

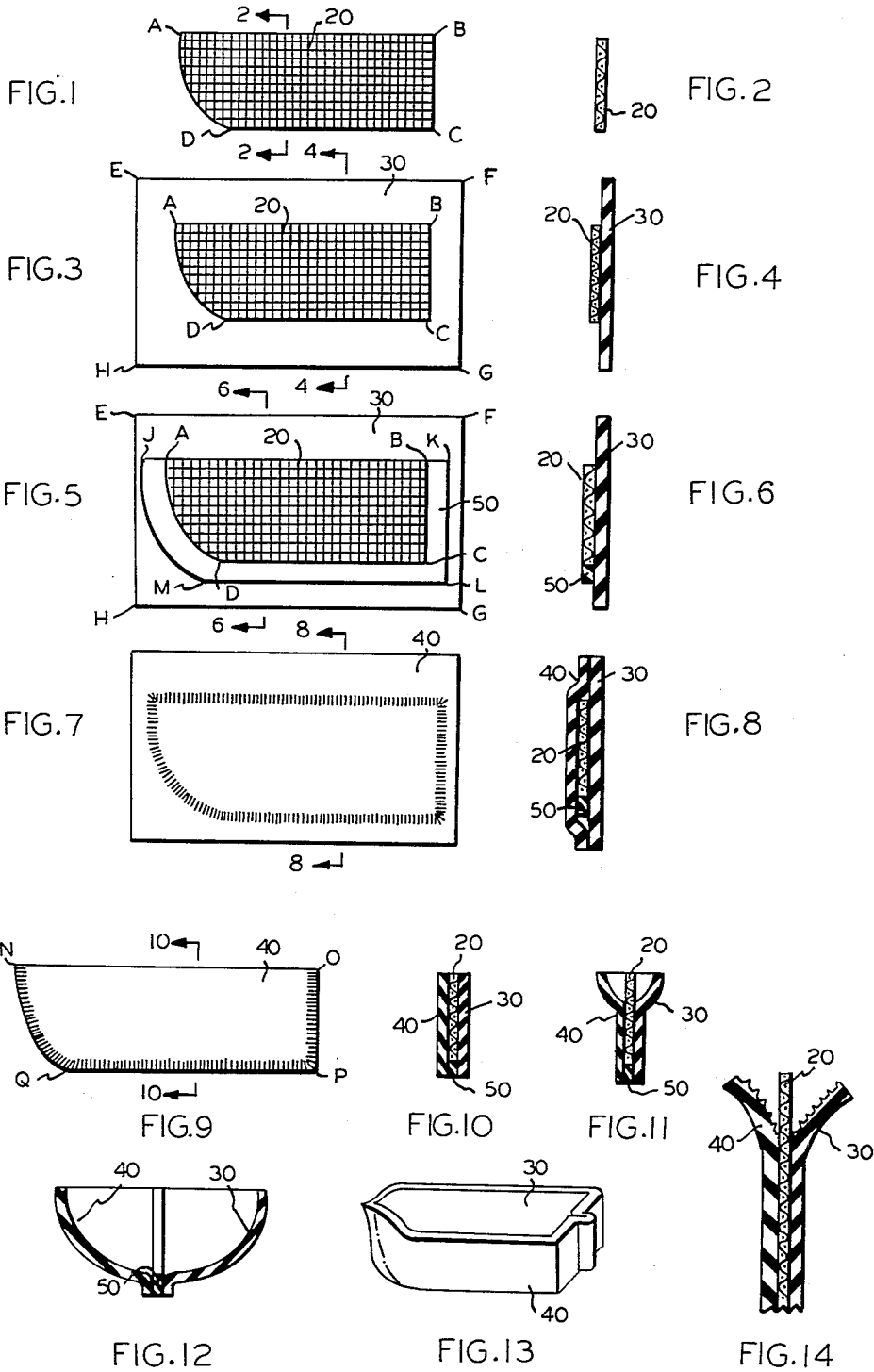
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METHOD OF MAKING A PROTECTIVE SHEATH FOR BOAT HULLS

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**METHOD OF MAKING A PROTECTIVE SHEATH FOR BOAT HULLS**

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5 Claims. (Cl. 156-267)

This invention generally relates to protective sheaths for waterborne objects. More particularly, this invention relates to a method for producing a protective covering (e.g. a hull sheath) to be applied to a boat hull by means of its elastic and gripping properties.

