

(No Model.)

2 Sheets—Sheet 1.

B. HUBER.
PRINTING PRESS.

No. 285,750.

Patented Sept. 25, 1883.

Fig. 3.

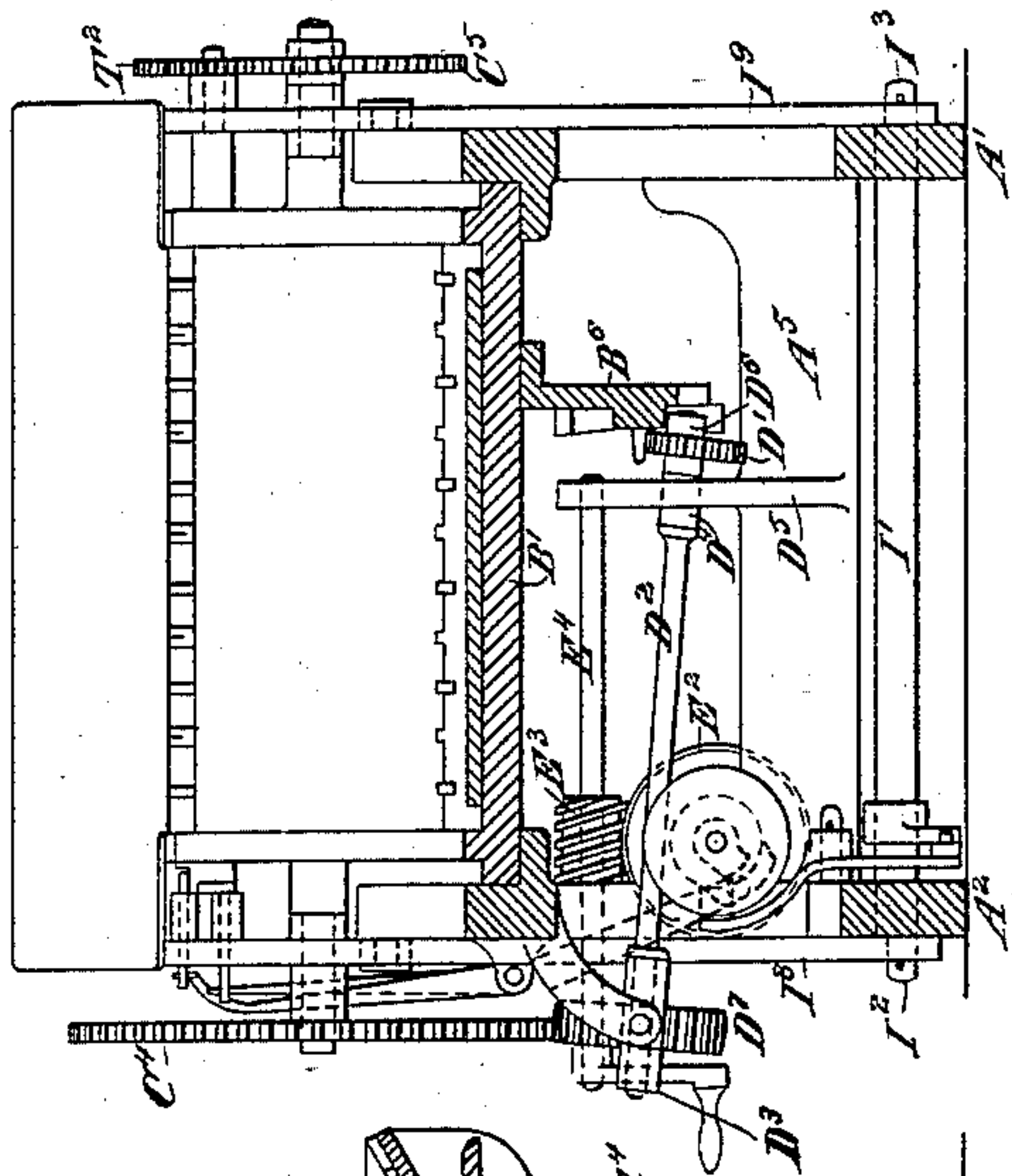


Fig. 4.

