Aug. 2, 1966 YASUKATA EGUCHI ETAL 3,263,290

METHOD OF MAKING A BUTTONHOLE AND EYELET

Filed Jan. 20, 1964

FIG. 1

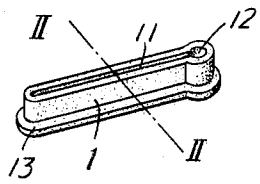


FIG. 2

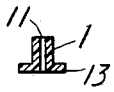


FIG. 4

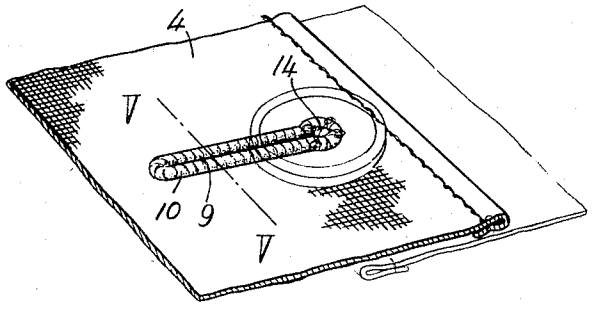


FIG. 3

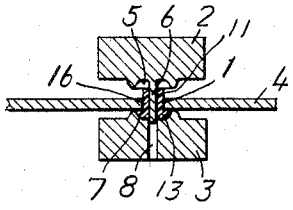


FIG. 6

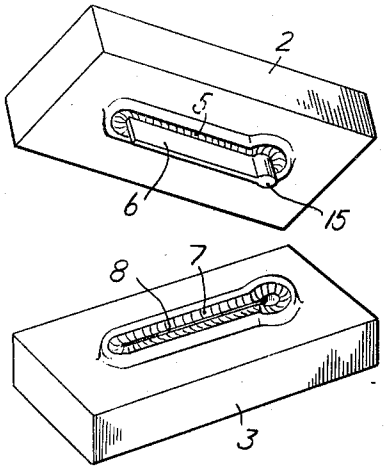
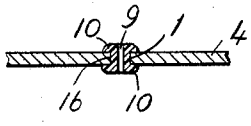


FIG. 5



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METHOD OF MAKING A BUTTONHOLE AND EYELET

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5 Claims. (Cl. 24—202)

The present invention relates to a method of making a buttonhole, and to an eyelet which forms the rim of a buttonhole instead of the conventional stitching along the buttonhole slit.

Conventional buttonholes in flexible fabrics are formed by tight stitches along a slit formed in the fabric. Handmade buttonholes are expensive since a great number of fine stitches is required for making a good buttonhole. On the other hand, buttonholes made on zig-zag sewing machines require a very skilled operator and a rather complicated machine which has to be carefully controlled by the operator to make stitches of the exactly right amplitude, in the exactly right field position of the needle bar assembly, and at the right feeding speed of the fabric. The ends of the slit cannot be covered by machine stitches in the manner of a handmade buttonhole, and longer transverse so-called bar tack stitches have to be made whose appearance is not as pleasing as a handmade buttonhole.

It is an object of the present invention to overcome the disadvantages of handmade buttonholes, and of machine made buttonholes, and to provide a method for making a buttonhole in an extremely simple and inexpensive manner.

Another object of the invention is to fix a flexible eyelet in the slit of a flexible fabric so that a flexible buttonhole is formed.

Another object of the invention is to make an eyelet for a buttonhole in such a manner that it adheres to the fabric in which the buttonhole is formed.

With these objects in view, a method according to the invention comprises the steps of making a slit in a fabric and inserting into the slit a blank consisting of a thermoplastic synthetic resin, such as polyvinyl chloride, and deforming the blank into an elongated endless rim extending along the edges of the fabric bounding the slit.

The resin of which the eyelet is made is normally hard and flexible, but becomes soft and deformable at a predetermined low temperature, for example at 160° C., so that it can be deformed by the pressure of a pair of dies to assume the shape of stitches bounding a buttonhole.

Due to the low temperature at which the deformation of the blank takes place, the fabric is not damaged. While the blank is pressed into the final shape of the eyelet, surfaces of the deformed blank are pressed into the front and back of the fabric so that projections and recesses are formed matching the configuration of the fibers forming the fabric. As a result, the eyelet firmly adheres to the fabric. Thus, it is not possible to remove the eyelet from the fabric by bending the flexible eyelet, or by spreading the slit of the flexible fabric.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of a blank for an eyelet according to the present invention;

FIG. 2 is a cross sectional view taken on line II—II in FIG. 1;

FIG. 3 is a fragmentary schematic view illustrating the position of the blank during a molding operation;

FIG. 4 is a perspective view illustrating a buttonhole according to the invention;

FIG. 5 is a cross sectional view taken on line V—V in FIG. 4; and

FIG. 6 is a perspective view of a pair of molds used in carrying out the method of the invention.

