Jan. 30, 1962 E. J. O'REILLY 3,018,487

METHOD OF MAKING MORTAR BOARD CAP

Original Filed Feb. 3, 1954 2 Sheets-Sheet 1

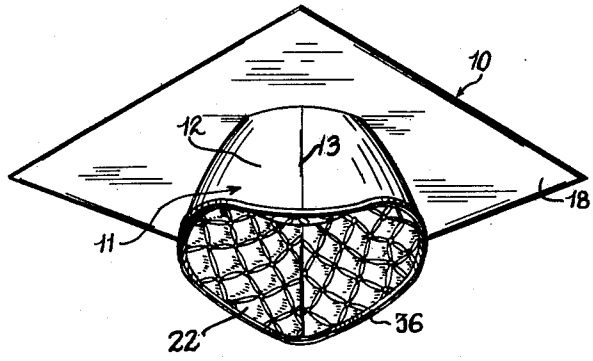


Fig. 1

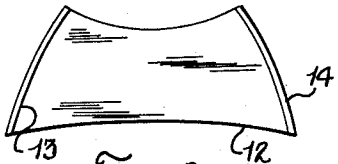


Fig. 2

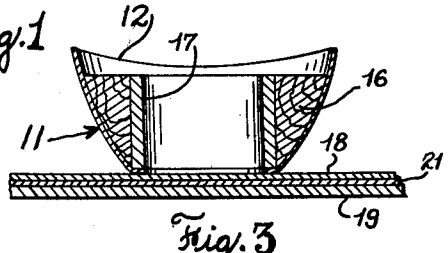


Fig. 3

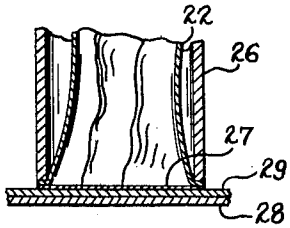


Fig. 4

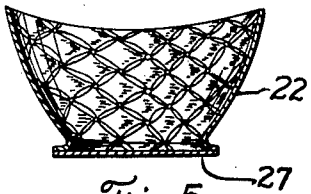


Fig. 5

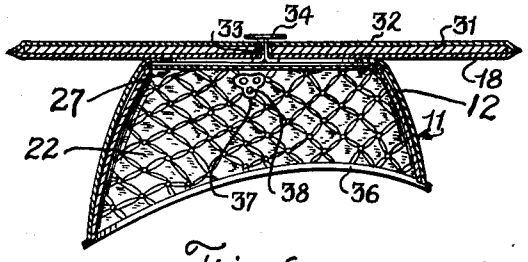


Fig. 6

INVENTOR.
EDWARD J. O'REILLY
BY
RICHEY, McNENNY & FARRINGTON
Donald W. Farrington
ATTORNEYS

Jan. 30, 1962 E. J. O'REILLY 3,018,487

METHOD OF MAKING MORTAR BOARD CAP

Original Filed Feb. 3. 1954 2 Sheets-Sheet 2

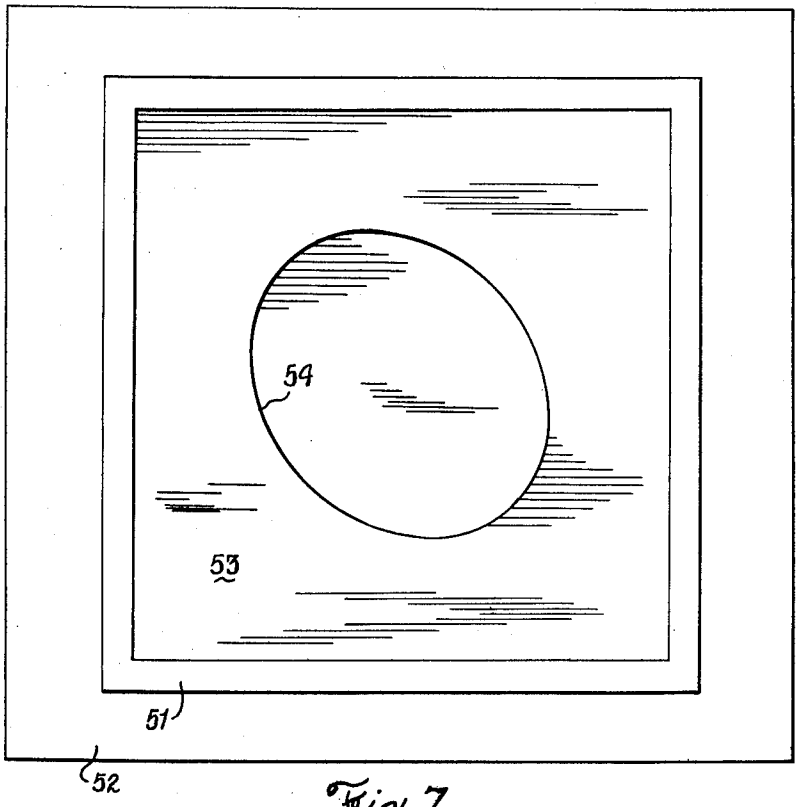


Fig. 7.

