

L. W. SOUTHGATE.

PRINTING MACHINE.

APPLICATION FILED AUG. 22, 1892.

942,980.

Patented Dec. 14, 1909.

6 SHEETS—SHEET 1.

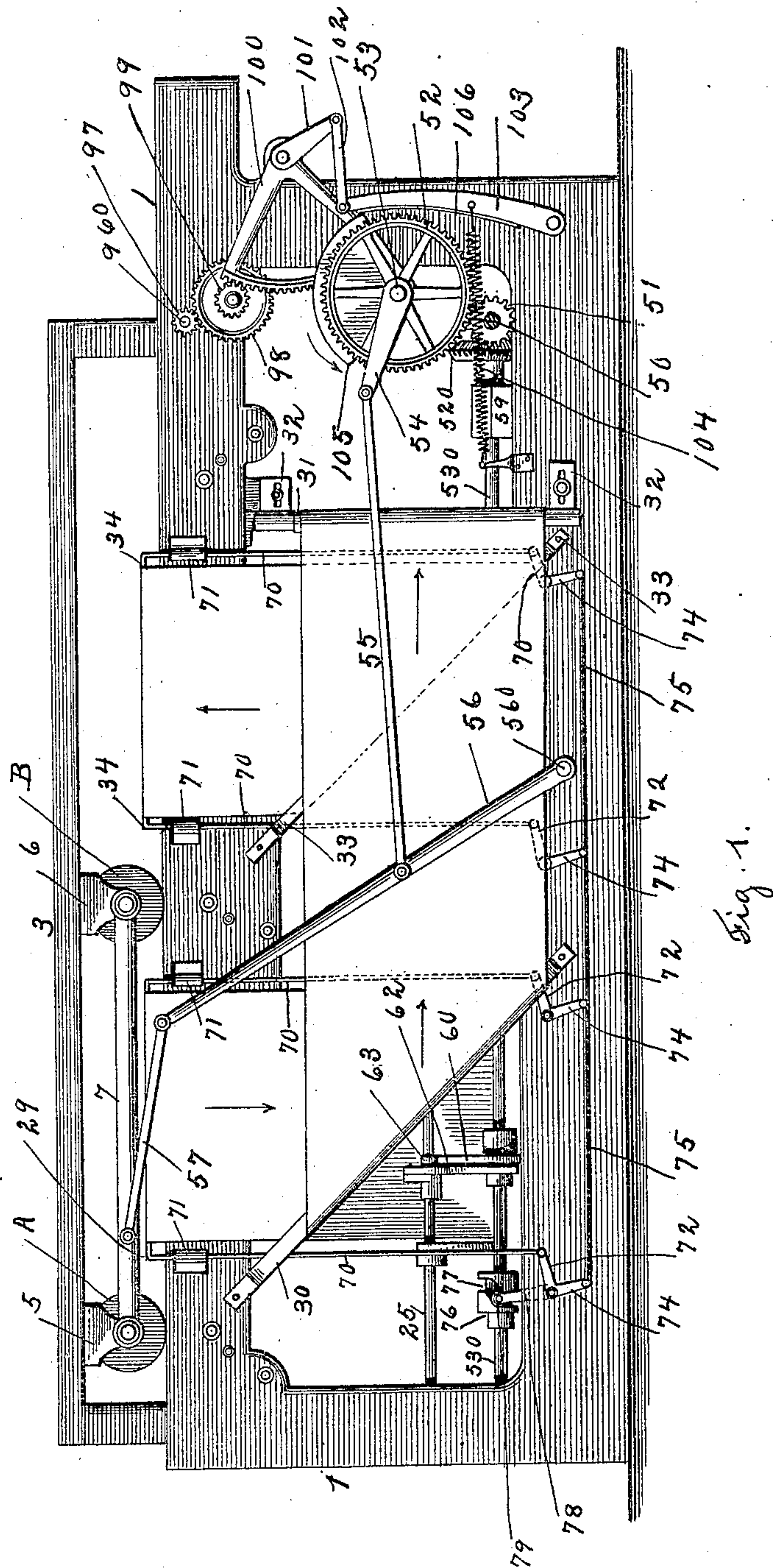


Fig. 1.

