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

(11) EP 0 754 549 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
22.01.1997 Bulletin 1997/04

(51) Int. Cl.[6]: **B41F 15/08**

(21) Application number: **95114009.4**

(22) Date of filing: **06.09.1995**

(84) Designated Contracting States:
DE GB IT NL SE

(30) Priority: **20.07.1995 JP 184382/95**

(71) Applicant: **SAKURAI GRAPHIC SYSTEMS CORP.**
Koto-ku, Tokyo 135 (JP)

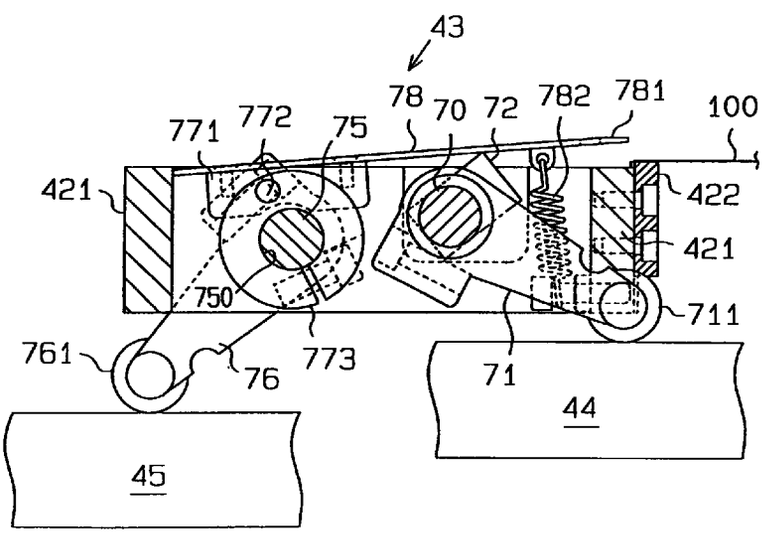
(72) Inventors:
- **Niwa, Masanori**
  Gifu-ken 501-37 (JP)
- **Takahashi, Satoshi**
  Gifu-ken 501-37 (JP)

(74) Representative: **Geyer, Werner et al**
Patentanwälte
Geyer, Fehners & Partner,
Perhamerstrasse 31
80687 München (DE)

(54) Mechanism for gripping a sheet in printer

(57) When a first opening and closing rail 44 is raised, a first lever 71 will rotate and a gripping plate 78 will be spaced from a frame 42 by means of a cam 72. When, on the other hand, the first opening and closing rail 44 is lowered, the first lever 71 will rotate and the gripping plate 78 will be brought into contact with the frame 42 by means of a gripper spring 782. In contrast, when a second opening and closing rail 45 is raised, a second lever 76 will rotate and the gripping plate 78 will be moved in the direction opposite to the conveying direction by means of a coupling tool 77. When, on the other hand, the second opening and closing rail 45 is lowered, the second lever 76 will rotate and the gripping plate 78 will be moved in the conveying direction by means of the coupling tool 77.

Fig.10



EP 0 754 549 A1

Description

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates generally to a gripping mechanism for a sheet to be printed in a screen type printer. More particularly, the invention relates to a gripping mechanism for a sheet in a screen type printer where sheet is conveyed by the movement of the gripping mechanism itself.

Description of the Related Art

A conveying apparatus, where, in conveying a sheet to be printed onto the printing table of the printer, the sheet is gripped by the gripping mechanism and conveyed to a predetermined position by the movement of the gripping mechanism itself, has been so far put into practical use. The gripping mechanism generally consists of a gripping plate for gripping a sheet in cooperation with a frame supporting the gripping mechanism and a drive unit for driving the gripping plate. And, when the sheet is gripped, the gripping plate is spaced from the frame so that the sheet is placed between the gripping plate and the frame, and the gripping plate is then placed over the frame so that the sheet is gripped between the gripping plate and the frame. The gripping mechanism, which gripped the sheet, passes over the printing table to convey the sheet onto the printing table. At this time, the gripping plate remains gripping the sheet and covers part of the sheet.

The above-described conveying mechanism, however, has the disadvantage that a large blank portion remains in the sheet because the gripping plate covers part of the sheet. In the screen printing, the interference between the gripping plate positioned on the sheet and the squeegee needs to be avoided because printing is performed while the squeegee is being slid on the screen. Therefore, when the squeegee is lowered on the screen, it should be lowered to the position where the gripping plate has passed. Thus, there is at least a portion of the sheet corresponding to the width of the gripping plate that cannot be printed on.

As a result, a sheet cannot be used effectively and printing efficiency cannot is reduced.

SUMMARY OF THE INVENTION

Accordingly, it is a primary objective of the present invention to provide a gripping mechanism for a sheet in a printer where there is no possibility that the mechanism disturbs effective printing of the sheet.

To achieve the foregoing and other objects and in accordance with the purpose of the present invention, a gripping apparatus in a screen type printing machine is provided. The apparatus grips and carries a sheet supplied from an external paper supplying device in a direction reverse to a running direction of a squeegee to a printing table where the sheet is printed. The mechanism includes a frame disposed under a screen to move to a predetermined printing range. The apparatus has at least one holder plate mounted on the frame. The plate is arranged to contact an upper surface of the frame to hold the sheet when the frame moves to the printing range, removes from the upper surface to release the sheet when the frame reaches the printing range, and retract from the front edge of the sheet to avoid overlapping the sheet when the squeegee begins to move. The apparatus also has an mechanism for actuating the holder plate.

BRIEF DESCRIPTION OF THE DRAWINGS

The features of the present invention that are believed to be novel are set forth with particularity in the appended claims. The invention, together with objects and advantages thereof, may best be understood by reference to the following description of the presently preferred embodiments together with the accompanying drawings in which:

Fig. 1 is a schematic side elevational view showing a printing system including the conveying unit of a printer of the present invention;

Fig. 2 is a side elevational view showing selected internal parts of the printer;

Fig. 3 is a plan view showing the printer of Fig. 2 with parts omitted;

Fig. 4 is an enlarged side view showing a conveying unit in the printer of Fig. 2;

Fig. 5 is a plan view showing the conveying unit Fig.4;

Fig. 6 is a schematic side elevational view showing a sheet feeding unit;

Fig. 7 is a diagrammatic side elevational view used to explain the first operational state of a first gripper;

Fig. 8 is a diagrammatic side elevational view used to explain the second operational state of the first gripper;

Fig. 9 is a diagrammatic side elevational view used to explain the third operational state of the first gripper;

Fig. 10 is a diagrammatic side elevational view used to explain the fourth operational state of the first gripper;

Fig. 11 is a diagrammatic side elevational view

used to explain the fifth operational state of the first gripper;

Fig. 12 is a diagrammatic side elevational view used to explain the sixth operational state of the first gripper; and

Fig. 13 is a timing diagram showing the operational timing of each unit of the printer including the conveying unit.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A preferred embodiment of the present invention in a screen type printer will hereinafter be described in reference to the accompanying drawings.

First, the system structure of a printer 30, including a conveying unit 40 constructed in accordance with the present invention, will be described in reference to Fig. 1. Fig. 1 shows a printing system 10 including the conveying unit 40 of the printer 30 constructed in accordance with the present invention. The printing system 10 is constituted by a sheet feeding unit 20 and the printer 30 including the conveying unit 40.

The paper feeding unit 20 will be described in reference to Fig. 6. The sheets feeding unit 20 is provided with a tray 21 for storing sheets, in this case, sheets of paper 100, a sheet feeding belt 22, which is driven by a drive unit (not shown) and which supplies the printing paper 100 of the tray 21 to the printer 30, and a press roller 23 for suppressing the disorder of the printing paper 100 at the sheet feeding belt 22 during conveying. Also, the sheet feeding unit 20 is provided with casters 24 which are fitted into rail grooves 25 formed in a base 26. With these casters 24, the sheet feeding unit 20 is freely movable toward and away from the printer 30.

Next, the structure of the printer 30 will be described in reference to Figs. 2 to 5. Fig. 2 is a side elevational view showing the internal structure of the printer 30, Fig. 3 is a plan view showing the printer 30, Fig. 4 is an enlarged side view showing the conveying unit 40 in the printer 30, and Fig. 5 is a plan view showing the conveying unit 40 in the printer 30.

