J. THOMSON.

PRESS.

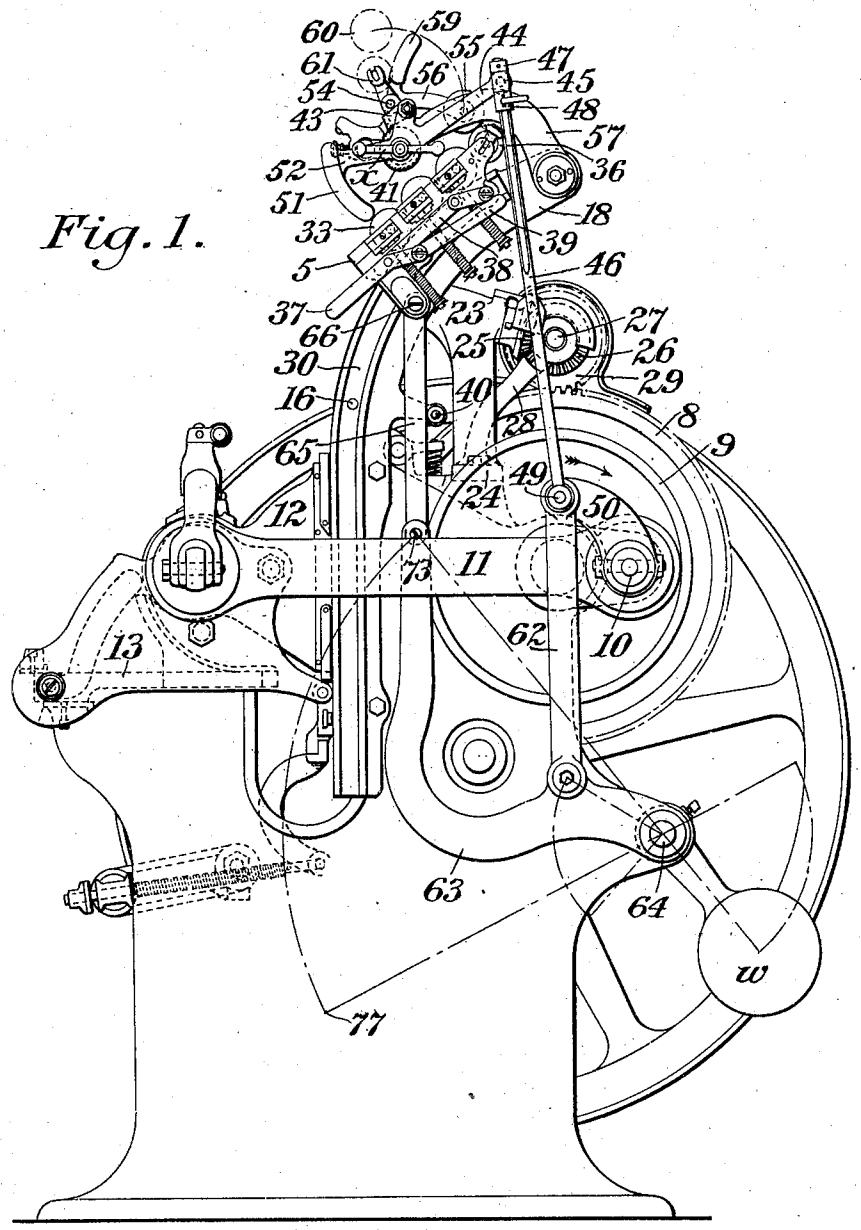
APPLICATION FILED FEB. 25, 1910.

980,455.

Patented Jan. 3, 1911.

5 SHEETS—SHEET 1.

Fig. 1.



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5 SHEETS—SHEET 2.

Fig. 2.