Witnesses
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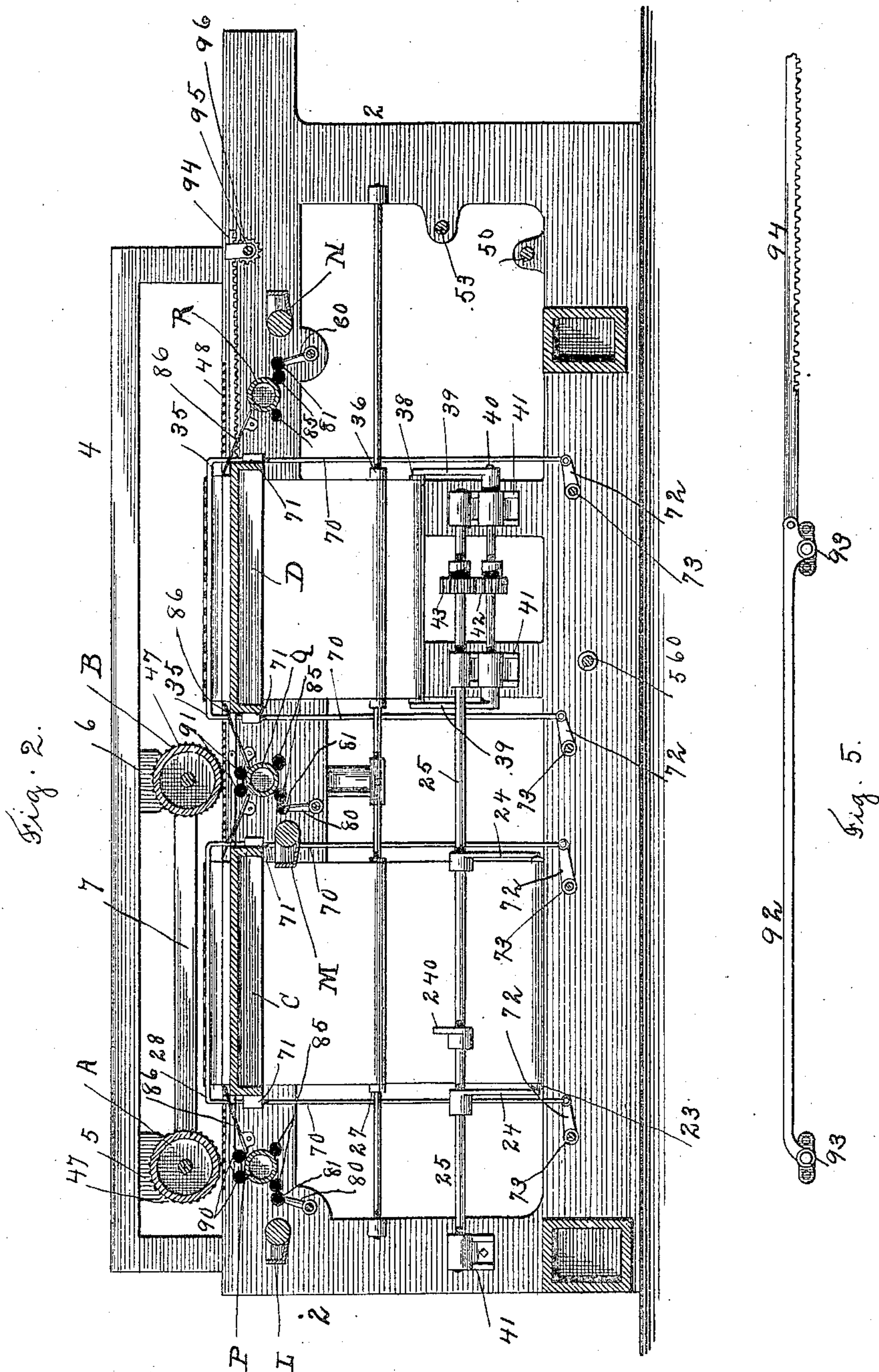
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6 SHEETS—SHEET 2.

