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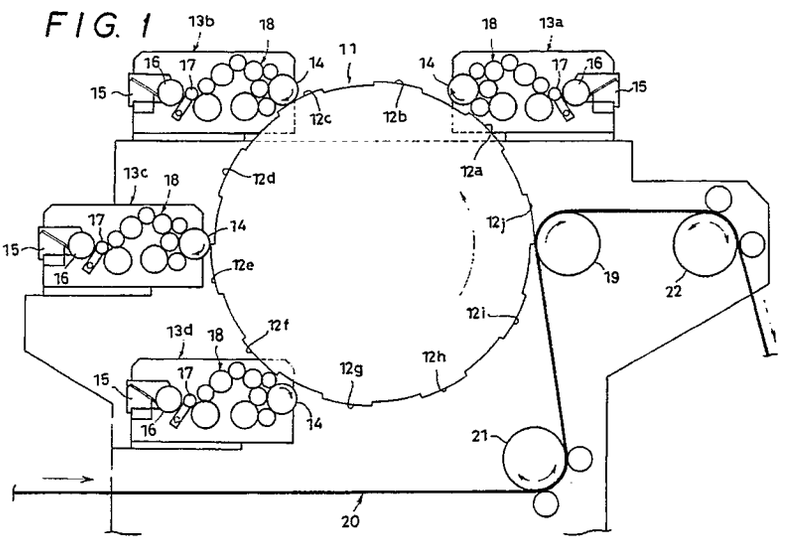
(54) Multiple printing press.

(57) A multiple printing press comprising a blanket cylinder (11) having a plurality of blankets (12a-12j) which are spaced in a circumferential direction thereof, a plurality of plate cylinders (14) which are disposed to be spaced around the outer periphery of the blanket cylinder, each plate cylinder becoming in rotational contact with the blankets respectively in a separate manner at a rotation of the blanket cylinder, an impression cylinder (19) facing each of the blankets after they past along surfaces of a plurality of plate cylinders respectively, and a paper feed device for supplying base paper between the impression cylinder and the blanket cylinder.

FIG. 1



EP 0 452 535 A1

MULTIPLE PRINTING PRESS

BACKGROUND OF THE INVENTION

(Field of Industrial Applications)

The present invention relates to a multiple printing press in use for offset printing.

(Prior Art)

The conventional multiple printing press for offset printing has a plurality of offset printing units disposed in series relatively to a strip of continuous base paper being transferred by means of a paper feed device. For this reason, a consecutive passing of the base paper which is transferred through a plurality of offset printing units permits the multiplexed type of multicolor printing to be made on specified positions of the base paper.

Such a known printing press, however, has a drawback that an expansion or contraction of the base paper caused by a change in humidity and the like incurs a positional shear among layers of inking whic are consecutively printed in a multiple manner on the base paper while it is being transferred and passed through a plurality of printing units.

Although the shear in printing can be corrected by adjusting a rotational direction of a plate cylinder of each printing unit to correct a position of what is printed on the base paper by the plate cylinder, it is unavoidable that a necessity of performing a trial printing on the base paper during the correcting work may waste a great amount of base paper before completing the correction.

In the case of the aforementioned printing press, the outer diameter of the plate cylinder which has been set to the specified length cannot be changed. For this reason, when making a replacement of the block to a smaller block to be mounted on the plate cylinder, since the dimension of what is printed on the base paper by each printing unit becomes correspondingly smaller, a space between what is earlier printed on the base paper and what is succeedingly printed on the base paper is enlarged so that a relatively larger blank space takes place between both the parts to have been printed on the base paper, thereby wasting the base paper.

On the other hand, in addition to the aforementioned series type printing press, a satellite type printing press is also known as the multiple printing press in use for offset printing. This satellite type printing press comprises an impression cylinder of larger diameter which is disposed on the center of the press, and a plurality of printing units which are disposed to be spaced in a circumferential direction of the impression cylinder. According to this satellite type printing press, a strip of continuous base paper is wound around the impression cylinder, and each printing unit permits the multiplexed type of multicolor printing to be made on the base paper while it is being transferred together with a rotation of the impression cylinder.

Also in the case of the satellite type printing press, however, drawbacks similar to those of the afore-mentioned series type printing press are found: The expansion or contraction of the base paper caused by a change in humidity makes it unavoidable to incur the shear in printing and, in order that a position of what is printed on the base paper is adjusted by means of adjusting the rotational direction of the plate cylinder in each printing unit so that the shear in printing may be corrected, it is needed to perform the trial printing by using the base paper, whereby a great amount of base paper must be wastefully consumed. Furthermore, when making a replacement of the block to the smaller block to be mounted on the plate cylinder, larger blank space results in taking place between the parts to be printed on the base paper with an interval left therebetween.

