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EUROPEAN PATENT APPLICATION

21 Application number: 89122379.4

51 Int. Cl.⁵: G03G 15/00

22 Date of filing: 05.12.89

30 Priority: 22.12.88 JP 324642/88

43 Date of publication of application:
27.06.90 Bulletin 90/26

84 Designated Contracting States:
DE FR GB NL

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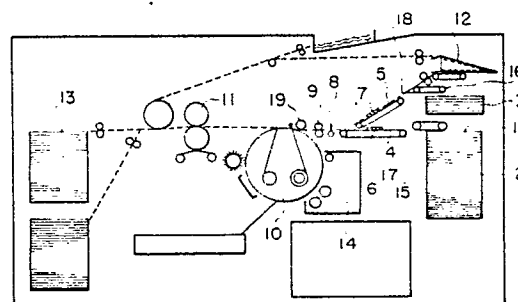
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52 Register mechanism for printing printer and printer with said register mechanism.

EP 0 374 575 A2
 57 A register mechanism for a printing printer is capable of correcting shift and skew of sheets of paper (1) which are conveyed by a plurality of paper conveying passages and of temporarily stopping the conveyance of the papers (1) while they are brought into register with a toner image. The register mechanism includes: oblique belts (4, 5) provided in each of the paper conveying passages; a guide plate (6, 7) for restricting inclination of the paper (1) located on the oblique belt (4, 5); and pivot members (8, 8a, 8b) for correcting skew of the papers (1), which is located at a joined portion of the paper conveying passages where the sheets of paper (1) whose shift has been corrected by the respective guide plates

(6, 7) are joined, and downstream of the conveying passages at a distance shorter than the length of the paper (1) in the conveying direction from the end of the guide plates (6, 7).

FIG. 1



REGISTER MECHANISM FOR PRINTING PRINTER AND PRINTER WITH SAID REGISTER MECHANISM

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

The present invention relates to a printer for printing, including duplex printing, which has a plurality of hoppers, and more particularly, to a register mechanism suitable for use in correcting skew and shift of a sheet of paper.

DESCRIPTION OF THE RELATED ART

Conventional register mechanisms for duplex printing printer have been proposed in the specification of, for example, U.S. Patent No. 4162844. This register mechanism is only capable of temporarily suspending the flow of a sheet of paper, of correcting skew (an oblique position with respect to the direction of flow) of the paper, and of adjusting the timing so as to cause the toner image on a photosensitive drum to become in register with the paper.

Japanese Utility Model Unexamined Publication No. 62-26337 discloses a register mechanism which has no specific register mechanism and in which the paper is brought into register with the toner image on the photosensitive drum at a timing and a posture of the paper at which the paper is separated from the hopper.

Japanese Utility Model Unexamined Publication No. 57-90343 discloses a register mechanism in which a sheet of paper on which printing is to be conducted on one side thereof is fed obliquely and in which shift of the paper is corrected by bringing it into contact with a guide plate.

The conventional duplex printing printer includes the structure that a plurality of conveying paths are joined and a toner image is transferred on a sheet of paper. In this printer, it is not taken into consideration to similarly perform skew and shift correction of the paper in high-accuracy, which paper flows through the respective conveying paths. Therefore, there are some following problems in the above printer. That is, the accuracy of register is changed as the paper is moved to the other conveying path. Further, if the conventional structure is applied to the respective conveying paths, the register mechanism requires large space and prevents the apparatus from being made low expensive and compact size.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a register mechanism for a printing printer which is capable of correcting with a high degree of accuracy shift and skew of the sheets of paper which are fed through a plurality of conveying paths, and which has a minimum configuration.

To achieve the above object, the present invention provides a register mechanism for a printing printer which is capable of correcting shift and skew of a sheet of paper which is conveyed by at least one paper conveying means and of temporarily stopping the conveyance of the paper while it is brought into register with a toner image, the register mechanism comprising oblique belts provided in the paper conveying means; means for restricting inclination of the paper located on the oblique belts; and means for correcting skew of the paper, which is located downstream of the restricting means at a distance shorter than the length of the paper in the conveying direction from the end of the restricting means.

