Aug. 25, 1931. C. L. LOW 1,820,470

GRIPPER MOTION FOR CYLINDER PRINTING PRESSES

Filed Sept. 18, 1929 8 Sheets-Sheet 1

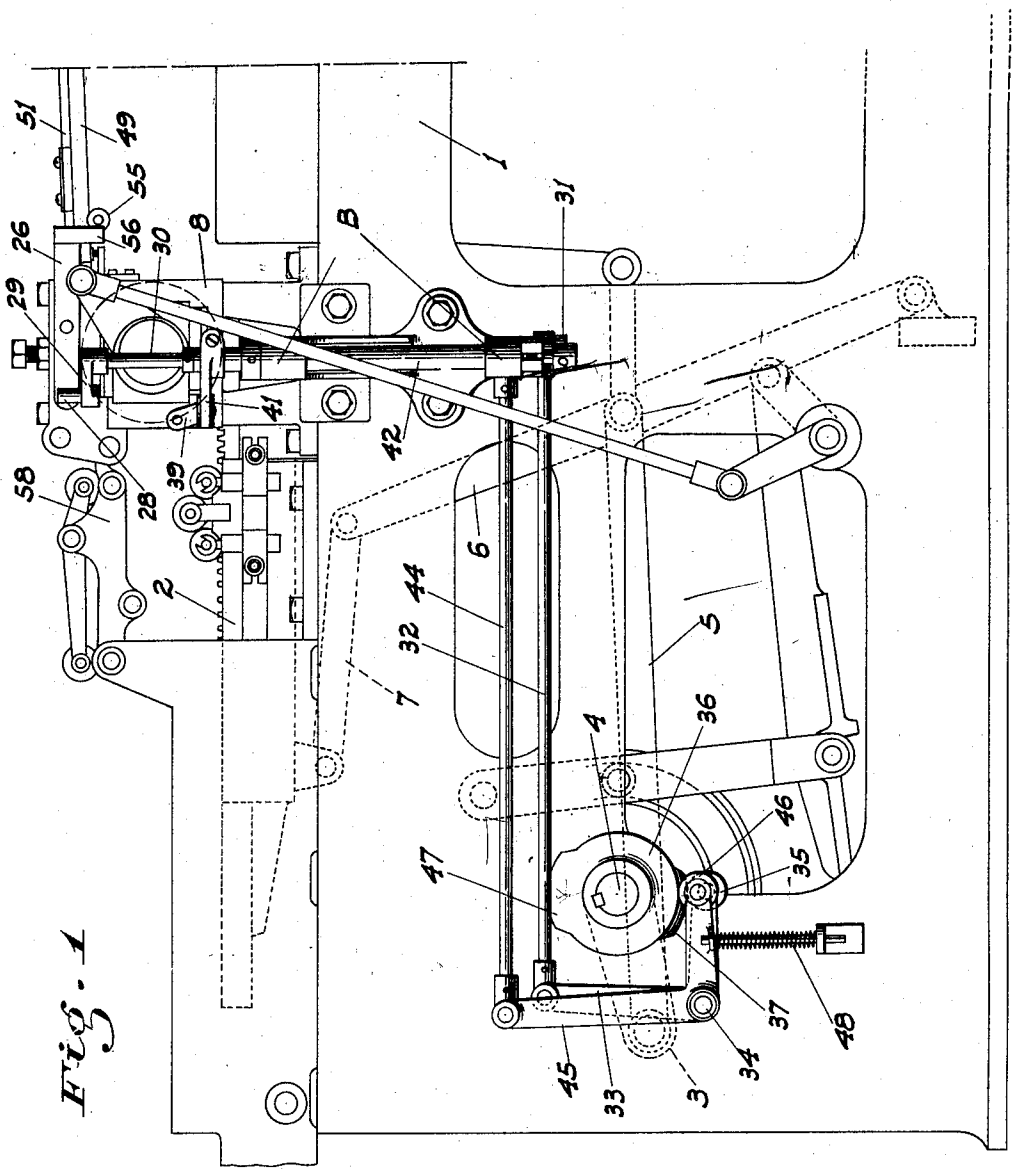


Fig. 1

INVENTOR

Chas. L. Low

BY

ATTORNEY

Aug. 25, 1931. C. L. LOW 1,820,470

GRIPPER MOTION FOR CYLINDER PRINTING PRESSES

Filed Sept. 18, 1929 8 Sheets-Sheet 2

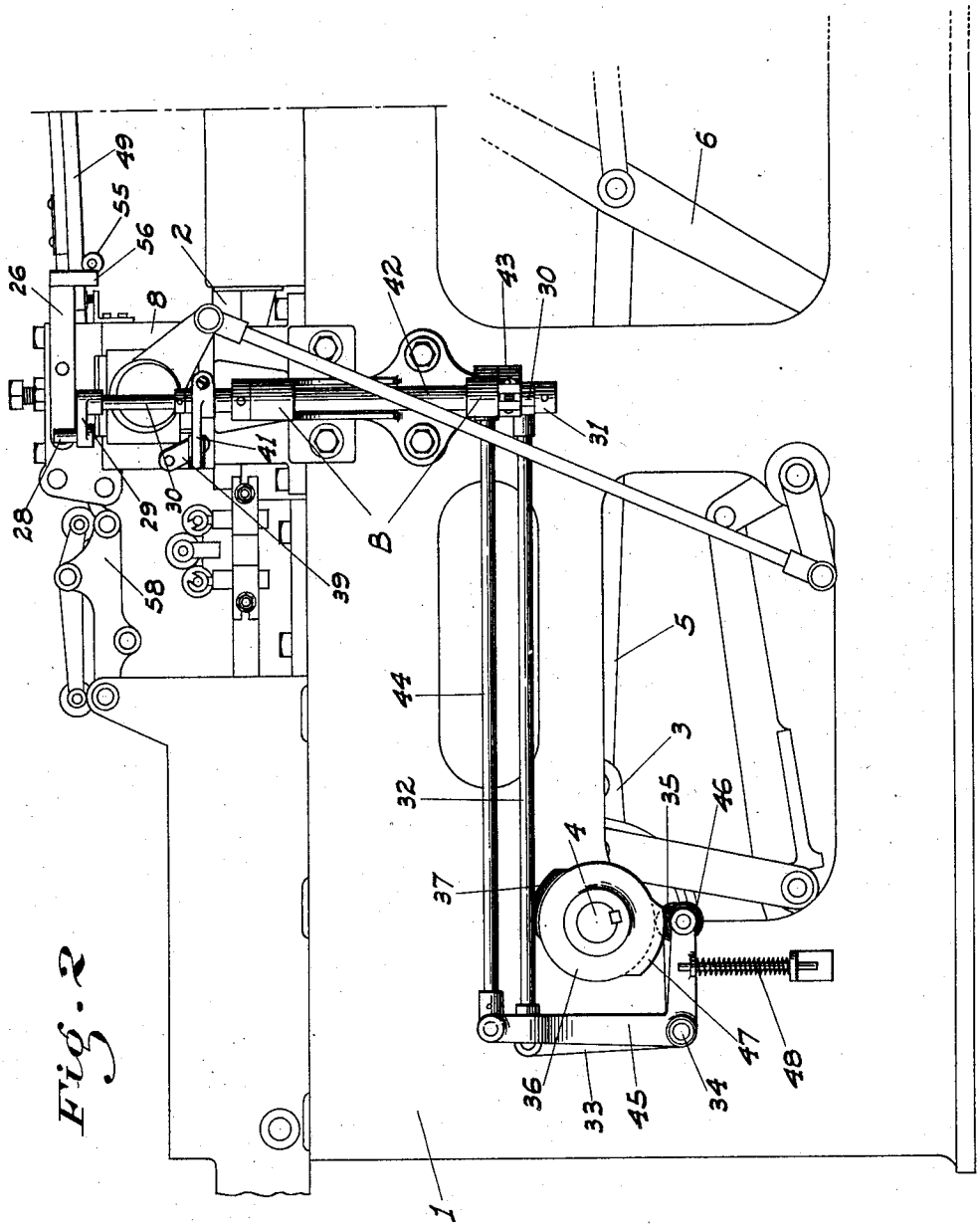


Fig. 2

INVENTOR

Chas. L. Low

BY

ATTORNEY

Aug. 25, 1931. C. L. LOW 1,820,470

