

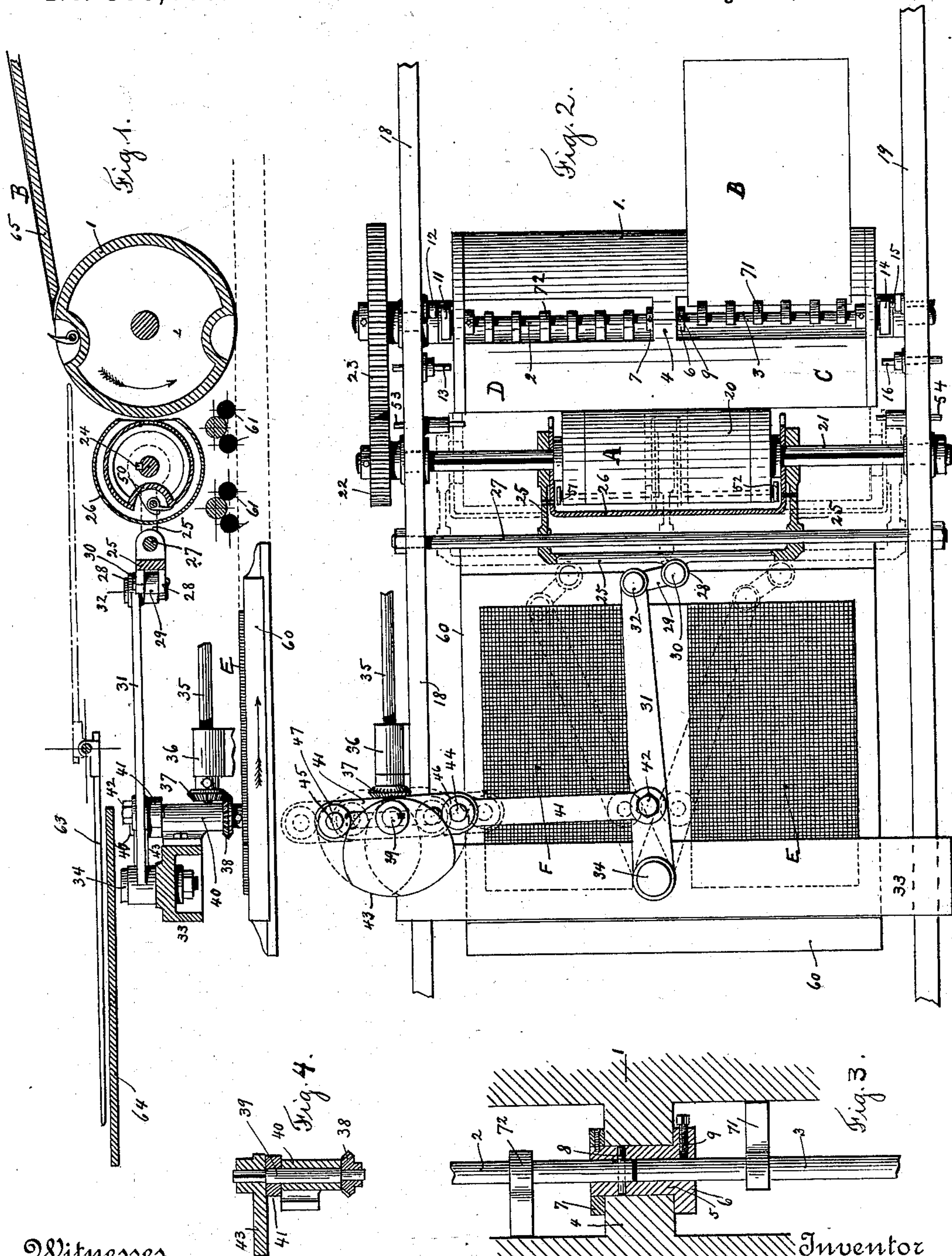
(No Model.)

