

(No Model.)

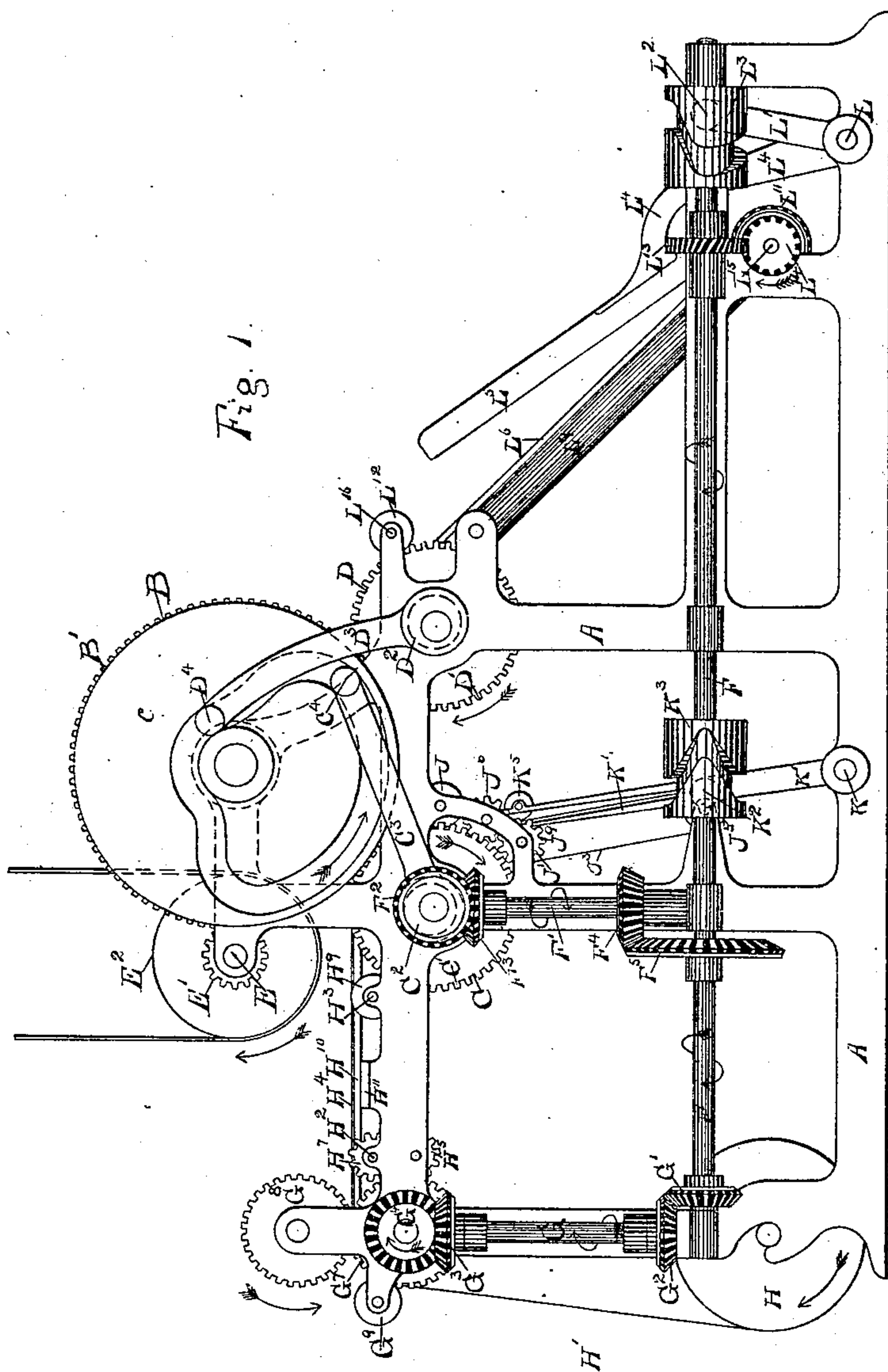
J. T. HAWKINS.

4 Sheets—Sheet 1.

PRINTING PRESS.

No. 272,834.

Patented Feb. 20, 1883.



WITNESSES:

James Buddy
D. H. Kenaga

INVENTOR

John T. Hawkins
by P. A. Voorhes

ATTORNEY

(No Model.)

