METHOD OF FORMING A FIBER HEAD FOR FIBER CONTAINERS

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The present invention relates to fiber heads for containers and their method of formation, and more particularly to heads made from laminated layers of fiber material and a method for molding them into the desired shape with the proper characteristics satisfying preset criteria, conditions and requirements.

In recent years, it has been customary to make most of the heads or covers for fiber containers out of steel. The increasing cost of steel, as well as its availability, have been of great concern to the industry.

Accordingly, our present invention contemplates the elimination of the utilization of steel for container heads, as well as the problems and drawbacks incident thereto. It should be understood that the containers contemplated by our invention are the large fiber containers and drums employed in shipping raw materials and chemicals. Under normal circumstances, these containers and drums are fabricated from convoluted wound laminated layers of kraft paper or similar fibrous material. Examples of such containers and drums are disclosed in U.S. Patent No. 2,056,956 and U.S. Patent No. 2,382,858 and U.S. Patent No. 2,892,749.

Thus, an object of the present invention is to provide a molded fiber head for such containers made from laminated layers of fibrous material, as well as its method of formation.

Another object of our invention relate to such heads and their fabrication wherein: the fiber heads permit uniform insulating properties for assembled containers because substantially the same materials are utilized for both; the fiber heads provide not only high insulation protection, but are water resistant, scuff resistant, have high impact resistance; the fiber heads present no immediate problems with respect to rusting, as is the case with steel heads, especially when liquids or chemicals are stored or contained in their associated drums; the fiber heads are not only non-corrosive, but are relatively inexpensive; the fiber heads provide for sanitary sealing and smooth container interiors for efficient product handling, especially those that are sensitive and delicate; the fiber heads readily lend themselves to the employment of special interliners, coatings, and film or foil interior liners; the fiber heads possess extraordinary strength for shipping and storage to insure safe handling of costly products contained in the associated drums; the fiber heads are so constructed that they may be employed with locking rim assemblies so that an associated fiber container will be of sufficient strength to readily accommodate shipping weights up to 550 lbs.; the smooth fiber surfaces of the heads are ideal for printing, painting or labeling for product identification; and the fiber heads contribute to relatively low tare weight for the associated drums and containers which are thusly manufactured and assembled in accordance with all major shipping specifications, regulations and classifications.

Other objects and advantages will become apparent from the following detailed description of our invention which, in general, relates to container heads made from laminated layers of fibrous material. In forming such heads, a pair of discs are employed, each of which is made of several laminated layers of fibrous material, such as kraft paper. One of these discs possesses overall dimensions greater than the other so that when they are molded together, in accordance with the teachings of our present invention, into finished form having the desired configuration, the peripheral edges of each disc will be proximately located with respect to the other. Additional discs of somewhat reduced dimensions may be utilized to provide the necessary thickness, for certain requirements and conditions, to the central portion of the head without radically altering the specifications of the molding dies, especially that employed in the formation of a transversely extending peripheral apron for the contemplated heads.

The discs are adhesively secured to one another into a symmetrically arranged sandwich which is suitably molded in dies while the adhesive is still moist and prior to its setting. The sandwich is formed into the head by means of an upper die engaging the lower surface of the sandwich, a lower die engaging the upper surface of the sandwich and a ring or annular die engaging the periphery of the sandwich to mold it into a depending apron or flange. The lower die as well as the ring are heated, whereas the upper die is cool. In this connection, the sandwich is permitted to be properly molded without breaking the fibers under the action of the heated dies. The cooled upper die prevents the bursting of the fibers by the action of water, steam or pressure. A form of plastic binders may also be utilized in the laminating, and, in such circumstances, the heated dies will render the resins workable.

In order to counteract the effects of the memory of the mold head prior to the complete setting of the adhesives, the peripheral apron of the head is locked or flanged inwardly to assure its ultimate disposition normal to the major part of the remainder of the head.

The finished head has a central disc portion which is adapted to cover the open end of the contemplated container or drum. The peripheral apron or flange extends transversely of this central disc portion and is adapted to embrace the sides of the drum at the open end. This apron forms part of a U-shaped structure which conveniently receives the upper edges of the drum. This U-shaped structure extends into a downwardly projecting head which advantageously rests on the usual internal head of the drum.

