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A Long-Distance Model Monoplane

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Puzzle Picture Competition

Bind your "Hobbies"

This is the first issue of a new series of competitions. Those readers who wish to enter the first volume bound up (Volume I), may like to know that we shall shortly be selling a binding case, tube page and cover for the same. I strongly urge all readers to keep for reference hereafter, the parts of the magazine they have bound with the index supplied with the binding case, as the information contained in them will prove a ready means of turning up the information you require. The index, by the way, has been very thoroughly prepared, and is cross-referenced so that a particular item can be found more quickly. Lower copies are likely to be lost. Will those readers who require binding cases write to me at once, please?

A "Hobbies" Club

A PROPOS my recent, paragraph in which I asked for readers' criticisms, opinions, etc., was suggested that I should start a "Hobbies Club" having a badge and certificate of membership for a nominal sum.

"No Serial Story!"

"Why can birds alight on telegraph or other wires?" This is a question which arose quite naturally to me, as I was reading a paragraph in recent issues of HOBBIES that dealt with the subject of birds and their habits.

"The Lowest Powered Motor Cycle"

The lowest powered motor cycle, made by J. L. Dening, in 1921 was the "Permutative" or "Firestone". It is of French manufacture. In France several other models were made, and the first was the "Permutative" or "Firestone". The model was introduced in 1921, and it was claimed to be the first of its kind in the world. The model was a success, and it was decided to produce it in other countries as well. The model was manufactured in France, and it was sold in the United Kingdom, Australia, and other countries. The model was a success, and it was decided to produce it in other countries as well.
THE ART OF MAKING KNOTS

By "Home Mechanic"

Concluded from page 848 of our issue of March 28th, 1931.

The Clove and Timber Hitch.

The next two knots, the clove hitch and the timber hitch, are used for tying ends of ropes to spars or to bollards. You have all seen bollards; these are short upright iron posts with round heads, and are often seen where ropes and cables are fastened. The clove hitch (Fig. 8) is very much used for this purpose, since it can be thrown on to the bollard in a moment by an expert, and, of course, it automatically tightens itself under a strain. The timber hitch (Fig. 9) is used chiefly for slinging bags—hence its name. Neither of these two knots is of use when the strain is continuous, as they give way quickly and needly a better job of tying ropes to spars or to other ropes.

Tying Ropes to Spars.

Figs. 10, 11 and 12 show three more ways of tying ropes to spars or to other ropes. The two half-hitches are used chiefly for securing the running end of a rope to the standing part. The rolling bend is rather more secure, and does not slip so easily. It is used for finally making a rope fast to a bollard. The rolling bend is not formed under strain which keeps on relaxing and increasing—such a strain, for instance, as a ship riding at anchor puts on her anchor cable. If we have to deal with a varying pull of any sort, we make use of the fisherman's bend.

We have all seen how to make a good many knots, but there are, of course, a great many more in everyday use, and when you have nothing else to do, spend a few minutes in practising the knots which we have described. You will be surprised to find how soon you become quite expert at making them all.

A List of Useful Knots.

Carry your bend of string in your pocket, and when you have nothing else to do, spend a few minutes in practising the knots which we have described. You will be surprised to find how soon you become quite expert at making them all.

Here is a useful list of knots and the purposes for which they are used:

1. The thumb and figure of eight—to make a stop on a rope.
2. The sheet bend, double sheet-bend, and carrick bend—for fastening two ropes together.
3. The bowline on a bight—for making a loop on the end of a rope.
4. The bowline on a loop—for making a pair of loops on the end of a rope.
5. The clove hitch—for making a loop in the middle of a rope.
6. The fisherman's bend—for fastening a spar or beam across a vessel.
7. The timber hitch—for fastening a log to the end of a rope.
8. The sheet bend, double sheet-bend, and carrick bend—for fastening the end of a rope to another rope, spar, or bollard.
9. The harver bend—for fastening two heavy ropes together.

Remember that a rope is measured by its circumference in inches and divided by the diameter. Thus, a six-inch hawser is only about two inches in diameter.

A LOUD-SPEAKER

The LOUD-SPEAKER

remove the horn and turn the adjusting screw to its most sensitive position, which is only attained by lightly tapping the diaphragm. Then hold the "microphone" against your mouth so that metallic tinkling issues from the loud-speaker, do not be alarmed, but remove the cone and connect the top of the base to a more distant position and then listen to the heart-beats proper.

To give a further and more definite idea of the heart-beats, there is of great use to an officer, for occasions are constantly arising, especially on active service, when it is necessary to be dealt with, and the man who knows the art of the "knot" to use and how to make it quickly and neatly will make a better job of conserving space.

A Space-Saving Plate Rack.

In modern horticultural space or lack of it is a serious consideration. We are all aware of the modern flower-cheese bowl galow where, to get from the dining-room to the drawing-room you stay where you are! The tendency is to produce Combination articles, such as box-ottoman-bal-cum-sideboard-warlins, in an attempt to conserve space. The raft shown below is a space-saving device, for it is collapsible, and when not in use need not remain open with its wings spread to the empyrean. It folds up. When the crockery is being washed the stand is on the draining board, and when not in use it can be placed out of the way.

THE LOUD-SPEAKER

The LOUD-SPEAKER

The LOUD-SPEAKER

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The LOUD-SPEAKER
NOTES AND NOTIONS from our READERS

A Useful Window Stop.

When a window commences to rattle, the usual method of stopping it is by means of a wooden wedge. The disadvantage with this kind of window stop is that when the window is opened or shut the wedge falls out and the window continues to rattle. The catch shown in the form of window stop shown in the sketch is quite a simple matter to wedge a window. The catch is fixed to the side of the window as shown, and when pressed against the window holds it quite firmly.—O. B. (Fulham).

A Substitute for a Torch.

A substitute for a torch, a handy substitute can be made in the following manner. Fix a bolt to the small terminal with a piece of wool, and bend down the end of the larger terminal about an inch. Press with the finger on the longer terminal, and when it touches the sensitive end of the bulb, quite a good light results.—C. B. (Fulham).

A Whitewash Brush Shield.

Before commencing to whitewash a ceiling it is a good idea to fix a thin square of rubber over the handle as shown in the sketch. This will prevent the whitewash running down your arms and inconvenience you while working.—F. R. (Newcastle-on-Tyne).

A Substitute for a Strainer.

When you have a strainer, or any other article, which must suit, the article for which it is designed, that is to say any strainer, a substitute can be made in the following manner. Place the design on the leather, which has previously been damped with a wad of cotton wool which has been squeezed in water; using the blunt point of the needle, work up the design. Remember that wrong lines cannot be taken out. This should be done with a large bowl of cold water and let it remain for two hours. Take out and place face upwards on a towel to dry over night.

Method of Colouring.

For colouring the leather you will need one or two powder stains, some being tinted with methylated spirits, diluting to the required strengths.

For large surfaces use a brush of cotton-wool, working with a circular movement, then for the more intricate parts of the design use a brush. Paint the background first and then proceed to the design. When the leather is quite dry, polish with a good shoe cream, rubbing well in with a brush and finishing with a velvet pad. Lastly, iron your work with skiver, using a photographic press, pressing from the smooth side of the leather to the order edge. Leave under a weight till quite dry.

IMPORTANT NOTICE: All correspondence intended for the Editor or Advertisement Manager MUST be addressed to "Hobbies," Messrs. George Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2.
Patterns for a home-made THERMOMETER

The larger pattern is cut from a 3-inch board, the smaller one from 1-inch freewood. Glue one on top of the other and then nail to the thermometer itself.

April 4th, 1931

HOBBIES

THE ROMANCE OF PERPETUAL MOTION

The Dream of Centuries.

Ingenious Devices Intended to Work for Ever!

By The Editor

The idea that we owe to those who, by striving to achieve the impossible, have stumbled across some discovery or invention of great value to civilization will never be realized. The alchemists endeavored to turn base metals into gold. It was a singular desire, for, had it been possible, the value of gold, and hence the purpose of exclusion, would have vanished; gold would have been of no more value than lead.

In their endeavour, however, they accidentally made discoveries which have been of great value in other directions.

The idea has been in the world of mechanism for centuries men have toiled to invent a machine which would go for ever. Now it can be definitely stated that perpetual motion is an impossibility and will never be an accomplished fact. It is only the untrained mind, the unmechanized mind, the mind knowing little of first principles, that would waste time, money, and thought on the proposition.

And yet every year the specifications at the Patent Office represent a bulky and tangible proof of the fact that it is still thought to be possible.

Patents Granted.

Apparently these misguided persons think that the fact of letters patent being granted for an invention is proof of the soundness of the idea.

One hundred years hence the dream of centuries will be as fresh as ever. The country will still draw patent fees from people who believe that they can get more money units out of a given effort than is possible,

Why Perpetual Motion is Impossible.

To repeat a well-known law of mechanics, it is impossible to get more work out of a machine than is put into it. Engineers would be well satisfied if they could get out as much as they put in, but after friction and other losses have been allowed for actually out of, say, 100lb. of energy put in, only, perhaps, seventy are available for useful work. In order that the worker may more fully appreciate the reason why devices for perpetual motion cannot work, a drawing of a simple lever is given in Fig. 1.

The wheel.

The two magnets N, N, are given to the unbalanced wheel, which consists of a number of arms pivoted at equal distances round the outer edge of a wheel. He erroneously thought that the wheel would revolve. By the time the wheel had made a quarter turn the other arms would be fully extended, and so on for ever and ever!

It is quite plain that the wheel would remain stationary, and the arms all dropping downwards.

A few years ago some London firms showed a model of this device in their windows, apparently working by itself. It was, of course, driven by a small motor, so contrived that it was obscured from the view of the observer.

The Balls in the Wheel and the Magnetic Wheel.

An adaptation of this device is shown in Fig. 3, where a series of balls are shown in their relative positions in the spokes of a wheel, as if the latter were revolving, the spokes being so constructed that the balls ran in a little track to prevent them falling out. Unfortunately, it was not successful!
which attract the rim of the wheel, will render one side lighter and the other heavier, thus imparting a perpetual motion; but not quite.

A Ball and Tube Device.

Probably the reader will remember the device shown by Fig. 6—the ball-and-tube device. As the balls in tubes A and B are equidistant from the central line, they are in equilibrium, but the balls on the outside are in the supporting point beyond D, destroys the balance, and thereby causes that side to sink. Thus, if A then occupies the position formerly occupied by C; and, by a continuous rotation of the, actual perpetual motion is achieved.