3 Sheets—Sheet 1.

H. A. W. WOOD.
MULTICOLOR PRINTING MACHINE.

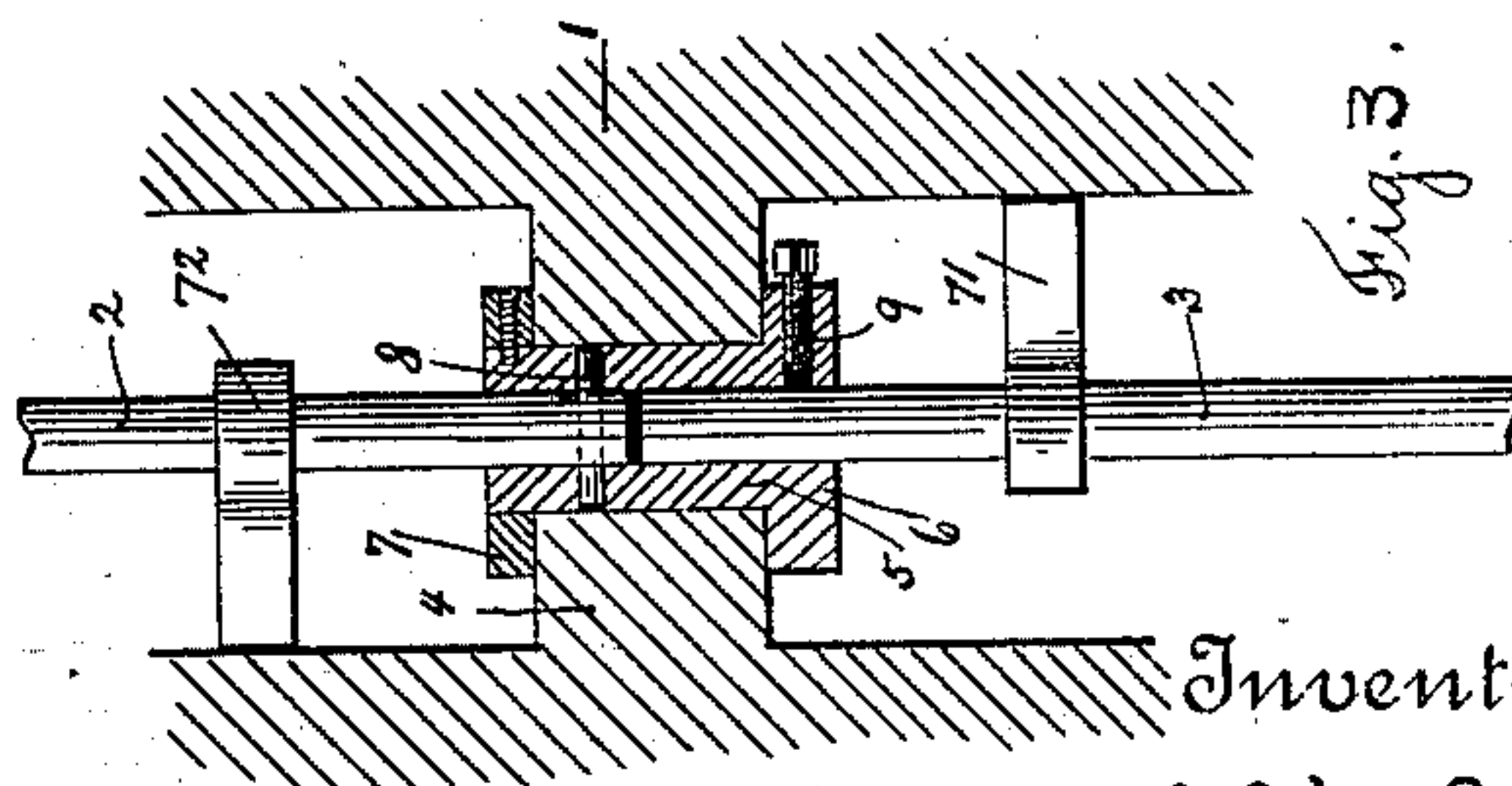
No. 560,880.

Patented May 26, 1896.



