

Oct. 23, 1973

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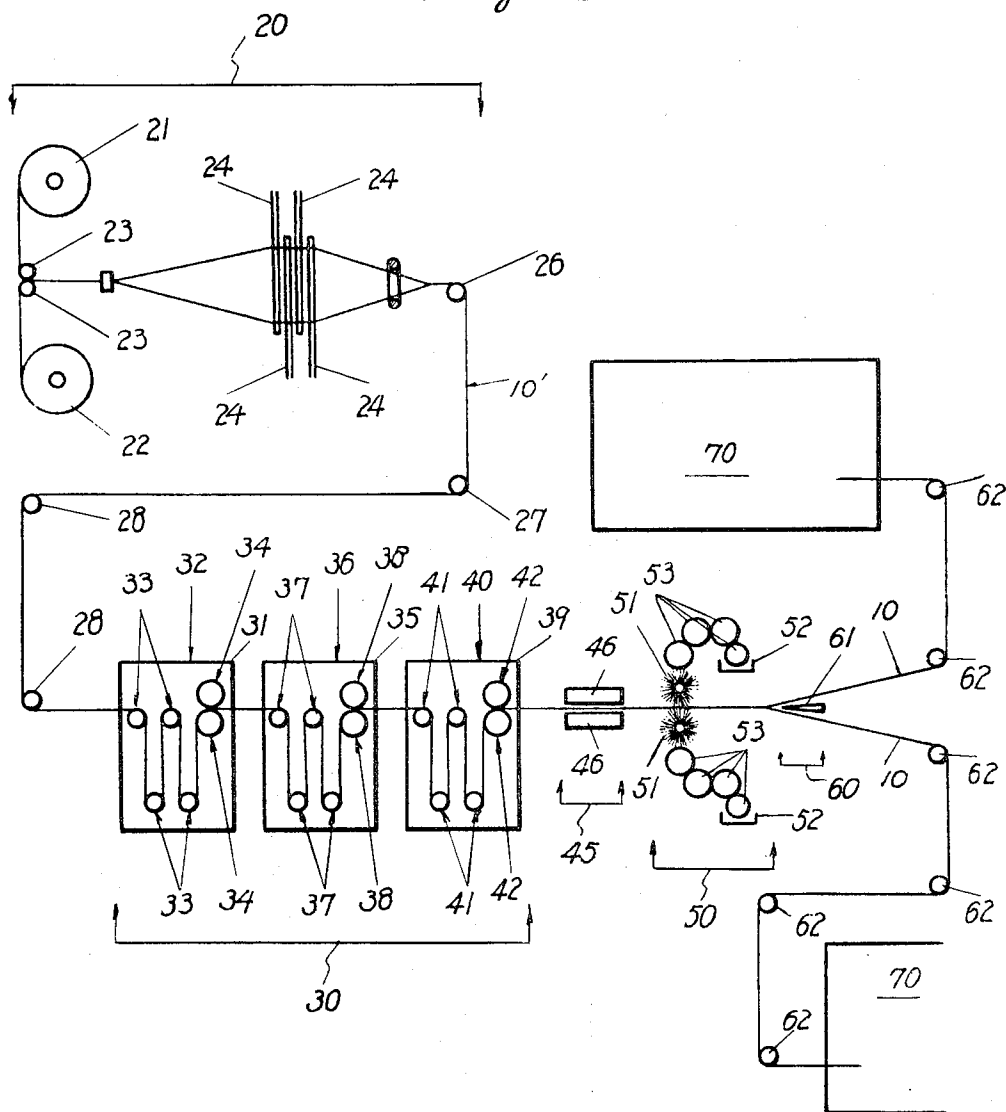
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METHOD OF MAKING FASTENING FABRIC