The bellows wheel (Fig. 7) is a further ingenious attempt to obtain perpetual motion. It consists of a series of radial tubes, each connecting an inner and outer bellows. Liquid is poured into each tube, sufficient to fill the tube and one bellows.

Perpetual Motion—But Not Quite!

A weight is placed on the outside of the cottage, and the whole is fixed on the ground, for nothing short of some form of motor would induce it to work.

The Modern Weather Cottage.

Having fixed the bellows, Fig. 7,—cut the two roof slopes, 5 in. thick, this is also shown in the figures into the model. The cottage is now complete, covering with brick paper; the gable overlays, 2 in. wide.

Two pieces 1 in. thick for the figures.

Set the cottage in the platform, fixing at the top as already described. Having fixed all the interior parts, the front may now be screwed in place.

WORKING MODEL BOAT DESIGN SHEET

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THAT New Zealand and Australia have been found with the central picture upside down ?
Then this stamp, which has never been discovered before, was sold in London on auction in March ?
That any collector may be handed a similar stamp nowadays ?
That an entirely new set of pictorial stamps for South-West Africa is to be issued shortly ?
That there is a scarce variety of South African official stamps which have a spot after OAYTTIA ?
That Canada is the most popular country with British collectors ?
That she can run very closely by the Commonwealth of Australia and South Africa ?

A Ball and Tube Device.

Probably the reader will remember the device shown by Fig. 6—the ball-and-tube device. As the balls in tubes A and B are equidistant from the central line, they are in equilibrium, but the balls on the outside are in the supporting point beyond D, destroys the balance, and thereby causes that side to sink. Thus, if A then occupies the position formerly occupied by C; and, by a continuous rotation of the, actual perpetual motion is achieved.

The bellows wheel (Fig. 7) is a further ingenious attempt to obtain perpetual motion. It consists of a series of radial tubes, each connecting an inner and outer bellows. Liquid is poured into each tube, sufficient to fill the tube and one bellows.

Perpetual Motion—But Not Quite!

A weight is placed on the outside of the cottage, and the whole is fixed on the ground, for nothing short of some form of motor would induce it to work.

The Modern Weather Cottage.

Having fixed the bellows, Fig. 7,—cut the two roof slopes, 5 in. thick, this is also shown in the figures into the model. The cottage is now complete, covering with brick paper; the gable overlays, 2 in. wide.

Two pieces 1 in. thick for the figures.

Set the cottage in the platform, fixing at the top as already described. Having fixed all the interior parts, the front may now be screwed in place.

WORKING MODEL BOAT DESIGN SHEET

To be given shortly.
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Throw Away Your Braces! Why be bothered with the irritation and discomfort of old-fashioned braces and the squeeze they cause? Order them away and wear the "SPAN" Patent HALF-BELT Bracer. It is the perfect modern way to prevent the sway.

You will be surprised and delighted with the freedom of movement it gives you, the extra chest expansion, and the improved hang of your clothes. The "SPAN" BRACER does for any number of pairs of trousers. Quickly interchangeable, yet once fixed always in position. For flannels, breeches, evening dress or business wear. Amazingly thin—thinnest silk web elastic, adjustable, lasts for years.

In Black, Grey or White, with set of self-fixing threadless buttons (additional sets of buttons 3d. per set).

The "SPAN" BRACER CO., (Dept. H), Castle Green, Bristol, England.

Trade inquiries invited.

A MODERN WEATHER COTTAGE and HOW IT IS MADE

Fig. 1.—The finished "span" cottage.

Box may be stuck at the back of the openings, instead of glass. The window-sills are plain pieces, 2in. wide by 4in. high, by 1in. thick. These are fixed underneath the window in the position shown by the dotted lines. The dimensions of the doorways are shown clearly, they have curved tops, the radius being 11in. The opening at the top is to take the ridge, the dotted lines "B" show the position of the supports, to which the gudgeon is fixed.

The Back. This is cut in exactly the same shape as the front, 4in. thick, omitting all interior openings, but having the opening at the top to take the ridge piece. The two ends are just plain rectangular pieces, measuring 2in. by 6in. by 4in. thick. Having cut the parts mentioned, screw the ends to the back, and then the whole to the base, leaving the front off for the time being. Now cut the two supports "F" 2in. long by 11in. wide, 4in. thick, with a hole cut centrally. Glue from the front edge, just large enough to take the output. Screw these to the back, completing the bottom part, 5in. from the bottom edge, and the bottom piece, 5in. from the bottom edge. Fig. 5 shows all these parts screwed together.

The Figures. The figures should be cut out from paper, the plan to be treated ones cut from maga-

Fig. 4—Tea overlap for holding the glass in position.

In Black, Grey or White, with set of self-fixing threadless buttons (additional sets of buttons 3d. per set).

Give waste measurement. Enquiries should be on postal order. for mold and cutout. one into the dimen-

THE SPAN BRACER CO., (Dept. H), Castle Green, Bristol, England.

Trade inquiries invited.
SEVERAL readers wish to construct small rock gardens, and it is hoped that the following may not be possible to give definite instructions in this article to meet every need, yet, with the help given, any reader may turn a barren and desolate spot into a very pleasing prospect at very little trouble or expense.

Where to Place the Pools.
If a garden only is required, it will be a fairly simple matter to arrange it on any selected spot, but when a pool is also desired, it needs to be carefully planned before operations are commenced. Where the spot is very small, a pool may be quite out of the question. Much depends upon the size, shape, position, and condition of the available plot. If it is well drained, the garden may be formed without any thought being given to this matter, but if not, especially if a paved or cemented surface is being used, it is imperative to arrange large stones around the border with their edges touching, and fill in to a good depth inside with small stones, sand, and cement. Three parts of small stones, two sand, and one cement makes good concrete.

A ROCK GARDEN AND POOL FOR A SMALL GARDEN
By A. Western

Fairly large stones, not less than a foot in length, should be used, they need to be firmly bedded in the soil and arranged to slope backwards slightly, as this allows the moisture to percolate to the roots of the plants. It is possible to form a pool in the center by arranging the stones with this end in view. A pool only 3 ft. in diameter may be made most easily. Fig. 1 and section Fig. 2 give an idea of how it may be formed.

Pool Made Separate from the Garden.
Where the plot is large enough, the pool may be made separate from the garden, and this is generally found to be more ornamental and give greater satisfaction. Two plans are shown at Figs. 4 and 5, or, by following the instructions, any shape pool may be made. In the plans it is suggested that a pool surrounded with crazy paving should be laid out in the center, with small rock gardens at each side, the latter being made as previously described. The position is indicated by the dotted lines, and securely to the larger and thicker piece. The interior frets should be cut first, and then the piece which forms the back, in order to hang the thermometer up. The thermometer pipe is a small box, Excel & Co., making, measuring 3 in. long and 1 in. wide, placed in a hole marked off in degrees and with a tube mounted on a heavy metal plate. Two holes are provided for screw nuts to fix it to the overlay.

Fixing a Door to a Clock Case

If fitting doors into framework designs sometimes has to be done to allow the barest projection through the back. This looks unsightly if the clock is stood on a mantelshelf in front of a mirror so the back is a little visible. A simple and easy way to overcome this is illustrated. A door cut and hinged to the actual back of the works set inside this, is in embossed brass, and other parts, as seen in the second picture. These spindle is easily cut to any length with a pair of scissors. The door can be circular or square sides. If a circle, a short straight segment must be cut out of the circumscribing circle, as can be seen in the illustration. A small single hinge is fitted to this straight edge with screws. A watch hook is screwed into the paper remains with a medium grade of sandpaper, and then cut out the smallest piece from the thin thick wood. Five interior holes should be cut first, and then the outer edge of the wood. Clear the piece up both back and front, and glue centrally and secure to the larger and thicker piece. The position is indented by the dotted lines on the patterns of the larger part, and it is also shown here how the background behind the fretted pieces in the overleaf can be treated with a matting tool to make them more distinctive. Each part can be polished before it is cut out, or a coat of shell and stull polish applied if preferred. It will be noted that a small hole is provided in the piece which forms the back, in order to hang the thermometer up. The thermometer is a small box, Excel & Co., making, measuring 3 in. long and 1 in. wide, placed in a hole marked off in degrees and with a tube mounted on a heavy metal plate. Two holes are provided for screw nuts to fit it to the overlay.

Suitable wood is obtainable from Hobbies Ltd., and the necessary thermometer (No. 5003) costs 1s. 1d. with 1s. 6d. extra for postage. Any branch of Hobbies Ltd. will supply.
### A SIMPLE AND SAFE MODEL AIRSHIP

**Hobbies Ltd** describes it as **"Home Mechanic"**

**WING** to the enormous amount of interest created by the first Horsemans airship and the large number of letters received from readers asking if the expense of the glass skin envelope could be avoided, various designs and experiments have been made with the object of producing a design for an airship which anybody can make at the cost of a few pence, at the same time avoiding the use of highly inflammable hydrogen gas for inflation.

The result of these experiments is an airship made of tissue paper inflated by hot air from an ordinary oil stove, as shown in the photograph (Fig. 1). The fuselage and propeller are not shown in this photograph; they are locked on to the balloon when inflation is completed (see Fig. 1-right).

When inflated as instructed, later on, the airship will make flights of about one minute or more in duration, usually longer than the propeller run for. The duration of flight can be greatly prolonged by using a small pad of cotton wool soaked with methylated spirits and ignited to keep the air hot underneath one back over the top one, as shown in Fig. 2. Press down lightly with a pad of rag and open out before hanging up to dry.

When the twelve long pieces are dry (they will surely tear if not dry, cross one along its length to mark the centre line, then mark out the shape as shown in Fig. 2. The final shape of the airship depends upon the shape of these pieces, so draw the curves in nicely. Perforate them along the edges of the pieces and fold the underneath back over the top one, as shown in Fig. 3. Pin down tightly with a pad of rag and open out before hanging up to dry.

The two pieces to be joined should be laid on top of each other, the lower one protruding a little, as shown in Fig. 2A. Smear a little paste along the edges of both pieces and fold the underneath back over the top one, as shown in Fig. 2A. Press down lightly with a pad of rag and open out before hanging up to dry.

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the envelope all together by laying weights on them and cut out all the twine at once.
Now paste these together in twos along the edges, as shown in Fig. 2, and hang each pair up to dry. These pairs require to be hung up very carefully, for they will no longer lie flat when opened out. They will dry very well if hung conically side down over two chair backs about 2ft. apart. When the paste is dry, fold the double strips flat again as they were before being pasted, bring two of the double strips together, and join them as before, and open out before drying. You will now have three of the sections of the envelope, each consisting of four strips, which, when opened out, have a shape something similar to the shell of a boat. When these three sections are dry, fold them up flat again, and join the first to the second and the second to the third, just as before, and allow these two sections to dry. The envelope is then practically complete except for the last seam, but do not attempt to open it out just yet.

