

(No Model.)

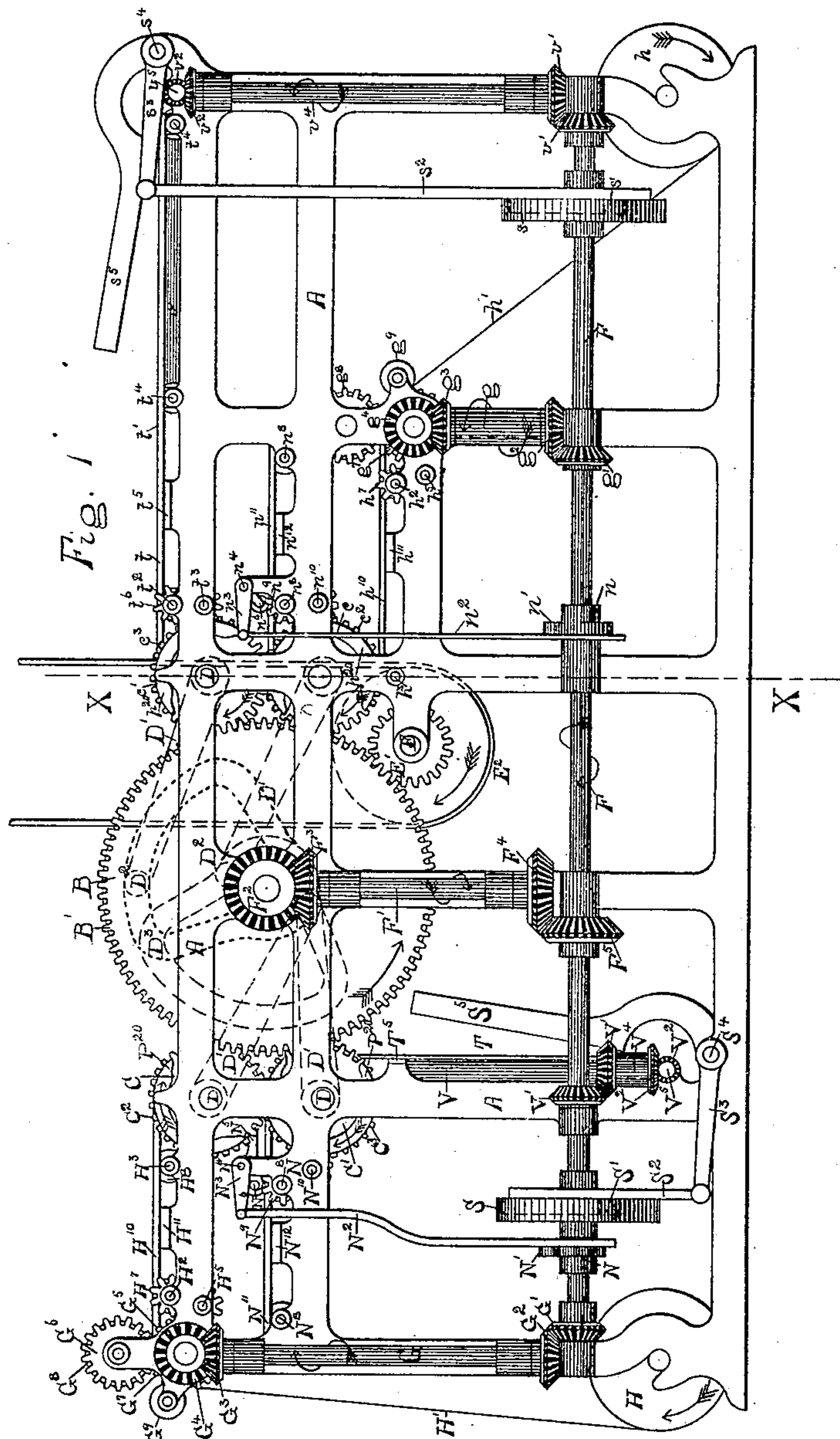
6 Sheets—Sheet 1.

J. T. HAWKINS.

PRINTING PRESS.

No. 272,835.

Patented Feb. 20, 1883.



WITNESSES:

James Buddy
D. H. Kerraga

INVENTOR

John T. Hawkins
By R. R. Voorhees

ATTORNEY

(No Model.)

