Jan. 27, 1931. E. F. DUDLEY 1,790,465

PRINTING PRESS CONTROL MECHANISM

Filed June 15, 1928 3 Sheets-Sheet 1

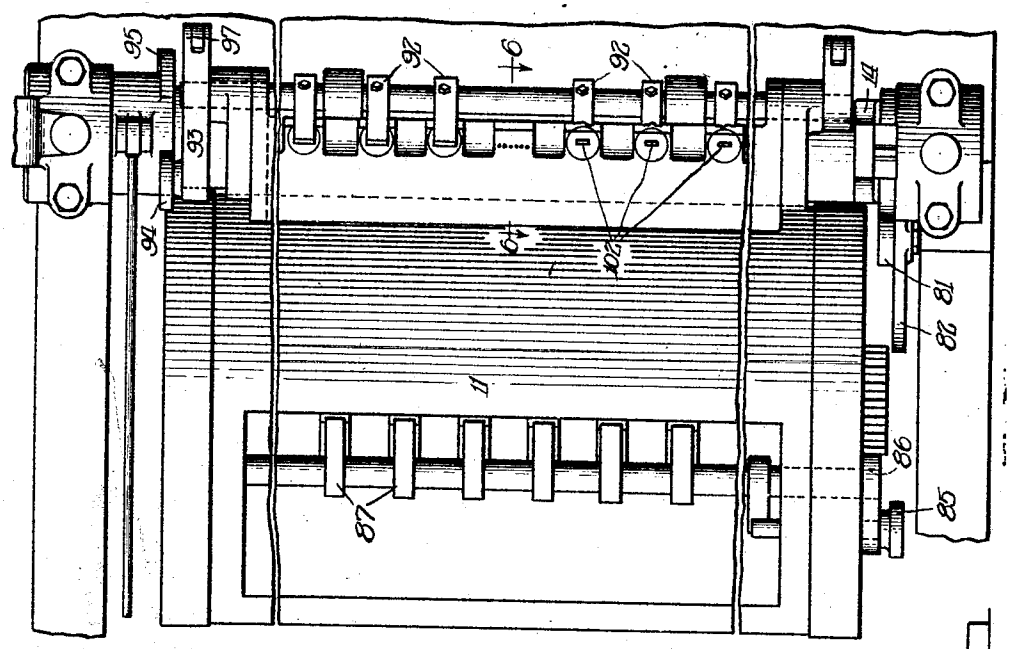

Fig. 2.

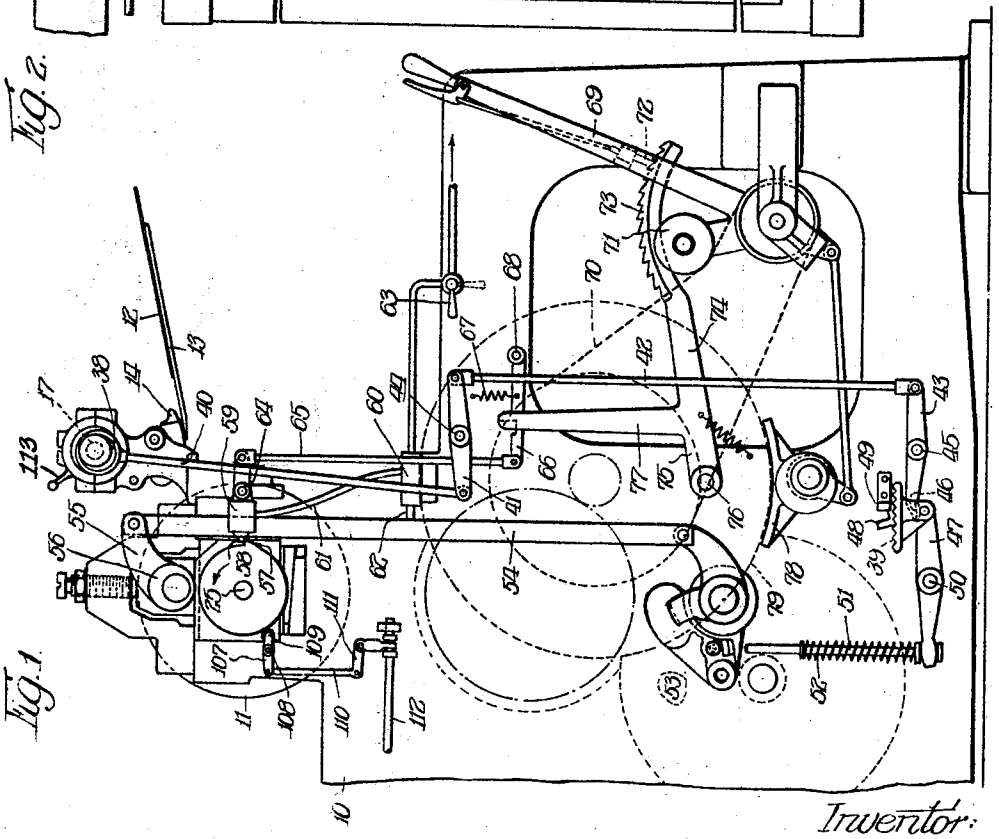

Fig. 1.

