

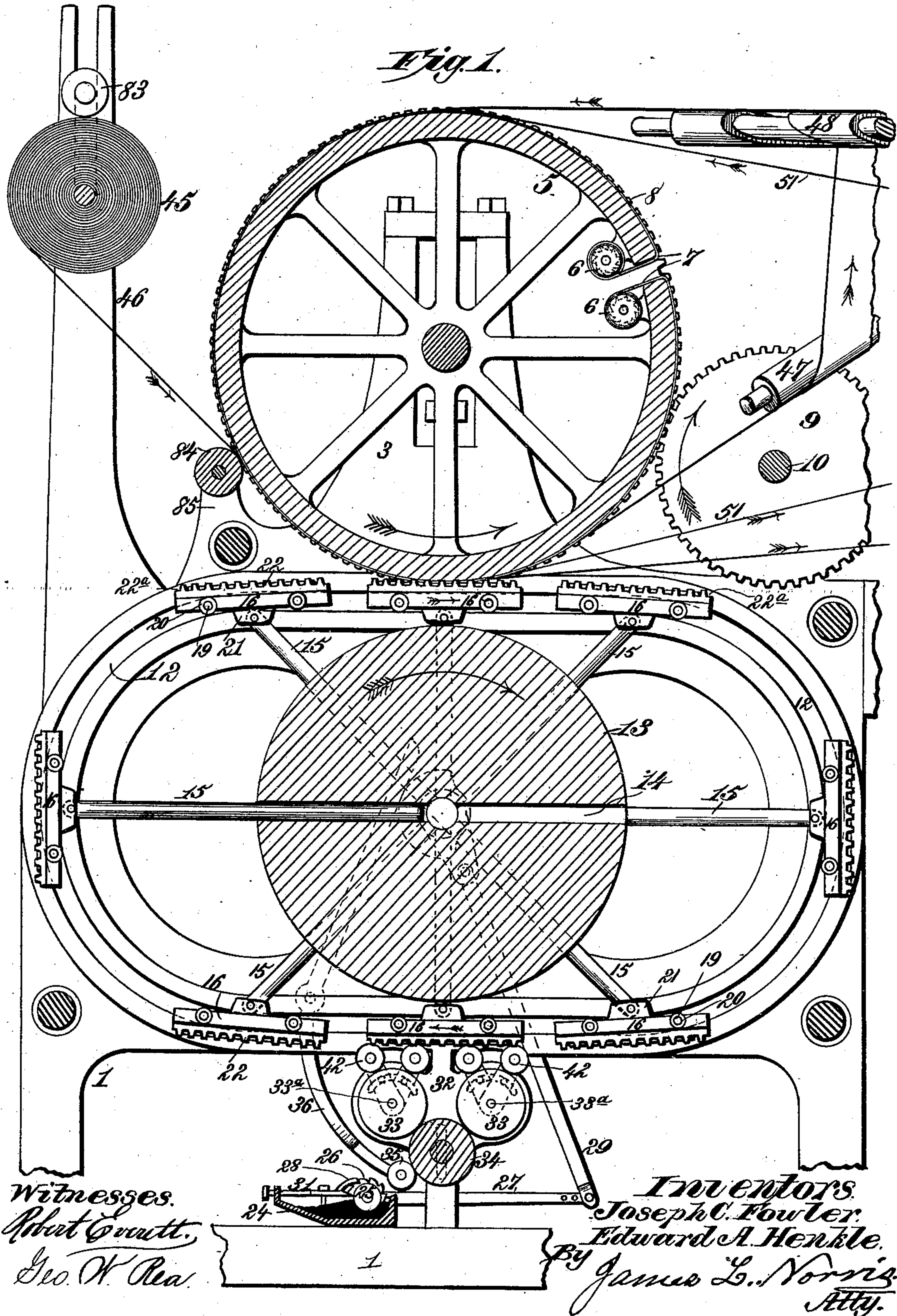
(No Model.)

8 Sheets—Sheet 1.

J. C. FOWLER & E. A. HENKLE.
PRINTING MACHINE.

No. 373,353.

Patented Nov. 15, 1887.



