(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 976 865 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
02.02.2000 Bulletin 2000/05

(21) Application number: **98203866.3**

(22) Date of filing: **18.11.1998**

(51) Int. Cl.[7]: **D06J 1/00**, D06J 1/12, D06B 11/00, D06M 15/39, D06M 15/423

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **30.07.1998 IT BO980468**

(71) Applicant:
Levi Strauss & Co. Europe N.V.
1050 Brussels (BE)

(72) Inventors:
- **Morani, Mario**
  61023 Macerata Feltria, Pesaro (IT)
- **Pignotti, Paolo**
  63036 Pagliare Del Tronto, Ascoli Piceno (IT)

(74) Representative:
Long, Giorgio et al
Jacobacci & Perani
Via Senato, 8
20121 Milano (IT)

(54) Method for applying a finishing treatment to clothing

(57) The present invention relates to a method for applying a finishing treatment to the abovementioned clothing.

In particular, the present invention relates to a method for applying a finishing treatment to clothing, comprising the following steps:

- applying a coat of curable resin to the surface of selected portions (3, 4, 5, 6, 7, 8) of a garment (1);
- forming, in the said selected portions (3, 4, 5, 6, 7, 8), a plurality of three-dimensional creases (3a, 4a, 5a, 6a, 7a, 8a) shaped approximately in the same way as the corresponding creases that would form naturally as a result of prolonged usage of the said garment (1); and
- curing the said coat of resin so as to render the said three-dimensional creases (3a, 4a, 5a, 6a, 7a, 8a) permanent.

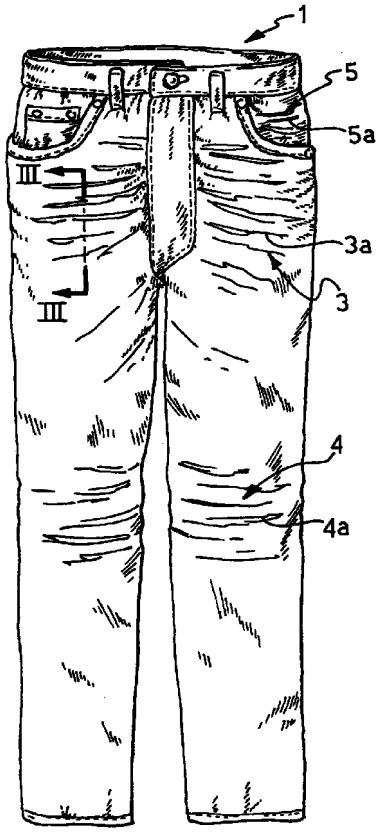


FIG.1

EP 0 976 865 A2

Description

[0001] The present invention is concerned with the technical field of the manufacture of so-called "casual" clothing.

[0002] In particular the present invention relates to a method for applying a finishing treatment to the abovementioned clothing.

[0003] It is well known that so-called "casual" clothing is often put through special finishing treatments on completion of the production cycle in order to give it a aesthetically pleasing appearance, or at any rate to make it particularly attractive to the consumer.

[0004] These treatments are mainly applied to clothes such as trousers, shirts and jackets made of denim because with clothes of this kind the fashions and tastes of consumers require, practically every year, new aesthetic features or "looks". The most desirable "looks", especially among the young, are usually those which give the clothes a "lived-in" appearance suggestive of clothes that have already been worn for a long time, have gone through many washings and have therefore become well-worn and partly faded. Other known treatments give the treated garment a feel, a roughness and a patterning of the faded parts such as to make them very similar to the same garments not treated but repeatedly washed with water and rubbed for a long time with a brush.

[0005] International patent application WO 97/200096, filed by the same Applicant, discloses a very simply and efficient method for producing the look described above. In this method each garment is treated for a predetermined length of time, in special machines fitted with rotating baskets, with predetermined amounts of corrosive substances (e.g. sodium hydroxide in flakes), together with a solid, abrasive and spongy material (e.g. pumice) and a solid inert material (e.g. perlite).

[0006] It is obvious from all this that the industry is continually on the lookout for special effects for imparting to casual garments, in such a way as to mimic during the industrial process the appearance the garments take on only after prolonged usage.

[0007] The problem addressed by the present invention is therefore that of providing a method for applying a finishing treatment to clothing whereby the characteristic "lived-in" appearance of a garment that has been worn for a long period of time can be reproduced.

[0008] This problem has been solved by a method in accordance with the appended Claim 1 and with the claims that depend on it.

[0009] The features of the invention are explained below with particular reference to the accompanying sheets of drawings, in which:

- Figure 1 shows in diagrammatic form the front of a pair of denim trousers treated according to the method of the present invention;
- Figure 2 shows the back of the same pair of trousers;
- Figure 3 shows in diagrammatic form a section on the plane marked III-III in Figure 1;
- Figure 4 shows a perspective view of a machine performing creases in trousers according to the method forming the subject-matter of the present invention;
- Figure 5 shows a side view of the machine from Figure 4 in the rest position; and
- Figure 6 shows a side view of the machine from Figure 4 in the working position.