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PRINTING PRESS CONTROL MECHANISM

Filed June 15, 1928. 3 Sheets-Sheet 2

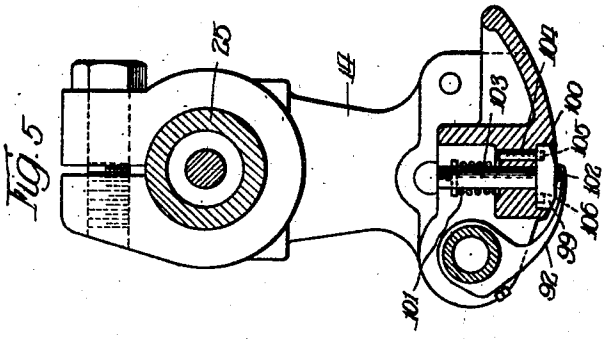

Fig. 5

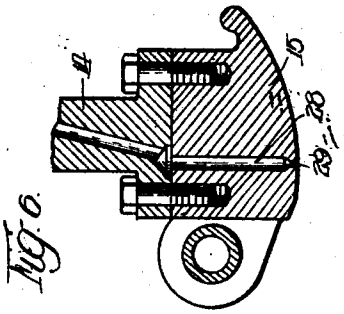

Fig. 6

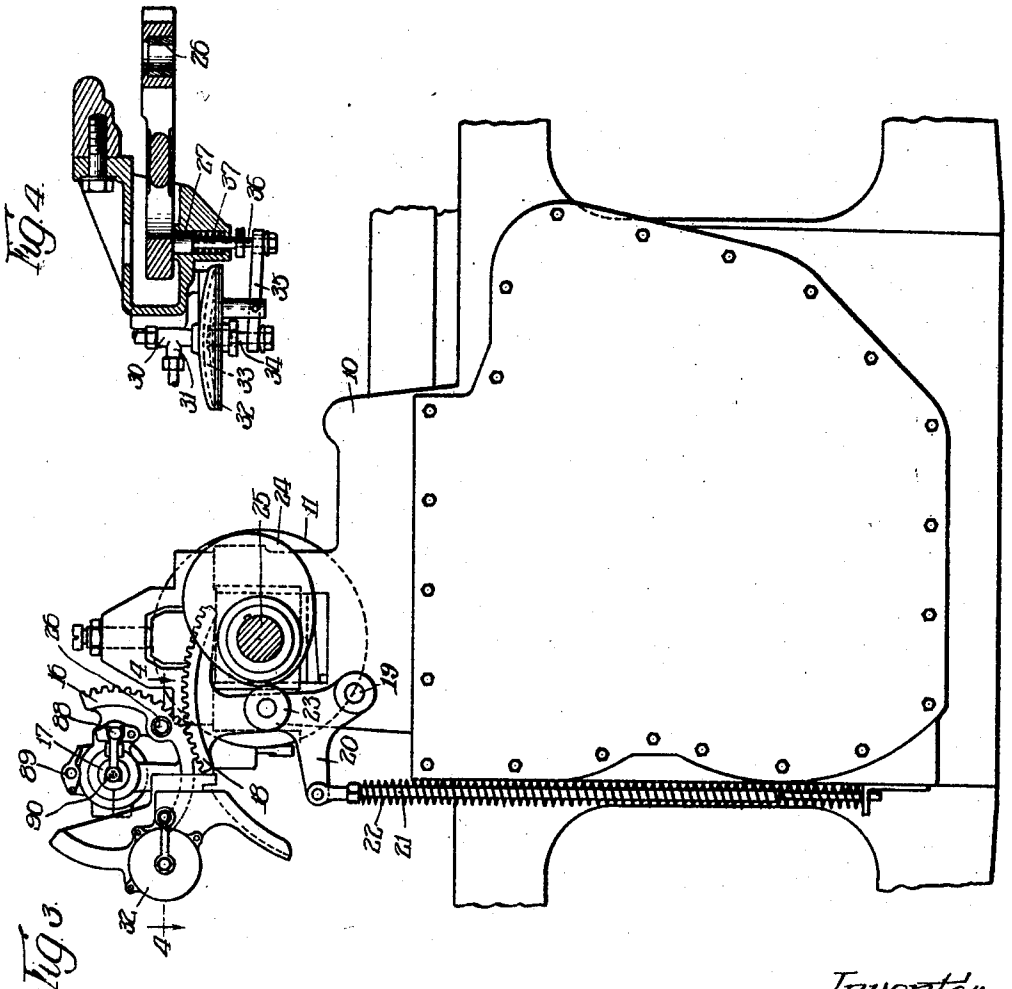

Fig. 4

Fig. 3

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PRINTING PRESS CONTROL MECHANISM

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Fig. 8.

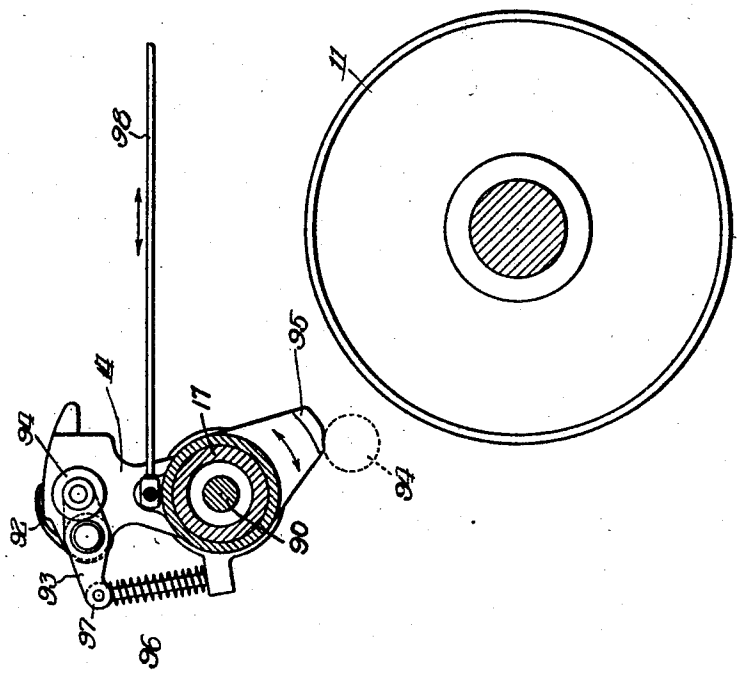
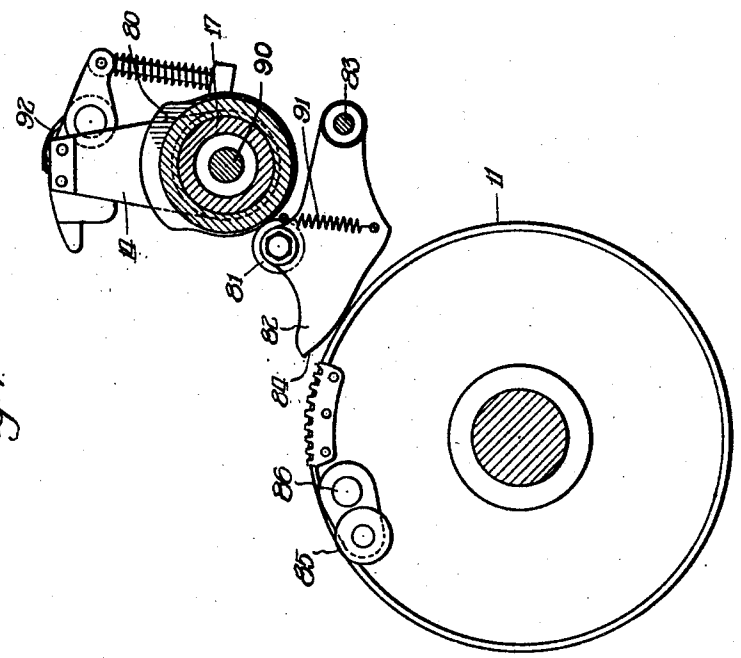


Fig. 7.



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UNITED STATES PATENT OFFICE

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PRINTING-PRESS-CONTROL MECHANISM

Application filed June 15, 1928. Serial No. 285,615.

This invention relates to printing presses and more particularly to automatic control mechanism therefor.

The invention specifically applies to that type of printing presses in which the sheets to be printed are transferred from sheet supply means to the impression cylinder or member of the press by means of oscillating gripper mechanism, commonly known in the art as stop gripper or transfer gripper mechanism.

