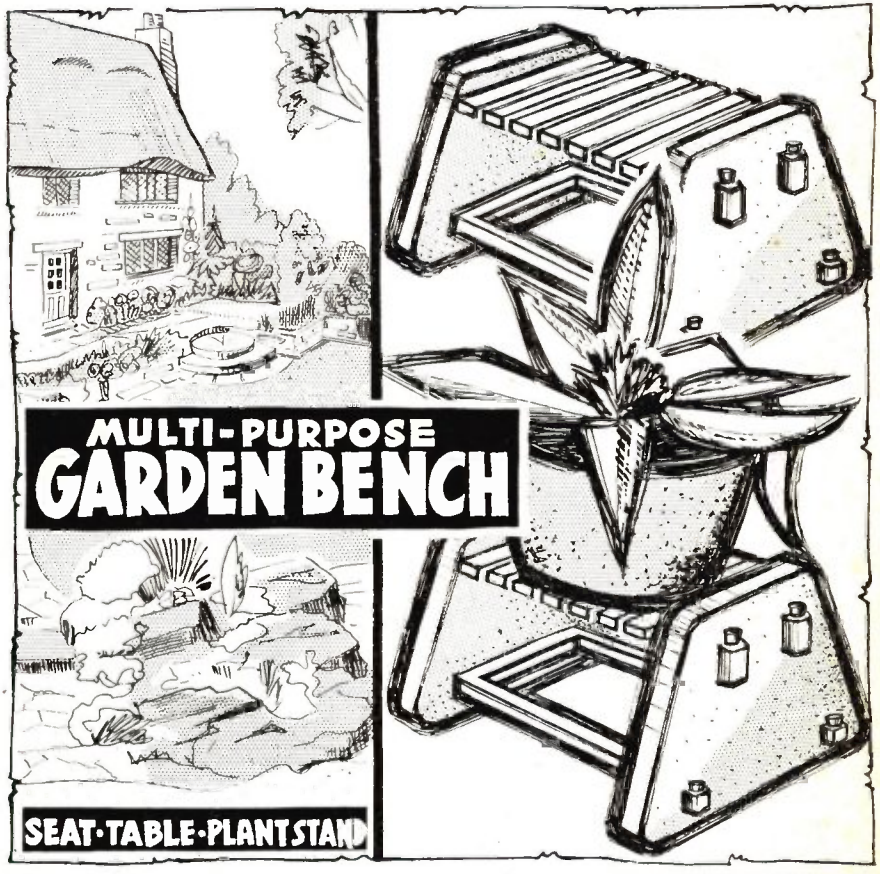
HOBBIES weekly

31st MARCH 1965 VOL. 319 NUMBER 3616



MULTI-PURPOSE GARDEN BENCH

SEAT · TABLE · PLANT STAND

Hobbies

FOR CRAFTSMEN OF ALL AGES

6D.

MULTI-PURPOSE GARDEN BENCH

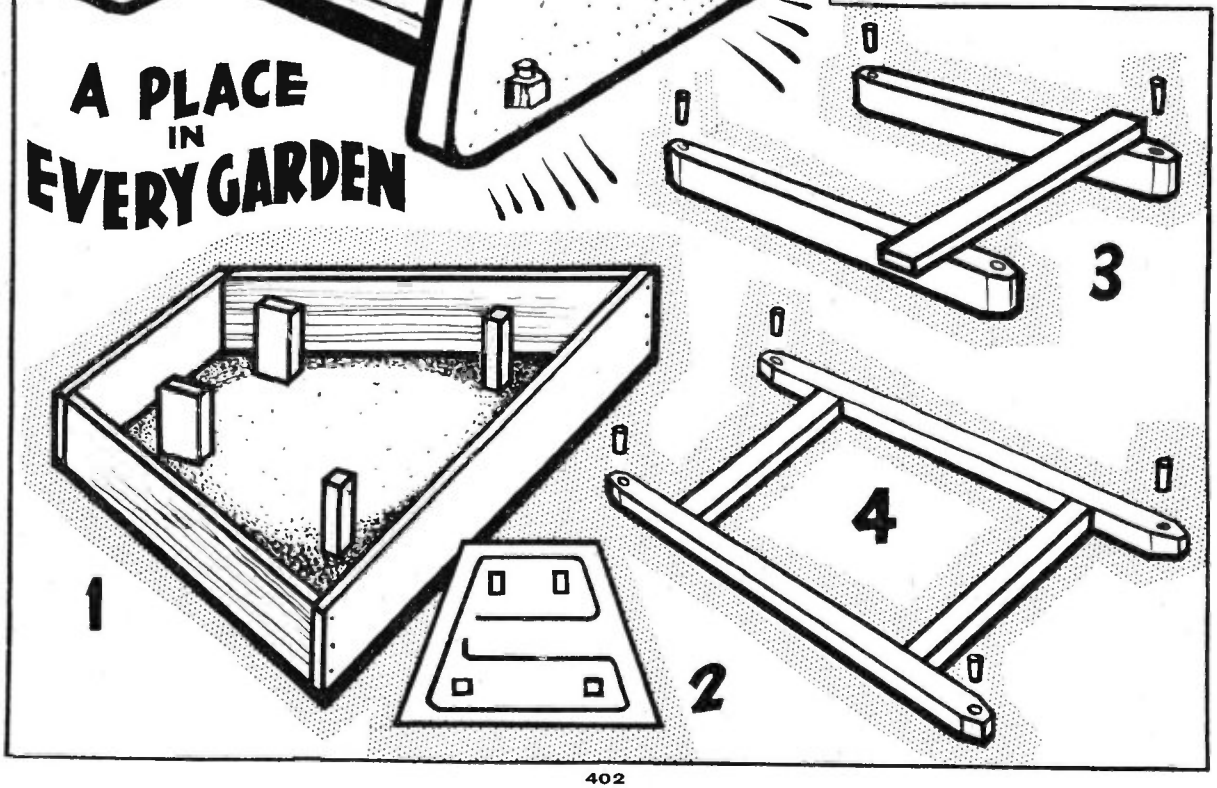
THE piece of garden furniture shown here has many uses. It can serve equally well as seat, table or plant-pot stand. Made of concrete and varnished wood, it is solid and durable, and its simple lines blend well with most surroundings.

First, the mould for the concrete end-pieces is constructed. One mould can be used repeatedly to turn out a number of concrete castings, so that several benches can be made. The mould (1) has a hardboard base, and sides of ¾ in. thick wood at least 3 in. high. The longest side is 18 in. long, the shortest side is 12 in. long, and the distance between them is 18 in. so that the concrete casting will stand 18 in. high. It should be noted that these are the inside measurements of the mould.

The sides are screwed together and tacked to the base with panel pins. Two pieces of 2 in. by 1 in. wood are lightly pinned to the base, 3 in. in from the short side, and 6 in. apart; two pieces of 1 in. square stripwood are also pinned in place, 12 in. apart, and 3 in. in from the long side. These wooden pegs form the holes through which the timbers of the bench will pass. They should be at least 6 in. long, so that they can easily be withdrawn when the concrete has set.

Metal reinforcement

The inside of the mould is wiped with grease applied with an old rag, not forgetting the surfaces of the four pegs. The cement, a 2:1 sand and cement mixture, or a ready-mixed fine casting variety of concrete, is poured in to a depth of 2 in. The reinforcement, which can be either scrap rod or strip about ½ in. wide, is bent as shown at 2 and embedded in the wet concrete. More concrete is then added until the mixture is 3 in. deep, and after tamping it well into the corners, it is left to dry.



At this stage, a major pitfall, which can easily be avoided, is the premature removal of the casting from the mould. This should not be done for at least four days. The sides are unscrewed and pulled away, the pegs carefully withdrawn, and the casting removed from the backing. It should be left to harden off for a further few days, while the mould is cleaned, assembled and greased to make the second casting. When dry, the corners of the castings should be rounded off with an old file.

The woodwork of the bench is now made. The slatted top is supported on two 26 in. lengths of 2 in. by 1 in. wood (3). These are tapered at the ends, and a ½ in. diameter hole is drilled at each end to take the dowel pin peg which holds it in place. These pegs are lengths of ½ in. diameter dowel rod. The two strips are passed through the holes in the concrete end-pieces, the dowel-pins temporarily inserted, making sure that they are close against the concrete, and the positions for the 12 in. long slats are marked on the bearer strips. The strips are then removed and the slats, made of 2 in. by ¾ in. thick wood, are screwed in place, starting with the end slats and spacing the remaining ones equally.

The lower wooden frame (4) is made from 1 in. square stripwood. Two 26 in. lengths are tapered at the ends and drilled as before to take the dowel pegs, and two cross-members are screwed in place, the same distance apart as the two end slats of the seat.

