

(No Model.)

3 Sheets—Sheet 1.

J. MICHAUD.

ROTARY PRINTING MACHINE.

No. 396,592.

Patented Jan. 22, 1889.

Fig. 1.

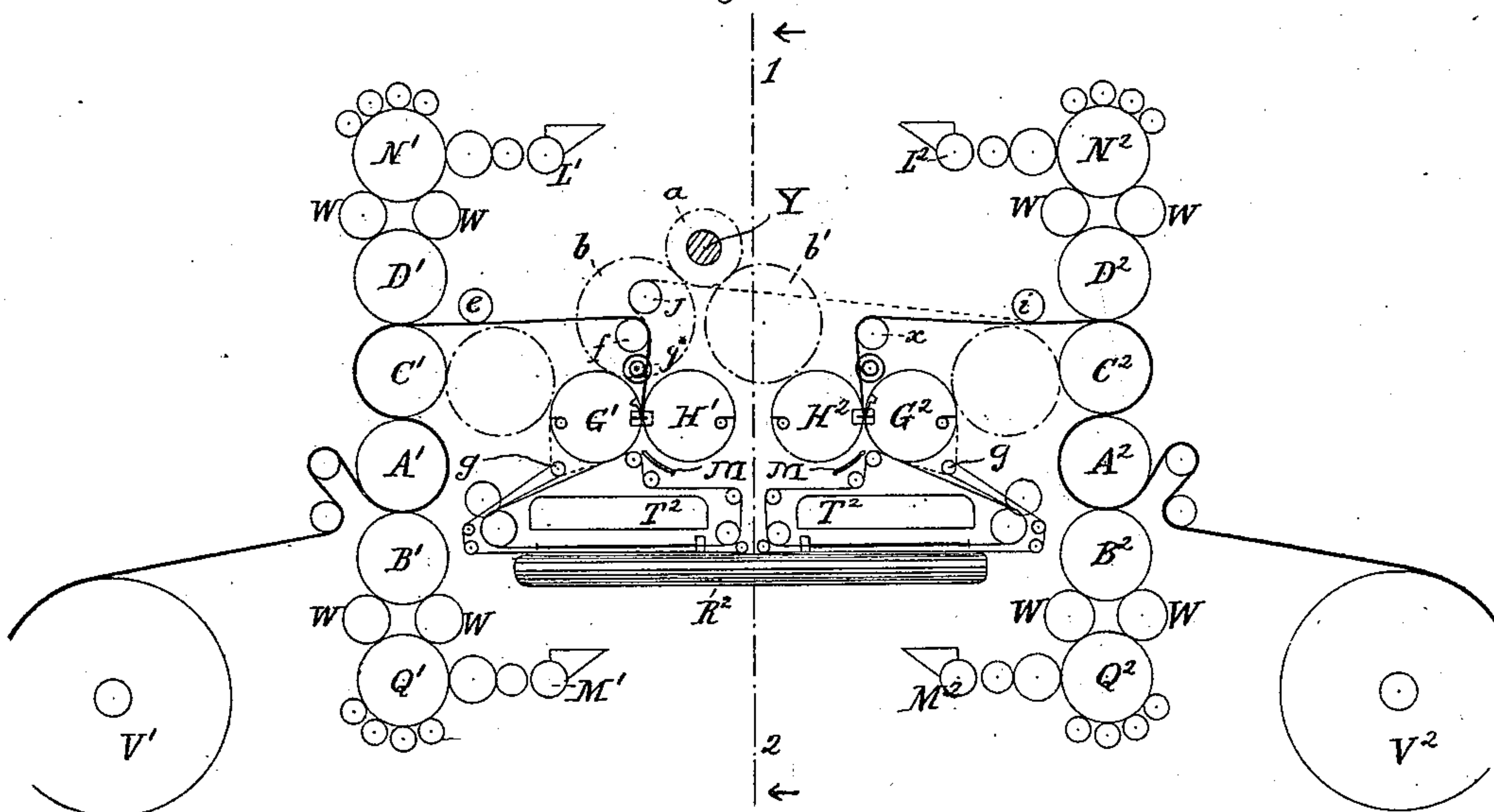
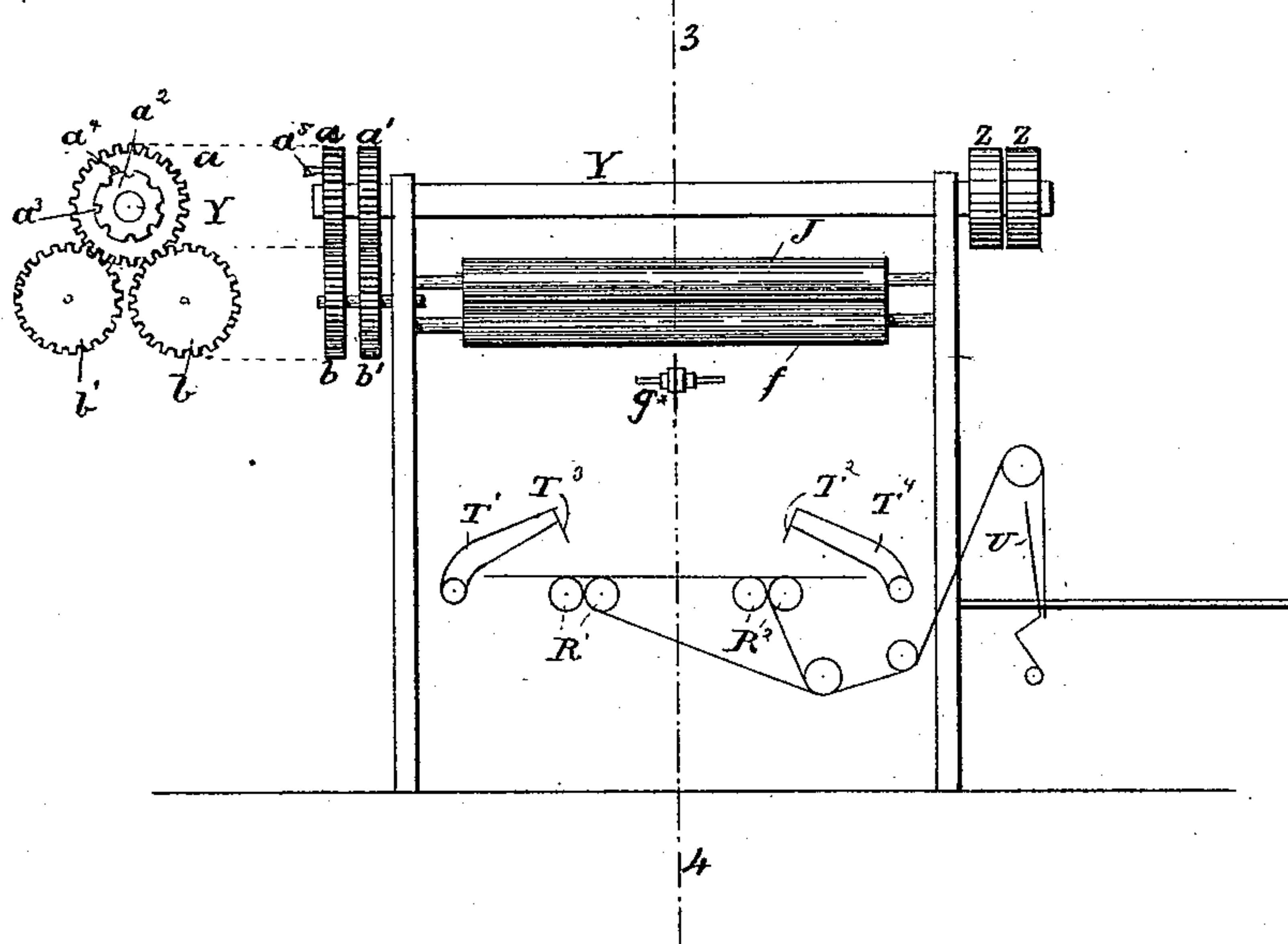