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Fig. 1



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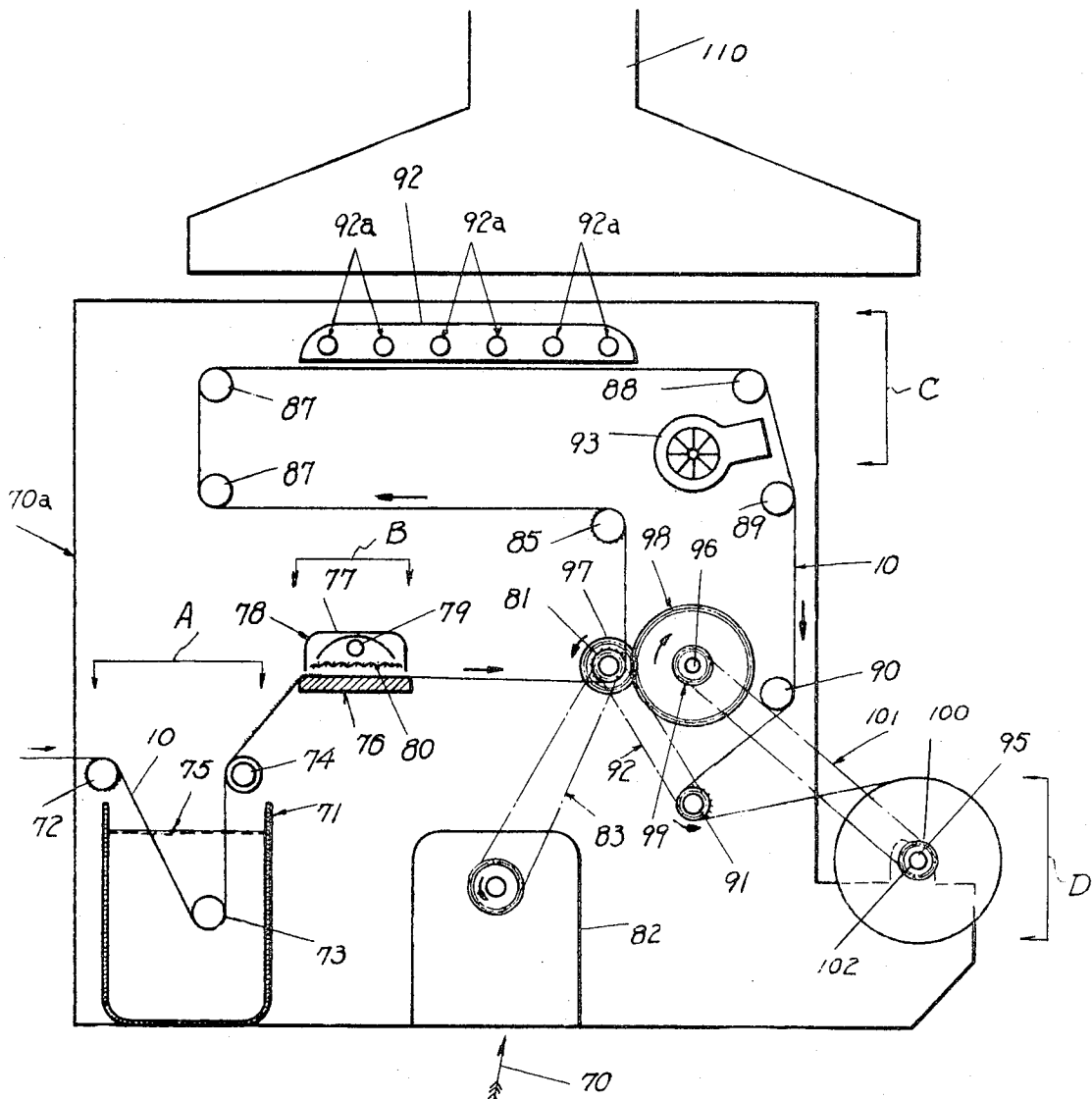
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Fig. 2



