

Chapter 6

KITTIWAKE – TWO-SEATER
FABRIC-COVERED CANOE: The Skin

BEFORE the skin is fitted it is advisable to make the keel (G), bilge keels (H and I) and gunwale rubbing strips (J), using the framework to obtain the lengths of these parts. The parts may be varnished or painted while covering is proceeding so that they will be dry by the time they are needed.

Cut the keel to length so that its ends pass over the hog on to the end post a short way. Taper both ends in stages down to about $\frac{3}{8}$ in. square, starting about 2 ft. from the end. Mark the side which is to come against the canoe, so as to avoid the misfortune of tapering opposite ends from opposite sides! First taper in the thickness (fig. 8, 1), then mark the centre of the ends and taper in the width (fig. 8, 2). Finally, make a shallow bevel on the end to take the brass strip. A hole may also be drilled to take a screw to be driven from outside. All other screws will be driven from inside through the hog. Round the outer edges.

Four bilge keels are advisable. They take much of the rub which would otherwise come on the canvas. However, if only two are wanted, they should be the inner ones. Taper the ends down to $\frac{3}{8}$ in. from about 1 ft. from the end, then round the end and the exposed edges and drill for one screw at each end (fig. 8, 3).

The rubbing strips (J) are best bought as half-round moulding, but if this is unobtainable, flat strips may be used and their outer edges well rounded. Bend a strip around a gunwale and mark its length so that it comes within about 1 in. of each end of the canoe. Round the ends neatly. Have a screw hole about 1 in. from each end,

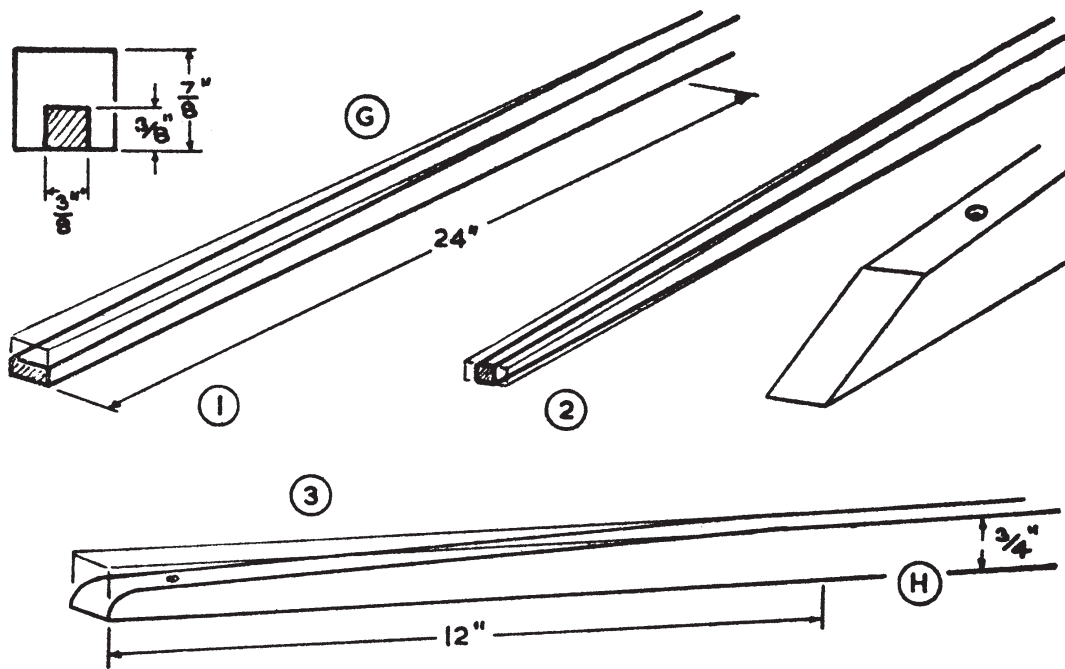


Fig. 8

then space others at about 6 in. intervals for the whole length. The two rubbing strips may be cut and drilled together.

