

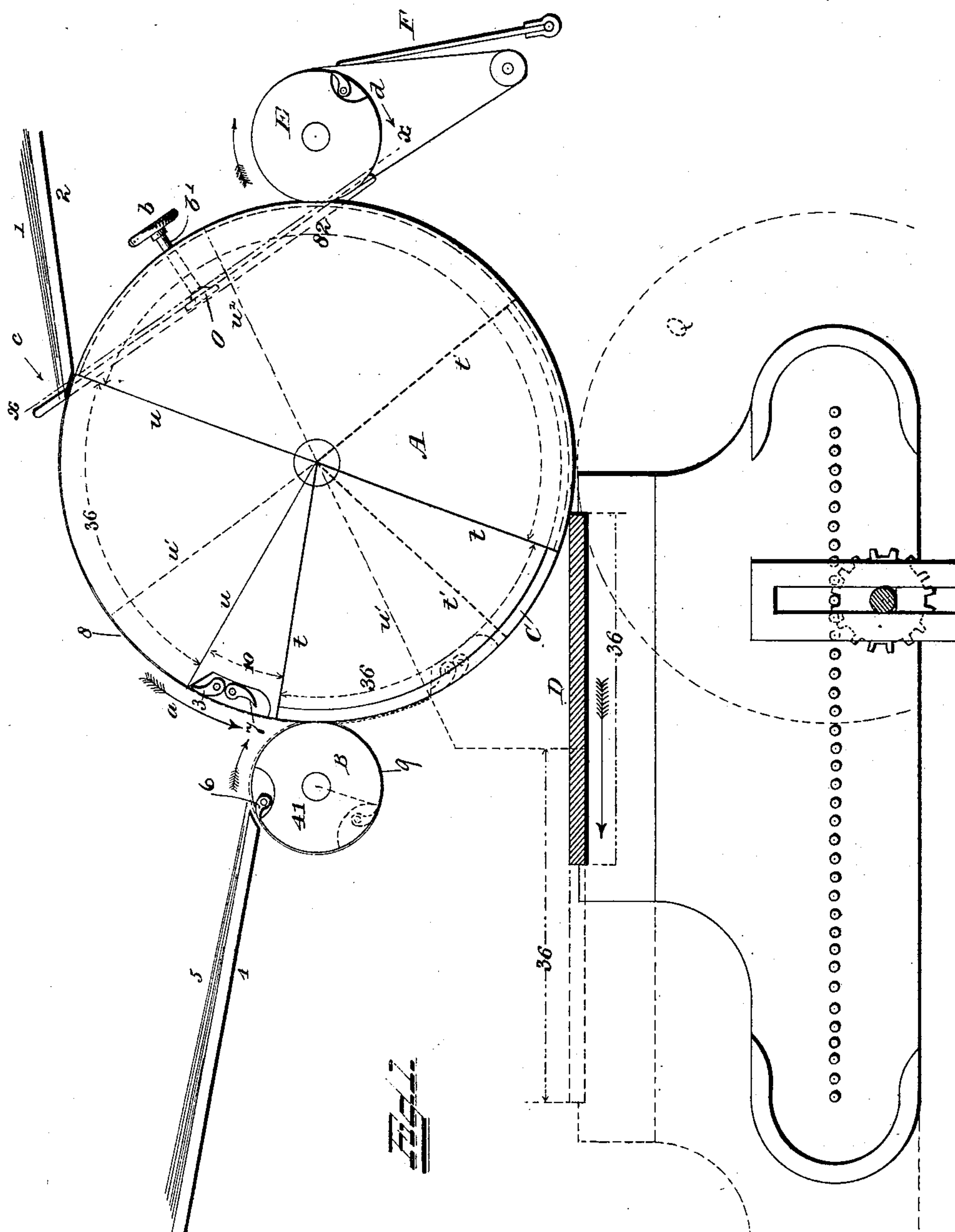
(No Model.)

2 Sheets—Sheet 1.

J. L. FIRM.
PRINTING MACHINE.

No. 366,388.

Patented July 12, 1887.



WITNESSES
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INVENTOR
Joseph L. Firm
by Wm. H. Finckel
his Attorney.

(No Model.)

2 Sheets—Sheet 2.

J. L. FIRM.
PRINTING MACHINE.

No. 366,388.