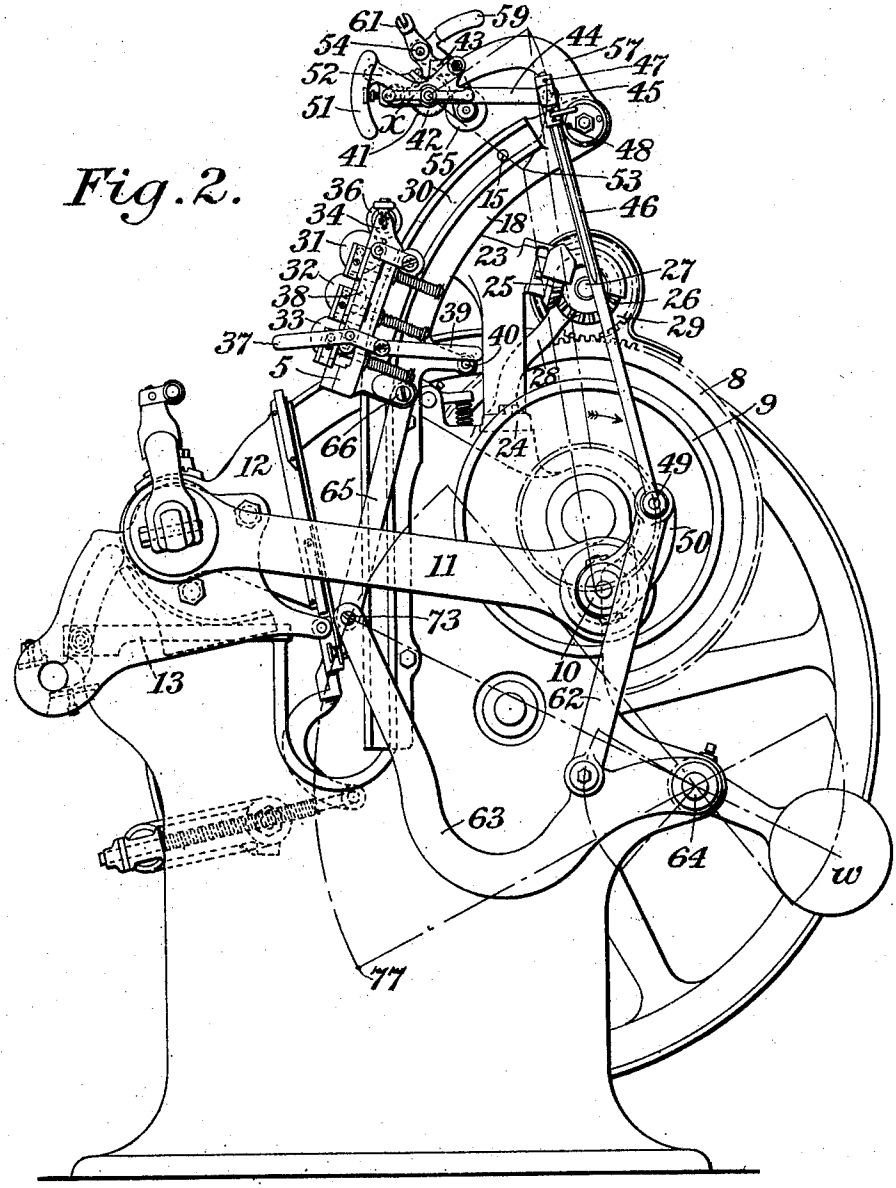
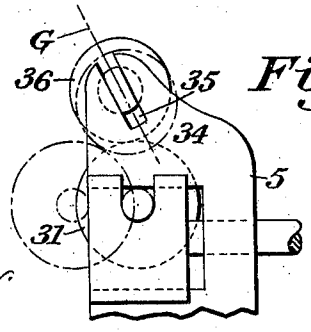


Fig. 4.



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5 SHEETS—SHEET 3.

