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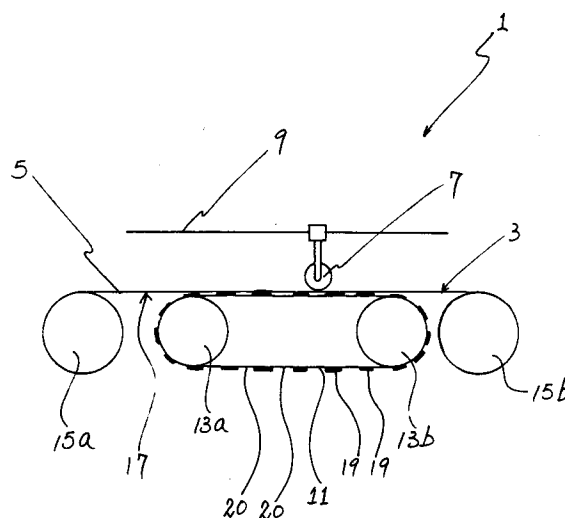
(11) Publication number:

0 687 759 A1

(12)

EUROPEAN PATENT APPLICATION(21) Application number: **94304242.4**(51) Int. Cl.⁶: **D06C 23/02, D06B 11/00**(22) Date of filing: **13.06.94**(43) Date of publication of application:
20.12.95 Bulletin 95/51(84) Designated Contracting States:
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HASELTINE LAKE & CO.
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London WC2A 1AT (GB)(54) **Method and apparatus for mechanically abrading fabric**

(57) The present invention provides a method for mechanically abrading fabric (5) which includes the steps of moving the side of the fabric to be abraded over an abrasive surface (7) at a controlled velocity and, simultaneously, selectively applying pressure to the side (17) of the fabric to be abraded so as to increase abrasion between the abrasive surface and the fabric in the region where pressure is applied relative to areas where pressure is not applied. An apparatus comprising means for carrying out the steps of the method is also provided. The method and apparatus of the invention are less environmentally-damaging than the prior art and can produce a treated fabric which displays predetermined wear characteristics.

FIG. 1**EP 0 687 759 A1**

This invention relates to a method and an apparatus for mechanically abrading fabric and, in particular, to a method and an apparatus for abrading fabric on the roll or in the piece having pre-determined characteristics such as surface wear, shading or patterns. Fabric "in the piece" herein refers to articles of clothing made of fabric, e.g. jeans or jackets. Fabric "on the roll" refers to unworked fabric, usually but not necessarily, wound into a roll. This invention is most suitable for application on Indigo denim or pigment painted fabrics.

In a so-called "stonewash" method of treating fabric, garments are tumbled together with water and pumice stones in a rotatable chamber to produce a worn out effect. Another is the so called "sandblasting" method, which involves the application of jets of high velocity fine sand particles carried by an air current produced by an air compressor so as to produce patches of worn out areas on the fabric. U.S. Patent No. 4,912,056 discloses a method of treating denim cloth with a cellulase enzyme. U.S. Patent No. 5,114,426 discloses a method wherein the fabric is tumbled with stones of a chemical composition that is soluble in wash or rinse liquid for the fabric, but where the stones are of sufficient size and hardness to effect abrasion of the fabric without substantial mechanical disintegration of the stones.

The effect of treatment of most of the above methods is homogenous, i.e. the degree of treatment or abrasion is substantially the same over the entire treated fabric. For those methods whose effect is not homogenous, e.g. the "sandblasting" method, it is not possible to determine before treatment to an accurate extent, any specific characteristics of any particular area or areas of the fabric, e.g. surface wear, shading or patterns. Any disparity in the degree of treatment or abrasion among the areas of the fabric is largely accidental and not accurately repeatable.

The use of water and chemicals in some of the above methods also poses environmental problems. In countries where effective anti-pollution laws are in place, the manufacturers have to treat the wastewater generated by the methods, with or without the chemicals, before disposal. Such will increase the cost of production. Even in countries where there are no or no effective anti-pollution laws, the disposal of the wastewater and/or the chemicals could cause serious pollution problems to the surrounding environment.

It is therefore an object of the present invention to provide a method and an apparatus for abrading fabric on the roll or in the piece wherein the aforesaid shortcomings are obviated.

According to a first aspect of the present invention, there is provided a method for abrading

5 fabric on the roll or in the piece having pre-determined characteristics such as surface wear, shading or patterns, including the steps of providing an abrasive surface for abrading one side of the fabric; moving the side of the fabric to be abraded over the abrasive surface at a controlled velocity relative thereto; simultaneously therewith, providing means for selectively applying pressure to the side of the fabric to be abraded in a direction towards the abrasive surface so as to increase abrasion between the fabric and the abrasive surface in the region where said pressure is applied relative to areas where said pressure is not applied; and moving said fabric out of contact with said abrasive surface to produce a fabric with an abraded surface.

The abrasive surface may be movable during the abrasion step.

Conveniently, the abrasive surface may be cylindrical and rotatable.

The means for selectively applying pressure to the side of the fabric not to be abraded may constitute a roller selectively biased towards the abrasive surface. The surface of the roller may have a relief or pattern thereon having respective high and low areas relative to the median surface of the roller, to thereby selectively vary the pressure applied to the fabric such that when the fabric passes the abrasive surface a corresponding relief or pattern is imparted to it on that side of the fabric adjacent to the abrasive surface. The velocity of the fabric may be synchronized with that of the roller such that the relative velocity between the fabric and the roller at the point where the fabric is closest to the surface of the roller is substantially zero.

The means for selectively applying pressure to the side of the fabric not to be abraded may alternatively constitute a continuous belt supported for movement on rollers, which belt having a relief or pattern thereon having respective high and low areas.

The means for selectively applying pressure to the side of the fabric not to be abraded may alternatively constitute a plurality of individually controllable elements which are adapted to bear against the fabric during treatment thereof, thereby to provide corresponding areas on the fabric which are more abraded than others.

The fabric may be moved during abrasion by means of rollers, the velocity of such movement being relatively substantially lower to the movement of the abrasive surface, thereby to increase the abrasion received by the fabric.

Pressure applied to that side of the fabric not to be abraded may be synchronized with the movement of the fabric such that substantially only those areas where maximum pressure on the fabric

is applied are abraded by the abrasive surface.

According to a second aspect of the present invention, there is provided an apparatus for abrading fabric on the roll or in the piece having predetermined characteristics such as surface wear, shading or patterns, comprising an abrasive surface for abrading the fabric; means for moving the side of the fabric to be abraded over the abrasive surface at a controlled velocity relative thereto; and means for selectively applying pressure to the side of the fabric not to be abraded in a direction towards the abrasive surface so as to increase abrasion between the fabric and the abrasive surface in the region where said pressure is applied relative to areas where said pressure is not applied.

The abrasive surface may be movable.

Conveniently, the abrasive surface may be cylindrical and rotatable.

The means for selectively applying pressure to the side of the fabric not to be abraded may constitute a roller selectively biased towards the abrasive surface. The surface of the roller may have a relief or pattern thereon having respective high and low areas relative to the median surface of the roller, to thereby selectively vary the pressure applied to the fabric such that when the fabric passes the abrasive surface a corresponding relief or pattern is imparted to it on that side of the fabric adjacent to the abrasive surface. The velocity of the fabric may be synchronized with that of the roller such that the relative velocity between the fabric and the roller at the point where the fabric is closest to the surface of the roller is substantially zero.

The means for selectively applying pressure to the side of the fabric not to be abraded may alternatively constitute a continuous belt supported for movement on rollers, which belt having a relief or pattern thereon having respective high and low areas.

The means for selectively applying pressure to the side of the fabric not to be abraded may alternatively constitute a plurality of individually controllable elements which are adapted to bear against the fabric during treatment thereof, thereby to provide corresponding areas on the fabric which are more abraded than others.

The means for moving the side of the fabric to be abraded over the abrasive surface at a controlled velocity relative thereto may constitute a plurality of rollers.

According to a third aspect of the present invention, there is provided a fabric and a clothing piece abraded in accordance with any of the above methods.

According to a fourth aspect of the present invention, there is also provided a fabric and a clothing piece, abraded by any of the above ap-

paratus.

The invention will now be described in more detail by way of example with reference to the accompanying drawings wherein:-

Fig. 1 shows a first apparatus according to the present invention;

Fig. 2 shows a second apparatus according to the present invention;

Fig. 3 shows the fabric feeding system of the apparatus shown in Fig. 2;

Fig. 4 shows a fabric abrasion unit of the apparatus shown in Fig. 2;

Fig. 5 shows a first part of an abrasion roller delivery system of the apparatus shown in Fig. 2;

Fig. 6 shows a cross sectional view taken along line A-A of Fig. 5;

Fig. 7 shows a cross sectional view taken along line B-B of Fig. 5;

Fig. 8 shows a second part of an abrasion roller delivery system of the apparatus shown in Fig. 2;

Fig. 9 shows the end of a driving head associated with one end of the abrasion roller;

Fig. 10 shows a cross sectional view taken along line C-C of Fig. 9;

Fig. 11 shows the view of the end of the abrasion roller associated with the driving head;

Fig. 12 shows a cross sectional view taken along line D-D of Fig. 11;

Fig. 13 shows a longitudinal sectional view of the end of a support head associated with the other end of the abrasion roller; and

Fig. 14 shows a longitudinal sectional view of the abrasion roller adjacent its end associated with the support head.

