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(54) Printing device, and printing state and printing position detection and correction methods for printing device.

(57) A printing device (1) is disclosed comprising a duplicator (3) for performing 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) ; a die cutting device (5) for punching a strip-shaped printed article (S2) printed by the duplicator (3) into a suitable shape ; and a punched residue winding device (6) for winding a punched residue (A) after punching by the die cutting device (5) ; wherein the duplicator (3) is provided with an ink applying device (11) which allows a forward-step 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 a backward-step application roller for applying ink during the backward step to contact with each of the individual ink rolls which rotate in the reversed direction with respect to the rotation direction of each of the application rollers so as to adhere ink onto each of the application rollers, the ink applying device comprising a bottling roll (13) for sending ink from an ink tank (12) ; an access roll (15) which performs rotational movement with a support arm (14) so as 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 the ink rolls (16,17), the kneading roll (19) being rotated at a high speed so as to adhere ink onto the kneading roll (19), the ink rolls (16,17) and the fixed metal roll (18) for circulating the ink ; whereby the formation is made so as to equalize adhesion of ink onto the application rollers.

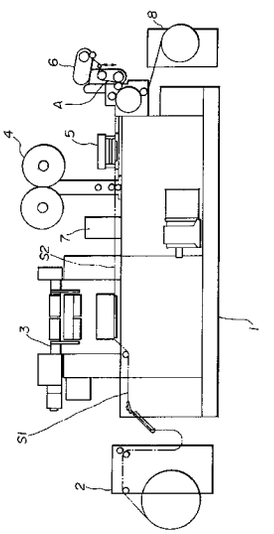

FIG.1

EP 0 540 430 A2

BACKGROUND OF THE INVENTION

The present invention relates to a printing device, and to a printing state and printing position detection and correction methods for the printing device, wherein, with respect to a duplicator of the printing device, the number of ink rolls to be interposed between a bottling roll for supplying ink and an application roller for applying ink onto a printing impression roll is reduced; the ink is thereby rapidly supplied to the printing impression roll, the scattering of ink adhering to each of the rolls and the heating of each of the rolls are restricted to a minimum, and the color of ink to be supplied can be changed with ease; and with respect to the duplicator 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; the detachment of an upper chase plate can be performed safely and with ease in a die cutting device for punching labels, seals and the like in which a pattern or letters is suitably printed on paper or film by the duplicator without cutting the peeling sheet, with respect to a punched residue winding device, while allowing continuous punched residue generated when a product is suitably and continuously punched from a strip-shaped printed article which is not to be cut, it becomes possible to tightly wind by performing the so-called surface winding to securely reel the continuous punched residue without loss, and if the punched residue is cut, a reeling device for reeling the residue and a device in an upstream step thereof are immediately stopped, and control is made extremely simple, rapid, and accurate so as to make the printing state of the 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; and the present invention further relates to the printing state and to the printing position detection and correction methods for 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. 5A, 5B, and 5C, 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 downstream 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 above-mentioned 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

Thus, the present invention has been created, having as one of its objects the reduction of the number of the ink rolls to be interposed between the bottling roll for supplying ink and the application roller for applying ink onto the printing impression roll, thereby rapidly supplying the ink to the printing impression roll, the scattering of ink adhered to each roll and the heating of each roll are restricted to the minimum, and the color of ink to be supplied can be changed with ease, and it makes it possible by extremely simple operation to adjust the error of the printing position which occurs due to 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, the frictional resistance during the reciprocating movement of the printing impression roll with the contact with the printing paper sheet, the fact that the printing paper sheet is not accurately supplied and arranged at a specified place on the base stand and the like, and the control can be performed extremely simply, rapidly, and certainly 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 proper within an acceptable range, and with respect to the die cutting device, the exchange of the punching blade and the inspection of the punching blade can be performed by means of extremely easy operation, so as to provide an upper chase plate sliding mechanism which is extremely safe with no fear of accidental dropping, and the continuous punched residue generated during suitable and continuous punching of the product from the strip-shaped printed article is reeled without cutting in a regular manner, and when the punched residue is cut, the reeling device for reeling the residue, and the device in the upstream step thereof, are immediately stopped so as to avoid jamming, and a state can be ensured in which the continuous punched residue can be treated in a regular manner.

The present invention offers a solution for the problems in the above-mentioned task in accordance with the fact that, 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 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 duplicator is provided with an ink applying device which allows 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 to contact with each of individual ink rolls which rotate in the reversed direction with respect to the rotation direction of each of the application rollers so as to adhere ink onto each of the application rollers; the ink applying device comprises a bottling roll for sending ink from an ink tank, an access roll which performs rotational movement with a support arm so as to suitably abut against the bottling roll; and a fixed metal roll and a kneading roll for adhering ink supplied by

the bottling roll and the access roll onto the ink rolls; and the kneading roll is rotated at a high speed so as to adhere ink onto the kneading roll, the ink rolls and the fixed metal roll to circulate it, whereby the construction is such that the adhesion of ink onto the application rollers is equalized.

Additionally, a solution is offered for the above-mentioned task in accordance with the fact that the ink applying device is constituted by fixing the bottling roll for sending ink from the ink tank, the access roll which performs rotational movement with the support arm to suitably abut against the bottling roll, and the fixed metal roll and the kneading roll for adhering ink supplied by the bottling roll and the access roll onto the ink rolls to a sliding base stand which is attached in a manner capable of sliding in the horizontal direction via a rail; the sliding base stand is suitably moved to allow the kneading roll to abut against the ink roll, and the kneading roll is rotated at a high speed so as to adhere ink onto the kneading roll; the ink rolls and the fixed metal roll to circulate it, whereby the formation equalizes adhesion of ink onto the application rollers.

The problem of the above-mentioned task is solved in accordance with the fact that the ink applying device is formed such that an ink supply body comprising the ink tank and the bottling roll is installed on the sliding base stand in a detachable manner.

Additionally, the problem of the above-mentioned task is solved in accordance with the fact that with respect to the printing device, the duplicator is constituted to have the printing impression roll of forward or backward movement which is formed such that a rack mechanism is formed in parallel with the movement direction of the printing impression roll which performs forward or backward movement, a gear is attached to one end of a rotation shaft of the printing impression roll, and the printing impression roll is allowed to perform positive or reversed rotation in accordance with the forward or backward movement by engaging the gear with a rack of the rack mechanism, a preceding positive or reversed rotation mechanism is arranged such that the positive or reversed rotation in accordance with the forward or backward movement of the printing impression roll is made to have faster rotation than the standard positive or reversed rotation in which the engagement of the gear with the rack of the rack mechanism is regarded as the engagement of a standard gear with a standard rack engaging therewith, the 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 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 which is 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, and thereby the formation is 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 forward or backward movement of the printing impression roll with respect to the standard positive or reversed rotation, and the rack mechanism is constituted in a manner capable of movement in the forward or backward movement direction of the printing impression roll.

On the other hand, the problem of the above-mentioned task is solved in accordance with the fact that with respect to a printing state 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 article subjected to printing by means of the duplicator to form a print portion, a variable density indicating portion to serve as a standard for judgement of variable density of each color is printed in the same manner using ink used for the formation of the print portion at a proper position around the print portion to be printed; and at first a standard variable density for each color of the variable density indication portion is registered as data; next, a CCD camera is installed at a proper position through which the strip-shaped printed article passes after printing; the variable density indicating portion is monitored by means of the CCD camera to detect the variable density; and using data obtained thereby, the variable density for each color is compared with the standard variable density for each color, and instruction of correction is not given when the error is within a range of setting of the standard, or instruction of correction is given when the error is outside the range of setting of the standard so as to control and adjust a sending amount of ink and the like.

Furthermore, the problem of the above-mentioned task 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.

The problem of the above-mentioned task is solved in accordance with the fact that with respect to the printing device, the die cutting device is allowed to have a structure such that an upper chase plate having its lower face detachably attached with a punching blade is inserted between an upper frame and a lower frame via guide members at both sides in a manner capable of free insertion and drawing in forward and rearward directions and capable of freely turning upward.

The problem of the above-mentioned task is solved in accordance with the fact that with respect to the die cutting device, each of the guide members is formed respectively such that a sliding receiving plate having a sliding groove portion at the inside face for sliding each of the stoppers provided projecting laterally at both sides of a rearward end of the upper chase plate respectively is provided at the inside of a forward end portion of a guide member main body, a stopper receiving means for stopping each of the stoppers is provided at a forward end of the sliding receiving plate, and a holding means for holding the upper chase plate to turn is provided at an upper face at a rearward portion of the sliding receiving plate.

The problem of the above-mentioned task is solved in accordance with the fact that with respect to the printing device, in relation to the punched residue winding device, a reeling device for the punched residue is constituted by a reeling roller which performs driving and rotation and a reeling auxiliary roller which is arranged in a substantially parallel manner closely adjacent to the reeling roller, the reeling roller is formed so as to wind at a speed faster than a printing speed by the duplicator by a certain ratio, the formation is made to apply pressure in a direction to abut against the reeling auxiliary roller by its own weight or suitable urging force, and the formation is made to allow the continuous punched residue to pass between the reeling roller and the reeling auxiliary roller so as to wind around the reeling roller.

The problem of the above-mentioned task is solved in accordance with the fact that with respect to the punched residue winding device, the continuous punched residue to be wound by the reeling roller has one face as an adhesive adhering face, and the construction is made such that winding is performed allowing the adhesive adhering face to contact with the peripheral surface of the reeling roller.

Furthermore, the problem of the above-mentioned task is solved in accordance with the fact that with respect to the punched residue winding device, a residue cut detecting bar which is arranged to give tension which does not cause cutting of the punched residue by means of its own weight or urging force is provided between a guide roller arranged at a rearward portion from the die cutting device and the reeling device for reeling the punched residue arranged at a rearward portion from the guide roller, and the formation is made such that when the repulsive resistance from the punched residue ceases in a state of giving tension to the punched residue by means of the residue cut detecting bar, the entire apparatus including the die cutting device and the reeling device is immediately stopped.

In the printing device according to the present invention, in relation to the duplicator thereof, when the ink is supplied from the ink tank to the ink roll via the bottling roll, the access roll, the fixed metal roll, and the kneading roll, the kneading roll is rotated at a high speed so as to adhere the ink onto the kneading roll, the ink roll, and the fixed metal roll to circulate it; thereby the adhesion of ink onto the application roller is made uniform.

In addition, to the sliding base stand are fixed the bottling roll for sending ink from the ink tank, the access roll which rotates with the support arm to suitably abut against the bottling roll, and the fixed metal roll and the kneading roll for adhering ink supplied by the bottling roll and the access roll onto the ink roll, the sliding base stand is suitably moved to allow the kneading roll to abut against the ink roll, and the kneading roll is rotated at high speed so as to adhere the ink onto the kneading roll, the ink roll, and the fixed metal roll to circulate it.

When the color of the ink is changed, the ink supply body is removed, an ink tank provided with ink

having a predetermined color is installed onto the ink supply body, and this ink supply body is installed onto the sliding base stand.

In addition, in the printing device according to the present invention, at first, assuming that the printing paper sheet does not deviate when the printing paper sheet contacts with the printing impression, the positional relationship between the gear of the printing impression roll and the rack mechanism is set so as to provide printing at a regular position. While maintaining the second rack of the rack mechanism to be fixed, the first rack is moved, and the phase of the tooth for the first rack and the second rack is deviated. At this time, the tooth grooves of the first rack and the second rack are made to have a groove width wider than the tooth groove of the standard rack so as to allow slack beforehand, so that the phase of the tooth for the first rack and the second rack is deviated, thereby the tooth groove becomes narrow to approach the width of the tooth groove of the standard rack.

At a position after the approach toward the tooth groove of the standard rack to some extent, the first rack is fixed, and the printing impression roll is allowed to perform forward or backward movement.

At this time, the preceding positive or reversed rotation mechanism is arranged at one end of the rotation shaft, so that the gear has the engagement between the gear and the rack mechanism which always performs preceding rotation to a degree of slack, and for example, when the printing impression roll 1 moves from the left to the right, the teeth of the gear abut against the left side of the rack tooth groove, that is, the rearward side with respect to the moving direction of the gear so as to engage with the rack mechanism. Therefore, the rotation of the printing impression roll in this case always maintains a preceding state with respect to the standard rotation of the printing impression roll rotating in accordance with the forward or backward movement with the engagement between the rack having the regular groove width and the gear.

As described above, the degree of deviation of the printing paper sheet toward the forward direction of the movement of the printing impression roll during the contact between the printing paper sheet and the printing impression of the printing impression roll is offset by allowing the preceding rotation beforehand with respect to the standard rotation of the printing impression roll.

In addition, the deviation of the printing paper sheet which occurs due to the frictional resistance during the forward or backward movement with the contact of the printing impression roll with the printing paper sheet after the contact of the printing impression roll with the printing paper sheet, the fact that the printing paper sheet is not accurately supplied and arranged at a specified place on the base stand and the like is offset by moving the rack mechanism toward the forward or backward movement direction of the printing impression roll. That is, when the rack mechanism is moved in the forward or backward movement direction of the printing impression roll, the printing impression roll also rotates via the gear in accordance with the moving action, so that the contact face between the printing paper sheet and the printing impression of the printing impression roll is adjusted using the rotation of the printing impression roll in accordance with the movement of the rack mechanism.

On the other hand, with respect to the printing state and the printing position detection and correction methods for the printing device according to the present invention, in the case of the detection and correction of the printing state for the printing device, when a pattern or letters is continuously and suitably printed onto the strip-shaped article subjected to printing by means of the printing device to form the print portion, the variable density indicating portion to serve as the standard for judgement of variable density of each color is printed in the same manner using ink used for the formation of the print portion at the proper position around the print portion to be printed, and at first, the standard variable density for each color of the variable density indicating portion is registered as data; next, the CCD camera is installed at the proper position through which the strip-shaped printed article passes after printing, the variable density indicating portion is monitored by means of the CCD camera to detect the variable density; and using data obtained thereby, the variable density for each color is compared with the above-mentioned standard variable density for each color, and instruction of correction is not given when the error is within a range of the set standard, or instruction of correction is given when the error is outside the range of the set standard so as to control and adjust the amount of ink sent and the like; and thereby, during the printing of the print portion, the variable density indicating portion has been printed in the same manner as the variable density judgement standard at the proper position around the print portion, so that the variable density indicating portion is under the same conditions as those of the print portion; and the variable density indicating portion and the standard variable density are converted into numerical image values by means of the CCD camera to perform comparison, so that extremely accurate judgement of variable density becomes possible; and moreover, the conversion into data as an image can be performed using the CCD camera, so that computer processing can be conducted extremely easily, and when the amount of ink sent is controlled via a computer by means of a control unit, then automatic, rapid, and accurate control can be carried out.

