

No. 741,375.

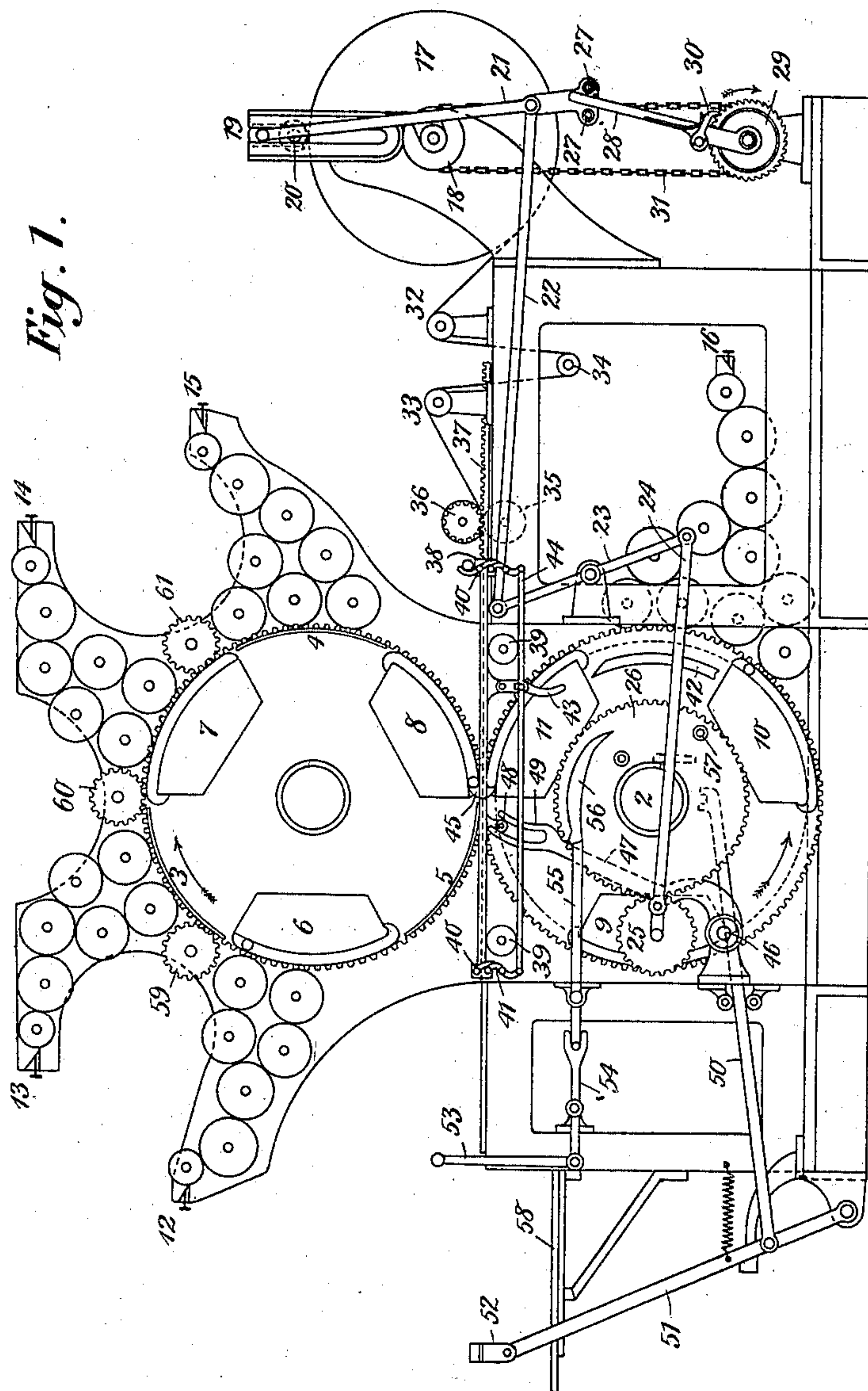
PATENTED OCT. 13, 1903.

M. RUDOMETOFF.
MULTIPLE COLOR AND TEXT PRINTING MACHINE.

APPLICATION FILED OCT. 28, 1902.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses:

Barbara Lambie
Julia McLaughlin

Inventor

Michael Rudometoff
by Henry L. Reynolds
Attorney.