Fig. 1 shows an abrasion apparatus generally designated as 1 for abrading the upper side 3 of a piece of fabric 5. The apparatus 1 includes an abrasion roller 7 rotatable along its longitudinal axis and movable along a rail 9. There is also provided a continuous rubber belt 11 mounted for movement on rollers 13a and 13b.

The outer circumferential surface of the abrasion roller 7 is provided with abrasive materials, which may be provided by securing to the surface a sheet of paper or cloth coated with abrasive particles, e.g. silicone oxide, aluminium oxide and metal carbide particles. It is found that abrasive particles of a diameter of about 0.2mm to 0.8mm and coated abrasive sheets having a grit size of 180 to P1200 are suitable for this purpose.

A roller 15b is driven by a motor (not shown) to rotate in the clockwise direction and thus to draw the piece of fabric 5 off roller 15a onto roller 15b. The upper side 3 of the fabric 5 faces the abrasion roller 7 and its bottom side 17 faces the rubber belt 11.

The rubber belt 11 is provided with high areas 19 and low areas 20. In the drawing, the height of the high areas 19 is exaggerated. In practice, the high areas 19 will be in the region of several millimetres high. The roller 13b is also driven to rotate in the clockwise direction at such a speed that there is substantially no relative movement between the fabric 5 and the rubber belt 11 at or adjacent the region where the fabric 5 comes into contact with the abrasive materials of the abrasion roller 7.

The abrasion roller 7 is driven to rotate at a relatively high speed, e.g. 3000 r.p.m.. The linear velocity of the fabric 5 across the abrasion roller 7 is substantially lower, e.g. from 1/3 metre to 2 metres per minute. In regions of the fabric 5 where, at the time of abrasion, there are underlying high areas 19, the degree of abrasion will be higher due to higher pressure exerted by the high areas 19 against the fabric 5. Such regions will therefore be more faded than those regions where, at the time of abrasion, there are underlying low areas 20. The general degree of shading can be determined by adjusting the speed of the fabric 5 across the abrasion roller 7. The lower the speed, the more abraded the fabric 5 will be, and vice versa.

It is thus possible to determine, before treatment, the general degree of abrasion of the fabric 5 as well as the specific degree of abrasion of any particular area or areas on the fabric 5. By way of such a method, it is possible to produce different degrees of shading and patterns, e.g. geometrical patterns, on the fabric 5 so treated.

Fig. 2 shows a second embodiment of an abrasion apparatus according to the present invention generally designated as 19. While the particular apparatus 19 shown in the drawing comprises three abrasion units arranged in series generally designated as 21, 23 and 25 respectively, it should be understood that the number of such abrasion units in any particular apparatus 19 may vary according to the specific requirements and needs.

Fabric 5 to be treated is first wound upon a feeding roller 27 supported by two freely-rotatable support rollers 29a and 29b. The fabric 5 is then passed through a fabric feeding system, generally designated as 31, to be described in more detail below.

As shown in Fig. 2, the fabric 5, after being treated successively by the abrasion units 21, 23 and 25, is received and wound upon a receiving roller 33. The receiving roller 33 is in contact with and is caused to move by a torque motor 34. The torque motor 34 rotates in a clockwise direction and causes the receiving roller 33 to move in an anti-clockwise direction and to thus draw onto itself fabric 5 treated by the abrasion units 21, 23 and 25. The fabric 5, after its treatment by abrasion unit

25, has substantially no velocity and will accumulate near the abrasion unit 25 and will thus be wound onto the receiving roller 33. If, however, the fabric 5 between the abrasion unit 25 and the receiving roller 33 is in tension, the torque motor 34 will stop rotation to avoid any damage to the torque motor 34 or the fabric 5.

The abrasion rollers 45 generally rotate in an anticlockwise direction. Due to the high speed of rotation of the abrasion rollers 45 and the friction between the abrasion rollers 45 and the fabric 5, there is a large force drawing the fabric 5 away from the fabric feeding system 31 towards the abrasion units 21, 23 and 25. The fabric feeding system 31, to be described below, serves the purpose of limiting the speed of the movement of the fabric 5.

Fig. 3 shows in more detail the fabric feeding system 31. Fabric 5 from the feeding roller 27 (not shown in this drawing) passes through pulleys 35 and 36. The respective outer circumferential surface of pulleys 35 is provided with relatively rough materials to increase the friction between the fabric 5 and the pulleys 35. The pulleys 35 are driven by, and their speed of rotation is controlled by, a motor 37. The pulleys 35 are caused to rotate in the same direction and at the same speed by connecting them with a continuous belt (or loop) 39 which is in close contact with the pulleys 35. To allow easy insertion of the fabric 5 through the fabric feeding system 31, the pulleys 36 are mounted on a support bar 41 movable along rails 43. By reason of the large friction between the pulleys 35 and the fabric 5, the fabric feeding system 31 sets a limit on the speed of movement of the fabric 5 which is drawn by the abrasion rollers 45.

As shown in more detail in Fig. 4, the abrasion unit 21 is provided with an abrasion roller 45 and a relief bearing roller 47. Fabric 5 to be treated passes through rollers 49a, 49b, 49c and 49d. The fabric 5 is abraded when it comes into contact with the outer circumferential surface of the abrasion roller 45, which is provided with abrasive materials. As shown in Fig. 4, the fabric 5 is in contact with the abrasion roller 45 over about half of its outer circumferential surface, which will give the treated fabric a generally more worn out effect. If this is not desired, the fabric 5 may be caused to pass through rollers 49a, 49e, 49f and 49d, in which case the fabric is shown as the phantom line in Fig. 4. In such an arrangement, the fabric 5 only comes into contact with the abrasion roller 45 at substantially one point, i.e. where the abrasion roller 45 is nearest to the relief bearing roller 47.

In either of the above cases, the relief bearing roller 47 is provided with patterns of high and low areas on its outer circumferential surface and is driven to rotate along its longitudinal surface by a

motor 51. The speed of rotation of the relief bearing roller 47 is so adjusted that, at or near the point or region of contact with the fabric 5, the relative velocity between the fabric 5 and the relief bearing roller 47 is substantially zero. The general degree of pressure exerted by the relief bearing roller 47 upon the fabric 5 may also be regulated by adjusting the position of the bracket 53, to which the relief bearing roller 47 is secured.

To prevent the abrasion roller 45 from stopping to rotate due to excessive pressure exerted by the relief bearing roller 47 and, at the same time, to prevent the relief bearing roller 47 from being out of contact with the fabric 5, the displacement of the bracket 53 is less than 0.1mm between its two extreme positions. For such a fine adjustment, which is easily overdone, springs 48 are provided. When the pressure exerted by the relief bearing roller 47 upon the abrasion roller 45 is excessive and tends to cause the rotation of the abrasion roller 45 to stop, the springs 48 will act as a buffer and cause the bracket 53 and the associated relief bearing roller 47 to be slightly displaced away from the abrasion roller 45, thus avoiding any damage to the abrasion units 21, 23 and 25. This arrangement is also beneficial and effective when the fabric 5 to be treated is not even enough.

Referring again to Fig. 2, in order to provide a larger or longer pattern over the fabric 5, abrasion unit 23 provides a continuous relief bearing sheet 55 mounted for movement on rollers 57a, 57b, 57c, 57d and 57e, against which the abrasion roller 45 abrades the fabric 5.

This invention may also be practised by providing the abrasion unit 25 with one or more pressure applying elements 57, e.g. finger-like members. The movement of such elements 57 are programmed so that each of them may independently be caused to move towards or away from the abrasion roller 45 and thus to exert different degrees of pressure onto the fabric 5 as and when required. This arrangement may be used in producing random-like surface wear, shading or patterns.

There is also shown in Fig. 2 a delivery system generally designated as 59 for transporting abrasion rollers 45 to and from the abrasion units 21, 23 and 25. The delivery system 59 is shown in Fig. 2 as including six pairs of support members 61 mounted on a continuous chain 63 for movement around rollers 65, and three lifting apparatus 67. It should of course be understood that the number of pairs of support members 61 and lifting apparatus 67 may vary according to actual needs.

The arrangement of the support members 61 and continuous chain 63 is shown in more detail in Figs. 5 to 7. Fig. 5 is a plan view of a part of the arrangement showing each abrasion roller 45 sup-

ported at its either end by a pair of support members 61. Each support member 61 comprises a pair of support elements 69 carried by a generally trapezoidal plate 71. The pair of support elements 69 protrude away from the direction of the chain 63 to which the respective plate 71 is attached.