In addition, in the case of the detection and cor-

rection 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.

In the die cutting device in the printing device according to the present invention, when the punching blade is exchanged or the punching blade is inspected, unlike the prior art in which the upper chase plate is slid forward to once remove the upper chase plate from the rail so as to turn the upper chase plate, the upper chase plate is instead slid forward via the guide members at both sides so as to turn the upper chase plate upward.

In addition, when the punching blade is exchanged or the punching blade is inspected, each of the stoppers at both sides of the rearward end of the upper chase plate is slid forward along the sliding groove portion of the sliding receiving plate of each of the guide members so as to stop each stopper of the upper chase plate with the stopper receiving means at the forward end of the sliding receiving plate of each of the guide members, and the upper chase plate is turned upwardly with each stopper as the center so as to hold both side portions at the upper face of the upper chase plate with the holding means at the upper face at the rearward portion of the sliding receiving plate of each of the guide members.

Furthermore, the punched residue winding device after the punching of the product in the printing device according to the present invention is formed such that with respect to the punched residue winding device after the punching of the product for the strip-shaped printed article in which the strip-shaped printed article continuously and suitably printed with a pattern or letters by the duplicator is subjected to suitable and continuous punching using the die cutting device in the next step at the portion containing the pattern or letters as a predetermined product; and there is provided the reeling device for automatically winding the continuous punched residue generated during the period, the reeling device being constituted by the reeling roller which performs driving and rotation, and the reeling auxiliary roller which is arranged substantially parallel closely adjacent to the reeling roller; the reeling roller being formed to apply pressure in the direction to abut against the reeling auxiliary roller by its own weight or suitable urging force, so that when the above-mentioned continuous punched residue is allowed to pass between the reeling roller and the reeling auxiliary roller so as to wind around the reeling roller, the continuous punched residue is wound around the winding roller while pressure is being applied by the winding auxiliary roller, so that it is wound tightly.

Moreover, at this time, the construction is made with respect to the winding speed by the reeling roller so as to wind at a speed faster than a printing speed by the duplicator by a certain ratio, so that the continuous punched residue is always wound in a state of tension, and it is wound tightly and reeled in a regular manner.

The continuous punched residue to be wound by the reeling roller has as one face an adhesive adhering face, and the formation is made such that winding is performed while allowing the adhesive adhering face to contact the peripheral surface of the reeling roller, so that when it is tightly wound in a regular manner to yield a rolled state, the so-called surface winding state is obtained, so that no winding deficiency due to the adhering force of the adhesive results, which is extremely convenient for handling.

Furthermore, tension to an extent which does not cause cutting is given to the above-mentioned punched residue by means of the weight of the residue cut detecting bar itself or the urging force, thereby when the punched residue is cut, the repulsive resistance from the punched residue disappears when giving tension to the punched residue by the residue cut detecting bar, so that the entire apparatus including the above-mentioned die cutting device and the reeling device is stopped, so as to prevent deficiency of treatment which may produce winding deficiency and a disordered state of the punching reside as generated when the punched residue is cut.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an illustrative front view of one example of the present invention.

Fig. 2 is a front view of a state in which an ink applying device is attached in a duplicator as one example of the present invention.

Fig. 3 is a side view of an ink supply body in which a base frame body is installed with an ink tank in a duplicator as one example of the present invention.

Fig. 4 is an exploded plan view of a portion of an ink supply body in which a base frame body is installed with an ink tank in a duplicator as one example of the present invention.

Fig. 5A is a side view showing an installation example of rolls in a conventional duplicator.

Fig. 5B is a side view showing an installation example of rolls in a conventional duplicator.

Fig. 5C is a side view showing an installation example of rolls in a conventional duplicator.

Fig. 6 is a perspective view of an important part showing one example of the present invention.

Fig. 7 is a front view showing one example of the present invention.

Fig. 8 is a diagram of printing steps in the movement in the forward direction of a printing impression roll.

Fig. 9 is an enlarged view of an important part showing an engagement state between a gear and a rack.

Fig. 10 is a perspective view of an important part of a strip-shaped printed article in an example of the present invention.

Fig. 11 is an illustrative side view of a monitoring portion in an example of the present invention.

Fig. 12 is a chart in the case of printing state detection and correction in an example of the present invention.

Fig. 13 is a chart in the case of printing position detection and correction in an example of the present invention.

Fig. 14 is a side view showing one example of the present invention.

Fig. 15 is a front view showing one example of the present invention.

Fig. 16 is a plan view with partial omission showing one example of the present invention.

Fig. 17 is an enlarged perspective view of a left guide member of the present invention.

Fig. 18 is a perspective view of an important part of 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 according to the present invention 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.

As shown in Fig. 2, the two sliding base stands 24 and 25 are attached to the rail 23, and when the ink tanks 12 for different colors are installed on each of the sliding base stands 24 and 25, then the sliding base stands 24 and 25 are suitably slid, and inks having different colors can thereby be easily supplied to the ink rolls 16 and 17.

In addition, when an ink supply body 26 compris-

ing the ink tank 12 and the bottling roll 13 is installed on the sliding base stands 24 and 25 in a detachable manner, inks having different colors may be optionally supplied with ease. For example, as shown in Fig. 3 and Fig. 4, this ink supply body 26 is constituted by installing the ink tank 12 which has a box shape having its bottom plate inclined and one side wall in an open state onto a base frame body 27 provided with the bottling roll 13. The base frame body 27 fixes both side walls 29 and 30 through a bottom plate 28, and 4 bottling rolls 13 are arranged between both side walls 29 and 30. In addition, the base frame body 27 is attached with handles 31 and 32 in order to make transportation thereof easy in a manner capable of free rotational movement.

On the other hand, as shown in Fig. 3, a side wall 33 of the ink tank 12 is cut out so as to substantially form a circular arc, so as to abut against a rotation shaft 34 of the base frame body 27 which supports the above-mentioned bottling roll 13 by a shaft to allow the peripheral surface of the bottling roll 13 to enter into the ink tank 12. Owing to such a constitution, the ink in the ink tank 12 is sufficiently adhered to the rotating bottling roll 13. When the ink tank 12 is installed on the base frame body 27, a stopper 35 which is attached to the bottom plate of the ink tank 12 abuts against the bottom plate 28 of the base frame body 27 to be fixed at a predetermined position.

Printing onto the strip-shaped article subjected to printing S1 placed on a printing pressurizing stand 36 is performed by rotating and pressurizing a predetermined printing impression roll 38.

This printing impression roll 38 proceeds leftwardly from a position shown in Fig. 2 (continuous line) while performing counterclockwise rotation. A printing impression face of the printing impression roll 38 contacts the strip-shaped article subjected to printing S1 which stops after being supplied by every certain length in a direction perpendicular to the proceeding direction of the printing impression roll 38 on the printing pressuring stand 36 so as to perform the first printing.

The printing impression roll 38 further proceeds leftward (two-dot chain line in Fig. 2), which arrives at the left end and changes its rotation direction into the clockwise direction to begin proceeding in the right direction. After the printing impression roll 38 has made the first printing onto the strip-shaped article subjected to printing S1, the strip-shaped article subjected to printing S1 is subjected to paper supply by a predetermined length and stops again, and the printing impression face of the printing impression roll 38 proceeding from the left end contacts this strip-shaped article subjected to printing S1 to perform the second printing and returns to the position shown in Fig. 2 (continuous line).

In the meantime, an application roller 39 abuts against the printing impression face of the printing impression roll 38 when the printing impression roll 38 proceeds from the right end to the printing position (continuous line in Fig. 2), and the ink is applied onto the printing impression face while performing upward movement.

At this time, since the printing impression roll 38 rotates counterclockwise, the application roller 39 which abuts there against applies ink while rotating clockwise, and the application roller 39 performs rotational movement together with its support arm 40 upwardly during the period of proceeding of the printing impression roll 38 to the central printing position to be lifted up to a position for abutting against the ink roll 16, which abuts against the ink roll 16 rotating counterclockwise (two-dot chain line in Fig. 2). Therefore, while maintaining the initial clockwise rotation of the application roller 39, the ink is smoothly applied onto the printing impression face.

During the period in which the printing impression roll 38 completes the first printing onto the strip-shaped article subjected to printing S1 and proceeds to the left end of the duplicator main body 22, the strip-shaped article subjected to printing S1 is supplied by a certain length and stops. When the printing impression roll 38 arrives at the left end of the duplicator main body 22, another application roller 41 performs rotational movement together with a support arm 42 downward to abut against the printing impression roll 38 (two-dot chain line in Fig. 2). When the printing impression roll 38 starts proceeding from the left end of the duplicator main body 22 toward the central direction, the printing impression roll 38 rotates clockwise opposite to the case of the first printing.

Therefore, the application roller 41 which abuts against the printing impression roll 38 applies ink onto the printing impression face while rotating counterclockwise opposite to the printing impression roll 38, and the application roller 41 performs rotational movement upwardly together with the support arm 42 during the period of proceeding of the printing impression roll 38 to the central printing position to be lifted up to a position to abut against the ink roll 17 (continuous line in Fig. 2). At this time, the ink roll 17 which abuts against the application roller 41 rotates clockwise opposite to the application roller 41. Therefore, the application roller 41 lifted upward while rotating counterclockwise abuts against the ink roll 17 rotating clockwise, so that the ink is smoothly applied while maintaining the initial rotation of the application roller 41.

The ink rolls 16 and 17, which supply ink to these application rollers 39 and 41, rotate while abutting against the kneading roll 19 respectively. That is, the roll 20 of the kneading roll 19 which abuts against the ink roll 16 rotates clockwise, and the roll 21 of the kneading roll 19 which abuts against the ink roll 17 rotates counterclockwise.

Thus, the printing impression roll 38 performs the second printing onto the strip-shaped article subjected to printing S1, which returns to the right end of the duplicator main body 22, and as shown in Fig. 2, the application roller 39 performs rotational movement downward together with the support arm 40 to abut against the printing impression roll 38. During this period, the strip-shaped article subjected to printing S1 is supplied by a certain length and stops.

Then, the printing impression roll 38 starts proceeding again from the right end of the duplicator main body 22 toward the central direction, and goes on to the third printing in accordance with the same cooperative relationship as that of the first printing.

The above-mentioned movement in which the application rollers 39 and 41 abut against the printing impression roll 38 to thereafter perform the rotational movement to abut against the ink rolls 16 and 17 and further to perform the rotational movement from the abutment against the ink rolls 16 and 17 toward the abutment against the printing impression roll 38 is conducted, for example, by means of suitable cooperation with cam mechanisms 43 and 44 shown in Fig. 2.

On the other hand, as described above, the above-mentioned printing impression roll 38 is attached to the duplicator main body 22 in a manner capable of forward or backward movement, which is supported by the shaft in a rotatable manner.

A gear 53 is fixed to one end of a rotation shaft 52 of the printing impression roll 38, and at a downward position of this gear 53 is arranged a rack mechanism 54 in parallel with the forward or backward movement direction of the printing impression roll 38, and the construction is such that the rack mechanism 54 is allowed to engage with the gear 53, thereby the printing impression roll 38 is allowed to perform positive or reversed rotation while performing forward or backward movement. The forward or backward movement of the printing impression roll 38 is conducted by means of a driving belt arranged at one end or both ends of the rotation shaft 52.

At one end of the rotation shaft 52 of the above-mentioned printing impression roll 38 thus formed is arranged a preceding positive or reversed rotation mechanism 57.

The preceding positive or reversed rotation mechanism 57 thus formed has such a structure that the positive or reversed rotation in accordance with the forward or backward movement of the above-mentioned printing impression roll 38 is allowed to rotate faster than the standard positive or reversed rotation in which the engagement between the above-mentioned gear 53 and the rack mechanism 54 is regarded as the engagement between a standard gear and a standard rack engaging therewith. Concretely, as shown in Fig. 6, it comprises a gear 58 which is fixed to one end of the rotation shaft 52 of the printing impression roll 38 and a rack 59 which is arranged at a downward position of the gear 58 in parallel with the forward or backward movement direction of the printing impression roll 38. This rack 59 is set to give rotation faster than the standard positive or reversed rotation in which the engagement between the above-mentioned gear 53 and the rack mechanism 54 is regarded as the engagement between the standard gear and the standard rack engaging therewith.

At this time, the preceding positive or reversed rotation mechanism 57 may be added with a slip driven rotation body. With respect to this slip driven rotation body, when forced positive or reversed rotational force is applied to the printing impression roll 38 to provide rotation faster than the standard positive or reversed rotation, the forced positive or reversed rotation is subjected to slip to simulate the rotation in accordance with the engagement between the above-mentioned gear 53 and the rack mechanism 54 to some extent so as to allow the printing impression roll 38 to rotate. Concretely, for example, it comprises a disk which is fixed to the rotation shaft 52 by means of a pin or the like, a gear which outwardly fits to the rotation shaft 52 in a freely rotatable manner and has fewer teeth than those of the above-mentioned gear 53, a pressurizing disk which outwardly fits to the rotation shaft 52 in a manner capable of free sliding and is arranged at a position to interpose the gear with the disk, and a spring which is arranged between a spring base plate fixed to the rotation shaft 52 and the pressurizing disk and pressurizes the pressurizing disk toward the direction of the gear (not shown).

On the other hand, with respect to the above-mentioned rack mechanism 54, a first rack 60 and a second rack 61 arranged in parallel are allowed to approach or contact, and the above-mentioned gear 53 engages with the first rack 60 and the second rack 61 at the same time. The teeth of the first rack 60 and the second rack 61 are formed such that the backlash becomes large when the gear 53 is engaged; that is, the tooth groove of the rack is made to have a groove width which is wider than the regular one to provide looseness.