How these parts are finished depends on the type of skin and the colour scheme chosen. If the hull is to be painted canvas, the keel and bilge keels should be painted the same colour. If hull and deck are to be in different colours it is usually best to make the rubbing strip black. This usually looks better than painting it the same colour as the deck or the hull or in a third colour. If the hull is a plastic material which does not need paint, the underwater woodwork may be painted the same colour, although, again, black is a safe choice. In any case, get the parts smooth, then give them primer, under and top coats. If the rubbing strips are mahogany or other choice wood a varnished finish looks good with some colour schemes.

It is advisable to allow enough time to fit the hull fabric completely in one working session, so that any stresses due to leaving it partially fixed are not allowed to settle. Fixing should not take two workers more than four hours. Whether the material is proofed canvas or P.V.C. plastic fabric, heat is a great help. If the roll of material is kept in

a warm place for several days, so as to absorb warmth, this will be more effective than taking it from a cold storage place into a warm work room.

If the material is received folded, it should be opened out and rolled until wanted, so that any creases may disappear.

Have the work place warm. Convector heaters placed near the work, so that hot air circulates, are a big help. If a framework has to be covered in a cold place, the work is not impossible, but getting the skin on without puckers or creases is more difficult, and with some of the stiffer fabrics may be nearly impossible.

Have the framework supported evenly upside-down. Either mark a centre line on the fabric or make centre marks at the ends and at intervals along the length. Drape the material over the framework with adequate overhang at each end. Drive three or four tacks into the base of one end post (fig. 9, 1). Go to the other end and stretch as hard as you can, then tack to the base of that end post. This stretching along the keel line is most important if the job is to be done without puckering around the gunwale. The fabric is being forced around a compound curve and stretch along the bottom reduces the amount of slack which has to be disposed of on the gunwale lines.

If the fabric is very stiff or the working place cold, it may be worth while doing the stretching in two stages. Besides tacking at the first end, put scrap wood each side of the end post and cramp over them. At the other end stretch as much as possible, then cramp over scrap wood without tacking. After leaving for a few hours, release this cramp and stretch farther before finally tacking.

When the ends are tacked, put more tacks along the centre-line of the hog at about 12 in. intervals, to keep the fabric central, then turn the canoe over.

Starting near the centre, pull the fabric with good hand pressure up and over the gunwale to tack inside (fig. 9, 2). Tacks should finally be at 2 in.–3 in. intervals and about

