., plus £1 carriage and ins. Booklet of photos, circuit diagram, etc. 2/6 (returnable).

3-SPEED GRAM UNIT



Induction motor, instantly changeable, 33—45 — 78 revs., £4 10s., post and insurance 3/6. Precision balanced pick-up with plug-in heads for long playing and standard records 54/-, plus 2/6 post. Both items, £7.

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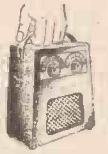
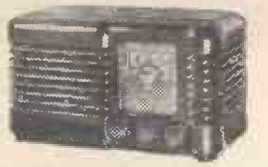
42-46 WINDMILL HILL, RUISLIP, MIDDLESEX. • 152-3 FLEET ST. LONDON E.C4



FREE

Constructional data showing how to make our "Handy Battery Three". (Total cost 70/-, including cabinet.) Send stamp to-day.

GIVE A RADIO THIS CHRISTMAS



You will be giving a £12 present which costs you approx. £6. All mains. 4-valve, bakelite case. Send 1/6 for returnable constructional data and photo.

CRYSTAL SET

Two wave, uses latest crystal valve—good results without batteries or mains 18/-, or send only 4/6 for crystal valve, you can make the rest, blueprint free.

DON'T FUMBLE IN DARK

Install two-way switching. 2 Hi-craft two-way switches, two blocks, 24ft. T.R.S. 3-core cable, clips and illustrated instructions, 20/-, complete.

ELECTRICAL ACCESSORIES

5 amp surface switches one way 1/3. two way 1/6, brown or white. Ceiling pull type with cord, one way, 3/9, two way 4/3. Shuttered switch plug, 5 amp 3-pin 2/3 less switch 1/-. 15 amp switch plug 8/6. Fluorescent control unit 40 watts 19/6. T.R.S. Cable, twin 1/- yd., triple 1/6 yd. Send for electrical list.

BE PREPARED

for a cold winter by making our low cost **Electric Blanket.** 27 yards of special heater wire and blueprint, 20/-. Blueprint only 1/6.

The Schoolboys' Exhibition is coming again in January

If you have a camera and live anywhere near London during the holidays come and learn how you can develop your films in daylight and make your own prints.

PRACTICAL DEMONSTRATIONS
—AT WHICH YOU CAN HELP—
WILL BE GIVEN ALL DAY LONG

Everything connected with print-making clearly shown and explained. You will be allowed to do some of the work yourself under the guidance of photographic experts. Don't miss this opportunity. It's going to help you quite a lot.

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OPENS DEC. 31
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PRESSURE UNIT MK.23/AP.—6in. x 4in. x 3in., contains a small compressor operated by a 27 volt D.C. motor with switches, fuse, indicator lamp, 10ft. of air line and 21ft. of twin flex in a flexible tubing, etc. American made. Brand new. Only 45/-, post 2/6.

"INEXPENSIVE TELEVISION." Revised and enlarged edition giving circuit of R1355, etc., also 45 Mc/s Pye Strip. 2/6, post 3d.

RECEIVER R.1355 as specified for "Inexpensive Television." Complete with 10 valves, 38/6. Cge. 7/6.

POWER MICROPHONE INSERTS.—Truvox. Diam. 2⅜in. x 1in. 5/-, post 6d.

THROAT MICROPHONES.—American twin-button type with strap lead and plug. 5/-, post 6d.

HEAD SET ADAPTOR.—High to low impedance, 2/6, post 6d.

MOVING COIL METER with 1 M/A movement, 2½in. flush, rectifier type, scaled 0/100 volts A.C. Resistance 100 k. ohms. A very useful basic meter. 30/- post free.

PORTABLE TEST METER. Just the job for the home constructor, in neat case, 6in. x 5in. x 4in., reading 1.5, 3, 150 volts, 6 and 60 m/a. D.C., 5 k. and 25 k. ohms. 37/6, post 1/6.

CLOCKWORK MECHANISM.—Precision made movement with contacts making and breaking twice per second, can be used for switching on and off lamps, etc. Brand new in sound-proof cabinet with thermostat temperature control. Ideal for flashing signs. 17/6, post 1/6.

HEADLAMP complete with Battery Case. Fits on forehead. Leaves both hands free, 10/-, post 1/-.

VEEDER COUNTER 0-9999, 1in. x ¾in. x ¾in. Very useful, 10/-, post 6d.

BROMIDE PAPER.—Glossy grade, soft, 5¼in. x 5½in., 7/6 per gross, post 6d.

PHOTO FLOOD LAMPS.—1,000 watt, 230 volt. 10/-, post 1/-.

RESISTANCE MATS.—Make ideal heating mats for Aquariums, Photographic solutions, Print dryers, etc. Mains voltage, 150 or 620 watts. Black heat, size 10in. x 6in. 2/6, post free.

METAL RECTIFIERS. Bridge Types. 6 v. 1 a., 10/6 ; 12 v. 1 a., 12/6 ; 24 v. 75 mA., 5/- ; 36 v. 2.5 a., 30/- ; 48 v. 75 mA., 7/6 ; 48 v. 150 mA., 10/- ; 96 v. 2.5 a., 75/-. Post 1/-.

AERIAL RODS.—12in. long, ½in. diameter. Any number of sections can be fitted together. 2/6 dozen, 6/- for 3 dozen, 11/- half gross, 20/- gross, £6 per 1,000.

SLOW MOTION DIALS.—6in. Scaled 0-100, reduction 200 to 1 or direct. Ideal for wavemeters, signal generators, etc. Our price, while they last, 5/6, post 1/-.

THERMOSTAT SWITCH.—Bimetal type in sealed glass tube, 2½in. x ¼in. 30 deg. Cent. Ideal for Aquariums, Wax and Oil Baths, Gluepots, etc. Will control 1 amp. at 240 v., 5/-, post 6d.

THERMOSTAT.—Satchwell 12in. stem, 0/250 v. A.C./D.C., 15 amps. A.C., .1 amp. D.C., 10 to 90 deg. Cent., 35/-, post 1/6.

FLASHING SWITCH UNIT with 6 contacts. Full rotation 60 seconds, operated by a Sangamo Synchronous Motor. 230 volts A.C. 2 watts. In metal case, 3in. x 2¾in. x 2¾in. 15/-, post 1/-.

ACFIL PUMPS.—These pumps enable you to fill all accumulators on the bench with the carboy at floor level. Brand new, only 30/-, post 2/-.

INTERESTED IN FISHING?—Then send for one of our tapered whip aerials and make yourself a fine rod worth pounds. Consists of three tubular steel, seamless copper plated sections 4ft. long, which screw into each other and are well finished. 7/6, carriage 2/-. (Eire, 6/6.)

CUTTER HEADS.—"Recording" high impedance. A bargain at 55/-, post 1/-.

CUTTER STYLII, 6/- per doz., large quantity available at special rates.

PORTABLE ELECTRIC BLOWERS.—220/230 volts 220 watts. Completely enclosed, 8ft. flexible hose and nozzle, 7 yds. C.T.S. Flex. Many uses where clean, dry air is required. £7/10/-.

ACCUMULATOR CHARGERS in black crackle case with fuses and meter, 6 and 12 volts at 4 amps. Bargain Price, £4/19/6. Pkg. and carr., 5/-.

"ELF" CIRCUIT BREAKER, 220 volts 2 amps., size 3in. round, 10/6, post 1/-.

KLAXON GEARED MOTORS No. 1K5SB3-W7. Torque 15 lbs. ins. 175 r.p.m., 220/240 v. A.C. Induction type £10 each.

24-VOLT D.C. MOTORS with double ended shaft 2in. x 3in., 8/6, post 1/-.

TWIN FLEX, in black braided covering, approx. 25-yd. coils 7/6, post 1/-.

INTERCOM. CABINETS.—Solid back, polished all round, 15¾in. x 9¾in. x 6¾in., with two 4in. circular frets for speakers and cut-out for control panel. 25/-, post 3/6.

HAND TELEPHONE. Brand new with cord, 15/- each, post 1/6.

INERT CELLS, 1½ volts, size 2in. x 2in. x 5in. Just add water, last for years, ideal for Electric Bells, Telephones, Models, etc. Only 2/- each, post and pkg. 1/-, or 4 for 10/-, post free.

MASTS, TELESCOPIC. Extending to 12ft. in 7 sections. 15/6, post 1/6.

These are just a few of the items in our stocks. Send 6d. in stamps for comprehensive list giving full details of Potentiometers, Condensers, Resistors, Telephone Key Switches, etc.

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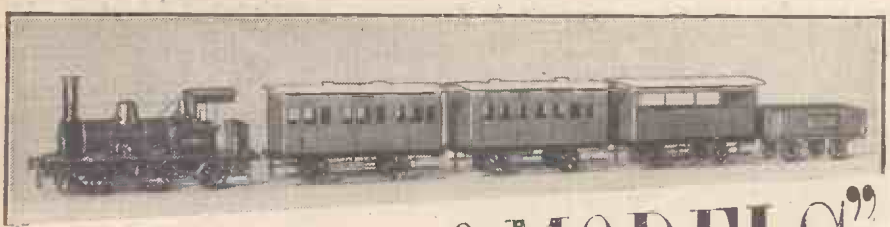


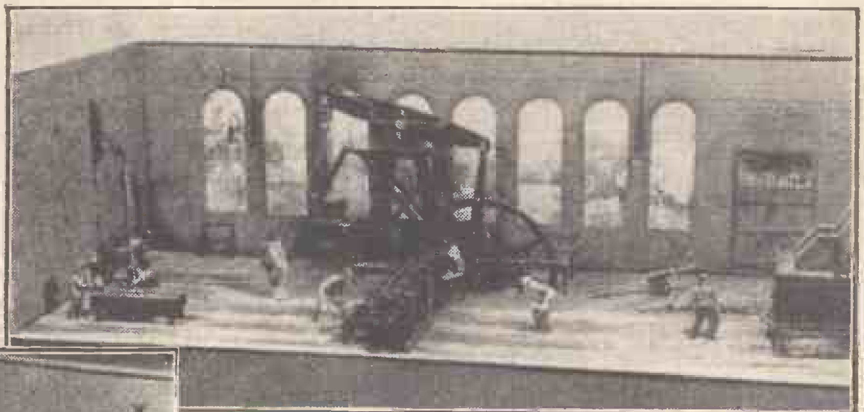
The "World of MODELS"

By "MOTILUS"

Realistic Models of Steel Working Plants

AMONG the marvels of modern engineering at the International Machine Tool Exhibition at Olympia this year I came across a series of most interesting working models: these were in tableau form and revealed excellent workmanship in depicting steel production over the past hundred years at the works of Messrs. Samuel Osborne and Co., Ltd., of Sheffield. All the models were assembled at the company's works, and they all have that most realistic atmosphere which it is only possible to obtain with full knowledge of the subject which is modelled.

The exhibit was to show the history of the company, who have celebrated their centenary this year; it also showed steel manufacturing methods of a hundred years ago in comparison with methods of the present day. The models were all to a scale of 1in. to 1ft., and the work was beautifully executed with a remarkable amount of realistic and authentic detail.



