



(19)

Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 711 663 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
15.05.1996 Bulletin 1996/20

(51) Int. Cl.⁶: **B41F 15/08**, B41F 15/24,
B41F 35/00

(21) Application number: 95116662.8

(22) Date of filing: 23.10.1995

(84) Designated Contracting States:
CH DE FR GB IT LI NL

(30) Priority: 09.11.1994 JP 274765/94
07.02.1995 JP 19114/95
25.08.1995 JP 217454/95

(71) Applicant: ICHINOSE INTERNATIONAL
INCORPORATED
Amagasaki-shi, Hyogo-ken (JP)

(72) Inventor: Ichinose, Shiro
Nishinomiya-shi, Hyogo-ken (JP)

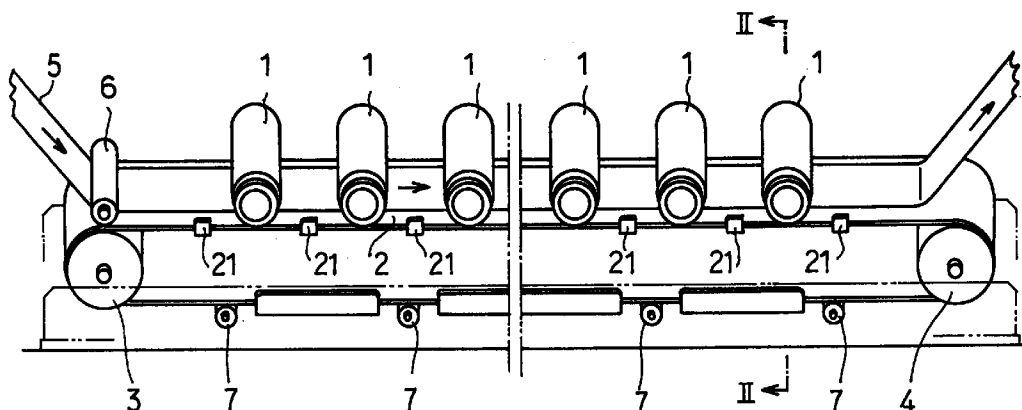
(74) Representative: Schubert, Siegm, Dipl.-Ing. et al
Patentanwälte
Dr. Weinhold, Dannenberg,
Dr. Gudel, Schubert
Grosse Eschenheimer Strasse 39
D-60313 Frankfurt (DE)

(54) Automatic rotary screen textile printing machine

(57) Disclosed is an automatic rotary screen textile printing machine including at least one rotary screen (1), an endless belt (2), printing tables (20), a carrier roller (3), a return roller (4), etc. the printing machine being characterized in that the above-mentioned components of the machine are all inclined widthwise of the endless belt at a specified angle with a horizontal plane, or a

machine frame (100) provided with these elements is adapted to be inclined with respect to the horizontal plane in the widthwise direction of the endless belt (2), the endless belt being adapted to travel straight by being restrained by guide means (21), or alternatively by a guide member (30, 31), and guide grooves (30', 31').

F I G. 1



EP 0 711 663 A1

Description

FIELD OF THE INVENTION

The present invention relates to automatic rotary screen textile printing machines, and more particularly to an automatic rotary screen textile printing machine which includes at least one rotary screen, an endless belt extending under the rotary screen in a direction orthogonal to the axis of the rotary screen for transporting the fabric to be printed on, a printing table opposed to the rotary screen with a carrier portion of the endless belt interposed therebetween, a roller having the starting end or head portion of the endless belt reeved therearound and a roller having the rear end or tail portion of the endless belt reeved therearound, at least one of these rollers being driven.

DESCRIPTION OF PRIOR ART

Conventionally, such automatic rotary screen textile printing machines are of the horizontal type wherein the above-mentioned components are arranged horizontally.

With these printing machines of the horizontal type, zigzag travel of the fabric transporting endless belt impairs the accuracy of screen adjustment with respect to the widthwise direction of the fabric or results in misregister of the pattern widthwise of the fabric as is known to those skilled in the art. It is also known to those skilled in the art that uneven printing or variations in color density occur owing to the supply of color paste to the horizontal screen.

SUMMARY OF THE INVENTION

An object of the present invention is to prevent the fabric transporting endless screen from traveling zigzag to thereby improve the accuracy of widthwise screen adjustment or obviate widthwise pattern misregister, and also eliminate uneven printing and variations in color density.

Another object of the present invention is to incline the rotary screen in a specified direction along with the other components mentioned above in order to overcome the foregoing problem of the prior art, the rotary screen nevertheless being made efficiently cleanable as installed in the printing machine with water injected into the screen without the likelihood of the effluent from the screen soiling the neighborhood. If the rotary screen can be cleaned without being removed from the printing machine, the screen can be cleaned easily free of the damage or break that would otherwise be caused by inadvertent striking contact of the screen with the machine frame or the like or by some other cause.

A color change is frequently made and a pattern change is sometimes made in the rotary screen printing machine. Such a change requires removal and installation of the rotary screen and squeegee, application of

adhesive to the endless belt surface, initial feeding of the fabric to be printed on, etc. Apparently, these items of work can be performed with greater ease for members in a horizontal arrangement than those inclined.

Another object of the present invention is to realize the foregoing arrangement of components in an inclined position while assuring that the above-mentioned items of work can be performed with ease.

To fulfill the above and other objects, the present invention provides an automatic rotary screen textile printing machine including at least one rotary screen, an endless belt extending under the rotary screen in a direction orthogonal to the axis of the rotary screen for transporting the fabric to be printed on, at least one printing table opposed to the rotary screen with a carrier portion of the endless belt interposed therebetween, a roller having a starting end or head portion of the endless belt reeved therearound and a roller having a rear end or tail portion of the endless belt reeved therearound, at least one of the rollers being driven. The printing machine has the following features.

The above-mentioned components of the machine are all inclined widthwise of the endless belt at a specified angle with a horizontal plane, guides are provided in contact with the lower side edge of the carrier portion of the endless belt, and the rotary screen is adapted to be supplied with a color paste injected from its higher end thereinto through a pipe.

Alternatively, a printing machine frame provided with the components is adapted to be inclined with respect to the horizontal plane in the widthwise direction of the endless belt. The endless belt is adapted to travel straight by being restrained by guide means which comprises a guide member(s) attached to the rear side of the endless belt and extending or aligned in the lengthwise direction of the belt; guide grooves formed in the peripheries of the rollers positioned at the side edge portion of the belt and at the end portions of rollers, the guide member(s) being movably fittable in the guide grooves; and guide rail(s), or by guide means which comprises a guide member(s) and guide grooves, the guide member(s) being movably fittable in the guide grooves. The rotary screen is supplied with a color paste injected thereinto from a higher side of the machine frame held in an inclined position.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front view showing an embodiment of automatic rotary screen textile printing machine according to the invention;

FIG. 2 is a view in section taken along the line II-II in FIG. 1;

FIG. 3 is a view in section taken along the line III-III in FIG. 2;

FIG. 4 is a front view showing another embodiment of automatic rotary screen textile printing machine of the invention;

FIG. 5 is a view in section taken along the line V-V in FIG. 4;

FIG. 6(A) is a view showing a guide member and a guide rail for use in the printing machine shown in FIG. 4;

FIG. 6(B) is a view showing other examples of guide member and guide rail;

FIG. 7 is a view in section taken along the line VII-VII in FIG. 5;

FIG. 8(A) is a view showing the guide member of FIG. 6(A) and a guide groove in a roller for the head portion of an endless belt, as well as in a roller for the tail portion of the belt;

FIG. 8(B) is a view showing the guide member of FIG. 6(B) and another example of guide groove in these rollers;

FIG. 9 is a view in section taken along the line IX-IX in FIG. 5 to show an example of guide rail;

FIG. 10 is a sectional view showing another example of guide rail;

FIG. 11 is a view in section taken along the line XI-XI in FIG. 5;

FIG. 12 is an enlarged view in section taken along the line XII-XII in FIG. 9;

FIG. 13 is a perspective view showing modified belt guides;

FIG. 14 is a side elevation showing a modified post;

FIG. 15 is a right side elevation of FIG. 14;

FIG. 16 is a side elevation showing another embodiment of automatic rotary screen textile printing machine according to the invention wherein a machine frame is adapted to be inclined; and

FIG. 17 is a side view of the embodiment of FIG. 16.

PREFERRED EMBODIMENTS OF THE INVENTION

The present invention will be described with reference to the drawings showing embodiments thereof.

Throughout the drawings, like parts are designated by like reference numerals.

One of the embodiments is shown in FIGS. 1 to 3, and the other embodiment in FIGS. 4 to 15. A further embodiment is shown in FIGS. 16 and 17.

The embodiment shown in FIGS. 1 to 3 comprises rotary screens 1 arranged side by side at a predetermined spacing, an endless belt 2 extending under the arrangement of rotary screens in a direction orthogonal to the axes of the screens 1 for transporting the fabric 5 to be printed on, printing tables 20 arranged as opposed to the screens 1 with the carrier portion of the endless belt interposed therebetween, a roller 4 having the starting end or head portion of the belt 2 reeved therearound, a roller 3 having the rear end or tail portion of the belt 2 reeved therearound, at least one of these rollers 4, 3 being driven, a roller 6 for pressing the fabric 5 against the carrier portion of the endless belt 2, rollers 7 for supporting the underside of return portion of the endless belt 2, etc. These components are inclined upward from the machine operating side (the left side of the view of FIG.

2) to the opposite side widthwise of the endless belt 2 at a specified angle with a horizontal plane. The inclination is generally in the range of 5 to 25 degrees, preferably in the range of 15 to 20 degrees, with respect to the horizontal plane. The machine may have only one rotary screen 1.

Guides 21 are provided in contact with the lower side edge of carrier portion of the endless belt 2. The guide 21 may be of the non-rotatable type (FIGS. 1 and 2), or in the form of a roller rotatable by contact with the belt (FIG. 13).

