

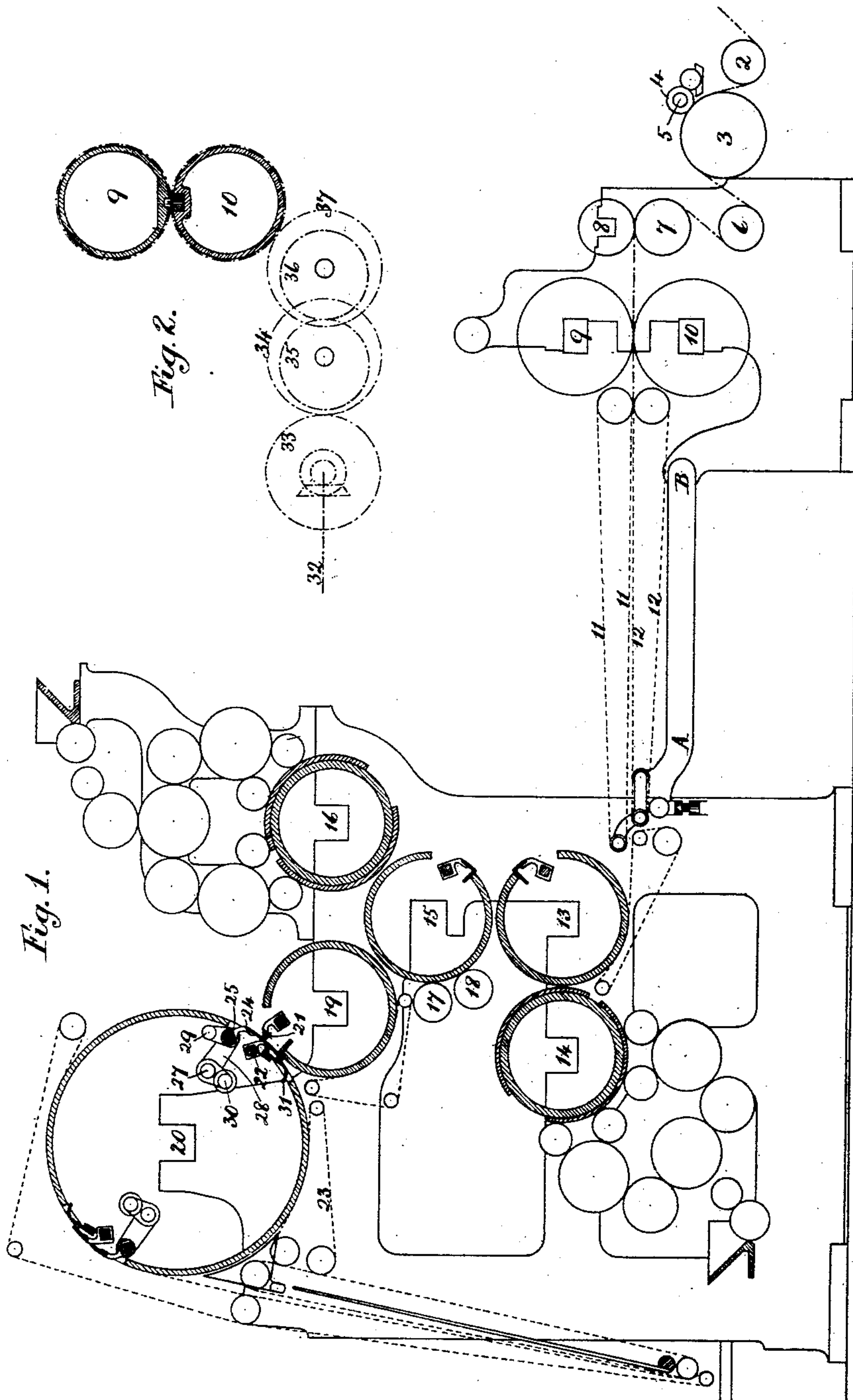
(No Model.)

3 Sheets—Sheet 1.

J. MICHAUD.  
ROTARY PRINTING PRESS.

No. 520,069.

Patented May 22, 1894.