As shown in Fig. 7, the rack 59 which constitutes the preceding positive or reversed rotation mechanism 57 is fixed to a frame 62 through a side plate 69. The first rack 60 which constitutes the rack mechanism 54 is installed on a base body 68 for the rack in a manner capable of sliding. In addition, the second rack 61 which constitutes the rack mechanism 54 is fixed on the base body 68 for the rack. A base stand 63 for placing the strip-shaped article subjected to printing S1 is fixed in the duplicator by means of a constitution other than the frame 62.

The movement adjustment of the first rack 60 which constitutes the above-mentioned rack mechanism 54 is performed, for example, as shown in Fig. 6, such that a screw rod 64 is allowed to abut against

one end face of the first rack 60 so as to screw this screw rod 64. The screw rod 64 is attached at a predetermined position through a joint piece 65 having substantially an L-shape. Therefore, when the screw rod 64 is rotated, the first rack 60 on the base body 68 for the rack moves to deviate phases of teeth of the first rack 60 and the second rack 61. In this case, when a dial knob 66 is attached to one end or the other end of the screw rod 64, visual observation of the movement adjustment becomes possible, which is extremely convenient. When the movement adjustment is completed, a handle 67 for the rack is rotated to fix the position of the first rack 60.

Furthermore, with respect to the first rack 60 and the second rack 61 which constitute the rack mechanism 54, the entire movement adjustment is possible. As described above, the first rack 60 and the second rack 61 are fixed to the base body 68 for the rack. Therefore, for example, as shown in Fig. 6, the movement adjustment thereof is performed such that a screw rod 70 is allowed to abut against one end face of the base body 68 for the rack, and the screw rod 70 is screwed. The screw rod 70 is attached to a side wall 71 with screwing engagement. Therefore, when the screw rod 70 is rotated, the first rack 60 and the second rack 61 move together with the base body 68 for the rack. In this case, when a dial knob 72 is attached to one end or the other end of the screw rod 70, visual observation of the movement adjustment becomes possible, which is extremely convenient. When the movement adjustment is completed, a handle 73 for the base body for the rack is rotated to fix the position of the base body 68 for the rack.

Next, the operation thereof will be explained in the following.

That is, at first, assuming that the strip-shaped article subjected printing S1 does not deviate when the strip-shaped article subjected to printing S1 contacts with the printing impression 56, the positional relationship between the gear 53 of the printing impression roll 38 and the rack mechanism 54 so as to perform printing at a regular position. While maintaining the second rack 61 in the rack mechanism 54 fixed, the screw rod 64 is rotated to move the first rack 60 so as to deviate the phase of the teeth of the first rack 60 and the second rack 61. At this time, since the tooth grooves of the first rack 60 and the second rack 61 have been formed to have a groove width wider than the tooth groove of the standard rack to give looseness, the phase of teeth of the first rack 60 and the second rack 61 deviates, and thereby the tooth groove becomes narrow to approach the width of the tooth groove of the standard rack.

At a position to approach the tooth groove of the standard rack to some extent, the first rack 60 is fixed, and the printing impression roll 38 is allowed to perform forward or backward movement.

At this time, since the preceding positive or reversed rotation mechanism 57 is arranged at one end of the rotation shaft 52, with respect to the gear 53, the engagement between the gear 53 and the rack mechanism 54 always provides preceding rotation of a degree of the looseness, and for example, as shown in Fig. 8, when the printing impression roll 38 moves from the left to the right, as shown in Fig. 9, the teeth of the gear 53 abut against the left side in the rack mechanism 54, that is, the rearward side with respect to the movement direction of the gear 53 so as to engage with the rack mechanism 54. Therefore, the rotation of the printing impression roll 38 always maintains a preceding state with respect to the standard rotation of the printing impression roll 38 rotating in accordance with the forward or backward movement with engagement between the rack having the regular groove width and the gear.

By doing so, the degree of deviation of the strip-shaped article subjected to printing S1 in the forward direction of the movement of the printing impression roll 38 during the contact between the strip-shaped article subjected to printing S1 and the printing impression 56 of the printing impression roll 38 is offset by performing preceding rotation beforehand with respect to the standard rotation of the printing impression roll 38.

As a result, when printing is performed while rotating the printing impression roll 38 in accordance with the forward or backward movement, as shown in Fig. 8, in the case of the movement in the forward direction from the left to the right, in a stage of migration from a step shown in (A) in which the printing impression 56 has not yet contacted the strip-shaped article subjected to printing S1 to a step shown in (B) in which the printing impression 56 contacts the strip-shaped article subjected to printing S1, the printing impression 56 movingly deviates from the regular position in the movement direction of the printing impression roll 38, so that the gear 53 is allowed to perform the preceding rotation to that extent as described above in the relationship between the gear 53 and the preceding positive or reversed rotation mechanism 57, thereby the contact is performed with the strip-shaped article subjected to printing S1 faster than an expected movement position of the printing impression roll 38 to cause deviation, and when the expected regular printing position of the printing impression roll 38 contacts with the strip-shaped article subjected to printing S1, the strip-shaped article subjected to printing S1 has already preceded to give deviation, so that the degree of deviation is offset, and in a step shown in (C), the printing can be performed onto the regular position of the strip-shaped article subjected to printing S1.

On the other hand, the deviation of the strip-shaped article subjected to printing S1, which occurs due to frictional resistance during the forward or backward movement of the printing impression roll 38

while contacting the strip-shaped article subjected to printing S1 after the contact of the printing impression roll 38 with the strip-shaped article subjected to printing S1, the fact that the strip-shaped article subjected to printing S1 is not accurately supplied and arranged at a specified place on the base stand 63 and the like, is offset by moving the rack mechanism 54 in the forward or backward movement direction of the printing impression roll 38. That is, when the screw rod 70 is rotated to move the rack mechanism 54 in the forward or backward movement direction of the printing impression roll 38, the printing impression roll 38 also rotates in accordance with the moving action thereof, so that the contact face between the strip-shaped article subjected to printing S1 and the printing impression 56 of the printing impression roll 38 is adjusted using the rotation of the printing impression roll 38 in accordance with the movement of the rack mechanism 54.

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. 10, a variable density indicating portion 83 to serve as the standard of the variable density judgement 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. 11.

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 state, as in a chart shown in Fig. 12, after the start of detection, the standard variable density for each color is registered as data, and next, the CCD camera 93 is installed on the above-mentioned image processing mechanism 7 through which the strip-shaped printed article S2 after printing passes as described above, the variable density indicating portion 83 of the passing strip-shaped printed article S2 is monitored by means of the CCD camera so as to detect the standard variable density and the variable density of the variable density indicating portion 83 for each color, and using data obtained thereby, the variable density for each color of the variable density indicating portion 83 is compared with the above-mentioned standard variable density for each color, and instruction of correction is not given when the error is within a range of setting of the standard, or when the error is outside the range of setting of the standard, instruction of correction is given to the above-mentioned ink applying device 11 as a control device of the printing device 1 so as to adjust the amount of ink sent.

In this case, although not shown, when a putty light, which is arranged for each ink bottle of the ink tank 12 in the ink applying device 11, is lit to indicate which ink is being sent in an excess or deficient amount, and further when a lamp is arranged using a light emitting diode for indicating the upper limit and the lower limit of the sending amount of ink of each ink bottle respectively, then an operator can recognize this extremely clearly, and it also becomes possible to control and adjust the sending amount of ink manually, which is convenient.

On the other hand, in the case of the detection and correction of the printing position in the printing device, as in a chart shown in Fig. 13, 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.

On the other hand, with respect to the above-mentioned die cutting device 5, in relation to the upper chase plate sliding mechanism thereof, as shown in Fig. 14 to Fig. 17, between an upper frame 102 and a lower frame 103 of the die cutting device 5 is inserted an upper chase plate 105 made of steel having a punching blade 104 attached to its lower face in a detachable manner through a pair of right and left guide members 106 at both sides in a manner capable of free insertion and detachment in forward and rearward directions and capable of freely turning upward.

That is, the upper frame 102 and the lower frame 103 of the above-mentioned die cutting device 5 are arranged at a suitable interval in upper and lower directions through support columns 107 at four corner portions, and at a downward side of the upper frame 102 is supported an oscillating plate 109 having rails 108 with a cross-section having substantially an L shape at lower faces at both side portions respectively in a manner capable of free tilting in the right and left directions through an oscillating adjustment bolt 110 at the forward end portion, and between both rails 108 at the downward side of the oscillating plate 109 is inserted the upper chase plate 105 in a manner capable of free insertion and detachment in the forward and rearward directions.

This upper chase plate 105 is formed such that the punching blade 104 is attached in a detachable manner at the lower face of an upper chase plate main body 112 having sliding portions 111 at the lower faces of both side end portions being inclined from the vicinity of the lower faces of both side ends toward the upward direction of the lower faces of both side ends respectively, a handle portion 113 is provided with projections at the central portion in the front end widthwise direction of the upper chase plate main body 112, and a handle 114 having a substantial C shape is provided at the front face of the handle portion 113, a lock portion 115 is provided in a concave manner at the right side face at the front end portion of the upper chase plate main body 112, and stoppers 116 are provided projecting toward the side direction at portions subjected to slight cut-out at both sides of the rear end portions of the upper chase plate main body 112.

In addition, each of the above-mentioned guide members 106 has a sliding receiving portion 119 for sliding the sliding portion 111 of the above-mentioned upper chase plate 105 being inclined at the upper face at the inside portion from the vicinity of the upper face of the inside end toward the lower direction of the upper face of the inside end at the inside of the front end portion of a guide member main body 118 having a cut-out portion 117 for escape of the above-mentioned support column 107 in the vicinity of the inside face at the rear end portion, and a sliding receiving plate 121 having a sliding groove portion 120 for sliding each of the above-mentioned stoppers 116 is provided at the lower portion of the sliding receiving portion 119, and a stopper receiving plate 122 is provided at the front end of the sliding receiving plate 121 as a stopper receiving means for stopping each of the above-mentioned stoppers 116. Furthermore, the construction is made such that respectively as a holding means for turning and holding the above-mentioned upper chase plate 105, a magnet holder 124 provided with a magnetic change-over lever 123 is magnetically attached in a detachable manner at the upper face at the rear portion of the sliding receiving plate 121 through a support plate 125 at the rearward side so as to project slightly inwardly from the inside end of the sliding receiving plate 121, and at the outside face at the rear end portion of the right side guide member main body 118 is provided a lock screw 126 for abutting against the lock portion 115 of the above-mentioned upper chase plate 105 at its forward end so as to lock sliding.

Between the above-mentioned left side guide member 106 and the right side guide member 106 arranged at both sides between the upper frame 102 and the lower frame 103 of the die cutting device 5 is inserted the above-mentioned upper chase plate 105 in a manner capable of free insertion and detachment in the forward and rearward directions while allowing the sliding groove portion 120 of each sliding receiving plate 121 through each stopper 116 at both sides of the rear end portion of the upper chase plate main body 112 and allowing the sliding receiving portion 119 of each sliding receiving plate 121 through the sliding portion 111 of the upper chase plate main body 112, and between the left side guide member 106 and the right side guide member 106 is inserted the upper chase plate 105 in a manner capable of freely turning upward such that each stopper 116 at both sides of the rear end portion of the upper chase plate main body 112 stops at the stopper receiving plate 122 as the stopper receiving means at the front end of each sliding receiving plate 121 so as to allow both side portions at the upper face of the upper chase plate main body 112 to be held at the front face of the magnet holder 124 as the holding means at the upper face of the rear portion of each sliding receiving plate 121.

In the meantime, as the stopper receiving means for stopping each stopper 116 of the above-mentioned upper chase plate 105, explanation and illustration in the figures are given such that the stopper receiving plate 122 is provided as another body at the front end of the sliding receiving plate 121; however, there is no limitation thereto, and it is also possible that a stopper receiving portion is integrally provided at the front end of the sliding receiving plate 121. In addition, as the holding means for turning and holding the above-mentioned upper chase plate 105,

explanation and illustration in the figures are given such that the magnet holder 124 provided with the magnetic change-over lever 123 is magnetically attached to the upper face at the rear portion of the sliding receiving plate 121 in a detachable manner through the support plate 125 at the rearward side so as to project slightly toward the inside with respect to the inside end of the sliding receiving plate 121; however, there is no limitation thereto, and it is also possible that a holding plate provided with a holding tab capable of free tilting movement for holding with tilting after the turning of the upper chase plate 105 be provided to project slightly inwardly with respect to the inside end of the sliding receiving plate 121.

In addition, explanation and illustration in the figures are given such that the guide member 106 is fixed to the main body of the die cutting device 5; however, there is no limitation thereto, and it is also possible that the guide member 106 itself is provided with a groove portion for sliding and a sliding stopper receiving means, which is combined with the upper chase plate 105 so as to make it possible to perform sliding in two stages. In this case, in a state in which the upper chase plate 105 and the guide member 106 are installed on the main body of the die cutting device 5, the guide member 106 is located on the inside further inwardly than shown in the figure, so that the projecting portion is reduced, which provides safety advantages during the operation.

A lateral estimation adjusting bolt 127 having its forward end engaged with the front face of the above-mentioned oscillating plate 109 is provided in a manner capable of free movement in the front and rear directions at the upper face of the front portion of the handle portion 113 of the above-mentioned upper chase plate 105 through a lateral estimation adapter 128. In addition, a lower chase plate 129 is provided at the upper face of the lower frame 103 opposing the above-mentioned upper chase plate 105 with each other.

Next, with respect to the printing device 1, the construction is such that the strip-shaped article subjected to printing S1 which is an adhesive paper or the like having an adhesive layer at the back face of a substrate such as paper, a film or the like being constituted by protecting its lower face with peeling paper having a peeling treatment face, is sent from the paper supply device 2, the label printing of a pattern or letters is performed by the intermittent duplicator 3 having the above-mentioned reciprocating printing impression to form the strip-shaped printed article S2, and then laminating processing is optionally applied to the surface of the printed strip-shaped printed article S2 by means of the laminating device 4, and then labels as the product are continuously punched by means of the die cutting device 5.