Arranged inside the rotary screen 1 are a roller squeegee 17, a stopper 18 for holding the squeegee in position and a bar 19 provided with the stopper and extending longitudinally of the rotary screen 1. These members are also inclined in corresponding relation with the inclination of the screen 1. The stopper 18 is attached to the bar 19 by a member 190 extending longitudinally of the screen 1 in its inner hollow space and joined to the bar 19.

The fabric 5 to be printed on is affixed to the carrier portion of the endless belt 2 in the same manner as in the prior art, passed beneath the rotary screens 1 and automatically printed on by the screens 1. This mode of printing is the same as in the conventional horizontal machine.

When the endless belt 2 is inclined widthwise thereof, a component of gravity acting on the endless belt 2 vertically acts toward the lower side of inclination at the angle of inclination of the belt 2. Consequently, the endless belt 2 is deviated toward the lower side of inclination at all times during travel, and prevented from traveling zigzag unlike horizontal endless belts by this effect and also by the guiding action of the guides 21 which are in contact with the lower side edge of carrier portion of the belt 2.

The rotary screens 1 as arranged in parallel are therefore accurately adjustable widthwise of the fabric. When the rotary screen is used singly, the pattern can be prevented from misregister widthwise of the fabric.

When the rotary screen 1 is inclined, the color paste is injected into the screen 1 from its higher end. This eliminates the likelihood that the color paste will remain in the rotary screen as in the case of the conventional horizontal machine, permitting the color paste to flow down the bottom of the screen 1 toward its lower end along the inclination thereof, whereby a fresh portion of the color paste is supplied to the screen bottom at all times. Accordingly, the present machine does not cause uneven printing or produce variations in color density.

With the embodiment of FIGS. 4 to 15 and the embodiment of FIGS. 16 and 17, a printing machine frame 100 provided with rotary screens 1, an endless belt 2, roller 3, 4, printing tables 20, and rollers 6, 7 is adapted to be inclined with respect to the horizontal plane in the widthwise direction of the endless belt.

The machine frame 100 can be brought to an inclined position according to the embodiment of FIG. 5 or the embodiment of FIGS. 16 and 17.

With reference to FIG. 5, the machine frame 100 is supported at one side thereof in the widthwise direction of the belt 2 by a pivot 211 on each of pedestals 210 and is pivotally movable in a vertical plane which is in the widthwise direction of the belt 2. The other side of the machine frame 100 is supported by a pivot 213 on each of mounts 212 which are upwardly and downwardly movable and is pivotally movable in a vertical plane which is in the widthwise direction of the belt 2. A post 212a for supporting the mount 212 is stretchable by a fluid-pressure cylinder such as a hydraulic cylinder (FIG. 5), or can be a component of a screw jack lift mechanism (FIGS. 14 and 15). The post 212a is supported at its lower end by a pivot 215 on a base 214 and movable in the same direction as above. With reference to FIGS. 14 and 15, a plurality of such screw jack lift mechanisms are arranged longitudinally of the belt 2. Each of these mechanisms has a nonrotatable screw rod serving as the post 212a, and a member serving as a nut screwed on the rod. This member is in the form of a worm wheel 212b. A line shaft or rotary shaft 212c extends longitudinally of the belt 2. The worm wheel 212b is in mesh with a worm 212d fixed in position on the shaft 212c, and is rotated by the rotation of the shaft 212c to raise or lower the post 212a. The shaft 212c is driven by a motor M through a transmission mechanism T such as a timing belt or the like. The worm wheel 212b and the worm 212d are housed in a casing c, by which the shaft 212c is supported. The casing c has a lower end supported by the pivot 215 on the base 214. The transmission mechanism T is held under a specified tension by a tension pulley or tension roller R. The tension pulley or tension roller R is supported by the free end of a swing arm a to eliminate a slack from the mechanism T by being biased by a spring or known method.

With reference to FIGS. 16 and 17, the machine frame 100 is supported in the center thereof in the widthwise direction of the belt 2 by a pivot 211 on each of pedestals 220 provided at one end or the other end of the machine frame 100 and an intermediate position thereof, or alternatively at one end and the other end thereof in the lengthwise direction of the belt 2 and is pivotally movable in a vertical plane which is in the widthwise direction of the belt 2. In the embodiment of FIGS. 16 and 17, the machine frame 100 can be brought to an inclined position or a horizontal position by screw jack lift mechanisms 222.

A guide member 30 extending longitudinally of the belt 2 or guide members 31 arranged in a row in the same direction are attached to the rear side of the endless belt 2 on the inclinable machine frame 100. A V-belt (FIG. 6A) is usable as the guide member 30, while rollers (FIG. 6B) are serviceable as the guide members 31.

The machine frame 100 is provided with a guide rail(s) 32 extending or aligned nearly over the entire length of the parallel arrangement of printing tables 20 longitudinally of the arrangement. The guide member 30 or guide members 31 are movably fitted in the guide rail 32. The extending guide rail 32 is shown in FIG. 9, and

the aligned guide rails 32 in FIG. 10. The screen printing machine having one rotary screen is provided with one printing table. In this type of machine, the guide rails 32 can extend over a distance corresponding to the size of the single printing table 20 in the lengthwise direction of the belt 2. In this type, the guide rails can be omitted if the intended purpose permits.

The rollers 3, 4 are each formed in the periphery with a guide groove 30' or 31' corresponding to the guide member 30 or 31 in position, and the guide member 30 or 31 is movably fitted in the guide groove 30' or 31'.

The embodiments of FIGS. 4 to 17 have substantially the same construction as that of FIGS. 1 to 3 with the exception of the following features. The machine frame 100 provided with the main components of the printing machine, i.e., the rotary screens 1, endless belt 2, rollers 3, 4 and printing tables 20, is adapted to be inclined as described above. The guide means for the endless belt 2 comprises the guide member 30 or guide members 31 attached to the rear side of the belt 2, the guide groove 30' or 31' formed in the periphery of each of the rollers 3, 4 and the guide rail(s) 32 mounted on the machine frame 100. Alternatively the guide means comprises the guide member 30 or 31 and guide groove 30' or 31'.

The embodiments of FIGS. 4 to 17 are adapted to incline the machine frame 100 to bring the endless belt 2 and the rotary screen 1 to an inclined position, thereby producing the same results as those of the embodiment of FIGS. 1 to 3 previously described. With the embodiments of FIGS. 4 to 17, the endless belt 2 is prevented from traveling zigzag by the guiding action of the guide means comprising the guide member 30 or 31, guide grooves 30' or 31' and guide rail(s) 32, or the guide means comprising the guide member 30 or 31 and guide grooves 30' or 31'.

These types of guide means are so structured that the guide member 30 or 31 is movably fitted in the guide grooves 30' or 31' and guide rails 32, or in the guide grooves 30' or 31' to positively restrain the endless belt from traveling straight. Accordingly the belt 20 can be prevented from traveling zigzag with the desired effect. The zigzag travel of the belt 20 is more effectively avoidable by the guiding action of the guide means comprising the guide member 30 or 31, guide grooves 30' or 31' and guide rail(s) 32.

The guide member 30 or guide members 31 on the rear side of the endless belt 2 and the guide grooves 30' or 31' in the peripheries of the rollers 3, 4 are positioned preferably at the side edge portion of the belt 2 and at the end portions of the rollers 3, 4, respectively, which portions are closer to a higher side of the machine frame 100 in an inclined position. When the endless belt 2 is driven while the belt 2 and the rotary screens 1 are in the inclined position, the endless belt 2 travels straight as restrained at the higher side of the inclined belt 2, whereby zigzag travel of the endless belt 2 is more effectively avoidable.

With either of the foregoing embodiments, the color paste is injected into the higher end of each rotary screen 1 in the following manner. Furthermore, these embodiments may be modified or provided with additional means as will be described below. In connection with the rotary screens 1 and like main components of the printing machine which are adapted to be inclined, the terms the "higher end" and the "lower end" of the rotary screen 1 or other member are hereinafter used for the rotary screen 1 or the component as inclined.

The rotary screen 1 has connected to its higher end a color paste injecting pipe 11, through which the color paste is injected into the higher end of the screen 1. The color paste is sent from a tank 14 to the pipe 11 by a pump 13. In the printing machine having the inclining type of machine frame 100, the machine frame 100 is inclined before the injection of the color paste.

A color paste collecting pipe 10 is preferably connected to the lower end of the rotary screen 1. The pipe 10 is provided with a pump 12 and has one end connected to the bottom of the screen 1 at its lower end and the other end connected to the paste injecting pipe 11. Thus, the color paste is supplied to the rotary screen 1 while circulating through the pipe 11, rotary screen 1 and pipe 10 and being replenished with a fresh portion of paste from the tank 14. The color paste held in the rotary screen 1 is therefore readily allowed to remain unaltered in viscosity and fluidity to ensure uniform printing.

Preferably, the rotary screen 1 has a wash water injecting pipe 8 connected to its higher end and a waste water collecting trough 9 connected to its lower end. This results in the following advantage.

The rotary screen 1 can be cleaned effectively by driving the screen 1 and the endless belt 2 while injecting wash water into the higher end of the screen 1 continuously or from time to time. With the rotation of the rotary screen 1, the squeegee 17 also operates, contributing to the cleaning of the screen 1. The screen 1 can be cleaned efficiently because of this effect and also because the screen 1 is inclined, permitting fresh wash water to flow down the bottom of the screen 1 at all times. In the case of the inclining type of machine frame 100, the machine frame 100 is inclined before cleaning the screen 1. The squeegee 17 further cooperates with the table 20, serving to drain the screen of the wash water. The screen can be drained efficiently in the case where the squeegee 17 is made of a magnetic material and the table 20 is a magnet. The squeegee 17 of the illustrated embodiment, which is a roller squeegee, can be replaced by a squeegee of elastic material such as a rubber plate or thin metal plate.

The waste wash water flowing out from the lower end of the screen 1 is trapped in the trough 9. This eliminates the likelihood that the water will fall onto the floor from the screen and scatter around to soil the neighborhood of the printing machine. Consequently the rotary screen can be cleaned without being removed on the textile printing machine.

Preferably, the rotary screen 1 is internally provided with a water injector 81 extending longitudinally thereof for applying wash water to the screen approximately over the entire length thereof or at least in a region thereof toward the higher end. A water supply pipe 83 is connected to the water injector 81. The provision of the injector achieves an improved cleaning effect by cleaning the screen 1 with the water applied to the interior of the screen from the injector as required.

