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Zimmermann et al.

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[54] **SHEET TURNING MECHANISM FOR PERFECTORS**

[75] Inventors: **Hans Zimmermann,** Heidenau; **Otfried Rudolph,** Dresden; **Wilfried Kuhn,** Radebeul, all of Germany

[73] Assignee: **Veb Polygraph Leipzig Kombinat Fur Polygraphische Maschinen und Ausrustungen,** Leipzig, Germany

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[21] Appl. No.: **93,202**

[52] **U.S. Cl.** **101/230,** 271/65

[51] **Int. Cl.** **B41f 5/02**

[58] **Field of Search** ..... 101/183, 222, 223, 101/230, 246, 229, 231, 232; 271/51, 54, 64, 64 MA, 65, 69, 71, 79

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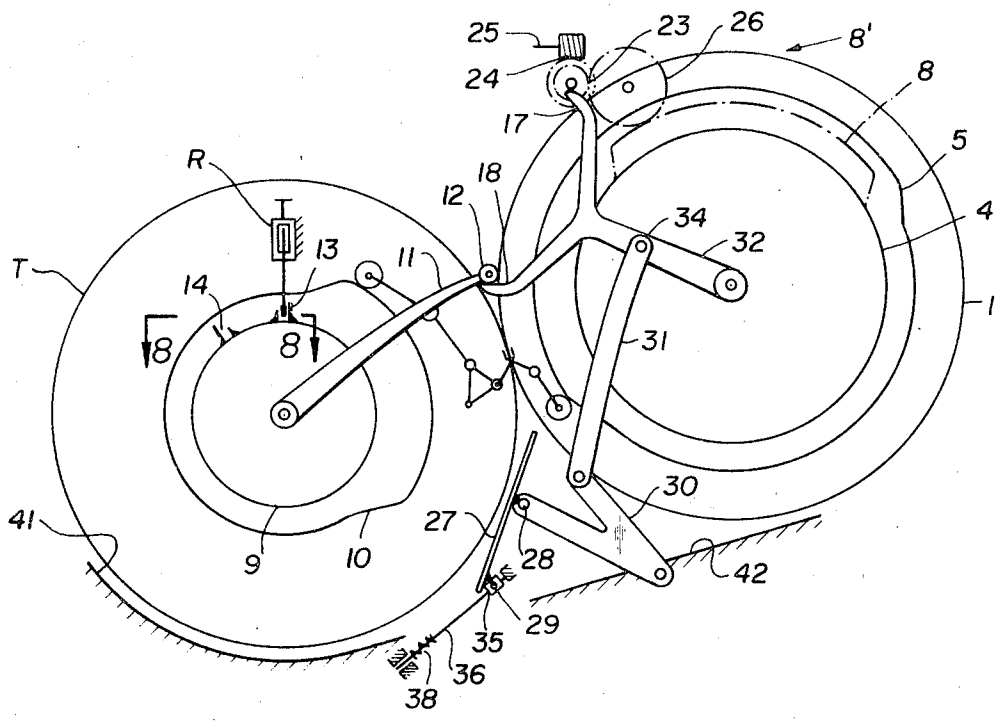
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Primary Examiner—Robert E. Pulfrey
Assistant Examiner—Eugene H. Eickholt
Attorney—Nolte and Nolte

[57] **ABSTRACT**

Mechanism for controlling sheet manipulators, including sheet guides, in a perfector press, when the press shall be switched from obverse-obverse to obverse-reverse printing, or vice versa. A first printing cylinder and an adjacent transfer cylinder of the press have linkages pivoted about the respective cylinder axes and swingable, relative to the cylinders, in coordinated and partly overlapping motions. The linkage of the first printing cylinder repositions a sheet guiding plate by crank, link and guide units. It also repositions the sheet gripping mechanism of the first cylinder and, with lost motion, that of the transfer cylinder. Exact positioning of all mechanisms are provided by detent and release means in the transfer cylinder.