The aforementioned objects and advantages will be evident from the following detailed description of our invention which is to be taken in connection with the accompanying drawings in which:

FIG. 1 is a perspective view of a finished head incorporating the teachings of our present invention with certain parts broken away and removed;

FIG. 2 is an exploded perspective view of discs which are essentially and molded to form this head;

FIG. 3 is a perspective view of these discs in proper assembled form with an interposed adhesive between discs being utilized in forming this composite laminate resembling a sandwich;

FIG. 4 is a fragmentary elevational view of the sandwich during an initial pressing operation for purposes of assuring optimum contact of the discs through the interposed adhesives, together with the penetration of the adhesives through the fibers;

FIG. 5 is a perspective view of the sandwich after this pressing operation with a lubricant applied to the under face of the sandwich to permit the desired shifting of the laminas with respect to the molding die faces as well as provide a certain degree of stretching of the fibers during the molding operation;

FIG. 6 is a perspective view of a series of dies employed in molding the sandwich into a predetermined shape and configuration with an upper die broken away to expose to a greater extent the die face of a lower die;
FIG. 7 is a fragmentary sectional view of the sandwich of FIG. 5 properly mounted in this series of dies between an upper unheated die and the lower heated die by means of guides projecting upwardly from a heated ring; FIG. 8 is a similar view showing the closing of the upper and lower dies and thusly the formation of the central disc portion and downwardly projecting head of the head; FIG. 9 illustrates the shifting of the ring in an upward direction to form the transversely extending apron and complete the fabrication of the U-shaped structure which is adapted to receive the upper peripheral edges of a mounting drum; FIG. 10 shows the opening of the upper die relative to the lower die and ring; FIG. 11 shows the elevation of the ring with respect to the upper and lower dies to remove the sandwich from the lower die cavity and suspend it between the upper and lower die faces; FIG. 12 illustrates the downward shifting of the ring relative to the upper and lower dies to permit the head to come to rest solely on the lower die face; FIG. 13 is a plan view of another die employed to counteract the effects of the memory of the thusly formed head by flanging or necking inwardly the transversely extending apron to assure its proper orientation with respect to the remainder of the head, with the head being illustrated in phantom; FIG. 14 is a fragmentary sectional view of the head, after its removal from the lower die and prior to the complete setting of the adhesive in association with this flanging-in die; FIG. 15 is a similar view showing the closing of this die; FIG. 16 is a fragmentary sectional view of the finished head properly mounted on the open end of a container or drum and secured thereto by a locking rim assembly; FIG. 17 is an exploded perspective view of the finished head, associated drum and locking rim assembly; FIG. 18 is an exploded perspective view of several discs employed in fabricating another form of head by the method taught by our present invention wherein one of the discs is a barrier or seal; FIG. 19 is a fragmentary sectional view of the finished head molded from the discs of FIG. 16 and shown associated with the upper end of a drum and a locking rim assembly; FIG. 20 is a further exploded perspective view of several discs utilized in the formation of still another form of head wherein the upper and lower faces of the head will be essentially a resin laminate; and FIG. 21 is a fragmentary sectional view of the head molded by the herein disclosed method, from the discs of FIG. 20, in association with the upper end of a mounting drum and anchoring locking rim assembly.

In a Fig. 1 a fiber head 30 formed pursuant to our invention is illustrated and may be of substantially annular configuration for association with well known types of cylindrical drums. This head 30 includes a central body portion 32 and a continuous U-shaped structure 34 which extends into a transversely extending apron 36 and downwardly depending head 38. In accordance with one aspect of our present invention, a series of discs 40, 42 and 44 of substantially circular configuration are initially provided, as shown in FIG. 2, in the fabrication of such heads 30. Each of these discs is made of adhesively secured laminated layers of fibrous material such as kraft paper. Discs 40, 42 and 44 are of progressively smaller radii so that in the completely molded head the peripheral edges of discs 40 and 42 will be proximate one another. In this connection, the peripheral edges of disc 44 will terminate short of the edges of disc 40 and disc 42 in the head 30 for reasons that will become apparent shortly. Suffice it to say, disc 44 is simply employed for the purpose of supplying additional thickness to the finished head 30 in order that certain conditions and requirements in this regard are met and satisfied. Thus, for a 15/8 inch drum size, the respective diameters for discs 40, 42 and 44 are approximately 1 inch, 3/4 inch and 1/2 inch, respectively. In addition, for a 20 inch drum size, the respective diameters will be 21/8 inches, 21/4 inches and 21 inches.