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Fig. 3

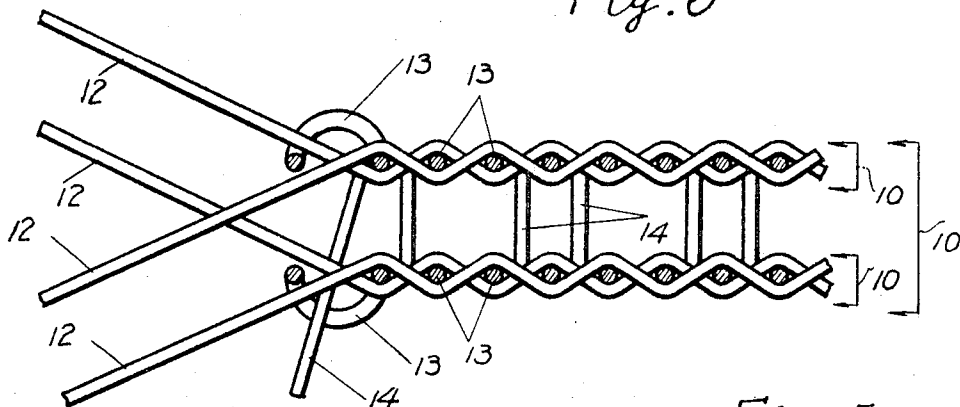


Fig. 4

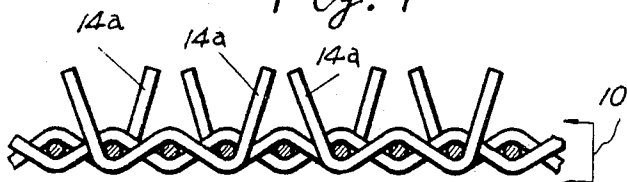


Fig. 5

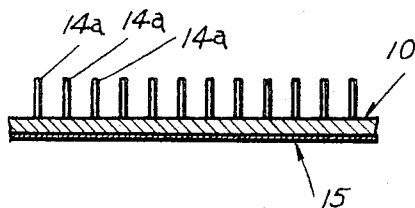


Fig. 6

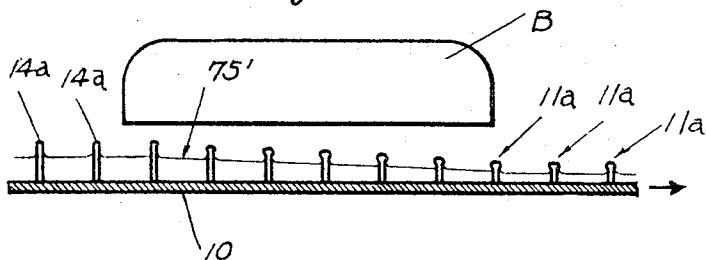
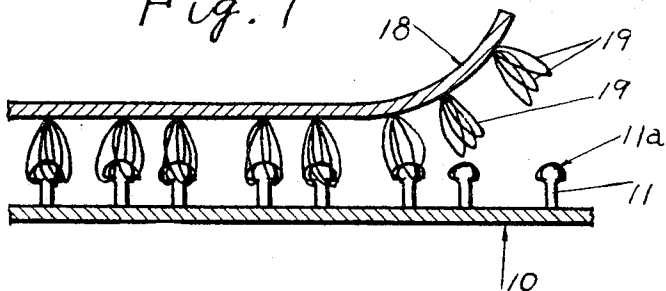


Fig. 7



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METHOD OF MAKING FASTENING FABRIC

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Filed Dec. 13, 1971, Ser. No. 207,325

Int. Cl. B29d 5/00

U.S. Cl. 264-103

1 Claim

ABSTRACT OF THE DISCLOSURE

This invention relates to method for making separable fastening fabric in fabric fastener. The method comprises the steps of forming a number of projecting piles having free ends and made of thermoplastic resinous material on one surface of a base fabric; soaking said base fabric in liquid in a container; removing said base fabric from said container thereby forming a liquid layer on said base fabric among said projecting piles; and then passing said base fabric along a heater and heating same in such a manner that said one surface of said base fabric having said projecting piles faces said heater and subjecting said projecting piles and liquid layer to heat of the heater such that said liquid layer evaporates to expose free ends of said piles and to the extent of said evaporation of said layer the exposed free ends of said filaments are melted and swelled by surface extension to spherically swollen headed pile elements on said base fabric.

The present invention relates to method of making separable fastening fabric in fabric fastener, and more particularly to a method of forming beadlike or mushroom-like terminated pile elements upon foundation structure.