It is well known that boat hulls may be constructed of an almost unlimited variation of materials so long as waterproof characteristics are present. A boat or buoy may often be subjected to adverse weather conditions or to corrosive action by mineral components or detrimental organisms in the water. In operation, a boat may also become damaged by objects floating on the water or by inadvertent contact with docking facilities or piers, thus damaging the hull. Other occasions which present possible damage to a boat hull are encountered when it has been removed from the water for transportation or storage purposes.

This invention has as its primary object the provision of a method for forming a protective sheath to reduce the effect of hazards which would ordinarily damage a boat hull. A sheath made in accordance with this invention may be applied to most conventional hull structures.

Another object of this invention is to provide a method of applying a protective sheath to any waterborne object having a form which may be assumed by the deformation of an elastic sheet.

A further object of the present invention is the provision of an easily formed, inexpensive and versatile fabrication operation for the formation of a protective sheath.

Another object of the present invention is the provision of a protective sheath which may be formed without special equipment, such as preformed molding devices.

Another object of this invention is the provision of a protective sheath for boat hulls which will prevent side slip and reduce surface drag.

Another object is the provision of a protective sheath which will give year-round protection for a hull stored either in or out of the water and which can be easily repaired if damaged.

These and other objects and advantages may be achieved by the invention described hereinafter when read in conjunction with the drawings, wherein:

FIGURE 1 is a side view of a half hull fabric pattern; FIGURE 2 is a cross-sectional view along 2-2 of FIGURE 1;

FIGURE 3 is a side view showing the fabric pattern of FIGURE 1 placed upon a first sheet of elastic waterproof material;

FIGURE 4 is a cross-sectional view along 4-4 of FIGURE 3;

FIGURE 5 is a side view showing the arrangement of FIGURE 3 with added border strips;

FIGURE 6 is a cross-sectional view along 6-6 of FIGURE 5;

FIGURE 7 is a side view showing the arrangement of FIGURE 5 after the application of an overlying sheet of elastic waterproof material;

FIGURE 8 is an end view of FIGURE 7;

FIGURE 9 is a side view showing the arrangement of FIGURE 7 after trimming;

FIGURE 10 is a cross-sectional view along 10-10 of FIGURE 9;

FIGURES 11 and 12 are sequential views similar to FIGURE 10 showing how the fabric pattern is removable;

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FIGURE 13 is a perspective view of a hull sheath in accordance with this invention;

FIGURE 14 is an enlarged fragmentary view of FIGURE 11 showing the shape of the inner faces of the outer sheets after being separated from the fabric pattern.

In one of its broader aspects the present invention can be considered as comprising the following procedural steps (and the product produced thereby):

(1) Providing a half-hull pattern which has dimensions corresponding to the dimensions of approximately the surface area of a hull which is on either half of a vertical plane passing midway through the bow and stern,

(2) Said pattern preferably being made from a fabric having a limited degree of porosity,

(3) Placing said half-hull pattern upon a first sheet made of elastic, waterproof material,

(4) Said first sheet having length, width and height, dimensions which exceed the corresponding dimensions of said half-hull pattern;

(5) Placing a comparatively narrow border strip of material around the front, rear and bottom sides of said half-hull pattern,

(6) Placing a second sheet on said half-hull pattern and border strip, said second sheet being the same size and composition as said first sheet,

(7) Subjecting the aforesaid assembly to a bonding operation so that the facing surfaces of said first sheet, second sheet and border strip bond together,

(8) Trimming the front, rear and bottom sides of said assembly to the desired degree,

(9) Trimming the top of said assembly along a line corresponding generally with the top line of said half-hull pattern and removing said half-hull pattern from between said first and second sheets.

The step of cutting the half-hull pattern to the dimension of one half of the boat to be covered is not absolutely critical but the closer one approximates the exact dimensions of one-half the surface area of the hull the better will be the fit of the end product.

Referring now to FIGURE 1, the half-hull pattern 20, which is generally defined by points A, B, C and D, may be made of a number of different materials. Loosely woven textile fabrics having square openings have been found preferable. The size and shape of the pores or openings in the pattern, as well as the thickness of the pattern material will govern or at least largely influence the type of interior surface that the final product (hull sheath) will have.