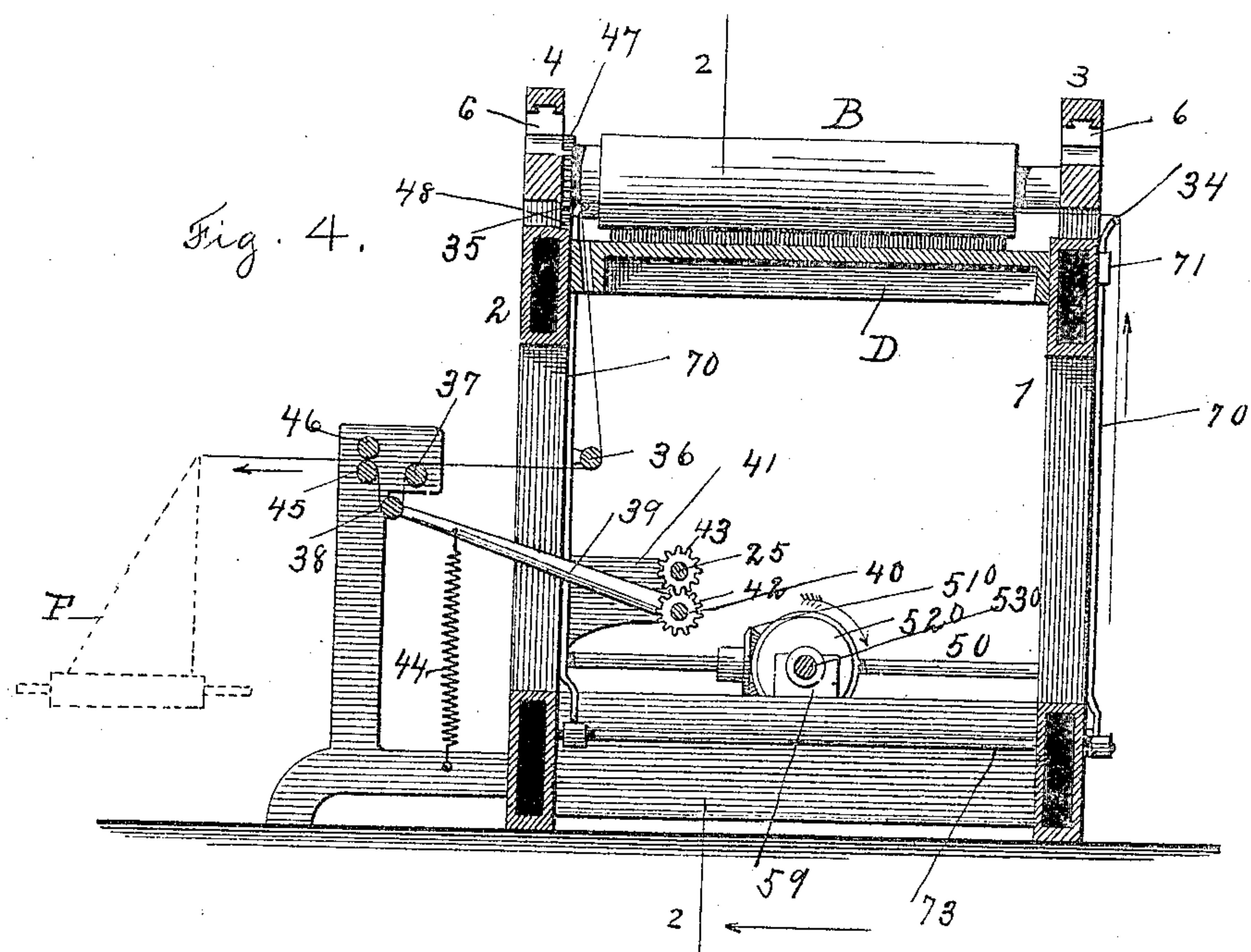


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8 SHEETS—SHEET 3.



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6 SHEETS—SHEET 4.

