

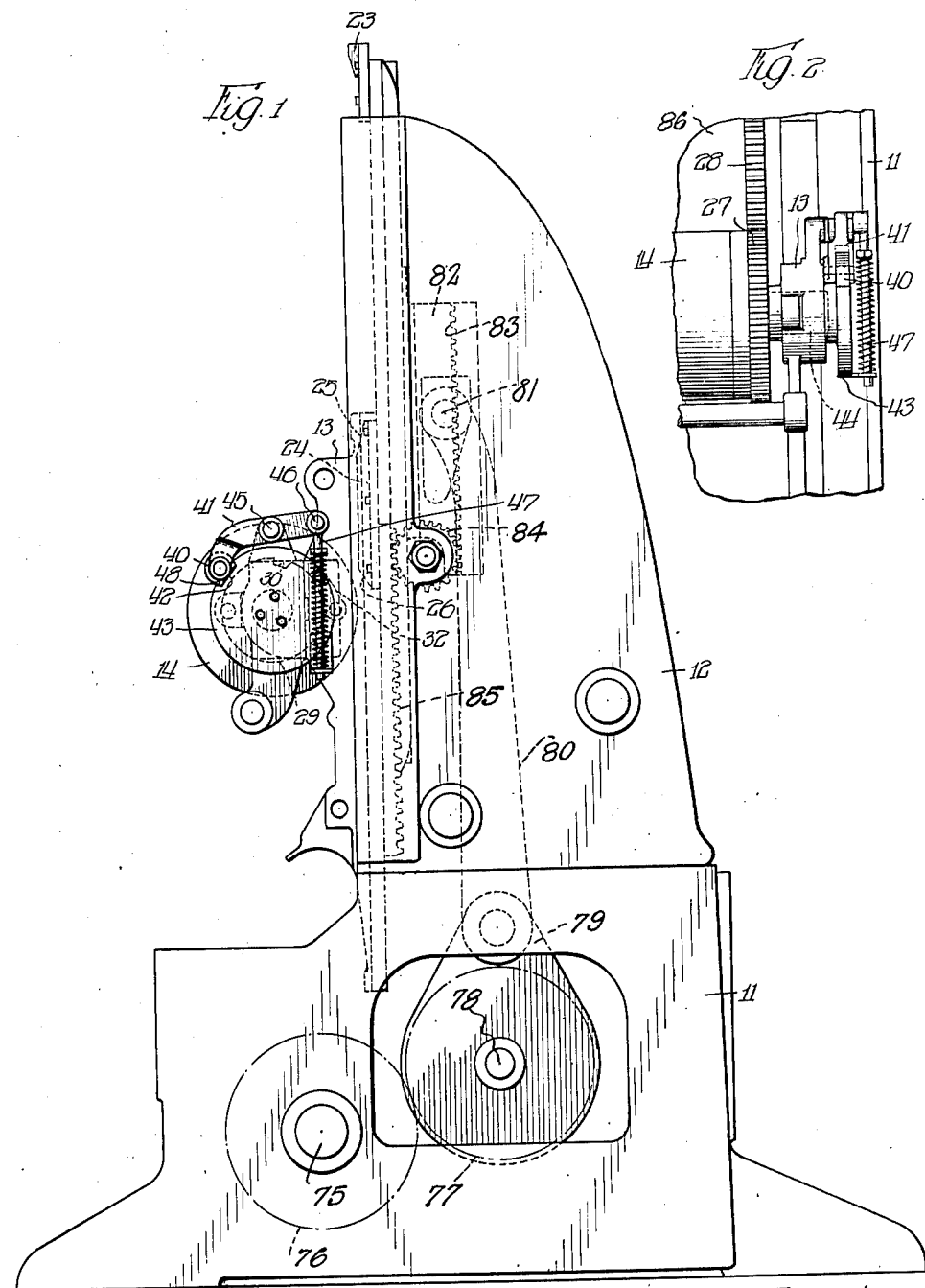
Dec. 29, 1925.

