

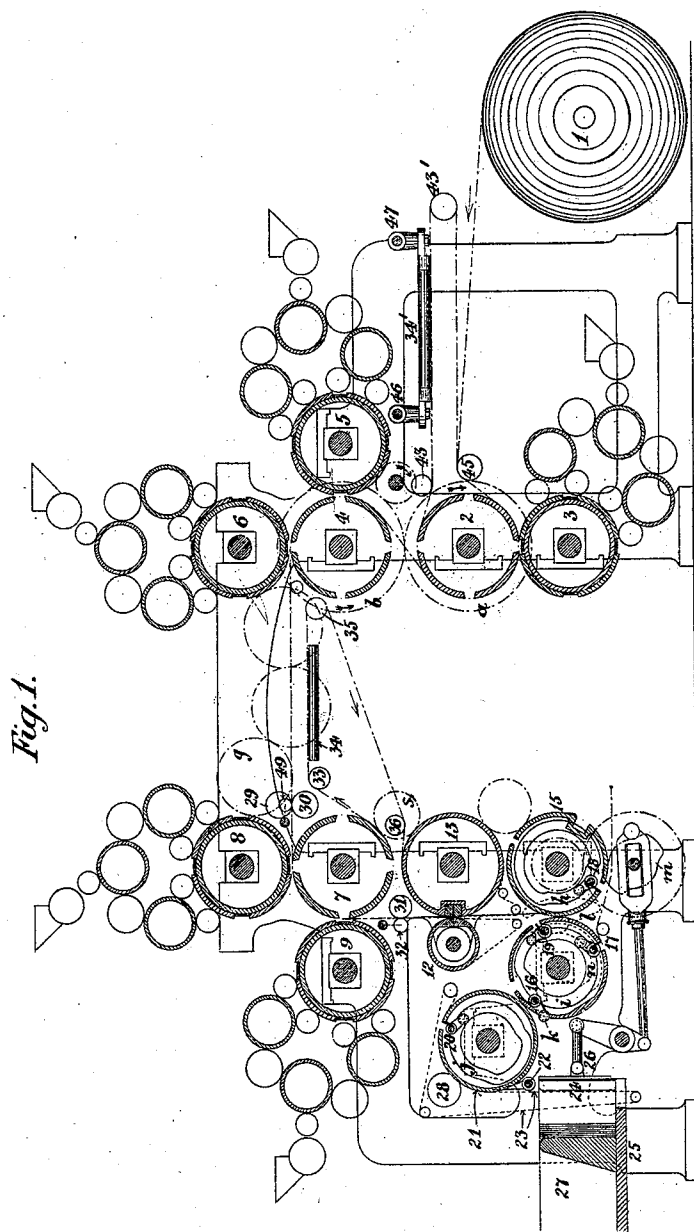
(No Model.)

10 Sheets—Sheet 1.

J. MICHAUD.
ROTARY PRINTING MACHINE.

No. 555,460.

Patented Feb. 25, 1896.



Witnesses:

Luzie M. Dorsett,
Jan G. Cameron,

Inventor:

Jules Michaud,
By F. B. Jones,
Attorney.

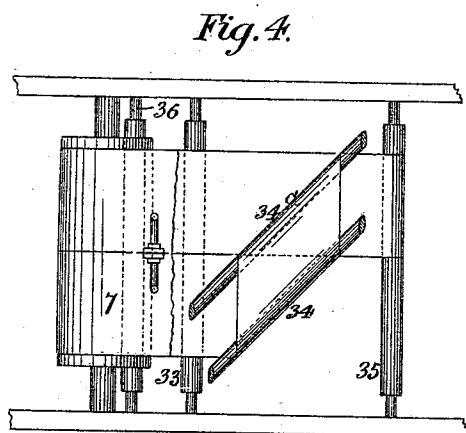
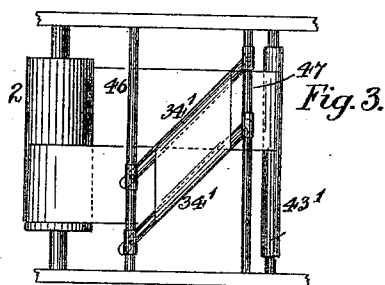
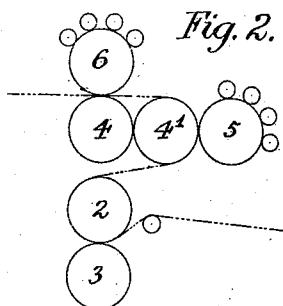
(No Model.)

10 Sheets—Sheet 2.

J. MICHAUD.
ROTARY PRINTING MACHINE.

No. 555,460.

Patented Feb. 25, 1896.