In the register mechanism for a printing printer which sheets of paper are conveyed by a plurality of paper conveying means, the means for correcting skew of the papers is provided at a joined portion of the paper conveying means where the sheets of paper whose shift has been corrected by the respective restricting means are joined, and downstream of the conveying means and at a distance shorter than the length of the paper in the conveying direction from the end of the restricting means.

The means for restricting inclination of the paper may be a guide plate provided on the side of the oblique belts.

The means for restricting inclination of the paper may be a steel belt which moves along the side of the oblique belts.

The means for correcting skew of the paper may be pivot members.

A printing printer incorporates a register mechanism for correcting shift and skew of sheets of paper conveyed by a plurality of paper conveying means and for temporarily stopping the conveyance of the papers while they are brought into register with a toner image. The register mechanism incorporated in the printing printer includes oblique belts provided in the respective paper conveying means, means for restricting inclination of the paper located on the oblique belts, and means for correcting skew of the papers, which is located downstream of a joined portion of the paper conveying means where the papers whose shift has been corrected by the respective restricting means are joined, and at a distance shorter than the length

of the paper in the conveying direction from the end of the restricting means.

The printing printer incorporating the aforementioned register mechanism may be a duplex printing printer.

In the present invention, since the register mechanism is provided on the conveying paths, in particular, at a joined portion where the plurality of conveying paths are joined, the oblique belts and the inclination restricting means provided in the individual conveying paths for correcting shift of the paper operate independently from each other, and the skew correcting means provided downstream of the joined portion operate with respect to the sheets of paper which are conveyed through the respective conveying paths under the same condition.

The skew correcting means is disposed at a distance shorter than the length of the paper in the conveying direction from the inclination restricting means provided in the respective conveying paths, and beyond the joined portion where the conveying paths are joined. The forward ends of the sheets of paper abut against the skew correcting means immediately after the papers have passed through the joined portion in which the papers are conveyed along the inclination restricting means by means of the oblique belts and the inclination restricting means.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic cross-sectional view of an embodiment of the present invention;

Fig. 2 is an enlarged cross-sectional view of the essential parts of the embodiment of Fig. 1;

Fig. 3 is an illustration of the operation of a register mechanism shown in Fig. 1; and

Fig. 4 is a flowchart of the paper conveying operation employed in the embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

An embodiment of the present invention will be described below with reference to Figs. 1 to 3.

As shown in Figs. 1 to 3, a register mechanism for duplex printing printer according to the present invention is composed of a skew correcting means 8 of capable of correcting shift and skew of the sheets of paper 1 which are respectively conveyed by a plurality of paper conveying means 20 and 21, and of temporarily stopping the conveyance of the papers 1 while they are brought into register with a toner image (not shown). The register mechanism includes: oblique belts 4 and 5 and guide plates 6

and 7, i.e., shift restricting means, provided on the respective paper conveying means for restricting inclination of and correcting shift of the sheets of paper 1; and pivot means 8a and 8b for correcting skew of the sheets of paper 1. The pivot means 8a and 8b are provided downstream of a joined portion 22 where the sheets of paper whose shift has been corrected are joined, and at a distance shorter than the length of the paper 1 in the conveying direction from the end of the guide plates 6 and 7.

A duplex printing printer according to the present invention incorporates a register mechanism composed of the skew correcting means 8 which is capable of correcting shift and skew of the sheets of paper 1 which are conveyed by a plurality of paper conveying means 20 and 21, and of temporarily stopping the conveyance of the papers 1 while they are brought into register with a toner image (not shown). The register mechanism includes: oblique belts 4 and 5 and guide plates 6 and 7, i.e., shift restricting means, provided on the respective paper conveying means for restricting inclination of and correcting shift of the sheets of paper 1; and the skew correcting means 8 having pivot means 8a and 8b for correcting skew of the sheets of paper 1. The pivot means 8a and 8b are provided downstream of a joined portion 22 where the sheets of paper whose shift has been corrected are joined, and at a distance shorter than the length of the paper in the conveying direction from the end of the guide plates 6 and 7.