Protect the woodwork

The woodwork is varnished or treated with wood sealer before it is put in place. It should be a close fit in the holes in the concrete, but should not be forced into place. Any tight spots which have developed after varnishing should be glass-papered. Finally, the dowel pegs are tapped into place, being held with waterproof adhesive, and are also varnished over for protection against the weather.

(A. L.)

Kite flying in the Spring breezes

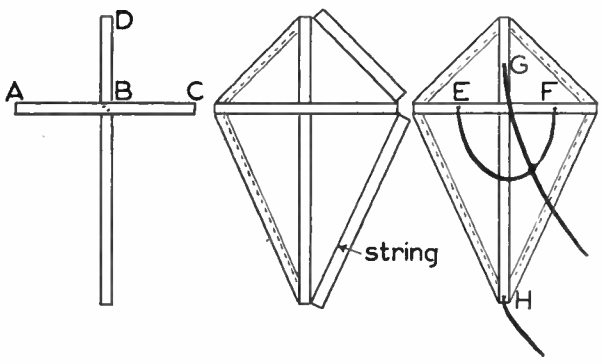
SPRING breezes are ideal for kite flying, and it is fun making your own kite. But we warn you right away that it is worth your while to do every bit of the work carefully, because a shoddy job will either break, fly badly or not at all. Gather the parts together, make your kite, and when conditions are ideal you will be ready.

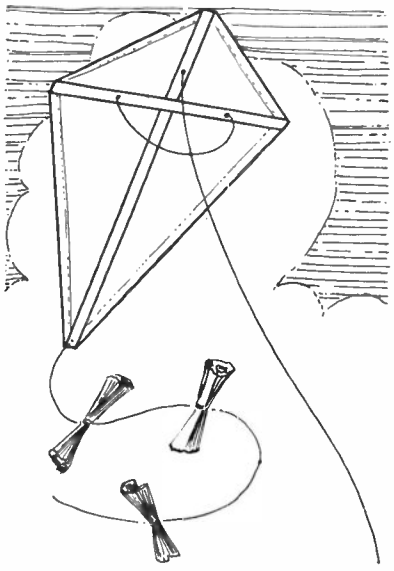
To make a good sized kite you will need two builder's laths, one 3 ft. long and the other 2 ft. long. These two laths are made into a perfect cross. Ensure that the distances between A–B, B–C and B–D are each 1 ft.

The next step after screwing the laths together, as shown by the dots in the diagram, is to make an outline with strong twine secured to the ends of each lath. Now take a piece of unbleached calico, or similar material, stretch tightly over the frame, fold it over the twine as shown, then oversew with fine string or the strongest cotton thread you can obtain.

Holes are next bored through the laths and fabric at points E, F, G and H. Take three lengths of string about 12 in. long, pass through the holes E, F, and G, and secure with a knot. If you think it advisable you might fasten the string to a button, so that there is no chance of the string being released through a hole. Tie the strings together as shown — the string from G is tied in the centre of the loop made from E and F — and then tie to the flying line. The latter is a length of good quality string, and you will need a large ball for high flying. This should be wound on to a rod about 12 in. long. Leave sufficient space at each end, so that the rod can be held comfortably in the hands, and the flying line easily released as height increases.

The kite is stabilized and kept vertical by means of a tail made with rolls of newspaper 6 in. long, and tied about 12 in. apart. In theory the tail should be five times as long as the kite.





All you have to do is to roll up the papers, and tie to a piece of string, one end of which is fastened to the hole made at point H. It will be best to experiment with three rolls at first, lengthening or shortening as may be necessary, since it is difficult to lay down hard and fast rules about the precise length of the tail. However, if the kite starts plunging about in the air it will probably require a longer tail. If on the other hand it is not rising steeply enough the tail may be too long.

We need a reasonable breeze to fly a kite, and you will have best success at the top of a rise. On level ground we usually release a little of the line, and run with the kite into the breeze. You will soon feel the pull of the wind, the kite lifting, and the need for the release of more line.

(S.H.L.)

Make the children a harbour with . . .

REMOTE CONTROL SHIPS

ARE you fascinated by those working table-top models that appear from time to time on television? In most cases the cars or ships are moved by magnets under the table. The easiest of these for a handyman to make, and one which will give children hours of amusement, is a harbour with ships.

The main tray is constructed from plywood and put together with a good waterproof glue such as Cascamite 'One Shot' and panel pins. The sides are $\frac{3}{16}$ in. thick and are made 2 in. deep to prevent spillage although only a $\frac{1}{2}$ in. depth of water is used. The base is thinner so as to give better control with the magnet. The thinner the better, but anything up to $\frac{1}{8}$ in. is suitable. Square joints are essential to prevent leaks.

Four blocks, 2 in. square by $\frac{1}{2}$ in. thick, are glued to the corners of the underside to accept the legs. The blocks are drilled for the legs before gluing. The legs are 6 in. lengths of $\frac{1}{2}$ in. diameter dowel and are glued into the corner blocks. The whole tray should be given an undercoat and three coats of enamel, allowing each application to harden thoroughly.

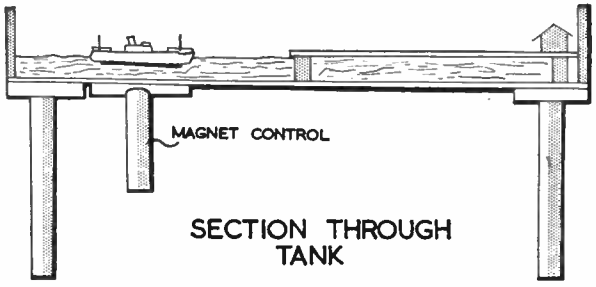
The harbour platform is cut with a fretsaw from $\frac{1}{8}$ in. thick plywood and is supported on $\frac{1}{2}$ in. long lengths of $\frac{1}{2}$ in. diameter dowel. Added touches can be given to make the harbour more realistic. A lighthouse, dock sheds, a crane and other waterside features can be made from scrap pieces of wood or metal.

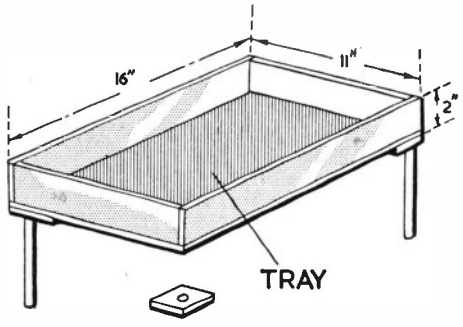
All the fittings, including the platform, should be well painted with enamel to protect them from the water. Waterproof plywood is of course best, but if you want to use ordinary plywood, which may be to hand, it is advisable to give it a thin coat of knotting or French polish before painting.

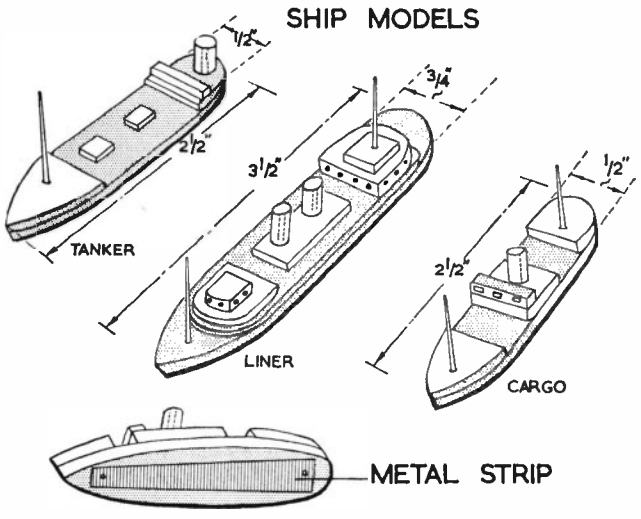
Suggested colours for finishing are: white for the harbour platform and blue or blue-green for the inside of the tray. The hulls of the ships are black, and the superstructures and decks white. Dock buildings are white, with red roofs.