Witnesses:

C. A. Reed  
E. J. Ruy

Inventor:

Jules Michaud,  
By F. C. Lomes,  
Attorney.

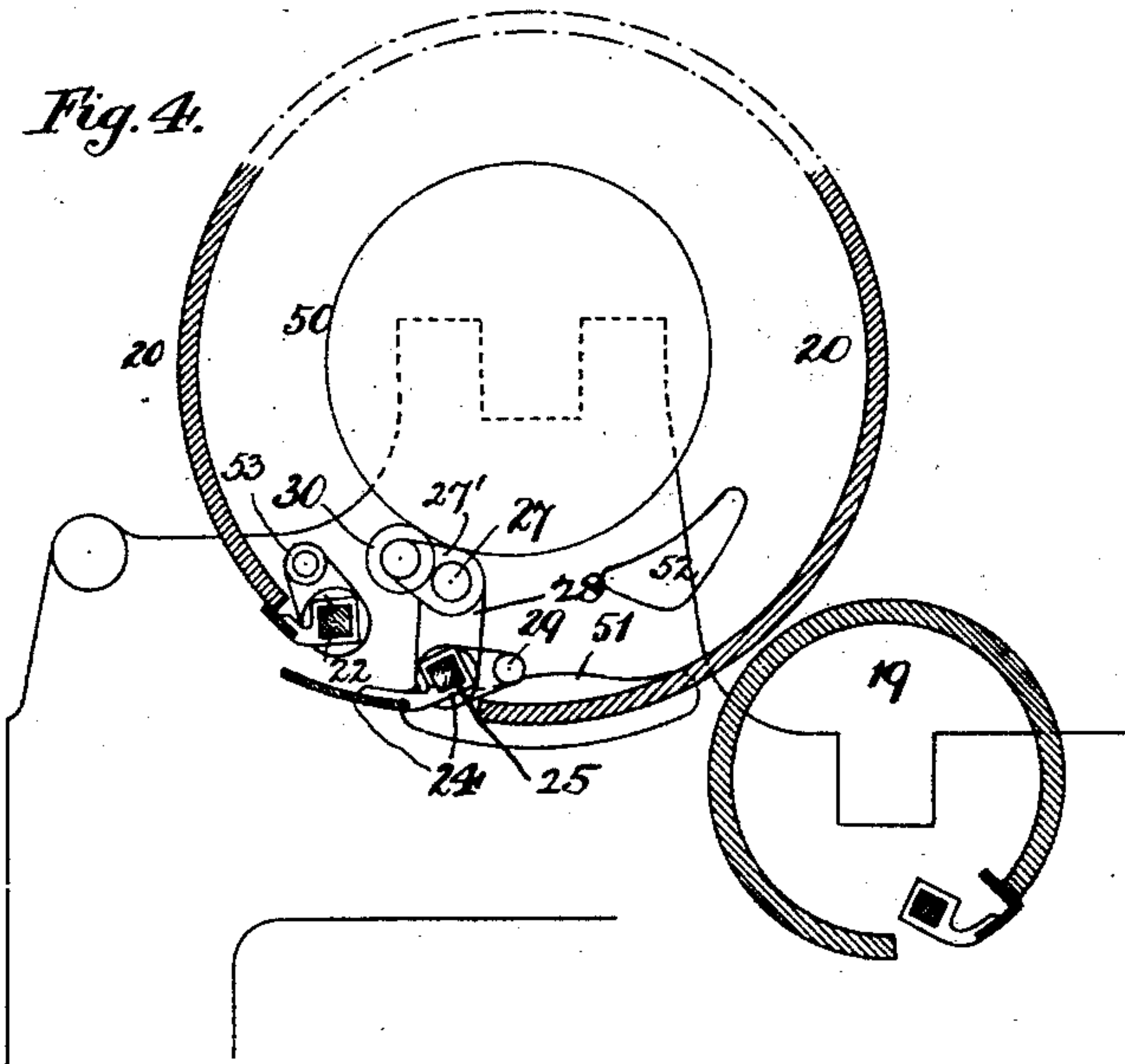
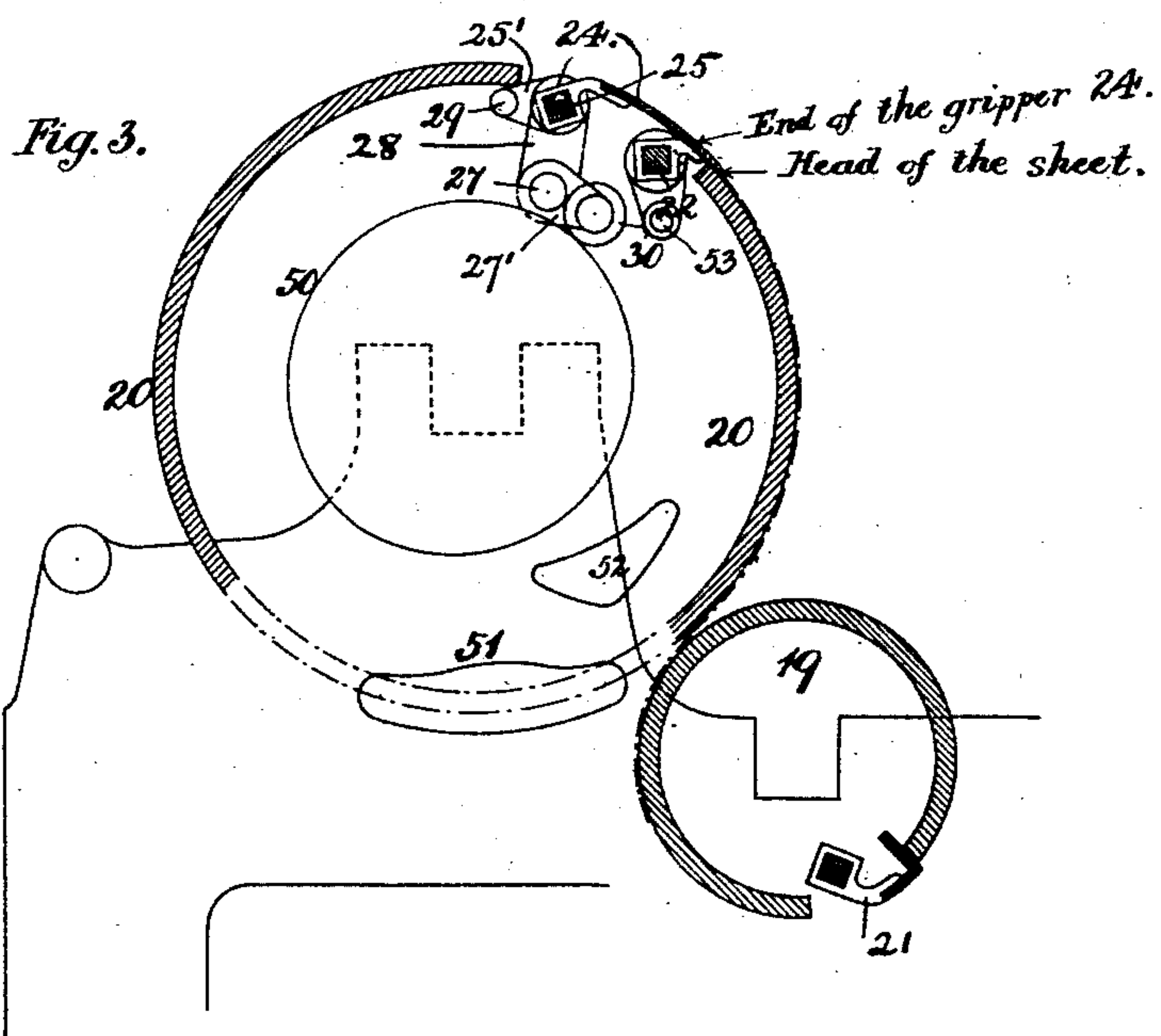
(No Model.)

