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PLATE CYLINDER AND INKING ROLLER THROWOFFS

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2 Sheets-Sheet 1

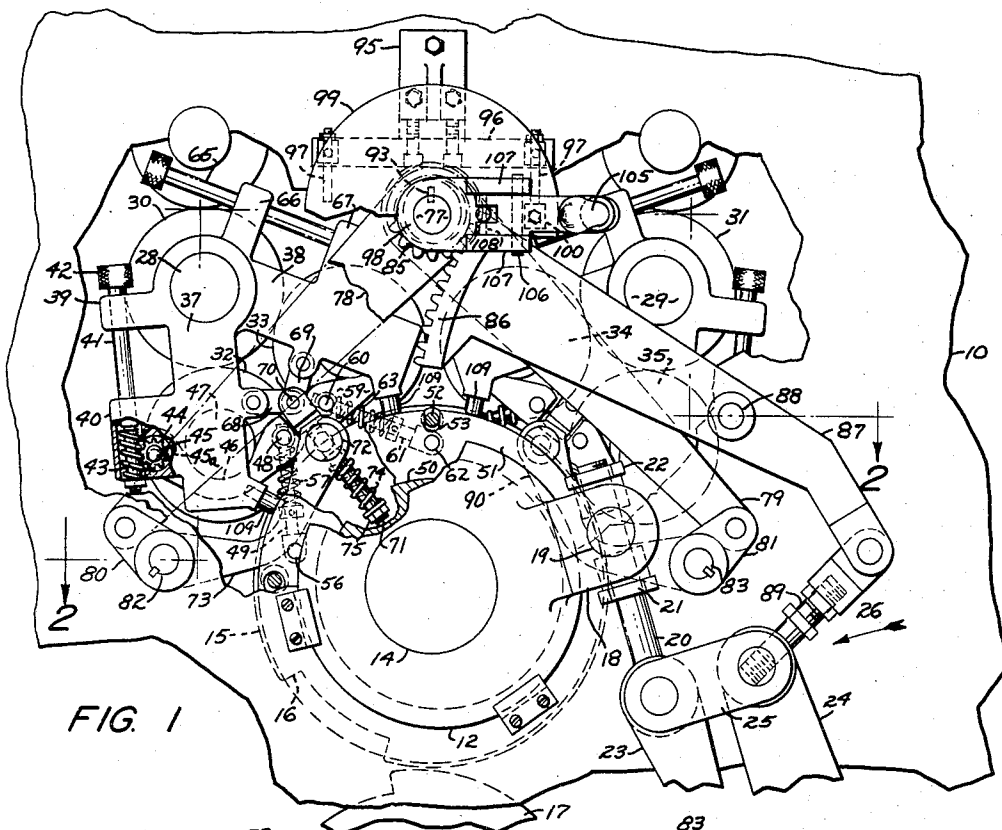


