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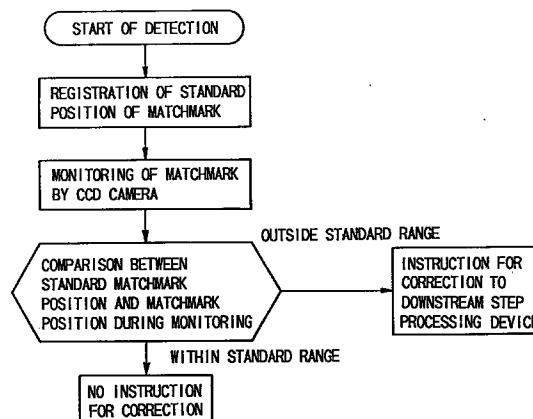
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(54) **Printing position detection and correction method**

(57) A printing position detection and correction method for a printing device, wherein when a pattern or letters are continuously and suitably printed onto a strip-shaped printed article by means of a printing device to form a print portion, a matchmark for position determination of printing is formed beforehand at a proper position around the print portion to be printed, and at first a regular positional relationship when the print portion is printed at a regular position is registered as data beforehand, next a CCD camera or a sensor is installed at a proper position through which the strip-shaped printed article passes after printing, the matchmark formed around the print portion being monitored by means of the CCD camera or the sensor so as to detect the regular positional relationship of the matchmark, and data obtained thereby are compared with the regular positional relationship of the matchmark. Correction instructions may or may not then be given to a downstream step printed strip processing device, depending on whether the error is within a range of setting of the standard, or outside the range of setting of the standard, so as to correct and adjust accordingly the positional deviation corresponding to the error.

Fig. 5



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## Description

### BACKGROUND OF THE INVENTION

The present invention relates to a printing position detection and correction method for a printing device, wherein, with respect to a duplicator of the printing device having a reciprocating printing impression roll, the construction is made to properly adjust for the error of the printing position which occurs due to the deviation of a printing paper sheet generated during contact of the impression face of the printing impression roll with the printing paper sheet, the friction resistance during contact of the printing impression roll with the printing paper sheet to perform forward or backward movement, the fact that the printing paper sheet is not properly supplied and arranged at a specified place on a base stand and the like; and control is made extremely simple, rapid, and accurate so as to make the printing state of a strip-shaped printed article and the downstream processing state by a downstream step processing device to be regular within an acceptable range in relation to the printing device.

#### Prior art

With respect to a printing device comprising a duplicator for performing intermittent printing onto a strip-shaped article subjected to printing supplied from a paper supply device using a printing impression roll which performs positive or reversed rotation when performing forward or backward movement in a direction perpendicular to a transmission direction of the strip-shaped article subjected to printing; a die cutting device for punching a strip-shaped printed article printed by the duplicator into a suitable shape; and a punched residue winding device for winding a punched residue after punching by the die cutting device; in the case of the duplicator, an application roller for applying ink during the forward step onto a printing impression face of the printing impression roll which performs positive or reversed rotation while performing forward or backward movement, and an application roller for applying ink during the backward step, are allowed to contact each of the individual ink rolls which rotate in the reverse direction with respect to the rotation direction of each of the application rollers, so as to adhere ink onto each of the application rollers; and in the conventional duplicator, for example, as shown in Figs. 2A, 2B, and 2C, a plurality of ink rolls are interposed between a bottling roll 46 for sending ink from an ink tank 45 and the application roller 48 for applying ink onto the printing impression roll 47.

By disposing such a plurality of ink rolls therebetween, the adhesion of ink onto the application roller for applying ink onto the printing impression roll has been equalized.

Additionally, in contrast, with respect to a duplicator in which a printing impression roll is allowed to perform

positive or reversed rotation with forward or backward movement, and in which a printing paper sheet is intermittently supplied and stopped by a certain length in a direction perpendicular to the forward or backward movement direction to perform printing, a phenomenon has occurred in which the printing paper sheet deviates slightly during contact of the printing impression roll with the printing paper sheet.