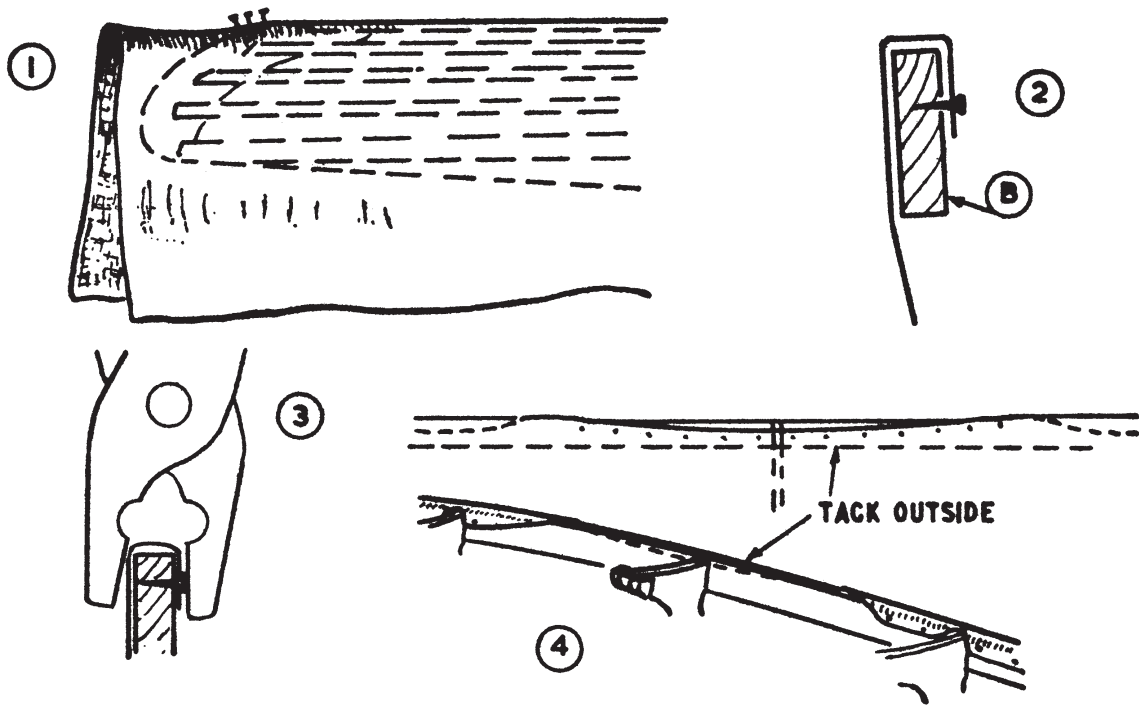


Fig. 9

$\frac{1}{2}$ in. down from the top edge of the gunwale, but at first they may be more widely spaced. Support the outside when driving the tacks (photo 8). If working alone, do about 12 in. one side, then do the matching part at the other side. If the canoe is a club project, up to eight people can be used on this job: four pairs, with one pulling and the other tacking, working from the centre to the ends on opposite sides.

Trim the fabric as you go and make V-cuts over frames. Keep the pull at right-angles to the centre line of the canoe. Pliers may be used if extra grip is needed when pulling on the edge of the fabric, but avoid using them to gain extra leverage. Get all the hand tension you can, but excessive local tensioning may distort the framework.

Be careful to avoid leaving loose tacks inside the canoe. Any tack which has to be discarded should be dropped on the floor, and the same with trimmings of fabric. Where a hammer cannot be used, drive the tacks by squeezing in with pliers (fig. 9, 3) (photo 9).

Examine the outside of the skin frequently. If small

creases or puckers occur, they may be ignored if they are no deeper than the gunwale. Anything deeper should be worked out. Do not pull the fabric towards the end. This will get rid of the particular crease, but it will build up surplus fabric nearer the end, causing even worse puckering, which cannot be worked out. Instead, pull out the tacks locally and divide up the slack evenly for perhaps 6 in. along the gunwale, then tension over the edge and tack again. Pull harder up what was the centre of the pucker. Creases which do not extend downwards more than about 2 in. usually even themselves out overnight or are flattened by the rubbing strip.

If the available skin material is only wide enough to just reach up the outside of the gunwale, without turning over, it can be used. Pull as high as possible at the widest part of the canoe, and tack outside at about 1 in. intervals. & the canoe narrows, the fabric may be taken over the edge and tacked inside normally (fig. 9, 4). The part tacked outside will be covered later by the deck canvas and the rubbing strip. Although turning over the edge is better, using a more economic width in this way has proved satisfactory in practice.

Getting a good pull upwards is most important at the ends. Some workers tend to let bagginess develop there. Continue stretching upwards and tacking inside until the space for working becomes too restricted inside – probably within 6 in.–9 in. of the end. One or two tacks may be driven downwards into the edge of the gunwale.

The two sides of the skin have to be cut and folded in turn over the end post. With thin fabric it is advisable to go right around to the other side, but with stouter material it is neater and sufficiently strong only to fold on to the thickness of the wood. Press one side against the end and use a pencil or a piece of chalk to mark the outline of the wood (fig. 10, 1). Thick material should be trimmed about $\frac{1}{2}$ in. outside this. Thinner material may be $1\frac{1}{2}$ in. outside in the first instance. In both cases the cuts will run