Such transfer gripper mechanism usually comprises a gripper bar mounted to swing to and fro between the sheet supply means and the impression cylinder, and adapted to engage a sheet while at rest on such supply means. Thereupon the sheet is conveyed by the transfer gripper mechanism toward the cylinder at a speed which is accelerated to attain the surface speed of the cylinder at the moment when the sheet so conveyed is transferred from the transfer grippers to the grippers of the impression cylinder.

One of the principal objects of my invention is to provide automatic operating mechanism, whereby, when a sheet is not presented to the grippers of the transfer gripper mechanism, the latter is rendered ineffective, while the press itself can still continue to operate if required, so that the sheets, which at that time are passing through the press, can be delivered without interrupting the operation of the press itself.

Another object of my invention resides in the provision of means whereby the transfer gripper mechanism can be swung out from its operative position into an inoperative position.

In order to attain these and other objects which will be apparent from the following description and appended claims, I provide pneumatically controlled mechanism adapted to perform a combination or series of functions occurring under different conditions. For example, when the transfer gripper mechanism is swung by hand into its inoperative position, the impression cylinder grippers are rendered inoperative, while the press itself can continue to operate if so desired. By swinging said mechanism into such position, the cylinder is readily accessible for make-ready.

When a sheet misses, that is to say, when a sheet is not presented to the transfer mechanism, or when it is presented thereto out of proper register, then the transfer gripper mechanism is automatically locked in one of its end positions, namely, when it is adjacent the edge of the feed table over which the sheets are conveyed, and, unless the vacuum line to the automatic stop mechanism is shut off, the cylinder and therewith the ink fountain are tripped and the press stopped.

I will now proceed to disclose a preferred embodiment of my invention and describe consecutively the arrangement and groups of the various parts whereby certain functions are attained.

For the purpose of simplification, I have illustrated in the accompanying sheets of drawings merely those parts of a printing press that are essential to render the invention succinct to anyone skilled in the art, the same reference characters applying to like parts throughout the several views.

In these drawings:

Figure 1 is a partial side elevation of a printing press to which my invention is applied and shows the general arrangement of the parts comprising the improved control mechanism;

Figure 2 is a fractional plan view of Figure 1, indicating the arrangement of the impression cylinder grippers and the operating mechanism for the stop grippers, the latter, however, being shown in the inoperative position, i. e. when the bar on which they are mounted is swung upward 180° from the position illustrated in Figure 1;

Figure 3 is a partial side elevation showing substantially the same section of the press as illustrated in Figure 1, but taken from the opposite side of the press;

Figure 4 shows a fractional cross-section of a detail taken along line 4—4 of Figure 3;

Figure 5 is a detail sectional view taken through the transfer gripper mechanism and illustrating a preferred construction and arrangement of the stop grippers and their cooperating gripper pads;

Figure 6 is a detail sectional view taken through the transfer gripper mechanism and indicating the arrangement of an air duct whereby the pneumatic mechanism for automatically locking the transfer gripper mechanism is controlled;

Figure 7 illustrates the relative arrangement of the impression cylinder gripper operating mechanism to the transfer gripper mechanism, the latter being shown in its inoperative position, i. e. swung up 180° from the position shown in Figure 1; and

Figure 8 indicates the arrangement of the transfer gripper actuating mechanism.

As is apparent from the accompanying drawings, the printing press to which the invention is applied is of the two-revolution type and comprises a main frame 10 which supports, among other things, an impression cylinder 11 in any suitable manner commonly known in the construction of printing presses.

The sheets 12 are conveyed from stock supply means downwardly over the feed table 13 by any preferred mechanism, and the leading edge of each individual sheet is brought to bear against front guides preferably carried on the swingably mounted transfer gripper arm 14 as will be more clearly described hereinafter. When a sheet has been properly presented to the front guides, its leading edge is engaged by the grippers on the arm 14 and the latter is swung away from the feed table 13 and towards the impression cylinder 11 for the purpose of transferring the sheet to the grippers of the latter.

Preferably the gripper bar 14 extends over the entire width of the sheet feeding or registering mechanism so as to serve for the purpose of straightening out the leading edge of the sheets fed to the transfer grippers, therewith assuring perfect register of the sheets against the front stops.

From the beginning of the transfer movement of the transfer gripper mechanism, the speed of said mechanism is accelerated to attain the surface speed of the impression cylinder so that the sheet will be transferred from the transfer grippers to the impression cylinder grippers at cylinder speed. When the invention is applied in connection with a two-revolution press as shown it is of advantage to swing the transfer gripper arm 14 forward during one revolution of the cylinder 11 and to return it to its sheet engaging position during the subsequent revolution of the cylinder.