According to the satellite type printing press, in order to minimize the larger blank space on the base paper between the aforementioned parts to be printed corresponding to the smaller block, a simple requirement lies in a replacement with the plate cylinder of smaller diameter to which the block is mounted, such an actual replacement of the plate cylinder is executed in practice. Nevertheless, a provision of the plate cylinders which are different in diameter from each other may incur a rise in costs, the time and labor for the replacement work being wasted.

SUMMARY OF THE INVENTION

The present invention is to provide a multiple printing press which has solved all the afore-mentioned problematic points.

The primary object of the present invention is to provide a multiple printing press comprising a blanket cylinder having a plurality of blankets which are spaced in a circumferential direction thereof, a plurality of plate cylinders which are disposed to be spaced around the outer periphery of the blanket cylinder, each plate cylinder becoming in rotational contact with the blankets respectively in a separate manner at a rotation of the blanket cylinder, an impression cylinder facing each of the blankets

after they past along surfaces of a plurality of plate cylinders respectively, and a paper feed device for supplying a strip of continuous base paper between the impression cylinder and the blanket cylinder.

A further object of the present invention is to provide a multiple printing press equipped with a paper feed device comprising feed rollers around which the paper is wound, a drive source for driving rotationally the feed rollers, and a reverse rotation controlling means for causing the drive source to perform a fine reverse rotation of the feed rollers, when each of the blankets of the blanket cylinder passes the impression cylinder.

In the present invention, it is preferable that the paper feed rollers comprise a first feed roller which is disposed at the front side of the impression cylinder and a second feed roller which is disposed at the rear side of the impression cylinder with respect to the direction of feeding the paper.

The reverse rotation controlling means preferably comprise a detecting means of detecting that each of the blankets of the blanketcylinder past the impression cylinder, a means of outputting a control signal when receiving a detecting signal from the detecting means, and a drive controlling means of rotating reversively the drive source for the feed rollers in a fine manner when receiving the control signal.

Still further object of the present invention is to provide a multiple printing press comprising a blanket cylinder having a plurality of blankets to be spaced in a circumferential direction thereof, a plurality of block units which are disposed to be spaced around the outer periphery of the blanket cylinder and include a plate cylinder to transit layers of printing ink to the blankets, an impression cylinder facing each of the blankets after they past along surfaces of a plurality of plate cylinders respectively, and a paper feed device for supplying a strip of continuous base paper between the impression cylinder and the blanket cylinder, said paper feed device being equipped with feed rollers around which the base paper is wound and passes through between the impression cylinder and the blanket cylinder, a drive source for driving rotationally the feed rollers, and a reverse rotation controllong means for causing the drive source to perform a fine reverse rotation of the feed rollers when each of the blankets of the blanket cylinder passes the impression cylinder.

Each block unit comprises a plate cylinder which becomes in rotational contact with each blanket in a separate manner at the rotation of the blanket cylinder, and an ink supplying unit for supplying an ink to the plate cylinder.

Each plate cylinder which becomes in rotational contact with the blanket of the blanket cylinder can be preferably adjusted in one or all of directions including a circumferential direction, an axial lengthwise direction, and center line's inclined deflection direction thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front view illustrating an embodiment of the multiple printing press according to the present invention;

Fig. 2 is an enlarged front view of the reverse rotation controlling means incorporated into the multiple printing press according to the present invention; and

Fig. 3 is a front view of the conventional multiple printing press along which a plurality of printing units are disposed in series.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A detailed description of one embodiment of the present invention is made in conjunction with Figs. 1 and 2 as follows:

In Fig. 1, a blanket cylinder 11 has its outer periphery equipped with a plurality of (10 units of in the illustrated embodiment) blankets 12a-12j which are spaced in a circumferential direction thereof, and the blanket cylinder 11 is rotationally driven in an arrow direction by a drive source (not shown).

A plurality of (4 units of in the illustrated embodiment) block units 13a-13d are disposed to be spaced around the outer peripheral surface of the blanket cylinder 11. Each block unit 13 includes a plate cylinder 14 which becomes separately in rotational contact with each blanket 12 at the rotation of the blanket cylinder 11. In order to perform such an estimated alignment to the blanket 12 as mentioned hereunder, the plate cylinder 14 can be adjusted its position in any of directions including the circumferential direction (rotational direction), the axial direction (axial lengthwise direction), and the twisted direction (center line's inclined deflection direction). Each block unit 13 is furnished with an ink supplying unit for supplying an ink to the plate cylinder 14. The ink supplying unit comprises an ink reservoir 15, an ink roller 16, a priming roller 17, and a group of kneading rollers 18. Then a layer of printing ink is formed on the block of each plate cylinder 14. For this reason, a passing of the blanket 12 of the blanket cylinder 11 being rotated along each plate cylinder 14 of the block units 13 causes a transition of a layer of printing ink from the plate cylinder 14 onto the surface of the blanket 12, whereby such a series of consecutive passing thereof along a plurality of block units 13a-13d allows multilayer of printing ink to be coated onto

the surface of the blankets 12 respectively.