FIG. 1

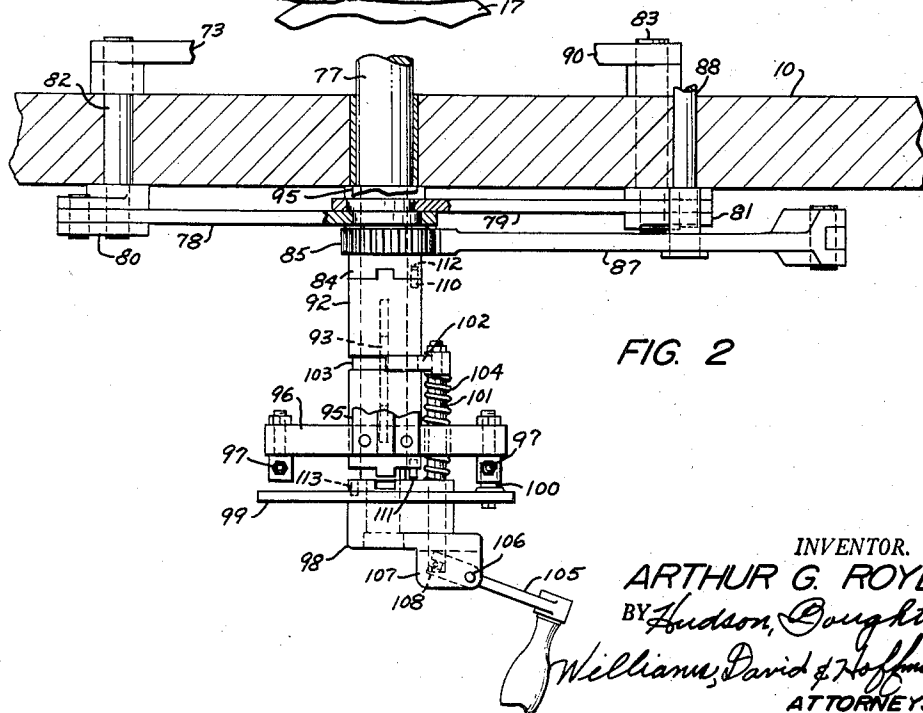


FIG. 2

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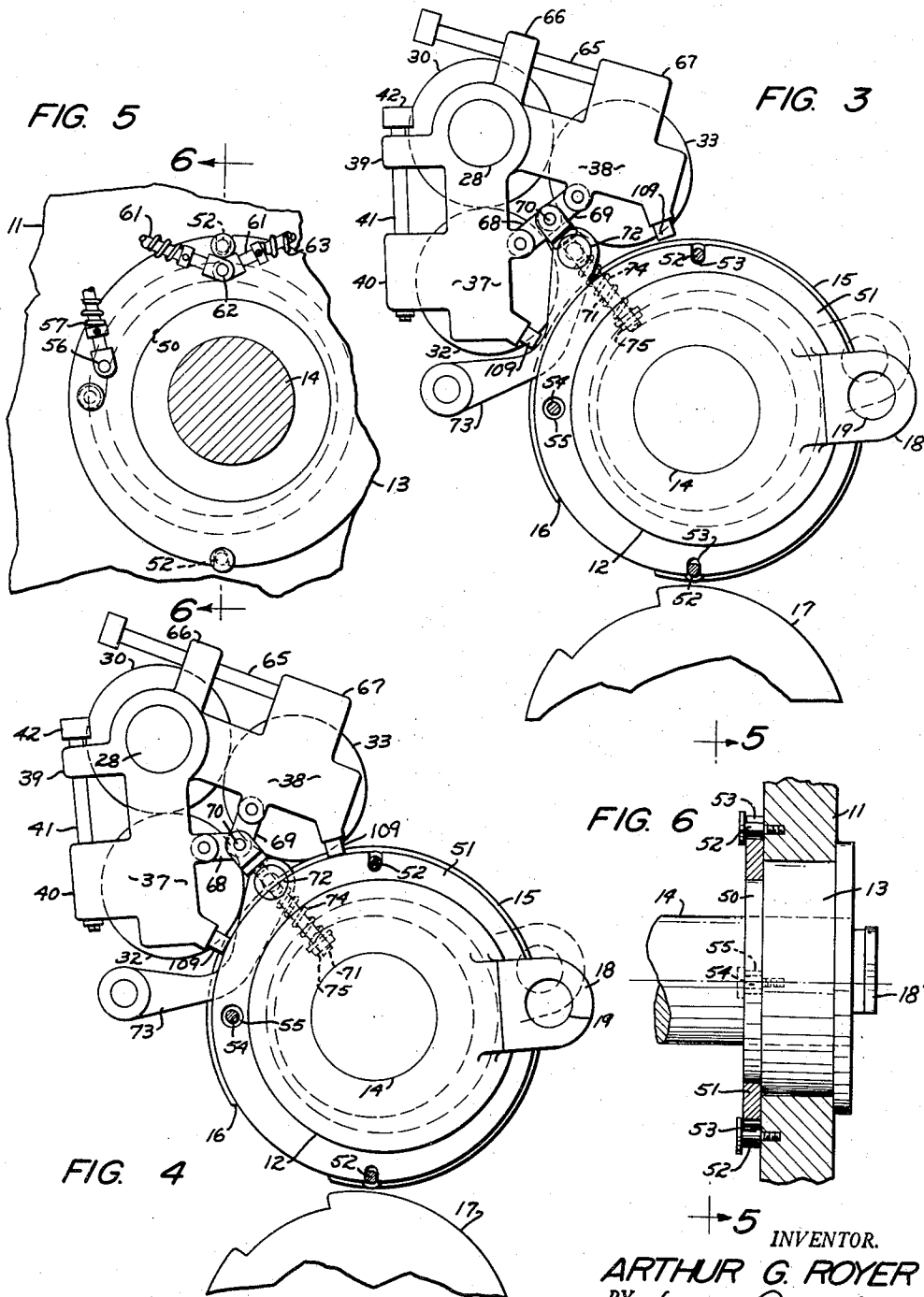
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1