In the downstream step of the die cutting device 5 is added and provided the punched residue winding device 6 having a reeling device 132 for reeling the continuous punched residue A after punching labels from the strip-shaped printed article S2. The product after the removal of the punched residue A is wound by the product winding device 8, or individually cut just before this device 8.

As shown in Fig. 18, this punched residue winding device 6 is formed such that the punched residue A continuously sent from the die cutting device 5 through a sending roller 133 is allowed to pass through a guide roller 134 to be wound by the reeling device 132 arranged at an upward position.

This reeling device 132 is constituted by a reeling roller 135 which is driven to rotate by a driving device such as a motor or the like (not shown), and a reeling auxiliary roller 137 is arranged substantially parallel closely adjacent to the reeling roller 135, the reeling roller 135 has a construction so as be to pressurize in the direction to abut against the reeling auxiliary roller 137 using its own weight or suitable urging force, which is driven and rotated at a faster rotation speed by a predetermined ratio as compared with a printing speed of the above-mentioned intermittent duplicator 3, so as to make it possible to always apply tension to the strip-shaped printed article S2.

The formation is made such that the punched residue A in a state of the formation of the reeling device 132 as described above is allowed to pass between the reeling roller 135 and the reeling auxiliary roller 137 to be wound by the reeling roller 135.

In addition, the construction is such that the continuous punched residue A to be wound by the reeling roller 135 is wound in such a way that provided that its one face is an adhesive adhering face A1, the adhesive adhering face A1 contacts the peripheral surface of the reeling roller 135.

This provides the so-called surface winding in which the adhesive adhering face A1 of the continuous punched residue A is wound with adhesion around the peripheral surface of the reeling roller 135, which is extremely convenient for handling.

Between the guide roller 134 and the reeling device 132 thus arranged is provided a residue cut detecting bar 136 arranged to give tension so that the above-mentioned punched residue A is not cut by means of its own weight.

Its concrete structure is such that one end of the rotatable residue cut detecting bar 136 is supported in a manner capable of free tilting in upper and lower directions, and the residue cut detecting bar 136 is arranged to apply tension by its own weight downward to the strip-shaped punched residue A passing between the guide roller 134 and the reeling device 132.

By doing so, when the punched residue A is cut, the repulsive resistance from the punched residue A disappears in a state of giving tension to the punched residue A by the residue cut detecting bar 136, so that the whole apparatus including the above-mentioned

die cutting device 5 and the reeling device 132 stops, so as to prevent the winding deficiency which may occur when the punched residue is cut and the treatment deficiency which may provide a disordered state of the punched residue. In this case, when the winding speed of the residue is faster than the sending speed from the die cutting device 5, the residue cut detecting bar 136 is lifted upwardly, and when the residue cut detecting bar 136 is lifted to a position above a certain position, the reeling device 132 is stopped, or when the residue cut detecting bar 136 is lowered to a position below a certain position, the reeling device 132 is operated again.

In this case, although not shown in the figures, the residue cut detecting bar 136 may be formed to apply tension to the punched residue A by urging force provided by a spring or the like instead of its own weight, and the above-mentioned guide roller 134 itself may be formed to be capable of driving rotation.

Of course, the present invention is not limited to the above-mentioned example.

The present invention constituted as described above lies primarily in the printing device comprising the duplicator 3 for performing intermittent printing onto the strip-shaped article subjected to printing S1 supplied from the paper supply device 2 using the printing impression roll 38 which performs positive or reversed rotation while performing forward or backward movement in the direction perpendicular to the sending direction of the strip-shaped article subjected to printing S1, the die cutting device 5 for punching the strip-shaped printed article S2 printed by the duplicator 3 into a suitable shape, and the punched residue winding device 6 for winding the punched residue A after punching by the die cutting device 5, wherein the duplicator 3 is provided with the ink applying device 11 which allows the application roller 39 for applying ink during the forward step onto the printing impression face of the printing impression roll 38 which performs positive or reversed rotation while performing forward or backward movement and the application roller 41 for applying ink during the backward step to contact with each of individual ink rolls 16 and 17 which rotate in the reversed direction with respect to the rotation direction of each of the application rollers 39 and 41 so as to adhere ink onto each of the application rollers 39 and 41, which comprises the bottling roll 13 for sending ink from the ink tank 12, the access roll 15 which performs rotational movement with the support arm 14 so as 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, and the kneading roll 19 is rotated at a high speed so as to adhere ink onto the kneading roll 19, the ink rolls 16 and 17 and the fixed metal roll 18 to circulate it, so that the adhesion of ink onto the application rollers 39 and 41 can be made uniform using an extremely small number of the rolls 19, 16, 17, and 18.

That is, the ink is allowed to adhere to and circulate on the kneading roll 19, the ink rolls 16 and 17, and the fixed metal roll 18, and thereby no unevenness is given for the amount of ink to be applied onto the kneading roll 19, the ink rolls 16 and 17, and the fixed metal roll 18, and the adhesion of ink onto the application rollers 39 and 41 can be made uniform.

In addition, only the access roll 15, the fixed metal roll 18, the kneading roll 19, and the ink rolls 16 and 17 are present between the bottling roll 13 for sending ink and the application rollers 39 and 41 for applying ink onto the printing impression roll 38, so that the ink can be smoothly applied onto the printing impression roll 38 in accordance with rotation of each of the rolls 15, 18, 19, 16, and 17.

Furthermore, the number of rolls 15, 18, 19, 16, and 17 is small, so that the scattering of ink adhered to each of the rolls 15, 18, 19, 16, and 17 can be restricted to the minimum. At the same time, the number of each of the rolls 15, 18, 19, 16, and 17 to rotate in abutment is small, so that the heating of each of the rolls 15, 18, 19, 16, and 17 can be restricted, and the duplicator main body 12 can be continuously used for a long time.

On the other hand, when the constitution is made by fixing the bottling roll 13 for sending ink from the ink tank 12, the access roll 15 which performs rotational movement 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 to the sliding base stand 24 which is attached in a manner capable of sliding in the horizontal direction via the rail 23, the sliding base stand 24 can be suitably moved to allow the kneading roll 19 to abut against the ink rolls 16 and 17 with ease. In this state, when the kneading roll 19 is rotated at a high speed, the ink adhered to each of the rolls 15, 18, 19, 16 and 17 is adhered and circulated, and no unevenness occurs in the amount of ink to be applied onto the kneading roll 19, the ink rolls 16 and 17, and the fixed metal roll 18.

When inks having different colors are installed on the sliding base stands 24 and 25 beforehand, only by suitably sliding the sliding base stands 24 and 25, the inks having different colors can be applied onto the printing impression roll 38 with ease.

Furthermore, when the ink applying device 11 is constituted such that the ink supply body 26 comprising the ink tank 12 and the bottling roll 13 is installed on the sliding base stand 24 in a detachable manner, it is possible to perform washing of the ink tank 12 and the bottling roll 13 and supplemental supply of ink without interrupting the printing operation; and only by suitably sliding the two sliding base stands 24 and 25, the inks having different colors can be applied

onto the printing impression roll 38 with ease.

Therefore, it is unnecessary to exchange a plurality of rolls every time the color of ink is changed, and it is possible to change the color of ink to be applied onto the printing impression roll 38 easily and rapidly.

Alternatively, the duplicator according to the present invention is provided with the ink applying device 11, and this ink applying device 11 comprises the bottling roll 13 for sending ink from the ink tank 12, the access roll 15 which performs rotational movement 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, and its constitution is extremely simple, so that a large amount of products can be produced in a short time to provide products at a low cost.

In addition, with respect to the duplicator 3, the deviation of the strip-shaped article subjected to printing S1, which occurs due to the friction resistance during the forward or backward movement with the contact of the printing impression roll 38 with the strip-shaped article subjected to printing S1, the fact that the strip-shaped article subjected to printing S1 is not supplied and arranged at a specified place on the base stand 63 and the like, can be adjusted by the simple operation.

That is, the rack mechanism is constituted in a manner capable of movement in the forward or backward directions of the printing impression roll 38, and the printing impression roll 38 also rotates in accordance with the movement action thereof through the gears 53 and 58, so that the contact face between the strip-shaped article subjected to printing S1 and the printing impression 56 of the printing impression roll 38 is adjusted using the rotation of the printing impression roll 38 in accordance with the movement of the rack mechanism 54.

As a result, complicated operation is avoided in which the lock bolt which fixes the printing impression roll 38 and its gear is loosened so as to set the change of phase of the printing impression roll 38 with manual rotation, and the contact position between the strip-shaped article subjected to printing S1 and the printing impression of the printing impression roll 38 can be controlled rapidly.

In addition, in the operation in which the lock bolt is loosened so as to set the change of phase of the printing impression roll 38 with manual rotation, it is difficult to perform fine phase setting, and the phase of the printing impression roll 38 must be set again and again during printing, whereas according to the present invention, anyone can extremely accurately control the contact position between the strip-shaped article subjected to printing S1 and the printing impression 56 of the printing impression roll 38 by means of the simple operation.

Moreover, even during the forward or backward movement of the printing impression roll 38, the rack mechanism can be moved to control the contact position between the strip-shaped article subjected to printing S1 and the printing impression 56 of the printing impression roll 38, so that the printing operation is never interrupted.

Therefore, by moving the rack mechanism 54 in the forward or backward movement direction of the printing impression roll 38, the deviation of mold punching due to color deviation during printing or printing positional deviation can be prevented.

On the other hand, in the case of the printing state 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 variable density indicating portion 83 to serve as the standard for judgement of variable density of each color is printed in the same manner using ink used for the formation of the print portion 82 at a proper position around the print portion 82 to be printed; and at first, the standard variable density for each color of the variable density indicating portion is registered as data, next the CCD camera 93 is installed at a proper position through which the strip-shaped printed article S2 after printing passes, the variable density indicating portion 83 is monitored by means of the CCD camera 93 to detect the variable density, and using data obtained thereby, the variable density for each color is compared with the above-mentioned standard variable density for each color, and instruction of correction is not given when the error is within a range of setting of the standard, or instruction of correction is given to a control portion of the printing device when the error is outside the range of setting of the standard so as to control and adjust a sending amount of ink and the like, thereby the variable density indicating portion has been printed in the same manner at the proper position around the print portion during the printing of the print portion, so that the variable density indicating portion 83 is under the same condition as that of the print portion 82, and the variable density indicating portion and the standard variable density are converted into image manual values by means of the CCD camera 93 for comparison, so that extremely accurate judgement of the variable density becomes possible, and it is possible to perform data conversion as an image using the CCD camera 93, so that it is possible to perform computer processing extremely easily, and when the sending amount of ink is controlled through a computer using the control device, the control can be carried out automatically, rapidly, and accurately.

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 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 above-mentioned printing state detection and correction, control can be performed automatically, rapidly, and accurately.

Therefore, 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, anyone can perform the control extremely easily, rapidly, accurately, and without training.

As described above, the upper chase plate sliding mechanism of the die cutting device 5 of the present invention is formed such that the upper chase plate 105 having its lower face detachably attached with the punching blade 104 is inserted between the upper frame 102 and the lower frame 103 of the die cutting device 5 of the duplicator for labels, seals and the like via the guide members 106 at both sides in a manner capable of free insertion and drawing in the forward and rearward directions and capable of free turning upwardly, so that when the punching blade 104 is exchanged or the punching blade 104 is inspected, unlike in the prior art in which the upper chase plate is slid forwardly to once remove the upper chase plate from the rail and thereafter the upper chase plate is turned, but by means of the extremely easy operation in which the upper chase plate 105 is only allowed to slide forwardly through the guide members 106 at both sides to turn the upper chase plate 105 upwardly, the exchange of the punching blade 104 and the inspection of the punching blade 104 can be performed safely, and there is no fear of accidental dropping as in the prior art.

In addition, with respect to each of the guide members 106, the sliding receiving plate 121 having the sliding groove portion 120 at the inside face for sliding each of stoppers 116 provided projecting laterally at both sides of the rearward end of the upper chase plate 105 respectively is provided at the inside of the forward end portion of the guide member main body 118, the stopper receiving means for stopping each of the above-mentioned stoppers 116 is provided at the forward end of the sliding receiving plate 121, and the holding means for holding the upper chase plate 105 to turn is provided at the upper face at the rearward portion of the sliding receiving plate 121 respectively, and thereby when the punching blade 104 is exchanged or when the punching blade 104 is inspected, each of the stoppers 116 at both sides of the rear end portion of the upper chase plate 105 is allowed to slide forward along the sliding groove portion 120 of the sliding receiving plate 121 of each of the guide members 106 so as to stop each of the stoppers 116 of the upper chase plate 105 at the stopper receiving means at the front end of the sliding receiving plate 121 of each of the guide members 106, and the upper chase plate 105 is turned upwardly using each of the stoppers 116 as the center, so as to make it possible to hold both sides at the upper face of the upper chase plate 105 by the holding means at the upper face of the rear portion of the sliding receiving plate 121 of each of the guide members 106, so that the exchange of the punching blade 104 and the inspection of the punching blade 104 can be certainly carried out by very easy operation, which is very desirable from the standpoint of safety.

The punched residue winding device 6, which automatically winds the continuous punched residue A during the period after suitably and continuously punching by means of the above-mentioned die cutting device 5, is constituted by the reeling roller 135 which performs driving and rotation and the reeling auxiliary roller 137 which is arranged in a substantially parallel manner closely adjacent to the reeling roller 135; the reeling roller is formed so as to apply pressure in the direction to abut against the reeling auxiliary roller 137 by its own weight or other suitable urging force, so that when the construction is made such that the above-mentioned continuous punched residue A is allowed to pass between the reeling roller 135 and the reeling auxiliary roller 137 so as to wind around the reeling roller 135, the continuous punched residue A is wound by the reeling roller 135 while being pressed by the reeling auxiliary roller 137, so that it is possible to wind tightly.

In this case, the construction is made such that the winding is performed at the winding speed by the reeling roller 135 which is faster than the printing speed of the duplicator 3 by a certain ratio, so that the continuous punched residue A is always wound in a state of tension, is wound tightly, and can be reeled

in a regular manner.

