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2,656,541

FLEXIBLE THERMOPLASTIC FASTENER

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Fig. 1.

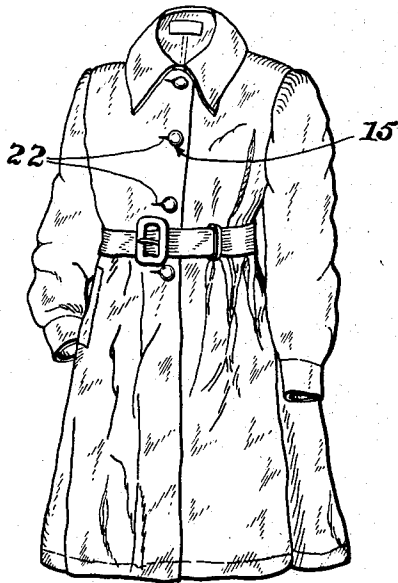


Fig. 3. Fig. 5.

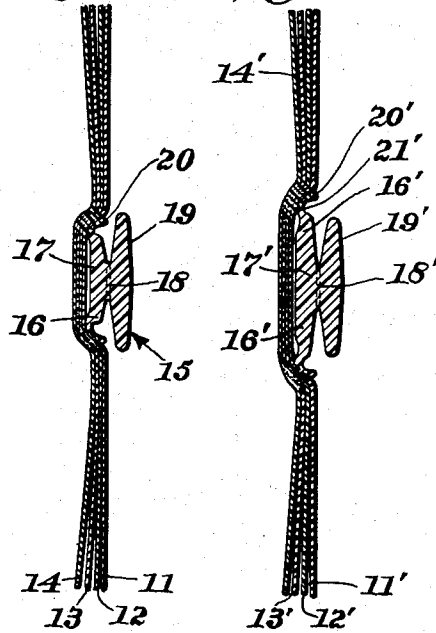


Fig. 2.

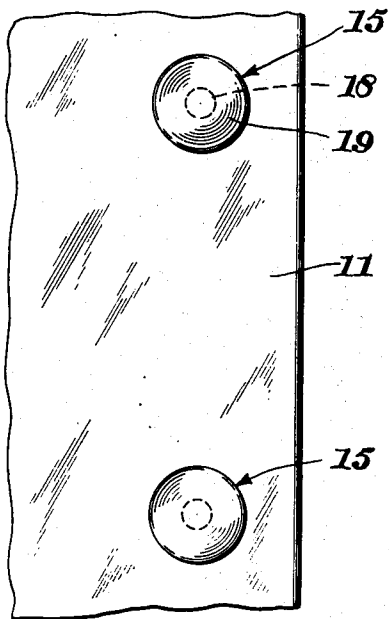
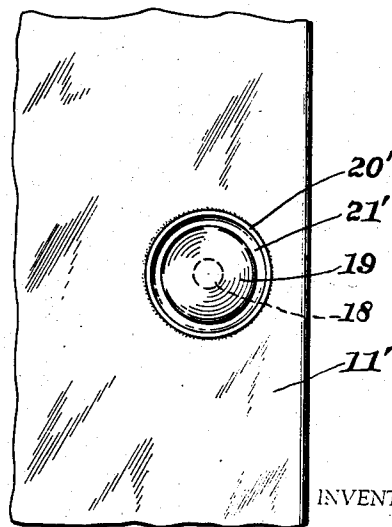


Fig. 4.



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FLEXIBLE THERMOPLASTIC FASTENER

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10 Claims. (Cl. 2—96)

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The present invention relates primarily to fastening devices for garments, such as raincoats made of thermoplastic sheet material, such as polyvinyl chloride. However, in its broader aspects, the invention is not limited to raincoats or other garments, as the fastening elements may be employed with a wide variety of other articles made from non-woven, thermoplastic sheet material, such as bags, receptacles, covering devices and the like.

The primary object of the invention is to eliminate conventional buttons, snap fasteners, hooks, clasps, and the like, usually made of metal or other rigid material and secured to the sheet material by a clamping, crimping, clinching, or sewing operation, and to provide, instead, a soft, flexible fastening device of molded, thermoplastic material which may be integrally bonded to the thermoplastic sheet material, under heat and pressure and which, in reality, becomes an integral part thereof, eliminating the likelihood of accidental dislodgment and tearing of the sheet material, encountered with prior fastening devices.

A further object of the invention is to provide fastening devices which make possible the elimination of the use of metals in the production of raincoats and other garments.

A further object of the invention is to provide a button of flexible, thermoplastic material, having improved structural characteristics facilitating its attachment to a garment by the use of heat and pressure and providing an improved bond between the button and the garment.

A further object of the invention is to provide a reinforcement for the attachment of such a button to a garment, by sealing or integrally bonding the several layers of the garment to each other throughout the area of attachment of the button to the outermost layer. As a result, the several layers and the button are all united to each other and constitute an integral structure throughout the area of attachment.