The Disc for the Nose.
For the last seam, draw the edges together, keeping them flat on the table, and paste and fold out as before. Stir from the tail end and leave about 2in. of seam unjointed near the nose end, but join about 6in. of the seam right up to the nose. When this last seam is dry enough, open out the envelope as far as possible and paste a disc of tissue paper over the front end. This disc will probably require to be about 8in. in diameter to close the opening.

The best way of fixing the disc is to hold a dinner plate bottom upwards, inside the envelope (through the 2ft. of open seam), and get an assistant to apply the disc and press it down smoothly against the plate.
The tail does not require a disc, the pointed ends of the strips are simply gathered together and bound with sewing cotton. Adhere to the dimensions closely, for if you try to make the envelope more slender in shape you will probably upset the mechanism and fuselage. The basic construction is shown in Fig. 5.

The Wire Frame.
Do not be discouraged if the envelope does not appear to be a good shape, as it is possible to judge the shape until it is inflated.
Now cut out the wire frame and fix it in the wire frame shown in Fig. 4. This is made of thin piano wire about No. 23 (gauge). It is fixed by simply lapping the envelope over the wire and pasting down. The 2ft. of open seam can then be pasted up in the manner familiar to you by now, and the envelope is finished. Its weight should at this stage be 34oz.
The square opening is, of course, at the bottom of the envelope; on the top fix two small angles of folding wool by stitching the wool once in and out again through the double thickness of the transverse wire seams, one loop at the front seam and one at the rear seams. These loops are for hanging the envelope up while it is being inflated.

The Propelling Mechanism.
The propeller is made in the manner illustrated in Fig. 5, and, as already mentioned, from a separate unit specially designed with a view to extreme lightness. The whole unit, including the suspension wires, should weigh about 8oz. The mechanism is made from two strips of birch wood, jin. by 4in. by 2ft. long. These strips are cut into small pieces of cork at intervals of about 8in., glued, and pasted on a long thread; the parts of the mechanism, where two strips of wood should be about 1in. apart.
The bearing for the propeller shaft is made about 4in. x 1/8in., the propeller shaft being a piece of No. 23 gauge piano wire; the hook for the front end of the mechanism is also made of the same wire. The propeller is a compound affair with a small cork for the boss, a strip of wood 4in. x 1/8in. x 1/16in. for the arms, and blades of thin card-board, the whole being 1/16in. diameter. Two good features to look for are the cork boss and the metal parts; these would probably make a good light propeller. Two small glass beads form the thrust bearing. Two strips of 4in. strip elastic should be used; this will provide enough thrust to keep the airship in motion.

The sup- porting wires are made of the same wire as used to frame the opening in the envelope. It is necessary to fix the wires between a cork and the wood. About 3in. is sufficient long, somewhat as shown, as they are easy to fix and do not jump out of their eyes as short, open hooks would do. The diaphragms are made of films, the two rear wires stay having an eye near the top to prevent the cotton from sliding down the wire.

Inflating the Airship.
The best method of inflating the envelope is (as mentioned above) out of a stove. The stove shown in the photograph is a large size "Vulcan Perfect," the cylindrical body of this being 7in. diameter. Remove the top plate by undoing two long bolts, and cover up the ornamental holes in the top end of the cylindrical body. Cut one strip (for any thin sheet metal) into a cylindrical form and slipping it inside the body of the stove. Piece "c" shown in Fig. 4 is about 1in. wide should be made by melting the tin plate with shears. By bending these two outwards over the edge of the stove body the template will be held.
There is so much interest in carving amongst our readers that we have had an export write this article on how to begin, the tools and wood needed, etc. Full of practical hints and sound advice, shown in Hobbs' Catalogue, to which reference should be made. A set of four knives showing the most useful shapes is illustrated here.

Before the carving is started the wood should be firmly clamped to the bench, and a simple way of doing this is with two small clamps as shown at Fig. 2. For convenience of working, a Hobbs' bench clamp is shown at Fig. 3, and it will be seen that the reverse is also shown at Fig. 4, and by its use work may be held firmly and held firmly to make the cuts. Two examples of chip carving are shown at Fig. 1, one being a simple banding, and the other a more elaborate carved center. It will be seen that they consist of a number of sunken pockets, and the cutting of the pockets is almost identical in every case. Chip carving designs are almost entirely composed of straight lines, circles or parts of circles, and in setting out a piece of work on the wood on which it is to be carved, a rule, compass and a fine dark pen are necessary. The outlines and all the leading lines should be marked first, and then the design is completely filled in, care being taken to see that all corresponding pieces are exactly alike in voice and shape, and that if a circle is divided up it is done equally. Firm lines of a suitable width are necessary for easy working.

Hobbies Ltd. supply everything required for chip or wood carving. For chip carving, wood jins or lin cloths, etc., are generally used, but for wood carving jins or lin. is the best material. Thickness is desirable, the most suitable kinds being oak, ash, elm, walnut, or mahogany. A good selection of carving tools, ranging from a simple chip carving knife to a full set of wood carving tools, are needed. Each tool has its particular use, and it is advisable to keep it going longer, as the knife inside goes hotter and deeper, and the knife needs a longer distance of flight. In Fig. 1 the envelope is shown fully inflated, and en- dering. The pocket is then formed by shaping the lines with a knife if it is first held vertical, and then in slanting positions, to make cuts on each side of the vertical and on the small V-shaped vein as shown at Fig. 4. These details having been attended to, the actual carving may be commenced. As before stated, the centre consists of a number of shaped pockets which form the design. The pockets may be of varied shapes, as shown at Fig. 5, but they are all cut in the same way, the knife being inserted in the centre, A, and vertical and horizontal cuts are made following the shape described in those pages a few weeks ago, according to the number of our readers, and some have asked for the plans and directions. The 6-ft. table is shown at Fig. 7. The depth of the cut at A should be about jin. more or less according to the size of the work in hand, and the pocket should gradually diminish in depth until it rises to the surface at the corner. The pocket is then formed by shaping it out with the knife or chisel, as shown at Fig. 6. Taking

In position. The gaps left by the ears will then accommodate the cross-wires in the envelope opening, and allow the imitate to protrude a little into the envelope.

With the work turned right up the envelope becomes fully inflated in the upper side and it is advisable to keep it going longer, as the side inside goes hotter and deeper, and the knife needs a longer distance of flight.

In Fig. 1 the envelope is shown fully inflated, and extending to the top, but it is held down by being tied to the stove. When properly heated it will easily rise to 50ft., as shown with the propeller and motor attached. It simply leaps up.

How to Fly the Airship

The best place to fly the airship is a lofty hall, but not everybody is fortunate enough to obtain access to such a place. If released in an ordinary room it rises to the ceiling and stays there, because the pro-

In Fig. 2 the lines are to show how to cut a 6ft. table, as shown in our issue of February 14th, 1931.

All the principal lines of a chip carving design should be divided, so that they consist of a number of sunken pockets, and the cutting of the pockets is almost identical in every case. Chip carving designs are almost entirely composed of straight lines, circles or parts of circles, and in setting out a piece of work on the wood on which it is to be carved, a rule, compass and a fine dark pen are necessary. The outlines and all the leading lines should be marked first, and then the design is completely filled in, care being taken to see that all corresponding pieces are exactly alike in voice and shape, and that if a circle is divided up it is done equally. Firm lines of a suitable width are necessary for easy working.

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WHILE making these pieces, the lid stays also may be made, as shown in Fig. 10. It is a strip of stout brass, drilled and slotted in the manner indicated. Centre-bits holes for the needle stops may be bored in the middle-link near angle of the front part of the motor board.

The biscuit. After the holes for the winding key enters sufficiently to clear the table top, i. u Fig. 9. The Rubber Feet.

in to see that it works freely and engages with the down from the mark made on the side of the ease, the position of which should be determined by measuring the manner indicated.

11, with care to see that the screw in front of the motor spindle when the winding key enters. This may be done in several ways. If the constructor has graduated in that article. A stop is essential to the task, he may cover it with Rexine, glued secretly to the wood. It is by no means a very difficult job, but a treky in adding terminals, which, if not neatly made, would mar the good appearance of the instrument.

Perhaps a better finish for the amateur is to finish the case with two or three coats of good varnish.

Lid Rings. This should also be the piano variety. It should be fixed at the side of the board to the latter as the winding key enters. Though often placed at the back of the case, the position indicated is a better one.

The Lock and Handles. The lock fitted is deemed necessary. The handles may be of wood as shown in Fig. 12, or ornamental metal handles may be purchased and fitted.

The Tone Arm. This piece is purchased from the dealer. Many patterns are available—straight, goose-neck, swan, crescent, and convolute. The other two should be all-sufficient.

Speed. It is essential that the motor should be adjusted to run at the standard speed of 78 revolutions per minute.

GIVEN NEXT WEEK! DESIGN SHEET FOR A LONG-DISTANCE SPACE MONOPLANE!

This has been done with file and sandpaper, and we must remember that it is done underneath; when we fit it. This is glued and screwed along the top edge of the frame, so that the back edge is flush, whilst the front projects 1in. Hence this projecting shelf is fitted of a length of No. 17 moulding supplied in the parcel. This moulding is cut with its ends squared, and a short piece may be turned to turn the corner and carry it to the end of the frame. The detail at Fig. 3 shows this shelf, but it will be seen that a piece only about 1ft. long is required to carry the shape of the moulding round the back and bring it square with the edge. A small pediment is added equidistant between the ends, and this, like the other pieces, is glued and screwed down to the surface of the top rail and bottom. The position of these is given at Fig. 4, which shows the pediment, the pediment back, and, of course, the main frame.

The position of the mirror itself has already been provided for by the hollow crescent rectangle. If we have proceeded thus up in constructing the framework, the mirror should just fit between the side rails and the top and bottom. It is held in place from the back by a similar framework of No. 18 moulding. This framework is just over half wide, and is glued round the edges with 3in. of its edge projecting. This provides the backing for the mirror in pieces. Two mouldings, one 12in. long, are required, and round the rails to ensure an equal projection over the back. Each of these is 3in. wide, and the parts down.