11 Claims, 9 Drawing Figures



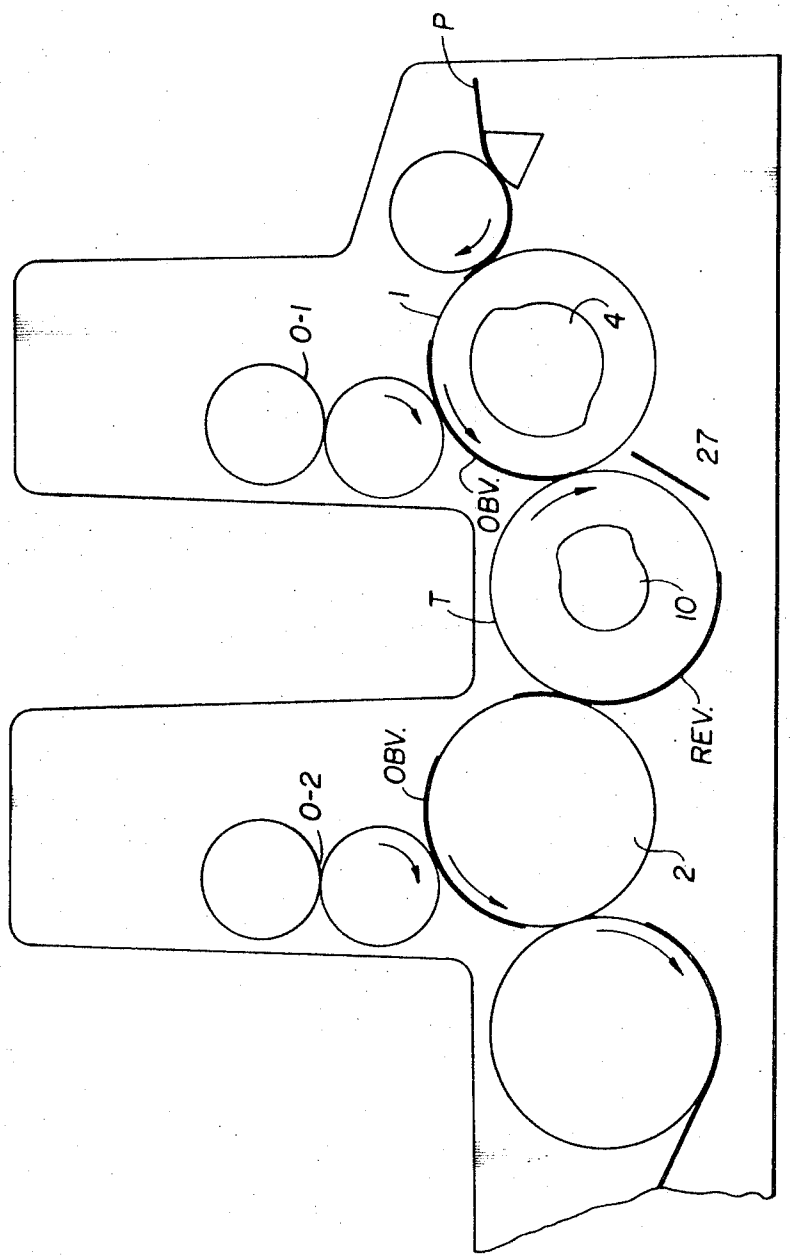


FIG. 1

INVENTORS
HANS ZIMMERMAN
OTFRIED RUDOLPH
WILFRIED KÜHN

BY Nolte & Nolte
ATTORNEYS

FIG. 2