When the aforementioned bar 19 is in the form of a tube and formed with holes 82 in its peripheral wall over the entire length thereof or at least in a portion thereof toward the higher end, the bar 19 is used as the water injector 81. The bar 19 for providing the stopper 18 is then serviceable also as the water injector 81. Thus, the water injector 81 can be provided by a simple structure for the application of wash water.

When required according to the invention, a sensor 22 can be provided for detecting the level of the color paste in the lower-end bottom portion of the rotary screen 1. The operation of the pump 13 is then controllable by a known method based on the paste level in the bottom portion detected by the sensor 22 to supply the color paste at a rate suitable for maintaining the paste in the bottom portion at a constant level.

According to the invention, the printing machine frame 100 provided with the rotary screens 1, endless belt 2, printing tables 20, rollers 3, 4, etc. is adapted to take an inclined position, and these components of the printing machine held in an inclined state can be brought to a horizontal position together with the machine frame 100. While a color change is frequently made and a pattern change is sometimes made in the rotary screen textile printing machine, such a change requires removal and installation of the rotary screen and squeegee, application of fabric adhesive to the endless belt surface, initial feeding of the fabric to be printed on, etc. Because of the feature described above, however, these items of work can be readily performed with the foregoing components brought to the horizontal position. Thus, the present invention realizes an inclined arrangement of the components while assuring that the work can be performed with ease.

Claims

1. An automatic rotary screen textile printing machine including at least one rotary screen (1), an endless belt (2) extending under the rotary screen (1) in a direction orthogonal to the axis of the rotary screen (1) for transporting the fabric to be printed on, at least one printing table (20) opposed to the rotary screen (1) with a carrier portion of the endless belt (2) interposed therebetween, a roller (4) having a starting end or head portion of the endless belt (2) reeved therearound and a roller (3) having a rear end or tail portion of the endless belt (2) reeved therearound, at least one of the rollers being driven, the printing machine being characterized in that the elements (1,

2, 3, 4, 20) are inclined widthwise of the endless belt (2) at a specified angle with a horizontal plane, guides (21) being in contact with the lower side edge of the carrier portion of the endless belt (2), the rotary screen (1) being adapted to be supplied with a color paste injected from its higher end thereinto through a pipe (11).

2. An automatic rotary screen textile printing machine including at least one rotary screen (1), an endless belt (2) extending under the rotary screen (1) in a direction orthogonal to the axis of the rotary screen (1) for transporting the fabric to be printed on, at least one printing table (20) opposed to the rotary screen (1) with a carrier portion of the endless belt (2) interposed therebetween, a roller (4) having a starting end or head portion of the endless belt (2) reeved therearound and a roller (3) having a rear end or tail portion of the endless belt (2) reeved therearound, at least one of the rollers being driven, the printing machine being characterized in that the elements (1, 2, 3, 4, 20) are inclined widthwise of the endless belt (2) at a specified angle with a horizontal plane, guides (21) being in contact with the lower side edge of the carrier portion of the endless belt (2), the rotary screen (1) being adapted to be supplied with a color paste injected from its higher end thereinto through a pipe (11), the inclined rotary screen (1) having a wash water injecting pipe (8) connected to the higher end thereof and a waste wash water collecting trough (9) connected to the lower end thereof, a color paste collecting pipe (10) having one end connected to the bottom of the rotary screen (1) at its lower end and the other end connected to the pipe (11) for injecting the color paste into the higher end of the rotary screen (1).
3. An automatic rotary screen textile printing machine including at least one rotary screen (1), an endless belt (2) extending under the rotary screen (1) in a direction orthogonal to the axis of the rotary screen (1) for transporting the fabric to be printed on, at least one printing table (20) opposed to the rotary screen (1) with a carrier portion of the endless belt (2) interposed therebetween, a roller (4) having a starting end or head portion of the endless belt (2) reeved therearound and a roller (3) having a rear end or tail portion of the endless belt (2) reeved therearound, at least one of the rollers being driven, the printing machine being characterized in that the elements (1, 2, 3, 4, 20) are inclined widthwise of the endless belt (2) at a specified angle with a horizontal plane, guides (21) being in contact with the lower side edge of the carrier portion of the endless belt (2), the rotary screen (1) being adapted to be supplied with a color paste injected from its higher end thereinto through a pipe (11), the inclined rotary screen (1) having a wash water injecting pipe (8) connected to the higher end thereof and a waste wash water col-

lecting trough (9) connected to the lower end thereof, a color paste collecting pipe (10) having one end connected to the bottom of the rotary screen (1) at its lower end and the other end connected to the pipe (11) for injecting the color paste into the higher end of the rotary screen (1), a water injector (81) being provided in an inside space of the rotary screen (1) and extending longitudinally thereof for injecting wash water into the rotary screen (1) over the entire length thereof or at least in a portion thereof toward its higher end.

4. An automatic rotary screen textile printing machine including at least one rotary screen (1), an endless belt (2) extending under the rotary screen (1) in a direction orthogonal to the axis of the rotary screen (1) for transporting the fabric to be printed on, at least one printing table (20) opposed to the rotary screen (1) with a carrier portion of the endless belt (2) interposed therebetween, a roller (4) having a starting end or head portion of the endless belt (2) reeved therearound and a roller (3) having a rear end or tail portion of the endless belt (2) reeved therearound, at least one of the rollers being driven, the printing machine being characterized in that the elements (1, 2, 3, 4, 20) are inclined widthwise of the endless belt (2) at a specified angle with a horizontal plane, guides (21) being in contact with the lower side edge of the carrier portion of the endless belt (2), the rotary screen (1) being adapted to be supplied with a color paste injected from its higher end thereinto through a pipe (11), the inclined rotary screen (1) having a wash water injecting pipe (8) connected to the higher end thereof and a waste wash water collecting trough (9) connected to the lower end thereof, a color paste collecting pipe (10) having one end connected to the bottom of the rotary screen (1) at its lower end and the other end connected to the pipe (11) for injecting the color paste into the higher end of the rotary screen (1), a stopper (18) being provided for holding a roller squeegee (17) in position, a hollow bar (19) extending in an inside space of the rotary screen (1) longitudinally thereof and being formed in its peripheral wall with holes (82) approximately over the entire length of the bar or at least in a portion of the bar toward a higher end thereof, a water supply pipe (83) being in communication with the hollow space of the bar (19).
5. An automatic rotary screen textile printing machine including at least one rotary screen (1), an endless belt (2) extending under the rotary screen (1) in a direction orthogonal to the axis of the rotary screen (1) for transporting the fabric to be printed on, at least one printing table (20) opposed to the rotary screen (1) with a carrier portion of the endless belt (2) interposed therebetween, a roller (4) having a starting end or head portion of the endless belt (2) reeved therearound and a roller (3) having a rear end or tail

portion of the endless belt (2) reeved therearound, at least one of the rollers being driven, the printing machine being characterized in that a printing machine frame (100) provided with the elements (1, 2, 3, 4, 20) is adapted to be inclined with respect to the horizontal plane in the widthwise direction of the endless belt (2), that the endless belt (2) is adapted to travel straight by being restrained by guide means which comprises a guide member (30) or guide members (31, 31) attached to the rear side of the endless belt (2) and extending or aligned in the lengthwise direction of the belt (2); guide grooves (30', 31') formed in the peripheries of rollers (3, 4), the guide member (30) or guide members (31, 31) being movably fittable in the guide grooves (30', 31'); and guide rail (32) or rails (32, 32), or alternatively by guide means which comprises the guide member (30) or guide members (31, 31) and guide grooves (30', 31'), the guide member (30) or guide members (31, 31) being movably fittable in the guide grooves (30', 31'), and that the rotary screen (1) is supplied with a color paste injected therein through a pipe (11) from a higher side of the machine frame (100) held in an inclined position.

6. An automatic rotary screen textile printing machine including at least one rotary screen (1), an endless belt (2) extending under the rotary screen (1) in a direction orthogonal to the axis of the rotary screen (1) for transporting the fabric to be printed on, at least one printing table (20) opposed to the rotary screen (1) with a carrier portion of the endless belt (2) interposed therebetween, a roller (4) having a starting end or head portion of the endless belt (2) reeved therearound and a roller (3) having a rear end or tail portion of the endless belt (2) reeved therearound, at least one of the rollers being driven, the printing machine being characterized in that a printing machine frame (100) provided with the elements (1, 2, 3, 4, 20) is adapted to be inclined with respect to the horizontal plane in the widthwise direction of the endless belt (2), that the endless belt (2) is adapted to travel straight by being restrained by guide means which comprises a guide member (30) or guide members (31, 31) attached to the rear side of the endless belt (2) and extending or aligned in the lengthwise direction of the belt (2); guide grooves (30', 31') formed in the peripheries of rollers (3, 4), the guide member (30) or guide members (31, 31) being movably fittable in the guide grooves (30', 31'); and guide rail (32) or rails (32, 32), or alternatively by guide means which comprises the guide member (30) or guide members (31, 31) and guide grooves (30', 31'), the guide member (30) or guide members (31, 31) being movably fittable in the guide grooves (30', 31'), and that the rotary screen (1) is supplied with a color paste injected therein through a pipe (11) from a higher side of the machine frame (100) held in an inclined position, the rotary screen (1) hav-

ing a wash water injecting pipe (8) connected to the end thereof at a higher side of the machine frame (100) in an inclined position, and a waste wash water collecting trough (9) connected to the opposite end thereof, a color paste collecting pipe (10) having one end connected to the bottom of the rotary screen (1) at said opposite end thereof and the other end connected to the pipe (11) for injecting the color paste into the rotary screen (1).