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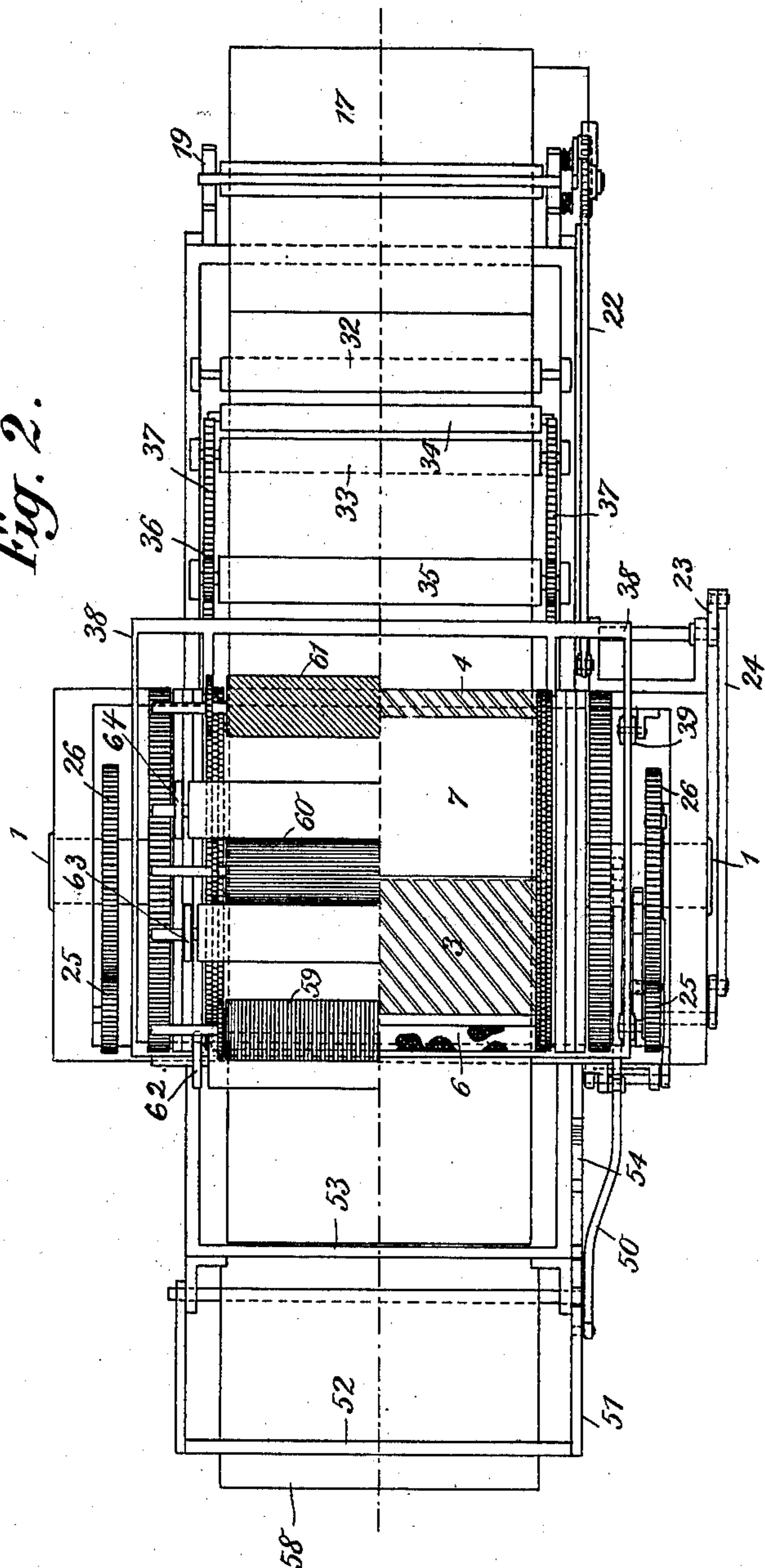
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3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