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E. F. DUDLEY ET AL
CYLINDER CONTROL MECHANISM

Filed March 25, 1922

2 Sheets-Sheet 1



Witness:

R. Burkhardt.

Inventors:
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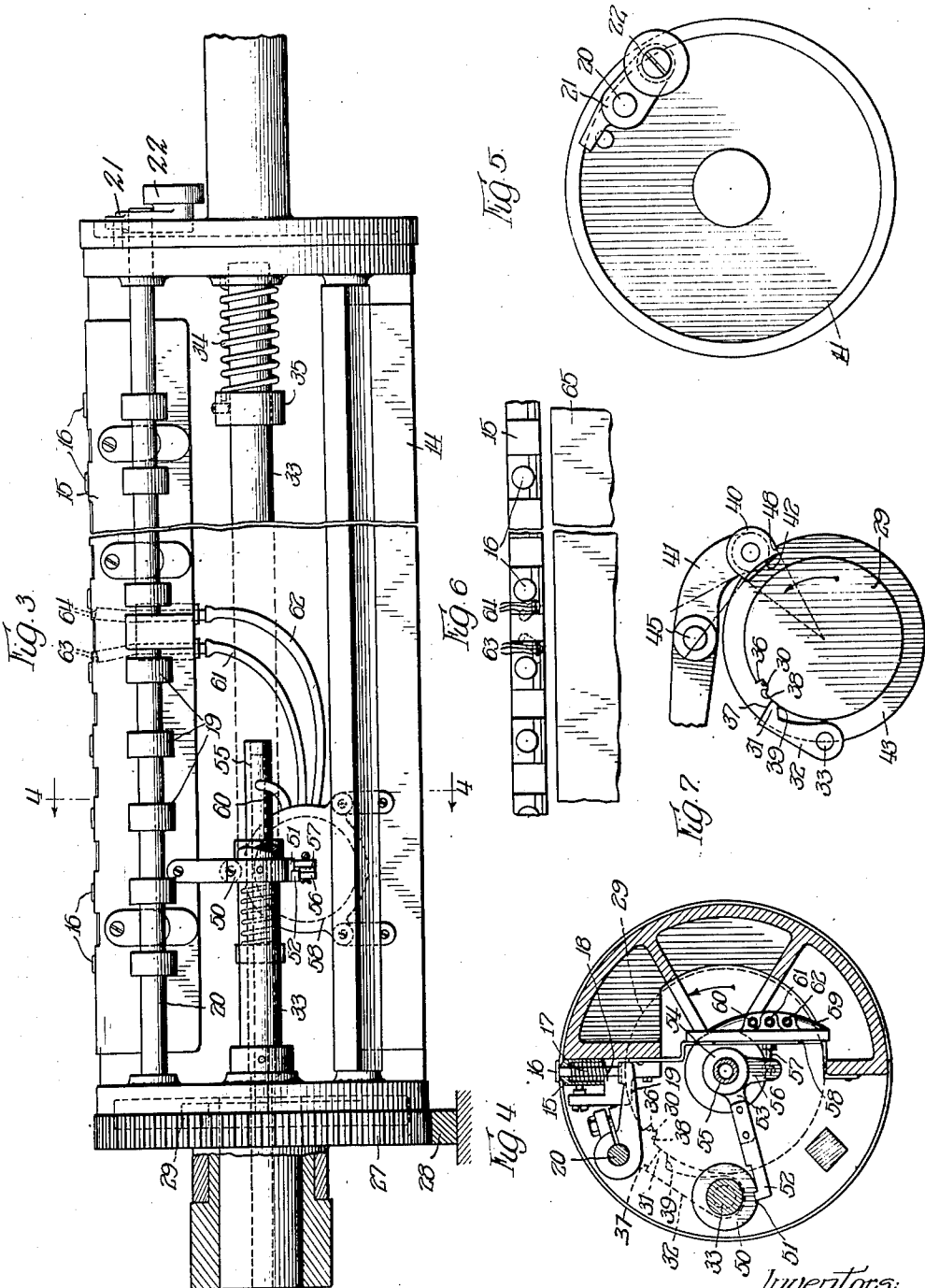
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UNITED STATES PATENT OFFICE.