Witnesses:

S. M. Dorsett,

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Inventor:

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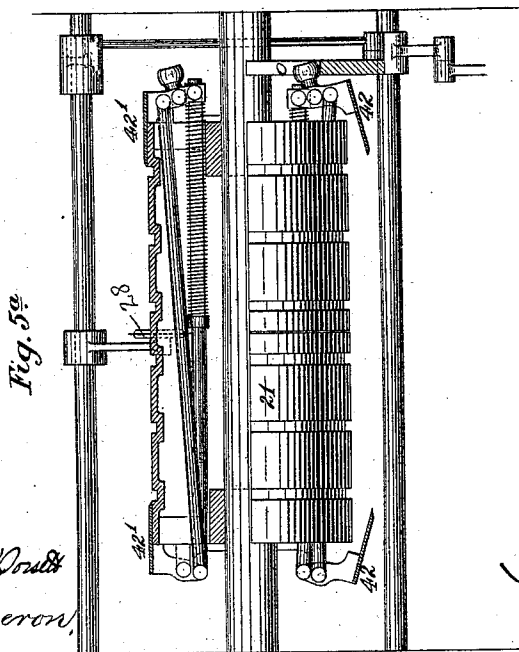
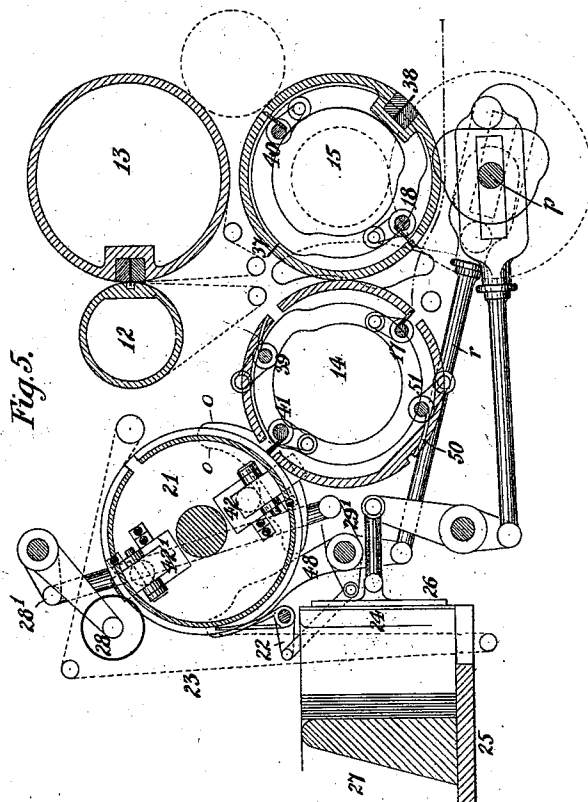
(No Model.)

10 Sheets—Sheet 3.

J. MICHAUD.
ROTARY PRINTING MACHINE.

No. 555,460.

Patented Feb. 25, 1896.



Witnesses:

Louis M. Doud
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(No Model.)

10 Sheets—Sheet 4.

J. MICHAUD.
ROTARY PRINTING MACHINE.

No. 555,460.

Patented Feb. 25, 1896.

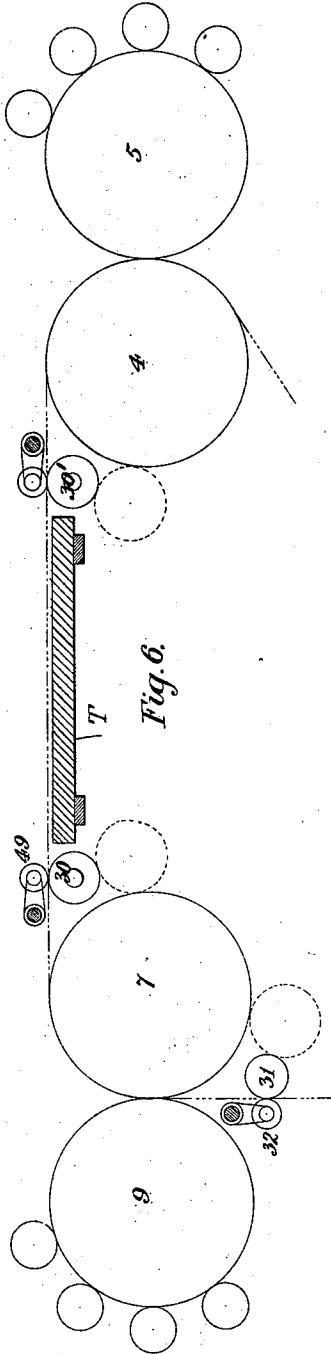


Fig. 6.