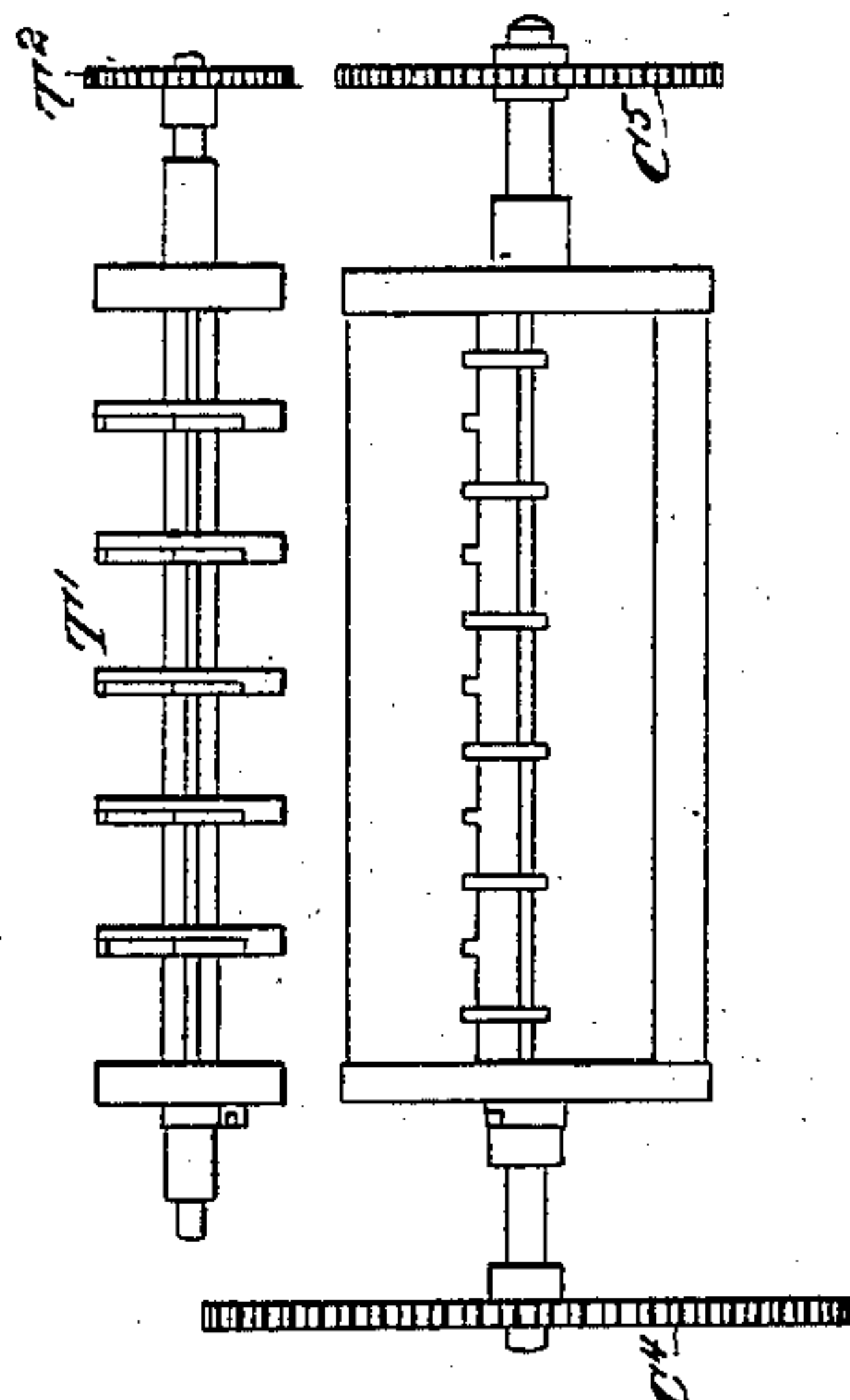


Fig. 1.