As can be seen from Fig. 6, the plate 71 is attached to the chain 63 via a bolt 73 which allows the plate 71 to swivel generally about the bolt 73. The support element 69 is connected to the plate 71 via a bolt 75 which allows the support element 69 to rotate generally about the bolt 75. As can be seen in Fig. 7, by reason of the generally trapezoidal shape of the plate 71 and the attachment thereto of the support elements 69 and abrasion roller 45, the centre of gravity of the assembly will be below the bolt 73. There is thus avoided the possibility of the abrasion roller 45 being dislodged from the support members 61.

The delivery system 59 also includes a number of lifting apparatus 67 shown in more detail in Fig. 8. The lifting apparatus 67 includes a platform 77 in a generally inverted "h" shape. The leg 79 of the platform 77 is secured to a chain 81 wound for movement on two rollers 83a and 83b. The roller 83a is connected to and driven by a motor 85. By adjusting the direction of movement of the roller 83a, the platform 77 can be caused to move upward or downward, as desired.

The abrasion roller 45 can be released from the abrasion unit 21, 23 or 25 onto the platform 77 and lowered onto the support members 61 for maintenance or replacement of abrasive materials. The chain 63 is then caused to move the abrasion roller 45 so released away and another abrasion roller 45 which is in order for abrasion is moved to the required position and lifted up to the required height by the platform 77 for engagement with the abrasion unit 21, 23 or 25. Such an arrangement greatly enhances the speed of assembly and release of abrasion rollers 45 from the abrasion units 21, 23 and 25 and efficiency of operation is increased.

Fig. 9 shows the end view of a driving head 87 associated with one end of the abrasion roller 45. The driving head 87 comprises a spindle 89 surrounded by four equally distributed protruding ends 91. As can be seen from Fig. 10, each protruding end 91 sits on an outwardly biased spring 93. The driving head 87 is driven by a motor (not shown) and rotatable along the spindle 89.

The driving head 87 is arranged to engage one end of the abrasion roller 45 shown in Figs. 11 and 12. The end of the abrasion roller 45 shown in Figs. 11 and 12 includes a hole 95 surrounded by four equally distributed abutment members 97. The spindle 89 is received into the hole 95 and each of the protruding ends 91 will come into contact with

a respective abutment member 97 after, at most, a quarter-revolution. Rotation of the driving head 87 will thus bring about a corresponding rotation of the abrasion roller 45.

The other end of the abrasion roller 45 is connected to a support head 99 shown in Fig. 13. The support head 99 comprises a spindle 101 including a number of ball bearings 103 received in a groove 105 on the surface of a cylindrical member 107 carried by the support head 99. Each ball bearing 103 is urged away from the cylindrical member 107 by a respective outwardly biased spring 109. As the outside width of the groove 105 is smaller than the diameter of the ball bearings 103, while the ball bearings 103 are prevented from dislodgement from the cylindrical member 107, a part of each ball bearing 103 is exposed to the outside environment and raised above the outer circumferential surface of the cylindrical member 107.

Fig. 14 shows the end of the abrasion roller 45 to which the support head 99 is engaged. The engagement between this end of the abrasion roller 45 and the support head 99 is by a simple snap fit action whereby the ball bearings 103 are received in the circular recess 111. Disengagement of the two parts is effected by simply pulling the two parts apart.

From the foregoing description it will be seen that this invention provides a method and an apparatus whereby fabric on the roll or in the piece may be mechanically abraded with the resultant treated fabric displaying pre-determined characteristics. The disclosed method also avoids the use of water and chemicals which would be harmful to the environment.

It should be noted that the above only describes an example of practising the invention and it is possible to carry out the invention with some variations, while not departing from the spirit of the invention.

Claims

1. A method for abrading fabric on the roll or in the piece having predetermined characteristics such as surface wear, shading or patterns, including the steps of:-
 - (a) providing an abrasive surface for abrading one side of the fabric;
 - (b) moving the side of the fabric to be abraded over the abrasive surface at a controlled velocity relative thereto;
 - (c) simultaneously therewith, providing means for selectively applying pressure to the side of the fabric to be abraded in a direction towards the abrasive surface so as to increase abrasion between the fabric and

the abrasive surface in the region where said pressure is applied relative to areas where said pressure is not applied; and
(d) moving said fabric out of contact with said abrasive surface to produce a fabric with an abraded surface.

2. A method according to Claim 1 further characterized in that the abrasive surface is movable during the abrasion step.
3. A method according to Claim 2 further characterized in that the abrasive surface is cylindrical and rotatable.
4. A method according to Claim 1 further characterized in that the means for selectively applying pressure to the side of the fabric not to be abraded constitutes a roller selectively biased towards the abrasive surface.
5. A method according to Claim 4 further characterized in that the surface of the roller has a relief or pattern thereon having respective high and low areas relative to the median surface of the roller, to thereby selectively vary the pressure applied to the fabric such that when the fabric passes the abrasive surface a corresponding relief or pattern is imparted to it on that side of the fabric adjacent to the abrasive surface.
6. A method according to Claim 1 further characterized in that the means for selectively applying pressure to the side of the fabric not to be abraded constitutes a continuous belt supported for movement on rollers, which belt having a relief or pattern thereon having respective high and low areas.
7. A method according to Claim 1 further characterized in that the means for selectively applying pressure to the side of the fabric not to be abraded constitutes a plurality of individually controllable elements which are adapted to bear against the fabric during treatment thereof, thereby to provide corresponding areas on the fabric which are more abraded than others.
8. A method according to any of Claims 2 to 7 further characterized in that the fabric is moved during abrasion by means of rollers, the velocity of such movement being relatively substantially lower to the movement of the abrasive surface, thereby to increase the abrasion received by the fabric.

9. A method according to Claim 8 further characterized in that pressure applied to that side of the fabric not to be abraded is synchronized with the movement of the fabric such that substantially only those areas where maximum pressure on the fabric is applied are abraded by the abrasive surface. 5
10. An apparatus for abrading fabric on the roll or in the piece having pre-determined characteristics such as surface wear, shading or patterns, comprising:- 10
- (a) an abrasive surface for abrading the fabric;
 - (b) means for moving the side of the fabric to be abraded over the abrasive surface at a controlled velocity relative thereto; and 15
 - (c) means for selectively applying pressure to the side of the fabric not to be abraded in a direction towards the abrasive surface so as to increase abrasion between the fabric and the abrasive surface in the region where said pressure is applied relative to areas where said pressure is not applied. 20
11. An apparatus according to Claim 10 further characterized in that the abrasive surface is movable. 25
12. An apparatus according to Claim 11 further characterized in that the abrasive surface is cylindrical and rotatable. 30
13. An apparatus according to Claim 10 further characterized in that the means for selectively applying pressure to the side of the fabric not to be abraded constitutes a roller selectively biased towards the abrasive surface. 35
14. An apparatus according to Claim 13 further characterized in that the surface of the roller has a relief or pattern thereon having respective high and low areas relative to the median surface of the roller, to thereby selectively vary the pressure applied to the fabric such that when the fabric passes the abrasive surface a corresponding relief or pattern is imparted to it on that side of the fabric adjacent to the abrasive surface. 40
15. An apparatus according to Claim 10 further characterized in that the means for selectively applying pressure to the side of the fabric not to be abraded constitutes a continuous belt supported for movement on rollers, which belt having a relief or pattern thereon having respective high and low areas. 45
16. An apparatus according to Claim 10 further characterized in that the means for selectively applying pressure to the side of the fabric not to be abraded constitutes a plurality of individually controllable elements which are adapted to bear against the fabric during treatment thereof, thereby to provide corresponding areas on the fabric which are more abraded than others. 50
17. An apparatus according to any of Claims 10 to 16 further characterized in that the means for moving the side of the fabric to be abraded over the abrasive surface at a controlled velocity relative thereto constitutes a plurality of rollers. 55