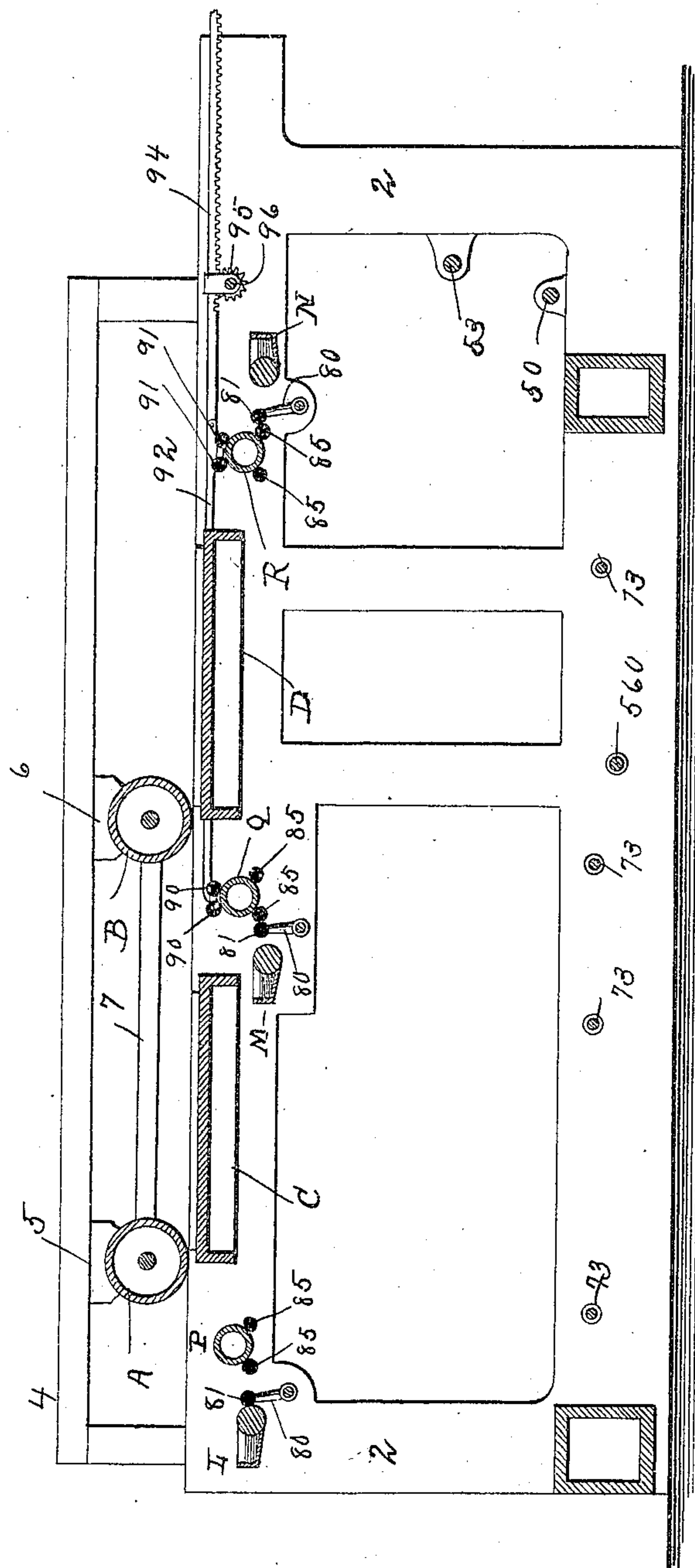


Fig. 6.

Witnesses
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 6 SHEETS—SHEET 5.

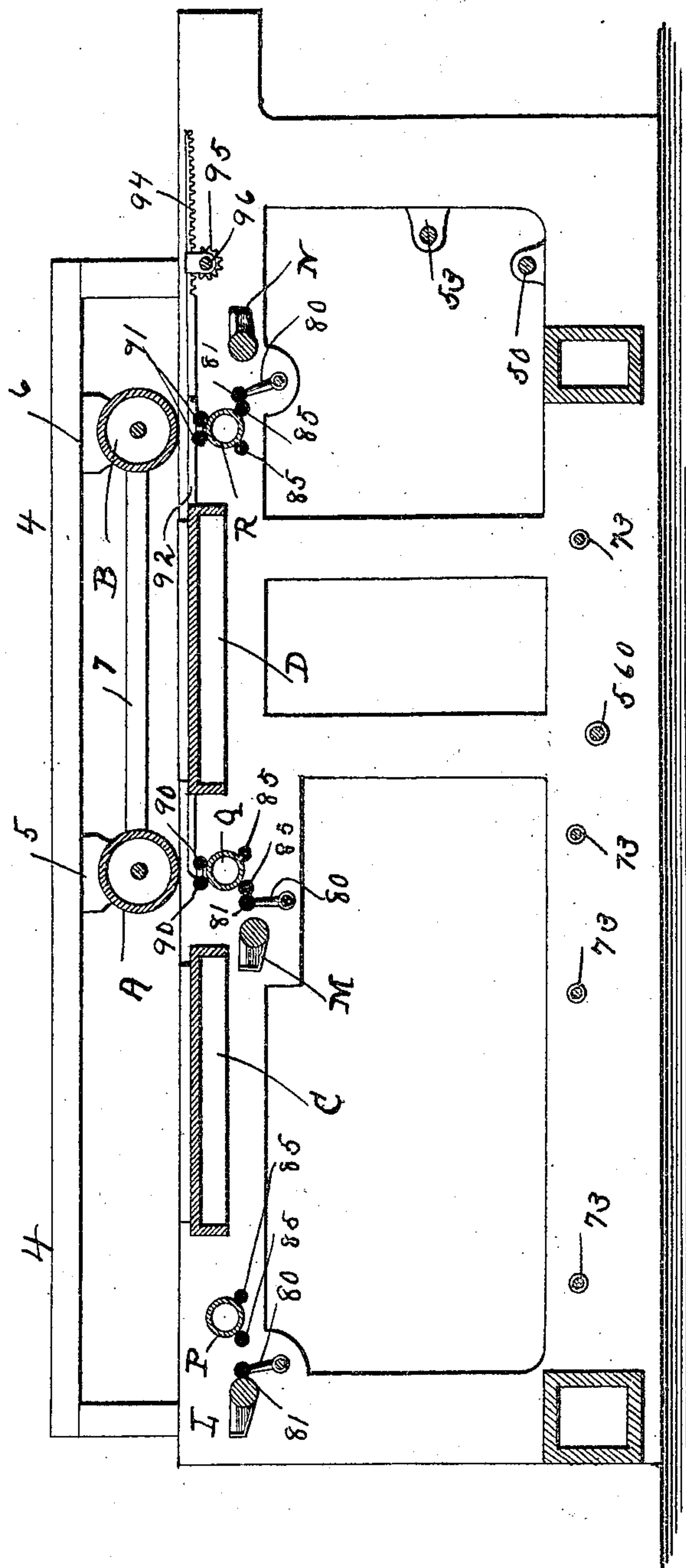


Fig. 7.