EDWARD F. DUDLEY, OF OAK PARK, AND BURT D. STEVENS, OF EVANSTON, ILLINOIS, ASSIGNORS TO MIEHLE PRINTING PRESS & MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

CYLINDER-CONTROL MECHANISM.

Application filed March 25, 1922. Serial No. 546,566.

To all whom it may concern:

Be it known that we, EDWARD F. DUDLEY and BURT D. STEVENS, citizens of the United States, residing respectively, at Oak Park, in the county of Cook and State of Illinois, and at Evanston, in the county of Cook and State of Illinois, have jointly invented certain new and useful Improvements in Cylinder-Control Mechanism, of which the following is a specification.

This invention relates to printing presses and more particularly to cylinder control mechanism thereof.

While this invention is not limited to a vertical type of printing press, it is disclosed in connection with such a printing press in which the type bed and the cylinder reciprocate vertically in opposite directions in a manner such that when the cylinder moves upwardly carrying a sheet of material and the type bed moves downwardly, the cylinder is locked to its driving mechanism and caused to rotate for causing the sheet of material carried thereby to receive an impression. However, when the movements are reversed, that is, when the cylinder is moved downwardly and the type bed upwardly, the cylinder is unlocked from its driving mechanism so that said cylinder does not rotate in its downward movement. While the cylinder normally rotates as it moves upwardly for giving a sheet carried thereby an impression, it is desirable not only to prevent said cylinder from rotating during an upward movement if a sheet of material has not been fed to the cylinder or is not in proper register with respect thereto, but also it is desirable for the cylinder to be connected to its driving mechanism and disconnected therefrom at different and proper points during the cycle of operation in a manner to meet requirements.

Accordingly, one object of the invention is to provide simple, reliable and efficient means whereby the cylinder may be connected to and disconnected from its driving mechanism at the proper points during the cycle of operation and to lock said cylinder against rotation during its downward movement or during a time when it is to be prevented from rotation.

Another object is to provide cylinder control mechanism in which the parts cooperate in an improved manner to meet the various

requirements for successful commercial operation.

These and other objects are accomplished by means of the arrangement disclosed on the accompanying sheets of drawings, in which—

Figure 1 is a fragmentary side elevation of a printing press embodying our invention;

Figure 2 is a fragmentary elevational view of part of the cylinder control mechanism shown at an angle of 90 degrees from that shown in Figure 1;

Figure 3 is an elevational view of the printing press cylinder embodying the invention;

Figure 4 is a sectional view taken in the plane of line 4—4 of Figure 3;

Figure 5 is a fragmentary end elevation of the same cylinder;

Figure 6 is a fragmentary plan view of the cylinder showing the grippers, suction openings in the gripper bar and a sheet of material being fed to the cylinder grippers; and

Figure 7 is a detail view showing a pawl and ratchet whereby the cylinder may be connected to its driving mechanism for rotating the cylinder, and ratchet and pawl mechanism operably associated with the other ratchet and pawl mechanism for holding the cylinder against rotation.

The various novel features of the invention will be apparent from the following description and drawings, and will be particularly pointed out in the appended claims.

Referring to the figures of the drawings, it will be noted that the invention is illustrated in connection with a vertical type of printing press including a main frame 11 upon which is mounted the way-frame 12 in which the type bed and the cylinder frame 13 are vertically slidably mounted for simultaneous reciprocation in opposite directions, a cylinder 14 being rotatably mounted in the cylinder frame 13.