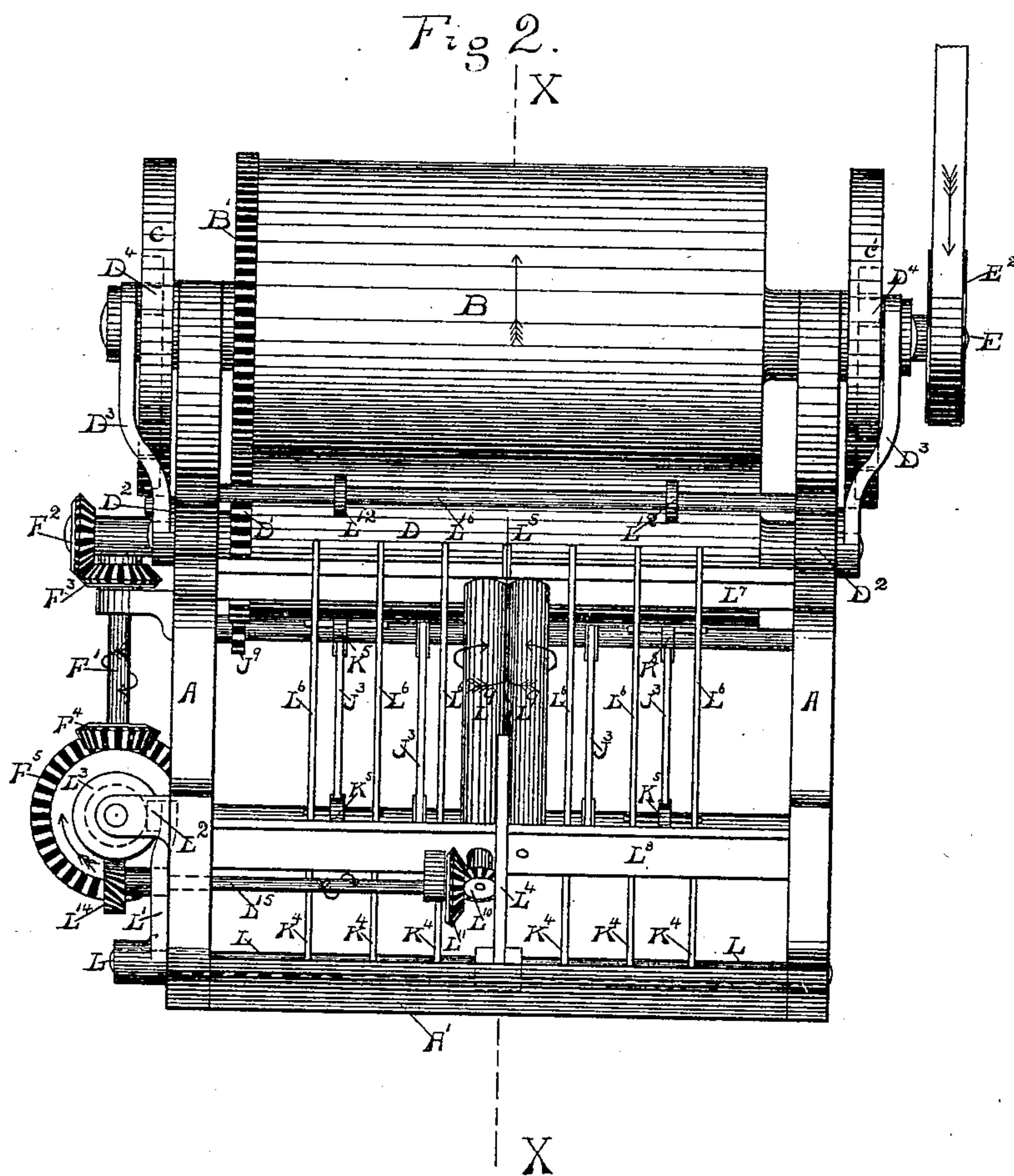
4 Sheets—Sheet 2.