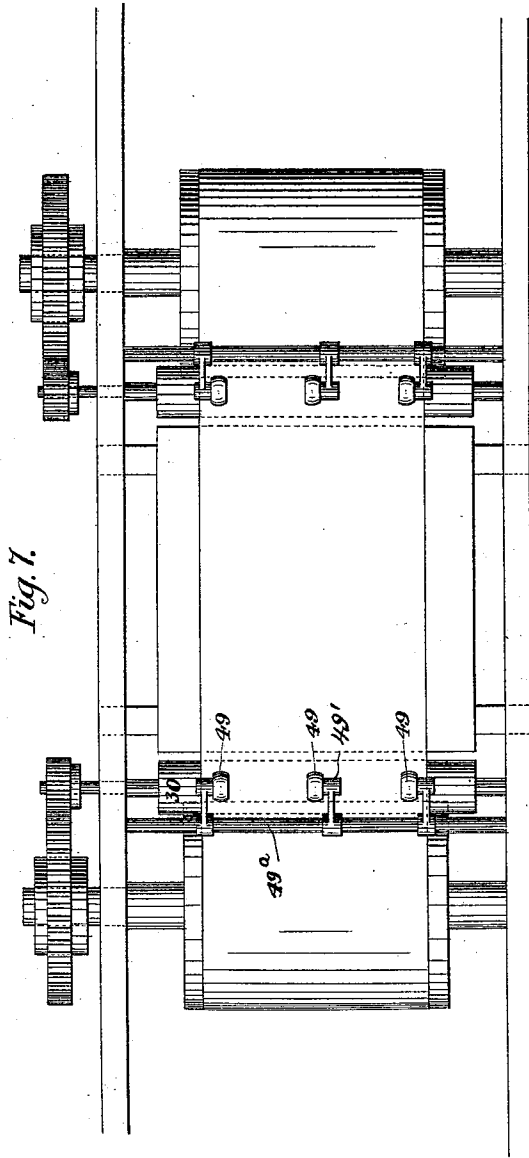


Fig. 7.

Witnesses:
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San J. Cameron.

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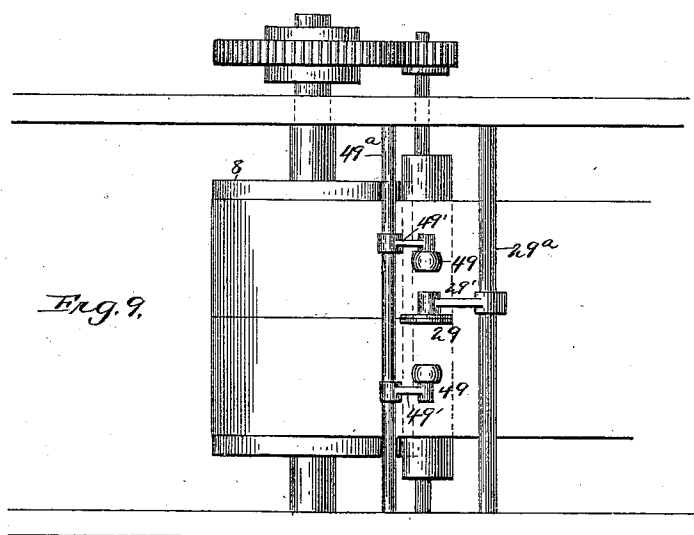
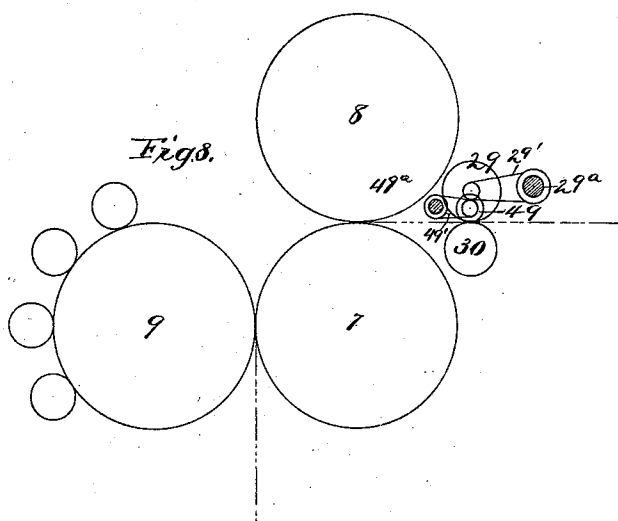
(No Model.)

10 Sheets—Sheet 5.

J. MICHAUD.
ROTARY PRINTING MACHINE.

No. 555,460.

Patented Feb. 25, 1896.



Witnesses

Suzie M. Dorsett,
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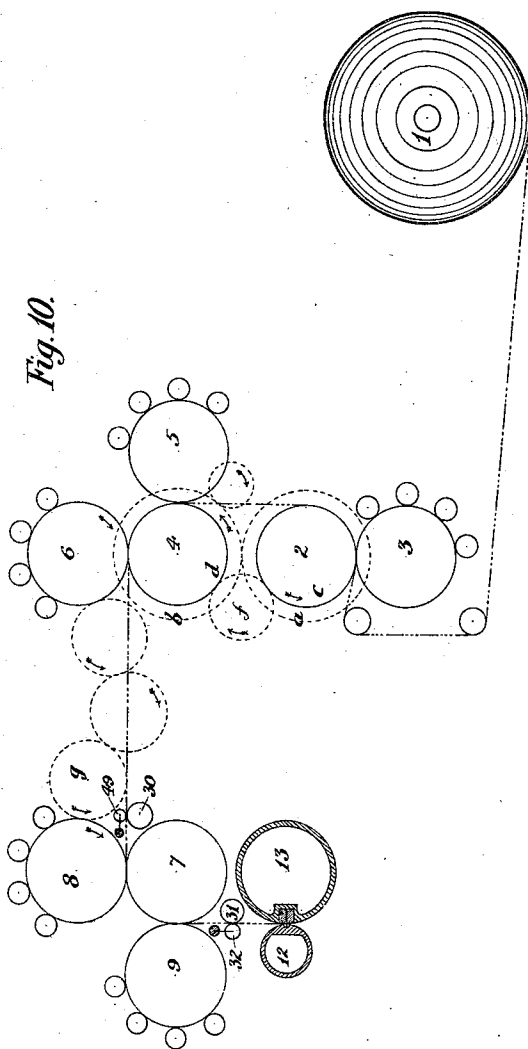
(No Model.)