The applicant has made various improvements for devices for adjusting such deviation of the printing paper sheet, and for example, has filed a patent application as Japanese Patent Application No. 59-162505.

This patent application applies to a duplicator having a reciprocating printing impression roll which is formed such that a rack mechanism is formed in parallel with the moving direction of a reciprocating printing impression roll, a gear is attached to one end of a rotation shaft of the printing impression roll, and the gear is allowed to engage with a rack of the rack mechanism; thereby the printing impression roll is allowed to perform positive or reversed rotation in accordance with the reciprocating movement; characterized in that an operation control mechanism is arranged for controlling operation of the above-mentioned printing impression roll; the operation control mechanism comprises a preceding positive or reversed rotation mechanism which permits rotation in which the positive or reversed rotation in accordance with the reciprocating movement of the above-mentioned printing impression roll is faster than the standard positive or reversed rotation when the engagement of the above-mentioned gear with the rack of the rack mechanism is the engagement of a standard gear with a standard rack engaging therewith, and a slip driven rotation mechanism which rotates the printing impression roll to slip the forced positive or reversed rotation to simulate the rotation due to the engagement of the above-mentioned gear with the rack of the rack mechanism to some extent when the printing impression roll is applied with forced positive or reversed rotation force to rotate faster than the standard positive or reversed rotation; the above-mentioned rack mechanism is formed such that a first rack and a second rack arranged in parallel are allowed to approach or contact so as to simultaneously engage the above-mentioned gear with the first rack and the second rack; tooth grooves of the first rack and the second rack are formed to have a groove width wider than that of the standard rack; the formation is made to suitably deviate phases of the tooth grooves of the first rack and the second rack; the formation is thereby made such that an engagement state of simultaneous engagement of the gear with the first rack and the second rack is controlled to give forced positive or reversed rotation so as to slightly precede the rotation in accordance with the reciprocating movement of the printing impression roll with respect to the above-mentioned standard positive or reversed rotation.

Furthermore, the present state of the art in the printing device with respect to the control of a printing state of the strip-shaped printed article and a down-

stream processing state by the downstream step processing device is such that trial printing is performed several times, a skilled person observes it visually so as to judge whether the error is within an acceptable range or exceeds the range, and correction is made by manual work in accordance with the perception of the skilled person.

Additionally, a die cutting device in such a printing device is formed to have a sliding mechanism for detaching its upper chase plate in which, between an upper frame and a lower frame of the die cut of the printing device, items such as labels, seals and the like are inserted into the upper chase plate made of thick steel attached with a punching blade at its lower face in a detachable manner via suitable rails at both sides in a manner simply capable of free insertion and detachment in forward and rearward directions, and when the punching blade is exchanged or the punching blade is inspected, the upper chase plate is slid forwardly to once remove the upper chase plate from the rails, and thereafter the upper chase plate is turned.

In addition, a printing production device for labels and the like is provided for various markets in which a strip-shaped printed article on which a pattern or letters is continuously and suitably printed by a duplicator, is suitably and continuously punched by a die cutting device at a portion containing the pattern or letters as a predetermined product in the next step, and such a printing production device for labels and the like is necessarily added and provided with a punched residue winding device after punching the product with respect to the strip-shaped printed article as having a reeling device for automatically winding the continuous punched residue generated during the operation period.

Such a punched residue winding device has a general structure in which the continuous punched residue, after suitably and continuously punching a predetermined product from the strip-shaped printed article by means of the die cutting device, is simply and automatically wound by means of the reeling device.

However, in the conventional duplicator, with respect to its ink supply mechanism, a plurality of ink rolls is interposed between the bottling roll for supplying ink and the application roller for applying ink onto the printing impression roll, and it has therefore taken a long time to allow ink to arrive at the printing impression roll from the ink tank.

In addition, a plurality of ink rolls rotate, so that ink adhered to each of the rolls has scattered. At the same time, a plurality of ink rolls are in rotating abutment, so that each of the ink rolls has been easily heated.

Furthermore, because of the presence of a plurality of ink rolls therebetween, a plurality of ink rolls should be exchanged when the color of the ink is changed, and it has taken a long time to do the exchanging work or washing work for the roll.