The position of the mirror is now complete, but there remain the minor fitting which holds themselves, in the strengthening mental overlays. The mirror is fixed in a simple piece of wood cut out of the wood. The longer one is glued down on the back, centrally above the mirror on the upper rail, the smaller one comes below the mirror, but fits so that the centre of the wood runs along the join between the two. The piece which holds it is drawn with the hanging addition. On each of these overlays there is a further ornament, like the one in Fig. 10, a corresponding shaped and cut, all that is needed here is to round this back with a file and then glue them in place, or clearly seen on the finished drawing. The whole of the work is now complete, and it should be treated with Hobbies oak spirit stain.
A handsomely inexpensive piece of work suitable for the modern hall. The amateur carpenter can complete it easily, and a special parcel of timber is supplied from which the parts can be cut. Make it from the full-size patterns in the design chart.

The Use of Spanish Chestnut.
This material is very much like oak in its appearance, but has the advantage that it has a softer grain, and is, therefore, easier to operate upon by the amateur. When stained up, the average carver will not be able to tell that the article was cut in oak.

The whole construction of the main work is by means of dowel joints, and for this reason the material is thin throughout. The dowel pins are all the same diameter, and sufficient length are enclosed in the parcel, or can be bought separately, if desired.

A Word on Dowel Joints.
These dowels are really short pieces of rod sunk into the two parts of the wood, and held them together with glue. Wherever a dowel joint is required, an inch of the rod is cut off. A hole is bored in the wood, and the dowel rod driven in after having been dipped in glue. It thus projects a little beyond the surface of the wood. This projecting portion is driven into another hole bored into the flat piece of wood which is to be joined on so that the two parts are brought together and the glue on the rod and the edge of the other piece holds them quite strongly. The detail at Fig. 1 shows this principle, and how the dowel joints are made. In boring the holes with a brace and bit, see that the brace is held upright, and make a mark on the bit to show when it is sunk into the wood. The required distance is the position of the last pair of dowels should be made at one time wherever the two parts are to join. Put the two pieces in a vise, lay the square across, and then, to get the centre of the boring hole, use the marking gauge to half the width of the wood. A drawing is given at Fig. 2 of the framework of the hall fitment is made up of two cross rails, two upper rails, and four ornamental inlay rails, with two further supports for the mirror. All that is perfectly straightforward. In addition, there is a flat rail above the mirror, a pediment, and some shaped work to be done below the lower rail.

Various odd parts can be cut out with a fret-saw, and in no case is any of them beyond the ability of the average workman. The wood, of course, should be chosen with care for its strength and good looks. Oak is obviously the best for the purpose, but, as in may be a trifle hard for the young worker to cut, plane, chisel, etc., we can recommend that Spanish chestnut be used instead.

COUPONS

—that's all you need! The "Rajar" Folding Camera takes marvellous snaps, sharp and clear. And it is simple to use! Worth two guineas. Yet free for less coupons than ever before! Start saving B.D.V. coupons to-day. You'll be snapping by Whitsum in April by Whitsun!
A MODEL OF STEPHENSON'S
"LOCOMOTION No. 1"
A South African Achievement

An enthusiastic amateur engineer now residing in Johannesburg has lately built a model of George Stephenson's first public railway locomotive, "Locomotion No. 1," of the Stockton and Darlington Railway.

The "Locomotion No. 1" model is one-eighth full size, built to fit a rail gauge of 7\(\frac{1}{2}\) inches, and is arranged to work under its own steam. It weighs about 80 lbs. in working order and has driving wheels 6\(\frac{1}{2}\) inches diameter. The two cylinders are vertical and partly immersed in the boiler. The model is just over 3 feet in length and is capable of a speed of 14 miles an hour.

A parallel motion, which maintains the piston rod in a true line, will be fitted. All the four wheels are coupled together and one slip eccentric operates both valves. The boiler is a plain cylindrical vesel with a furnace of similar form. For model purposes the furnace-flue is fitted with water tubes and the method of firing is by petroleum or petrol blow-lamp placed in the tender. The model is just over 3 feet long, 20 inches high and 11 inches wide.

The driver of the original "Locomotion" engine sat on top of the boiler and operated the various levers. This position for the engineer was very necessary as in these early days reversing gears were of a very primitive character.

The front view picture is interesting in that it not only indicates the relative size of Mr. B. R. Hunt's second model—the G.W.R. engine now building—a model which will weigh ten times that of the "Locomotion No. 1"—but illustrates how the increase in the size of boiler has in the modern locomotive reduced the height of funnel.

A FINE MODEL OF THE SCHNEIDER TROPHY SEAPLANE

This fine scale model shown in the right of the famous Supermarine S.6 Rolls-Royce Engine Seaplane, which won the Schneider Trophy contest, and established a world speed record of 357.7 miles an hour.

This model was made from odd pieces of wood with a fretsaw, chisel and plane, by Charles H. Hoyland, 17, Somerston Avenue, Ilfracombe, Surbiton, Surrey.

A model of Geo. Stephenson's "Locomotion No. 1" of 1825, built in Darlington by Mr. B. R. Hunt.

A South African Amateur's Achievement

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THE fine scale model shown in the right of the famous Supermarine S.6 Rolls-Royce Engine Seaplane, which won the Schneider Trophy contest, and established a world speed record of 357.7 miles an hour.

This model was made from odd pieces of wood with a fretsaw, chisel and plane, by Charles H. Hoyland, 17, Somerston Avenue, Ilfracombe, Surbiton, Surrey.

A parallel motion, which maintains the piston rod in a true line, will be fitted. All the four wheels are coupled together and one slip eccentric operates both valves. The boiler is a plain cylindrical vesel with a furnace of similar form. For model purposes the furnace-flue is fitted with water tubes and the method of firing is by petroleum or petrol blow-lamp placed in the tender. The model is just over 3 feet long, 20 inches high and 11 inches wide.

The driver of the original "Locomotion" engine sat on top of the boiler and operated the various levers. This position for the engineer was very necessary as in these early days reversing gears were of a very primitive character.

The front view picture is interesting in that it not only indicates the relative size of Mr. B. R. Hunt's second model—the G.W.R. engine now building—a model which will weigh ten times that of the "Locomotion No. 1"—but illustrates how the increase in the size of boiler has in the modern locomotive reduced the height of funnel.

A FINE MODEL OF THE SCHNEIDER TROPHY SEAPLANE

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station, the small knob on the volume control brings the volume up to the required strength. The switch when pressed down will bring the long-wave aerial into action when tuned to the shortest wave is in use, and in the centre position the valve is switched off.

The actual position of the receiver has a great deal to do with the selectivity, the top of the set being pointed in the direction of the station for maximum strength. A turntable will be found very useful for this purpose, although of course it is not essential.

If 'the front and the back chain wheels were both the same size, the chain would be said to be geared 1 to 1, and the forward speed being the same as driving speed, but such a machine is never seen except for conical turns by stage cyclists, for as we nowadays use a 26in. driving wheel pedalling a 26in. wheel the gear is 52in. Similarly if your front chain wheel on the crank spindle is exactly twice as big as the chain ring on the back wheel, so that if that is a 26in. size of the back wheel, your machine is geared to 78in., standing 60ins. high, there were many more who would be said to be geared 2 to 1.

And if the front chain wheel on the crank spindle is three times as big as the chain ring on the back wheel, your machine is exactly twice as big as the chain ring on the back wheel, standing 90ins. high, your machine is three times as big, and if the front chain wheel is four times as big, the machine is exactly four times as big.

It is produced.

In the first stage of a great many Stuart models, or, better still, write for the H catalogue (price 6d. post free) which contains particulars of all our Model productions, all fully illustrated and described.

No intermediate gearing, that is, with the cranks fixed driven direct, each rider straddling the biggest wheel his machine could conveniently stretch his legs upon, and those very tall men could Beside a wheel standing 60ins. high, there were many more who used 6in., wheels, and the 2in. wheel was quite common, for the 2in. wheel pedalling a 26in. wheel a 52in. wheel pedalling a 26in. wheel was quite revolutionary, and the revolution of the road-wheel, To-day we are all geared up, and our small

To carry the receiver about a bundle must be fitted at the top of the set, and this may be made from a strip of leather such as a section of a thick strip, held down by small blocks of wood and screws, or a ready-made suit-case handle box may be purchased with the necessary fittings for attachment.

Care should be exercised in handling the set, service valves may be broken. Put the set in a good place and don't treat it as a suit-case and bang it down. Keep a note of the conditioner readings so that you can readily tune it in to a particular station; and take care that you can always read away from the wiring.

Our Cyclist's Corner
Conducted by F. T. Bidlake

Every cyclist nowadays knows that his machine is geared up, so that although his road-wheel is small his rate of pedalling is not a rapid as if he drove the road-wheel direct. In this way the high bicycle the front wheel was driven direct, each rider straddling the biggest wheel he could conveniently stretch his legs upon, and those very tall men could Beside a wheel standing 60ins. high, there were many more who used 6in., wheels, and the 2in. wheel was quite common, for the 2in. wheel pedalling a 26in. wheel was quite revolutionary, and the revolution of the road-wheel, To-day we are all geared up, and our small

driven road-wheel does not carry the brakes, but they rotate on a separate spindle at the crank-bracket and the rotating frame, and the rotating road-wheel. If the front and the rear chain wheels were both the same size, the chain would be geared 1 to 1, and the forward speed being the same as driving speed, but such a machine is never seen except for conical turns by stage cyclists, for as we nowadays use a 26in. driving wheel pedalling a 26in. wheel the gear is 52in. Similarly if your front chain wheel on the crank spindle is exactly twice as big as the chain ring on the back wheel, so that if that is a 26in. size of the back wheel, your machine is geared to 78in., standing 60ins. high, there were many more who would be said to be geared 2 to 1.

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It is produced.

In the first stage of a great many Stuart models, or, better still, write for the H catalogue (price 6d. post free) which contains particulars of all our Model productions, all fully illustrated and described.

You MUST HAVE THE S.T. ENGINE

S.T. Engine Parts - 5/-
Finished Boiler - 8/-
Finished Plant on Fireproof Base 11/6

It is utterly different from the ordinary Toy Shop model engine.

In the first place you have the pleasure of building it yourself. You need have no fear, we GUARANTEE it will work when you have built it. Secondly, like all Stuart models it is made on correct engineering lines and therefore has POWER. The Boiler is of Copper, brazed throughout and fireproof.

Send a stamp for List 184, which describes this and any other model for which you wish particulars. This List gives no description of our Model productions all fully illustrated and described. 