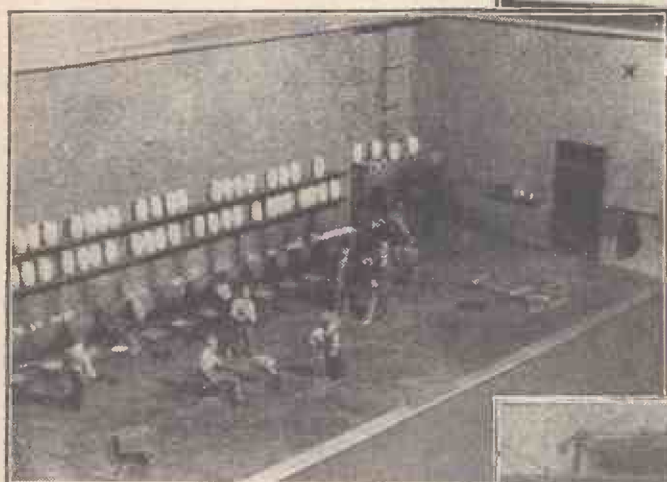


Fig. 1 (Left).—Crucible steel melting in 1852.

Fig. 3 (Above).—Model of a steel rod rolling shop in 1852.

(By courtesy of Samuel Osborne and Co., Ltd., Sheffield.)

The first three working models in the series of six represented the melting, forging and rolling of steel as practised in 1852; the last three represented corresponding modern processes in steel manufacture. In each display, scale model figures helped to give realism to the operations being demonstrated. All the figures had been made by students of the Sheffield Art School.

Crucible Melting Shop

Model No. 1 (Fig. 1) showed a typical crucible melting shop of the mid-nineteenth century, where melting was being carried out by the method devised by Huntsman, later improved by David Mushet. The crucible process is still in use, although it has been largely superseded by the high-frequency electric induction melting process. In the model, the crucible pots could be seen warming on a stove, prior to being put into the furnaces, two at a time. When the metal was molten, the pots would be lifted out and the slag removed before the contents were poured into the ingot moulds. Model figures could be seen carrying out these operations under the watchful eye of a top-hatted steelmaster.

Water-driven Hammer

Model No. 2 (Fig. 2) showed a pair of "helves" or old-fashioned hammers driven by water power. In this model the hammers were striking 120 blows a minute, and it was interesting to see how the water-wheel provided the power, through cogged wheels, for actuating the hammer shafts. The model figures were particularly useful here, to show the action of the swing seats that enabled the men to follow the steel bars through the anvil with minimum exertion. This type of seating is still used to-day with modern forging hammers. A second water-wheel was used to drive the bellows for the reheating furnace. Some of these old forges have been preserved in the Sheffield district as historic relics, and one of them is still in working order to-day.

Rolling Mill

Model No. 3 (Fig. 3) represented a rolling mill of about a hundred years ago, and included an interesting model of a 24 h.p. Watt beam engine. Nowadays, of course, an electric motor is used, although the basic principle of the rolling process has changed little since 1783, when it was first practised by Henry Cort.

Electric-arc Furnace

Model No. 4 represented a 6-ton Heroult electric arc furnace, as used nowadays for producing large steel ingots and castings. It included exact reproductions of melting furnace equipment. After melting and refining has been carried out in the

(Continued on page 126)

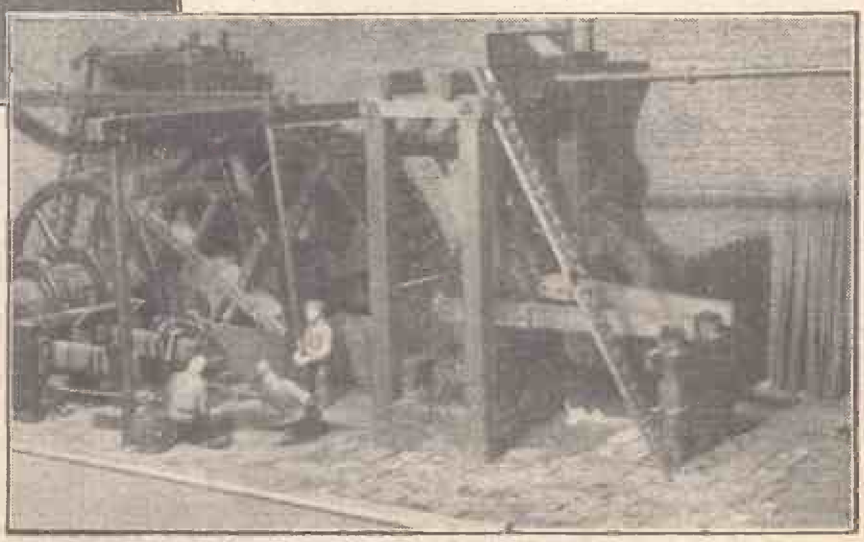


Fig. 2.—Model of steel hammering in 1852. Scale 1in. to 1ft.

Trade Notes

Bassett-Lowke Catalogues

NEW editions of their "Gauge 'O' Catalogue" and the "Model Shipping and Engineering Catalogue" were issued recently by Messrs. Bassett-Lowke, Ltd., Northampton. Items included in the comprehensive lists of the "Gauge 'O' Catalogue" are electric, clockwork and steam locomotives, goods and passenger rolling stock, clockwork and electric power units and mechanisms, lineside features, stations, signals, etc., permanent way and books, charts and drawings. New products include a Southern Railway electric train set, a station building and some additions to the rolling stock. Everything for the model railway enthusiast is included, each item is priced, and the booklet is illustrated with photographs and drawings on every page.

The "Model Shipping and Engineering Catalogue" includes all items which were previously contained in the ships catalogue and the model supplies catalogue; there are also many new parts. There are sections devoted to boiler fittings, sailing yachts and ship's fittings, power craft and ship machinery, stationary engines, castings and parts for locomotives and traction engines, permanent way materials, model engineer's tools and sundry other items. There is also a section devoted to books, drawings and plans. Every item is priced, and in both catalogues full instructions on how to purchase items by post are included.

Black & Decker Ltd.

BLACK & DECKER LTD., Harmondsworth, Middlesex—manufacturers of portable electric tools—announce the appointment of Mr. A. N. Greaves as advertising manager. This position was previously held by Mr. M. W. Boyce, who was appointed sales manager of the company in January, 1951. Mr. Greaves joined Black & Decker in April, 1951, as assistant advertising manager.

BOOKS REVIEWED

Motor Cycle Maintenance and Repair Series: B.S.A. Motor Cycles, by D. W. Munro, M.I.Mech.E.; Royal Enfield Motor Cycles, by C. A. E. Booker, A.M.I.Mech.E.; Triumph Motor Cycles, by A. St. J. Masters. Published by C. Arthur Pearson, Ltd. Price 6s. net each volume.

EACH of these three handbooks, which are third editions, has been brought up to date and includes the latest information on the respective models. The books form a practical guide for owners and repairers, and deal fully with service and maintenance. Engine dismantling, assembly and overhaul; repair and adjustment of clutch and gearbox; adjustment of wheels, brakes and chains, and lighting and ignition equipment are among the numerous subjects dealt with. Each handbook is well illustrated and has a full index.

Modern Motor-cycles. By Bernal Osborne. Published by Temple Press, Ltd. 86 pages. Price 8s. 6d. net.

THIS book, which is another addition to the Boys' "Power and Speed" Library series, introduces young readers to a world where highly skilled technicians contribute to the fashioning of metals into sleek, fast motor-cycles. To the novice, this book gives an insight into every aspect of motor-cycling activity, including local grass-tracks, trials and hill-climbs. The author also covers the great international race meetings of Europe.

LETTERS FROM READERS

(*Continued from page 122*)

"Perpetual Motion"

SIR,—I feel that Mr. D. A. Bell's claims for even a working model of the perpetual motion machine, described by him in the December, 1951, issue of PRACTICAL MECHANICS, cannot go unanswered.

First, the "low" temperature to which he refers, at which mercury has no resistance, is, of course, the Absolute Zero of temperature, i.e., —273 deg. C. approx.

This temperature has not so far ever quite been attained, although scientists have approached to within 0.1 deg. C. of it. Secondly, even if it were possible to attain this extremely low temperature, to maintain any object at it would require a considerable amount of refrigerating machinery, consuming no small amount of power, which would have to be supplied from an external source.

How, then, can the motion of the electric current be considered as perpetual motion, since the machinery necessary for producing the "low" temperature would constantly be consuming power?—J. H. FRENCH (Bedford).

Tobacco Shredding Machine

SIR,—Can any reader offer a suggestion for the construction of a simple machine for shredding tobacco, incorporating these points? (1) simple in construction; (2) cuts by turning a handle; (3) automatic feed of tobacco to knife; (4) the machine to be able to cut tobacco fine, medium or coarse by a simple adjustment.

I grow a lot of the tobacco I smoke, but find the cutting up by hand very tedious.—J. G. G. DAVIES (Tredegar).

Time Lag in Photocells

SIR,—A colleague of mine is an official A.A.A. timekeeper and was an official timekeeper at the 1948 Olympic Games. He has been very interested in the relative accuracies of the recording of track times by pistol and stopwatch and by electrical methods.

We are aware of the personal error in the use of the stopwatch and want to compare this error with those which may be present in electrical apparatus. We have discussed the possible error introduced by starting a stopwatch by operating an electromagnet because of self-inductance. [Using $i = \frac{E}{R}(1 - e^{-\frac{Rt}{L}})$].

We hope to be able to estimate the magnitude of this error if we can obtain information of the constructional details of the apparatus. (Could you suggest sources here?)

We had also considered the possibility of a time lag in the operation of a relay actuated by breaking a light beam (superimposed on any inductance effect as at the start). Your answer to a correspondent in the January PRACTICAL MECHANICS led us to believe that such time lags do exist and that they depend on the nature and age of the photocell used. What we want to know is, then, the magnitude of the lag in order to determine whether it is worth while taking into account. We should be glad of any information you can give on this subject.—F. BUTLER (Merton Park).

[*Readers' suggestions are invited.*—ED.]

Club Reports

The Northern Association of Model Engineers

THIS association meets on the first Saturday in each month, at 2.30 p.m., in the Milton Hall, Deansgate, Manchester. The Society of Inventors, Manchester, meet every second Tuesday each month in the Onward Hall, Deansgate, Manchester, at 7.30 p.m.

RALPH WOODS, Hon. General Secretary, "Lilstock," Middleton Road, Hopwood, Heywood, Lancs.

The Birmingham Society of Model Engineers

ON December 10th at 7.30 p.m. Mr. K. Williams will talk about his speed-boat *Faro* at the Crown Hotel, Corporation Street, Birmingham.

Exhibition Announcement.—The Birmingham Society of Model Engineers are arranging to hold an exhibition in the Bingley Hall annexe between May 4th and 9th, 1953. This is not an annual event, but it is hoped that it will be one of the largest exhibitions held outside the London area. It is expected to have approximately 150ft. of track for passenger hauling in 3½in. and 5in. gauge.

All enquiries will be welcomed by the Society's Exhibition Management, 254, Reddings Lane, Birmingham, 28.—R. PHILLIPS, Hon. Secretary, 92, Gilberstone Avenue, Gilberstone, South Yardley, Birmingham, 26.

Aylesbury and District Society of Model Engineers

THE October meeting of this society was devoted to a model night as a preview of our exhibit in connection with the Aylesbury Association Third Exhibition. Several models were on show and a visit to our stand on October 18th showed that our standard has been maintained.—EWART H. SMITH, Hon. Sec., Mulberry Tree Cottage, Devonshire Avenue, Amersham, Bucks.

THE "WORLD OF MODELS"

(*Continued from page 125*)

electric furnace it is tilted so that the metal pours out into a ladle, which is raised by a crane, carried to the casting pit and the metal poured into the moulds through a stopper in the bottom of the ladle.