Fig. 2.



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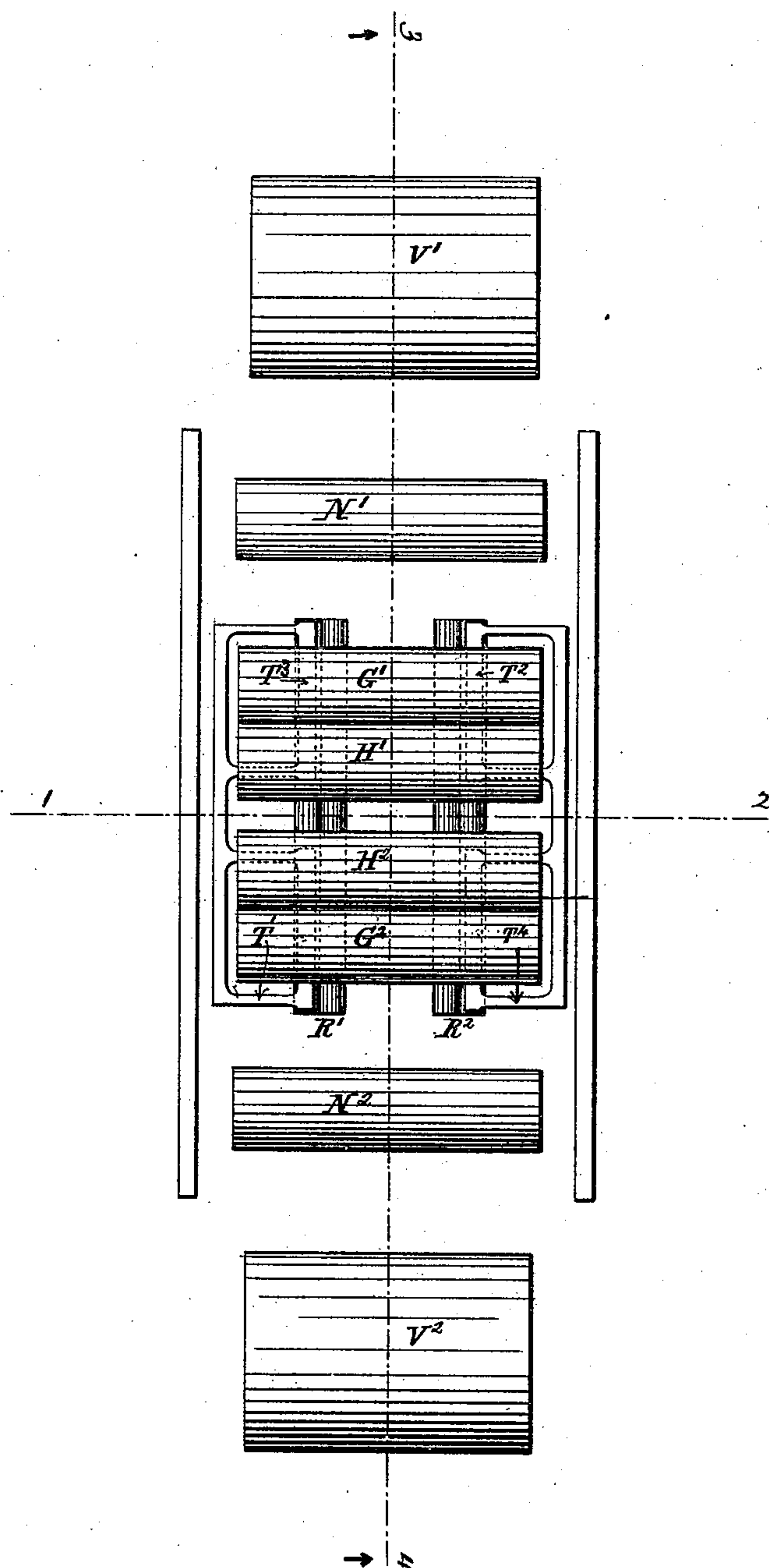
(No Model.)

3 Sheets—Sheet 2.

J. MICHAUD.
ROTARY PRINTING MACHINE.

No. 396,592.

Fig. 3. Patented Jan. 22, 1889.



