1-1-1960

Making your own beehives

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THE publication of this article runs counter to my own principles to some extent as I have long maintained that most beekeepers will find it cheaper in the long run to purchase factory-made hives and frames. I realise, however, that many apiarists possess both the skill and equipment to make hive-bodies, and that some at least can occupy slack periods profitably in this manner.

I would not advise anybody to make his own frames unless he has a very well-equipped machine-shop, but I realise that there are a number of reasons why hive-bodies could be profitably constructed by the bee-keeper himself.

To the beginner in beekeeping I would strongly urge standardisation so that all his hive materials are interchangeable whether they are home-made or purchased ready for assembly. Decide on either eight-frame or ten-frame hives—don’t have a hotch-potch of sizes.

Have you ever considered making your own bee-hives? Probably you have, but dismissed the idea because you imagined that it would need expensive wood-working equipment, or because you doubted whether suitable timber was available.

The equipment need not be costly. A good power saw with a rise and fall table is of course a necessity if you intend to tackle the work on a fairly large scale, but most of the other equipment may be home-made or could be constructed fairly cheaply by tradesmen.

The timber problem is as old as the Australian beekeeping industry but early beekeepers managed to overcome it, and you have far better opportunities than they had.

The scarcity of Australian softwoods compelled the pioneer bee-keepers to depend very largely upon that popular container—the imported kerosene or petrol case, of the pre-bowser days. The cases and the tins they contained—two tins to the case—might almost be described as having laid the foundations of Australian civilisation.

The hives in many sizeable apiaries were entirely constructed from petrol-cases in the early years of this century and the cases were widely used for fruit-packing—in fact the size of the modern beehive and the “dump” fruit-case were largely influenced by the ubiquitous petrol or kerosene case.

Many an outback home was almost entirely equipped with petrol-case furniture in the form of chairs, meat-safes, cupboards, desk, book-cases, etc., and the tins were used as honey containers, buckets, wash-bowls, dish-pans, cooking utensils—to name but a few of their varied roles.

Later, a number of hives were made from suitable Australian timbers but far more were made from imported softwoods such as red pine, yellow pine, Oregon and other materials from across the Pacific.

Here in Western Australia we still have to depend largely on imported timber for beehive construction. We have fairly extensive plantations of softwoods, but in the main these are still too young to provide large quantities of suitable beehive timber and we have to look to Malaya, Borneo and to South Australia whose pine plantations are older than ours.
Most of our local pine is from two introduced species, the Monterey pine (*Pinus radiata*) and the Maritime pine (*Pinus pinaster*). *Pinus radiata* was formerly known as *Pinus insignis* and, in the days when most of the local supplies were from thinnings and immature trees, some wag rechristened the timber "Pinus intwistis" because it had a habit of warping badly.

Suitable timber is usually available in 6 in. x 1 in. and 4 in. x 1 in. planks. Occasionally 10 in. x 1 in. planks may be obtained, but trees of this size are usually reserved as "peeler" logs for our young and vigorous plywood industry.

The height of a finished beehive box is 9\(\frac{1}{2}\) in. with a length of 20 in. and a width of either 14 in. or 16 in. according to whether we are making eight-frame or ten-frame hives. Timber thickness should be \(\frac{3}{4}\) in. giving the hive-box the inside measurements of 18\(\frac{1}{4}\) in. x 12\(\frac{1}{2}\) in. for the eight-frame hive or 18\(\frac{1}{4}\) in. x 14\(\frac{1}{4}\) in. for the ten-frame size.

**PREPARING THE TIMBER**

Few bee-keepers have the equipment and space required to treat unseasoned rough-sawn planks, and it is better to buy dry timber dressed to \(\frac{1}{4}\) in. When 1 in. thick planks are dressed, the timber usually finishes nearer 13/16 in. thick and unless we can ensure that the rough-sawn material is somewhat thicker than 1 in. we may have to make do with the 13/16 in. timber. In this case it will be necessary to make the dovetails 13/16 in. in depth instead of 1 in.

Check the plank widths also, if using the 6 in. x 4 in. material. It may be necessary to use 6 in. and 5 in. planks to ensure that our finished boxes are 9\(\frac{1}{2}\) in. high.

The best way to handle the planks is to glue them together using a good quality waterproof glue such as marine glue or one of the cold-water casein compounds.

Make a frame of 4 in. x 2 in. timber, similar to the floor-joists of a house. Nail blocks of waste timber to the joists to serve as stops and put your plank against them. The modern glues, used properly, are stronger than the timber but as an extra precaution I would suggest that you drive a few 2\(\frac{1}{4}\) in. hive nails into the edge of the plank leaving about half the length of the nails protruding. Cut off the heads with pincers or wire-cutters, apply the glue to the edges of both planks and force them together with floor cramps. The nails act as dowels and keep the planks in position.