Hammer Shop

Another realistic model was of a 4-ton hammer shop. Power for the hammer now comes from compressed air instead of from a water-wheel, and the heat of the furnace is controlled. In the forge, ingots are hammered down into billets or slabs, suitable for rolling into bars or sheets.

There was also a model showing a modern double-duo rolling mill. Here could be seen the modern steel rolling operations in progress. The steel billets are reheated in a furnace similar to that in the hammer shop and then they are carried by an overhead runway to the rollers; here they are rolled into bars, passing through an upper set of rolls and then back through lower ones. The bars are then hot sawn, cooled, examined, marked and prepared for despatch.

No doubt these models will be displayed again on future occasions, and readers may have opportunities of seeing them.

THE TECHNICAL SERVICES CO.
SHRUBLAND WORKS, BANSTEAD, SURREY

Terms : Cash with Order. No C.O.D. All goods on 7 days approval against cash.

POCKET VOLTMETER
0-12 v., 0-240 v. AC/DC. Diameter, 2in., depth 1in. Brass case, moving iron system. For testing L.T. and H.T. batteries, house wiring, etc. Price, 19/- each, post and packing 1/-.

THERMOSTAT
Type L.A.40. 1 a. 240 v. A.C. 2in. x ½in. x ½in. For tropical fish tanks, etc. Price, 3/9 each, post 3d.

THERMOSTAT
Type BW/1. 3 amps., 250 v. A.C. For control of hot plates, vulcanisers, etc., 50-550 deg. F. Price, 15/6, post 4d.

ROOM THERMOSTAT
Type PF. Wall mounting. 2 to 15 amps., 250 v. A.C. 5in. x 1¾in. x 2in. deep. In temp. ranges, 30/90, 40/100, 40/80, 60/100 deg. F. Price, £2/0/0, post 6d.

AUTOMATIC FLASHER
Model MH. For signs, warning beacons, etc., up to a total load of 1 kW. on 200/50 A.C. or 24 watts on 12 v. D.C. 3 seconds "On." 3 seconds "Off." 2 7/16 in. x 1½ in. x 7in. Price, £1/0/2, post 6d.

DRAWING AND INSTRUCTIONS
For making a 60in. x 30in. electric blanket from our heating cords. Price, 2/6 post free.

ASBESTOS HEATING CORD
Fully flexible for electric blankets and experimental heating. Stocked in 15, 25, 200, 400 ohms per yd. Price, 1/- per yd. post free.

BI-METAL
Standard thermometal ready cut to 1½in. x 3/16in. x .036in. For making small thermostatic assemblies. Price, 6d. each, post free.

ASBESTOS SLAG WOOL
For thermal insulation. Price, 1/- per lb. or special price for our standard 56lb. sack.

VARNISHED CAMBRIC TAPE
Bias cut, width ½in., thickness .006in In 72 yd. reels for coil insulation. Price, 6/3 per reel, post 3d.

ELECTRIC MOTOR
200/50 v. AC/DC. 40 w., 8,000 r.p.m. (light). Suitable for hairdryers, blowers, drink mixers, etc. Each motor is brand new and by a well-known maker. Price, £1/17/6, post 8d. Four blade fan to fit motor spindle, 2/- each, post 4d

MIRRORS
Circular 2½in. diameter. Brand new. Price, 8d. each, postage 4d.

ELECTRIC BLANKET
Model TS/1. Single heat, 60in. x 30in., 100 w., 200/50 v. AC/DC. Complete with detachable washable cover. Individually boxed and guaranteed 12 months. Price, £7/10/0, post free.

ELECTRIC HAIRDRYER
Model TS/A. Moulded bakelite. Hot and cold air. 200/50 v. AC/DC. Weight 28 oz. Overall size 8in. An attractive well balanced hairdryer. Fully guaranteed 12 months. Price £3/11 0, post free.
Ask for details of our Easy Payment Terms on Electrical Blankets and Hairdryers.

ASBESTOS DISCS
5in. diameter, ½in. thick. Ideal as soldering iron rests. Price, 2/- per doz., post 6d.

COMMUTATOR
7 segment, 39/64in. O.D. x 29/64in. bore. Price, 2/- each, post 4d.

CONVECTOR HEATER BODIES
These bodies are ideal for the construction of attractive convector heaters. Stove enamelled in cream and green. All air vents are punched and only the installation of an element is required. Price, £1/5/0, carriage 2/6.

CONVECTOR THERMOSTAT
Model C.S. For control of space heaters, low temperature ovens. To cover any 40 deg. F. between 40 deg. and 120 deg. F. 15 amps., 250 v. A.C. 4½in. x 1½in. x 1½in. Price, £1/5/0, post 6d.

SILVER TIPPED CONTACT SCREWS
½in. x 7 B.A. brass. Fitted with conical fine silver tip. For making up small electrical assemblies. Price, 6d. each, post free.

CERAMIC ELEMENT FORMER TUBE
Length 5in., O.D. 7/16in., bore ¼in. Spiralled for resistance wires up to 30 s.w.g. 30 t.p.i. For making immersion heaters up to 400 w. loading as for fish tanks. Price, 2/6 each, post 4d.

THERMOSTAT
Model MB. For control of electric immersion heaters up to 3 kW. range, 90/190 deg. F., 15 amps., up to 250 v. A.C. Stem length 11in. Also for control of platens, baths, drying cabinets and ovens. Price, £2/0/0, post 9d.

All our goods are Brand New and of High Quality.

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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.

"VINAMOLD" is the flexible mould employed by leading industries, including the big film studios. Trade enquiries are invited.

Write for full details and instructions.

VINYL PRODUCTS LTD. (Dept. P.M.2), Butter Hill, CARSHALTON.

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Waterproofing Glue in Model Boat

I HAVE constructed a clinker-built model sailing dinghy, the planks being overlapped and pinned and glued to frames. On giving it a water test I noticed that the water is softening the glue, and it would appear that I should have used a waterproof one. The finish I desire on the boat is white inside and copal varnish outside, but I am not sure whether this would effectively seal the glue.—R. Millmore (Swindon).

A GOOD procedure would be for you to make up a mixture of equal quantities of cold water and commercial formalin, which latter you should be able to obtain from any pharmacist. The mixture is brushed over the glue between the boards of your sailing dinghy and allowed to dry on. The process is repeated three or four times. After a sufficient number of repetitions, you will find that the glued joints will have developed a very high resistance to water. In fact, rather than soften under the influence of water they will, after the formalin treatment, tend to be become brittle and to crack. At this stage it will be as well to paint over them two coats of a good bituminous paint such as "Bitumastic," which is obtainable from Wailes Dove Bitumastic Co., Ltd., Collingwood Buildings, Newcastle-on-Tyne. These paints are now obtainable in a number of different colours and they are highly waterproof. The alternative to the above is to chip the original glue away and to use in its place a casein glue which is also very highly water-resisting and which can be obtained from Messrs. Leicester Lovell & Co., Ltd., 14/18, Nile Street, London, N.1.

For a white finish inside the vessel you will find a white-lead paint protected by several layers of a good copal varnish quite satisfactory, but we doubt whether you will find copal varnish alone on the outside to be efficacious. For the outside of the vessel we would suggest one of the bitumastic paints in the colour most suitable to your requirements.

Degreasing Compounds

I SHOULD like your advice concerning degreasing compounds, as I have a fairly constant supply of parts in for repair which are invariably covered with thick hard grease and dirt. Please give the names and addresses of the manufacturers of degreasing compounds.—A. Longworth (Warrington).

DEGREASING compounds generally consist of various admixtures of sodium-carbonate, silicate and phosphates, the precise composition depending more or less on the work to be degreased. A simple degreasing composition can be made by dissolving 1 part of caustic soda or soda ash in 12 parts of water, the work being immersed for about half an hour in the warm or hot solution. Tin, zinc, aluminium, lead or their various alloys must not be immersed in these caustic solutions, since they will be attacked by the solution. These solutions are cheap and effective.

Trichlorethylene is an excellent degreaser, although expensive. Degreasing is effected by immersing the work in the liquid or by suspending it in the vapour of the boiling liquid. Trichlorethylene must not be heated in an open tank. Its vapour is toxic and anaesthetic, and it has other dangers as well, chiefly its liability to decompose into phosgene, which is an extremely poisonous gas. If you are not experienced with trichlorethylene, you had better leave it alone except for very small degreasing work.

There is also "electrolytic degreasing," a method which is gaining in popularity. This consists in putting a solution of caustic soda or soda ash (1 in 12) in an iron tank which is made anode. the work, which is made cathode, being suspended in it. A heavy current is then switched on. Large volumes of hydrogen gas are evolved, and the grease is quickly removed.

For medium-small work, the following chemical degreaser of the alkali type is very efficient:

Soda ash	6oz.
Caustic soda	2 ,,
Trisodium phosphate ...	2 ,,
Sodium silicate ...	1 ,,
Water	1 gallon.

To the above may be added 2oz. sodium cyanide if it is necessary to prevent any staining of the work, but the cyanide addition will render the solution excessively poisonous and it is, on the whole, better to do without it.

Various alkali degreasing compounds formulated on the above lines are obtainable from:

Messrs. Wm. Canning & Co., Ltd., Great Hampton Street, Birmingham; Messrs. R. Cruickshank, Ltd., Camden Street, Birmingham, 1; Hoklykem, Ltd., Hockley Hill, Birmingham; Messrs. Grauer & Weill, Ltd., 3/4, Hardwick Street, London, E.C.1; Laporte Chemicals, Ltd., Luton, Beds.

Brushless Shaving Cream

PLEASE supply me with a formula for making a brushless shaving cream.—G. Taylor (Birmingham, 14).

THERE are many formulae for brushless shaving creams, but the following is probably as effective as any:

Stearic acid	16 parts
Lanolin (anhydrous) ...	3 ,,
Mineral oil (white oil) ...	9 ,,
Glycerin	5 ,,
Triethanolamine ...	1.8 ,,
Borax	1.8 ,,
Water (to make up) ...	100 ,,

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.

Melt all the fats together and bring to 75 deg. C. Strain, and put the mixture into a blade mixer. The glycerin is dissolved in water and heated to 70 deg. C. The diluted glycerin is then added to the fats, which are continuously stirred. If the cream is required to be perfumed this can be added, but should be warmed to 40 deg. C. To obtain a smooth cream, one should use a homogenizer, but this is not always necessary.

Making Dolls' Heads

USING Vinamold, I propose to make casts of dolls' heads and I should be grateful if you can advise me of the most suitable material for making heads. Wax would, I think, be too expensive and plaster of paris too brittle and porous.—R. M. Stewart (Fife).

THERE is no specially cheap material which you could utilise for the casting of dolls' heads. An ordinary white wax mixture would be fairly cheap for the purpose; so, too, would plaster of paris, the plaster cast being well sized with a solution of 15 parts of gelatine and 85 parts of water. You could also use (at a little greater expense) either ordinary white cement or ordinary plaster of paris slaked with a rubber emulsion, which latter can be obtained from Revertex, Ltd., Upper Thames Street, London, E.C.4. The following composition has also been suggested as an excellent flexible dolls' head composition:

Rubber powder	35 parts
Coumarone resin ...	35 ,,
Heavy mineral oil ...	10-40 parts
Ester gum	20-40 ,,

Such a composition, however, is likely to give rise to difficulties in preparation. It is possible that you may be able to purchase a ready-made dolls' head moulding material from Dryad, Ltd., St. Nicholas Street, Leicester, from whom books on this subject may be procured.