More specifically, sheets of paper 1 are piled in a main hopper 2. The sheet of paper which is separated one by one from the main hopper 2 is fed to a shift correcting mechanism 17 which is composed of a guide plate 6 and oblique belts 4 disposed slantingly with respect to the direction of conveyance of the paper.

A sheet of paper 2, which is piled in a secondary hopper 3 or which is sent out from a turning mechanism 12, is fed to a shift correcting mechanism 18, which is composed of a guide plate 7 and oblique belts 5 disposed slantingly with respect to the direction of conveyance of the paper.

The shift correcting mechanisms 17 and 18 are located in their respective conveying passages in such a manner that the sheets of paper which pass through the respective shift correcting mechanisms 17 and 18 are joined on the downstream side thereof.

After the sheets of paper 1 have passed through the shift correcting mechanisms 17 and 18, they reach the skew correction means of a register mechanism 8 provided in the conveying passage downstream of a joined portion where the sheets of paper which have passed through the respective shift correcting mechanism 17 and 18 are joined, where skew is corrected and the sheets of paper

are brought into register with the toner image.

After the top sheet of paper 1 has been brought into register with the toner image by the skew correction means 8 of the register mechanism, it is fed to a transfer portion 19 by means of conveying rollers 9. A latent image formed on a photosensitive drum 10 is developed by a developer 14 to form a toner image.

The toner image thus-formed is brought into contact with the sheets of paper 1 in the transfer portion 19 so as to allow the toner image to be transferred onto the sheets of paper 1.

The sheets of paper 1 with the toner image transferred thereon are conveyed to a fixing machine 11 without being brought into contact with the toner surface of the photosensitive drum 10.

After the fixing, the sheets of paper 1 are conveyed to either a stacker 13 or a turning mechanism, depending on whether the backing printing is conducted or not.

Fig. 3 schematically shows the structure of the shift correcting mechanism 17 or 18 and that of the skew correction means for the register mechanism 8.

The shift correcting mechanism 17 or 18 is composed of the oblique belts 4 or 5 disposed at an angle θ° with respect to the direction of conveyance of the sheet of paper 1, and the guide plate 6 or 7 for restricting the movement of the sheet of paper 1 in the direction perpendicular to the direction of conveyance thereof. The shift correction mechanism 18 is inclined with respect to the shift correction mechanism 17 with its upstream side separated upwardly from the shift correction mechanism 17, so that it is joined with the shift correction mechanism 18 on the downstream side thereof. The shift correction mechanism 17 is composed of the oblique belts 4 and the guide plate 6, whereas the other shift correction mechanism 18 is composed of the oblique belts 5 and the guide plate 7.

The sheets of paper 1 are conveyed downstream while being moved toward the guide plates 6 and 7 by means of the oblique belts 4 and 5 of the shift correction mechanism. At that time, the posture of the sheets of paper 1 changes from that 1a to that 1b. Downstream of the shift correction mechanism 17 and 18 and at a distance L shorter than the length l of the sheet of paper from the guide plate 6 and 7 is disposed the skew correction means of the register mechanism 8. The skew correction means 8 of this register mechanism is composed of stoppers (pivot members) 8a and 8b which can pivot.

The posture of the sheets of paper 1 which are about to abut against the skew correction means 8 of the register mechanism after having passed through the shift correction mechanisms 17 and 18

is shown by 1b. Contact of the sheets of paper 1 with the skew correction mechanism changes the posture thereof to a desired posture 1c and the posture is secured. The stoppers 8a and 8b are pivotally supported on a side plate (not shown).

The stoppers 8a and 8b are pivoted at a timing at which the sheets of paper 1 can be brought into register with the toner image formed on the photosensitive drum 10, and thereby release the sheets of paper 1.

Fig. 4 is a flowchart of a paper conveying operation. The sheets of paper 1 are fed out of a main separation mechanism 15 and a secondary separation mechanism 16 or the turning mechanism 12 in response to signals which are output from a central processing unit (not shown).