In addition, in the patent application in relation to the above-mentioned Japanese Patent Application No. 59-162505, although the deviation of the printing paper

sheet generated during the contact of the impression face of the printing impression roll with the printing paper sheet can be adjusted, it has been impossible to adjust the deviation of the printing paper sheet generated during the reciprocating movement on the printing paper sheet after the contact of the printing impression roll with the printing paper sheet.

This deviation of the printing paper sheet occurs due to frictional resistance during reciprocating movement with the contact of the printing impression roll with the printing paper sheet, and due to the fact that the printing paper sheet is not accurately supplied and arranged at a specified place on a base stand and the like.

As a result, for example, when a printed portion is punched by a press machine or the like after the completion of printing during the production of labels and the like, the print position deviates from a predetermined position, so that problems have occurred in which the pattern of a label or the like cannot be accurately punched during the punching process.

In addition, in order to avoid such a situation, a lock bolt which fixes the printing impression roll and its gear is loosened, and the change of the phase of the printing impression roll must be set by manual rotation; the adjustment of the contact face between the impression face of the printing impression roll and the printing paper sheet has therefore been extremely troublesome.

Furthermore printing operation should be interrupted one by one so as to perform such an adjustment, and this has consumed time in the printing operation.

On the other hand, with respect to the printing device, in relation to the control of the printing state of the strip-shaped printed article and the downstream processing state by the downstream step processing device, a long time is required for correction, even in the case of being performed by a skilled person, or the correction cannot be made accurately due to dependency on the perception of the operator, or the labor costs become high because of the requirement of a skilled person; therefore, it has been regarded as completely impossible to contemplate lowering the cost of printing, which has been a large problem in printing work.

In addition, with respect to the die cutting device, due to a combination of the facts that the punching blade is attached to the lower face of the upper chase plate and the upper chase plate is made of thick steel, the upper chase plate is extremely heavy, and it is therefore troublesome to exchange the punching blade or inspect the punching blade, and there is a fear of accidental dropping, which is extremely dangerous.

Furthermore, in the case of the structure of the abovementioned punched residue winding device, the continuous punched residue is highly likely to be cut, and the punched residue itself is a strip-shaped article after the punching of the product, so that it is cut during winding, or it is almost impossible to tightly wind, and the continuous punched residue cannot be wound in a regular manner, resulting in occurrence of various

inconveniences.

## SUMMARY OF THE INVENTION

In accordance with the invention, the problem mentioned above is solved in accordance with the fact that with respect to a printing position detection and correction method for a printing device comprising a duplicator for performing intermittent printing onto a strip-shaped article subjected to printing supplied from a paper supply device using a printing impression roll which performs positive or reversed rotation while performing forward or backward movement in a direction perpendicular to a sending direction of the strip-shaped article subjected to printing, a die cutting device for punching a strip-shaped printed article printed by the duplicator into a suitable shape, and a punched residue winding device for winding a punched residue after punching by the die cutting device, when a pattern or letters are continuously and suitably printed onto the strip-shaped printed article by means of the duplicator to form a print portion, a matchmark for position determination of printing is formed beforehand at a proper position around the print portion to be printed; and at first, a regular positional relationship when the print portion is printed at a regular position is registered as data beforehand; next, a CCD camera or a sensor is installed at a proper position through which the strip-shaped printed article passes after printing, the matchmark formed at the proper position around the print portion is monitored by means of the CCD camera or the sensor so as to detect the regular positional relationship of the matchmark; and data obtained thereby are compared with the regular positional relationship of the matchmark, and correction instructions are not given to a downstream step processing device which performs downstream processing of the strip-shaped printed article when the error is within a range of setting of the standard, or instruction of correction is given to the downstream step processing device when the error is outside the range of setting of the standard so as to correct and adjust the positional deviation corresponding to the error.