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Re-spraying Binoculars

I AM proposing to re-spray with cellulose a pair of prismatic binoculars. There are no leather coverings to be considered, and the present cellulose has a very poor adhesion to the metal—the application of a needle point causes it to flake off freely; the metal is both brass and aluminium alloy.

Is a special primer necessary? Can I protect the lenses with vaseline and spray without dismantling? How can the clear-cut maker's lettering be retained?—E. G. Carter (Orpington).

FIRST of all strip away as much as possible of the poorly adhering cellulose coating. After this wipe down the binoculars' casing with a soft cloth impregnated with acetone or a mixture of acetone and ethyl acetate, or with some other liquid in which you know the cellulose coating to be soluble. By these means—and a little patience—you will gradually be able to remove all the unsatisfactory coating from its position.

It will not be necessary to use a special priming agent previous to re-coating the binoculars for, since you will obviously desire to use a perfectly transparent coating, any underlying priming coat would not be feasible in this case. The aluminium alloy portion of the metalwork should be rubbed over with a soft rag charged with a 5 per cent. solution of caustic soda. This will effectively degrease the metalwork. The brass portion may be treated in the same way, although it may be blackened as a result. However, after the caustic soda treatment the whole of the metalwork should be gone over very carefully with fine glasspaper and then with a fine abrasive such as Tripoli powder in order to bring it up to a maximum degree of polish. The metalwork, after this treatment, may be sprayed or brushed with the lacquer. A suitable cellulose lacquer for the purpose should be amply plasticised in order to render it sufficiently flexible to resist peeling-off influences. Sometimes such lacquers can be obtained from a high-class local paint shop, but you could obtain good lacquer of this type from either Messrs. Wm. Canning and Co., Ltd., Gt. Hampton Street, Birmingham, or from Messrs. R. Cruickshank, Ltd., 1, Camden Street, Birmingham, 1.

The lenses can be protected with either vaseline or Lanoline, so that the lacquer may be sprayed without dismantling the parts. A fairly heavy coating of vaseline or Lanoline should be applied.

The lettering on the lens mounts will best be filled in by means of the black wax which is used by clockmakers for dealing similarly with figures and fine engravings on clock dials. The wax is supplied in the form of sticks, the end of the stick being heated and passed over the engraved figures which are thereby filled with the black pigmented wax. Subsequently, the surplus black wax is rubbed away by careful abrasion with a soft cloth charged with a paste of fine emery and water. The method is tedious but quite effective. The black numeral wax here referred to can be obtained quite cheaply from any dealer in clockmakers' requisites, such as Messrs. E. Gray and Son, Ltd., 18 and 20, Clerkenwell Road, London, E.C.1.

Waterproofing Spruce Planking

I AM building a boat which is planked with $\frac{3}{4}$in. spruce and will be painted white. The planking on similar boats when they have been in salt water for a while absorbs water and increases in weight considerably, despite the fact that it is painted with both raw linseed oil and a final coating (flat paint and gloss paint mixed). How can I keep this water out of the timber? The objection is to the increase in weight.—Joseph A. Kilkenny (Dublin).

WOOD, even if it is impregnated with linseed oil, raw or otherwise, will always contrive to absorb a certain amount of water. You could have reduced this tendency towards water absorption by brushing the spruce planks liberally with hot creosote, but this would have prevented them from being painted afterwards. It would have been better to use teak for the planking instead of spruce, which is a much more absorbent wood. We can only suggest that you dissolve about 10 parts of aluminium naphthenate in 90 parts of white spirit. This is brushed on to the wood fairly liberally and allowed to dry in. Finally, the planks are painted over with the chosen oil paint, to which a small proportion of the stearate solution has been added. Aluminium stearate is a powerful waterproofer. It can be obtained from Messrs. Thos. Tyrer & Co., Ltd., Stratford, London, E.15, the price being about 6s. a pound.

There is, however, no type of paint which will really successfully waterproof the deck planks in the instance which you quote.

Alkaline Degreasing Salts

I WISH to obtain details of an electrolytic alkali for degreasing and removing rust from metals.

The process is apparently used in this country for reconditioning and reclaiming metals, and I understand that the process removes grease and rust with very little damage to the surface of the metals.

I shall be obliged if you will be good enough to advise me of the name or names of the manufacturers of the above chemical.—H. S. Barton (Farnborough).

THERE are quite a number of alkaline cleaning and degreasing salts which can be used electrolytically. Such salts are usually trisodium phosphate, sodium metasilicate and caustic soda. These may be had (in bulk), from Laporte Chemicals, Ltd., Luton, Beds, or from any firm of laboratory furnishers. It must, of course, be recognised that alkaline salts are not suitable for the electrolytic cleaning of all metals indiscriminately. Some of these salts would actually dissolve and corrode many of the lighter non-ferrous alloys, but since you mention the de-rusting of metals, we imagine that you are, in the main, referring to the ferrous metals only. An all-round alkaline preparation for electrolytic cleaning preparation is given in the following formula:

Sodium carbonate	8oz.
Caustic soda	2 „
Trisodium phosphate	2 „
Sodium silicate	2 „
Water	1 gallon

From Messrs. Wm. Canning & Co., Ltd., Great Hampton Street, Birmingham, you can obtain ready-made alkaline salts for electrolytic cleaning.

All these cleaning salts are used as follows: The salts are dissolved in water so as to form a moderate-strength solution. The solution is poured into an iron tank, which is made the anode. While the work to be cleaned is suspended in the solution as the cathode. A moderately heavy current is passed. Large volumes of hydrogen are liberated at the cathode and the grease is quickly removed therefrom.

Electric Fires: "Coal" Effect and Sticking Vane

(1) COULD you tell me how to get the "coal" effect for an electric fire I am building? I have tried silicate of soda on a fine wire mesh, but this does not give the proper effect.

(2) I have a commercial fire and the small vaned wheel which should revolve under the "coals" only does so if one taps the fire or if started by some vibration in the room. I can see no wear in any of the parts. Can you suggest a remedy?—D. Beamont (Plymouth).

(1) THE commercially made electric fires have the "coals" made of glass which are fused together in one piece. If the sodium silicate which you have tried is in large pieces it should give a correct effect, especially if the upper surfaces of the big lumps are brushed over with a dead black paint or the blacklead with which grates are treated.

(2) With regard to the sticking vane, it is evident that the point on the top of the lamp is blunt and sets up friction. Mould a small lump of Plasticine or hard clay around the "pip" on the lamp and set in it about ⅜in. of the pointed end of a fine needle. On this new point the vane will revolve without trouble.

Making a Kaleidoscope

COULD you please give me details of how to make a kaleidoscope? I have some idea of the principle, but do not know the most suitable length and angles.—E. Spencer (Northampton).

THE most simple form to give a kaleidoscope is that of an equilateral triangle with three strips of mirror glass, all of equal width and fitting closely together in a tin or cardboard tube, which tube should be parallel. The ends should be cut square. At the end opposite to that which you look into there should be two pieces of plain clear glass with a space between them. In this space are placed a number of oddly-shaped fragments of coloured glass.

When the tube is rotated the coloured fragments are reflected in all three mirrors and produce very beautiful symmetrical patterns. The degree of beauty and colour effects are dependent upon the shapes and choice of colour in the glass fragments. The principle can be very much elaborated by making the kaleidoscope larger and increasing the number of mirrors. It is also possible to have double sets of coloured fragments.

Reinforced Concrete Slab

WOULD a reinforced concrete slab be suitable over the door of a garage? The doors are 7ft. wide and the walls are 9in. thick. The front of the garage will be stepped up from a height of about 6ft. 6in. to 9ft.

If it will be suitable, will you let me know what composition of concrete to use and the number of steel rods to use, etc.?

I have tried to obtain an "H" girder, but have met with no success, as they appear to be very scarce.—S. Beckett (Farnworth).

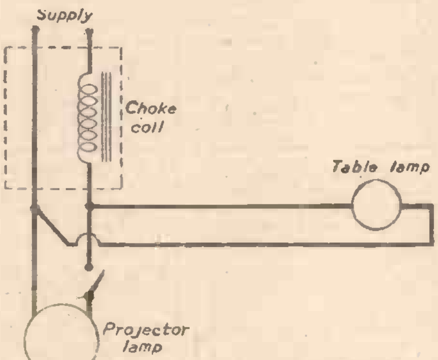
A REINFORCED concrete slab would be quite strong enough for the purpose you name provided that it was properly formed. For the concrete mix use two parts Portland cement and two parts of aggregate. The aggregate should comprise one part (by measure) clean sand (NOT sea sand), one part fine sieved ashes one part fine grit (⅛-¼in. particle size) and one part fine brick dust, or any type of fine inert filling material. When slaking this mixture with water to make the cement, it is a good thing to work into it a quantity of well-wetted hair (horsehair, etc.) or any other fibrous material. This gives extra strength to the material when set. You should use as metal reinforcements from six to 10 ¼in. iron rods, laid in the direction of the length of the cast beam, but at different levels in it. As a matter of fact, you may use as many of these as you like, together with intervening scraps of metal mesh and network, but you MUST be sure that the concrete mix is well tamped down into the mould and well consolidated therein so as not to leave empty spaces and voids which would provide areas of weakness and thus powerfully counteract the good influences of the reinforcing material which you have provided. You can also mix a small amount of angular stones with the concrete. The stones must be well wetted beforehand, and preferably soaked in water or left out in the rain a few hours before mixing in the cement.

Projector Switching Device

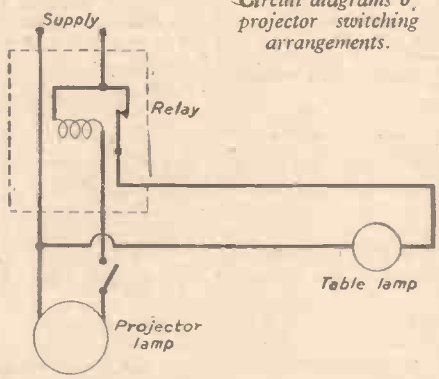
I HAVE seen in an American journal a very useful device for using with a cine-projector. I would like to build something like it, and hope that you can tell me the lines on which to work.

The device is in the form of a small box, which plugs into a wall switch plug, rather as a two-way adaptor does. It has two two-pin sockets—one for the projector and one for a table lamp. The current is switched on, lighting the table lamp, and when the projector is switched on (it has its own switch built in) then the table lamp goes out; when the projector is switched off, on comes the table lamp.

It is specified for A.C. only, and no alteration is to be made to the projector wiring, the flex for which is a normal two-core.—Harold Gough (N.W.11).



Circuit diagrams of projector switching arrangements.



IT occurs to us that the projector lamp may have a considerably lower voltage than the supply mains and that this is connected through a choke coil to reduce the voltage at the projector. The table lamp may be of mains voltage and low wattage and connected across the output terminals of the unit, to which the projector lamp is connected. The projector lamp probably takes quite an appreciable current. When the projector is switched off the table lamp may take such a low current that the volt drop across the choke coil is then negligible, giving almost mains voltage at the table lamp.

When the projector lamp is switched on the volt drop across the choke coil may reduce the output terminal voltage below the lighting value of the table lamp.