Fastening fabrics provided with spherically swollen headed upright pile elements are well known. In FIG. 7, an example of conventional fabric fastener is shown in which bead-shaped pile elements are separably engaged with loops 19 formed upon the faced surface of another fabric 18. In conventional manner, such a bead-shaped pile elements have been formed by directly heating the tips of the upstanding elements and melting the tops. However, if the melting heat is excessively high, the piles will melt and flow off, while the surface of the foundation fabric will be damaged. If the heating is insufficient, the beadlike head will be too small or absent. Besides, when excessively heated, the piles will be easily carbonized, while the inner structure of the filaments will be fragile and the beadlike head will be easily torn off. Also, close observation shows that the melted part will flow and coagulate in a malformed condition like a melting candle and consequently malformed swollen head will be formed, their engagement with the loops of the other fabric will be too strong and, when the fabrics are separated the loops will often be broken, while the swollen head will be damaged. The purpose of this invention is to eliminate such defects.

More particularly, it is an object of the present invention to provide an improved method of making a fastening fabric having beadlike terminated pile element, wherein a liquid layer is present among the piles upon the surface of the foundation fabric during heating of the tips of the piles thereby eliminating above-mentioned defects.

Other objects and advantages of the present invention will become apparent from reading the following detailed description and by reference to the accompanying drawings wherein:

FIG. 1 is a diagrammatic view of apparatus available to carry out the method according to the present invention;

FIG. 2 is an enlarged diagrammatic view of a forming machine in the apparatus;

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FIG. 3 is an enlarged sectional view of a part of a double fabric;

FIG. 4 is an enlarged sectional view of a part of a separated pile fabric;

FIG. 5 is a diagrammatic sectional view of the pile fabric;

FIG. 6 is a diagrammatic sectional view showing heating state to form beadlike head; and

FIG. 7 is a sectional view of the fabric fastener.

In FIG. 1, apparatus for the invention is illustrated. The apparatus comprises a conventional weaving machine 20 for weaving a double woven fabric 10', bleaching machine 30, a heater 45, a coating machine 50, a cutter 60 and a pair of forming machines 70. Said weaving machine 20 is provided with a pair of rolls 21 and 22, one of which supports twisted thread of cotton and other of which supports filament of thermoplastic material. The twisted thread and the filament released from the rolls are forwarded to conventional weaving mechanism 24 through a pair of conducting rolls 23 at which the twisted thread and the filament are woven into the double fabric 10'. As shown in FIG. 3, said double fabric 10' comprises a pair of seats 10 consisted of warp threads 12 and weft threads 13, and upstanding pile elements 14 connecting the seats, said pile elements 14 being formed of the thermoplastic filament supported by the roll.

Said bleaching machine 30 comprises a bleaching device 31, a neutralizing device 35 and a washing device 39. The said bleaching device 31 consists of a tank 32 containing suitable bleaching solution therein and having a plurality of guide rolls 33 and a pair of pulling rolls 34. The said neutralizing device 35 consists of a tank 36 containing neutralizing solution and having a plurality of guide rolls 37 and a pair pulling rolls 38. The said washing device 39 consists of a tank 40 containing water and having a plurality of guide rolls 41 and a pair of pull rolls 42. The double fabric 10 woven by the weaving machine is forwarded to the bleaching machine 30 through rolls 26, 27, 28 and 29 and then bleached.

Said heater 45 comprises a pair of heat sources 46 which are spaced apart from each other so as to form a passage therebetween. The heater 45 heats the top and the back surface of the double fabrics passed through the passage of the heater.

The coating machine 50 comprises a pair of rotating brushes 51 and two groups of supplying rolls 51, 52 and 53, each group of supplying rolls being adapted to transfer binding solution contained in a tank 52 to the appropriate brush 51. Therefore, when the double fabrics 10' is passed between the brushes 51 the binding solution is supplied on the outer surface of the fabric to form outer layer 15 (FIG. 5) of binding agent, whereby piles 14a are rigidly connected with a foundation of a separate pile fabric 10 which is hereinafter described. The binding solution is preferably of instantaneous dry type.

The double fabric 10 is then cut in a medial plane by a knife 61 of the cutter 60 reciprocally traveling along the horizontal direction. Thus, the double fabric 10' is separated into separate pile fabrics 10, 10. Then, each of separate pile fabrics 10 is forwarded to the appropriate forming machine 70 via guide rollers 62.