STUART TURNER, LTD.,
HENLEY-ON-THAMES.
The receiver described this week is entirely self-contained, although provision has been made for the attachment of an external aerial and earth, where this is found to be necessary. No great skill is required in the construction of the complete set, although those readers who are lucky with wood-working tools will be able to exploit their skill in the construction of the case. We will describe this part of the work first and it should be borne in mind that the design described is a very simple one, especially prepared for those who are not skilled in carpentry.

The Frame Aerial.

The frame for the aerial and receiver mounted on it as shown in the drawings.

The frame may now be pushed home so that the sides of the case are made from a piece of standard, 1/2 in. square section stripwood, which is entirely self-contained, although provision has been made for the attachment of an external aerial and earth, where this is found to be necessary. No great skill is required in the construction of the complete set, although those readers who are lucky with woodworking tools will be able to exploit their skill in the construction of the case. We will describe this part of the work first and it should be borne in mind that the design described is a very simple one, especially prepared for those who are not skilled in carpentry.

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Hobbies

April 4th, 1931

The receiver described this week is entirely self-contained, although provision has been made for the attachment of an external aerial and earth, where this is found to be necessary. No great skill is required in the construction of the complete set, although those readers who are not familiar with wood-working tools will be able to exploit their skill in the construction of the case. We will describe this part of the work first and it should be borne in mind that the design described is a very simple one, especially prepared for those who are not skilled in carpentry. It may be modified to suit your own personal taste provided the dimensions are adhered to, and that the fretted opening is of the correct size for the particular loud speaker employed.

The sides of the case are made from thin stuff, the actual material depending upon the finish required. Mahogany should be used if a French polished surface is desired, which is the case here. The panel should be attached to the edges of the wood and ebonite the opening should be faced with a small neat moulding. Or seccotine and the speaker chassis then screwed into position.

The front panel is entirely covered with Rexine or similar material.

The back of the case is to be made from solid wood, 1 in. thick, the required design being cut out, and for those who wish to avoid this part of the work we would suggest the purchase of one of the ready-made frets on the market. The back of the case is made from 1 in. plywood about 9 in. square, the required design being cut out, and the wood and ebonite the opening should be faced with a small neat moulding.

The front panel is entirely covered with Rexine or similar material.

The bottom of the case (in the case of the sides of the case) is a little care should be exercised in the choice of these components in view of the horizontal space available.

The Valves. The valves required are a screen grid, general purpose and H.F. type, the screen-grid valve giving in the set of the aerial, 7 in. from the top. The actual winding consists of No. 22 D.C.C. wire wound in the following manner. Pierce two small holes near one edge as shown, and thread the wire through the holes to make a flax anchorloop, leaving a few inches of wire for subsequent connection to the switch. Wind on tightly 15 turns of wire, allowing a space of 1/10th of an inch between each turn. At the 15th turn pierce a hole through the frame and pass a large loop of wire through the hole, after- wards wedge the wire in the hole with a small splinter of wood and a drop of glue. Commence the winding for a further 4 turns, pierce two more holes, ease off the wire (leaving a length for connection) and anchor off. Half an inch away from this last turn make another pair of holes at which to commence the long-wave winding. This commences with 8 turns of wire, each turn touching after the wire of the aerial. Two pieces of 1 in. square strips of wood are screwed on the inside of the frame, 7 in. from the top. The actual winding consists of No. 22 D.C.C. wire wound in the following manner. Pierce two small holes near one edge as shown, and thread the wire through the holes to make a flax anchorloop, leaving a few inches of wire for subsequent connection to the switch. Wind on tightly 15 turns of wire, allowing a space of 1/10th of an inch between each turn. At the 15th turn pierce a hole through the frame and pass a large loop of wire through the hole, afterwards wedge the wire in the hole with a small splinter of wood and a drop of glue. Commence the winding for a further 4 turns, pierce two more holes, ease off the wire (leaving a length for connection) and anchor off. Half an inch away from this last turn make another pair of holes at which to commence the long-wave winding. This commences with 8 turns of wire, each turn touching after the wire of the aerial.

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To carry the receiver about a handle must be fitted at the top of the set, and this may be made from a strip of leather such as a section of a thick strap, held down by small blocks of wood and screws, or a ready-made suitcase handle may be purchased with the necessary fittings for attachment.

Care should be exercised in handling the set, as service valves may be broken. Put the motor out of the way; don’t treat it as a suitcase and bang it down. Keep a note of the condenser readings so that you can readily tune in to a particular station; and take the valve out and away from the wiring.

List of Components.

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4in.</td>
<td>0005 variable condenser (Ormond No. 4 or Formco)</td>
</tr>
<tr>
<td>0001</td>
<td>0002 reaction condenser (Flint Midget)</td>
</tr>
<tr>
<td>0003 fixed condenser (Lampco)</td>
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<tr>
<td>0004 fixed condenser (Lampco)</td>
<td></td>
</tr>
<tr>
<td>4 in.</td>
<td>Midget grid lead</td>
</tr>
<tr>
<td>0.02-inch</td>
<td>5-value-holders (Lotus, Benjamin, etc.)</td>
</tr>
<tr>
<td>Ebonite</td>
<td>panel 15in. by 10in.</td>
</tr>
<tr>
<td>Screws</td>
<td>for grille.</td>
</tr>
<tr>
<td>Screws</td>
<td>for frame aerial.</td>
</tr>
<tr>
<td>Screws</td>
<td>for attachment.</td>
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</tbody>
</table>

**OUR CYCLIST’S CORNER**

Conducted by F. T. Bidlake

Every cyclist this week knows that his machine is geared up, so that although his road wheel is small his rate of pedalling is not so rapid as if he drove the road-wheel direct. In this way all the high bicycle the front wheel was driven direct, each rider straddling the biggest wheel he could conveniently stretch his legs upon, and those very tall men could beside a wheel standing 60ins. high, there were many more who used 6in., wheels, and the 2in. wheel was quite common; and these wheels were driven direct, with no means of governing that, is, with the cranks fixed on the axle of the wheel, and each revolution of the pedals caused one revolution of the road-wheel. To-day we are all geared up, and our small driven road-wheel does not carry the crooks, but they rotate on a separate spindle at the crank-bracket and the rotating crank-shaft and the rotating road-wheel. If the front-end and the back chain-wheels were both the same size, the cycle would be said to be geared level, and it is exactly reproduce the old ordinary as regards pedalling speed being the same as driven direct, but such a machine is never seen except for consular turns by stage cyclists, for as we nowadays use a 26in. driving-wheel pedalling a 26 is a pure whirligig of fun.

Gearing. So we naturally gear up instead of gear level. And if the front chain wheel on the crank spindle is three times as big as the chain rear on the road-wheel, your cycle is geared to exactly double the size of the back wheel, so that if you pedalled in 2in. wheel the gear is 50in. Similarly if your front chain ring is three times as big as you used to 7in., this is quite a happy gear for a strong fellow able to hurry, and not prolonging his journeys, after getting nicely tired. We can, however, get intermediate and other gears by choosing intermediate sizes of chain rings, not exact multiples of each other. All we have to do is have one bigger than the other.

(To be continued.)
A MODEL OF STEPHENSON'S "LOCOMOTION No. 1"  
A South African Amateur's Achievement  

An enthusiastic amateur engineer now residing in Johannesburg has lately built a model of George Stephenson's first public railway locomotive, "Locomotion No. 1," of the Stockton and Darlington Railway.

The "Locomotion No. 1" model is one-eighth full size, built to fit a rail gauge of 7\1\2 inches, and is arranged to work under its own steam. It weighs about 80 lbs., is working order and has driving wheels 6\1\2 inches diameter. The two cylinders are vertical and partly immersed in the boiler. In the model they are 3\1\2 inches bore by 3\1\2 inches stroke and connected to the coupled wheels through cross beams guided by a wonderful system of levers invented by the great James Watt.

A parallel motion which maintains the piston rods in a true line will be fitted. All the four wheels are coupled together and one slip eccentric operates both valves. The boiler is a plain cylindrical vessel with a furnace of similar form. For model purposes the furnace-flue is fitted with water tubes and the method of firing is by petroleum or petrol blow-lamp placed in the tender. The model is just over 3 feet long, 20 inches high and 11 inches wide.

The driver of the original "Locomotion" engine sat on top of the boiler and operated the various levers. This position for the engineman was very necessary as in those early days reversing gears were in the size of boiler has in the modern loco." Locomotion No. 1"-but illustrates how the invention of the G.W.R. loco.

A SOUTH AFRICAN AMATEUR'S ACHIEVEMENT  
This model was made from odd pieces of wood with a fretsaw, chisel and plane, by Charles H. Hoyland, of 357.7 miles an hour.

April 4th, 1931

A REAL MICROPHONE FOR 5/- COMPLETE  
The E.C.C. Microphone Button will do all that a real microphone is capable of. Actually smaller than our illustration shows, it can be applied in numerous ways for amusement, proper service, experimenting, etc. It is extremely sensitive(14,18),(986,994).
The amateur carpenter is to turn out something useful, and which, at the same time, is not too expensive to construct. Most readers of these pages have a set of fretwork and carpentry tools, which enable them, week by week to go forward, with some piece of woodwork of which they can be proud. They have the big advantage always of being able to obtain a parcel of wood with all the necessary parts ready to start work upon, as well as full-size patterns to paste down or use as templates for the various pieces required.

A Modern Piece of Work.
This week the simple modern Hall Mirror illustrated can be made up in this way, and we are sure it will appeal very strongly to a great number of our readers, both for its simplicity and usefulness. It is in keeping with the modern trend of plain, dignified furniture, and is not too expensive to construct.

The Use of Spanish Chestnut.
This material is very much like oak in its appearance, but has the advantage that it has a softer grain, and is, therefore, easier to operate upon by the amateur. When stained up, the average connoisseur would not be able to tell that the article was cut in oak.

The whole construction of the main work is by means of dowel joints, and for this reason the material is jin. throughout. The dowel pins are jin. and jin. diameter, and sufficient length are enclosed in the parcel, or can be bought separately, if desired.

A Word on Dowel Joints.
These dowels are really short pieces of rod sunk into two parts of the wood, and held them together with glue. Wherever a dowel joint is required, an inch of the rod is cut off. A hole is cut in the work jin. deep, and the dowel rod driven in after having been dipped in glue. It thus projects jin. beyond the surface of the wood. This projecting portion is driven into another hole bored into the flat piece of wood which is to be joined on so that the two parts are brought together and the glue on the rod and the edge of the wood holds them quite strongly.

A drawing is given at Fig. 2 of the framework of the mirror. As in most other dowel joints, the two pieces in a vise, lay the square across, and then, to get the centre of the boring hole, use the marking gauge to half the width of the rod, and make a mark on the bit to show when it is sunk into the wood. The required distance is jin. It is jin. that the article was cut in oak.