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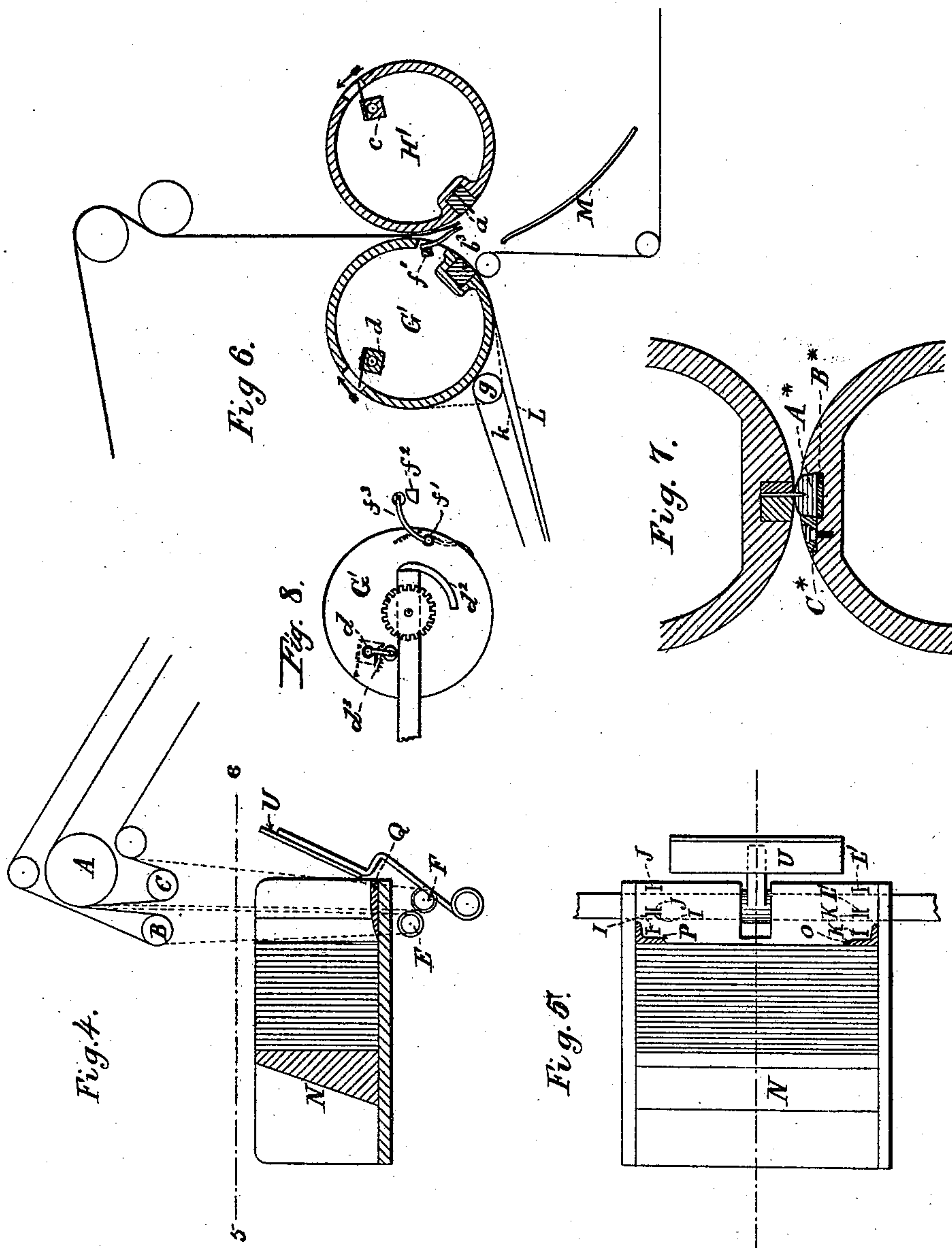
(No Model.)

3 Sheets—Sheet 3.

J. MICHAUD.
ROTARY PRINTING MACHINE.

No. 396,592.

Patented Jan. 22, 1889.



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UNITED STATES PATENT OFFICE.

JULES MICHAUD, OF PARIS, FRANCE.

ROTARY PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 396,592, dated January 22, 1889.

Application filed June 6, 1887. Serial No. 240,374. (No model.) Patented in France June 6, 1885, No. 169,380, and September 18, 1886, No. 178,606; in Belgium February 22, 1886, No. 72,096; in England February 25, 1886, No. 2,772, and May 23, 1887, No. 7,484; in Germany April 1, 1886, No. 39,460, and in Austria-Hungary August 21, 1886, No. 40,547.

To all whom it may concern:

Be it known that I, JULES MICHAUD, a citizen of France, residing at Paris, have invented new and useful Improvements in Rotary Printing-Machines, (for which I have obtained a patent in France, No. 169,380, dated June 5, 1885, with certificate of addition dated February 12, 1886; also French Patent No. 178,606, dated September 18, 1886; Great Britain, No. 2,772, dated February 25, 1886, and No. 7,484, dated May 23, 1887; Belgium, No. 72,096, dated February 22, 1886; Germany, No. 39,460, dated April 1, 1886, and Austria-Hungary, No. 40,547, dated August 21, 1886,) of which the following is a specification.