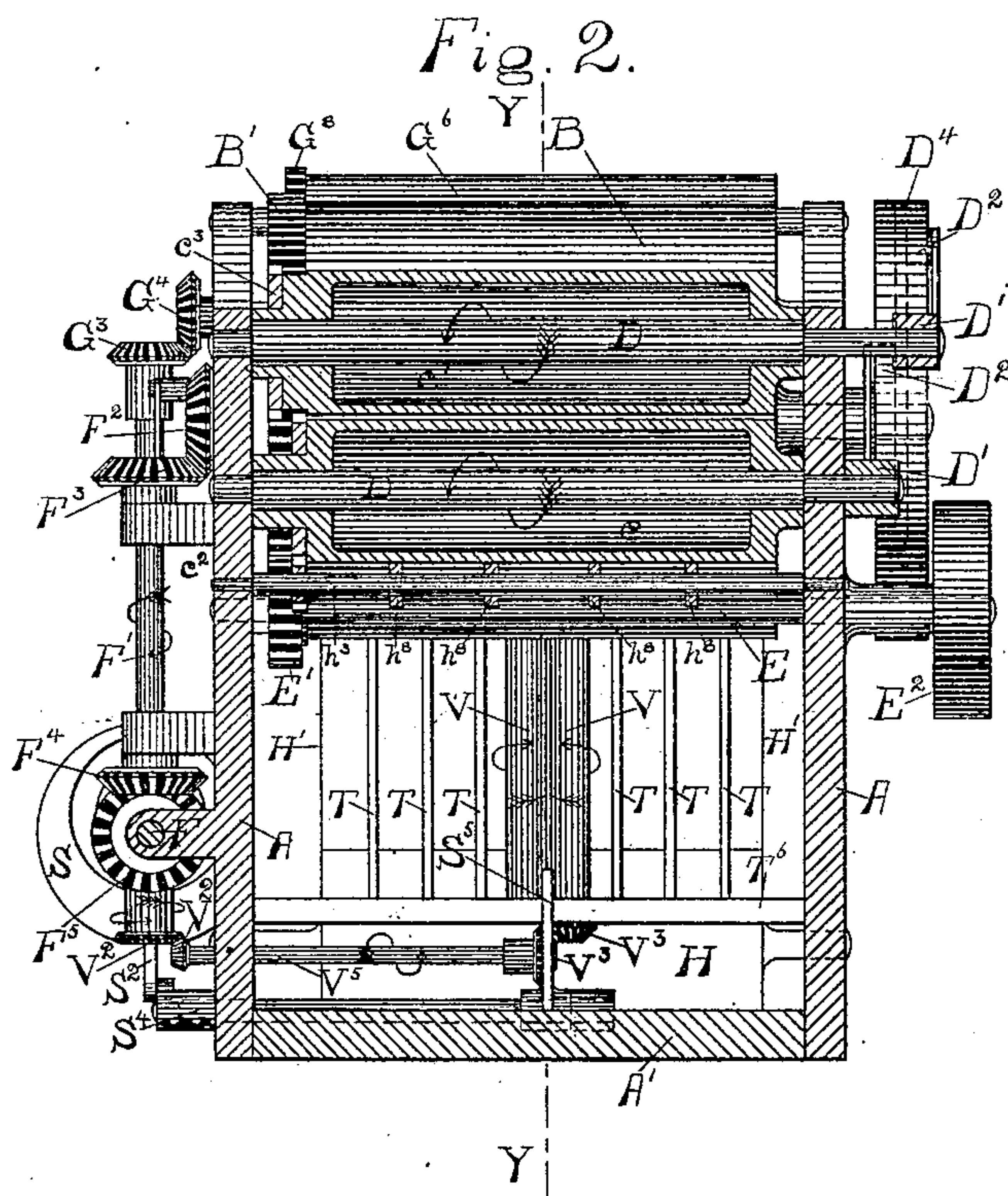
6 Sheets—Sheet 2.

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No. 272,835.

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(No Model.)

6 Sheets—Sheet 3.

J. T. HAWKINS.

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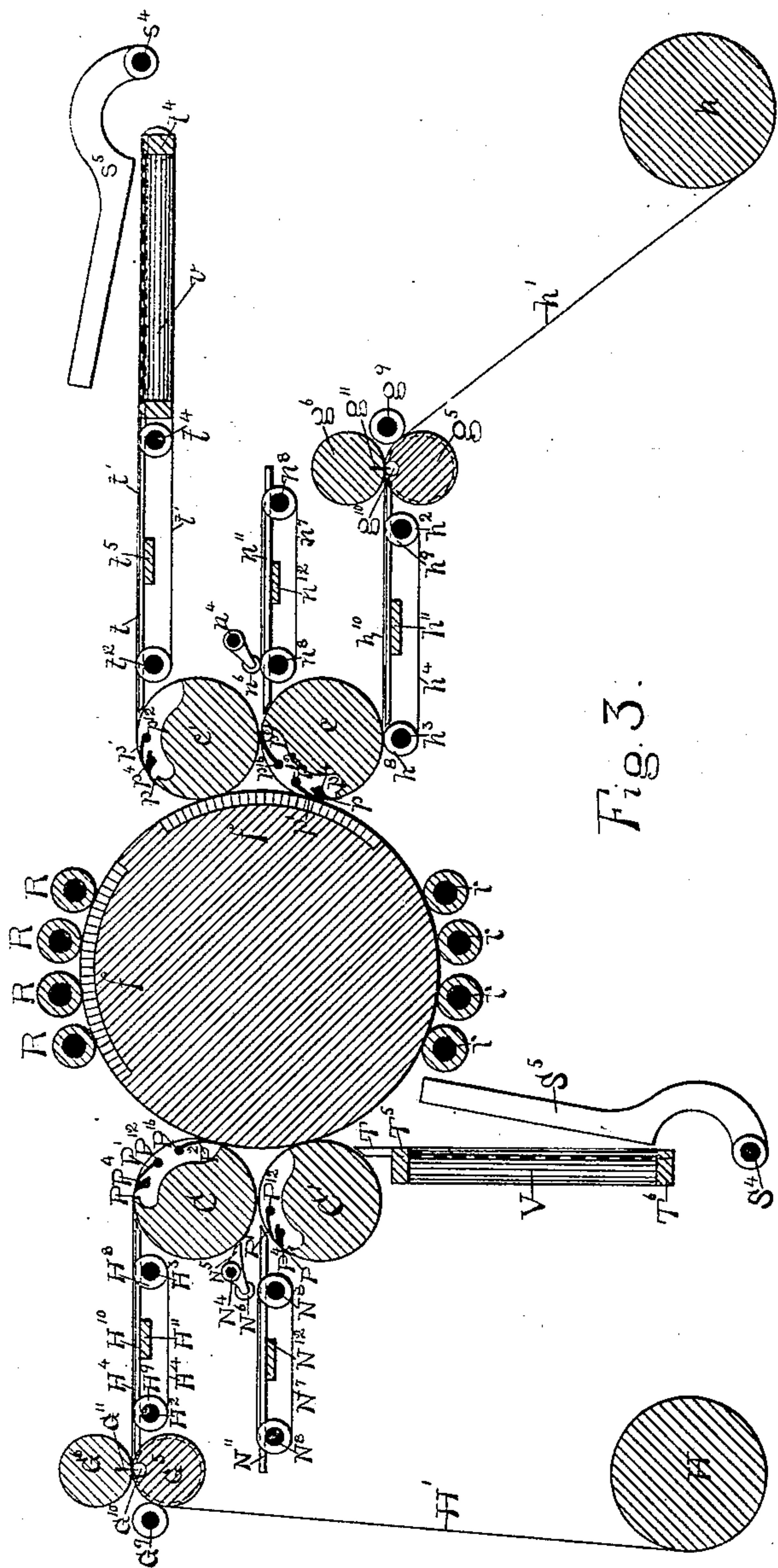