The amateur carpenter can complete it easily, and a special parcel of timber is supplied from which the parts can be cut. Make it from the full-size patterns on the design chart.

HALL MIRROR AND HAT RACK.
A handsome, inexpensive piece of work suitable for the modern hall. The amateur carpenter can complete it easily, and a special parcel of timber is supplied from which the parts can be cut.

A drawing is given at Fig. 2 of the framework of the hall fitment is made up in this way, and we are sure it will appeal very strongly to a great number of our readers, both for its simplicity and usefulness. It is kept in keeping with the modern trend of plain, dignified furniture, and is large enough for the modern small hall where we outline in hall-stands would be out of place. The subject is 2ft. 10in. long and 2ft. 6in. high. The central mirror measures 15 x 10, and on each rail above the pediment, and supports 813 (post 1/3).

A handsome and inexpensive piece of work suitable for the modern hall.

The amateur carpenter can complete it easily, and a special parcel of timber is supplied from which the parts can be cut. Make it from the full-size patterns on the design chart.

Great for Summer Holidays!

Tins material is very much like oak in its appearance, but has the advantage that it has a softer grain, and is, therefore, easier to operate upon by the amateur. When stained up, the average connoisseur would not be able to tell that the article was cut in oak.

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WHILE making these pieces, the lid stay also may be made, as shown at Fig. 10. It is a strip of stout brass, drilled and slotted in the manner indicated. Centre-holes for the needle eyes may be bored in the blank near angle of the fixed part of the motor spindle.

The Escutcheon. After the hole for the winding key, the position of which should be determined by measuring down from the mark made on the side of the case, the escutcheon may be screwed in place, and the key pushed down from the mark made on the side of the case, the position of which should be determined by measuring the right-hand near angle of the fixed part of the motor

The Rubber Foot. winding spindle.

In to see that it works freely and engages with the escutcheon may be screwed in place, and the key pushed down from the mark made on the side of the ease, the position of which should be determined by measuring

the right-hand near angle of the fixed part of the motor manner indicated.

remains open by its own weight.

To see that it holds the lid well back so that it

hoard.

The lid stay arm is swung over to that shown here.

Those with metallic diaphragms are preferable.

Adjusting the Tone Arm. Fig. 12.-The tone arm is held and run at the standard speed of 78 revolutions per minute, with

The making of the

Speed. It is essential that the motor should be adjusted to run at the standard speed of 78 revolutions per minute.

The Tone Arm. The arm is purchased from the dealer. Many patterns are available—straight, goose-neck, swan-neck, etc. The first and fourth named are all good. The other two should be avoided.

The Length of tone arm must be such that the needle point stands about 3½ in. in front of the motor spindle when the arm is fully extended. It should be so made that while the length, therefore, should be measured and a tone arm of suitable length purchased. In the gaugeboard described the measurement would be 7½ in., for which an 8½ in. tone arm would serve.

The Sound Box. The patterns of these are legion and most of them are good. Prices range from 3s. 6d. up to 3 guineas, and there is nothing to choose between them in regard to sound.
A Simple Lesson in CHIP and WOOD CARVING

There is so much interest in carving amongst our readers that we have an expert write an article on how to begin, the tools and wood needed, etc.

Full of practical advice shown in Hobbes' Catalogue, to which reference should be made. A set of four knives showing the most useful shapes is illustrated here.

Before the carving is started the wood should be firmly clamped to the bench, and a simple way of doing this is with two small clamps as shown at Fig. 2. For convenience of working, a Hobbes' bench clamp is shown at Fig. 4, and by its use work may be clamped firmly and held firmly at any desired angle.

The first simple example is to use Hobbies Bench Clamp on the wood as shown at Fig. 4.

All the principal lines of a chip carving design should be visible; they may be V- or U-shaped, and are most easily cut with a chisel similar to that shown at Fig. 5, where the end shape of the cutting edge is seen as a U and a V. It is also possible to cut the lines in the same way if it is first held in an upright position to make a vertical cut, and then in slanting position to make cuts on each side of the vertical cut and so form a small V-shaped vein as shown at Fig. 4.

These details having been attended to, the actual carving may be commenced. As before stated, this consists of cutting a number of shaped pockets which form the design. The pockets may be of varied shapes, as shown at Fig. 5, but they are all cut in the same way. The knife is inserted in the centre, A, and vertical and horizontal cuts are made as shown at Fig. 5.

The depth of the cut at A should be about 1/8 in. or less, according to the size of the work in hand, and the cut should gradually diminish in depth until it rises to the surface at the corners. The carved pockets is then forced by tapering it out with the knife or chisel, as shown at Fig. 6.

Although in position, the gaps left by the cuts will then accommodate the cross-wires in the envelope opening, and allow the bipede to protrude a little into the envelope.

With the work turned right up the envelope becomes fully inflated in the same way as one would do with it to keep it going longer, so the air inside then gets hotter and slower, and the bird rises a long distance of flight.

In Fig. 1 the envelope is shown fully inflated, and en- deavouring to rise, but it is held down by being tied to the stove. Where properly heated it will easily rise to 500 ft., and with the propeller and motor attached. It simply leaps up.

How to Fly the Airship

The best place to fly the airship is a lofty hall, but not everybody is fortunate enough to obtain access to such a place. If released in an ordinary room it rises to the ceiling and stays there, because the pro- peller has no thrust to overcome the friction and weight of the airship. To let the airship fall again the propeller has probably come to a stop, for enough to support its own weight is it possible to get it to fly the length of the room. As before stated, the propeller and motor in the envelope will certainly catch light. Without the thread and curtains about, the airship will rise up, which might be dangerous if there are any open, naked lights or other inflammables near the place.

Captive Flights

Captive flights may be made with the airship on the end of a thread, but this is not usually very successful, for directly any wind comes in the propeller thing tills, spills out the hot air and falls quickly. If you try it, fix about 10 ft. of the thin piano wire on to the envelope, projecting vertically downwards, and tie the thread to the wire; this prevents the thread and the elastic from becoming inextricably mixed.

If you do not mind losing your airship you can (after inflating by the stove) put a pint of water and a few seeds in a saucer and place it on the floor. Do not try to fly it as a captive with the modulated spirtes, because it is very light, and if it lifts up with the pull of the air- ship will certainly catch light. Without the thread and curtains about, the airship will rise up, which might be dangerous if there are any open, naked lights or other inflammables near the place.

Hobbies

April 4th, 1931

HOBBIES

April 4th, 1931

HOBBIES

Out-of-doors flights may be made when the air is quite still, but this is not a good time of the year for oak or elm weather. The best time of the day to fly a model airship is usually just before sunrise—the air is frequently very still then, but directly the sun shows itself little clouds of wind come up, which will probably cause some exciting moments.

BUILDING A BILLIARD TABLE

By "Home Mechanic"

The following information supplements that given in our issue of February 14th, 1931.

Fig. 3. How to measure up a 5ft. 4in. billiard table.

DIRECTIONS. Billiard table designed to be made by the amateurs at little expense from materials readily available, the frame described in those a few pages a week ago, from the original article appearing in "Home Mechanic" 4in., and fixed first, after which the remaining ones are fixed and fixed, and the upper edges are placed perfectly straight and true. Owing to the extra weight of the balls and cushions, the table is not advisable to provide a middle rail 1 in. to support the billiard table. The sides of the table are to be made by the amateur himself, and by the time the air has cooled enough to let the envelope work the weight of the airship, the envelope will rise to 50ft. or more with the propeller and motor attached.

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Now paste these together in two ways along the edges, as shown in Fig. 2, and hang each pair up to dry. These pairs require to be hung up very carefully, for they will no longer lie flat when opened out. They will dry very well if hung converse side down over two chair backs about 2ft. apart. When the paste is dry, fold the double strips flat again as they were before being pasted, bring two of the double strips together, and join them as before, and open out before drying. You will now have three sections of the envelope, each consisting of four strips, which, when opened out, have a shape something similar to the shell of a boat.

When these three sections are dry, fold them up flat again, and join the first to the second and the second to the third, lastly, but before, and allow these two sections to dry. The envelope is then practically complete except for the last seam, but do not attempt to open it out just yet.

**The Disc for the Nose.**

For the last seam, draw the edges together, keeping them flat on the table, and paste and fold over as before. Start from the tail end and leave about 2ft. of seam unjointed near the nose end, but join about 6in. of the seam right up to the nose. When this last seam is dry enough, open out the envelope as far as possible and paste a disc of tissue paper over the front end. This disc will probably require to be about 8in. in diameter to close the opening.

The best way of fixing the disc is to hold a dinner plate upright inside the envelope (through the 2ft. of open seam), and get an assistant to apply the paste and press it down smoothly against the plate. The tail does not require a disc, the pointed ends of the strips are simply gathered together and bound with sewing cotton.

Adhere to the dimensions closely, for if you try to make the envelope more slender in shape you will probably upset the whole unit, and if you try to make it too big for the envelope more slender in shape you will probably require to be about 8in. in diameter to close the opening.

The Disc for the Nose.

The propelling mechanism is illustrated in Fig. 5, and, as already mentioned, from a separate unit specially designed with a view to extreme lightness. The whole unit, including the suspension wires, should weigh about 12oz.

The framework is made of two strips of bircb wood, jin. by $\frac{1}{8}$in. by 8ft. long. These are spaced by small pieces of cork at intervals of about 3in., placed as shown in Fig. 5, and to each thread the corcs are jin. thick at each end, increasing in thickness towards the centre, where the strips of wood are about $\frac{1}{8}$in. apart.

The bearing for the propeller shaft is built about 3in. x $\frac{1}{8}$in., the propeller shaft being a piece of No. 23 gauge piano wire, the hook for the front end of the motor being made of the same wire. The propeller is a composite affair with a small cork for the boss, a strip of wood $\frac{3}{4}$in. x $\frac{1}{8}$in. x 8ft. for the arms, and blades of thin card board, the whole being 10in. diameter. Two good feathers stuck into the cork boss and tied to the propeller would probably make a good light propeller. Two small glass bowls form the thrust bearing. Two attendants of $\frac{1}{8}$in. strip elastic should be used; this will provide enough thrust to keep the airship in motion.

The Wire Frame.