This invention has to do primarily with cylinder control mechanism. In this connection it is desired to connect a cylinder with its driving mechanism at the lower limit of vertical reciprocatory movement of the cylinder and to disconnect said cylinder from its driving means at the upper limit of its vertical reciprocatory movement. Not only this, but it is desired to provide locking

means which become effective at the upper limit of vertical movement of the cylinder so that the cylinder in moving downwardly will be held against rotation, and it is desired that this holding or locking means become ineffective at the lower limit of vertical movement of the cylinder. As a matter of fact, the means for forming the driving connection between the cylinder and its driving means and the cylinder locking or holding means are operable upon and control each other in a manner to be more fully described hereinafter.

To give a full description of the various cooperative parts of the cylinder control mechanism, it will be noted that the cylinder 14 is provided with a gripper bar 15 in which the grippers 16 are slidably mounted, each gripper normally being held closed by a spring 17 coiled around the shank of each gripper and interposed between the inner part of the gripper bar and a pin 18 in the shank of the gripper. The cylinder grippers 16 are opened by means of mechanism including fingers 19 mounted upon a rod 20 carried in the walls of the cylinder, one end of said rod 20 extending through one of the cylinder walls and having mounted thereon a lever 21 carrying a roller 22 which cooperates with two cams 23 and 24, the cam 23 being located at the upper part of the type bed so that when the roller 22 rides upon said cam 23 the grippers 16 are opened to release an impressed sheet of material preparatory to the latter being carried away from the cylinder by delivery grippers, not shown. The cam 24 is located at the lower limit of movement of the cylinder and has two cam portions 25 and 26. The upper cam portion 25 opens the grippers near the end of the downward movement of the cylinder for the purpose of receiving a sheet of paper fed to the cylinder, and the lower cam portion 26 of the cam 24 permits the roller 22 to ride downwardly thereon for permitting the grippers to close upon the sheet of material fed to the cylinder. At first it would appear that the roller 22 in the next upward movement of the cylinder would engage the lower cam 26, causing the grippers again to open and release the sheet of paper before it received an impression. However, such occurrence is avoided by reason of the fact that the cylinder rotates in a manner for carrying the roller 22 away from the cam 26 during the upper vertical impression movement of the cylinder.

In connection with the rotative driving movement of the cylinder, a gear 27 is provided at one end of the cylinder, and it is loosely mounted with respect to the cylinder and the parts thereof, so that it is possible for the gear 27 to be rotated while the cylinder may not be rotated. The gear 27 is actuated during its upward and downward

movements with the cylinder by meshing with a rack 28 carried by the type bed. Secured to or formed integrally with the gear 27 is a ratchet wheel 29 having a single slot 30 which is adapted to receive the hooked end 31 of a pawl 32 mounted upon a shaft 33 carried by the cylinder. This shaft has surrounding it a coiled spring 34, one end of which is anchored to a wall of the cylinder and the other end of which is anchored to a collar 35 secured to the shaft in a manner such that the pawl is yieldably held against the ratchet wheel 29 and as a result thereof, at any time that the slot 30 is presented to the hooked portion 31 of the pawl 32, such pawl enters such slot for locking the cylinder to its driving mechanism for rotating said cylinder.

Attention is called to the fact that the slot 30 is provided with a straight driving wall 36 which is adapted to engage a corresponding front wall 37 of the pawl 32 for positively driving the cylinder in a counterclockwise direction, as viewed in Figures 4 and 7. The other wall 38 of the slot 30 is inclined, as is also the corresponding wall 39 of the pawl 32 whereby the pawl may be forced out of the slot 30 of the ratchet wheel 29 when the cylinder has reached its upper limit of movement preparatory to the cylinder moving vertically downwardly without rotating. However, the inclination of the walls 38 and 39 of the slot 30 and pawl 32, respectively, is sufficiently abrupt to prevent the cylinder running away from the gear during their rotative movements.