In addition, in the case of the detection and correction of the printing position for the printing device, when a pattern or letters is continuously and suitably printed onto the strip-shaped printed article by means of the printing device to form the printed portion, the matchmark for position determination of printing is formed beforehand at the proper position around the print portion to be printed; and at first, the regular positional relationship when the print portion is printed at the regular position is registered as data beforehand; next, the CCD camera or the sensor is installed at the proper position through which the strip-shaped printed article after printing passes; the matchmark formed at the proper position around the print portion is monitored by means of the CCD camera or the sensor so as to detect the regular positional relationship of the matchmark; and data obtained thereby are compared with the regular

positional relationship of the matchmark, and instruction of correction is not given to the downstream step processing device which performs downstream processing of the strip-shaped printed article when the error is within a range of setting of the standard, or alternatively, instruction of correction is given to the downstream step processing device when the error is outside the range of setting of the standard so as to correct and adjust the positional deviation corresponding to the error, thereby the positional relationship of the matchmark itself is compared with the position in the regular case to judge the error thereof, so that in the same manner as the case of the above-mentioned printing state detection and correction, automatic, rapid, and accurate control can be carried out.

## BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an illustrative front view of an example of a printing device.

Fig. 2A is a side view showing an installation example of rolls in a conventional duplicator.

Fig. 2B is a side view showing an installation example of rolls in a conventional duplicator.

Fig. 2C is a side view showing an installation example of rolls in a conventional duplicator.

Fig. 3 is a perspective view of a part of a strip-shaped printed article in an example of the present invention.

Fig. 4 is an illustrative side view of a monitoring portion in an example of the present invention.

Fig. 5 is a chart in the case of printing position detection and correction in an example of the present invention.

## PREFERRED EMBODIMENTS OF THE INVENTION

An example of the present invention will be explained hereinafter on the basis of the drawings.

As shown in Fig. 1, a printing device 1 comprises a duplicator 3 which performs intermittent printing onto a strip-shaped article subjected to printing S1 supplied from a paper supply device 2 using a printing impression roll which performs positive or reversed rotation while performing forward or backward movement in a direction perpendicular to a sending direction of the strip-shaped article subjected to printing S1, an image processing mechanism 7 which detects and corrects deviation of a printing position of a printed article and the like, a laminating mechanism 4 which laminates a transparent adhesive film onto a print face of the printed strip-shaped printed article S2, a die cutting device 5 which punches the strip-shaped printed article S2 printed by the duplicator 3 into a suitable shape, a punched residue winding device 6 which winds a punched residue A after punching by the die cutting device 5, and a product winding device 8 which winds the punched product. In the figures in this case, it is not shown that in the rearward direction of the duplicator 3,

a drying mechanism is arranged for drying ink printed by the duplicator 3.

The above-mentioned duplicator 3 comprises a bottling roll 13 for sending ink from an ink tank 12, an access roll 15 which rotates with a support arm 14 to suitably abut against the bottling roll 13, and a fixed metal roll 18 and a kneading roll 19 for adhering ink supplied by the bottling roll 13 and the access roll 15 onto ink rolls 16 and 17 as an ink applying device 11.

The access roll 15 which constitutes the ink applying device 11 has such a structure that it abuts against the bottling roll 13 when it tilts upward, and it abuts against the fixed metal roll 18 when it tilts downward. In addition, the kneading roll 19 which abuts against the fixed metal roll 18 comprises two rolls 20 and 21 which rotate while being provided with a driving device. The two rolls which constitute the kneading roll 19 abut against the ink rolls 16 and 17 and supply ink to the rolls 16 and 17.

The ink applying device 11 shown in Fig. 1 is constituted such that to a sliding base stand 24 attached in a manner capable of sliding in the horizontal direction via a rail 23 arranged in the lateral direction of a duplicator main body 22 are fixed the bottling roll 13 for sending ink from the ink tank 12, the access roll 15 which rotates with the support arm 14 to suitably abut against the bottling roll 13, and the fixed metal roll 18 and the kneading roll 19 for adhering ink supplied by the bottling roll 13 and the access roll 15 onto the ink rolls 16 and 17.

When a pattern or letters is continuously and suitably printed onto the strip shaped article subjected to printing S1 by means of the duplicator 3 as described above so as to form a print portion 82, the detection of a printing state and a printing position is performed, and the correction thereof is performed, if necessary.