GRIPPER MOTION FOR CYLINDER PRINTING PRESSES

Filed Sept. 18, 1929 8 Sheets-Sheet 3

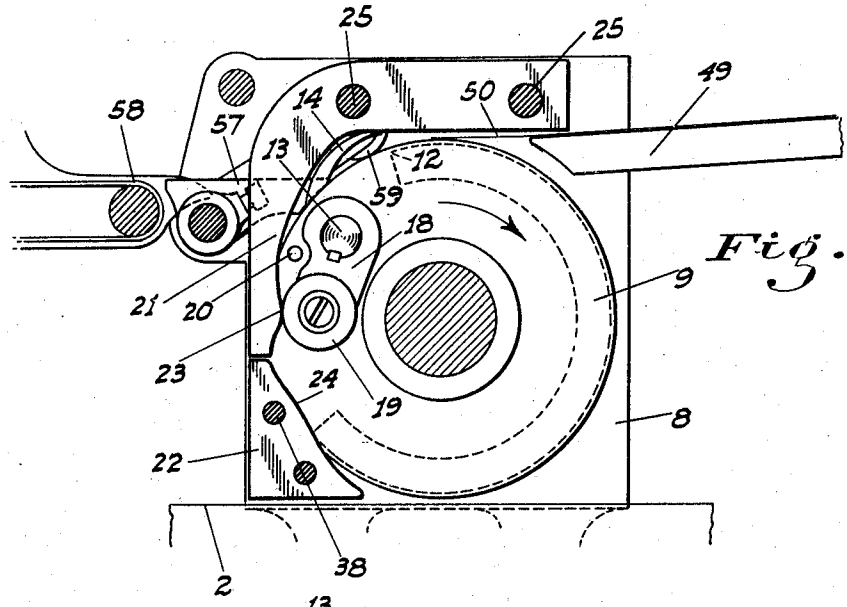


Fig. 3

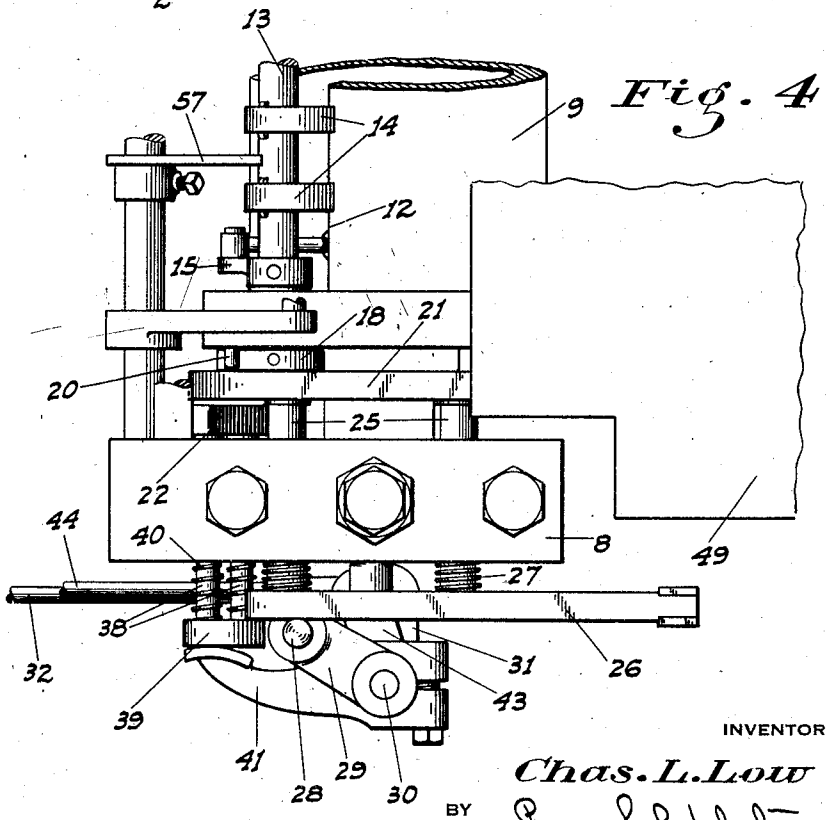


Fig. 4

INVENTOR

Chas. L. Low

BY

ATTORNEY

Aug. 25, 1931. C. L. LOW 1,820,470

GRIPPER MOTION FOR CYLINDER PRINTING PRESSES

Filed Sept. 18, 1929 8 Sheets-Sheet 4

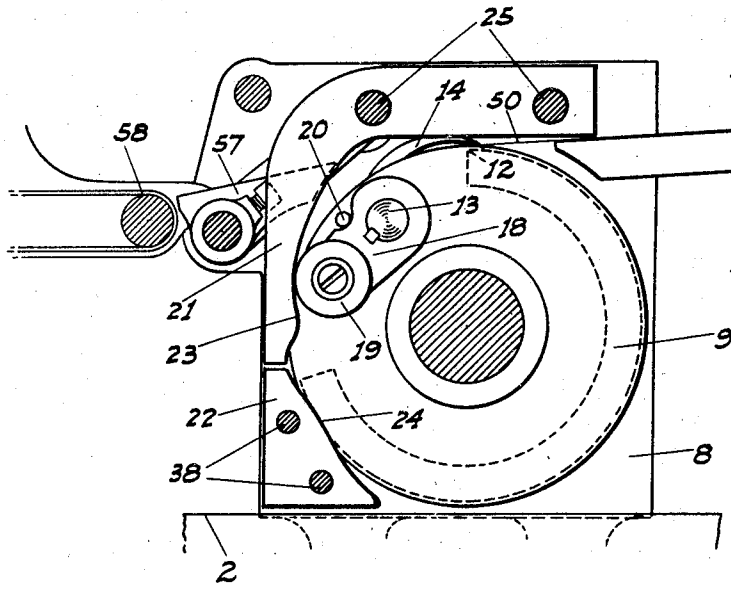


Fig. 5

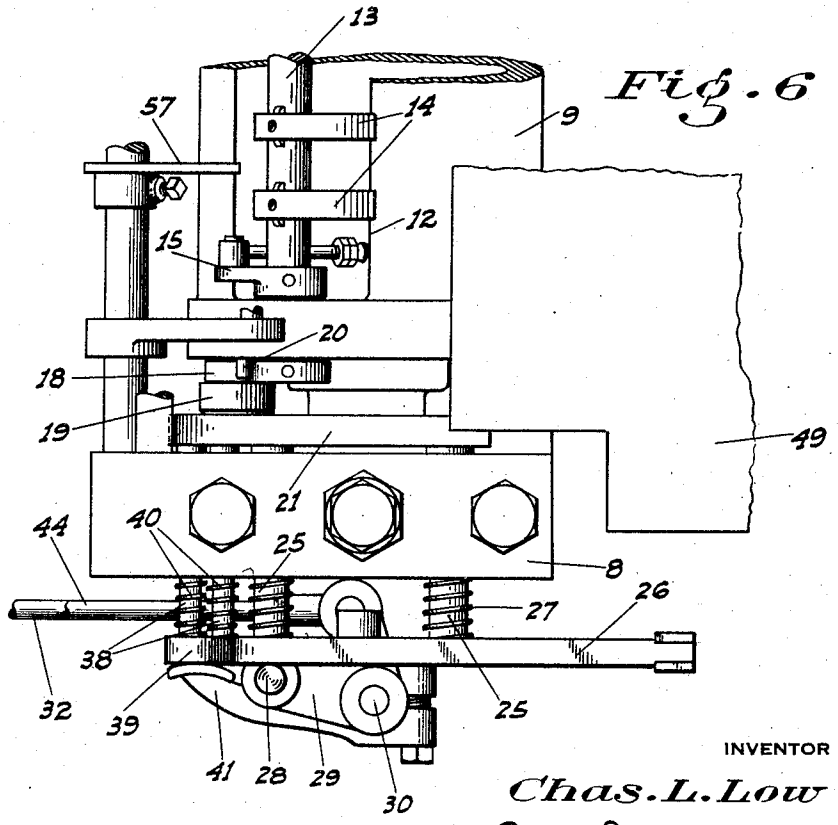