A preferred form of means to oscillate the transfer gripper mechanism comprises a gear sector 16 mounted on the rock shaft 17 which carries the arms 14 of the transfer gripper mechanism. The sector 16 meshes with another gear sector 18, which is pivotally supported on the machine frame at 19. The sector 18 is formed with a laterally extending arm 20 to the extreme end of which is pivoted an operating rod 21, the free end of which is slidably supported in any suitable manner. A coil spring 22 embraces the rod 21 and acts to push the arm 20 upwardly and the roller 23 against the cam 24, which is keyed to the impression cylinder shaft 25 so as to rotate with the cylinder during the operation of the press. When the roller 23 rides from the high portion of cam 24 towards the low portion of said cam, the sector 18 will be moved to the right as viewed in Figure 3, and swing the sector 16 upwardly, thereby swinging the transfer gripper arm 14 in an anti-clockwise direction according to Figure 3, or in a clockwise direction as viewed in Figure 1.

As is shown in Figure 4, the sector 16 is formed with a recess 26 adapted to receive a plunger 27 of a vacuum mechanism controlled by the air ducts 28 and pin holes 29 in the transfer gripper bar 15.

While the plunger 27 is withdrawn as shown in Figure 4, the sector 16, and therewith the transfer gripper mechanism, is free to oscillate between the feed table 13 and the impression cylinder 11.

I will now describe the means whereby the transfer gripper mechanism is automatically locked, i. e. held in its inoperative position, in the event that a sheet does not reach the transfer grippers, or when a sheet is not properly registered with relation to the front guides.

Referring to Figures 4 and 6, the inner end of the air duct 28 is connected to a nipple 30 of the pneumatic mechanism for holding the transfer gripper mechanism in its inoperative position. Another connection leads from the nipple 31 to a vacuum pump or the like. Within the vacuum box 32 is arranged a diaphragm 33, which, during normal operation of the press, is in the position indicated in broken lines in Figure 4. The diaphragm 33 is operatively connected with the plunger 27 by means of a stem 34, lever 35 and stem 36 of the plunger 27.

With the diaphragm 33 in the position as shown, the plunger 27 will be held against the action of a compression spring 37 and therefore will not enter the recess 26 when the latter is brought in alignment therewith during the oscillation of the sector 16. However, when a sheet of material is not presented to the transfer gripper mechanism, the pin holes 29 will not be sealed and the air will not be exhausted from the vacuum box 32, consequently the spring 37 will force the plunger 27 outwardly so as to extend into the recess 26 when presented in alignment therewith. At that moment, the high portion of the operating cam 24 will be in position opposite to that illustrated in Figure 3, and the sector 18, which meshes with the sector 16 as hereinbefore described, will have been moved to the left due to the cooperation of

the roller 23 with the cam 24. Therefore, during continued rotation of the cylinder shaft 25, to which the cam 24 is secured, the roller 23 will be held out of engagement with cam 24 and against the tension of the spring 22.

Normally the locking of the transfer gripper mechanism against oscillation will also cause the impression cylinder to trip, and consequently stop the press. However, when the vacuum connection, whereby the mechanism for tripping the impression cylinder and for stopping the press is controlled, is shut off, the impression cylinder will be held in its tripped position but will be still permitted to rotate inasmuch as the press will not be stopped under such conditions.

The arrangement and operation of the mechanism whereby the impression cylinder is tripped and the press stopped is as follows, references being made to Figure 1:

The transfer gripper shaft 17 carries at its outer end, preferably at the feeder side of the press, an eccentric 38 connected to the free end of the operating rod 40 so that said rod moves up and down as the transfer grippers oscillate between the table 13 and the cylinder 11. This movement of the rod 40 is transmitted to the manually operable trip lever 39 of the press by means of lever 41, rod 42 and lever 43. The lever 41 is mounted to rock about stud 44, while the lever 43 is pivotally mounted at 45 to the machine frame.

The free end of the lever 43 bears against the free end of the lever 47, so that when lever 43 is caused to move the lever 47, i. e. the trip pedal 39, downwardly, the ledge 48 provided on the trip pedal will be able upon manual actuation to engage beneath the stop 49, at which time the impression cylinder will be raised off impression, i. e. will be in its tripped position.

Figure 1 shows the relative cooperating parts in a position just prior to the moment when the impression cylinder 11 is tripped, that is to say, the rod 40 has almost reached its lowermost position. The lever 47 is pivoted at 50 to the machine frame and its free end carries an operating rod 51, which is normally pressed downwardly by means of a coil spring 52.