Referring now to the drawings, and more particularly to FIGS. 1 and 2, a blank **1** comprises a vertical collar and a lower flange **13** transversely projecting from the collar. The collar has two elongated substantially parallel wall portions connected at the ends by curved end portions. One end portion is of almost circular shape and laterally projects from the side wall portions to form a larger opening **12** at the end of slot **11** which is bounded by the parallel side wall portions. The contour of flange **13** follows the contour of the collar.

As best seen in FIG. 3, the collar of blank **1** is inserted into a slot **16** in a fabric **4** so that flange **13**, and more particularly the inner face thereof, abuts the back face of fabric **4**.

Two molds **2** and **3** are placed on opposite sides of the fabric, with flange **13** resting in a corresponding recess of the lower mold **3**.

The shape of molds **2** and **3** is best seen in FIG. 6. Mold **3** has a slot **8** whose transverse width corresponds to the width of the slot **11** in blank **1**. This slot is provided at the center of the recess **7** in which collar **13** rests and has a wider end portion corresponding to the opening **12** in the blank.

Mold **2** has a recess **5**, and at the center of recess **5** a narrow projecting part **6** with a wider end portion **15** fitting into slot **8** of mold **3**.

The recesses **5** and **7** of the molds have a configuration corresponding to the configuration of carefully made buttonhole stitching of a handmade buttonhole. Projections and notches extending transversely to mold portion **6**, **15** are the negative of the projections and recesses formed by the thread of buttonhole stitching.

The blank consists of polyvinyl chloride, polystyrene, polybutadiene, polyvinyl acetate, or another thermoplastic synthetic resin which becomes soft and moldable at a comparatively low temperature at which no damage can be done to a textile fabric. For example, polyvinyl chloride becomes moldable and soft at 160° C. which temperature will not damage the fibers of a textile fabric.

After the blank has been placed in the position shown in FIG. 3, the molds **2** and **3** are heated to the required temperature by heating means, not shown, which may be embedded in molds **2** and **3** in a conventional manner, whereupon the molds **2** and **3** are moved toward each other to a molding position in which the projecting portion of the collar of the blank is deformed in recess **5** to form a flange, while flange **13** is deformed in recess **7** to assume a desired shape and configuration corresponding to the shape and configuration of the flange newly formed by recess **5** of mold **2**. The inner faces of the thus formed flanges **10** have a shape and configuration exactly corresponding to the stitching along a handmade buttonhole, and have a surface formed with projections and recesses simulating the threads of the buttonhole stitching and extending perpendicularly to the slit in the fabric along the sides of the slit, and in radial direction along the curved wall portions at the ends of the slit. The color and surface texture of the finished eyelet can be controlled so that the eyelet has the appearance of textile thread.

While the eyelet is molded, the confronting inner faces of the flanges **10** are pressed into the fabric, and form projections and recesses corresponding to the recesses and projections formed on the front and back of the fabric by the fibers of the fabric. The fabric is clamped and due to the interengagement between the projections and the recesses on the clamped surfaces, the finished buttonhole eyelet firmly adheres to the fabric, and can neither be removed by flexing the eyelet and fabric, or by pulling the fabric away from the slit **16**.

During the molding operation, the projecting mold portion **6**, **15** passes into the corresponding slot **8** in mold **3**, and assures a perfect shape and a smooth inner surface of the slot **9** in the finished eyelet. Molds **2** and **3** are maintained in the molding position for two to ten seconds, whereupon the mold is opened, and the eyelet permitted to cool off. The following example is illustrative of the present invention. A blank **1** consisting of polyethylene is inserted into a slit **16** cut in a cloth or fabric **4** by a cutting blade, whereupon the upper and lower molds **2** and **3** heated to a temperature of about 160° C., are first placed in the position shown in FIG. 3, and then moved toward each other to a molding position. The molds are maintained in the molding position for about 5 seconds while the blank is heated to 160° C. and subjected to pressure. When the molds **2** and **3** are moved apart, the eyelet is secured to the fabric as shown in FIGS. 4 and 5, and cools off to normal room temperature at which the eyelet is flexible and adapted to be slightly flexed when a button is pushed through slot **9**.

From the above description of a method and article according to the present invention, it will become apparrent that the present invention permits a very fast easy formation of a buttonhole requiring no particular attention or skill from the operator.

The finished buttonhole is durable, and the synthetic resin of the eyelet will penetrate into the fibers and tissue of the fabric in its soft condition when heated, so that the eyelet is firmly bonded to the fabric. Such connection between the buttonhole eyelet and the fabric is obtained without fraying or damaging the threads or fibers along the cut slit **16** in the fabric. Even if the eyelet is forcibly removed, the edge of the fabric will not be torn. This is an advantage as compared with buttonhole stitching since the threads of the fabric are separated and frayed by buttonhole stitching so that the fabric is permanently damaged when buttonhole stitching separates from the fabric after extended use.