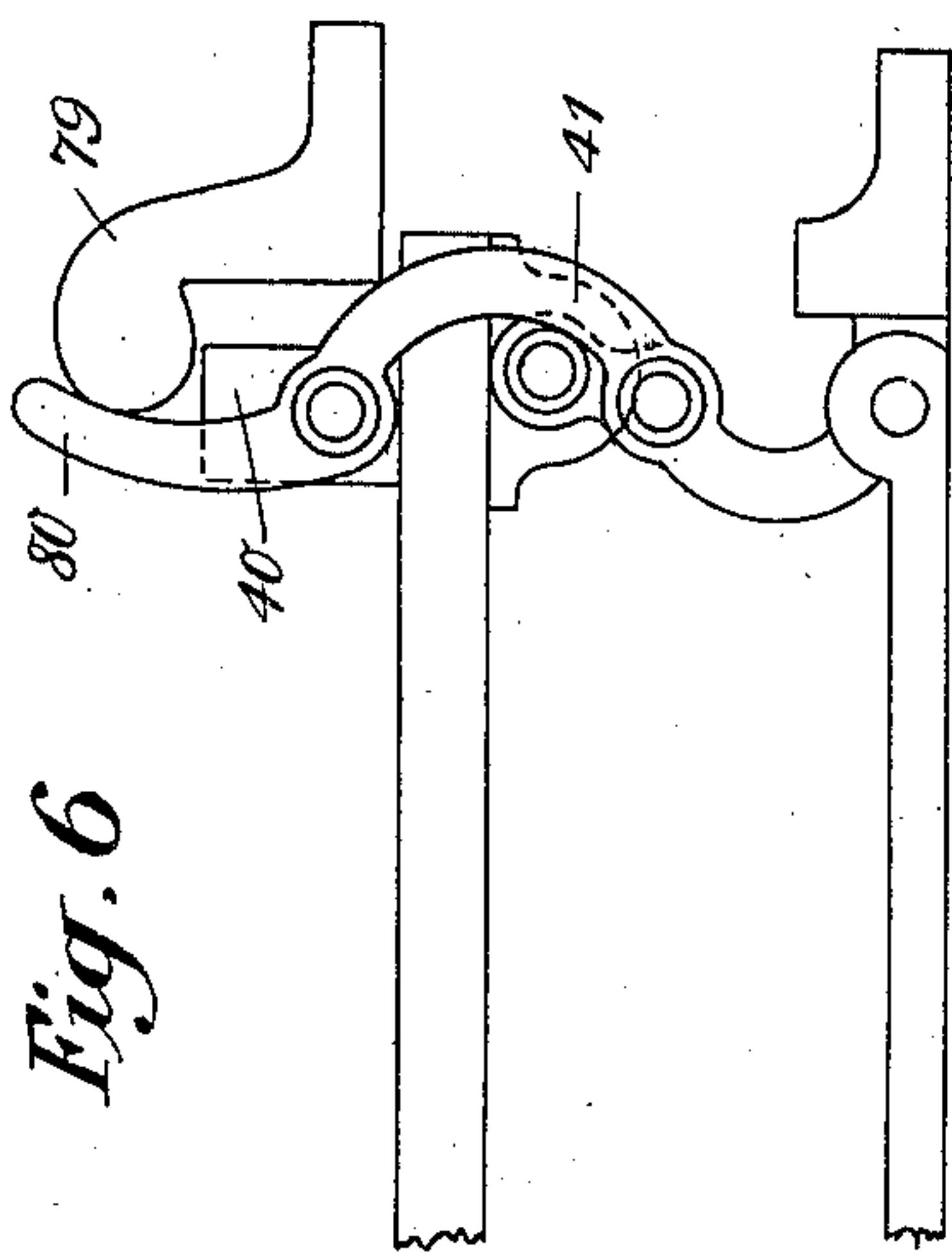


Fig. 6

Fig. 3.