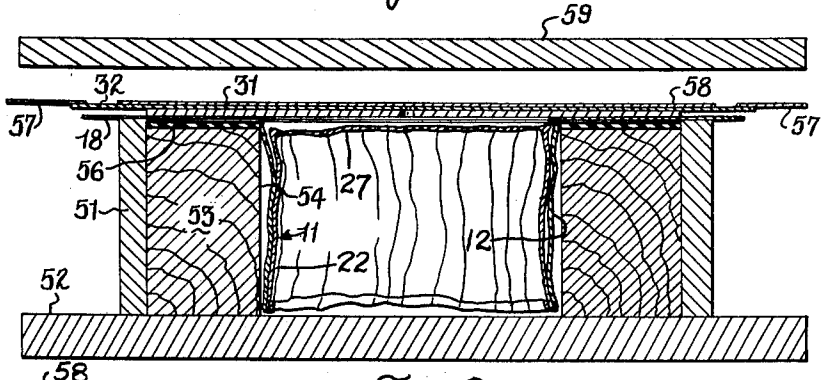


Fig. 8

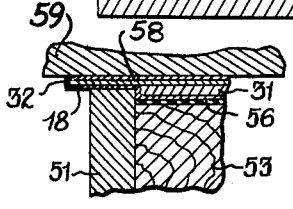


Fig. 9.

INVENTOR.
EDWARD J. O'REILLY

BY
RICHEY, McNENNY & FARRINGTON
Donald W. Farrington
ATTORNEYS

United States Patent Office 3,018,487 Patented Jan. 30, 1962

3,018,487

METHOD OF MAKING MORTAR BOARD CAP

Edward J. O'Reilly, New London, Ohio, assignor to The C. E. Ward Company, New London, Ohio, a corporation of Ohio

Original application Feb. 3, 1954, Ser. No. 407,842, now Patent No. 2,880,423, dated Apr. 7, 1959. Divided and this application Feb. 6, 1959, Ser. No. 791,693

2 Claims. (Cl. 2—192)

This invention relates generally to caps and the like and more particularly to a method for making mortar board caps. This application is a division of applicant's co-pending application Serial No. 407,842, filed February 3, 1954, now Patent No. 2,880,423, issued April 7, 1959, and entitled "Mortar Board Caps."

Mortar caps have heretofore been made by inserting a cardboard stiffener into a cloth covering. Attached to the covered board is a crown or cap piece. This structure has a number of disadvantages which have resulted in poor serviceability and high expense. Since the stiffener for the mortar board on the top section is made of cardboard, it has been difficult or impossible to clean the caps when they become stained because the cardboard insert would be destroyed by the cleaning solutions. Because of the nature of use, normally a mortar board cap is only worn by any given individual once and it is highly desirable to be able to clean the cap each time it is used. One of the more practical methods of cleaning such caps was to remove the cardboard insert and then clear the textile material and re-assemble the cap. This, of course, involves a large amount of labor and is very unsatisfactory.

It is an important object of this invention to provide a method for making a mortar board cap having a crown and a covered mortar board stiffener wherein the crown and cover for the stiffener are not detrimentally affected by cleaning solutions, and are virtually immune to stains.

It is another object of this invention to provide a method for making such a cap wherein the cap may be easily fabricated by low cost, high production methods of manufacture. The crown and stiffener cover are made of heat-weldable plastic material by a series of manufacturing steps that result in a completed article having invisible seams, the various steps being simple and rapidly performed to result in an article having the features described in this and in any aforesaid application.

Further objects and advantages will appear from the following description and drawings, wherein:

FIG. 1 is a perspective view of a finished mortar board cap according to this invention;

FIG. 2 is a view of the first step in the assembly of the cap showing the outer portion of the crown;

FIG. 3 is a partial cross section showing the method of connecting the crown to the mortar board covering;

FIG. 4 is a view showing the forming of the crown liner;

FIG. 5 is a cross section of the completed crown liner;

FIG. 6 is a cross-sectional view of a completed mortar board cap;

FIG. 7 is a plan view of a jig and welding apparatus for welding the edges of the plastic around the insert;

FIG. 8 is a cross-sectional view of the jig and welding apparatus shown in FIG. 7 shown with a mortar board cap positioned ready for welding;

FIG. 9 is an enlarged fragmentary cross section showing the position of the elements when the actual welding occurs.