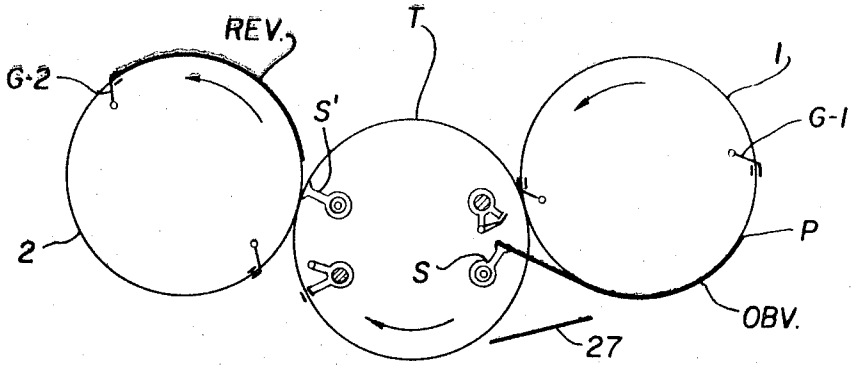


FIG. 3

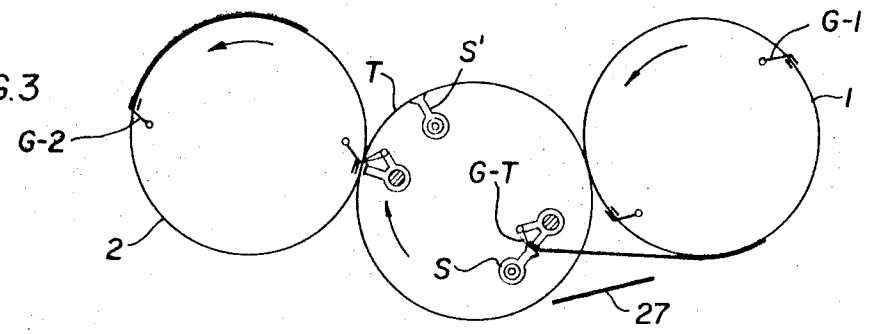


FIG. 4

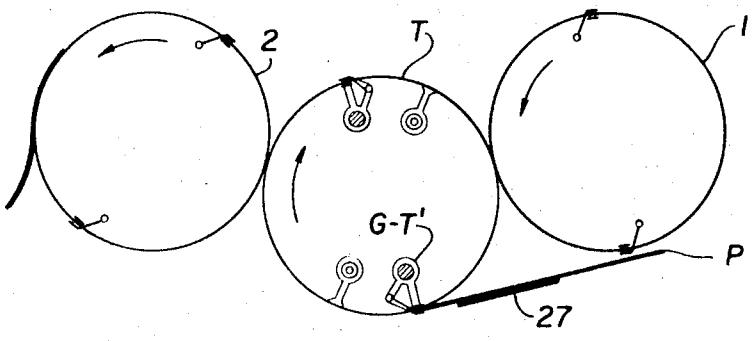
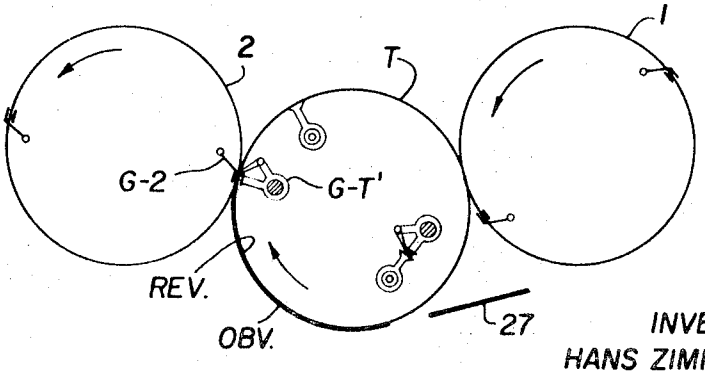