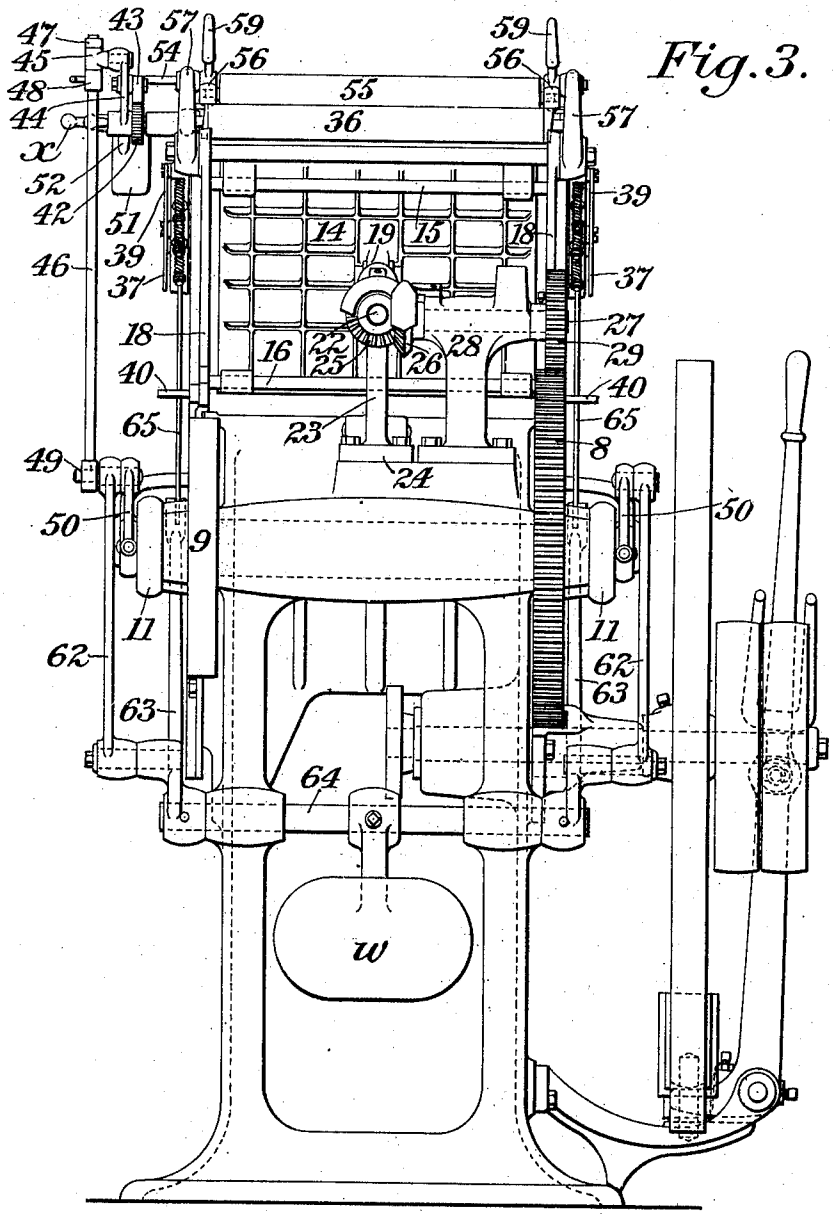

Fig. 3.

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5 SHEETS—SHEET 4.

Fig. 5.