7. An automatic rotary screen textile printing machine including at least one rotary screen (1), an endless belt (2) extending under the rotary screen (1) in a direction orthogonal to the axis of the rotary screen (1) for transporting the fabric to be printed on, at least one printing table (20) opposed to the rotary screen (1) with a carrier portion of the endless belt (2) interposed therebetween, a roller (4) having a starting end or head portion of the endless belt (2) reeved therearound and a roller (3) having a rear end or tail portion of the endless belt (2) reeved therearound, at least one of the rollers being driven, the printing machine being characterized in that a printing machine frame (100) provided with the elements (1, 2, 3, 4, 20) is adapted to be inclined with respect to the horizontal plane in the widthwise direction of the endless belt (2), that the endless belt (2) is adapted to travel straight by being restrained by guide means which comprises a guide member (30) or guide members (31, 31) attached to the rear side of the endless belt (2) and extending or aligned in the lengthwise direction of the belt (2); guide grooves (30', 31') formed in the peripheries of rollers (3, 4), the guide member (30) or guide members (31, 31) being movably fittable in the guide grooves (30', 31'); and guide rail (32) or rails (32, 32), or alternatively by guide means which comprises the guide member (30) or guide members (31, 31) and guide grooves (30', 31'), the guide member (30) or guide members (31, 31) being movably fittable in the guide grooves (30', 31'), and that the rotary screen (1) is supplied with a color paste injected therein through a pipe (11) from a higher side of the machine frame (100) held in an inclined position, the rotary screen (1) having a wash water injecting pipe (8) connected to the end thereof at a higher side of the machine frame (100) held in an inclined position, and a waste wash water collecting trough (9) connected to the opposite end thereof, a color paste collecting pipe (10) having one end connected to the bottom of the rotary screen (1) at said opposite end thereof and the other end connected to the pipe (11) for injecting the color paste into the rotary screen (1) at the end thereof at a higher side of the machine frame (100) held in an inclined position, a water injector (81) being provided in an inside space of the rotary screen (1) and extending longitudinally thereof for injecting wash water into the rotary screen (1) over the entire length thereof or at least in an end portion thereof at a

higher side of the machine frame (100) held in an inclined position.

8. An automatic rotary screen textile printing machine including at least one rotary screen (1), an endless belt (2) extending under the rotary screen (1) in a direction orthogonal to the axis of the rotary screen (1) for transporting the fabric to be printed on, at least one printing table (20) opposed to the rotary screen (1) with a carrier portion of the endless belt (2) interposed therebetween, a roller (4) having a starting end or head portion of the endless belt (2) reeved therearound and a roller (3) having a rear end or tail portion of the endless belt (2) reeved therearound, at least one of the rollers being driven, the printing machine being characterized in that a printing machine frame (100) provided with the elements (1, 2, 3, 4, 20) is adapted to be inclined with respect to the horizontal plane in the widthwise direction of the endless belt (2), that the endless belt (2) is adapted to travel straight by being restrained by guide means which comprises a guide member (30) or guide members (31, 31) attached to the rear side of the endless belt (2) and extending or aligned in the lengthwise direction of the belt (2); guide grooves (30', 31') formed in the peripheries of rollers (3, 4), the guide member (30) or guide members (31, 31) being movably fittable in the guide grooves (30', 31'); and guide rail (32) or rails (32, 32), or alternatively by guide means which comprises the guide member (30) or guide members (31, 31) and guide grooves (30', 31'), the guide member (30) or guide members (31, 31) being movably fittable in the guide grooves (30', 31'), and that the rotary screen (1) is supplied with a color paste injected therein through a pipe (11) from a higher side of the machine frame (100) held in an inclined position, the rotary screen (1) having a wash water injecting pipe (8) connected to the end thereof at a higher side of the machine frame (100) held in an inclined position, and a waste wash water collecting trough (9) connected to the opposite end thereof, a color paste collecting pipe (10) having one end connected to the bottom of the rotary screen (1) at said opposite end thereof and the other end connected to the pipe (11) for injecting the color paste into the rotary screen (1) at the end thereof at a higher side of the machine frame (100) held in an inclined position, a stopper (18) being provided for holding a roller squeegee (17) in position, a hollow bar (19) extending in an inside space of the rotary screen (1) longitudinally thereof and being formed in its peripheral wall with holes (82) approximately over the entire length of the bar or at least in an end portion of the bar at a higher side of the machine frame (100) held in an inclined position, a water supply pipe (83) being in communication with the hollow space of the bar (19).

9. A method of cleaning a rotary screen in an automatic rotary screen textile printing machine including at least one rotary screen (1), an endless belt (2) extending under the rotary screen (1) in a direction orthogonal to the axis of the rotary screen (1) for transporting the fabric to be printed on, at least one printing table (20) opposed to the rotary screen (1) with a carrier portion of the endless belt (2) interposed therebetween, a roller (4) having a starting end or head portion of the endless belt (2) reeved therearound and a roller (3) having a rear end or tail portion of the endless belt (2) reeved therearound, at least one of the rollers being driven, the method being characterized in that the method comprises (i) cleaning the rotary screen 1 by injecting the wash water from a higher side of the rotary screen (1) on the inclined printing machine frame (100) provided with the elements (1, 2, 3, 4, 20) which is adapted to be inclined with respect to the horizontal plane in the widthwise direction of the endless belt (2); (ii) and discharging the waste wash water after cleaning from the lower end of the rotary screen into a waste water collecting trough (9).