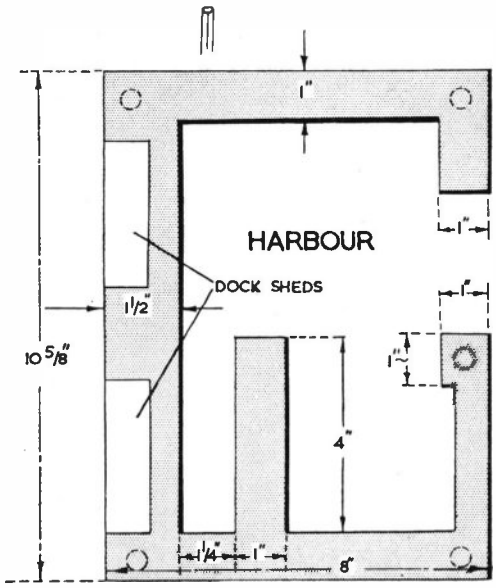
Quite simple flat-bottomed ships of $\frac{1}{8}$ in. plywood are best, and they should

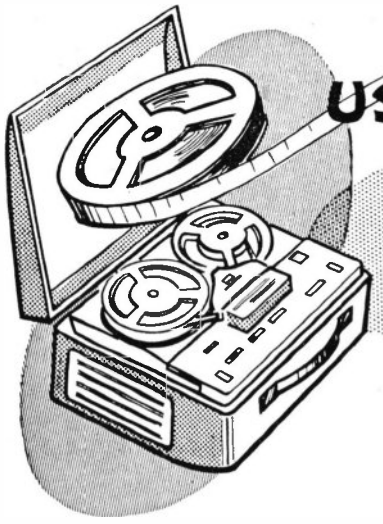
● **Continued on page 405**











USING YOUR TAPE RECORDER

PREPARE FOR THE HOLIDAYS

AS I get more and more experienced in audio matters I get more and more wary, and prepare for any unlikely eventuality when considering some self-imposed assignment, such as having a 'taping' holiday.

Even though my readers may not be more accident prone than myself (that must be impossible!) some of them may well be less experienced, and certainly I am ready to believe that very few have elevated audio to the level of a second religion, which my friends say I have done.

So if you are considering taking a sound recorded holiday I must advise you to start thinking about it, and plan *now*.

The first thing the would-be holiday recordist requires is a good supply of tapes. Even if there is an excellent hi-fi shop at his destination (and how often is it that he just doesn't know?) he has no guarantee that it will stock his favourite tape. And in my experience the best is Agfa.

But the odds are really heavily against him finding a firm of audio specialists. Let us face it, Bournemouth, Brighton or Cliftonville is not everyone's cup of tea.

I have found that general electrical shops who sell tape recording equipment with less enthusiasm than electric light bulbs or food mixers are rarely helpful, and they seldom seem to stock much more than two makes of tape. So take a good supply with you, especially if you are travelling in the remoter parts of the British Isles or the Continent.

All portables take 3 in. diameter, and most take 4 in. when the lid is removed. If you have this latter type of machine take both sizes. The 4 in. will come in handy if you wish to tape hotel and 'local' get togethers.

If you wish to use tape already recorded on, clean it up beforehand. There are many kinds of tape erasers, although the basic magnetic principle will always be the same. I have not got the space to go into them here, but my own method is to run my tapes through my mains machine at 'record', preferably with the mike tab down, but with no microphone attached, of course.

Nor should you forget to stock up with the right kind of transister battery. These can fail at the most awkward times. If you are taking your car get a cable attachment so that you can save your recorder batteries by using your car's. Invariably these will be easier to replace if you are journeying in remote country areas. (Good garages are everywhere — in the British Isles or on the Continent.)

Take at least three microphones — the original microphone that goes with the portable, a good reliable pedestrian one (that is not too highly sensitive) and an extra sensitive one.

There are also a whole list of things that are vitally essential, but which are not on the face of it to do with audio. Even after only a fortnight's holiday you will have amassed quite a number of 3 in. and 4 in. spools; and you will make your post holiday task much easier if everything is labelled. Not only the tapes, but the boxes too. Although only specialist dealers can provide ideal labels for the former, suitable broad tape for the latter can be bought. Wide tape is essential because not only does it have to bear the descriptions of the sounds, but the time and day they were recorded.

If your machine has not got a special canvas or leather holder a small haversack is required. It is often necessary, anyway, to carry your mikes, spare tapes, and perhaps, spare batteries with you. A capacious haversack would enable you to get unconscious tape 'snaps', with the aid of the sensitive microphone. You can always slip into a handy cloakroom in order to stop the machine.

Finally, here is a special tip to the would-be holiday recordist. People will co-operate with you if you are popular; and the way to be popular is to slip in a couple of pre-recorded tapes of pops. May I recommend the Beatles and the Rolling Stones.

● **Continued from page 404**

Remote control ships

have a minimum of superstructure to prevent them from overturning. For this reason merchant ships are more suitable than warships.

The control strips on the underside of the hulls are cut from thin tinplate. An old food tin is ideal. They are held to the ship by fretpins.

Any bar magnet can be used for the steering control. One about 2½ in. long is about the right size, but this is not critical. It is glued in a slot cut in the top of a 4 in. length of dowel to form a handle.

In use, the harbour is placed in the tray and water is poured in until it comes to the underside of the harbour platform. Should there be any tendency for the platform to float, it can be weighted by pinning a couple of pieces of strip lead to the underside.

When the magnet is moved under the tray the ships will follow it and can be berthed or taken out of harbour quite realistically, giving many hours of amusement and interest to a youngster.

(P.B.)

YOU WILL NEED

Tray:
- Sides 2 in. by 16 in. by $\frac{3}{16}$ in. ply — 2 off
- Ends 2 in. by 10$\frac{3}{8}$ in. by $\frac{3}{16}$ in. ply — 2 off
- Base 16 in. by 11 in. by $\frac{1}{4}$ in. ply — 1 off
- Blocks 2 in. by 2 in. by $\frac{1}{2}$ in. — 4 off
- Legs 6 in. by $\frac{1}{4}$ in. dia. dowel — 4 off

Harbour:
- Platform 10$\frac{3}{8}$ in. by 8 in. by $\frac{1}{4}$ in. ply — 1 off
- Supports $\frac{1}{2}$ in. by $\frac{1}{2}$ in. dia. dowel — 5 off

Ships:
- $\frac{1}{4}$ in. ply offcuts from harbour platform

Sheds:
- Offcuts from scrap box

Steering Control:
- $\frac{3}{4}$ in. dia. by 4 in. dowel — 1 off
- Bar magnet 2$\frac{1}{2}$ in. by $\frac{1}{2}$ in. square or similar
- Waterproof glue, panel pins, enamel

CHEMISTRY AT HOME

Part 2.

MANGANESE SULPHATE EXPERIMENTS

By L. A. Fantozzi

WE saw in the last article on manganous sulphate, $MnSO_4.4H_2O$, that manganous hydroxide, $Mn(OH)_2$, on exposure to the air is converted into brown hydrated oxides of manganese. This can be turned to account in wood staining, White woods can be stained to imitate Jacobean or natural old oak.

To see how this works take a slip of wood and paint two stripes on it with a 5 per cent solution of manganous sulphate. Let it dry. Then paint one stripe with 10 per cent sodium hydroxide, NaOH, solution and the other with ammonium hydroxide, NH_4OH, of specific gravity 0·88 diluted with an equal volume of water. In each case manganous hydroxide is formed on the wood:

$MnSO_4 + 2NaOH =$
$Mn(OH)_2 + Na_2SO_4$ (sodium sulphate),

$MnSO_4 + 2NH_4OH =$
$Mn(OH)_2 + (NH_4)_2SO_4$
(ammonium sulphate).

As the wood dries the colours appear — Jacobean in the case of sodium hydroxide, old oak in the case of ammonium hydroxide.

A similar process was formerly used for dyeing cloth various shades of brown. Saturate a small piece of cotton cloth in manganous sulphate solution, squeeze it well, stir it around in a weak solution of sodium hydroxide, and hang it up to dry, when the brown shade will develop. Then rinse the cotton well in warm water. Shades produced thus from manganous salts and alkalis were known as Manganese Brown.

Manganous carbonate, $MnCO_3$, occurs as the mineral dialogite in parts of central England and may be made artificially by adding a solution of sodium carbonate (washing soda), $Na_2CO_3.10H_2O$, to manganous sulphate solution until a drop of the mixture just blues red litmus paper. It appears as a white precipitate:

$MnSO_4 + Na_2CO_3 = MnCO_3 + Na_2SO_4$.