The sheets of paper 1 are conveyed to the shift correction mechanisms 17 and 18 which are composed of the oblique belts 4 and 5 and the guide plates 6 and 7 and where shift amount thereof is corrected, and then reach the joined portion. Subsequently, progress of the sheets of paper is restricted by the skew correction means 8 of the register mechanism during which skew of the sheets of paper 1 is corrected, and the sheets of paper 1 are brought into register with the toner image on the photosensitive drum 10.

Immediately after the sheets of paper 1 have been released from the skew correction means 8, they are gripped between the rollers 9 disposed immediately beyond the skew correction means 8. In consequence, the posture of the sheets of paper which have been released from the skew correction means 9 remains the same.

The above-described embodiment is a register mechanism for use in a duplex printing printer. However, the present invention may also be applied to an one-side printing printer having a single conveying means or an one-side printing printer in which a plurality of paper hoppers and a plurality of conveying means are provided in one-to-one correspondence.

Furthermore, in the above-described embodiment, the shift restricting means provided along the oblique belts is the guide plate. However, it may be replaced by a steel belt which is designed to extend between pulleys along the oblique belts.

As will be understood from the foregoing description, in the present invention, registration is conducted in the duplex printing printer on the sheets of paper which are passed through a plurality of conveying passages, by means of one register mechanism. In consequence, variations in the registering function can be eliminated, and the register mechanism can be made inexpensive and compact.

Furthermore, the shift correction function is provided on each of the conveying passages up-

stream of the joined portion, and the skew-correction means is disposed on the conveying passage downstream of the joined portion. This enables shift correction, skew correction and registration to be conducted substantially simultaneously and in sequence, thereby enabling posture of the sheets of paper to be controlled with a high degree of accuracy. It is also possible to provide a compact printer.

Claims

1. A register mechanism for a printing printer which is capable of correcting shift and skew of a sheet of paper which is conveyed by at least one paper conveying means and of temporarily stopping the conveyance of said paper while it is brought into register with a toner image.

the register mechanism for a printing printer comprising, oblique belts (4, 5) provided in said paper conveying means, means (6, 7) for restricting inclination of the paper located on said oblique belts (4, 5), and means (8) for correcting skew of the paper, which is located downstream of said restricting means (6, 7) at a distance shorter than the length of the paper (1) in the conveying direction from an end of said restricting means (6, 7).

2. A register mechanism for a printing printer which is capable of correcting shift and skew of sheets of paper which are conveyed by a plurality of paper conveying means and of temporarily stopping the conveyance of said papers while they are brought into register with a toner image,

the register mechanism for a printing printer comprising, oblique belts (4, 5) provided in each of said paper conveying means, means (6, 7) for restricting inclination of the paper (1) located on said oblique belts (4, 5) and means (8) for correcting skew of the paper (1), which is located at a joined portion of said paper conveying means where the sheets of paper whose shift has been corrected by said respective restricting means (6, 7) are joined, and downstream of said conveying means at a distance shorter than the length of the paper in the conveying direction from the end of said restricting means (6, 7).

3. A register mechanism for a printing printer according to claim 2, wherein said means for restricting inclination of the paper (1) is a guide plate (6, 7) provided on the side of said oblique belts (4, 5)

4. A register mechanism for a printing printer according to claim 2, wherein said means for restricting inclination of the paper is a steel belt which moves along the side of said oblique belts (4, 5).

5. A register mechanism for a printing paper

according to claim 2, wherein said means for correcting skew of the paper is pivot members (8a, 8b).

6. A register mechanism for a duplex printing printer which is capable of correcting shift and skew of sheets of paper which are conveyed by a plurality of paper conveying means and of temporarily stopping the conveyance of said papers while they are brought into register with a toner image,

the register mechanism for a duplex printing printer comprising, oblique belts (4, 5) provided in each of said paper conveying means, means (6, 7) for restricting inclination of the paper located on said oblique belts (4, 5), and means (8) for correcting skew of the paper, which is located downstream of a joined portion of said paper conveying means where the sheets of paper whose shift has been corrected by said respective restricting means (6, 7) are joined, at a distance shorter than the length of the paper in the conveying direction from the end of said restricting means (6, 7).