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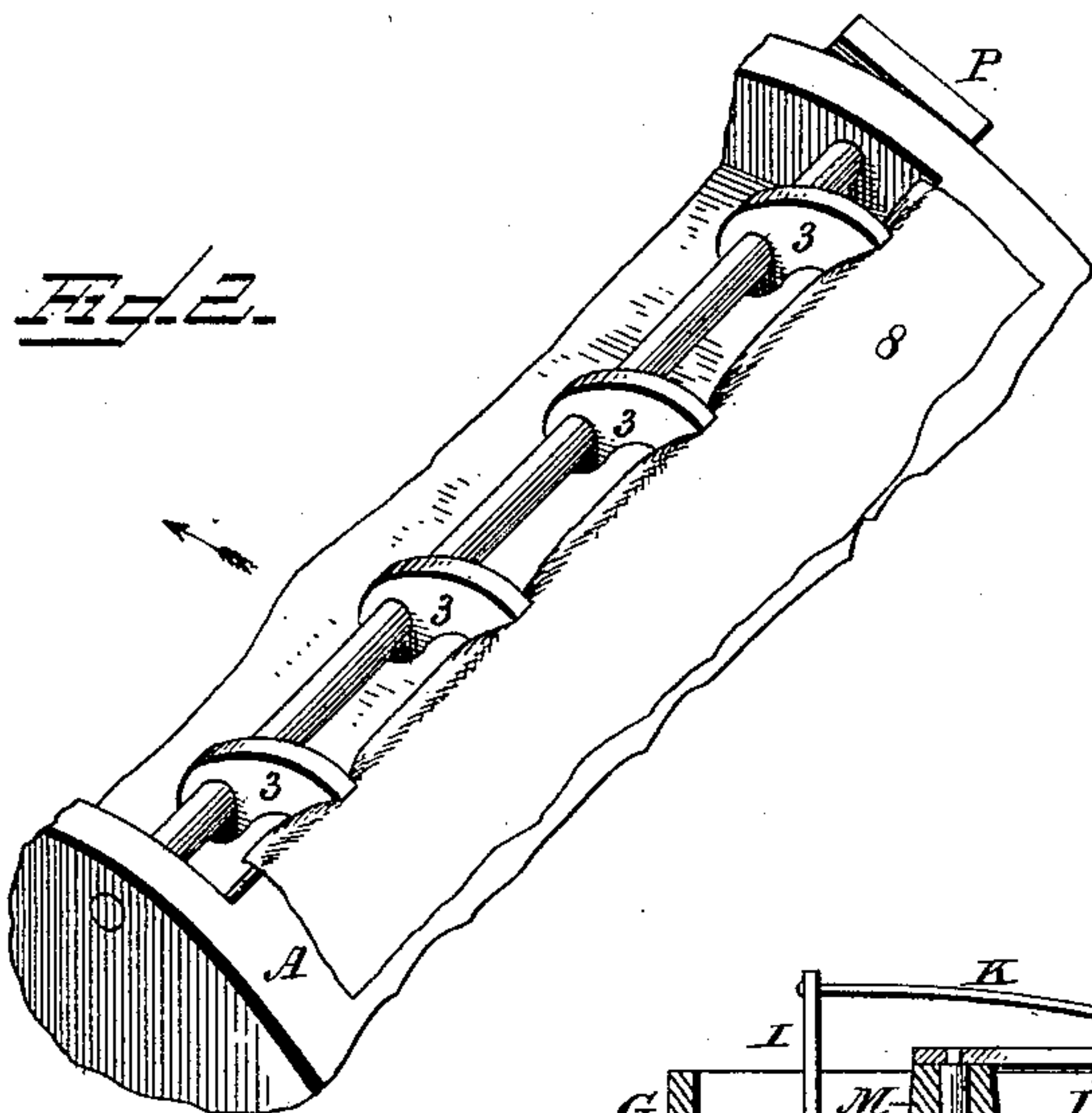


Fig. 3.