Let it be assumed that the cylinder is at its lower limit of vertical movement, and that conditions are proper for the cylinder to be connected to its driving mechanism. Such being the case, reference being had to Figures 4 and 7, the ratchet wheel 29 driven by the gear 27 will have been rotated in a direction to a point where the slot 30 has presented itself to the hooked portion 31 of the pawl 32. Such being the case, the head 31 of the pawl snaps into the slot 30 whereupon the cylinder which is operatively connected to the pawl 32 is driven in a counterclockwise direction during its upward vertical movement. As mentioned hereinabove, it is desirable that the cylinder be disconnected from its rotary driving means at the upper limit of movement of the cylinder preparatory to moving vertically downwardly without rotating. To this end, at the upper limit of vertical movement of the cylinder, a dog 40 carried in one end of a pawl 41 drops into a slot 42 in a disk 43 secured to the projecting end of a cylinder trunnion 44. The pawl 41 is pivoted at the point 45 intermediate its ends and has its other end pivotally connected at 46 to a spring pressed rod 47, the effect being to yieldably press the dog 40 against the disk

43 whereby the dog 40 will enter the slot 42 whenever the two come into register. The slot 42 and the dog 40 are so arranged with respect to each other that they do fall into register at the exact dead center or upper limit of movement of the cylinder. Accordingly, the dog 40 clicks into the slot 42 for causing the pawl 32 to move out of the slot 30 as the cylinder is given its downward movement and also to hold such cylinder against rotation during the entire downward movement.

Referring to Figures 4 and 7, it will be appreciated that with the dog 40 in the slot 42, with the cylinder starting on its downward movement, and the ratchet wheel 29 accordingly rotating in a clockwise direction, the pawl 32 will be forced out of the slot 30 against the tension of spring 34 in view of the fact that the cooperating walls 38 and 39 of the notch 30 and pawl 32, respectively, are inclined. The ratchet wheel 29 in its downward movement, as well as in its upward movement, makes one complete revolution, so that when the cylinder reaches its lower limit of movement or dead center, the notch 30 in the ratchet wheel 29 has again presented itself to the hooked head 31 of the pawl 32 and as a result thereof, if conditions are proper for the cylinder to be connected to its driving mechanism, in a manner to be described later, the pawl will click into the slot 30 preparatory to the next upper and rotary movement of the cylinder. As the cylinder has moved downwardly the dog 40 has remained in the notch 42 for holding the cylinder against rotation. However, when the cylinder has reached its lower limit of movement and the pawl 32 has been connected with the ratchet wheel 29 for rotating the cylinder on the next upward movement, it is desirable to move the dog out of the slot 42. Such is accomplished when the ratchet wheel 29 is rotated in a counterclockwise direction, as viewed in Figures 4 and 7, and when the pawl 32 is in the slot 30, because the disk 43, which is then rotating in the direction with the cylinder, exerts a lifting pressure upon the dog 40 and the dog end of the pawl 41. Referring specifically to Figure 7, it will be noted that when the disk 43 is rotated in a counterclockwise direction the radial straight side wall 48 exerts a pressure upon the dog 40 in a line at right angles to the plane of the wall 48, which line at right angles falls to the right of the pivotal center 45 of the pawl, such resulting in lifting the dog 40 out of the notch 42 in the disk 43 for permitting the cylinder to rotate unhampered as a result of its connection with its driving mechanism. When the cylinder has reached its upper limit of movement the notch 42 will have gone through an angle of 360 degrees and will have presented itself to the dog 40 which will again click into the

notch, whereupon when the cylinder then moves downwardly the pawl 32 will be moved out of the notch 30 for breaking the connection between the cylinder and its driving means.