The particular construction of the molds according to the present invention assures an accurate centering of the blank and eyelet by the projecting portions **6** passing into slot **8** of mold **3**.

A buttonhole eyelet according to the present invention is very convenient during use. The button can be easily slipped through the flexible eyelet while the garment is buttoned or unbuttoned. The thermoplastic resin of the eyelet provides a smooth surface along which the button slides easily, while on the other hand the width of the slot **9** of the eyelet will always be the same, even after long use, so that the button cannot slip out of the buttonhole by merely pulling apart the two buttoned parts of the garment.

It will be understood that each of the elements described above or two or more together, may also find a useful application in other types of buttonholes differing from the types described above.

While the invention has been illustrated and described as embodied in a method for molding a buttonhole eyelet of a thermoplastic synthetic resin, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis the foregoing will so fully reveal the gist of the present invention that others can by

applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed and desired to be secured by Letters Patent is:

1. The method of making a buttonhole comprising the steps of making a slit in a fabric and inserting into the slit a blank consisting of a thermoplastic synthetic resin selected from the group consisting of polyethylene, polyvinyl chloride, polystyrene, polybutadiene, polyvinyl acetate and being soft and deformable at a predetermined low temperature; and pressing said blank at said predetermined temperature to form an elongated endless collar extending along the edges of the fabric bounding said slit and abutting onto, and partly penetrating between the fibers on the front and back faces of the fabric adjacent said slit so that said elongated endless collar firmly adheres to said fabric.

2. The method of making a buttonhole comprising the steps of making a slit in a fabric and inserting into the slit a blank consisting of polyethylene being soft and deformable at a temperature of 160° centigrade; and pressing said blank at said predetermined temperature to form an elongated endless collar extending along the edges of the fabric bounding said slit and abutting onto, and partly penetrating between the fibers on the front and back faces of the fabric adjacent said slit so that said elongated endless collar firmly adheres to said fabric.

3. The method of making a buttonhole comprising the steps of making a slit in a fabric and inserting into the slit a blank consisting of polyethylene being soft and deformable at a temperature of 160° centigrade; pressing and blank at said predetermined temperature between a pair of heated molds located on opposite sides of the fabric to form an elongated endless collar extending along the edges of the fabric bounding said slit and abutting onto, and partly penetrating between the fibers on the front and back faces of the fabric adjacent said slit so that said elongated endless collar firmly adheres to said fabric; and permitting said thus adhering elongated endless collar to cool to normal room temperature until the thus cooled elongated endless collar becomes a hard and flexible eyelet.

4. A buttonhole eyelet for attachment to a fabric consisting of a thermoplastic synthetic flexible resin selected from the group consisting of polyethylene, polyvinyl chloride, polystyrene, polybutadiene, and polyvinyl acetate, said plastic partly penetrating between the fibers of a fabric to which said eyelet is attached, said eyelet comprising a collar having two substantially parallel elongated side wall portions, a first curved end wall portion connecting one pair of ends of said side wall portions, and a second curved end wall portion connecting the other pair of ends of said side wall portions, and laterally projecting from the same, said wall portions defining together a buttonhole having an elongated narrow part and a round part having a diameter greater than the transverse extension of said narrow part and adapted for receiving thread securing a button, and a pair of spaced transverse flanges outwardly projecting from said collar integral with the same and adapted to partly penetrate and adhere to a fabric having a slit bounded by said collar.

5. A buttonhole comprising a flexible fabric having a slit, and an eyelet consisting of a thermoplastic synthetic flexible resin selected from the group consisting of polyethylene, polyvinyl chloride, polystyrene, polybutadiene, and polyvinyl acetate and adapted to partly penetrate said flexible fabric, said eyelet comprising a collar located in said slit and having two substantially parallel elongated side wall portions, a first curved end wall portion connect-

ing one pair of ends of said side wall portions, and a second curved end wall portion connecting the other pair of ends of said side wall portions and laterally projecting from the same, said wall portions defining together a buttonhole having an elongated narrow part and a round part having a diameter greater than the transverse extension of said narrow part and adapted for receiving thread securing a button, and a pair of spaced transverse flanges outwardly projecting from said collar integral with the same, the inwardly facing surfaces of said flanges clamping the front and back faces of the fabric and having projections and recesses matching the recesses and projections on the front and back faces of the clamped fabric, the outwardly facing surfaces of said flanges having projections simulating the threads of buttonhole stitching and extending perpendicularly to said slit in said side wall portions, and in radial directions in said curved end wall portions the thermoplastic synthetic flexible resin of which said collar consists partly penetrating said flexible fabric along said slit so that said collar firmly adheres to the same along said slit.

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