By depressing the trip pedal 39, the rod 51 will be moved upwardly, thereby disconnecting those parts of the trip mechanism 53 which normally operate to move the cylinder 11 down onto impression by means of the connecting bar 54, which is pivotally mounted to the free end of the arm 55, whereby the eccentric 56 is rocked to operatively engage the bearings of the impression cylinder 11 for the purpose of moving the latter up and down. As the press is of the two-revolution type, however, the return oscillating movement of the transfer gripper shaft 17 serves to retract or move downwardly the operating rod 51 to reseat the trip mechanism 53 in time to enable the impression cylinder to move downwardly for its impression stroke. When the transfer grippers are locked, however, in the event that a sheet is not presented to the mechanism, this return oscillating movement does not take place and the rod 51 is held in its upward position. The trip mechanism 53 is thus held in tripped position and the cylinder 11 prevented from moving downward for its impression stroke.

The trip mechanism 53, whereby normally the impression cylinder 11 is moved into and out of impression and held in tripped position after operation and locking of the trip pedal 39, may be of any desirable design, such as are well-known in the manufacture of printing presses, and consequently it does not form part of my invention. I have therefore not described the trip mechanism in detail but have merely indicated its important parts in Figure 1.

I will now proceed to describe the means whereby the press is automatically stopped. As shown in Figure 1, the impression cylinder shaft 25 has rigidly secured thereto a disc formed with a stop portion 57 adapted to engage a plunger 58 which projects from the vacuum box 59 when the cylinder 11 is in its raised, i. e. tripped position.

The vacuum box 59 is connected with a vacuum valve 60 by means of a tube 61 within which valve operates a plunger 62, which normally projects from the valve and bears against the operating bar 54. The latter, as the cylinder is moved down onto impression, swings to the right as viewed in Figure 1, and pushes the plunger 62 inwardly, thereby shutting off the connection with the vacuum box 59. By means of the air cock 63, the operator of the press can shut off the connection from the valve 60 to the vacuum pump at will so that air will not be exhausted from the vacuum box 59.

The vacuum box 59 is pivotally mounted at 64 and is provided with a laterally extending arm to which is pivotally secured a connecting rod 65, which in turn is connected with a release lever 66, normally held in the position shown in Figure 1 by means of a tension spring 67, and mounted on a stud 68.

In the position shown, the operating lever 69, whereby tension is applied to the driving belt 70 of the press by means of a tension pulley 71, is held in its operative position, namely it is locked by means of the pawl 72 engaging the teeth of the ratchet 73 provided on the arm 74 of the lever 75, which latter is pivotally mounted at 76. The lever 75 is also formed with an upwardly extending arm 77, the outer end of which rests on the arm 66.

It will be seen that when the plunger extends from the vacuum box 59 and the disc

with its stop portion 57 continues to rotate in the direction indicated, said stop will engage the plunger 58 and swing the vacuum box 59 about its pivot 64, thereby moving the connecting rod 65 downwardly and permitting the lever 75 to drop and to release the engagement of its ratchet 73 with the pawl 72. Thereupon, the pulley 71, which is mounted on the operating lever 69 will release its tension against the belt 70 and simultaneously the lever 69 by its own gravity will drop to the right, thereby automatically applying the brake 78 to the brake wheel 79 indicated in broken lines. This brake mechanism in itself is of a well-known construction and is merely shown as a preferred form in combination with this invention.

The means whereby the impression cylinder grippers are rendered inoperative will be readily understood upon inspection of Figure 7, which shows a cam 80 secured to the transfer gripper shaft 17 to move therewith and to normally cooperate with a roller 81 carried by the cam 82 mounted to pivot about the stud 83. The cam 82 is formed with a cam surface 84 which engages a roller 85 mounted on the cylinder gripper shaft 86 to open the cylinder grippers 87, shown in Figure 2.

In order to render the impression cylinder 11 conveniently accessible for make-ready, etc., the transfer gripper mechanism can be swung out of its operative position.

In Figure 7, the transfer gripper arm 14 is shown in its raised position into which position it is swung by means of a handle 113, and where it is held against operation preferably by means such as indicated in Figure 3, and comprising a plunger 88 engaging within a recess 89. This plunger can be disengaged from the recess 89 by means of a rod 90 arranged to slide within the shaft 17 and adapted to be manually operated from the feeder side of the press, by means of a knot or the like, not shown.

It will be readily understood that with the cam 80 in the position shown in Figure 7, the cam 82 will be held in its raised position by means of a coil spring 91 so that during the rotation of the cylinder 11, the roller 85 will not ride over the cam surface 84.