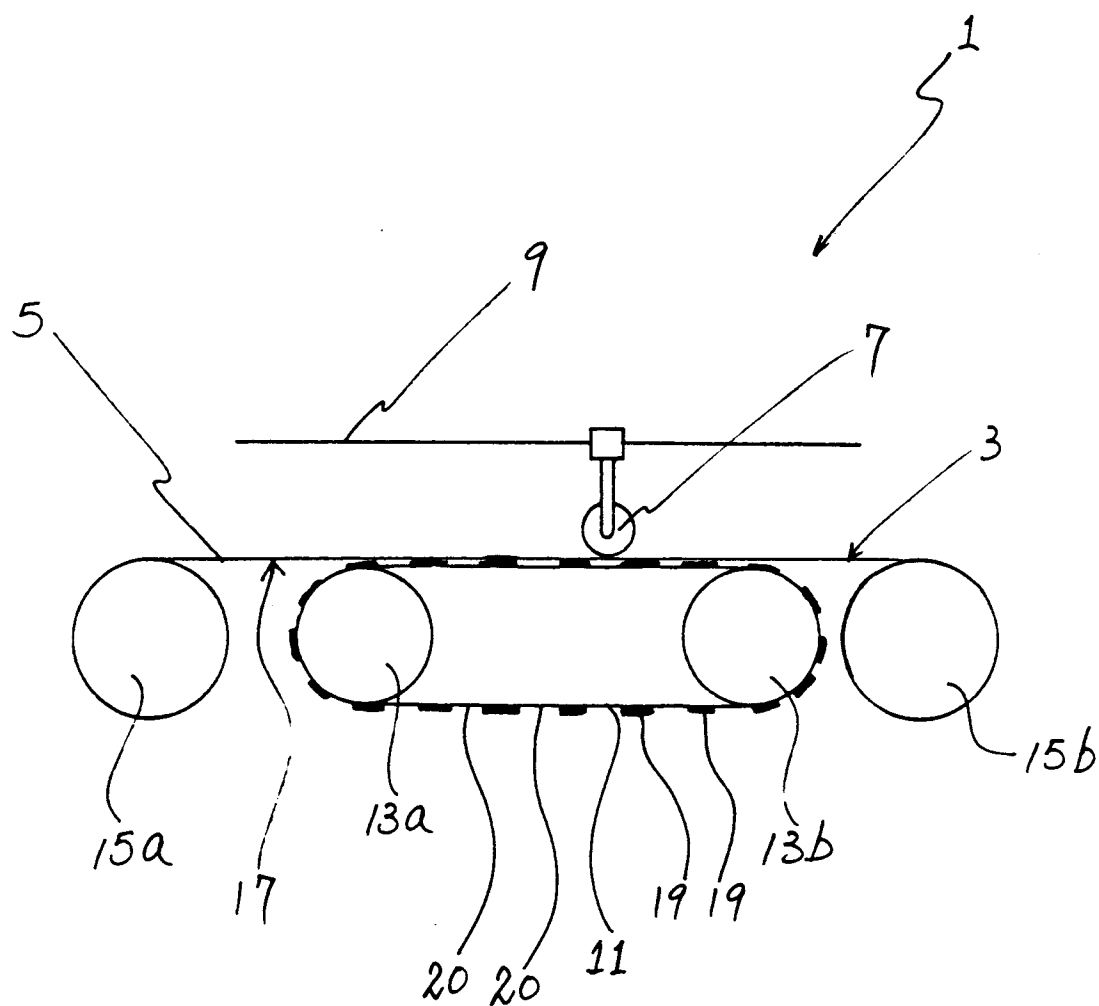
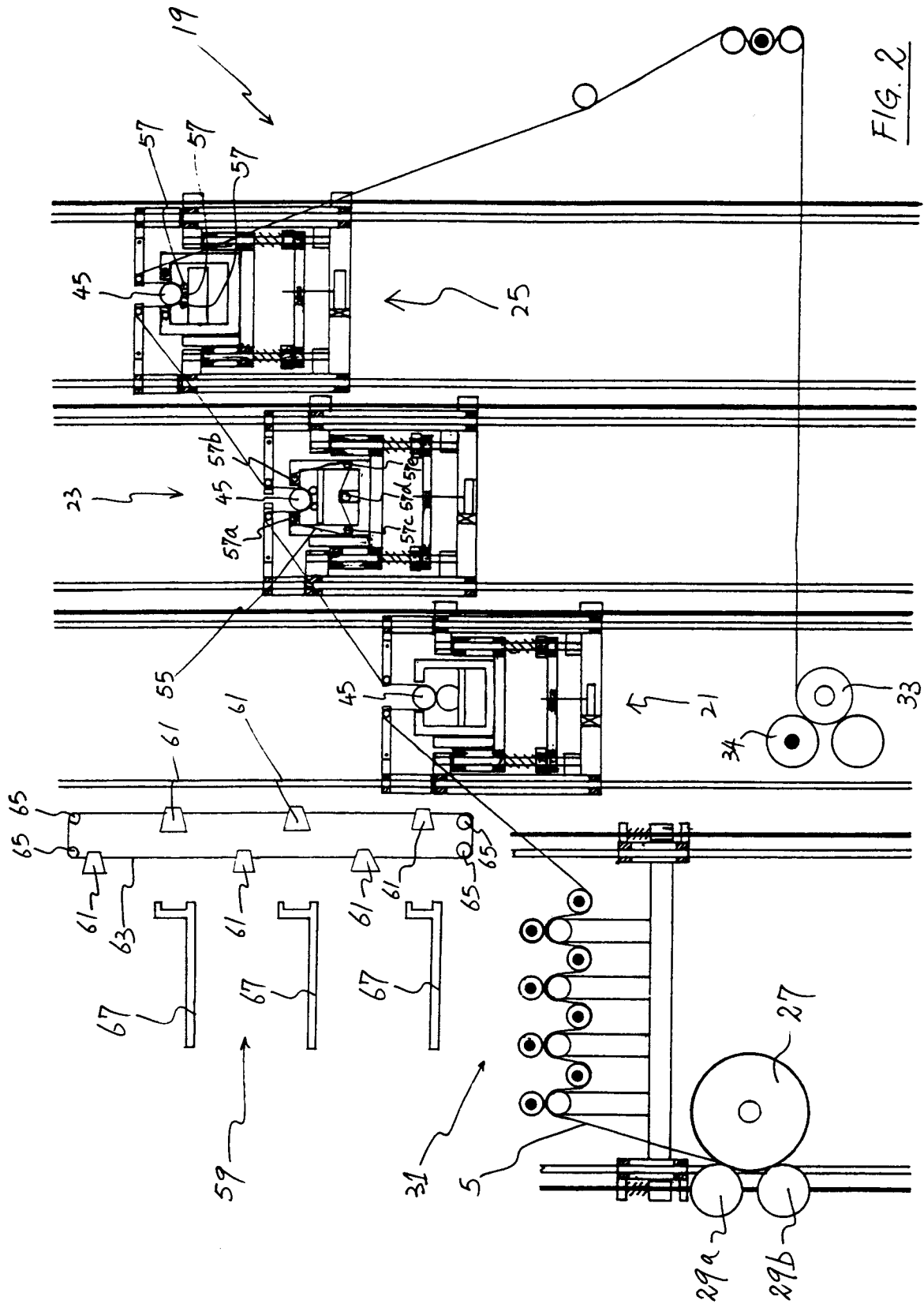


