7 Sheets. Sheet. 1.

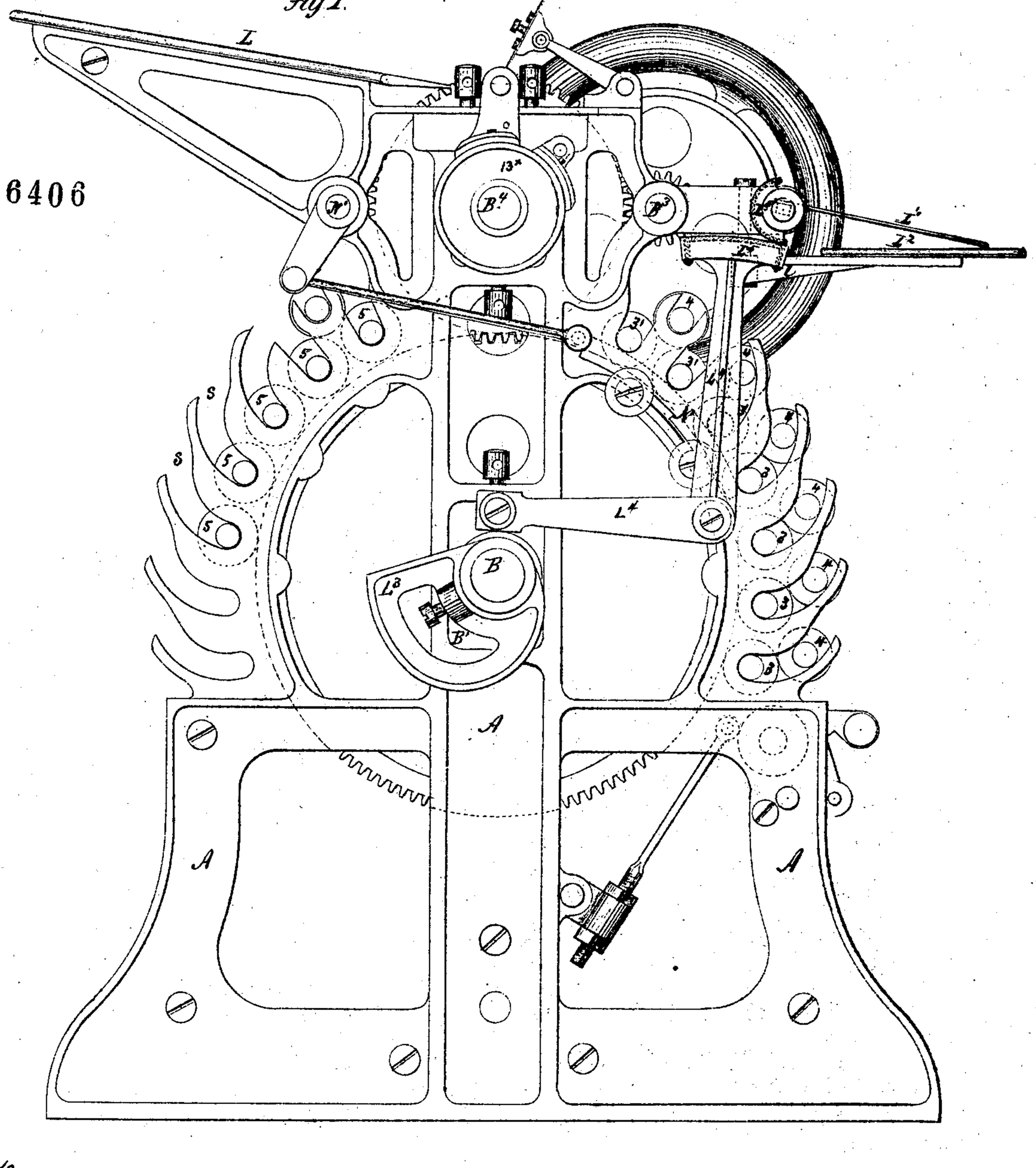
Edward S. Boynton
Assignor to
Self & Charles Parker
Boston

Lithographic Printing Press.

PATENTED JUN 27 1871

116406

Fig 1.



Witnesses.
J. H. Shumway
A. J. Tibbits

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Inventor
By his Attorney
John E. Earle

7 Sheets.

Sheet. 2.

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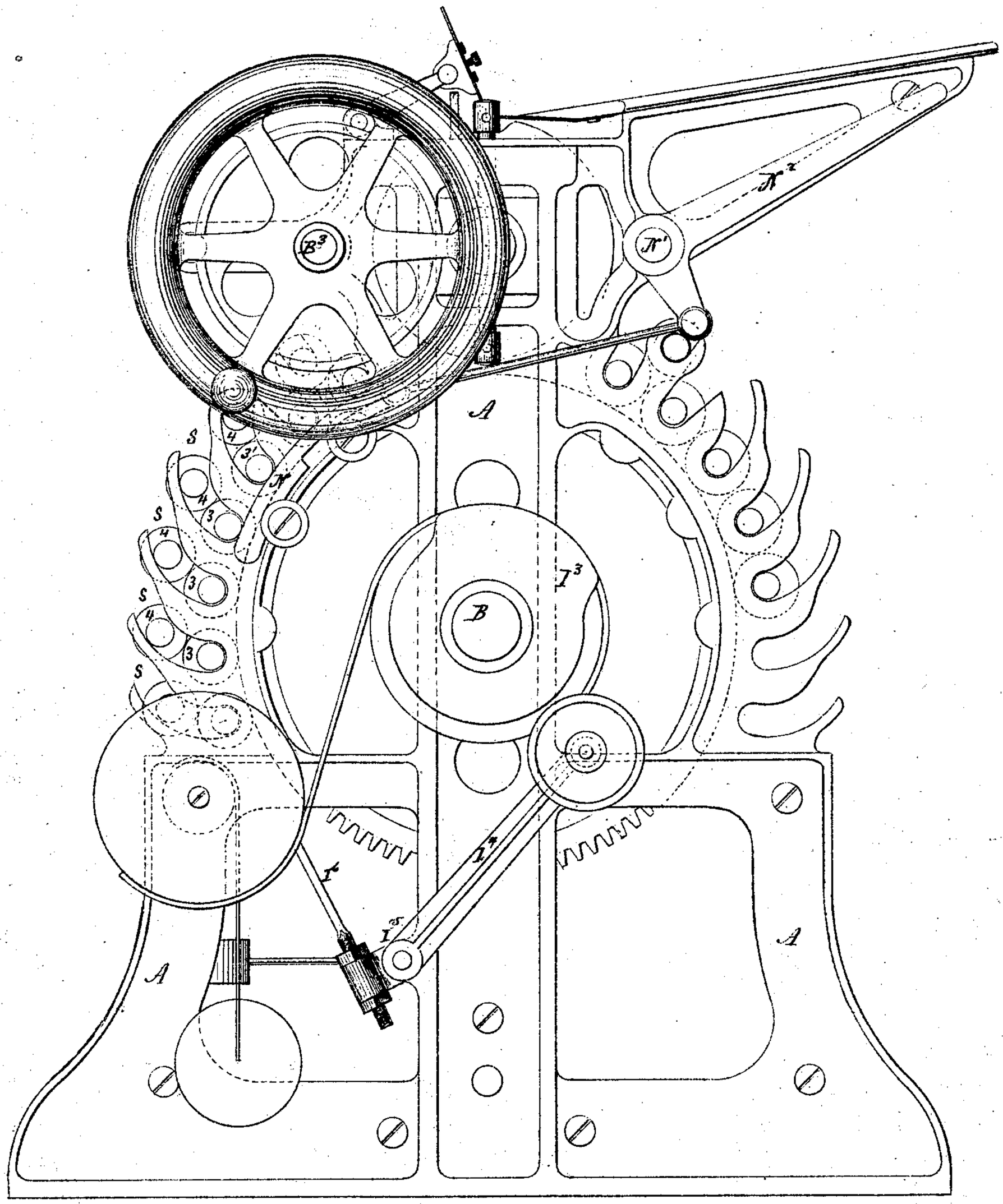
Lithographic Printing Press