Witnesses
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6 SHEETS—SHEET 8.

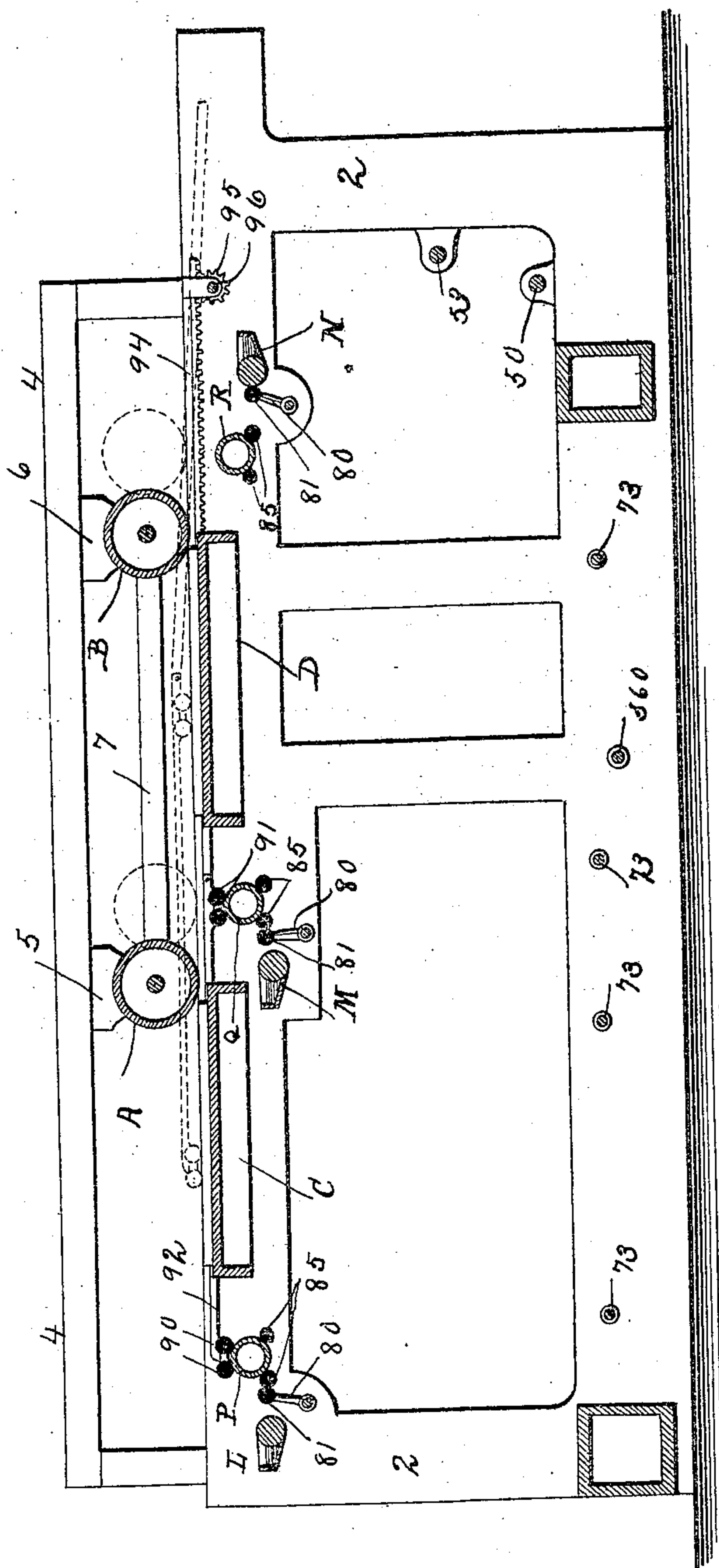


Fig. 8.

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UNITED STATES PATENT OFFICE.

LOUIS W. SOUTHGATE, OF WORCESTER, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO DETROIT TRUST CO., TRUSTEE, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

PRINTING-MACHINE.

942,980.

Specification of Letters Patent.

Patented Dec. 14, 1909.

Application filed August 22, 1892. Serial No. 443,703.