FIG. 1



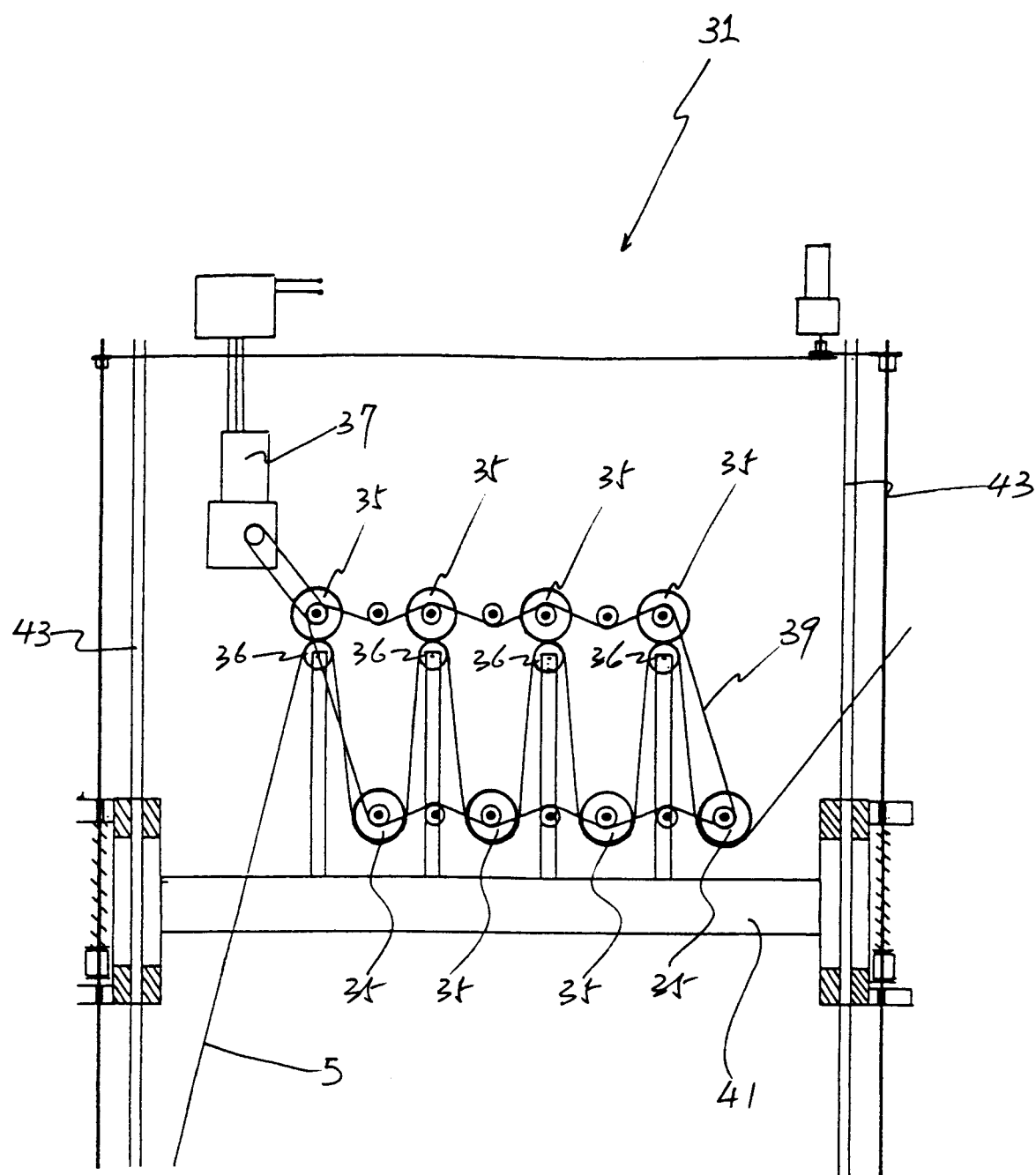


FIG. 3

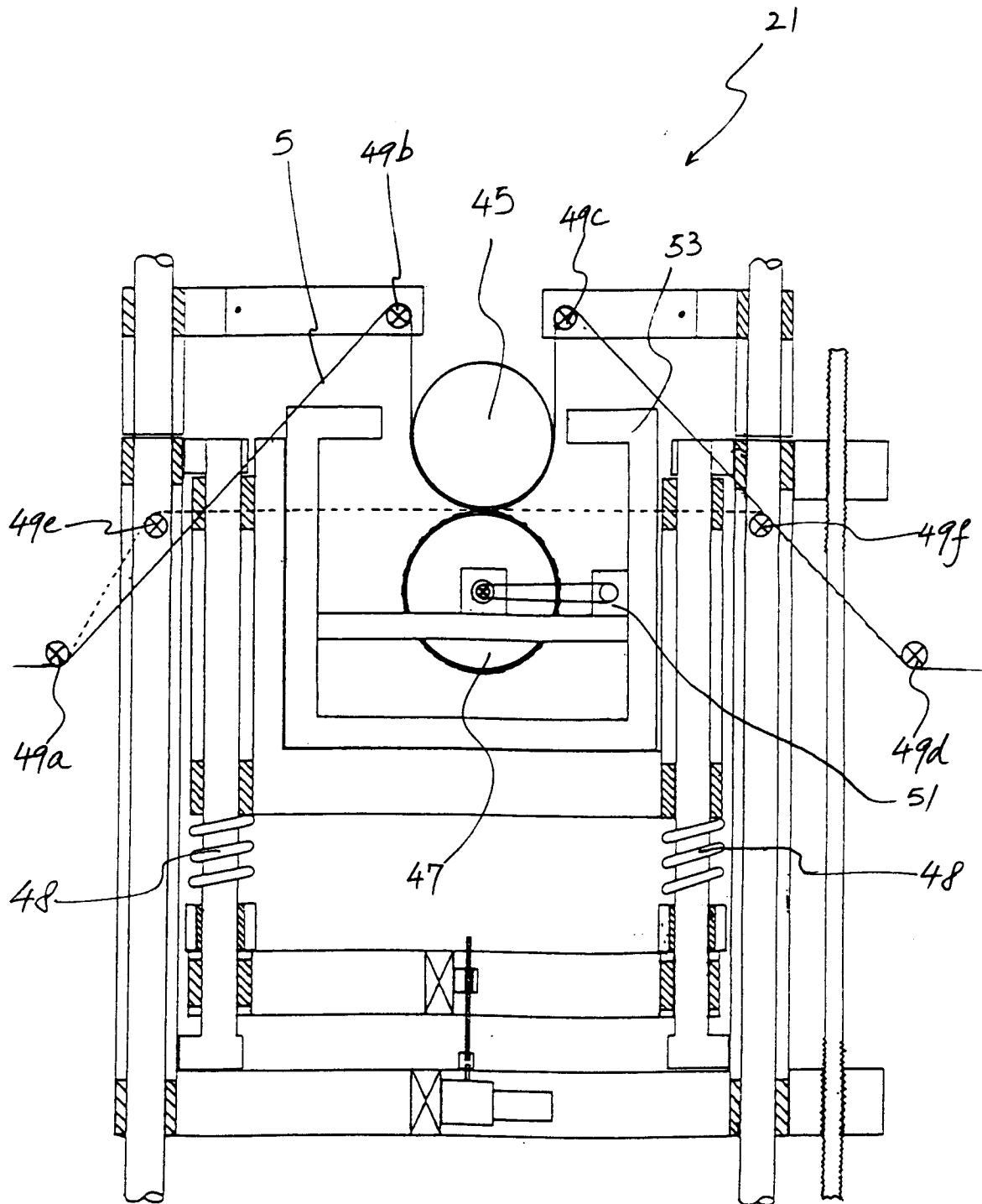
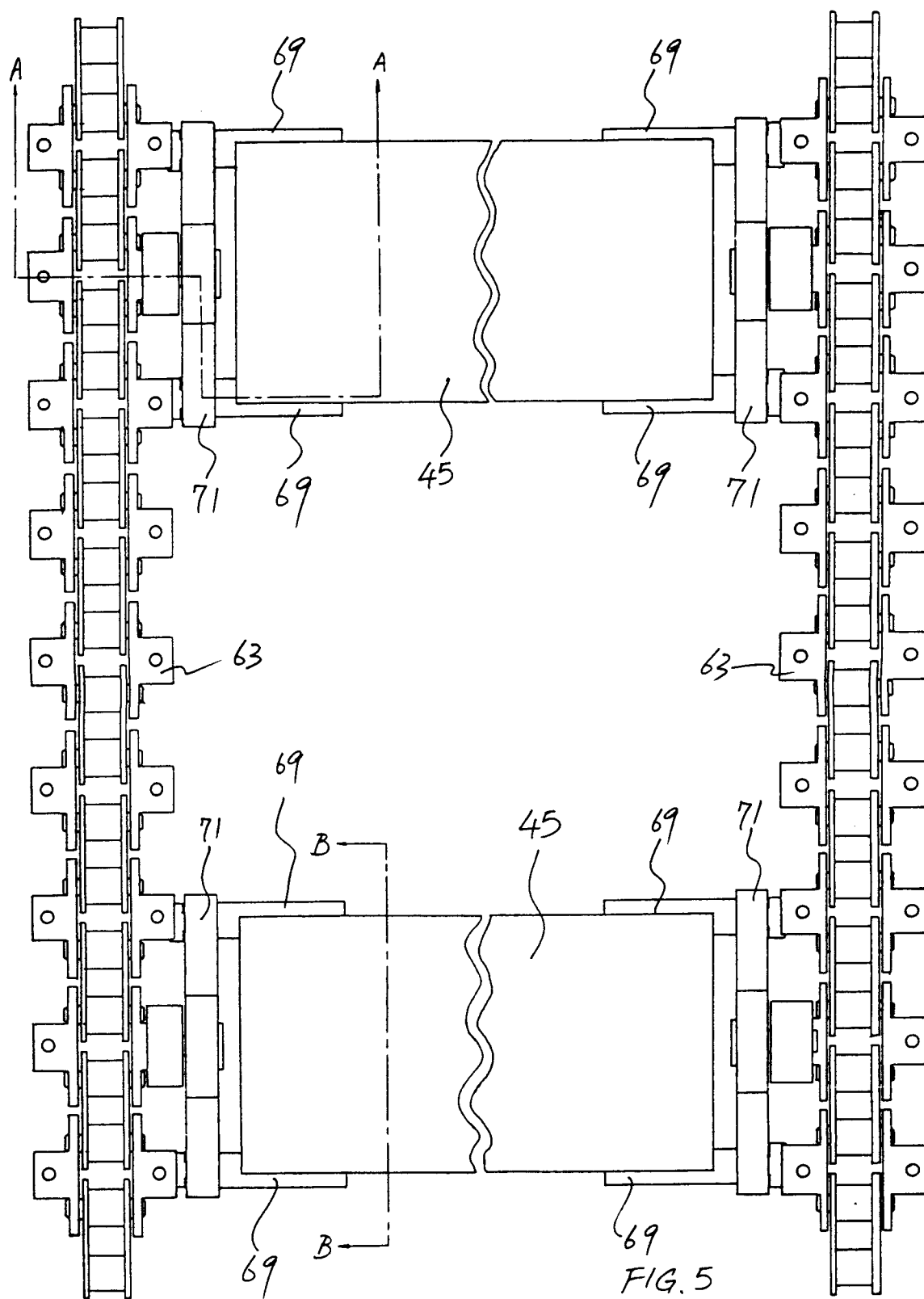


