ANCIENT CRAFTS
THE COOPER

by J. GERAINT JENKINS

One of the most intricate of all woodcrafts is that of cask making, for the cooper rarely uses any written measurements or patterns to make a cask of specified girth and capacity. One of the secrets of the trade is to know the number and dimensions of the staves that are required to make a vessel of a particular size and in the accurate shaping of those staves to fit tightly together. Not only must the craftsman make his casks so that they are perfectly watertight, but he must also ensure that each one holds the exact intended contents of liquid. Each cask must be strong enough to withhold the great force of fermenting liquids and it must last for many years despite much rough handling and frequent journeys.

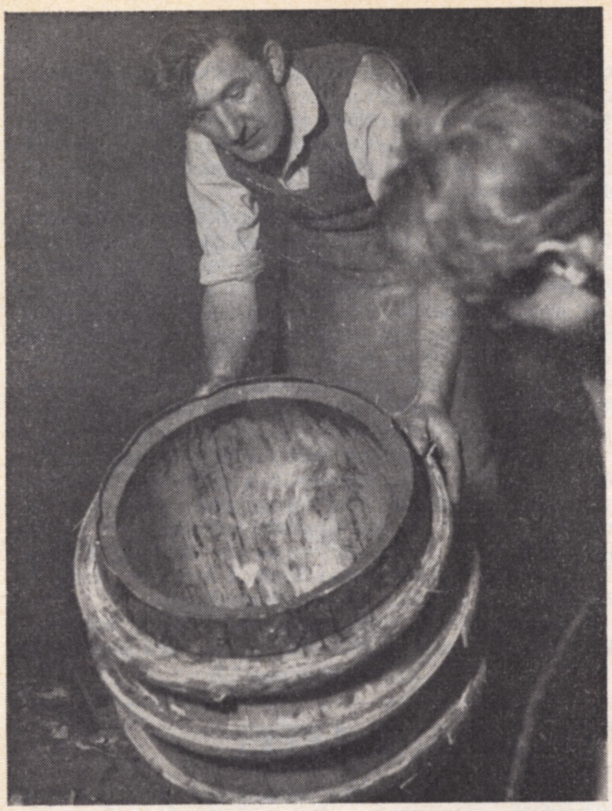

FIG. 1. FIRING THE BARREL

(Photographs by permission of University o Reading Museum of English Rura' Life).

COOPERING IS A rapidly dwindling trade, for other types of containers are rapidly gaining ground and the number of craftsmen still employed making barrels is small indeed. Not long ago the craft was very widespread, for not only did every brewery in the land possess its coopers' shop, but coopers were essential members of ships' crews, while master coopers making a great variety of products from butter churns to harvest bottles were to be found in most large towns. Today the trade is concentrated in a few large breweries where the craftsmen spend most of their time repairing barrels that have been in circulation for many years.

Types of casks

In the trade the following terms are used for the various sizes of casks:

BEER		SPIRITS	
Butt	— 106 gals.	Butt	— 108 to 120 gals.
Hogshead	— 54 gals.	Port Pipe	— 108 to 112 gals.
Barrel	— 36 gals.	Puncheon	— 80 to 100 gals.
Kilderkin	— 18 gals.	Hogshead	— 48 to 56 gals.
Firkin	— 9 gals.	Quarter	— 26 to 32 gals.
Pin	— 4½ gals.	Octaves	— 20 gals.
		Kegs	— below 15 gals.

Materials

The only timber used in wet coopering is oak. For spirits, American oak; for wine, oak grown south of latitude 50 deg. N is preferred, while for beer and ale oak grown north of latitude 50 deg. N is used. In Britain, very little native oak is used today, and the main sources of supply are Germany, Russia and Persia. Different qualities of wood are required for different classes of work. For example, porosity is essential in some wine casks to allow for the passage of air through the wood to assist fermentation. For spirits, the wall of the cask must be so tight that neither water nor alcohol can escape, and for this reason staves cleft along the radius of a tree trunk are used, the natural concentric rings of the tree making the barrel perfectly tight.