It is, of course, possible that there is a small relay inside the unit. Such a relay could have its coil connected in series with the projector lamp circuit with contacts (which close when the relay coil is de-energised) in series with the table lamp. In this case the table lamp and projector may be of mains voltage so that no choke coil is required. A shading band would be required on the core of the A.C. relay.

Regilding Picture Frames

I HAVE been trying to regild some old picture frames, using gold paint, but it has dried very unevenly. Could you advise me how to achieve a good even coat? Is there such a thing as a cheap type of gold leaf which I could use instead of gold paint, and if so could you please advise me in its use?—W. E. Grenfell (Southsea).

THERE is no such thing as a cheap gold leaf. Gold is gold the world over. "Dutch metal," a zinc-copper alloy of golden colour, can be had in leaf form, but it rapidly tarnishes and is hardly suitable for your purpose. Gold leaf can be attached to picture frames by lightly brushing over them a 50 : 50 mixture of egg white and COLD water. When this has dried, it is then breathed on to moisten it slightly, and the gold leaf is merely rubbed down over the surface, the thin paper backing of the leaf being peeled off. The operation requires some skill and practice and it is expensive, particularly when operating on big picture frames.

A very good substitute for real gilding can be effected as follows:

Obtain from Shawinigan, Ltd., Marlow House, Lloyd's Avenue, London, E.C.3, about ½ lb. of polyvinyl acetate resin ("Gelva" Resin, No. 7). Obtain also, from Messrs. Johnson & Bloy, Ltd., Metana House, Hind Court, Fleet Street, London, E.C.4, an ounce or two of "Rich Pale Gold" bronze powder.

Dissolve 20 parts of the polyvinyl acetate resin in 80 parts of warm methylated spirit. Pour a little of this solution on to a shallow dish, and work into it a quantity of gold bronze powder. This will give you a freshly-prepared gold paint which will be quick-drying and whose spreading qualities will be governed by the amount of the resin solution which you incorporate into it. This paint cannot be kept. You will have to make it afresh every time you require to use it. But you will find it better than the majority of proprietary gold paints, and, moreover, much cheaper than the latter.

Carefully applied to a clean and grease-free frame with a hard, flat brush, the effect will be brilliant and lasting. In fact, the only drawback to the result, from an artistic standpoint, will be the inner realisation of the fact that "all that glitters is not gold."

Other shades of gold bronze powders can be obtained from the above-mentioned firm, but the shade above quoted is about the most brilliant for average picture frame purposes.

Negative Reversal: Stereoscopic Projection Arrangement

I AM interested in stereoscopic photography and would like to know:

1. Is there a method by which an ordinary negative film can be developed to give a positive transparency instead of a negative?

2. If a stereoscopic pair of transparencies were superimposed by projecting both onto one screen, each having first to pass separately through a polarising glass filter so that they were polarised at 90 deg. to each other, would a stereoscopic effect be produced by viewing the screen through a pair of polarised spectacles with the glasses arranged so that each eye would only be able to accept one of the polarised images on the screen?

Any information or references to books on the above queries would be appreciated.—T. J. H. Bate (Devonport).

(1) GENERALLY speaking, methods of negative reversal are not very successful, when the reversed negatives (otherwise positives), are required for transparency purposes, the reversal process taking away a good amount of the fine detail. However, for your information here is a process with which you can experiment:

The reversal bath is made up as follows:

Potassium dichromate	8 grams.
Sulphuric acid	12 cc.
Water	1,000 cc.

Develop the plate or film in the ordinary way. Wash it well but do not fix it. After washing for a few minutes immerse the negative in the above reversal bath, and then turn up the full artificial light, or, alternatively, place the dish in full daylight. After about 1½ minutes, the negative image will be dissolved away and a faint positive image will be seen. When the negative image has gone, wash the plate or film in running water for five minutes or so in order to get rid of the dichromate stain. Then re-develop in any ordinary developer, the plate or film being kept in artificial or daylight all the time. Finally, wash the positive well and dry it in the usual manner. No fixing is necessary.

(2) The arrangement for stereoscopic projection which you outline would not work because despite the fact that the arrangement would enable each eye to diacern only one particular image, the required image-separation (in a spatial sense), would not be present. As a matter of fact, we believe that something very similar to your suggested method has been tried out for stereoscopic screen viewing, but we have not been able to find the precise reference to this experiment.

A modern standard work on stereoscopy and its applications is:—

A. W. Judge: "Stereoscopic Photography" (Chapman and Hall). This should be available in your local reference library or from your county library.

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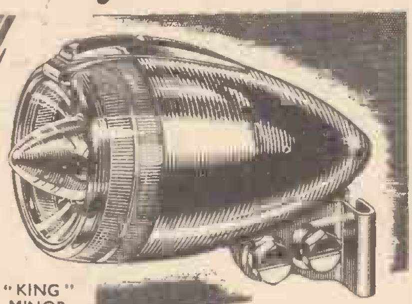

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THE Cyclist
Editor: F. J. CAMM
VOL. XXI DECEMBER, 1952 No. 367

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Phone: Temple Bar 4363
Telegrams: Newnes, Rand, London

Comments of the Month

By F. J. C.

The W.R.R.A. and Eileen Sheridan

ON more than one occasion we have had to criticise the Women's Road Record Association because of its inexperience and wrong handling of its affairs. When Margaret Wilson was making most of the members of the W.R.R.A. jealous by the consistency with which she made and broke records, finally holding every one on the books, some effort was made to strike a distinction between amateurs and professionals and a proposition was actually tabled suggesting a change of rule which was to be retrospective so as to upset some of those records. It may be that women have not the ability to legislate so well as men and this curious institution which seems to be specially created to watch their interests certainly has not taken a leaf out of the book of its older counterpart, the R.R.A. The W.R.R.A., as a fact, is an unnecessary institution, for the homologation of women's records could equally well be undertaken by the older institution, whose long experience would have avoided some of the mistakes which the W.R.R.A. has made.

Take its latest antic over Eileen Sheridan's Land's End-London record; when the Association met to consider Eileen's claims to record they rejected out of hand the Land's End-London record because there had been an infringement of rule 44, which lays down that "any preliminary notice specifying the intended date or time of a record attempt appearing in the Press with or without the consent of a rider may be regarded by the committee as a sufficient ground for the rejection of the rider's claim." This rule is quite monstrous and militates against the rules of natural justice; for on no grounds, ethical or otherwise, should a rider be held responsible for the action of another. In this case Eileen Sheridan was unaware of the unwitting infraction of this specious rule and to reject her record for something of which she was unaware and could not prevent is just the sort of thing which one would expect from this committee. The rule, it will be noted, is framed in the subjunctive mood. It says that such infraction *may* be regarded as sufficient grounds for the rejection of a record. On what grounds, therefore, was the record rejected in view of the facts?

Unless this rule is removed we foresee an early demise of the W.R.R.A.; for what woman is going to risk riding against the watch from Land's End to London only to find at the end that because of some accidental prior publicity the record has been rejected? There will have to be some relaxation of this advertising rule, not only in connection with road records but with time trials and road racing. We are living in 1952 not in 1892, which seems to be the spiritual home of the old fogies of the past who still think that a cyclist clad in black tights is inconspicuously attired. It should, perhaps, be hardly necessary to state the name of the paper which published the "offending" paragraph giving news of Mrs. Sheridan's attempt. Frank Southall, the team manager, and the rider were both unaware of the paragraph.

Now that mass start racing is accepted firms will not be interested in it unless publicity for both rider and machine be permitted. If the W.R.R.A. continues to act in this captious, frivolous and irresponsible way it will find a schism within its ranks and another body will be born. This is what has happened in other cycling organisations. Hell hath no fury . . . !

B.L.R.C.—N.C.U. Affiliation Rejected

THE B.L.R.C. has rejected the terms of affiliation offered to them by the N.C.U.

All hopes, therefore, of a peaceful settlement of this long-standing dispute seems to have vanished like a cloud upon the silent summer heaven. The rejection was made in the following terms: "That this meeting turns down any proposition for an affiliation to the National Cyclists Union. We are prepared to negotiate an agreement with the N.C.U. on similar terms to the R.T.T.C., i.e., equal terms. The B.L.R.C. feels that they have earned and are entitled to be recognised as the controlling body for road racing in this country." The N.C.U. president replied: "You will know from my previous letters and my statement when the League, the Union and the R.T.T.C. met the Manufacturers Union in Coventry that your letter closes the door to further negotiations. . . . The N.C.U. is not prepared to acknowledge a governing body for any form of cycling sport. That is the position to-day. The N.C.U. made concessions which most probably exceeded anything that my members in Council would make, but we did that in an effort to bring peace to the sport. These concessions are now withdrawn and the Union will now only admit the League to membership on the terms of my letter dated June 14th. The Union intends to maintain its position as the governing body of British cycling."

The letter of June 14th referred to above from the N.C.U. to the B.L.R.C. contained the following terms of membership:

(1) That the B.L.R.C. applies for affiliation (as an affiliated organisation under the Union's Article 10 (b)). The minimum subscription under this article is £1 1s. per year, and the organisation is allowed one Centre Councillor (to the N.C.U. Centre in which its headquarters are situated) for *each* £1 1s. paid (By-law 41 (b)).

Acceptance of this would allow the B.L.R.C. to retain its identity and give it a similar official status as the Army Cycling Union.

(2) All B.L.R.C. clubs to have the option of affiliating to the N.C.U. as clubs—affiliating their individual members in the club's name, each affiliated member to get full N.C.U. benefits, including the right to one Centre Councillor for the first 10 affiliated members and one for each 15 thereafter.

Any Centre Councillor representing the League or its clubs would, of course, be in a position to stand for election for the General Council on the same terms as present N.C.U. members and clubs. Any General Councillor so elected would have the right to stand for election to any standing committee of the Union or any official position. Any club can include B.L.R.C. in its name if it wishes.

(3) Affiliation of non-racing members of League clubs may be optional, but all racing members of League clubs must be affiliated to the N.C.U. and must hold Union Racing Licences.

(4) The B.L.R.C.—as an affiliated organisation—would be able to organise events (a) confined to League members (this would enable the League to hold its own championships) or (b) open events, but under N.C.U. rules, e.g., Tour of Britain or Brighton-Glasgow race, organised by the B.L.R.C. (under N.C.U. rules).

(5) All open events (whether B.L.R.C. or N.C.U. promotions) to be open to all holders of N.C.U. licences. Holders of U.C.I. licences to be able to compete under the usual conditions applicable to N.C.U. events.

(6) B.L.R.C. independents who had received money prizes or trade sponsorship (whether from the cycle trade or any other commercial source) will be reinstated as professionals.

(7) B.L.R.C. independents who have not received money prizes or sponsorship would be reinstated as amateurs.

At a meeting between the N.C.U. and B.L.R.C. on September 27th the Union agreed to amendments to the original terms, to provide that racing members of League clubs wishing to participate in open events must hold N.C.U. licences and that major open events (Tour of Britain, etc.) should be under agreed B.L.R.C./N.C.U. rules, with all open events to be free to "holders of internationally recognised licences. . . ."

1953 Tour of Britain

IN the meantime the League, in its official journal, states that it *will* be promoting the 1953 Tour of Britain. This seems to deny the rumours that the *Daily Express* had applied to the N.C.U. for next year's event to be run under their rules. Their attitude towards the N.C.U. is expressed in the following words. "The B.L.R.C. seeks to bring unity to the cycling world. They wish to make it quite clear, however, that they are in no circumstances prepared to accept the original N.C.U. terms as they stand at present."