fig. 2.



Witnesses.
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A. J. Tibbits

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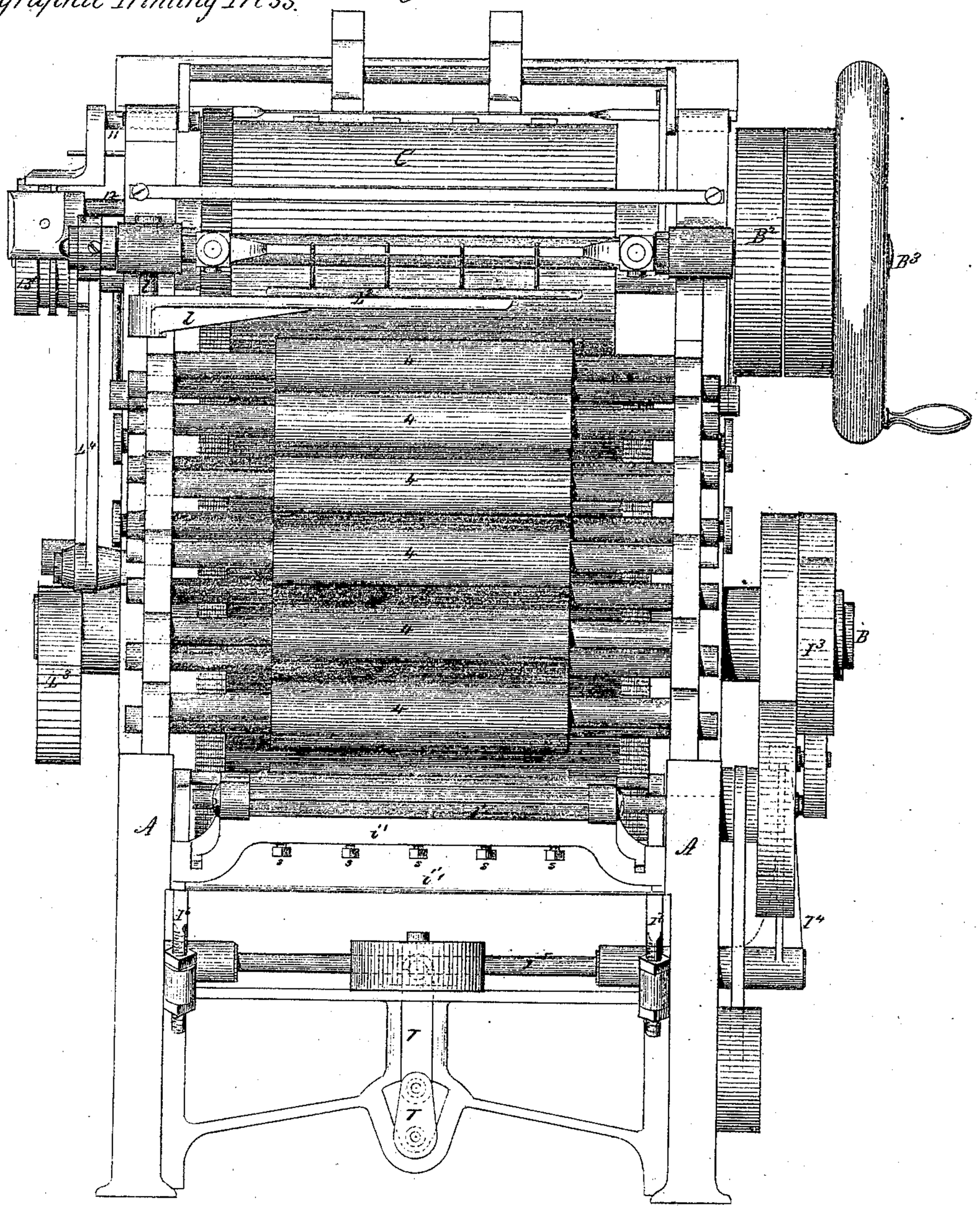
Thos. E. Earle

7 Sheets. Edward S. Boynton
Assignor to
Self & Charles Parker
Improvement in
Lithographic Printing Press.

Sheet 3.

fig 3.



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7 Sheets.

Sheet. 4.