The best method of inflating the envelope is (as mentioned above) to use a stove. The stove shown in the photograph is a large size of the "Princess" type, the cylindrical body of this being 7in. diameter. Remove the top plate by undoing two long bolts, and cover up the ornamental holes in the top end of the cylindrical body. If required for any thin sheet metal) into a cylindrical form and clipping it inside the body of the stove. Piece "cane" about jin. wide should be made by dipping the tin plate with sheets of tin, by bending these sheets upwards over the edge of the stove body the template will be held in place.

Inflating the Airship.

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the triangle formed by the lines A-B, B-C, C-A first, the wood is clipped out from the lines B-C. After that the other two triangular shapes are treated in a similar way, and the piece is completely formed. Care must be taken in using the knife, or chisel always facing the grain of the wood or the wood be remembered that the wood must be completed with the knife or chisel, and neither file nor glasspaper should be used to give finishing touches. Wood carving is not so simple as chip carving, and some practice is necessary to advance in this branch. The beginner is advised to confine himself to simple subjects until he has obtained some experience in handling the tools. 

In starting the work the carver should make a knowledge of freehand drawing very helpful to the wood-carver, as it is advisable to set out all the designs full-size on paper to the wood-carver, as it is a very suitable subject. A patera, carved centrepiece, or entice in handling the tools. The wood must be cramped to the bench, as previously described, before the carving is commenced. The first operation is to divide the carving from the ground, and to reduce the latter to give the relief required, which, for an ordinary piece of flat relief carving, may be about one inch. The easiest way to divide the carving is from the ground with a V or parting chisel, a tool similar to the V chisel used to cut the vee lines in chip carving. With this tool a cut is made right round just clear of the outline to a depth of 3 mm., as shown in Fig. 9. Care must be taken to work with the grain as far as possible, and if there is any tendency for the chisel to run, or the wood to split away, let it be on the grain. The next stage is to cut away the ground to a depth of 3 mm., for which purpose a sharp chisel should be used, as shown at Fig. 10. With care and experience it will be possible to make the ground flat and smooth with the gouge alone, but a smaller router could be used for this purpose when opportunity offers.

The carving has now to be modelled to shape, but before this is done it will be necessary to see that the outline is perfect, and that it is cut quite square with the ground. Grooves or channels which fit the shape are glued into place as near as possible should be used, and any small irregularities in shape corrected. In modelling the piece of wood carving under consideration, the centre should be separated from the five prominent petals. The latter are recessed slightly at the base, and each one is hollowed or worked to a very flat V shape, while the centre is rounded. The less prominent petals are recessed slightly from the prominent ones, and are modelled in the same way. This carving is also finished directly from the tools without the use of files or glasspaper. A matt surface is often introduced in wood carving. Reference to Fig. 1 shows how useful this may be in chip carving. In wood carving the matt surface is chiefly used on groundwork. The effect may be easily and quickly produced with matching tools, which may be purchased from Hobbie Ltd. Quick cut and quick cheaply in various sizes, the smaller ones are useful for working the most useful to the carver.

The result of these experiments is an airship made of tissue paper inflated from hot air using an ordinary stove, as shown in the photograph (Fig. 1). The fuselage and propeller are not shown in this photograph; they are made on the balloon. When inflation is complete (see Fig. 1—right), when inflated as instructed, later on, the airship will make flights of about one minute or more in duration, usually longer than the propeller runs for. The duration of flight can be greatly prolonged by using a small pad of cotton wool soaked with methylated spirits and ignited to keep the air hot inside the envelope, but as there is some risk of setting fire to the envelope, it is not advisable to do this indoors. Out of doors the airship will rise to a great height and will probably blow away beyond recovery if provided with a methylated spirits flame.

A Satisfactory Filer described by “Home Mechanic” was made from paper obtained from a W. H. Smith and Son’s shop at a cost of sixpence for one piece. Do not use the very soft fluffly sort of tissue paper, as this has very little strength; the rigid paper should make a crisp noise when crumpled up in the hand, and should be as free from porosity as is possible, though probably this thin paper is bound to be to some extent porous. Take eighteen sheets of the paper and cut them in half lengthways, making thirty-six pieces each 10 in. by 10 in. Paste those together in threes so as to make twelve pieces, each 30 in. by 10 in., and allow the paste to dry before proceeding.

How to Join the Twelve Sections of the Envelope.
Ordinary flour paste of rather thin consistence, brought to the boil and allowed to get cold before use—is quite suitable. The two pieces to be joined should be laid on top of each other, the lower one protruding 1 in., as shown in Fig. 2A. Smear a little paste along the edges of both pieces and fold the underneath one back over the top one, as shown in Fig. 2B. Press down lightly with a pad of rag and open out that before hanging up to dry. When the twelve long pieces are dry (they will surely tear if not dry, cross one along its length to mark the centre line, then mark out the shape as shown in Fig. 2. The final shape of the airship depends upon the shape of these pieces, so draw the curves in nicely. Pinning the shape along the end of the paper with one eye closed will facilitate the curve and so help to show up irregularities. When the airship has the shape drawn to your satisfaction, you can cut the sheet on top of the other eleven, and will probably blow away beyond recovery if provided with a methylated spirits flame.

Plain and Ornamental Hinges

The hinges and construction should be the same as the Filer, but in this case only twelve pieces, each 30 in. by 10 in., are necessary, and are stuck together in threes to make six long pieces, each 30 in. by 10 in. The two pieces to be joined should be laid on top of each other, the lower one protruding 1 in., as shown in Fig. 2A. Smear a little paste along the edges of both pieces and fold the underneath one back over the top one, as shown in Fig. 2B. Press down lightly with a pad of rag and open out that before hanging up to dry. When the twelve long pieces are dry (they will surely tear if not dry, cross one along its length to mark the centre line, then mark out the shape as shown in Fig. 2. The final shape of the airship depends upon the shape of these pieces, so draw the curves in nicely. Pinning the shape along the end of the paper with one eye closed will facilitate the curve and so help to show up irregularities. When the airship has the shape drawn to your satisfaction, you can cut the sheet on top of the other eleven, and will probably blow away beyond recovery if provided with a methylated spirits flame.

The best method of making these hinges is to fold them in the same way as the Filer, and with the same precautions. The only difference is that the hinges are made with the grain cut horizontally, and the top piece is left uncut when folded. The result of these experiments is an airship made of tissue paper inflated from hot air by an ordinary stove, as shown in the photograph (Fig. 1). The fuselage and propeller are not shown in this photograph; they are made on the balloon. When inflation is complete (see Fig. 1—right). When inflated as instructed, later on, the airship will make flights of about one minute or more in duration, usually longer than the propeller runs for. The duration of flight can be greatly prolonged by using a small pad of cotton wool soaked with methylated spirits and ignited to keep the air hot inside the envelope, but as there is some risk of setting fire to the envelope, it is not advisable to do this indoors.

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SEVERAL readers wish to construct small rock gardens. This may not be possible to give definite instructions in this article to meet every need, yet, with the help given, any reader may turn a barren and desolate spot into a very pleasing prospect at very little trouble or expense.

Where to Place the Pools.

If a garden only is required, it will be a fairly simple matter to arrange it on any selected spot, but when a pool is also desired, it needs to be carefully planned before operations are commenced. Where the spot is very small, a pool may be quite out of the question. Much depends upon the size, shape, position, and condition of the available plot. If it is well drained, the garden may be formed without any thought being given to this matter, but if not, and especially if a paved surface is being treated, it is imperative to arrange large stones around the border with their edges touching, and fill in to a good depth inside with a mixture of small stones, sand, and cement. It is possible to form a pool in the midst by arranging the stones with this end in view. A pool only 3ft. in diameter may be made most conveniently. Fig. 1 and section Fig. 3 give an idea of how it may be formed.

Pool Made Separate from the Garden.

Where the plot is large enough, the pool may be made separate from the garden, and this is generally found to be more ornamental and give greater satisfaction. Two plans are shown at Figs. 4 and 5, or, by following the instructions, any shape pool may be made. In the plans it is suggested that the pool be surrounded with crazy paving should be laid out in the centre, with small rock gardens at each side, the latter being made as previously described. It will be found that a square or oval shaped pool is the simplest to make. The hole is dug to the required size and depth, and the soil is removed quite clean. The bottom and sides are formed with concrete made from a mixture of small stones, sand, and cement. Three parts stones, two sand, and one cement makes good concrete.

The bottom of a small pool should be about 3in. thick and the sides 3in. thick. The section Fig. 6 shows a square pool with a drainage pipe and plug at the bottom, and an overflow pipe arranged at the upper end. Both of these pipes should be arranged to flow into a drain.

Our free patterns for making a THERMOMETER.

These drawings we give on page 28 for the two parts of a metal little thermometer any fretworker can make. Such an article is useful in any home, and if the worker makes up a large number, they will form excellent efforts for a bazaar or Scout sale of work. The two parts required can be cut in any convenient fretwork, and it is immaterial whether they are taken out in one piece, or two pieces, of which the larger piece required is 3in. long, and the smaller piece, which forms the thermometer, is 1in. thick.

Paste the patterns down to the wood, or trace them off if you do not want to spoil the copy of Hansard. Do not commence to cut until the paper is dry, or it will tear up and spoil the pattern. Cut out the large piece first with a sharp freeman, keeping the edges straight by holding a glass against the frame upright. Clean the paper with a damp cloth before cutting out the second picture. Paste the patterns down to the wood, or trace them off if you do not want to spoil the copy of Hansard. Do not commence to cut until the paper is dry, or it will tear up and spoil the pattern. Cut out the large piece first with a sharp freeman, keeping the edges straight by holding a glass against the frame upright. Clean the paper with a damp cloth before cutting out the second picture.

Fixing a Door to a Clock Case.

If fitting clocks into fretwork designs one sometimes has to make a square or oval shaped piece projecting through the back. This can be made in any number of ways, but the one shown here is easily made and cheap. The clock is stood on a plinth or shelf in front of a mirror so that the back is easily seen. A single and a very simple way to overcome this is illustrated. A door cut out and hinged to the actual back of the works set in side of this is shown. This is in embossed brass, and its position must be made accurate, and when the catch is swung over it engages on the stud of the other part. This catch is No. 2473, and only costs 1½d. Its actual position when the door is closed is shown in the second picture.

This particular ornament is also useful for many other little jobs, and can be used as a catch for a small box lid. The use has been illustrated in these pages, and when fitted to a box the piece with the hole in it is fixed to the outside of the lid, whilst the stud is put to receive it on the front of the box itself.
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Trade enquiries invited.

A MODERN WEATHER COTTAGE and HOW IT IS MADE

By E. Kerb.

Fig. 1.—The finished "modern" weather cottage.