Witnesses
Chas. F. Schuch

J. A. Richardson



Inventor
Henry A. Wise Wood

By his Attorney

Louis W. Southgate

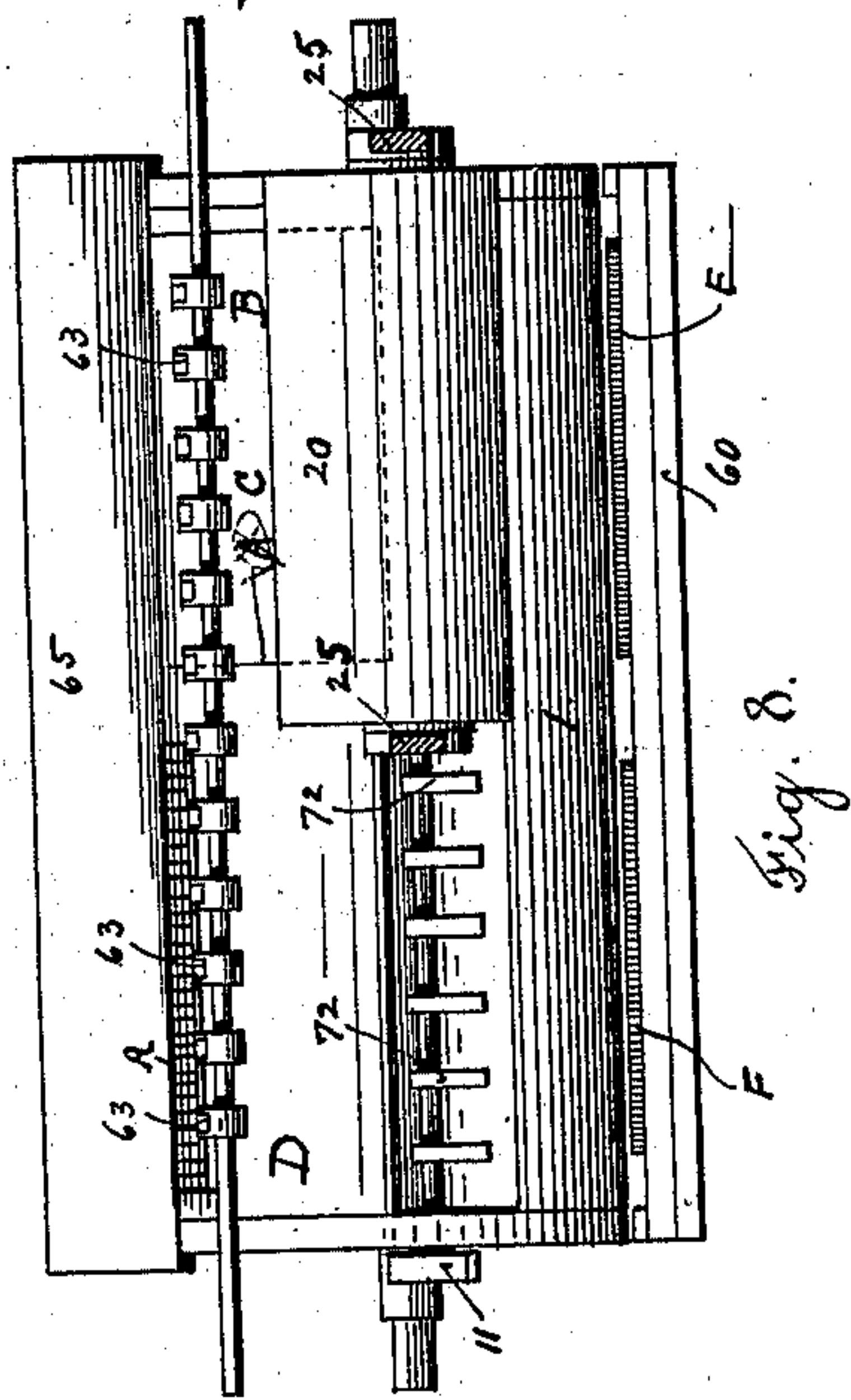