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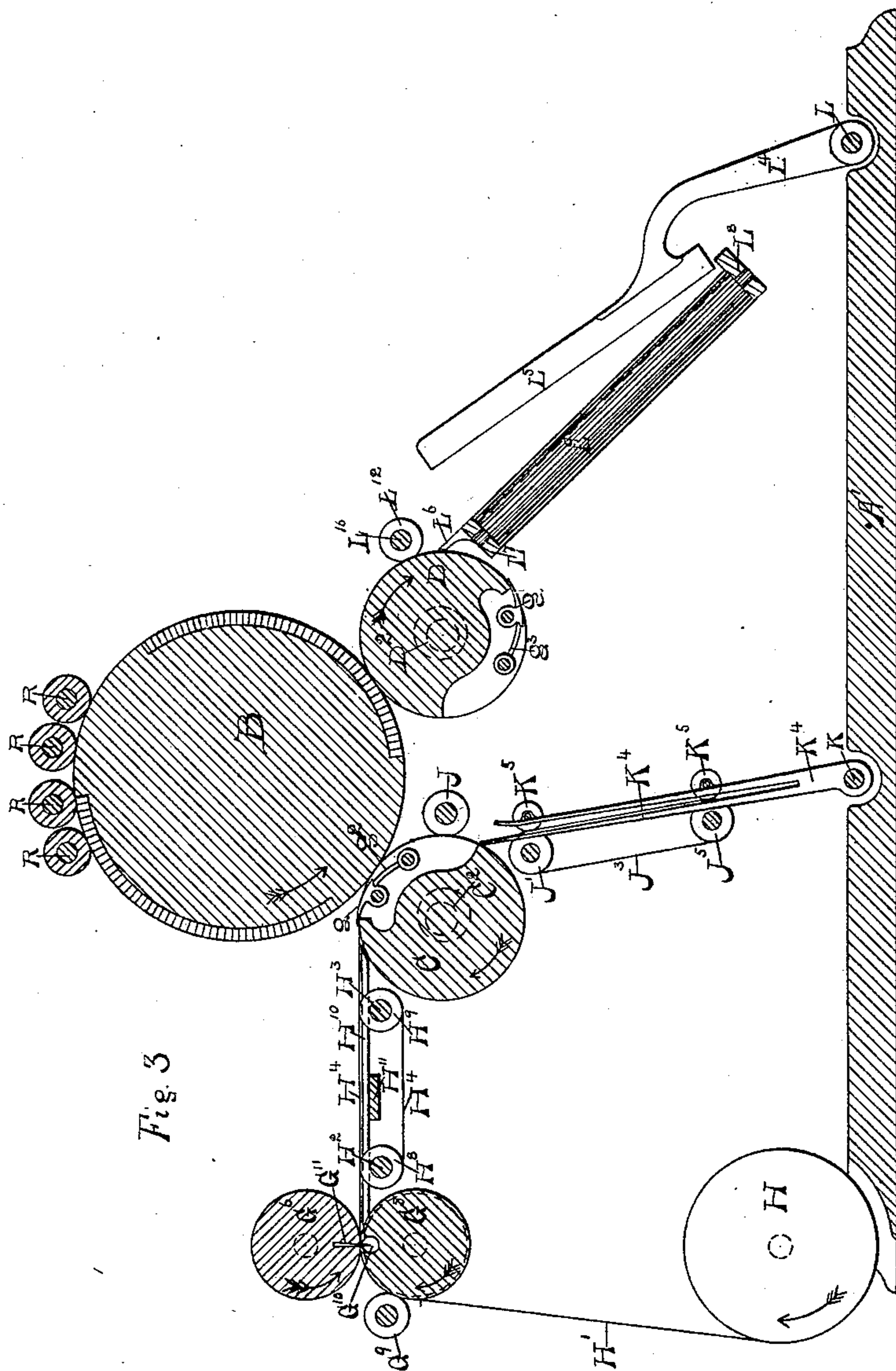
J. T. HAWKINS.

