(No Model.) 6 Sheets—Sheet 1.

J. DERRIEY.

PRINTING MACHINE.

No. 428,668. Patented May 27, 1890.

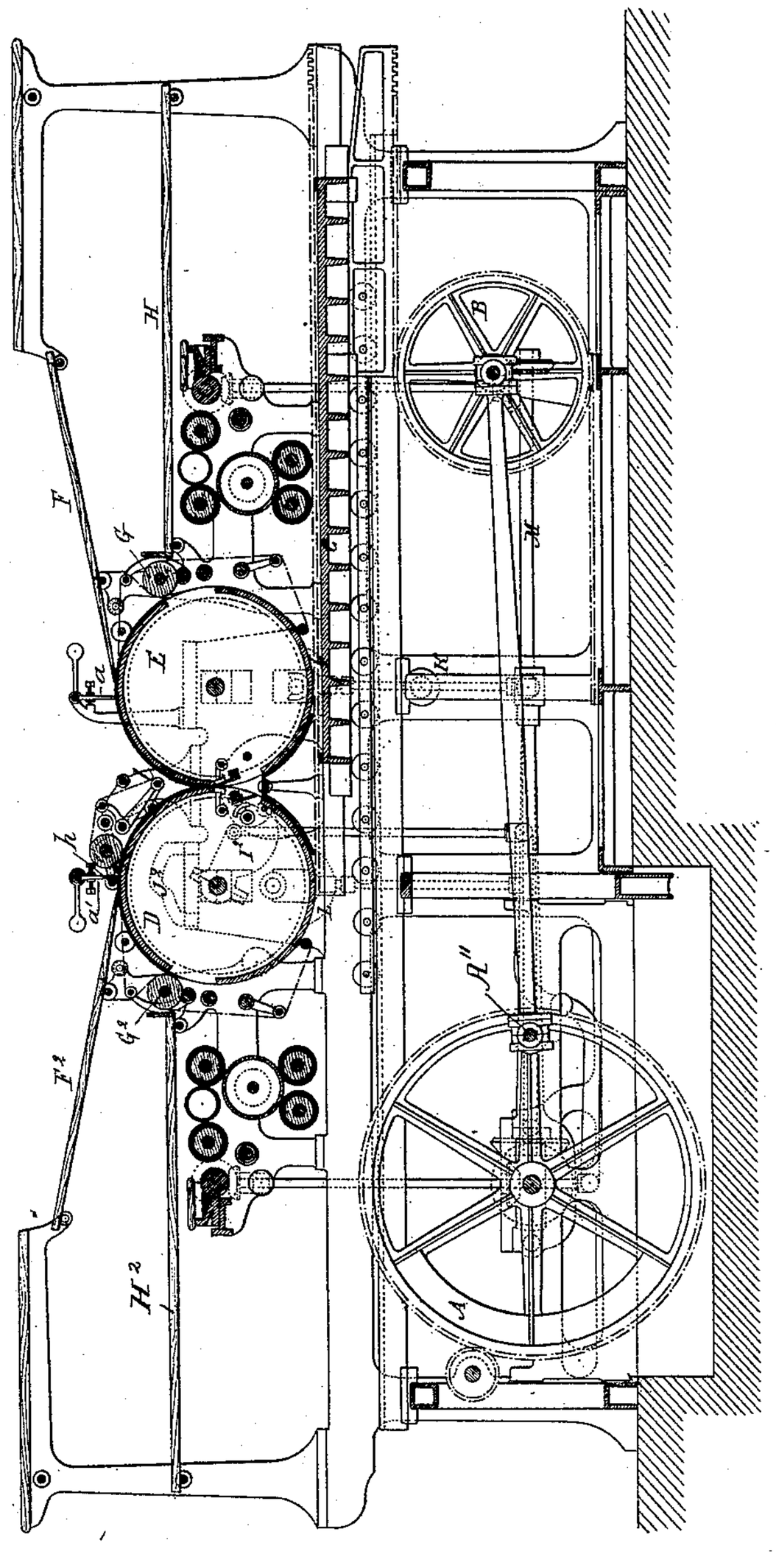

Fig. 1.

Witnesses
Albert Speideur.
Fannie Hill.

Inventor
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by his Attorney
Joseph Lyons.

(No Model.) 6 Sheets—Sheet 2.

J. DERRIEY.

PRINTING MACHINE.

No. 428,668. Patented May 27, 1890.