The printer 30 is provided with the conveying unit 40 for conveyng the printing paper 100 supplied by the sheet feeding unit 20 to a printing position, a printing unit 50 for printing the printing paper 100, a discharge unit 60 for discharging the printing paper 100 printed, and a drive unit 90 as a drive source for driving the units 40, 50, and 60. The drive unit 90 is provided in a housing 31, and a first gripper 43, of the conveying unit 40, is driven by another conveyor frame drive motor 47, which is different from the drive unit 90.

The conveying unit 40 is provided with a positioning mechanism 41, a conveyor frame 42, the first gripper 43, a first opening and closing rail 44, a second opening and closing rail 45, a first guide rail 46, and the conveyor frame drive motor 47. The positioning mechanism 41 receives the printing paper 100 fed by the sheet feeding unit 20 and performs accurate positioning. For this purpose, the positioning mechanism 41 is provided with a table 411 for receiving the printing paper 100, a longitudinal positioning tool 412 for positioning the longitudinal direction of the printing paper 100, and a lateral positioning tool 413 for positioning the lateral direction of the printing paper 100. The longitudinal positioning cool 412 is lowered to the paper receiving table 411 when the printing paper 100 is positioned, and is raised from the paper receiving cable 411 when the printing paper 100 is conveyed. The lateral positioning tool 413 causes the side edge of the printing paper 100 to contact a positioning projection 414 by a drive roller (not shown) provided in the paper receiving table 411, thereby performing the lateral positioning.

The conveyor frame drive motor 47 is fixed to the housing 31 facing to the positioning mechanism 41 and drives a frame drive belt 462 tensioned in the conveying direction with a pulley belt 463 by means of a pair of pulleys 461 arranged on both sides of the printer 30.

The conveyor frame 42 is provided with two lateral frames 421 extending in the lateral direction, and a plurality of longitudinal frames 424 for reinforcing the lateral frames 421. On the lateral frame 421 opposite to the positioning mechanism 41, there is mounted a gripping member 422 for gripping the printing paper 100 in cooperation with a gripping plate 78. Also, in the vicinities of the opposite ends of the lateral frame 421, there are provided carriages 435 having bearings (not shown) therein.

Below the carriages 435, a pair of first guide rails 46 are arranged along the conveying direction, and the carriages 435 are fitted into the first guide rails 46 so that carriages 435 are freely movable in the conveying direction. Further, fixing members 423 for fixing the lateral frame 421 to the frame drive belts 462 are attached to the opposite ends of the lateral frame 421 so that the conveyor frame 42 can move in the horizontal direction as the drive belts 462 are moved. Also, each longitudinal frame 424 is formed with a first shaft hole 425 having a diameter greater than chat of a first shaft 70 to be described later and a second shaft hole 426 having a diameter greater than that of a second shaft 75 to be described later.

The first gripper 43 is provided with the first shaft 70, a first lever 71, the second shaft 75, a second lever 76, and the gripping plate 78. The first shaft 70 and the second shaft 75 extend along the lateral frame 421 and are inserted into the first shaft hole 425 and the second shaft hole 426 of the longitudinal frame 424, respectively. The first shaft 70 has a first end 701 and a second end 702. Likewise, the second shaft 75 has a first end 751 and a second end 752. The first end 701 of the first shaft 70 and the second end 752 of the second shaft 75 project from the outermost longitudinal frame 424.

The first lever 71 is fixedly mounted on the first end 701 of the first shaft 70, and a square-shaped cam 72 is fixedly mounted on the portion of the first shaft 70 cov-

ered with the gripping plate 78. The first lever 71 is formed at one end with a fixing hole 710 through which the lever 71 is fixedly mounted on the first shaft 70, and at the other end, it carries a roller 711. The lower end of the roller 711 is brought into contact with the first opening and closing rail 44 extending in the conveying direction. The first opening and closing rail 44 is connected to the drive unit 90 through a link mechanism 80 so that it is lowered when the printing paper 100 is gripped and it is raised when the printing paper 100 is released. The first lever 71 is urged toward the first opening and closing rail 44 at all times by a coil spring 703 inserted on the first shaft 70.

The second lever 76 is fixed to the second end 751 of the second shaft 75, and the second shaft 75 and the gripping plate 78 are coupled through coupling tools 77. The second lever 76 is formed at one end with a fixing hole, 750 through which the lever 76 is fixedly mounted on the second shaft 75, and at the other end its carries a roller 751. The lower end of the roller 751 is brought into contact with the second opening and closing rail 45 extending in the conveying direction.

The second opening and closing rail 45 is connected to the drive unit 90 through a link mechanism 81 so that it is raised when the printing paper 100 is gripped and it is lowered when the printing paper 100 is released. The second lever 76 is urged toward the second opening and closing rail 45 at all times by a coil spring 752 inserted on the second shaft 75.

The coupling tool 77 is constituted by a first coupling member 771 of square shape, which is coupled directly to the gripping plate 78 and has an arcuate cut-out, and a second coupling member 773 of cylindrical shape, which is fixed to the second shaft 75 and rotates the first coupling member 771 through a stop pin 772, and which is formed with a cut-out.

The gripping plate 78 is a substantially rectangular-shaped metal plate, and the end of the gripping plate 78, facing to the positioning mechanism 41, has claw portions 781, which are slightly bent downward for gripping the printing paper 100 in cooperation with the gripping member 422. Also, the gripping plate 78 is urged in the closing direction by a gripper spring 782 arranged between a bolt 425 mounted in the lateral frame 421 and the lower surface of the gripping plate 78.

The printing unit 50 is provided with a printing frame 51, a doctor 52, a squeegee 53, and a table 54. The printing frame 51 is formed into a rectangular shape when viewed from top, and has a pair of second guide rails 511 extending in the conveying direction of the printing paper 100 in the parallel side frames. Also, the printing frame 51 has four corners to which poles 512 are connected through link mechanisms 82 and gear mechanisms 83 so that the frame 51 is moved up and down according to printing conditions. The doctor 52 is attached to a doctor frame 521 which is movably supported in the horizontal direction by the second guide rail 511. The squeegee 53 is attached to a squeegee frame 531 which is movably supported in the horizontal direction by the second guide rail 511.

The table 54 is arranged in the central portion of the printer 30 when viewed from top and is formed with a plurality of through holes 541 for attracting and holding the printing paper 100 placed on the table 54. Also, the table 54 is connected to the drive unit 90 through a link mechanism 84 and a gear mechanism 85. Since the table 54 is lowered when the conveyor frame 42 is moved and is raised when printing is performed, interference with the conveyor frame 42 is prevented. A screen 55, formed with a desired printing plate, is fixed to the printing frame 51.

Printing is performed by lowering the squeegee 53 onto the screen 55 which has ink on its surface, sliding the squeegee 53 in the right direction of Fig. 2, and applying the ink passed through the unmasked portion of the screen 55 to the printing paper 100. The ink spread out by the squeegee 53 is collected to the original position by returning the doctor 52 moved together with the squeegee 53 to the left side of Fig. 2.

The discharge unit 60 is provided with a discharge frame 61, a second gripper 62, and a third opening and closing rail 63. Also, the second gripper 62 is provided with a third shaft 621 and a third lever 622. The discharge frame 61 is arranged at right angles relative to the conveying direction. Also, on the discharge frame 61, the third shaft 621 is mounted. The third lever 622 has formed at its one end with a fixing hole 623 through which the lever 622 is fixedly mounted on the third shaft 621, and at the other end carries a roller 624.

The lower end of the roller 624 is brought into contact with the third opening and closing rail 63 extending in the conveying direction. The third opening and closing rail 63 is connected to the drive unit 90 through a link mechanism 86 so that it is raised when the printing paper 100 is gripped and it is lowered when the printing paper 100 is released. The third lever 622 is urged toward the third opening and closing rail 63 at all times by a coil spring (not shown) inserted on the third shaft 621. This discharge unit 60 and the conveying unit 40 are connected by a connecting rod 49 so that the discharge unit 60 is moved when the conveying unit 40 is moved.

The drive unit 90 is provided with a motor 91 as a drive source, and five cams (not shown) are mounted on the motor shaft so that each movable unit is operated at a predetermined timing.

Next, the operation of the printer 30 will be described in reference to the operational explanatory diagrams of the first gripper 43 shown in Figs. 7 to 12 and the timing diagram shown in Fig. 13. Suppose that a printing paper 100 printed in a previous printing cycle has been placed on the table 54 and the next printing paper 100 fed from the paper feeding unit 20 has been accurately positioned and placed on the positioning mechanism 41.