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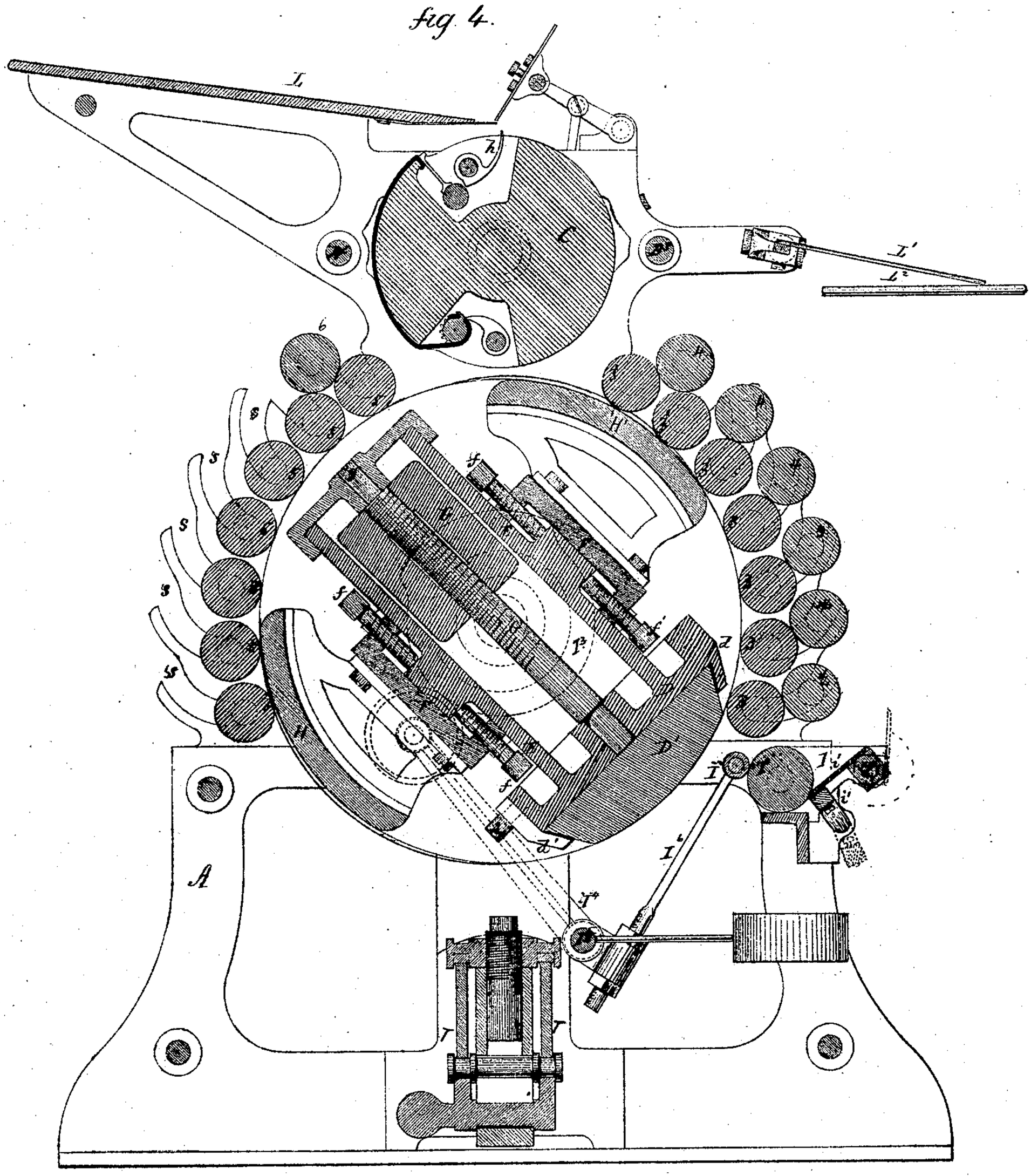
Boynton
Lithographic Printing Press.

fig. 4.



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7 Sheets.

Sheet. 5.

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Employés

Lithographic Printing Press.

fig. 5.