Fig. 3.

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6 Sheets—Sheet 4.

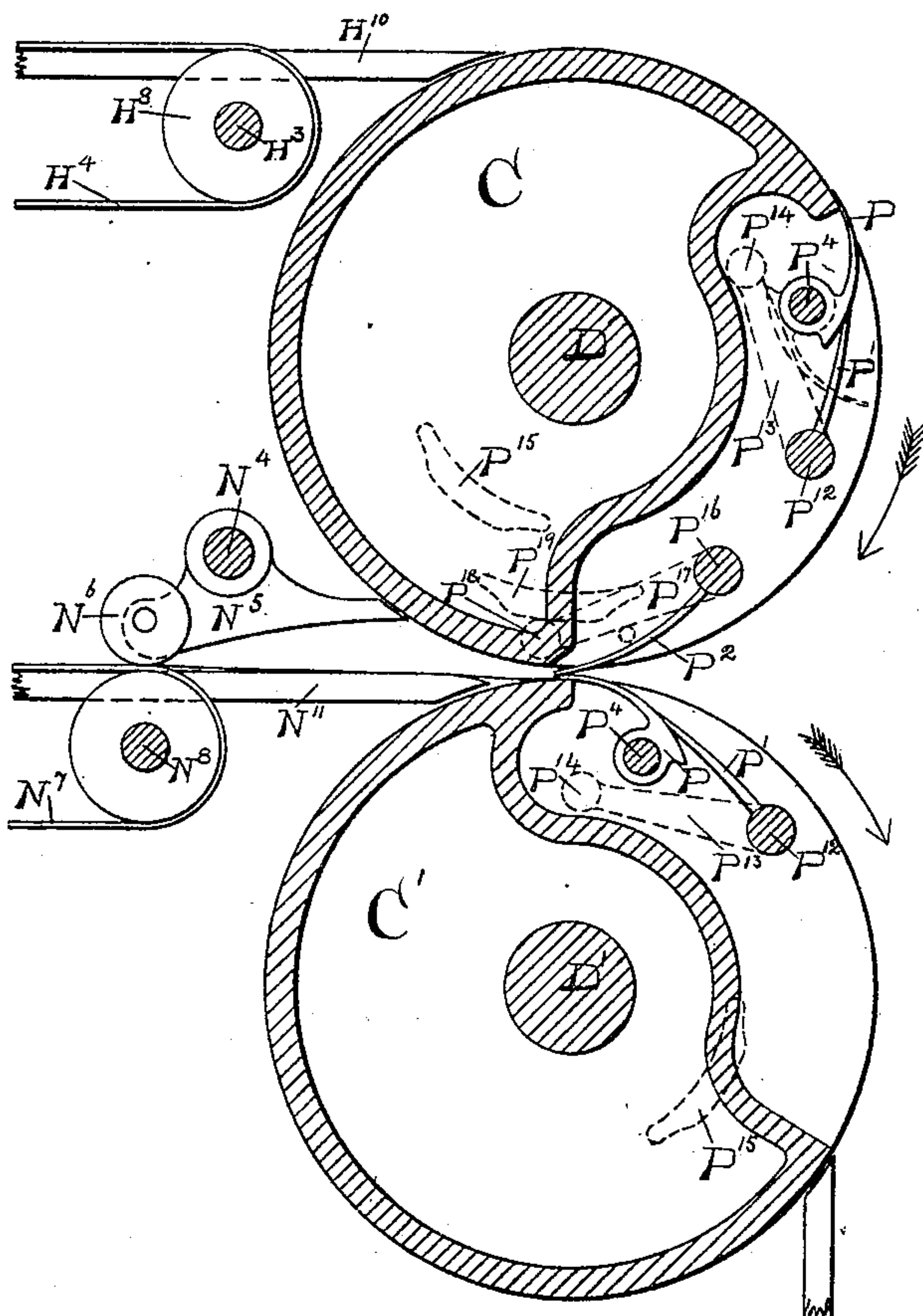
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Fig. 4



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6 Sheets—Sheet 5.