My invention relates to rotary printing-machines which will permit of the printing, superposing, and folding of publications from two rolls of paper, or the printing and folding, without superposing, from one or two rolls of paper at will.

The invention is illustrated in the accompanying drawings, in which—

Sheet 1 shows two views of the machine, Figure 1 being a section on line 3 4 of Fig. 3, and Fig. 2 a section on line 1 2 of Fig. 1. Fig. 3 is a plan view of the machine, the driving mechanism being omitted. Figs. 4 and 5 are respectively a vertical section and plan view of the arrangement for the delivery of the sheets. Fig. 6 is a vertical section through the cutting and folding cylinders. Fig. 7 is a detail view of the arrangement of the counterpart or maiden in conjunction with which the cutting-knife works; and Fig. 8 is an end view of one of the folding-rolls, showing the operating-cams.

There are two series of cylinders—one on each side of the machine—and for each series an endless roll or web of paper is provided. The paper from the roll or reel V' passes between the cylinders A' and B' , A' being clothed with a suitable fabric or blanket and B' carrying the printing-form, which may be of metal type, electros, stereos, or zincos. The paper then passes between a second pair of cylinders, C' and D' , C' being clothed with a suitable fabric or blanket and D' carrying the form for printing the back or opposite side. In the same way the paper from the roll or reel V^2 is printed on its opposite sides be-

tween cylinders A^2 and B^2 for one side and between C^2 and D^2 for the back or opposite side, A^2 and C^2 being clothed with a suitable fabric or blanket and B^2 and D^2 carrying the forms. The paper from reel V' , when printed, passes under roller e and over roller f and descends between the cutting and folding cylinders $G' H'$. The paper from reel V^2 , when printed, passes under roller i and over rollers $J f$ and descends between the same cutting and folding cylinders, $G' H'$, as shown in dotted lines. The webs from the two reels are thus superposed, their travel being such that the texts and the margins of the sheets coincide. The roller J , being adjustable, allows of the travel of the paper from reel V^2 being lengthened or shortened, so that the superposition may be effected with great exactitude. The webs are then cut together and receive a first fold, and are carried by the cutter and folder G' into a set of tapes, which conducts them above the rollers R for the second fold.

Fig. 6 on Sheet 3 shows the special construction of the cutting and folding cylinders.

Cylinder H' carries the cutting-knife a , which is serrated—that is, it has parts of its cutting-edge opposite the threads, hereinafter described, cut away, so that it will not sever the paper at those points. Cylinder G' carries the counterpart or “maiden” b^3 , in conjunction with which the cutting-knife works, and which may be of india-rubber or of india-rubber and leather.

f' is a bar terminating in trunnions and supported by pieces fixed to cylinder G' . This bar carries a number of steel blades, which, when at rest, lie against the cylinder, and which after the cut assume the position shown in the drawings, the bar having been turned by the action of a cam, f^2 , on a roller mounted on a crank-arm, f^3 , with which it is provided at one extremity. The cylinder H' carries a bar, c , on which is fixed a steel blade. The cylinder G' carries a bar, d , on which is also fixed a steel blade. The bars c and d are supported by pieces fixed to the cylinders and in which they can turn, and are actuated by cams d^2 coming in contact with rollers mounted on crank-arms d^3 , fitted to the extremities of the bars.

In the cylinder G' grooves are formed to

receive threads or cords which pass round roller *g*, as shown in dotted lines.

The paper which descends between the two cylinders *G'* and *H'* is cut by the knife *a* almost entirely across, leaving, however, certain parts or shreds, corresponding to the threads passing round cylinder *G'*, still connecting the descending sheet to the preceding one. At this moment, under the action of the cam *f*², the bar *f'* is moved to the position shown in the drawings, and thus tears off these shreds and entirely separates the two sheets and forces the forward end of the descending sheet over the plate *M*, which prevents it falling upon the tapes. When the blades mounted on bars *c* and *d* come in contact, the blade *c*, which projects from cylinder *H'*, folds the sheet of paper and forces its edge between the blade *d* and the edge of the recess in cylinder *G'*. The blade *d* by the action of the cam *d*² on its bar is caused to bear against the edge of the recess in cylinder *G'*, against which it nips the paper, and the continued rotation of the cylinders carries the sheet forward folded by the cylinder *G'*, the part which had descended over the plate *M* being drawn back and placing itself against the other part. The sheet being subsequently released by the arm *d*³ of the blade *d* passing by the end of cam *d*², it is detached from cylinder *G'* by the threads and passes between tapes *k* and *L*, which carry it to the rollers for the second fold.