FIG. 2. SHAPING THE STAVES WITH A DRAW KNIFE

Making the cask

The manufacture of a tight barrel starts in the woods where oak trees averaging two hundred years old, are selected and felled. These are cut with cross cut saws to roughly the lengths required for staves. The logs are

quartered with beetle and wedge and further broken down to the required shape with a long handled fromard. They are then shaped roughly with a draw knife, and cut to the exact length of the required stave.

The rough staves are thoroughly dried by piling in the open for a length of time, which varies according to moisture and temperature conditions. So far preparing the staves has been the province of the woodland worker, and it is not until the rough staves are dried down to an uniform moisture content, that they are taken to the coopers' workshop.

The processes involved in the manufacture of a tight cask may be divided into the following stages:

Preparing the staves

The staves are either placed in a shaving horse or clamped to a hook on the cooper's block and shaped with a series of draw knives, Fig. 2. In a cask the staves are wider in the centre than at the top and bottom and the required taper is obtained with the broad bladed side axe, followed by the straight bladed draw knife. The sides are then bevelled according to the radius of the cask on the long jointer plane.

FIG. 3 (above). TRUSSING UP

Raising the cask

The staves are arranged inside an iron raising hoop until a complete circle is formed. An ash truss hoop, again the product of woodland craftsmen, is driven down temporarily to hold the staves in place. The roughly assembled cask at this stage has the appearance of a truncated cone, the staves being held in place by the iron raising hoop, and splaying outwards to be held in place at a lower level by the ash truss hoop. The cask is now said to be raised.

Trussing up

This is probably the most complicated of all the stages, since the straight staves have to be bent to the typical barrel shape. In the larger workshops it is placed in the steaming chest for some twenty minutes at a temperature of approximately 200 deg. F. The more usual method, however, is to moisten the staves with water and place the cask over a fire of wood shavings. This softens the fibres of the wood and enables the staves to bend. The cooper and his assistant each armed with a heavy hammer go round and round the barrel, beating consecutively smaller ash truss hoops into place, Fig. 3, until the splayed staves are drawn closely together. Since the staves used in making wine casks are thinner than those used in beer casks, a slightly different method of trussing up is employed. In this case the staves of pliable Mediterranean oak are drawn together by a rope and tackle known as a Dutch hand or Spanish windlass, passed round the stave ends.

Firing

The cask is again placed over a small fire and kept there to set for some fifteen minutes, Fig. 1. The moisture absorbed in trussing is now dried out, the fibres of the wood shrink, so that the strain placed on the staves in bending is greatly reduced. After firing, the staves are rigidly set, so that when the truss hoops are removed, there is no tendency for the staves to spring out of position.

Topping

The cooper first of all trims the top of the cask with an adze in order to form what is known as a chime or bevel, Fig. 4.