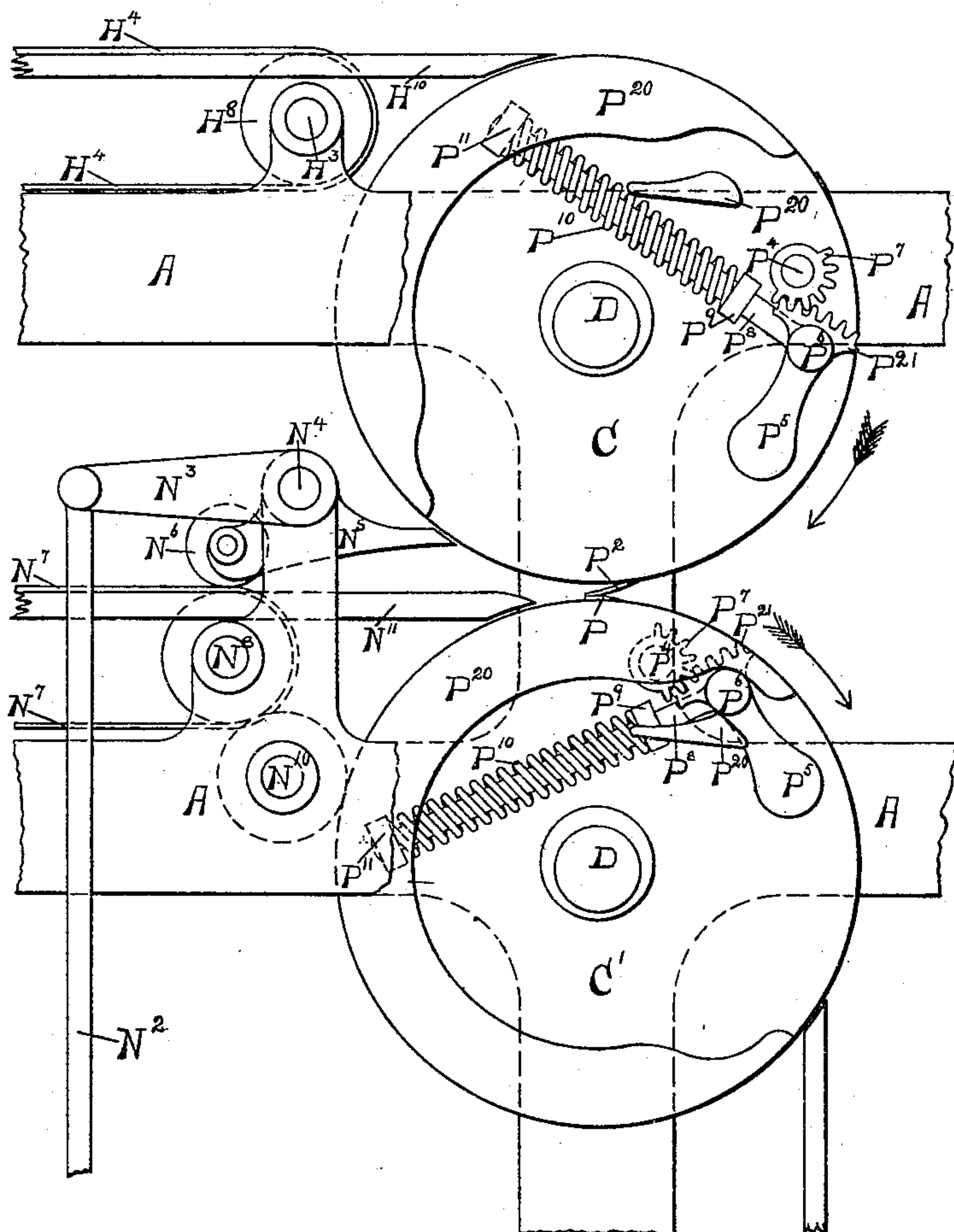
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Fig. 5.



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(No Model.)

6 Sheets—Sheet 6.

J. T. HAWKINS.

PRINTING PRESS.

No. 272,835.