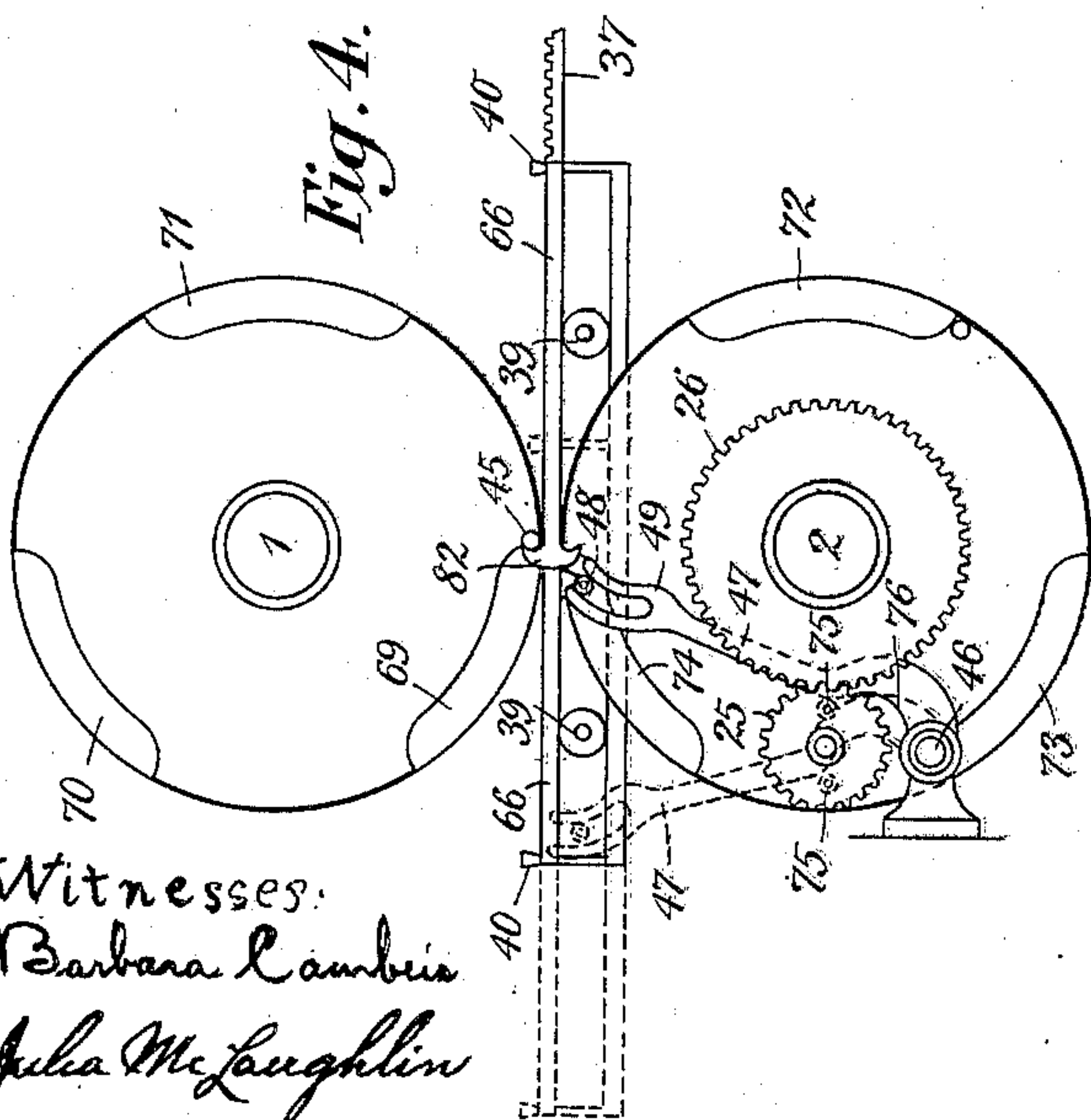
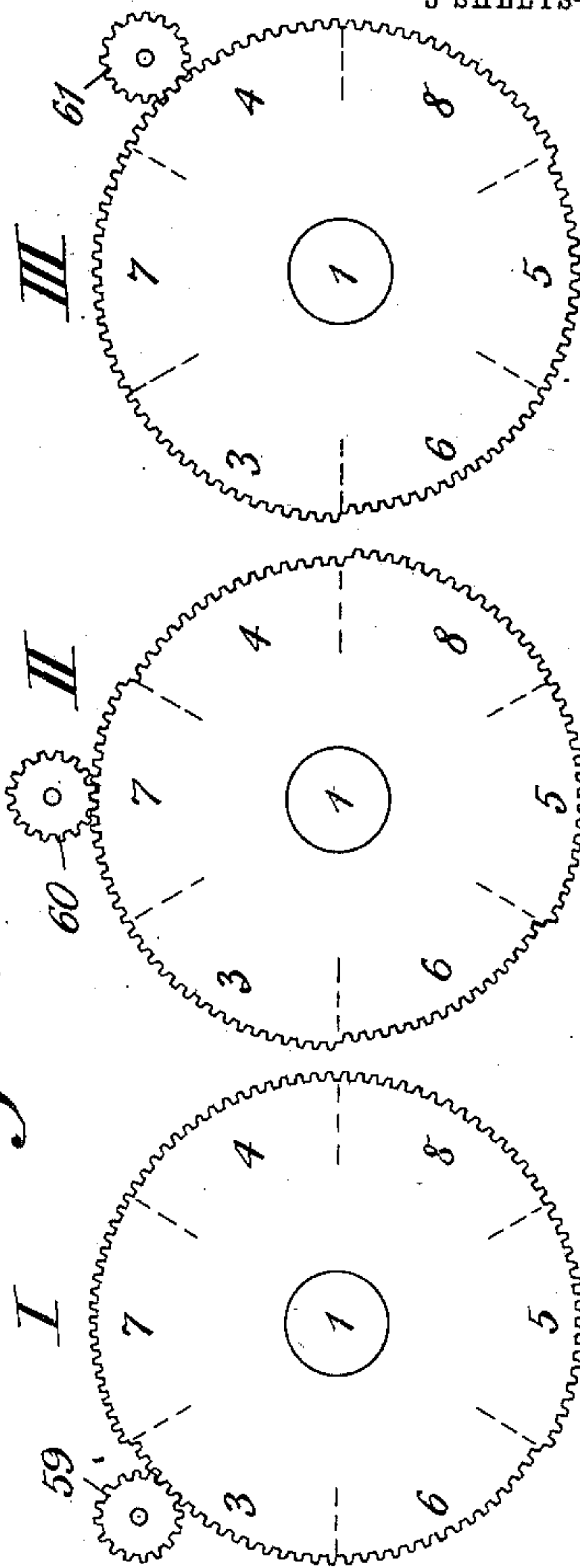


Fig. 4.