4 Sheets—Sheet 3.

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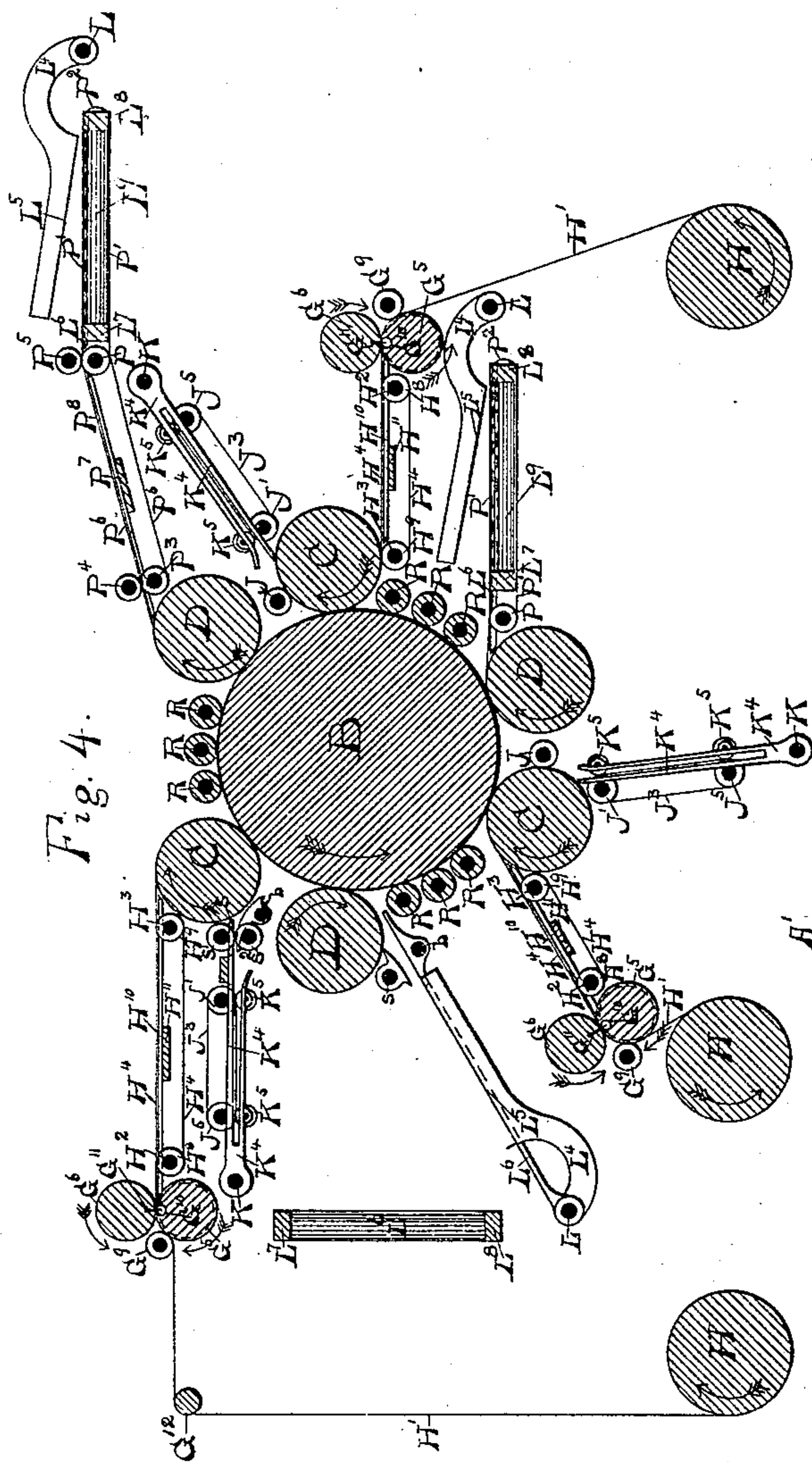
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UNITED STATES PATENT OFFICE.

JOHN T. HAWKINS, OF TAUNTON, MASSACHUSETTS.

PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 272,834, dated February 20, 1883.

Application filed March 9, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. HAWKINS, of Taunton, in the county of Bristol and State of Massachusetts, have invented a new and useful Improvement in Printing-Presses, more particularly relating to that class of printing-machines commonly known as "perfecting-presses," which improvement is fully set forth and illustrated in the following specification and accompanying drawings.

The object of the invention is to dispense with the curved stereotype-plates heretofore most generally used upon the type-cylinders of perfecting-presses, and to print perfected sheets from a continuous web of paper on the original type-forms, and thus to save the cost of the stereotype plant and the time necessarily consumed in molding and casting the stereotype-plates from the original type-forms after being set up by the compositor, the self-feeding, speed, and all the other advantages of the perfecting-press being at the same time preserved.

The mere perfecting features of printing from the roll a continuous web of paper on both sides at one operation upon a cylinder provided with forms of type set up by the compositor, instead of being stereotyped, is not entirely original with me; but the novel means whereby I accomplish the object of my invention impart great simplicity and durability to the machine at a comparatively cheap cost of construction.