7. A register mechanism for a duplex printing printer according to claim 6, wherein said means for restricting inclination of the paper (1) is a guide plate (6, 7) provided on the side of said oblique belts (4, 5).

8. A register mechanism for a duplex printing printer according to claim 6, wherein said means for restricting inclination of the paper is a steel belt which moves along the side of said oblique belts (4, 5).

9. A register mechanism for a duplex printing paper according to claim 6, wherein said means for correcting skew of the paper (1) is pivot members (8a, 8b).

10. A printing printer comprising a register mechanism for correcting shift and skew of sheets of paper (1) conveyed by a plurality of paper conveying means and for temporarily stopping the conveyance of the papers while they are brought into register with a toner image, and said register mechanism including oblique belts (4, 5) provided in each of the said paper conveying means, means (6, 7) for restricting inclination of the paper located on said oblique belts (4, 5), and means (8) for correcting skew of the paper, which is located downstream of a joined portion of said paper conveying means where the papers whose shift has been corrected by said respective restricting means (6, 7) are joined, and at a distance shorter than the length of the paper (1) in the conveying direction from the end of said restricting means (6, 7).

11. A printing printer according to claim 10 is a duplex printing printer which is capable of two-side printing.

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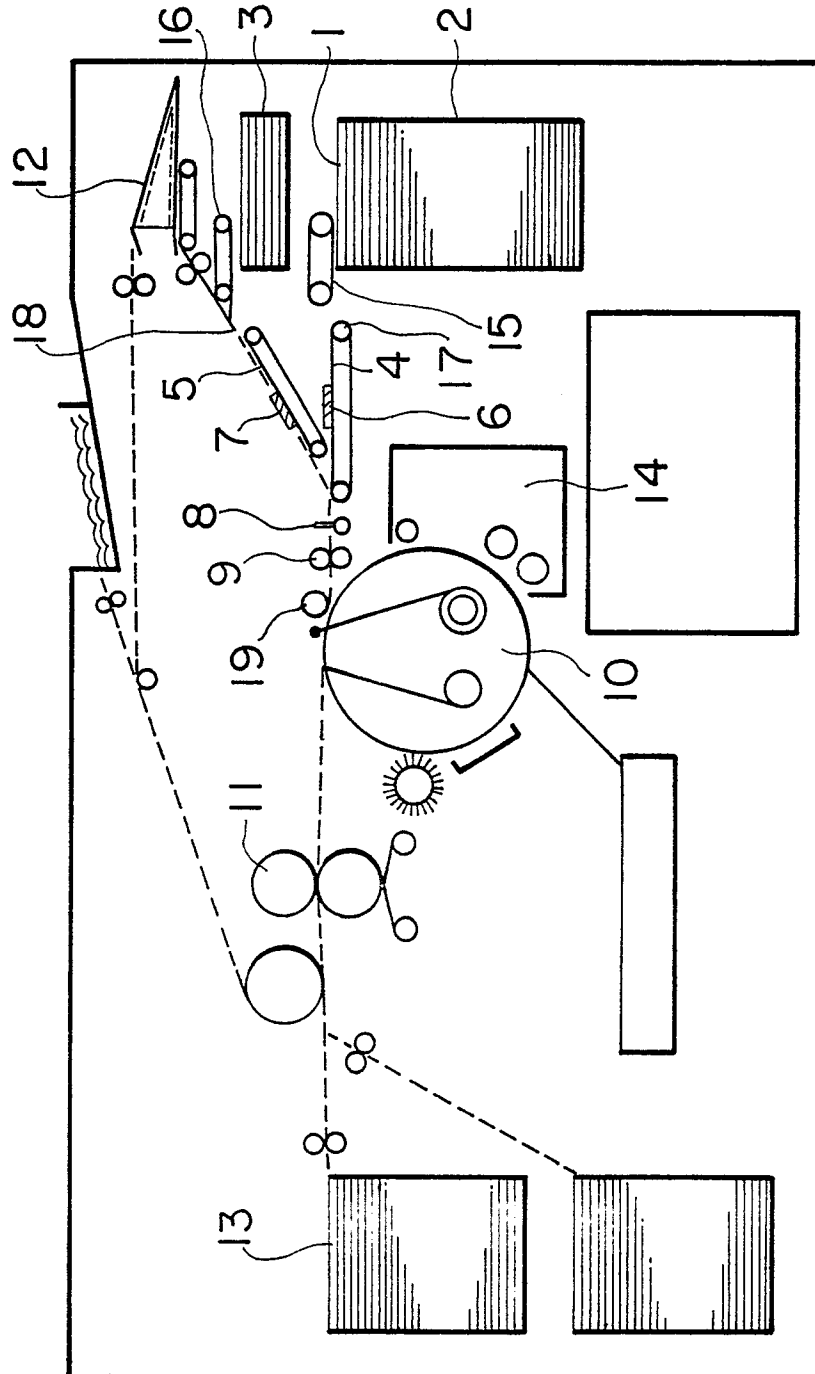