As viewed in FIG. 2, the underside of disc 44 and that of disc 42 are coated with a waterproof resin adhesive of the type that will set upon encountering an increase in temperature for certain periods of time. In this connection we may employ this type of an adhesive containing a liquid, such as a water base, which will wet and soften the fibers of the disc. Adhesives possessing the desirable properties and characteristics are commercially available, as for example, Formula 5534 supplied by the H. B. Fuller Co. of St. Paul, Minnesota, and Formula 20N782 supplied by the National Starch and Chemical Corp. of Plainfield, New Jersey, have performed satisfactorily. In addition, thermoplastic binders as well as thermosetting adhesives may be employed between the discs or layers of fiber to accomplish the desired binding and permit slippage between layers at the temperatures encountered during the molding of the head 30 and facilitate the formation of the discs into the desired shape at such temperatures. As will be understood, we may utilize resin saturated or coated layers of fiber in fabricating the head 30 to insure water or chemical proof characteristics. The discs 40, 42 and 44 are simultaneously glued to one another with the aid of a centering jig (not shown) to assume the form of a composite laminar or sandwich 46 resembling that illustrated in FIG. 3.

The sandwich 46 is then placed in a press 48 wherein it is subjected to a force of approximately 5,000 pounds for approximately 15 to 20 minutes. We have found this pressing operation to be desirable for obtaining optimum contact of discs 40, 42 and 44 through their interposed adhesives. Further, the adhesives employed as well as the moisture thus created permeate the fibers of the discs 40, 42 and 44 to a much greater extent so that the subsequently employed molding operations are enhanced. It should be understood that a number of sandwiches 46 may be stacked in the press 48 at one time for greater efficiency, keeping in mind that the disc 40 first glued should be the next in line for molding into the finished product.

Upon removal from the press 48, the adhesives securing the discs 40, 42 and 44 of the sandwich 36 will still be wet and will not have had an opportunity to set to any appreciable extent. That side of sandwich 46, which ultimately forms the bottom face of the finished head 30, is coated with a lubricant 50 along its periphery, as shown in FIG. 5. This lubricant may consist essentially of soap and water, with the water supplying the additional moisture not available from the adhesives alone utilized to secure the discs together, for purposes of permitting the stretching of the fibers during the subsequent molding steps. The soap, on the other hand, of lubricant 50 permits shifting as well as slippage and sliding of the lamina of sandwich 46 with respect to the die faces during the molding of the head 30. The lubricant 50 may be properly applied by means of a simple sponging application.

The sandwich 46 with the applied lubricant 50 is then placed between the open faces of an upper unheated die 52, a lower die 54, and heated ring or annulus-type 56. The sandwich 46, under such conditions, is placed on the lower die 54 with its bottom side facing upwardly and is properly centered in the dies by means of a pair of guide stops 58 and 60 projecting from the upper edge of the ring 56.

The lower die 54 of the instant embodiment is stationary and is heated to a temperature of about 200° F. This temperature may range from 190° F. to 210° F. Naturally, as the temperature is lowered below this range,
the time for the molding cycle will increase and, accordingly, will not provide for an efficient molding operation. On the other hand, temperatures about 210° F. approach the boiling point of water, one of the usual constituents of the adhesives employed to secure the discs 40, 42 and 44 and, consequently, will result in explosion of the fibers in most instances.

The upper die 52 is shiftable and unheated. It will be understood that the evaporation of the condensation accumulated on the faces of the upper die 52 will maintain it sufficiently cool for purposes of the present invention. However, a cooling system can be incorporated into the upper die 56 if this is found to be necessary for certain materials having a central body portion 32.

The ring 56 is heated to approximately 450° F. which temperature may range from 400° F. to 450° F., depending upon the particular conditions encountered. A temperature below this range will usually be insufficient to overcome the memory or set of the kraft, whereas a temperature above may induce burning of the fiber. Suitable automatic temperature controls may be employed to ensure proper temperature requirements for the lower die 54 and this ring 56. The disclosed combination of hot and cold dies facilitates the penetration of moisture through the fibers and functions to prevent explosion or breaking of the fibers upon the actuation of the heated dies.

The upper die 52 is then lowered to exert approximately 50 tons of force against the lower die 54 through the interposed sandwich 46. As will be appreciated by those skilled in the art, pressures that are too low, under the circumstances, will not smooth out wrinkles in the fiber. The employment of pressures that are too great, on the other hand, may tend to create weak points in the finished product.