10 Sheets—Sheet 6.

J. MICHAUD.
ROTARY PRINTING MACHINE.

No. 555,460.

Patented Feb. 25, 1896.



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(No Model.)

10 Sheets—Sheet 7.

J. MICHAUD.
ROTARY PRINTING MACHINE.

No. 555,460.

Patented Feb. 25, 1896.

Fig. 10^b.

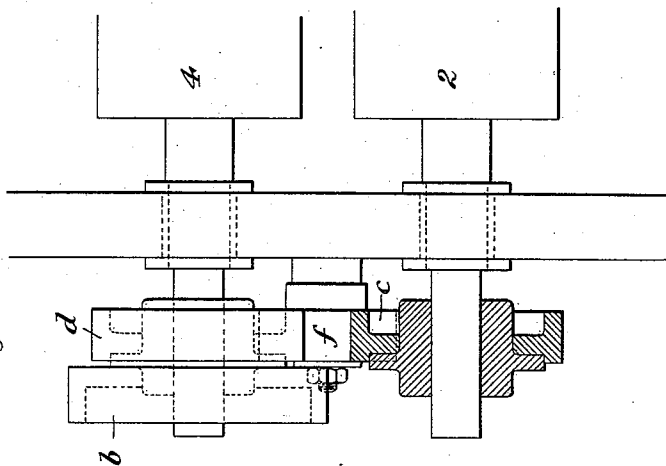
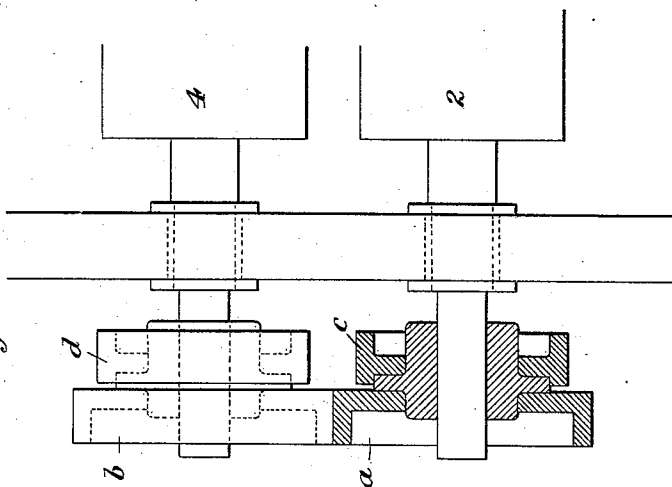


Fig. 10^a.



Witnesses:

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(No Model.)

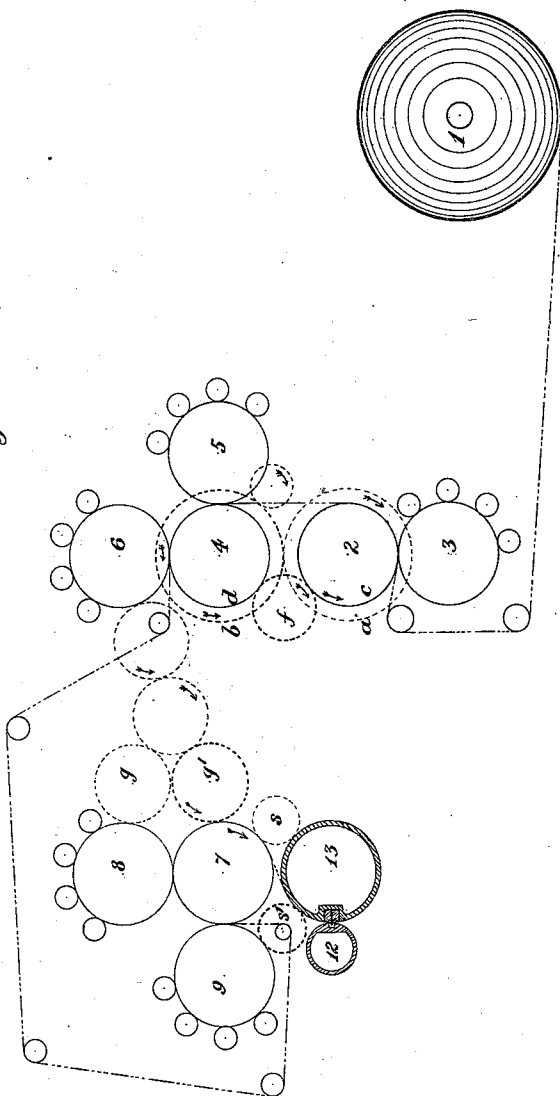
10 Sheets—Sheet 8.