At the point of time of rotational angle 0 , the table 54 is lowered to the lowest position through the link mechanism 84 and the printing frame 51 is raised to the

highest position through the link mechanism 82. Also, the squeegee 53 and the doctor 52 are in the standby states at their upper positions on the downstream side of the conveying direction.

The first opening and closing rail 44, as shown in Fig. 7, is in its upper position by means of the link mechanism 80, the first lever 71 is urged counterclockwise with the first shaft 70 as a center, and the cam 72 pushes up the gripping plate 78 against the urging force of the gripper spring 782. On the other hand, the second opening and closing rail 45 is also in its upper position by means of the link mechanism 81, the second lever 76 is urged clockwise with the second shaft 75 as a center, and the gripping plate 78 is in its advanced position. Also, the third opening and closing rail 63 is moved from its lower position toward its upper position by means of the link mechanism 86, and the second gripper 62 is moved from its open state to its closed state.

At this time, the longitudinal positioning tool 412 has been gradually raised upward so as not to disturb the conveyance of the printing paper 100, and the operation of the lateral positioning tool 413 has been stopped. And, when the longitudinal positioning tool 412 is raised to the highest position, the printing paper 100 is supplied between the gripping plate 78 and the gripping member 422.

Then, if an angle of rotation reaches near 10 , the first opening and closing rail 44 will be lowered via the link mechanism 80 and the first gripper 43 will grip the printing paper 100 between the claw portion 781 and the gripping member 422, as shown in Fig. 8. At this time, the third opening and closing rail 63 has been in the lowest position, and the second gripper 62 has gripped the printing paper 100 which has been printed at a previous printing cycle and which has been placed on the table 54.

Subsequently, if an angle of rotation reaches near 40 , the conveyor frame drive motor 47 will be operated and the drive belt 462 will be driven. As a result, the conveyor frame 42 is horizontally moved toward the downstream position. At this time, the discharge frame 61, which has been connected to the conveyor 42 through the connecting rod 49, is also horizontally moved toward the downstream position.

Thus, if the conveyor frame 42 is moved, the printing paper 100 gripped by the first gripper 43 will be conveyed to the printing position. Also, if the discharge frame 61 is moved, the printed paper 100 gripped by the second gripper 62 will be discharged to a position where it will be taken out. Note that, the conveyor frame 42 is operated by the drive motor 47 separated from the drive unit 90 for driving the printer 30. Therefore, the conveying operation can be performed at a conveying speed corresponding to the type of material of the sheets.

This conveying operation is completed in the vicinity of a rotational angle of 140. If the rotational angle reaches 140 , the table 54 will be raised toward the printing frame 51 and the printing frame 51 will be lowered toward the table 54. Also, the first opening and closing rail 44 is raised again, as shown in Fig. 9. As a result, since the first lever 71 is urged counterclockwise, the gripping plate 78 is opened and the printing paper 100 gripped by the gripping plate 78 (first gripper 43) is released. At this time, the released printing paper 100 is drawn in from the through holes 541 of the table 54 and is adhered closely to the table 54.

On the other hand, since the second opening and closing rail 45 starts moving downward, the force that has urged the second lever 76 into the clockwise direction, against the elastic force of the coil spring 762 urging the second lever 76 into the counterclockwise direction, disappears. As a result, as shown in Fig. 10, the first coupling member 771 supported through the stop pin 772 by means of the second coupling member 773 is moved rearward from the advanced position (Fig. 9) because the second lever 76 and the second coupling member 773, together with the second shaft 75, are rotated in the counterclockwise direction. Therefore, the gripping plate 78 coupled to the first coupling member 771 is also moved rearward.

Subsequently, as shown in Fig. 11, the first opening and closing rail 44 starts moving downward, and the gripping plate 78 is closed and reaches its horizontal state. At this time, with the state of the gripping plate 78 being moved rearward, the gripping plate 78 is closed, and the claw portion 781 of the gripping plate 78 does not contact the printing paper 100. Therefore, in the subsequent printing process, the squeegee 53 can start moving downward from the position where the first gripper 43 exists, unlike the conventional conveying unit where the squeegee 53 must start moving downward from the position passing over the first gripper 43. As the result of this, printing can be performed without leaving an unnecessary blank portion on the printing paper 100, and printing efficiency is enhanced.

When printing is performed, the squeegee 53 is lowered until it is brought into contact with the screen 55, and is horizontally slid on the screen 55 from the upstream side toward the downstream side. As a result, ink is placed on and applied to the printing paper 100, except the masked portion, and printing is completed. If the squeegee 53 is slid up to the upstream position, it will be raised and not lowered. Instead the doctor 52 will be lowered until it is brought into contact with the screen 55. And, the doctor 52 is moved from the upstream side toward the downstream side to collect the ink spread out by the squeegee 53 slid on the screen 55. In this way, the printing process is completed.

Before returning the conveyor frame 42 to the original position, when the rotational angle reaches near 210 , the table 54 starts moving downward and the printing frame 51 starts moving upward in order to avoid interference between the conveyor frame 42, the table 54, and the printing frame 51. At the same time, an operation where the doctor 52 and the squeegee 53 are returned to the downstream position is being performed on the screen 55.

Also, the positioning mechanism 41 starts lowering

the longitudinal positioning tool 412 to the paper receiving table 411 to receive the next printing paper 100.

Where the angle of rotation reaches in the vicinity of 260 , the conveyor frame 42 is driven by the drive motor 47 and therefore moves from the downstream side to the upstream side, and the discharge frame 61 also moves to the upstream side. At this time, the first opening and closing rail 44 starts moving upward and rotates the first lever 71 counterclockwise. Then, the first gripper 43 opens as shown in Fig. 12 and stands by for the supply of a printing paper 100 to be gripped next. Thereafter, the second opening and closing rail 45 starts moving upward and rotates the second lever 76 clockwise. As a result, the gripping plate 78 advances and returns to the state shown in Fig. 7.

The lateral positioning tool 413 of the positioning mechanism 41 starts the lateral positioning of the printing paper 100 supplied from the vicinity of a rotational angle 300 . Also, in the vicinity of a rotational angle 360 the conveyor frame 42 returns to the original position and the third opening and closing rail 63 starts moving upward. As a result, the printing paper 100 printed in the current printing process is gripped.

Printed papers are successively completed by repeating the operation described referring to the operational explanatory diagrams and the timing diagram.

As has been described, the conveying unit 40 of the printer 30 according to the embodiment of the present invention has the conveyor frame drive motor 47 for horizontally moving the conveyor frame 42 and the drive unit 90 for driving the printer 30 separately.

Therefore, a sheet to be printed is conveyed to a table at a conveying speed corresponding to the material of the sheet without putting the entire timing of the printer 30 out of order and altering the entire operational speed of the printer 30. As a result, even if a sheet to be printed were easily damaged material such as a film, the sheet is conveyed without damaging, and the yield rate of printed papers is increased.

Also, a sheet to be printed can be conveyed to the table 54 at a conveying speed corresponding to the thickness of the sheet. Therefore, there is no possibility that a sheet will be dropped from the first gripper 43 during conveyance, and there is no need to interrupt a printing process because of the dropping of the sheet from the gripper. As a result, printing operations are performed efficiently.

Also, after the printing paper 100 is conveyed to a predetermined position, the gripping plate 78 is moved rearward and closed so that the claw portion 781 of the gripping plate 78 does not contact the printing paper 100. Therefore, the squeegee 53 can start moving downward from the position where the first gripper 43 exists unlike the conventional conveying unit where the squeegee 53 must start moving downward from the position passing over the squeegee 53 in order to avoid interference with the claw portion 781 existing on the printing paper 100. As a result, the present invention, as compared with a conventional conveying unit, can print over a wide range on the printing paper 100, and there is no need to leave an unnecessary blank portion on the printing paper 100. Also, since a wide range of a sheet to be printed can be printed at a time, printing efficiency is enhanced.

Although only one preferred embodiment of the present invention has been described herein, it should be apparent to those skilled in the art that the present invention may be embodied in many other specific forms without departing from the spirit or scope of the invention. Particularly, it should be understood that the present invention may be embodied in the following mode.

For example, while the printing paper 100 has been used as a sheet to be printed in the above-described embodiment, other sheets, such as a film and corrugated cardboard may be used. This is because the conveying speed can be changed according to the sheet material.