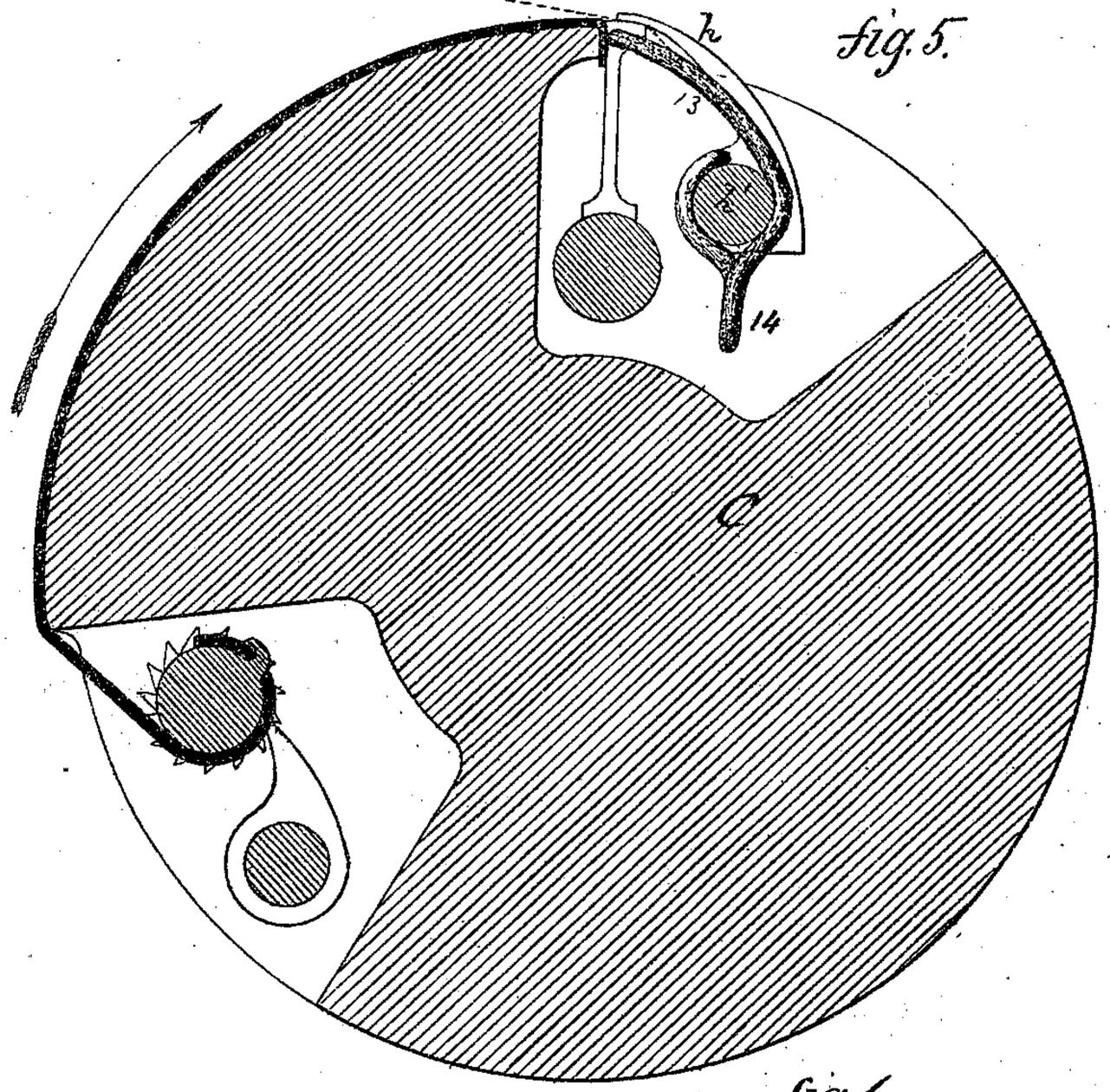
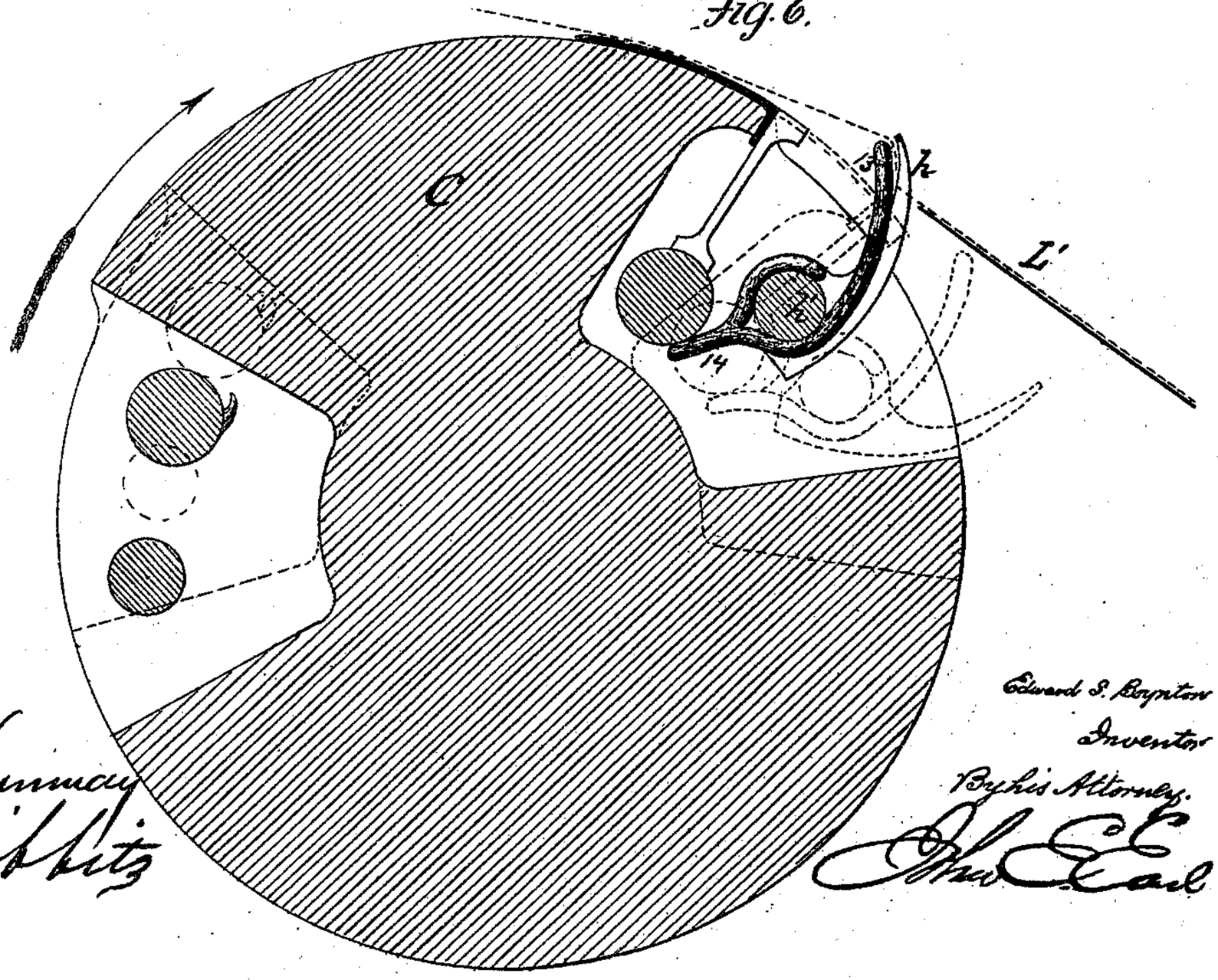


fig. 6.



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Chas. E. Earl

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Self & Charles Parker
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Sheet. 6.

116406

Lithographic Printing Press.