**CUTTING THE SIDES**

When the glue has set and the composite planks are removed from the joists by pulling the nails out of the waste timber, the next task is to trim them to an exact 9\(\frac{1}{2}\) in. width, and then to cut your boards to the required lengths—20 in. for the sides and 14 in. or 16 in. for the ends.

Simple guides on the saw-bench will ensure accuracy in cutting.

N.B.—If the timber is knotty, make sure that your saw-cuts do not go through the knots as knots will interfere with the dovetailing of the ends.
Fig. 2—Left shows dovetail pattern on one end of the hive body side. Right shows weathered and sawn hand-holes, also section of the hive body end and frame.
DOVETAILING

A glance at Fig. 2, which represents one end of the side of our box shows that the "sockets" and "pins" of the dovetails—except those at the top and bottom—are exactly ⅜ in. square, which measurement is the thickness of our box timber.

The top socket or cutaway portion is only 13/16 in. x 7/16 in. Fig. 2 also shows the end of the box and one of the frames and will explain the reason for this being only half the horizontal depth of the other sockets. It takes that portion of the box end which is rabbeted to take the metal slide which in turn supports the lugs of the frames.

The bottom socket has the full ¾ in. horizontal depth but like the top socket, is only 13/16 in. deep vertically. The reason for the two 13/16 in. sockets is so that the box is only 9¼ in. deep and not 9½ in. as it would be if all sockets were ¾ in.

Cutting the Dovetails

Having established our sizes, let us now concentrate on cutting the dovetails. We will need a circular saw with a rise and fall table and our saw must be a "drunk saw" capable of being set at an oblique angle to the saw-spindle by means of special washers or collars. Our saw is "drunked" so that it cuts exactly ⅜ in. wide, and the table is adjusted so that the saw protrudes just ¼ in. above the surface. In other words it is now set to cut an exact square for the dovetail socket.

A simple jig or guide is a piece of dressed timber measuring a shaving under ¾ in. x 7/16 in. and long enough to go across the saw-bench from front to rear parallel with the saw-blade.

If all our sockets and pins were to be ¾ in. it would only be necessary to clamp or screw the guide exactly ¾ in. from the saw's farthest left-hand cut, and then use it as a fence or guide. The hive-box sides would be stood on end and run over the saw which would remove a ⅜ in. square. The cut-out square could then be fitted over the guide and another run over the saw would cut the next socket and so on.

Being a perfectionist, however, I suggest that you make a second jig to take care of those 13/16 in. sockets.

Obtain a piece of 3 in. x 2 in. Oregon or other suitable timber long enough to go across the saw-bench from front to rear. Dress it down so that it measures exactly 2-11/16 in. in width—the height can remain at 2 in. or thereabouts.

With your first jig or guide in position just ¾ in. from the left-hand cut of the drunk saw, lift the rise and fall saw-bench table so that the saw cuts 7/16 in. deep. Press the new piece of timber hard up and the tops of the frames in the box below, if two or more decks of frames are being used.

These spaces are the minimum and maximum allowances for "bee-space." A space of less than 3/16 in. does not allow the bees free access to keep the frames free from bee moth and other pests. Bees also tend to seal off such small spaces with the gummy substance known as propolis.

Spaces in excess of ¾ in. are liable to be filled in with "burr comb" as bees have fixed ideas regarding empty spaces in the hive.
Illustrated above is an onion-skimming implement designed by Mr. Charlie Loveday, of Lovely Banks, Victoria.

reaps benefits from own invention

This device was constructed by Mr. Loveday from pieces of steel he had on his farm. His own portable welding plant and a few S.A.E. spanners were the only pieces of equipment used in construction.

The implement consists of an onion skimmer, onion rakes and front wheel clearing rakes. The skimmer is made of two 3' x 4" cambered high-tensile steel blades welded on two mild steel plates mounted on the belly equipment of the tractor and raised and lowered hydraulically. The onion rakes consist of mild steel rods attached to the rear hydraulic assembly and are set 5' apart immediately behind the tractor closing to 2' apart at the end of the rakes. The rakes move the onions into 2' rows for maturing and easy collection.

The front wheel clearing rakes are constructed from mild steel rods welded to a tubular steel spring-loaded frame. The rakes clear a path for the tractor wheels preventing damage to the onions during sowing and harrowing.

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against the guide and run it slowly over the saw which will cut a groove measuring \( \frac{3}{4} \) in. wide by 7/16 in. deep.

To make the next cut, fit this groove over the guide and run the timber over the saw once again, but before doing so, drop the table so that the saw cuts \( \frac{3}{4} \) in. deep instead of 7/16 in. This allows the saw to remove 1/16 of an inch to a depth of 1/4 in. as shown in Fig. 4.