J. MICHAUD.
ROTARY PRINTING MACHINE.

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Fig. 11.



Witnesses:

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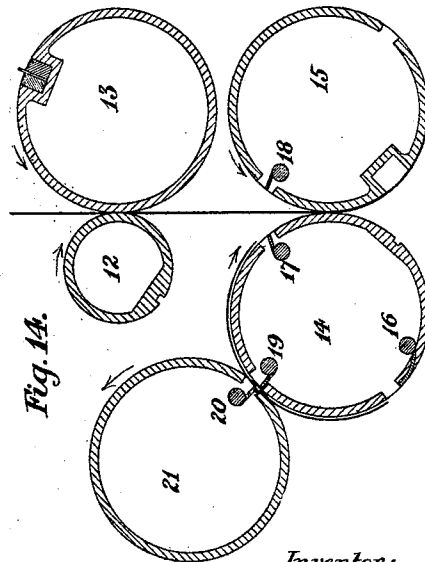
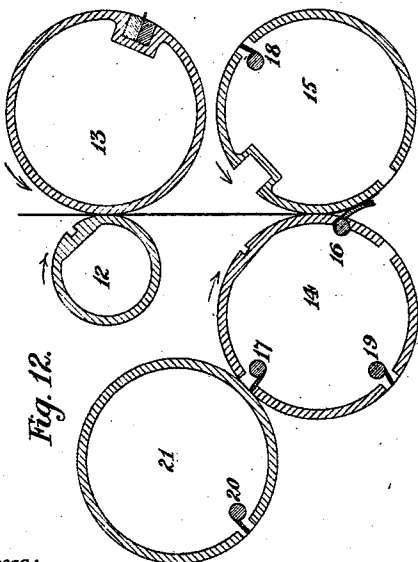
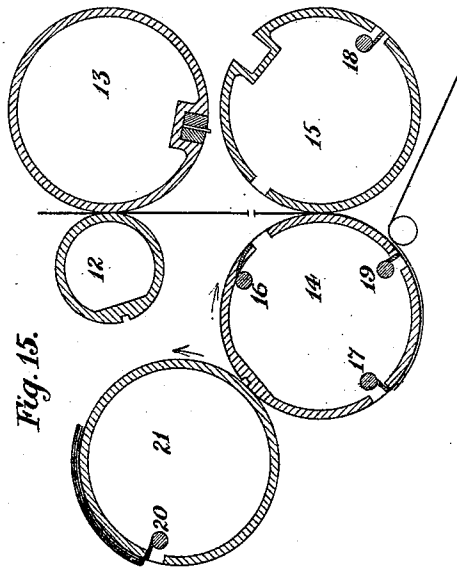
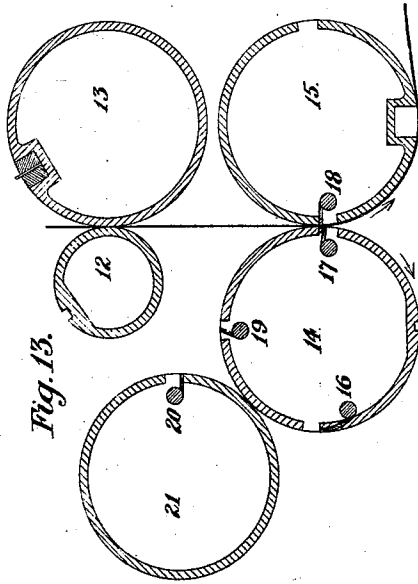
(No Model.)

10 Sheets—Sheet 9.

J. MICHAUD.
ROTARY PRINTING MACHINE.

No. 555,460.

Patented Feb. 25, 1896.



Witnesses:

Lucie M. Dorsett,
Jan G. Cameron,

Inventor:

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By *J. C. Jones*
Attorney.

(No Model.)

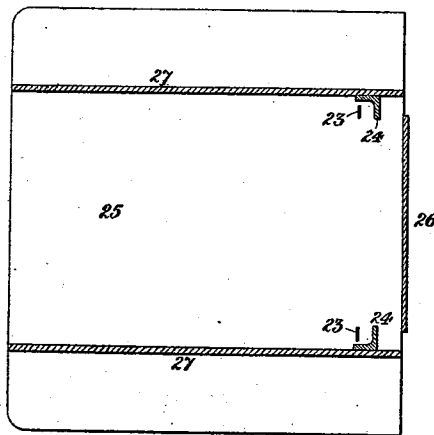
10 Sheets—Sheet 10.

J. MICHAUD.
ROTARY PRINTING MACHINE.

No. 555,460.