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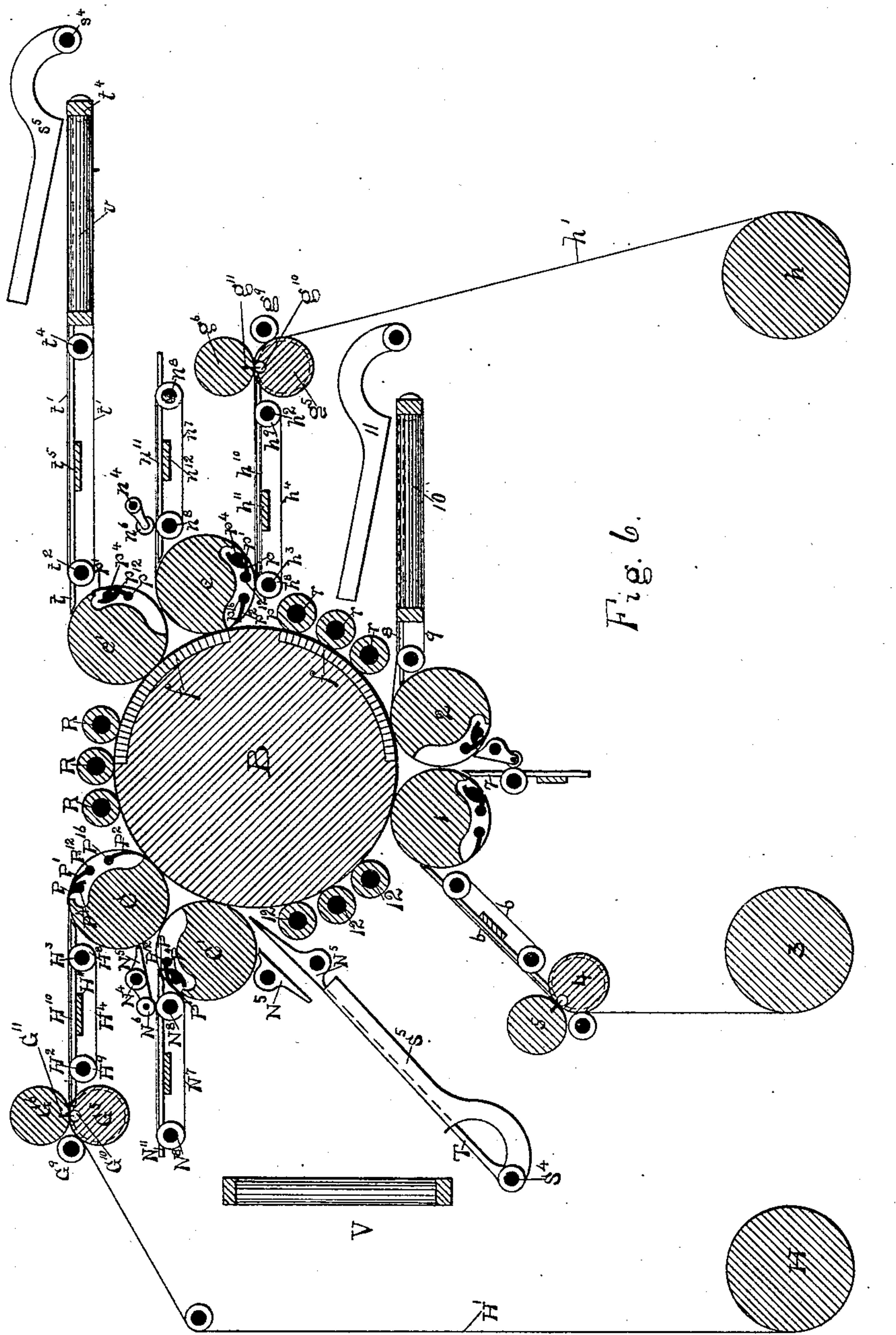


Fig. 6.

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UNITED STATES PATENT OFFICE.

JOHN T. HAWKINS, OF TAUNTON, MASSACHUSETTS.

PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 272,835, 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. It will 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, if so desired; 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. 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 one or more pairs of feeding and cutting cylinders, a type revolving cylinder, and one or more

pairs of impression-cylinders geared thereto at equal surface velocities, the sheets of paper to be printed are first cut from the web or webs, when, during the first impression, they are fed head first through and between the type-cylinder and the first-impression cylinder, from which the heads of the sheets are projected during said impression, at the end of which their tail ends are directly delivered from the first-impression cylinder or cylinders (where more than one such cylinder is used) to the grippers of the second-impression cylinder or cylinders.

In the accompanying drawings, Figure 1 is a side elevation, and Fig. 2 an end elevation, of the machine, taken in vertical section at the line X X of Fig. 1. Fig. 3 is a longitudinal vertical section through the center of the machine, taken at the line Y Y of Fig. 2, omitting the outlines of the frames and all the devices for transmitting motion to the several actuated parts of the machine, for the purpose of more clearly illustrating the relative positions of the principal moving parts. Fig. 4 shows, in transverse section, upon an enlarged scale, the pair of impression-cylinders to the left in Figs. 1 and 3. Fig. 5 is an elevation, also upon an enlarged scale, of the ends of said cylinders, with the framing of the machine broken away to exhibit the mechanism which imparts motion to and the operation of the grippers and sheet-lifter fingers in taking the sheets from the web, delivering the same to the first-impression cylinder, from said cylinder to the second-impression cylinder, and thence delivering it to the folder or other delivery attachment. Fig. 6 is a sectional view similar to Fig. 3, illustrating principal parts and the manner of multiplying the number of pairs of impression-cylinders and arranging the same about and around a single type-cylinder.

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 pe-

riphery the type-forms $f f$ are secured in the ordinary manner, not necessary to describe, and forming no part of this invention.

The two pairs of impression-cylinders $C c C' c'$ respectively and successively impart the first and second impressions to the sheets, to each of which cylinders is secured a gear-wheel, $C^2 C^3 c^2 c^3$, which gear-wheels severally engage the gear-wheel B' upon the type-cylinder B . Said gear-wheels are so proportioned that when the cylinders $C c C' c'$ 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 , mounted in suitable bearings in one of the frames A , is actuated by the shaft of the type-cylinder B through the intervention of the bevel-wheels $F^2 F^3$, the vertical shaft F' , journaled likewise in suitable bearings projected from one of the frames A , and the bevel-wheels $F^4 F^5$. These several wheels are so proportioned that the shaft F makes one revolution for each revolution of the type-cylinder B .