The front and rear planar surfaces of the half-hull pattern 20 are preferably treated with a material which will either minimize or completely eliminate the bonding of the half-hull pattern to sheets of elastic, waterproof material. For example, the half-hull pattern can be dusted with soapstone or sprayed with a silicone mold release lubricant.

The treated half-hull fabric pattern 20 is then placed upon a first sheet of elastic, waterproof material 30 (having the boundaries E, F, G, H), and as is shown in FIGURE 3 the half-hull fabric pattern 20 only partially covers said sheet 30. The elastic sheet material 30 is preferably composed of uncured gum rubber, either natural or synthetic. The sheet 30 should be sufficiently large so that portions of the sheet 30 extend outwardly beyond the periphery of the half-hull fabric pattern 20 as shown in FIGURE 1. A satisfactory result has been obtained by utilizing a sheet 30 which extends outwardly at least one foot from all sides of the half-hull fabric pattern 20 but a lesser distance is satisfactory where economy of materials is quite important.

One or more strips of border material 50, made of uncured rubber and having the same bondable properties as said first sheet 30 are placed around a portion of the

outer periphery of the half-hull fabric pattern at a location outside of points A, B, C, D and within the area defined by points E, F, G and H (see FIGURES 5 and 6). A strip 50 about one foot wide will usually suffice.

A second sheet of elastic waterproof material 40 having the same dimensions as the first sheet 30 is then placed over the previously described assembly to thus produce the arrangement shown in FIGURES 7 and 8. The resulting assembly is thus seen to be composed of said first sheet 30, the fabric pattern 20, partly surrounded by the border material 50, and said second sheet 40. The raised outline of the fabric pattern (and contiguous border strips) are usually quite visible (e.g. see FIGURE 7) but in the event the outline is not readily visible the outline may be traced with a non-curing marking crayon to aid in the later step of removing the fabric pattern. Such a line is drawn to outline the extended keel portions. The upper line is drawn even with the top of the fabric pattern. The assembly shown in FIGURES 7 and 8 is then cured by conventional means including heat and pressure. An open side press has been found to satisfactorily perform this curing step. However, other curing methods may be used. The fact that the assembly is in substantially a single plane during the curing process precludes the necessity for elaborate molding equipment for the production of a hull sheath. When the curing step has been completed at a suitable pressure and temperature the assembly is removed from the press and allowed to cool. It should be noted that the inner faces of the sheets 30 and 40 and the intermediate border strip 50 will be firmly bonded together to thus form a bonded laminar construction completely surrounding the fabric pattern 20. The fabric pattern 20 interposed between the sheets 30 and 40 serves to prevent the portions of sheets 30 and 40 which abut directly against the fabric pattern from bonding together. An impression of the fabric pattern 20 will be formed on portions of the inner faces of the sheets 30 and 40 due to the weave of the fabric.

The cured assembly is then trimmed to the desired size by cutting either along a visible ridge or along a line marked prior to the curing operation, and a product is obtained as shown in FIGURES 9 and 10. Enough of the border portion is retained after trimming so that after sheets 30 and 40 are spread apart and the fabric pattern 20 removed, a thick laminated portion will remain corresponding to the keel. Cutting away all but about  $\frac{1}{8}$  inch of the border strip 50 has been found to produce a quite satisfactory product, but wider strips can be left if desired. However, the width of the laminated bonding portion (containing the border strip) that is allowed to remain need not be uniform along the length of the keel. A portion along the bottom of the boat may advantageously be allowed to extend six inches to eighteen inches. This extending portion will act to prevent side slip in a similar manner to the extended keel of a sailboat. Even when this keel effect is desired it is preferable to have the bow and stern portions trimmed down to a much narrower width (e.g. one-eighth inch). In a preferred embodiment of this invention the bow and stern seam portions (containing the border strip) of the hull sheath are closely trimmed to approximately  $\frac{1}{8}$  inch and the bottom seam keel portion allowed to extend 6 to 18 inches. The top of the product shown in FIGURE 7 has been cut along a line corresponding with the upper edge of the fabric pattern 20 so that the sheets 30 and 40 can be spread apart to expose the fabric pattern 20.