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PLATE CYLINDER AND INKING ROLLER THROWOFFS

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This invention relates to improvements in plate cylinder and inking roller throwoffs.

Whenever there is an interruption in sheet feeding in a modern printing press the cylinders continue to turn but impression is thrown off, that is to say certain normally contacting cylinders are separated a short distance so that no impressions are made while sheets are absent. It is also the practice to separate the form rollers from the plate cylinder at the same time so that excessive inking of the plate cylinder will not occur.

In some cases throwoff of impression involves bodily movement of a printing cylinder normally contacting the plate cylinder while the axis of the plate cylinder remains fixed. With that type of machine we are not here concerned. In other cases however the plate cylinder must be moved, usually in an up or down direction, to separate it from a cylinder below or above it, and it is this type of press to which the present invention applies. The form rollers of the inker are usually disposed above or below the plate, and when the plate is thrown off upwardly or downwardly the form rollers generally move in the same direction as the plate cylinder and have further movement in the same direction in order to break connection with the plate cylinder.

After an interruption of printing the plate on the plate cylinder should be inked preparatory to the resumption of printing. In some prior art devices, the form rollers are spring pressed against the plate cylinder and when the throwoff occurs this spring means is compressed due to the cylinder movement. If throwoff of the form rollers is additionally provided then further compression of the spring means occurs due to the consequent movement of those rollers. Now when the form rollers are returned to contact with the plate in its thrown off position for the purpose of pre-inking the plate, the spring pressure urging the form rollers against the plate cylinder is still higher than when the plate cylinder is in printing position. This is not desirable for a good inking action and furthermore it accentuates "bounce" of the form rollers as the gap in the cylinder passes them.

One of the objects of the present invention is to overcome the difficulties above mentioned and to provide mechanism which will maintain the pressure of the form rollers against the plate uniform at all times when there is contact between them.

Another object is to provide an improved mechanism for automatically throwing the plate cylinder to off position and simultaneously throwing the form rollers away from said plate cylinder.

Another object is the provision of stop rings bodily movable with the plate cylinder between on and off positions, against which rings abutments moving with the form rollers bear for determining or limiting the degree of pressure between the form rollers and the cylinder under all conditions.

Still another object is the provision of means, operable after automatic throwoff of cylinder and rollers, for disabling that portion of the mechanism which pro-

2

duced roller throwoff and for bringing into operative position manual means for moving the form rollers into contact with the plate cylinder for preliminary inking of the cylinder and for returning the mechanism to position for full automatic operation when the manual means has been released.

Other objects and features of novelty will appear as I proceed with the description of that embodiment of the invention which, for the purposes of the present application, I have illustrated in the accompanying drawings, in which

Fig. 1 is a fragmental side elevational view of a plate cylinder and form rollers with throwoff mechanism embodying the present invention;

Fig. 2 is a fragmental plan view partly in section on the line 2—2 of Fig. 1;

Fig. 3 is a more or less diagrammatic view illustrating the plate cylinder thrown off from a cooperating cylinder therebeneath and the form rollers thrown off from the plate cylinder;

Fig. 4 is a view similar to Fig. 3 but showing the form rollers down in contact with the plate cylinder for preliminarily inking the latter;

Fig. 5 is a partial view taken on the line 5—5 of Fig. 6, and

Fig. 6 is a sectional view taken substantially on the line 6—6 of Fig. 5.