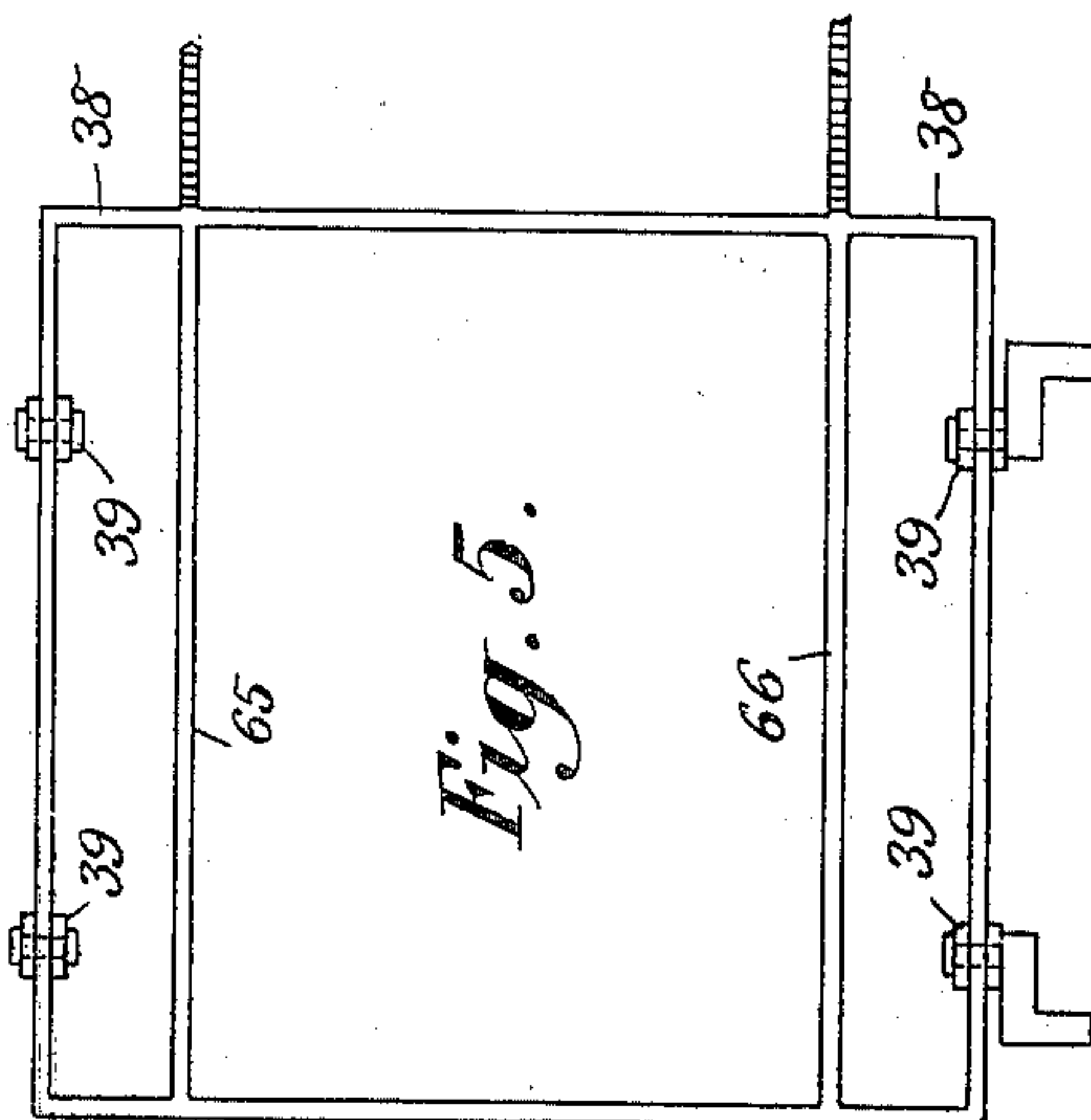


Fig. 5.

Witnesses:
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UNITED STATES PATENT OFFICE.

MICHAEL RUDOMETOFF, OF GOTTSCHINA, RUSSIA.

MULTIPLE-COLOR AND TEXT PRINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 741,375, dated October 13, 1903.

Application filed October 28, 1902; Serial No. 129,168. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL RUDOMETOFF, a subject of the Emperor of Russia, and a resident of Gottschina, Russia, have invented Improvements in Multiple-Color and Text Printing Machines, of which the following is a description.