Among these, in the detection and correction method of the printing state and position, at first, as shown in Fig. 3, a variable density indicating portion 83 to serve as the standard of the variable density judgment for color is printed at a proper position around the printed print portion 82.

In the case of the figure, standard implantation for 4 colors in total is formed as two individuals in a thin band shape at both sides of print portion 82 beforehand.

In addition, at a proper position at the side of the print portion 82, a matchmark 84 is provided one by one for the print portion 82 beforehand.

The strip-shaped printed article S2 thus printed is allowed to pass through the image processing mechanism 7 shown in Fig. 4.

This image processing mechanism 7 is arranged at the downstream step side of the duplicator 3, which is formed by fixing a CCD camera 93 to a moving frame 92 supported by a base column 91. In this case, the CCD camera 93 may be provided as one individual; however, the variable density indicating portions 83 are arranged at both sides of the print portion 82, so that two individuals are desirable.

In the case of the detection and correction of the

printing position in the printing device, as in a chart shown in Fig. 5, after the start of detection, the regular positional relationship of the matchmark 84 when the print portion 82 is printed at the regular position is registered as data beforehand, and next, the CCD camera 93 is installed at a monitoring portion through which the strip-shaped printed article S2 after printing passes as described above, the matchmark 84 formed at the proper position around the above-mentioned print portion 82 is monitored by means of the CCD camera so as to detect the positional relationship of the matchmark 84, and data obtained thereby are compared with the regular positional relationship of the matchmark 84, and when the error is within the set range of the standard, instruction of correction is not given to the downstream step processing device for performing downstream processing of the strip-shaped printed article S2, for example, the die cutting device 5, or when the error is outside the set range of the standard, correction instructions are given to the downstream step processing device so as to correct and adjust the positional deviation corresponding to the error. In this case, instead of the CCD camera 93, it is also possible to use a sensor (not shown), and in such a case, the error is corrected in accordance with the positional relationship of a passing state of the matchmark 84.

Incidentally, in this case, it is unnecessary to say that there is no limitation to the above-mentioned example, and it is even possible that only the standard variable density indicating portion 83 may be formed around the above-mentioned print portion 82, or only the matchmark 84 may be formed; however, it is desirable to provide both at the same time.

In addition, in the case of the printing position detection and correction in the duplicator 3, when a pattern or letters is continuously and suitably printed onto the strip-shaped article subjected to printing S1 by means of the duplicator 3 to form the print portion 82, the matchmark 84 for position determination of printing is formed beforehand at a proper position around the print portion 82 to be printed; and at first, the regular positional relationship when the print portion 82 is to be printed at a regular position is registered as data beforehand; next, the CCD camera 93 or the sensor is installed at a proper position through which the strip-shaped printed article S2 after printing passes, the matchmark 84 formed at the proper position around the print portion is monitored by means of the CCD camera 93 or the sensor so as to detect the regular positional relationship of the matchmark 84, and data obtained thereby are compared with the regular positional relationship of the matchmark 84, and correction instruction is not given to the downstream step processing device which performs downstream processing of the strip-shaped printed article S2 when the error is within a range of setting of the standard, or instruction of correction is given to the downstream step processing device when the error is outside the range of setting of the standard so as to correct and adjust the positional deviation.

ation corresponding to the error, thereby the positional relationship of the matchmark 84 itself is compared with the position in the regular case to judge its error; so that in the same manner as the abovementioned printing state detection and correction, control can be performed automatically, rapidly, and accurately. 5

Therefore, in order to make the printing position of the strip-shaped printed article and the downstream processing state by the downstream step processing device to be regular within an acceptable range, anyone can perform the control extremely easily, rapidly, accurately, and without training. 10

Thus, according to this invention, there are provided various excellent effects such if the printing paper sheet is not accurately supplied and arranged at a specified place on the base stand and the like, it can be adjusted by an extremely-simple operation, and in order to make the printing state of the strip-shaped printed article and the downstream processing state by the downstream step processing device to be regular within an acceptable range, the control can be performed extremely easily, rapidly, and accurately. 15 20