Other and further objects and advantages of the invention will become apparent from a consideration of the following description of certain preferred embodiments, shown in the accompanying drawing for purposes of illustration, in which

Figure 1 is an elevation of a garment, such as a raincoat, having the invention applied thereto;

Figure 2 is an enlarged plan view of one edge of a garment or other article, having the buttons secured thereon;

Figure 3 is a longitudinal section through the button of Figure 2;

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Figure 4 is a view similar to Figure 2, showing a modification, and

Figure 5 is a section through the button shown in Figure 4.

The raincoat illustrated somewhat diagrammatically in Figure 1 may be of the well-known type, made from thermoplastic sheet material, such as polyvinyl chloride sheeting, of one or more thicknesses and with the various seams formed by uniting the various garment parts under heat and pressure, for instance by the use of dielectric heating or high frequency currents.

The garment in accordance with the present invention, along the edges of the front opening preferably, is composed of a plurality of superposed layers of thermoplastic sheet material, as indicated at 11, 12, 13, and 14 in Figure 3. Throughout the major portion of the area of the superimposed layers, the several plies are separate, independent, and not physically joined to each other, to impart improved characteristics of flexibility to the garment, but they may be secured together under heat and pressure along certain seam lines and the like.

The buttons indicated generally at 15 may be recessed into and secured to the outermost ply or layer 11 of the edge portion of the front of the garment. Each button, of molded, flexible, thermoplastic material, comprises a circular base 16 of substantial size, with an upwardly tapering, thickened central portion 17, terminating in a short neck 18 of reduced or restricted diameter, and an enlarged, circular head 19, projected outwardly in spaced relation to the base. The marginal portion 20 of the base is relatively thin, as compared to the central portion, and may be turned outwardly or upwardly.

The lower surface of the button may be secured to the outer ply 11 by the application of heat and pressure, through suitable dies or other pressing devices, particularly along a marginal zone adjacent to the upturned portion 20 of the base, to maintain the base in the inwardly recessed relation, as shown. The area of the application of heat and pressure and, hence, the area of integral bonding of the base to the adjacent ply, may extend inwardly from the outer edge of the base as far as desired and, in some cases throughout the entire lower surface of the base. The important thing, however, is to have the annular marginal portion of the base firmly secured and integrally united to the thermoplastic sheet material, to prevent the initial, edge separation of the base from the layer.

Throughout the area of attachment of the

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base to the ply 11, the other plies, 12, 13, and 14 are integrally bonded to each other and to the ply 11 by the same heat and pressure used to secure the button in place. The application of heat and pressure to materials of the class under consideration results in softening of the materials and an actual molecular intermingling between the several layers, and between the base of the button and the adjacent layer. As a result, the base and the layers become a unitary integral structure. The union of the several plies of the garment constitutes a reinforcement for the attachment of the button and prevents inadvertent tearing of the sheet material.

As noted above, the attachment of the base of the button to the layers or plies of thermoplastic sheet material may be confined to an annular zone adjacent to and extending inwardly a substantial distance from the upturned, marginal portion 20, leaving the central, circular portion of the base and the corresponding portions of the plies unsecured; or, if desired, the entire undersurface of the base may be bonded by heat and pressure to the adjacent ply and all of the plies bonded to each other throughout that area.

The softness and flexibility of the button contributes materially to the prevention of accidental separation of the button, for instance, by tearing the foundation material, since there are no sharp or hard parts which might tend to initiate a tearing action.

The recessing of the base into the sheet material results in an improved appearance of the buttons on the garment, as they do not project outwardly as far as they would if simply secured, flatwise, to the outer surface of the material.

The modified form of the invention shown in Figures 4 and 5 differs only slightly in construction from the one shown in Figures 2 and 3, and primarily in the fact that the base 16' is of greater diameter than the head 19'. It is preferably provided with an upwardly or outwardly turned, beaded edge 20', with a circumferential groove 21' disposed inwardly thereof. A heating die or tool may be applied to this groove, while the back ply 14' of the foundation material may be received in a socket of a complementary die. The dies may constitute electrodes of a dielectric heating apparatus, so that heat is quickly generated between the contacting surfaces of the annular marginal portion of the button and the several layers of thermoplastic sheet material.

The buttons of the present invention, being soft and flexible, cooperate especially well with buttonholes 22 formed in the mating portion of the garment, by recently developed buttonhole forming machines for thermoplastic sheet material, which seal and form the edges of the buttonholes under the application of heat and pressure. The improved buttons of the present invention have far less tendency to rip or tear such buttonholes than conventional buttons of metal or other rigid material.

As stated above, the thermoplastic sheeting and the molded buttons may be made of polyvinyl chloride, preferably plasticized. Other suitable materials include polyvinyl resins in general, e. g. polyvinyl chloride-vinyl acetate copolymers; vinyl chloride-vinylidene chloride copolymers; polyvinyl acetate resins, and the like.