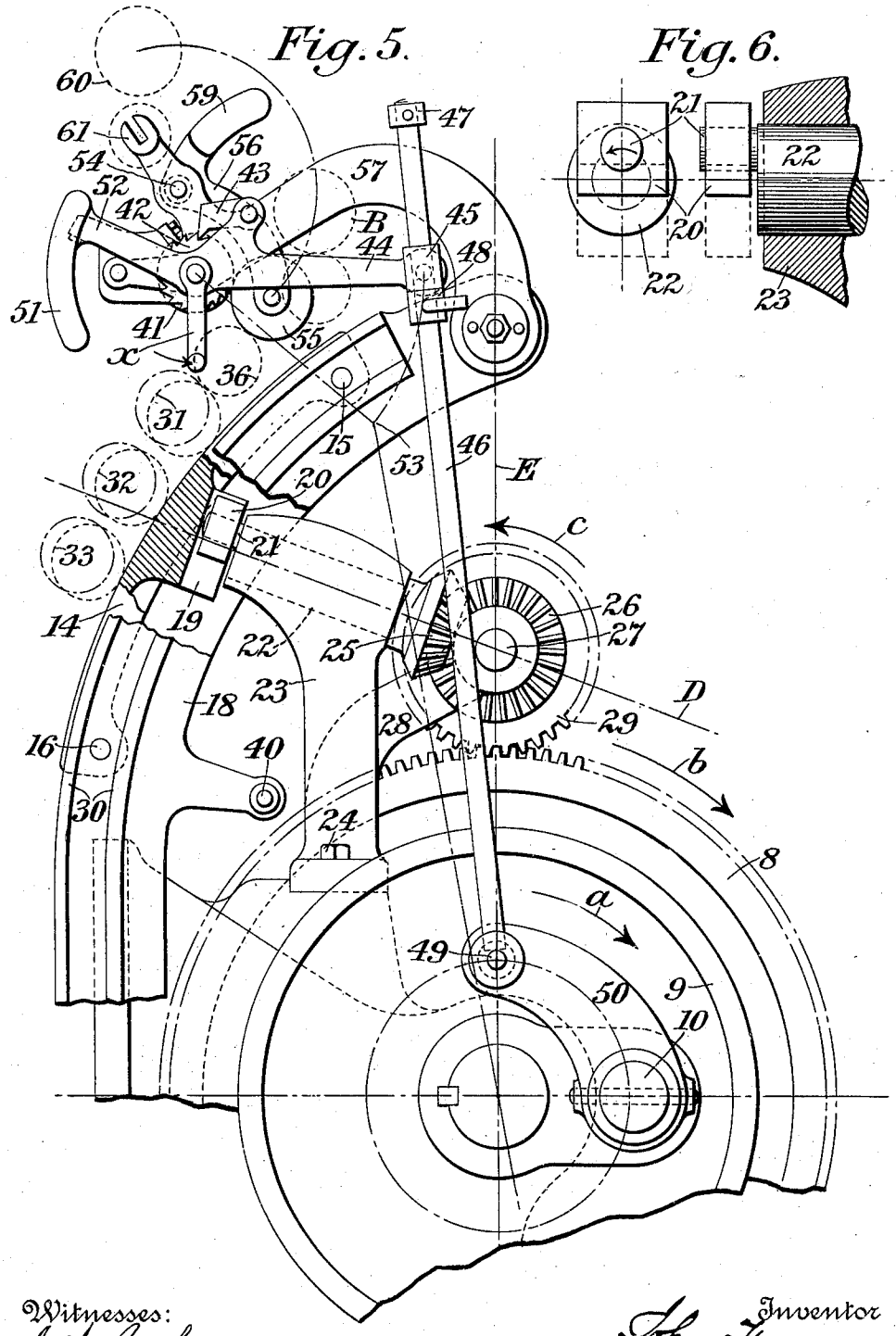

Fig. 6.

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6 SHEETS—SHEET 5.