The invention consists, broadly, in so arranging the parts of the machine that by means of feeding and cutting cylinders, a type-revolving cylinder, and two impression-cylinders geared thereto at equal surface velocities the sheet of paper to be printed is cut from the web after its seizure for the first impression, when, during the course of said impression, it is fed head first through and between the type-cylinder and the first-impression cylinder, from which it is taken and thence fed tail first through and between a second form on the type-cylinder and the second-impression cylinder, in the course of which operation it receives the second impression on its opposite side, whence it is delivered as may be required.

In the accompanying drawings, Figure 1 is a side elevation of the machine. Fig. 2 is an

end elevation from the right of Fig. 1. Fig. 3 is a longitudinal vertical section through Fig. 2, taken at the line X X of said figure, showing only the principal moving parts in position and omitting the outlines of the frames, the driving-shafts, &c., for the sake of clearer illustration. Fig. 4 is a sectional view similar to that illustrated in Fig. 3, and is intended to illustrate the arrangement of the different parts when it is desired to multiply the number of pairs of impression-cylinders to be used with one and the same type-cylinder and forms, requiring, as is shown and hereinafter explained, a separate set of cutting and feeding cylinders, a separate roll and web of paper, and a separate folder or other delivery, as desired, to each pair of impression-cylinders.

In said figures, the letters A A indicate the main frames of the machine, and the letter A' its base-plate. A shaft, E, is journaled in said frames, which carries on one end the pinion E', and upon the other end the belt-pulley E², to which the necessary power from any suitable source is applied to impart motion to all the different actuated parts of the machine, the pinion E' engaging the gear-wheel B', secured to the type-cylinder B, upon whose periphery the type-forms are secured in the ordinary manner, not necessary to describe, and forming no part of this invention. The impression-cylinders C and D respectively and successively impart the first and second impressions to the sheets, to each of which cylinders is secured a gear-wheel, C' and D', which wheels severally engage the gear-wheel B' upon the type-cylinder B. Said gear-wheels are so proportioned that when the cylinders C and D are moved out of contact with the type-cylinder B, as hereinafter explained, they will not pass entirely out of gear with the gear-wheel B'. The shaft F, in suitable bearings upon the outside of one of the frames A, is actuated by the shaft of the impression-cylinder C through the intervention of the miter-wheels F² F³, the vertical shaft F', journaled likewise in suitable bearings projected from one of the frames A, and the bevel-wheels F⁴ F⁵. These several wheels are so proportioned that the shaft F makes one revolution for each revolution of the type-cylinder B. The vertical shaft G, journaled in one frame A, similarly to the

shaft F', is driven by the shaft F through the intervention of a pair of bevel-gears, G' G², and imparts motion to the lower cylinder of the pair of cutting and feeding cylinders G⁵ G⁶ by means of the bevel gears G³ G⁴. Said cutting and feeding cylinders are geared together by a pair of spur-gears, G⁷ and G⁸, and the gear-wheels actuating them from the shaft F are so proportioned as to give to the cylinders G⁵ G⁶ such surface velocities as to deliver one severed sheet for each revolution of the type-cylinder B. The cylinder G⁵ has in its surface, parallel to its axis, a recess or slot, G¹⁰, and the cylinder G⁶ a serrated knife, G¹¹, for severing the sheets from the web in the ordinary and well-known manner.

The roll of paper H is carried on a core or shaft running in suitable bearings formed in the frames A, from which the web of paper H' is led to and between the cylinder G⁵ and a binding or pressure roller, G⁹, also journaled in the frames A, and, passing over the cylinder G⁵ and between it and the cylinder G⁶, is cut into sheets of proper length by the knife G¹¹ as it is passed to the impression-cylinder C. The shafts H² H³, also journaled in the frames A, carry a series of tape-pulleys, H⁸ H⁹, upon which are driven the tapes H⁴, said pulleys being driven by the gear-wheel G⁷ through the interposed idler-gear H⁵ and the gear H⁷ upon one end of the shaft H², the idler-gear H⁵ running upon a stud secured to the inside of one frame A.