[0010] With reference to the abovementioned Figures 1, 2 and 3, the number 1 denotes a garment of casual cut, preferably a pair of trousers of the type known as "jeans". The method according to the invention is described below in its application to this pair of trousers 1, but it will be immediately deduced that it also applies to other garments, such as a jacket or shirt, for example.

[0011] Furthermore, the method will be applicable not only to denim, but also to cotton in general and indeed to synthetic fabrics capable of taking a treatment with an anticrease resin.

[0012] According to the said method, the trousers 1 are first given an application of a coat of heat-curable resin to the surface of selected portions 3, 4, 5, 6, 7, 8 of the trousers (see also Figure 2). The resin will be preferably put in an aqueous medium. Said portions of the trousers include the front regions on either side of the crotch 3, the front regions corresponding to the knees 4, the regions immediately above the front pockets 5, the regions immediately below the rear pockets 6, the rear regions corresponding to the articulation of the knees 7 and the inside region of a hip pocket 8.

[0013] The aforementioned heat-curable resins are of known type and widely used in the clothing industry as anticrease resins. Types of resin that can be used advantageously in the process of the present invention are glyoxalic resins and urea-formaldehyde resins. By way of example the glyoxalic resin known by the trade name "Reacel KT" by the company Garmon S.A. and the urea-formaldehyde resin known by the trade name "Arkofix NG-E" from the company Hoechst can be used. This latter resin requires a catalyst for the subsequent curing reaction. One catalyst that can be used advantageously is the zinc nitrate-based catalyst known by the name "NKN" from Hoechst.

[0014] In general, however, the resins that can be used for giving an anticrease treatment to fabrics in the method of the present invention will be soluble in water and will have a curing temperature below 200°C, preferably below 180°C, so as not to cause damage to the fabric during heat curing.

[0015] In a preferred embodiment of the present invention, the resin is first dissolved in water in a proportion of between 10 and 45% by weight, preferably in a proportion of about 30% by weight, before being applied

to the selected portions of the garment.

[0016] A preferred method of application is spraying, but it is also possible to apply it with brushes, rollers, pads or similar instruments normally used in the industry.

[0017] By way of example, for an average sized pair of trousers the area covered by the resin may vary between 1300 and 1800 cm^2, while the amount of resin sprayed on is 5-6 g calculated on a dry weight basis.

[0018] After the resin has been sprayed on, the garment is preferably put through a drying process to allow the water to evaporate off, leaving a coat of dried resin on the treated areas of the garment. This drying step is preferably carried out at a temperature of approximately 80°C.

[0019] There are then formed, in the abovementioned selected portions 3, 4, 5, 6, 7, 8, a plurality of three-dimensional creases 3a, 4a, 5a, 6a, 7a, 8a, respectively, suitably divided into groups in the respective portions of the trousers 1. These creases are approximately shaped to match the forms of the corresponding creases in the manner in which they usually form in the trousers 1 after they have been worn for a long period of time.

[0020] For example, the creases 3a produced in the regions on either side of the crotch 3 run approximately horizontally and parallel with each other, to simulate the creases that would actually develop if the trousers 1 were worn long-term in a sitting position; the creases 4a produced in the front regions corresponding to the knees 4 take the form of bagging; the creases 8a produced in the inside region of a hip pocket 8 have the configuration of the shape left by the continuous presence of a wallet in the pocket.

[0021] Obviously, in the case of a garment other than the trousers 1, the creases are formed according to the invention in selected portions of this garment different to those described above. In the case of a shirt, the creases may for example be produced in the sleeves, in front of and behind the elbow, and in the back.

[0022] The creases may be formed by hand or with suitable equipment set up in some appropriate manner, such as that which will be described below, to which the invention also relates.

[0023] The above-described crease-forming stage is followed by a stage of curing of the resin applied to the selected portions 3, 4, 5, 6, 7, 8, in order to make the creases permanent. The term "permanent" is used here to mean permanence of the crease for at least three washes.

[0024] The curing is carried out by the application, to the abovementioned selected portions, of heat for a defined period of time, sufficient to raise the applied resin to its curing temperature. As an example, if using the abovementioned glyoxalic resin "Reacel KT" or the "Arkofix NG-E" resin on a 14-ounce fabric, heat is applied so as to reach a temperature of approximately 170°C for from 2 to 4 minutes, preferably for 3 minutes.

[0025] It is clear that the process to which the present invention relates can be applied to fabrics of different kinds and physical characteristics, in which case the length of time for which the heat is applied in the said curing stage will depend on the physical characteristics of the fabric, being shorter for a lighter fabric.

[0026] The application of heat may be effected by directing towards the garment a jet of hot air, or by introducing the garment into a suitably heated environment, or by placing the areas of the garment impregnated with resin in contact with a heating surface.

[0027] With other types of resin the temperatures and application times may vary. It is also possible to use resins which cure not with the application of heat but of catalyst or other known techniques or materials.