Patented Feb. 25, 1896.

Fig 16.



Witnesses:

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Sam G. Cameron.

Inventor:

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UNITED STATES PATENT OFFICE.

JULES MICHAUD, OF PARIS, FRANCE.

ROTARY PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 555,460, dated February 25, 1896.

Application filed November 11, 1892. Serial No. 451,683. (No model.) Patented in France March 24, 1888, No. 189,564, and August 6, 1890, No. 207,459, and in England February 14, 1889, No. 2,631, and December 8, 1890, No. 20,001.

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 certain new and useful Improved Rotary Printing-Machine, (for which I have obtained patents in France, No. 189,564, dated March 24, 1888, and No. 207,459, dated August 6, 1890, and a certificate of addition thereto dated September 4, 1890, and in Great Britain, No. 2,631, dated February 14, 1889, and No. 20,001, dated December 8, 1890,) of which the following is a specification.

This invention relates to an improved machine for printing works in one or in several colors on one or on both sides of the sheet, either for book-work or for newspapers, either ordinary or illustrated.

In the accompanying drawings, Figure 1 is a longitudinal section of a machine embodying this invention, certain parts of the folding and delivery mechanism not being shown, but shown in detail in Figs. 5 and 5^a. Fig. 2 is a diagrammatic side elevation showing a modification of one part of the machine. Fig. 3 is a plan view of the arrangement for changing the travel of the paper so as to cause the web to pass twice or oftener between the same cylinders. Fig. 4 is a plan view of the arrangements for changing the travel of one part of the web of paper, so as to superpose it upon the other part. Fig. 5 is a side elevation, and Fig. 5^a an end view, showing the folding-cylinders and delivery apparatus in detail. Figs. 6 and 7 are respectively a side elevation and plan view of the rollers and table for preventing the paper from sagging. Figs. 8 and 9 are respectively a side elevation and plan view of the arrangement employed for cutting the paper in two parts. Fig. 10 is a diagrammatic view showing means for printing a web of paper at will with one color on one side and four on the other or in five colors on the same side. Figs. 10^a and 10^b are side elevations, partly in section, of the gearing mechanism for changing the rotation of the printing mechanism. Fig. 11 is a diagrammatic view showing means for printing a web of paper in three colors on one side and two on the other. Figs. 12, 13, 14, and 15 are detail views showing the action of the fold-

ing-cylinders. Fig. 16 is a plan view of the delivery mechanism.

The paper from reel 1, Fig. 1, passes over cylinder 2, called the "blanket-cylinder," and is printed on one side by cylinder 3, carrying the printing-plates, after which it passes round the blanket-cylinder 4 and is printed on the opposite side first by the printing-cylinder 5 and then by the cylinder 6. The web next passes to the blanket-cylinder 7 and is printed, still on the same side, by coming in contact with the cylinders 8 and 9, after which it descends between the cutting-cylinders 12 and 13 and passes to the folding-cylinders 14 and 15. The head of the sheet is then thrown out toward cylinder 15 by the blade 16, (see Fig. 12,) and its center is by the blades 18 caused to be seized by the blades 17, (see Fig. 13,) which carry it forward, having received a first fold on cylinder 14.

The sheet carried forward by blades 17 is by blades 19 caused to engage the blades 20 of cylinder 21, Fig. 14, and thus receives a second fold, when it is abandoned, Fig. 15, and then, as shown in Figs. 1 and 16, descends between guides 22 and tapes 23, then between the tapes 23 and guides 24 until it arrives on the table, where it is pushed along by the reciprocating plate or plunger 26 into the channel formed by the table 25 and the two cheeks 27.

The guides 22 project into grooves formed in cylinder 21, so as to detach the sheet from the latter.

The blades 16 are mounted on a rod fitted with a crank *k* actuated by a cam *l*, Fig. 1.

The blades 17 are mounted on a rod fitted with a crank carrying a roller actuated by the cam *i*.

The blades 18 are mounted on a rod provided with a crank carrying a roller actuated by cam *h*.

The blades 19 are actuated by cam *n*, Fig. 1.

The blades 20 are actuated by cam *j*.

The reciprocating plate or plunger 26 is operated by a set of levers controlled by a cam *m*, Fig. 1.

It will be seen by the preceding description that the sheet is printed on one side by the printing-cylinder 3, then on the other side by the printing-cylinders 5, 6, 8 and 9, which may

each be inked with a different color, as a separate inking apparatus is provided for each cylinder, and finally that this sheet after receiving two folds then passes to the table 25 beside those previously delivered.

The printing-cylinders 5 and 6 are in contact with the same blanket-cylinder 4; but I may, as shown in Fig. 2, provide a separate blanket-cylinder for each printing-cylinder—that is to say, have a blanket-cylinder 4' in contact with cylinder 5, and a blanket-cylinder 4 in contact with cylinder 6—so as to enable two “make-readys” to be effected separately. I may also adopt the same arrangement on the left hand of the machine, so that the printing-cylinders 8 and 9 will each have a corresponding blanket-cylinder.