FIG. 4. CUTTING THE CHIME

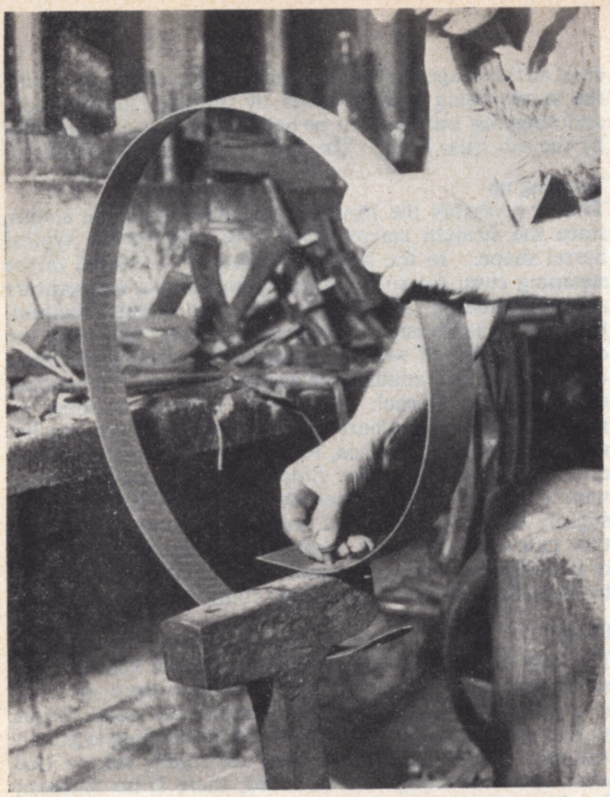

FIG. 5. HOOP MAKING

FIG. 6. SHAPING THE HEAD

The stave ends are then levelled with the semi-circular sun or topping plane. Some two inches below the edge, a broad but shallow channel is cut with a special plane called a chiv. A deeper and narrower groove into which the cask head fits is then cut with the narrow bladed croze.

Cleaning down

Since the staves are now well set, all the truss hoops, with the exception of the two iron end hoops, are removed to provide a clear surface for the various shaves used in cleaning and smoothing the outside of the cask. Both the inside and outside of the vessel are cleaned by a number of small shaves, all resembling the carpenter's spokeshave.

Bunging

Before the heads are fitted, the bung hole is bored with a conical auger and afterwards smoothed with a burning iron.

Heading

The head of a barrel consists of three or more pieces of oak held together by dowel pegs and caulked with dry rush placed in between the joints, Fig. 6. To obtain the approximate radius of the head, the craftsman adopts a trial and error system of stepping a pair of dividers around the top of the cask. until the distance between the points is one-sixth the diameter of the cask top. This gives the radius of the head. After shaping the head is inserted in the cask, the end hoop having been first removed.

Hooping

The iron hoops are cut, beaten into shape and riveted on the T-anvil or bick iron, Fig. 5. They are then driven into place with a hammer and iron tipped, wedge-shaped driver.

The cask is then stamped, checked to see whether it is completely watertight (it must be able to bear pressure of up to forty pounds per square inch) and also checked, so that it will hold the correct volume of liquid. (659-343)

(To be continued)

CHIPS FROM THE CHISEL

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illimitable universe, brought so frequently to mind by large-scale attempts to penetrate its secrets, the rapid advance of scientific knowledge, rapid changes in the social scene, always plotting out the small in favour of the big, even to the rise of hideous concrete and chromium buildings everywhere invading even the smaller towns; these things have the effect of closing the mind in upon itself rather than of expanding and rejoicing it. Large things threaten to swallow us up whereas truly human creativeness is concerned with the small things, the building up detail by detail of an idea, something which can be seized and expressed by the mind and hands working together to make a kind of harmony.

More and more we are tending to retreat into our own homes, where space is enclosed and private and for the craftsman gives the kind of opportunity he needs. Here he is free to create in his own fashion, and every meticulous detail of his work can assume its rightful proportions against a background made to his measure. If he wishes to experiment with a richer, freer type of design than the furniture makers favour then the opportunity is there and the challenge. It is when the imagination kindles in this way that life flows into the work he does. Down on the job the outside world recedes and he can rejoice in his own creativeness and, in the rejoicing, maybe grace comes too. (608)

ANCIENT CRAFTS

THE COOPER.—2

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In this second article on the cooper's craft is a list of the tools used, their peculiarities and uses. Some of the tools were, of course, shown in use in the article last month.

FIG. 1. INITIATION CEREMONY
Rolling cask three times round workshop

THE BROAD AXE has a blade as long as twelve inches, which is set at a slight angle to the handle to facilitate the downward chopping of the staves. The blade is sharpened on one side only, and having no poll it cannot be used for hammering. It is used by the cooper for two distinct operations: 1, for splitting the staves and shaping them ready for bevelling on the jointer plane; 2, for the rough shaping of the head. The head is rested on the splitting block, being supported by the craftsman's body and left hand. The head is then shaped with the axe held well up the haft with the right hand.

The straight-bladed two-handled draw knife is used after the broad axe for smoothing the staves, prior to bevelling.

For shaping the backs of the staves, that is the outer surface of the cask, the backing knife (a two-handled draw knife with a slightly concave blade) is used.