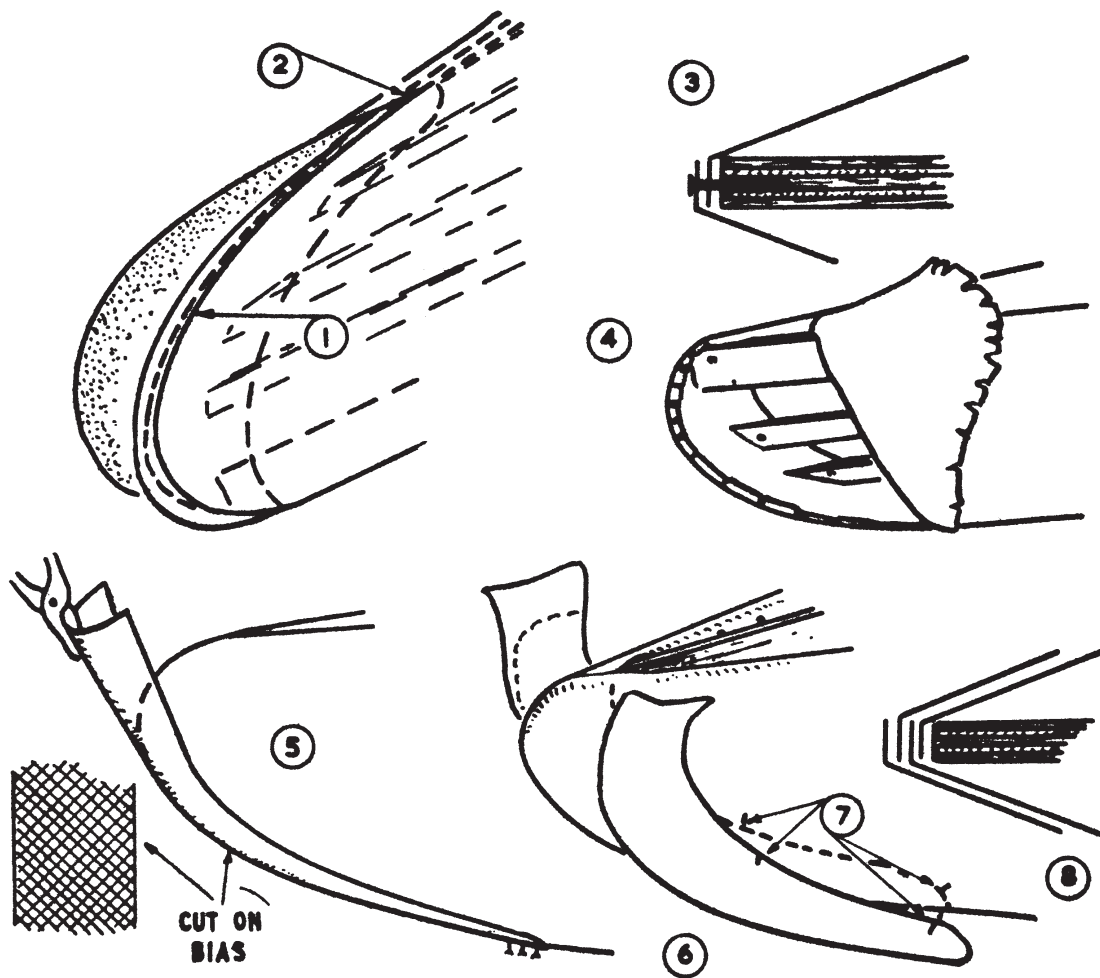


Fig. 10

together at the bottom. If the cut can go as far as where the curve blends into the flat and be taken to one side of the wood, wrapping over will be simplified (fig. 10, 2).

With stout P.V.C. material, coat the wood and material at one side with adhesive. Use a pointed stick to get adhesive well into the space, where the cut ends near the hog. Follow the adhesive maker's instructions, but with most of them, the parts may be brought together almost immediately. Using pliers, start near the hog and pull the first side over the end. While holding the tension, drive in a tack. Move farther up the end and do the same. Tacks on the flatter curves may only have to be about 2 in. apart, but on smaller curves they should be closer. Trim the fabric level with the wood, and leave the first side for an hour or so for the adhesive to set, then do the same with

the opposite side, bringing it over the first and later trimming level (fig. 10, 3).

Tacks with small heads are available and will reduce the risk of one tack coming over another on this job. Brass nails also have smaller heads, but they are difficult to drive fully into the edge of the plywood, without bending.

If canvas is used the usual adhesive is black reclaim rubber cement. After applying to canvas and wood this should be left until it is dry to the touch before bringing the parts together. If a thin fabric is used and it is to be wrapped around to the other surface, cut darts in the edges to prevent puckering (fig. 10, 4). After pulling a side around, tacks should be driven into some of the tabs to hold them against the tendency of the adhesive to slide before it has fully set.

When the two sides have been fixed down at each end, the hull should be waterproof and could be used, but if there are wrapped-over tabs they are rather ugly, and with the fabric on the end only, the skin is rather vulnerable. Although a racing canoe usually has the ends left at this stage it is better on a touring canoe to fit end caps.