The present invention relates to a machine by means of which a sheet of paper stretched in a frame is, during one revolution of the printing-drum, printed on both sides with text and simultaneously on one side with a multiple-color print.

In the accompanying drawings the invention is illustrated in diagrams.

Figure 1 is a side elevation. Fig. 2 is a plan showing the manner of differently grooving or fluting the surfaces of the rolls which receive the different colors. Fig. 3 shows diagrammatically in side elevation the means for operating said rolls. Fig. 4 is a side elevation of the carriage with its driving-gear; Fig. 5, a plan of the carriage with the rails attached thereto, and Fig. 6 shows the paper-gripping device.

The improved machine consists, essentially, of two cylinders of equal diameter mounted on the shafts 1 and 2. The supporting-frames for the latter are omitted in the drawings for the sake of greater clearness. During the running both cylinders continue to turn in one and the same direction, as indicated by the arrows in the drawings. The cylinders are driven in the known manner by means of tooth-gears. Each cylinder is divided into six equal parts, the upper cylinder being provided with three color-blocks 3, 4, and 5, the impression-surface 8, the type block or form 7, and the collecting-block 6, on which latter the designs of all three original blocks are collected or assembled, then deeply etched, and also provided with lines of different depths, according to a process described in my Patent No. 714,953, issued December 2, 1902. Two impression-surfaces 9 and 10 and the type-block 11 are arranged on the lower cylinder.

The printing operation of the upper cylinder is as follows: At each complete revolution of the cylinder the color-blocks 3, 4, and 5, Fig. 1, are each provided with its proper

color from the coloring-roll sets 12, 13, and 14, and those blocks which are not to be provided with color have their corresponding inking-rolls raised by means of rolls 62, 63, and 64, Fig. 2, arranged or mounted on the ends of these inking-rolls. The blocks which have been provided with color transmit the same to the take-up rolls, the surfaces of which are provided with grooves or flutings corresponding with the grooves or flutings on its particular block, the block 3 transmitting color to roll 59, block 4 to roll 60 and block 5 to roll 61, Fig. 1. These rolls, which are respectively lined or fluted in different directions, as shown in Fig. 2, and also preferably to different depths, transmit the outlines of the various colors to the collecting form or block 6, which is also preferably grooved or fluted to correspond to the grooves in all the color-transmitting rolls. These rollers receive the ink from the blocks upon the tops of their flutings—that is, upon the cylindrical surfaces between the grooves—and transfers it to the bottoms of the grooves of the printing or collecting form 6. In order to enable each transfer-roll to come into contact with its proper coloring or color-feed mechanism only, a known method is employed, in that both ends of the shaft of the cylinder 1 are provided with three gears each of two different diameters, as will be seen from Fig. 3. The teeth of the gear I lie deeper or are set back at that part of the cylinder corresponding to the collecting-block 6 and the coloring-block 3, while at all the other parts of the cylinder where the type-form 7, the coloring-block 4 and 5, and the impression-surface 8 are provided the diameter of the pitch is increased, so that contact with the take-up roll 59 is avoided at these parts. In a similar manner the gears II and III are provided with a reduced diameter for the rolls 60 and 61 as regards the collecting-block, as also the corresponding color-blocks 4 and 5. Thus it will be clear that when the collecting-block 6 has passed all three transfer-rolls 59, 60, and 61 all the colors of the original will be transferred to the said collecting-block and at the bottom of deep flutings of different direction and of different depths for each color. When the collecting-block reaches the paper, it will be

evident that a single impression will print all the colors simultaneously, whereupon the operations described will be repeated. The type-block 7 on the upper cylinder is provided with ink by the rolls 15 and prints the paper in the known manner. At the lower side two impression-blocks 9 and 10 are arranged to cooperate, respectively, with the collecting-block 6 and the type-form 7, while, in addition to these, another type-form 11 is arranged on the lower cylinder, which is inked from the distributing mechanism 16 in the known manner. This type-form 11 corresponds to the impression-surface 8 of the upper cylinder. It will therefore be understood that the sheet of paper fed through between the two cylinders will, in addition to the color-printing, be provided with text on the upper side and also with text on the lower surface.