[0028] Before the resin is sprayed on, the garment may optionally also undergo a treatment to give it a "greasy-shiny" look. This treatment involves applying, for example by spraying, a mixture comprising silicone oil, wax and water. A suitable composition may contain, for example, 35% silicone oil, 15% wax and 50% water, the percentages being calculated by weight relative to the total weight of the solution. An ordinary floor polish can be used for the wax. The percentages indicated can of course be modified depending on whether the "greasy-shiny" look is to be made more obvious or less. After this mixture has been applied the garment must undergo drying before being treated with the resin.

[0029] Optionally, after treatment with the resin the garment may undergo a final treatment with a dye or colouring substance. This colouring substance will preferably be black or generally of a dark colour.

[0030] It will be obvious that the garments that are to be put through the process according to the present invention may first undergo one of the known finishing treatments to which casual clothes, especially jeans, are usually subjected. One example of such a treatment is that described in the international patent application published under number WO 97/20096, cited earlier.

[0031] Referring now to Figures 4, 5 and 6, a machine specially designed to form creases on trousers in accordance with the method of the present invention will now be described.

[0032] This machine, which bears the general reference number 10, comprises a form 101 on which a pair of trousers 1 is placed, a heating plate 102 and deforming components 103 and 104 for the trouser seat and for the rear pocket of the trousers, respectively.

[0033] The form 101 is fixed to a bracket 105 integral with a column 106 which in turn is mounted on a base 107.

[0034] The form 101 is divided into two symmetrical parts arranged side by side to roughly reproduce the shape of a pair of trousers. Each of these symmetrical parts comprises a fixed section 108, corresponding to the seat and thighs of the trousers, and a mobile end section 109 which corresponds to the lower legs.

[0035] The fixed section 108 is fixed at one end to the

bracket 105, while the other end terminates, close to the point of junction with the mobile section 109, with a shape 110 substantially resembling a knee.

[0036] The mobile section 109 of the form 101 is hinged to said fixed section 108 to enable it to adopt at least a horizontal position in line with the fixed section 108 and a vertical position perpendicular to the plane of the said fixed section 108.

[0037] On the back of the said mobile section 109, near the point of junction where it meets the fixed section 108, is a rear shape 111 in the form of a segment of a circle. This reproduces the back of the leg behind the knee. This rear shape 111 is hinged to the said mobile section 109 so that it can pivot freely about a transverse axis.

[0038] The underside of the said fixed section 108 of the form 101 supports an actuator 112 with a piston 113 connected by a hinge to the rear side of the lower section 109 of the form. This actuator 112 has the function of rotating the said mobile section 109 about the axis lying transversely to it passing through the points where the said mobile section is hinged to the said fixed section 108. The mobile section 109 can therefore adopt the in-line position or the perpendicular position with respect to the said fixed section 108.

[0039] A first deforming component 103 for the seat of the trousers comprises a pivoting support 115 and a deforming plate 114.

[0040] The pivoting support 115 has a curved end to which the said deforming plate 114 is hinged so that the latter can in turn pivot freely about its transverse axis. The junction between the said pivoting support and the said deforming plate may comprise an elastic return component to keep the plate roughly horizontal.

[0041] The pivoting support 115 is hinged in turn to the underside of the said fixed section 108 of the form 101. The opposite end of the said support 115 from that connected to the deforming plate 114 is hinged to a piston 116 driven by an actuator 117. The actuator 117 in turn is fixed by means of a hinge to the column 106. The function of this actuator 117 is to cause the support 115 to pivot about its transverse axis so that the deforming plate 114 is pushed down and deforms the trouser seat. The fact that this plate 114 is pivoting allows it to maintain a roughly horizontal position even in the working position (with the trousers inserted over the form).

[0042] A second deforming component 104 for the hip pocket of the trousers comprises a heating pad 118 with a handgrip 119 connected by a fastener 120 (e.g. a chain) to the bracket 105. The shape and dimensions of the plate 118 are such that it can be introduced into a hip pocket of the trousers 1.

[0043] The heating pad 118 contains an internal electrical resistor connected by an electrical lead 121 to an electricity generator (not shown). The purpose of this heating pad 118 will be explained in the later description of the operation of the machine 10.

[0044] The heating plate 102 is firmly fixed to a mobile support 122, which is hinged to two vertical supporting components 123 fixed to the rear of the said bracket 105.

[0045] The heating plate 102 is approximately rectangular in shape and comprises, at the end designed to come into contact with the thighs and knees of the trousers 1, a front wall 124 and two side walls 125, 125' which project downwards. The plate 102 and the front wall 124 accommodate electrical resistors connected by an electrical lead 126 to an electricity generator (not shown). The side walls 125, 125', however, are purely for containment purposes.

[0046] The mobile support 122 is connected by hinges to a piston 128 that passes through a through hole 129 of generally elongate form through the bracket 105. This piston 128 is driven by an actuator 127 which in turn is fixed by means of a hinge to the column 106.