While the fabric pattern 20 performs an important function in the formation of the hull sheath it must be removed from the product shown in FIGURES 9, 10 and 11. Since the fabric pattern 20 and the sheets 30 and 40 are only loosely bonded together (if at all) due to the presence of the soapstone or silicone mold release lubricant, the sheets 30 and 40 may be easily separated and the fabric pattern removed. The steps of removal are best illustrated in FIGURES 11 and 12, wherein the sheets

30 and 40 are shown separated from the interposed fabric pattern 20. As rubber sheets 30 and 40 are separated and the fabric pattern 20 removed, it will be noticed that the fabric pattern 20 will have left an impression on the interior faces of the hull sheath. Referring now to FIGURE 14, the small gripping edges or fingers that are formed on the inner faces of the sheets 30 and 40 are shown. These gripping edges or fingers aid in retaining the hull sheath on the boat hull. The weave of the fabric pattern 20 will control the size, shape and configuration of the gripping edges or fingers and one may easily experiment with various fabric patterns so as to produce a surface having the desired clinging characteristics. Depending also upon the weave of the fabric and the pressure of the curing press the sheets 30 and 40 may even be continued until the fabric pattern 20 may be removed completely or openings in the fabric pattern, thus resulting in portions of sheets 30 and 40 being bonded through the openings in the fabric pattern 20. These bonded portions will be broken during removal of the fabric pattern 20 and the inner faces of sheets 30 and 40 will be found to have very desirable gripping features. The separation of the sheets 30 and 40 as shown in FIGURE 11 is of course continued until the fabric pattern 20 may be removed completely. FIGURE 12 shows a cross-sectional view of the hull sheath with the fabric removed. If the fabric pattern 20 has been properly measured the sheets 30 and 40 will substantially conform to the hull of the boat.

The hull sheaths formed by my method may be placed on a boat by first stretching the sheet over the stern as shown, then the sheath may be progressively stretched forward by the progressive stretching of the bow portion of the sheath and upward over the bow of the boat. The very flexible and elastic properties of the sheath allows it to conform to the shape of the boat hull. The gripping inner faces of the hull sheath retains the sheath on the boat hull in a tightly clinging relationship.

Depending upon the desired strength of the sheath and the size of the boat to be covered, various thicknesses of elastic sheet material may be used. A .062 gauge blank of elastic sheet material has been found to be sufficient for an eleven-foot boat. This method may be used to produce a protective hull sheath for boats of all types from 5 feet to 50 feet in length. The hull sheath may be replaced or if damaged may be easily repaired by conventional means.

In conclusion, while there has been illustrated and described a preferred embodiment of my invention, it is to be understood that since the various details of construction may obviously be varied considerably without really departing from the basic principles and teachings of this invention, I do not limit myself to the precise constructions herein disclosed and the right is specifically reserved to encompass all changes and modifications coming within the scope of the invention as defined in the appended claims. Having thus described my invention, what I claim as new and desire to secure as United States Letters Patent is:

1. A method for producing protective sheaths for boat hulls which comprises the steps of:
  - (1) providing a half-hull pattern which has dimensions corresponding to the dimensions of approximately the surface area of a hull which is on either half of a vertical plane passing midway through the bow and stern,
  - (2) said pattern preferably being made from a fabric material having a limited degree of porosity,
  - (3) placing said half-hull pattern upon a first sheet made of elastic, waterproof material,
  - (4) said first sheet having length, width and height, dimensions which exceed the corresponding dimensions of said half-hull pattern;
  - (5) placing a comparatively narrow border strip of material around the front, rear and bottom sides of said half-hull pattern,

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- (6) placing a second sheet over said half-hull pattern and border strip, said second sheet being about the same size and compositions as said first sheet,
- (7) subjecting the aforesaid assembly to a bonding operation so that the facing surfaces of said first sheet, second sheet and border strip bond together, 5
- (8) trimming the front, rear and bottom sides of said assembly to the desired degree,
- (9) trimming the top of said assembly along a line corresponding generally with the top line of said half-hull pattern, and 10
- (10) removing said half-hull pattern from between said first and second sheets so as to thereby form a protective sheath for a boat hull.
2. A method according to claim 1 wherein half-hull pattern comprises a loosely woven textile fabric. 15
3. A method according to claim 2 wherein said fabric has square openings.

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4. A method according to claim 1 wherein said pattern is treated with a material which will inhibit the adherence of said sheets to said pattern.

5. A method according to claim 1 wherein said sheets are made of uncured gum rubber.

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