FIG. 5



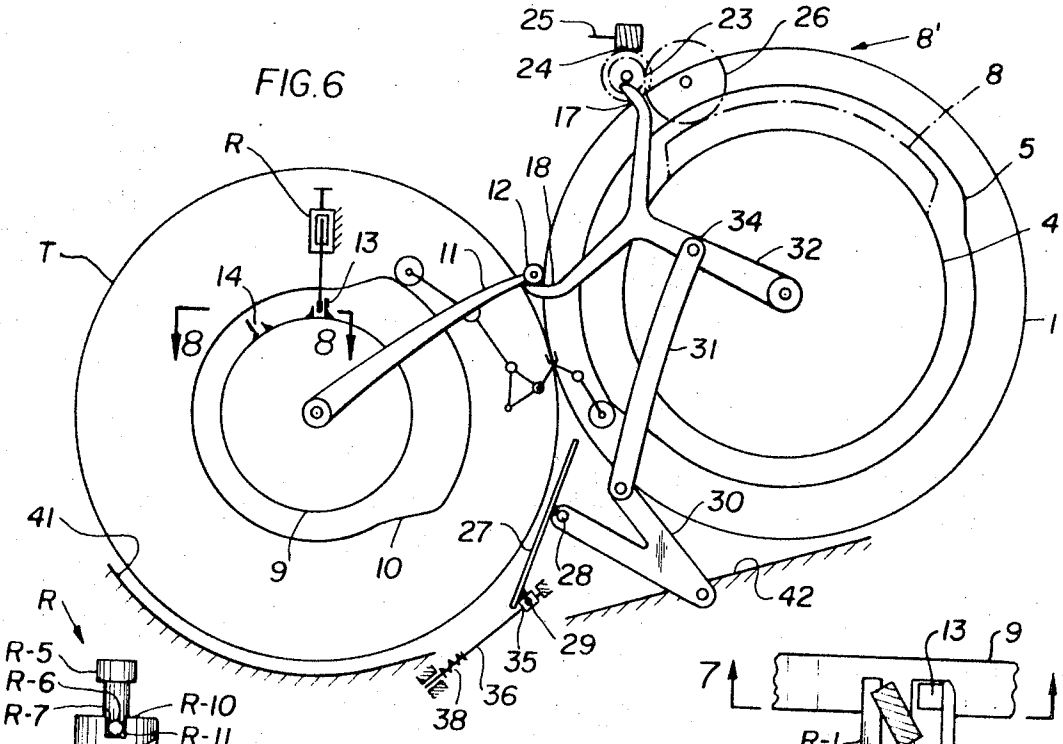
INVENTORS
HANS ZIMMERMAN
OTFRIED RUDOLPH
WILFRIED KÜHN
BY Nolte & Nolte
ATTORNEYS