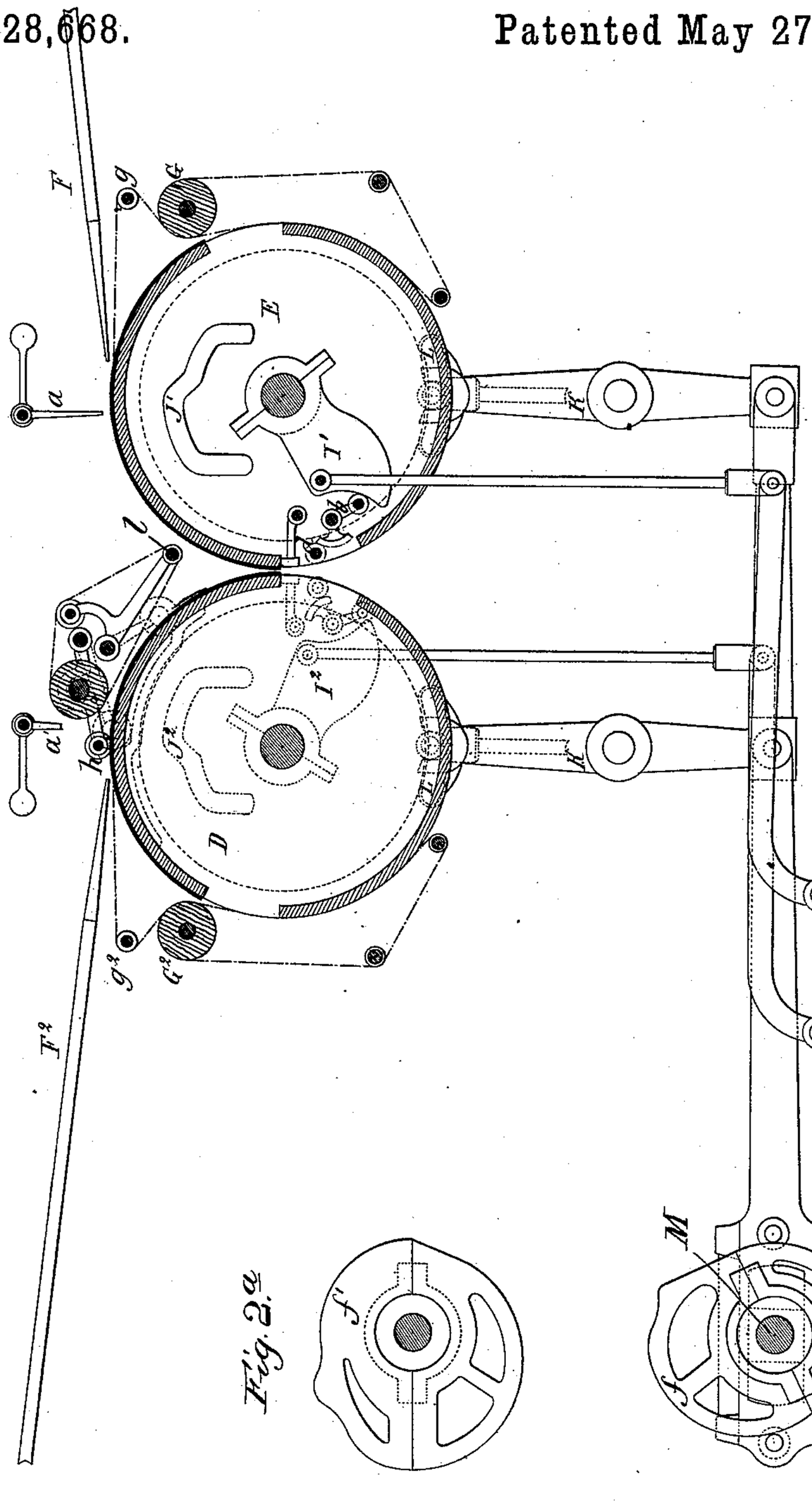

Fig. 2.

Fig. 2a.

Witnesses
Albert E. Speidel.
Fannie Kise.

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Jules Derriey
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Joseph Lyons.

(No Model.) 6 Sheets—Sheet 3.

J. DERRIEY.

PRINTING MACHINE.

No. 428,668. Patented May 27, 1890.