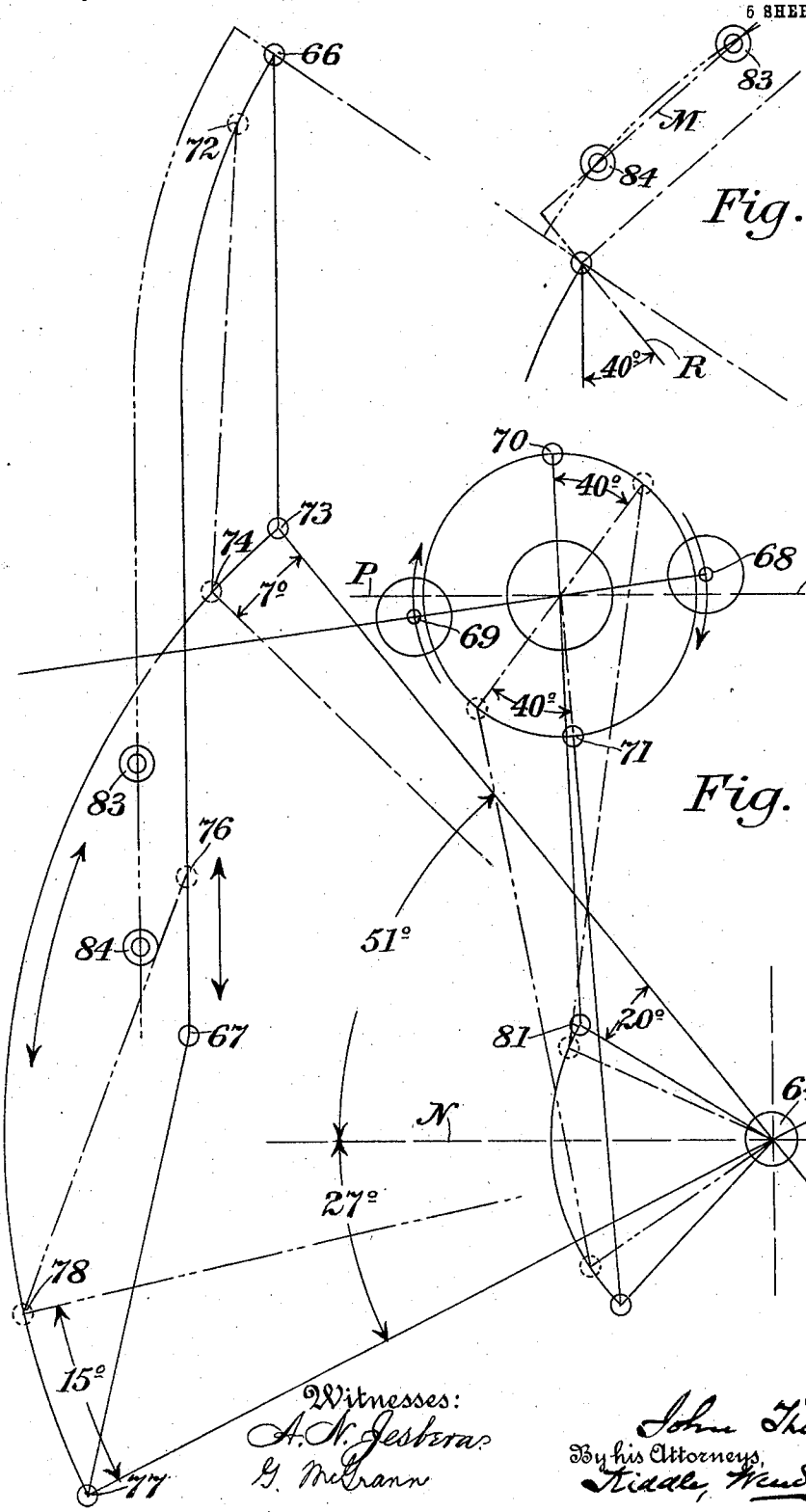

Fig. 8.

Fig. 7.

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UNITED STATES PATENT OFFICE.

JOHN THOMSON, OF NEW YORK, N. Y., ASSIGNOR TO JOHN THOMSON PRESS COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PRESS.

980,455. Specification of Letters Patent. **Patented Jan. 3, 1911.**

Application filed February 25, 1910. Serial No. 545,847.

To all whom it may concern:

Be it known that I, JOHN THOMSON, a citizen of the United States, and a resident of the borough of Manhattan of the city of New York, in the county and State of New York, have invented certain new and useful Improvements in Presses, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention relates particularly to improvements in the inking apparatus of printing presses and to the coördination of the carriage movement with the action of a rocking platen.

Some objects of the invention are to provide for the most effective distribution of the ink with the least number of rollers; to be able to change from one color to another without removing any of the parts; and, in general, to provide a simple and smoothly operating mechanism.

Another object of the invention is to produce a carriage movement which shall operate without shock or jar at any rate of speed possible to feed the sheets, which shall produce a very slow rate of speed as the carriage moves across the ink plate and especially during the period of contact with the ductor roller, and which shall insure adequate clearance with the lower edge of the platen. This last consideration demands particular attention in the case of a rocking platen action, such as has been very generally adopted for embossing, stamping, paper-box cutting and other machines, as well as for printing presses of the type generally known by the trade-name of "The Colts Armory". There are two features which make the application of form inking apparatus very difficult in such presses: first, that the lower edge of platen, due to its relative location to the center of the platen rockers, rises and falls, when contiguous to the form, either in a nearly vertical line or in a flat cycloidal arc; and, second, that the platen-shaft also traverses a flat cycloidal arc, constantly falling during the out-movement and rising during the in-movement. The consequences of these conditions are that the platen-ends of the connecting rods fall below the horizontal dead-center line, whereby the platen is swung out to the limit of its movement with less than half of a revolution of the cranks, while more than half of a revolution is necessary to return it. Therefore, the combination of these features makes it difficult to obtain an adequate clearance between the carriage and form-inking rollers and the lower edge of the platen, in other words the reciprocating action of the carriage, which must be derived from a revolving movement passing through equal arcs in equal periods of time, must be made to operate in conformity with the rocking platen whose outer traverse is produced by less circular crank action and in a less period of time than its inward traverse, so that the problem of devising a carriage movement having all of the desired characteristics becomes quite complicated.

Referring now to the drawings in which a printing press has been shown embodying the improvements, Figure 1 is a side elevation of the press, as completely assembled, the platen being shown on the impression and the form-inking carriage at the upward termination of its movement. Fig. 2 is a side elevation similar to that of Fig. 1 except that the platen is shown away from the form and the carriage as it is about to pass down over the form. Fig. 3 is a rear elevation, developed from Fig. 1. Fig. 4 is an enlarged detail view of the upper portion of the carriage frame to show the manner of mounting the changer. Fig. 5 is an enlarged detail view, in elevation and section, of the ink-distributing apparatus and the actions for operating it. Fig. 6 is a combined front and side detail view of the slide-block and crank which reciprocates the ink-plate, and, Figs. 7 and 8 are enlarged diagrams, scaled from Figs. 1 and 2, to illustrate the kinematics of the devices which actuate the carriage.