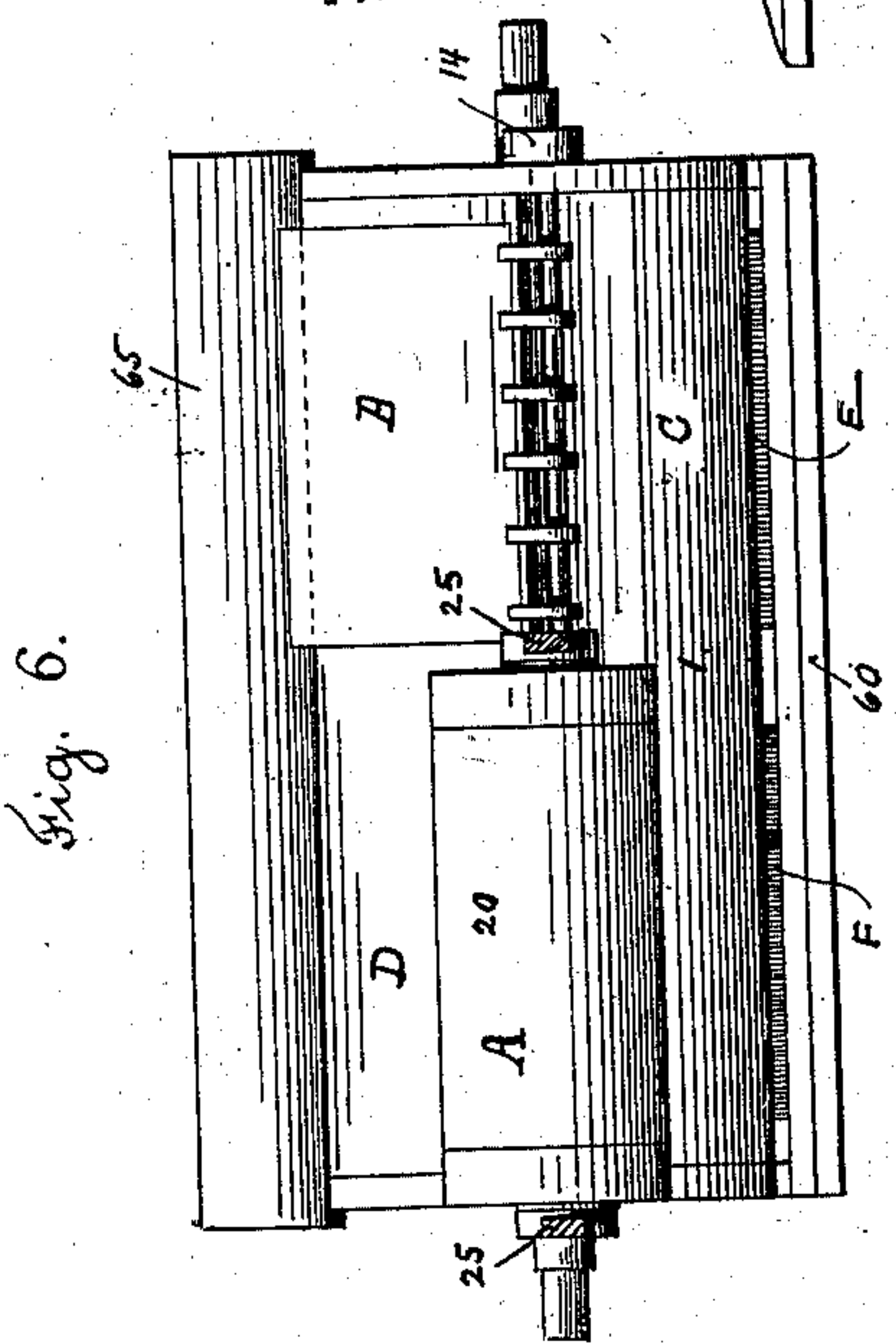
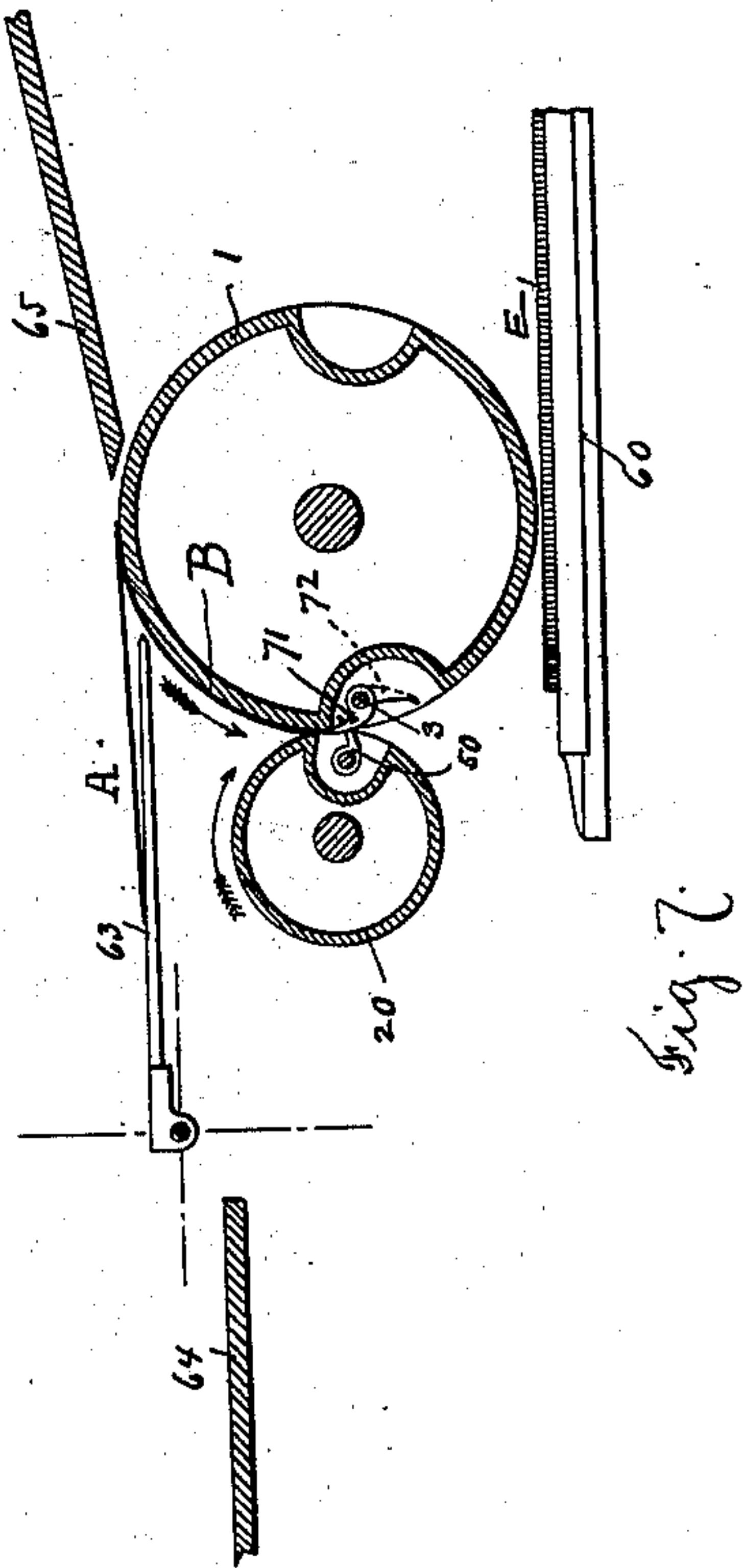
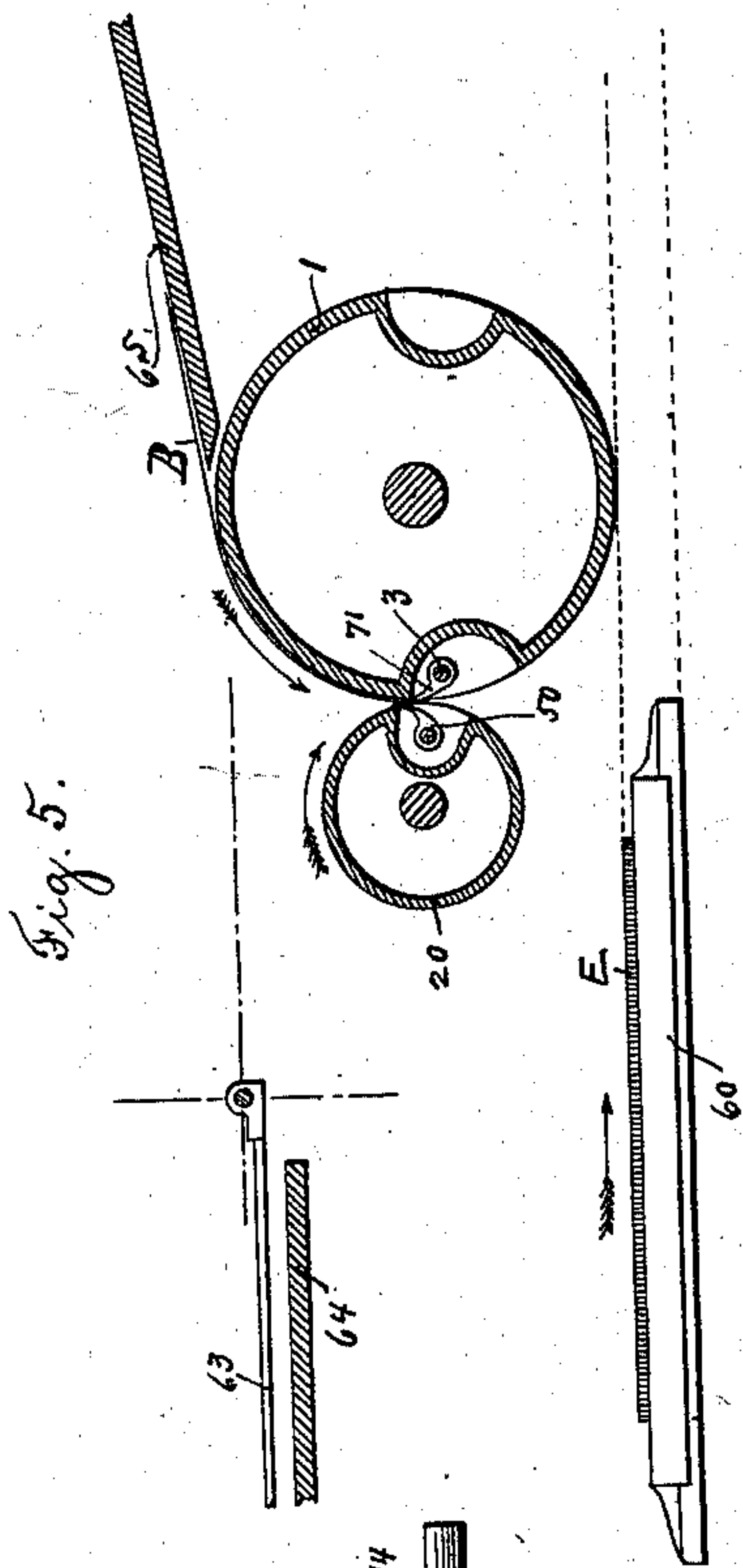
(No Model.)