FIG. 4



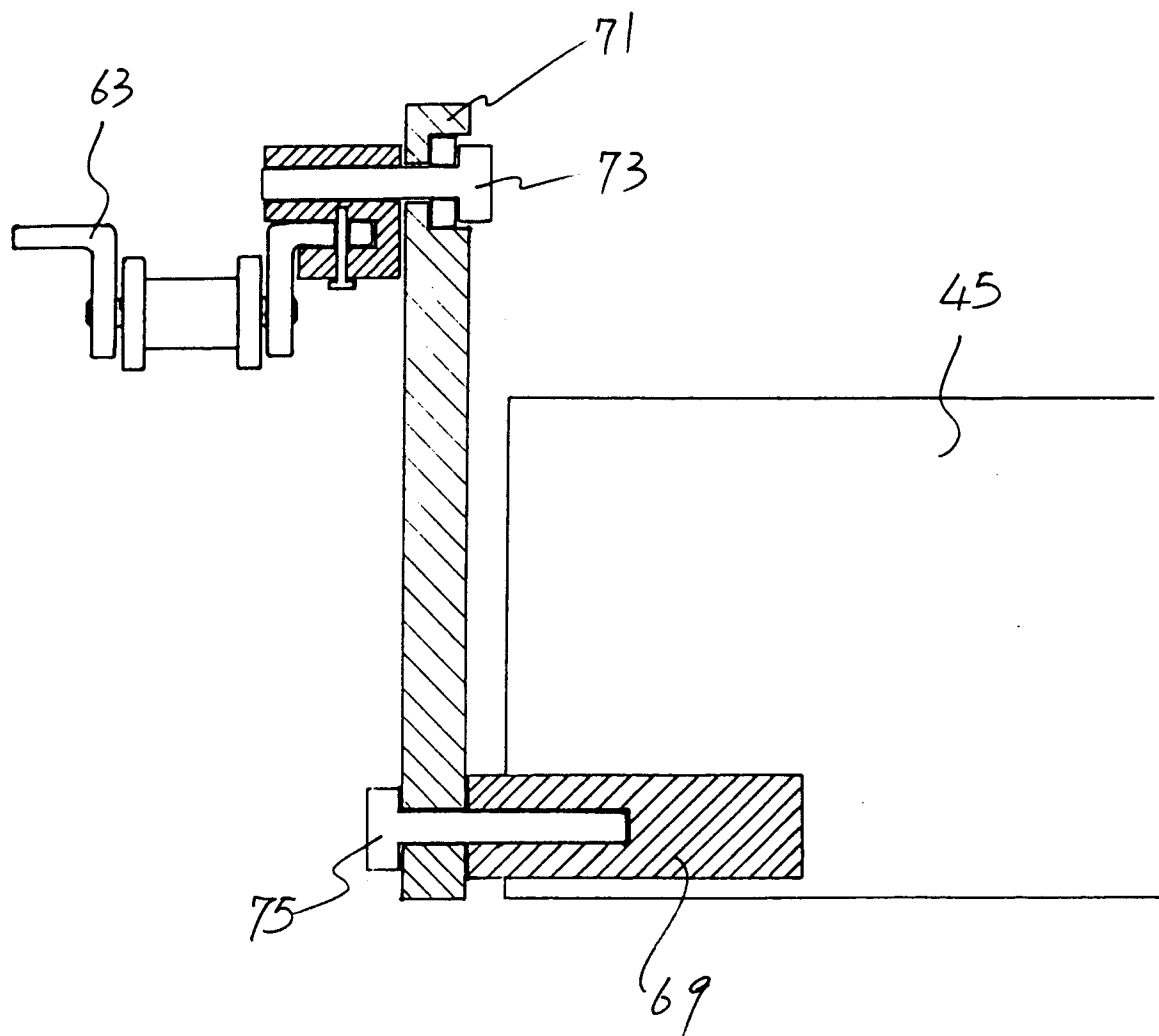


FIG. 6

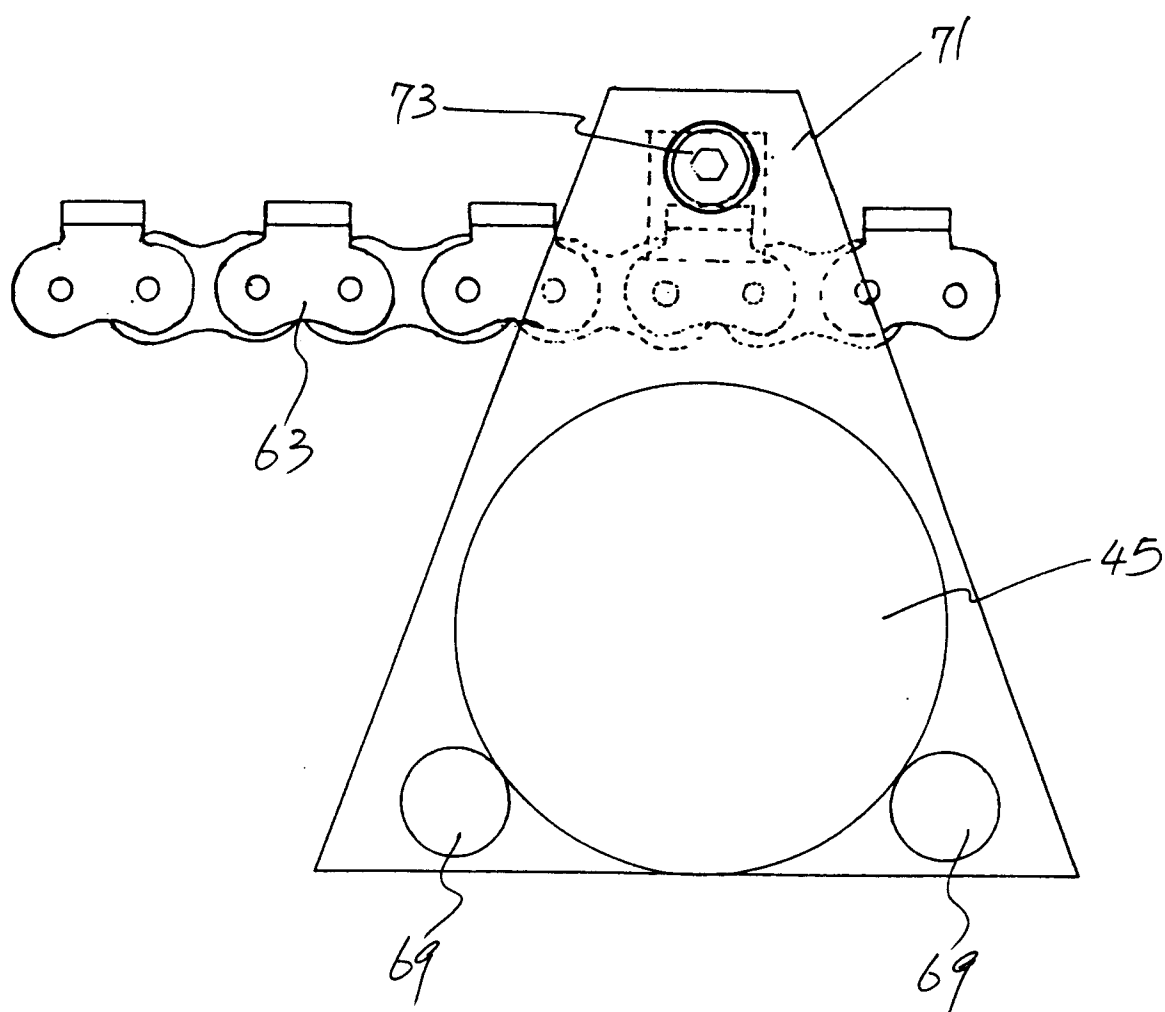


FIG. 7