Each of said forming machines 70 comprises a water supplying mechanism A to supply water onto the separate pile fabric 10, means B for fusing a point of each pile 14a to form bead-like or mushroom-like head indicated at 11a in FIG. 7, means C for drying the fabric 10, and means D for winding the finished article.

The said water supplying mechanism A includes a container 71 containing water 75 and having roll 73 therein. The separate pile fabric 10 is soaked in and removed from the water in the container via rolls 72, 73 and 74 thereby forming a water layer 75' among the projected

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piles 14 as shown in FIG. 6. Preferably, sulfate of soda is added in the water in a rate 25 cc. of the sulfate of soda per 50 liters of water, whereby the fabric 10 is prevented from the change of color by oxidation in after days. The roll 74 is covered by the absorbent material such, for example, as urethane thereby absorbing water sticking on the rear surface of the fabric 10.

The fabric 10 having the water layer 75' among the piles 14a is then forwarded on a slide-way 76 of the fusing means B at which the fabric 10 is heated by an infrared heater 77. Above the slide-way 76, the fabric 10 is pulled by a drive roll 81 at a constant speed in direction of arrow, said drive roll 81 being driven by a motor 82 through an endless chain 83. The infrared heater 77 comprises a lower-opened housing 78, a gas burner 79 in the housing, and a wire-netting 80 arranged below the burner 79, whereby the top of the pile 14a of the fabric 10 on the slide-way 76 is heated by radiant heat to form the bead-like or mushroom-like heads 11a. As shown in FIG. 6, the water layer or moisture among the piles is gradually evaporated by the radiant heat of the infrared heater 77 and the tips of the piles 14a project from the water layer 75' to the extent of its evaporation, so that the projecting parts only may be melted to form the bead-like or mushroom-like heads 11a. Consequently, many engaging pile elements 11 having bead like or mushroom-like heads 11a may be formed upon the surface of the fabric 10 as shown in FIG. 7.

It is understood that size of bead-like or mushroom-like head is easily adjusted by changing heat value of the infrared heater 77.

The fabric 10 having engaging pile elements is then forwarded to the drying means C through idle rolls 85, 86 and 87 by a pull roll 91 which is connected with the drive roll 81 through an endless chain 92. The drying means C comprises an electrical heater 92 having a plurality of heat sources 92a and a conventional blow dryer 93. After drying, the fabric or finished article is wound by a winding roller 95 of the winding means D. Said roller 95 has at one end thereof a chain wheel 100 and the latter is connected with the drive roll 81 through a pinion 97, reduction gear wheels 98, 96 and an endless chain 101. The automatically control winding speed of the winding roller 95, there is provided a troque cratch 102 between the winding roller 95 and the chain wheel 100 so that the winding speed is reduced in proportion to increase of winding volume.

Mounted over an open-topped frame 70a of the form-

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ing machine 70 is a sucking duct 110 to suck vapor generated within the frame 70a.

While the present invention has been illustrated and described herein with respect to preferred embodiments, it is not desired to limit the invention only to the embodiments, but the invention should be considered to include all the substitutes, modifications and equivalents which are encompassed within the essential part of the invention to be set forth in the scope of the underwritten claim and within the scope of the spirit exhibited in the intention of the invention.

I claim:

1. A method of making swollen headed pile elements on a base fabric of a fabric fastener comprising the steps of forming a double woven fabric having a pair of seats and upstanding pile elements connecting the seats, the pile elements being formed of thermoplastic material; bleaching, washing and then drying the double woven fabric; coating binding solution onto the outer surface of each seat of the double woven fabric; cutting the double fabric in a medial plane between the seats to form two separate pile fabrics, each separate pile fabric being provided with a plurality of piles projecting from one surface of a base fabric and terminating in free ends; soaking each base fabric in liquid in a container; removing each base fabric from said container thereby forming a liquid layer on each base fabric among said projecting piles; passing each base fabric adjacent a heater so that said one surface of each base fabric having said projecting piles faces the heater; heating the projecting piles and each liquid layer so that each liquid layer evaporates to expose the free ends of the piles and the exposed free ends of the piles are melted and swelled by surface extension to form spherically swollen headed pile elements on each base fabric.

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U.S. Cl. X.R.

264—136, 160, 322