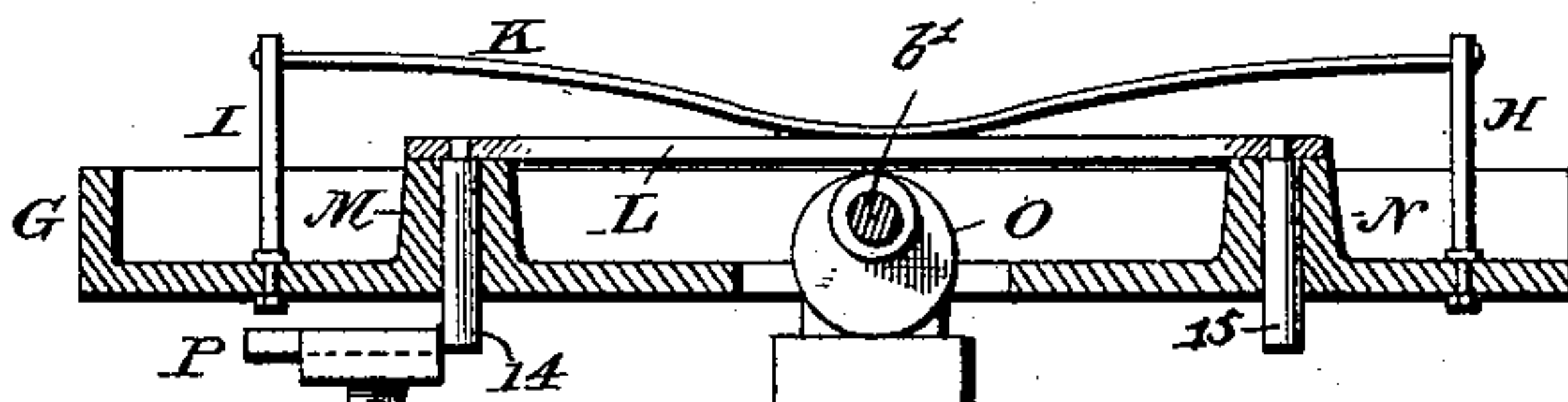


Fig. 4.