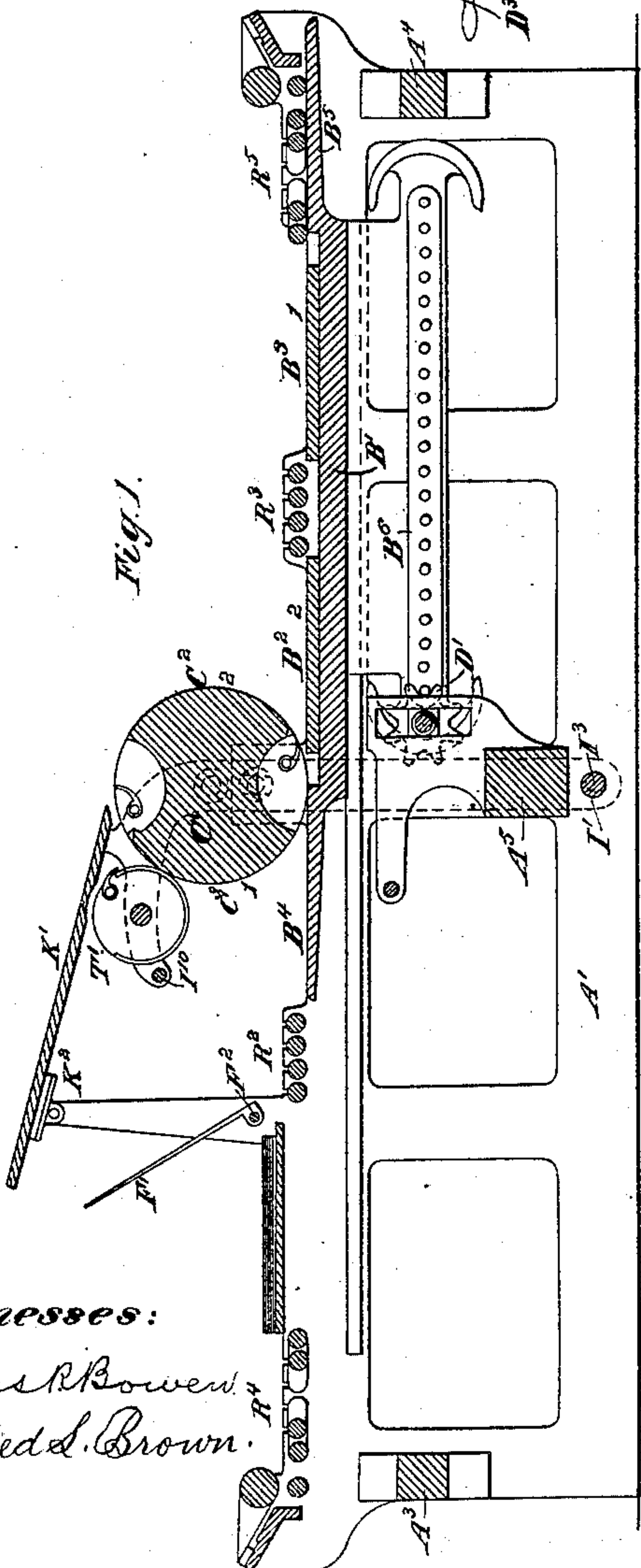