The impression cylinder 19 is disposed between the last block unit 13d and the first block unit 13a relatively to the rotational direction of the blanket cylinder 11. Namely, upon completion of providing each blanket 12 of the blanket cylinder 11 with a multilayer of printing ink as the result that the transition of a layer ot the printing ink has been step by step made from each block unit 13, each blanket 12 comes to face the impression cylinder 19.

A strip of continuous base paper 20 is supplied through and between the impression cylinder 19 and the blanket cylinder 11 by a paper feed device. The paper feed device comprises a first feed roller 21 disposed under the impression cylinder 19 and a second feed roller 22 disposed at a position following the rotational direction of the impression cylinder 19. These feed rollers 21 and 22 are, as shown in Fig. 2, rotationally driven by servo-motors 23 and 24 acting as drive sources thereof.

The strip of base paper 20, continuously drawn out, is wound around the first feed roller 21, the impression cylinder 19, and the second feed roller 22, and is transferred in an arrow direction along the rotational direction of both the feed rollers 21 and 22. In the present invention, in stead of the paper, a synthetic resin film may be used as the base paper 20.

For this reason, according to the printing press of the present invention as mentioned above, a rotation of the blanket cylinder 11 permits each blanket 12 to pass the block units 13 from the first block unit 13a to the last block unit 13d, whereby 4 kinds or 4 colors of printing ink in total are transited from the corresponding 4 plate cylinders 14 onto each blanket 12, then a coated multilayer of printing ink is formed on the surface of each blanket 12. When each blanket 12 passes the impression cylinder 19, said multilayer of printing ink coated on the blanket 12 is at a stroke transited to the base paper 20 which is being transferred along the surface of the impression cylinder 19 by means of the feed rollers 21 and 22, thereby printing such a multiple printed layer 25 on the base paper 20.

Since the blanket cylinder 11 may be equipped with a multiplicity of blankets 12a-12j to a maximum limit, it is possible to minimize a length of the interval between the adjacent blankets 12a and 12b, i.e. a length of the neutral parts 26 (as shown in Fig. 2) where the printing process is not performed. In this connection, in order to reduce the interval to be located on the base paper 20 between the printed layers 25 and 25 to a further extent, the reversive rotation controlling means 27 for the feed rollers 21 and 22 is preferably provided.

As shown in Fig. 2, the reversive rotation controlling means 27 can reversively rotate finely the servo-motors 23 and 24 constituting the drive sources for the feed rollers 21 and 22 respectively, when the blanket 12 of the blanket cylinder 11 passes the impression cylinder 19. In such an embodiment as shown in Fig. 2, the reversive rotation controlling means 27 includes a servo-mechanism comprising a sensor 28 for detecting a rotational position of the blanket 12 of the blanket cylinder 11, a microcomuter 29 which inputs a signal from the sensor 28 into an input port 29a and issues a specified control signal from an output port 29b, a converter 30 for making D/A conversion of the control signal, and a drive unit 31 which is actuated in response of its receipt of the resulting signal. The microcomputer 29 puts into memory a series of information concerning the processes where while, when the printed layer 25 is transited from the blanket 12 onto the base paper 20, i.e. when the printing process is under way, the feed rollers 21 and 22 are rotated by a predetermined rotational distance at the specified speed, when a detecting signal that the blanket 12 has completed its passage along the impression cylinder 19 is issued from the sensor 28, i.e. just when the printing process has been completed, the feed rollers 21 and 22 are reversively rotated to a fine extent. That enables the drive unit 31 to rotate the servo-motors 23 and 22 in a reversive/forward manner in accordance with the information.