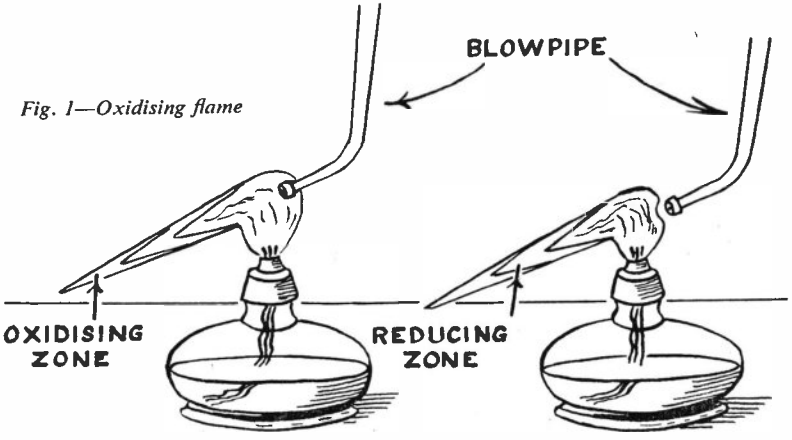


Fig. 1—Oxidising flame

Fig. 2—Reducing flame

In the moist state it has a tendency to absorb atmospheric oxygen and form partially hydrated manganic oxide, MnO(OH), and carbon dioxide, CO_2:

$4MnCO_3 + 2H_2O + O_2 =$
$4MnO(OH) + 4CO_2$.

Consequently, rapid filtration is advisable under reduced pressure, as outlined in the previous article, following up the washing with water by rinsing with methylated spirit and ether, $(C_2H_5)_2O$, and then sucking dry.

Like other carbonates, manganous carbonate is useful when one wishes to prepare a soluble salt of the parent metal. Manganous chloride, $MnCl_2.4H_2O$, for instance, is easily prepared. Add dilute hydrochloric acid, HCl, to manganous carbonate little by little until a small amount of manganous carbonate remains undissolved:

$MnCO_3 + 2HCl = MnCl_2 + H_2O + CO_2$.

Boil the mixture, filter it into an evaporating basin, boil it to low bulk and then finish off the evaporation to dryness on a water bath. A pink mass of manganous chloride remains. As this is deliquescent it should be bottled while still warm in a screw capped bottle whose cap has been fitted with an extra rubber disc to keep out atmospheric moisture. Like many deliquescent salts it is soluble in alcohol as well as water.

By adding a solution of sodium tetraborate (borax), $Na_2B_4O_7.10H_2O$, to one of manganous sulphate a bulky white precipitate of mixed manganese borates is formed. This product is used as a paint drier.

To prepare a specimen dissolve 6 grams of manganous sulphate in 100 ml. of water and 9·5 grams of borax in 250 ml. of water. Mix the solutions. As this precipitate, too, is liable to turn brown in the moist state, again adopt filtration under reduced pressure and, owing to the slow filtering nature of the precipitate, use a circle of white cotton cloth instead of the usual filter paper. This speeds filtration still further. Wash several times with water, follow up with methylated, then ether, finally sucking dry. The powder is quite stable when it is dry.

Manganous ammonium phosphate, $MnNH_4PO_4.H_2O$, is a pinkish salt and is used as a means of estimating manganese in analysis. To prepare it add ammonium hydroxide to a solution of sodium phosphate, $Na_2HPO_4.12H_2O$, until the mixture smells strongly of ammonia, NH_3. To some warm manganous sulphate solution add the ammoniacal sodium phosphate solution until no further precipitate appears to be forming. This precipitate is manganous ammonium phosphate, formed thus:

$MnSO_4 + Na_2HPO_4 + NH_4OH =$
$MnNH_4PO_4 + Na_2SO_4 + H_2O$.

Filter it off and wash it on the filter until one wash water no longer gives a white turbidity with a solution of strontium nitrate, $Sr(NO_3)_2$. Dry the salt in a warm place.

Heat some of it to redness for about half-an-hour in a crucible. Ammonia and water are given off and white manganous pyrophosphate, $Mn_2P_2O_7$, remains in the crucible:

$2MnNH_4PO_4.H_2O =$
$Mn_2P_2O_7 + 2NH_3 + 3H_2O$.

By similar means manganese can be separated from other metals and the

amount of manganese in the original sample calculated from the weight of manganous pyrophosphate obtained.

Two useful tests for manganese involve the use of the ordinary mouth blowpipe. If the jet of the blowpipe is held just inside the flame of a spirit lamp or candle an oxidizing flame is produced, if just outside a reducing flame. Figs. 1 and 2 make this clear. A little preliminary practice will soon reveal the knack of keeping up a steady blast without becoming breathless. Breathing is uninterrupted and the back of the mouth closed by the tongue. The cheeks act as bellows. When the mouth is empty of air more is admitted by momentarily moving the tongue.

Make a small loop in a platinum or nichrome wire by bending the tip round a pencil point. Dip the loop into powdered borax and hold the loop in the ordinary flame until it fuses to a clear bead. Now touch the bead to a tiny speck of manganous sulphate and reheat the bead in an oxidizing flame. The bead becomes coloured violet. Now heat it in a reducing flame. The bead turns colourless.

A very characteristic reaction of manganese is the change which occurs when one of its compounds is fused with sodium carbonate and potassium nitrate, KNO_3. Mix together about equal volumes of manganous sulphate, sodium carbonate and potassium nitrate. Heat a little in a small crucible until it is red hot. Let it cool. A green mass is left owing to the presence of sodium manganate, Na_2MnO_4. Potassium nitrate, KNO_2, sodium sulphate and carbon dioxide are also produced in the reaction:

$$MnSO_4 + 2KNO_3 + 2Na_2CO_3 = Na_2MnO_4 + 2KNO_2 + Na_2SO_4 + 2CO_2.$$

Dissolve the mass in water. On standing, the green solution deposits hydrated manganese dioxide, $MnO(OH)_2$, and the solution turns purple owing to formation of sodium permanganate, $NaMnO_4$, due to the action of the carbon dioxide of the air:

$$3Na_2MnO_4 + 2CO_2 + H_2O = 2NaMnO_4 + MnO(OH)_2 + 2Na_2CO_3.$$

Pull-along Toys for Toddlers

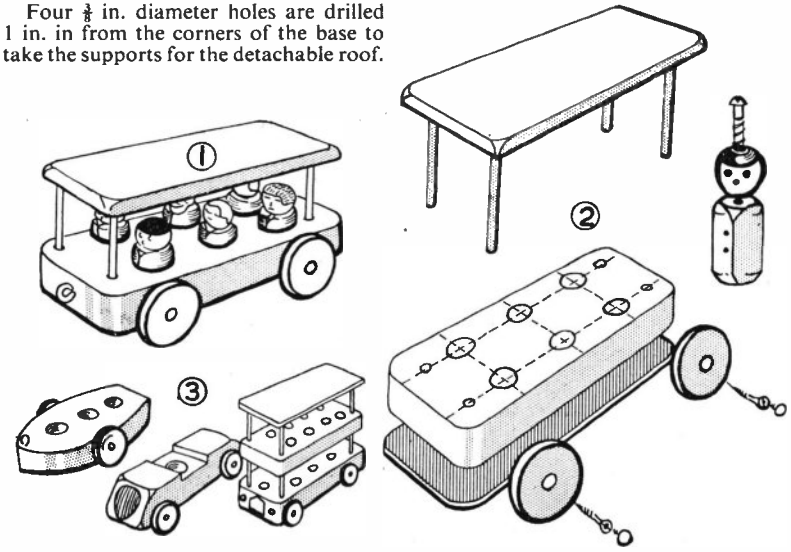
By A. Liston

ATTRACTIVE wooden pull-along toys for young children, complete with detachable wooden passengers, can be made very quickly and cheaply in a variety of styles.

The single-decker bus shown in Fig. 1 is a typical example of this kind of toy. The method of construction is shown in Fig. 2. The base is a 4 in. by 8 in. piece of 1 in. thick wood. Six 1 in. diameter holes are drilled in this base; these are arranged in pairs with their centres 1 in. in from the sides of the base, and the pairs are drilled at 2 in. intervals.

Four $\frac{3}{8}$ in. diameter holes are drilled 1 in. in from the corners of the base to take the supports for the detachable roof.

When all the holes have been drilled, a piece of hardboard, the same size as the base, is pinned and glued to the underside. The corners are rounded off, and four 2 in. diameter wooden wheels are screwed in place, using dome-headed mirror screws which present a smooth surface to both fingers and furniture.

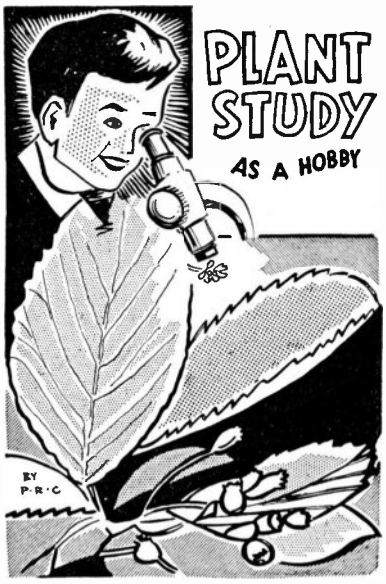


The roof is an 8 in. by 4 in. piece of $\frac{1}{2}$ in. thick wood, with four 4 in. lengths of $\frac{3}{8}$ in. diameter dowel rod glued in holes coinciding with those in the base. The edges of the roof are rounded off, and the passengers are then made.