AROUND THE WHEELWORLD

By ICARUS

A picturesque Thameside village very popular with London wheelfolk.

Fifty Years of S.A. Gears

THE first Sturmey-Archer gear appeared in 1902 so this year it celebrates its Golden Jubilee. The company now produces eight different hub gears, five brake hubs and combinations, three dyno-hubs and combinations and a full range of cycle lighting equipment. Sturmey-Archer Gears, Ltd., of Nottingham has signalised the Golden Jubilee of the S.A. gear by publication of a book entitled "Fifty Years of Leadership." The company is, of course, part of Raleigh Industries, Ltd., which to-day employs nearly 7,000 people in what is probably the largest and most modern cycle plant in the world, covering an area of 40 acres. The company was founded by the late Frank Bowden, who also founded the Raleigh Cycle Co. To-day over 2,000,000 hubs are sold every year and they are exported to practically every country in the world. The story of Frank Bowden is quite remarkable. He took up cycling after a long illness and became so interested in cycling that he secured a financial interest in a small bicycle workshop in Raleigh Street, Nottingham. In those days bicycles were heavy and roads were bad. He realised that a gear was the solution to the problem. It was whilst he was searching for a design for a variable gear that Henry Sturmey, a Somerset schoolmaster, who was not by any means an engineer, offered to him a device which he had designed in collaboration with Arthur Pellant, who was a London cycle dealer.

Round about this time Bowden met James Archer, who had invented a three-speed gear on lines somewhat similar to Sturmey's. Combining the advantages of both, the first Sturmey-Archer three-speed gear patents were taken out in 1902 and a new department was formed to develop it under the foremanship of Archer. Shortly afterwards the first gears were marketed. Later G. P. Mills, one of the greatest racing cyclists, joined them and so did William Reilly, who had himself invented a two-speed gear. Gear succeeded gear and culminated in the production of the now famous X hub. The original hubs were three guineas each, but increased demand led to increased production and the price dropped to a guinea. The three-speed gear and coaster hub combined was marketed in 1908 under the name of the Tri-Coaster. The K hub was produced in 1918 and four years later a new single coaster hub, type CC, was marketed. Many famous racing cyclists have raced using Sturmey-Archer hubs, including Harry Green, Jack Rossiter, Sid Ferris, Bert James, Charles Holland, Tommy Godwin, Charles Marshall, and many others. The hub gear to-day is more popular than ever in spite of the competition of the derailleur gear.

A Bottom Brake and Gear

MR. G. H. KENDALL tells me that in Sweden the greater majority of bicycles are fitted with back pedalling brakes only and that they are also fitted with Novo-Vaxel hub type two-speed gears. This revives memories of the James two-speed gear which was built into the bottom bracket. An illustration of the Vaxel gear is given on this page.

I have often wondered why the Eadie coaster hub went out of popularity. I used one for many years and had no trouble with it, although I know that some cyclists never really got used to the back pedalling action and were apt to apply the brake when they did not wish to do so.

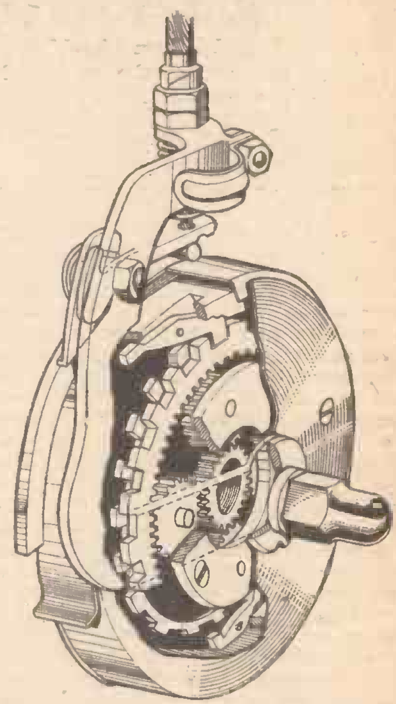
Death of Harry Payne

I GREATLY regret the passing of my old friend, Harry Payne, who had such a distinguished racing career. He was a member of the Road-farers' Club and often recounted his early racing history. His very first ride was on Good Friday, 1894, at Putney, and during his long racing career he managed to win well over 200 prizes in this country and on the Continent. Although he was at his best in the sprint, he won four national championships which included the 50 mile. He maintained a keen interest in cycling events right up to his death and regularly attended all Road-farers' functions.

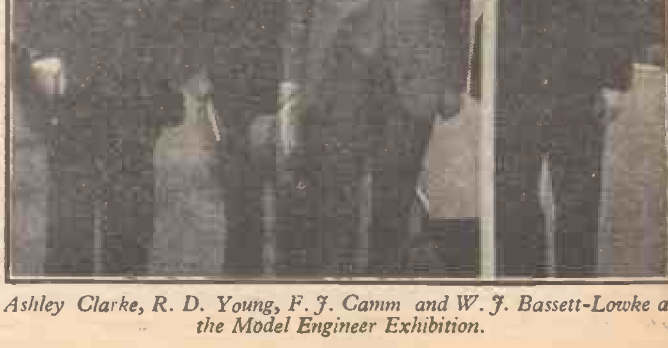
He was well acquainted with almost everyone of note in the cycling world.

The Financial Position of the N.C.U.

THE fact that the N.C.U. has scarcely managed to keep its head above water during recent years has very naturally caused them great concern. At the recent meeting there were many proposals for methods of increasing revenue. One of those proposals was that the membership fee should be increased for, although the N.C.U. is still solvent, it requires about £2,000 a year more to make it a paying concern. However, the proposal to increase fees was defeated, but it was agreed that administration costs must be reduced. A resolution was accepted that



The Novo-Vaxel hub type two-speed gear.



Ashley Clarke, R. D. Young, F. J. Camm and W. J. Bassett-Lowke at the Model Engineer Exhibition.

The Crown

Horton. Bucks.

A quiet secluded little village near Colnbrook. John Milton lived here for six years. His mother is buried in the chancel of the church, a fine building containing interesting Norman work.

a levy of threepence per rider be imposed on all entrants in open circuit and road racing and open track meetings. A new scale of representation on the General Council was agreed to by 56 votes to 14 and this will reduce the numbers of those attending the General Council meetings, which take place twice a year, by nearly 25 per cent. and save nearly £100 a year. There are to be reductions also in three committees, the Management Committee from 9 to 7, the Track Racing Committee from 7 to 5 and the Touring Committee from 7 to 5. The Legal Committee remains at 5. Professional licence fees are increased from 1s. to £2 and managers, licensed trainers and masseurs must pay an annual fee of 10s., an increase of 7s. 6d. The National Rally will continue to be held at Leamington, probably in the second week in July.

The secretary said that the Centre spirit scarcely exists and that racing alone is insufficient to support the N.C.U. What is required are more rallies and centre functions. Next year the N.C.U. celebrates its 75th anniversary.

Sid Cozens

SID COZENS, who has done so much for the sport, has been called upon to resign by the N.C.U. in which he holds a number of official positions. This was circulated in a statement to the Press after a meeting of the Appeals Committee. Previously he had been suspended for contravening Rule of Racing No. 11 and Article of Association 70. His appeal against the decision succeeded as far as Rule of Racing 11 was concerned, but under Article of Association 70 his conduct was considered prejudicial to the interests of the Union. "For this reason the Appeals Committee calls upon Mr. Cozens to resign all his official positions not later than October 14th failing which he shall be removed from all such official positions." Sid Cozens is employed by B.S.A. Cycles, Ltd., and acted as manager to their winning team in the Tour of Britain. He is chairman of the Birmingham and Midlands Centre Mass Start Committee and a delegate to the U.C.I.

"Daily Express" Tour of Britain

A WELL-ILLUSTRATED booklet telling the full story of the second *Daily Express* Tour of Britain 16 day cycle race, organised in conjunction with and under the rules of the British League of Racing Cyclists, from August 22nd to September 6th, has just been published by the *Daily Express* at 2s. It is not only an interesting record and souvenir of the race but a glowing tribute to the efficiency of the B.L.R.C. Copies may be obtained from the newspaper named at their Fleet Street office.

New Use for the Dynohub?

I HAVE received the following interesting letter from Mr. G. Harris, of Nottingham. Perhaps readers would like to discuss the technical points he raises. I will give my own comments on the matter next month.

"From time to time I have derived great pleasure and interest by reading your excellent articles relating to inventions and discoveries, that I have decided to tender an important discovery to you for the benefit of your readers who care to try for themselves the facts I state herewith. The benefits concern those of the cycling fraternity, and can be attained by anyone who cares to try out for themselves the method I have discovered for making a cycle so easy running as to be self-propelled.

"No doubt many of your readers have been confronted with the eternal question of perpetual motion and many vague ideas have been met with such as utilising an electric motor to drive a dynamo whilst using the output of the dynamo to drive the motor—and so on, ad lib. It is no use, however, for it has not been possible to attain 100 per cent. efficiency from any electrical conversion to power. The falling balls and weights on loaded wheels have failed for the same reason, but there has been one small electric device overlooked in this search for the ideal, and it is to be found in the hub-dynamo or 'dynohub' now so common to cyclists.

"Experiments with this device have shown that the principle of the multi-element magnet array of this instrument can possess certain little understood factors which, when properly arranged and paired together, can produce surges, one within the other, when revolved whilst connected with terminals joined together. It is difficult to explain to the lay mind, but the facts are well known to the power engineer engaged in running tandem alternators for, under certain conditions, there will be periods of unstable running in which no current flows either to or from an alternator, and at this critical period it is possible to obtain a slight torque from no apparent source of energy. This is known as 'hunting,' and can be a source of danger to the machines so afflicted.

"You may say it is not possible to see the connection of what I say above to the benefits I wish to offer cyclists, but the dynohub, with almost frictionless bearings running with considerable flywheel energy (impetus of rider), will be found to possess this yet unexplained source of free energy or torque when run in tandem whilst connected together externally by conductors from terminal to terminal.

"Proof has been found in these statements on actual tests with dynohub in rearwheel and front wheel. For anyone with rear dynohub it is a simple matter to borrow from a friend an identical one to try at the front. The procedure is to join them together electrically and venture out on the road. Depending upon the actual electrical phasing at any given time some rather astounding results will be apparent from time to time as the wheels allow of synchronism, or rather, it would be more correct to say, during those periods of slight slip in the near synchronism, for this is the cause of the source of free power or torque.

"It is possible to explain on paper by drawings and graphs why this is so, and also to produce in practice with heavier machines excess momentary torques which would strain the machines severely, but the best proof for the layman is to try the two dynohubs, for, as I have said, there is, in these devices, just the mechanism to bring the facts to the notice of the rider.

"At first there will be noticed nothing different, but on the level when the cycle is under way with the easiest of pedalling a condition will arise when the rider will be conscious of an added torque resembling that found with the wind to the rear. This will undulate according to the relative sizes of the front and rear wheels, and experiments should be tried by releasing air from one of the tyres (although both must be really hard). The result is both gratifying and uncanny, but on those periods when the synchronism is slightly lagging in one of the hubs the rider, if he be sensitively acute to the result, will be drawn along on the level whilst the 'feel' of the magnet poles passing over the central stator will be apparent. Speed is increased for a while until near-synchronism passes into complete dis-synchronism and pedalling will have to be resumed. After a short while (depending on the relative diameters of the two wheels existing at the time) a further accelerating will be noticed and a cycle of periods will reoccur. Tuning up to quicker repetitions can be made by adjusting the pressure in the tyres, but it must be made clear that tyres must be hard and the cycle bearings in good order for the effect to be really worth while. It is really astounding what can be done by carefully noting the periods of self-acceleration of the machine, and if two cycle wheels are set up to revolve freely and synchronised with strobic light they will run for whatever period desired. Unfortunately, this cannot be attained as the effects cancel eventually owing to the 'slip' and lack of re-synchronising effected whilst on the road by the rider pedalling during the periods of no torque.