Fig. 6

INVENTOR

Chas. L. Low

BY

ATTORNEY

Aug. 25, 1931. C. L. LOW 1,820,470

GRIPPER MOTION FOR CYLINDER-PRINTING PRESSES

Filed Sept. 18, 1929 8 Sheets-Sheet 5

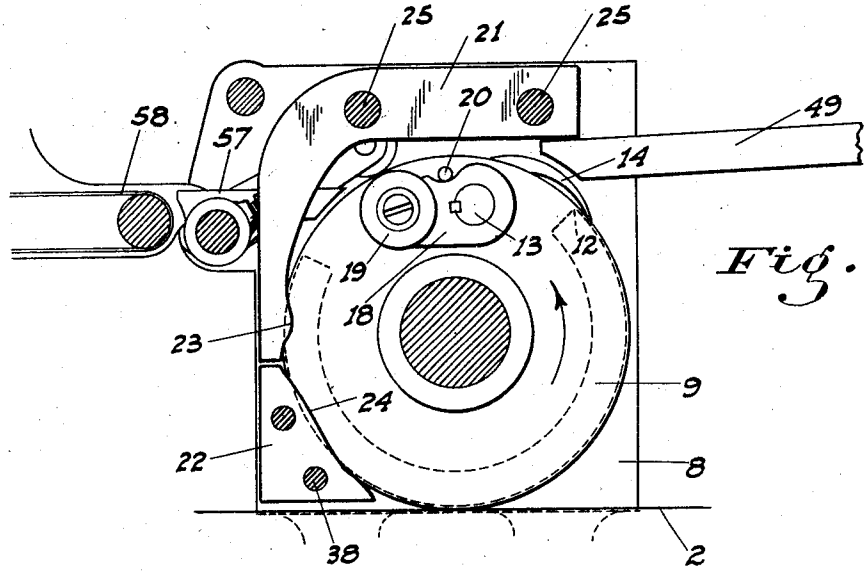


Fig. 7

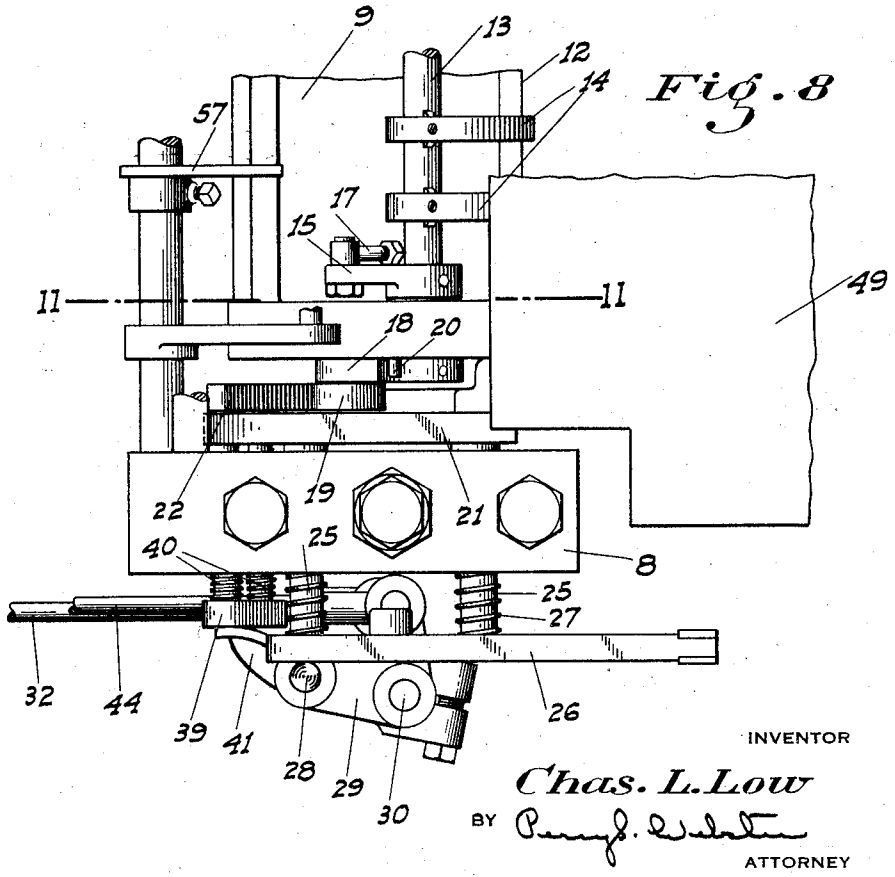


Fig. 8

INVENTOR

Chas. L. Low

BY

ATTORNEY

Aug. 25, 1931. C. L. LOW 1,820,470

GRIPPER MOTION FOR CYLINDER PRINTING PRESSES

Filed Sept. 18, 1929 8 Sheets-Sheet 6