The drawings show a machine arranged for making two folds only; but it can, if required, be arranged to make three, four, or a greater number.

The ink supplied by the ink-ducts *L'* and *M'* *L*² and *M*² is transferred by rollers to the cylinders *N'* and *Q'* *N*² and *Q*², on which it is distributed by other rollers, the rollers *W* then laying it very evenly on the printing-cylinders.

Fig. 2, Sheet 1, is a section of the machine on line 1 2 of Fig. 1, same sheet. This figure shows that the machine is double—that is to say, that a circular cutter, *g*^{*}, divides the sheets in two, one set of sheets receiving the second fold by the blade *T*³ forcing them between the rollers *R'*, and the other set receiving the second fold by the blade *T*² forcing them between rollers *R*².

The blades are of steel and are supported by pivoted levers *T'* *T*⁴. They are actuated by circular eccentrics or by cams and force the folded sheet between the rollers placed beneath them. After the second fold the sheets are delivered onto a table by a flier or oscillating plate, *U*, as shown in the drawings, unless it is required to give them more folds.

The delivery of the sheets is shown more clearly on Sheet 3. The sheets carried to roller *A* are released by a portion of the tapes which conveyed them there and which pass around the rollers *B* and *C*. The end tapes, or those at each edge of the paper, (indicated by dotted lines in Fig. 4,) after proceeding

with the sheets to the table, pass over pulleys *E* and *F* and return to their starting-point. These tapes are shown in dotted lines in Fig. 4 and in Fig. 5 (which is a plan on line 5 6) by the lines *I J K L'*. When the sheet comes in contact with the table, the flier or oscillating plate, actuated by an eccentric, bears against such sheet and causes it to leave the end tapes, from between which it is pushed by the motion of said flier, and to enter the receiving box or tray. The block *N*, placed in the box or tray, serves to support the packet of sheets received, and it recedes as the packet increases. When the flier or oscillating plate recedes, the last sheet received, which has a tendency to move back again, is arrested by angle-pieces *O* and *P*, fixed at each side of the box or tray, and which prevent it bearing against the tapes. The curved part *Q* of the receiving-table also serves to retain the packet of sheets and prevent it moving back again.

The machine illustrated in Sheets 1 and 2 delivers two copies of a publication at the same time, the two copies each containing two sheets superposed and folded. If the machine is not required to effect such a large output, reels of half the width may be employed, the printing and cutting cylinders being half the length, and for each revolution of the machine only one copy, consisting of two sheets superposed and folded, will be delivered, the slitting-knives being in this case dispensed with.

In the case where the sheets cut from the webs coming from the reels *V'* and *V*² are not required to be superposed the web from reel *V'* is first passed over roller *f*, then slit longitudinally by knife *g*^{*}, and next cut transversely and folded by the cylinders *G'* *H'*, after which it is directed by cylinder *G'* over one end of the rollers *R'* *R*². The web from reel *V*² is first passed over roller *z*, then slit longitudinally by a knife similar to *g*^{*}, and next cut transversely and folded by the cylinders *G*² and *H*², after which it is directed by cylinder *G*² over the other end of the rollers *R'* *R*², the same as in the case of web from reel *V'*, above described. The adjacent ends of the two blades *T*³ *T*², which lie, respectively, over one end of the rollers *R'* *R*², give the second fold to the sheets coming from the reel *V'* and force them between said rollers, and the other adjacent ends of said blades give the second fold to the sheets coming from the reel *V*² and force them between the rollers near their outer ends in the same manner.

Y is the driving-shaft of the machine, and carries fast and loose pulleys *z* and two gear-wheels, *a* *a'*. The wheel *a* gears with wheel *b*, which actuates all the machine on the side of the reel *V'*, and wheel *a'* gears with wheel *b'*, which actuates all the machine on the side of the reel *V*² through suitable intermeshing gear-wheels at the ends of the several rollers, as will be readily understood.