All of the mechanism of the press is mounted upon a self-contained bed and frame, motion being communicated from a fly wheel and its pinion-shaft to the main gear wheel 8, and crank-disk 9, the crank pins, as 10, acting through the connecting rods, as 11, to rock the platen 12 back and forth upon the rocker-seats, as 13, of the frame.

The main ink-distributing element is a curved plate 14, (see particularly Fig. 5) mounted upon two rods 15, 16 fixed in the correspondingly curved portion of the car-

riage ways, as 18. The width of the plate is less than the free space between the inner sides of the carriage-ways for the purpose of permitting the plate to be reciprocated in a horizontal direction. This reciprocation is obtained by forming a slot, as 19, in about the center of the inner side of the plate, in which slot operates a slide-block 20 mounted upon a crank-pin 21 (Fig. 6) of a shaft 22. The latter is journaled in a bracket 23 bolted to the top of the bed, as at 24. To the other end of the shaft 22 is secured a bevel gear 25 which meshes with another bevel gear 26; the latter is secured to a shaft 27 journaled in a bracket 28 and secured to the frame as in the first instance. To the outer end of the shaft 27 is secured a spur gear 29 which meshes with the main driving gear-wheel 8. The arrows *a*, *b*, *c* denote the directions of the revolutions. It will be observed that the axis, broken line D, of shaft 22 lies at an angle to that of the vertical center, broken line E, of less than 90°, the object of this being to center and equalize the thrusts of the slide-block upon the plate and its bearings. By this arrangement the plate may be reciprocated at any desired rate with the utmost smoothness of action, and by a proper proportionment of the spur and bevel gears, the form rollers will not reach the plate in successive unison with the lateral action, which is conducive to the most effective distribution.

As here shown, the carriage 5 slides in the slots, as 30, of the carriage ways, as 18, and has three composition form rollers 31, 32 and 33 mounted in the usual slidable boxes with retracting springs. In the upper ends of the carriage frames, as 34 (Fig. 4) slots, as 35, are formed to receive a metallic "changer" 36 which rests upon the upper form roller. This slot is preferably at an angle, as broken line G, forward from the vertical, the object being to better resist the revolving thrust of the form rollers while yet leaving it entirely free to respond to any definite action of the latter. The carriage frames are provided with hand-levers, as 37, to which bars, as 38, are suitably connected by links, the bars engaging the projecting edges of the form roller boxes. When these levers lie in the position shown in Fig. 1, the rollers are then in proper position to act upon the ink-plate and upon the form; but when the levers are pulled forward (as shown in Fig. 2) the rollers are then definitely withdrawn from and out of contact with the ink-plate. In this position the rollers may then either be easily removed or may be most conveniently cleaned in place. Again, the changer may either be conveniently lifted out of its slots, or it will automatically adjust itself to the form roller, as is shown by the broken lines of Fig. 4. The inner extensions, as 39, of the hand levers are adapted to engage pins, as 40, located in the carriage ways, whose function is to automatically reset the levers and permit the rollers to slide back to their normal operative positions should the operator neglect to do so. It is to be particularly observed, however, that these disengaging pins are set well down so that the automatic disengagement will not take place until the lower form roller is approximately over the upper portion of the chase. In this wise, about half of the upper surface of the plate is exposed whereby this portion of the plate may be washed, as also may be the rollers, then, by moving the carriage up to its topmost position (Fig. 1) the lower surface of the plate may be washed.

An important coördinating feature of the carriage and plate is the apparatus for operating the ink-fountain and automatically transmitting its ink to the plate and the form inking-rollers. The fountain cylinder 41 (Fig. 5) is intermittently revolved through the medium of the ratchet wheel 42, pawl 43, and pawl-lever 44, the latter being provided with a swiveled sleeve 45 through which freely slides the rod 46. This rod has a fixed collar 47 at its upper end and an adjustable collar 48 below the swiveled collar. The lower end of this rod is pivotally connected, as at 49, to the sub-crank arm 50 which is secured to the crank pin 10 of the crank-disk 9. Thus each complete revolution of the crank arm will yield two reciprocations of the rod, and by merely sliding and setting the adjustable collar 48, the fountain cylinder may either not be operated at all, or it may revolve through the space of one or a plurality of the ratchet teeth. It is important to observe here that the movement to revolve the ratchet-wheel is during the upmovement of and terminates with that of the carriage; thus, the fresh charge of ink from the fountain cylinder will be practically entirely brought forward by the time that the upward stroke of the carriage terminates. The outer end of the pawl-lever is counterweighted, as at 51, to hold the pawl in engagement while the rod may be sliding idly through the swiveled collar, and the disposal of the counterweight arm 52 is such that if the rod were accidentally forced forward when the pawl lever is at its lowermost position, as 53, it will engage the projecting pin 54. Without such a provision the pawl lever could be accidentally forced beyond its dead-center, when the apparatus might be damaged.