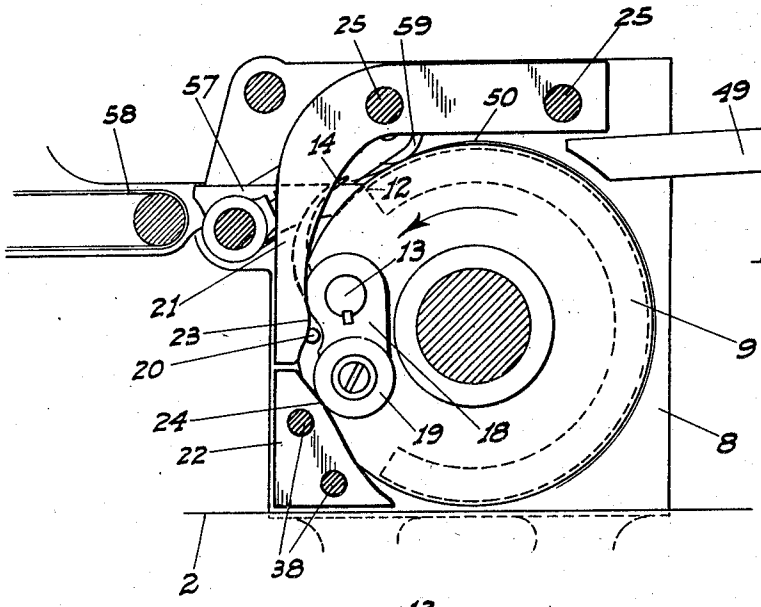


Fig. 9

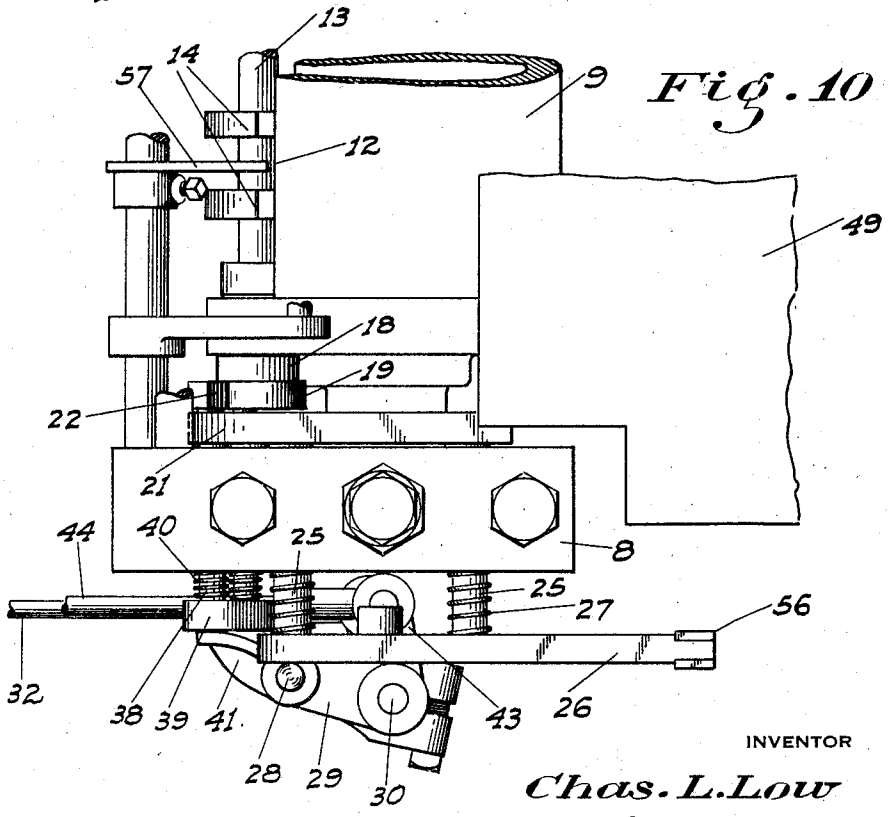


Fig. 10

INVENTOR

Chas. L. Low

BY

ATTORNEY

Aug. 25, 1931. C. L. LOW 1,820,470

GRIPPER MOTION FOR CYLINDER PRINTING PRESSES

Filed Sept. 18, 1929 8 Sheets-Sheet 7

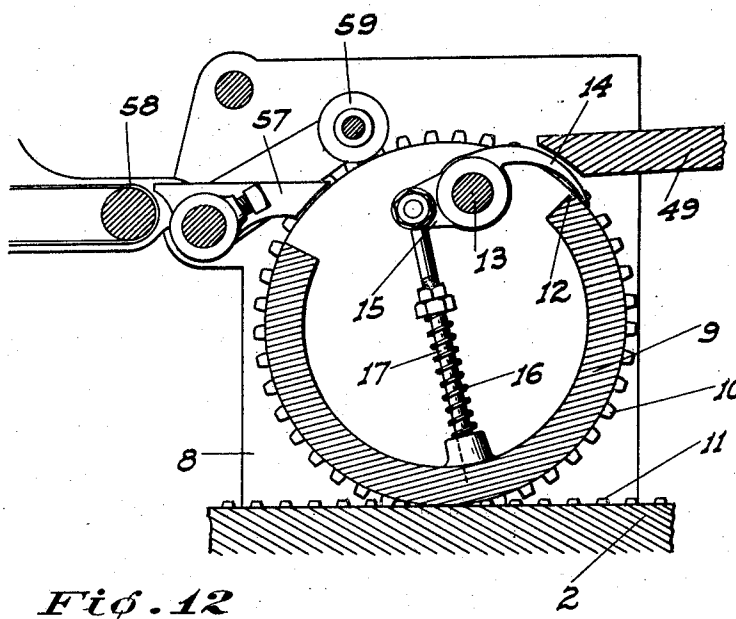


Fig. 11

Fig. 12

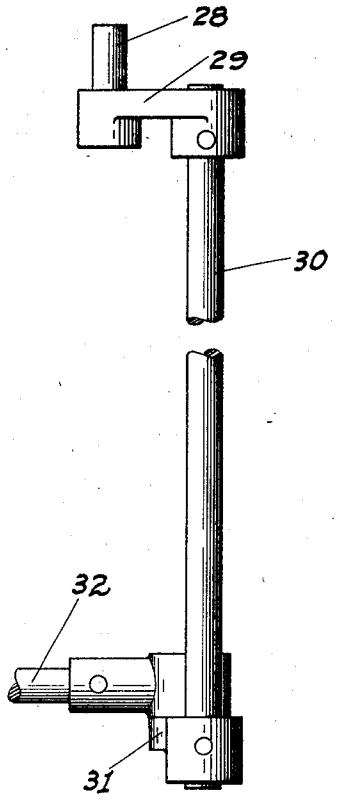


Fig. 13

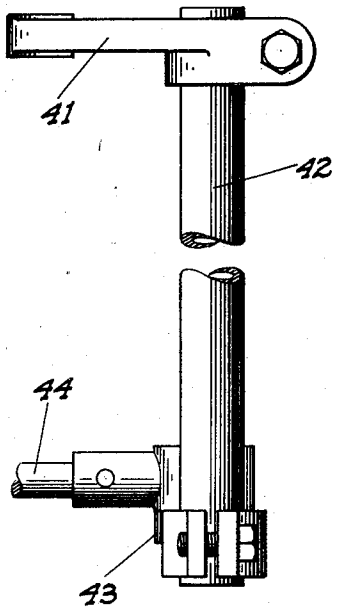
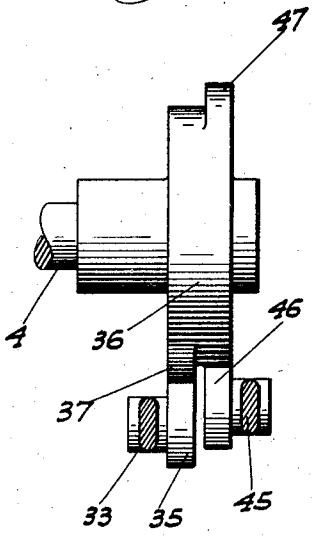