The paper-feed takes place in the following manner: The paper web 17 is wound in a roll mounted in bearings 18. In order to regulate the winding-off of the paper, an iron roll 19 and a rubber roll 20 are arranged above the paper-roll. According to the quantity wound off and the consequent decrease in the diameter of the paper-roll the roll 19 will sink down and will take a rod 21, connected with it, down also. This rod is connected to a gear 25 by means of levers 22, 23, and 24, the gear 25 being driven by a gear 26 on the shaft of the lower drum or cylinder, the gears being in the proportion of three to one. As will be seen from the drawings, the rod 24 is eccentrically connected to the gear 25, so that the rotation of the said gear will rock the lever mechanism swinging round the fixed pivot 81. Since the rod 22 is pivoted to the rod 23, it will be able to follow the downward movement of the rod 21 caused by the decrease in the diameter of the paper-roll and will impart a rocking motion to the rod 21. The lower end of 21 carries rolls 27, between which a lever 28 is loosely arranged which will follow the swinging motion of the rod 21, which motion will increase as the rod 21 sinks. The lever 28 is mounted on the spindle of a ratchet-wheel 29, while a pawl 30 is mounted on the lever itself, which will rotate the ratchet-wheel 29 in the direction of the arrow owing to the backward-and-forward motion of the lever 28. The motion of the ratchet-wheel 29 is transmitted by means of chain-wheels and chain 31 to the paper-roll 17, so that the paper will be wound off at a greater speed in the proper proportion to the decrease in the diameter of the paper-roll. The paper runs from the roll 17 over the freely-rotating rolls 32 and 33. The roll 34, which rests freely on the paper, serves to constantly and evenly stretch the paper wound off. The paper then passes between two india-rubber clamping-rolls 35. The upper one of these two rolls engages a rack 37 with its gear 36, said rack forming a prolongation of the frame 38, Fig. 2, which slides freely on the rolls 39 during the motion of the cylinder. Straight

edges covered with rubber are attached to this frame, which with the aid of a suitable lever system 41 serve to clamp the paper. This clamping-frame is operated from the lower cylinder by means of a cam-surface 42, which contacts with a finger 43, attached to the rod 44. As soon as the cam 42 contacts with the finger 43 by the rotation of the cylinder 2 (in the position shown in Fig. 1) the said finger will be moved to the right in Fig. 1 and will move the rod 44 in the same direction. The result is that the lever system 41 (shown in Fig. 6 drawn to a larger scale) will move the two straight edges 40 apart and will allow the paper band either to enter the frame or to pass on through the machine.

When the finger 43 has passed off the cam 42, it will return to its initial position, as will also the rod 44, whereupon the straight edges 40 will again clamp the paper, in that the movable lever 80 strikes the stop 79, Fig. 6. This frame or carriage is now moved by the upper cylinder to attain the necessary impression, while the backward movement of the carriage takes place much more quickly. With this object in view a lever 47, Figs. 1 and 4, is pivotally supported at 46 and engages with its bifurcated end 49 a pin 48 on the carriage. This lever is moved by means of a roll 75, mounted on the gear 25. If the lever, together with the carriage, has been moved right over to the left by the rotation of the cylinder, as illustrated in dotted lines in Fig. 4, the said lever will be at the opposite side of the wheel 25 to that illustrated in dotted lines in Fig. 4 and will be thrown back by the roll 75 with the speed at which this gear is driven from the gear 26 and will take the carriage with it. If the carriage should get stuck in its movement through the cylinders from left to right, the roll 75 of the gear 25 will continue its movement without moving the lever farther, in that it moves in a recess 76, formed in said lever. The carriage with the paper stretched therein moves six times during one complete revolution of the cylinders—three times in the direction of motion of the cylinders forward and three times backward. The frame of the carriage rests on rolls 39, Fig. 5, while two iron rails 65 and 66, provided with rubber to increase the friction, serve to retain the carriage between the upper and lower cylinders, so that the carriage moves together with the cylinders. In order to determine the exact moment at which the movement of the carriage is to take place, a finger 45 is attached to the cylinder 1, which engages the lug 82 of the carriage and releases it again when taken upward by the motion of the cylinder, so that the carriage will be moved at this moment solely by the friction between it and the cylinder 1. The backward movement of the carriage is effected, as already described, by means of the lever 47. With this object in view recesses 69, 70, 71, 72, 73, and 74 are provided in the cylinders, so that on the backward movement

the carriage may move freely between the cylinders when the recesses of both cylinders are in a corresponding position.