FIG. 1

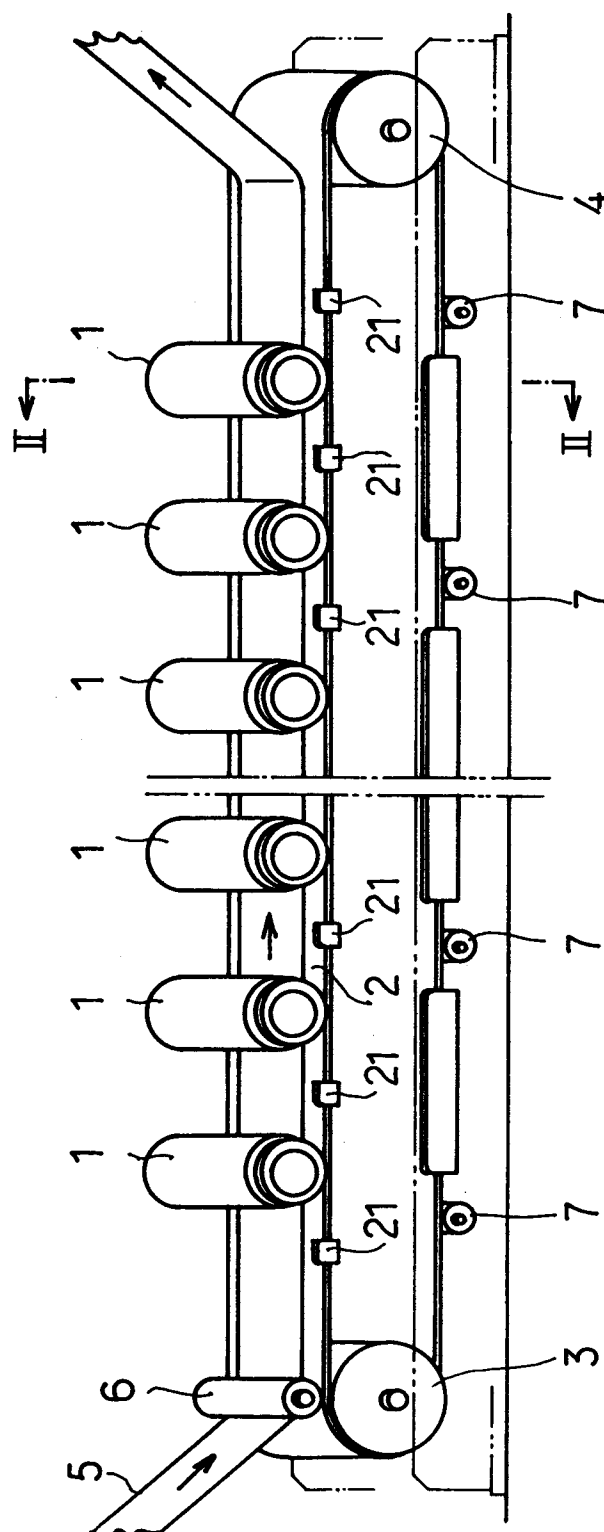


FIG. 2

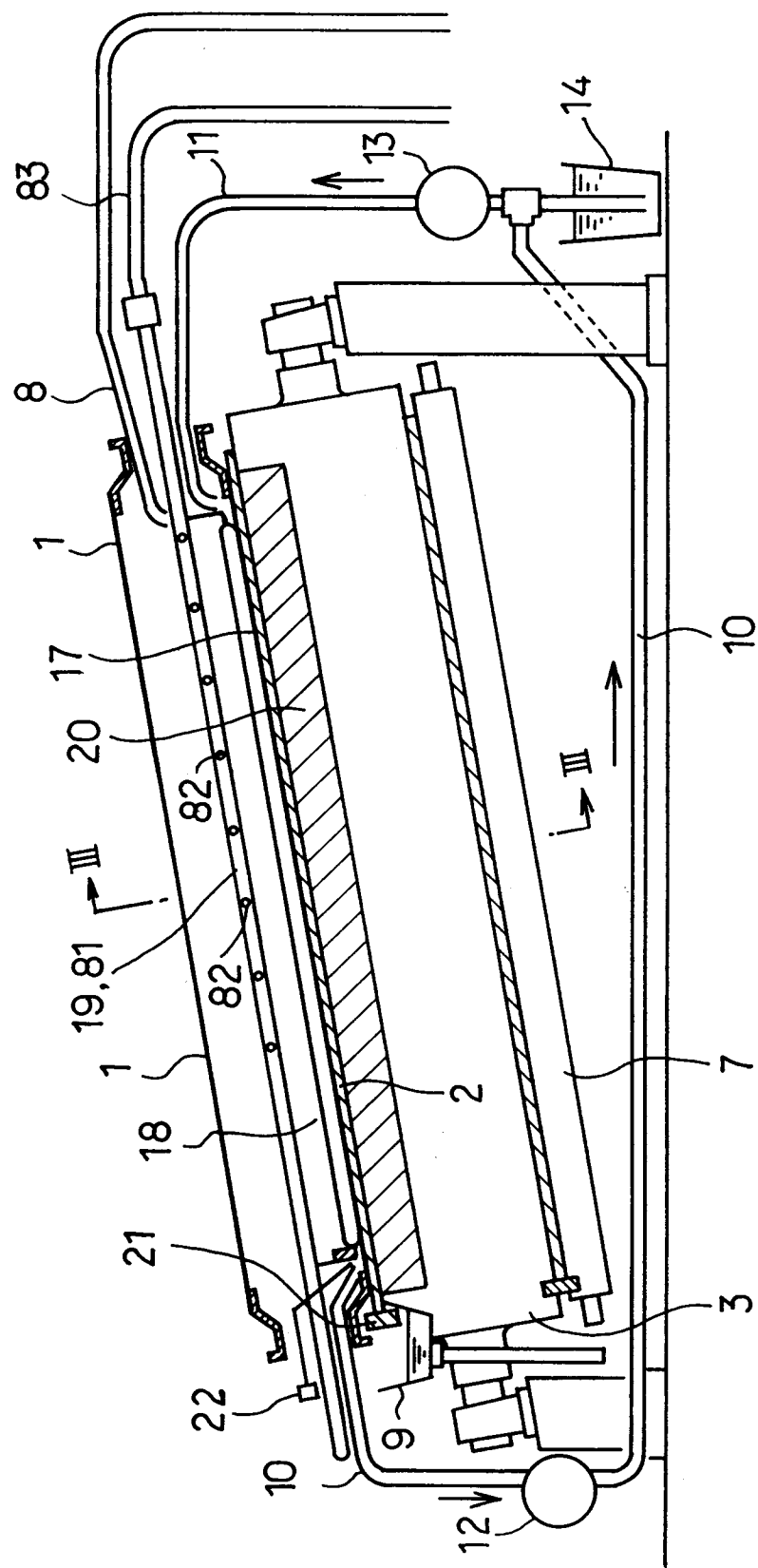


FIG. 3

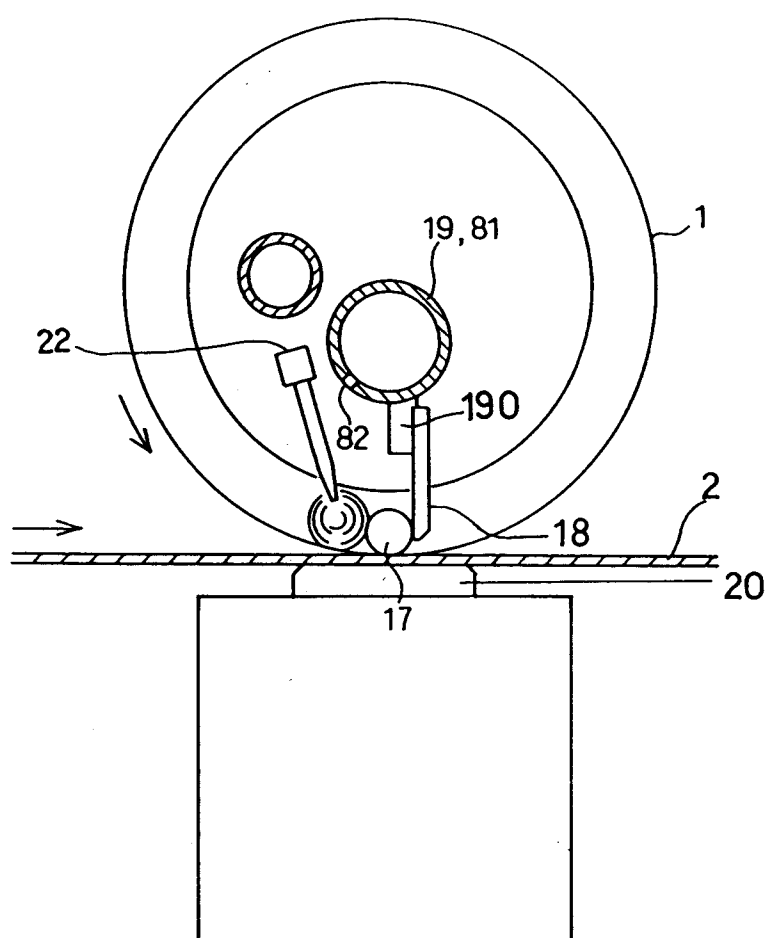


FIG. 4

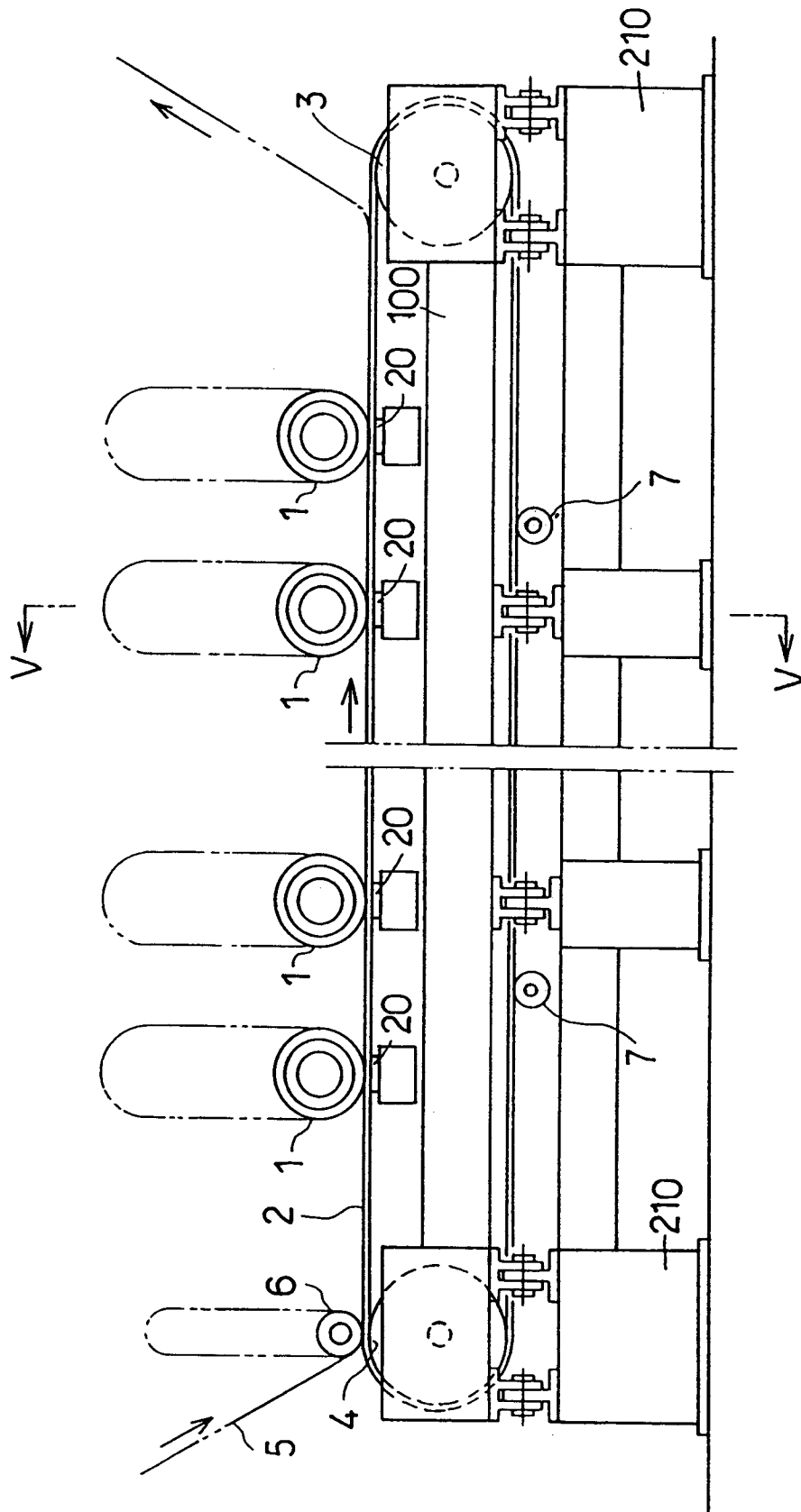
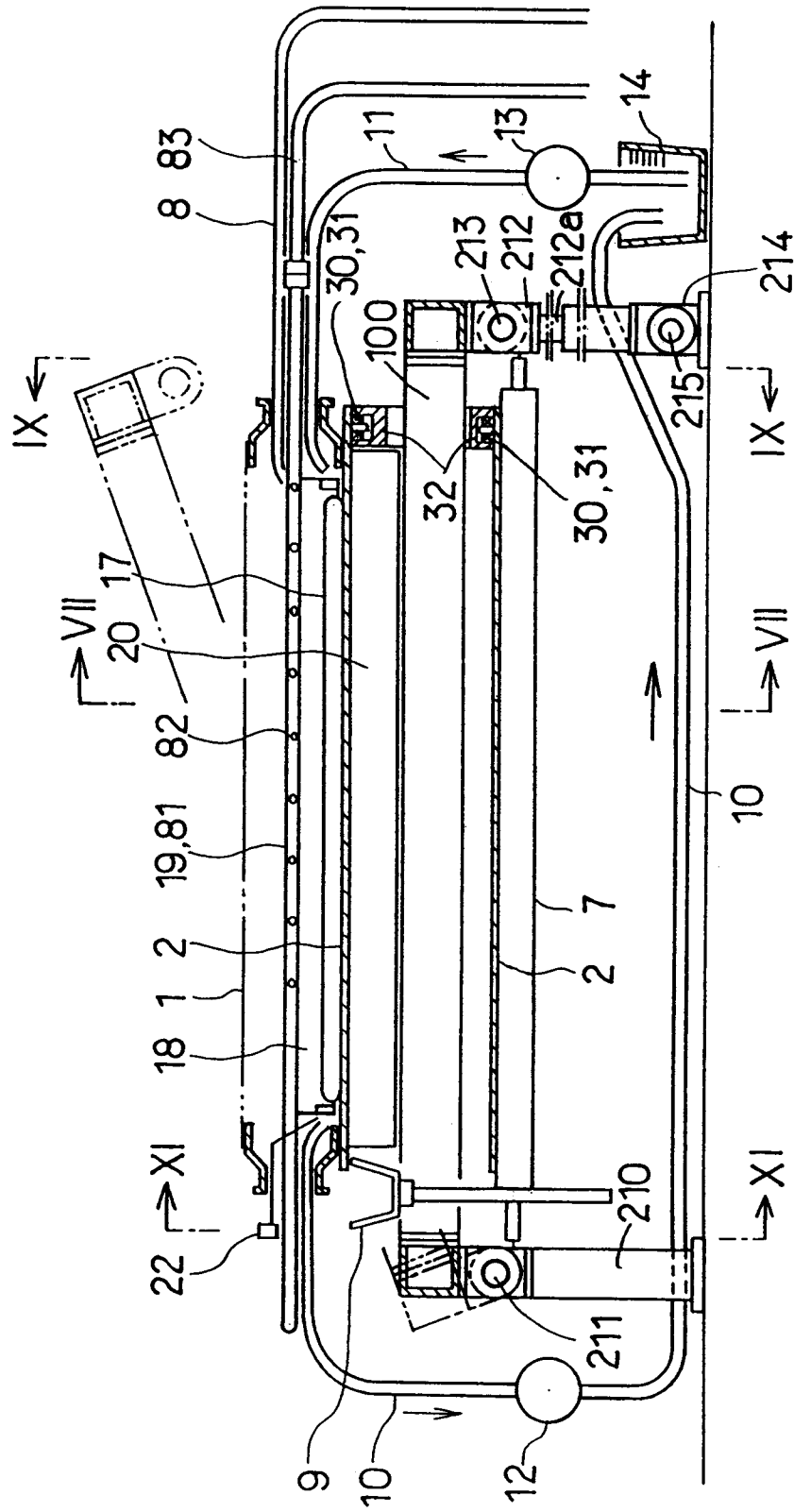
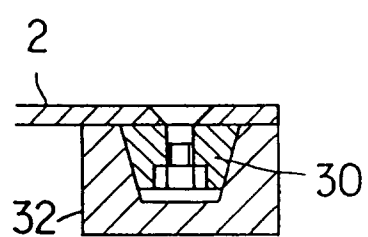