Fig. 14



INVENTOR

Chas. L. Low

BY

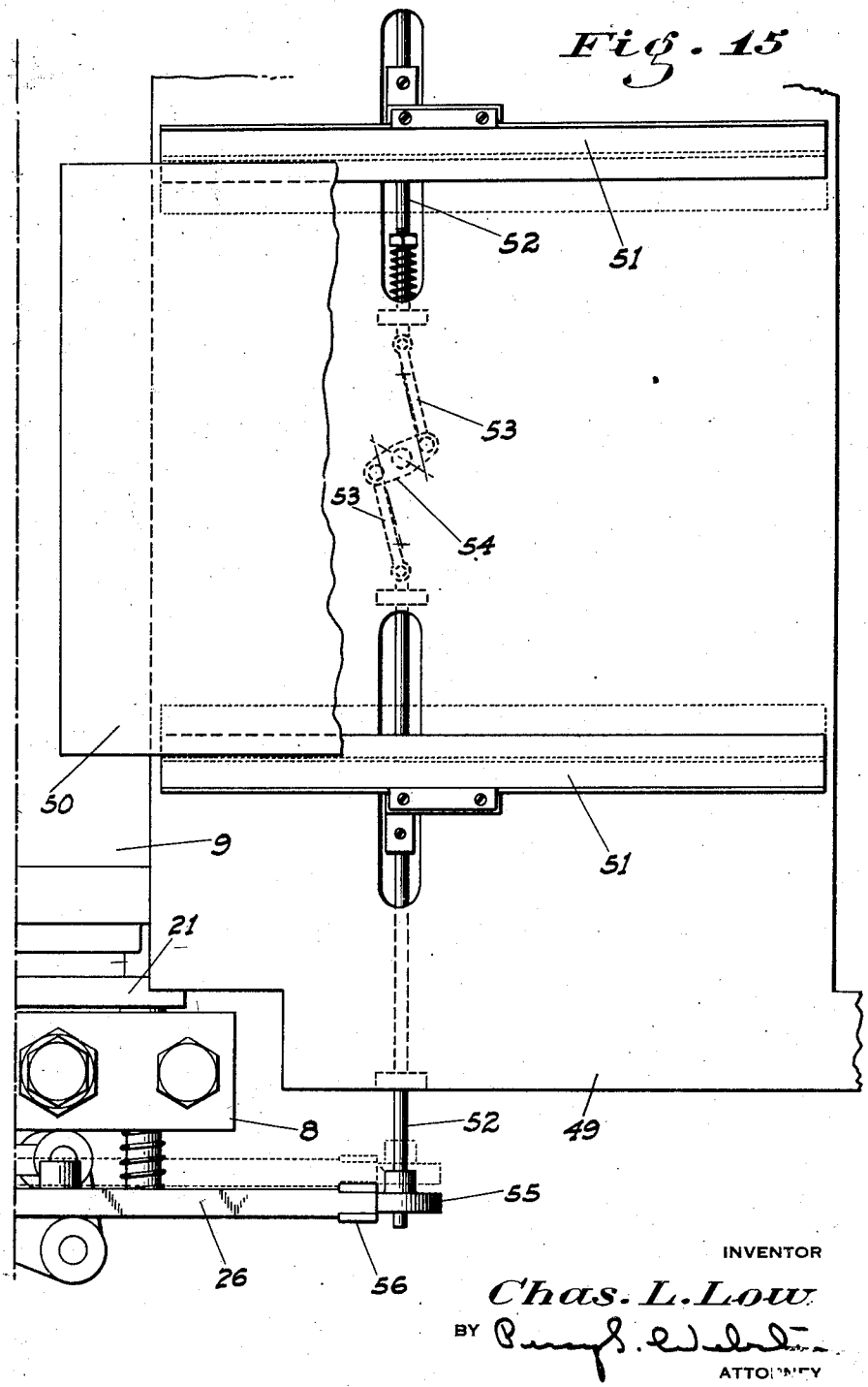
ATTORNEY

Aug. 25, 1931. C. L. LOW 1,820,470

GRIPPER MOTION FOR CYLINDER PRINTING PRESSES

Filed Sept. 18, 1929 8 Sheets-Sheet 8

Fig. 15



INVENTOR

Chas. L. Low

BY

ATTORNEY

Patented Aug. 25, 1931 1,820,470

UNITED STATES PATENT OFFICE

CHARLES L. LOW, OF FRESNO, CALIFORNIA, ASSIGNOR TO LISENBY MANUFACTURING COMPANY, OF FRESNO, CALIFORNIA, A CORPORATION

GRIPPER MOTION FOR CYLINDER PRINTING PRESSES

Application filed September 18, 1929. Serial No. 393,404.

This invention relates to printing presses and particularly to one of the cylinder and flat bed type, such as for instance is shown in my Patent No. 1,587,968, dated June 8, 1926.

In presses of this character the cylinder oscillates through a certain arc, and with each alternate oscillation a sheet of paper is arranged to be passed around the cylinder and thereby placed in contact with the type on the moving bed under the cylinder. A mechanism, timed to co-ordinate with the oscillation of the cylinder, must of course be provided to insure the movement and the feeding of the paper into position at the proper instant.

In the device of the above menticned patent this was done by means of a roller mechanism co-operating with the feed tapes, which intermittently caused the paper to definitely travel forward into the sphere of action of the cylinder. This arrangement was not only somewhat complicated but there was a chance of the paper slipping relative to the advancing mechanism and thereby failing to be moved into co-operating relationship with the cylinder at the proper instant.

The present invention relates to the mechanism for passing the paper about the cylinder and my principal object is to simplify the construction of the necessary mechanism over what was previously used, and to arrange it so that the paper will be definitely gripped and held against the cylinder in the exact position desired without any possibility of slipping. At the same time the paper is instantly released as soon as it has been printed so that it then passes without interference to the stacker.

The structure of the present invention is also particularly intended to be used in connection with the automatic feeding mechanism shown and described in my co-pending application for patent, Serial No. 391,606, filed September 10, 1929, and in which the use of tapes to advance the paper has been eliminated, and the paper is fed directly by the suction nozzles from the pile to the position where it is engaged by the gripper mechanism of the cylinder.

The above and other objects I accomplished by means of the structure and arrangement of parts as will fully appear by a perusal of the following specification.

In the drawings similar characters of reference indicate corresponding parts in the several views.

Fig. 1 is a fragmentary side elevation of a press, showing the control mechanism for the gripper actuating cams, in the position occupied by the various parts just before the paper is to be gripped.

Fig. 2 is a similar view showing the position of the parts as the paper after it has been printed, is passing from the cylinder toward the stacker.

Fig. 3 is an enlarged end view of the cylinder, taken just inside adjacent end supporting block of the cylinder, showing the position of the grippers corresponding to the position of the other parts as in Fig. 1.

