

Sept. 11, 1973

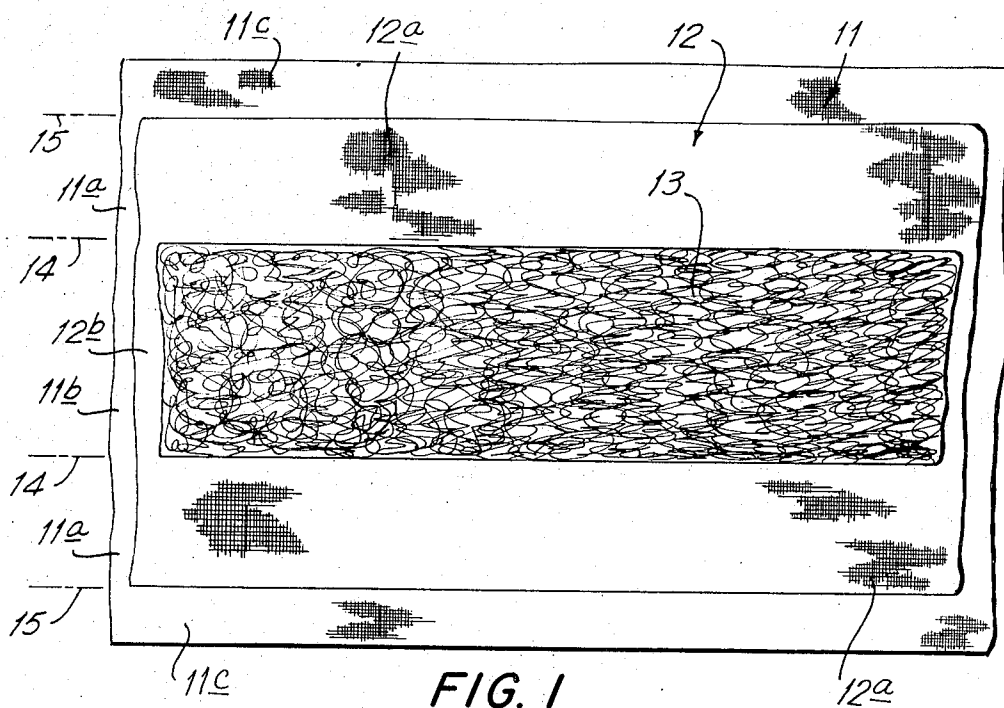
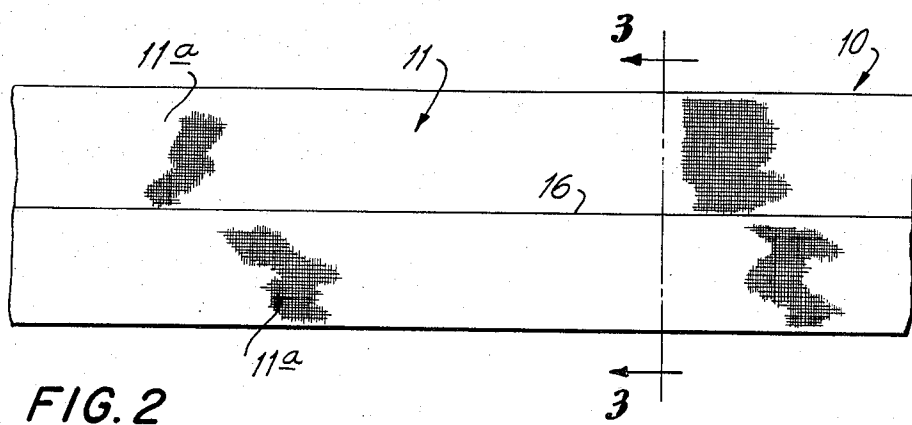
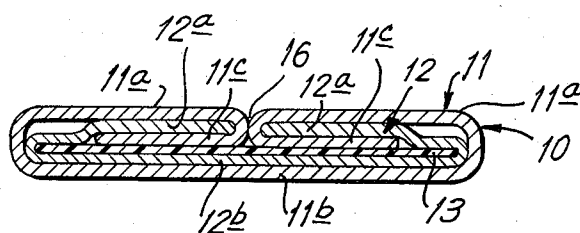
I. EDELMAN