FIG. 5



F I G. 6 (A)



F I G. 6 (B)

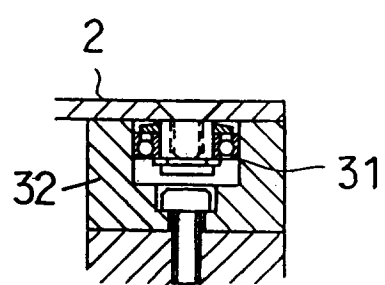
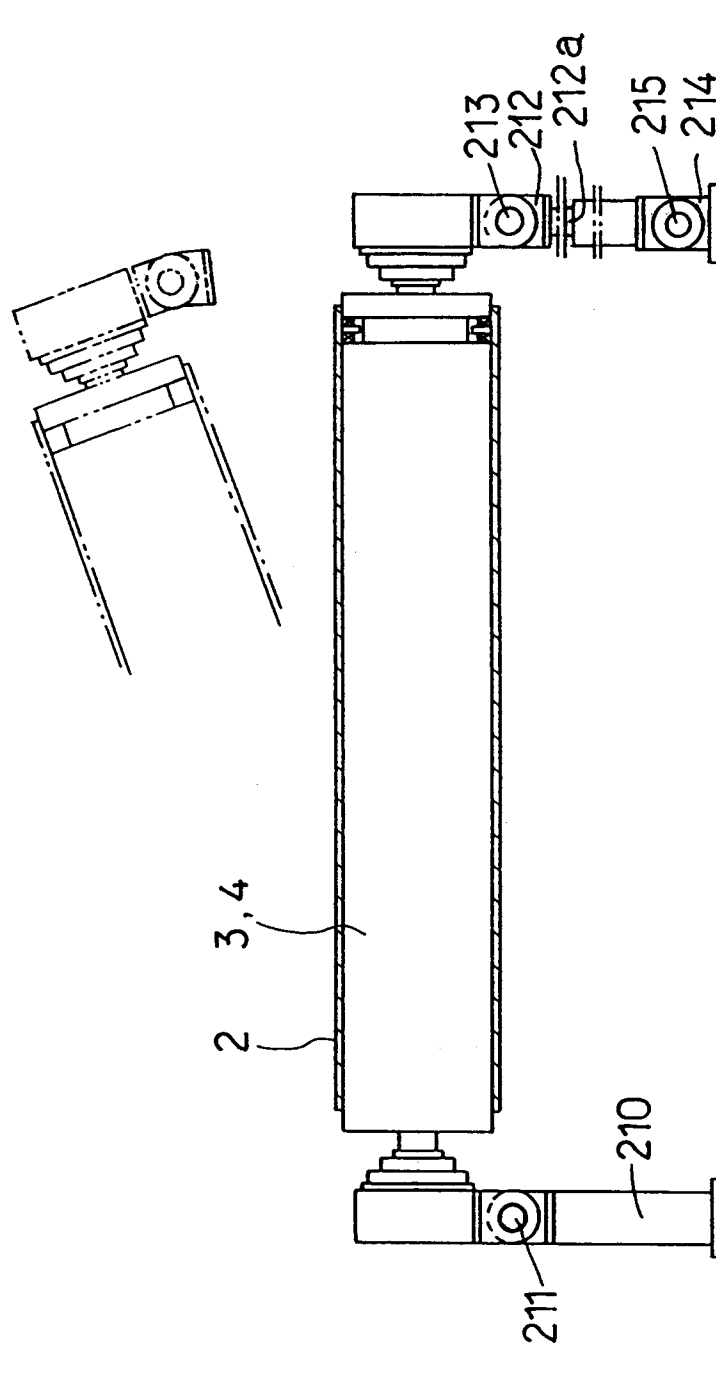
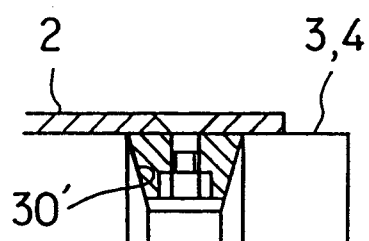


FIG. 7



F I G. 8 (A)



F I G. 8 (B)