In the drawings side members of a printing press frame are indicated at 10 and 11. At opposed points in these side members there are oscillatably mounted circular blocks or disks 12 and 13 carrying eccentrically bearings for shaft 14 of a plate cylinder 15. This cylinder carries a planographic plate, the ends of which are secured to the cylinder within a gap 16 in accordance with conventional practice. Normally, that is during printing, the plate on plate cylinder 15, contacts a cooperating cylinder 17. In the case of an offset printing press cylinder 17 would be a blanket cylinder. The oscillatable blocks 12 and 13 carry bifurcated lugs 18 and 18', in each of which there is mounted a pivot 19 that is transversely bored to receive a link 20 upon which nuts 21 and 22 are threaded and by means of which the effective length of the link may be adjusted. The lower end of link 20 is pivotally connected with a swingable arm 23, and between this arm and a second swingable arm 24 there is a connecting link 25. The lower ends of arms 23 and 24 are mounted upon pivots, not shown. The parts are shown in Fig. 1 in normal printing position.

Should there be an interruption in the feeding of sheets an automatic control of conventional character would swing arm 24 counterclockwise or in the direction of arrow 26, which would turn blocks 12 and 13 clockwise as viewed in Fig. 1 and thereby move shaft 14 and cylinder 15 eccentrically from the position of Fig. 1 to that of Fig. 3, thus separating or throwing off plate cylinder 15 from its cooperating cylinder 17.

In the frame members 10 and 11 there are rotatably mounted the shafts 28 and 29 of two storage rollers 30 and 31 forming parts of an inking mechanism. These shafts therefore turn upon fixed axes. Form rollers 32 and 33 remain in contact at all times with storage roller 30 and form rollers 34 and 35 remain in contact at all times with storage roller 31. The mounting of storage roller 31 and form rollers 34 and 35 is the same as that of storage roller 30 and form rollers 32 and 33, and therefore the latter only will be described in detail.

Oscillatable about each end of shaft 28 there are two arms 37 and 38. Arm 37 carries laterally extending lugs 39 and 40 in which there is rotatably mounted a rod 41 having a knurled head 42, the lower end of this rod being provided with a worm 43 which meshes with a worm wheel 44 that is fixed to a short shaft 45 which

is journaled in lug 40. Shaft 45 carries eccentrically a pivot 45a on which one end of a stirrup 46 is pivotally supported. The stirrup 46 constitutes an open bearing for one end of a shaft 47 that carries the form roller 32. The other end of this stirrup is mounted upon a pivot 48 which is carried at the upper end of a rod 49.

Each of the blocks 12 and 13 carries a shoulder 50 that is concentric with the bearing for shaft 14. A ring 51 is mounted on shoulder 50, the shoulder being adapted to turn to a limited extent within the ring. Ring 51 is held against rotational movement by means of headed pins 52 which are threaded into the adjacent frame member and extend through vertical slots 53 in the upper and lower portions of the ring. Other threaded and headed pins 54 mounted in the frame extend through holes 55 of greater diameter than the diameter of the pins and thus permit movement of the ring vertically while preventing its movement away from the frame. Although part 51 is preferably a ring, a member of some other shape may be employed provided that it is so formed as to act equally upon the two abutments or feet 109 later to be described. Also the part 51 instead of being held stationary by means of the pins 52 may revolve with the shaft 14 although in such case the abutments 109 should take the form of rollers in order to reduce friction.

The lower end of rod 49 is pivotally connected at 56 with ring 51. Surrounding rod 49 there is a pre-loaded spring 57 which functions to urge stirrup 46 upwardly or outwardly and thereby to maintain desired pressure of form roller 32 against storage roller 30. A stirrup 59 similar in all respects to stirrup 46 functions to hold form roller 33 with proper pressure against storage roller 30, one end of the stirrup being supported by a pivot 60 carried at the upper or outer end of rod 61 similar to rod 49 and pivotally connected at 62 to ring 51. Rod 61 carries a preloaded spring 63. The opposite end of stirrup 59 is mounted upon a pivot which is adapted to be moved eccentrically for adjustment purposes by a worm and worm wheel similar to worm 43 and worm wheel 44 previously described, the worm being mounted upon a rod 65 rotatable in lugs 66 and 67 on arm 38 in the same manner as rod 41. If the ring 51 were to be made rotatable the pivots 56 and 62 would be attached to the frame 10.