The cooperation of the cylinders and the carriage takes place in the following manner: At the first forward movement of the carriage between the two cylinders an impression of the collecting form or block 6 takes place. Then the carriage moves back again. The
 10 third step is an impression of the upper type-form, the fourth step the return of the carriage again, and the fifth step the impression of the lower type-form on the under side of the paper. At the close of this step the cam
 15 42 comes into contact with the finger 43, thus causing the straight edges 40 to open in the manner described and release the sheet of paper. At this moment the clamping device
 20 52 approaches the cutter 53, grips with its clamps the projecting edge of the paper strip, and holds it fast. At the sixth step the carriage is moved backward with the straight edges 40 opened, so that the upper one will slide over the paper until the lever 80 strikes
 25 the stop 79 in the manner described. This causes the straight edge to close and clamp a fresh piece of paper, whereupon the whole set of operations is repeated. At the first step of the new or repeated set of movements the clamping device 52, with the paper in it,
 30 moves to the left under the influence of a spring, and the cutter 53 severs the paper. The clamping device 52 finally releases its straight edges and the sheet falls down onto
 35 the receiving-table 58. For this purpose a lever 50 is arranged on the gear 26, which is, in connection with a lever 51, attached to the frame of the machine and being under the influence of a spring. The upper part of
 40 this lever 51 carries the clamping device 52. The cutter device 53, which is only diagrammatically illustrated in the drawings and may be of any desired construction, is operated by levers 54 and 55, the latter of which comes
 45 with its cam 56 under the bolt 57, mounted on the gear 26, and is thereby moved up and down.

Apart from the peculiar construction the novelty of the present machine also consists
 50 in the fact that a sheet of paper is printed with text at both sides and provided in addition with a multiple-color print on one side during a single complete revolution of the upper and lower cylinders, the simultaneous
 55 printing from the collecting-form being rendered possible by providing the said form with lines of different direction and depth corresponding to the different colors.

I claim as my invention--

60 1. In a multicolor-printing mechanism, the combination with a multicolor-printing form a plurality of single-color forms, and means for supplying the ink to the single-color forms, of fluted rollers for transferring the ink from
 65 the single-color forms to the multicolor form.

2. In a multicolor-printing mechanism, the combination with a multicolor-printing form,

a plurality of single color forms, and means for supplying ink to the single-color forms, individual transfer-rollers each adapted to
 70 transfer ink from its particular single-color form to the multicolor or printing form, said transfer-rollers having grooved or fluted transfer-surfaces with the direction of the grooves different on each roller. 75

3. A multicolor-printing mechanism, comprising a multicolor-printing form, and means for transferring the different colors to the printing-form each as a series of lines which
 80 lines differ in direction for each color and are sufficiently interrupted at crossing-points to prevent superposition of colors.

4. In a printing mechanism, the combination with a pattern-surface and a printing-surface, of a transfer-roller having a finely-
 85 grooved surface and adapted to contact with both of said surfaces.

5. In a multicolor-printing mechanism, the combination with a multicolor-printing form, and a plurality of inking-forms, of a plurality
 90 of transfer-rollers having fluted or grooved transfer-surfaces, the multicolor-printing form having its printing-surface grooved or fluted to correspond therewith.

6. In a multicolor-printing mechanism, the combination with a multicolor-printing form, a plurality of inking-forms, and a transfer-roller for each inking-form, the transfer-sur-
 95 faces of the said transfer-rollers being grooved or fluted, the direction of said grooves or flutings varying for different rollers, and the printing-surface of the multicolor form being grooved in a plurality of directions corresponding with the grooves of the transfer-
 100 rollers. 105

7. In a multicolor-printing mechanism, the combination with a multicolor-printing form, and a plurality of inking-forms, of a transfer-roller for each inking-form, said transfer-
 110 rollers having grooved transfer-surfaces, the direction of the grooves and their depth being different for each roller, and the multicolor-printing form having its printing-surface grooved to correspond in direction and depth with the grooves of the transfer-rollers. 115

8. In a printing-press, the combination with a pair of cooperating cylinders, one adapted to receive a plurality of printing-forms and an impression-surface alternating with substantial separating-spaces, the other cylinder
 120 having a plurality of impression-surfaces and adapted to receive a printing-form, said impression-surfaces and printing-forms being separated to cooperate with the complementary surfaces upon the other cylinder, of
 125 means for presenting a sheet of paper successively to the action of all the printing-forms during a revolution of the cylinders.

9. In a printing-press, the combination with a pair of cooperating cylinders, one adapted
 130 to receive a plurality of printing-forms and an impression-surface all alternating with substantial separating-spaces, the other cylinder having a plurality of impression-sur-

faces and being adapted to receive a printing-form, said impression-surfaces and printing-form being spaced to coact with the complementary members of the other cylinder, of
5 means for reciprocating a sheet of paper between said cylinders alternating with and against their direction of motion until it has received impressions from all the printing-forms.

10 10. In a printing-press, the combination with a pair of coöperating cylinders, one adapted to receive two printing-forms and having an impression-surface, said forms and impression-surfaces alternating with substantial

spaces which do not engage the paper, means 15
for applying a plurality of colors to one of said forms, the other cylinder having complementary impression-surfaces and printing-form, of means for reciprocating a sheet to successively present it to all of the said printing-forms. 20

In witness whereof I have hereunto set my hand in presence of two witnesses.

MICHAEL RUDOMETOFF.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.