PATENTED JUL 3 1973

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FIG.6



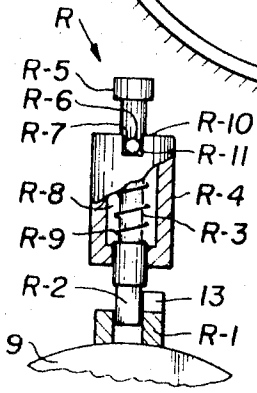


FIG.7

FIG.8

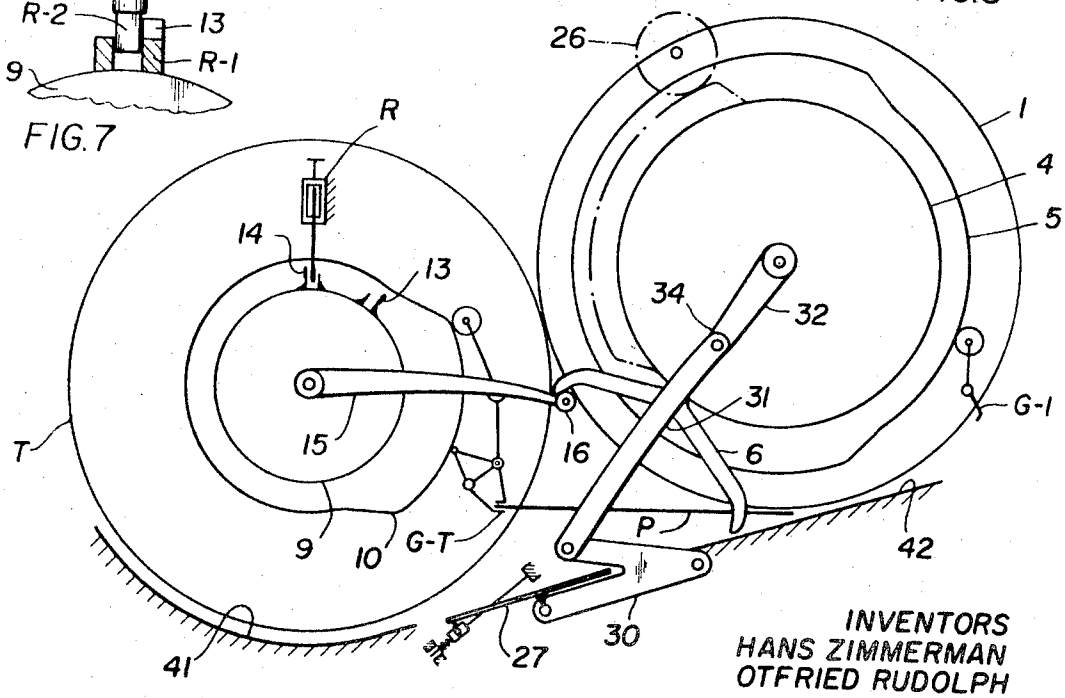


FIG.9

INVENTORS
HANS ZIMMERMAN
OTFRIED RUDOLPH
WILFRIED KÜHN
BY Nolte & Nolte
ATTORNEYS

SHEET TURNING MECHANISM FOR PERFECTORS

In perfector presses, the normal transfer of a sheet from one cylinder to another must be modified. A sheet must first be printed on its obverse side and then turned for reverse printing and reapplied to proper cylinders. The sheet reversing process makes it necessary to guide the sheets from one cylinder to another along a path different from that used in normal obverse-obverse printing.

Certain devices, developed for these purposes, have been in need of improvement. In one case the arrangement was such that certain mechanisms for the control of sheet grippers were operated even when not needed, and were thereby subjected to unnecessary wear and tear. It also was necessary to install and reinstall elements in the printing plant, when changing from obverse printing to reverse printing or vice versa and to spend time for such purposes instead of merely switching the printing plant from one operation to another with a minimum of "down"time.

The invention overcomes the drawbacks of earlier constructions, without sacrifice in other functions and with no increase in construction costs. It does this by providing a new mechanism for the control of the sheet manipulators, a preferred form of which will now be described.

DRAWINGS AND DETAILED DESCRIPTION:

FIG. 1 is a schematic side view of the new perfector in position for obverse-obverse printing;

FIG. 2 is a generally similar view, limited to the cylinders which are essential for the present invention, and showing one stage of an obverse-reverse printing operation;

FIGS. 3, 4 and 5 are views similar to FIG. 2, showing further stages of obverse-reverse printing;

FIG. 6 shows details of the sheet turning mechanism, in the position of FIG. 1;

FIGS. 7 and 8 show a more specific detail, FIG. 8 being seen along lines 8 — 8 in FIG. 6. FIG. 7 is seen along lines 7 — 7 in FIG. 8 to provide a sectional enlargement of the corresponding detail in FIG. 6; and

FIG. 9 is a view generally similar to FIG. 6 but showing the mechanism in the position of FIG. 2.

As shown in FIG. 1, paper sheet P is introduced into the machine and applied to a first printing cylinder 1, which by means of offset mechanism 0–1 imprints the obverse side of the sheet in a first color. The sheet is then received by transfer cylinder T. Since the two cylinders are tangent to one another, the reverse side of the sheet is turned outward while the sheet is on cylinder T. This condition is again reversed when the transfer cylinder transfers the sheet to second printing cylinder 2, which now imprints the obverse side of the sheet in a second color, by offset mechanism 0–2.