The hollowing knife is similar to the backing knife except that the blade is convex. It is used to shape the inside of the staves. Each stave is either held in the shaving horse or in the hook on the cooper's block, which is a heavy log some two feet high and one foot in diameter on which the staves are split. A hook is fitted to the top of this block, and the staves for the larger casks are held in this hook while they are being shaped with draw knives.

For shaping all staves designed for casks of less than nine gallons capacity a shaving horse is used. The workman sits astride the horse, the stave being clamped on the sloping table in front of him. The pressure on the clamped stave is regulated by the feet, leaving the craftsman's hands free to shape the stave with the various draw knives.

The jointer plane already mentioned is a very long plane, with a stock as long as six feet. It is used to bevel the edge of each stave, so that they fit together exactly when the cask is raised. The jointer is the largest of all planes, but unlike all others it is used upside down and remains stationary in the planing process. It stands on a pair of straight legs some two feet high, which are socketed loosely into a mortise in one end of the plane. This elevates the plane towards the craftsman and enables him to smooth each stave end as he slides it downwards over the blade.

Trussing tools

The wooden truss hoops of various sizes are made of ash and are produced by woodland craftsmen. In trussing a thick iron raising hoop is also used. The type of hammer used by coopers is a short-handled four or five pound sledge hammer.

The cresset is a small iron grate no more than twelve inches high and eight inches in diameter, in which a fire of wood shavings is lit. It is generally made up of pieces of old hoop iron. It is used in the trussing process, the staves having been first moistened, and is also used for setting the staves of the completed cask as described last month.

Topping tools

Cooper's adzes differ from carpenter's adzes in that their blades are far more curved. Their cutting edges are generally sharpened on the inside only, while the handle is no more than nine inches long. The short handle is necessary so that the craftsman can swing the tool within the radius of the cask. The adze is used to shape the end of the cask on the chime, to produce a flat surface for the croze to run in.

The topping or sun plane is used to finish off the stave ends. This provides a level surface on which the fence of the chiv and croze will travel when the groove is cut. In its mechanism the tool is similar to the carpenter's trying plane, possessing a flat blade and central shavings discharge. It differs, however, in that the stock is semi-circular, in order to conquer the narrow circular margin of the stave ends.

The chiv, just mentioned, is a convex bladed tool and

is used for cutting a broad but shallow channel—the howel—some two inches below the top of the staves. It provides a bed for the groove which will be cut with the croze at a later stage. In general appearance the croze and chiv are similar except that the convex blade of the chiv is some two inches wide while that of the croze is no more than half an inch in width.

Before the introduction of the chiv, and also in cases where the cooper does not possess the right size for a particular barrel, the channel is cut with a hollow bladed howel adze. For repair work the channel is cut with a curved, hollow-bladed knife known as a jigger.

The groove for the head is cut with the croze, its very narrow blade being a simple router (hawksbill) or of the sawtooth type. The most common type of croze consists of a square wooden peg which carries the blade, connected to a large semi-circular wooden fence. The fence, which guides the blade in its channel, is placed horizontally on the cask rim, and the blade set at the required distance below it. As the instrument is pushed around the inside of the cask, the circular groove to receive the head is cut.

Cleaning tools

The downright shave is the cooper's form of the carpenter's spokeshave used to clean and smooth the outside of the cask. All the truss hoops are removed, and the shave is used by pushing it downwards, away from the craftsman. The blade, which is generally about three inches wide, has a slightly concave edge to allow for the curvature of the cask. After the outside of the cask has been cleared with the downright shave, a small scraper shave called a buzz is used to finish off. The blade of this tool is almost at right angles to the stock.

FIG. 2. THE CROZE

FIG. 3. FINISHING OFF THE OUTSIDE OF A BARREL
The tool used here is the downright shave

For smoothing the inside surface of the cask, the inside shave, a tool similar in shape to the downright shave, is used. In this case, however, it has a slightly convex blade. A series of single- or double-handled round shaves are used for smoothing the joints inside the cask. By pulling the tool along the joints, the craftsman smooths away any roughness on the inside of the cask.