It will be seen that to insure the paper being carried forward and prevented from sagging between the cylinders 4 and 7 a roller 30 is provided, and in the “whites” or blanks of the sheet balls 49, of metal, india-rubber or other suitable material, bear on such roller. This roller 30 is driven by gearing at a surface speed slightly greater than that of the printing-cylinders, whereby the paper is always kept taut between the cylinders 4 and 7, thus insuring a perfect register. The balls 49 are cast on or attached to arms 49' pivoted to a transverse rod 49^a. On leaving blanket-cylinder 7 the paper passes over a roller 31, against which balls of metal, india-rubber or other suitable material bear, such roller 31, like roller 30, also being driven by gearing and at a surface speed slightly above that of the printing-cylinders. I thus obtain a regular tension of the paper, which is very necessary to produce a correct register. If necessary I also place a similar roller 30' at the delivery of cylinder 4, and between the cylinders 4 and 7 I arrange tapes or a table T to support the paper and prevent it from sagging during its passage, as shown in Figs. 6 and 7.

The machine shown in the drawings is arranged to print one color on one side and four colors on the opposite side. It is evident that I may increase the number of colors by causing the paper after it leaves cylinder 7 to pass to one or several other blanket-cylinders working in conjunction with one or several other printing-cylinders. I could also interpose between the cylinders 2 and 4 one or several blanket-cylinders working in conjunction with one or several printing-cylinders.

If necessary to print each side of the sheet in several colors I may also provide the requisite number of cylinders and inkers for printing the first side of the sheet.

The machine described may be arranged to print two copies in its width. These copies will then be separated on cylinder 21 by a disk 28, which projects into a groove made in the middle of such cylinder.

If there are four pages of a publication in the development of the cylinder, in the manner just described, I obtain on the machine

two copies, each of eight pages, folded with two folds.

I may, if I wish, obtain on the machine one copy of sixteen pages composed of two parts of eight pages each, superposed and folded together with two folds. The mechanism for effecting this object is best seen in Figs. 1, 8 and 9. A cutting-disk 29, journaled on an arm 29' pivoted on a transverse rod 29^a, engages a groove in the roller 30 and divides the web longitudinally into two parts of eight pages each, both of which pass over the blanket-roller 7 and between it and the printing-cylinder 9, one of said parts or web thence passing downward between the rapidly-revolving roller 31 and the pivoted balls 32, which hold it in contact with said roller, which latter serves to carry the paper along. The other part of the divided web adheres to the roller 7, passing under and upward on the back side of said roller and thence being directed over the roller 33; thence upward over a diagonal bar 34, whereby its direction is changed from a longitudinal to a transverse movement; thence to a corresponding diagonal bar 34^a parallel with the bar 34; thence downward under said bar; thence backward over the roller 35, whereby its direction of movement is restored, but in a different plane; thence downward and forward under the roller 36 and over the roller 13, where it meets the other portion of the cut web, which descends past the roller 31. The two cut webs thus become superposed on the roller 13, and in passing between the rollers 12 and 13 the superposed webs are cut transversely and descend together between the folding-rollers 14 and 15, where they receive their first fold. The superposed webs then pass between the rolls 14 and 21 and there receive a second fold, and thence are deposited on the delivery-table and the reciprocating plate will push into the delivery channel or tray a copy of sixteen pages.

If there are only two pages of a publication in the development of the cylinders, I shall in the case just described obtain four and eight pages instead of eight and sixteen.

I may with the same machine print, fold with one fold, and deliver copies of four pages, each of the pages having the same dimensions as in the preceding cases. For this purpose (see Figs. 5 and 5^a) the folding-cylinders 14 and 15 must be regulated in relation to the cutters 12 and 13 by means of gearing connecting them, so that the head of the sheet cut by the cylinders 12 and 13 is caused to correspond with the point 37 diametrically opposite the saw 38. Then the head of the sheet descending between the cylinders 14 and 15 is thrown out in the direction of the cylinder 15 by the blades 39, and the middle is by blades 40 engaged with the blades 41, which carry it forward folded. At the moment when the blades 41 pass the line of the centers of the cylinders 14 and 21 they

release the sheet, which is seized by the side grippers 42. After a complete rotation of the cylinders the grippers 42 gather a second sheet, cut and folded in the same manner as the first. Then the two superposed sheets are released by the grippers 42 under the action of the cam 48. The guides 22, which until now have not engaged the grooves made in the cylinder 21 to receive them, enter such grooves and remove the sheets from the cylinder, such sheets descending together to the receiving-table. The sheet following immediately after the first sheet above referred to—that is to say, the one of which the head was cut by the cylinders 12 and 13—is separated from the latter sheet by the saw 38 entering the groove 50 of cylinder 14, is thrown out toward the cylinders 15 by the blade 51, receives its fold by the blades 17 and 18, and is then seized by the grippers 42', which afterward gather a second, and the two sheets descend as the former ones onto the table, after having been removed from the cylinder 21 by the action of the movable guides 22. The side grippers 42 and 42' operate under the action of the cam *o* to seize the sheet. The cam 48 is brought into operative position to release the sheet at the required time by the action of a cam mounted on the shaft *p* and which acts on such cam through a connecting-rod *r*.