"I trust you will find this information interesting and that it may be tried easily to lend assurance to the claims made herewith, and a report made in your paper accordingly.

"I should add that if no results are apparent at first, the rider should dismount and spin one wheel, or move it slightly, to position the poles of the magnet. It will be readily seen that certain positions of the wheels are unfavourable for the torque to be available."

Wayside Thoughts

By F. J. URRY, M.B.E.

GREAT FOSTERS
EGHAM.
A lovely Elizabethan house which was once on the edge of the great forest of Windsor

These Swift Times

WHILE I'm thinking how to ride comfortably, if slowly, the younger generation of racing cyclists is wondering how to squeeze in that other bit of speed and complete the unpaced out-and-home "100" in four hours. In my day we deemed such a feat impossible, and even when the "25" was completed in less than an hour, the "100" was still half an hour off the "even time" of these modern days. Then, only a few years ago, the "50" was hauled down under two hours, and now the "100" times are creeping nearer and nearer to the magic four hours, the fastest yet, as I write, being but a trifle over six minutes outside. I remember when a certain journal offered a gold medal for the inside five hours' ride for the out-and-home "100," and this was eventually won by the late Leon Meredith after several attempts by him and other great riders of that day. Who is going to offer a "gold" for the four hours' performance? It almost seems as if it were on the *tapis*, and I shouldn't be surprised to see it accomplished in the near future. Many people have speculated about the reasons for this quickening of human endeavour in the athletic field and especially in the cycling branch of sport, and some have wondered if our simpler diet has had anything to do with the matter. Personally, I don't think that side of the question counts very much. We must recollect that improvements in athletics with the aid of a machine must owe something to the vehicle, and in the latter sport particularly to tyres; but there is no doubt the boys know better how to train, to use every ounce of energy in the effort, with a nice calculation of unleashing such energy with splendid judgment over a period of time. I like to see these things happen, and in my ambling gait find the lads whizzing by me with a speed undreamed of in the days when I thought I could ride.

How Worthwhile

OF course I know I'm growing older and, maybe, foolish in the eyes of some folk, but the fact is I can just about cope with the exuberance of the new generation, and, incidentally, teach them how to ride, to see things, to recognise birds by their songs and to love the heart and soul of this delightful land. And besides I like to share the favours that have fallen to me, and am convinced if more folk did this who can afford it, their lives would be the happier as a result. By and large, too, it is plain to me that young and old can enjoy the thrills and quiet delights of touring. In a year or so will come the day when possibly the youngsters who were my companions will also be attracted by speed, but, maybe, they will remember their earlier days when "the old man" prowled around with them and realise there are better things in life than all the modern invasions that attract and distract us, and that one of them is cycling, that simple and satisfying form of travel—neither too fast nor too slow—that makes every day a holiday and some of them an unforgettable experience.

Motor Snobbery

THE other day the B.B.C. asked me to call at a certain time, and I went there on a bicycle, my usual method of travel. The cheerful janitor told me my bicycle must remain outside, and my reply was to the effect that I should accompany it, for if the B.B.C. wanted information from me that bicycle was part of my needful equipment. A 'phone message to authority put the matter right, and the merry janitor said he was very glad to communicate my protest, but had to carry out his instructions. So much for that; but isn't it strange that a man on a bicycle should be counted such small fry, and his machine less still by people who ought to know better. I've reached the time of life when I care little enough what people think of me and if they care to be rude to me or my belongings I can give them the correct change without, I hope, jangling the coin too fiercely. I am tired of this sense of importance attaching itself to the car-owner, probably not by the driver but certainly by the individual he calls to see; though curiously enough the importance immediately disappears if the man is driving a lorry or van, yea, even though he be the owner, and may even have a multitude of such vehicles. The spit and polish of commercial life to-day has transferred itself from silk hats to steering wheels, and it is about time that phase ceased, and an individual was accorded the right to present his credentials without any outward display of ostentation.

The Intolerance of Youth

I READ a letter printed in a certain journal in which the writer describes the old cyclist as a "holier than thou" artist scaring away from the sport and pastime the younger element who love all the adventure and hard riding attractive to youth. How good it is to hear these young people talk of their joy in "taking acid," and their firm belief that that condition of cycling will last for ever. To ride two hundred miles over a brief week-end, partly through the night, for the purpose of seeing one well-known beauty spot was an adventure to me once, but fortunately for my health and happiness, as I grew up through the fifties and sixties, I came to recognise there was far more in this game than the ability to ride fast and far, so I remained a cyclist. Others of the golden friends of my youth didn't, and most of them still alive are sorry, but few of them would publicly say so. Youth in the hey-day of its prime is a fine thing to stretch into miles of personal travel, to revel in such exercise and feel on top of the world, but the passing seasons will change the individual, and if he or she is to remain a cyclist with all a cyclist's freedom, the change must occur naturally in relation to age; and while one may regret the passing of youth, there is left to one then the delight of activity heightened by the greater appreciation of this lovely land. I say that now with knowledge; indeed, years ago I might easily have been the author of the letter referred to because my attachment to cycling then was concerned with speed and sport. The sport goes on, and I still revel in it by proxy; the speed has lost its attraction because it is now more enjoyable to see, hear and contemplate beauty than to chase it from county to county and miss something on the way. The old rider and the quiet rider know these things; the vigorous youngster can't—yet, but one sincerely hopes he will in the years to come, and so broaden his outlook on a game that is as wide in variety as the characteristics of the people who play it.

The Right Cure

IN the early part of this season, just before the entry of spring, there occurred one of those days as harbinger of the gay time, and I had the luck to enjoy it. During the daylight hours I drifted through the heart of Warwickshire, without touching any township and invaded the counties of Oxford and Gloucester in a round of some seventy miles, and never I think was I more in love with the pastime. I had lived through a winter of work and disappointment, and the promised land of leisure had seemed remote. Except for a short Sunday ride in shower or shine, only one week-end of riding had fallen to my lot since July, and though fit by reason of my daily journeys, I was beginning to wonder if all work and no play could develop into a nasty habit sick with acquisition. That day out cured me of the doldrums as nothing else in my philosophy could. I heard and saw the birds, the under-note of the wind surging in the thickening hedges; the sunshine fell on my neck and hands, the hills looked mysterious and the fresh loveliness of the earth entered into my soul. I went lonely because I wanted to travel that way, to think things out and solve the problem; actually nothing of that sort happened, for the day and the changing scenes claimed me, and I was willing to be so captured and captivated. I made three stops in all, a long one for lunch, and two lesser ones to smoke a pipe where hill streams came foaming under bridges, and the whole conversation of the day would not make a paragraph. I suppose some people will say such an experience is "potty"; but I wonder if any other game could supply so excellent a cure for what appears to have been a close approximation of self-pity, the most horrible mental disease an otherwise sensible mortal can contract. That was a beautiful day out in the fullest meaning of the term.

Those Tasty Snacks

HOW I do envy those people who can eat raw fruit and enjoy it. I saw quite a lot of them during a recent week-end run revelling in the juicy flavour of Victoria plums, and the old desire to emulate them during those warm hours in the valley of the Avon very nearly overcame me. I resisted it, though, remembering that if I did I should soon be paying the penalty, as I have

(*Continued on page* 23.)

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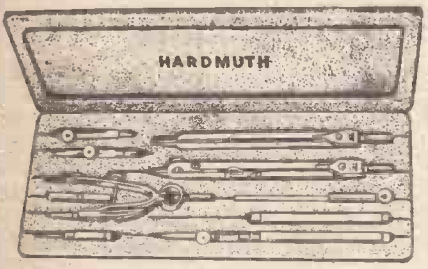

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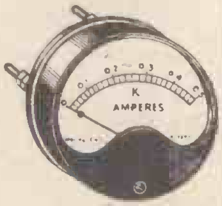

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WAYSIDE THOUGHTS

(*Continued from page 20*)

on so many occasions before, the last one being during the strawberry season. It seems absurd that an otherwise healthy man runs into trouble after eating fresh fruit; but there it is, and the knowledge of consequences keeps me from the temptation. Chocolate, another favourite pick-me-up for the cyclist, is completely outside my taste, and makes me shudder. Not so with fruit: I could enjoy it, but it doesn't like me, so I have to be content with lesser things like the common humbug.

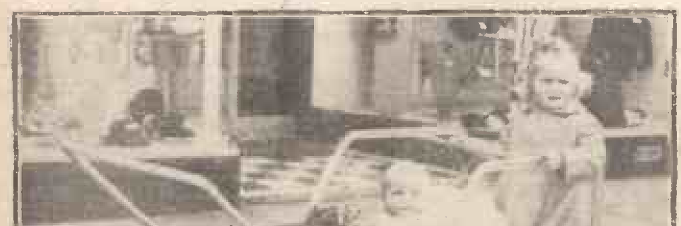
On this particular day I called at an old refreshment place which aforetime understood how to cater, but alas, the standard had fallen to thick slabs of bread and margarine skimmed in grease and served with mass-produced jam of no particular kind. Not a lettuce or a home-made cake, but the kind of meal that just kept you going, devoid of a memory of the pleasure of eating it. Many of our caterers have become terribly stream-lined in this matter of offering refreshment at top prices, and it is about time they were ostracised until they mend their ways. It seems a pity such people are doing their best to dampen the joys of the outdoor life, and damning the once good name of British catering.

Then and Now

STREAMS of lads and lassies went by me in gaily-coloured, scanty raiment as I sat smoking on a comfortable hedgerow seat one Sunday morning some weeks ago, and I marvelled at their vigorous activity and shiny faces as they passed by in an atmosphere which must have been 80 deg. I sat there for half an hour watching the procession and during that period did not observe one rider meandering quietly along, as I had done, but all seemed in a hurry to get somewhere. Then I remembered I was in a state of similar urgency once, gathering the miles for the sheer joy of activity, nor stopping to consider the heavily-burdened air of a full-blown summer's day. I remembered, too, when I was young and touring in the good company of the guv'nor, how he would insist on a rest by the way, and how I used to wonder why, despite his then sixty years of existence. Now I know and, furthermore, am sure he was right, as I'm certain I am now. The time of life makes a difference, but adds to the quiet joy of the pastime much that one missed years ago. Then anything less than 50 miles was not considered a ride; we youngsters were as much the captive of our vigour as the youngsters of to-day, and it is pleasant to admit that tolerance and to hope that most of them will remain cyclists and capture the real charm of meandering with the aid of a couple of wheels. I like to see the riders of to-day on their excursions, and how neat and airily clad most of them are. A similar spirit moves them to enjoy the freedom of cycling, but fine and fresh as this is I'm still of the opinion that the best is still to come if they remain cyclists and all that happy condition connotes, for I've grown old enough to know delight in individual activity is not confined to how fast or how far, but rather how comfortably you can make the grade, gather the beauty on the way and finish the day with sense of satisfaction and well-being. In a car you are glad when the journey's over; on a bicycle you regret the end of a glorious day, and that is the difference. Remain a cyclist and you will retain the quiet glory of individualism that is lost when activity ceases to function.