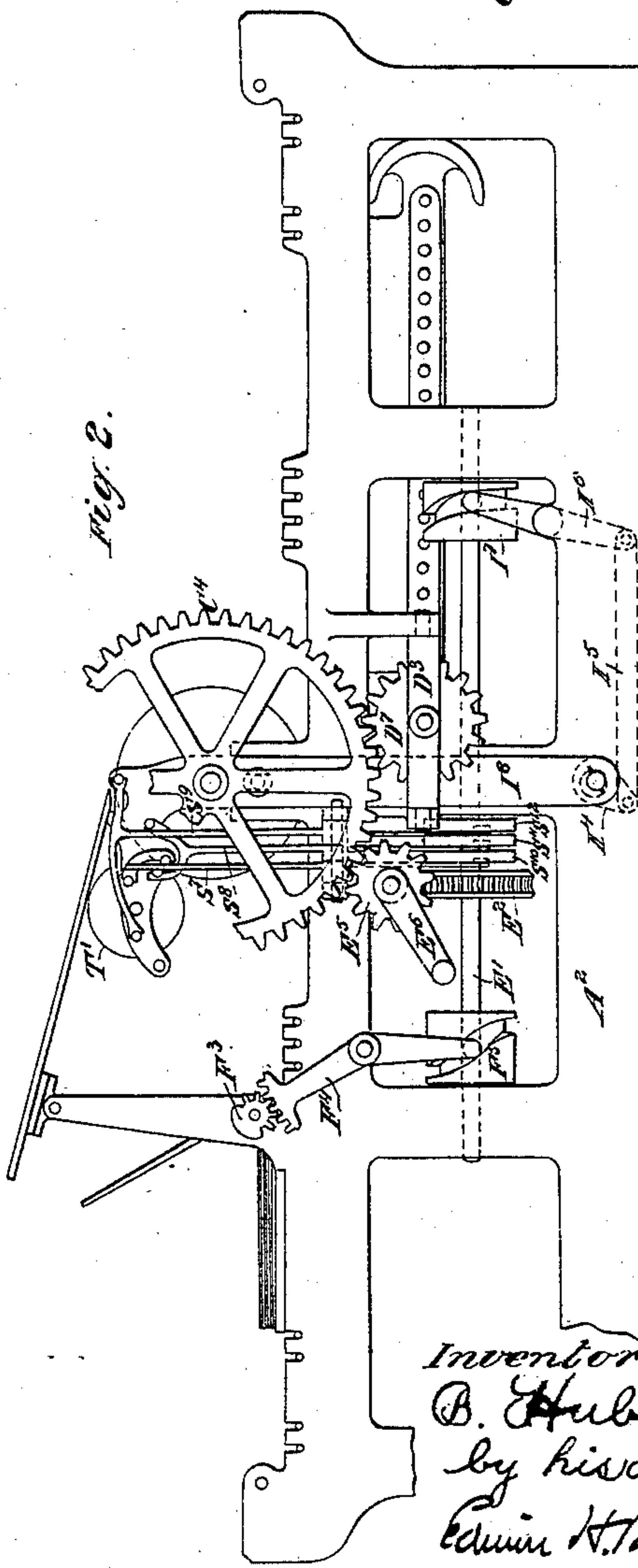