fig. 7

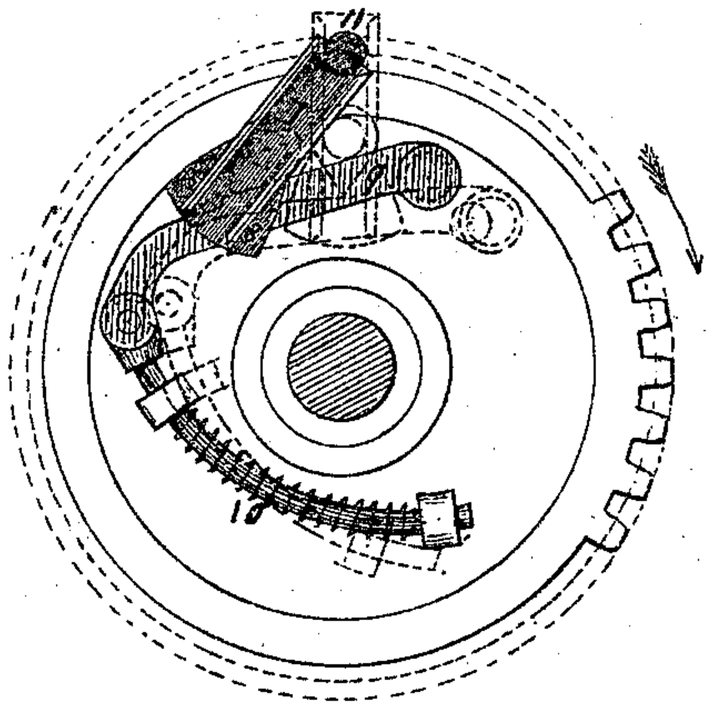


fig. 8

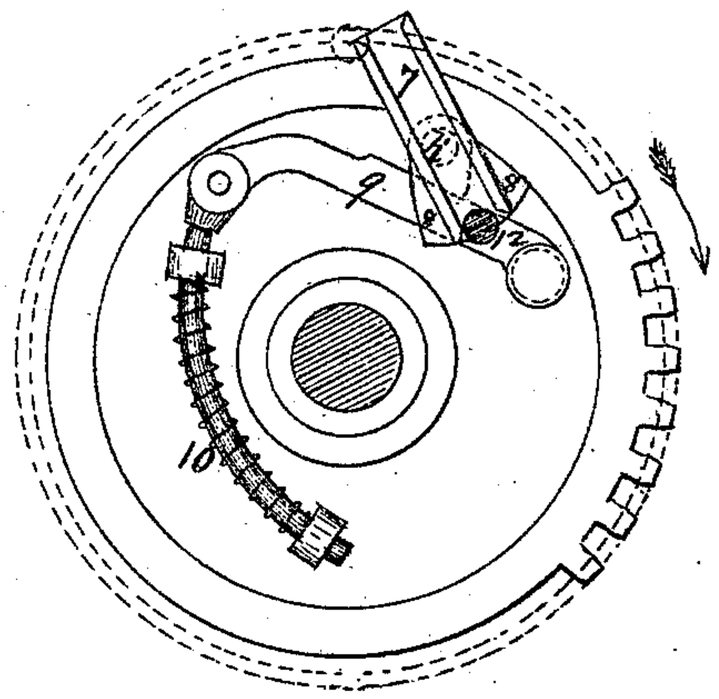


fig. 9

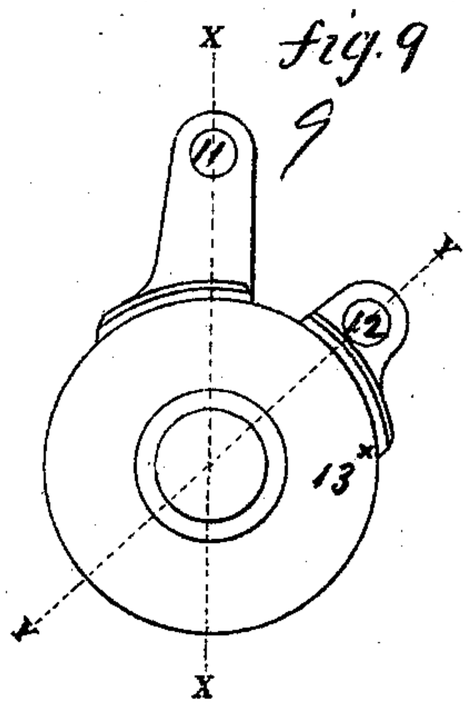


fig. 10

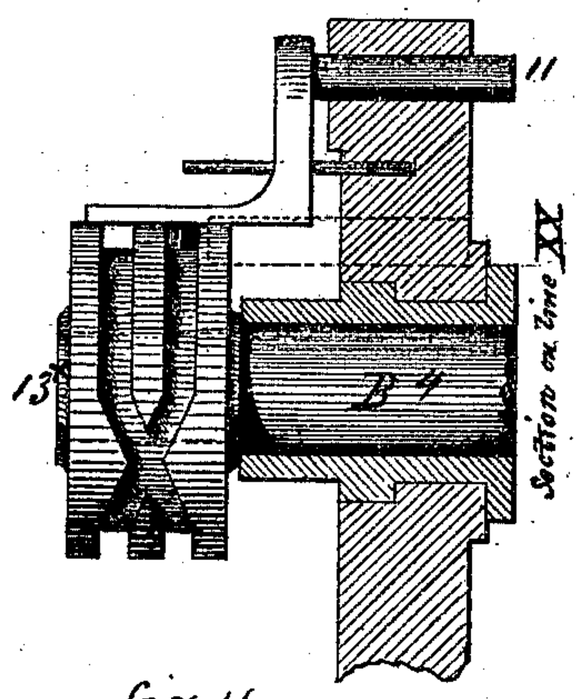
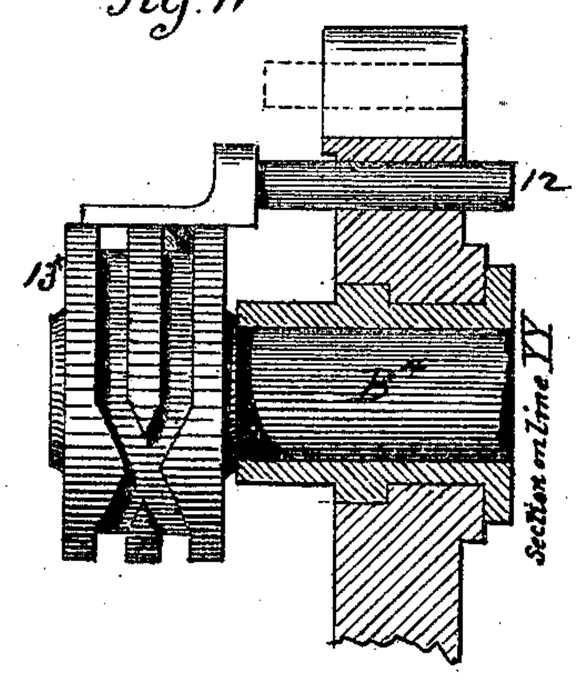


fig. 11



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- Imprint -
Lithographic Printing Press.

Sheet. 7.

fig. 12.