[0047] The function of this actuator 127 is to pivot the mobile support 122 about its transverse axis, causing the heating plate 102 to adopt a raised position (rest position) or a horizontal position in which there is contact between the said plate 102 and the trousers (working position).

[0048] The actuators 112, 117 and 127 are controlled by a control unit (not shown in the figures).

[0049] Referring now to Figures 5 and 6, the machine 10 for forming creases in trousers works in the following manner.

[0050] Figure 5 shows the machine 10 in a rest position. The heating plate 102 is in the raised position, the mobile section 109 of the form 101 is in the horizontal position lined up with the corresponding fixed section 108 and the deforming component 103 is in the retracted position.

[0051] Before being placed on the machine 10, the trousers 1 must already have been treated with the heat-curable resin on the said selected portions 3, 4, 5, 6, 7, 8 and then dried. The trousers may also have undergone a treatment to give them a "greasy-shiny" look or any other finishing treatment that may be appropriate.

[0052] The trousers are now slid onto the form 101, each leg of the trousers being introduced around the respective symmetrical adjacent parts of the said form. The seat of the trousers is arranged so that the deforming component 103 is inside it. The heating pad 118 of the deforming component 104 is then introduced into the hip pocket of the trousers, preferably inside the right hip pocket.

[0053] The operator now intervenes manually to form creases 3a, 5a in the regions immediately below 3 and above 5 at the front trouser pockets, closing these creases with clamps (not shown in the figures).

[0054] The machine is then operated in the following manner, as shown in Figure 6.

[0055] The actuator 112 puts the mobile section 109 of the form 101 in the vertical position, while the actuator 117 puts the deforming plate 114 in the downward

extended position. Also, the actuator 127 moves the plate 102 to a horizontal position, placing it in contact with the upper surface of the trousers 1. In particular, the front wall 124 attached to the said plate 102 will come into contact with the knee region of the trousers 1.

[0056] Simultaneously the pad 118 of the deforming component 104, the plate 102 and its front wall 124 are heated to the desired temperature by passing an electric current through their respective resistors. This temperature, as stated earlier, will depend on the type of resin employed and on the nature and thickness of the fabric from which the trousers are made.

[0057] The length of time for which the heating elements are in contact with the trousers will also depend on the same parameters, generally being between 2 and 4 minutes.

[0058] By this means with the aid of the machine 10 described above, the trousers 1 are deformed at the knees, at the trouser seat and in the hip pocket. In addition, the presence of the heating elements - the plate 102, the pad 118 and the front wall 124 - allows the machine 10 to cure the resin, making not only the deformations 4a, 8a of the knees and hip pocket of the trousers, but also the front creases 3a, 5a permanent.

[0059] It will be understood that the above description has been given by way of non-restrictive illustration and consequently any variants are to be understood as falling within the protective scope of the present technical solution as described above and as claimed below.

Claims

1. Method for applying a finishing treatment to clothing, comprising the following steps:
   - applying a coat of curable resin to the surface of selected portions (3, 4, 5, 6, 7, 8) of a garment (1);
   - forming, in the said selected portions (3, 4, 5, 6, 7, 8), a plurality of three-dimensional creases (3a, 4a, 5a, 6a, 7a, 8a) shaped approximately in the same way as the corresponding creases that would form naturally as a result of prolonged usage of the said garment (1); and
   - curing the said coat of resin so as to render the said three-dimensional creases (3a, 4a, 5a, 6a, 7a, 8a) permanent.

2. Method according to Claim 1, in which the said resin is of the heat-curable type and in which the said curing step is effected by applying heat to the said selected portions (3, 4, 5, 6, 7, 8) of the said garment (1).

3. Method according to Claim 2, in which the said curing step is effected by placing the said selected portions (3, 4, 5, 6, 7, 8) of the said garment (1) in contact with a heating element.

4. Method according to Claim 2 or 3, in which the said resin is put into an aqueous medium.

5. Method according to Claims 2 to 4, in which the said resin is soluble in water and has a curing temperature below 200°C, preferably below 180°C.

6. Method according to Claim 5, in which the said resin is a glyoxalic resin or a urea-formaldehyde resin.

7. Method according to Claim 6, in which the said resin is selected from Reacel KT from the company Garmon S.A. and Arkofix NG-E from the company Hoechst.

8. Method according to Claim 7, in which the said curing step is performed, on a 14-ounce fabric, at a temperature of approximately 170°C for from 2 to 4 minutes, preferably for 3 minutes.

9. Method according to Claims 2 to 8, in which the said resin is first dissolved in water in a proportion of from 10% to 45% by weight, preferably in a proportion of 30% by weight.

10. Method according to Claims 1 to 9, in which the said resin is applied by spraying.

11. Method according to Claims 1 to 10, in which the said selected portions (3, 4, 5, 6, 7, 8) of the said garment (1) cover an area of from 1300 to 1800 cm^2 and the amount of said resin sprayed onto the said selected portions is from 5 to 6 g calculated on a dry weight basis.