3 Sheets—Sheet 2.

J. MICHAUD.  
ROTARY PRINTING PRESS.

No. 520,069.

Patented May 22, 1894.



Witnesses:

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(No Model.)

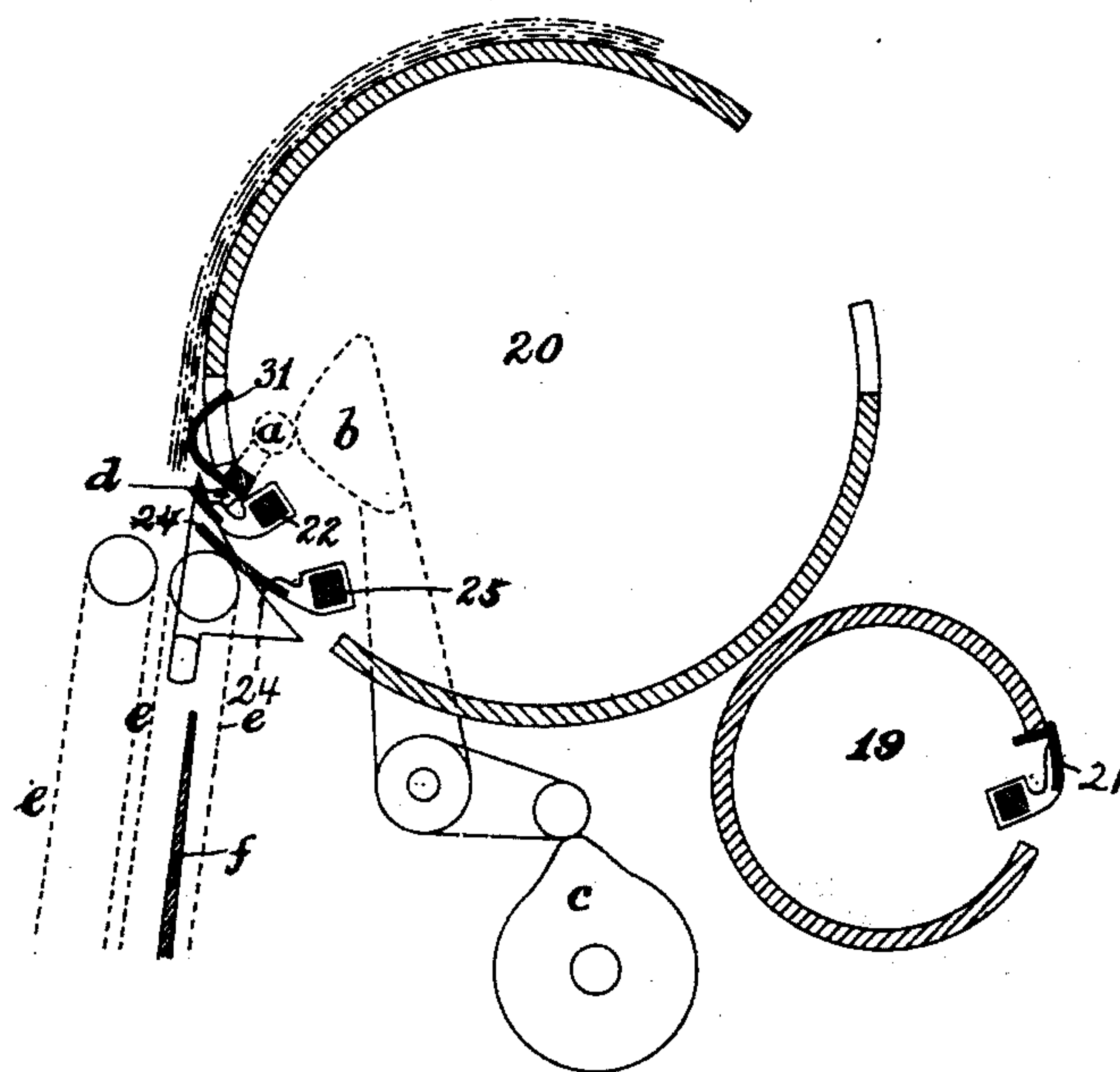
3 Sheets—Sheet 3.

J. MICHAUD.  
ROTARY PRINTING PRESS.

No. 520,069.

Patented May 22, 1894.

*Fig. 5.*



Witnesses:

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# UNITED STATES PATENT OFFICE.

JULES MICHAUD, OF PARIS, FRANCE.