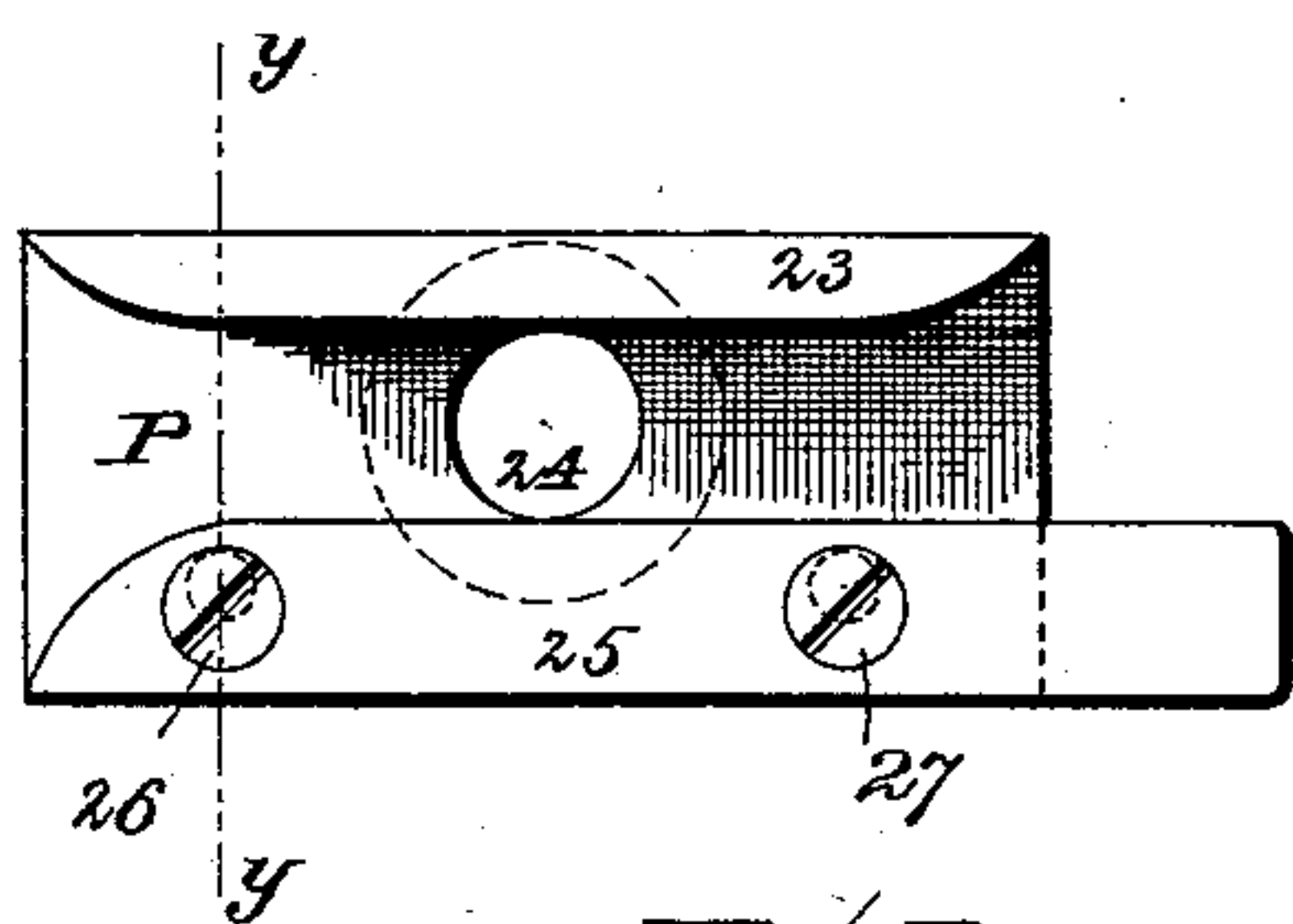
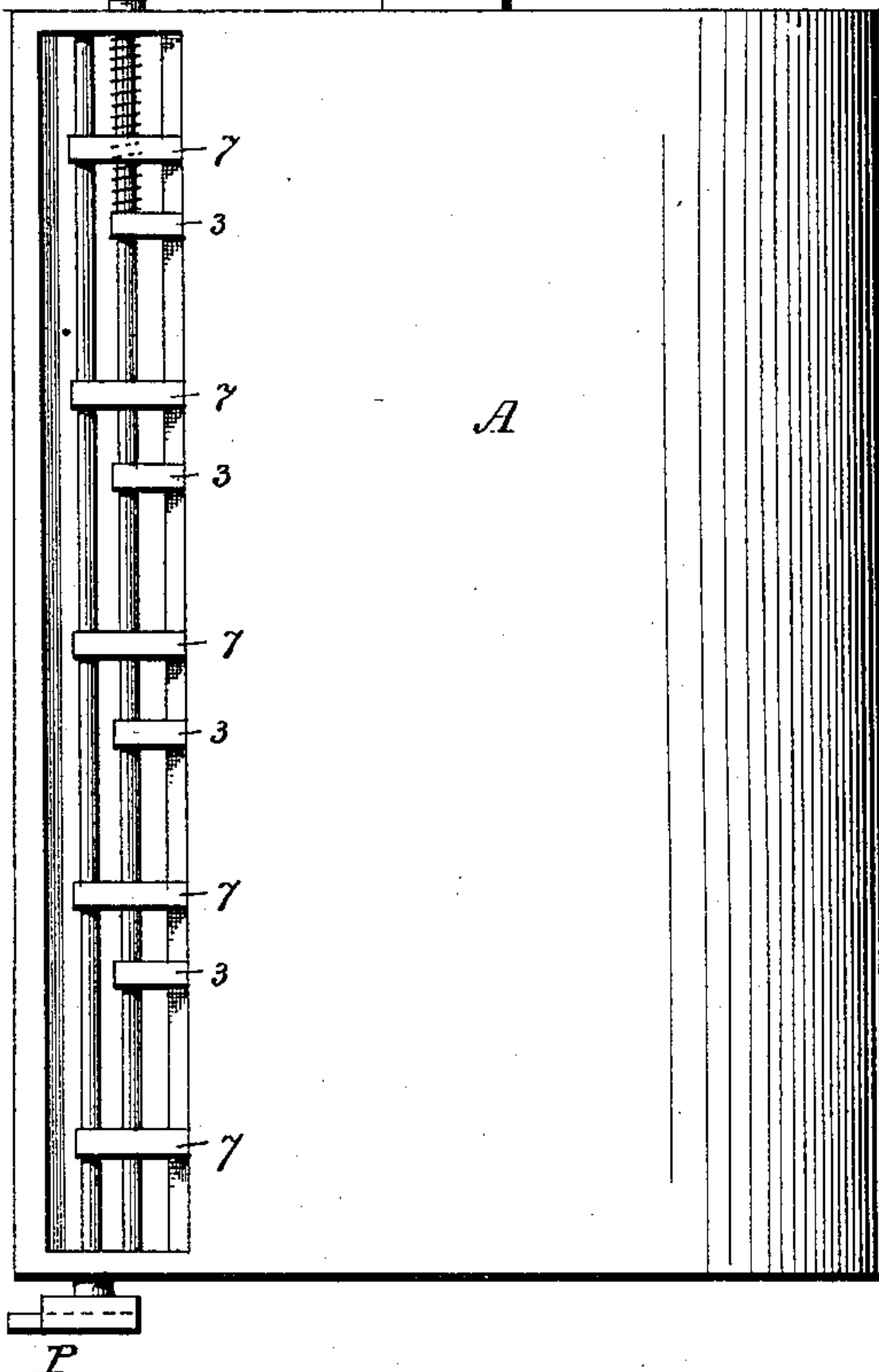
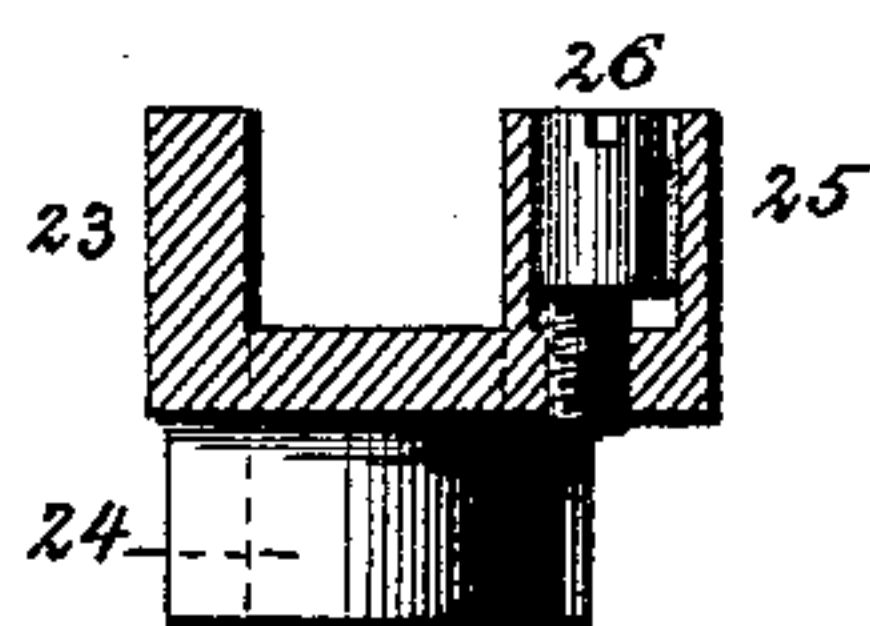