Figure 8 ilustrates the mechanism for opening and closing the transfer grippers 92. This mechanism comprises a rock arm 93 mounted on the transfer gripper arm 14 and carries a cam roller 94 adapted to cooperate with a cam 95, as indicated in broken lines, to open the grippers 92. Said grippers are held in closed position by means of a compression spring 96 exerting pressure against the outer end 97 of the arm 93.

When the transfer gripper arm 14 is in its position where a sheet is transferred from the grippers 92 to the grippers of the impression cylinder, the cam 95 will be oscillated by means of a rod 98, causing the high portion of the cam 95 to depress the roller 94 and open the grippers 92. A similar cam means may be provided for operating the transfer grippers in the other position of the transfer arm, namely where the grippers 92 take a sheet from the feed table 13, such as indicated in Figure 1.

In Figure 5 I have illustrated a preferred form of gripper pads cooperating with the grippers of the transfer mechanism. The gripper pads 99 which are held within the sockets 100 by means of compression springs 101 are formed with a front stop or guide 102, which is arranged eccentrically to the shaft 103.

Sometimes stock has to be fed, the leading edge of which is not even, and therefore point register is required. That is to say, instead of the sheet registering against each one of the front guides such as 102, some of these guides should be rendered ineffective so that merely a certain number of the front guides will be presented to the front edge of the sheet. I can readily accomplish this by forcing the gripper pads 99 from their sockets 100, and by turning the pads through 180° so that the locking pin 104, which engages the recess 105 will enter the recess 106 formed in the gripper pad.

As indicated in Figure 1, suitable means is provided for tripping the fountain roller of the inking mechanism, one form of mechanism for establishing this purpose comprising a lever 107 which is pivoted at 108 to the machine frame. The arm 109 is connected to the bearing of the cylinder 11 so as to move up and down therewith, consequently rocking the lever 107 and transmitting motion to any suitable fountain trip mechanism by means of the rod 110, bellcrank lever 111 and rod 112.

Preferably I provide a connection with the stop mechanism of the press whereby the press can be conveniently stopped from the delivery end. I have not illustrated any details for such connection, inasmuch as this may be of any convenient design.

It will be readily understood that the construction and general arrangement of the cooperating parts constituting my invention are subject to the embodiment of various modifications without, however, departing from the principles of the invention. Therefore, it is my intention to cover any such modifications that will come within the scope and essence of the appended claims.

I claim:

1. In a printing press, the combination of sheet feeding mechanism, an impression member, and oscillating sheet transfer means to convey a sheet of material at an accelerating speed from said sheet feeding mechanism to said impression member, said transfer means

being adapted to be swung out of its operative position.

2. In a printing press, the combination of sheet feeding mechanism, an impression member, oscillating sheet transfer means to convey a sheet of material at an accelerating speed from said sheet feeding mechanism to said impression member, means to swing said transfer means out of its operative position, and means to retain said transfer means against movement.

3. In a printing press, the combination of sheet feeding mechanism, an impression cylinder, oscillating sheet transfer means to convey a sheet of material from said sheet feeding mechanism to said impression cylinder, means whereby said transfer means can be swung out of its operative position, and means to retain said transfer means against movement in its inoperative position.

4. In a printing press, the combination of sheet feeding mechanism, an impression cylinder, sheet transfer means to convey a sheet of material from said sheet feeding mechanism to said cylinder, and automatically controlled means adapted to hold said transfer means against movement.

5. In a printing press, the combination of sheet feeding mechanism, an impression cylinder, sheet transfer means to carry a sheet of material from said sheet feeding mechanism to said cylinder, and means controlled by the position of a sheet to hold said transfer means against movement.

6. In a printing press, the combination of sheet feeding mechanism, an impression cylinder, sheet tranfer means to convey a sheet of material from said sheet feeding mechanism to said cylinder, and pneumatically actuated means controlled by sheet feeding conditions to hold said transfer means against movement.

7. In a printing press, the combination of sheet feeding mechanism, an impression cylinder having sheet engaging grippers, sheet transfer means to convey a sheet of material from said sheet feeding mechanism to said grippers, and under certain conditions adapted to be held against movement, and means on said sheet transfer means to operate said grippers, the latter being rendered inoperative when said transfer means is held against movement.

8. In a printing press, the combination of sheet feeding mechanism, an impression cylinder having sheet engaging grippers, sheet transfer means to convey a sheet of material from said sheet feeding mechanism to said grippers, means controlled by sheet feeding conditions to automatically hold said transfer means against movement, means to operate said grippers, and means to render said grippers inoperative when said transfer means is held against movement.