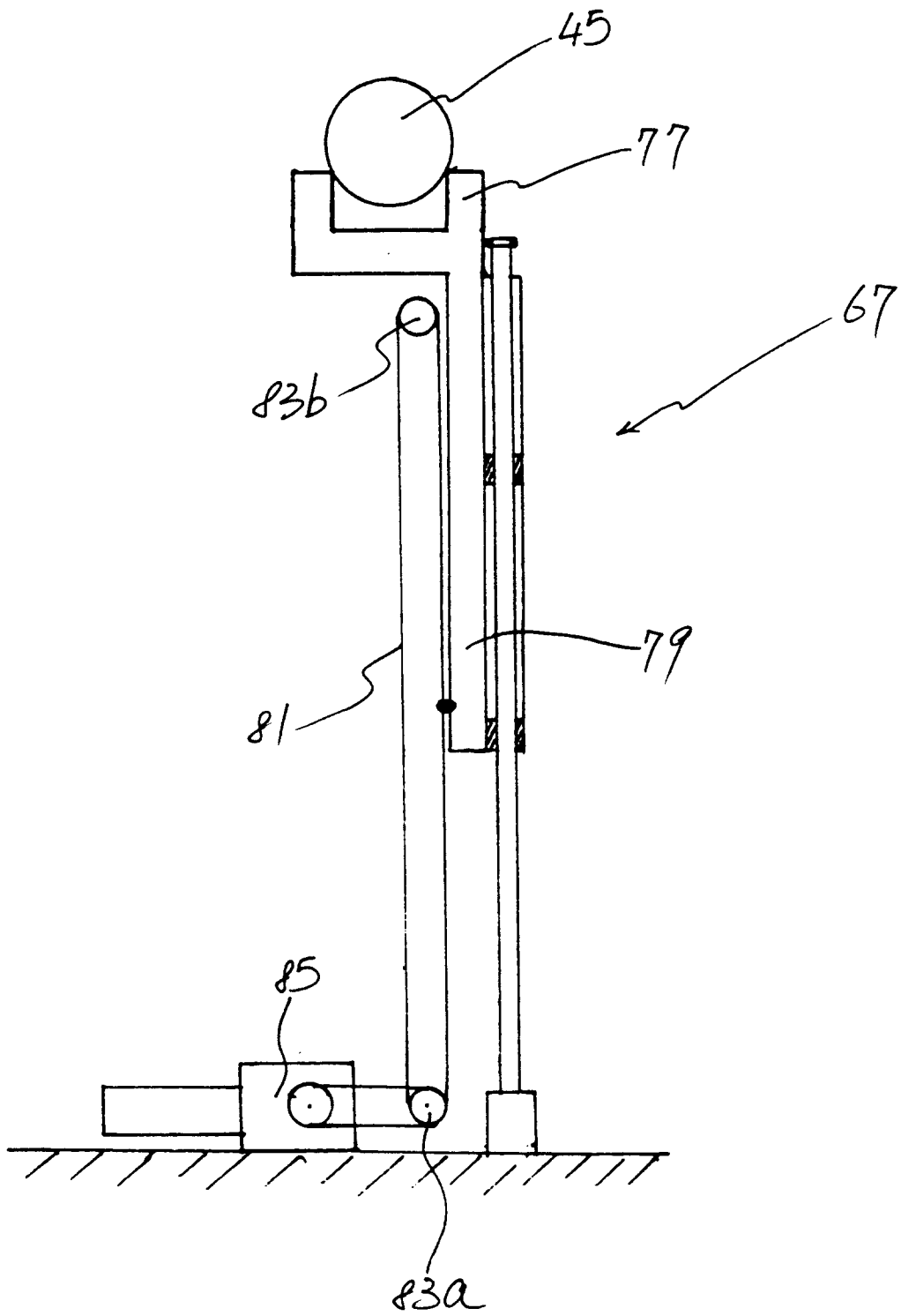
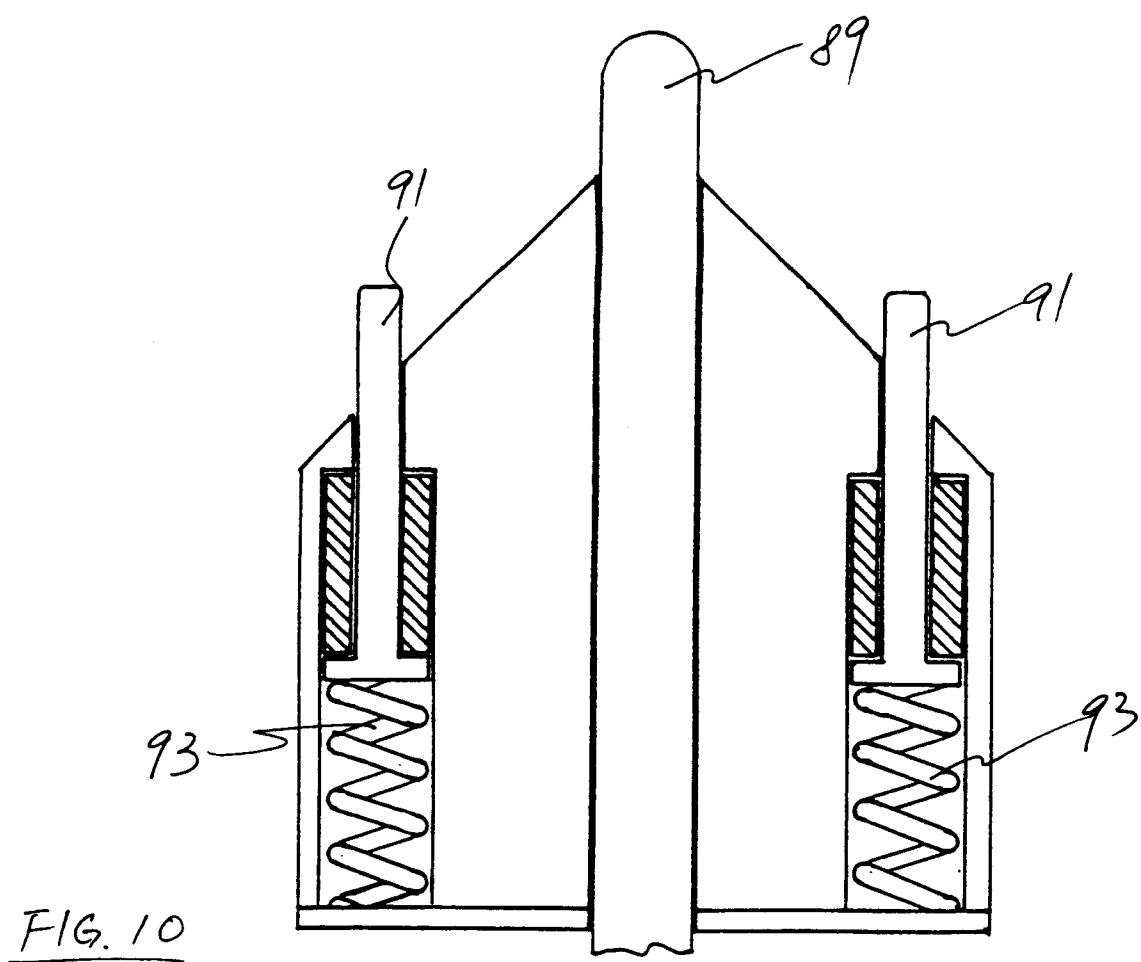
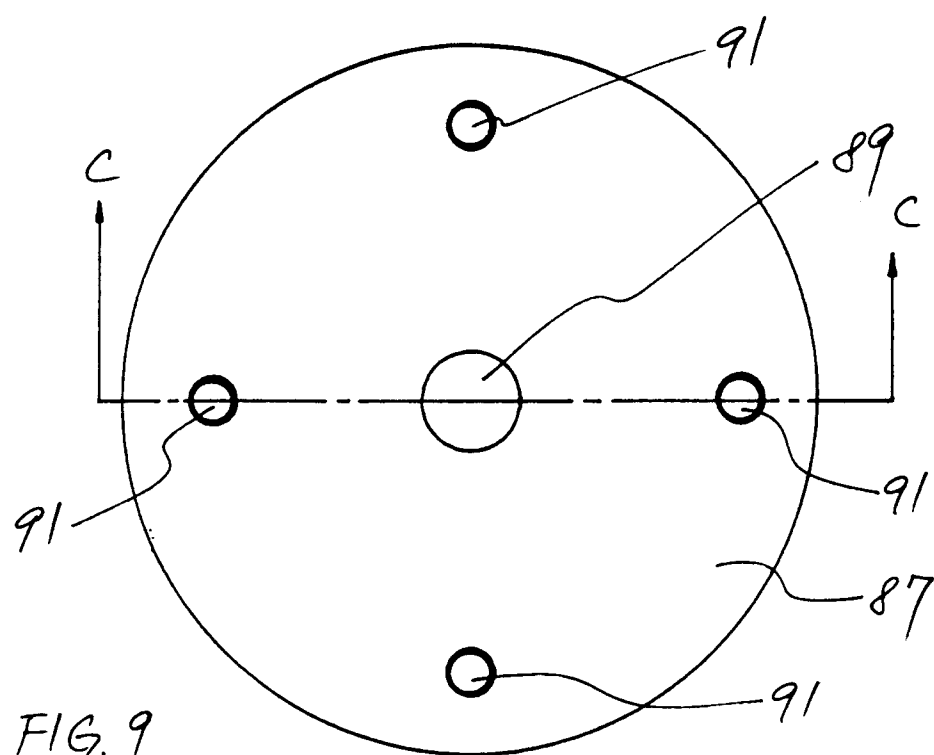