Fig. 4 is a fragmentary top plan view of the cylinder showing the control mechanism of the gripper actuating cams in positions corresponding to Fig. 3.

Fig. 5 is a view similar to Fig. 3 showing the position of the grippers just as the paper is engaged thereby.

Fig. 6 is a fragmentary top plan view of the cylinder and adjacent parts, showing such parts in the positions corresponding to Fig. 5.

Fig. 7 is a view similar to Fig. 3 showing the position of the grippers as the cylinder is moving through and has nearly completed its printing stroke or oscillation.

Fig. 8 is a fragmentary top plan view of the cylinder and adjacent parts in the positions coresponding to Fig. 7.

Fig. 9 is a view similar to Fig. 3 showing the position of the cylinder and grippers just as the paper is released and is about to pass onto the conveyor tapes.

Fig. 10 is a fragmentary top plan view of the cylinder and adjacent parts in the positions corresponding to Fig. 9.

Fig. 11 is a cross section of the cylinder taken on the line of 11—11 of Fig. 8.

Fig. 12 is a fragmentary detached view of the upper cam actuating unit.

Fig. 13 is a similar view of the lower cam actuating unit.

Fig. 14 is an end view of the double cam member which controls the operation of said upper and lower cam actuating units.

Fig. 15 is a fragmentary top plan view of the drum and paper supporting table associated with it, showing the means for engaging or straightening the paper which operates in timed conjunction with the engagement of the grippers with the paper.

It is to be noted that certain ones of the various views above described only show such features as are pertinent to the structure being emphasized thereon, in order to avoid complication of lines as much as possible.

Referring now more particularly to the characters of reference on the drawings, 1 denotes the main side frames of the press slidably mounted on which in a suitable manner is the moving bed 2. This bed is reciprocated through a certain stroke from a crank 3 on the main drive shaft 4 of the press; this crank being connected by rod 5 with a vertical walking beam 6 which is pivoted at its lower end in connection with the frame. The upper end of this beam is connected with the bed by a link 7. The above is a common arrangement for the purpose and of itself forms no part of my invention.

Supported between end bearing blocks 8 mounted on the frames 1 is the printing cylinder 9 extending transversely of the frames and of course disposed above the bed. This cylinder at one end has a gear 10 mounted in connection therewith which meshes with a rack 11 fixed on the bed, so that the cylinder will oscillate with the reciprocation of the bed. The extent of the reciprocation is such that the cylinder will oscillate through an arc somewhat greater than a full revolution. As usual the cylinder is mounted in eccentric bearings, which are arranged to be rotated to intermittently raise and lower the cylinder to and from engaging with the type on the bed, in timed conjunction with the oscillation of the cylinder and movement of the bed. This arrangement also is common and forms no part of my invention.

The cylinder is hollow as shown in Fig. 11 and various other views and for a portion of its periphery it is cut away for a certain circumferential extent, forming a relatively wide slot which extends for the full operating width of the cylinder, and at one end has a straight sharp cornered edge 12 disposed parallel to the axis of the cylinder.