Fig. 2.



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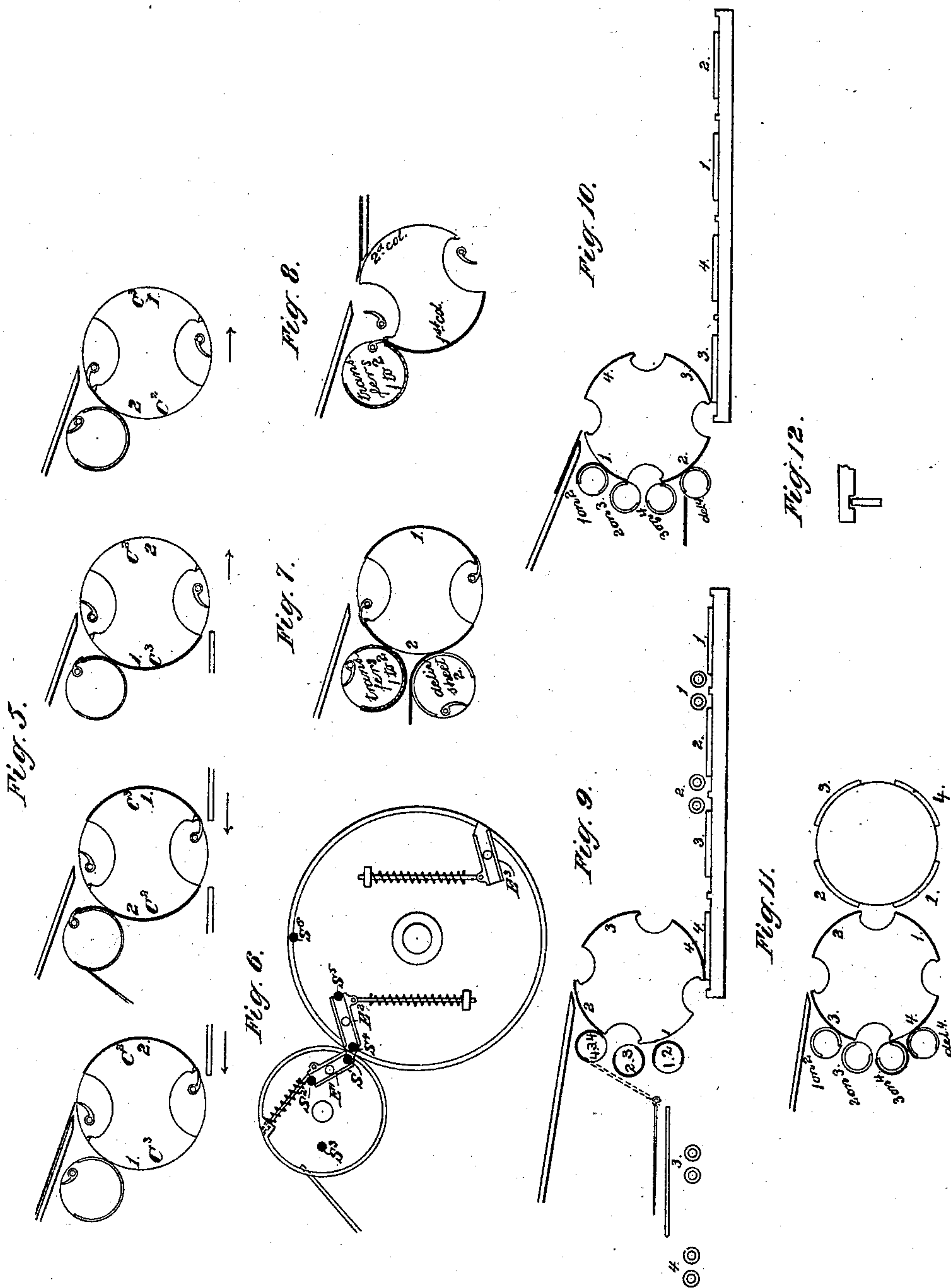
(No Model.)

2 Sheets—Sheet 2.

B. HUBER.
PRINTING PRESS.

No. 285,750.

Patented Sept. 25, 1883.



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UNITED STATES PATENT OFFICE.

BERTHOLD HUBER, OF TAUNTON, MASSACHUSETTS.

PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 285,750, dated September 25, 1883.

Application filed February 19, 1883. (No model.)

To all whom it may concern:

Be it known that I, BERTHOLD HUBER, of Taunton, in the county of Bristol and State of Massachusetts, have invented a certain new and useful Improvement in Printing-Presses, of which the following is a specification.

My invention relates to a color-printing press in which are employed an impression-cylinder having two or more impression-surfaces, from one to the other of which sheets are transferred, and a number of forms for operating in conjunction with said impression-surfaces.

In my drawings I have shown my invention applied to two and four color presses. I have, however, shown the two-color press more elaborately, and will begin my description with it.

Figure 1 is a sectional side elevation, Fig. 2 is a side elevation, and Fig. 3 a cross-section, of a two-color cylinder-press. Fig. 4 is a view of the cylinder and transfer-wheels and their gears.

A' A² are the side frames. A³ A⁴ are the end cross-stays, and A⁵ is the center cross-stay.

B' is the bed. It slides on lips or ways provided on each side of the frames.

B² B³ are the two forms on the bed.

B⁴ B⁵ are ink-tables on each end of the bed.