These are 2 in. lengths of 1 in. diameter dowel rod, glasspapered so that they slip easily into the holes in the base. The head of each figure is a 1 in. diameter wooden ball or bead, screwed in place. Lastly, a screw-eye is fitted to the front of the base, and the toy is then painted.

The base and roof are enamelled bright red, and the wheels are bright red or white, with black 'tyres.' Each of the figures is given a flesh-coloured head, and a body in a bright colour. When these are dry, black or brown hair is painted on, three dots represent the facial features, and a few lines of black on the body serve to delineate the clothing.

Other shapes of toy made on the same principle are shown in Fig. 3. The boat is also made of 1 in. thick wood, and wheels can be fitted if desired, or omitted if the toy is to be played with in the bath. The single-seat car is made from a length of 2 in. square wood, cut away in the middle, and with the body details painted on. The double-deck bus is largely the same as the one described. One inch thick wood is used for the upper deck, and the lower set of four dowel rods is glued into $\frac{1}{2}$ in. deep holes on the underside of the upper deck section. The roof is attached to the upper deck as before



WATER PLANTS

IN the previous two articles we have dealt with the xerophytes, plants of dry places, and the epiphytes, plants living on others, away from the 'rat race' on the ground.

As we might expect, to reduce the competition from others many plants have become adapted to living actually in the water. All these plants, of course, have no difficulty in obtaining their water supply, and most of them are able to absorb water all over their surfaces, not just the roots, as in the case of land plants.

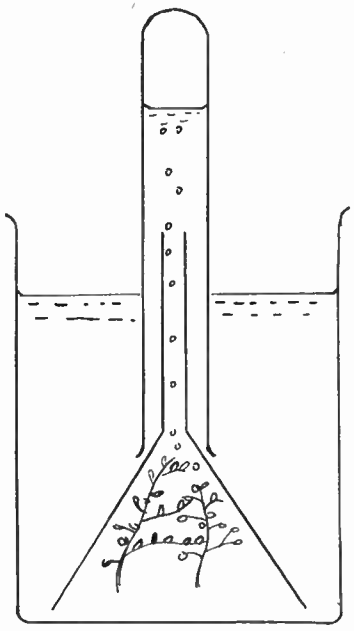
They can, however, be divided into two classes, those always totally submerged in water, and those whose leaves float on the surface. The first type must also be able to obtain their oxygen and carbon dioxide from solution in the water. Oxygen is less readily available for the water plants than for their land relatives, since there is proportionally less of it in the water than in air. Carbon dioxide, however, due to its greater solubility, is more plentiful.

We have seen in an earlier article how plants respire or 'breathe' by taking in oxygen and giving out carbon dioxide, as other living things, but that in light, they also photosynthesize, by taking in carbon dioxide and giving out oxygen, using the light energy to build up their food. Water plants of course also do this, passing the oxygen into the water, and this fact is of immense importance for fish and other creatures living in the water.

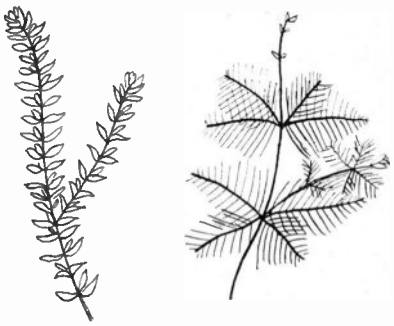
All aquarium keepers will know that it is essential to have plants in the water with their fish, unless air is artificially bubbled into the tank. They will also know that light is necessary to cause the plants to release oxygen, and in an earlier article we mentioned a simple experiment in which leaves of a water plant were immersed in water, in the sun, and gas, proved to be oxygen, collected. This is shown in the sketch. These submerged plants do not usually possess the pores, or stomata, of land plants on the leaves, and the interchange of gases takes place by diffusion over the whole surface.

The type of water plant with floating leaves, such as the well-known water lilies, has the stomata on the upper surface of the leaves, and is able to carry out the interchange of gases into the air, as in the case of land plants. These plants are restricted to fairly shallow water, so that their leaves can reach the surface whilst their roots are fastened to the bottom. In deeper water, the plants are totally submerged.

It is worth noting here that the flowering plants that we shall describe are only found in fresh water; the sea is the great home of the Algae, or seaweeds, which we described in detail in an earlier article.



An experiment to show the evolution of oxygen from a water plant in sunlight



Two common submerged water plants. Canadian Water-weed (left) and Water Milfoil

Flowering plants, as we know them in fresh water, do not appear to have become adapted to life in salt water. In some respects this makes it easier to study them, for it is not necessary to await the annual holiday to find specimens; any river, stream or pond will usually provide something of interest.

Differences in structure

Since water plants are supported by the water on all sides, there is not the need for mechanical strength as in land plants, and a microscopical examination of a stem section of such a plant will usually show a simpler structure than a land plant. The supporting tissue is restricted to a central strand, and large air canals are present.

Types of water plant

One of the most common and widespread of our water plants is the Canadian Waterweed, *Elodea canadensis*. As the name implies, this is not a native plant, and it was not known here before 1842. Since it is able to spread rapidly by vegetative means, soon after its introduction from North America, it was a serious pest in rivers and dykes. However, some natural check appeared to take place, and although still quite plentiful, it is not such a menace as before. If introduced into a cold water fish tank, masses of it will frequently have to be removed, owing to its rapid multiplication. The plant exists in male and female forms, although all the specimens commonly found are female.

Another common water plant, also completely submerged (although in some species the flowers appear above the surface) is the Water Milfoil, *Myriophyllum*. This has delicate feathery-like leaves, and is also well-known to aquarists. Both these plants are able to pass the winter in a resting stage, consisting of tightly wrapped leaves, or

'winter buds'.

A very common plant, not completely submerged, is the Duckweed, *Lemna*, of which there are several species. They are mostly very small, in fact one of them, *Lemna arrhiza*, is the smallest British flowering plant, its leaves being about the size of a pin's head. These are floating plants, the small roots merely hanging down in the water, to balance and absorb. Duckweeds also are prolific; although small, they can completely cover a pond with a green carpet. These plants tend to thrive in foul water, particularly in farmyard ponds fed from manure heaps. The 'leaves' are in reality portions of flattened stem, and although the plants do produce flowers, reproduction commonly takes place by budding, a characteristic of these water plants which can cover a stretch of water very rapidly.

The Lesser Duckweed is the commonest species in this country, the 'leaves' or fronds being about a quarter of an inch across. The Greater Duckweed is quite large, with fronds about an inch. The minute flowers of the Duckweeds are above water level, and are probably insect pollinated.

Making a plant aquarium

An interesting collection of the plants we have already mentioned can be made in an aquarium, or even a plastic washing-up bowl. This should be placed in a sunny window with well-washed sand or gravel at the bottom. It should be filled, preferably with pond water, although this is not essential. Pieces of the plants we have mentioned can be obtained from ponds or ditches and planted in the sand (Duckweeds will of course float), stones being used to anchor the roots until they take hold.

In a natural pond, or an aquarium with plants and fish, a balance is struck between the inhabitants, the plants freeing oxygen for the fish, and the latter producing nitrogenous matter and mineral salts for the plants. Therefore in a plant aquarium, it may be necessary to add a little liquid plant food from time to time. This can be bought as a concentrate in small bottles, quite cheaply, and since so little is used it will last a very long time.

Incidentally, such a plant aquarium, if filled with pond water, will provide interest for the amateur microscopist, for it will soon be inhabited with a multitude of minute living things.

Other well-known water plants with floating leaves are the Water-lilies. These are not suitable for an indoor tank, but can be grown in an outdoor pond. There are two common species in this country, the white Water-lily, *Nymphaea alba*, and the yellow, *Nuphar lutea*. They can obviously be distinguished when in flower by the colour, but otherwise the white has the smaller leaves, and all floating, whilst the yellow has some submerged leaves. Both are rooted in the mud on the bottom and are common in sheltered fresh water. The flowers appear in late spring and summer.

A Water-lily

Other plants

In addition to the true water or 'aquatic' plants, there are others living around ponds and other damp areas. One of these, the most interesting Sundew, a plant feeding upon insects, we shall describe in a later article dealing with carnivorous plants. This is not so easy to find, but there are other damp loving plants that are quite conspicuous.

