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(54) **Machine for the reciprocal fastening of facing edges of the instep part of a shoe upper**

(57) A machine fastens to each other the opposite edges (51a,51b) of the instep part of a shoe upper by a piece (15) of thread (2) that is introduced in the holes

(52a,52b) made in the edges and clamped at the related ends (15a,15b) by a cylindrical element (36) which receives these adjacent parts and is deformed permanently thus locking the ends (15a,15b) of the thread.

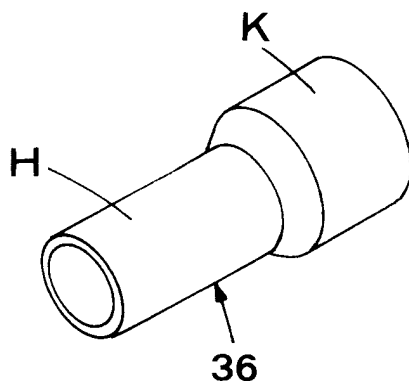


FIG. 1

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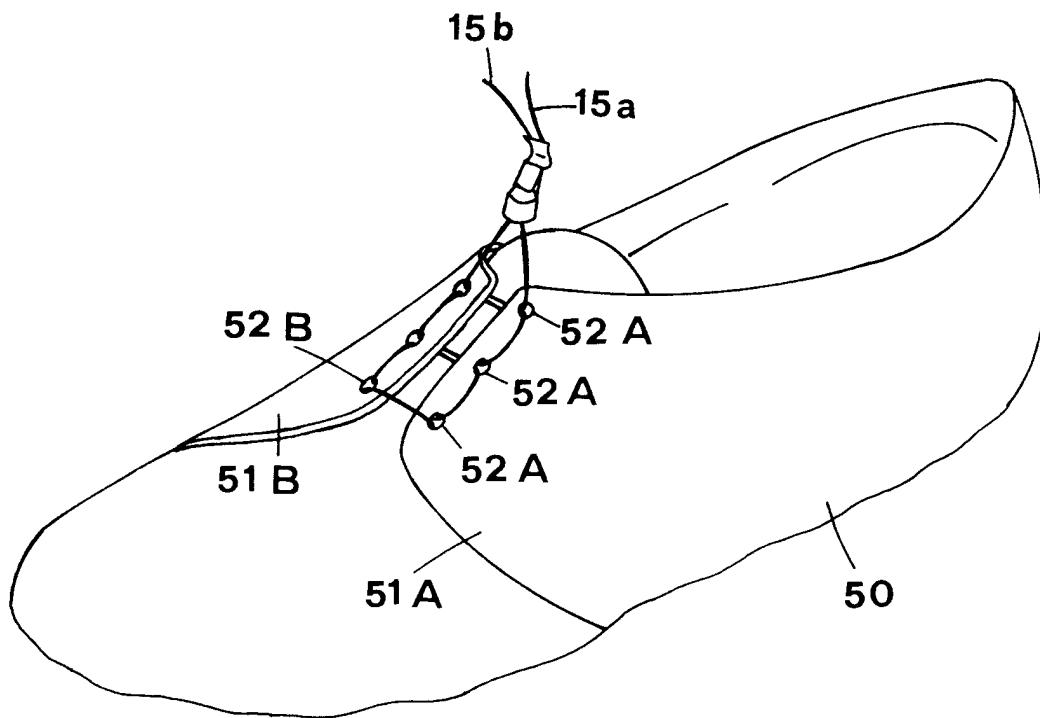


FIG. 10

Description

[0001] Footwear production includes lasting a shoe upper in order to perform on various working steps, such as rubbing, glue application, stretching, application of a relative sole, and so on.

[0002] Before the upper is set on the last, it is necessary to close the instep portion, so as to avoid possible upper deformation and/or relative displacement between the upper and the last.

[0003] The instep is closed by removably fastening to each other the opposite edges of the fore-upper part of the shoe upper.

[0004] At present, these edges are fastened to each other by a thread (e.g. of cotton) which passes through the holes made in these edges and whose ends are knotted.

[0005] If this knot is not tied perfectly, it tends to untie causing all possible disadvantages deriving therefrom.

[0006] A machine for carrying out the above mentioned operations, uses cam systems that operate lever mechanisms. This complicate configuration requires frequent maintenance operations, since inaccuracies occurring to the machine, due to wearing and clearances, are amplified by the lever mechanisms.

[0007] The above mentioned machine includes a thread carrying needle, which moves horizontally, between an advanced position and a retracted position.

[0008] When the needle is in the advanced position, the end of the thread is hooked by first pliers, when the needle returns to the retracted position, a part of the thread is placed near a unit that first hooks this part of the thread, then pulls it to draw the other thread through the needle, then oscillates outwards so as to allow the operator to join the holes of the above mentioned edges.

[0009] The holes are matched in pairs, in coaxial arrangement, by drawing the edges close to each other, and are joined together by cylindrical elements with the above mentioned part of the thread attached thereto.

[0010] Afterwards, the needle returns to vertical position and raises these cylindrical elements, so as to allow the formation of loops in the region of the cylindrical elements and on the side of the needle.

[0011] At this point, the needle returns to the advanced position entering the loops during this stroke.

[0012] Second pliers, situated beside the first ones, grip the needle thread, which is subsequently cut off.

[0013] The operator, in time relation with the needle return to the retracted position, disengages the holes of the above mentioned edges from the unit, pulls the thread and sets it on the knot tying group.

[0014] The thread stretching depends on the operator's ability and also on the position of this knot tying group with respect to the above mentioned unit.

[0015] Consequently, the thread stretching is not the same for all the uppers, as well as the knot tying is not always reliable.

[0016] This invention was evolved with the general

object or providing a machine for fastening to each other the facing edges of the instep part of the upper, so as to close the instep, this machine including a station for firmly fastening the part of thread being used without tying knots and with a predetermined adjustable stretching of this thread.

[0017] Another object of the present invention is to provide a machine, in which the above mentioned station does not require operator's intervention.