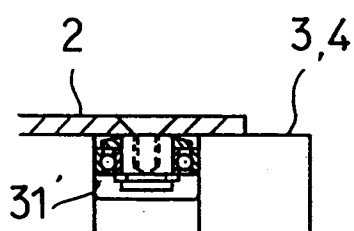


FIG. 9

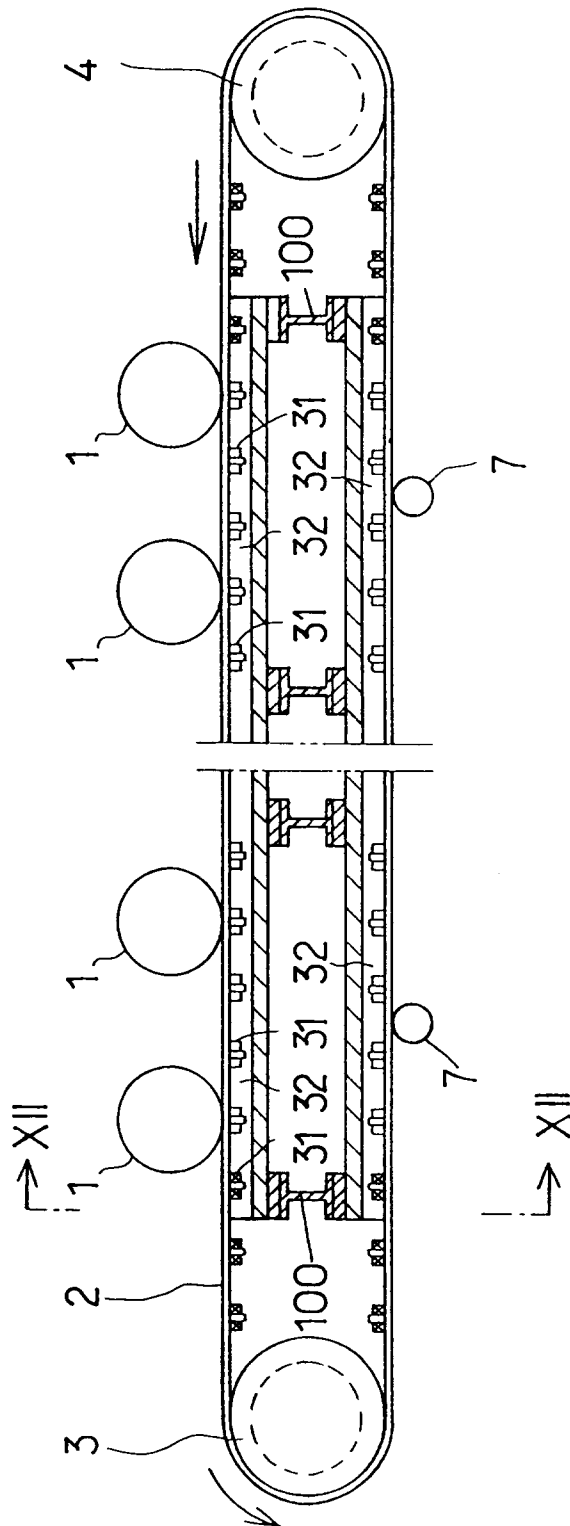


FIG. 10

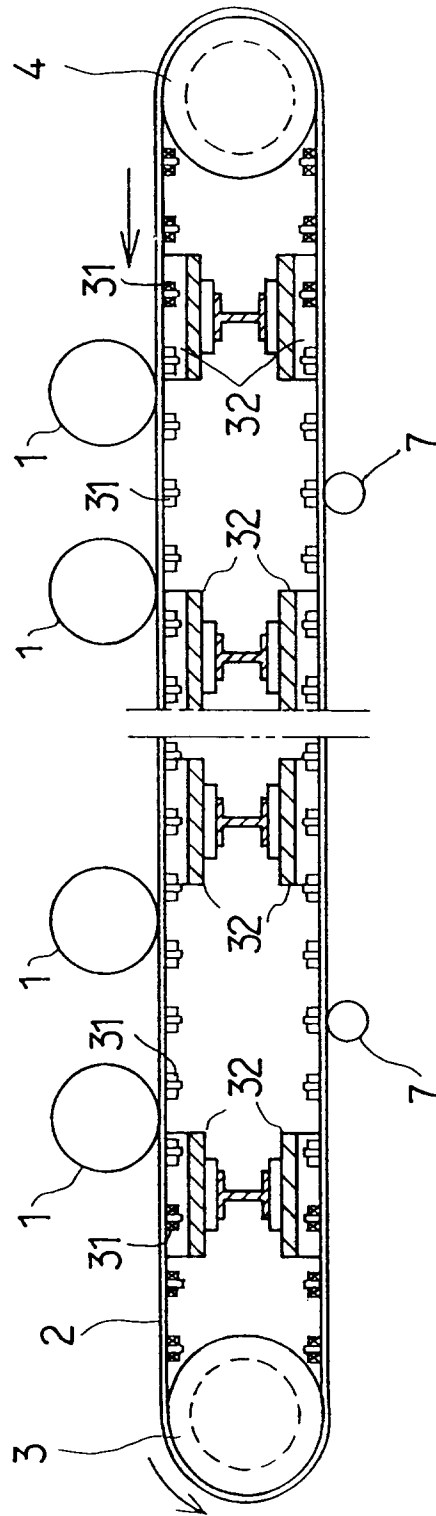


FIG. 11

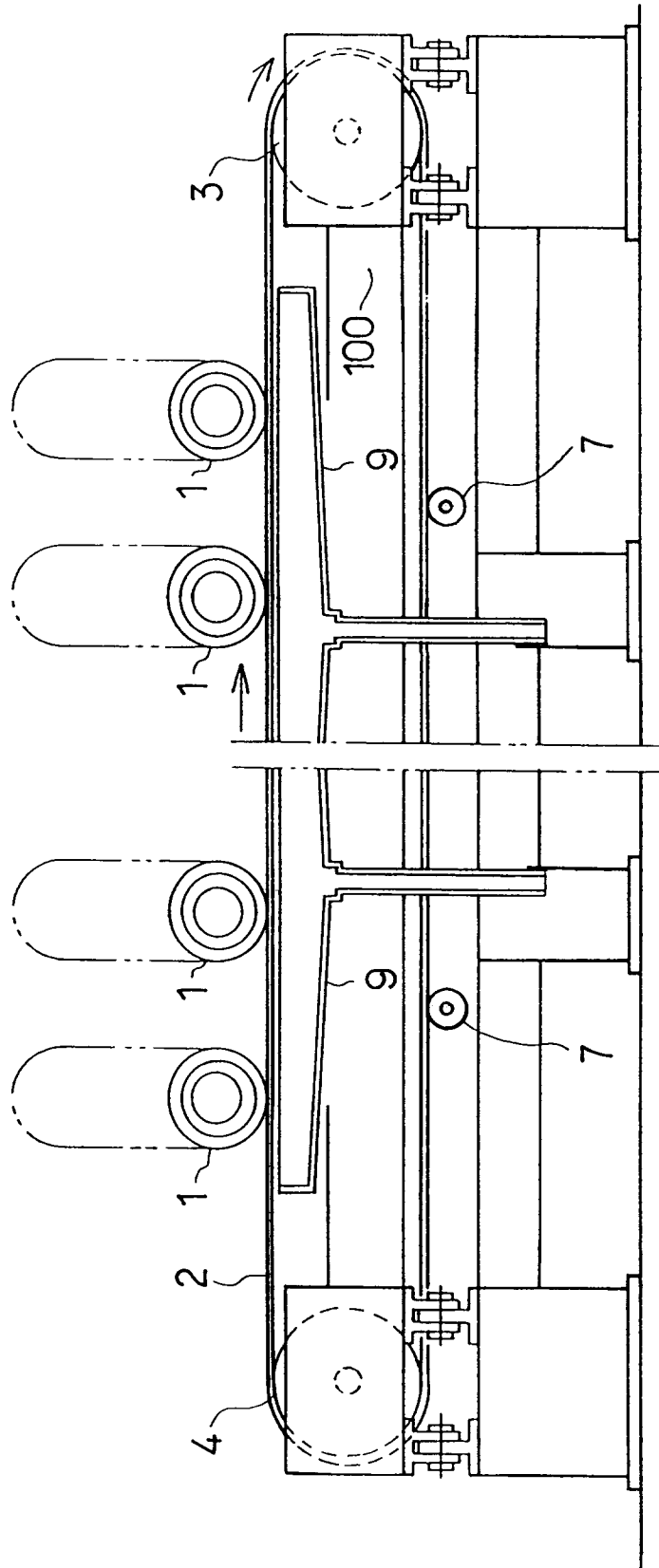
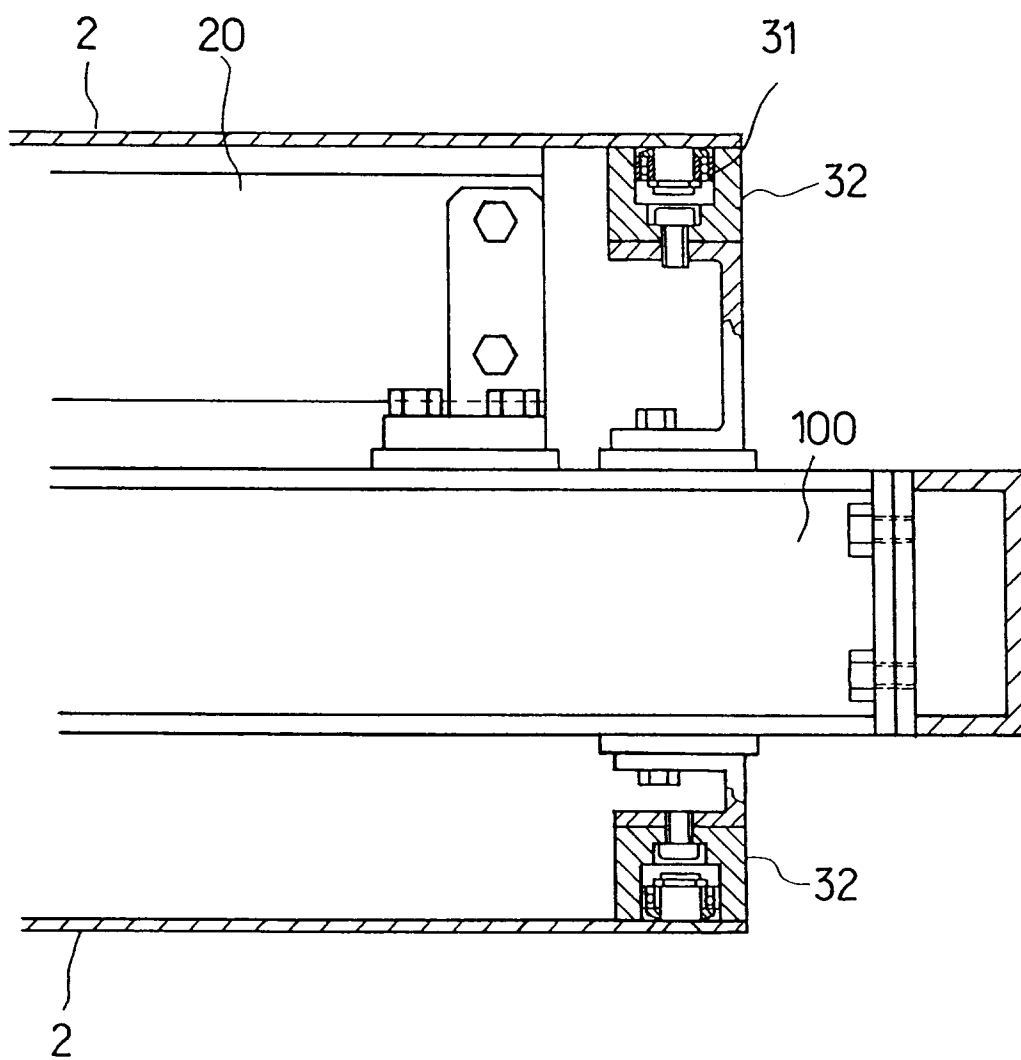