3 Sheets—Sheet 2.

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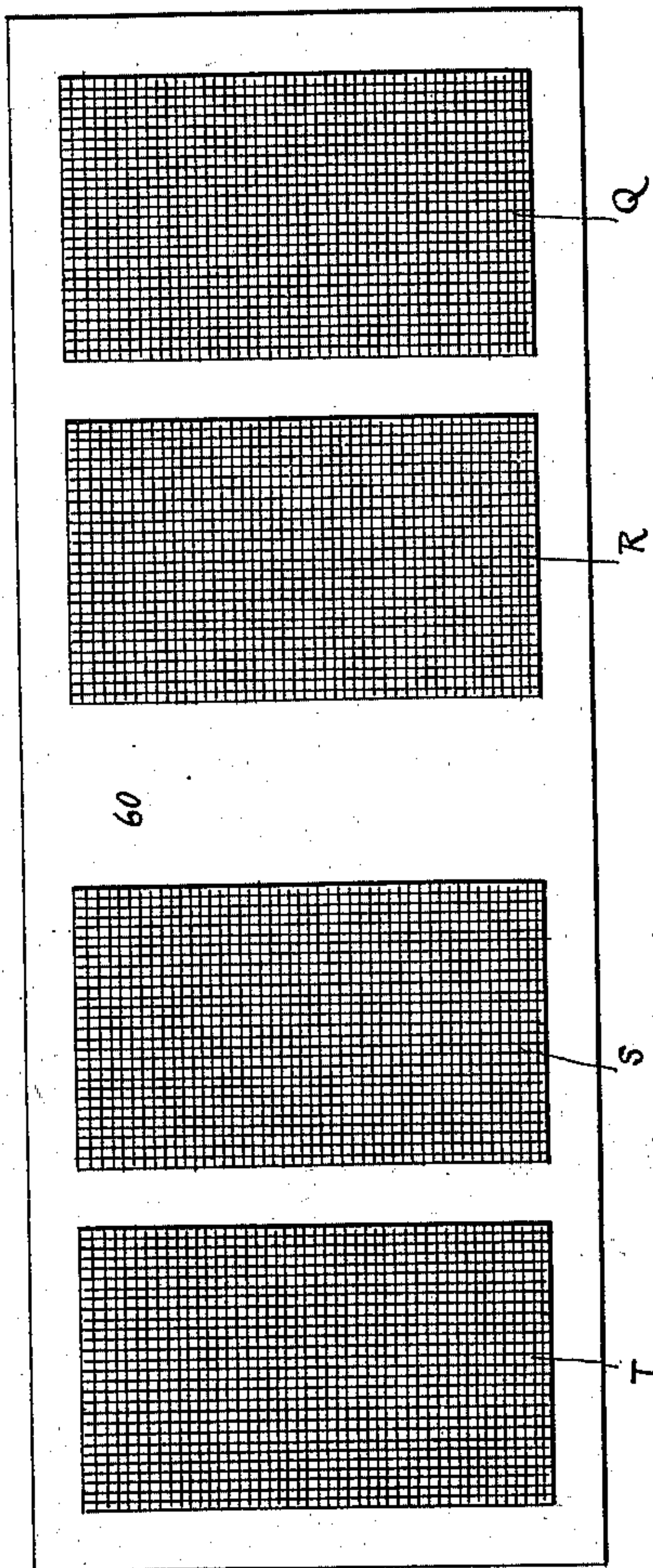
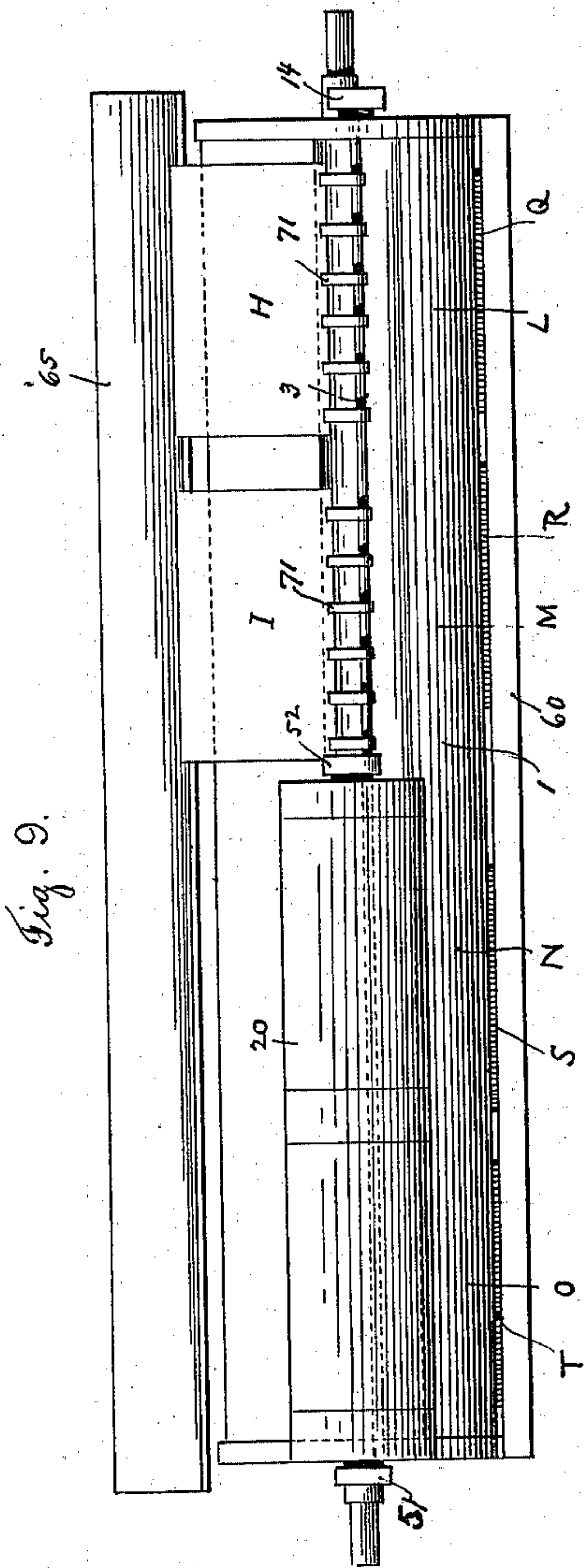
(No Model.)