Arms 37 and 38 are connected together by a pair of toggle links 68 and 69, the elbow joint of which is formed by a pivot 70 whose ends are mounted in the bifurcated head of a rod 71 which projects through a bore in a pivot 72 carried at one end of a lever 73. A spiral spring 74 surrounding rod 71 bears at one end against pivot 72 and at the other end against a nut 75 by means of which its force may be adjusted.

Extending through the machine and journaled in opposite side walls thereof there is a throwoff shaft 77 near the opposite ends of which there are eccentric portions which are encircled by eyes in arms 78 and 79 extending diagonally downward and pivotally connected at their lower ends to cranks 80 and 81 which are keyed to short shafts 82 and 83 mounted in the frame. Carried by a collar 84 which is rotatable on the shaft there is a pinion 85 with which a gear sector 86 meshes. This sector is integral with a lever 87 that is oscillatable upon a pivot pin 88 and the lower bifurcated end of which receives a rod 89 that is adjustable as to length and is pivotally connected with the upper extremity of arm 24.

Lever 73 is keyed to short shaft 82 and lever 90 similar in construction and function to lever 73 is keyed to short shaft 83. When impression is thrown off in response to automatic control means, not shown, arm 24 swings counterclockwise and lever 87 is thereby moved clockwise, causing sector 86 to rotate pinion 85 counterclockwise. On one end of shaft 77 there is a sleeve 92 which is slidable lengthwise of the shaft and is held against rotation by a key 93. As shown in Fig. 2, this sleeve is clutched to collar 84 so that the rotation of col-

lar 84 and pinion 85 by sector 86 turns shaft 77. Because of the eccentric connections of arms 78 and 79 with the shaft these arms are pushed downwardly, turning shaft 82 counterclockwise and shaft 83 clockwise. Lever 73 is thus swung counterclockwise and lever 90 clockwise, which acts through rod 71 and a similar rod at the right side of Fig. 1 to spread the toggle links 68, 69 and similar links on the right side of the machine and put the toggles on-toggle, thereby swinging the arms 37, 38 and similar arms on the right side of the machine away from each other to separate the rollers of each pair from each other and from the plate cylinder, as indicated in Fig. 3.

Supported in a suitable manner upon the side of the frame member 10 there is a bracket 95 which carries a horizontal bar 96 at the ends of which there are mounted downwardly extending stops 97. A casting 98 is rotatably mounted on the forward extremity of shaft 77. The casting is held against endwise movement on the shaft by shoulders on the latter. The casting carries a plate 99 from which extends a rearward projection 100 that is adapted to contact one or the other of the two stops 97 and thus limit the rotation of plate 99 and casting 98 to an angle of 180° approximately. In the casting 98 there is slidably mounted a rod 101 at the inner end of which there is carried a yoke 102 which runs in an annular groove 103 in sleeve 92. A spiral spring 104 surrounding rod 101 and bearing at its ends against casting 98 and yoke 102 tends to move sleeve 92 rearwardly or into clutching position with collar 84. The sleeve may be shifted forwardly however by a forward pull on rod 101 which is effected by a hand crank 105 that is mounted on a pivot pin 106 extending between bifurcations 107 on casting 98. The inner end of crank 105 is slotted to straddle a small pin 108 mounted in rod 101, so that when the crank is swung counterclockwise about pivot 106 as viewed in Fig. 2, rod 101 is pulled forward causing yoke 102 to shift sleeve 92 forward into clutching position with the casting. This leaves collar 84 and pinion 85 free to turn upon the shaft.

Then the operator may turn the crank 105 clockwise from the Fig. 2 position through 180° approximately, turning the shaft 77 accordingly, which moves levers 73 and 90 in a direction to break the toggle connections, whereupon the spring 74 and its counterpart on the opposite side of the plate cylinder pull the arms 37 and 38 and the similar arms on the opposite side toward each other and the form rollers toward the cylinder. This movement is limited by abutments or feet 109 mounted in the inner ends of the arms which contact the periphery of rings 51. These abutments may be threadably mounted in the arms and may be adjusted inwardly and outwardly by means of such threaded mounting if desired. The position of the parts after the form rollers have been lowered into contact with the thrown off plate cylinder for preliminary inking is illustrated in Fig. 4.