## Claims

1. A printing position detection and correction method for a printing device comprising a duplicator for performing intermittent printing onto a strip-shaped article subjected to printing supplied from a paper supply device using a printing impression roll which performs positive or reversed rotation while performing forward or backward movement in a direction perpendicular to a sending direction of the strip-shaped article subjected to printing, a die cutting device for punching a strip-shaped printed article printed by the duplicator into a suitable shape, and a punched residue winding device for winding a punched residue after punching by the die cutting device, the improvement in that when a pattern or letters are continuously and suitably printed onto the strip-shaped printed article by means of the printing device to form a print portion, a matchmark for position determination of printing is formed beforehand at a proper position around the print portion to be printed, and at first a regular positional relationship when the print portion is printed at a regular position is registered as data beforehand, next a CCD camera or a sensor is installed at a proper position through which the strip-shaped printed article after printing passes, the matchmark formed at the proper position around the print portion is monitored by means of the CCD camera or the sensor so as to detect the regular positional relationship of the matchmark, and data obtained thereby are compared with the regular positional relationship of the matchmark, and instruction of correction is not given to a downstream step processing device which performs downstream processing of the strip-shaped printed article when 25 30 35 40 45 50 55

the error is within a range of setting of the standard, or instruction of correction is given to the downstream step processing device when the error is outside the range of setting of the standard so as to correct and adjust the positional deviation corresponding to the error.