FIG. 2

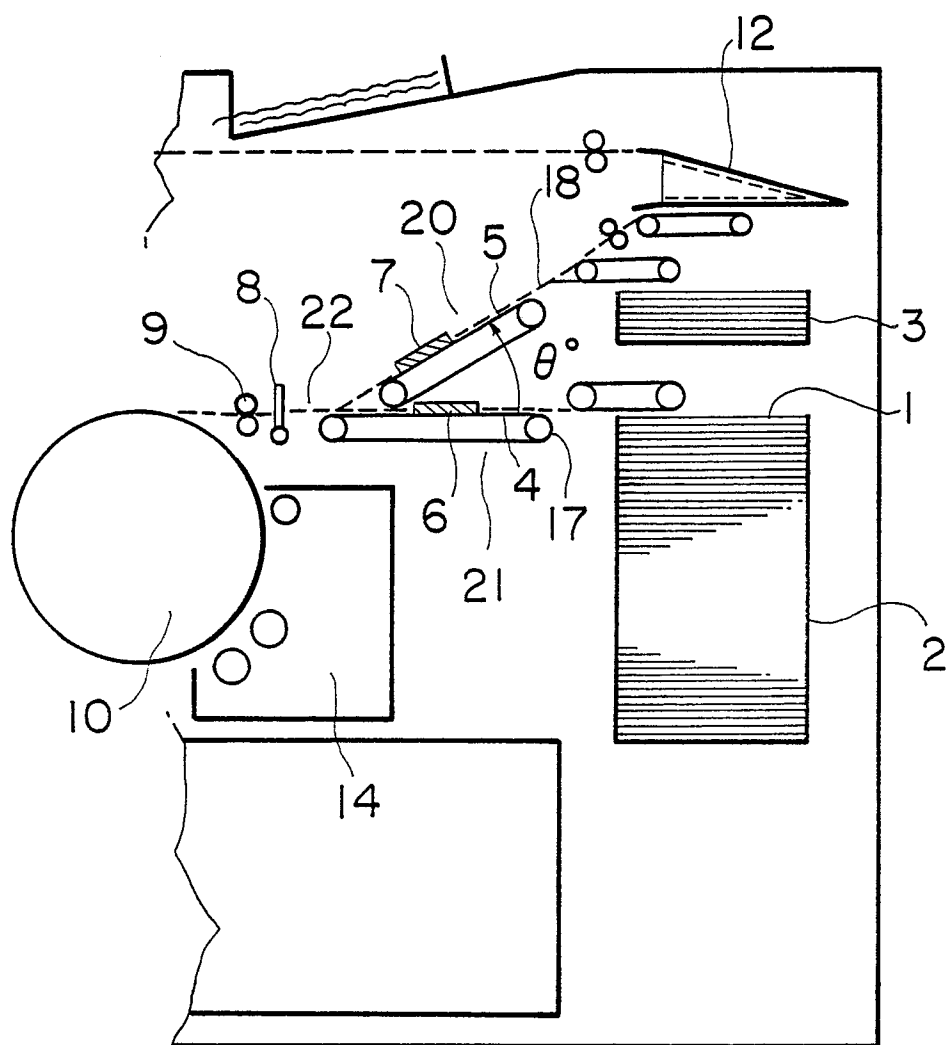