The sleeve 92 carries two aligned pins 110 and 111 which are adapted to enter holes 112 and 113 in collar 84 and casting 98 respectively in the two different rotational positions of the shaft 77 and sleeve 92. The position of printing is shown in Figs. 1 and 2. Now when impression is thrown off automatically the pinion 85, which is then keyed to shaft 77 through sleeve 92, will move counterclockwise through a 180° angle approximately, sleeve 92 moving along with it. The eccentric mounting of the plate cylinder 15 will throw that cylinder out of contact with cylinder 17 and the simultaneous rotation of pinion 85 will operate through the eccentrically connected arms 78 and 79 to throw the form rollers off the cylinder to the positions indicated in Fig. 3, and at the same time to turn pin 111 into alignment with hole 113.

Now in order to preliminarily ink the plate cylinder, the operator pushes inwardly on the crank handle 105, thereby by clutching sleeve 92 to casting 98 and freeing collar 84

5

with its pinion 85, after which he turns the crank clockwise through an angle of 180° substantially which swings the lever 73 and similar levers to break the toggle connections and enable spring 74 and similar springs to pull arms 37 and 38 at both sides of the machine and their counterparts on the opposite side of the plate cylinder toward each other and to draw the form rollers into engagement with the plate cylinder to the extent permitted by the engagement of abutments 109 with ring 51. This is the position of Fig. 4. The pinion 85 and cylinder throwoff mechanism remain in the same position as in Fig. 3. Levers 73 and 90 return to their normal position of Fig. 1. Spring 74 and other corresponding springs are compressed between nuts 75 and pivots 72 and therefore tend to exert greater pressure of rolls 32 and 33 against the surface of cylinder 15 than when the cylinder is in printing position. This tendency is overcome however by the engagement of abutments 109 with rings 51. This engagement limits the pressure exerted by the springs and maintains it uniform whether the cylinder be in printing or thrown off position.

The sleeve 92 is now back again in the angular position of Fig. 2 and so is the shaft 77. The crank 105 is then released. Sleeve 92 remains in clutching relation to the casting 98 until the throw-off mechanism for the plate cylinder is operated to move the plate cylinder to the blanket cylinder. As soon as the plate cylinder is so moved, the pin 110 and hole 112 and other corresponding engageable parts on the sleeve 92 and collar 84 become aligned. The previously compressed spring 104 therefore slides the sleeve 92 toward the collar 84 so that subsequent operation of the throwoff mechanism will move both the plate cylinder and form rolls automatically.

When the plate cylinder is finally lowered into operating contact with cylinder 17, the form rollers 32, 33 and the corresponding rollers on the opposite side of the cylinder follow the cylinder down under the influence of the springs 74, but only so far as the abutments 109 contacting ring 51 permit. In earlier machines where the plate cylinder in moving toward off position moves also toward the mounting for the form rollers, the pressure of the rollers on the cylinder in that position is necessarily greater than in printing position. Consequently when the cylinder is being inked preparatory to resumption of printing there is more "bounce" of the form rollers as the gap passes under them than when the cylinder is in printing position, and this effect is highly objectionable. In the case of the present invention on the contrary, the pressure is the same in all positions.

While the invention has been described in relation with inking form rolls, it should be understood that it is applicable also for use with dampening form rolls.

Having thus described my invention, I claim:

1. In a printing press, a plate cylinder laterally movable toward and away from printing position, a plate on said plate cylinder, pairs of arms at opposite sides of the press mounted to swing about a common fixed axis parallel to said cylinder, two form rollers, bearings for said form rollers carried by opposed arms and adapted to provide operative engagement of said rollers with the plate on said cylinder, spring means for biasing said arms toward each other and said form rollers toward said plate cylinder means mounted at the ends of said cylinder portions of which at least are concentric with and equidistant from the axis of the plate cylinder at all times, and an abutment on each of said arms adapted to engage the concentric portions of said last-named means for limiting the motion of said rollers toward the plate on said cylinder under the influence of said spring means.