Also, while, in the above-described embodiment, the table 54 and the printing unit 50, and so on, are operated by she link mechanisms 82 and 84, they may be operated with hydraulic cylinders or pneumatic cylinders.

Further, although the conveyor frame 42 has been driven with a conveyor belt, it may be driven with a gear mechanism such as a rack-and-pinion mechanism. In such a case, the conveyor frame can be moved to an accurate position, as compared with the case where the conveyor belt is employed.

Therefore, the present example and embodiment are to be considered as illustrative and not restrictive and the invention is not to be limited to the details given herein, but may be modified within the scope of the appended claims.

Claims

1. A gripping apparatus (43) in a screen type printing machine (30) for gripping and carrying a sheet supplied from an external paper supplying device (20) in a direction reverse to a running direction of a squeegee to a printing table (54) where the sheet is printed, said mechanism comprising:

   a frame (42) disposed under a screen (55) to move to a predetermined printing range;
   at least one holder plate (78) mounted on the frame (42), said plate (78) being arranged to contact an upper surface of the frame (42) to hold the sheet when the frame (42) moves to the printing range, removes from the upper surface to release the sheet when the frame (42) reaches the printing range, and retract from the front edge of the sheet to avoid overlapping the sheet when the squeegee (53) begins to move; and
   an mechanism (44, 45) for actuating the holder plate (78).

2. The apparatus (43) as set forth in Claim 1, wherein said actuating mechanism (44, 45) includes:

a first and a second rails (44, 45) respectively extending parallel to a feeding direction of the sheet, said rails (44, 45) being adapted to vertically move between an uppermost position and a lowermost position;
a first lever (71) rotatably mounted on the frame (42), said first lever (71) including a first portion (711) and second portion (72) respectively engaging the first rail (44) and the holder plate (78);
a second lever (76) rotatably mounted on the frame (42), said second lever (76) having a third portion (751) engaging the second rail (45) and a forth portion (750) rotatably connected to the holder plate (78);
a spring (782) biasing the holder plate (78)to the upper surface;
an actuator (70) for actuating the first rial (44) and the second rail (45); and

wherein said holder plate (78) removes from the upper surface against force of the spring (782) based on the respective engagements of the first rail (44) with the first portion (711), of the second engagement with the holder plate (78) and of the second rail (45) with the third portion (751) when the first and the second rails (44, 45) are lifted by the actuator (70);

wherein said holder plate (78), kept removed from the upper surface, contacts the upper surface in accordance with the force of the spring (782) when the first lever (71) is shifted by the actuator (70); and

wherein said holder plate (78), kept in contact with the upper surface, removes from the upper surface based on the engagements of the first portion (711) with the first rail (44) and of the second portion (72) with the holder plate (78) when the first rail (44) is lifted up to the uppermost position by the actuator (70), retracts to a position to avoid overlapping the sheet based on the engagement of the third portion (751) with the second rail (45) and contacts with the upper surface based on the engagement of the third portion (751) with the second rail (45), and contacts the upper surface which is free from the covering of the sheet according to the force of the spring (782) when the first rail (44) is shifted to the lowermost position by the actuator (70).

3. The apparatus (43) as set forth in Claim 2, wherein said connecting portion (750) of the second lever (76) includes:

a plurality of blocks (771) secured to the holder plate (78), said blocks (771) being separated from one another by a predetermined space;
a shaft (75) rotatably supported on the frame (42); and
a plurality of collars (773) respectively connected with the blocks (771).

4. The apparatus (43) as set forth in Claims 2 or 3, wherein each of said first and third portions (751) includes a roller.

5. The apparatus (43) as set forth in Claims 2 or 3, wherein the first lever (71) is biased in such a manner that the first portion (711) engages the first rail (44), and wherein the second lever (45) is biased in such a manner that the third portion (751) engages the second rail (45).

6. The apparatus (43) as set forth in any one of the preceding claims further including a member (41) for positioning the sheet before the sheet is held by the holding plate (78).