Bunging tools

For boring the bung hole in the cask a taper auger is used. It consists of a tapering blade set at right angles to a wooden handle. Where necessary the hole is smoothed afterwards with a burning iron, a tool similar in shape to a soldering iron. To pare away the jagged edges on the inside of the bung hole a small knife, called a thief, similar in shape to a gimlet, but with a sharp edge almost at right angles to the shank of the tool is used.

Heading tools

The large cooper's brace with a fixed spoon bit of small diameter is used to bore the dowel holes in the various sections of the head. To obtain the radius of the head, the cooper steps the compasses around the croze mark at the top of the cask, until the distance between the compass points is equal to approximately one-sixth the circumference of the cask This gives the radius of the head. After shaping with the side axe, the head is bevelled along the sides with a bowed draw knife, called a heading knife. This differs from the ordinary draw knife in that the blade is much thinner and is distinctly bow shaped.

The heading swift, a heavy shave, similar in general

THE COOPER

(*Continued from page* 123)

shape to the downright shave is used for the final smoothing of the head. It has a two-and-a-half-inch cutting iron, and the head is planed against the grain.

The chincing iron is used to push the dried rushes or flags into the joints between the separate sections of the head and between the head and the croze cut. The chincing iron is a small chisel, no more than two inches wide, which is often made of old hoop iron. In repair work and occasionally in making new casks, rushes are inserted between the staves. A fork-like tool called a flagging iron is used to twist each stave in turn, to open the joint sufficiently for the insertion of rushes.

A steel or iron bar about three-quarters of an inch in diameter, bent at one end, the jumper, is used to lever heads into position by pushing it through the bung hole. It can then raise the head if it falls below the level of the croze channel.

Hooping tools

A bick iron is the tall but narrow cooper's T-anvil known also as a beak iron or cooper's strake. At each extremity of the T, a hole is drilled, where the rivets are beaten into the hoop as it rests on it. The hoop cutting chisel, similar to a blacksmith's hardy, can also be stuck into one of these holes.

The driver or drift is made of steel and is fitted with an oak handle, the steel narrow end being grooved to prevent the driver from slipping off the hoop. Its main use is in driving the iron hoops into place on the cask, and due to constant hammering, the wooden handle has to be replaced at frequent intervals. A driver generally measures some six inches in length, while the steel edge is some three inches wide. To beat down the end hoops of the cask a chime mawl is used. (690-343)

(*Concluded*)

TELEPHONE FITMENT

(*Continued from page* 95)

are let straight into the back top rail mortises. The back top rail is finished 1 ft. 11 in. by $1\frac{3}{4}$ in. by $1\frac{1}{16}$ in., and is shaped on the bottom edge to flow into the seat back leg. One end of this rail is tenoned into the carcase end and the other bored for dowelling on to the seat back leg. It should be left slightly long for trimming later.

The fall is finished 1 ft. $3\frac{1}{4}$ in. by $9\frac{1}{4}$ in. by $\frac{5}{8}$ in., and has a moulded finger grip on the top edge. The left-hand edge must be bored to take a small ball catch.

If a contrasting veneer is required on the front of the drawer and the fall, it is advisable to construct the fall of chipboard, lipped all round, and a compensating veneer put on the back. Hinge the fall to the carcase bottom with a piano hinge. A brass stay is fixed on to the inside of the left-hand facing carcase end to support the fall. The ball catch plate is screwed to the carcase end.

Mitre the low back at both ends, to finish 1 ft. $4\frac{3}{4}$ in. by 1 in. by $\frac{5}{8}$ in., and then glue into position.

A good durable finish is with white polish followed with applications of beeswax. Use the white polish until a good body has been built up. The loose cushion is made up from 2 in. plastic or latex foam, and must be cut out to fit round the seat back leg. It is advisable to use a soft covering for the cushion, such as moquette or replin, although vynide or hide can be used providing eyelets or air vents are inserted in the sides. Any joins in the covering on the wall of the cushion should be made on the side which is against the cabinet.