3,758,364

APPARATUS FOR THE MANUFACTURE OF LAMINATED  
SHOULDER STRAP MATERIAL

Original Filed June 22, 1970

2 Sheets-Sheet 1



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FIG. 7

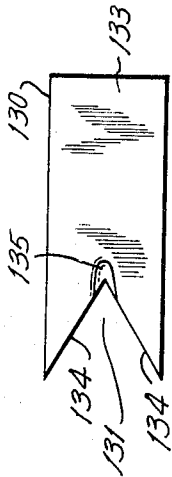


FIG. 4

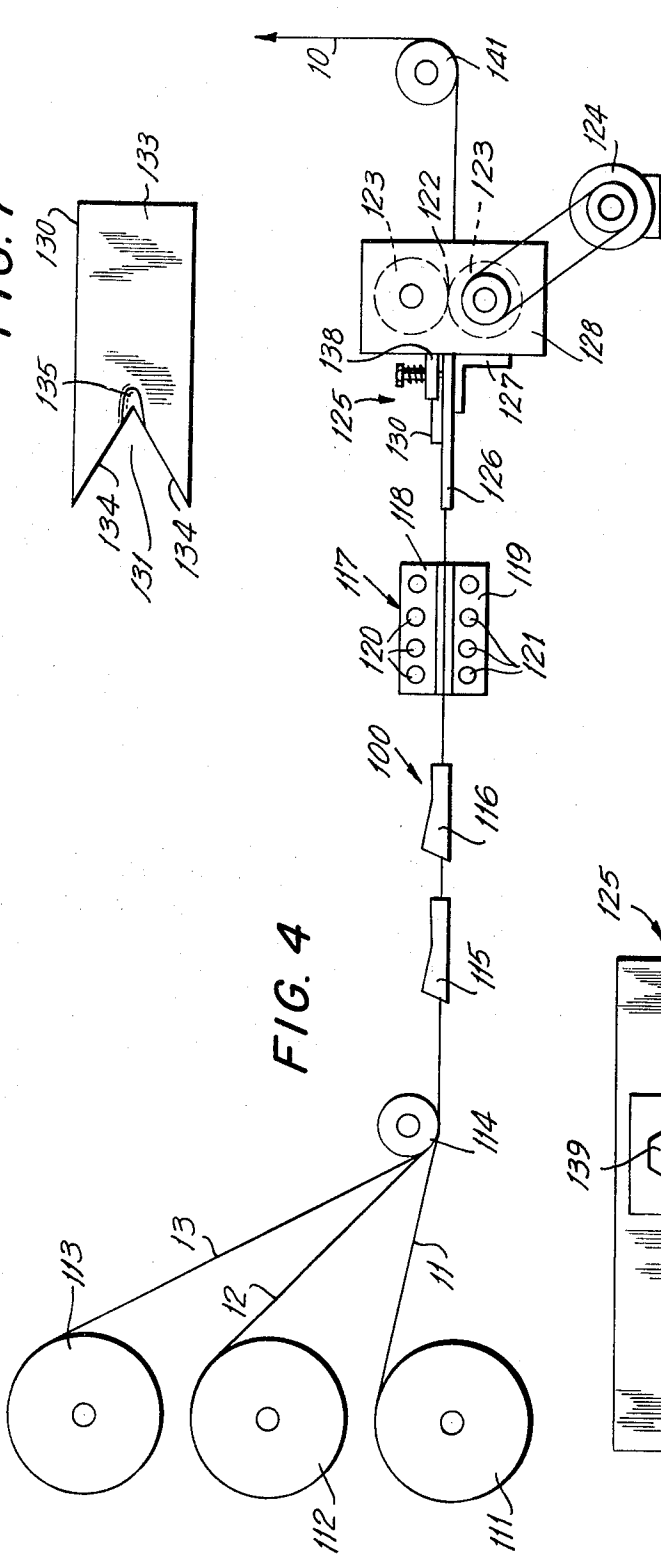


FIG. 6

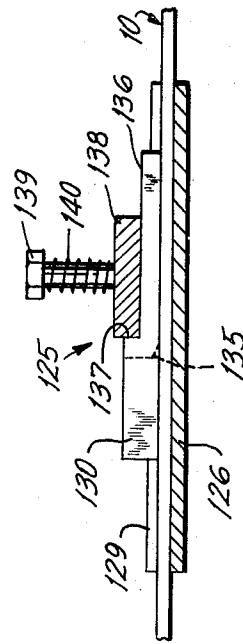
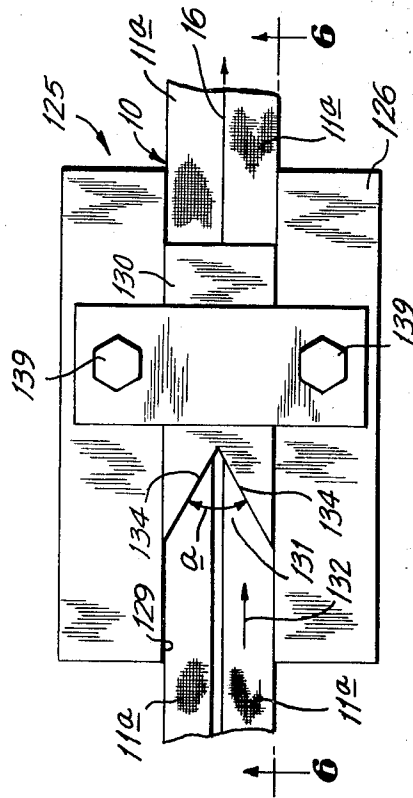


FIG. 5



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## APPARATUS FOR THE MANUFACTURE OF LAMINATED SHOULDER STRAP MATERIAL

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Original application June 22, 1970, Ser. No. 47,984, now Patent No. 3,616,148. Divided and this application Apr. 26, 1971, Ser. No. 137,569

Int. Cl. B31f 1/00

U.S. Cl. 156—463

4 Claims

### ABSTRACT OF THE DISCLOSURE

A shoulder strap material for articles of feminine wearing apparel has an outer shell or envelope of nylon tricot fabric enclosing a cotton fabric tape to which such shell or envelope is bonded by a hot melt or thermoplastic. In the apparatus for producing such strap material, folded side portions of a nylon tricot fabric tape which constitutes the shell or envelope are urged laterally toward each other to close a longitudinal medial seam of the strap material before the bonding is completed by passage through a set of nip or pressure rollers.

This application is a division of U.S. patent application Ser. No. 47,984, filed June 22, 1970, and now U.S. Pat. No. 3,616,148.

This invention relates generally to shoulder straps for brassieres, slips or other articles of feminine wearing apparel.

Many articles of feminine wearing apparel, such as brassieres, slips, nightgowns and the like, are presently formed of nylon tricot textile fabric. Although the aesthetic desirability of providing such articles of wearing apparel with shoulder straps of the same nylon tricot fabric has long been apparent, previous