FIG. 8



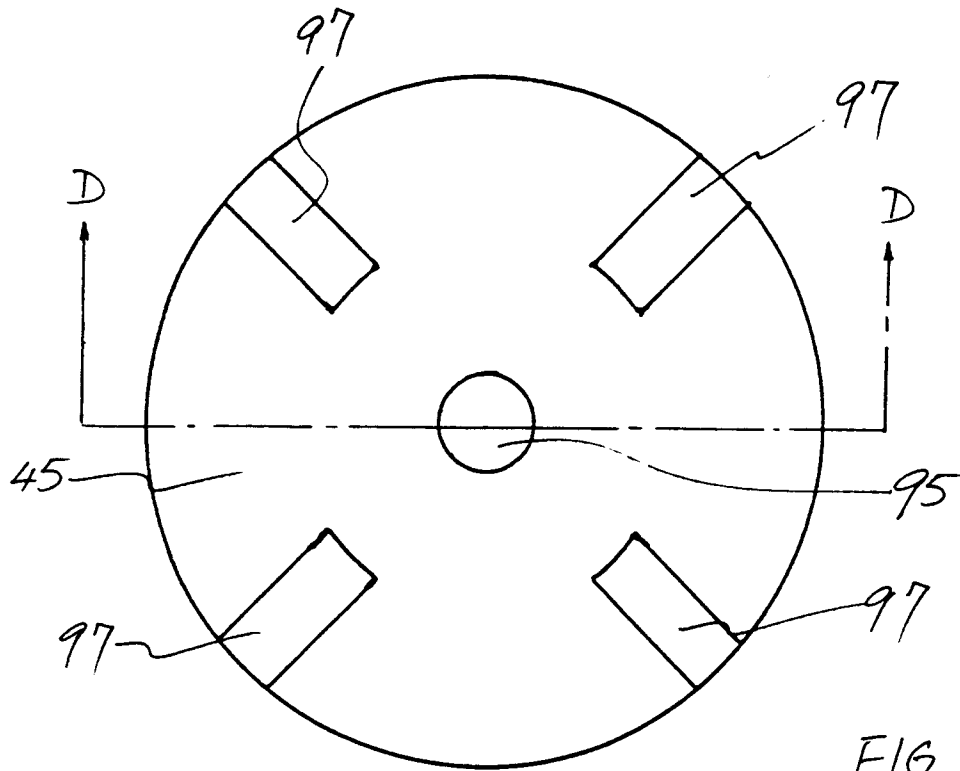


FIG. 11

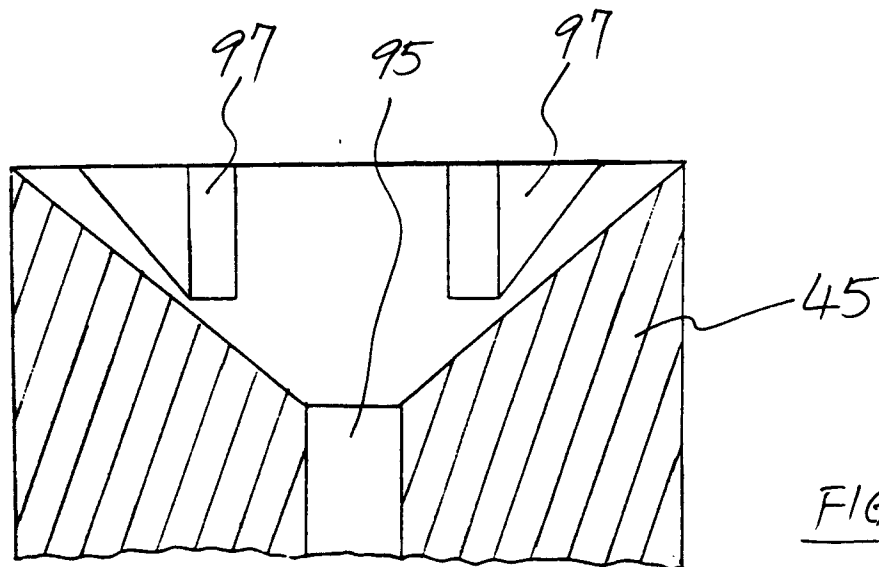
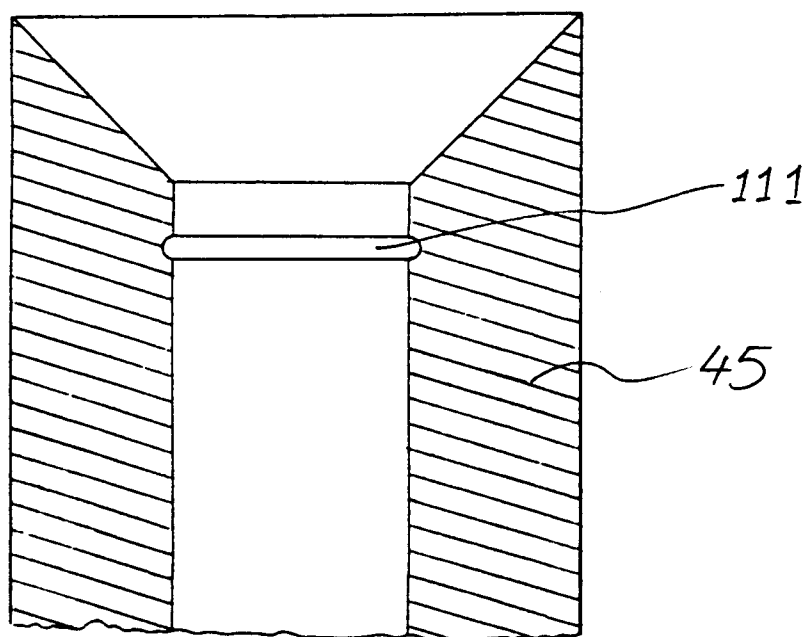
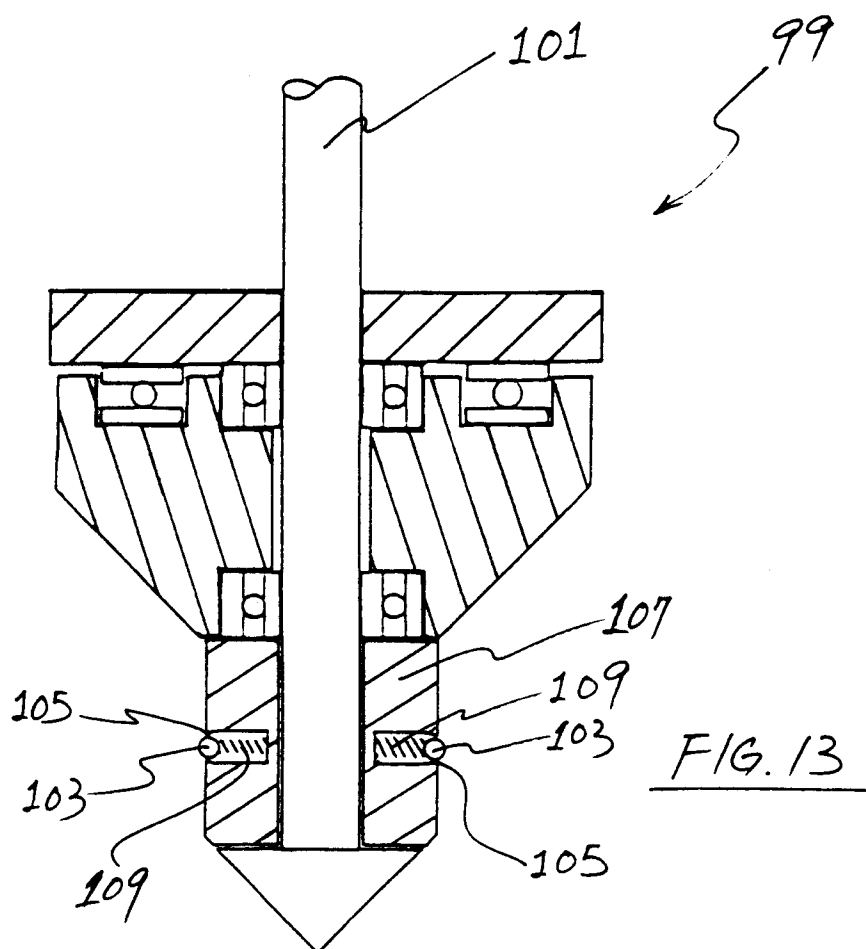


FIG. 12





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 30 4242

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.6)
X	US-A-3 769 058 (BAYER ET AL)	1-3, 10-12	D06C23/02 D06B11/00
A	* column 2, line 45 - column 5, line 23; figures 1-4 *	4,5,13, 14	
A	---		
A	US-A-3 818 554 (DAVIDSON) * column 3, line 16 - line 49; figures 3,4 *	1,6,15	
A	---		
A	DE-A-42 11 000 (K.K.NAKAGAWA SEISAKUSHO) * column 5, line 59 - column 6, line 11; figures 10,11 *	1,7,16	
A	---		
A	FR-A-2 628 762 (SALIGNY)		
A	---		
A	FR-A-2 415 161 (LARUSMIANI S.P.A.)		
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			D06C D06B
Place of search		Date of completion of the search	Examiner
THE HAGUE		21 November 1994	Van Gelder, P
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