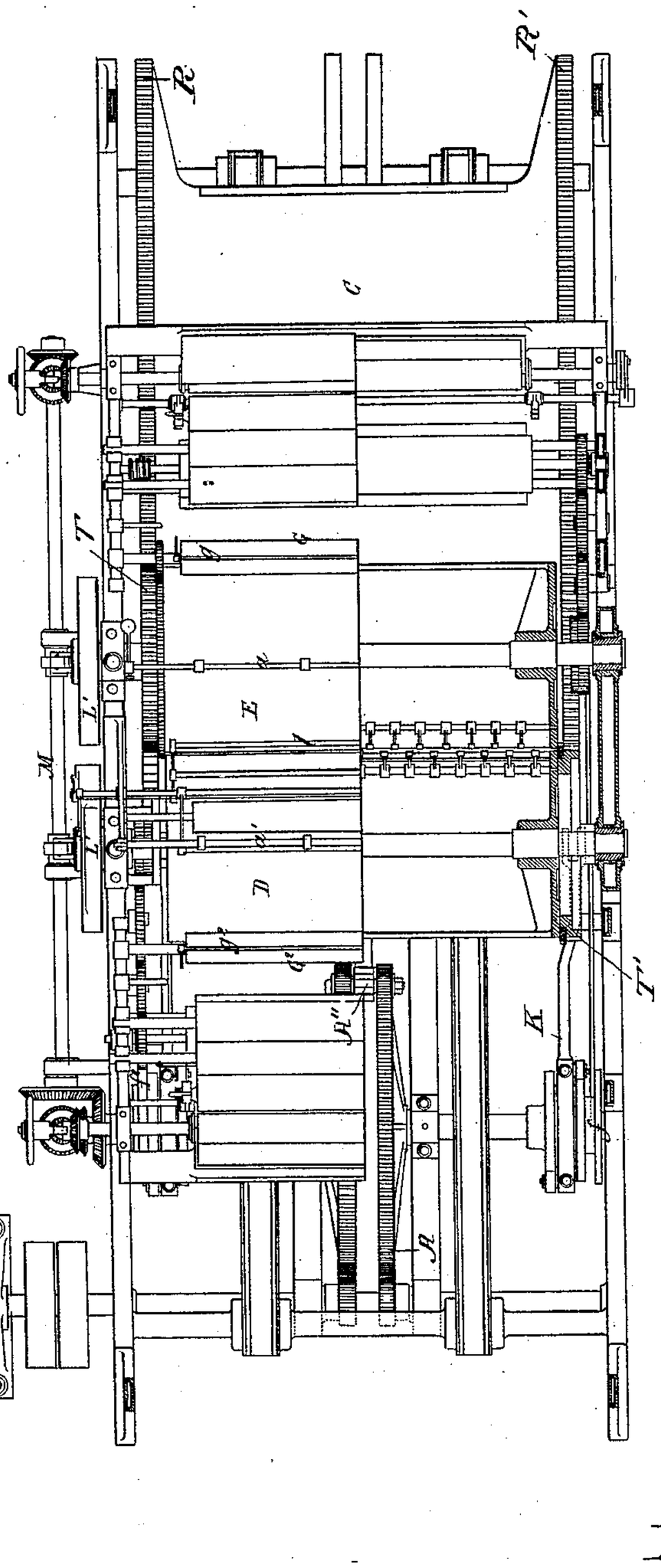

Fig. 3.

Witnesses
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(No Model.) 6 Sheets—Sheet 4.

J. DERRIEY.

PRINTING MACHINE.

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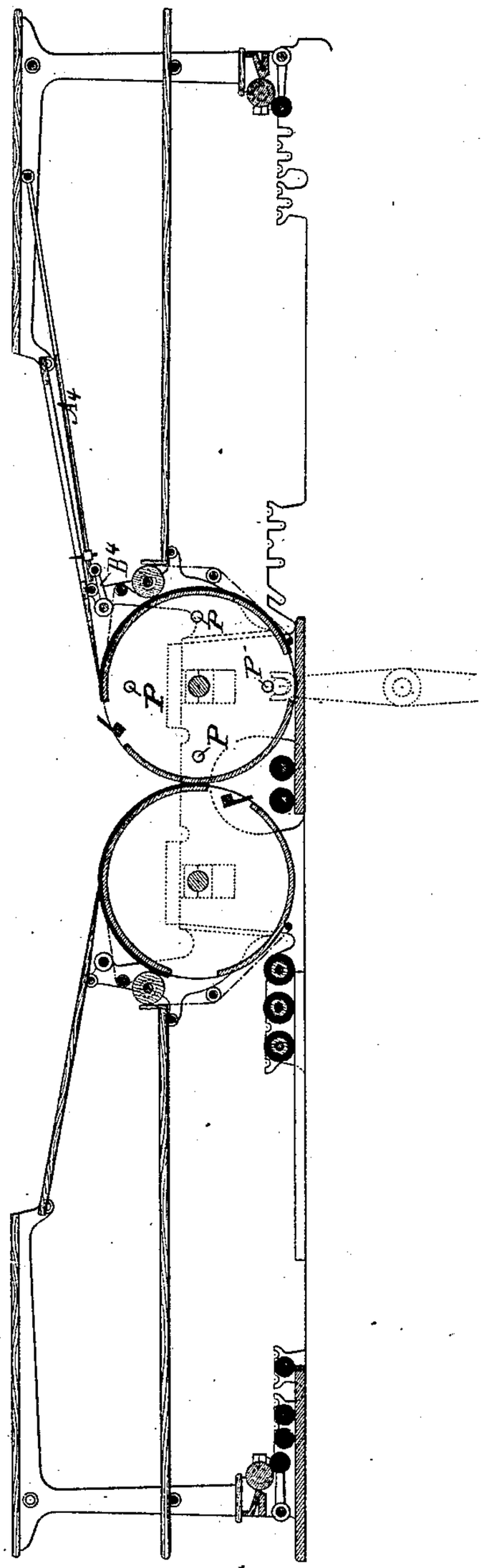

Fig. 4.

Witnesses
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Jules Derriey
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Joseph Lyons.

(No Model.)

6 Sheets—Sheet 5.

J. DERRIEY.

PRINTING MACHINE.

No. 428,668. Patented May 27, 1890.

Fig. 5.