Substantially simultaneously with the lowering of the upper die 52, the ring 56 shifts upwardly to form the transversely extending apron 36 on the finished head 30. The dies are held in this closed position, which is illustrated in FIG. 9, for about twelve seconds. The upper limit for such time is obviously determined by practical economics, whereas below about ten seconds proper molding of the head from the sandwich 46 would be extremely difficult. The particular clearance present between the upper die 52 and the ring 56 is less than the thickness of the peripheral sector of the sandwich 46 so that sufficient radial forces are exerted for purposes of properly forming this apron 36.

Thus, it will be seen in FIG. 9 that the dies 52, 54 and 56 cooperate to provide cavities capable of molding a fiber braid 8 by a U-shaped structure 34 extending into a transversely extending apron 36 and a downwardly depending bead 38. As will be appreciated, the dimensioning of disc 44 is such that thickness may be added to the head without having to increase the diameter of the ring 56 or upper die 52, as well as the diameter or thickness of the peripheral apron 36.

Upon the expiration of the preset period of time for the foregoing molding step, the die 52 is first elevated. Shortly thereafter, the ring 56 follows to suspend the head by its apron 36 between the upper and lower dies in a manner suggested by FIG. 11 for approximately 9 seconds. This suspension of the head by the ring 56 may vary in time between 8 to 12 seconds as particular situations may dictate. Under such circumstances, relaxation of the head inwardly of the apron 36 occurs in order that the head is prevented from expanding radially due to its memory upon release of the constraint exerted by the upper die 52 and lower die 54. The head is lifted off the bottom die 54 in order to prevent the head from exploding, as would be its natural tendency upon prolonged contact with the heat emanating from this die 54.

The heated ring 56 is then lowered to its original starting position during which the head is forced to abut against the lower die 54 and, consequently, free itself from the confines of the ring. Accordingly, the head will fall to rest upon the lower die 54, as illustrated in FIG. 12, at which time it may be removed to permit the repeating of the foregoing molding operation for another sandwich 46.

At this stage of the head formation, the fibers are still warm, as a result of the foregoing molding operation, and the adhesives employed have not completely set. Under such circumstances, the apron 36, due to the memory of the fibers, tends to tip outwardly, as indicated in FIG. 14. In order to counteract this effect, the apron 36 of the head is subjected to a flanging or necking-in die operation so that when the adhesives have completely set to the desired amount, the apron will assume a position substantially normal to the central body portion 32.

Thus, the head is placed on an inner annular ring die 70 such that the U-shaped structure 34 rests upon lip 72. As will be observed the head 38 is suspended above the inner die 70 to maintain the desired draw depth for the drum to be covered, and to ensure that the head 38 rests on the inwardly extending bead of such drum. The circumferentially extending face 74 of the inner die 70 is tapered anywhere between 10 to 20 degrees to permit the desired amount of apron movement, with a 15 degree taper found to be satisfactory under most circumstances. A four-piece heated compression die ring 76 is set in the ring 56 radially outwardly of the inner die 70. Each piece 77 of this die ring 76 includes an annular beveled or cammed head retaining face 78 and annular tapered apron engaging face 80. The taper of face 80 corresponds with that of tapered face 74 of the inner die 70. In addition, the pieces 77 of the die 76 are heated. If desired, to a temperature ranging between 250° F. to 450° F. to facilitate the flanging-in of the apron 36 and complete the setting of the contained adhesives. The individual pieces 77 of the die 76 are adapted to exert a radial thrust of about 2,000 pounds against the associated segments of the apron 36. This thrust in most instances is applied for approximately 30 seconds in the manner illustrated in FIG. 15, with the duration of thrust depending upon the time required to complete the setting of the adhesives and prevent memory of the fibers from forcing the apron 36 beyond its proper position normal to the body portion 32 of the head.

The die 76 is then withdrawn and the head removed for the desired and selected commercial application.

In FIGS. 16 and 17, a finished fiber head 30 fabricated in accordance with the foregoing method is shown and is adapted to be associated with the upper open end 84 of a conventional fiber drum 86, to be ultimately secured or anchored thereto by a locking rim assembly 88 which may assume the form of the locking rim assembly disclosed in U.S. Patent No. 2,382,858. It will be observed that the upper end 84 of the drum 86 contains the usual chime strip 90 and inwardly extending annular bead 92. The apron 36 of the fiber head 30 conveniently embraces this upper end 84, the upper periphery of which is adapted to be received by the U-shaped structure 34. The downwardly depending bead 38 of the head 30, on the other hand, is adapted to advantageously rest upon the inwardly extending head 92 of the drum 86 to create superior drum sealing conditions. The locking rim assembly 88, under normal circumstances, is adapted to engage the base of the U-shaped structure 34 and the inwardly extending bead 92 of the drum 86 for purposes of releasably anchoring the head 30 to the drum in a manner well known to the art.