The vertical shafts $G g$, journaled in one frame A , similarly to the shaft F' , are respectively driven by the shaft F through the intervention of the pairs of bevel-wheels $G' G^2$ and $g' g^2$, and impart motion to the lower cylinders of the two pairs of cutting and feeding cylinders $G^5 G^6 g^5 g^6$ by means of the second pairs of bevel-wheels, $G^3 G^4 g^3 g^4$. Said pairs of cutting-cylinders $G^5 G^6 g^5 g^6$ are each geared together by the pairs of spur-gears $G^7 G^8 g^7 g^8$, secured to their axes, and the gear-wheels actuating them from the shaft F are so proportioned as to give to the cutting and feeding cylinders $G^5 G^6 g^5 g^6$ such surface velocities as to deliver one sheet for each revolution of the type-cylinder B . The cylinders $G^5 g^5$ have in their surfaces, parallel to their axes, slots or recesses $G^{10} g^{10}$, and the cylinders $G^6 g^6$ each a serrated knife, $G^{11} g^{11}$, for severing the sheets from the webs in the ordinary and well-known manner.

The rolls of paper $H h$ are carried on cores or shafts running in suitable bearings in the frames A , from which the webs of paper $H' h'$ are led to and between the cylinders $G^5 g^5$ and the pressure-rollers $G^9 g^9$, also journaled in the frames A , and, passing over the cylinders $G^5 g^5$ and between them and the cylinders $G^6 g^6$, are cut into sheets of proper length by the knives $G^{11} g^{11}$ as they are passed to the impression-cylinders $C c$. The shafts $H^2 H^3 h^2 h^3$, also journaled in the frames A , each carry a series of tape pulleys, $H^8 H^9 h^8 h^9$, upon which are driven the tapes $H^4 h^4$, said pulleys being driven by the gear-wheels $G^7 g^7$ through the interposed idler-pinions $H^5 h^5$ and the gears $H^7 h^7$ on the ends of the shafts $H^2 h^2$, the idler-gears $H^5 h^5$ running upon studs secured to the inner sides of the frames A .

The two series of bridge-fingers $H^{10} h^{10}$ are supported upon the cross-bars $H^{11} h^{11}$, secured at their ends to the frames A . Said fingers are spaced across the press alternately with

the two series of tapes $H^4 h^4$, and their ends adjoining the cutting-cylinders $G^5 g^5$ enter shallow grooves turned in the peripheries of said cylinders, as shown in dotted lines in Figs. 3 and 6, for the purpose of stripping the advancing edges of the webs of paper from the cylinders $G^6 g^6$ after the preceding sheets have been severed from their respective webs by the knives $G^{11} g^{11}$. The other ends of the bridge-fingers $H^{10} h^{10}$ extend nearly to the impression-cylinders $C c$, to the top of the former and bottom of the latter, and lie nearly at a tangent to the surfaces of said cylinders.

The impression-cylinders $C C' c c'$ revolve upon the shafts D , which are journaled eccentrically in the frames A , and to whose ends are secured the arms D' , each carrying a roller, D^2 , engaging suitably-formed grooves, D^3 , in the box-cam D^4 , which is secured to one end of the axis or shaft of the type-cylinder B . The grooves in said cam are two in number—one on each side of the cam—and two of the four rollers D^2 run in each of said grooves. The arrows in Fig. 2 surrounding the shafts D indicate the directions in which the cylinders $c c'$ respectively rotate. This arrangement of eccentric shafts is for the purpose of bringing each of the impression-cylinders $C C' c c'$ in contact with the type-cylinder B at the proper times—when their respective type-forms secured to said type-cylinder are passing—and it also keeps said impression-cylinders out of contact with the type-cylinder during the revolution of the remaining portions of said cylinder's surface.

The cylinder-grippers $P p$ are of the usual form, and seize the sheets and hold them in contact with their respective impression-cylinders until the leading edges of the sheets have passed through the impression. The sheet-lifter fingers $P' p'$, upon which the leading edges of the sheets are clamped by the grippers $P p$, are spaced alternately with said grippers throughout the length of the cylinder, in the usual manner. The sheet-lifter fingers $P^2 p^2$ are situated upon the impression-cylinders $C c$, so that their points lie under the tail margin of each sheet, said margins being made to overhang the impression-surfaces of the cylinders sufficiently for that purpose.

The shafts $P^4 p^4$, upon which the grippers $P p$ are spaced and secured, have each secured to one end the segmental gears or sectors P^7 , and the arms P^5 , carrying rollers P^6 , are pivoted on the ends of the cylinders $C C' c c'$. Said arms have formed upon their free ends the sector-gears P^{21} , engaging the sectors P^7 .

Pivoted to the inner ends of the studs upon which the rollers P^6 run are the rods P^8 , each carrying a collar, P^9 , and a spring, P^{10} , the free ends of the rods P^8 passing through lugs P^{11} , attached to the cylinder-heads.

To the shafts $P^{12} p^{12}$, on which the sheet-lifter fingers $P' p'$ are spaced and secured, are secured at one end the arms P^{13} , carrying rollers P^{14} , the shafts $P^{12} p^{12}$ being surrounded in

part by a helical spring, (not shown in the drawings,) so acting as to keep the points of the sheet-lifter fingers pressing tightly upon the cylinder when not lifted, as hereinafter explained.