Fig. 4—Oregon jig for cutting the 13/16 in. sockets

With this second jig clamped in position over the first, the saw can only cut 13/16 in. instead of 14/16 in. (\( \frac{3}{4} \) in.).

It will be found advisable to clamp about ten of the box sides together between two pieces of waste timber—the waste timber being to ensure that there is no splintering of the bee-hive material where the saw enters and leaves the timber. The ten sides must be clamped to form a solid block with the ends perfectly square. The "nailing jig" shown in Fig. 6 will help to achieve this, as this is welded to form a perfect right angle.

Fig. 5—Cut hand-holes on the heartwood side of the box

Dovetailing the Sides

With your ten hive-body sides—plus the waste strips—clamped together by large G-cramps or similar gadgets, stand the block of sides on end and run them over the saw, using your Oregon jig as a fence. This will cut the bottom dovetail sockets—presuming that your saw is cutting \( \frac{3}{4} \) in. deep. Treat any succeeding bundles of sides in the same manner, then set saw to cut half the depth (7/16 in.) and cut the top sockets which take the rabbeted portion of the side.
When these are completed, drop the saw-bench table down to cut \( \frac{3}{4} \) in. deep again, remove the Oregon jig and use the first jig or fence to complete the \( \frac{3}{8} \) in. square sockets.

Remember to move the jig back to \( \frac{3}{8} \) in. before cutting the remainder of the dovetails.

**Handholes**

Both the sides and the ends of the factory-made hive-bodies are equipped with recessed hand-holes for easier lifting. The factory-made boxes usually have "weathered" hand-holes made with a special cutter but if the home hive-maker does not wish to incur this added expense, a satisfactory hand-hole can be made by lowering the sides and ends separately on to a drunk saw set to cut \( \frac{3}{4} \) in. wide and 7/16 in. deep. Suitable guide fences and stops are attached to the saw-bench to ensure that the hand-holes are scooped out in the same pre-determined position on each piece of timber.

A point worth mentioning in connection with the hand-holes is that they should be cut on the heartwood or inside portion of the timber. The rings on the ends of the timber will indicate the heartwood sides. The hand-hole should be on the inside of the curves as shown in Fig. 5. The wood on the bark side of the tree is less dense and shrinks more than that on the inner portion. With the heartwood on the outside, there is less tendency for the shrinkage to lift the outer edges where nailing is less secure.

**ASSEMBLING BOXES**

With the ends and sides completed, the next task is to assemble the boxes. Whether home-made or factory-made, the boxes represent a sizeable outlay, so it is up to you to ensure that they have a long life and resist the ravages of the weather and dry rot. Careful painting and assembling can help.

Before assembling the boxes, dip the dovetailed ends in a good primer paint, or apply the paint lavishly with a brush. Red lead primer has stood the test of time and that sold by ship chandlers is the best I have yet encountered.

Assemble the boxes while the paint is still wet as this forms a good seal. The nailing jig shown in Fig. 4 is a great help at this stage as it holds the box in place and ensures that all corners are square. Drive the 2\( \frac{1}{4} \) in. hive nails in at an angle as shown in Fig. 1, and punch the heads well in so that the holes may be filled up.
Fig. 9.—Dipping and draining methods can be applied to completed boxes or to separate sides with putty later after the priming coat is applied. The metal strips to carry the frame lugs may be attached either before or after assembling the box.

Stack your boxes in “pigeon-hole” fashion as shown in Fig. 7 to facilitate painting the insides. Use a primer, undercoat and a finishing coat on both the inside and outside of the boxes. Failure to paint the inside of the boxes allows condensation moisture to soak into the wood, lowering the temperature of the hives, causing mildew, rusting the nails, encouraging wood-rotting fungi, and incidentally adding considerably to the weight of the hives if they have to be transported.

When the inside painting is finished, stack the boxes in “chimneys” eight or ten high and proceed with the outside painting (Fig. 8). Light stone, yellow, light green or blue, silver or white are popular finishing colours. Personally I like the silver paint as this seems to give the best protection against summer heat which has a marked effect on honey production.

Many bee-keepers use bitumen-based aluminium paint which, being of a very thin consistency, lends itself to application by dipping the boxes in a shallow tray (Fig. 9). After dipping, the boxes are stacked in criss-cross fashion to dry. The plastic glue called Boncrete, diluted with four parts of water is another popular primer as it seals the wood very effectively.

BRANDING

The law requires that all boxes be fire-branded with the bee-keeper’s registered brand on at least one surface. Most bee-keepers prefer to brand on all four sides to guard against theft. Where a number of boxes are to be branded, a branding-iron attached to a blowlamp (Fig. 10) is a good investment.