The basic operation of the machine during obversereverse printing begins with the same obverse printing at 1 and 0–1 as is shown in the first cylinder section of FIG. 1. However, as shown in FIG. 2, the front edge of paper sheet P now is carried by cylinder 1 beyond the tangent point between cylinders 1 and T. Pneumatic devices including suction member S in transfer cylinder T then engage the rear end portion of paper sheet P, and cause it thereafter to move with transfer cylinder T. Meanwhile the front edge grippers 6–1 of cylinder 1 have been opened. As may be noted from comparison

between FIGS. 2 and 3, continued motion of cylinder T causes the suction members, with the former rear edge of the sheet, to move into leading position on transfer cylinder T, while the former front edge portion to trail and returns along cylinder 1. Additionally, transfer grippers G–T in transfer cylinder T are then brought into engagement with the sheet edge engaged by suction members S. These grippers are thereupon (FIG. 4) caused, by a swinging motion to position G-T', to bring the engaged edge of the sheet into a position tangent to transfer cylinder T. This cylinder continues to rotate. As shown in FIG. 5, the grippers G-T' later transfer the sheet to grippers G–2 of the second printing cylinder 2. Thereafter the further mechanical motion of the sheet is the same as in the corresponding parts of FIG. 1, but with the former reverse side of the sheet exposed for the printing operation of the second offset system 0–2. It will be seen in FIGS. 2 to 5 that, during the so-controlled printing operations, the reverse sides of consecutive sheets from cylinder 1 slide over guide plate 27, which plate at this time is held in relatively flat position.

As schematically indicated in FIG. 1, cylinders 1 and T have, respectively, discs 4 and 9 concentric therewith. These discs do not rotate with the cylinders but are independently rockable about the cylinder axes. They serve to reposition sheet manipulator members, including the normally stationary gripper cams 5 and 10, in cylinders 1 and T respectively. The discs also control a slide 6, for mutual repositioning of other parts in cylinders 1 and T. The repositioning mechanism is controlled by a drive 8', applied to a gear segment 8, which is shown as rigid with disc 4.

Slide 6 effects mutual positioning, subject to a time delay, between the positioning unit 4, 5, 6 of cylinder 1 and a somewhat similar unit 9, 10, 11 of transfer cylinder T. The latter unit includes disc 9, gripper cam 10, and mutual engagement lever 11. This lever carries a roller 12 which engages certain surfaces on slide 6. Disc 9 of transfer cylinder T also has stop members 13, 14 on its periphery for engagement with a stop and release mechanism R.

Drive 8' imparts motion to the positioning units (4, 5, 6) of cylinder 1 and the similar unit (9, 10, 11) of cylinder T, by a gear drive 23, actuated by worm gear 24 which has positioning shaft 25. Spur gear 26 of gear drive 23 is in mesh with toothed segment 8 on disc 4, to transmit motions of drive shaft 25 to the two positioning units (4–6 and 9 to 11).

Guide plate 27 is moveable in planes perpendicular discs 4 and 9, under the control of linkage pivoted to the plates at a pair of pivots 28, 29. Pivot 28 is connected to one arm of bell crank lever 30, the other arm of which, by link 31, can be swung in one of the aforementioned planes, by crank 32, which is rigid with disc 4 and pivoted, at 34, to the link. The second pivot 29 of guide plate 27 is formed on block 35, which is guided in a straight line, with rod 36, against a resilient stop 38, to interconnect stationary guides 41, 42 below cylinder T and 1 (FIG. 9).