The cams P^{15} , secured to the inner side of the frames A, acting upon the rollers P^{14} , cause the sheet-lifter fingers $P' p'$ to elevate the head of the sheet from the respective impression-cylinders simultaneously with the opening of the grippers $P p$. The shafts $P^{16} p^{16}$ in the cylinders C c only carry the lifter-fingers $P^2 p^2$, hereinbefore described as lying under the overhanging margins of the sheets. The levers P^{17} , secured to one end of the shafts $P^{16} p^{16}$, carry rollers P^{18} , which engage cams P^{19} , so placed upon the inner side of the frames A as to cause the tails of the sheets to be elevated at the proper times to allow of their being seized by the grippers $P p$ of the cylinders C' c'.

Referring to Figs. 1 and 5, the cams $P^{20} p^{20}$ are secured to the inner side of the frames A, which are in Fig. 5 broken away to show said cams engaging the rollers P^6 on the sector-levers P^5 , which cams are so formed and placed as to open and close the cylinder-grippers at the proper times for releasing and gripping the sheets.

On the shaft F are two cams, N n, engaging the rollers $N' n'$, the latter being attached to the rods N^2 , forked at their lower ends to embrace the shaft F. The upper ends of the rods $N^2 n^2$ are connected to the levers $N^3 n^3$, which are secured to two shafts, $N^4 n^4$. The shaft N^4 carries a series of strippers, N^5 , spaced across the machine, so as to alternate with the grippers P and lifter-fingers P' .

On two of the strippers N^5 are carried two rollers, N^6 , set so as to roll upon the unprinted margins of the sheets.

On the shaft n^4 is a pair of arms carrying rollers, n^6 , set in the same manner as are the rollers N^6 , so as to roll upon the unprinted margins of the sheets only. The cams N n are so formed and adjusted on the shaft F as to cause the points of the stripper-fingers N^5 to lie close to the cylinder C, and at the same time to keep the rollers N^6 in contact with the tapes running upon the shafts N^3 and their pulleys when the sheet is being delivered from the cylinder C, and to make the rollers n^6 perform the same functions for the cylinder c. The cylinder c requires no stripper-fingers to correspond to those on the cylinder C, the bridge-fingers n^{11} serving that purpose, for the reason that the sheets come from the top of the cylinder c, but from the bottom of the cylinder C.

Upon the shaft F are secured two box-cams, S s, having suitably-formed grooves engaging the rollers $S' s'$, attached to the rods $S^2 s^2$, each rod having its free end bifurcated to embrace the shaft F. The rods $S^2 s^2$ are connected to the lever-arms $S^3 s^3$, secured to the rock shafts $S^4 s^4$, journaled in the frames A. Attached to

said rock-shafts are the folder-blades $S^5 s^5$, which, through the instrumentality of the cams S s and their connections just described, are caused to crease and enter the delivered sheets between the first pair of folding-rollers, to make the first fold upon the arrival of the sheets at the proper place to receive such folds.

The stripper and bridge fingers T t are secured, respectively, to cross-bars $T^5 T^6$ and to the single and similar bar, t^5 . The bridge-fingers t have alternating with them the tapes t' , carried on pulleys on the shafts $t^2 t^4$, and driven from the gear c^3 by the pinion t^6 and the intermediate pinion, t^3 . The folding-rollers V v, at which the first fold is made, are actuated from the shaft F through the bevel-gears $V' v' V^2 v^2 V^3 v^3$, the vertical shafts $V^4 v^4$, and the horizontal shafts $V^5 v^5$.

In Fig. 3 the positions to be occupied by the inking-rollers for each pair of impression-cylinders are indicated by the letters R R r r, and in Fig. 6 for the third pair of cylinders by the figures 12 12, &c. In Figs. 1 and 2 all that relates to the gripper and sheet-lifter fingers is omitted, being very clearly shown, enlarged in Figs. 4 and 5, and in section in Figs. 3 and 6. All the inking apparatus, except the positions of the form-rollers indicated by the letters R R r r and 12 12, &c., is also omitted.

Fig. 6 shows the arrangement of the principal parts in outline and section when three pairs of impression-cylinders are used to print from three rolls or webs and deliver to three folders. In this figure the folder-blades $S^5 S^5$ for the cylinders C C' c c' each form one finger of two sets of fly-fingers, T t, which convey the sheet to the fold-rollers V V, the stripper and bridge-fingers $N^5 n^{11}$ serving to direct the sheets thereto. In this figure the third pair of impression-cylinders and their concomitant parts are indicated by numbers, as follows: 1 2, the impression-cylinders; 3, the roll of paper; 4 5, the cutting and feeding cylinders; 6, the feed and conveying tapes; 7, the stripper-fingers to cylinder 1; 8, the stripper-fingers to cylinder 2; 9, the conveying-tapes from cylinder 2; 10, the folding-rollers, and 11 the folding-blade. The other two pairs of impression-cylinders and concomitant parts are lettered in conformity with the other figures.

It is not intended to limit this system to three pairs of impression-cylinders to one type-cylinder, as any number of such pairs may be used, each with their own webs of paper, folding apparatus, and other parts, by means of the arrangement of parts shown in the several figures or equivalent parts. In all the figures all those parts of the folding apparatus beyond those necessary for making the first fold are omitted as unnecessary to be shown here, such parts in practice being arranged in well-known ways to suit the number and direction of the folds required to be made.