It should be clear that an extremely effective method of molding adhesively secured laminated layers of fibrous material is provided by our invention. These materials, under normal circumstances, cannot be drawn. We have made it possible by this invention to provide a precisioned fiber head which does not require any further trimming which is difficult if not virtually impossible to accomplish.

In addition, we contemplate treating the outer exposed
sheet of disc 49 molded into the finished head 30 with melamine to provide fibers that are hard sized and rendered waterproof. Since certain of the fibers are stretched during the herein disclosed molding operation, we may employ stretchable Kraft paper such as Kraftman Clupak Multiwall 50 or 60 Multiwall. Reference is now made to FIGS. 18 and 19. There we have illustrated a fiber head 130 formed in substantially the same manner as fiber head 30 previously described. In this connection, the starting discs 40, 42 and 44 are substantially the same; and we include a barrier sheet 132 interposed between discs 42 and 44. The barrier sheet 132 may be a metallic foil, asphalt or steel and functions as a shield in protecting the contents contained in the mounting drum 86.

In FIGS. 20 and 21, we disclose a further embodiment of fiber head 230 molded into finished form similar to head 30. However, in this form a pair of resinsheets 232 and 234 are laminated to discs 44 and 40, respectively. Mylar, polyethylene, or equivalent resinous material, may be employed for such sheets. Incidentally, these continuing sheets serve to decrease the required amount of moisture needed during the molding operation because of the inherent tendency of the sheets to retain the moisture in the fiber. Quite obviously, the heated dies employed during the molding operation render the resin sheets workable so that they are relatively easily formed and laminated. Aside from the pronounced visual effects such laminated sheets have on the finished fiber heads, a superior barrier or shield necessarily ensues for fiber heads through their use.

Thus, the aforementioned objects and advantages are most effectively attained. It should be understood that our invention as to the shape of the head and containers disclosed is in no sense limited by the disclosure of specific embodiments herein, but is to be defined by the scope of the appended claims.

We claim:

1. The method of forming an improved fiber closure comprising: providing a first disc-shaped member formed from a plurality of adhesively secured layers of fibrous material, a second disc-shaped member formed from a plurality of adhesively secured layers of fibrous material, and said members being symmetrically formed with said first member being of larger dimensions than said second member; adhesively securing said first member to said second member such that said members are symmetrically disposed with respect to one another and thusly form a composite laminated sandwich; while the adhesive between said members is still wet, molding a peripheral apron on said sandwich extending substantially normal to the major part of the remainder of said sandwich such that the peripheral edges of said first and second members are proximate one another and molding a bead in said sandwich inwardly of said apron; and thereafter flanging inwardly said apron from the position normal to the major part of said sandwich by exerting thereon predetermined pressures for a predetermined period of time to permit complete setting of the sandwich adhesives and prevent memory of the sandwich from forcing the apron outwardly beyond the position normal to the major part of the remainder of said sandwich while permitting such memory to return said apron to this normal position.

2. The invention in accordance with claim 1 wherein immediately after the formation of the peripheral apron and bead, the sandwich is suspended for a predetermined period of time to relax the central portion of the sandwich and complete the molding of said apron.

3. The invention in accordance with claim 1 wherein prior to molding said sandwich, said sandwich is lubricated with a water based lubricant so that the sandwich is rendered more moldable and permitted to stretch and slip a selected amount during molding.

4. The method of forming an improved fiber closure comprising: providing a first disc-shaped member formed from a plurality of adhesively secured layers of fibrous material, and a second disc-shaped member formed from a plurality of adhesively secured layers of fibrous material, and a third disc-shaped member formed from a plurality of adhesively secured layers of fibrous material, and a fourth disc-shaped member formed with said first member being of larger dimensions than said second member and said second member being of larger dimensions than said third member; adhesively securing said first member to said second member and said second member to said third member such that said members are symmetrically disposed with respect to one another and thusly form a composite laminated sandwich; while the adhesive between said members is still wet, subjecting said sandwich to predetermined pressures for a predetermined period of time to assure optimum contact of said members and prevention of the moisture created by the adhesive into the members to render said sandwich moldable; lubricating the sandwich with a water based lubricant so that the sandwich is rendered more moldable and permitted to stretch and slip a selected amount during molding; placing said sandwich while wet and moist between an upper die, a lower die and a sandwich ring and one of the upper and lower dies being heated to a predetermined temperature; closing said upper and lower dies to exert pressure on said sandwich for a predetermined period of time to mold a bead in said sandwich; and shifting said ring relative to said sandwich to exert predetermined pressures for a predetermined period of time to mold a flanged sandwich; and thereafter flanging inwardly said apron from the position normal to the major part of said sandwich by exerting thereon predetermined pressures for a predetermined period of time to permit complete setting of the sandwich adhesives and prevent memory of the sandwich from forcing the apron outwardly beyond the position normal to the major part of the remainder of said sandwich while permitting such memory to return said apron to this normal position.