The ink-table B⁴ receives color from the inking apparatus R⁴ and delivers it to the form-rollers R², which in turn roll over the form B². The ink-table B⁵ receives color from the inking apparatus R⁵ and delivers it to the form-rollers R³, which roll over the form B³. It will be noticed that the two forms B² and B³ are so far apart that in the extreme end of the stroke of the bed the form-rollers R³ touch neither of the forms—that is, after they have rolled over the whole of form B³ they will never come in contact with form B². This forms an incidental part of my invention. The gain by this arrangement is that the rollers R³ will not have to be lifted up, as they would have to be if they were not placed where they are, or if the space between the two forms were not sufficiently large. The same operation takes place on the other side. On the under side of the bed is a rack, B⁶, in the well-known form of the Napier movement.

D' is the reversing-pinion, fastened on a shaft, D². Said shaft is held in a swivel-box, D³, on

the frame end, and on the rack end runs in a square box, which in its turn is arranged to slide up and down in the slotted hanger D⁵. It also has a roller, D⁶, running on a straight part or rib of the rack, inside of the teeth. The pinion is held in its proper working position by this roller on one side and the top and bottom of the slot in its hanger on the other. How the pinion rises and falls on the end teeth and by means of the shoe on each end that guides the roller during that interval is well understood, and I lay no claim to it.

On the outside of the frame, and in the center of the swivel-box, is a pinion, D⁷, fastened on the shaft D². It runs in the cylinder-gear and is rounded off to allow for its swinging motion. The cylinder C' has two printing-faces, C² and C³. The printing-face C² comes in contact with form B² only and the printing-face C³ only with the form B³. On the side shown in Fig. 2 the cylinder has a gear-wheel, C⁴, that meshes in the pinions D⁷ and E⁵. On the other side the cylinder has a smaller gear-wheel, C⁵, that drives the transfer-wheels T' by means of a gear-wheel, T².

F' designates a series of fly-fingers on a shaft, F². Said fly-fingers vibrate between a position tangential to the wheels T' and the fly-board, in the usual manner. In the present case it is operated by a pinion, F³, that gears into teeth on a lever, F⁴. This lever is in the form of a segment on one end, and on the other end it has a roller that works in a cam, F⁵, arranged on the longitudinal shaft E', making only one revolution to one complete stroke of the bed, which shaft is driven by the worm-wheel E², which in turn is driven by the worm E³ on the shaft E⁴. The shaft E⁴ derives motion from the driving-pinion E⁵, which is operated by means of the crank E⁶. The driving-pinion E⁵ gears into the large gear-wheel C⁴ of the cylinder. In practice the hand-crank would be replaced by pulleys and fly-wheel. The printing-cylinder in this case makes two revolutions to one complete stroke of the press—one while the bed is moving forward to print, and another while the bed is moving back. The cylinder therefore has to be held down while printing and to be lifted up when the bed is passing under it in the reverse direction. This is accomplished by a rock-shaft, I', having eccentric ends I² I³,

and deriving an oscillating motion from a lever, I^4 , connecting-rod I^5 , and lever I^6 . The latter has a roller in its upper end, which works in a cam, I^7 . On each side of the press there is a side rod, I^8 and I^9 , in whose lower ends the eccentric ends of the rock-shaft turn, and in whose upper ends the cylinder has its bearing. Near the cylinder-journals the side rods are guided by a stud or block, so that the side rods can move up and down, but not sidewise. The side rods are extended beyond the cylinder-journals, and form a bearing for the transfer-wheels T' , and support the forward part of the feed-board K' , and also a stay-rod, I^{10} . The latter forms a support for the fly-fingers when they strip off the sheet. The feed-board K' swings on a pivot, K^2 , and, being supported by the side rods on the forward end, the latter will rise and fall with the cylinder. Each face of the cylinder is provided with a set of grippers, and so are the transfer-wheels. The grippers in each case rest on a shaft, which has on one end a tumbler-cam, E' , E^2 , or E^3 , Fig. 6, which are operated in connection with a spring by studs that alternately throw them open or close them. I have represented those studs by black dots in Fig. 6, and on an enlarged scale. They are arranged to be pushed forward and back—that is, in or out of reach of the tumbler-cams.