## ROTARY PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 520,069, dated May 22, 1894.

Application filed March 1, 1890. Serial No. 342,311. (No model.) Patented in France December 16, 1889, No. 202,626, and in England January 30, 1890, No. 1,635.

*To all whom it may concern:*

Be it known that I, JULES MICHAUD, a citizen of the Republic of France, residing at 96 Rue d'Assas, Paris, France, have invented a new and useful Improved Rotary Printing-Press, (for which I have obtained Letters Patent in Great Britain, No. 1,635, dated January 30, 1890, and in France, No. 202,626, dated December 16, 1889,) of which the following is a specification.

The present invention relates to an improved rotary printing press, which is more particularly adapted to book work and also to ruling; the sheets printed may be of different sizes, both in the direction of the development of the cylinders as well as in the direction of the width of the machine.

In the accompanying drawings:—Figure 1, is a longitudinal section of the complete machine; Fig. 2, a longitudinal section of the cutting cylinders, and shows the arrangement of gearing for driving same at a varying speed. Figs. 3 and 4, are both sections showing the action of the additional grippers 24 with which the accumulating cylinder is provided. Fig. 5 is a section of the accumulating cylinder showing the means for releasing the sheets which have been collected thereon.

The paper coming from a reel passes under a roller 2, Fig. 1, then over a cylinder 3. It is upon this cylinder that the ruling is effected by means of disks 4, of which the number and the arrangement on the rod 5 which carries them, vary according to the nature of the work to be executed. The paper after passing under a roller 6, enters between the two rollers 7 and 8 which serve to carry it forward. I may heat the rollers 2, 3 or 6, by steam or otherwise, so as to insure a more rapid drying of the ruling.

The rate of feed of the paper is regulated by the speed of roller 7, against which bears the roller 8 and insures the forward movement of the paper. The paper then passes between the two cutting cylinders 9 and 10, which make one revolution for each revolution of the printing cylinders, and thus cut sheets of which the size varies according to the variations of speed of roller 7. Any suit-

able known means may be employed for varying the speed of roller 7, and it is therefore not deemed necessary to illustrate the same.

It will be noticed that the cutting apparatus is placed at the foot of the machine, and the impression cylinders 13 and 15 are situated one above the other at that end of the frame in which they are mounted which is nearest to the cutting cylinders 9 and 10, the objects being to prevent the dust resulting from the cutting from falling upon the inking rollers and upon the form cylinders, and also to leave the front of the machine completely open so as to facilitate access thereto.

In order that the paper may be cut well, it is necessary that the surface speed of the cutting cylinders at the moment of cutting should be practically the same as the rate of travel of the paper, otherwise the cutting blade or saw carried by one of the cylinders, will make distinct marks on the paper, by meeting same at a different speed than its own, before the moment for cutting. This result may be obtained by having as many pairs of cylinders 9 and 10 as it is desired to produce different sized sheets in the direction of the development of the cylinders, the development of each of the cylinders of these pairs being equal to the length of each of the different sizes. For this purpose it will be necessary, as shown in Fig. 1, that the centers of the cylinders 9, 10, may vary their position so as to approach each other when smaller cylinders are used, and to recede from each other when larger cylinders are used.

In Fig. 2, I have shown another arrangement, which enables the same results to be obtained without having to change the cylinders 9, 10. For this purpose, instead of a uniform movement which they usually have, these cylinders have a periodically varying movement, the period being one revolution of the cylinders. This movement is such that the maximum speed corresponds to the speed with which the paper travels in the case of the largest size, and that the minimum corresponds to the speed of the paper in the case of the smallest size to be made. With this



arrangement if it is desired for example to make the smallest sized sheet, it suffices for the cutting blade or saw of cylinder 10 to come in contact with cylinder 9 at the moment when the cylinders revolve at their slowest speed. The largest and all intermediate sizes between the smallest and largest, may in the same way be produced by causing the moment of cutting to correspond to the greatest speed of the cylinders or to an intermediate speed.