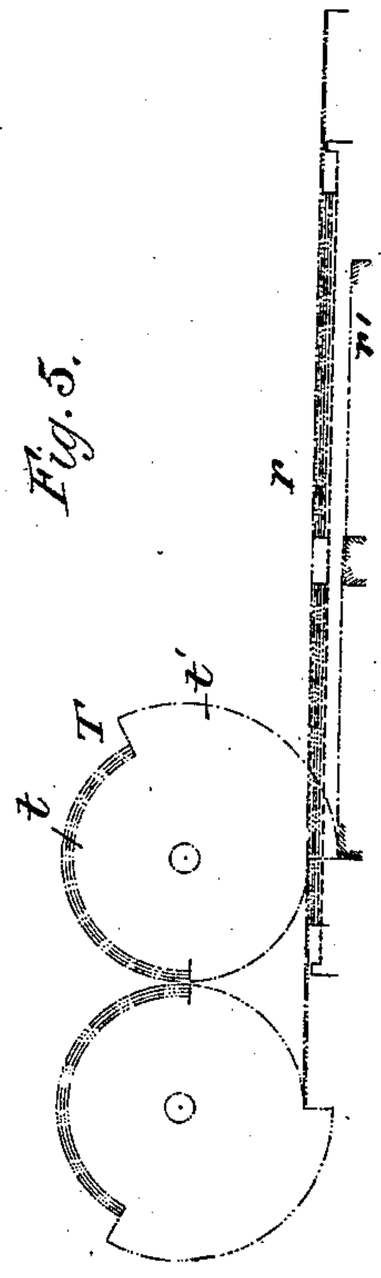
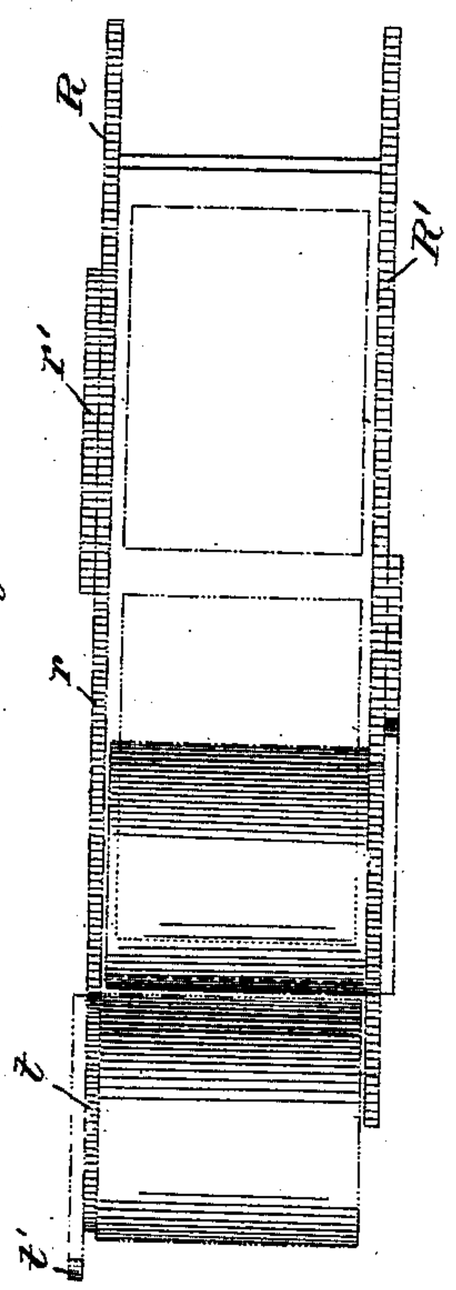


Fig. 6.



Witnesses

Albert G. Speidel.

Fannie Kuse.

Inventor

Jules Derriey

By his Attorney

Joseph Lyons.

(No Model.) 6 Sheets—Sheet 6.

J. DERRIEY.

PRINTING MACHINE.

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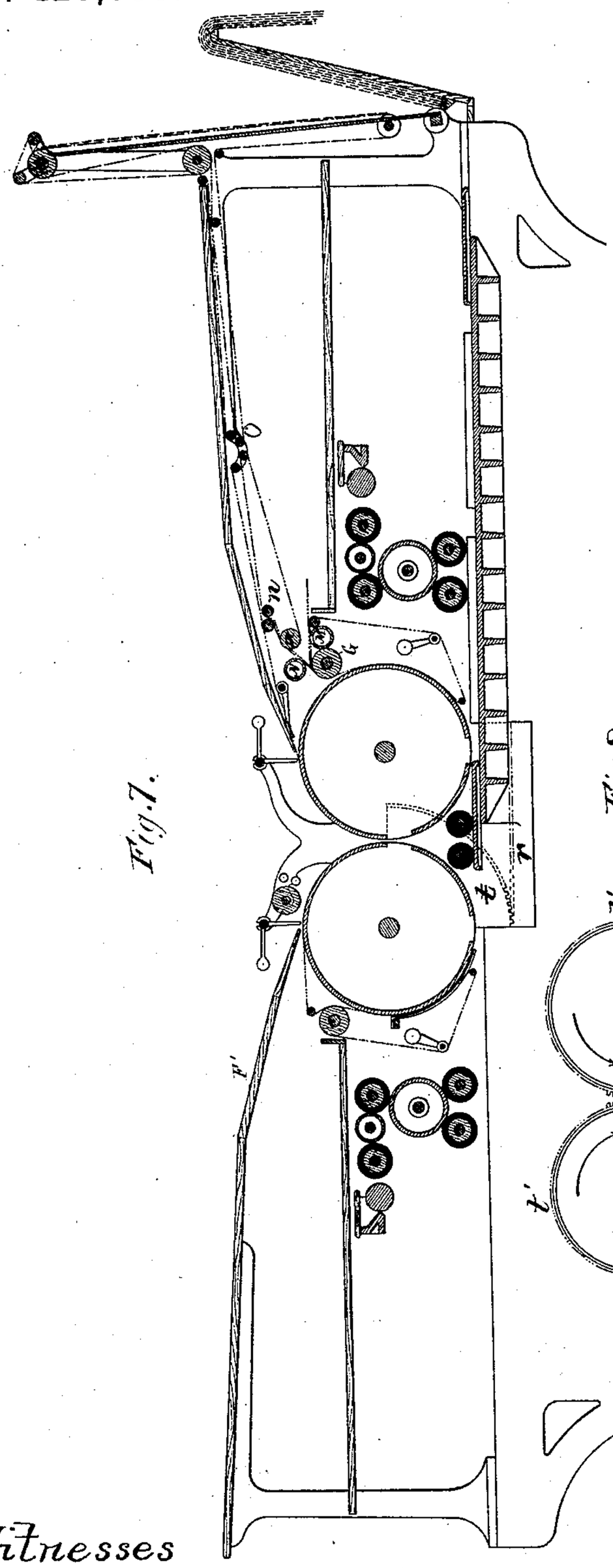

Fig. 7.