Fig.1

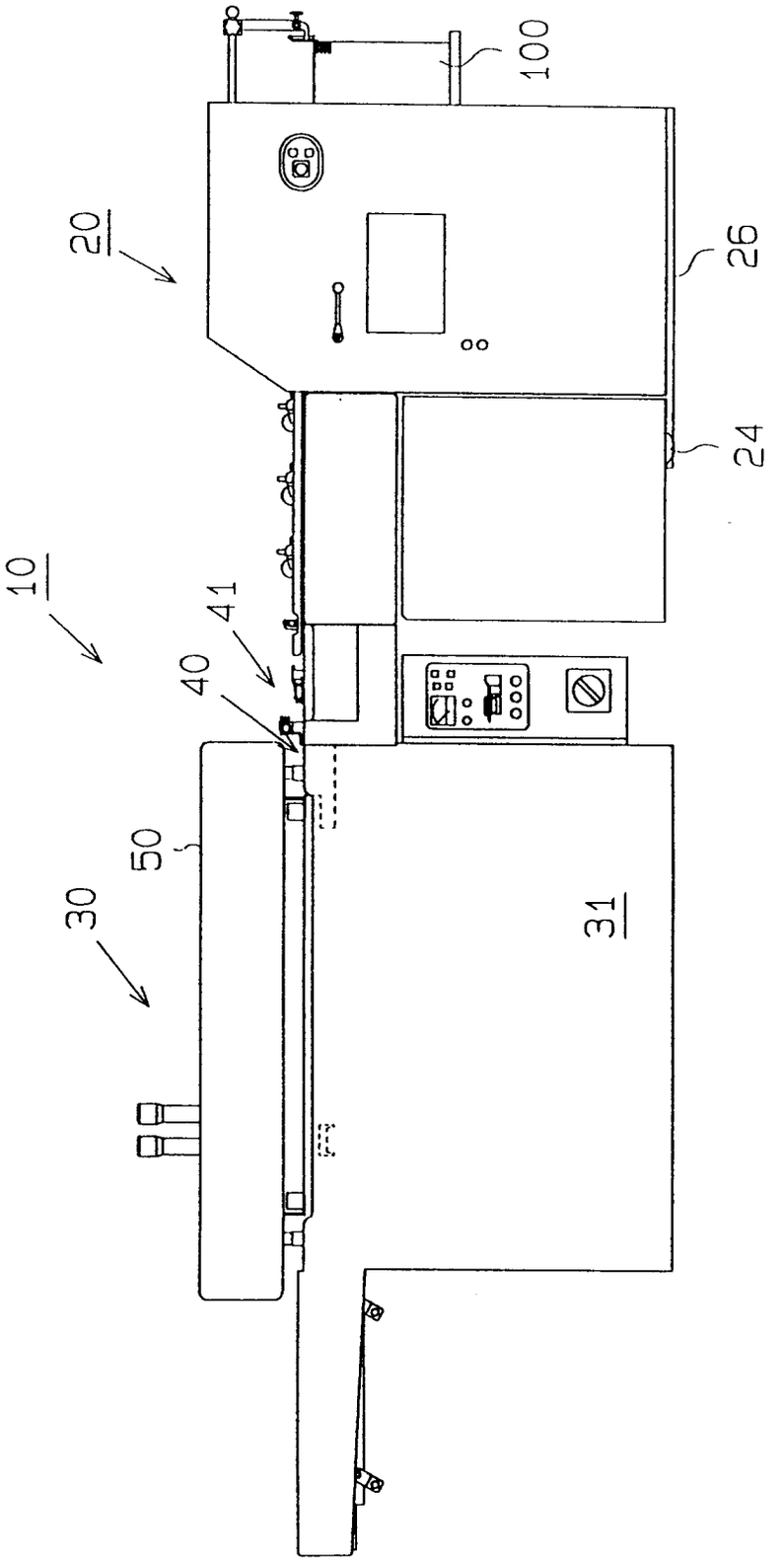


Fig.2

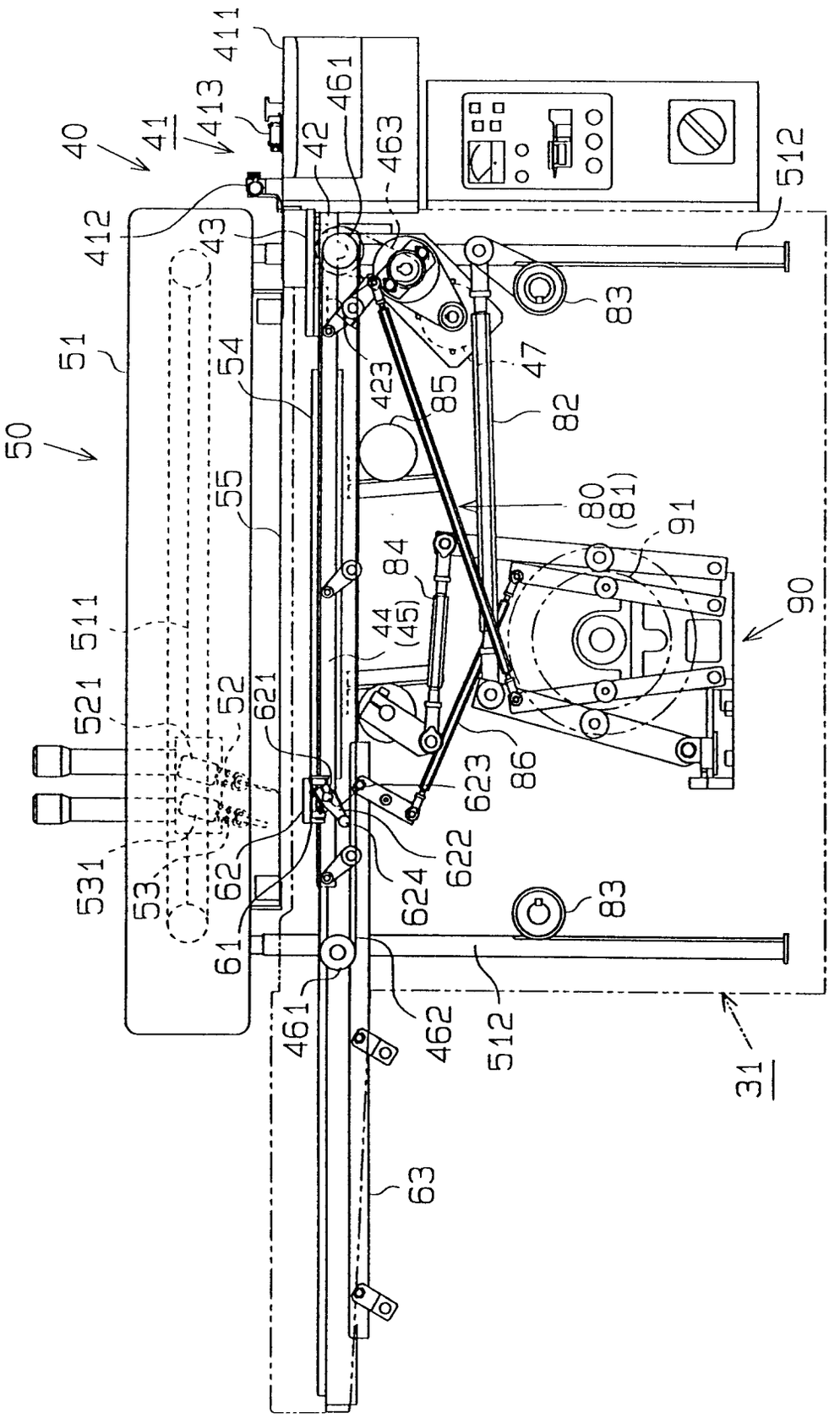

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Fig.3

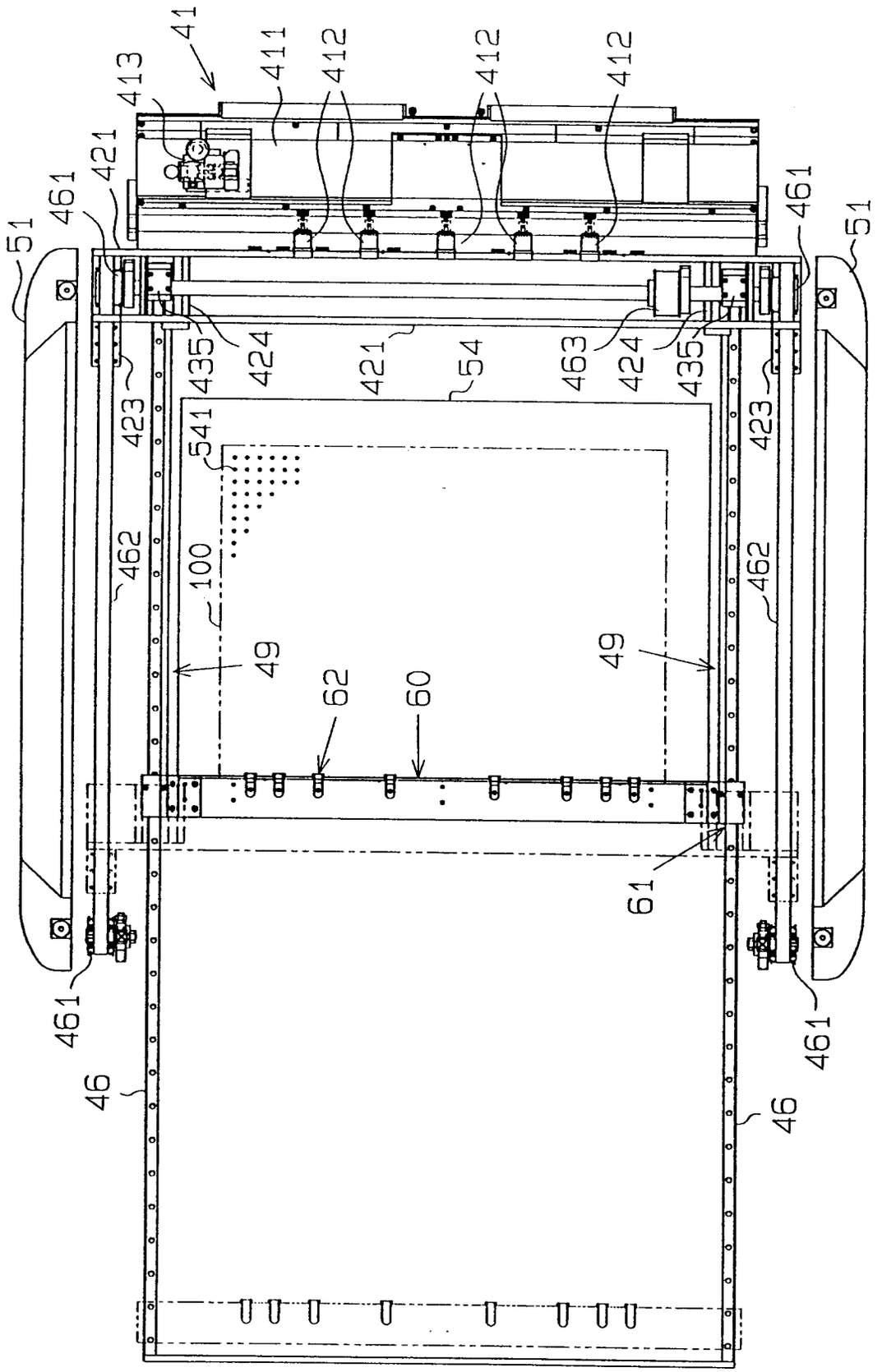
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Fig.4