By operation of the linkages shown here, operation of control drive 8' causes the sheet manipulators 27, G of cylinders 1 and T to move from obverse-obverse to obversereverse position and back. Operation of drive 25 repositions the grippers of cylinder 1 and guide plate 27 between it and transfer cylinder T. Subject to a short time delay it also repositions the gripper mechanism of

transfer cylinder T, and causes a detent and release action to come into effect by engagement of stop unit 13 or 14 with detent and release mechanism R. The functioning of this mechanism will become clear from review of FIGS. 7 and 8.

Disc 9 has, rigidly connected thereon, a pair of stop members R–1, spaced to allow insertion of blade R–2 therebetween. This blade can be withdrawn from the space between members R–1 by pin R–3, guided in frame R–4 and having handle R–5. Pin R–3 also has cross-pin R–6, vertically slidable in slot R–7 of frame R–4. In open space R–8 of this frame, spring R–9 urges pin R–3 downwardly and thereby tends to lower blade R–2 to between stops R–1. Also provided on one of those stops is rigid upper extension 13 thereof, and, on the other stop mechanism (FIG. 6) symmetrical extension 14.

When drive 25 is actuated while the press is in the position of FIG. 6, stop unit R is released by raising handle R–5 of pin R–3, against the pressure of spring R–9. Blade R–3 is then turned to remain in raised position by engagement with top surface R–10 of frame R–4. The removal of this blade from R–1 enables slide 6 of cylinder 1, (driven by 8') in due course to engage roller 12 at blade surface 17 and thereupon to turn the positioning unit (9, 10, 11) of cylinder T into position of FIG. 9. When this position approaches, extension 14 reaches blade R–2 and turns it into position for insertion in the space between stops R–1. Such insertion is caused by spring R–9 when the proper position of the unit is reached. Later, reversal to the FIG. 6 position can follow in corresponding ways.

What is claimed is:

1. A mechanism for switching a perfector press, of the type having a printing cylinder and an adjacent transfer cylinder, the cylinders having sheet grippers capable of being switched from obverseobverse to obverse-reverse positions, comprising first means operatively associated with one of said cylinders for repositioning the grippers thereof from and to the obverse and reverse positions, second means operatively associated with the other of said cylinders for repositioning the grippers thereof from and to the obverse and reverse positions, means operatively associated with said first and second means for supporting said first and second means about the respective axes of the cylinders for swinging the same in coordinated and partly overlapping motions relative to the cylinders, a sheet guiding plate, means operatively associated with said plate for positioning said plate below and between the cylinders, said first means including means for connecting said plate and for repositioning the same to and from the obverse and reverse positions while repositioning the grippers.

2. A mechanism according to claim 1, wherein said guide plate connecting and repositioning means includes means for swingingly translating one part of the guide plate, and means are provided for translating another part of said plate in a straight line.

3. A mechanism according to claim 1 wherein said first and second means are rockable cams.

4. A mechanism according to claim 3 also including a lost-motion connection between the rockable cams.

5. A mechanism according to claim 1, wherein said guide plate connecting and repositioning means includes a link having one end translatable with said first means, and lever means on the other end controlled by said link.

6. A mechanism according to claim 5 wherein the lever means is a bell crank lever having one end pivoted to said plate.

7. A mechanism according to claim 1, wherein said first and second means include means rockable about the respective axes of said cylinders, a slide path structure forming part of one said first and second means, and a roller lever forming part of the other.

8. A mechanism according to claim 7 wherein the slide path structure forms part of said first means.

9. A mechanism according to claim 1 additionally including means interposed in one of the first and second means for releasably stopping the same in the obverse and reverse positions.

10. A mechanism according to claim 9, wherein said releasable stopping means includes a pair of stop assemblies swingable with said second means.

11. A mechanism according to claim 10, wherein said releasable stopping means includes a generally stationary device opposite said stop assemblies, a movable element in said device, and means for successively reciprocating and turning the movable element to successively manually release said first means for readjustment thereof, and then automatically limiting the movement of said first means for said readjustment.

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