3 Sheets—Sheet 3.

H. A. W. WOOD.
MULTICOLOR PRINTING MACHINE.

No. 560,880.

Patented May 26, 1896.



Witnesses
Chas. F. Schuchert

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UNITED STATES PATENT OFFICE.

HENRY A. WISE WOOD, OF NEW YORK, N. Y., ASSIGNOR TO THE CAMPBELL PRINTING PRESS AND MANUFACTURING COMPANY, OF SAME PLACE.

MULTICOLOR-PRINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 560,880, dated May 26, 1896.

Application filed February 8, 1892. Serial No. 420,781. (No model.)

To all whom it may concern:

Be it known that I, HENRY A. WISE WOOD, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a new and useful Improvement in Multicolor Printing, of which the following is a specification.

The aim of this invention is to improve printing-machines wherein two or more impressions are made upon the same side of the material, and the invention has special reference to what is known as "multicolor printing" upon paper, cloth, or other material.

The invention is not limited to multicolor printing, as the same may be applied and used in that art wherein the complete impression is made from two or more forms by two or more separate operations; but with this understanding the invention will be further described in reference to multicolor printing.

Referring now to the drawings, which illustrate a mechanism that is adapted to carry out my invention, Figure 1 is a sectional elevation. Fig. 2 is a plan. Fig. 3 is a sectional elevation, on an enlarged scale, showing the means for connecting and disconnecting the two sets of gripper mechanisms in the impression-cylinder. Fig. 4 is a sectional view of the cam-shaft. Figs. 5 to 8, inclusive, are diagrammatic views illustrating the various positions assumed by the mechanism during the operation, Figs. 5 and 7 being sectional elevations similar to Fig. 1, and Figs. 6 and 8 plan views similar to Fig. 2; and Figs. 9 and 10 are views illustrating a modification or further carrying out of my invention.

The particular form of my invention shown in the drawings relates to a printing-machine in which the sheets are shifted laterally between the printing operations.

The particular press shown is an adaptation of the well-known two-revolution cylinder-press, and only enough of the complete structure is shown to illustrate the application of my improvement.

In detail, 1 indicates an impression-cylinder carrying within a longitudinal slot upon its periphery two rods 2 and 3, upon which are mounted the usual sets of gripper-fingers. The slot in the cylinder is divided by the bridge-piece 4, and each of said rods extends

about half the length of the impression-cylinder, the axes of the rods being in line. The ends of the rods fit into a bushing 5, which is journaled in said bridge-piece 4, and the bushing 5 is held in place laterally by collar 6, formed on one end of the same and loose collar 7, which is secured to the bushing 5 on the other side of the bridge after the bushing is placed in said bridge. Rod 2 is secured to bushing 5 by pin 8, and the two thus work together at all times. Rod 3 may be connected to move with the bush 5 by means of a detachable screw or dowel-pin 9, and by this means the two gripper-rods may be connected to move together or independently.

On the end of the rod 2 is placed the usual T-head cam 11, and the same is arranged to engage tumbling-studs 12 and 13 of the usual construction, so as to properly operate the gripper-fingers on said rod, so that the same will properly engage and deliver the sheet. Rod 3 has a similar T-head cam 14, that is adapted to engage tumbling-studs 15 and 16 in a similar manner, so as to handle the sheet in the way desired. The operation of the gripper mechanism is so well understood that the same will not be further described, except to state that each gripper mechanism when used independently is set by means of the tumbling-studs to act as further described, and when used together one of the sets of tumbling-studs is rendered inoperative.

Cylinder 1 has the usual shaft, which may be cast with the cylinder, and this shaft is journaled in the side frames 18 and 19 of the press in the usual manner.

The numeral 20 represents what I call the lateral "transfer" or "shifting" cylinder, and in the construction under consideration this transfer-cylinder is made one-half the diameter of the impression-cylinder and about one-half the length of the same. Said impression-cylinder is geared to shaft 21, which is slotted and which is journaled in the side frames by gears 22 and 23, whereby said shaft 21 is driven continuously in the same direction. Gear 23 is double gear 22, whereby the surface or peripheral speed of the two cylinders is the same.

The bosses of the transfer-cylinder 20 are fitted with keys or feathers 24, which engage the slot or keyway in the shaft 21, and thus

while the transfer-cylinder is free to slide or move on said shaft 21 the cylinder and shaft turn together.

Spanning cylinder 20 in a direction parallel to its axis is a yoke 25, the ends of which loosely embrace the slotted shaft and fit closely against hood 26, which entirely envelops the transfer-cylinder and bears against bosses formed on the side of the transfer-cylinder 20.