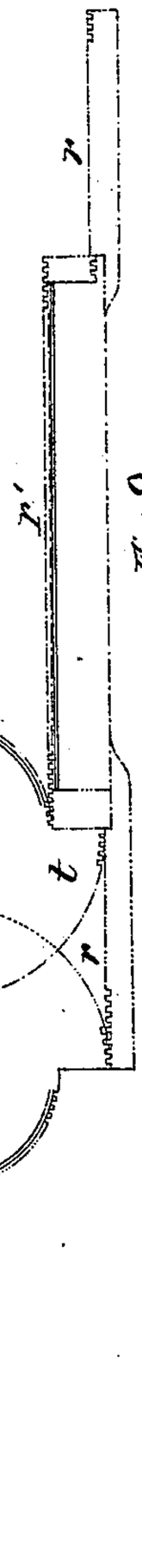

Fig. 8.

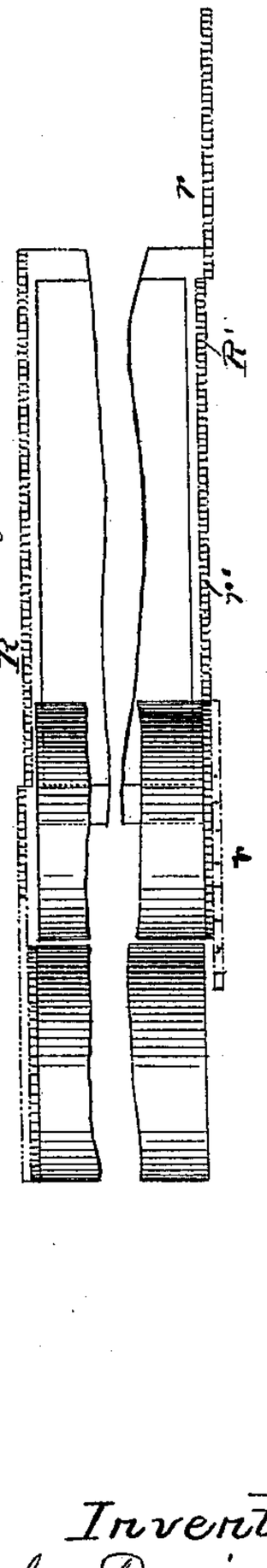

Fig. 9.

Witnesses

Albert G. Speidel.

Fannie Rise.

Inventor

Jules Derriey

By his Attorney

Joseph Lyons.

UNITED STATES PATENT OFFICE.

JULES DERRIEY, OF PARIS, FRANCE.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 428,668, dated May 27, 1890.

Application filed July 9, 1888. Serial No. 279,478. (No model.) Patented in France April 24, 1886, No. 175,735; in England July 5, 1887, No. 9,525, and June 5, 1888, No. 8,213, and in Germany July 16, 1887, No. 43,871.

To all whom it may concern:

Be it known that I, JULES DERRIEY, of Paris, France, have invented certain new and useful Improvements in Printing-Machines, (and which has been patented in France April 24, 1886, No. 175,735; in Germany July 16, 1887, No. 43,871; in Great Britain July 5, 1887, No. 9,525, and June 5, 1888, No. 8,213,) of which the following is a specification.

This invention has reference to printing-machines of the kind generally called "perfecting-machines," and more particularly to those known as "Anglo-French perfecting-machines" and its object is to overcome the objections inherent in these Anglo-French machines, while retaining and increasing the advantages obtained by the use of such machines. The increase of advantages is attained by constructing the machines so that they can be employed as desired either as "perfecting-machines" or as double "single-cylinder machines," or as "stop-cylinder single machines," by reducing the space occupied by the machines and by providing a better arrangement for inking the forms. The lifting movements which have always existed in this class of machine for raising the impression-cylinders are dispensed with and so is the usual rack-movement, and the speed of the machine can thus be increased.

The accompanying drawings illustrate the invention.

Figure 1 represents a longitudinal vertical section of the machine embodying my invention; Fig. 2, a detail vertical sectional view illustrating the mechanism for moving and stopping the impression-cylinders; Fig 2^a, a detail view of the cam f'; Fig. 3, a plan of the machine, partly in section; Fig. 4, a longitudinal vertical section of the machine with the parts so adjusted as to change it into a stop-cylinder single machine; and Figs. 5 to 9, inclusive, show some modified forms of a press embodying my invention.

Referring first to Sheets 1, 2, and 3, the machine is actuated by two large wheels A, connected together by a crank-pin A''. The motion of this crank-pin is transmitted by a connecting-rod to the wheels B, which actuate the bed C of the machine, giving it a longitudinal travel double that of the wheels B.