With respect to the continuous punched residue A to be wound by the reeling roller 135, provided that its one face is the adhesive adhering face A1, the construction is made to wind allowing the adhesive adhering face A1 to contact with the peripheral surface of the reeling roller 135, so that when it is wound tightly and in a regular manner, the so-called surface winding state is obtained, so that there is no winding deficiency due to adhesive effects of the adhesive, no cutting of the residue or the like, which makes handling extremely convenient.

Moreover, the residue cut detecting bar 136 which is arranged to give tension so as to cut the above-mentioned punched residue A by means of its own weight or urging force is provided between the guide roller 134 arranged at the rearward portion from the die cutting device 5 and the above-mentioned reeling device 132 for reeling the punched residue A arranged at the rearward portion from the guide roller 134, and the formation is made such that when the repulsive resistance from the punched residue A disappears in the state of giving tension to the punched residue A by means of the residue cut detecting bar 136, the entire apparatus including the above-mentioned die cutting device 5 and the reeling device 132 is immediately stopped, whereby in the punched residue winding device 6, after the punching of the product with respect to the strip-shaped printed article S2 having the reeling device 132, when the tension which does not cause cutting is given to the above-mentioned punched residue A by the own weight of the residue cut detecting bar 136 or the urging force, then the punched residue A can be securely wound with the reeling device 132 in a regular manner.

In addition, when the punched residue A is cut, the repulsive resistance from the punched residue A disappears in the state of giving the tension to the punched residue A by the residue cut detecting bar 136, so that the whole apparatus, including the above-mentioned die cutting device 5 and the reeling device 132, stops immediately; and it is possible to prevent the winding deficiency generated when the punched residue is cut and the treatment deficiency in which the punched residue becomes disordered.

Therefore, using an extremely simple device, the continuous punched residue generated when the product is suitably and continuously punched from the strip-shaped printed article S2 is tightly wound in a regular manner without being cut, and when the punched residue is cut, the reeling device for reeling the residue and the device in the upstream step thereof are immediately stopped to prevent disorder, and the continuous punched residue can be treated in a regular manner.

Thus, according to this invention, there are provided various excellent effects such that the number of the ink rolls to be interposed between the bottling roll for supplying ink and the application roller for applying ink onto the printing impression roll is reduced; thereby, the ink is rapidly supplied to the printing impression roll, the scattering of ink adhered to each of the rolls and the heating of each of the rolls are restricted to the minimum, the color of ink to be supplied can be easily changed, the error in the printing position which occurs due to the deviation of the printing paper sheet generated during the contact between the impression face of the printing impression roll and the printing paper sheet, the friction resistance during the contact between the printing impression roll and the printing paper sheet to perform the forward or backward movement, the fact that the printing paper sheet is not accurately supplied and arranged at a specified place on the base stand and the like 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, and with respect to the die cutting device, it is possible to perform the exchange of the punching blade and the inspection of the punching blade by an extremely easy operation, so as to provide an extremely safe upper chase plate sliding mechanism with no fear of accidental dropping, and furthermore, the continuous punched residue generated when the product is suitably and continuously punched from the strip-shaped printed article is reeled in a regular manner without being cut, and when the punched residue is cut, the reeling device for reeling the residue and the device in the upstream step thereof are immediately stopped to prevent disorder, and the state in which the continuous punched residue can be treated in a regular manner can be ensured and the like.

Claims

1. 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;

wherein the duplicator is provided with:

an ink applying device which allows a forward-step 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

a backward-step application roller for applying ink during the backward step to contact with each of the individual ink rolls which rotate in the reversed direction with respect to the rotation direction of each of the application rollers so as to adhere ink onto each of the application rollers,

the ink applying device comprising:

a bottling roll for sending ink from an ink tank,

an access roll which performs rotational movement with a support arm so as to suitably abut against the bottling roll, and

a fixed metal roll and a kneading roll for adhering ink supplied by the bottling roll and the access roll onto the ink rolls, the kneading roll being rotated at a high speed so as to adhere ink onto the kneading roll, the ink rolls and the fixed metal roll for circulating the ink,

whereby the formation is made so as to equalize adhesion of ink onto the application rollers.

2. A printing device according to claim 1, wherein the ink applying device is constructed by:

fixing the bottling roll for sending ink from the ink tank,

fixing the access roll which performs rotational movement with the support arm to suitably abut against the bottling roll, and

fixing the fixed metal roll and the kneading roll for adhering ink supplied by the bottling roll and the access roll onto the ink rolls to a sliding base stand which is attached in a manner capable of sliding in the horizontal direction via a rail, the sliding base stand being suitably moved to allow the kneading roll to abut against the ink roll, and the kneading roll being rotated at a high speed so as to adhere ink onto the kneading roll, the ink rolls, and the fixed metal roll to circulate it,

whereby the construction ensuring equitable adhesion of ink onto the application rollers.

3. A printing device according to claim 2, wherein the ink applying device is formed such that an ink supply body comprising the ink tank and the bottling roll is installed on the sliding base stand in a detachable manner.

4. 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,

characterized in that:

the duplicator is constituted to have the printing impression roll of forward or backward movement which is formed such that a rack mechanism is formed in parallel with the movement direction of the printing impression roll which performs forward or backward movement,

a gear is attached to one end of a rotation shaft of the printing impression roll, and

the printing impression roll is allowed to perform positive or reversed rotation in accordance with the forward or backward movement by engaging the gear with a rack of the rack mechanism,

a preceding positive or reversed rotation mechanism is arranged such that the positive or reversed rotation in accordance with the forward or backward movement of the printing impression roll is made to have faster rotation than the standard positive or reversed rotation in which the engagement of the gear with the rack of the rack mechanism is regarded as the engagement of a standard gear with a standard rack engaging therewith, the rack mechanism formed such that a first rack and a second rack arranged in parallel are allowed to approach or contact so as to simultaneously engage said gear with the first rack and the second rack, tooth grooves of the first rack and the second rack are formed to be a groove width which is 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, whereby the formation is 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 forward or backward movement of the printing impression roll with respect to said standard positive or reversed rotation, and said rack mechanism is constituted in a manner capable of movement in the forward or backward movement direction of the printing impression roll.

5. A printing state detection and correction method for a printing device wherein 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 article subjected to printing by means of the duplicator to form a print portion, a variable density indicating portion to serve as a standard for judgement of variable density of each color is printed in the same manner using ink used for the formation of the print portion at a proper position around the print portion to be printed, and at first a standard variable density for each color of the variable density indicating portion is registered as data, next a CCD camera is installed at a proper position through which the strip-shaped printed article after printing passes, the variable density indicating portion is monitored by means of the CCD camera to detect the variable density, and using data obtained thereby, the variable density for each color is compared with said standard variable density for each color, and instruction of correction is not given when the error is within a range of setting of the standard, or instruction of correction is given to a control portion of the printing device when the error is outside the range of setting of the standard so as to control and adjust a sending amount of ink and the like.

6. 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 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.

7. A die cutting device 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 with 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 die cutting device comprising the improvement in that an upper chase plate having its lower face detachably attached with a punching blade is inserted between an upper frame and a lower frame via guide members at both sides in a manner capable of free insertion and drawing in forward and rearward directions and capable of free turning upwardly.

8. The die cutting device according to claim 7 wherein each of the guide members is formed respectively such that a sliding receiving plate having a sliding groove portion at the inside face for sliding each of stoppers provided with projecting toward the side direction at both sides of a rearward end of the upper chase plate respectively is provided at the inside of a forward end portion of a guide member main body, a stopper receiving means for stopping each of said stoppers is provided at a forward end of the sliding receiving

plate, and a holding means for holding the upper chase plate to turn is provided at an upper face at a rearward portion of the sliding receiving plate.

9. 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 with 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 punched residue winding device comprising the improvement in that a reeling device for the punched residue is constituted by a reeling roller which performs driving and rotation and a reeling auxiliary roller which is arranged in a substantially parallel manner closely adjacent to the reeling roller, the reeling roller is formed so as to wind at a speed faster than a printing speed by the duplicator by a certain ratio, the formation is made to pressurize in a direction to abut against the reeling auxiliary roller by its own weight or suitable urging force, and the formation is made to allow said continuous punched residue to pass between the reeling roller and the reeling auxiliary roller so as to wind around the reeling roller.

10. A printing device according to claim 9 wherein the continuous punched residue to be wound by the reeling roller has its one face of an adhesive adhering face, and the formation is made such that winding is performed with allowing the adhesive adhering face to contact with the peripheral surface of the reeling roller.

11. A printing device according to claim 9 or 10 wherein a residue cut detecting bar which is arranged to give tension of an extent not to be cut to said punched residue by means of its own weight or urging force is provided between a guide roller arranged at a rearward portion from the die cutting device and said reeling device for reeling the punched residue arranged at a rearward portion from the guide roller, and the formation is made such that when the repulsive resistance from the punched residue disappears in a state of giving tension to the punched residue by means of the residue cut detecting bar, the entire apparatus including said die cutting device and the reeling device is immediately stopped.

FIG. 1

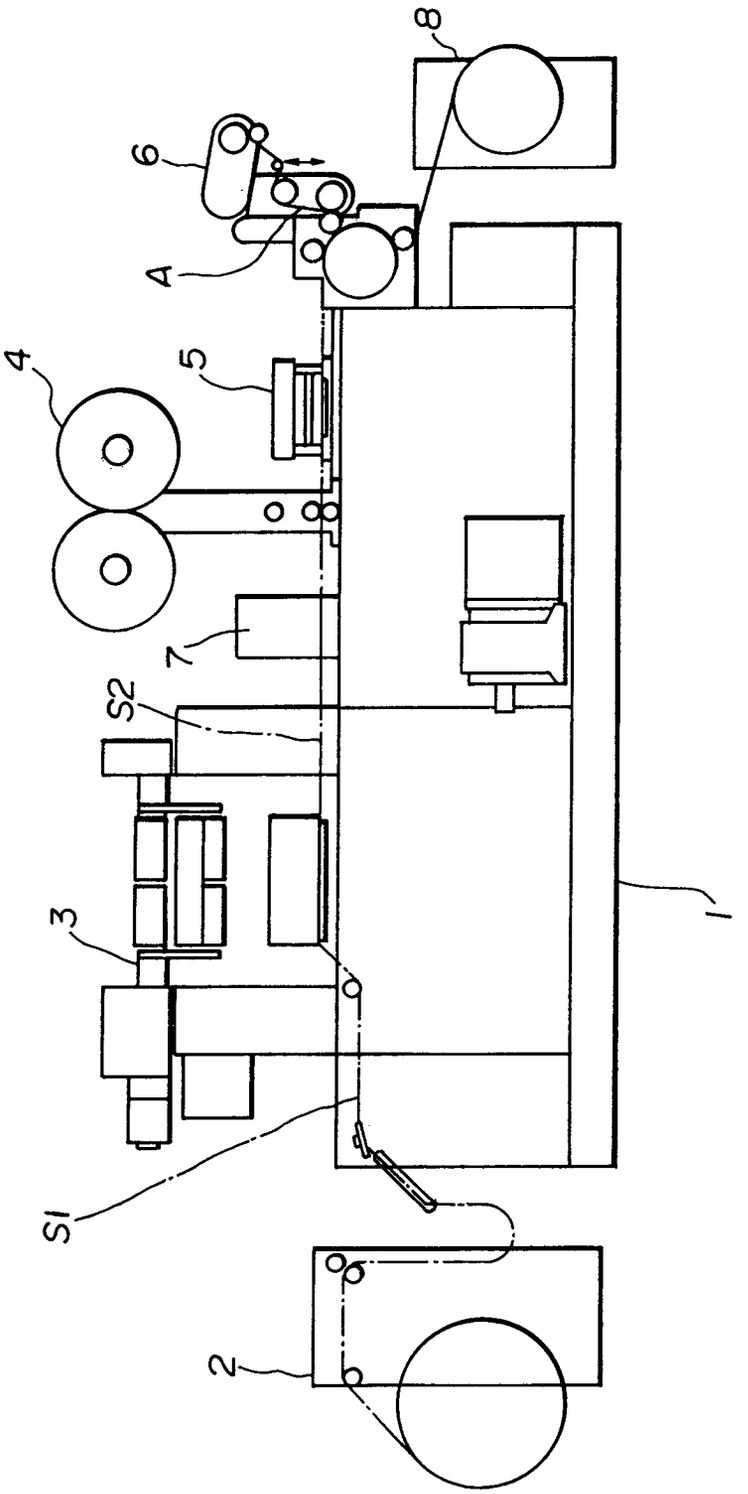

FIG.2

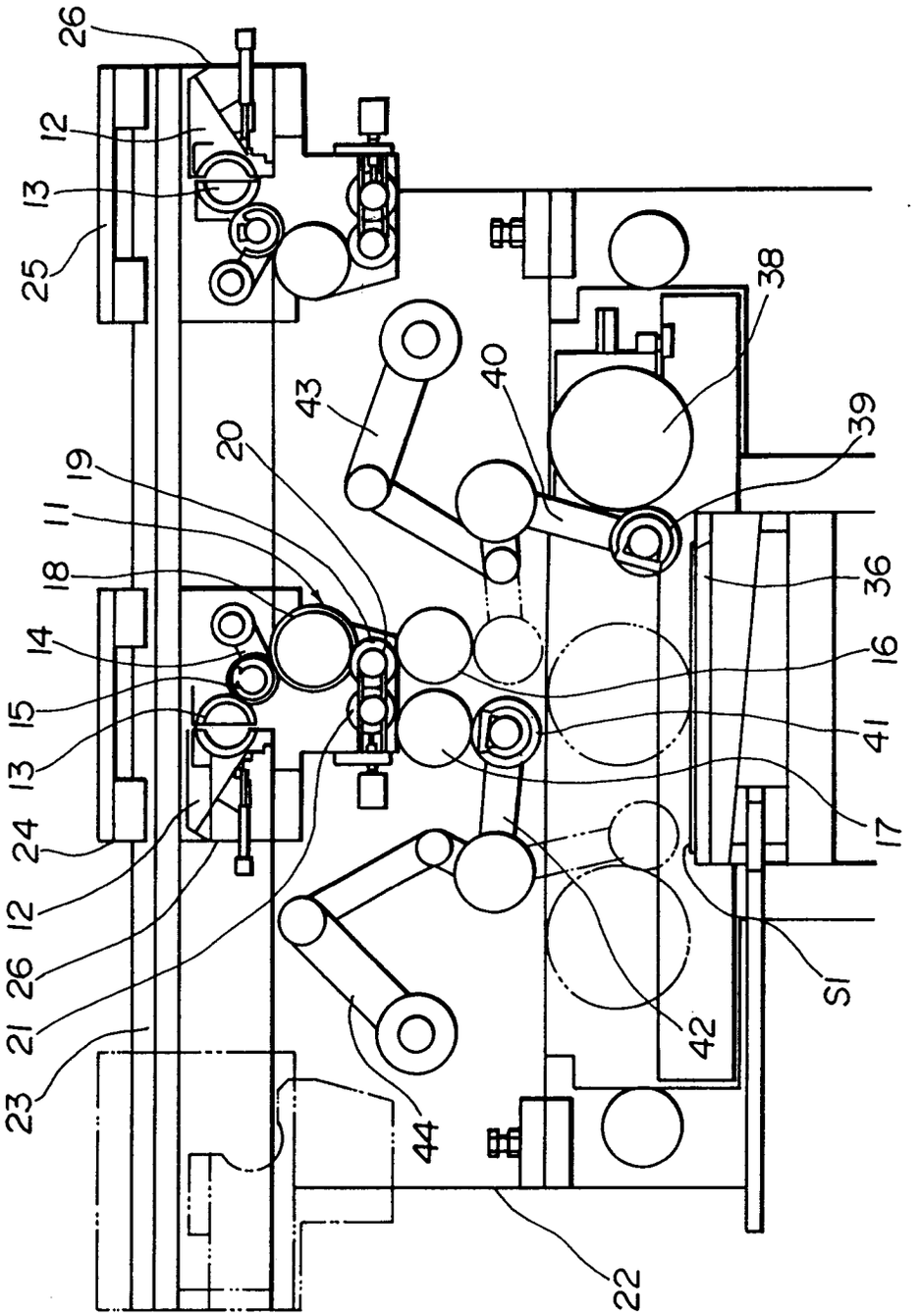
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FIG.3