As a result, as shown in Fig. 2, just after the blanket 12 of the blanket cylinder 11 permits the printed layer 25 to be transited and printed onto the base paper 20, a responded reversive rotation of the feed rollers 21 and 22 retreats the paper 20, then an interval S between the adjacent repeated printed layers 25 and 25 comes to be narrowed within abt. 2-3 mm, thereby enabling the interval between the printed layers 25 and 25 to become as small as possible, even if a designed specification of the blanket cylinder 11 causes the neutral part 26 to be relatively longer. In that case, when retreating the base paper 20, the impression cylinder 19 faces the neutral part 26 so that the base paper 20 gives rise to relatively larger gap between the surfaces of impression cylinder 19 and blanket 12 through which the base paper 20 is fed, whereby such a reversive rotation thereof does not give a damage to the base paper 20. Additionally, further accepted modification of the structure may be that: The base paper 20 makes a retreat, while it slips on the impression cylinder 19 being stopped. Alternatively, the impression cylinder 19 may be adapted to be freely rotatable so that it is reversively rotated following to the retreat of the base paper 20. In addition, a mechanism of driving the impression cylinder 19 to rotate reversively the same in a positive manner by the amount necessary for the

retreat of the base paper 20 may be provided.

At the forward rotation of the feed rollers 21 and 22, it is recommended that on the basis of a signal from a provided detecting means of detecting a peripheral rotating speed of the blanket cylinder 11, a rotational frequency of driving the servo-motors 23 and 24 is determined so that the feeding speed of the base paper 20 may be synchronized with the peripheral rotating speed of the blanket cylinder 11.

OPERATION

Fig. 3 illustrates the conventionally known multiple printing press for offset printing. According to the known printing press, a plurality of printing units 2a, 2b and 2c are disposed in series relatively to a strip of base paper 1 which is transferred by a paper feed device (not shown). Each printing unit 2 has a blanket cylinder 3 and an impression cylinder 4 between which the base paper 1 is interposed, the blanket cylinder 3 becoming in contact with a plate cylinder 5. The ink supplying means 6 is combined with the plate cylinder 5. For this reason, the known printing press adopts an arrangement in which a layer of ink formed on the surface of the plate cylinder 5 is transited onto the blanket of the blanket cylinder 3 and is further transited from the blanket onto the paper 1, thereby performing the printing thereon.

According to the conventionally known printing press, a plurality of printing units 2a, 2b and 2c allow the multiplexed type of multicolor printing to be continuously made on the specified place of the base paper 1 which is being transferred. However, a study by the present inventor shows that this known printing press has the following drawbacks:

Namely, it is unavoidable that the continuous multiple printing, made by means of a plurality of printing units 2a, 2b and 2c which are disposed in series relatively to the transferring direction of the base paper 1, gives rise to shear in multiple printing with respect to the multilayer of ink to be printed. That is because a fact that the base paper 1 being transferred is furnished with a specified tension by the paper feed device, it may cause the base paper 1 to be expanded between both the printing units 2a and 2b (or between 2b and 2c). Furthermore, since an expansion or contraction degree of the base paper 1 may be refinedly changed in response to a change in humidity, after all, it is impossible that the layers of ink transited onto the base paper 1 from each blanket cylinder 3 of the units 2a, 2b and 2c are fully exactly brought in line with one another without incurring the shear therein.

From that view, in the known printing press, a slight shear in printing has to be reluctantly accepted. In this connection, in order to prevent the shear in printing as much as possible, a trial operation of the printing press should be carried out to correct such a shear in printing, while inspecting the printing situation made by the printing units 2a, 2b and 2c relatively to the base paper 1. In particular, the estimated alignment for making a correction of the shear in printing needs a work of adjusting individually all the printing units 2a, 2b and 2c which are disposed separately from one another. If there takes place a positional shear between a first ink layer which is printed on the base paper 1 by means of the blanket of the first printing unit 2a and a second ink layer which is printed over said first ink layer by means of the blanket of the second printing unit 2b, for example, upon completion of making a fine adjustment of a position of the blanket cylinder 3 of the second printing unit 2 in a circumferential direction, a trial printing should be repeatedly executed on the base paper 1 so as to confirm whether such an adjustment has been properly performed. Similarly, the further estimated alignment between the second printing unit 2b and the third printing unit 2c has to be performed.

Thus, when the individual estimated alignment of printing is applied to each of printing units 2a, 2b and 2c, it has to be judged on the base paper 1 whether a series of repeated adjustment for the estimated alignment has been properly performed, while executing the trial printing on the base paper 1 on all such occasions. Therefore, the adjustment works for such alignment take longer time, and furthermore, a great amount of base paper 1 has to be wastefully consumed.

In addition to that, since the interval among the printing units 2a, 2b and 2c is fixed in the printing press, the interval between the front printed part and the rear printed part on the base paper 1 is constant, such an interval being unable to be changed. Ordinarily, a larger blank space takes place between the first printed part and the following printed part, resulting in a wasteful space on the base paper 1. Therefore, generally, in such a series type printing press as shown in Fig. 3, the diameter of the plate cylinder 3 and the dimension of the block thereon are set to the specified version, and the dimension of the block (printed part) cannot be changed.