Above the bed C are two impression-cylinders D and E, held against vertical movement, and the circumference of which is equal to the length of the travel of the bed C. The cylinder D works when the bed moves from right to left. It makes a complete revolution and then stops, it and cylinder E being reduced in diameter at the proper point, as shown, and having their gear mutilated in the ordinary way. The cylinder E works when the bed moves from left to right, likewise making a complete revolution and then stopping. When the cylinder E is turning, the grippers with which it is provided take hold of the white sheet, which has been laid on the feed-board F, when they pass the end of this board and carry the sheet to the line of the centers of the two cylinders. At this point the cylinder E stops, its grippers open by virtue of the vibrating cam I', which is caused to rise at this point and release the sheet, and the grippers of the cylinder D at the same time close upon it by reason of the vibrating cam I. As soon as cylinder D begins to move, it carries the sheet with it and impresses it upon the form placed on the first half of the bed C. The cylinder D making its complete revolution, again brings the sheet to the line of the centers of the two cylinders. The grippers which held the sheet to the cylinder D now open in their turn, while those on the cylinder E close and again take hold of the sheet. The cylinder E, again beginning to turn, carries the sheet with it and impresses it upon the form placed on the second half of the bed. The grippers open by virtue of cam I' when they pass the roller G, and the sheet is removed by tapes to the receiving-board H, while the grippers pass on to take a new sheet, as before.

The foregoing is the action of the machine when it is employed as a perfecting-machine—that is to say, for printing a sheet on its two sides successively. When, on the other hand, it is desired to employ the machine as a single-cylinder machine, it is necessary to remove the vibrating cams I' and I^2, which cause the grippers to open or close on the line of the centers of the two cylinders. The result is that the grippers which have taken hold of the sheet at the end of the feed-board F retain the sheet when the

cylinder stops, and when the cylinder again begins to move it carries the sheet with it, so as to print it on one side only, after which it delivers it from the machine at the roller G, as before.

In addition to removing the vibrating cams I′ and I², a cam J² is introduced in connection with the cylinder D similar to the cam J′. This cam J² closes the grippers of the cylinder D to cause them to take hold of the white sheet as they pass the feed-board F², and opens them at the roller G² after the cylinder D in its revolution has printed the sheet on one side. The sheets thus printed by means of the cylinder D are removed by tapes to the receiving-board H².

When "set-off sheets" are employed in ordinary machines, they are inserted by means of a special feed-board which encumbers the upper part of the machine; but in my improved machines when it is required to use set-off sheets, they are fed by means of the feed-board F², so that much more of the upper part of the machine remains uncovered than in the ordinary machines which have a special feed-board for the set-off sheets.

I will now proceed to describe the mechanism whereby the impression-cylinders are put into motion and stopped. In the so-called "Anglo-French" machines the cylinders revolve continuously. The cylinder which has to print the sheet on the first side is lowered upon the bed of the machine by means of special eccentrics, while the other cylinder is lifted so as not to touch the bed. Then when the bed travels in the reverse direction the first cylinder is lifted in its turn, while the second is lowered. It will be readily understood that as soon as the parts which effect these lifting movements begin to wear there ceases to be any accuracy in the impression. In the improved machine each of the cylinders is actuated directly by the bed C by means of a rack R, placed at the right of the bed for one of the cylinders, and gearing with a toothed wheel or pinion T on the one cylinder and by means of a rack R′, placed at the left of the bed and similarly acting upon a toothed wheel or pinion T′ on the other cylinder. These racks and pinions may be either in the forms shown in Figs 1 and 3 or those shown in Figs. 5 to 9, where the racks R and R′ are each composed of two parts *r* and *r′*, and the pinions T and T′ are each composed of the two parts *t* and *t′* of different radii, as and for the purpose to be described farther on. The starting of the respective cylinders is effected by means of cams which act upon levers K (Sheets 2 and 3) through the intermediation of connecting-rods. The levers K have each a forked or toothed end which stops the corresponding cylinder when it has completed its revolution, and holds it fixed until it has again to be put into motion. These starting and stopping actions are similar to those in what are known as "stop-cylinder single machines," and more particularly in those of French and German construction. The retention of the stop is assured by brakes L L, acting on pulleys L′, and actuated by cams on the longitudinal shaft M.

A special feature of the improved machine is the combination of two cylinders like those in single stop-cylinder machines, the one of which stops when the other begins to move, and the stop occurring so that the grippers which conduct the sheet are at the time of the stop on the line of the centers of the two cylinders.