A mortar board according to this invention is fabricated from materials which may be easily cleaned with

any of the standard cleaning processes and materials. Preferably, the material is a plastic relatively impervious to the moisture penetration. Three embodiments are shown, in the first of which a fiber glass insert is provided for the stiffener of the mortar board which is covered with a plastic material embossed with a broadcloth surface. The crown is also formed of plastic material, the outer surface of which is embossed with a broadcloth texture, the liner of which is embossed with a tufted design. The crown is attached to the lower mortar board cover by welding the plastic material. In the second embodiment of this invention, the board per se is molded in sections, the upper section being formed with generally radial extending ribs which give added stiffness and the under surface of a relatively thin sheet of plastic which is molded around the edge to the first part. A mounting member also molded of plastic is welded or otherwise attached to the central part of the lower surface of the mortar board and is formed with an outwardly extending flange. The crown in this embodiment is secured to the mortar board by means of elastic or draw strings which draw the upper edge of the crown inward underneath the flange on the mounting member. In this embodiment the crown may be removed from the mortar board if desired, for either the purposes of cleaning or mounting a different size crown. In the third embodiment of this invention, the board is made up of two sheets of fiber glass reinforced plastic material. These two sheets are sealed together about the perimeter with polyester resin and under heat and pressure until the resin is cured. The board is then covered with poplin or rayon material. The crown is positioned in place, a retainer of fiber glass reinforced plastic material is inserted inside the crown and the cap is stitched together with metal stitches.

Referring to the drawings, the finished mortar board cap **10** has an appearance as shown in FIG. 1 and is formed of several sub-assemblies. The crown **11** itself, which is attached to the mortar board proper, is formed with an outer portion and a liner. In order to form the outer portion **12** of the crown, two pieces of vinyl plastic having a profile substantially as in FIG. 2 are placed together with their outer surfaces adjacent to each other. They are then welded together along the seams **13** and **14**. In the preferred embodiment these two pieces are welded together by electrical heat means since this method has been completely satisfactory in forming a permanent bond when the material is vinyl plastic. I prefer to use dielectric welding, but this invention contemplates other welding methods such as conduction heating. By welding the various elements, a permanent bond is made without the time-consuming sewing used in the past. In the preferred embodiment, a sheet of thermo-plastic vinyl plastic is used which is embossed with a broadcloth finish so that it will appear to be made of a textile fabric while being immune to stains and easily cleaned.

The outer portion **12** of the crown is then turned inside out to place the embossed side out and the seams in and is slipped over a form **16** which is preferably wood. As is apparent in FIG. 3, the outer portion **12** has a generally cup-shaped appearance and is positioned wtih the small end of the lower end of the form **16**. The outer portion **12** is proportioned so that the lower edge fits beneath the heating element **17** so that it may be welded thereby to the lower surface **18** of the mortar board portion. The lower surface **18** is also formed of a sheet of vinyl plastic embossed with a broadcloth surface and is positioned on the welding table **19** with a sheet of phenolic resin **21** therebetween. Electrical power is then applied to the heating element **17** and

welding table thereby welding the outer portion of the crown to the under surface 18 of the mortar board. The phenolic resin 21 prevents scorching or burning of the vinyl along the weld and assists in the production of a neat weld.

The liner 22 of the crown portion is also formed of vinyl plastic; however, in this case, it is desirable to use a sheet of plastic embossed with a tufted design which will give the appearance of quilting or the like. Here again two sheets having a shape generally shown at FIG. 2 are welded together along the seams in the same manner as the outer portion. The cup-shaped liner is then inserted into the center of a cylindrical heating die 26 as shown in FIG. 4 with the lower edge projecting outwardly adjacent to the lower edge of the die. The linear is not turned inside out as the seams should be on the outside. Here again a flat sheet of tufted vinyl 27 is positioned on the welding table 28 with a sheet of phenolic plastic 29 therebetween. The liner is then inserted into the outer portion of the crown and fastened in place around the lower opening by means of sewing, welding or any other suitable means. In the preferred form, the liner 22 is sewn to the outer portion 12 with a seam tape 36. It is preferable to form all crowns 11 with the same dimensions at the point where they are fastened to the mortar board so that a single welding die can be used and by merely changing the contours approaching the lower opening it is possible to achieve a large variety of hat sizes. The liner 22 is welded to the flat sheet 27 thereby forming the completed cup-shaped liner shown in FIG. 5.