It is possible to make an end cap from a single piece of fabric cut on the bias (diagonal to the weave). This is coated with adhesive, then its centre is tacked to the hog and it is pulled over the end (fig. 10, 5).

However, end caps made from skin material in two parts at each end look better and give better protection. The usual end cap is shaped something like the end post and enough surplus material is left at the top to fold over the deck after that is fitted. Mark the shape of the end, allowing enough at the bottom to come under the end of the keel. Draw an inner curve, then trim the piece about $\frac{1}{2}$ in. outside the outer line and leave some spare at the top (fig. 10, 6). Try this in position. If it is satisfactory make the other side a pair to it. There is no need for the greatest width of an end cap to exceed 3 in. and on a small end it may be less.

Sometimes the two halves of an end cap are sewn where they overlap, but this is not really necessary. Put one side in position on the canoe and mark its outline in pencil, with two register marks so that it will be put back in exactly the same place afterwards (fig. 10, 7). Put adhesive within the marked area, except for about 1 in. at the top, where the deck canvas will come, and on the end cap up to the same point. Locate the material with the register marks, then rub down, so as to squeeze out air bubbles. If necessary, put a few tacks in the edge which overlaps the end. Fix the other side in the same way, leaving the surplus projecting at the top. Arrange the overlaps so that the end cap edges alternate with those of the skin (fig. 10, 8).

The keel and bilge keels have to be fitted before the deck is fixed. If a plastic fabric has been used for the hull, do not treat it in any way. If proofed canvas has been used, give it two coats of top coat paint. The wood parts may be fixed before the second coat of paint has set, so that it beds down on to it. Alternatively, the hull paint may be allowed to dry, then the contact surfaces of the keel and bilge keels given a coat just before fixing.

Ordinary paint is harmful to P.V.C. plastic so do not paint it or fix the wood parts while their paint is wet. Dry paint does not affect the plastic.

Locate the keel over the hog, by feeling through the skin. At the ends it should overlap the end caps. If they are made of very thick material, it may be advisable to notch the keel over them (fig. 11, 1). Have an assistant hold the keel down while you screw upwards from below near the centre of the canoe. Use a drill first. After fixing one screw, place the ends of the keel in position, then stand back and sight along it. If the keel is not straight, withdraw the central screw and re-position it. Drive alternate screws through the hog and check frequently that the keel is being kept straight.