I will now explain the gripper movements and the travel of the paper. The gripper movements will be best understood by reference to Sheet 2. They are effected by fixed cams and movable gripper-cams. The fixed cams cause the grippers to take hold of the sheet and to deliver it after the impression. The movable cams open and close the respective grippers, so as to cause the sheet to be transferred from the one cylinder to the other. Take, in the first place, the case of a sheet which has to be printed on both sides without the intervention of a set-off sheet. The white sheet is laid on the feed-board F against the feed-stops *a*. The gripper-lever *b* in revolving with the cylinder E runs over the fixed cam J′, and the incline of this cam lowers the lever, which, by means of a toothed sector gearing with a pinion on the gripper-rod *d*, causes this rod to turn, together with the grippers, so that they close, take hold of the sheet, and carry it off. The grippers bring the sheet up to the line of the centers of the two cylinders and the cylinder stops. At this moment the lever *b* meets the movable gripper-cam I′, which is lifted by the action of the cam *f* and causes the grippers to open. At the same time the movable gripper-cam I² is acted upon by means of the eccentric *f″*, which is on the same shaft as the cams *f*. (The cam *f″* is shown detached in Fig. 2ª, so as not to confuse the drawings.) The movement thus given to the cam I² causes the grippers of the cylinder D to close, and this cylinder begins to move immediately. These grippers draw the sheet with them and make a complete turn with the cylinder. They therefore return to the starting-point and the cylinder stops. At this moment the movable cam I² is lifted by the cam *f′*, so that the grippers are opened, and simultaneously the movable cam I′, under the action of the cam *f*, closes the grippers of the cylinder E. This cylinder immediately begins to move and the sheet is carried on for the second impression. When these grippers come to the roller G, the lever which acts upon them rises over the fixed cam J′, which causes them to open and to release the sheet, which is then carried to the receiving-board H by tapes which pass round the roller G and a rod *g*. When it is required to insert a set-off sheet, the action of the grippers is precisely the same; but a second layer-on lays the set-off sheet on the feed-board F² up to the feed-stops *a′*, and as soon as the grippers of the

cylinder D have passed the upper part of the cylinder the rollers *h* are lowered on the cylinder and draw the second sheet, which is accompanied by tapes, up to the rod *l*. When it reaches this point, the set-off sheet is abandoned by the tapes and the rod *l* is lifted by an eccentric placed on the brake-pulley of the cylinder D. At this moment the cylinder D stops. Its grippers are opened and release the sheet which they carried and on which the set-off sheet now lies. The grippers of cylinder E close. This cylinder begins to move, and draws the printed sheet, and with it the overlying set-off sheet, which thus becomes interposed between the already-printed side and the cylinder E, after which the grippers open at the roller G, and the sheets are delivered in the manner already explained.

When it is required to employ the machine as a double stop-cylinder single machine, the cams I′ I^3 are removed and a fixed cam J^2 is fitted for the cylinder D like the cam J′ for the cylinder E. In this case each cylinder takes its sheet at the feed-board and does not release it when the cylinder stops. After the stop the cylinder again begins to move, prints its sheet on the one side, and delivers it at the roller G or G^2.

For inking the forms the inking apparatus employed is composed of rollers, which are all of equal diameters, so that in practice any of the rollers can be employed one for another. The vibrator supplies the ink to an iron cylinder, which is in contact with both the vibrator and the distributer. The cylinder is rotated by the rubbing contact of the rollers, and is mounted on a fixed shaft cut with a screw having two crossed threads, which causes the cylinder to receive a to-and-fro movement, so that the ink is distributed both on the vibrator and the distributer independently of the action of the distributer on the cylinder which is in contact with the inkers. The inking apparatus is carried in a frame forming a sort of small inking-machine, which can be slid into place on the frame of the printing-machine. This will allow of its being moved out, if required, in order to facilitate corrections in the forms placed in the machine.

In order to employ the machine as a single stop-cylinder machine, (see Sheet 4,) it is sufficient to disconnect the toothed wheel T, which is adjustably fixed on one cylinder and gears with the rack R on the machine-bed, but leaving the wheel below the stop-lever of the cylinder, then to turn the cylinder so as to bring the grippers to the top of the cylinder at the time of the stop, instead of leaving them placed on the line of the centers of the two cylinders, and to fix the wheel to the cylinder in this new position by means of bolts connecting the wheel with the cylinder, it and the toothed wheel being provided with four perforations, each as shown at P, Fig. 4

In order to insure perfect inking of all the form, I arrange two inking-rollers between the two impression-cylinders. These two rollers, which run over the whole form, produce uniformity between the parts which receive more and those which receive less ink from the other rollers.

The drawings represent a machine with flat ink-distribution; but it is evident that cylindrical ink-distribution can equally be adapted thereto. Further, a point-rod A^4 is added to the machine and is actuated by a lever B^4, fixed on the shaft, which when the machine is used as a perfecting-machine serves for raising the lower part of the feed-board, so that the layer-on may adjust the sheet to the feed-stops. This very simple transformation allows of the machine being used as either a perfecting-machine, with or without a set-off sheet, as a double single-cylinder machine, or as a stop-cylinder single machine, thus making it, so to speak, a universal machine, fulfilling all the requirements of a printing-office and rendering it particularly adapted for small establishments.

It will be understood that machines constructed according to this invention should in principle have the circumference of the cylinders equal to the travel of the bed in one direction and that the speed is the more limited as the cylinder is larger. The stopping of the cylinder becomes more difficult in proportion to the increase in its diameter, while the bed, being driven directly by a crank-movement, can easily bear an increased speed. The large size of the cylinder, on the contrary, causes a difficulty in the movement of the stop-lever. In order to overcome this difficulty, I considerably reduce the diameter of the cylinder by the following arrangements, (see Figs. 5 and 6:) The cylinder need not have a circumferential travel exactly equal to the bed carrying the forms, as in the part where the contact exists between them for printing the sheet. I therefore place on the bed first a rack R, having a part *r* gearing with a sector *t* on the cylinder in the part corresponding to the quarter-turn necessary to bring the head of the sheet in contact with the bed and in the part corresponding to the duration of this contact for the impression of the largest sheet for which the machine is made. The rest of the circumference is occupied by a sector *t*′, of larger radius, gearing with the part *r*′ of the rack R, placed on the same side of the bed underneath. The result is that in this part of the movement the cylinder travels more slowly. These two arrangements allow of reducing the size of the cylinder and facilitate the action of the stop-lever. The arrangement of the two racks and two sectors is repeated at each side of the bed and on each cylinder.