The bridge-fingers H¹⁰ are supported in series upon a bar, H¹¹, secured at each end to the frames A. Said fingers are spaced across the press alternately with the tapes H⁴, and their ends adjoining the cutting-cylinders G⁵ G⁶ enter shallow grooves turned in the periphery of the cylinder G⁵, for the purpose of stripping the advancing edge of the web of paper from the cylinder G⁵ after the preceding sheet has been severed from it by the knife G¹¹. The other ends of said fingers extend nearly to the impression-cylinder C, their upper surfaces leading nearly at a tangent to its upper surface.

Within the usual gaps or recesses in the impression-cylinders C and D are ordinary grippers, g and g', mounted respectively upon an ordinary gripper-shaft in each cylinder. Said grippers seize each sheet at the proper time to receive the impression, as hereinafter explained, and carry it through the impression, when its advancing edge is released. The sheet-lifter fingers g² g³ are spaced in series alternately with said grippers, and on the top of the free ends of said fingers the sheets lie when clamped by the grippers. These grippers and lifter-fingers are operated in the usual way by cams attached to the frames A, and by arms and rollers engaging said cams and secured to their respective shafts. These cams are so placed and formed as to operate the grippers and lifter-fingers at the proper times, respectively, to seize, convey, and deliver the sheets, as hereinafter explained. As these parts just mentioned are well known in the art and form no

part of this invention, they have, for the sake of clearness of illustration, been omitted from the drawings.

The impression-cylinders C and D are journaled in eccentric-boxes C² D², (shown in dotted lines only,) which boxes are also journaled in the frames A. Secured to the eccentric-boxes C² D² are lever-arms C³ D³, carrying on their free ends rollers C⁴ D⁴, which rollers engage a suitably-formed groove in each of the two box-cams c c', secured upon the axis or shaft of the type-cylinder B, outside of the frames A. The cams c c', levers C³ D³, with their rollers C⁴ D⁴, and the eccentric-boxes C² D² coact to bring each impression-cylinder alternately in contact with the type-cylinder to make the impression from its respective type-forms, and also to hold the impression-cylinders out of contact with the type cylinder when all portions of its periphery, save said type-surface, are passing said impression-cylinders.

A pressure-pulley or binding-roller, J, is carried upon a shaft journaled in the frames A. Two or more of these rollers may be set in such position as to bear only upon the unprinted margins of the sheet as it passes around with the impression-cylinder C after having been printed on its first side. Said rollers serve to further convey the sheet when its tail end has passed from between the type-cylinder and the cylinder C. A series of tapes, J³, are driven by the gear-wheels J⁸ and J⁹, the former running upon a stud attached to one frame A and the latter secured to the upper pulley-shaft of the tapes J³, a corresponding series of lower tape-pulleys, J⁵, being journaled in brackets projecting from the frames A, which said pulleys are driven by the tapes J³. To the rock-shaft K, journaled in the frames A, is secured an arm, K', which carries at its free end a roller, K². Said roller engages the groove of a cam, K³, secured to the shaft F, which groove is so formed as to impart a vibrating motion to the arm K'. Secured to the rock-shaft K is a fly, K⁴, formed with double fingers, and on pivots secured to two or more of said fingers the pulleys K⁵ run loosely, being driven by frictional contact with the tapes J³, or with the interposed sheets, when the latter are passing between said tapes and said pulleys. If desired, a series of tapes may also run upon the pulleys K⁵, in which case the sheet in passing down between the double fingers of the fly K⁴ will be conveyed and guided by two series of tapes, one set or series on each side or surface of the sheet.

To the rock-shaft L, journaled in the frames A, is secured the arm L', carrying on its free end the roller L², which roller engages the groove of a cam, L³, secured to the shaft F, said groove being so formed as to give a vibrating motion to the arm L'.

To the central part of the rock-shaft L is secured an arm, L⁴, to which is attached a folder-creasing blade, L⁵. From a cross-bar, L⁷, a series of bridge-fingers extend in an inclined

position to a sheet-stop, L^8 , said bar and stop being each secured to the frames A and serving as bearings for the folding-rollers L^9 . The pair of folding-rollers L^9 , with the blade L^5 , serve to make the first fold in the perfected sheet in the ordinary and well-known way. Motion is transmitted from the shaft F to said folding-rollers by means of the screw-gears L^{13} L^{14} , secured respectively to said shaft and to the outer end of the shaft L^{15} , said shaft having secured to its inner end a bevel-gear wheel, L^{11} , which engages a corresponding gear-wheel, L^{10} , secured to one of the folding-rollers L^9 .