[0018] A further object of the present invention is to provide a machine which not only does fulfill the above mentioned objects, but has also higher throughput than the machine described in the prior art.

[0019] Yet another object of the present invention is to provide a machine obtained by a combination of devices, means and operative mechanisms preferably driven by electric and/or pneumatic actuators, with reduction of inaccuracies and maintenance operations frequency.

[0020] These objects are obtained in a machine made accordance with the preamble of claims 1 and 6, and including all the features of the characterising portions of these claims.

[0021] The characteristic features and advantages of the present invention will become more fully apparent from the following detailed description taken in conjunction with the accompanying drawings, in which:

- Figure 1 is a perspective view of a thread fastening element;
- Figure 2 is a schematic front view of some characteristic parts of the proposed machine;
- Figures 3 and 4 show views corresponding to the one of Figure 2 in different characteristic working situations;
- Figure 5 is a cross-section view taken along line V-V of Figure 4;
- Figure 6 is the same view as in Figure 2 in another characteristic working situation;
- Figure 7 illustrates a cross-sectional view taken along line VII-VII of Figure 6, with the hooking unit in inclined position for setting thereonto the holes made in the facing edges of the instep part of the upper;
- Figure 8 shows the unit of Figure 7 in vertical position and in a working step different from the one shown in Figure 7;
- Figure 9 is the same view as Figure 1, of another, final characteristic working situation;
- Figure 10 is a perspective view of an upper, in which

the instep is closed by the method carried out by the proposed machine.

[0022] With reference to the above described figures, reference numeral 1 generally designates a horizontally oriented needle, that carries a thread 2. The needle 1 is supported by a slide 3 operated by a relative first actuator 70.

[0023] The needle 1 moves between two characteristic extreme positions, namely an advanced position A and a retracted position R, respectively.

[0024] During the stroke between these extreme positions A and R, advanced and retracted respectively, the needle 1 passes through a unit 10, where a part 15 of the thread is hooked and handled, a station 30, where the ends 15a, 15b of this part 15 of the thread are fastened in a way explained later, and through a centring member 16. The centring member 16 has a through hole 16a, which the needle enters freely when it reaches the advanced position A.

[0025] Two pliers 17 and 18, first and second respectively, described in detail later, operate between the centring member 16 and the station 30.

[0026] The pliers 17, 18 are driven into oscillation by relative actuators, second and third, respectively, both actuators not being shown.

[0027] The unit 10 includes:

- a carrier member 11, that can oscillate around a hinge pin 11a parallel to the needle 1 movement direction W, which is moved by a fourth actuator 72 from a vertical position V (Figure 8) to an inclined position I (Figure 7);
- a support base 12, having longitudinal dimension parallel to the above mentioned hinge pin 11a and carried by a shaft 13. The shaft 13 is driven by a fifth actuator 73, that is carried by the carrier member 11, so that the base 12 is moved crosswise;
- a plurality of pins 31 (e.g. three), parallel to each other, carried by the support base 12 and spaced apart like the holes 52A, 52B made in the edges 51a, 51b of an upper 50 (Figure 10); each of the pins 31 features, made in one side of its upper part, a hook 31a and an indentation 31b, arranged under the hook 31a and substantially at 90° with respect to the hook 31a;
- a plurality of tightening members 19, each of which is formed by a square-shaped rod, whose terminal part 19a is perpendicular to the pins 31; the tightening members 19 are arranged along planes set crosswise to the hinge pin 11a but staggered with respect to the planes in which of the pins 31 lie. The tightening members are carried by a common support element 14 fastened to the carrier member 11 and operated by a relative sixth actuator (not

shown);

- a guiding and centring body 95, which forms in its lower part a groove 95a, centred with respect to the pins 31, when the carrier member 11 is in vertical position; this body is operated to move vertically by a relative seventh actuator 74.

[0028] The pins 31 can be rotated each one around its related axis by rotation driving means (which are not shown) operated by the same fourth actuator 72.

[0029] The station 30 includes a feeder 35 supplying tubular cylindrical elements 36. The feeder 35 is inclined and opened in its front part.

[0030] The station 30 has also buckling or pressing means including a punch 40 operated vertically by a relative eighth actuator, not shown.

[0031] The base 37 of the feeder 35, which holds the lowermost tubular cylindrical element 36a of the pile 36, is set in such a way that this lowermost element 36a is coaxial with the needle 1 axis.

[0032] The base 37 has a recess 37a having a shape that matches up the shape of the head 40a of the punch 40.

[0033] Operation of the machine will be explained in the following.

[0034] At the beginning of each operation cycle, the needle 1 is located in the retracted position R and the carrier member 11 takes the vertical position V.

[0035] The needle 1 moves to the advanced position A, passing through the lowermost tubular element 36a, until the needle tip enters the hole 16a of the centring member 16.

[0036] When the needle tip reaches the hole 16a, the pliers 17 grip the end 15a of the thread 2 (see Figure 3).

[0037] At this point, the needle moves back to the retracted position R (see Figure 4). By doing so, the needle makes the portion 15 of the thread, i.e. the portion between the pliers 17 and the needle 1 itself, pass through the tubular element 36a and locates the same portion 15 in initial part of the hook 31a of each pin 31 (see Figure 5).

[0038] The tightening means are then lowered so that the terminal parts 19a engage the adjacent sections T of the thread portion 15 located among the pins 31.

[0039] This calls other threads from the needle 1 (see Figure 6) and firmly insert the thread in the hooks 31a.

[0040] After the above mentioned steps, the carrier member 11 is rotated so that it moves from the vertical position V to the inclined position I (see Figure 7). In phase relation with this movement, the pins 31 are rotated ninety degs around their axes and all in the same direction. Rotation is imparted to the pins by the already mentioned rotation driving means, which are not shown and which are controlled by the same fourth actuator 72 which makes the carrier member oscillate.

[0041] Now, after having set the edges 51a, 51b of the upper 50 closer to each other, so that the holes 52a, 52b

made in these holes match, sets each pair of holes 52a and 52b on a respective pin 31, and slides them until the edges 51a, 51b strikes the terminal parts 19a.