Figs. 7, 8, and 9 represent a modified form of the arrangements involving my invention wherein the production of the machine is increased by utilizing each of the cylinders for printing two forms on the obverse and reverse sides of the sheet, the sheet being cut in two

after the printing. The bed has at each side a rack R, consisting of the two parts r and r', gearing with two sectors t and t' on each cylinder, but placed in the order which is the reverse of the preceding arrangement. The bed has a travel longer than the circumference of the cylinders and runs quicker than the cylinder turns in the part of the cylinder not allotted to printing. This printing part is equal to nearly three-fourths of the circumference of the cylinder. This part corresponds to the total development of the two forms placed on the bed. When the first cylinder has printed this sheet corresponding to the two forms, it comes to its stop on the line of the centers of the two cylinders. The second cylinder takes this sheet and turns slowly until the sheet comes in contact with the bed, after which the cylinder turns at the same speed as the bed and prints in its turn upon the two forms, the second form coming upon the first that was previously printed. This sheet is afterward delivered to the receiving-board, as has been hereinbefore explained, by the opening of the grippers in front of the roller G. These sheets are afterward cut in two, which doubles the number of copies. This arrangement necessitates a given size of sheet, and the two ends of the forms should come at each end of the travel of the bed at an equal distance from the line of the centers of the two cylinders.

The same machine can be employed for any sizes of sheet smaller than the given size for which the machine is made by employing in this case single sheets corresponding to one of the forms, the reduction of the size being made at the space which separates the two forms and the cylinders being provided with blanket only in the part of their circumference corresponding with the form to be printed. When each of the cylinders prints on the two forms, I place at each end of the bed a small flat inking-table, receiving ink on the passage under the inking-rollers of the cylindrical inking arrangement and transferring it to two inking-rollers placed between the two cylinders and serving to ink the end of the forms which in turn are not entirely inked by the cylindrical inking arrangement. When a set-off sheet is necessary, this sheet is fed at the feed-board F, as has been already explained, and is drawn forward, as hereinbefore described. The printed sheet and the set-off sheet arrive at the same time at the exit-roller G, and at this moment the first is sucked from below by a tube M and the second from above by a tube N, these tubes being connected with an air-pump worked by the machine. This double suction separates the two sheets, compelling the set-off sheet to be taken hold of by tapes from the rollers m n o, which conduct it to a receiving device or flier, while the printed sheet falls on the receiving-board, where it is arranged by hand. The receiving device makes only a short movement and brings the set-off sheet to an inclined board of less length than the sheet which is thrown onto the board and hangs over it.

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

1. In a cylinder printing-machine, the combination of two impression-cylinders, each of which is adapted to stop in its turn, and provided with grippers so placed thereon as to be in the line of the centers of the two cylinders at the time of the stop, and means, substantially as described, for opening the grippers of the one cylinder and closing those of the other synchronously, substantially as described.

2. In a cylinder printing-machine, the combination of two impression-cylinders, each of which is adapted to stop in its turn, and each provided with grippers so placed thereon as to be in the line of the centers of the cylinders at the time of the stop, in combination with vibrating gripper-cams, one for each cylinder, substantially as described.

3. In a cylinder printing-machine, the combination of two cylinders, each of which is adapted to stop in its turn, and each provided with grippers, with a fixed and a vibrating cam for each cylinder, the fixed cam for one of the cylinders and both vibrating cams being removable, all substantially as described.

4. In a cylinder printing-machine, the combination of two cylinders, each provided with a toothed wheel at one end, the two toothed wheels being at opposite sides of the machine, in combination with a reciprocating rod provided with two racks at opposite sides, one for each toothed wheel, and means, substantially as described, for stopping one of the cylinders at the forward motion and the other at the return motion of the bed, whereby the necessity of elevating the cylinders is obviated, all substantially as described.

5. In a cylinder printing-machine, the combination of two cylinders, held against movement in a vertical direction, and means, substantially as described, for actuating the cylinders by the forward and backward movement of the bed, and stopping devices, one for each cylinder, and adapted to alternately engage with the cylinders, all substantially as described.

6. In a cylinder printing-press, the combination of two cylinders, each provided with a pinion, one of which pinions is adjustably attached with a reciprocating bed provided with racks on opposite sides of the bed, one for each pinion, all substantially as described.

7. In a cylinder printing-press, two impression-cylinders, each provided with two toothed sectors of different radii, the sectors being at opposite ends of the cylinders, in combination with a reciprocating bed provided with racks at opposite sides, each rack being composed of two parts corresponding to the two sectors on the printing-cylinders, all substantially as described.

8. In a cylinder printing-press, two impres-

sion-cylinders whose circumference is smaller than the travel of the reciprocating bed, and which are provided at opposite ends to each other with two toothed sectors of different radii, in combination with a reciprocating bed having two racks, one on each side, which racks are each composed of two parts corresponding to the toothed sectors, all substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JULES DERRIEY.

Witnesses:
ROBT. M. HOOPER,
ALBERT COHEN.