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOSEPH L. FIRM, OF JERSEY CITY, NEW JERSEY.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 366,388, dated July 12, 1887.

Application filed July 9, 1885. Serial No. 171,065. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH L. FIRM, a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Printing-Machines, of which the follow is a full, clear, and exact description.

My invention relates to certain new and useful improvements in printing-presses designed for printing on both sides of the sheet.

The invention consists in a combined impression and curved-form cylinder provided with grippers which introduce the offset-sheets, in combination with a flat form on the traveling bed, and an auxiliary impression-cylinder arranged in front of the first-named cylinder and provided with grippers, the whole so arranged and operating together that the sheet fed into the machine and engaged by the auxiliary impression-cylinder will be first printed on one side during its passage between the curved-form and auxiliary impression cylinder and then be taken and reversed by the grippers on the combined impression and form cylinder, and a set-off sheet interposed between it and the combined impression and form cylinder, and the other side printed from the usual flat form on the reciprocating bed.

The invention further consists of the means, hereinafter particularly set forth and claimed, for taking the set-off sheet and printed sheet from the impression-cylinder at one operation of the machine; and the invention further consists of a tumbler provided with an adjustable portion, in combination with eccentric studs or their equivalents, which will be hereinafter more fully set forth.

In the accompanying drawings, in the several figures of which like parts are similarly designated, Figure 1 is a transverse section of part of a machine, illustrating this invention. Fig. 2 illustrates in perspective the manner in which the set-off sheet is held to the cylinder by the grippers. Fig. 3 is a detailed sectional view of the mechanism to open the set-off-sheet gripper, taken on the line *x x*, Fig. 1, looking in the direction of the arrows *c d*. Fig. 4 is an enlarged view of the tumbler for gripper motion. Fig. 5 is a transverse section of tumbler on the line *y y*, Fig. 4.