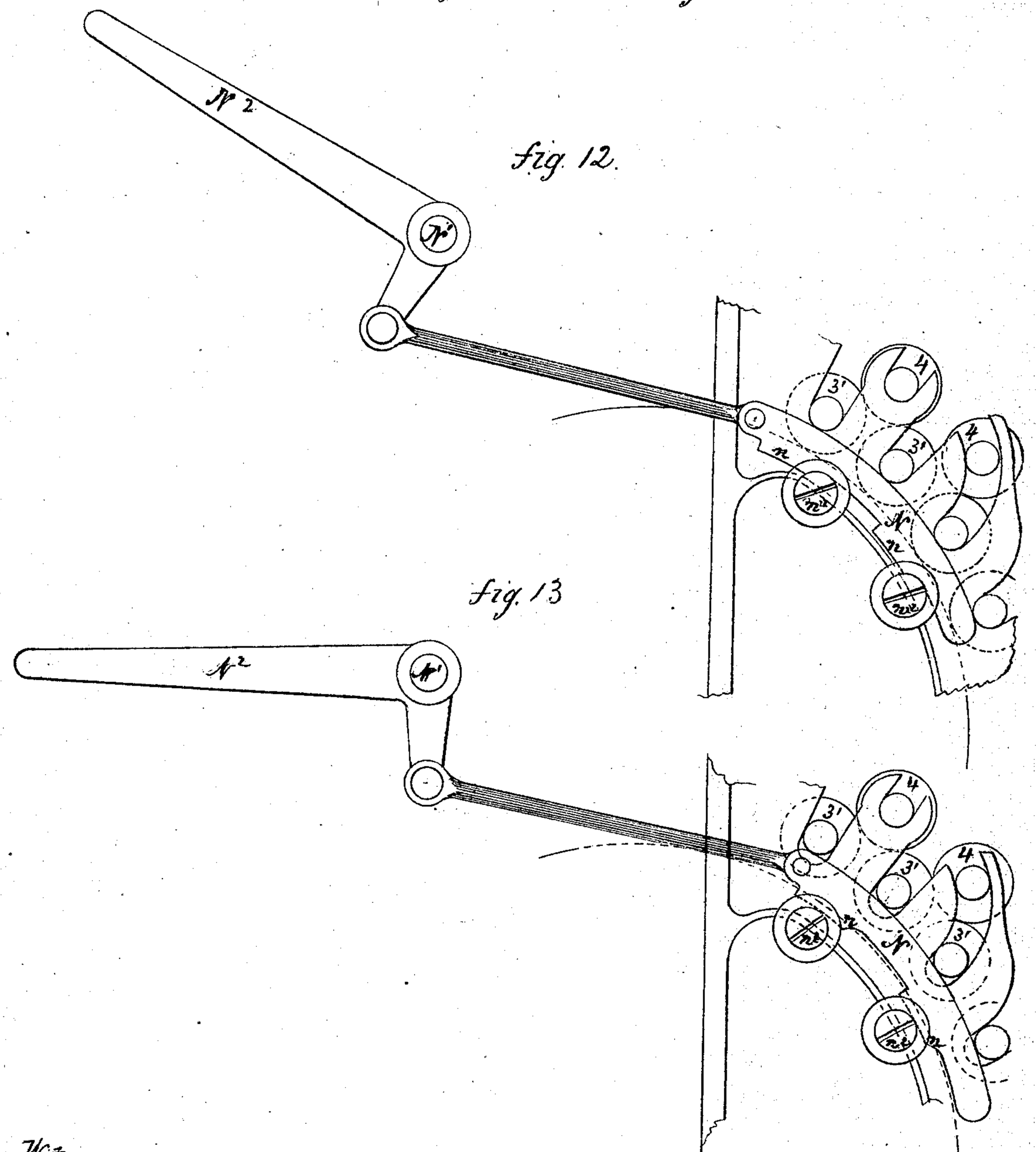

fig. 13

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UNITED STATES PATENT OFFICE.

EDWARD S. BOYNTON, OF BROOKLYN, NEW YORK, ASSIGNOR TO HIMSELF AND CHARLES PARKER, OF MERIDEN, CONNECTICUT.

IMPROVEMENT IN LITHOGRAPHIC-PRINTING PRESSES.

Specification forming part of Letters Patent No. 116,406, dated June 27, 1871.

To all whom it may concern:

Be it known that I, EDWARD S. BOYNTON, of Brooklyn, in the county of Kings and State of New York, have invented a new Improvement in Lithographic-Printing Press; and I do hereby declare the following, when taken in connection with the accompanying drawing and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawing constitutes part of this specification and represents, in—

Figure 1, a side view; Fig. 2, the reverse side; Fig. 3, the front or delivery side; Fig. 4, a transverse central section; and in Figs. 5 to 11, inclusive, detached views, illustrating the operation of the gripers.

This invention relates to an improvement in lithographic-printing presses, but is also applicable to zincographic or plate-printing, the object being the construction of a rotary press for this class of printing, parts of which are applicable to other printing-presses; and the invention consists: First, in arranging the stone-holder in the cylinder so that it may be adjusted to raise or lower the surface of the stone, as the case may be. Second, in an adjustable weight combined with the cylinder so as to counterbalance the stone. Third, in the manner of distributing the ink and dampening the surface, so that both are performed while the cylinder is revolving. Fourth, in a mechanism for operating the gripers, so that at one revolution of the impression-cylinder the gripers operate to grasp the paper, and at the next revolution to discharge the paper.

A is the frame of the machine; B, the shaft of the printing-cylinder, supported in adjustable bearings B^1, and caused to revolve, by the application of power to the pulley B^2, on the driving-shaft B^3, power at the same time being communicated to the shaft B^4 for the impression-cylinder C, the cylinders and driving-shaft being geared together and turned in the usual manner for common rotary presses, the impression-cylinder making two revolutions to each revolution of the printing-cylinder. D is the bed upon which the stone D′ is arranged, and is formed with an inclined ledge, *d*, upon one edge and with a similar-shaped clamp, *d′*, at the other edge, so that the stone (its edges being first beveled) is placed upon the bed D, one of the beveled edges lying under the ledge *d*, and the clamp *d′*, bearing upon the edge, binds the stone by means of a set-screw, 2, as seen in Fig. 2.

To prevent the chipping or breaking of the stone by thus clamping, or by use, I arrange upon one edge, between the stone and ledge or clamping device, an elastic or flexible material, as India rubber, leather, or their equivalents, so that the surface of the stone does not bear directly against a metal surface. The substance introduced, being of a slightly yielding character, prevents all difficulties which might arise from clamping the stone rigidly between the metal surfaces.