[0042] When the machine elements have reached this above-mentioned position, the carrier member 11 is moved back to the vertical position V. In suitable phase relation, and when the centring member 95 has been lowered, the terminal parts are raised all together so that the tips 31c of the pins 31 enter the groove 95a of the centring member 95 (see Figure 8).

[0043] After all these movement have been accomplished, the portion 15 of the thread 2 forms a loop 80 for each indentation 31b. The loops 80 lie in a plane perpendicular to the direction W.

[0044] At this point, the needle 1 is moved again to the advanced position A, thus passing through the loops 80, through the hole of the tubular element 36a, until the tip of the needle enters the hole 16a of the centring member 16.

[0045] Then, the second pliers 18 are operated and when the needle is again moved back, a thread cutter 81 controlled by the pliers 18 is moved to cut the thread (see Figure 9).

[0046] As soon as the needle has come out of the lowermost tubular element 36a, the punch 40 is lowered. The punch head 40a and the recess 37a co-operate to buckle the tubular element 36a.

[0047] Consequently, the ends 15a and 15b of the thread portion 15 remain locked by the collapsed wall of the tubular element 36a.

[0048] In the present example, the tubular elements 36 include each two consecutive sections H and K. The second section K has a diameter larger than the one of the first section H, so as to create a funnel shape for facilitating the entrance therein of the needle.

[0049] The punch created a buckling only in the first section H, as it appears in Figure 1.

[0050] On the other hand, the element 36 can have any shape and any cross-section. The buckling can be made in any part of the element 36 and can extend along the entire length thereof. Deformation of the element, which exerts a firm lock action on the thread ends, can be performed with the metal cold or warmed, and by any means other than the punch.

[0051] Instead of the single body element, a multi-component thread locking device can be used, that includes more components which are press fit into each other to firmly lock the thread ends 15a, 15b. According to another embodiment, the thread locking device includes components joined to each other by deformation to lock the thread therebetween.

[0052] As it appears, the proposed machine is capable of carrying out the closure of the instep portion of the shoe upper by using any type of thread, also synthetic (e.g. nylon). The ends of the thread are locked by a thread locking device, that can be of any type and that is located in the handling station 30.

[0053] The locking action is achieved without the

need of operation stops and with a constant tightness, that can be adjusted.

[0054] The basic technical feature of the present invention is the configuration of the handling station located between the operative unit 10 and the pliers 17 and 18.

[0055] Another advantageous aspect of the invention is the production of a machine which does not include cam means and which is moved by a series of actuators (electrical, pneumatic and so on), that are independent from each other, although they are operated in reciprocal phase relation.

[0056] Possible inaccuracies and clearances of the mechanical means operated by each actuator does not interfere with or influence the motion of the other mechanical means operated by the other actuators.

[0057] The scope of the present invention is wide, since not only a machine as described and shown is regarded as covered by the patent requested, but also a machine having cam means and lever mechanisms in which instead of the conventional knot forming station has the operative station 30 described hereinabove. Protection is also requested for a machine of the type described hereinabove, in which the operative station 30 has been replaced with a conventional knot forming station.

Claims

1. Machine for the reciprocal fastening of facing edges of the instep part of a shoe upper, said edges (52A, 52B) having through holes (51A, 51B), that match each other after setting the edges close, the machine including:

a needle (1) provided with a thread and moved horizontally along a path (W) between a retracted position (R) and an advanced position (A);

first pliers (17) capable of clamping an end of said thread (2), when the needle is in said advanced position (A);

a hinged carrier member (11), that is pivoted between a vertical position (V) and an inclined position (I), said carrier member (11) including at least two pins (31) spaced apart like two adjacent said holes (51A, 51B) in said edges, said pins (31) being designed for hooking said thread clamped by said pliers (17), when the needle is moved to said retracted position (A), and also including tightening means (19) which engage corresponding sections (T) of said thread and pull said sections (T) downwards, with said sections (T) being delimited by, and adjacent to, said pins (31), said carrier member (11) being moved from said vertical position (V)

to said inclined position (I), in which pairs formed by said holes (52A, 52B) of said edges can be set onto said pins (31), and then moved back to said vertical position (V);

moving means for raising said pins and said tightening means, after that said holes (52A, 52B) have been set onto said pins and that said carrier member has been moved to said vertical position (V), so as to form a series of loops (80) located along said path (W) of the needle (1);

second pliers (18) adjacent to said first pliers (17) for clamping the thread of said needle (1) when said needle is taken again to said advanced position (A) and the thread passes through all said loops (80);

a thread cutter (81) aimed at cutting said thread in a position close to said second pliers (18);

said machine being characterised in that an operative station (39) is located between said pliers first and second (17, 18), on one side, and the closest of said pins (31), on the other side, said operative station being designed for locking together said thread free ends (15a, 15b) clamped by said pliers first and second (17, 18), when the needle (1) is moved again to said retracted position (R).

2. Machine according to claim 1, characterised in that said operative station (30) includes:

a feeder (35) for supplying a locking element (36) which is disposed on said path (W) of said needle (1) and in a position located between said carrier member (11) and said pliers first and second (17, 18);

means (40) for pressing said locking element (36) so that said ends (15a, 15b) of said thread becomes firmly gripped by the buckled locking element (36).

3. Machine according to claim 2, characterised in that said locking element (36) includes a tubular element that can be permanently cold or warm deformed and can be passed through by said needle, with the said pressing means (40) including a punch that squeezes the said tubular element and deforms it permanently.

4. Machine according to claim 3, characterised in that said punch (40) has a head (40a) co-operating with a recess (37a) made in a base (37) on which said locking element (36) is set.

5. Machine according to claim 2, characterised in that said locking element includes at least two components which are fit to each other by warm or cold action of said pressing means.