Fig. 2 shows an arrangement for driving the cylinders 9, 10, so as to produce the varying speed. Shaft 32 actuated by the machine itself makes one rotation for each revolution of the printing cylinders; it carries a bevel pinion gearing with a similar pinion mounted on the same axis as the wheel 33. This wheel 33 gears with a wheel 34 of the same diameter. On the axis of the wheel 34 is mounted a wheel 35 gearing with another wheel 36. The two wheels 35 and 36 must not be circular, their pitch line being an ellipse, and they revolve round one of the foci of such ellipse. On the axis of the wheel 36 is mounted a circular wheel 37 gearing with the wheel of the same diameter on the cylinder 10. The wheel 35 therefore imparts a variable movement to the cylinder, the differences of speed being determined by the differences of the axes of the ellipse.

In practice the wheels 35 and 36 may be circumferences of which the center of rotation will be a small distance from the center of the figure, the necessary play being allowed for the teeth of the gearing. To impart to the cylinders the speed suitable for the moment of cutting, it is only necessary to dismount the wheels 36 and 37, then to cause the cylinders 9, 10 to rotate the required distance and replace the two wheels 36 and 37, the wheels 36 always engaging wheel 35 at the same point, while wheel 37 will gear with the wheel of cylinder 10 at a different point to what it did before. The sheets cut pass between the cords or tapes 11 and 12, which carry them to the cylinder 13, the grippers of which seize same. The cords 11 and 12 pass over rods mounted on movable pieces A, which are articulated on the axes B, thus permitting all the cords to be raised and give access to the impression cylinders 13 and 15.

The largest sheet which the machine can print in the direction of the development, is that equal to the development or circumference of cylinder 13 less a part of the space occupied by the groove in which move the grippers; it will be seen by the foregoing description that the machine will also print all sizes of sheets smaller than that of this largest sheet. The sheet seized by the grippers of the cylinder 13, is printed by cylinder 14 on one side, then delivered to the grippers of cylinder 15, which in its turn carries it forward, and is printed on the other side by cylinder 16. The rollers 17 and 18 which bear

upon cylinder 15, are cleaning rollers which serve to remove the off-set deposited on such cylinder, and avoid the soiling which such deposit would produce. The sheet printed on both sides is seized by the grippers of cylinder 19 and transmitted to cylinder 20, which is called an accumulating cylinder; in the machine shown, the cylinder 20 has a development double that of the printing cylinders. I employ this arrangement so as to have the fliers to receive the sheets nearly vertical and to enable the delivery table to be raised, but I may employ a cylinder of equal diameter, or of three, four or more times the diameter of the printing cylinders.

The direct transmission of a sheet from the grippers 21 of cylinder 19, to the grippers 22 of cylinder 20 necessitates that when cylinder 20 already carries a sheet held by the grippers 22, the latter open before the two cylinders come in contact, so as to penetrate into the groove of cylinder 19 without tearing the sheet it carries, and also that the grippers of cylinder 19 open and penetrate into the groove of the cylinder 20 without tearing the sheet that the latter has already gathered, it, therefore, follows that the sheets for a certain time are completely abandoned on the two cylinders. In so far as the sheet on cylinder 19 is concerned, this leads to no serious inconvenience, as the cords or tapes situated in the blank spaces will suffice to support the sheet during the time it is abandoned by the grippers. It is not the same with cylinder 20; not only does the first sheet tend to detach itself from the cylinder by its weight, but further, the weight of the second sheet gathered is added to that of the first, then that of the third, of the fourth, &c., according to the number of sheets to be delivered at a time. To remedy this inconvenience and to leave the cords 23 arranged in the blank spaces to the simple function of supporting the tail or end of the set of sheets, I have placed in the groove of cylinder 20, the grippers 24 which are brought to bear upon the sheets gathered by the cylinder, during the time that the grippers 22 remain open, and are lowered to seize a new one. The grippers 24 are mounted on a bar 25, supported in arms 28 attached to bar 27, the bar 25 being capable of oscillation in the arc of the circle of which the bar 27 is the center. The bar 25 carries at its end crank arms 25' provided with rollers, as 29, which come in contact with cams, as 51, in the rotation of the cylinder 20, whereby the grippers 24 are actuated to release the sheet. The bar 27 is also provided at its end with crank arms 27' carrying rollers, as 30, which ride upon cams, as 50.