Straightness. of the keel is important. Even if the hog is

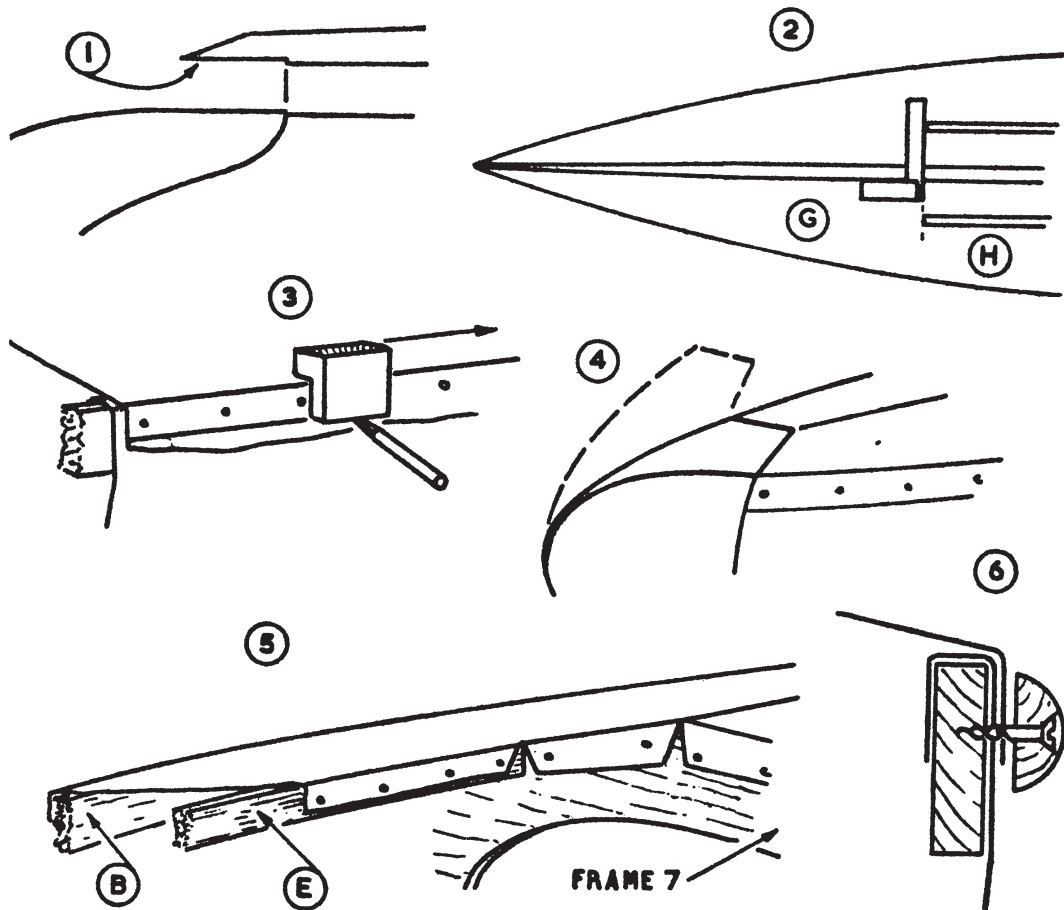


Fig. 11

out of true the keel should be straight. It may be helpful to stretch a string tightly between the centres of the end posts. Its position can be marked at intervals, then the width of the keel also marked, so that the helper can position the wood accurately during screwing. Near the ends of the keel have one screw driven from outside. Fix the bilge keels in the same way (photo 7). Use a try square against the keel to check that they are arranged opposite each other (fig. 11, 2).

Driving screws from below is difficult. Turn the canoe the right way up and tighten all screws by driving downwards. Be particularly careful of shearing screws. If the keel is pulled tightly against the skin, the material acts as a washer around each screw hole and prevents leaks, but if a sheared screw is left there will be a slight leak which will be difficult to locate later in use. If a screw shears,

drive another slightly askew, going in the same hole in the hog, but driving it beside the broken piece.

Before fixing the deck, thoroughly check the inside for anything which should not be there. A vacuum cleaner is useful.

Support the canoe evenly on keel and bilge keels. Drape the deck material over it. Put two tacks centrally into one end post. At the other end stretch well and put two tacks there. Tacks around the gunwales will eventually be about $\frac{1}{2}$ in. down and at 2 in.–3 in. intervals, but start by placing tacks at wide intervals to get the canvas evenly tensioned. First pull across the middle of the canoe, with a tack at each side. Go half-way between there and the ends. Check that the canvas is evenly tensioned and free from folds or creases, except those which can be expected to come out when more tacks are driven. Divide the distances again, then come down to 6 in.–8 in. intervals and finally 2 in.–3 in.

The rubbing strips are not very wide so tacks should be kept at an even distance down, otherwise it will be difficult to trim the canvas and cover both the edge and the tacks.

The amount to be trimmed off may be marked with a notched piece of wood (fig. 11, 3). At the ends fold the end caps over the deck and secure them with adhesive, and a few tacks .if necessary. At the stern the flaps may go straight across, but at the bow they look smart if taken to a point (fig. 11, 4).

The shape of the coaming frames can be felt through the deck. Cut first about $1\frac{1}{2}$ in. inside the edge. Cut into the corners so that the flaps will turn down inside and at the angle on top of the rear frame cut out so that the canvas win not pucker there (fig. 11, 5). Tack all round the inside at about 2 in. intervals. When tacking to the comparatively thin coaming frame have an iron block or another hammer on the inside to take the rebound and prevent the wood being cracked.

Screw on the rubbing strip. It is usually neater and easier to have the top edge of the strip about $\frac{1}{8}$ in. below the bend in the canvas (fig. 11, 6), than to have it level. The length of screws will depend on the thickness of skin and moulding, either $\frac{3}{4}$ in. or 1 in. x 5 gauge. After driving the screws, touch up their heads with paint to match the wood.



7. The hull covered; keel and bilge keels fitted



8. Tacking the hull fabric to the gunwale – note the supporting hand.



9. Squeezing in tacks with pliers where there is insufficient room to swing a hammer.

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