In connection with the control mechanism for the cylinder, attention is called to the fact that secured to the shaft 33 is a disk 50 having a single notch 51 engaged by a pawl 52 secured to one arm 53 of a bell crank lever 54 carried by any suitable support 55, the other arm 56 of the bell crank lever being connected to a rod 57 in turn operatively connected to a diaphragm 58 of a casing 59 forming part of a fluid pressure system. The interior of said casing beyond the diaphragm 58 is connected to a source of vacuum through a tube 60, said casing 59 also having extended therefrom a plurality of tubes 61 and 62 which are operatively connected with two series 63 and 64 of suction openings extending through the gripper bar 15. At the time that the cylinder is at its lower limit of movement preparatory to receiving a sheet of material, the suction chamber is in communication or is cut into communication with the diaphragm chamber 59 so that suction is exerted downwardly through the two series 63 and 64 of openings in the gripper bar and through the tubes 61 and 62 and diaphragm chamber 59 and tube 60. If the openings 63 and 64 are left uncovered at such time, it is apparent that the flow of air through the diaphragm chamber 59 will have no effect upon the diaphragm and accordingly, will not transmit any movement to the bell crank lever arm 53 and accordingly the pawl 32 will be held or locked out of operative relationship with respect to the ratchet wheel 29. Accordingly, if no sheet of paper is fed to the cylinder, or if the sheet of paper fed to the cylinder does not cover the openings 63 and 64, the cylinder will not become locked to its rotative or driving mechanism. As a result, the cylinder on its next upward movement and under the conditions stated, will not rotate. On the other hand, if the suction openings 63 and 64 in the gripper bar are closed by a sheet of material 65 which is fed to the cylinder and registered with respect thereto, it is apparent that the diaphragm 58 will be moved into the chamber 59, drawing the pawl 52 away from the disk 50, thereby releasing the pawl 32 to permit it to pass into the slot 30 in the disk 29 when they come into register with each other, thereby resulting in the cylinder 14 being rotated by its driving mechanism during the next upward movement of the cylinder. The series of openings 63 and 64 are arranged in a straight line and the forwardmost points lie in line of front register drawn between the points of front register. In other words, the openings 63 and 64 are advanced as far forward

as possible, so that the openings form a real front register detector.

It is apparent, therefore, that the rotation of the cylinder during its upward movement is dependent upon and controlled by a sheet of material being registered with respect to the cylinder; that when the cylinder operating mechanism is connected to the cylinder and starts to rotate it upon the upward movement of the cylinder, the cylinder holding means is forced out of its holding position; and, that when the cylinder reaches its upper limit of movement the cylinder operating mechanism is disconnected from the cylinder by the cylinder holding or locking mechanism, which holds the cylinder against rotation upon its next downward movement.

With respect to the operation of the press from its main actuated drive shaft 75, a gear 76 is secured thereto which meshes with and drives a gear 77 secured to another shaft 78 carrying two spaced cranks 79, only one being shown. To each crank 79 is pivotally secured a crank rod 80 which at its upper end is pivotally connected at 81 to a guided vertically movably mounted member 82 having two spaced racks 83, only one of which is shown. Each rack 83 meshes with and rotates a bodily fixed suitably supported gear 84, which in turn meshes with and drives an associated rack 85. The racks 85, there being two of them, are formed integrally with or secured to the type bed 86. As mentioned above, the type bed 86 also carries a rack 28 (see Figs. 2 and 3) for driving the cylinder 14 through the gear 27.

It is our intention to cover all modifications of the invention falling within the spirit and scope of the following claims.

We claim:

1. In a printing press, the combination of a cylinder, means for rotating same, means for connecting said cylinder and its rotary driving means, and means for holding said cylinder against rotation and disconnecting said cylinder from its rotary driving means, said connecting means and holding means being operable on each other to make same effective and ineffective.

2. In a printing press, the combination of a cylinder, means for driving same, means for connecting said cylinder and its driving means, and means for holding said cylinder against a given movement and disconnecting said cylinder from its driving means, said connecting means and holding means being operable on each other to make same effective and ineffective.

3. In a printing press, the combination of a cylinder mounted for rotary movement and reciprocatory movement, means for rotating said cylinder, means for connecting said cylinder and its rotary driving means

at one of its limits of reciprocatory movement, and means for holding said cylinder against rotation and disconnecting said cylinder from its rotary driving means at the other limit of reciprocatory movement of said cylinder, said connecting means and holding means being operable on each other to make same effective and ineffective.