The assembly shown in FIG. 3 comprising the outer portion 12 of the crown and the lower sheet of the mortar board 18 is then placed against a sheet of stiffening plastic 31 which is preferably fiber glass plastic since fiber glass plastics provide greater strength with little weight, and the upper surface of the mortar board 32 is welded to the lower surface 18 around the outer edge of the stiffening plastic 31. The stiffening plastic 31 is thereby totally covered by the covering plastic which is embossed with a broadcloth surface. The preferred form of the apparatus, used to weld the edges of the plastic covers around the stiffening plastic 31, is shown in FIGS. 7, 8 and 9 wherein a rectangular heating element 51 is mounted on a metallic mounting plate 52. The heating element 51 is preferably copper and surrounds a wooden form 53. The form 53 is formed with a central aperture 54 adapted to receive the crown portion 11 and properly center it. The upper surface of the jig 53 is spaced below the upper surface of the heating element 51 and a sheet of sponge rubber 56 is positioned in the cavity thereby formed. The sponge rubber is also formed with a central aperture similar to the aperture 54. The lower surface 18 is then positioned over the heating element 51 and jig 53 with the attached crown 11 extending into the aperture 54. The stiffening plastic 31 is then positioned over the lower surface 18. The aperture 54, of course, serves to locate the lower surface 18, and the edges of the stiffening plastic 31 are located by the heating element 51. The upper surface 32 of the mortar board is then positioned above the stiffening plastic 31 and tension is applied by the clamps or tape 57. Above the upper surface 32 a thin sheet of phenolic resin 58 is positioned to insure a good weld. The upper plate 59 is then brought into contact with the phenolic resin 58 compressing the lower surface 18 and the stiffening plastic 31 against the sponge rubber 56 until the upper surface and the lower surface 18 come into contact. The various elements assume the position shown generally in FIG. 9 at this time. Electric power is then supplied to create the weld between the upper surface 32 and lower surface 18 and the excess plastic is trimmed away. By utilizing this structure a uniform weld is insured and proper relationship of all the elements is accomplished.

In the preferred embodiment the stiffening plastic is provided with a central aperture 33 through which a button 34 may be fastened.

Since the motar board stiffener 31 is formed of a plastic which is immune to injury from cleaning solutions and the like, and since all the exposed portions of the cap are formed of stain-resisting plastics, it is a simple matter to just wipe off any dirt smudges which might be present and the necessity of disassembling is completely eliminated. Since the bond created by the welding is moisture-proof, moisture is also prevented from entering the cap itself.

If desired, the liner and the outer surface of the crown section may be welded together in some decorative design as at 37 and openings 38 cut through to provide ventilation into the crown proper.

Although preferred embodiments of this invention are illustrated, it will be realized that various modifications of the structural details may be made without departing from the essence of the invention. Therefore, except insofar as they are claimed in the appended claims, structural details may be varied widely without modifying this invention. Accordingly, the appended claims and not the aforesaid detailed descriptions are determinative of the scope of the invention.

What is claimed is:

1. A method of manufacturing mortar board caps comprising forming a crown of sheet plastic, seam welding the upper portion of said crown to a first flat sheet of plastic, laying a sheet of relatively rigid material of lesser dimension than said first sheet of plastic on said first sheet of plastic, positioning a second flat sheet of plastic on the other side of said relatively rigid material with the edges of said second plastic sheet projecting past the edge of said relatively rigid material, applying tension to said second plastic sheet, and applying heat and pressure to the edges of said flat sheets to weld them together and simultaneously applying pressure to the edge portions of the rigid stiffening material so as to cause the stiffening material to deform one of said sheets and cause it to embrace said stiffening material under tension.

2. A method of manufacturing mortar board caps comprising forming crown and liner members of sheet plastic, seam welding the upper portion of said crown to a first flat sheet of plastic, attaching said liner in said crown, laying a sheet of relatively rigid material of lesser dimension than said first sheet of plastic on said first sheet of plastic, positioning a second flat sheet of plastic on the other side of said relatively rigid material with the edges of said second plastic sheet projecting past the edge of said relatively rigid material, applying tension to said second plastic sheet, and applying heat and pressure to the edges of said flat sheets to weld them together and simultaneously applying pressure to the edge portions of the rigid stiffening material so as to cause the stiffening material to deform one of said sheets and cause it to embrace said stiffening material under tension.

References Cited in the file of this patent

UNITED STATES PATENTS

2,880,423 O'Reilly ---------- Apr. 7, 1959