The beautiful, early, Marsh Marigold, with its brilliant flowers, is familiar to most people. The flowers consist only of sepals, petals being absent. Between the marshy area and the pond itself there is often a swamp area, and here can be found Bulrushes. These have rounded, grass-like stems, and few leaves, either floating or submerged. The stems are still sometimes used for basket-making and chair seats.

Next. Japanese miniature trees, or Bonsai.

THE FITZ AND STARTZ

FOLLOWING the path successfully trodden by The Hollies, Freddie and The Dreamers and Herman's Hermits, a new young group from Manchester are currently building up a name round that area. They call themselves The Fitz and Startz.

Manager is one-time international athlete Michael Berisford, still our fourth fastest miler with a time of 3 minutes 59 seconds but now retired and working for his family business. By coincidence the title of their first disc on Parlophone is 'I'm not running away'.

CASTING PLASTER PLAQUES

WALL ornaments are always attractive, always in fashion, and can be simply and cheaply reproduced from the original to make excellent gifts for your friends.

The handyman who combines artistic sense with creative ability may prefer to begin at the beginning and make his own original. The materials necessary for starting 'from the bottom up' are as follows: a rough modelling board; small mixing bowl; a cup, or measure, for water; short lengths of stiff wire; modelling clay (obtainable from an artists' supplier) plaster of Paris or Italian white, etc; a little boiled oil, a 1 in. soft brush, and some shellac.

Fig. 1

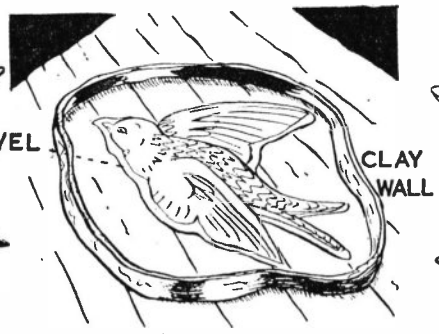


Fig. 2

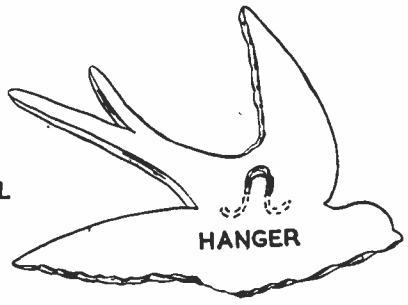


Fig. 3

Now let's assume you wish to make the bird ornament shown in Fig. 1. These can be made in pairs the same size to balance each other, or in sets of three different sizes.

Lay out a fair outline of the subject in clay on your board. Then fill in, building up in the middle to give a rounded body. Lay on the clay in small lumps, working each piece into the mass with the thumb. When you are satisfied, the whole surface can be smoothed off with wetted fingers.

Now attend to details such as the beak, feather effects and the eye, working them into the model with the help of a smooth tapered stick. Be careful not to 'undercut'. The reproduction is to be made from a plaster pull-mould, and you want your cast to come away easily. Any undercutting will key the plaster into the mould and you won't get it out by damaging either the mould or the cast. The slight bevelling of the edges should also be noted Fig. 2.

Once your model is satisfactory in this respect, as well as artistically, you can prepare it for the mould. For this, build a wall of clay all round it, made up of 'bricks' laid end to end and stuck firmly together. The clay has to be well wetted to do this. It should be at least 1 in. from the model all round (Fig. 2.) The height of the wall should be slightly above the highest part of the model.

To make your mould, measure some water into the mixing bowl, and add the plaster at the ratio of about 3 to 1 of water. Mix to a smooth creamy consistency. With the soft brush oil your model well, the clay wall, and the board inside it.

Take the bowl of plaster and pour out steadily, over and all round the model within the wall. It is essential that the model itself be covered while your mixture is still fluid. After that it will be best to allow it to congeal a little, to enable you to build up with the remainder. Flatten off the top so that it will stand when turned over.

Allow to harden

Between five and ten minutes should suffice for the plaster to harden if the consistency is correct. The plaster will become quite warm, owing to chemical processes. Once it has become cold it is safe to handle, and you can turn the board over and work the new mould off the model (which should stick on to the board).

If you oiled the clay all over, and if you avoided deep undercuts, the plaster mould can be coaxed off easily. Having got it off, look inside to see if any clay is stuck into odd corners. Find out whether it is keyed in. If so, you should dig it out and afterwards pare away carefully any overhanging plaster. It is one thing to dig out bits of clay, but your plaster cast might become hopelessly keyed in if you leave the mould as it is.

Your clay model has now served its purpose. The next thing is to reproduce it, as many times as you like, from your mould.

If you require only one or two ornaments, you can use the mould right away. But you might like to go on making them to build up a store either as replacements, as presents to your friends, or with a view to selling them. In this case, it is better to dry the mould thoroughly, either in the sun, or in a low oven. When dry, it will be quite hard and brittle. It can be tested with your thumbnail or by rapping it with the knuckles. Paint the inside with one or two coats of shellac, and you have a mould that will last for years.

Casting is the simplest process of all. Stand the mould on its back and paint the inside with oil, making sure you cover all surfaces and avoid bubbles. Mix up your plaster as before and pour it straight into the mould. Level it off with a straight-edge. While it is setting, prepare a short length of wire to stick into the back as a hanger, shaped as in Fig. 3. When the plaster shows signs of 'going off', push the ends of the wire into the back top-centre, leaving the middle to protrude slightly. You can cut away some plaster underneath with a knife, tunnelling upwards, to take the nail for hanging.

If you are casting small, light ornaments, you won't need wire. It will be enough just to cut out the depression in the back of each.

To extract the cast when fully set, turn the mould over and shake it out on to a folded cloth. Remove the bevel and dry out for painting.

Cellulose can be used at once, but water-colour needs to be sized or cellulosed. Stippling can be done with a mop brush and distemper mixed with sand, covering with a coat of gloss.

(E)

PREPARE FOR RUNNER BEANS

ALTHOUGH Broad, French and Runner beans are all popular and are widely grown, the Runner beans are probably general favourites. They are very prolific, especially if well treated, and it pays to give them extra attention.

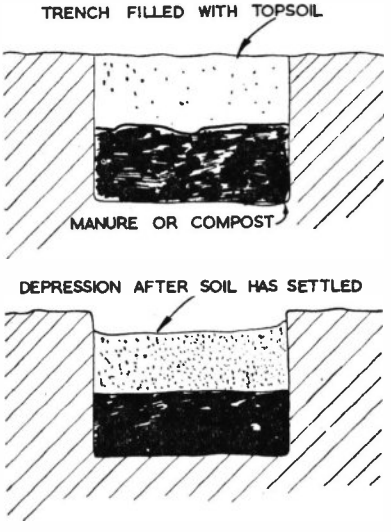
For heavy crops it is well to take out a trench about 2 ft. wide and 18 in. deep, forking over the bottom to give good drainage. The trench is then half-filled with farmyard manure or good compost and covered with soil. Into the top soil rake a general fertilizer — about 4 oz. to the square yard will be sufficient.

The trench should not be firmed or trodden down, but should be allowed to settle naturally. This will allow a shallow depression to form as shown in Fig. 1 greatly facilitating watering when the plants are flowering.

The beans can be grown up stakes, wire or netting, the ideal height being about 7 ft. Stakes should be in pairs, the foot being in the outside of the trench and each pair crossing about 12 in. from the top and secured with string or wire. Each pair can be about 9 in. to 12 in. apart. A long pole can be laid along the tops where the stakes cross and will help to keep the whole row steady.

If using wire netting, 9 ft. angle irons are driven in at each end and a single strand of wire stretched top and bottom. The netting is then secured to the irons and the wire. Two pieces of netting 4 ft. and 3 ft. wide can be used. For long rows, intermediate stakes may be placed at intervals of about 10 ft.

Another method of cultivation is to sow a double row of beans in the trench, without stakes of any kind. The beans are allowed to grow naturally, just pinching out the growing tips occasionally. In dry weather there is a distinct advantage in this method, for the mass of leaves spreading over the trench keeps the soil moist, and this in turn gives ideal conditions for 'setting' the flowers. One disadvantage is that a few beans may be splashed with soil during severe storms, but generally this method can be relied upon to give a heavy crop. Spacing of the beans in the rows should be about 9 in. and a few extra may be sown at the end of the rows. These can be transplanted if there are any failures.