6. Machine for the reciprocal fastening of facing edges of the instep part of a shoe upper, said edges (52A, 52B) having through holes (51A, 51B), that match each other after setting the edges close, the machine including:

a needle (1) provided with a thread and moved horizontally along a path (W) between a retracted position (R) and an advanced position (A);

first pliers (17) capable of clamping an end of said thread (2), when the needle is in said advanced position (A);

a hinged carrier member (11), that is pivoted between a vertical position (V) and an inclined position (I), said carrier member (11) including at least two pins (31) spaced apart like two adjacent said holes (51A, 51B) in said edges, said pins (31) being designed for hooking said thread clamped by said pliers (17), when the needle is moved to said retracted position (A), and also including tightening means (19) which engage corresponding sections (T) of said thread and pull said sections (T) downwards, with said sections (T) being delimited by, and adjacent to, said pins (31), said carrier member (11) being moved from said vertical position (V) to said inclined position (I), in which pairs formed by said holes (52A, 52B) of said edges can be set onto said pins (31), and then moved back to said vertical position (V);

moving means for raising said pins and said tightening means, after that said holes (52A, 52B) have been set onto said pins and that said carrier member has been moved to said vertical position (V), so as to form a series of loops (80) located along said path (W) of the needle (1);

a centring means (95) that is moved vertically from a raised position to a lowered position, and designed to keep centred, in the said lowered position, the tips (31c) of the pins (31) carrying said loops (80);

second pliers (18) adjacent to said first pliers (17) for clamping the thread of said needle (1) when said needle is taken again to said advanced position (A) and the thread passes through all said loops (80);

a thread cutter (81) aimed at cutting said thread

in a position close to said second pliers (18);

a locking station (30) provided with a feeder (35) for supplying cylindrical locking elements (36), said feeder having its bottom so located that the lowermost locking element (36a) of a stack of elements contained in said feeder is set in a position coaxial with said path of said needle, with the needle passing freely there-through, said locking station also including a punch (40) operated in phase relation with the needle moving back to said retracted position (R) for permanently buckling said locking element to lock therein free ends (15a, 15b) of said thread, with said free ends (15a, 15b) clamped by said pliers first and second (17, 18) respectively; said machine being characterised in that it induces:

one first actuator (70) for moving said needle in a linear path ;

one second actuator for operating said first pliers;

one third actuator for operating said second pliers;

one fourth actuator (72) for operating said carrier member (11);

one fifth actuator (73) for axial motion of said pins (31);

one sixth actuator for operating said tightening means (19);

one seventh actuator for vertical motion of said centring means (95);

one eighth actuator for operating said punch (40).