The wheels *a* and *a'* have hubs or bosses

keyed to the shafts, and such hubs or bosses can be made independent of their toothed rims by means of a coupling device. Consequently, by this arrangement, in order to stop the action of the entire machine all that is requisite is to shift the driving-strap from the fast to the loose pulley. To stop one of the two parts or halves of the machine (either that corresponding with reel V' or that corresponding with reel V^2) while the other part shall continue in operation, it suffices to shift the coupling device either of the wheel a or of the wheel a' . The driving-shaft Y will continue to revolve; but the hub or boss of the wheel which is uncoupled will revolve in its toothed rim without carrying the latter with it, and consequently without driving the part of the machine which it governs. Fig. 2, Sheet 1, shows one of said wheels, a , having a hub, a^2 , keyed to the shaft Y and provided with notches a^3 in its circumference. The toothed rim of said wheel has one or more notches, a^4 , on its inner face, and when said notches register and the plug a^5 is inserted the rim and hub are locked together.

It will thus be seen that this machine will, first, print sheets coming from two reels of paper, superpose, fold, and deliver them; second, print sheets coming from two reels of paper and fold and deliver same separately; third, print from one reel of paper only by causing one side of the machine only to be operated. When the two parts of the machine are in operation, either part or half can be arrested without stopping the other part or half.

In the case where it is desired either to only make use of one reel of paper or to always superpose the sheets coming from the two reels it will then only be necessary to have one pair of cutting and folding cylinders, G H , instead of two. The sheets coming from reels V' and V^2 will be superposed and pass thus between G and H , which will then cut and fold them, as hereinbefore described. The rollers R' R^2 will be only half as long and there will only be one point of delivery.

In Fig. 7 I have illustrated a new arrangement of the counterpart or maiden in conjunction with which the cutting-knife works. In this arrangement the leather A^* , which is brought to bear upon the cylinder carrying the knife, instead of being fixed on wood, as is often the case, is fixed above a strip of india-rubber, B^* , which gives a certain amount of elasticity to the pressure on the knife-cylinder and thus facilitates the cutting. The india-rubber and the leather are mounted in a slot having an inclined side, as indicated in the drawings, and a bar, C^* , which is clamped against them, keeps the whole in position. I may use a counterpart of all leather; but the strip of india-rubber placed beneath the leather will produce better results.

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

1. The combination of two rotary printing-machines for printing from separate continuous webs of paper, the two machines being arranged symmetrically and each having the impression-cylinders, the printing-cylinders and the inking-cylinders arranged in the same vertical line at opposite ends of the combined machine, the cutting and folding cylinders of each being arranged in a horizontal line toward the center of such combined machine, whereby the paper from one reel after being printed by the printing-cylinders at one end of the machine can be led to either pair of cutting and folding cylinders, so that the webs of paper after being printed may either be separately cut into sheets of the same dimensions and then separately folded and delivered or be superposed, cut, and folded together without any change in the direction of the travel of either web, substantially as described.

2. The combination, with one of the cutting and folding cylinders, of a movable bar journaled in said cylinder and located close to and in the rear of the cutting apparatus in the direction of rotation of such cylinder, blades carried by said bar, and cams for projecting said blades from the cylinder after the cut is effected to complete the separation of the sheets, and at the same time to direct the forward end of such sheets away from the cylinder which effects the fold, substantially as set forth.

3. In a printing-machine provided with two sets of printing, cutting, folding, and delivering appliances, a shaft provided with two gear-wheels, each capable of being made fast with or to revolve loose upon such shaft, one of such wheels serving to transmit motion to one half of the machine and the other wheel to the other half thereof, in combination with fast and loose pulleys on said shaft and a driving-belt adapted to be shifted from one to the other, substantially as described.

4. In a delivery apparatus, the combination, with a set of tapes, the middle tapes of which proceed only to a point above the delivery-table clear of the flier, while the end tapes pass down below the table, whereby the sheet is arrested by coming in contact with the table, of the oscillating flier and the angle-pieces O P in advance of the plane of the falling sheet, the whole arranged for operation substantially as described.

5. The herein-described cutting apparatus, comprising a cutting-cylinder, a knife carried by said cylinder, a maiden, a strip of india-rubber thereon, a working-surface of leather over said india-rubber strip, and a bar removably securing said leather in position, so as to oppose a yielding elastic pressure to the action of the knife, substantially as described.

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Witnesses:

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