FIG. 12



F I G. 1 3

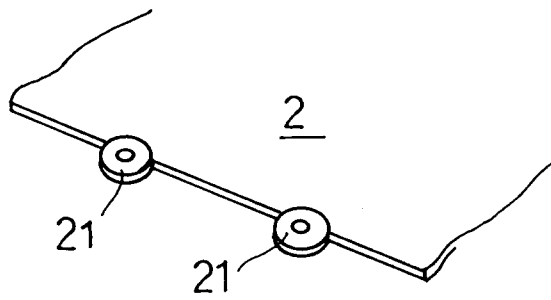


FIG. 14

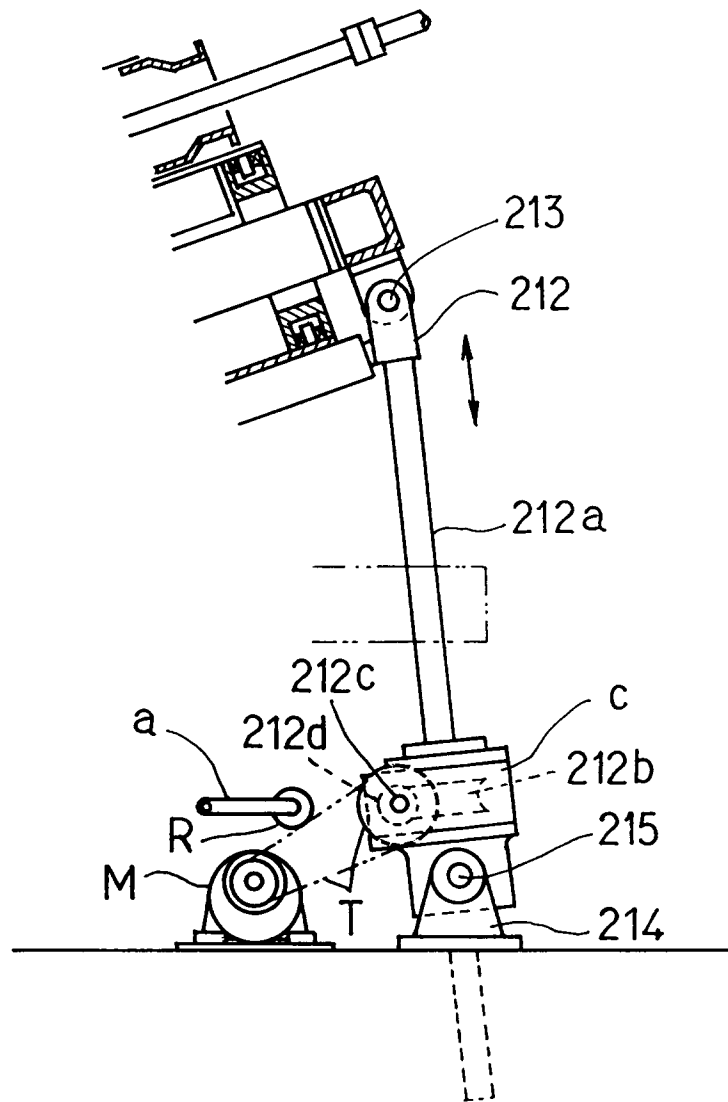


FIG. 15

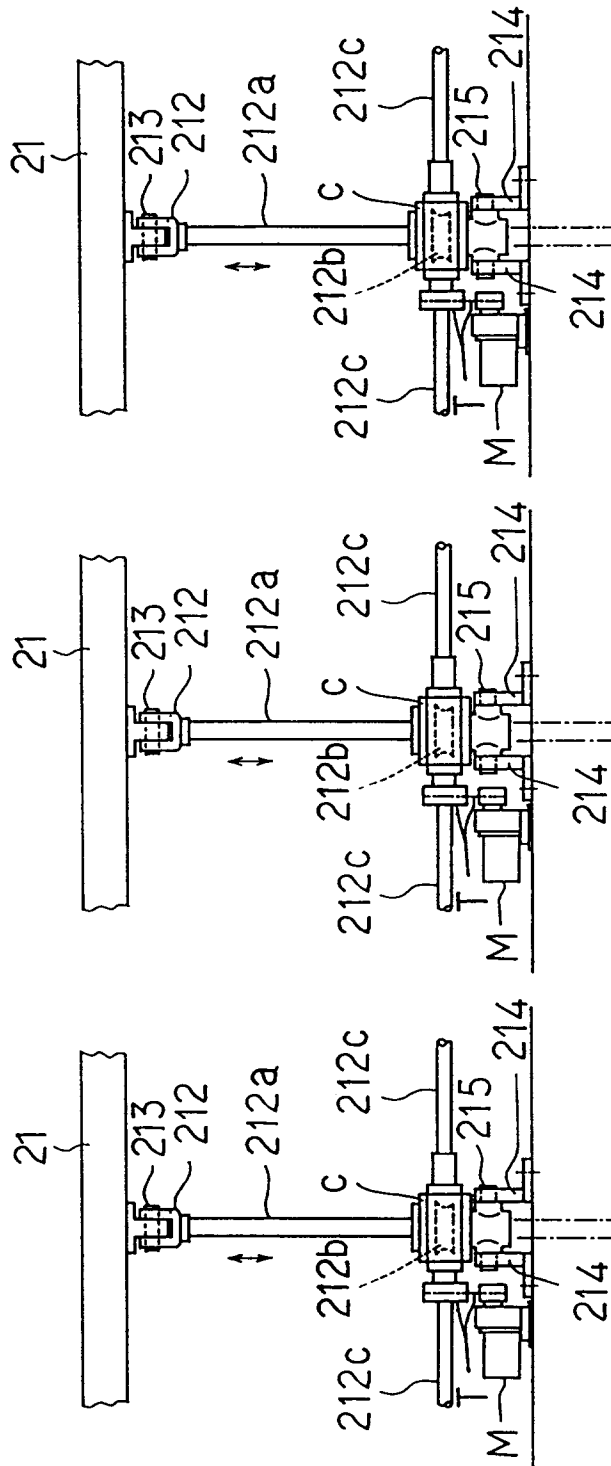


FIG. 16

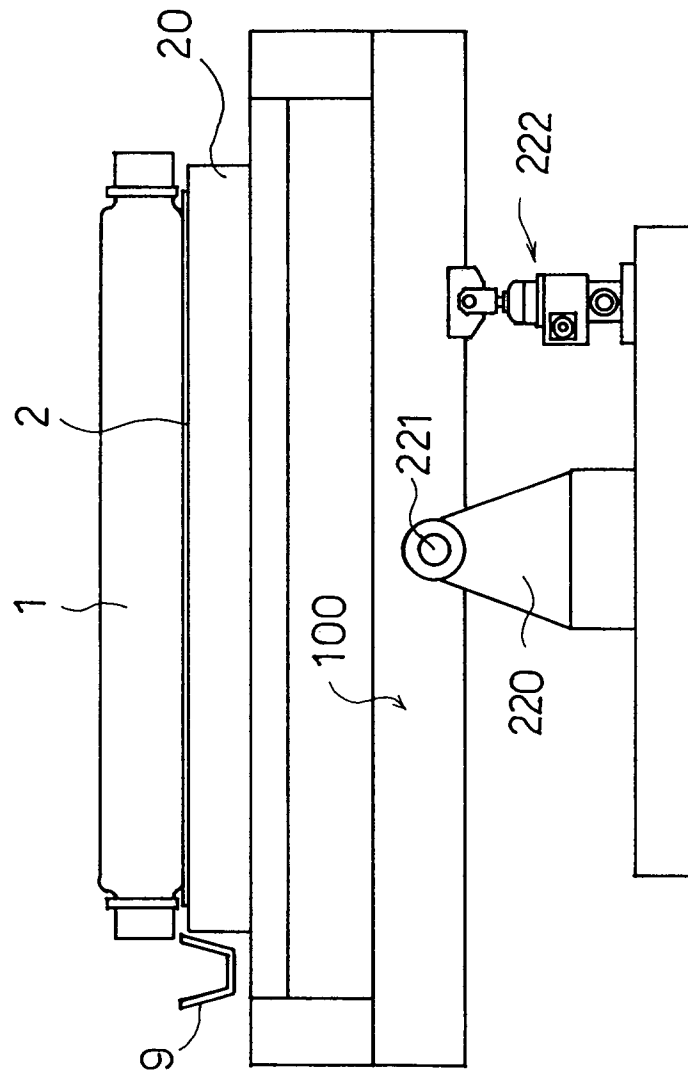
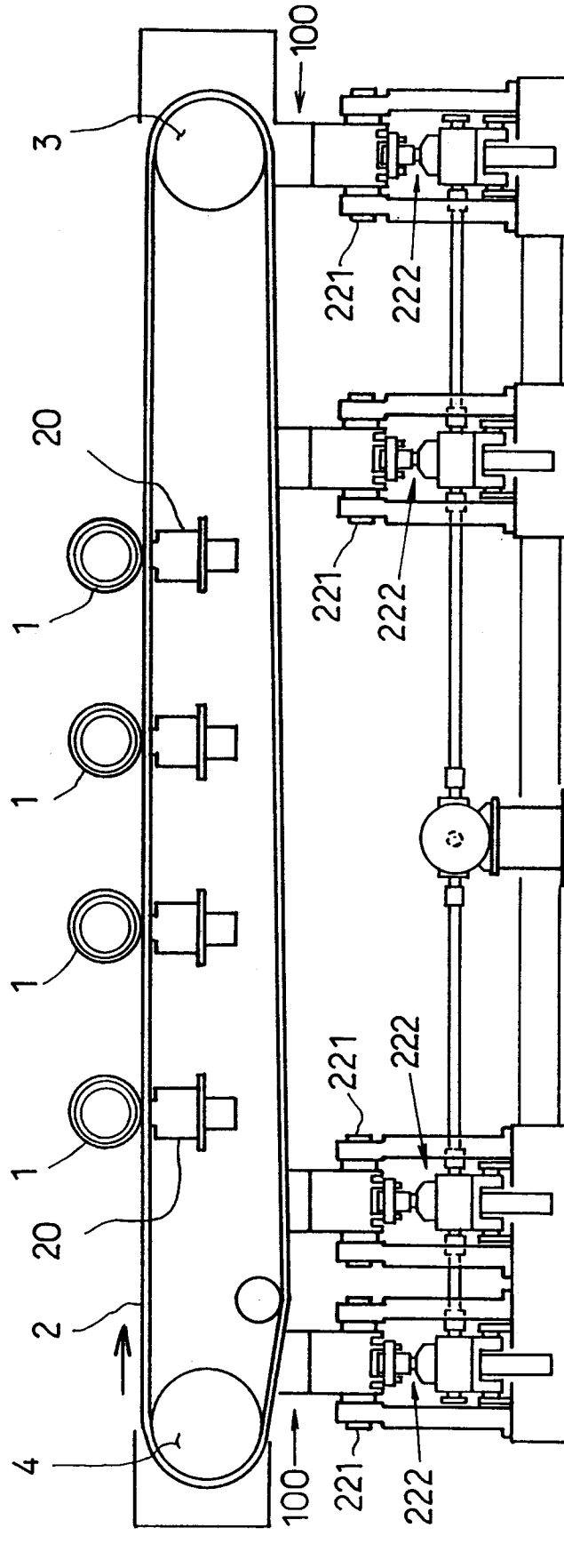


FIG. 17





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 11 6662

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)
E	EP-A-0 694 385 (TOSHIN KOGYO CO. LTD.) * the whole document *	1-9	B41F15/08 B41F15/24 B41F35/00
A	DE-A-24 00 728 (MITTER & CO.) ---	1-9	
A	EP-A-0 391 491 (STORK X-CEL B.V.) ---	9	
A	DE-A-34 35 657 (ZIMMER) -----		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B41F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		16 February 1996	DIAZ-MAROTO, V
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03.82 (P4/C01)