attempts to produce such shoulder straps have encountered functional inadequacies. More specifically, by reason of the stretch or give inherent in nylon tricot fabrics, straps formed thereof have been undesirably stretchable in the longitudinal direction with such longitudinal stretching being accompanied by lateral narrowing of the strap and consequent discomfort to the wearer by reason of the reduced area of contact of the strap with the shoulder.

Accordingly, it is an object of this invention to provide apparatus for the manufacture of a shoulder strap of nylon tricot fabric which resists undue longitudinal stretching and consequent lateral narrowing of the strap.

Still another object of this invention is to provide an apparatus for manufacturing a laminated shoulder strap of the described character, and which ensures that the produced strap will be of uniform appearance and quality, notwithstanding the stretchability or give of the nylon tricot fabric which has previously presented problems in the manufacture of nylon tricot straps.

More particularly, it is an object of this invention to provide an apparatus for manufacturing laminated shoulder strap material which includes a cotton fabric tape, and a nylon tricot tape enveloping the cotton tape and having a central portion defining one face of the strap and folded side portions coming together to define the other face of the strap with a longitudinal medial seam along such other face.

In accordance with a feature of this invention, the apparatus for manufacturing the described laminated shoulder strap includes an assembly by which the folded over side portions of the nylon tricot tape are urged laterally toward each other to close the longitudinal medial seam of the strap before the bonding together of the nylon tricot and cotton tapes is completed by passage through a set of nip or pressure rolls.