Boxes may be stuck at the back of the openings, instead of glass. The window slips are plain piece, 3½ in. long by ½ in. wide, ⅛ in. thick; these are glued underneath the window in the position shown by the dotted lines. The dimensions for the doorways are shown clearly, they have curved tops, the radius being ½ in. The opening at the top is to take the ridge piece, the dotted lines "B" show the position of the supports, to which the cutout is fixed.

EVENLY, no doubt, familiar with the little weather cottage shown in Fig. 1. It never loses its popularity, and it will be even more fascinating to make one for yourself.

As the outdoor season is approaching, for tennis, etc., it will be wise to make the weather cottage before starting out, as, if the little lady is in the doorway, you may be sure of a fine time, but here's the gentleman out—"Take your macintosh!"

The cottage is quite simple to make, if you follow the diagrams carefully. Commence by cutting the base, as shown in Fig. 2, ½ in. thick; the dotted lines indicate the position of the back, front, and ends.

The Front.

Next mark out the front, as shown in Fig. 3. a half in. high by ½ in. wide, ⅛ in. thick, the slope for the top being 45° taken from the front, but ½ in. from the bottom edge. A line should be drawn across the wood, as the window openings are also ½ in. from the bottom edge. These may be marked out on the cottage, from each edge, the openings being ½ in. wide by ⅛ in. high. The dotted lines indicate the position of the overlays, to bold glass in place, which are cut to the dimensions shown in Fig. 4, ½ in. thick. If preferred, a piece of transparent paper, cut from chocolate, could be used instead of glass.

The Back.

This is cut exactly the same shape as the front, ½ in. thick, omitting all interior openings, but having the opening at the top to take the ridge piece. The two ends are just plain rectangular pieces, measuring 2½ in. by ½ in. wide, ⅛ in. thick. Having cut the pieces, measure, screw the ends to the back, and then the whole to the base, leaving the front off for the time being. Now cut two supports "B" 3½ in. long by ½ in. wide, ⅛ in. thick, with a hole cut centrally, ½ in. from the front edge, just large enough to take the cutout. Screw these to the back, centrally, 1½ in. from the bottom edge, and the bottom onto the front, from the bottom edge. Fig. 5 shows all these parts screwed together.

The Figures.

The figures should be coloured in, and the plan to be realised.

1. Having cut the ridge piece, Fig. 2, mark the plan to realise the cottage.

2. Having cut the cottage, base is Fig. 4, mark the plan to realise the cottage.

3. Having cut the cottage, Fig. 3, mark the plan to realise the cottage.

4. Having cut the cottage, Fig. 5, mark the plan to realise the cottage.

5. Having cut the cottage, Fig. 6, mark the plan to realise the cottage.
which attract the rim of the wheel, will render one side lighter and the other heavier, thus imparting a weight to the device so that as the balls in tubes A and B are equidistant from the central line, they are in equilibrium, but the ball in tube A is the supporting point because of D, destroys the balance, and thereby causes the wheel to rotate. Thus it is evident that tube B always continues the position formerly occupied by C; and, by a continued rotation of this, actual perpetual motion is achieved in practice.

The bellows wheel (Fig. 7) is a further ingenious attempt to effect perpetual motion. It consists of a series of radial tubes, each connecting an inner and outer bellows. Liquid is poured into each tube, sufficient to fill the tube and one bellows.

Perpetual Motion—But Not Quite! A weight is placed on the outside of the bellows which also balances that on the inside. After some time, all be gradually closing (the horizontal one on the rising side will be entirely closed), whilst those on the other (the descending side) will be more or less open according to their position. As, therefore, one side of the bellows is being closed and the other again we have perpetual motion; but not quite.

Sufficient is shown in the diagrams to show the impossibility of the problem. The nearest approach to perpetual motion is the human being itself, and to endeavour to solve perpetual motion is to endeavour to solve the mystery of life.

A Ball and Tube Device. Probably the reader will remember the device shown by Fig. 8—the ball-and-tube structure. As the balls in tubes A and B are equidistant from the central line, they are in equilibrium, but the ball in tube A is the supporting point because of D, destroys the balance, and thereby causes the wheel to rotate. Thus it is evident that tube B always continues the position formerly occupied by C; and, by a continued rotation of this, actual perpetual motion is achieved in practice.

THE STORY OF A LATE GERMAN COLONY.

By P. L. Pemberton.

18. (Concluded from p. 851, March 25th issue.)

DO YOU KNOW—

Walter T. Gifford (Concluded from last issue)

That the New Zealand of pioneers has been found with the central picture upside down?

That this stamp, which has never been discovered before, was sold in London to a collector in March?

That any collector may be harming a similar stamp unaware?

That there is a rare variety of South African official stamps for South-West Africa formally in July, 1890, to the League of Nations. It covers a pretty sizable

That this stamp, which has never been discovered before, was sold in London to a collector in March?

That the nearest approach to perpetual motion is the human being itself, and to endeavour to solve perpetual motion is to endeavour to solve the mystery of life.
Patterns for a horse-made THERMOMETER

The larger pattern is cut from a 9-inch board, the smaller one from a 1-inch fretwood. Glue one on top of the other and then nail on the thermometer itself.

The Romance of Perpetual Motion

The Dream of Centuries.

Ingenious Devices Intended to Work for Ever!

By The Editor

It is well known that a machine is a device for altering the direction, point of application, or magnitude of a force. Altering the magnitude of a force does not increase the original force. For example, the lever in Fig. 1 works about the fulcrum shown as a small black circle. The portion marked 1 is one-tenth of the length of L, therefore the leverage is ten to one. A force of 10 lb. applied at B will, therefore, lift a weight of 100 lb. The force, however, is still the same, because 1 x 10 lb. equals 1 x 10 lb.

The Unbalanced Wheel.

Fig. 1-The lever, which shows the unbalanced nature of the idea.

The unbalanced wheel, shown in Fig. 2, is quite clever in conception. In their endeavor, however, they accidentally made discoveries which have been of great value in other directions. We have been in the world of mechanics for centuries. Machines have been invented which would serve for ever. Now it can be definitely stated that perpetual motion is an impossibility and will never be accomplished. It is the work of the untrained mind, the unscientific mind, the mind knowing little of first principles, that would waste time, unscientifically thought on the proposition.

Fig. 2.-The wheel.

The larger pattern is cut from a 9-inch board, the smaller one from a 1-inch fretwood. Glue one on top of the other and then nail on the thermometer itself.

One hundred years hence the dream of centuries will be as fresh as ever. The country will still draw an annual tax of over $50,000,000 for its uselessness. The unbalanced wheel, which consists of a number of arms pivoted at equal distances round the outer edge of a wheel, would make a quarter turn every time the wheel would revolve. By the time the wheel had made a quarter turn the arms would be fully extended, and so on for ever and ever.
NOTES AND NOTIONS from our READERS

A Useful Window Stop.

WHEN a window commences to rattle, the usual method of stopping it is by means of a wooden wedge, fitted to a suitable handle and a sharp piece of wood, which is inserted in the handle, it will make a handy glass cutter. When the needle becomes blunt it can easily be replaced.

A Substitute for a Torch.

A substitute for a torch which has previously been damped with a wad of cotton wool which has been squeezed in water; using the blunt part of the knitting needle, thread over the pattern, etc. Remember that wrong lines cannot be taken out. When the design has been traced, put the leather into a large bowl of cold water and let it remain for two hours. Take out and place face upwards on a towel to dry over night.

The Dresden tool is now used for modelling the design. Press firmly, using the edge of the tool, on the outside of the outline, to work up the design. This should be punched, and for this purpose various patterns of punch can be obtained. They add to the general effect of the work. Tap the punch lightly with a hammer, moving it over the whole of the background.

Method of Colouring.

For colouring the leather you will need one or two powder stains, these being mixed with methylated spirits, diluting to the required strength.

For large surfaces use a wad of cotton wool, working with a circular movement, then for the more intricate parts of the design use a brush. Paint the background first, and then proceed to the design. When the leather is quite dry, polish with a good shoe cream, rubbing well in with a brush and finishing with a velvet pad. Lastly, line your work with skiver, using the photograph paper, pressing from the wrong side of the leather to the order edge. Leave under a weight till quite dry.

Method of Working.

Place the design on the leather, which has previously been damped with a wad of cotton wool which has been squeezed in water; using the blunt part of the knitting needle, thread over the pattern, etc. Remember that wrong lines cannot be taken out. When the design has been traced, put the leather into a large bowl of cold water and let it remain for two hours. Take out and place face upwards on a towel to dry over night.

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The Clove and Timber Hitch.

The next two knots, the clove hitch and the timber hitch, are used chiefly for securing the running end of a rope to the standing part. The rolling bend is not jam so easily, and does not curl so much, and does not jam so easily. A list of useful knots and the purposes for which they are used:—

1. The clove hitch:—for making a loop in the middle of a rope.
2. The clove hitch, double or carrick bend:—for fastening two ropes together, a spar, or for fastening the end of a rope to another rope, a spar, or a bollard.
3. The timber hitch:—for fastening a spar or beam across a mizen, and for making a loop in the end of a rope.
4. The timber hitch, bowline:—for fastening a spar or beam across a mizen, and for making a loop in the end of a rope.
5. The harness hitch:—for making a loop in the middle of a rope.
6. The timber hitch, bowline:—for fastening a spar or beam across a mizen, and for making a loop in the end of a rope.
7. The timber hitch, bowline:—for fastening a spar or beam across a mizen, and for making a loop in the end of a rope.
8. The timber hitch, bowline:—for fastening a spar or beam across a mizen, and for making a loop in the end of a rope.

For fastening ropes to spars or to bollards. The clove hitch (Fig. 8) is very much used for this purpose, since it can be thrown on to the bollard in a moment by an expert, and, of course, it automatically tightens itself under a strain. The timber hitch (Fig. 9) is used chiefly for slipping hitches—hence its name. Neither of these two knots is of use unless the strain is continuous, as they give when the strain is intermittent or can be thrown on to the bollard in a moment.

Tying Ropes to Spars.

Fig. 10, 11, and 12 show three more ways of tying ropes to spars or to other ropes. The two half-hitches are used chiefly for securing the running end of a rope to the standing part. The rolling bend is rather more secure, and does not curl so much, and does not jam so easily. It is used for finally making a rope fast to a bollard. The rolling bend is not jam so easily, and does not curl so much. It is used for finally making a rope fast to a bollard. The rolling bend is not jam so easily, and does not curl so much. It is used for finally making a rope fast to a bollard.

HEART-BEATS FROM

The LOUD-SPEAKER

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