Two or more pressure-pulleys or binding-rollers, L^{12} , are carried upon a shaft, L^{16} , journaled in the frames A, which rollers serve a purpose similar to that served by the pressure-rollers J—that is, they insure the passage of the sheet down the inclined bridge-fingers L^6 after the tail of the sheet has passed from between the type-cylinder B and the impression-cylinder D.

In Figs. 3 and 4 R R indicate the positions in which the inking-rollers may be placed, the inking apparatus and arrangement being otherwise omitted, as the complete inking apparatus may be arranged in many well-known ways. All folding mechanism requisite for imparting further folds in the sheets has been likewise omitted, as the arrangement of such mechanism must be determined by the number and direction of the folds required.

In Fig. 4 are shown a series of stationary stripper-fingers, s , and a series of bridge-fingers, b , for respectively stripping and leading the sheet from the impression-cylinders either to the fly or conveyer K^4 or to the folder-knife L^5 , to the latter where the strippers s and bridges b are shown leading to a series of fly-fingers for conveying the sheet through the considerable angle from the point shown to the vertical fold-rollers L^9 , in which position the first fold is made from the left-hand upper pair of impression-cylinders.

It is obvious that from one pair to four pairs of impression-cylinders, with as many rolls and webs of paper, and either a folding or a flat delivery, may be used in several well-known ways, as circumstances may require. I do not therefore confine myself to the precise arrangement shown in Fig. 4 for bringing into use more than one pair of impression-cylinders.

In the kind of press illustrated, or whenever it is intended to secure type upon the periphery of a cylinder, it is customary to secure the same in narrow columns running parallel to the axis of the type-cylinder, making it necessary in the folding of a folio sheet to make its single fold parallel with said columns of type. In the machine herein illustrated the folding-blade is arranged to fold in the ordinary manner a quarto-sheet, in which case the first fold is made transversely to the columns of type. When, however, the machine is designed to fold only a folio sheet the folder-blade may be arranged to operate at right angles to the arrangement shown, or in either manner to suit

the particular folds intended to be imparted to the sheets.

The complete operation of the machine is as follows: The web of paper H' , passing under the pressure-rollers G^9 , between the cylinders G^5 and G^6 , is fed forward upon the tapes H^4 , by the action of said cylinders, to the point at which the grippers of the cylinders C grasp its leading edge. Simultaneously with this grasping of the sheet by the grippers g the cutting-knife G^{11} comes into position to sever and at the proper time severs the proper length of sheet from the web H' . The impression-cylinder C now carries the severed sheet through and between itself and the type-cylinder B, the type form being properly placed upon the cylinder B to meet the passing sheet. This operation prints the first side, at the conclusion of which the cylinder C, by the action of the cams c c' , is moved out of contact with the cylinder B until its proper type-form again arrives opposite to the cylinder C, when it is again brought into contact with the cylinder B. The grippers g are caused to open by suitable cams, (not shown in the drawings, as hereinbefore explained,) after passing the pressure-pulleys J and before passing the points of the fingers K^4 , which lie close to the periphery of the cylinder C, the lifter-fingers g^2 being raised simultaneously with the opening of said grippers. The head of the sheet is thus delivered upon the points of the fingers K^4 , and the sheet thus passes down between the double fingers K^4 until it reaches the bottom of the opening between them. Simultaneously with the arrival of the head of the sheet at the bottom of said opening the fingers K^4 are caused, by the action of the cam K^3 , to vibrate to the right until the tail end of the sheet is laid against the surface of the impression-cylinder D, at which time the grippers g' of said cylinder are brought into position to close upon said end and to carry it through between the cylinders D and B, on the latter of which the type-form for printing the second side is suitably situated to meet the sheet, which at this time is impressed between the cylinders B and D by the action of the cams c c' , as before explained, thus printing the second side of the sheet. The grippers g' of the cylinder D are caused to open, and simultaneously also the lifter-fingers g^3 to lift after passing the pressure-pulleys L^{12} and before passing the points of the bridge-fingers L^6 . The tail (now the head) of the sheet is thus passed upon and down the inclined bridge-fingers L^6 , under the folder-blade L^5 , when, upon the arrival of the sheet at the sheet-stop L^8 , said folder-blade, through the instrumentality of the cam L^3 and its connections, already described, makes the first fold in the paper, which then passes through the successive folds, which may be imparted to it in any desired manner, as before explained.