The hood is an important feature, and the function of the same is to keep the sheet from being displaced by suction or draft as the transfer-cylinder is rapidly shifted laterally. The hood is only cut away close to the impression-cylinder and forms practically a complete envelop for the said transfer-cylinder. The hood is pinned or fastened to the yoke, so as to be rigid and prevented from turning. A stay-rod 27 is fastened in the side frames and passes through bosses upon the side of the yoke and thereby supports and holds the yoke in a horizontal or proper position. The yoke has extending rear arms 28, which embrace one end of link 29 and the two are articulated by bolt 30. The other end of link 29 is articulated to the end of the lever 31 by means of bolt or stud 32. A stay or arch 33 is fastened to the side frames and extends across the press, as shown, and lever 31 is pivoted on this arch by means of stud 34. 35 represents a shaft which is continuously driven in the same direction from any part of the mechanism and the end of the shaft is shown as journaled in a bracket 36, bolted to the side frame 18. On the end of the shaft 35 is fastened a miter-gear 37, which is in mesh with miter-gear 38, fast on shaft 39, journaled in a bearing depending from the arch 33.

On the top of the bearing 40 rests the slotted link 41, which is articulated to lever 31 by means of stud 42. As the said link 41 spans the shaft 39, the same will always be properly guided.

On the top end of the shaft 39 is keyed the cam 43, and set in the slotted link 41 are studs 44 and 45, which have rollers 46 and 47, which bear on opposite sides of cam 43. Thus it will be seen that as the cam 43 is revolved the transfer-cylinder will be moved laterally and held or controlled as desired, depending upon the construction of the cam. The cam fills the space at all times between the friction-rollers 46 and 47, or, in other words, all the diameters of the cam are equal. The transfer-cylinder 20 carries a gripping mechanism 50, but this mechanism is not split as in the case of that within the impression-cylinder, but runs the full length of said cylinder 20. The said mechanism carries at the ends thereof T-head cams 51 and 52, so that the gripper mechanism may be operated by whichever of said cams is in contact with its corresponding tumbling-stud 53 or 54.

All the tumbling-studs thus far described are arranged with suitable means (not shown)

for withdrawing and inserting them so that the grippers will work properly.

60 represents an ordinary reciprocating type-bed, upon which two printing-forms E and F may be placed. These forms correspond with surfaces marked C and D upon the impression-cylinder. Each of the forms is supposed to be inked by rolls 61. These rolls may be stripped of their composition in their portions lying between the forms E and F, so that the colors will not blend with each other.

In the press under consideration a front fly-delivery is shown consisting of fly 63 and table 64, upon which the finished products may be deposited as they are stripped from the impression-cylinder onto the fly 63.

65 represents the usual feed table or board for feeding the sheets to the impression-cylinder. The fly mechanism and feed-table are preferably made to extend the full width of the machine, so as to adapt the press for ordinary use, as will be hereinafter described.

The operation of the device is as follows: The press so far described is, so far as the operation of its bed and cylinder is concerned, of the two-revolution type—that is, a type in which the impression-cylinder makes one revolution in contact with the bed, during which the printing takes place, and another revolution after having lifted while the bed is running back, during which revolution the printed sheet is delivered, the impression-cylinder at all times turning in the same direction.

The gripper mechanism on shaft 2 and that on shaft 3 will hereinafter be referred to as 72 and 71, respectively.

A sheet A is first taken from feed-board 65 by grippers 71 and carried around the impression-cylinder 1, so as to be printed from form E upon the bed, and then, after the cylinder has made one and one-quarter revolutions, its front edge, which is carried by grippers 71, reaches a point nearest the surface of cylinder 20, as in Figs. 5 and 7. Grippers 71 now release the sheet, and during the next half-revolution of the cylinder 1 the sheet is wound upon the surface of the transfer-cylinder 20, which is rotating oppositely to cylinder 1. When the sheet is entirely upon the transfer-cylinder, the same is operated by the shifting mechanism before described and is moved laterally, so as to come opposite the surface D of the impression-cylinder. This lateral movement is made in the time of a little less than one-half of a revolution of cylinder 1, so that when transfer-cylinder 20, rotating, of course, during its lateral movement, reaches a position opposite the said surface D the gripper mechanism 50 will be in proper position to surrender the once-printed sheet to the gripper mechanism 72 of the impression-cylinder, and then during the next half-revolution of cylinder 1, or whole revolution of the transfer-cylinder, the sheet is delivered back onto the surface D of the impression-cylinder, and during this half-revolution and succeeding

quarter-revolution of cylinder 1 is again printed from form F on the bed, as indicated in Figs. 5 and 6, and then during the next revolution of the cylinder 1 the sheet A is given by the grippers 72 to the fly and delivered by the same. Thus four revolutions of the impression-cylinder or two complete movements of the bed take place while a sheet is being printed and delivered.

By reference to the diagrammatic figures it will be observed that in Figs. 5 and 6 the sheet just mentioned is marked A, and that upon the surface C of the cylinder is shown another sheet marked B, which has been taken from the feed-board as the grippers 71 passed the said board the second time. The forward edges of both sheets A and B are shown as being about half-way down to the line of impression. Both surfaces C and D of cylinder 1 are now being supplied with sheets. That, A, upon D having already one color upon it passes to the impression and both sheets are printed upon. The sheet A upon the surface D having while upon the surface C at the previous impression received one color, and now having two colors upon it, is delivered as before described. The fly deposits the sheet A upon the table and then returns to its position against the cylinder for the sheets. In Figs. 7 and 8 the sheet A is running down upon the fly opposite the surface D. The sheet B, now having received one impression, is transferred by grippers 71 to cylinder 20, which cylinder, after transferring sheet A from surface C to D and returned to do a like service for sheet B, receives sheet B upon it and transfers it to said surface D. In Fig. 2 the cylinder 20 is shown as traversing the press with a sheet upon it. The position occupied by said cylinder when opposite surface C and taking a sheet is indicated in dotted lines as well as the other extreme, where it occupies a position opposite to surface D, so as to transfer a sheet to the same. Thus after the press has been started the impression-cylinder always has two sheets upon the same, and thus at the forward movement of the bed both forms E and F print upon sheets.