In the drawings, A represents the main im-

pression-cylinder; B, the auxiliary impression-cylinder; D, the reciprocating flat bed; E, the delivery-cylinder, and F the fly.

C represents a curved type-form secured to cylinder A, from which to print one side of the paper. Assuming the circumference of this cylinder to be one hundred and sixty-four inches, the type-form will occupy a space of thirty-six inches, the gripper-recess ten inches, and the impression-surface thirty-six inches, in all eighty-two inches, or half the circumference of the cylinder, the other half being blank and somewhat reduced in diameter, as usual, to permit the return of the bed. The circumference of the auxiliary impression-cylinder will be equal to half the circumference of the curved type-form, the gripper-recess, and the impression-surface, or forty-one inches, and the flat bed will have a printing-surface of thirty-six inches, equaling the circumference of the impression-surface on the main cylinder. The circumference of the delivery-cylinder is the same as that of the auxiliary impression-cylinder, both of which cylinders are driven by gearing on the main cylinder.

In Fig. 1 I have illustrated the relative movements of the flat bed and main cylinder. In the positions therein shown the bed is nearing the limit of its backward travel, that point being indicated by the vertical lines. By the time the bed has completed its backward movement the curved type-form, extending from *t* to *t*, will have passed to the position denoted by the dotted radial lines *t' t'*, and brought the impression-surface, extending from *u* to *u*, to the dotted radial-lines position *u' u'*. Now, on the forward movement of the bed the remainder of the type-form and the gripper-recess will have passed by the time the type-surface on the bed reaches the point of contact with the cylinder, at which time the impression-surface will come in contact with the type-surface. The bed will continue its forward movement until the point *u'* on the main cylinder reaches the position where the impression-surface commenced contact with the type-surface on the bed, when it will begin its retrograde movement. During this movement it (the bed) passes under the reduced portion of the main cylinder until the bed and cylinder have arrived at the positions shown

in full lines in Fig. 1, when the further movements of these parts will be as has been previously described.

In the operation of the press the set-off sheet 8, Fig. 1, is fed from the pile 1 on the board 2 to the gripper 3 on the impression-cylinder A. The cylinder, revolving in the direction of the arrow *a*, meets the sheet 9, that has been fed from the pile 5 on the board 4 to the gripper 6 on the auxiliary impression-cylinder B. This sheet 9, having been printed by the curved form C on cylinder A, is then transferred by the grippers 7 from the auxiliary cylinder B to the impression surface on cylinder A, and has its second side printed on the flat bed D, the printed side of the sheet coming in contact with the set-off sheet 8, to take any superfluous ink that it may have to offset from being printed by the curved form C. The sheet 9 and the offset-sheet 8 pass on together until they reach the delivery-cylinder, when the printed sheet only, or that sheet and the set-off sheet together, as desired, will be taken by the grippers on the delivery-cylinder and delivered to the fly.

The mechanism for operating the grippers on the main cylinder A, to permit the above-mentioned variable delivery of the sheets, will now be described.

It will be observed on inspection of Figs. 1 and 3 that there are two sets of grippers on cylinder A, one set, 3, for the set-off sheet, and another set, 7, for the printed sheet. The set-off-sheet grippers, four in number, are of the form shown in Fig. 2, and are so spaced on the cylinder that when they grasp the sheet only a small portion of its edge in the vicinity of each gripper will be carried down into the gripper-recess; but the edge of the sheet across its entire width will, however, be bent down below the periphery of the cylinder and held there under tension until the grippers are opened, when it will spring up flush with the periphery of the cylinder. The grippers for taking the printed sheet are of the ordinary construction and of any desired number, the tumbler for operating them being located at the end of the cylinder opposite to the end from which the set-off sheet grippers are operated.

Referring to Fig. 3, which clearly illustrates the mechanism for operating the grippers for the offset-sheet, G represents a portion of the frame of the press, the position of which is shown in dotted lines in Fig. 1, with bolts H and I fastened by nuts thereto, to which bolts the spring K is secured, and rests against the bar L, to which the studs 14 and 15 are fastened. These studs are moved in and out of the frame of the press through tubular boxes M and N by the cam O, operated by a hand-wheel, *b*, on the cam-shaft *b'*.