To all whom it may concern:

Be it known that I, LOUIS W. SOUTHGATE, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Printing-Machines, of which the following is a specification.

The aim of this invention is to produce a new and improved printing machine especially adapted to print on a web from stationary forms, and to this end the invention consists of the device described and claimed in this specification, and illustrated in the accompanying drawings, in which,

Figure 1 is a side elevation of a printing machine built after my invention, Fig. 2 is a sectional elevation on line 2—2 of Fig. 4, Fig. 3 is an end sectional elevation through one form bed, Fig. 4 is an end sectional elevation through the other form bed, Fig. 5 is a detail of the ink carriage, and Figs. 6, 7 and 8 are diagrammatic views similar to Fig. 2 illustrating the operation of my invention.

My invention consists in arranging a traveling cylinder web printing press, employing a stationary bed on which the forms are placed, so that the web can be led there-through without being wrapped around the impression cylinder. By feeding the material in this manner, the same will not have to be lifted up or moved by the impression cylinder.

The full embodiment of my invention that I have shown in the drawings consists of two form beds arranged in the same plane, two impression cylinders reciprocating over, and co-acting with said form beds, and means for feeding a web over one form bed, then turning the web, and leading the same over the other form bed, whereby both sides of the web are printed. To effect the inking, when the impression cylinders run off the form beds in either direction, I separate the web and the forms, and run form inking rollers over the forms. The web in the press is shifted or moved relatively to the beds at the same time, or when the impression cylinder or cylinders is or are clear of the web in either direction.

Referring now to the drawings and in detail, 1 and 2 represent the usual side frames of the machine, which may be connected to-

gether by any of the usual tie-beams, as shown. Mounted on each frame 1 and 2 are beams or guides 3 and 4, which guides have dove-tailed recesses on their under sides, as shown, and fitting into these recesses are carriage frames 5, 5 and 6, 6 in which impression cylinders A and B are mounted, which frames 5, 5 and 6, 6 may be connected together by beams or girders 7, 7 so that they will move in unison. The impression cylinders may be made adjustable for the purpose of varying the pressure of impression, if desired, in these carriage frames by any of the usual means, not necessary here to show. On the side of each impression cylinder is arranged a gear 47 which engages and meshes with a stationary rack 48, whereby the impression cylinders A and B will turn to properly register with the forms in a manner well understood.

Mounted between the frames 1 and 2 are the form beds C and D, which the impression cylinders A and B are adapted to move over.

Mounted on one side of the press is a suitable frame in which is mounted the roll of paper E. From this roll E the web is led between rollers 21 and 22, which may be continuously driven in the usual manner to unwind the web from the roll, then around looping roller 23, which is mounted in arms 24 fastened on shaft 25, then around roller 26, around roller 27, up over bar or roller 28, across over form bed C to bar or roller 29, then down at the side of the machine around the 45° turner bar 30, across to vertical roll 31 which is mounted in brackets 32 as shown, then back up over the 45° turner bar 33 fastened to the frame 1, then over bar or roller 34 across bed D, over bar or roller 35 around roll 36 to roll 37, and then around looping delivery roll 38, which is mounted in arms 39 fast on shaft 40, to delivery rollers 45 and 46, which may be continuously driven. By this passage of the web through the machine, it will be seen that the web is led over the two form beds so that the opposite sides thereof are presented to the forms, whereby as the impression cylinders reciprocate over the form beds they will press the web against the forms and print both sides, or perfect the web.

The driving mechanism for reciprocating the cylinders consists of shaft 50, to which

power may be communicated in any of the usual manners, on which is mounted a pinion 51, which meshes with and drives a gear 52 fast on shaft 53, which carries crank arms 54, which connect by links 55 to levers 56, which are mounted on shaft or studs 560. The ends of these levers are connected by links 57 to the beams 7, whereby, as the shaft 53 revolves, the impression cylinders will be moved forward and backward over the form beds. The feeding and delivery mechanism for drawing the web intermittently forward through the press may be driven from this shaft 50, by means of bevel pinion 510 thereon, which meshes with and drives bevel gear 520 fixed on shaft 530, which is journaled in suitable boxes 59. On this shaft 530 is mounted cam 60, and engaging the shaft 530 is a yoke 61, which has a roller 62 which bears against the cam 60. The proportion in the gearing, before described, is such, that the shaft 530 will turn twice as fast as the shaft 53. The yoke 61 is adjustably connected at 63 to arm 240 attached to the shaft 25.

The shafts 25 and 40 are journaled in suitable frames 41. The shaft 25 carries a pinion 43 which meshes with and drives a pinion 42 fast on the shaft 40, on which shaft 40 are fastened arms 39 which carry delivery rollers 38. Pinions 42 and 43 can be made of any desired shape necessary for the proper operation. Thus, as the cams revolve, the looping feed roller 23, and looping delivery roller 38 will be moved oppositely up and down at the proper times to draw the web through the press, when the cylinders are off impression.