7. Machine as in claim 6, characterised in that said actuators are pneumatic actuators.

8. Machine as in claim 6, characterised in that said actuators are electric actuators.

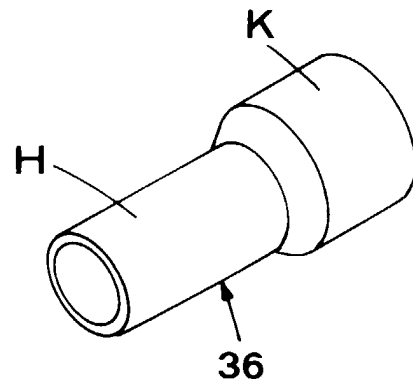


FIG. 1

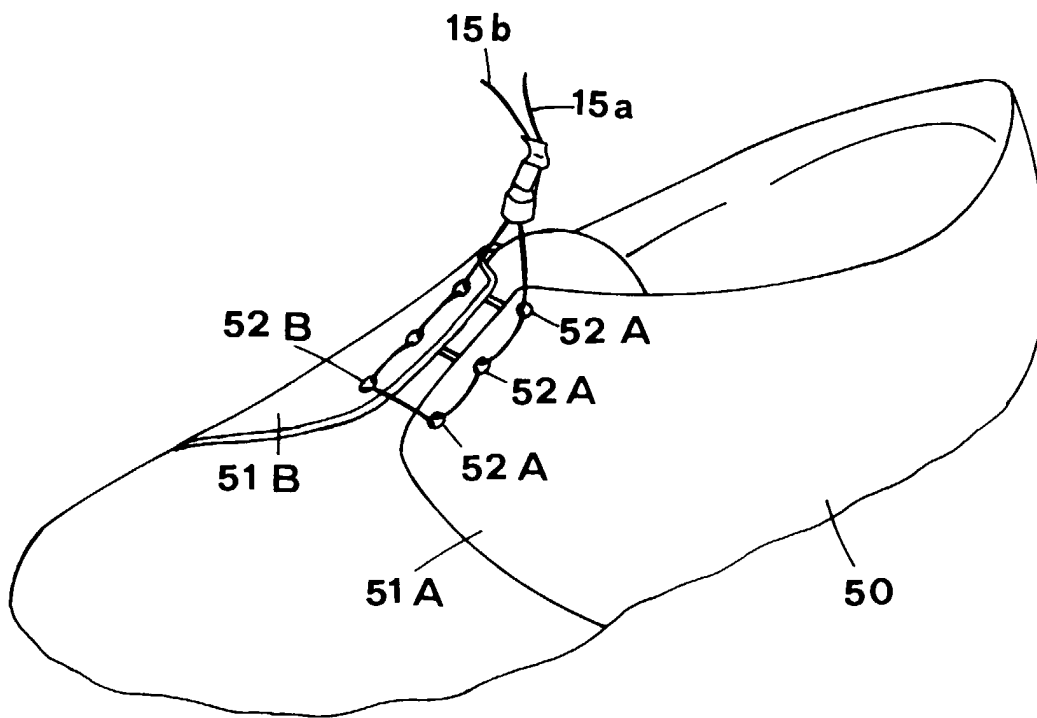


FIG. 10

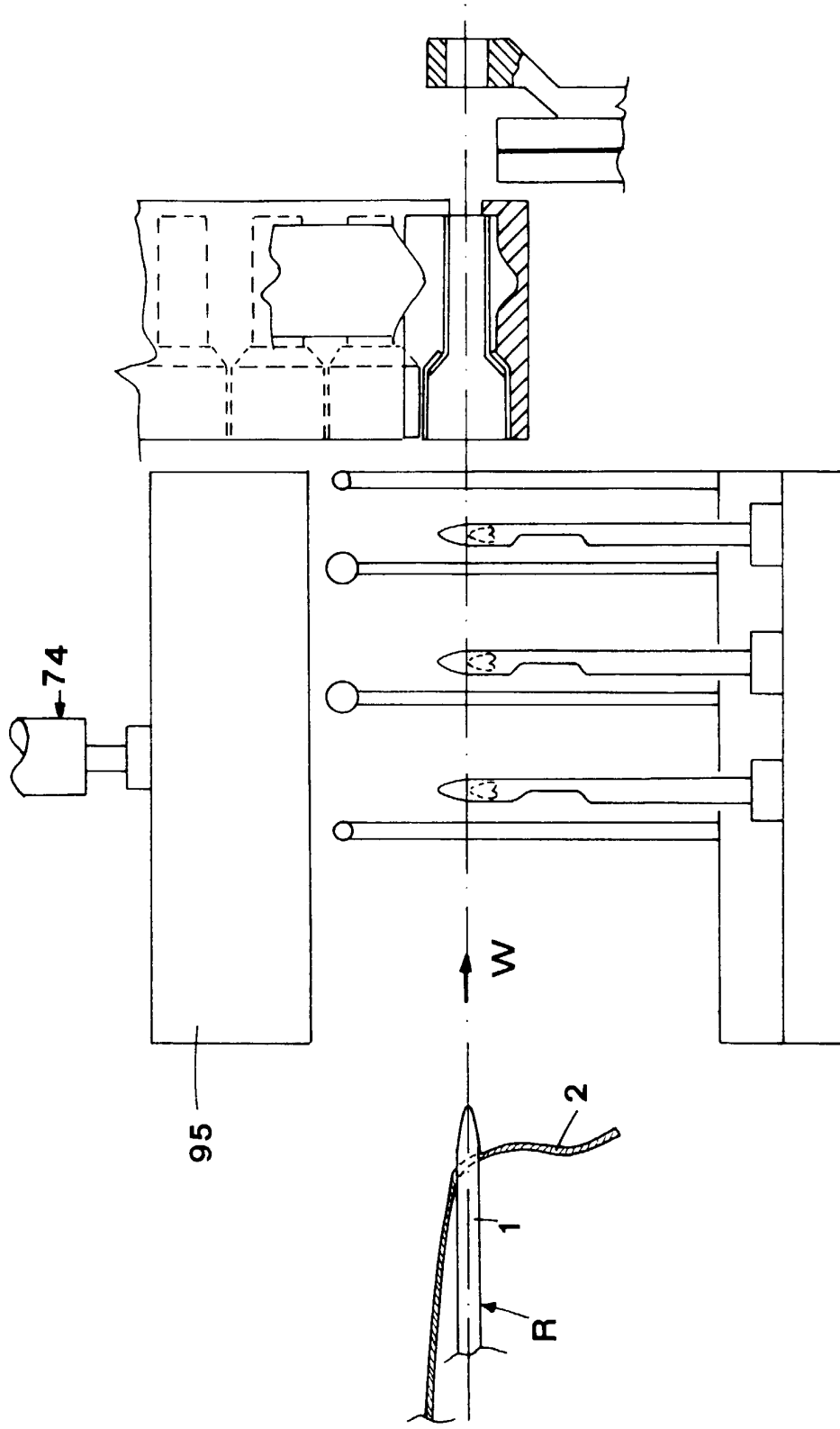
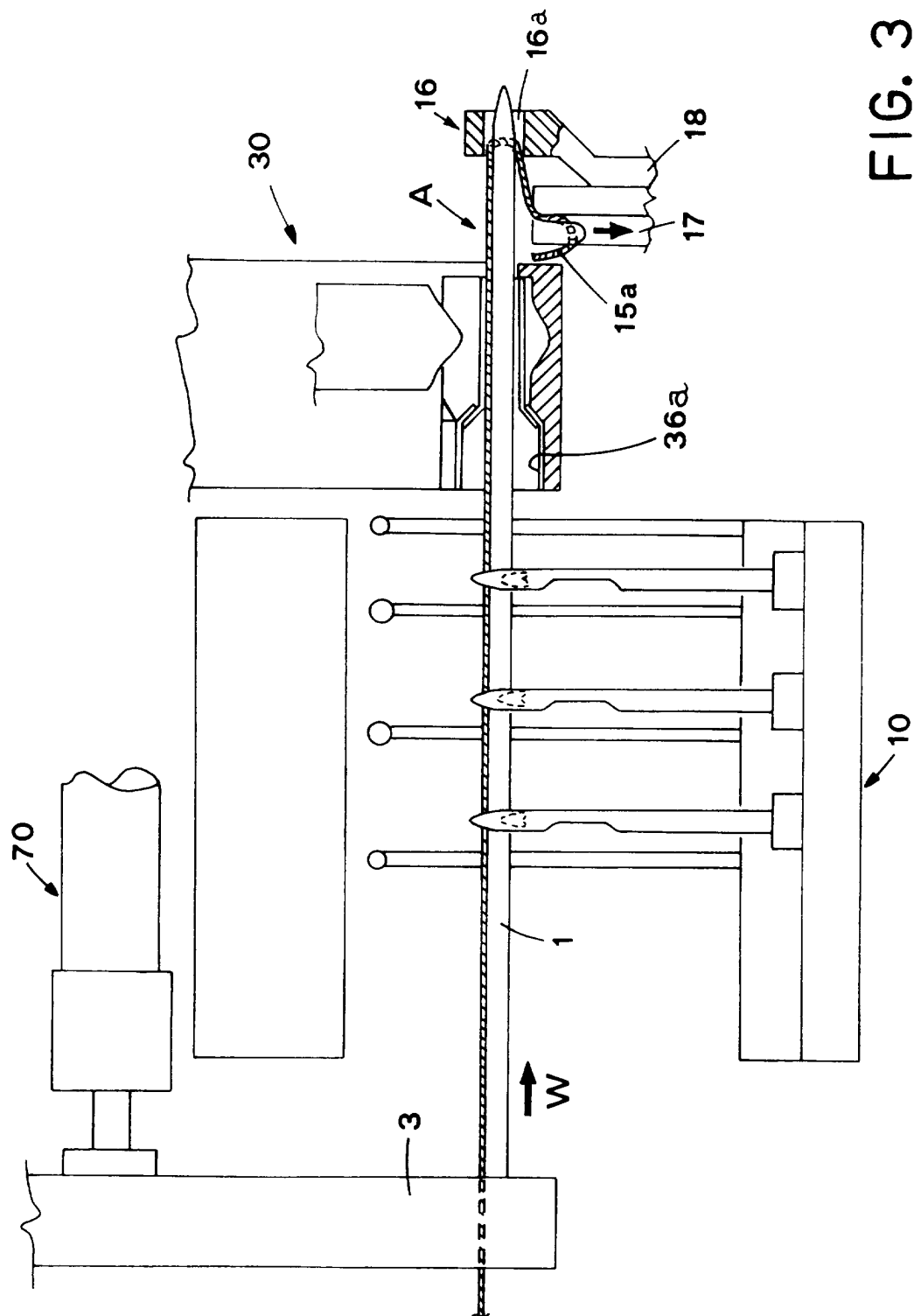