It is not essential to this invention that the delivered sheets shall be folded. They may be delivered flat, when desired, by substitut-

ing for the several folders used as many vibrating flies and receiving-tables as may be required. The direction of rotation of the several cylinders is indicated by the arrows clearly delineated in the drawings.

The complete operation of the invention is as follows: The webs of paper $H' h'$ are fed from the rolls $H h$ by the pressure-rollers $G^9 g^9$ and by the cutting and feeding cylinders $G^5 G^6 g^5 g^6$ until the leading edge of each web reaches the proper position to be seized by the grippers of the cylinders $C c$, the grippers of the former upon its upper side and those of the latter upon its lower side. Simultaneously with the closing of the grippers of the cylinders C and c upon the leading edges of the webs the cutting-knives $G^{11} g^{11}$ sever the sheets from the webs. The cylinders $C c$ at such times are caused to come in contact with the type-form, when the first side of each sheet is printed. It is to be understood, however, that these operations are not simultaneously performed by the two pairs of impression-cylinders, but that they are so timed as to meet the forms as they are rotated upon the type-cylinder B . The grippers of the cylinders $C c$ are caused to open and release the sheets at the proper times for their leading edges to be stripped from said cylinders by the strippers N^5 and n^{11} . The heads of the sheets now pass on the tapes $N^7 n^7$ and bridge-fingers $N^{11} n^{11}$, being propelled by the rollers $N^6 n^6$, until each pair of cylinders reaches the positions shown in Figs. 4 and 5, the cylinders $C c$ having been meanwhile moved out of contact with the cylinder B , when the end of the impression was reached, through the action of the cam D^4 and the eccentric shafts D . In the positions indicated by Figs. 4 and 5 the propelling-rollers $N^6 n^6$, through the action of the cams $N n$, release the sheets, so that they may be drawn back under said rollers. At this time the sheet-lifter fingers $P^2 p^2$ of the cylinders $C c$ will have lifted the tail margins of the sheets over against the adjoining cylinders $C' c'$, whose grippers are at this time caused to close, as hereinbefore described, their motion and velocity being such that their points have a greater velocity in the direction in which the adjoining surfaces of the cylinders $C c$ are traveling—that is, in opposite direction to that of the cylinders $C' c'$, carrying said grippers—thus enabling the grippers of the cylinders $C' c'$ to pass behind the lifted tail margins of the sheets and clamp them tail first to said cylinders. The cylinders $C' c'$ are now brought in contact with the type-cylinder B , as before explained, for the cylinders $C c$, and the second sides of the sheets are thus impressed and printed as the proper form is presented by the rotation of the cylinder B . The grippers of the cylinders $C' c'$ are now caused to open and the sheet-lifter fingers to elevate the now advancing but, previously, tail edge of the sheet upon the stripper-fingers $T t$, and the sheets are then conveyed to the folding-rollers $V v$,

the first fold being made in a vertical position for the cylinders $C C'$ and horizontally for the cylinders $c c'$.

I do not confine myself to either vertical or horizontal first fold rollers, as these may be inclined to any position to suit the arrangement best attainable or most desirable for other parts of the machine; nor do I confine myself to the methods shown for imparting motion to the cutting and feeding cylinders, to the type or form cylinder, or to the folding rollers and blades, as their several motions may be effected by many well-known means.

Any matter herein shown and not claimed, but claimed in my accompanying application marked "Case A," 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, one or more pairs of impression-cylinders, one pair or a corresponding number of pairs of feeding and cutting cylinders, and suitable sheet guides or conveyers, whereby each sheet is cut from its web and conveyed head first to a first-impression cylinder, and then by said cylinder delivered tail first directly to the grippers of a second-impression cylinder, thereby perfecting the printing of the sheets, all substantially as set forth.

2. In a printing-press, the combination of a type revolving cylinder, a pair of impression-cylinders, a set of stripper-fingers, a set of controlling-rollers, and a set of bridge-fingers and conveying-tapes, whereby the free end or head of the out-traveling sheet is directed and conveyed away from the first-impression cylinder until its tail end is seized by the grippers of the second-impression cylinder and the direction of its motion reversed for printing the second side of the sheet, all substantially as set forth.

3. In a printing-press, in combination with a type revolving cylinder and means, substantially as described, for receiving and directing the head of the sheet while the first impression is being made, one or more pairs of impression-cylinders, the first-impression cylinder in each pair being provided with one set of grippers and two sets of sheet-lifter fingers and its fellow second-impression cylinder with one set of grippers, whereby the first-impression cylinder is caused to first discharge the head of the sheet by means of one set of sheet-lifter fingers and then to deliver the tail of the sheet directly to the grippers of the second-impression cylinder by means of the other set of sheet-lifter fingers, substantially as and for the purpose set forth.

4. In a printing-press, in combination with a type-revolving cylinder, one or more pairs of impression-cylinders arranged to revolve so that their adjacent surfaces shall run in opposite directions, the grippers upon the second-impression cylinder of each pair being so timed in their action as to take the tail of the sheet

directly from its first-impression cylinder, after the first side of the sheet has been printed, for the purpose of imparting the second impression, substantially as set forth.

- 5 5. A printing-press having an impression-cylinder provided with two sets of sheet-lifter fingers, one set for raising the head of the sheet preparatory to its delivery, and the other

set for raising the tail of the sheet preparatory to its delivery, substantially as and for the 10 purposes set forth.

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