The Art of the Game

OUT recently with a friend and an occasional cyclist, I noticed how stiff was his action; there was nothing smooth or flexible about it. We discussed the matter and he agreed, after a few miles of practise, ankling was helpful and that it is wise to completely relax when free-wheeling. For the next week, on the way to work and home, I looked at the cyclists, and was once more astonished, such a huge percentage of them were completely indifferent to style and thereby imposed a penalty on themselves. Even those among them whose feet were properly placed rode stiff-legged, with the minimum movement of the ankles, which is a bad waste of muscular power; and even the youngsters, who danced up the slightest rise, seemed to me to need a lesson in ankling. It has become a speed fashion to depend on the fierce thrust helped by the weight and swing of the body, but it is a tiring method of covering the ground when purely pleasure jaunting, and, in my opinion, this part of the racing man's technique is something for the tourist to avoid. Sit still and claw the pedals round; that is what I was told in my young days, and for pleasure riding I think it is still correct. Use your ankles like a toggle joint on a press, and flex your knees and thigh muscles to match that lower movement; the trick is quickly learned and its result brings ease to the pedaller in all conditions. There is no secret about the matter, anyone can acquire it and become a better cyclist, because progress is easier, and the end of the day more comfortable. I am one of the "foot-flappers" as the young, swift men say, but I'm very comfortable in the saddle, and though I may get tired, it's a very long time since I was weary.



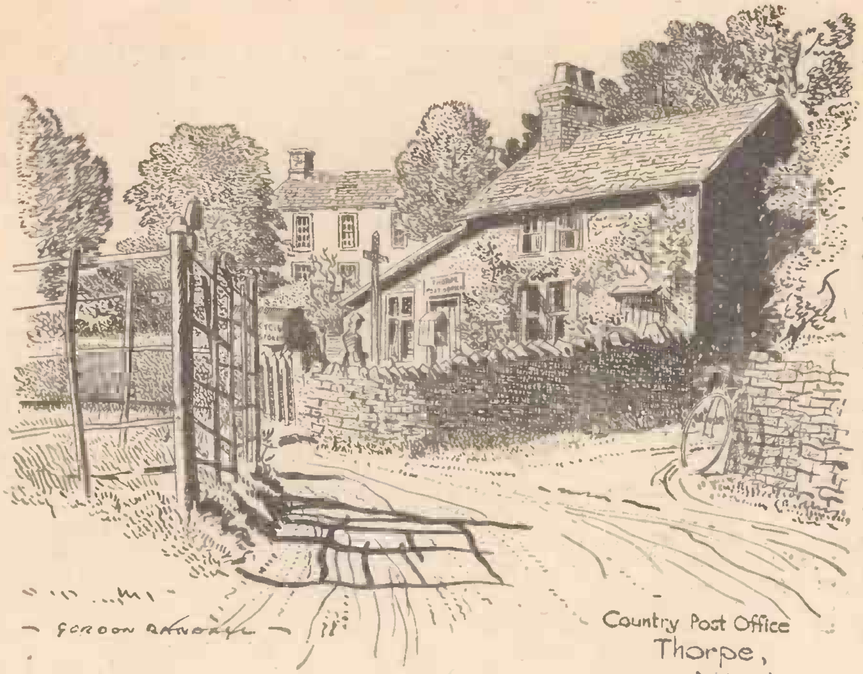
A perambulator-cycle-trailer recently demonstrated by Mr. Holman, of Skegness, in the television programme "Inventors' Club."

The Graceful Way

THE hard work label attached to cycling by non-cyclists and the occasional rider will persist so long as correct pedalling is not considered a matter of importance by the trade, maker and dealer alike. I have a collection of old books and catalogues on the art and pastime of cycling, some of them antidating the invention of the Dunlop tyre. All of them stress this matter of leg power and the best and easiest manner of obtaining it by adopting a style bringing all the muscles into play without overstrain on any. That is the point, the power of the drive can be and should be divided with the result of easing the process of movement and giving it a symmetry of grace. You sometimes hear an individual say "look at that girl, how well she rides." She does; she has acquired the art and therefore made the pastime easy. And so can all of us if we take a little trouble to perfect our pedalling action. It is a pleasant thing to ride a bicycle with the perfection of your own muscular energy; it is not hard work then, but a joyous exercise giving to the individual a sense of style that is with him on every trip. I am not pretending that storm and wind and long hills should be sought to prove my point, but I do know such conditions will neither deter nor distress if a man is well mounted and knows how to ride. Those, indeed, are the two essentials to perfect cycling, the bicycle and the style of the rider, and, having acquired them, then the country is yours in which to scatter your leisure hours and gather delight. That's how I find it, and how I want to find it, for without my bicycle to waft me into the country and all it connotes I should be a very handicapped man in movement and happiness.

The Easy Way

WITHOUT my bicycle! It is an unkind thought, and yet I suppose thousands would be glad to change it for a car. There is no virtue in not feeling so inclined, it is merely the nature of the individual who prefers to exercise his body rather than be whisked around in cushioned ease. The result of that is a body that still functions with ease if not grace. The vigour has tamed a little and it takes me longer time to gather the miles, but I do gather them, and in comfort, which seems to be the answer to the folk who think it's time I retired from the saddle. That time may come, but it isn't here yet so my quiet activity will go on in thankfulness. How much we old riders have to be thankful for can never be told, which is one good and commanding reason why the young folk should never put the bicycle aside. I've just been working out a little journey a couple of us intend to take before winter settles on the land, and we've had a lot of interest in planning our intentions. Whether we shall ever make the journey remains to be seen, but the intention is quite sound at the moment and that is a long way toward implication. I rather revel in these excursions into possibilities, for running over maps brings to the mind so very many happy memories of happy journeys and there seems little reason why they should not be repeated, tamed in tempo and performance, but sparkling with all the recollections of the years. I would far rather do these things than settle into the static manner so many folk appear to think designed for the three-score and ten period of life. There are far too few of us oldsters doing this kind of thing or wanting to, and yet here is the very pastime to fit the years and bring them that touch of youth worthy of living.



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CYCLORAMA

By H. W. ELEY

Christmas in the Country

IT is true, perhaps, that in these somewhat unromantic and utilitarian days Christmas has been shorn of some if its old-time traditions and charm, but in the heart of the English countryside traditions are apt to die hard, and certainly in this grey-green Derbyshire land where I reside Yuletide will be celebrated with something of the old vigour and rejoicing. The bells of the village church will peal merrily on Christmas morning; the interior of the church will be gay with holly, ivy and mistletoe decorations; on Christmas Eve there will be the waits singing outside the inn; in many a heart there will be the age-old feeling of goodwill towards everyone; and on everyone's lips the old, old greeting "A Merry Christmas." I plan, as in former years, to go for a bike ride on Christmas Day, and I hope the sun will shine and the rime gleam like silver on the hedges, for I like my Yuletide to be "seasonable"! Out into the "stone-wall" country—the true Derbyshire; out through tiny villages which have altered little in a hundred years; out to the wide moors where the winds blow, and all is clean and invigorating. Then, in the afternoon or evening, a log fire, a book (and I suspect it will be a book by Charles Dickens, the great interpreter of Christmas), a pipe and, maybe, a tankard of warmed ale!

The BBC and the Bike

CYCLING, whether viewed from the point of view of the tourist or the racing man, does not, in my opinion, receive the publicity it deserves. I have voiced this opinion before and mentioned the rather slender volume of publicity in the Press. And what of radio? I am not sure how many programmes have been devised about cycling or cycles, but I am sure that the "movement" deserves some time on the air. What a thrilling and absorbing programme could be devised about the history and evolution of the modern bike! What memories could be kindled into flame about old-time clubs, and tours, and experiences in the early days when the first machines took to the roads, and a new era of personal transport was launched. The early cycling costumes; the coming of the pneumatic tyre; the early long-distance rides; Land's End to John o' Groats. I can visualise a whole series of most fascinating programmes, with the bicycle as the centre motif: what about it, you busy producers? The material is there . . . and there are lots of "old timers" who could recall the glorious past and make history live.

For Coronation Year

ALREADY we hear and read much of the great plans which manufacturers have in mind in connection with the Coronation celebrations next year. Pottery manufacturers are busy with designs for loving cups and mugs; executives in our textile factories are evolving all kinds of special designs of fabrics to capture the trade, which the crowning of our beloved Queen will bring. Folks are looking out the bunting and flags, and I have heard whispers in many cycle factories that there are plans well advanced to produce special Coronation models of cycles . . . and colour will naturally be the main attraction. The British cycle manufacturer has shown all through the "difficult years" that he can cope with every problem and surmount every snag—and I am sure that 1953 will see a worthy effort on the part of the cycle trade to put cycles and cycling on the map in the year gracious Elizabeth will be crowned, with all the pomp and ceremony embedded in the long history of our royal line.

Beauty in the Black Country

TO some folk the Black Country means just smoke and grime and squalor, and the scarring hand of King Coal and his allies—but it would be quite wrong to imagine that all South Staffordshire is black and unappealing! I know Darlaston, and Tipton, and Wednesbury, and all the curious area around busy Wolverhampton, and whilst I admit its smoke and grime, I also know of some of its green and lovely oases—Kinver Edge and the good country around Stourbridge, and Dudley Castle with all its history and legends of the past. Staffordshire is a many-sided county, with the lush green valley of the Trent to charm one; with the one side of glorious Dovedale within its borders; with ancient Uttoxeter to bring back memories of Roman times; with little Lichfield and its cathedral of wondrous grace, all in the county which has, on the debit side, the Black Country. It's worth while to tour Staffordshire, and seek the green and lovely—so near to the domain of coal, and iron-foundries, and chain-making.

Still They Come

MY post continues to contain friendly letters from cyclists who are regular readers of these notes and I always appreciate the comments made about places and scenes and holiday tours. This year I have had quite an exceptional batch of letters and have gained from them a lot of information about various parts of England and Wales. It is evident that holiday cycle-touring is as popular as ever with those knowing few who realise that the best way of seeing the countryside is by bike. Recently came a letter from a rider who had been thrilled by a tour through homely East Anglia. Like many another he had always imagined Suffolk to be flat and lacking in beauty and interest, but visits to Clare, and sweet Long Melford and Woodbridge, and the ancient port of Dunwich, had altered his views! He had explored the beauties of "Constable Land"; had seen Flatford Mill; had talked with old fishermen at Southwold, and heard the story of the old battle of Sole Bay, and he had been to Framlingham Castle. He returned to London an enthusiast for the eastern land where so much peace still reigns; where the noble Suffolk "Punch" horses draw giant wagons along the lanes; and where there is such good fun in fishing for eels in the reed-fringed dykes. Yes! East Anglia is good . . . and I know it well.

Pink Coats and Panoply

I AM writing these notes on a November day. The sky is dull, but a robin sings cheerily from a gate-post at the bottom of my garden, and the day has been splashed with colour and romance. The hounds have met at "The Golden Cup" inn, and I have enjoyed a glass of toddy with the whipper-in, an old friend who just lives for horses and hounds, and all the glamour of the chase. Hounds moved off to Brackley Gorse and all the village was out to see them. Anti-hunting folk are very vocal and sometimes furious; not everyone believes in the hunting of the sly Reynard; but here, near the classic Meynell Kennels, the hunt is still venerated, and pink coats and fit men and horses, and hounds which are worth I know not what, are things to love.

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