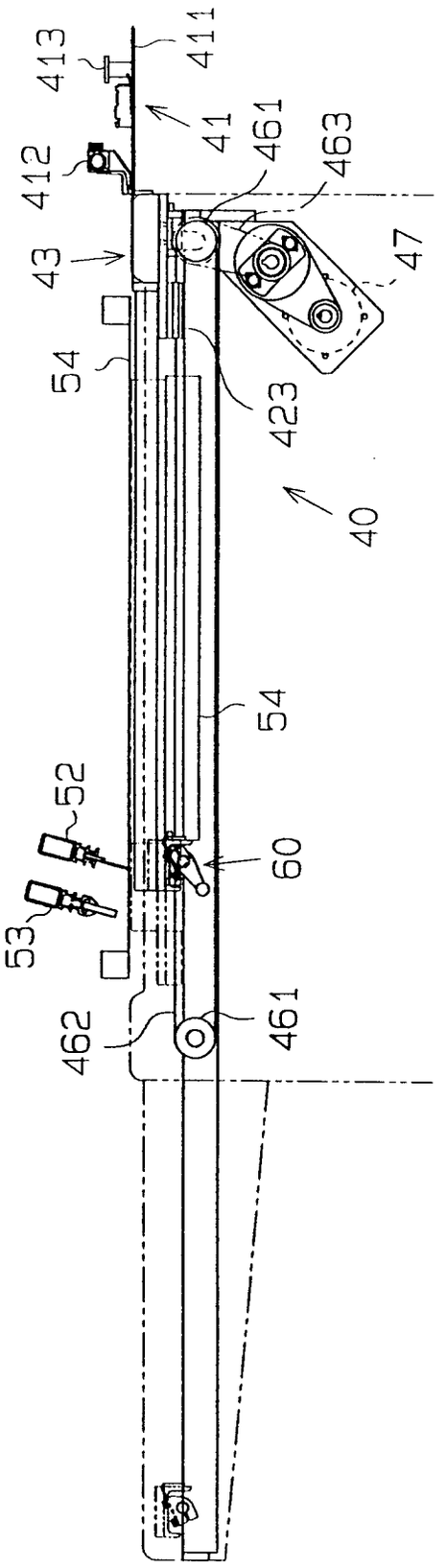

Fig.5

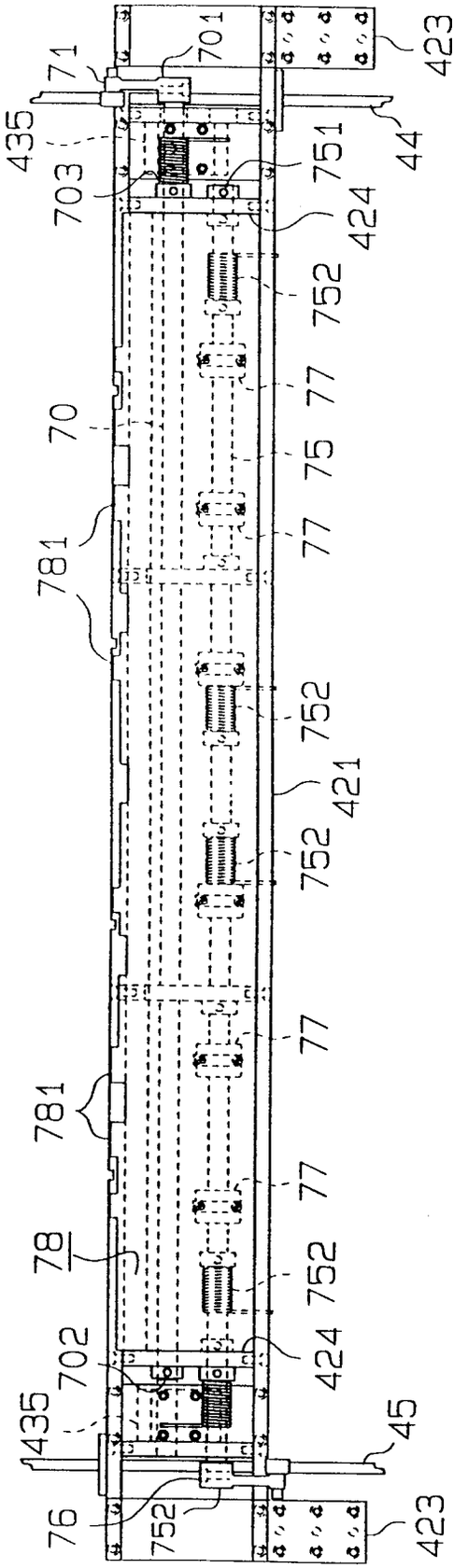
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Fig.6

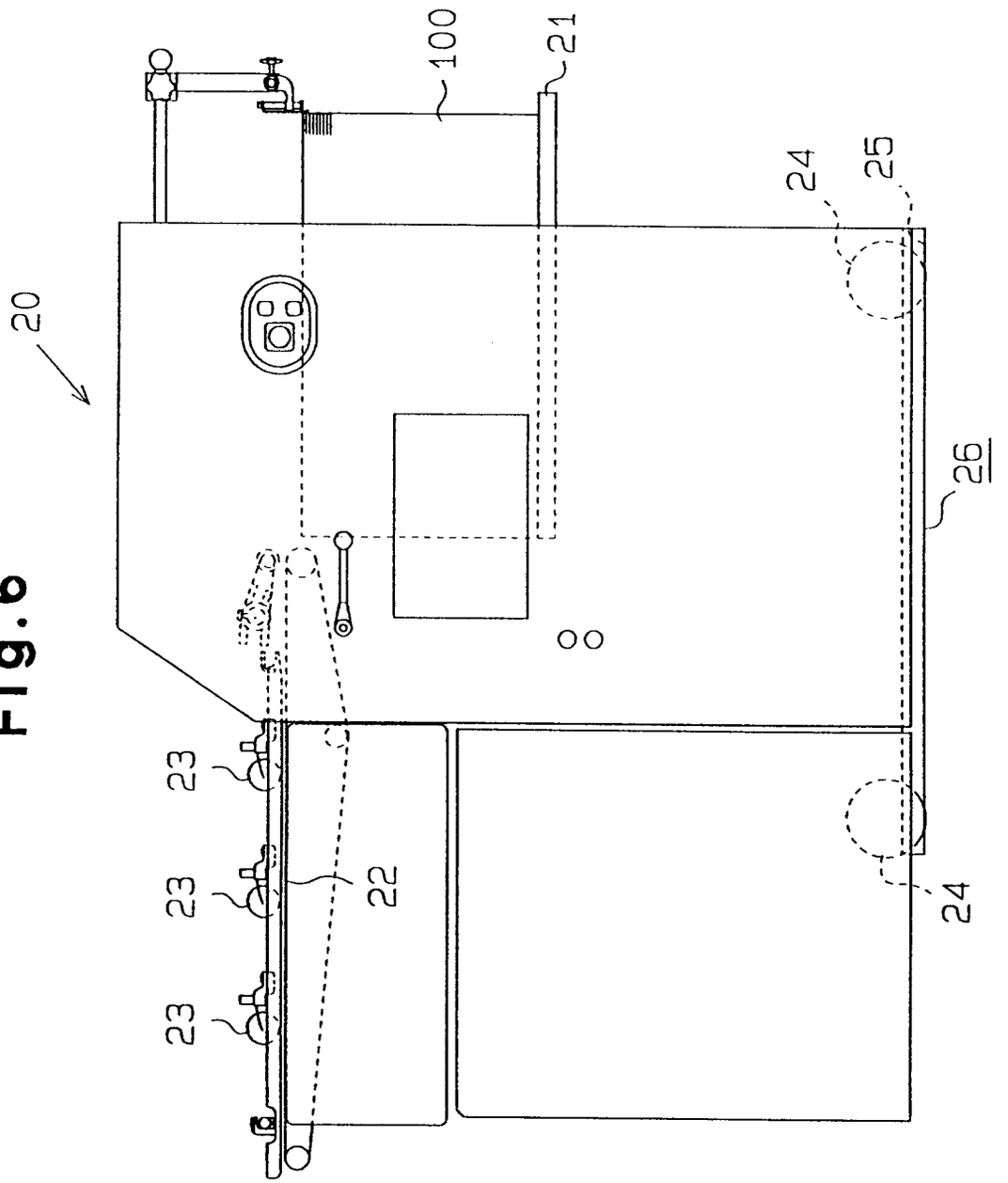

Fig.7

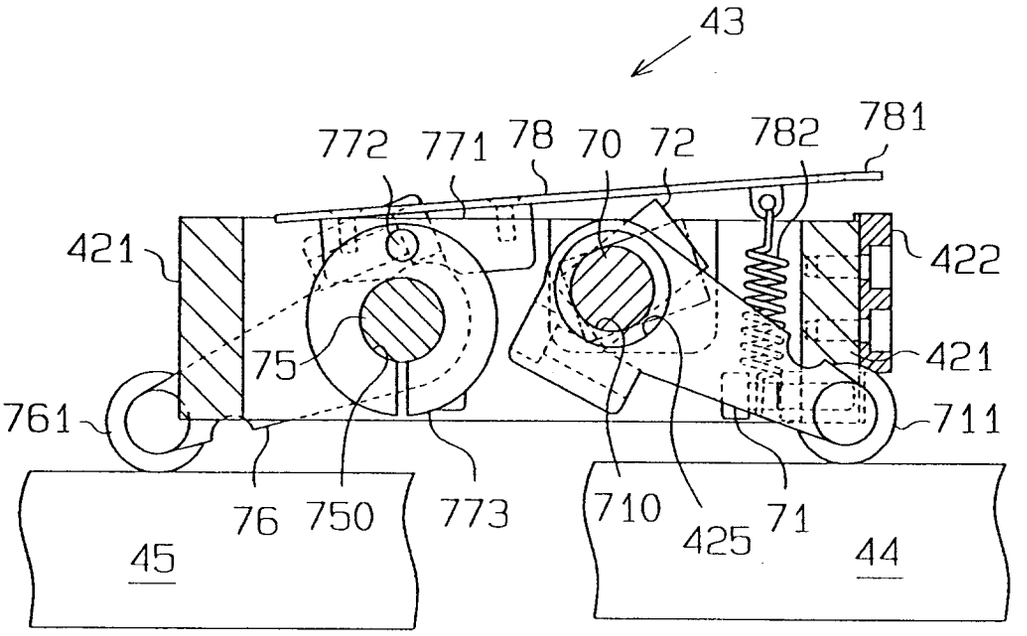
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Fig.8