Mounting in and extending lengthwise of the cylinder intermediate the ends of the cut out portion or slot is a shaft 13, which is parallel to the axis of the cylinder. This shaft carries a plurality of gripping fingers 14 which overhang the cylinder beyond the edge 12 a short distance. A short radial arm 15 on the shaft and projecting away from the fingers is acted on by an adjustable compression spring 16 to maintain the points of the fingers pressingly engaged with the cylinder. The spring extends across the cylinder substantially at right angles to the arm, and is disposed about a rod 17 which is swivelly connected at one end to said arm and is slidable at its other end in a guide socket in the cylinder as shown in Fig. 11.

The ends of the cylinder are solid and the shaft 13 projects through and beyond the end of the same which is opposite to the gear 10. Fixed on the outer end of the shaft in the space between the adjacent end of the cylinder and the corresponding bearing block 8, is a radial arm 18 carrying a roller 19 on its outer end, this roller being disposed on the side of the arm which is nearest the bearing block. A stop pin 20 projects from the cylinder and is positioned to engage the arm when the fingers are pressed against the cylinder, and thus limit the extent to which the pressure of the spring 16 can thus act. The above parts being mounted in direct connection with the cylinder, of course rotate therewith as a unit.

Also disposed in the space between the cylinder and bearing block are spaced upper and lower cam blocks 21 and 22 respectively. These blocks have swells 23 and 24 respectively, on their faces or edges which are nearest the axis of the cylinder, these swells being disposed relative to the path of movement of the outermost point of the roller when in a normal position and the cylinder turns, to engage said roller and cause the shaft 13 to be rotated and the fingers 14 to be lifted from engagement with the cylinder against the resistance of the spring. The cam swells are disposed relative to the oscillating movement of the cylinder as to cause the fingers to be released only at predetermined positions of the cylinder as will hereinafter be described.

The cam blocks are arranged to be moved into the path of movement of the roller only at certain predetermined and intermittently recurring intervals, and are therefore mounted and moved in or out at the proper time in the following manner.

The upper cam block 21 is mounted on spaced horizontal rods 25 which slidably project through and are supported by the adjacent bearing block 8; said rods being connected on their outer ends to a rigid bar 26. Compression springs 27 about the rods between the bar and the bearing block act to hold the bar away from the block, and the cam block close to the bearing block or away from the transverse path of movement of the roller.

The bar 26 is moved in toward the bearing

block against the resistance of the springs 27, so as to cause the corresponding cam block 21 to be moved transversely into the path of movement of the roller, by means of a pin 28 upstanding from the outer end of an arm 29 which is fixed on and projects radially from a vertical shaft 30. Projecting from the lower end of this shaft is a radial arm 31 to the outer end of which one end of a horizontal link 32 is connected. The other end of this link is connected to the upper end of a bellcrank 33 which is pivoted on the adjacent frame 1 as at 34.

The other leg of the bellcrank carries a roller 35 which rides on a cam 36 fixed on the shaft 4. This cam is circular for the most part, so that the roller 35 and bellcrank are not affected, but for a certain and relatively short portion of its circumferential extent, it has a swell 37 positioned to engage and depress the roller. With such depression the bellcrank is moved, and through the interconnecting parts the shaft 30 is turned in such a direction that the pin 28 pushes the bar 26 inwardly or toward the bearing block. This causes the corresponding cam block 21 to be moved into the path of the roller 19 as previously set forth. The swell 37 is positioned on the cam relative to the position of the crank 3 on the shaft 4, so as to cause the bellcrank to be thus actuated when the cylinder is just about the end of its stroke in one direction, but while the said cylinder is still rotating with its upper surface turning toward the rear, or toward the feed-in end of the press.

The lower cam block 22 is also mounted on horizontal rods 38 which slidably project through the adjacent block 8 and are connected on their outer ends to a rigid bar 39. Springs 40 about said rods act to hold the lower cam block 22 transversely clear of the path of the roller 19. The bar 39 is engaged by one end of a radial arm 41 which projects from the upper end of a sleeve-shaft 42 which surrounds and supports the shaft 30 and is itself supported from the frame 1 by suitable vertical spaced bearings B (see Figs. 1 and 2). A radial arm 43 projects from the lower end of this sleeve and is connected to one end of a horizontal link 44. This link extends parallel to the link 32 and is connected to the upper end of the vertical leg of a bellcrank 45 which is pivoted in common with the bellcrank 33. The other leg of this bell crank extends under the cam 36 and carries a roller 46 on its outer end to ride on the said cam in transversely spaced relation to the roller 35, as plainly shown in Fig. 14.

This cam has another swell 47, disposed to one side of the plane of the swell 37 so as not to affect the roller 35, but positioned so as to engage the roller 46 only. The swell 37 in turn is of course disposed so that it does not affect the roller 46. The swell 47 is positioned substantially in diametrally opposed relation to the swell 37, or so as to depress the roller 46 and actuate the corresponding bellcrank when the crank 3 is adjacent the opposite end of its stroke, as shown in Fig. 2; or when the cylinder has completed a full revolution from the position it occupied when the crank was at the other end of its stroke. With the depression of the roller 46 and the accompanying movement of the bellcrank 45, the bar 39 is acted on by the member 41 and depressed so as to move the corresponding cam block 22 inwardly or toward the cylinder and into the path of the roller 19. The control mechanisms for the two blocks are thus arranged so that both cam blocks cannot be moved in at the same time. Separate springs 48 act independently on the two bellcranks to hold their rollers against the cam member 36.

Projecting rearwardly from and disposed substantially tangent to the cylinder is a table 49 to separate individual sheets of paper 50. The sheet is fed onto the table so that its forward edge extends beyond the forward edge of the table and overhangs the adjacent portion of the cylinder, by suitable feeding means, which is preferably of the type shown in my co-pending application for patent previously mentioned. This sheet is located on the table between transversely spaced guide plates 51 extending lengthwise of the press and adjustably fixed on transversely extending rods 52.

These rods are separate from but alined with each other and are suitably mounted in connection with and under the table. The adjacent ends of the rods are flexibly connected by links 53 with the ends of a horizontal arm 54 which is pivoted centrally of its length under the table, so that when one rod is moved lengthwise in one direction, the other rod will be moved to the same extent but in the opposite direction.

The purpose of this arrangement is to cause the guides to engage and straighten the edges of a sheet resting on the table between the guides. One of the rods 52 projects beyond the adjacent side edge of the table and at its outer end carries a lug 55 or the like which projects between the sides of a forked member 56 depending from the rear end of the bar 26. Therefore when the bar is moved in or toward the cylinder bearing block, the rod 52 is moved in a corresponding amount and both paper guides approach each other to engage and straighten the edge of the sheet. This operation takes place just before the paper is gripped, as will be seen later, so that there is no chance for the paper when once straightened to get out of line before being gripped.