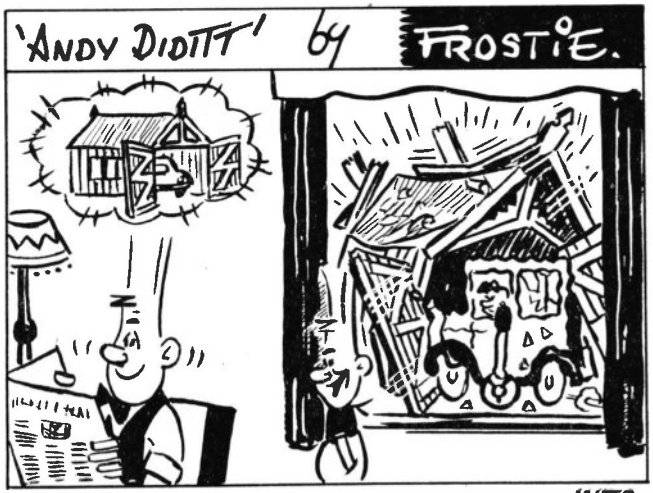


When grown up stakes, two or three should be sown around the bottom of the stake and the weakest one removed after germinating.

Cultivation consists of weeding and hoeing regularly. During dry weather the ground should be kept moist by watering. A good idea is to use one of the many polythene sprinklers, which are in fact a specially manufactured length of flat hose which is perforated at intervals to give a gentle spray in all directions. They are usually sold in lengths of about 20 ft. and are ideal for laying along the trench.

When the flowers begin to appear the plants should be syringed if the weather is dry. This will assist 'setting'. Once picking begins it should be a rule that 'old' beans must NOT be left on the plants. If they are removed it will encourage the plants to continue bearing.

(M.h.)



How water is made 'super-wet'

DIRT and grease usually go together. Unwashed dinner plates always hold some grease. Glands in your skin produce small amounts of oil — so dirty hands and soiled clothes are generally greasy too. Water molecules have a stronger attraction for each other than for grease. This means that — although very hot water can melt and wash away some kinds of grease — water cannot actually wet greasy surfaces. Therefore — since grease and dirt go together —the cleaning or 'detergent power' of water is greatly restricted.

Use an eye dropper to put some water drops on a piece of waxed paper saved from a Corn Flakes packet. You can guess how tightly the molecules stick together, because — even when you try to spread the water with the dropper — it remains in firm fat drops that don't wet the wax. In fact water molecules cling to one another so tightly that, at the surface, they form a tense skin. It is this 'surface tension' that tends to make all waterdrops round.

Repeat the experiment with soapy water. This time it is relatively easy to spread the water over the waxed paper, because soap makes water wetter! Soap particles can attract both water and grease. Thus soap acts like vital chain links that enable water to pull away greasy dirt from unclean dishes, clothes and hands — then the particles hold the dirt in suspension, to be rinsed away. However, soap used to increase the detergent power of water has some unfortunate disadvantages . . .

The trouble with soap

Make a glass of tap water really 'hard' by dissolving in it one teaspoonful of magnesium sulphate (Epsom salts). Pour half of this water into another glass. Label both glasses: 'Hard Water'. Then prepare two half-glasses of distilled or chemically pure water, that a chemist can supply. Label these: 'Soft Water'. Add a tablespoonful of vinegar to one lot of soft water, to make it acid. Record this fact on its label.

Put a half-inch cube of soap into the pure soft water, and shake the glass until the soap forms a fine frothy lather. Count the number of shakes. Next, put similar soap cubes into one glass of hard water and into the acidified soft water. Shake each glass the same number of times.

No lathers of soap suds form in these solutions. If you keep on shaking the hard water, a greyish scum appears — and white curds are produced if you continue shaking the acid water.

Set aside the remaining glass of hard water.

These tests clearly show the important limitations of soap as a detergent agent. Soap always reacts to form a scum with chemicals like calcium carbonate, magnesium sulphate, calcium chloride and calcium sulphate dissolved in hard water coming from limestone hills. Only after the scum-forming action ceases can soap start cleaning and form a lather with hard water. Also, water which is slightly acid turns soap into useless fatty acids. Soap only works really well when the water supply is chemically pure, or soft.

Synthetic detergents

Now add a drop of liquid detergent (e.g. 'Sqeezy') to the second glass of hard water. Shake the glass — and observe how soon a superior lather is produced. There is no scum, because modern synthetic detergents do not react with chemicals that make domestic water supplies hard. Until synthetic detergents were available, hard water always needed 'softening' before it could be used economically for washing away greasy dirt with soap.

Synthetic detergents are 'built up' chemically from petroleum products that are cheaper than the animal and vegetable fats and lye from which soaps have been made for nearly 2000 years. They work like old-fashioned soaps, but their action is far more dramatic. A duck sinks in a bath of detergent water until only its head and neck are above the surface. Detergent lets water wet the duck's oily feathers. Then water can displace air between the feathers that normally keeps the duck afloat.

All synthetic detergents and soaps in solution break up into molecules, or somewhat smallar particles than molecules that carry electric charges. However, the detergent particles have a curious 'head and tail' structure. The head is 'water loving' and readily clings to water molecules, while the tail 'hates' water and attracts grease. As we have said of soap, it is because the particles can hold together water and grease that they spectacularly improve water's wetting power. And wetting powers with modern detergents are supreme. . .

Blow a dust of talcum powder off your hand, to cover the surface of some clean water in a dish. Water is not attracted, so the heavier-than-water talc rests upon the water's tense skin. But add a drop of liquid detergent to the middle of the dish. At once the detergent particles spread across the surface and begin to bind the greasy talc to water. Then see how the now waterlogged powders sinks in a pretty outward — moving cloud.

Hot water made 'super wet' with synthetic detergents easily penetrates between the fibres of soiled clothes, to combine with dirt. Then the water must be agitated manually, or by a washing machine, to release the wetted dirt — now held in suspension — ready to be rinsed away. Scientists hope to develop detergents that will work well in cold water, with little or no need for mechanical agitation to complete the washing action.

At some sewage works the refuse from your kitchen sink is allowed to settle in special sedimentation tanks. Synthetic detergents help wet and suspend greasy dirt so well that sanitary engineers complain that, nowadays, the settling process tends to take too long.

Even these 'wonder chemicals' have their disadvantages! (A.E.W.)

TOPICS FOR COLLECTORS

COMMON STAMPS

COMMON stamps are never worthless. They may never become valuable, but they will always be of use to the collector for research and for exchanging with other collectors at home and overseas.

If I were asked to name the twelve commonest stamps ever issued I would give the following:

1. Great Britain, Queen Victoria, 1d. lilac, 1881.
2. Great Britain, King Edward, 1d. scarlet, 1902.
3. Germany, 1889, 10 pfennig rose.
4. Germany, 1921, 5 mark orange.
5. Germany, 1933, 10 pfennig brown.
6. Germany, 1941, 12 pfennig red.
7. U.S.A. 1947, 6 cent — Air mail.
8. U.S.A. 1947, 15 cent green—Air mail.
9. Cuba, 1948, 1 cent green.
10. South Africa, 1959, 3d. blue on indigo.
11. South Africa, 1959, 3d. blue and orange.
12. Switzerland. 1908, 5 cent green.

Of these stamps the Queen's head of Great Britain enjoyed the longest life. Whilst speaking of the length of currency enjoyed by stamps, it may be well to say that, of all the adhesive specimens issued throughout the world, the large fivepenny green of New South Wales remained unchanged for a longer period than most; whilst the Queen Victoria penny embossed envelope, with a light pink stamp (not, of course, an adhesive) was current from 1841 to 1902. But neither of these labels may be reckoned among the commonest varieties.

Of each of the twelve stamps mentioned in the list above prodigious numbers must have been issued. Just how many copies of each were used for franking letters cannot be gauged, but by turning to the postal records published annually by Great Britain some idea may be obtained of their colossal totals. During the year 1913 the G.P.O. dealt with the following:

3,298,300,000 letters.
899,000,000 postcards.
1,079,000,000 halfpenny packets.
202,300,000 newspapers.
130,200,000 parcels.

Of the letters, postcards, and halfpenny packets, it seems fair to assume that three-quarters were franked by halfpenny and penny stamps in the proportion, probably, of two of the former to one of the latter. In other words, roughly 1,500,000,000 penny stamps and 2,500,000,000 halfpenny stamps were used in Great Britain during the year 1913 alone. As the life of our British stamps averages a trifle over ten years, we must multiply the huge figures by ten to obtain a rough estimate of the individual copies which are likely to be printed of these two stamps.

What can we do with our accumulations of common stamps apart from giving them away? A good plan is to collect the various shades of colour and minute variations of design, which are sure to creep into issues that extend over a lengthy period. In this way an interesting assembly of stamps may be secured which might, in time, prove extremely valuable to a collector who specialized. The Georgian stamps of Great Britain of 1911 to 1935 lend themselves to such work. The halfpenny is known in several shades of green in the various issues. There are many engravings of the penny; in fact the issues throughout contain numerous variations.