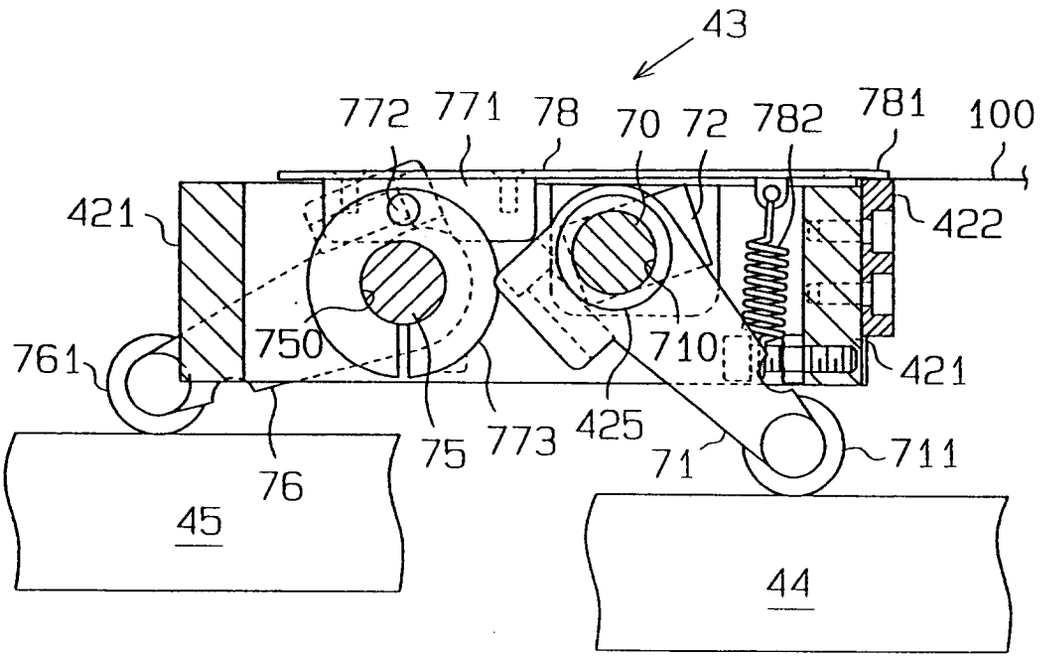
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Fig.9

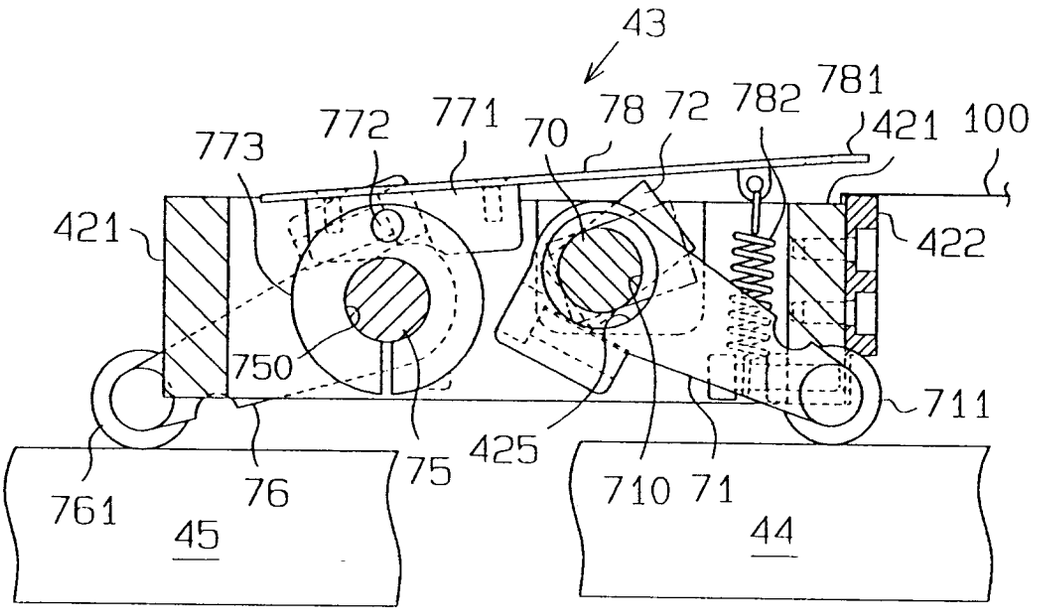
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Fig.10

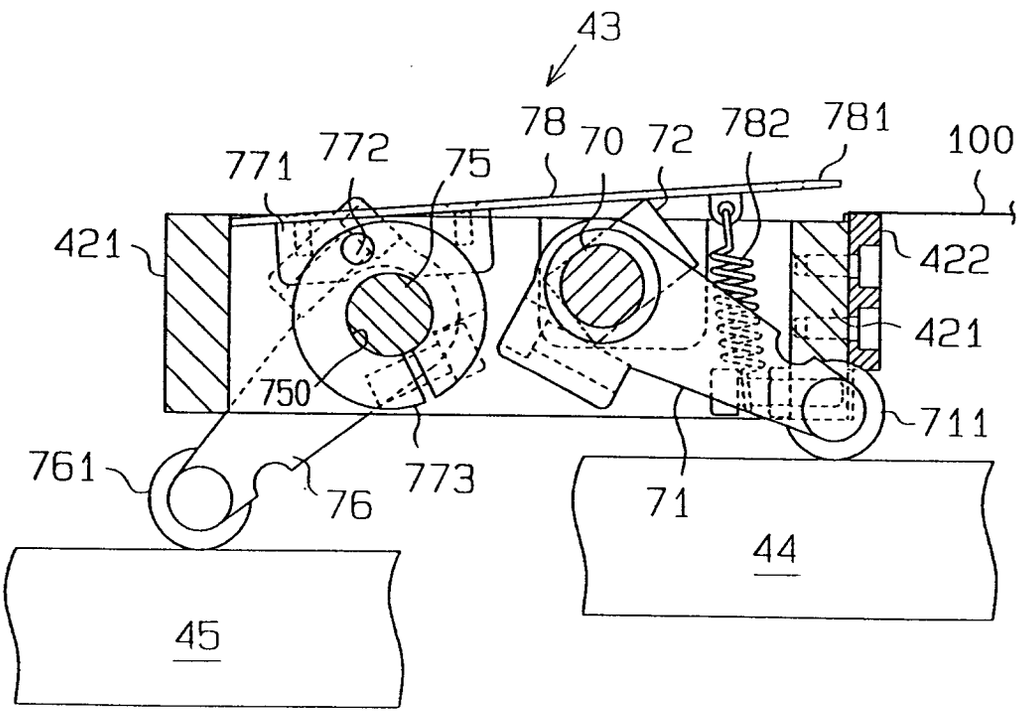
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Fig.11