12. Method according to Claims 1 to 11, which further comprises, after the said step of applying the resin to the said selected portions of the garment (1), a step of drying the said resin on the said garment (1).

13. Method according to Claim 12, in which the said step of drying the said resin on the said garment (1) is carried out at a temperature of approximately 80°C.

14. Method according to Claims 1 to 13, in which, prior to the said step of applying the said resin, the said garment (1) undergoes application of a mixture of silicone oil, wax and water, followed by drying, to give it a "greasy-shiny" appearance.

15. Method according to Claim 14, in which the said mixture is in a proportion by weight of 35% silicone oil, 15% wax and 50% water.

16. Method according to Claims 14 or 15, in which the

said wax is a floor polish.

17. Casual garment obtainable by the method according to Claims 1 to 16.

18. Garment according to Claim 17, in which the said garment is a pair of trousers.

19. Garment according to Claim 16 or 17, in which the said garment is made from denim.

20. Machine (10) for forming creases in trousers (1), the said machine being specially constructed to carry out the method according to Claim 1 to 16, comprising:

- a trouser form (101) composed of two symmetrical parts laid alongside each other, each of the said symmetrical parts comprising a fixed section (108) and a mobile section (109), the said mobile section being hinged to one end of the said fixed section (108) so that it can assume a horizontal position in line with the said fixed section (108), and a vertical position perpendicular to the said fixed section (108), while a shape (110) substantially resembling a knee is mounted firmly on the same end of the said fixed section (108);
- a first deforming component (103) comprising a pivotting deforming plate (114) which in turn is connected to a pivotting support (115) positioned on the underside of the said fixed section (108) of the form (101), the said plate (114) being suitable for insertion into and deformation of the seat of the trousers (1);
- a second deforming component (104) comprising a heating pad (118) suitable for insertion into a hip pocket of a pair of trousers (1); and
- a heating plate (102) comprising a heating front wall (124) that projects vertically downwards, the said plate (102) being able to assume a raised position and a horizontal position, in which the said plate (102) comes into contact with the front surface of the trousers (1).

21. Machine according to Claim 20, in which the said mobile sections (109) of the form (101), the said pivoting support (115) and the said heating plate (102) are moved by respective actuators (112, 117, 127).

22. Machine according to Claim 20 or 21, in which the said heating pad (118), the said heating plate (102) and the said heating front wall (124) are heated by respective electrical resistors.