The bed D which supports the stone is adjusted in such relative position to the periphery of the cylinder that the face of the stone may be dressed to present a surface corresponding to and making a part of the periphery of the cylinder, and this surface may be turned, finished, or ground off by the revolution of the cylinder without removing the stone from its bed; but to do this an adjustment of the stone is necessary to throw it out beyond the natural surface of the cylinder, and this adjustment I accomplish by arranging the bed D upon a cylindrical or other suitably-formed holder, E, extending radially across the cylinder; and this holder is supported in a frame, F, formed within the cylinder, in which are arranged adjusting-screws *f f*, so that by turning the said screws the bed D may be thrown out or in, as may be required for different thicknesses of stone, or for grinding off the surface, or for adjustment of the stone for any purpose. To counterbalance the weight of the stone and its bed I arrange within the holder E a weight, G, upon a shaft, G′, the said weight being fitted with a thread corresponding to the thread on the shaft, so that, by turning the said shaft (which is done by means of the head *g*) the weight G is moved toward or from the center until it fully counterbalances the stone and its bed. H is the inking or first table; H′, a distributing or second table. I is the ink-fountain; I^1, the fountain-roll; and I^2, the ductor-roll; the said ductor-roll, operated by the cam I^3 through the lever I^4, turning the rock-shaft I^5, to which, by means of the rod I^6, the ductor-roll is adjustably attached, as seen in Figs. 2 and 4, so that when the first table H is presented at that point it will, taking the ink from the fountain-roll, carry it to the inking-table H, and is adjusted so as to deposit upon the table the requisite quantity of

ink; then the ductor-roll drops away from the inking-table. The cylinder, revolving, carries the inking-table past the several rolls 3 and 3′, more or less in number, which distributes the ink over the several rolls; then the second table H′, in order to insure a more perfect distribution over the rolls 3′, in its turn passes the said rolls 3′, causing them to revolve over its surface, the last rolls 3′ being the rolls employed for inking the stone, the other rolls being arranged so as not to come in contact with the second table or stone. This is done by forming a cam upon the head of the printing-cylinder, as denoted in broken lines, Fig. 4, so that the raised portion of the cam will, at the proper time, operate upon and so as to slightly raise the rolls. The rolls 3 and 3′ are made light by forming them from wood or hollow cylinders of metal, and they are pressed against the table and stone by secondary or gravitation rollers 4. All the rollers are arranged in slotted bearings S, inclined so that the rollers 4, by their own gravity, rest and bear upon the inking-rollers; and this pressure may be adjusted by making the secondary rollers heavier or lighter by adding to or taking from the said secondary rollers the temporary weights. By this construction I am enabled to arrange the distributing-rolls below the center of the printing-cylinder, the slots S being curved up, as denoted in Fig. 4, to bring the bearings of the secondary rolls so far above the bearings of the inking-rolls as to force the inking-rolls up against the cylinder below the center. The secondary rollers serve as additional distributers, their surface rolling upon the surface of the inking-rolls. Both the inking and distributing-cylinders may, if desirable, be given a transverse movement to more equally distribute the ink. Upon opposite sides of the machine, in bearings similar to the bearings of the distributing-rolls, I arrange dampening-cylinders 5 5, more or less in number. These dampening-cylinders are formed hollow so as to receive a quantity of water, and are perforated upon their surface, and the surface wound or covered with linen or other similar fibrous or textile material, so that the water within the cylinder will permeate entirely through the whole body of the covering and give to the surface the requisite moisture for dampening the stone. Secondary cylinders 6, corresponding to the primary cylinders 5, are applied, in like manner as the secondary cylinders, upon the inking-rolls, and these secondary cylinders may be made hollow and perforated so as to contain a supply of water and thus dampen the primary rolls from the surface; or both may be used in combination, dampening the primary cylinders from the inside and outside. Therefore, at the commencement of the operation, the stone passes the dampening-cylinders, receiving upon its surface the necessary moisture. At the same time the inking-table H has been supplied with ink and passes on, coating the inking-rolls; the second table H′, following, thoroughly distributes the ink. The stone then comes in contact with the inking-rolls 3′ and receives the ink, (the impression having been previously made or taken upon the stone,) and is prepared for printing, the dampening-rolls being raised as the distributing and inking rolls pass so as not to come in contact, and the distributing-rolls 3 also raised as the stone passes. The impression-cylinder C is constructed with gripers *h* so as, at the proper time, to receive the paper from the table L and draw it down between the surface of the impression-cylinder and the stone. The gripers, still holding the paper, carry it around after it has received the impression, and deliver it to the fly L^1. The said fly L^1 is brought into position at the proper time to receive the printed paper and carry it onto the receiving-table L^2. This table L^2, which must necessarily be at the front of the machine, comes in such position as to interfere with the operator getting at the rolls in front. It is, therefore, necessary that the table be removed, and to do this I pivot the table, by an arm, *l*, to a stud, *l′*, so that it may be turned around the said pivot to take it away from the front of the press, the said pivot insuring its return to the proper position.

The impression-cylinder is here represented as half the diameter of the printing-cylinder; hence at one revolution of the printing-cylinder the paper is taken in, printed, and thrown out; at the next revolution a second sheet is taken, and so on; but it is only essential that the impression-cylinder should be of a diameter equal to a component part of the cylinder, as three to one, four to one, more or less. The arrangement of the gripers *h* in the cylinder C and their operation are shown in Figs. 5 to 11, inclusive, on a reduced scale. The grippers are arranged upon a shaft, *h′*, longitudinally in a recess in the cylinder C, as seen in Figs. 5 and 6, and at the end of the cylinder, on the said shaft *h′*, is arranged a slotted shoe, 7. (See Figs. 7 and 8.) The cylinder revolves in the direction denoted by the arrows, and when the gripers are open the shoe is in the position shown in Fig. 7, but when closed is in the position shown in Fig. 8. On the back of the shoe I form projections 8 8, corresponding to a ledge or flange upon the head of the cylinder, so that the said projections, in either direction, striking against the ledge, as seen in Figs. 7 and 8, form stops to arrest the throw of the shoe. A V-shaped cam, as denoted in broken lines, is formed upon the back of the shoe, resting upon a lever, 9, the said lever supported by a spring, 10, so that when the shoe is in the position seen in Fig. 7 the lever will bear against one side of the cam, and when turned past the center in the other direction the spring, operating upon the lever, will throw the shoe to the other extreme, and vice versa. In this movement of the shoe the lever is depressed, as denoted in broken lines, Fig. 7. To thus operate the shoe two studs, 11 and 12, are arranged through the frame of the machine so as to alternately stand in the path of said shoe, and are operated by a double-acting cam, 13*, as seen in Figs. 9, 10, and 11. Starting then with the shoe in the position seen in Fig. 7, the gripers open and, ready to receive the paper, the stud 11 is thrown in, as seen in Fig. 10. The shoe strikes the said stud 11, as seen in Fig. 7, and passing on throws the shoe over into the position seen