The feeding-in rollers 21 and 22 and the feeding-out rollers 45 and 46 are driven by any of the usual gearing, not necessary here to describe at length, and serve both to continuously feed the web in and out of the press. Tapes may also be arranged to cooperate with these rollers in any of the desired manners, if it is so desired. The gearing for driving the feeding-in and feeding-out rollers is preferably made adjustable, so that by varying the point of connection of the yokes to the arms, the length of the web let into and drawn through the press intermittently may be varied. The cams are made in practice virtually of such shape as to impart a uniform up and down movement to the loopers, and the parts are so proportioned that the loopers will act to hold the web in the press stationary during the period of impression, and to shift the web through the press in the periods of non-impression, the web being continuously fed in and out of the press. Springs 44 are preferably used to keep the rollers against the cams.

The bars or rollers 28 and 29, and 34 and 35, by which the web is led over the form

beds are connected by arms 70, mounted in brackets 71, to levers 72, which are fast on the shafts 73 journaled in the main frames 1 and 2, as shown. These shafts 73 are suitably oscillated at the proper time to lift the web off the form beds, while the feeding takes place, and so that inking rollers may be run between the web and the form beds to properly ink the forms. The shafts 73 have extending levers 74, which are connected by a rod 75, so that they will move in unison, and on one of the shafts 73 is arranged an arm 78, which carries roll 79, which engages cam 76 fast on the shaft 530, which cam 76 has a suitable cam slot 77 adapted to vibrate the lever 78.

The inking mechanism consists of three fountains L, M and N, arranged as shown, and distributing rolls or drums P, Q and R cooperating therewith, which distributing drums have suitable composition rollers as 85 bearing against the same to spread the ink in the usual manner. Ductor rollers 81 are arranged in arms 80 in the usual manner, and are adapted to carry ink from the fountain rollers, and deposit the same on one of the rollers 85, or on the drums P, Q and R in the usual manner. Extending up from the distributing drums P, Q and R to the two beds are guides 86, two guides being used in connection with roll or drum Q. The form rollers 90 and 91 are arranged in a suitable carriage 92, which has rollers 93 adapted to bear on these guides 86, so that as the carriage moves it will be raised, and the form rollers lifted from the distributing drums so as to properly engage the forms, but so that when the form rollers are inactive or on the drums, they will be dropped below the impression cylinders, as shown. The carriage 92 may be quickly moved to draw the form rollers over the forms by means of racks 94 pivoted to the same, which racks 94 engage pinions 95 fast on shaft 96. This shaft 96 is intermittently rapidly turned in opposite directions at the proper time to draw the form rollers over the beds, by means of gear 98 mounted on a short shaft, which engages pinion 960 fixed on shaft 96. A pinion 99 is secured to gear 98. The pinion 99 is oscillated by means of pivoted toothed segment 100, attached to which is an arm 101, which is connected by link 102 to pivoted arm 103. Mounted on the shaft 53 is a cam 105, which is adapted to properly vibrate the lever 103. A spring 104 is used to pull the arm 103 against the cam. By this mechanism, the carriage carrying the ink rollers will be properly operated. Any other suitable mechanism may be used for this purpose.

The roll 31 around which the web passes between the two form beds is adjustably mounted on the frame 1 by means of brackets 32, whereby by adjusting these brackets,

proper action of the web may be obtained upon the turner bars, and, also register thereof between the two form beds.

The operation of my device is as follows; and reference, to follow this operation, should be had to Figs. 1, 2, 6, 7, and 8. In Figs. 1 and 2, the impression cylinders are shown as just finishing their movement to the left, and the inking rollers as in their left-hand extreme, the rollers 90 receiving their usual supply of ink from the distributing roller P, and the rollers 91 receiving their supply of ink from the distributing roller Q. Now, while the cylinders A and B are reversing in this position, the web will be raised from the form beds, and the ink carriage will be moved quickly to the right, and the form rollers will thus pass over and ink the forms. At this time, the feeding and delivery mechanism will draw forward the web through the press. This will bring the parts to the position shown in Fig. 6. The web raising and lowering mechanism will now lower the web on to the forms, and the impression cylinders will move to the right, or until the parts assume the position shown in Fig. 7. While this is taking place, the form rollers 90 will receive a supply of ink from the distributing roller Q, and the form rollers 91, from the distributing roller R. While the impression cylinders are reversing at their right hand extreme, the web will be again raised from the form beds, and the form rollers moved over the same to the left, and the forms inked thereby, and the form rollers brought to the position shown in Fig. 8. During this inking operation, the web will be pulled through the press, as before described. The impression cylinders will now move to the left over the forms, and will again print the web. The raising and lowering of the web from the form beds by the means described, is so arranged that it will not affect the tension of the web, the cams being properly proportioned so that the rollers 23 and 38 will slightly yield to allow the web to be raised from the form beds. Thus, it will be seen that at each complete reciprocation of the impression cylinders forward and backward over the form beds, two perfected sheets will be perfected and delivered.