9. In a printing press, the combination of sheet feeding mechanism, an impression cylinder having sheet engaging grippers, sheet transfer means to convey a sheet of material from said sheet feeding mechanism to said grippers, pneumatically actuated means controlled by sheet feeding conditions to hold said transfer means against movement, means to operate said grippers, and means to render said grippers inoperative when said transfer means is held against movement.

10. In a printing press, the combination of sheet feeding mechanism, an impression cylinder having sheet engaging grippers, sheet transfer means having register stops and operative to convey a sheet of material from said sheet feeding mechanism to said cylinder, and means to hold said transfer means against movement.

11. In a printing press, the combination of sheet feeding mechanism, an impression cylinder having sheet engaging grippers, sheet transfer means having register stops and operative to convey a sheet of material from said sheet feeding mechanism to said cylinder, and means to hold said transfer means against movement, said register stops being adjustable for point register.

12. In a printing press, the combination of sheet feeding mechanism, an impression cylinder having sheet engaging grippers, sheet transfer means having register stops and operative to convey a sheet of material from said sheet feeding mechanism to said cylinder, and means actuated when a sheet is not in proper register with said stops to hold said transfer means against movement.

13. In a printing press, the combination of sheet feeding mechanism, sheet transfer mechanism, an impression cylinder, means for tripping said impression cylinder, and means controlled by the position of a sheet relative to said transfer mechanism to lock the latter against movement and to trip said cylinder.

14. In a printing press, the combination of sheet feeding mechanism, sheet transfer mechanism, an impression cylinder, means for tripping said impression cylinder, and pneumatically actuated means controlled by sheet feeding conditions to lock said transfer mechanism against movement and to trip said cylinder.

15. In a printing press, the combination of sheet feeding mechanism, sheet transfer mechanism having register stops, an impression cylinder, means for tripping said impression cylinder, and pneumatically actuated means controlled by the position of a sheet relative to said register stops to lock said transfer mechanism against movement and to trip said cylinder.

16. In a printing press, the combination of sheet feeding mechanism, an impression member, and pneumatically controlled sheet

transfer means to convey a sheet of material from said sheet feeding mechanism to said impression member, said transfer means being adapted to be swung out of its operative position.

17. In a printing press, the combination of sheet feeding mechanism, an impression member, and oscillating sheet transfer means to convey a sheet of material from said sheet feeding mechanism to said impression member at an accelerating speed, said transfer means being adapted to be swung out of its operative position.

18. In a printing press, the combination of sheet feeding mechanism, an impression member, and pneumatically controlled sheet transfer means to convey a sheet of material from said sheet feeding mechanism to said impression member at an accelerating speed, said transfer means being adapted to be swung out of its operative position.

19. In a printing press, the combination of sheet feeding mechanism, an impression member, and sheet transfer means for engaging a sheet of material while at rest on said sheet feeding mechanism and for conveying it at an accelerating speed to said impression member, said transfer means being adapted to be swung out of its operative position.

20. In a printing press, the combination of sheet feeding mechanism, an impression cylinder, pneumatically controlled sheet transfer means to convey a sheet of material from said sheet feeding mechanism to said cylinder at an accelerating speed, and automatically controlled means adapted to hold said transfer means against movement.

21. In a printing press, the combination of sheet feeding mechanism, an impression cylinder, sheet transfer means for engaging a sheet of material while at rest on said sheet feeding mechanism and for conveying it at an accelerating speed to said impression cylinder, and automatically controlled means adapted to hold said sheet transfer means against movement.

22. In a printing press, the combination of sheet feeding means comprising a sheet transfer member mounted on a rock shaft, operating means to transmit accelerated motion to said shaft, sheet engaging means on said transfer member, and means adapted to pivot about said rock shaft to operate said sheet engaging means.

23. In a printing press, the combination of sheet feeding means comprising a sheet transfer member mounted on a rock shaft, operating means to transmit accelerated motion to said shaft, sheet engaging means on said transfer member, and cam means adapted to pivot about said rock shaft to operate said sheet engaging means.

24. In a printing press of the two-revolution type, the combination of sheet feeding mechanism, an impression cylinder and a sheet carrier mounted to oscillate between said mechanism and cylinder to transfer sheets from the former to the latter, the movement of said carrier in one direction taking place during one revolution of said cylinder, while its movement in the other direction takes place during the subsequent revolution of said cylinder.

Signed at Chicago, Illinois, this 13th day of June, 1928.

EDWARD F. DUDLEY.