The means of transmitting the ink from the fountain cylinder consists of a composition ductor roller 55 mounted in two bell-crank levers 56 which swing on pins, as 54, fixed in an extension of the main suspending arms 57, the latter being secured, as shown, to the upper ends of the carriage

ways. The arrangement and disposal are such that the composition ductor roller 55 normally impinges, by gravity, against the fountain cylinder and directly receives the fresh ink therefrom. Then, as the carriage nears the termination of its upward movement, the changer makes contact with the ductor and both go upward and also return together, as to and from the position indicated by the dotted circle B, the ductor being revolved by the changer and the latter by the form inking roller. Thus, the fresh and undistributed film of ink from the ductor must first pass to the changer and thence to the upper form roller which, in its revolution, passes it to the ink plate; and, as this is also in a state of reciprocation, the effective spreading or distributing of the ink is of a high order. But in addition hereto it must be borne in mind that the changer also passes over the form (but not in contact therewith) which is highly advantageous in the production of half-tone and rule-printing. To operate the press without the ductor, or to clean it in place, the bell cranks may be swung forward until the handles, as 59, rest upon the main body of the fountain, when the ductor will be in the position indicated by the dotted circle 60. So, too, if it is not desired to use the changer, or as a convenience when cleaning, it may be removed from the carriage and placed in the slotted arms, as 61, immediately beneath the ductor when in its disengaged position. In order to effect a predistribution of the ink, that is to cover the ductor roller previously to running the press, a handle x may be attached to one end of the fountain cylinder which latter may thereby be revolved at will.

The means for effecting the movement of the carriage consists of connections, as 62, (Figs. 1 and 2) pivoted to the subcrank arms, the carriage levers, as 63, on shaft 64, the links, as 65, between the carriage and its levers and the counter-balancing weight w. To utilize this device in combination with the inking apparatus and platen action of a printing press of the type here illustrated has proven exceedingly difficult. On the other hand it is believed that its successful adaptation makes the coördinating elements much more effective than would otherwise be possible. Thus, aside from the difficulties to be overcome in obtaining adequate clearance at the lower edge of the platen, already referred to, it is very desirable to obtain the slowest possible rate of movement of the carriage across the ink plate and especially during the period of contact with the ductor roller, the latter condition being complicated by the rearward curving of the carriage ways, which very rapidly changes the thrusts to and from the carriage. A satisfactory solution of the problem for a press of the type herein referred to, is set forth, from a case in practice, in the drawings. The dominant principles of the movement are best shown in the diagrams of Figs. 7 and 8, which accurately represent the assembled action denoted in Figs. 1, 2 and 3. The aforesaid diagrams show the center of the connection at the carriage in four positions, as follows: 66 at the limit of the upmovement and 67 at the limit of the downmovement, these corresponding to the crank-pin centers 68, 69 and the subcrank centers, 70, 71; also position 72, caused by a crank swing of 40° which produces a swing of 7°, as 73 to 74, of the carriage lever center, moving 66 to 72, or vice versa; and finally the position 76 caused by a corresponding crank-swing of 40° which produces a swing of 15°, as from 77 to 78 of the carriage lever center, moving 67 to 76, or vice versa. Inspection of the relative carriage movements, 66 to 72, and 67 to 76, will show that, although the crank-swing is the same, 40° in both cases, the lower movement is about two and a half times greater than the higher. This result is obtained by the disposal of the carriage lever swing relative to the horizontal line N, that is 27° below and 51° above, or substantially twice as much above as below; also by the setting of the center 81 relative to the center 73 and to the rock-shaft 64, and, once more, by the relation of centers 73 and 66 to the line M (Fig. 8), which bisects the carriage frame friction rollers, 83, 84. One additional element remains, that of the setting of the subcrank center 70 relative to the crank-pin center 68, this being such that the upward movement of the carriage terminates before the crank-pin reaches the horizontal dead-center line P. The particular object of this is to permit the lower termination of the carriage movement to coincide with the outer limit of the platen action, which occurs when the crank pin has been swung to the position 69, that is below the dead-center line P. As shown in the set-off section of the diagram (Fig. 8) the thrust of the carriage connection is 40° from the theoretical limiting line R, which is about as close to the practical limit of movement as will operate without "cramping," due to the rearward swing of the carriage, or line M.