FIG. 3

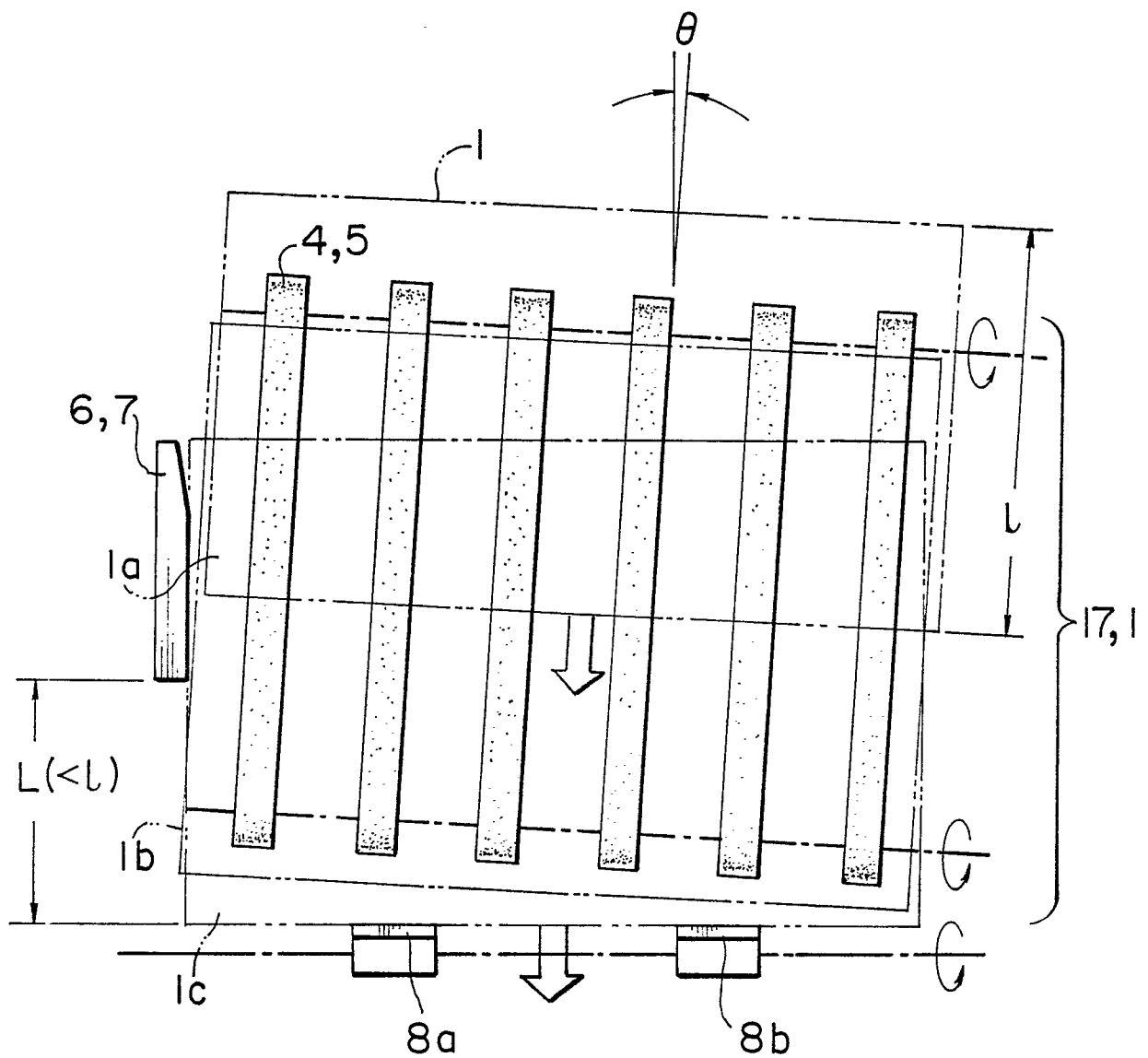


FIG. 4