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The above and other objects, features and advantages of the invention, will be apparent in the following detailed description of an illustrative embodiment which is to be read in connection with the accompanying drawings, wherein:

FIG. 1 is a fragmentary, enlarged plan view showing the several components of a shoulder strap to be produced by an apparatus according to this invention prior to the folding and bonding together of such components;

FIG. 2 is a fragmentary plan view of the completed shoulder strap as viewed from the side thereof having the longitudinal medial seam;

FIG. 3 is an enlarged, lateral sectional view taken along the line 3—3 on FIG. 2;

FIG. 4 is a diagrammatic side elevational view illustrating an apparatus by which laminated shoulder straps may be produced in accordance with the present invention;

FIG. 5 is an enlarged top plan view of an assembly included in the apparatus of FIG. 4 for ensuring proper closing of the longitudinal medial seam of the laminated strap;

FIG. 6 is a sectional view taken along the line 6—6 on FIG. 5; and

FIG. 7 is a plan view of the undersurface of a pressing member included in the assembly of FIGS. 5 and 6.

Referring to the drawings in detail and initially to FIG. 1 thereof, it will be seen that a shoulder strap material to be produced by an apparatus embodying the present invention and generally identified by the reference numeral 10 on FIGS. 2 and 3 is laminated from a nylon tricot fabric tape 11, a cotton fabric tape 12 having a width smaller than that of the nylon tricot tape 11, and a web 13 having a width smaller than that of the tape 12 and which is formed of a material capable of bonding together the tapes 11 and 12 when subjected to heat and pressure.

Preferably, the web 13, as illustrated on FIG. 1, consists of an open, randomly reticulate mat of thermoplastic polyester filaments, for example, as is available commercially under the tradename "Thermogrip" from USM Corporation, Middleton, Mass. The cotton fabric tape 12 preferably has a flannel or brushed finish on at least one surface thereof, and is arranged so that such flannel surface faces toward the nylon tricot tape 11.

In producing the laminated strap material 10 of FIGS. 2 and 3 from the tapes 11 and 12 and web 13 of FIG. 1, side portions 11a and 12a of tapes 11 and 12, respectively, are folded about fold lines 14 relative to the respective central portions 11b and 12b on which web 13 is superposed, with the opposite longitudinal edge portions 11c of tape 11 being folded under about fold lines 15 which extend along the longitudinal edges of tape 12.

It will be apparent that, upon such folding of tapes 11 and 12, the nylon tricot fabric of tape 11 forms an outer shell or envelope enclosing cotton tape 12 and thermoplastic web 13, with central portion 11b of tape 11 defining one face of the strap material 10, and with the folded over side portion 11a of tape 11 coming together to define the other face of the strap material having a longitudinal medial seam 16 extending therealong. The folded under longitudinal edge portions 11c of tape 11 avoid the presence of raw edges of fabric at the medial seam 16. It will further be seen that the folded side portions 12a of cotton tape 12 extend under the folded over side portions 11a of the nylon tricot tape and project between such side portions 11a and the folded-under longitudinal edge portions 11c. Preferably, as shown, the folded-under longitudinal edge portions 11c are of substantially smaller width than the folded over side portions 11a of tape 11 so that the opposite side portions of

web 13 and interposed between central portion 12b of cotton tape 12 and the folded side portions 12a of such tape at the regions thereof which are located laterally outward with respect to the molded-under longitudinal edge portions 11c of tape 11.

After tapes 11 and 12 have been folded about thermoplastic web 13 in a manner described above, the folded assembly is suitably heated so as to render molten or at least plastic the thermoplastic material of web 13, whereupon the strap material may be passed between pressure rollers which compress together the several fabric layers so as to cause impregnation of the hot melt or thermoplastic material into the fibers of cotton tape 12 and also into the folded-under longitudinal edge portions 11c of nylon tricot tape 11. Thereafter the strap material 10 is suitably cooled so as to set the hot melt or thermoplastic material for bonding together of taper 11 and 12.

It is an important feature of this invention that, in the completed strap material 10, the hot melt or thermoplastic material of web 13 does not come in contact with, and therefore does not impregnate either the central portion 11b or the folded side portions 11a of the nylon tricot tape 11 which form the outer shell of the strap material, so that the feel or hand of the nylon tricot shell is not affected by the hot melt or thermoplastic material. Nevertheless, by reason of the bonding of the folded-under longitudinal edge portions 11c of the tape 11 to the central portion 12b of cotton tape 12 and the fact that the folded side portions 12a and the central portion 12b of cotton tape 12 underlie and are coextensive with the folded side portions 11a and the central portion 11b of the nylon tricot tape 11 constituting the outer shell of the strap material, the cotton tape ensures that the completed strap material will have the necessary resistance to longitudinal stretching and further will resist lateral narrowing or bunching. When cotton tape 12 has a flannel or brushed finish on at least one of its surfaces, as is preferred, the completed strap material 10 will have a plump or cushioned feel and appearance.