When the grippers 22 are to seize the first sheet carried by the grippers of cylinder 19, they open, under the action of cam 52 acting upon roller 53 (see Figs. 3 and 4) and penetrating into the groove of cylinder 19 seize the sheet abandoned by the latter at the moment when the forward edge of this sheet



arrives in the line of the centers of the two cylinders. During this time the grippers 24 have remained at rest. When the sheet has been well laid upon cylinder 20 by the grippers 22, the grippers 24, which are then beneath the sheet begin to operate; they retire from beneath the sheet of paper without opening, and move to a position in advance of the forward edge thereof, as shown in Fig. 3. This backward movement results from the action of the cam 50 upon the roller 30. It is such that the gripper moves away without raising the sheet of paper placed over it, and consequently without tearing it; before the grippers 22 again open, the grippers 24 are raised under the action of the cam 51 acting upon the roller 29 (Fig. 4,) then by the simultaneous action of the cams 50 and 51 acting upon the rollers 29 and 30, they advance and are lowered upon the sheet. The grippers 22 are then raised and seize a new sheet, which they lay upon the first. The grippers 24 confined between the two superposed sheets are withdrawn as before without exercising any pressure upon either of the two sheets, and consequently without tearing the same. When the cylinder 20 has thus gathered the determinate number of sheets, the set collected is driven out in front of the fliers by the blades 31, after having been abandoned by the grippers 22 and 24, such blades being actuated at the proper time in order to throw the set out, as shown in Fig. 5. For this purpose the axis of blades 31 is fitted with a lever carrying a roller *a* which when the desired number of sheets has been accumulated on cylinder 20 is acted upon by a cam *b*. This cam *b* is brought to the required position when cylinder 20 has made the desired number of revolutions, by means of another cam *c* mounted on a shaft making one revolution for the given number of revolutions of such cylinder 20. The blades 31 are thus moved outward as shown in Fig. 5, and in their movement a projection *d* on such blades comes in contact with and raises the grippers 22, so that the latter are caused to release the set of sheets accumulated on cylinder 20. At the same time the grippers 24 also open under the action of the cam 51 (shown in Figs. 3 and 4) which actuates them at each revolution of cylinder 20, so that the set of sheets is entirely abandoned, and as their forward end is thrown out by the blades 31, the continued rotation of cylinder 20 causes them to pass between the cords or tapes *e* which may convey them to the fliers *f*. The cylinder 20 being of a

diameter double that of the printing cylinders, on the machine shown, carries two sets of grippers 22 and 24, and of blades 31, the operation being the same for each set. There would only be one set of such organs if the diameter of the cylinder 20 were the same as that of the printing cylinders, a cylinder of which diameter as above stated I may employ if desired.

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

1. In a rotary printing machine, the combination of two impression cylinders disposed one above the other, cutting cylinders disposed apart from said impression cylinders, a sheet conveying mechanism for transferring the sheets from the cutting cylinders to the impression cylinders, and a pivoted lever on which said sheet conveying mechanism is mounted, said lever being adapted to swing away from both impression cylinders giving free access thereto.

2. In a rotary web printing machine, the combination of cutting cylinders, a frame in which said cylinders are mounted, a separate frame, impression cylinders mounted one above the other in said separate frame at the end thereof which is nearest the cutting cylinders, and a lever, carrying the tapes for conveying the sheets from the cutting cylinders to the impression cylinders whereby on swinging back said lever, said tapes will be displaced and give free access to both impression cylinders.

3. The combination of a rotary cylinder, an inner rock shaft journaled therein, arms fixed on said rock shaft, an outer rock shaft journaled in the outer end of said arms, a gripper on said rock shaft, means for rocking said inner rock shaft to move the gripper backward without opening it, and means for oscillating said outer rock shaft to cause the gripper to open and close.

4. An accumulating cylinder fitted with two sets of grippers 22 and 24, the former mounted on a shaft capable of rocking in its bearings, and the latter on a shaft mounted in arms 28 in which it can rock, such arms being secured to shaft 27, which is also capable of rocking in its bearings, in combination with suitable cams for imparting the rocking movements to all three shafts at the required times, substantially as set forth.

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Witnesses:

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