In contrast with the conventional printing press, according to the multiple printing press of the present invention, a simple process wherein the base paper 20 is not needed to be supplied and the estimated alignment is performed on the blanket cylinder 11 may meet the requirements for the estimated alignment for the multiple printing and/or the multicolor printing. Namely, while the blanket cylinder 11 is being rotated, the layer of printing ink is being continuously transited from the plate

cylinders 14 of the block units 13a-13d onto the blankets 12 respectively, then the multilayer of printing ink is coated on each blanket 12. At that time, a visual inspection of the layer of printing ink may enable it to be judged whether the pertinent estimated alignment is proper or not. If any positional shear is found in the layers of printing ink which are coated on the blanket 12, it may be satisfactory that the adjustment is made as to one or all of positional directions including the circumferential direction (rotational direction), the axial direction (axially lengthwise direction), and the twisted direction (center line's inclined displacement direction) of the plate cylinder 14 of the block unit 13, to which the positional shear is ascribed. Subsequent to wiping off the ink previously formed, similarly to the afore-mentioned process, the vertical coating state of the layers of printing ink transited onto the blanket 12 from the block units 13a-13d is again confirmed whether it gives rise to the positional shear or not. For this reason, the estimated alignment of the present invention can be entirely effected simply on the blankets 12, such adjusting works being able to be executed without a need of supplying the base paper 20.

Upon completion of performing the estimated alignment, the next process is to execute the printing work with the base paper 20 being supplied. In this stage, even if any expansion or contraction of the base paper 20 takes place at the process of transferring the same, since the multilayer of printing ink is coated as desired on the blanket 12 where the estimated alignment has been finished in advance and the layers has been prepared as a printed layers 25 to be printed on the base paper 20, such prepared multilayer of printing ink is at a stroke transited and printed onto the base paper 20 on the impression cylinder 19, whereby any positional shear among the layers of printing ink does not take place.

Furthermore, just after completing the printing process, the aforementioned reverse rotation controlling means 27 causes the feed rollers 21 and 22 to be reversively rotated to a fine extent so as to retreat the base paper 20 by a necessary distance and, subsequently, the feed rollers 21 and 22 to be forwardly rotated so as to perform the next printing process through the following blanket 12 onto the base paper 20, an interval S between the printed layers 25 and 25 which are repeatedly printed on the base paper 20 can be made smaller than the dimension of the neutral part 26 of the blanket cylinder 11. In addition, in the event that a change in the dimension of the block in the plate cylinder 14 may cause the corresponding change of the dimension of the layer of printing ink on the blanket 12 and, then the interval between the layers of printing ink to be printed on the front and rear positions of the base paper 20 is to be consequently changed, the interval S between the printed layers 25 and 25 can be set to the desired narrower dimension by simply changing the amount of rotating reversively the feed rollers 21 and 22.

EFFECT OF THE INVENTION

According to the present invention, when performing the multiple printing and/or the multicolor printing by using basically a plurality of block units 13, the estimated alignment of the layers of printing ink can be performed on the blanket cylinder 11 with the visual inspection of the coating state thereof being concurrently made. As a result, it becomes unnecessary that the trial printing is executed with the base paper being supplied, whenever the adjusting work for the estimated alignment is performed. Therefore, the base paper is not wastefuly consumed so that the entire process becomes economical reality.

Furthermore, upon completion of the estimated alignment on the blanket 12, since the layers of printing ink are desiredly coated on the blanket 12 in advance bypassing the blanket 12 along each of a plurality of block units 13, and the prepared multilayer of printing ink is at a stroke transited and printed onto the base paper 20, even if an expansion or contraction of the base paper 20 being transferred takes place, any shear in printing is not incurred in the coating state of the printed layers 25 on the base paper.

Finally, according to the present invention, a provision of the reversive rotation controlling means 27 realizes an effect wherein the interval S between the printed layers 25 and 25 which are repeatedly printed on the base paper 20 can be made smaller as desired, thereby enabling the printing process in which the aforementioned interval becomes close.

Claims

1. A multiple printing press comprising a blanket cylinder (11) having a plurality of blankets (12) which are spaced in a circumferential direction thereof, a plurality of plate cylinders (14) which are disposed to be spaced around the outer periphery of said blanket cylinder (11), each plate cylinder (14) becoming in rotational contact with each of the blankets (12) at a rotation of said blanket cylinder (11), an impression cylinder (19) facing each of said blankets (12) after they past along surfaces of a plurality of plate cylinders (14) respectively, and paper feed means (21, 22) for supplying base paper between said impression cylinder (19) and said blanket cylinder (11).