in Fig. 8—that is, closed on the paper, as denoted in Fig. 5. At the next revolution the stud 11 is withdrawn and the stud 12 advanced, as seen in Figs. 8 and 11, so that the other end of the shoe passes onto the stud 12, the shoe returning to the first position and opening the gripers, whereby at the first revolution the paper is taken in and at the next discharged. To insure the throwing of the paper from the gripers onto the fly, I arrange auxiliary fingers 13, which lie below the paper, so that the paper rests between the gripers and the auxiliary fingers; and these are arranged upon the shaft h', as seen in Fig. 5, and are formed of wire or similar material bent around the shaft h', so that they are retained upon the shaft by their friction thereon to turn with the said shaft. A tail piece, 14, is formed on the said fingers 13, extending below the shaft. The fingers operate with the griper to take the paper, as seen in Fig. 6. When the gripers commence to rise and carry it forward toward the fly L^1, so as to insure the passage of the paper onto the fly—being the position about as denoted in Fig. 6—then the tail piece 14 of the fingers, striking a suitable top, arrests their further movement, and the griper is turned away as the cylinder advances, leaving the fingers as denoted in broken lines, Fig. 6. Suitable gauges for adjustment of the paper are properly presented to the cylinders, and are arranged in the usual manner. The fly is operated by a cam, L^3, through the lever L^4 and segment L^5.

It is often desirable to prevent the inking-cylinders coming in contact with the stone. To do this I arrange the said inking-rolls 3′ so that their shafts rest upon a bar, N, as seen in the detached view, Fig. 12, a similar bar being arranged upon both sides and connected to a rock-shaft, N^1, from which a lever, N^2, extends to a position convenient for the operator, as seen in Fig. 12, so that by depressing the said lever from the position in Fig. 12 to that in Fig. 13 the bar N is thrown forward, and the cams n upon the under side of the bar N in such movement pass onto studs n^2 and raise the inking-rolls, as seen in Fig. 13. The rolls are lowered by withdrawing the bar N.

The ink-fountain is formed by a plate, i, and cylinder I^1. In order to clean the fountain or remove any foreign substance therefrom, it has heretofore been necessary to remove the knife or plate entirely from the machine, which necessitates a readjustment when it is replaced—a difficult operation and one requiring great skill and no inconsiderable amount of time. To overcome these difficulties, I arrange the blade i upon a shaft, t, as seen in Fig. 4, the said shaft being parallel with the axis of the cylinder I^1, and so that the blade may be turned down and up into the position denoted in broken lines; and to adjust the blade I arrange a bar, i', (see Figs. 3 and 4,) the said bar pivoted so as to be turned out and down to the position denoted in Fig. 4; and in the bar I arrange adjusting-screws s, (see Fig. 3,) so that when the blade is turned against the cylinder and the bar i' under the blade the, blade may be adjusted by means of the said set-screws; then, when it is necessary to open the fountain, turn out the bar, without changing the set-screws, and turn up the plate to the position denoted in broken lines, and, when the purpose for which the fountain is opened is accomplished, return the blade and pass the bar back into position, and the same relative position of the blade is again insured.

To take impressions upon the stone, pass the copy between the impression-cylinder and the stone, (the copy having been first prepared in the usual manner, in like manner as for printing.) It will be understood that, for transferring, both the inking and dampening rolls are removed from contact with the stone. While this will give a most perfect transfer, it may, in some cases, be preferable to transfer by the scraping process. To do this I arrange a tympan, strained upon a carriage, beneath the cylinder, to which a movement is imparted corresponding to the cylinder, and upon this tympan the copy is placed; then, when the stone is presented, the copy passes over a scraper of the usual construction, the said scraper being arranged so as to be operated by a toggle-joint, P, as seen in Figs. 3 and 4, which will produce an impression upon the stone in the usual manner for common lithographic-printing presses.

The arrangement which I have described for the impression-cylinder to receive the blank to cause the impression and then deliver the blank to the fly, may be applied to many classes of printing-presses, and by such construction the use of the tapes is entirely avoided.

Other parts of my invention, as the construction of the inking-fountains, are alike applicable to other presses; I, therefore, do not wish to be understood as confining myself to lithographic or plate printing.

I claim as my invention—

1. The combination of the stone D′ and the holder E, arranged and made adjustable within the revolving frame F, substantially as described, whereby the surface of the stone may be set in proper relative position to the periphery of the cylinder, substantially as set forth.

2. The arrangement of the shoe 7 on the griper-shaft, the two reciprocating studs 11 12 combined with the double-acting cam 13* to introduce the fingers alternately to the operation of the griper-shaft, substantially as set forth.

3. In combination with the shoe 7 on the griper-shaft, constructed with projections 8 8 on opposite sides of the said shoe, and provided with the V-shaped cam, the lever 9, arranged upon the head of the cylinder and provided with a spring to force the said lever to act upon the said cam to throw the said shoe to either of its two extremes, the two extremes being limited by the said projections coming in contact with the rim of the cylinder, substantially as set forth.

4. The auxiliary fingers 13, having extensions 14, and attached by frictional-spring pressure to the shaft h', in combination with griping-fingers h, substantially as and for the purpose set forth.

5. The arrangement of the cam 13, by which the gripers are operated, directly upon the shaft of the impression-cylinder, so that the said cam revolves with the said impression-cylinder, as described.

6. In combination with the plate or blade *i*, arranged and operating as described, the bar *i'*, provided with screws to adjust the said plate *i*, and operating to support and release the said plate, substantially as described.

7. In combination with the inking or dampening rolls, the auxiliary or gravitation rolls 4, arranged in the slots S, curved upward to bring the bearing of the gravitation rolls above the bearing of the inking or dampening rolls, so that the gravitation-rolls will force the inking or dampening rolls, arranged below the center of the cylinder, up against the surface of the cylinder, substantially as set forth.

EDWARD S. BOYNTON.

Witnesses:
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