FIG. 2



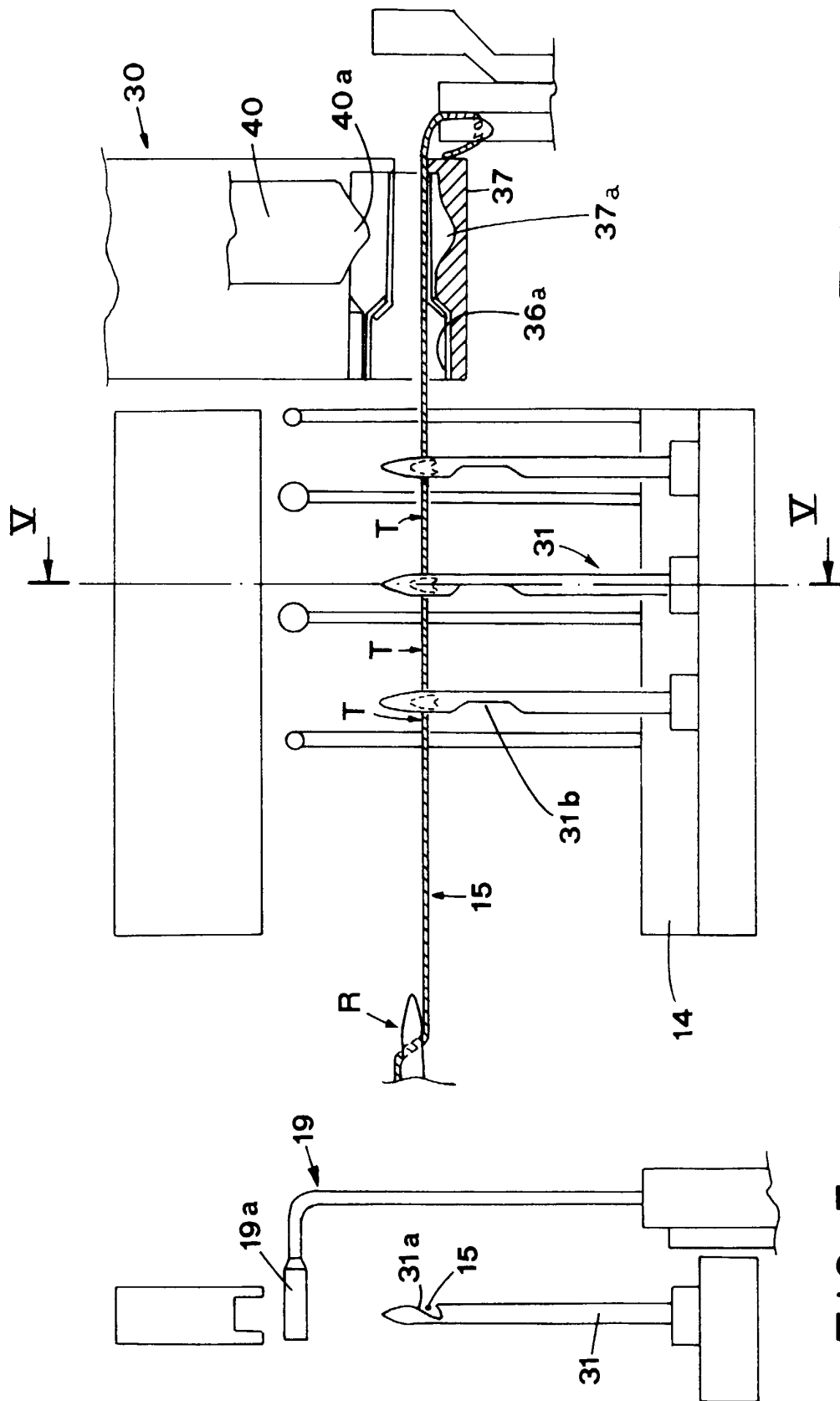


FIG. 4

FIG. 5

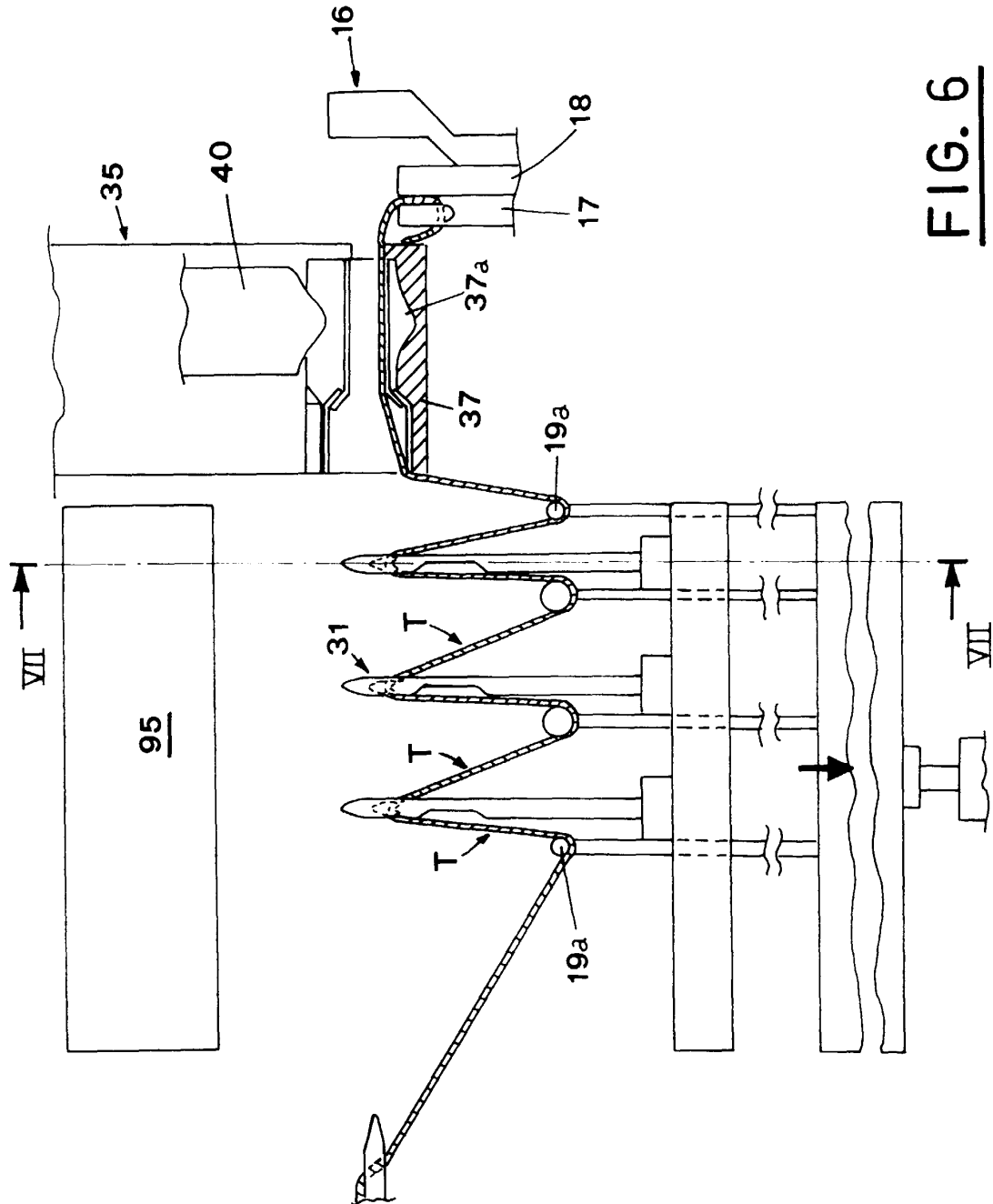