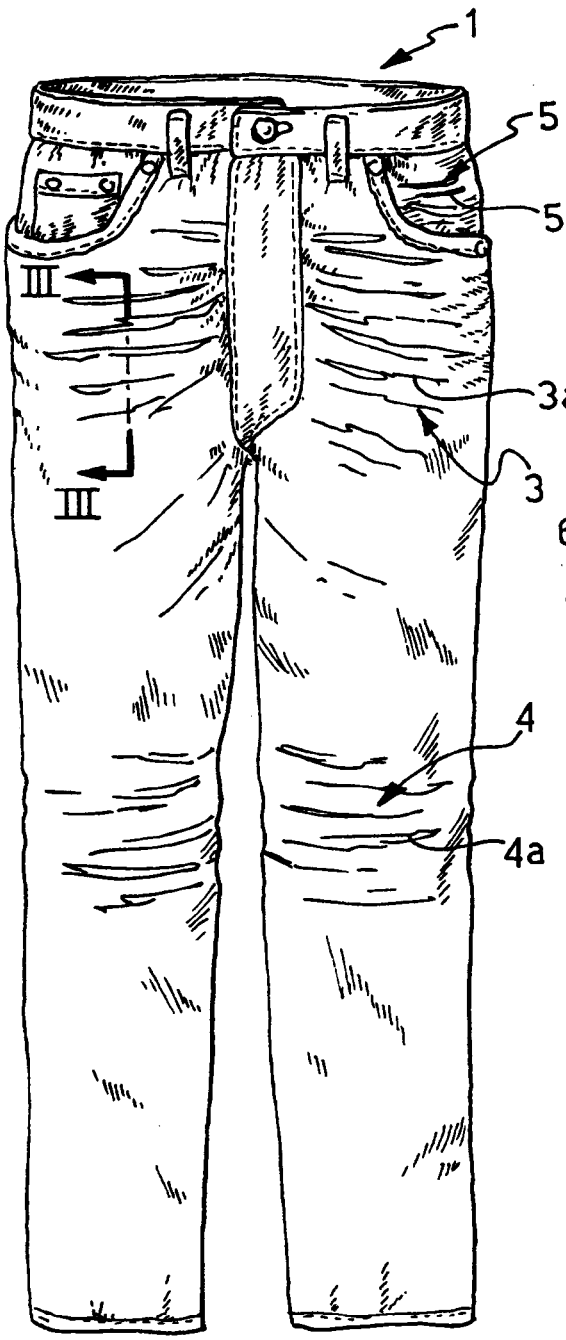


FIG.1

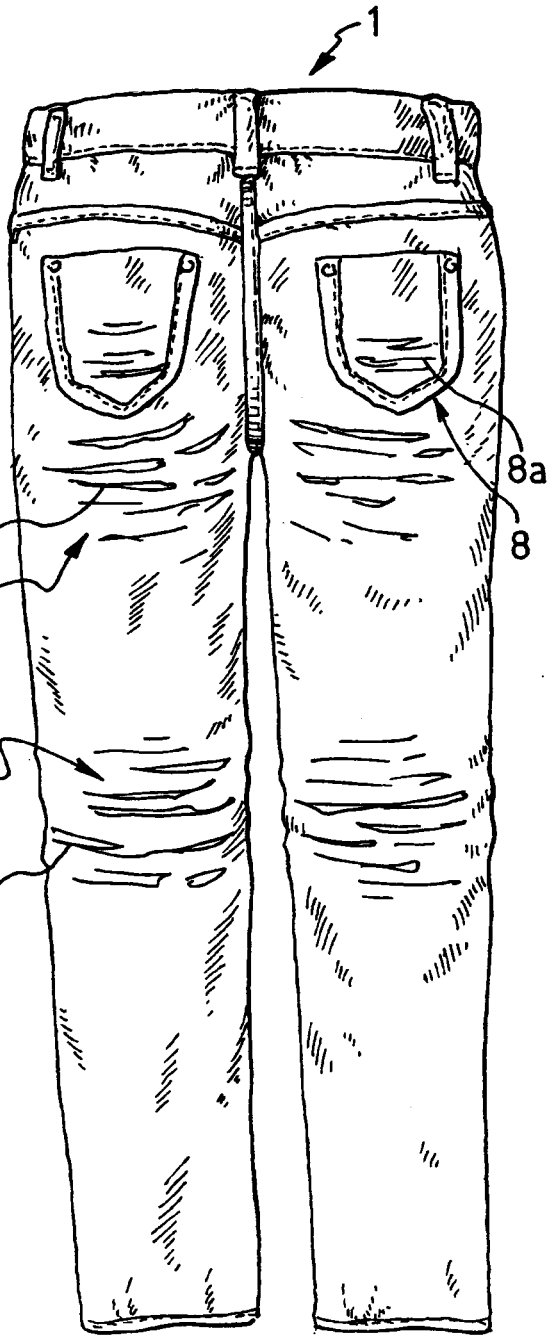


FIG.2

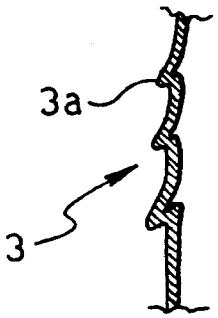


FIG.3