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It must be understood that the present invention is not limited to the exact details of construction shown in the accompanying drawings and described above, but includes all modifications coming within the scope of the appended claims and their equivalents.

We claim:

1. An article comprising a layer of non-woven, thermoplastic sheet material and a plurality of fasteners disposed adjacent one edge thereof, said fasteners each comprising a flexible thermoplastic element having a base of relatively large area having a thin annular marginal portion in surface contact with said layer and integrally bonded thereto under heat and pressure, a substantially circular, central portion of the base being unsecured to said layer, and a flexible head of substantial size made of the same material as and integral with the base and spaced therefrom.

2. An article comprising at least one layer of non-woven, thermoplastic sheet material and a molded button of flexible, thermoplastic material, said button comprising a substantially circular base of substantial surface area having a central portion projecting upwardly and constituting a neck of restricted diameter and an annular marginal portion of less thickness than said central portion, and an enlarged head projecting outwardly from the outer end of the neck, the thin annular marginal portion of said base being secured continuously around the circumference thereof to said layer of thermoplastic sheet material by an integral bond under heat and pressure.

3. A garment comprising a plurality of independent plies of thermoplastic sheet material superimposed upon each other along an edge thereof, and a plurality of buttons disposed along said edge, each of said buttons comprising a substantially circular base of substantial area, a short neck of restricted diameter, and an enlarged head projecting outwardly from the outer end of said neck, said base being integrally bonded under heat and pressure to one of the outermost of said layers, continuously around the circumference of its undersurface and throughout an annular area of substantial extent, leaving a central portion of said undersurface unsecured to said outermost layer, and said layers being integrally bonded to each other throughout said annular area.

4. A garment comprising a plurality of independent plies of thermoplastic sheet material superimposed upon each other along an edge thereof, and a plurality of buttons disposed along said edge, each of said buttons comprising a substantially circular base of substantial surface area having an upwardly turned marginal portion, a centrally positioned, short neck of restricted diameter, and an enlarged circular head projecting outwardly from the outer end of the neck, said base being recessed into said layers with the outermost layer attached to the undersurface of the marginal portion thereof by an integral bond under heat and pressure, continuously around the circumference thereof, said layers throughout said area of attachment being integrally bonded to each other under heat and pressure.

5. In combination, a sheet of non-woven, thermoplastic material and a molded button of flexible, thermoplastic material integrally bonded thereto under heat and pressure, said button comprising a circular base of substantial di-

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ameter having an upwardly turned marginal portion and an upwardly tapering, thickened central portion terminating in a neck of restricted diameter, and an enlarged, circular head projecting from the neck in spaced relation to the base, said base being recessed into said sheet with the edge of its marginal portion substantially flush with the adjacent surface of the sheet.

6. In combination, a sheet of non-woven, thermoplastic material and a molded button of flexible, thermoplastic material integrally bonded thereto under heat and pressure, said button comprising a circular base of substantial diameter having an upwardly turned marginal portion and an upwardly tapering, thickened central portion terminating in a neck of restricted diameter, and an enlarged, circular head projecting from the neck in spaced relation to the base, said base being recessed into said sheet with the edge of its marginal portion substantially flush with the adjacent surface of the sheet, the integral bond between the base and the sheet being confined to an annular marginal zone at and adjacent said upturned marginal portion.

7. The combination of claim 4, in which said sheet comprises a plurality of individual plies of thermoplastic sheet material integrally bonded to each other along said annular marginal zone.

8. A molded, flexible, thermoplastic button element, including a circular base of substantial size having an upwardly tapering, thickened, central area and an annular circumferential area thinner than said central area, a neck of reduced diameter connected to the central portion of the base, and a head extending outwardly in spaced relation to said base having a downwardly and inwardly tapering undersurface connected to said neck, the thin annular circumferential area of the base being adapted to be secured to a non-woven thermoplastic sheet by the application of heat and pressure thereto throughout said annular area.

9. A molded, flexible, thermoplastic button element, including a circular base of substan-

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tial size having an upwardly tapering, thickened, central area and an annular circumferential area thinner than said central area, a neck of reduced diameter connected to the central portion of the base, and a head extending outwardly in spaced relation to said base having a downwardly and inwardly tapering undersurface connected to said neck, said head being of substantially the same diameter as the base, the thin annular circumferential area of the base being adapted to be secured to a non-woven thermoplastic sheet by the application of heat and pressure thereto throughout said annular area.

10. A molded, flexible, thermoplastic button element, including a circular base of substantial size having an upwardly tapering, thickened central area and an annular circumferential area thinner than said central area, a neck of reduced diameter connected to the central portion of the base, and a head extending outwardly in spaced relation to said base having a downwardly and inwardly tapering undersurface connected to said neck, said head being of less diameter than said base, the thin annular circumferential area of the base being adapted to be secured to a non-woven thermoplastic sheet by the application of heat and pressure thereto throughout said annular area.

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