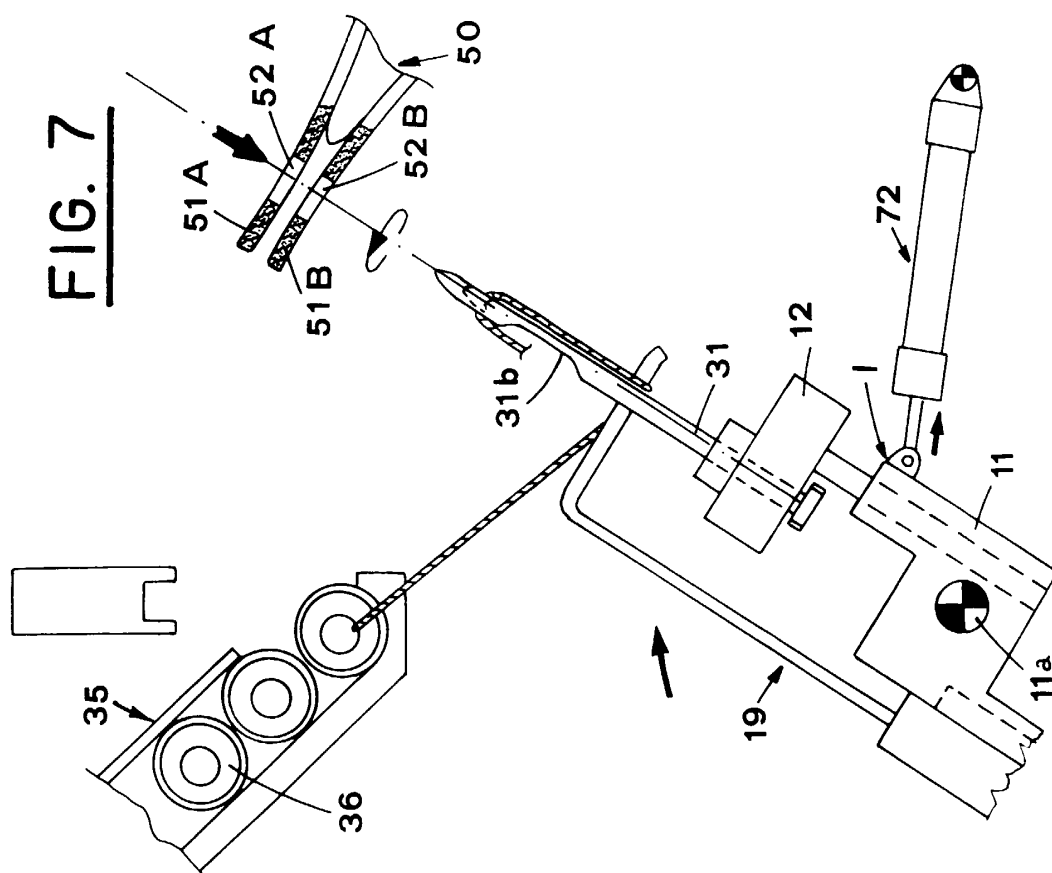
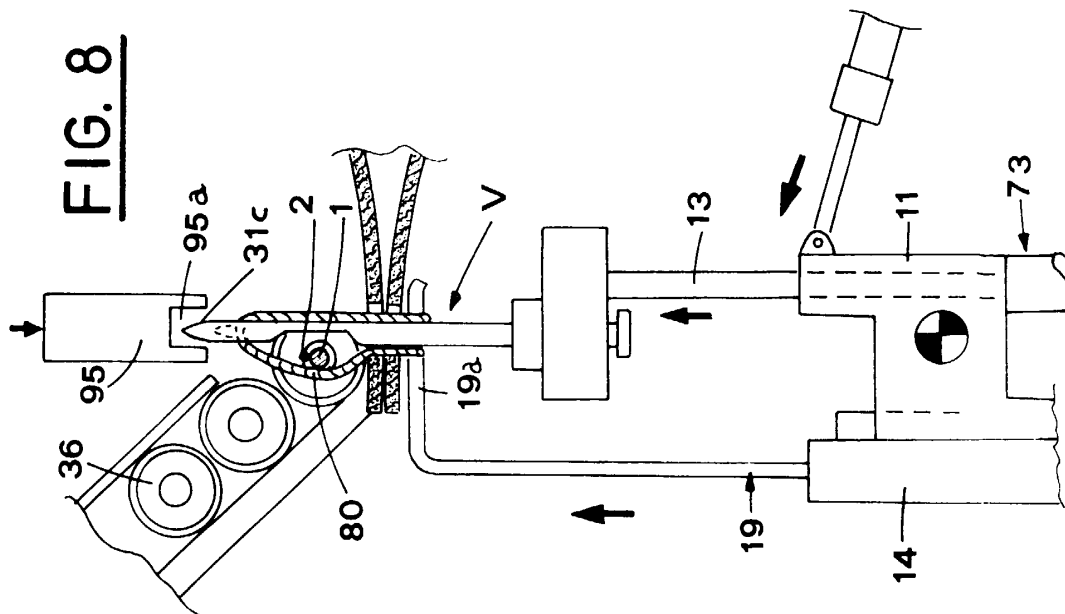