It is of course not essential to this machine that the sheets be folded at all, and in place of the fold-rollers L^9 and blade L^5 the ordinary

vibrating fly or any other suitable device may be used and operated in any suitable manner from the shaft F to deliver the sheets flat upon a suitable board or table, the fingers of such fly in that case occupying the place of the bridge-fingers L⁶ while receiving the sheet.

I do not confine myself to the methods herein shown for imparting motion either to the feed and cutting cylinders G⁵ G⁶, or to the fly or conveyer K⁴, or to the folding blade and rollers L⁵ L⁹, as these several revolutions may be imparted in many well-known ways most suited to the general design and particular arrangement of the several parts of the machine.

It is evident that motion may be imparted to the type or form cylinder B by gearing instead of by belt, or in any ordinary manner other than that shown in the drawings. It will also, of course, be understood by those skilled in the art that stereotype-plates may be used upon the type-cylinder of this machine as well as original type-forms; but there is no advantage in putting stereotype-plates on cylinders made large enough to carry a number of forms for many impressions. The better practice is the common one, where stereotype-plates are used—that is, to secure such plates upon a smaller cylinder, and to multiply the number of cylinders carrying such forms to conform to the number of the impressions required, instead of making one large cylinder carry all the forms required for the several impressions.

Any matter herein shown and not claimed, but claimed in my accompanying application marked "Case B," I herein disclaim.

Having thus fully described my said improvements as of my invention, I claim—

1. A perfecting printing-press having combined therein a type-revolving cylinder, two impression-cylinders arranged so as to respectively make contact with and avoid alternate forms on said type-cylinder, a pair of cutting and feeding cylinders, and a suitable conveyer for receiving a printed sheet head first from the first-impression cylinder and delivering the same tail first to the second-impression cylinder, whereby the sheets are first cut from the web and then successively printed upon opposite sides, substantially as and for the purposes set forth.

2. In a printing-press, in combination with a type-revolving cylinder provided with forms for printing both sides of a sheet, two impression-cylinders arranged relatively to said type-cylinder to respectively make contact therewith and avoid alternate forms thereon, so that the sheet is received head first upon the first-impression cylinder to print the first side, and

then tail first upon the second-impression cylinder to print the second side, substantially as and for the purposes set forth.

3. In a printing-press, the combination of a type-revolving cylinder, two impression cylinders arranged so as to respectively make contact with and avoid alternate forms on said type-cylinder, and a vibrating fly for receiving a printed sheet head first from the first-impression cylinder and delivering the same tail first to the second-impression cylinder, whereby the sheets are successively printed on opposite sides, substantially as and for the purposes set forth.

4. In a printing-press, in combination with a type-revolving cylinder and two impression-cylinders, a fly-frame consisting of a double set of fingers, within or between which fingers the sheet is caused to pass from the first-impression cylinder and therein to rest while being conveyed to the second-impression cylinder, substantially as and for the purposes set forth.

5. In a printing-press, in combination with a type-revolving cylinder and an impression-cylinder, a fly-frame consisting of a double set of fingers, and provided with a series of pressure-pulleys pivoted to one set of said fingers and in frictional contact with a series of conveying tapes or rollers, whereby the sheet is received head first from the impression-cylinder and delivered tail first, substantially as and for the purposes set forth.

6. In a printing-press, in combination with a type-revolving cylinder provided with forms for printing both sides of a sheet, a pair of impression-cylinders for printing opposite sides of a sheet, arranged relatively to said type-cylinder, so that when either one of said cylinders is imparting an impression in contact with the type-cylinder the other is held out of contact with the type-cylinder, substantially as and for the purposes set forth.

7. In a printing-press, the combination of a type-revolving cylinder and two impression-cylinders, said impression-cylinders being provided with eccentric journal-boxes and arms secured thereon, and said type-cylinder with cams on its axis or journal-shaft, constructed so as to actuate said arms, whereby when the type-cylinder rotates each impression-cylinder is alternately brought in contact with a type-surface on the type-cylinder and thrown out of contact therewith, substantially as and for the purposes set forth.

JOHN T. HAWKINS.

Witnesses:

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