5. The method of forming an improved fiber closure comprising: providing a first disc-shaped member formed from a plurality of adhesively secured layers of fibrous material, a second disc-shaped member formed from a plurality of adhesively secured layers of fibrous material, and a third disc-shaped member formed from a plurality of adhesively secured layers of fibrous material, and a fourth disc-shaped member formed with said first member being of larger dimensions than said second member and said second member being of larger dimensions than said third member; adhesively securing said first member to said second member and said second member to said third member such that said members are symmetrically disposed with respect to one another and thusly form a composite laminated sandwich; while the adhesive between said members is still wet, subjecting said sandwich to predetermined pressures for a predetermined period of time to assure optimum contact of said members and prevention of the moisture created by the adhesive into the members to render said sandwich moldable; lubricating the sandwich with a water based lubricant so that the sandwich is rendered more moldable and permitted to stretch and slip a selected amount during molding; placing said sandwich while wet and moist between an upper die, a lower die and a sandwich ring and one of the upper and lower dies being heated to a predetermined temperature; closing said upper and lower dies to exert pressure on said sandwich for a predetermined period of time to mold a bead in said sandwich; and shifting said ring relative to said sandwich to exert predetermined pressures for a predetermined period of time to mold a flanged sandwich; and thereafter flanging inwardly said apron from the position normal to the major part of said sandwich by exerting thereon predetermined pressures for a predetermined period of time to permit complete setting of the sandwich adhesives and prevent memory of the sandwich from forcing the apron outwardly beyond the position normal to the major part of the remainder of said sandwich while permitting such memory to return said apron to this normal position.
the remainder of said sandwich such that the peripheral edges of said first and second members are proximate one another; shifting one of the upper and lower dies relative to the other and said ring, and subsequently shifting said ring relative to both of the upper and lower dies to suspend the sandwich for a predetermined period of time between the upper and lower dies to relax the central portion of the sandwich and complete the molding of said apron; and thereafter flanging inwardly said apron from the position normal to the major part of said sandwich by exerting thereon predetermined pressures for a predetermined period of time to permit complete setting of the sandwich adhesives and prevent memory of the sandwich from forcing the apron outwardly beyond the position normal to the major part of the remainder of said sandwich while permitting such memory to return said apron to this normal position.

6. The method of forming an improved fiber closure comprising: providing a first disc-shaped member formed from a plurality of adhesively secured layers of fibrous material, a second disc-shaped member formed from a plurality of adhesively secured layers of fibrous material, said members being symmetrically formed with said first member being of larger dimensions than said second member; adhesively securing said first member to said second member such that said members are symmetrically disposed with respect to one another and thusly form a composite laminated sandwich; while the adhesive between said members is still wet, subjecting said sandwich to predetermined pressures for a predetermined period of time to assure optimum contact of said members and permeation of the moisture created by the adhesive into the members to render said sandwich moldable; lubricating the sandwich with a water base lubricant so that the sandwich is rendered more moldable and permitted to stretch and slip a selected amount during molding; placing said sandwich while wet and moist between an upper die, a lower die and a ring, said ring and one of the upper and lower dies being heated to a predetermined temperature; closing said upper and lower dies to exert pressure on said sandwich for a predetermined period of time to mold a bead in said sandwich; and shifting said ring relative to said sandwich to exert predetermined pressures for a predetermined period of time to the periphery of said sandwich to form a peripheral apron on said sandwich beyond said bead extending substantially normal to the major part of the remainder of said sandwich such that the peripheral edges of said first and second members are proximate one another; and thereafter flanging inwardly said apron from the position normal to the major part of said sandwich by exerting thereon predetermined pressures for a predetermined period of time to permit complete setting of the sandwich adhesives and prevent memory of the sandwich from forcing the apron outwardly beyond the position normal to the major part of the remainder of said sandwich while permitting such memory to return said apron to this normal position.

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