4. In a printing press, the combination of a cylinder, means for rotating said cylinder, means for connecting said cylinder and its rotary driving means at a given point in the cycle of operation, and means for holding said cylinder against rotation and disconnecting said cylinder from its rotary driving means at another point in the cycle of operation, said connecting means and holding means being operable on each other to make same effective and ineffective.

5. In a printing press, the combination of a cylinder, means for reciprocating said cylinder in a vertical direction, means for rotating said cylinder, means for connecting said cylinder and its rotary driving means at the lower limit of movement of said cylinder, and means for holding said cylinder against rotation and disconnecting it from its rotary driving means at the upper limit of movement, said connecting means and holding means being operable on each other to make same effective and ineffective.

6. In a printing press, the combination of a cylinder, means for rotating same, a releasable connection between said cylinder and rotating means, and means for holding said cylinder against rotation, said holding means as a result of its holding action being adapted to control said releasable connection.

7. In a printing press, the combination of a cylinder, means for rotating same, a releasable connection between said cylinder and rotating means, and means for holding said cylinder against rotation, said releasable connection being adapted to control said holding means.

8. In a printing press, the combination of a cylinder, means for rotating same, a releasable connection between said cylinder and rotating means, and means for holding said cylinder against rotation, said holding means and said releasable connection adapted to control each other.

9. In a printing press, the combination of a cylinder, means for rotating same, a releasable connection means between said cylinder and its rotating means, and means for holding said cylinder against rotation, said holding means by action of said releasable connection means being rendered ineffective when said releasable connection connects said cylinder and its rotating means, and said releasable connection being operated to prevent driving of said cylinder when said holding means becomes effective.

10. In a printing press, the combination of a vertical reciprocatory cylinder, means for rotating said cylinder, a releasable connection between said cylinder and its rotating means, and means for holding said cylinder against rotation, said cylinder holding means becoming ineffective and the releasable connection becoming effective at the lower limit of movement of the cylinder and said cylinder holding means becoming effective at the upper limit of movement of said cylinder, said holding means and driving connection having a controlling action one on the other.

11. In a printing press, the combination of a cylinder, means for rotating said cylinder, means for holding said cylinder against rotation, and means whereby the rotative movement of said cylinder depends upon the proper registration of a sheet of material relative to said cylinder.

12. In a printing press, the combination of a cylinder, means for actuating said cylinder, means for holding said cylinder against actuation, and means whereby the actuation of said cylinder depends upon the proper registration of a sheet of material relative to said cylinder.

13. In a printing press, the combination of a cylinder, means for rotating said cylinder, means for holding said cylinder against rotation, and control means carried by said cylinder operative in accordance with proper registration conditions of a sheet of material

with respect to said cylinder for controlling the rotative movement of the latter.

14. In a printing press, the combination of a cylinder, driving means therefor including a ratchet member and a pawl, means for holding said cylinder against rotation, and means for controlling the driving connection between such ratchet and pawl dependent upon proper registration of a sheet of material with respect to said cylinder.

15. In a printing press, the combination of a cylinder having a gripper bar and grippers, driving means for said cylinder, means for holding said cylinder against a given movement, and means for controlling the driving relationship between said driving means and cylinder dependent upon the proper registration of a sheet of material between said gripper bars and grippers.

16. In a printing press, the combination of a cylinder, means for rotating same, a releasable connection for connecting said cylinder and its rotary driving means, means for holding said cylinder against rotation and disconnecting said cylinder from its rotary driving means, and means dependent upon proper registration conditions of a sheet with respect to the cylinder for controlling said releasable connection.

Signed at Chicago, Illinois, this 2nd day of March, 1922.

EDWARD F. DUDLEY.
BURT D. STEVENS.