Consideration of the foregoing several features of construction will show that the uniform circular traverse of the main and subcranks produces a carriage movement of the lowest possible rate of speed at or near the upper portion of its stroke and of the highest possible rate of speed at or near the lower portion of its stroke. By thus obtaining variable ratios of traverse, the desired clearance is obtained between the carriage and the lower edge of the platen; the impact upon the "changer," at the highest rates of running, is negligible and the form inking

rollers are retained upon the ink-plate for the longest possible period of time, thus receiving the greatest possible number of vibratory actions to distribute the ink.

I claim as my invention:

1. In a press, the combination with a reciprocating platen and a form inking carriage of platen and carriage connections and a crank disk by which the said platen and carriage connections are actuated, but from different centers of said crank disk; the centers of the connecting members being so related that the lower termination and reversal of the carriage movement shall approximately coincide with the outer termination and reversal of the platen action.

2. A press having in combination a form, a reciprocating platen, a form inking carriage and crank disk; a link connection between the crank on the crank disk and the platen so constructed and arranged that a line through the center of the bearings at the opposite ends of the link will lie in a plane which extends in the same direction that the axis of rotation of the crank disk extends and which plane is normal to the face of the form when the platen is in impressing position, and a second crank operatively connected with the crank disk and also operatively connected to the carriage to move the carriage across the form in such manner that during the entire movement of the carriage to and from its lowest position the platen will be continuously receding from or approaching impressing position.

3. In a press the combination with a form roller carriage, form rollers therein and an inking plate of a changer mounted upon the carriage, so as to rest on one of the form rollers and so mounted that it never contacts with the printing surface of the form, and a ductor roller mounted so as to normally make contact with the ink fountain; the construction and arrangement being such that the ductor roller will move relative to the fountain and ride upon the changer as the latter passes beyond and returns to the fountain.

4. In a press, the combination with the carriage frame, the form rollers and the ink plate of a metallic changer mounted upon the carriage, adapted to rest upon the upper form roller and a composition ductor roller mounted in swinging arms to normally make contact with the ink fountain; the arrangement and construction being such that the said ductor roller will be caused to swing clear of the fountain and ride upon the changer as the latter passes beyond and returns to the said fountain.

5. In a press, the combination of the carriage frame, journal boxes for the form rollers, bars upon the sides of the frame adapted to engage the projecting edges of the boxes, links upon which the bars are pivoted, hand-levers having inner extensions, and stops which said extensions are adapted to engage to reset the device.

6. In a press, the combination with the fountain cylinder and carriage, of a crank disk, connections therewith for operating the carriage, and connections therewith for operating the fountain cylinder, said connections being attached to the crank disk at the same point so that the fountain cylinder will be actuated upon the up-movement of the carriage.

7. In a press, the combination with the platen, fountain cylinder and carriage, of a crank disk, connections therewith for operating the platen, connections therewith for operating the carriage, and connections therewith for operating the fountain cylinder, the connections for operating the carriage and fountain cylinder being made at the same point upon the crank disk.

8. In a press, the combination with the fountain cylinder and carriage, of a crank disk, a pawl lever to operate the fountain cylinder and having a swiveled sleeve, a rod one end of which is connected to the crank disk and the other end of which slides through the sleeve, a collar-piece upon said rod arranged to actuate the lever upon the up-movement, and carriage connections attached to the crank disk at the same point as the rod.

9. In a press having a form roller carriage, form rollers therein and an ink fountain comprising a fountain cylinder, the combination with the ink fountain, the ink plate and a changer mounted in the carriage, and in contact with the upper form roller, of a ductor roller mounted in pivoted arms primarily resting by gravity against the fountain cylinder and then being thrust away from the changer upon which it rides during the period when the carriage is at or near the upper termination of its movement.

This specification signed and witnessed this 7th day of January, A. D., 1910.

JOHN THOMSON.

Signed in the presence of—
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LUCIUS E. VARNEY.