S' is the closing-stud for the tumbler-cam E' at the point where the sheet is taken and transferred. S^2 is the opening-stud on the same place, and S^3 is the opening-stud for the tumbler-cam E' at the point where the sheet is switched off on the fly. S^4 is the closing-stud for the tumbler-cam E^2 of the cylinder-face C^2 when it receives the transferred sheet. S^5 is the opening-stud for the tumbler-cams E^2 and E^3 at the time when the cylinder-face C^2 releases the sheet to be delivered on the fly by the wheels T' , and when the face C^3 releases the sheet to be taken by the wheels, to be afterward transferred on the face C^2 . S^6 is the closing-stud at the point where the face C^3 takes the new sheet from the feed-board. Those studs do not work every time. Of those six, however, two always work at the same time. I have therefore connected them in pairs. For instance, when the sheet gets taken from the cylinder by the wheels, then the studs S^5 and S' work, (that is, are projecting in.) If the sheet gets transferred from the wheels on the cylinder, then S^2 and S^4 operate. When the sheet goes on the fly, it is just about the time the new sheet is taken from the feed-board. Therefore the studs S^3 and S^6 work together. Those pairs of studs are pushed in and out by levers $S^7 S^8 S^9$, which are T-shaped on top and reach part way in two studs, which latter are cut out to receive them, as shown in Fig. 12. The lower ends of those levers are provided with rollers working in box-cams $S^{10} S^{11} S^{12}$, arranged on the shaft E' .

In Fig. 5 I have shown the outline of the impression-cylinder and wheels in four different positions. The period between each posi-

tion is one-half a turn of the impression-cylinder, and the four positions represent the two complete turns which the cylinder makes during one complete stroke of the press. The first position is the same one shown in Fig. 1 when the bed is on the extreme end and is just beginning to go forward to print. In addition to designating the faces of the cylinders C^2 and C^3 , I mark them 2 and 1, corresponding with the face that prints second and first color on the sheet. We have, therefore, in this diagram face 2 with a sheet on, face 1 being as yet empty, but ready to grip the new sheet as it moves forward. In the second figure of this diagram the sheet on the face 2 is printed and the sheet is partly delivered on the transfer-wheels, from where it will go on the fly. Face 1 has the new sheet on and is about to print. In the third view of this diagram the sheet on face 1 is printed and the sheet is partly delivered on the wheels, while face 2 is empty. In the fourth view the wheels have partly transferred the sheet which was formerly on face 1 onto face 2, and face 1 is empty. At one-half a turn of the cylinder from this last position we find it again as in the position shown in the first view.

From the above it will be seen that the office of the wheels T' is twofold in the machine described. They take the sheet from face 2, (C^2), after having received the second color, and deliver it on the fly. Then they take the newly-fed sheet with one color printed on it from face 1 (C^3) and deliver it on face 2, (C^2). Where the device T' has this double duty, I consider it preferable to have it composed of wheels, so that the fly-fingers can reach into it. Where, however, I desire to accomplish by such a device only the transfer of the sheets from one face to another, I consider it best to make it in the shape of a cylinder, for when it is in that form the sheets will lie more smoothly against it.

In Fig. 7 I have shown a two-color press which has a series of wheels for delivering the sheet and a cylinder for transferring the sheet from face 1 to face 2, and this combination of parts would be applicable to a press whose impression-cylinder makes only one turn at a complete stroke of the press—as, for instance, a stop-cylinder. As shown, it would be about one-half stroke, and shows the new sheet on face 1. Face 2 is printed and its sheet partly delivered on the lower wheels, with the object to go on the fly. The sheet which was previously on face 1 is partly delivered on face 2 by the small cylinder, to receive its second color on the next stroke.

In Fig. 8 I have shown a two-color two-revolution press, where the sheet is delivered in front of the impression-cylinder and the small cylinder acts only to transfer the sheet.