Fig. 1

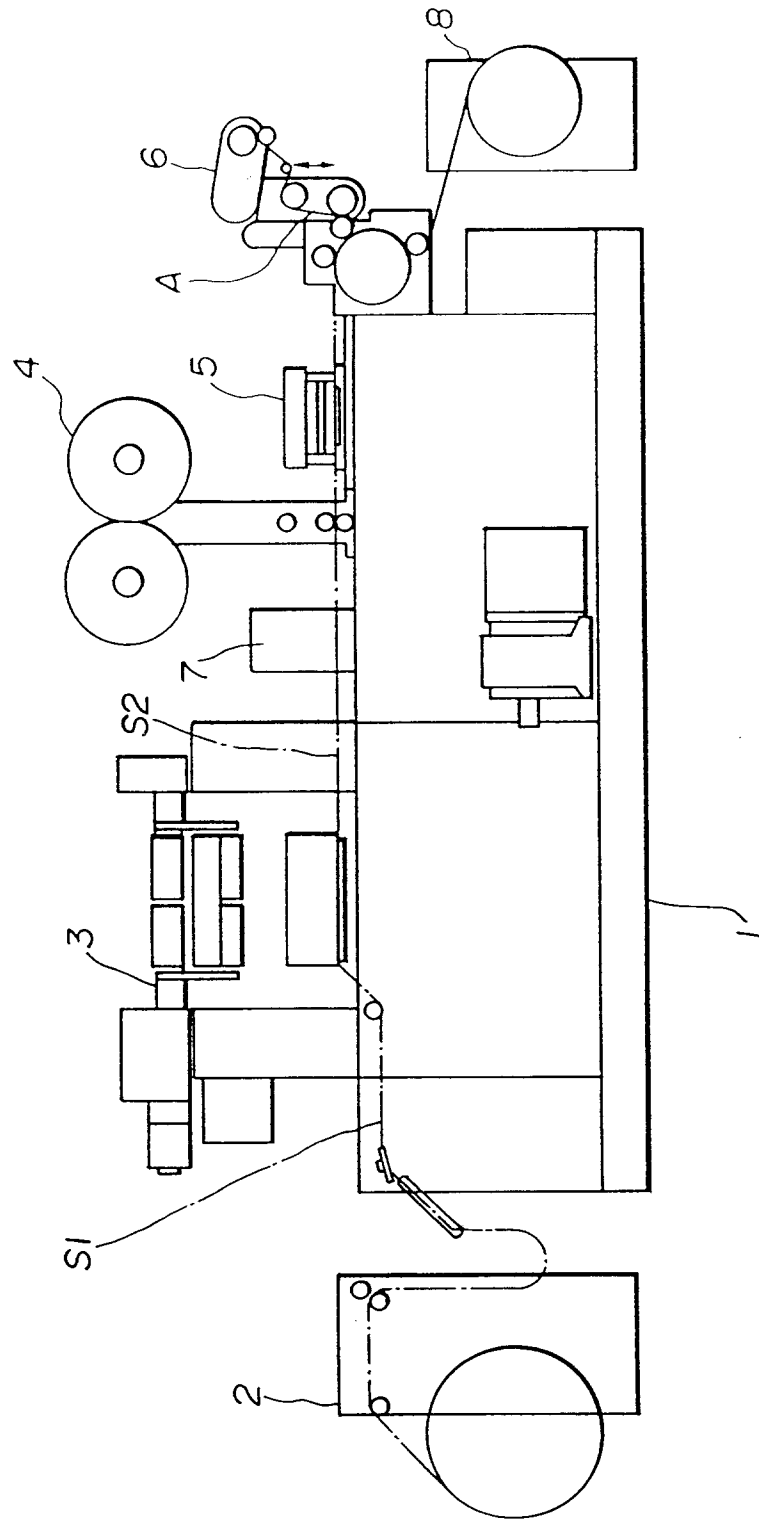


Fig. 2(C)

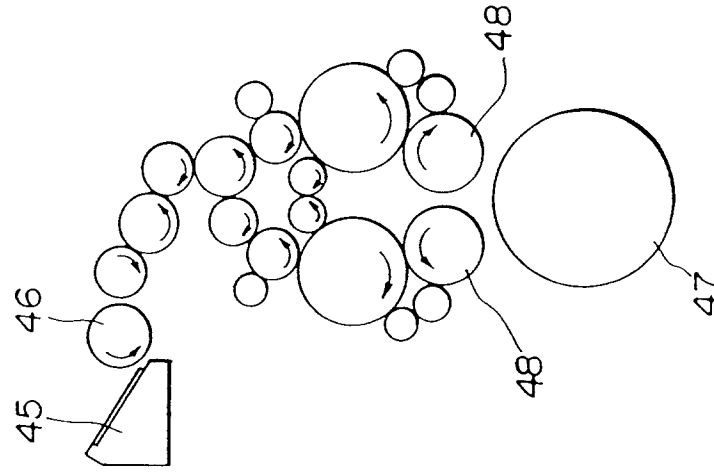


Fig. 2(B)

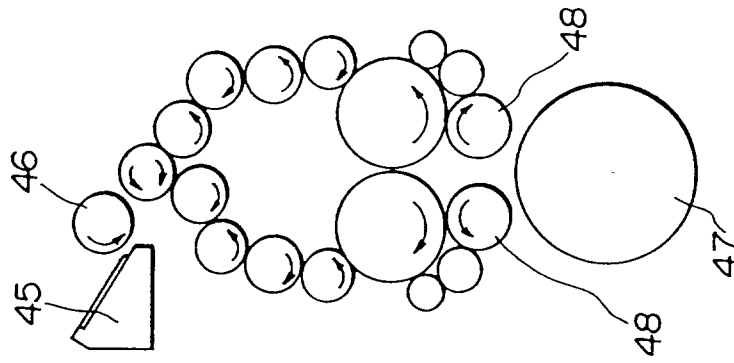


Fig. 2(A)