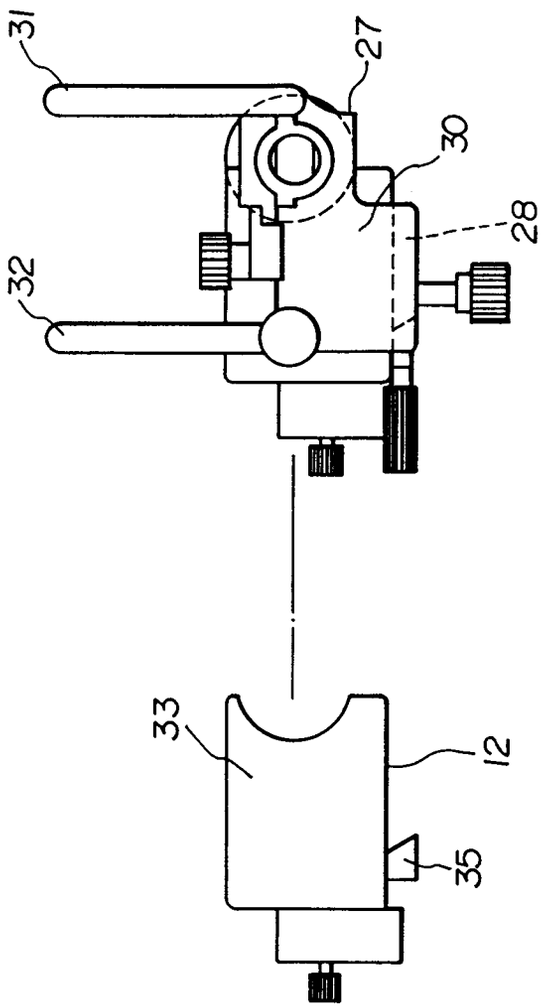


FIG.4

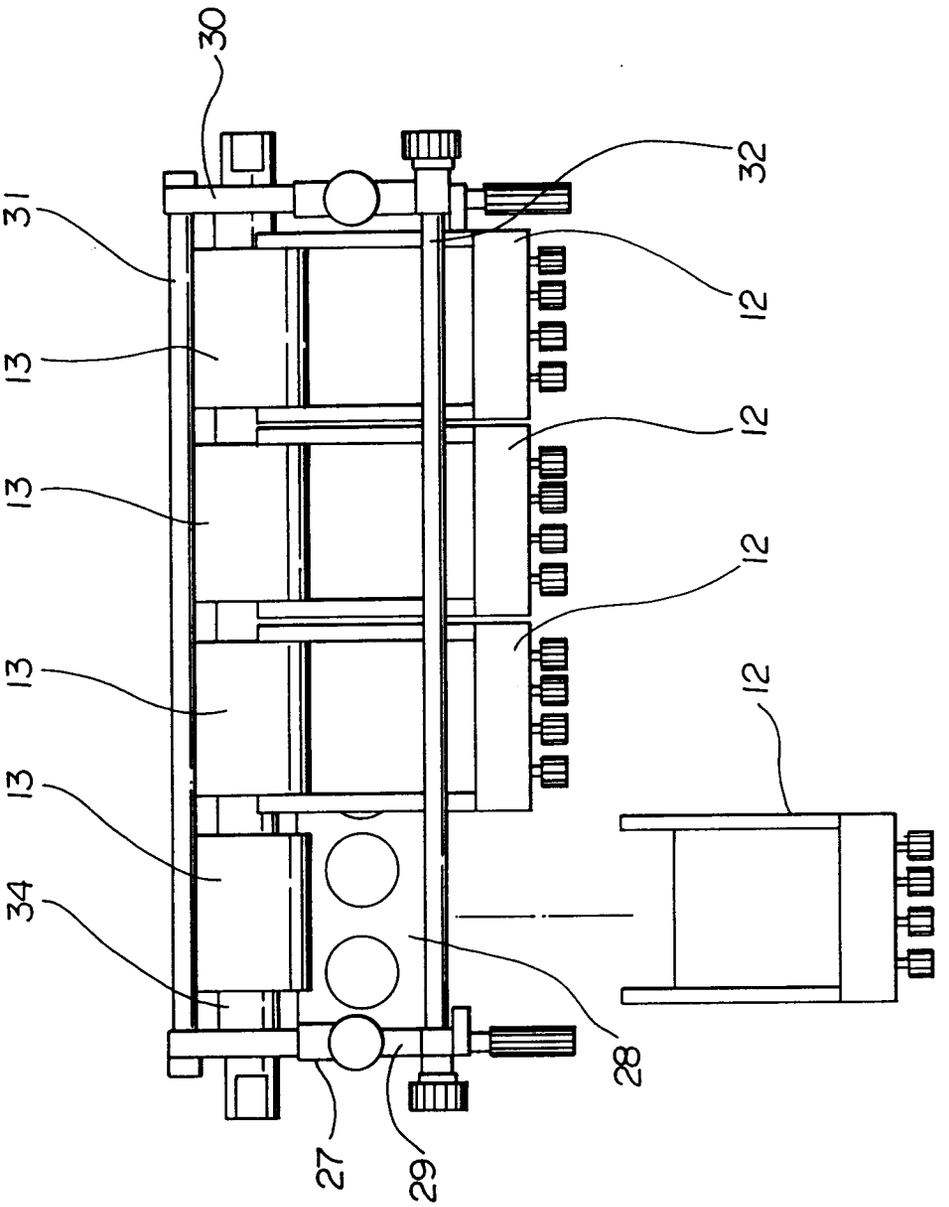


FIG.5(A)

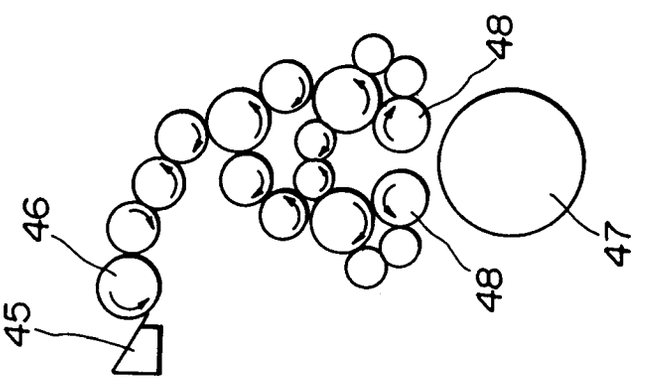


FIG.5(B)

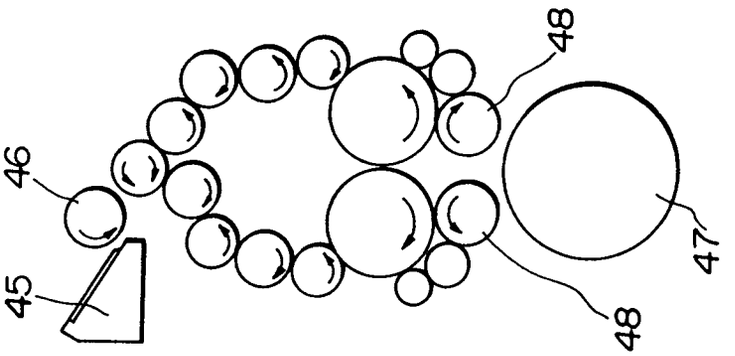


FIG.5(C)