In the above description of the strap material 10 according to this invention, the hot melt or thermoplastic material for binding the tapes 11 and 12 has been furnished in the form of a web composed of the thermoplastic material in the solid state, and which is heated to the molten condition following the folding of tapes 11 and 12. However, if desired, the hot melt or thermoplastic material may be applied, in molten condition, to the central portion of tape 12 prior to the folding operations.

Referring now to FIG. 4, it will be seen that a preferred apparatus 100 according to this invention for producing the shoulder strap material 10 described above with reference to FIGS. 2 and 3 comprises suitably supported supply rolls 111, 112 and 113 from which tapes 11 and 12 and web 13, respectively, are simultaneously drawn. Web 13 is superposed centrally on tape 12 which is, in turn, superposed centrally on tape 11, as shown on FIG. 1. The assembled tapes 11 and 12 and web 13 are passed under a guide roller 114 and then through a conventional folding device 115 which continuously operate to fold the longitudinal edge portions 11c of tape 11 onto the adjacent edge portions of tape 12. From folding device 115, tapes 11 and 12 and web 13 pass through a further conventional folding device 116 which continuously operates to fold side portions 11a and 12a of tapes 11 and 12 upwardly and inwardly over web 13, that is, to complete the necessary folding operations. Of course, the folding devices 115 and 116 which are shown separate from each other may be combined in a single conventional folding unit.

After tapes 11 and 12 have been folded around web 13, the resulting assembly passes continuously through a suitable heating unit 117 which, as shown, includes confronting upper and lower conductive blocks 118 and 119 defining a shallow, longitudinally extending groove (not shown) between their confronting surfaces and through

which the folded assembly of tapes 11 and 12 and thermoplastic web 13 is guided during the heating thereof. The conductive or metal blocks 118 and 119 contain conventional electric heating elements 120 and 121 supplied with electric current through suitable thermostatically regulated circuits (not shown). Preferably, such circuits are controlled so that the upper heating elements 120 will heat the upper surface of the folded assembly to a temperature that is slightly higher than that to which the lower surface of the folded assembly is heated by the lower heating elements 121. For example, when using the specific material identified above for the thermoplastic web 13, it is desirable to control the heating elements 120 and 121 so that the top surface of the folded assembly will be heated to no more than 320° F., while the lower surface of the folded assembly is heated to no more than 300° F.

After web 13 has been rendered molten or at least plastic by the heating thereof in unit 117, the strap material is passed through the nip 122 between pressure rollers 123 which are suitably driven, as by a motor 124. It will be apparent that the driven rollers 123 constitute at least part of the drive by which tapes 11 and 12 and web 13 are withdrawn from the respective drive rolls, and then passed through folding devices 115 and 116 and heating unit 117. The inherent drag or resistance to movement of the tapes 11 and 12 and web 13, particularly through folding devices 115 and 116, gives rise to a substantial tension which, in the case of the nylon tricot tape 11, tends to longitudinally extend the tape and thereby laterally narrow the tape. Such lateral narrowing of nylon tricot tape 11 after passage through folding device 116 tends to open or create a gap at seam 16, and this tendency has constituted a major obstacle to the production of a satisfactory laminated nylon tricot strap material. However, in accordance with the present invention, the apparatus 100 further comprises a device 125 located between heating unit 117 and pressure rollers 123, and preferably relatively close to the latter, which device 125 acts on the folded-over side portions 11a of tape 11 to urge such portions 11a laterally toward each other in response to the movement of the strap material by rollers 123, whereby to ensure that seam 16 is tightly closed upon passage through the nip 122 between rollers 123.