The advantage of my machine over that in which the web is led around the impression cylinders, is that my machine is capable of greater speed, because in the machine of the old class, more or less strain comes on the web from the wrap thereof around the cylinder, while in my machine there is no strain on the web from this source. Further, as the feeding takes place while the impression cylinders are out of engagement with the web, the same can be done very rapidly as there are very few rolls to lead the web around, and very little web in the press, as

the web does not have to shift on the surface of the impression cylinders, as in the previous machines. By leading the web directly from the turner bar 30 around turner bar 33, and by suitably arranging the inking apparatus, the web could be printed twice on the same side from the forms on the beds C and D. By varying the amount of web fed into the press by the means before described, and the length or width of the forms, as the case may be, a longer or shorter sheet may be printed, as desired. After the web issues from the rollers 45 and 46, it may be led to any suitable folder as F, arranged sidewise to the machine, as shown.

While I have shown my machine as a double machine, that is, as a machine adapted to twice print a web, it is to be understood that one half of my machine can be used and embodied in a single machine, which will print only on one side of the web.

The way in which the beds are arranged relatively to each other, and the way in which the web is led or guided to, fed and led from the one bed to the other may be greatly varied, as it is immaterial, so far as the broad scope of my invention is concerned, in what direction the cylinders move relatively to the web, or in what direction the inking mechanism moves relatively to the web, as either or both can move in the same direction that the web is fed, and a machine constructed on this plan would be within the scope of my invention. It is not essential to my invention that the beds should be arranged in the same plane.

While it is the preferred form of my invention to use mechanism which will raise the web clear of the forms during the period of non-impression so that the form rollers can be moved between the web and the forms, still it is within the scope of my invention to omit this mechanism, or to render this mechanism inoperative.

It is known in the art that there are certain forms that do not require extraneous inking, and with such forms, or where it is desired for any reason to omit the mechanism for raising and lowering the web, or to render the same inoperative, I may arrange the guide-rollers which lead the web to and from the beds slightly higher than the top of the forms, so that the web will have a slight spring-away from the forms when the cylinders are off impression, so that the feed may take place without contact between the web and the surface of the form.

The details and arrangements herein shown may be greatly varied by a skilled mechanic without departing from the scope of my invention, as expressed in the claims.

Having thus fully described my invention, what I claim and desire to secure by Letters-Patent is:—

1. In a printing press the combination of

a form bed upon which a flat printing form may be placed, a reciprocating impression cylinder co-acting therewith on both forward and backward movements, an inking mechanism, and means for imparting independent reciprocating motions to the impression cylinder and inking mechanisms, respectively, substantially as described.

2. The combination in a printing press of two form beds arranged in substantially the same plane, an impression cylinder coacting with each form bed, means for moving the impression cylinders relatively to the form beds, guides adapted to lead a web laterally over one form bed, a turner around which the web is then led, and web guides adapted to direct the web over the other form bed, substantially as described.

3. The combination in a printing press of the form beds C and D, the reciprocating impression cylinders A and B coacting therewith, means for leading a web over the form bed C, the turner bar 30, roll 31 and turner bar 33 around which the web is then led, and guides for directing the web then over the form bed D, substantially as described.

4. The combination of the beds C and D, reciprocating impression cylinders A and B coacting therewith, guides adapted to direct a web over the bed C, the turner 30 around

which the web is then led, the roll 31 and turner 33, and web guides adapted to direct the web over the bed D, the roll 31 being adjustable for the purpose of obtaining register of the web between the two beds C and D, substantially as described.

5. The combination in a web perfecting printing press of the two beds C and D arranged in substantially the same plane, the impression cylinders A and B coöperating therewith, means for moving the impression cylinders relatively to the beds, guides adapted to direct a web over said beds, means for raising the web from said beds, and an inking mechanism consisting of a carriage carrying two sets of form rollers, distributing rollers arranged one between said beds, and one at the end of each bed, and means for drawing said form rollers over the form beds while the web is raised, whereby the form rollers will pass from one set of distributing rollers to the other, substantially as described.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses.

LOUIS W. SOUTHGATE.

Witnesses:

BENJAMIN THOMAS HILL,
ELIZABETH M. HEALY.