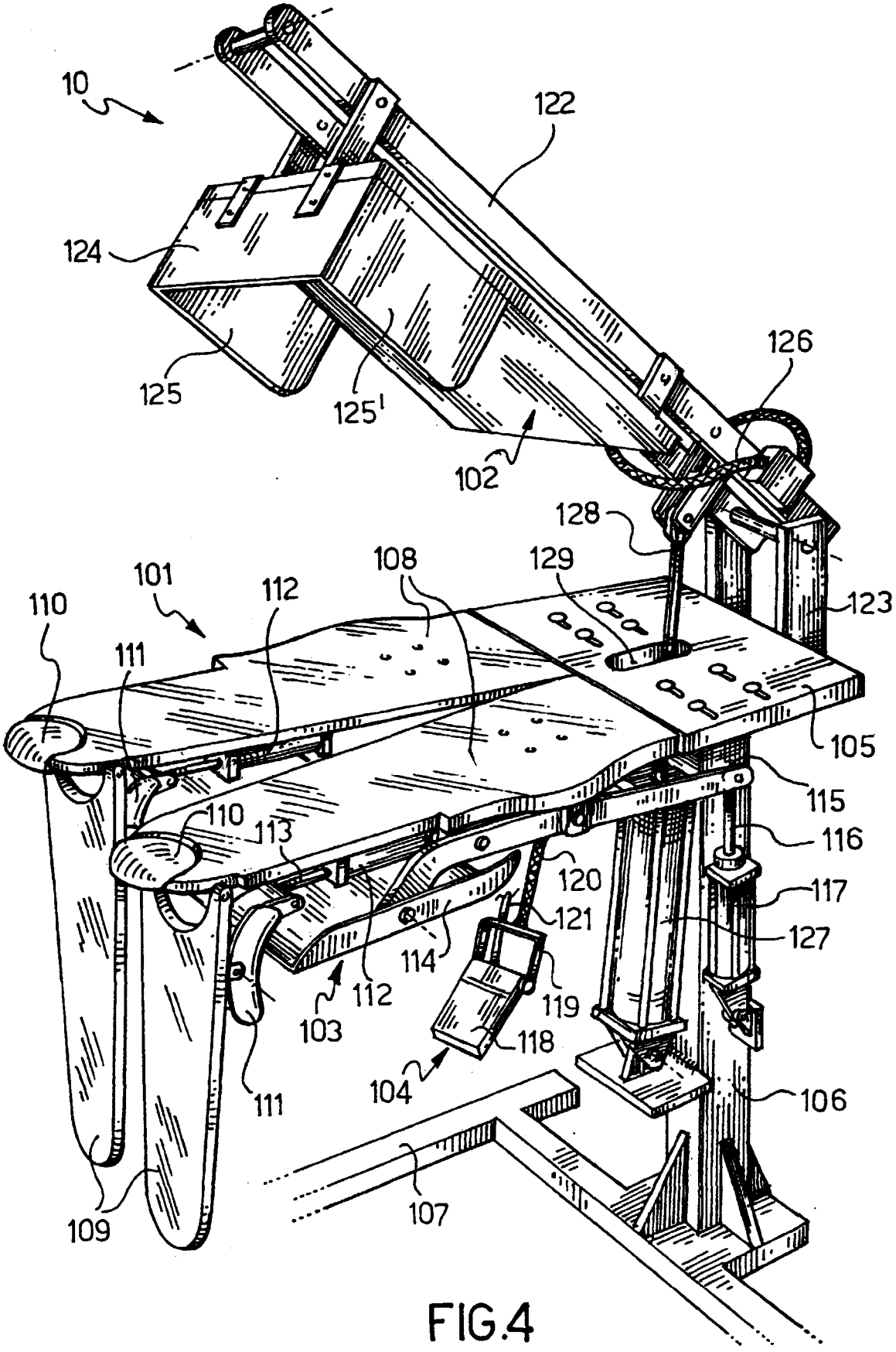

10
122
124
125
125'
126
102
128
101
108
129
110
112
123
111
105
115
110
113
116
120
117
121
127
114
112
119
103
118
104
106
111
107
109