Referring now to FIGS. 5 and 6, it will be seen that the device 125 comprises a horizontal base plate 126 mounted, as by a bracket 127 (FIG. 4) on the frame 128 supporting pressure rollers 123. Base plate 126 is formed, in its upper surface, with a longitudinal, upwardly opening groove or channel 129 which is laterally dimensioned to guide the folded strap material and which has its bottom surface at the level of nip 122. A pressing member 130 is urged downwardly in channel 129 to bear upon the folded over side portions 11a of tape 11 and has a V-shaped notch 131 in its end portion which is first encountered by the strap material during its movement through channel 129 in the direction of arrow 132 on FIG. 5. The notch 131 opens at least at the bottom surface 133 (FIG. 7) of members 130 and may extend through the entire thickness thereof, as shown. The sides 134 of notch 131 converge in the direction of travel 132 of the strap material and enclose an angle  $\alpha$  (FIG. 5) that is no greater than 60°. Preferably, such angle  $\alpha$  is substantially smaller than 60°. Further, the apex of notch 131 in bottom surface 133 is preferably rounded and tapered into surface 133, as at 135 on FIGS. 6 and 7.

In order to retain member 130 in channel 129, the top surface 136 of member 130 projects upwardly from channel 129 and has a step 137 (FIG. 6) facing in the direction of movement 132 of the strap material. A loading member 138 extends across channel 129 and rests on top surface 136 so as to be engaged by step 137. The opposite end portions of member 138 have holes (not shown) which loosely receive bolts 139 screwed into tapped holes provided in base plate 126, and compression springs 140

are provided on bolts 139 between the heads of the latter and member 138 to urge the latter downwardly. Obviously, the forces exerted by springs 140 can be readily varied by adjustment of bolts 139.

With the device 125 as described, movement of the strap material through channel 129 in response to the rotation of pressure rollers 123 draws folded side portions 11a of tape 11 under pressure member 130 while the latter is urged downwardly by springs 140. Due to the notch 131, the lower surface 133 of member 130 exerts an inwardly directed force on each folded side portion 11a to tightly close the seam 16. The rounded and tapered apex 135 of notch 131 ensures that the fabric of tape 11 will not pucker as it is drawn under pressing member 130.

With its seam 16 thus tightly and uniformly closed, the strap material passes through pressure rollers 123 by which the fabric layers are compressed together and the molten or at least plastic material of web 13 is made to impregnate the confronting fabric layers. After passage between rollers 123, the strap material may be guided by a roller 141 and by other similar rollers (not shown) to follow a sinuous path along which the strap material is suitably cooled.

Although a particular embodiment of apparatus according to this invention for producing strap material has been described in detail herein with reference to the accompanying drawings, it is to be understood that the invention is not limited to that precise embodiment, and that various changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of this invention.

What is claimed is:

1. An apparatus for producing a laminated shoulder strap material comprising a supply of fabric tape, a supply of thermoplastic webbing, drive means operative to simultaneously withdraw said tape and webbing from the respective supplies thereof, folding means operative, in response to the simultaneous movement of said tape and webbing therethrough by said drive means, to fold over side portions of said tape and thereby enclose said webbing between a central portion of the tape and said folded over side portions, said drive means including rotated rollers having a nip therebetween through which said tape

and webbing pass after passage through said folding means, heating means acting on said tape and webbing between said folding means and said rollers to soften said thermoplastic webbing, means located between said heating means and said rollers and defining an upwardly opening guide channel along which the folded tape is movable with said folded over side portions facing upwardly therein, and a pressing member urged downwardly in said channel to bear upon said folded over side portions of the tape, said pressing member having a V-shaped notch opening at the bottom surface of said member and the sides of which converge in the direction of movement of said tape in said channel to urge said folded over side portions laterally toward each other in response to the movement of said tape by said rollers, whereby to ensure that said folded over side portions abut through said nip.

2. The apparatus according to claim 1, in which said sides of the notch enclose an angle no greater than 60°.

3. The apparatus according to claim 1, in which said notch has a rounded apex which flares into said bottom surface of the pressing member.

4. The apparatus according to claim 1, said pressing member has a step in its top surface facing in the direction of said movement of the tape along said channel and projecting upwardly from said channel, a loading member mounted on said means defining the guide channel and resting on said top surface of the pressing member with said step of the latter engaging said loading member, and adjustable spring means urging said loading member downwardly on said pressing member to determine the pressure of the latter on the folded tape.

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U.S. Cl. X.R.

156—202, 216, 461, 467; 226—196