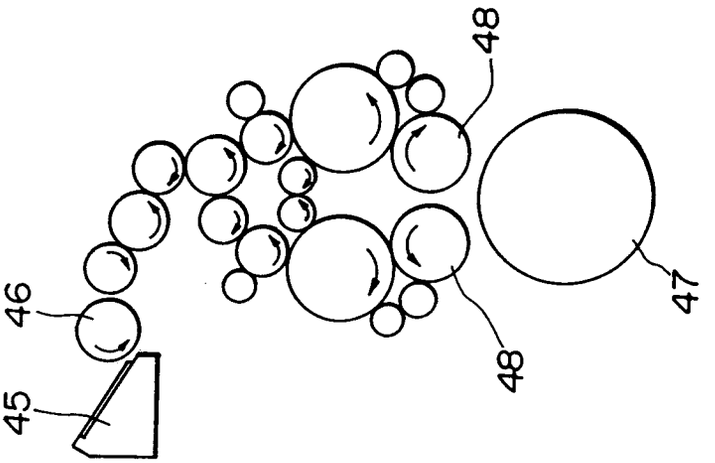


FIG.6

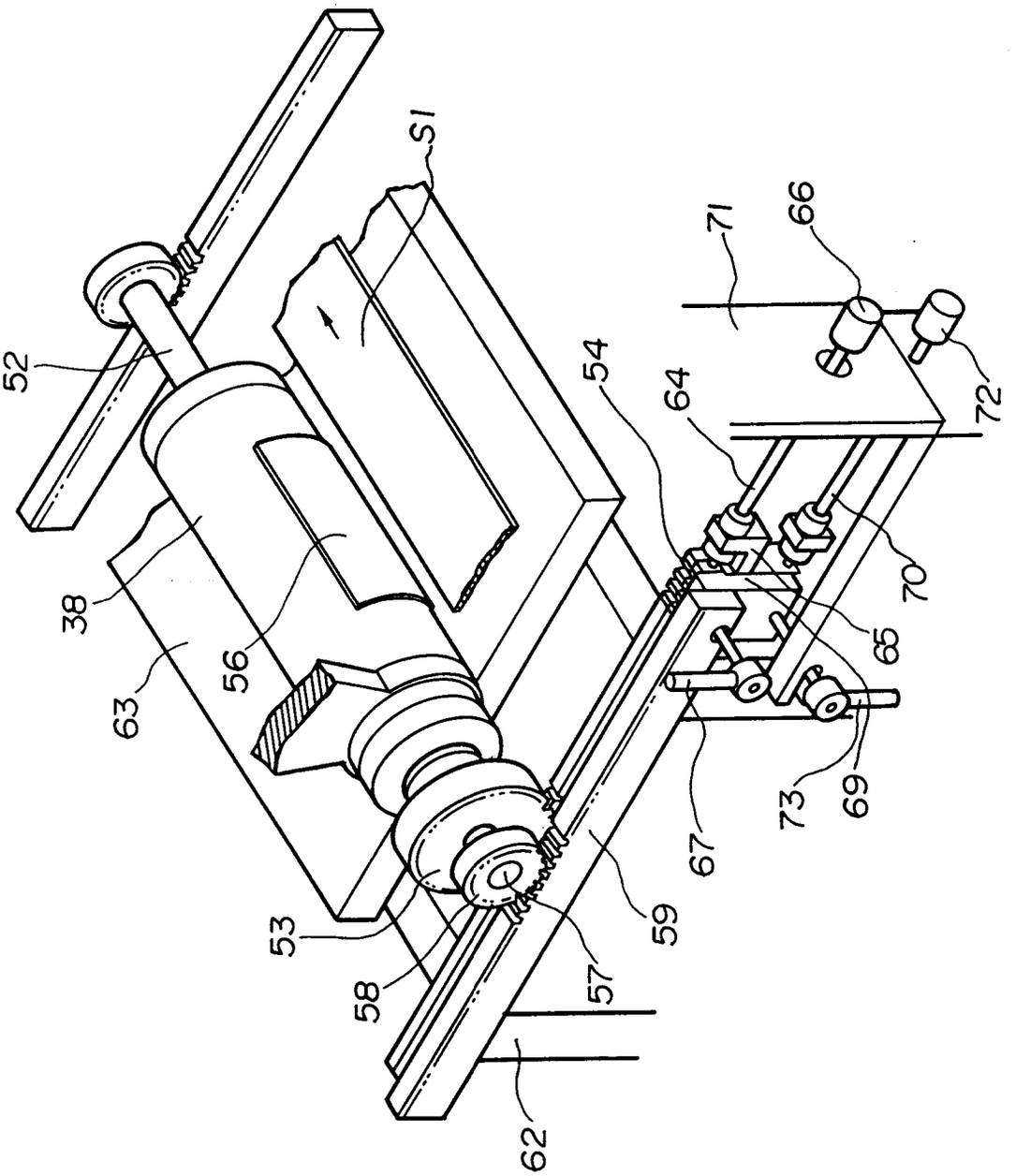


FIG.7

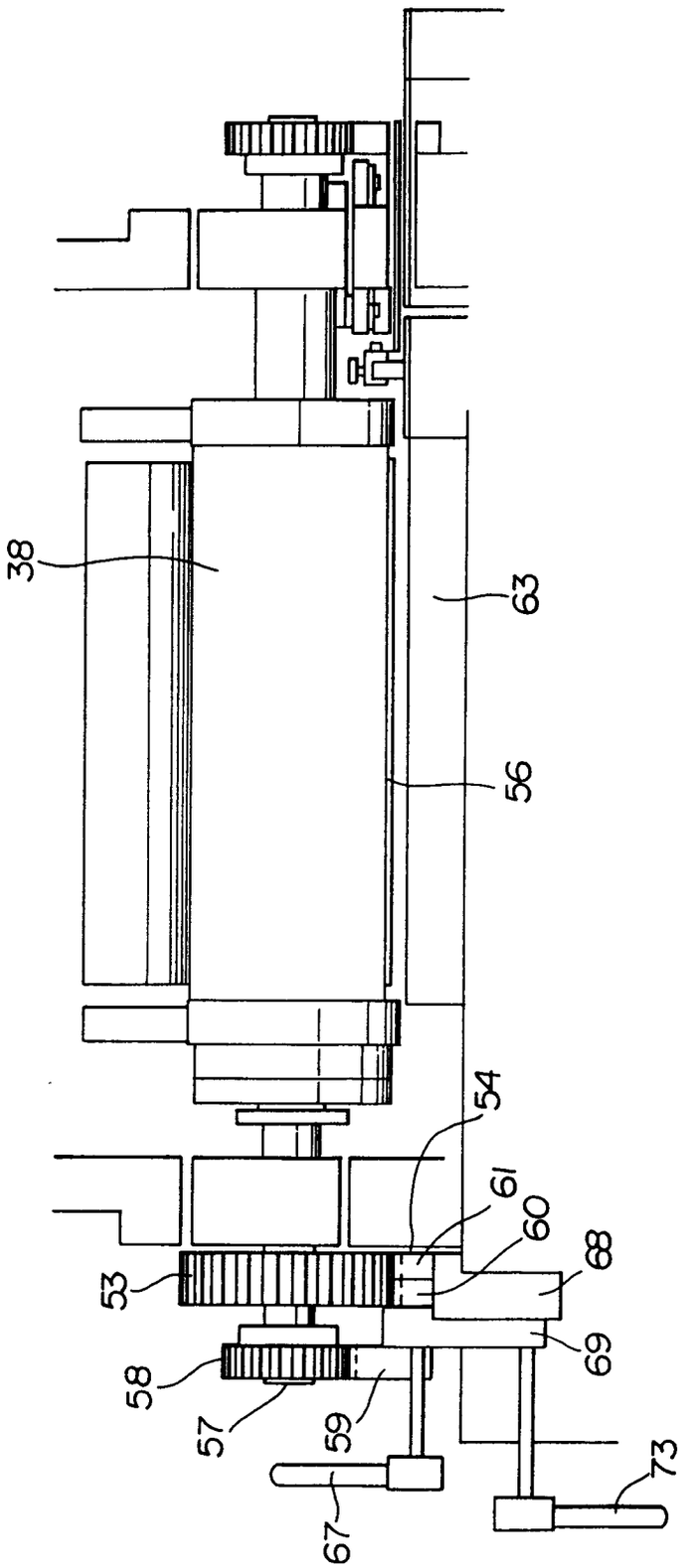


FIG.8(A)

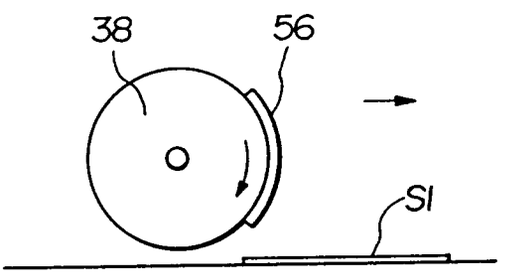


FIG.8(B)

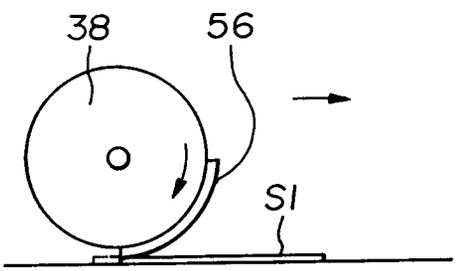


FIG.8(C)

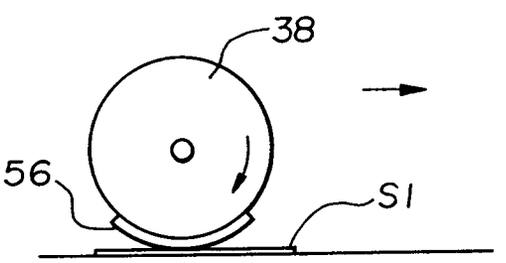


FIG.9

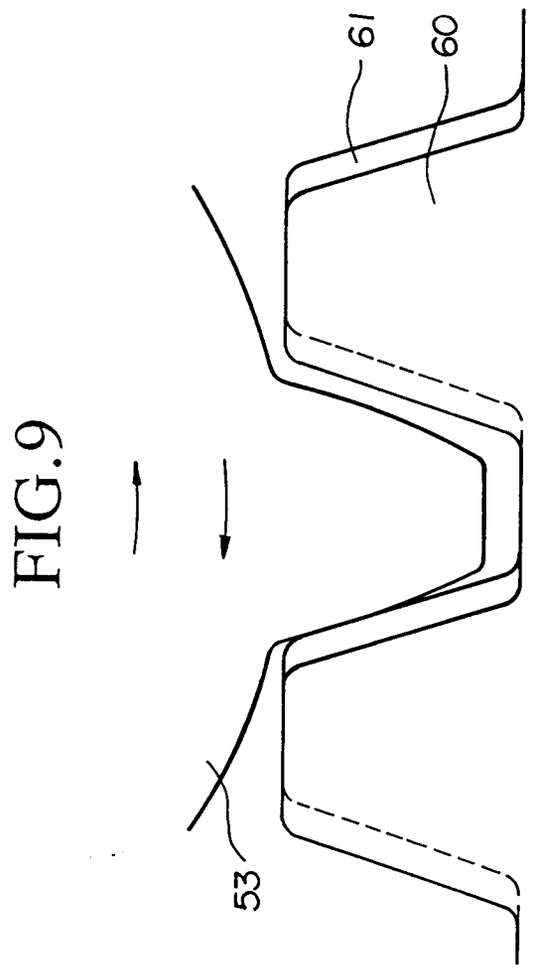


FIG.10

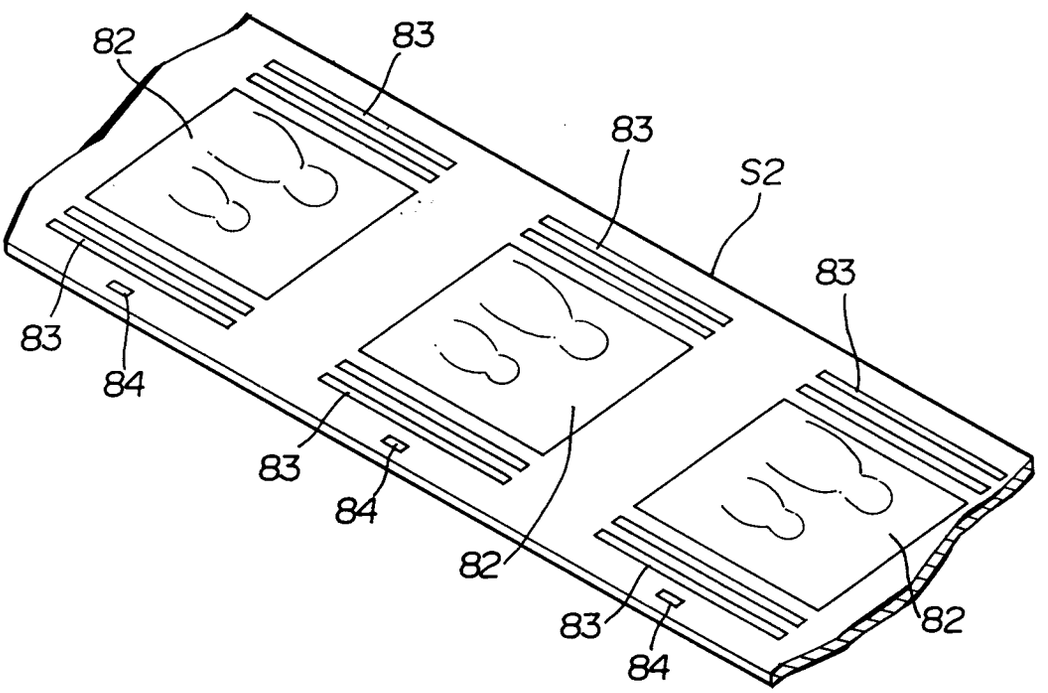


FIG.11

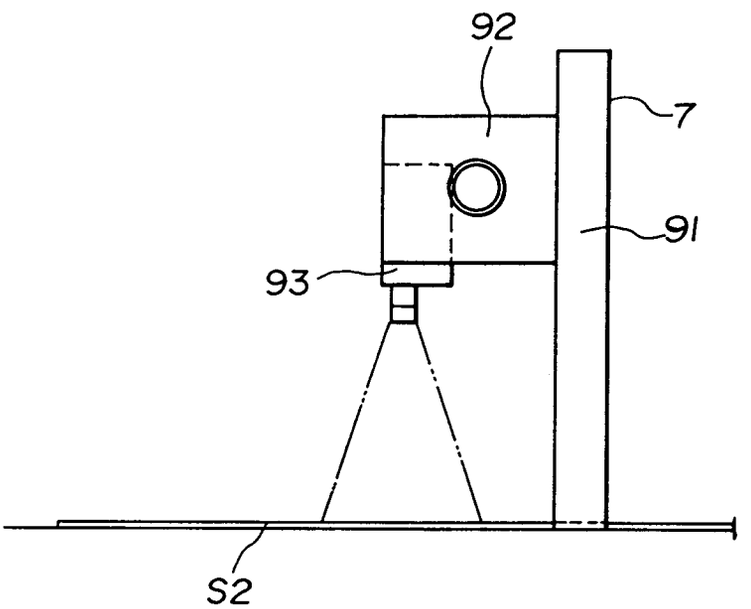
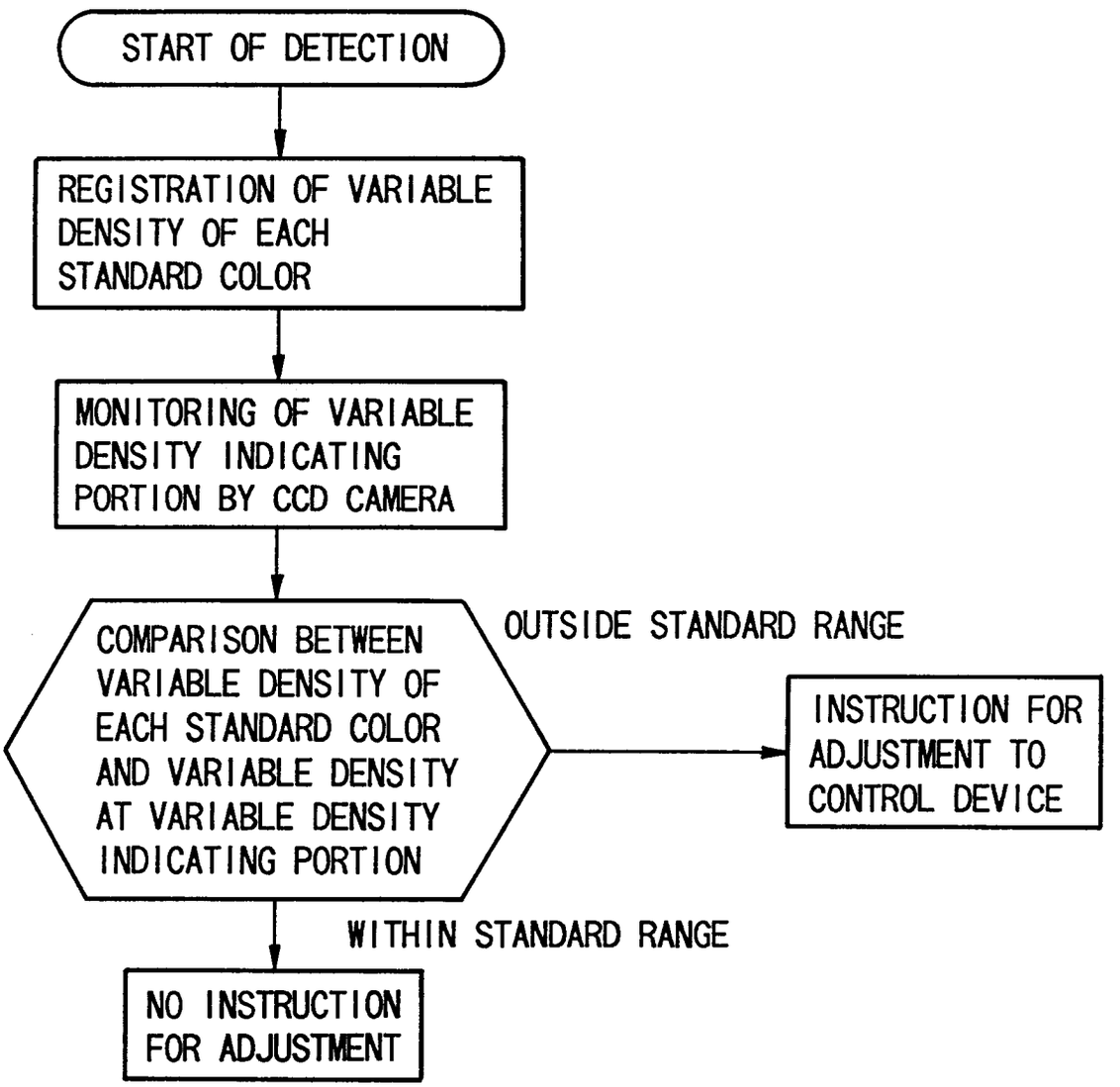