2. A printing press substantially as defined in claim 1, comprising a printing cylinder in printing relation with said plate cylinder, automatic means for throwing off said plate cylinder from said printing cylinder and simultaneously spreading said arms to throw said form rollers off from said plate cylinder, and manual means for swing-

6

ing said arms toward each other until said abutments again engage said concentric means, whereby said rollers are caused to contact said plate cylinder with the same pressure as when said plate cylinder is in printing relation with said printing cylinder and whereby the plate cylinder may be inked preparatory to resumption of printing.

3. A printing press substantially as defined in claim 1, comprising an ink storage roller rotatable about said fixed axis in engagement at all times with said form rollers.

4. A printing press substantially as defined in claim 3, comprising means operatively connected with said arms for urging said bearings toward said storage roller, wherein each of said bearings is adjustably connected on one side to the adjacent arm and on the other side is resiliently supported from one of said concentric means.

5. In a printing press, a frame, opposed coaxially oscillatable blocks mounted therein, eccentric bearings in said blocks, a plate cylinder mounted in said bearings, means for oscillating said blocks to move said cylinder toward or away from printing position, external bearings on said blocks coaxial with said cylinder bearings, rings at the ends of said cylinder mounted on said external bearings and having peripheral portions concentric with and equidistant from the axis of the plate cylinder at all times means for restraining said rings against rotation and against oscillation of said blocks, pairs of arms at opposite sides of the press mounted to swing about a common fixed axis parallel to said cylinder on the side thereof toward which throw-off movement takes place, spring means for biasing the arms of each pair toward each other and toward said cylinder, two form rollers, bearings for said form rollers carried by corresponding opposed arms and adapted to provide operative engagement of said rollers with said cylinder, and an abutment on each of said arms adapted to engage the peripheral portions of said rings for limiting the motion of said rollers toward said cylinder.

6. A printing press substantially as defined in claim 5, comprising automatic means for simultaneously turning said oscillatable blocks to move said cylinder into throw-off position and for swinging said arms apart to move said rollers out of engagement with said cylinder.

7. A printing press substantially as defined in claim 6, comprising means for manually swinging said arms toward each other while the cylinder is in throwoff position until said abutments strike said rings, said spring means being adapted to yield when said rings are moved toward the rollers, whereby the pressure of said rollers against said cylinder is maintained constant under all conditions.

8. A printing press substantially as defined in claim 6, comprising manually operable means for disabling that portion of the automatic means which oscillates said blocks and operating that portion which permits said spring means to draw said arms toward each other until said abutments strike said rings and pressure between said rollers and said cylinder is restored.

9. A printing press substantially as defined in claim 8, comprising a throwoff shaft operatively connected with said spring biasing means, a pinion loosely surrounding said shaft and a crank on said shaft rotatable with respect thereto, a sleeve surrounding said shaft between said pinion and said crank slidably keyed to the shaft, said sleeve having clutch teeth adapted to engage either said pinion or said crank, said sleeve being biased toward pinion clutching position, automatic means for turning said pinion to rotate said shaft and set said spring biasing means into operation, and means for moving said sleeve to disengage said pinion and engage said crank, whereby the automatic means is disengaged from said shaft and said crank is connected thereto.

10. In a printing press, a frame, a plate cylinder, movable mountings for rotatably supporting the ends of said cylinder in said frame, a pair of form rolls engageable with said plate cylinder, pairs of arms at opposite sides

7

of the press mounted to swing about a common fixed axis on the side of said rolls remote from the plate cylinder, the ends of said arms journalling said form rolls a second cylinder with which said plate cylinder is engaged during printing, means for moving said plate cylinder laterally from said second cylinder and for spreading said arms to move said form rolls from said plate cylinder when printing is interrupted, a non-rotatable member at each end of said plate cylinder movable bodily therewith and each having at least a portion thereof concentric with said plate cylinder at all times, spring means biasing said arms toward each other and thereby said form rolls toward said plate cylinder, an abutment on each arm adapted to engage the portions of those members concentric with the plate cylinder whenever the form rolls are engaged therewith, and means for moving said form rolls into engagement with said plate cylinder while said

8

cylinder is out of contact with said second cylinder, said cooperating abutments and members limiting the return movement of said form rolls toward said cylinder under the influence of said spring means so that the same pressure relationship of form rolls to plate cylinder exists for all positions of said plate cylinder whenever they are engaged.

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