FIG. 6



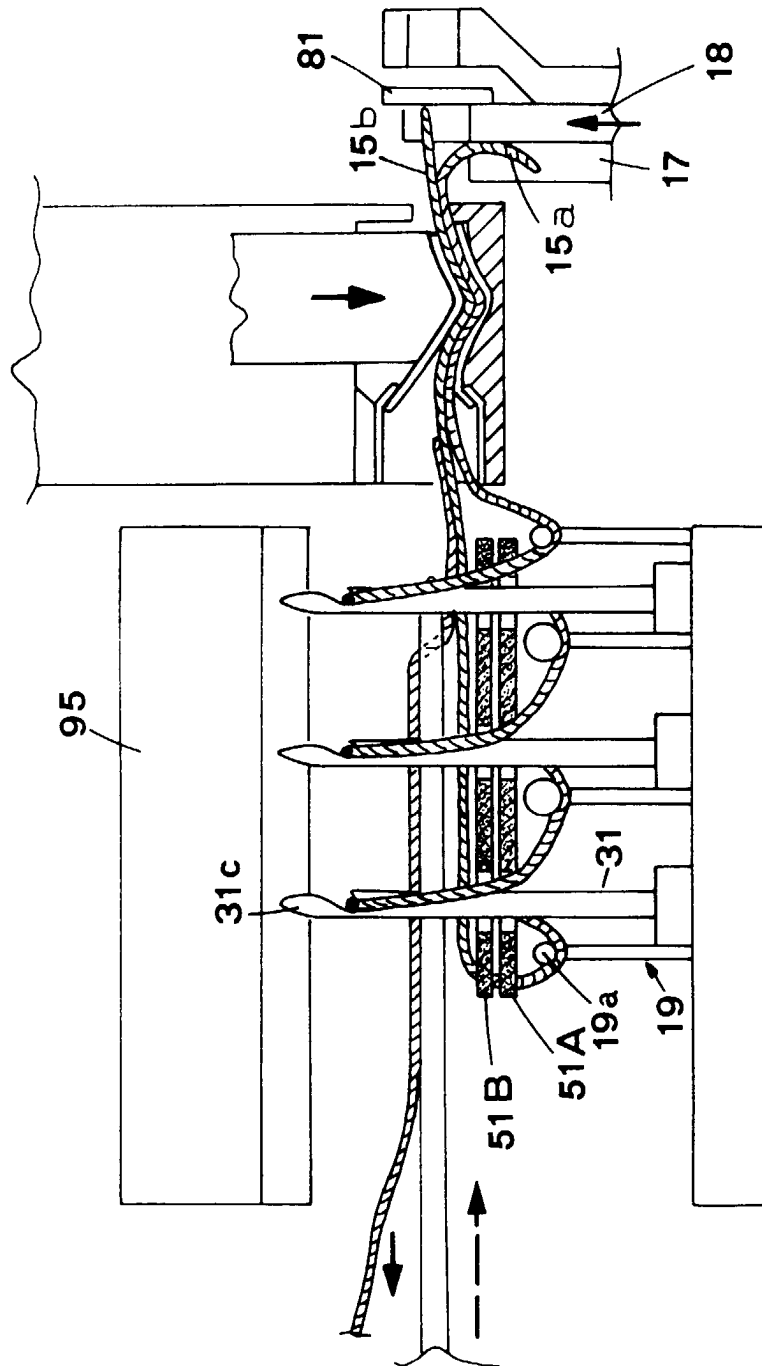


FIG. 9



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 99 12 0092

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	DE 201 501 C (UNITED SHOE MACHINERY COMPANY) 16 September 1908 (1908-09-16)	1	A43D11/08
A	* page 3, line 91 - line 109 * * page 6, line 88 - page 7, line 31 * * figures 3,5,29-34 * ---	6	
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A	EP 0 124 494 A (BERTOLAJA SOSTANTINO & C MECC) 7 November 1984 (1984-11-07) * claim 4; figure 6 * -----	6,7	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			A43D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 31 July 2000	Examiner van Elk, M
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EP 99 12 0092

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