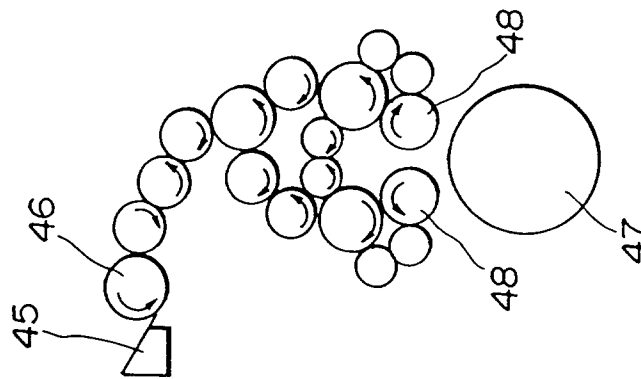


Fig. 3

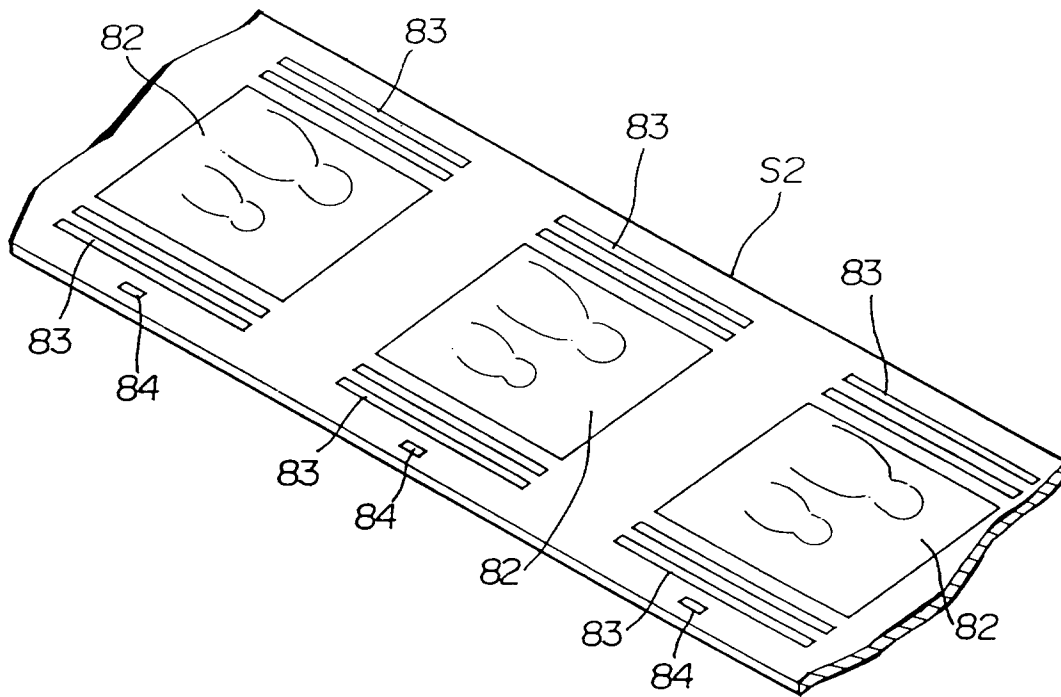


Fig. 4

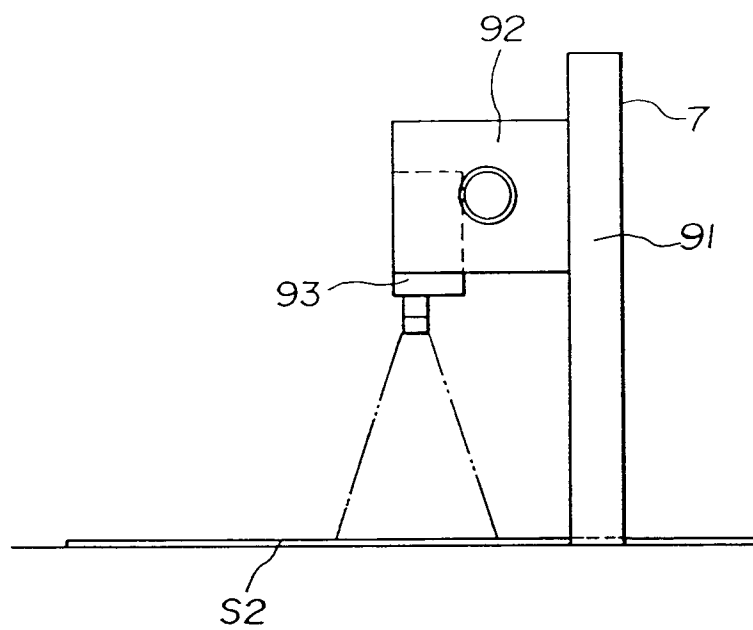


Fig. 5