Another good plan is to make what might be called a type collection, with the aid of common stamps. Such a collection should comprise (a) specimens of all known perforations from eight to sixteen; (b) cases of varied perforations — i.e., one gauge for the vertical, another for the horizontal sides; (c) stamps separated by other means than perforations; (d) stamps of every shade of the spectrum, arranged in a line and gradually merging from red through orange, yellow, green, blue, and indigo to violet; (e) stamps printed by different processes; (f) stamps printed on all the commoner forms of paper; (g) stamps mounted face downwards to reveal the watermarks, etc.

A third form of collection, which helps to use up the common stamps, is a historical collection. In such a gathering as we have here in mind, it becomes possible to trace out, by means of stamps, such interesting matters as the genealogical tables of royal families, the changes which certain Governments have undergone, lists of succession, etc.

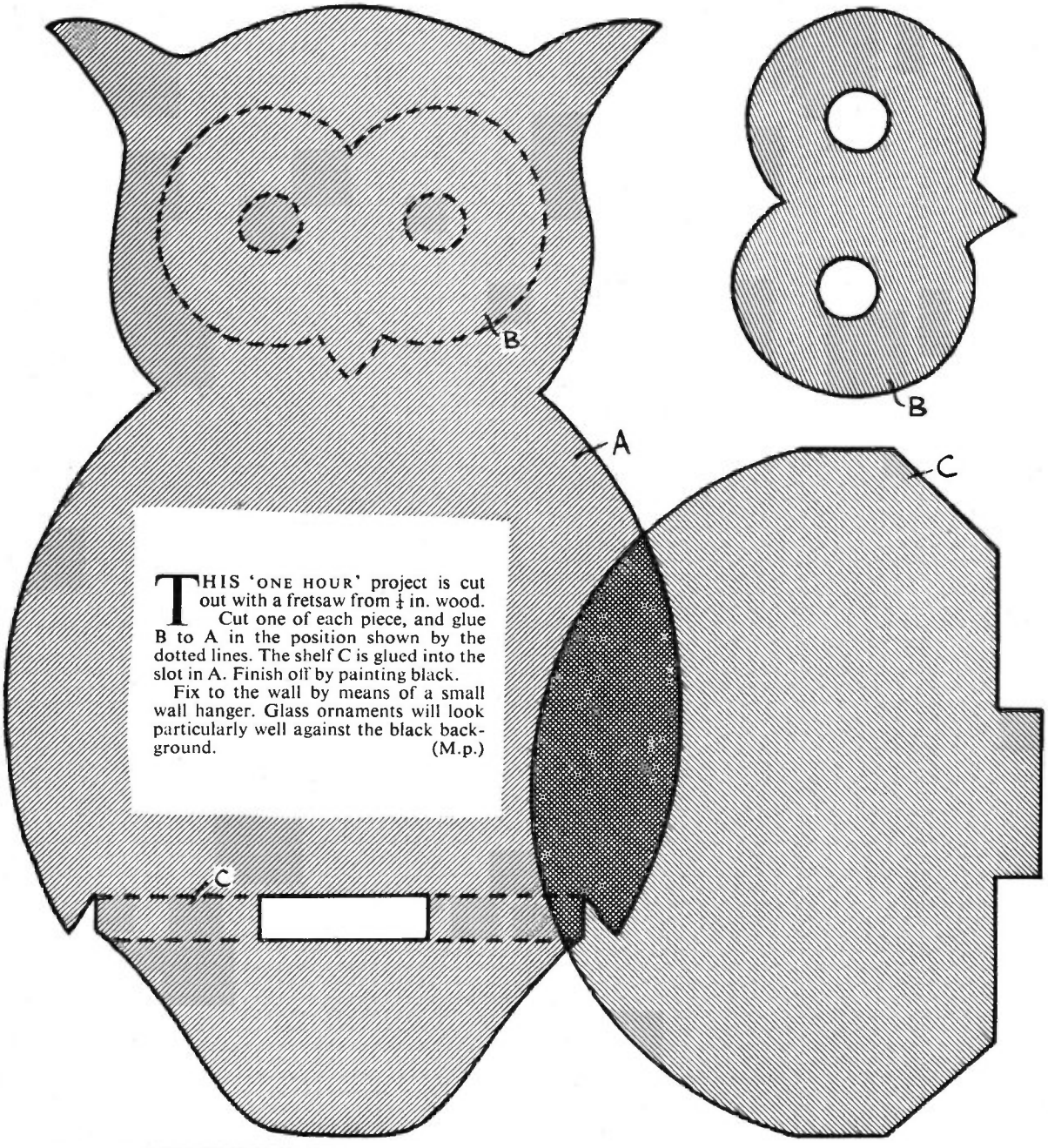
There are also various charities like the blind and handicapped who can always use unwanted stamps; indeed considerable funds are raised from the sale of used stamps which help the blind throughout the world. (R.L.C.)

Some of the common stamps mentioned in this article

NOTE TO CORRESPONDENTS

All correspondence on any subject covered in this magazine *must* be addressed to: The Editor, Hobbies Weekly, Dereham, Norfolk. If a reply is required, queries should be accompanied by a stamped addressed envelope and reply coupon inside back cover.

THE 'OWL' WALL SHELF



THIS 'ONE HOUR' project is cut out with a fretsaw from ¼ in. wood. Cut one of each piece, and glue B to A in the position shown by the dotted lines. The shelf C is glued into the slot in A. Finish off by painting black.

Fix to the wall by means of a small wall hanger. Glass ornaments will look particularly well against the black background. (M.p.)

Printed by BALDING + MANSELL, LTD., London and Wisbech, and Published for the Proprietors, HOBBIES LTD., by HORACE MARSHALL & SON, LTD., Distribution Centre, 8-11 St. John's Lane, Clerkenwell, E.C.1. Sole Agents for Australia and New Zealand: Gordon & Gotch (A'sia.) Ltd. For South Africa: Central News Agency Ltd. Registered for transmission by Canadian Magazine Post.

TWO SUPERB DESIGNS

For those who want 'something different'

The Swiss Church (right) and Willow Pattern Box (below) are two fine examples of exclusive designs introduced by Hobbies Ltd. They are intended for the worker who requires something more than just a plain 'musical box'.

Authentic in design and detail, the finished models provide ample reward for the care taken in execution, and can be put to a real practical use, such as for holding cigarettes or trinkets.

A list of tunes available which can be incorporated into these designs is given below. Kits and musical movements, which are sold separately, can be obtained from any Hobbies branch or stockist, or by post.

SWISS CHURCH
Design No. 256 Spcl.

Windows light up and music plays when the roof is raised. Kit of all materials and fittings, paint, glue, etc. (post 2/3 extra) **26/6**

Base 9 in. × 6¼ in.
12¼ in. high

WILLOW PATTERN BOX
Design No. 3284

Scenes from the famous story in fine detail. Music plays when pagoda lid is raised. Kit of wood and materials for making box. (post 2/- extra) **10/-**

Fit with a movement from adjoining list

MUSICAL MOVEMENTS

CHOOSE FROM THESE TUNES

(A) Westminster Chimes, (B) Kiss Me Honey-Honey, (C) The Knick-Knack Song, (D) Anniversary Waltz, (E) Jingle Bells, (F) O My Papa, (G) Blue Danube, (H) Vienna, City of My Dreams, (I) The Harry Lime Theme from 'The Third Man', (J) Brahms' Lullaby, (K) Parade of the Wooden Soldiers, (L) Auf Wiedersehen (Till we Meet Again), (M) Church Bells Air, (N) The Bridge on the River Kwai (Col. Bogey), (O) On the Street where you Live, (P) Ave Maria de Gounod, (Q) Auld Lang Syne, (R) Silent Night, (S) Limelight, (T) Moulin Rouge, (U) Greensleeves, (V) Home Sweet Home, (W) Swedish Rhapsody, (X) Bells of St. Mary's, (Y) Blue Bells of Scotland, (Z) Irish Eyes are Smiling.
Each movement 16/6 (post 6d.)

Ask for details of other musical kits.

To Hobbies Ltd., Dept. H.20, Dereham, Norfolk

Please send details of other Musical Box kits and items ticked.

- ☐ Swiss Church Kit 256 Spcl. 26/6 (post 2/3)
- ☐ Willow Pattern Box 3284, 10/- (post 2/-)
- ☐ Musical Movement (A, B, C, etc) 16/6 (post 6d.)

Name .....

Address .....

.....

.....