Fig. 9 represents a four-color two-revolution continuously-rotating cylinder-press. One turn of the impression-cylinder is made while the bed passes from right to left and while the printing is taking place. The sec-

ond turn of the cylinder is made while the bed returns from left to right, the cylinder being raised and lowered as in Fig. 1. The cylinder has four faces and the bed has four forms. On the back of the cylinder and under the feed-board are three series of transfer-wheels or three transfer-cylinders. The upper series has a double function. It takes the sheet from face 4 of the cylinder after it is printed and delivers it upon the fly. Next it takes the sheet from face 3 after it is printed and delivers it upon face 4 to be printed. The middle series of the transfer-wheels takes the sheet off face 2 after being printed, and transfers it to face 3 to be printed. The lower series of transfer-wheels will take the sheet from face 1 of the cylinder after being printed, and deliver it on face 2 to be printed. In the drawings, face 4 of the cylinder is in the act of printing, and as the cylinder rotates the sheets on its four faces will each receive an impression from the corresponding form. During the first turn of the impression-cylinder after printing, the following operation of the series of transfer-wheels takes place: The upper series of wheels takes the sheet from face 4 and delivers it on the fly, and then takes the sheet from face 3 and holds it. The middle series of transfer-wheels takes the sheet from face 2 and keeps it, and the lower series takes sheet from face 1 and keeps it. At this point there is no sheet on the impression-cylinder; but each of the series of transfer-wheels holds one and keeps rotating, waiting for the second turn of the impression-cylinder, when the upper series will deliver its sheet on face 4, the middle series on face 3, the lower series on face 2, and face 1 will receive a sheet from the feed-board.

In Fig. 10 I have shown the outline of a four-color one-revolution press. This is accomplished by employing four series of wheels or small cylinders. Supposing it is a stop-cylinder press, then the position drawn is the one where the cylinder is at rest and just getting ready to start. Face 1 has just gripped the new sheet, the first color sheet is partly taken by the upper wheels, which will afterward deliver it on face 2. The second wheels will take the second color sheet and deliver it on face 3. The third will take third color sheet and deliver it on face 4. The lower wheels will take the fourth color sheet and deliver it on the fly, as indicated. In Fig. 11 I have shown the four-color one-revolution arrangement as applied to a rotary press. We have here one printing-cylinder with four forms, one impression-cylinder with four faces, and four series of wheels or four small cylinders. The action of the latter is exactly as the stop-cylinder arrangement just described. I have shown the faces, however, in a different position. We find here sheet 4 just being delivered on the fly; sheet 3

just about being delivered on face 4. Sheet 2 is just done being delivered on face 3. The upper wheels are idling around, waiting for face 1, &c.

Of course a color-press could be made on the principle described in which two or more colors use the same face—for instance, a four-color press with only two faces on the impression-cylinder. The colors could be so chosen that the colors that use the same face of impression-cylinder would not lap one another.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, in a printing-press, of an impression-cylinder having two or more faces, each fitted with a set of grippers, and one or more series of wheels, or one or more cylinders fitted with sets of grippers, all arranged to take up a sheet from one printing-face of the impression-cylinder and transfer it onto another face of the same cylinder, substantially as and for the purpose described.

2. The combination, in a printing-press, of an impression-cylinder having two or more faces, each fitted with a set of grippers, a series of wheels or a cylinder fitted with grippers, and arranged for the double purpose of delivering one sheet onto the fly or sheet-piler and transferring another from one face of the impression-cylinder to another, substantially as and for the purpose described.

3. The combination, in a printing-press, of a bed having two or more forms, an impression-cylinder provided with two or more impression-faces, each provided with a gripper, and one or more series of wheels or cylinders, each fitted with grippers, all arranged to take up a sheet from one printing-surface of the impression-cylinder and transfer it onto another, substantially as and for the purpose described.

4. The combination, in a printing-press, of an impression-cylinder having two or more faces fitted with grippers, one or more series of wheels on one or more cylinders, also fitted with grippers, and means, substantially as described, whereby the impression-cylinder and the one or more series of wheels, or one or more cylinders, will be raised and lowered in unison, substantially as specified.

5. The combination, in a printing-press, of an impression-cylinder having two or more faces fitted with grippers, one or more series of wheels, or one or more cylinders, a feed-board, and means, substantially as described, whereby the impression-cylinder, the one or more series of wheels, or one or more cylinders, and the feed-board will be raised and lowered in unison, substantially as specified.

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