The operation of the gripping mechanism is as follows. Just before the crank 3 reaches its forward dead center position, and the bed occupies a corresponding position, the edge 12 of the cylinder-slot is disposed upper-

most and nearly at its rearmost position relative to the table (see Fig. 3). The upper cam is at this time moved into the path of the roller 19, causing the roller to ride on the swell 23 of said cam. This causes the gripping fingers to be spread away or disengaged from the cylinder and allows the projecting edge of the sheet resting on the table to be received between the cylinder and the grippers. At the same time the sheet is being straightened as previously explained. The sheet is disposed on the table so that when the edge 12 reaches its full rear position (which is at the full forward dead center position of the crank 3) the adjacent edge of the paper is alined with the edge 12.

At the same instant the roller 19 leaves the swell 23, allowing the spring 16 to act to cause the grippers to firmly engage and clamp the paper against the cylinder (see Fig. 5). Also at the same instant the roller 35 of the bellcrank which controls the position of the cam 21 leaves the swell 37 of the cam 36, so that said cam will be retracted from the path of the roller 19. Then with the turn of the cylinder in the opposite direction, imparted thereto by the forward movement of the bed, the roller 19 will not engage the cam and the grippers will remain engaged with the sheet. Said sheet is therefore held tight against the cylinder as the latter turns so that it is drawn under the cylinder and engaged with the bed in proper printing relation.

As the cylinder has about completed a full revolution in its printing direction, the crank 3 approaches its rearward dead center position, and the lower cam 22 is moved into the path of the roller 19 (see Fig. 8) by the action of the swell 47 on the roller 46 of the corresponding bellcrank. By the time the cylinder has made slightly more than a complete revolution the roller 19 engages the swell 24 on the cam 22, and the grippers are released from the sheet (see Fig. 9). The released edge of the sheet is then adjacent a number of horizontally alined fixed supporting fingers 57, which are disposed between the cylinder on the side thereof opposite to the table and the tape conveyor 58 leading to the stacker. The sheet then passes from the cylinder over the supporting fingers (which then practically engage the cylinder) and on to the tapes, from which it is conveyed to the stacker. The initial movement in this direction is imparted to the sheet by reason of the continued rotation of the cylinder in the same direction acting in conjunction with idler rollers 59 which engage the cylinder above the fingers 57.

As soon as the crank 3 reaches its full dead center position the cam 22 is withdrawn from the path of the roller 19 and the gripping fingers again close on the cylinder. By this time, however, the paper has moved on to the conveyor and is clear of the cylinder so that it is not now affected by the gripping movement of the fingers. The cylinder then oscillates in the opposite direction on a return or idle stroke until it assumes a position as described at the outset, when the fingers are again spread from the cylinder by reason of the cam 21, and the cycle of operations above described is repeated.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described my invention what I claim as new and useful and desire to secure by Letters Patent is:

1. In a printing press having a printing cylinder, end bearing blocks for the cylinder, means for oscillating the cylinder through an arc of predetermined length, sheet supporting means associated with the cylinder, grippers mounted in the cylinder to normally engage the periphery of the cylinder so as to grip one edge of a sheet during printing oscillation of the cylinder, a shaft parallel to the axis of and mounted on the cylinder and to which the grippers are secured, an arm on the shaft beyond one end of the cylinder and disposed between said end and the adjacent bearing block, and a roller on the outer end of the arm; a means for engagement with said roller to cause the grippers to be retracted from, and allowed to engage the periphery of the cylinder at predetermined periods in the cycle of oscillation of the cylinder, said means comprising separate cam members extending about the axis of the cylinder outwardly of the path of the roller and adapted to be alternately engaged by the same in a manner to cause the grippers to be moved clear of the cylinder, means supporting the cams slidably mounted in said block, bars secured to said supporting means outwardly of the block, springs acting to hold the cams adjacent the block and laterally clear of the roller, and means acting on the bars and functioning with the operation of the press to separately move the bars toward the block against the action of the springs whereby the corresponding cams will be shifted laterally into the path of travel of the roller.

2. In a printing press having a printing cylinder, end bearing blocks for the cylinder, means for oscillating the cylinder through an arc of predetermined length, sheet supporting means associated with the cylinder, grippers mounted in the cylinder to normally engage the periphery of the cylinder so as

to grip one edge of a sheet during printing oscillation of the cylinder, a shaft parallel to the axis of and mounted on the cylinder and to which the grippers are secured, an arm on the shaft beyond one end of the cylinder and disposed between said end and the adjacent bearing block, and a roller on the outer end of the arm; a means for engagement with said roller to cause the grippers to be retracted from and allowed to engage the periphery of the cylinder at predetermined periods in the cycle of oscillation of the cylinder, said means comprising separate cam members extending about the axis of the cylinder outwardly of the path of the roller and adapted to be alternately engaged by the same in a manner to cause the grippers to be moved clear of the cylinder, springs normally holding the cams clear of said path, and means for moving the cams into said path in predetermined and separate order, such means comprising a rotatable disc mounted in conjunction with the cylinder oscillating means so that said disc turns through a half revolution with each full oscillatory stroke of the cylinder, diametrally opposite and transversely spaced cam elements on said disc, rollers to separately ride on said elements, and separate operating connections between said rollers and the cams to cause them to be moved into the path of the first named roller when the disc elements engage the corresponding rollers.

3. A structure as in claim 1, in which said last named means includes vertical coaxial but independently turnable shafts mounted on the press outwardly of the bars, a radial arm projecting from the upper end of one shaft and bearing against one bar, a similar arm projecting from the upper end of the other shaft and bearing against the other bar, and means functioning with the operation of the press and applied to the lower ends of the shafts for separately turning the same sufficiently to cause the cams to be moved laterally into the path of the roller at predetermined periods in the cycle of oscillation of the cylinder.

4. In a printing press, a printing cylinder, means for oscillating the same through an arc of predetermined length, means for supporting a sheet of paper with one end overhanging and adjacent the cylinder, grippers mounted in connection with the cylinder to engage and clamp the said end of the sheet against the cylinder when the cylinder is at the end of an oscillatory stroke in one direction, means normally maintaining the grippers in their clamping positions, means acting to retract the grippers as the cylinder approaches the end of its stroke in said one direction, and to cause them to again assume their clamping positions as the cylinder reaches said end of its stroke; said means including a bar mounted adjacent the cylinder beyond one end of the same and movable transversely thereof, a sheet straightening and centering device, means for operating said device including a transversely extending rod adapted for movement in an axial direction, and a connection between the outer end of said rod and the bar to cause the rod to be thus moved with the transverse movement of the bar.

In testimony whereof I affix my signature.

CHARLES L. LOW.