The cushion is not reversible owing to the special shape, and therefore slipping should be on the underside. (665-353)

Cutting List	*Long* ft.	*Long* in.	*Wide* in.	*Thick* in.
1 Seat back leg (1)	2	$5\frac{1}{4}$	$1\frac{7}{8}$	$1\frac{5}{8}$
3 Stool legs (2)	1	5	$1\frac{7}{8}$	$1\frac{5}{8}$
2 Long rails (3)	3	2	$2\frac{1}{8}$	$1\frac{1}{16}$
2 End rails (4)	1	$1\frac{1}{2}$	$2\frac{1}{8}$	$1\frac{1}{16}$
1 Centre cross rail (5)	1	$0\frac{1}{2}$	$2\frac{1}{8}$	$1\frac{1}{16}$
1 Drawer rail (6)	1	5	$2\frac{3}{8}$	$1\frac{1}{16}$
1 Back top rail (7)	1	$11\frac{1}{2}$	2	$1\frac{1}{16}$
2 Carcase ends (8)	1	6	15	$\frac{5}{8}$
1 Carcase top (9)	1	5	$14\frac{7}{8}$	$\frac{5}{8}$
1 Carcase bottom (10)	1	5	$14\frac{7}{8}$	$\frac{5}{8}$
1 Fall (11)	1	4	$9\frac{1}{2}$	$\frac{5}{8}$
1 Drawer front	1	4	$5\frac{1}{2}$	$\frac{5}{8}$
1 Low back (13)	1	$5\frac{1}{4}$	$1\frac{1}{4}$	$\frac{5}{8}$
2 Drawer runners (14)		$10\frac{1}{2}$	$\frac{7}{8}$	$\frac{5}{8}$
4 Screw blocks (15)		$2\frac{1}{2}$	$\frac{7}{8}$	$\frac{5}{8}$
2 Drawer sides	1	$2\frac{1}{2}$	$4\frac{3}{4}$	$\frac{1}{2}$
1 Drawer back	1	4	$4\frac{1}{16}$	$\frac{1}{2}$
3 Back splats (18)	1	$2\frac{1}{2}$	2	$\frac{3}{8}$
1 Carcase back (19)	1	$4\frac{3}{4}$	17	4 mm.
1 Drawer bottom (20)	1	$3\frac{1}{2}$	$14\frac{1}{8}$	4 mm.

Allowances have been made in lengths and widths; thicknesses are net.

POLISHING METHODS

(*Continued from page* 99)

such that the last coat has dried bright off-the-brush; flatting is best then done with Grade 400 silicon carbide paper with soapy water for a lubricant. The aim here is to cut flat any nibs, ridges, waves, or pimples, leaving the film dead and flat. Remove the sludge with a damp wash-leather. The purpose of the rubbing compound used next is further to refine the surface. Wash-leather off again after which the lustre will just be beginning to show. The full brightness is induced with a superfine abrasive or an agent such as rottenstone and water. For a quick bright finish after the final denibbing or rubbing, it is practicable, for those skilled in french polishing, to use a rubber. First thin the lacquer at least 100 per cent with the solvent to reduce the viscosity sufficiently. If the pad is now charged lightly it is possible to work in light loops, then straight strokes. This will give a finish almost as good as the rubbed and polished version.

Compatibility

Polyurethane has quite remarkable adhesive qualities and this makes it almost universally compatible with other furniture finishes (except, of course, wax). Provided the work is cleaned and flatted it will take satisfactorily over french polish, cellulose, and all other kinds of catalyst-type finishes. Such finishes must, of course, be soundly based, as obviously the adhesion of the new lacquer is no better than that of the base.

Polyurethane has a slight amber cast which makes it unsuitable for bleached or very light finishes. It can be used on all woods, even oily timbers such as rosewood, iroko, cedar and teak. However, as a precautionary measure such woods should first be washed with the solvent, otherwise with unusual heat (perhaps hot, direct sunlight) there is a chance of the oil being drawn to the surface of the timber and maybe weakening the bond between it and the film.

Polyurethane lacquer comes in several grades. Specify the interior grade for furniture finishing. (692)