When wide reels of paper are used on the machine the right and left copies are separated at the moment of delivery by the cutting-disk 28, which is lowered at such moment. The levers actuating the disk 28 are shown at 28' and 29', Fig. 5.

In the case just described the folding-blades 19 and 20 do not enter into operation. In the preceding cases, those of publications of eight or sixteen pages, the blades 40 41, the saw 28, and the grippers 42 42' do not operate, it being easy to stop their action either by shifting the cams by which they are actuated or by removing the rollers on the crank-arms which bear against these cams.

The grippers 42 and 42' might release the sheet which they seize on their first passage in front of the reciprocating plate; but it would then be necessary for the latter to operate twice as quickly.

I may on this machine print in succession two colors on the same side of the sheet with a single printing-cylinder, one half of such cylinder serving for one color and the other half thereof for the other color. For this purpose I employ reels of paper of a width corresponding to one copy, the width of the cylinders being that corresponding to two copies. The web of paper, after being printed by passing between the two cylinders 2 and 3, passes around roller 4, then over the non-inverting laterally-shifting endwise web-reverser comprising the bars 34', roller 43' and roller 45, (shown in Fig. 3,) and passes again between the cylinders 2 and 3 at the part adjoining that where it passed previously, and

it receives a second impression on the same side. By use of this non-inverting laterally-shifting endwise reverser the paper is not turned on its opposite side, but laterally shifted and endwise turned to bring the same side a second time to the printing mechanism.

It is only necessary that the inking apparatus corresponding to the cylinder 2 should be divided into two parts, and for these two parts to contain different-colored inks, to insure the web receiving the two impressions in different colors. This combination of the change of direction of the printed web with the inking of the printing-plates of a single cylinder in different colors to obtain impressions in different colors, either superposed or not, I may apply to any kind of printing-machine.

I may, by changing the direction of rotation of a group of cylinders and the direction of the entrance of the paper between such cylinders, employ all the printing-plates to print one side only of a sheet. I may also employ two or three printing-cylinders to print on one side and the others for the opposite side.

In the machine described I obtain one color on one side and four on the other side. The cylinders 4 and 2 each carry two gear-wheels, (see Fig. 10,) the wheels *a* and *b*, which connect such cylinders together, and the wheels *c* and *d* of the same diameter as the cylinders themselves, and which gear with other wheels mounted on the cylinders 6 and 3.

If I remove wheel *a* from cylinder 2 and employ a wheel *f* connecting the two wheels *d* and *c*, the direction of rotation of cylinders 2 and 3 will be the opposite to what it was previously, and by passing the paper as shown by the broken line in Fig. 10 five colors will be printed on one side of the web of paper.

In Fig. 11 I employ the same arrangement of wheels. Wheel *a* is removed and wheel *f* employed, but in addition I take the wheel *g*, which actuates the set of cylinders 8 7 9, and place it at *g'*. By this means the direction of rotation of this group of cylinders is changed, and by passing the paper as shown by the broken line I print three colors on one side of the sheet and two on the other.

In order that the cutting-cylinders 12 and 13 and the folding-cylinders do not change their direction of rotation, I remove the wheel *s* and place same at *s'*.

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

1. The combination of two rotary printing mechanisms disposed in succession and adapted to perfect a wide web, and a reversing mechanism disposed adjacent thereto and adapted to reverse the direction of a part-width web, whereby it may be printed twice in two colors on the same side on the same printing-rolls, substantially as described.

2. A printing-machine having wide rotary printing mechanisms and a non-inverting laterally-shifting endwise web-reverser dis-

posed between said mechanisms and having a capacity of a fraction of the width thereof, and separate inking mechanisms for different parts of one of said printing mechanisms, whereby a wide web may be printed on one side and perfected or a narrow web printed twice in two colors on the same side by the same printing mechanisms and perfected, substantially as described.

10 3. The combination of two rotary printing mechanisms for printing a web, a roller disposed between said mechanisms and adapted to revolve at a speed greater than the travel of the web, and weighted arms resting on the whites of the web and holding it in contact with said roller, substantially as described.

15 4. The combination of two rotary printing mechanisms for printing a web, rollers disposed between said mechanisms and adapted to revolve at a speed greater than the

travel of the web, weighted arms resting on the blanks of the web for holding the web in contact with said rollers, and means for supporting said web while passing from one roller to the other, substantially as described. 25

5. In a rotary printing-machine, the combination of a series of rotary printing and impression cylinders, geared wheels on said impression-cylinders larger than said cylinders, meshing with each other, and geared wheels on said impression-cylinders of the same size as said cylinders adapted to mesh with gears on the printing-cylinders, and a pinion adapted to engage the smaller gears when the larger gears are disconnected, substantially as described. 30 35

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Witnesses:

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