2. A multiple printing press as defined in Claim 1 wherein the paper feed means is equipped with

feed rollers (21, 22) around which a strip of continuous paper is wound and passes through between the impression cylinder (19) and the blanket cylinder (11), said paper feed means comprises drive means (23, 24) for driving rotationally said feed rollers, and reverse rotation controlling means (27) for causing said drive means (23, 24) to perform a fine reverse rotation of said teed rollers (21, 22), when each of blankets (12) of said blanket cylinder passes said impression cylinder (19).

3. A multiple printing press as defined in Claim 1 or 2 wherein the paper feed means comprises a first feed roller (21) which is disposed at the front side of the impression cylinder (19) and a second feed roller (22) which is disposed at the rear side of said impression cylinder (19) with respect to the direction of feeding the paper.

4. A mulitiple printing press as defined in Claim 2 or 3 wherein the reverse rotation controlling means (27) comprises detecting means (28) of detecting that each of blankets (12) of the blanket cylinder past the impression cylinder (19), means (29) of outputting a control signal when receiving a detecting signal from said detecting means, and drive controlling means (31) of rotating reversively the drive means (23, 24) in a fine manner when receiving said control signal.

5. A multiple printing press comprising a blanket cylinder (11) having a plurality of blankets (12) to be spaced in a circumferential direction thereof, a plurality of block units (13) which are disposed to be spaced around the outer periphery of said blanket cylinder (11) and include a plate cylinder (14) to transit layers of printing ink to said blankets (12), an impression cylinder (19) facing each of said blankets (12) after they past along surfaces of said plate cylinders (14) respectively, and paper feed means (21, 22) for supplying a strip of continuous base paper between said impression cylinder (19) and said blanket cylinder (11), said paper feed means (21, 22) being equipped with feed rollers around which the base paper is wound and passes through between said impression cylinder (19) and said blanket cylinder, drive means (23, 24) for driving rotationally said feed rollers (21, 22), and reverse rotation controlling means (27) for causing said drive means (23, 24) to perform a fine reverse rotation of said feed rollers, when each of said blankets (12) of said blanket cylinder passes said impression cylinder (19).

6. A multiple printing press as defined in Claim 5 wherein the plate cylinder (14) of each block unit (13) becomes in rotational contact with each blanket (12), of the blanket cylinder (11) in a separate manner at the rotation of said blanket cylinder, and each block unit (13) is provided with an ink supplying unit (15, 16, 17, 18) for supplying ink to said plate cylinder (14).

7. A multiple printing press as defined in one of the preceding Claims wherein each plate cylinder (14) which becomes in rotational contact with the blanket (12) of the blanket cylinder (11) can be adjusted in one or all directions including a circumferential direction, an axially lengthwise direction, and a center line' s inclined deflection direction thereof.