FIG.4

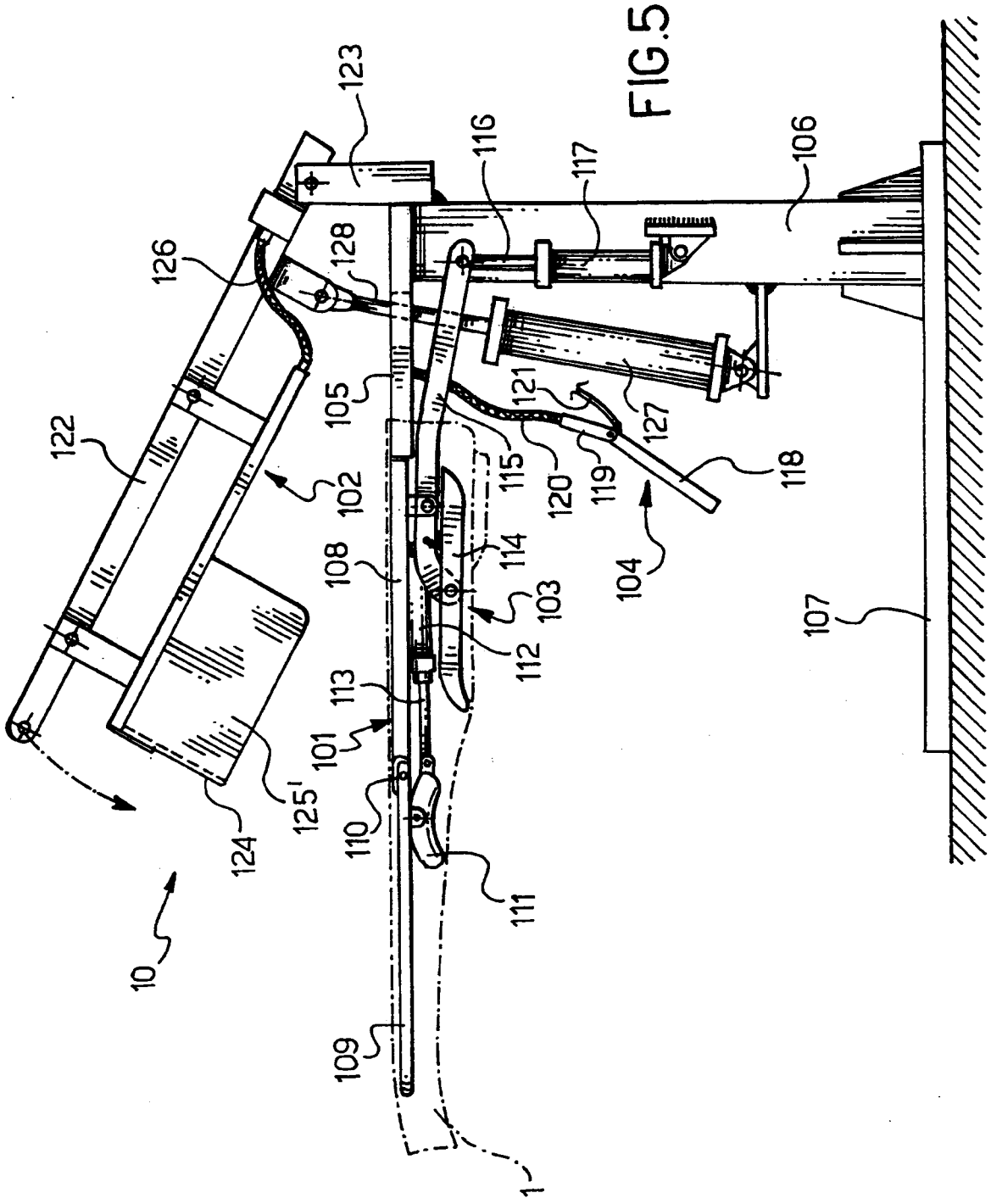
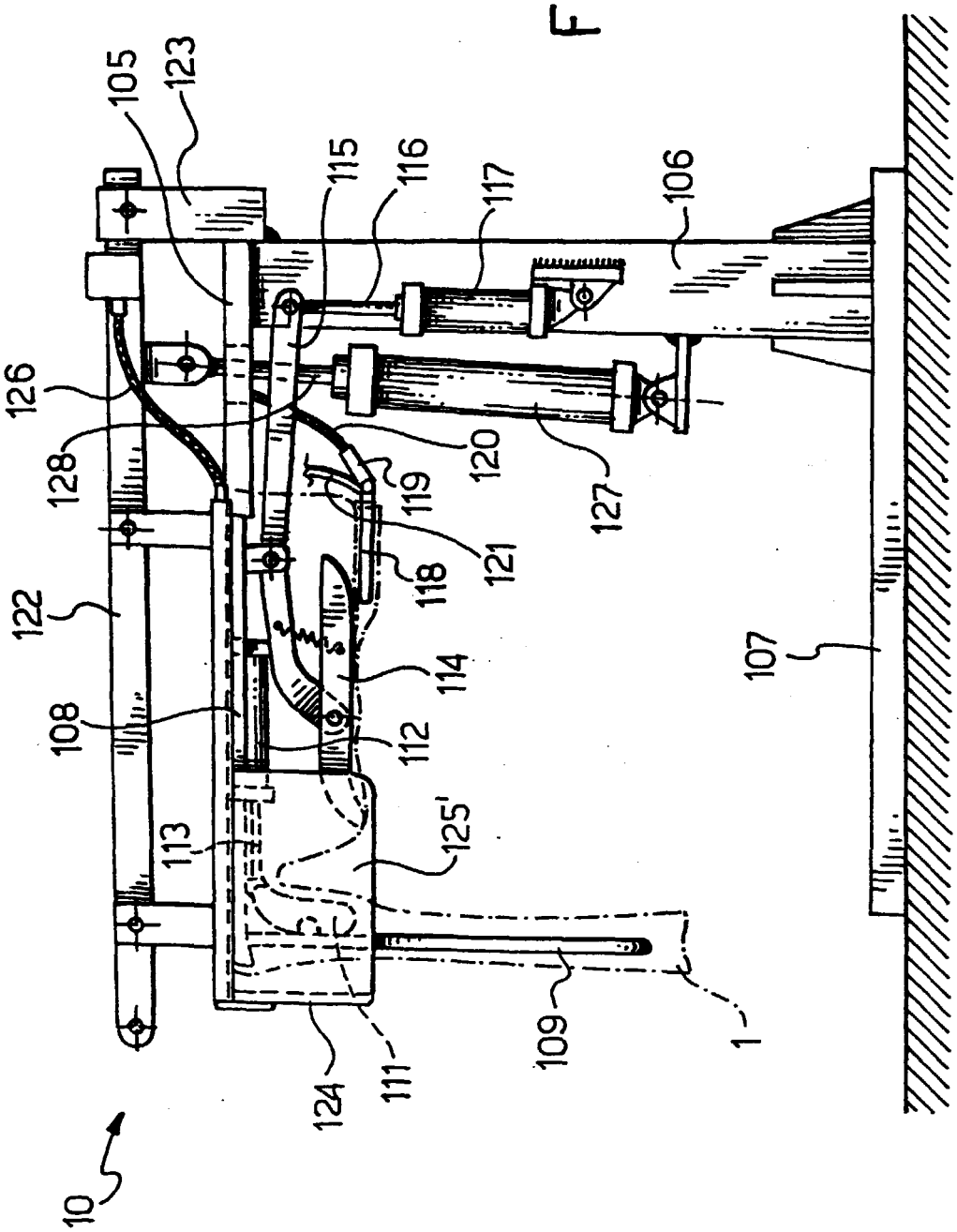

123
116
117
106
126
128
105
121
127
122
102
115
120
119
118
108
114
104
103
107
112
113
101
125'
110
124
111
10
109
1

FIG.5

FIG.6


105
123
115
116
117
106
126
128
120
119
127
121
118
122
114
107
108
112
113
125'
109
1
124
111
10