FIG.12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REGISTRATION OF VARIABLE DENSITY OF EACH STANDARD COLOR
MONITORING OF VARIABLE DENSITY INDICATING PORTION BY CCD CAMERA
COMPARISON BETWEEN VARIABLE DENSITY OF EACH STANDARD COLOR AND VARIABLE DENSITY AT VARIABLE DENSITY INDICATING PORTION
OUTSIDE STANDARD RANGE
INSTRUCTION FOR ADJUSTMENT TO CONTROL DEVICE
WITHIN STANDARD RANGE
NO INSTRUCTION FOR ADJUSTMENT

FIG.13

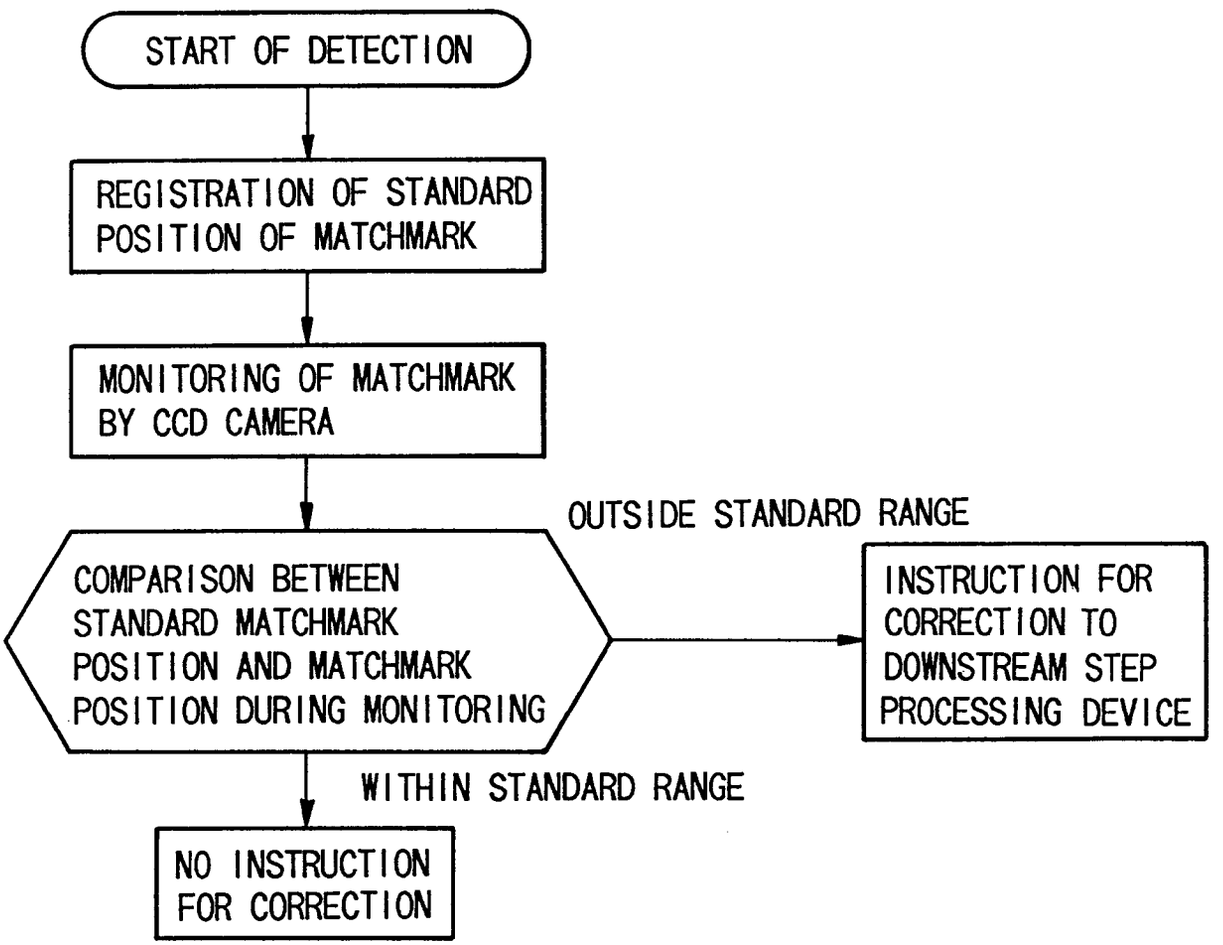
START OF DETECTION
REGISTRATION OF STANDARD POSITION OF MATCHMARK
MONITORING OF MATCHMARK BY CCD CAMERA
COMPARISON BETWEEN STANDARD MATCHMARK POSITION AND MATCHMARK POSITION DURING MONITORING
OUTSIDE STANDARD RANGE
INSTRUCTION FOR CORRECTION TO DOWNSTREAM STEP PROCESSING DEVICE
WITHIN STANDARD RANGE
NO INSTRUCTION FOR CORRECTION

FIG.14

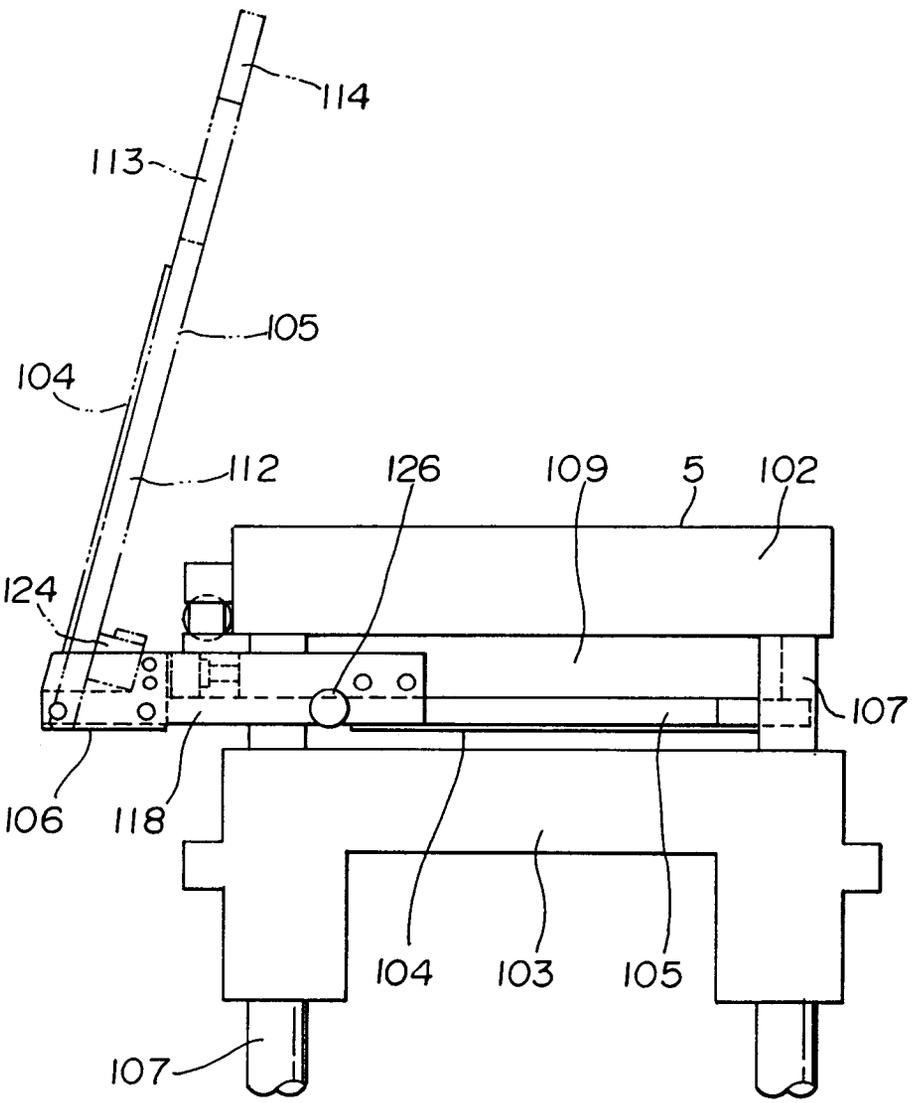

FIG.15

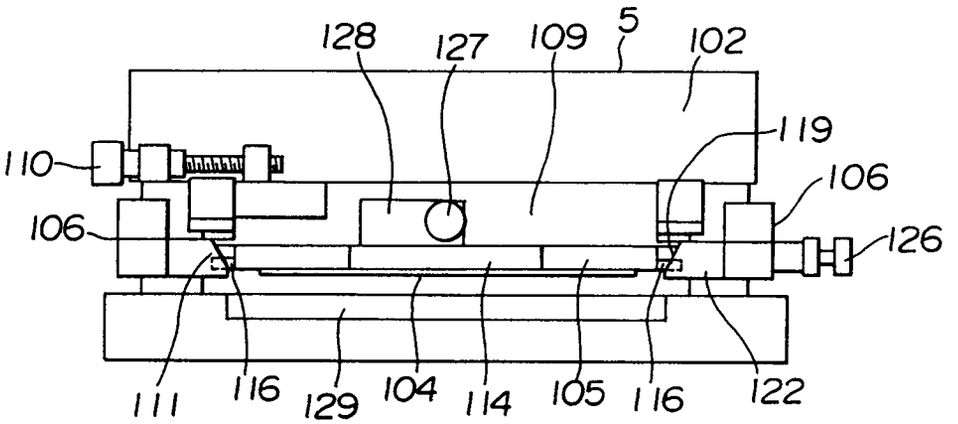
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FIG.16

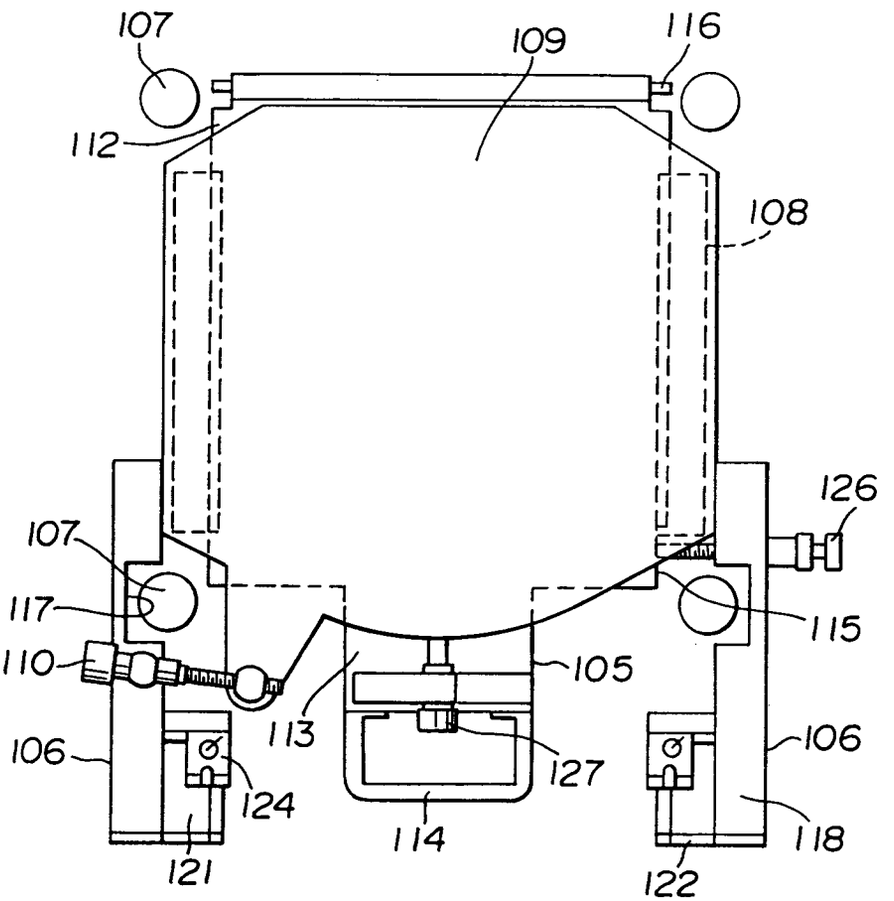
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FIG.17

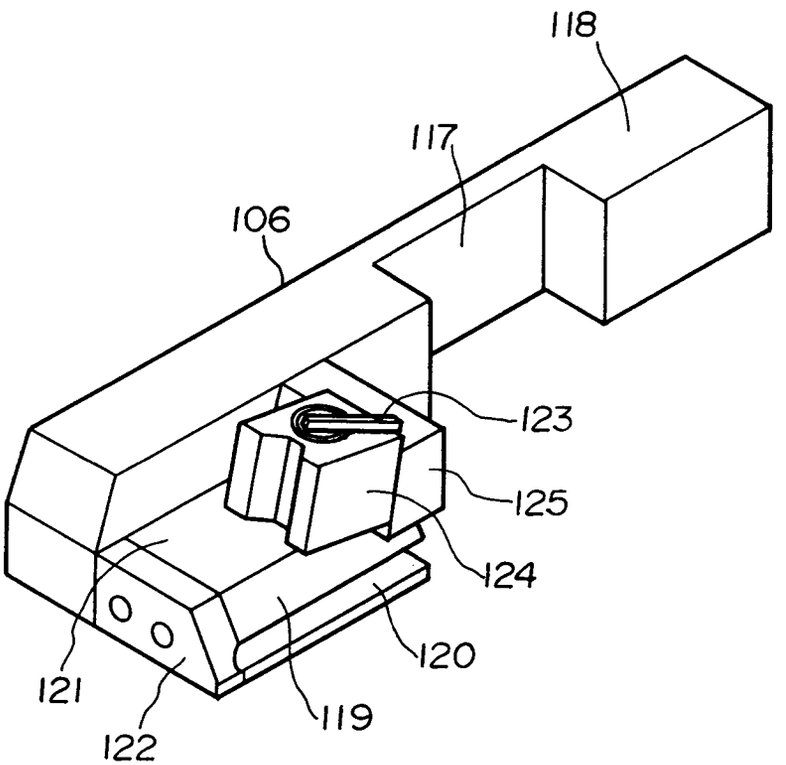

FIG.18