FIG. 1

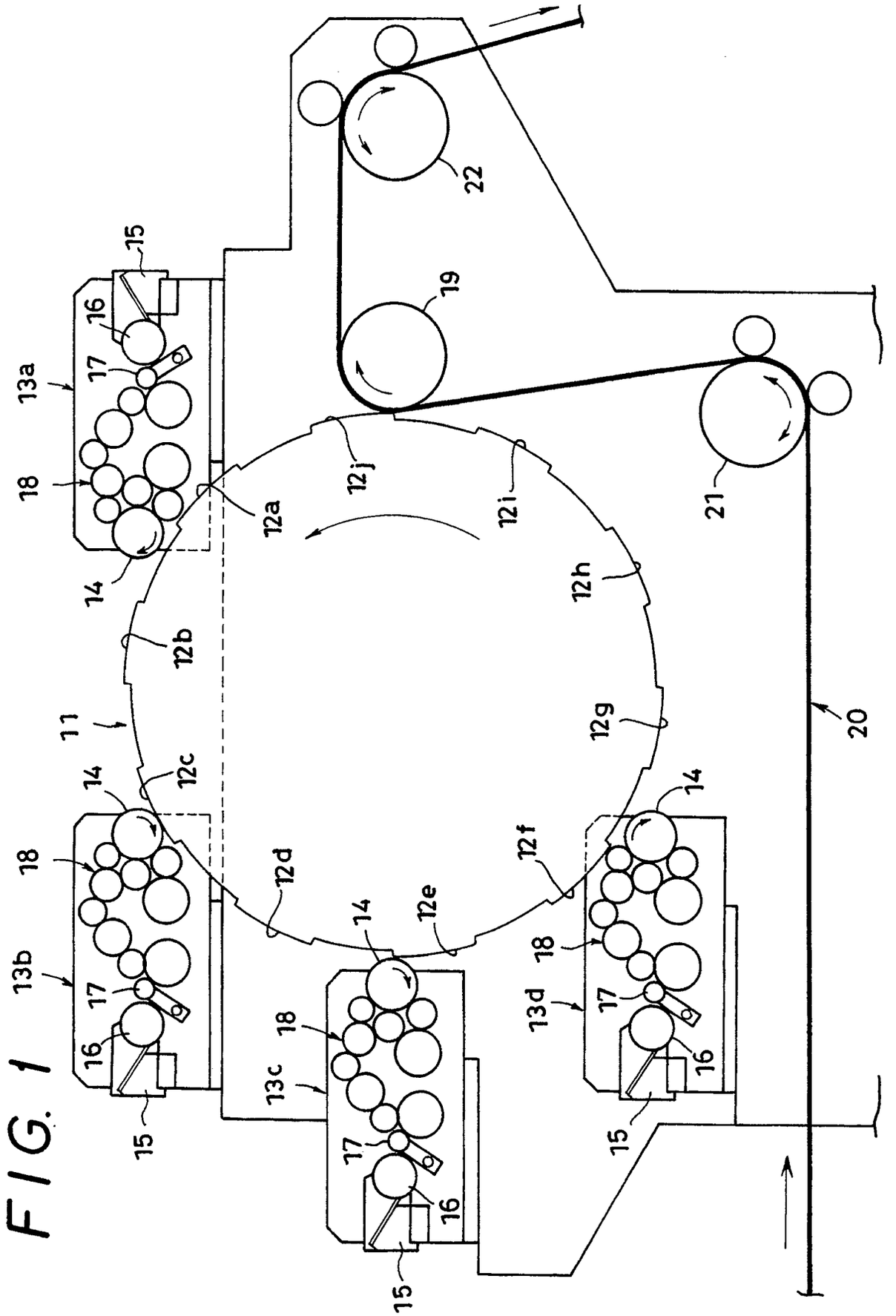

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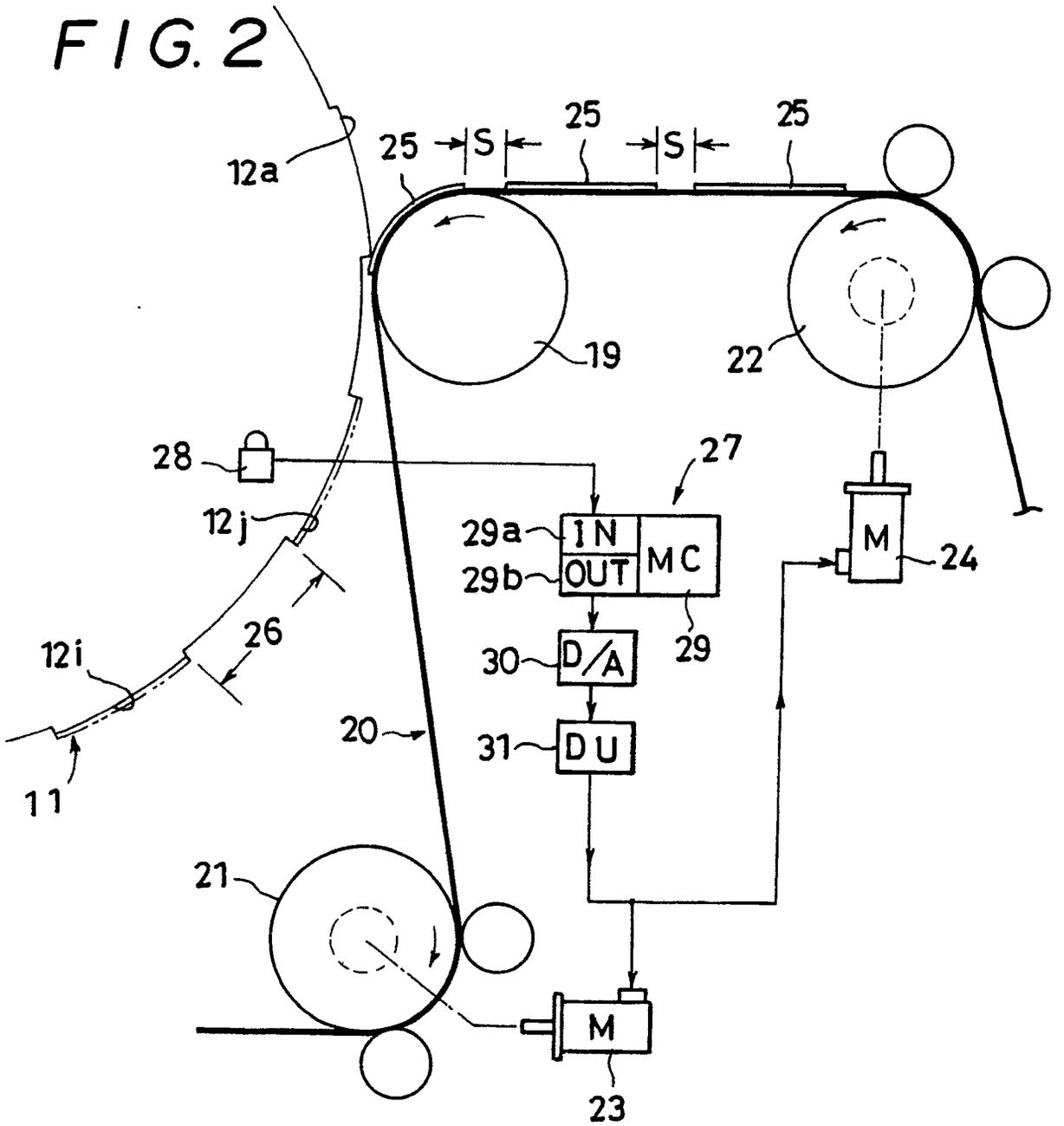
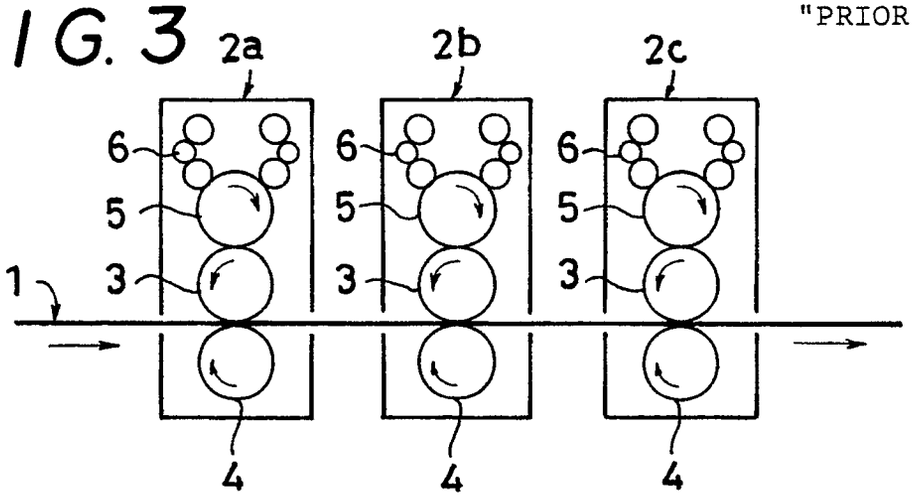
FIG. 2



"PRIOR ART"

FIG. 3



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EUROPEAN SEARCH REPORT

Application Number

EP 90 11 1788

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	BE-A-3 564 02 (L. DE MOOR & G. DE GUSSEM) * the whole document *	1	B 41 F 7/08 B 41 F 13/04
X,Y	US-A-1 379 365 (O. R. SCHULTZ AND O. KIRSCH) * the whole document *	1,2-7	
Y	GB-A-2 106 035 (KOENIG UND BAUER AG) * the whole document *	2-6	
Y,A	EP-A-0 353 652 (RENA INFORMATIONS TECHNIK) * claims * * figures *	7	
Y	US-A-4 491 071 (M.A.N.- ROLAND DRUCKMASCHINEN) * the whole document *	7	
X	PATENT ABSTRACTS OF JAPAN vol. 8, no. 262 (M-341)(1699) November 30, 1984 & JP-A-59 133 056 (OOSAKA SHIRING INSATSU) July 31, 1984 * the whole document *	1,2	
A	PATENT ABSTRACTS OF JAPAN vol. 11, no. 333 (M-637)(2780) November 30, 1987 & JP-A-62 116 148 (TORAY IND INC) May 27, 1987 * the whole document *	2-6	TECHNICAL FIELDS SEARCHED (Int. Cl.5) B 41 F
X	FR-A-5 450 39 (SOCIETE DES ANCIENS ETABLISSEMENTS & VOIRIN REUNIS) * the whole document *	1	
A	FR-A-2 242 243 (SHULZ) * page 6, line 34 - page 14, line 22; figures *	2-6	

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	11 July 91	MEULEMANS J.P.

CATEGORY OF CITED DOCUMENTS

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