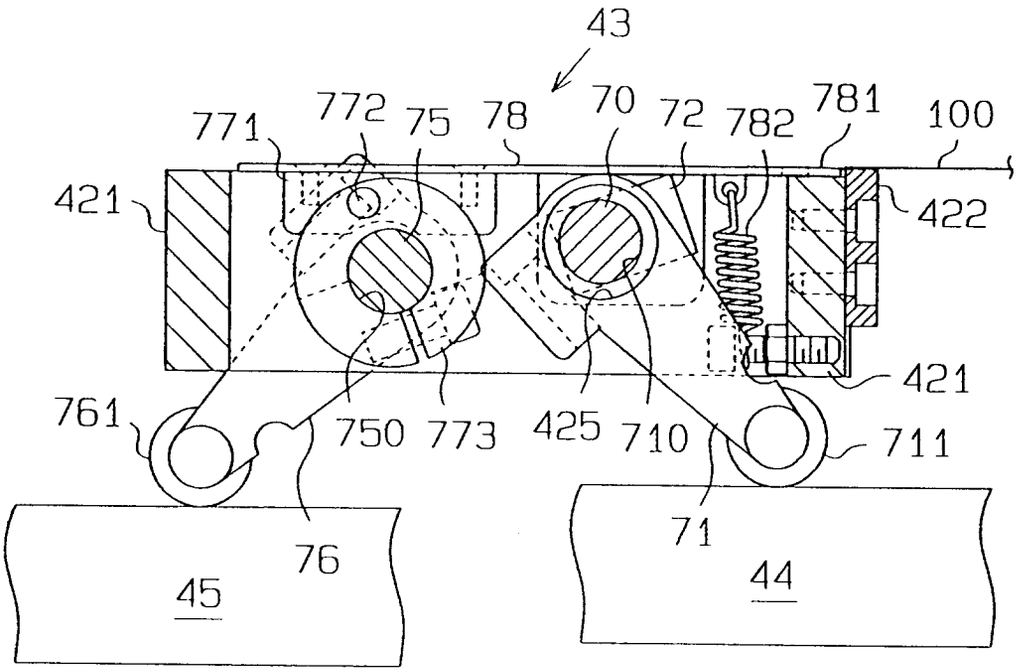
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Fig.12

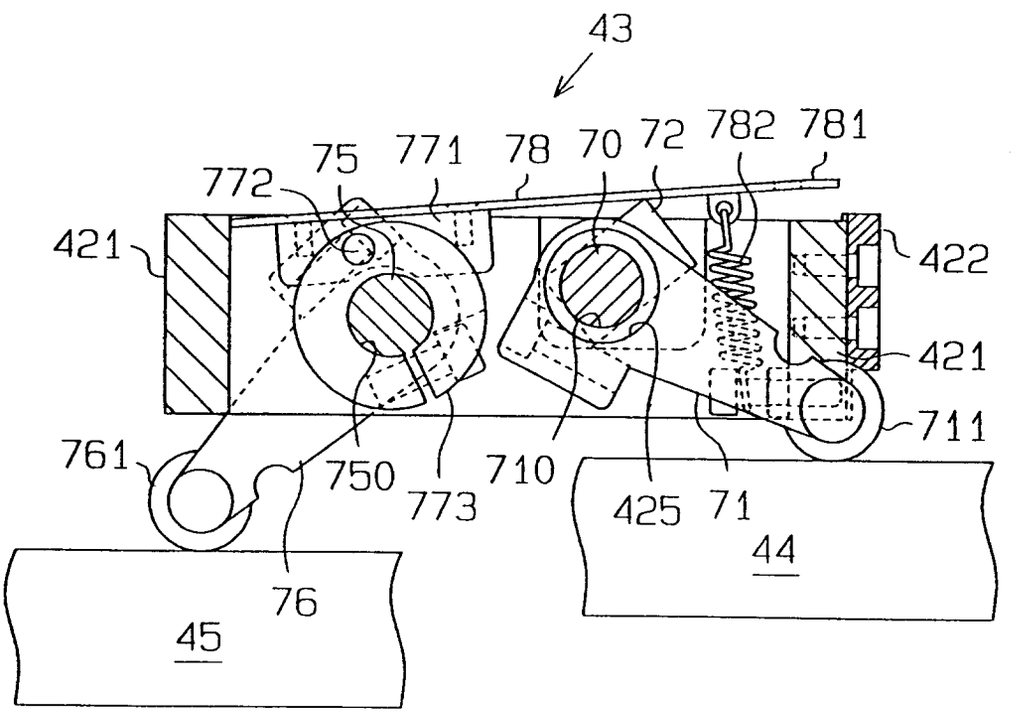
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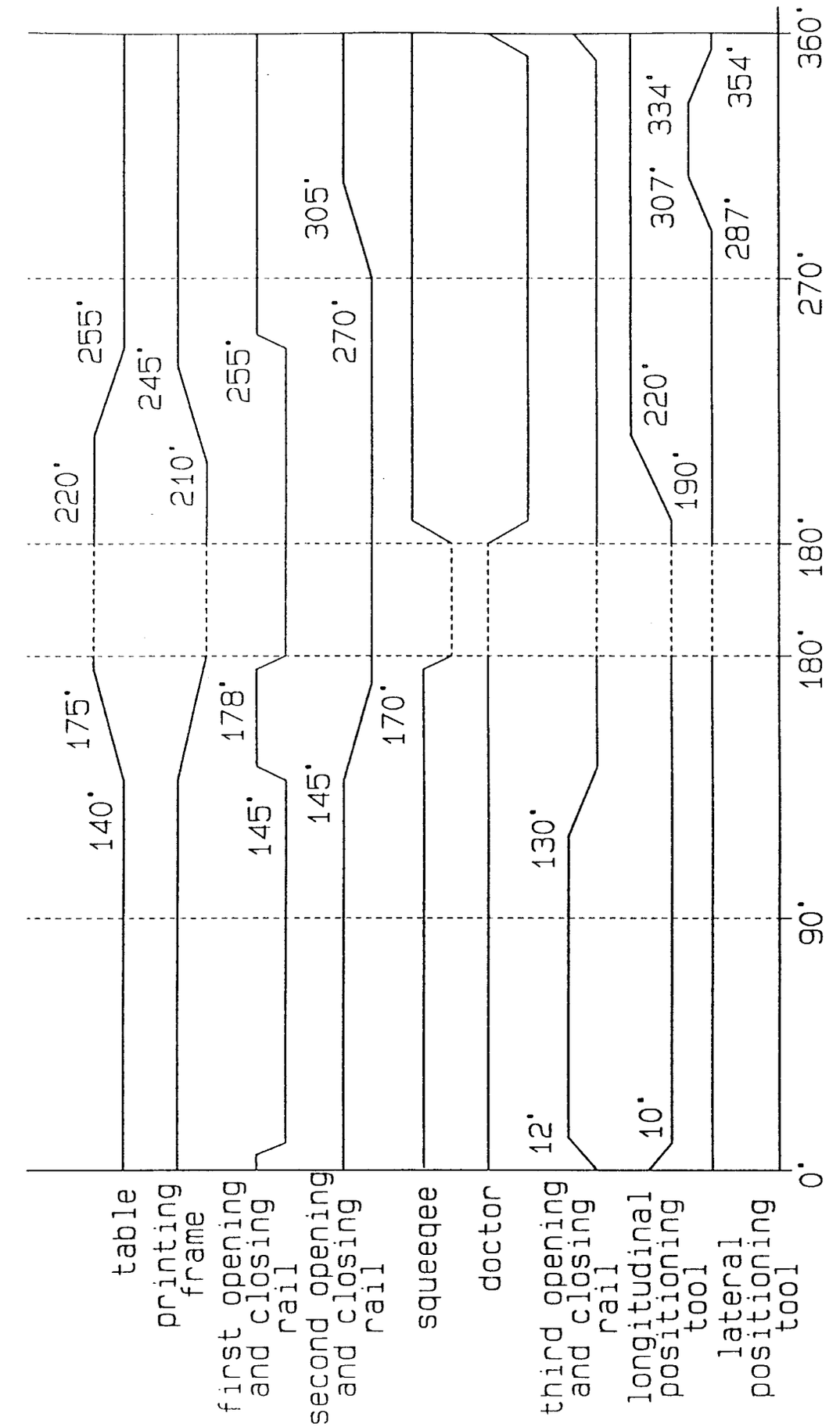
Fig.13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squeeqee
doctor
third opening and closing rail
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lateral positioning tool
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175°
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European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 11 4009

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)
A	US-A-3 026 794 (KUBIN-NICHOLSON) * the whole document * -----	1	B41F15/08

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	28 October 1996	Loncke, J

CATEGORY OF CITED DOCUMENTS

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