The cam and gripper mechanisms are properly set and designed, so that the operation above described takes place very easily.

In Figs. 9 and 10 my invention is shown as applied to a double press having four impression-surfaces L, M, N, and O on the impression-cylinder, and four forms Q, R, S, and T placed abreast upon the bed. Two sheets H and I are fed to the impression-cylinder, the entire mechanism operating as before described. The sheet H will be printed during the operation from forms Q and S and sheet I from forms R and T, exactly as in the case with the single sheet.

Of course instead of feeding two sheets a double sheet could be fed to the impression-cylinder and the same slit either before, during, or after the printing operation.

The only point of difference between the

two modifications shown in the drawings is that in the single-width machine the sheet is a second time printed from a form adjacent to the first printing-form, while in the other modification the sheet is a second time printed from a form not adjacent to the first form, and of course my invention embraces both these operations.

By disconnecting the cylinder 20 and connecting the gripper mechanisms so as to properly work together, by the means before described, and disconnecting the proper tumbling-studs, the press may be run as an ordinary two-revolution press, printing from the full width of the bed—a construction that makes the machine capable of many different uses and adapted to locations where multi-color printing is only occasionally done.

The particular structure herein shown and described is not material to my broad invention, as a skilled mechanic could of course apply my invention to any form of press, whether a cylinder, rotary, or other press. Therefore the structure herein shown and described may be greatly modified 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. The combination in a printing-press of an impression-cylinder and coacting printing mechanism, a transfer-cylinder coacting with the impression-cylinder, and means whereby a sheet may be taken from the impression-cylinder by the transfer-cylinder, shifted laterally, and transferred back to the impression-cylinder, substantially as described.

2. The combination in a printing-press of an impression-cylinder and coacting printing mechanism, a transfer-cylinder, means for shifting the same laterally, and means whereby said transfer-cylinder is adapted to take the sheet from the impression-cylinder, move the same laterally, and transfer the same back to the impression-cylinder, substantially as described.

3. The combination of an impression-cylinder and coacting printing mechanism, a slotted shaft, a transfer-cylinder keyed on this shaft, means for shifting the transfer-cylinder laterally on said shaft, and means whereby the transfer-cylinder may take a sheet from the impression-cylinder and deliver the same back to the impression-cylinder respaced laterally, substantially as described.

4. The combination in a cylinder-press of the feed-board, the impression-cylinder and reciprocating bed, a transfer-cylinder arranged tangentially to the impression-cylinder opposite the feed-board, means for shifting the transfer-cylinder laterally, and means whereby the transfer-cylinder may take a sheet from the impression-cylinder and deliver the same back to the impression-cylinder respaced laterally, substantially as described.

5. The combination of an impression-cylinder and coacting printing mechanism, a transfer-cylinder coacting with the impression-cylinder, a cam, connections between the cam and the transfer-cylinder, whereby the transfer-cylinder may be shifted laterally, and means whereby the transfer-cylinder can take a sheet from the impression-cylinder, and deliver the same back to the impression-cylinder respaced laterally, substantially as described.

6. The combination of an impression-cylinder and coacting printing mechanism, a transfer-cylinder mounted substantially as described, a yoke surrounding said transfer-cylinder, a driven cam, connections between said cam and yoke to shift the transfer-cylinder laterally, and means whereby the transfer-cylinder can take a sheet from the impression-cylinder and deliver the same back to the impression-cylinder respaced laterally, substantially as described.

7. The combination of an impression-cylinder and coacting printing mechanism, a transfer-cylinder mounted as described, a yoke surrounding said impression-cylinder, a stay-bar holding said yoke in place, a driven cam, and connections between said cam and yoke to shift the transfer-cylinder laterally, and means whereby the transfer-cylinder may take a sheet from the impression-cylinder, and deliver the same back to the impression-cylinder respaced laterally, substantially as described.

8. The combination in a printing-press of an impression-cylinder and coacting printing mechanism, a transfer-cylinder adapted to take a sheet from the impression-cylinder, and deliver the same back to the impression-cylinder respaced laterally, means for shifting the transfer-cylinder, and a hood surrounding the transfer-cylinder, substantially as described.

9. The combination with a printing-press of a transfer-cylinder, means for shifting the transfer-cylinder laterally or axially, a gripper mechanism mounted in the transfer-cyl-

inder and means whereby the gripper mechanism can be operated in the two positions of the transfer-cylinder, substantially as described.

10. The combination in a printing-machine of an impression-cylinder with coacting printing mechanism, said impression-cylinder having two sets of gripper mechanisms, means whereby said gripper mechanisms may be actuated together or independently, and means for shifting sheets laterally, substantially as described.

11. In a printing-press, an impression-cylinder having two gripper-rods mounted therein in line with each other, means for operating said rods, means for connecting or disconnecting said rods, means for shifting sheets laterally, and coacting printing mechanism, substantially as described.

12. In a printing-press, the combination of an impression-cylinder and coacting printing mechanism, a transfer-cylinder substantially one-half the diameter of said impression-cylinder, means for shifting the transfer-cylinder axially, and means whereby the transfer-cylinder may take a sheet from the impression-cylinder, and deliver the same back to the impression-cylinder, respaced laterally, substantially as described.

13. In a mechanism for the purpose described, a laterally-moving transfer-cylinder having a surrounding hood moving therewith, arranged to prevent the sheet being displaced by air-pressure, as the transfer-cylinder is moved, substantially as described.

14. A multicolor-printing press comprising an impression-cylinder, a laterally-shifting transfer-cylinder and a reciprocating bed adapted to carry a plurality of printing-forms abreast, substantially as described.

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

HENRY A. WISE WOOD.

Witnesses:

LOUIS W. SOUTHGATE,
JAMES J. RAFFERTY.