When the enlarged side of the cam O is turned by hand-wheel *b* against the bar L, the studs 14 and 15 are out of the way of the tumbler and the set-off sheet is permitted to pass by the delivery-cylinder, while the printed

sheet is released by its separate gripper mechanism, taken by said cylinder, and delivered to the fly; but when cam O is in the position shown in Fig. 3, the studs project into the path of the tumbler, whereby the grippers are opened and the set-off sheet is delivered, along with the printed sheet, to the delivery-cylinder.

On some kinds of work the set-off sheet will not become so blurred as to necessitate its removal for some time, and in this case the pressman can adjust its gripper mechanism so that it will not be delivered, and thereby dispense with a feeder.

Fig. 4 shows the tumbler P, having a stationary side, 23, and the hole 24, to fit on the gripper-bars of this machine. The side 25 of the tumbler, which is longer than the side 23, is adjustable by means of eccentric screws 26 and 27, to increase or diminish the width of the groove or way in the tumbler, so as to shorten or lengthen the movement of the grippers. This is a very essential mechanism for transferring and taking away sheets in different arcs, occasioned by the vertical adjustments of the cylinder, for by it the tumblers may be adjusted commensurately with the movement of the cylinder. In using these tumblers for the set-off sheet one can feed six or eight oiled sheets at a time to the grippers 3 on the impression-cylinder A by properly adjusting the movable side. These sheets are then torn off as required by hand when the machine is stopped, leaving their stubs in the gripper until they are all used up, when they are replaced by a fresh lot instead of delivering them to the fly F. The last sheet is not taken away by hand, but is delivered with the printed sheet when filled with offset. These offset-sheets are employed only in connection with the poorer class of work, and, as they are of practically inconsequential thickness and give a very hard impression, it does not show, as if a hard felt blanket were used. By these offset-sheets, used as set forth, a greater amount of impression can be carried than ordinarily, and by removing them one by one the work is not imperiled. There is no interference with the impression and no detriment to the forms or work.

I know that oiled sheets and blankets are old and have been used on impression-cylinders; but oiling a quantity of sheets and feeding them to an impression-cylinder and removing them in the manner described by hand is an advantage which will be appreciated for most kinds of work, as it requires no delivery for the set-off sheet.

Where heavy cut work or color work is being done, the curved form C can be dispensed with, and the set-off sheet 8 in Fig. 1 can be delivered by the cylinder E to the fly F with the sheet that is only printed on one side, so that each set-off sheet will only have the offset from the sheet that is underneath it.

A special advantage of this press over others is that one can use it as a perfecting-press

or as a single machine without occupying any more space or height, and by placing a form-cylinder, as indicated by dotted lines Q, and dispensing with the flat bed D the machine
5 can be converted into a rotary press with all my improvements attached thereto.

What I claim is—

1. A combined impression and curved-form printing-cylinder provided with grippers to
10 introduce a set-off sheet between the printed side of the paper and the impression-surface of the combined impression and form cylinder, in combination with a reciprocating form and an auxiliary impression-cylinder provided
15 with grippers and arranged in front of the combined form and impression cylinder, the whole operating together to print both sides of the sheet during its passage through the machine, substantially as set forth.

20 2. In a printing-press, the combination, with an impression-cylinder provided with grippers for holding the sheet to be printed, of a set of grippers for holding a set-off sheet, a tumbler for said grippers, and studs adapted to be
25 thrown into and out of engagement with said

gripper-tumbler for operating the set-off sheet, grippers whereby both sheets may be caused to be delivered together, or the printed sheet delivered and the set-off sheet retained on the cylinder for further use, in the manner set forth. 30

3. In a printing-press, the combination, with a gripper-tumbler, of a spring-pressed bar provided with studs which extend normally into the path of the gripper-tumbler, and a cam operated by hand for acting on the bar to with-
35 draw both of the studs from said path and render them inoperative for any length of time, substantially as described, and for the purpose stated.

4. The tumbler P, provided with an adjust-
40 able side, in combination with the eccentric bolts or screws, substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand this 8th day of July, A. D. 1885.

JOSEPH L. FIRM.

Witnesses:

WM. H. FINCKEL,
HARRY Y. DAVIS.