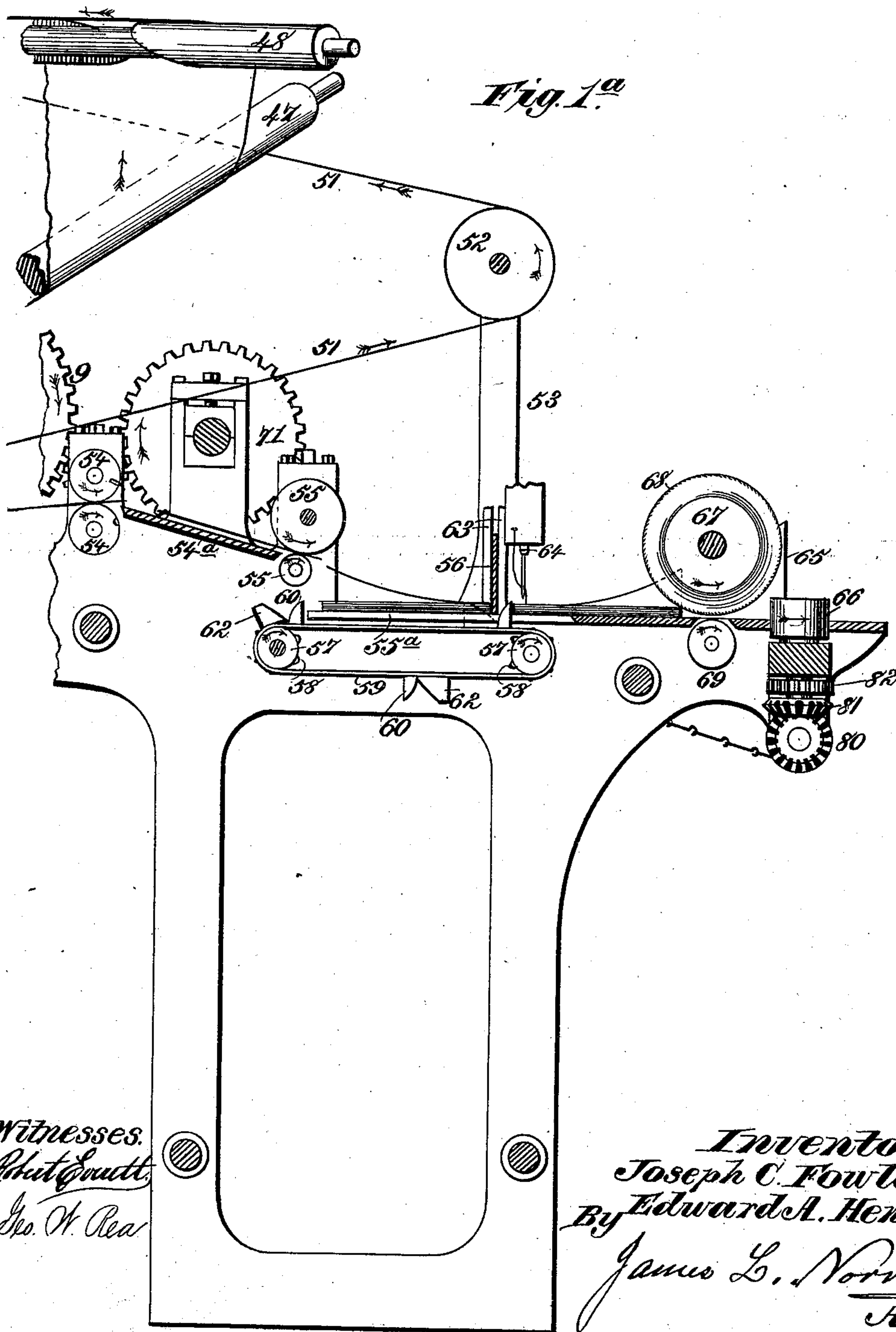
(No Model.)

8 Sheets—Sheet 2.

J. C. FOWLER & E. A. HENKLE.
PRINTING MACHINE.

No. 373,353.

Patented Nov. 15, 1887.



Witnesses.
Robert Smith
Geo. W. Rea

Inventors
Joseph C. Fowler
By Edward A. Henkle
James L. Norris
Atty.

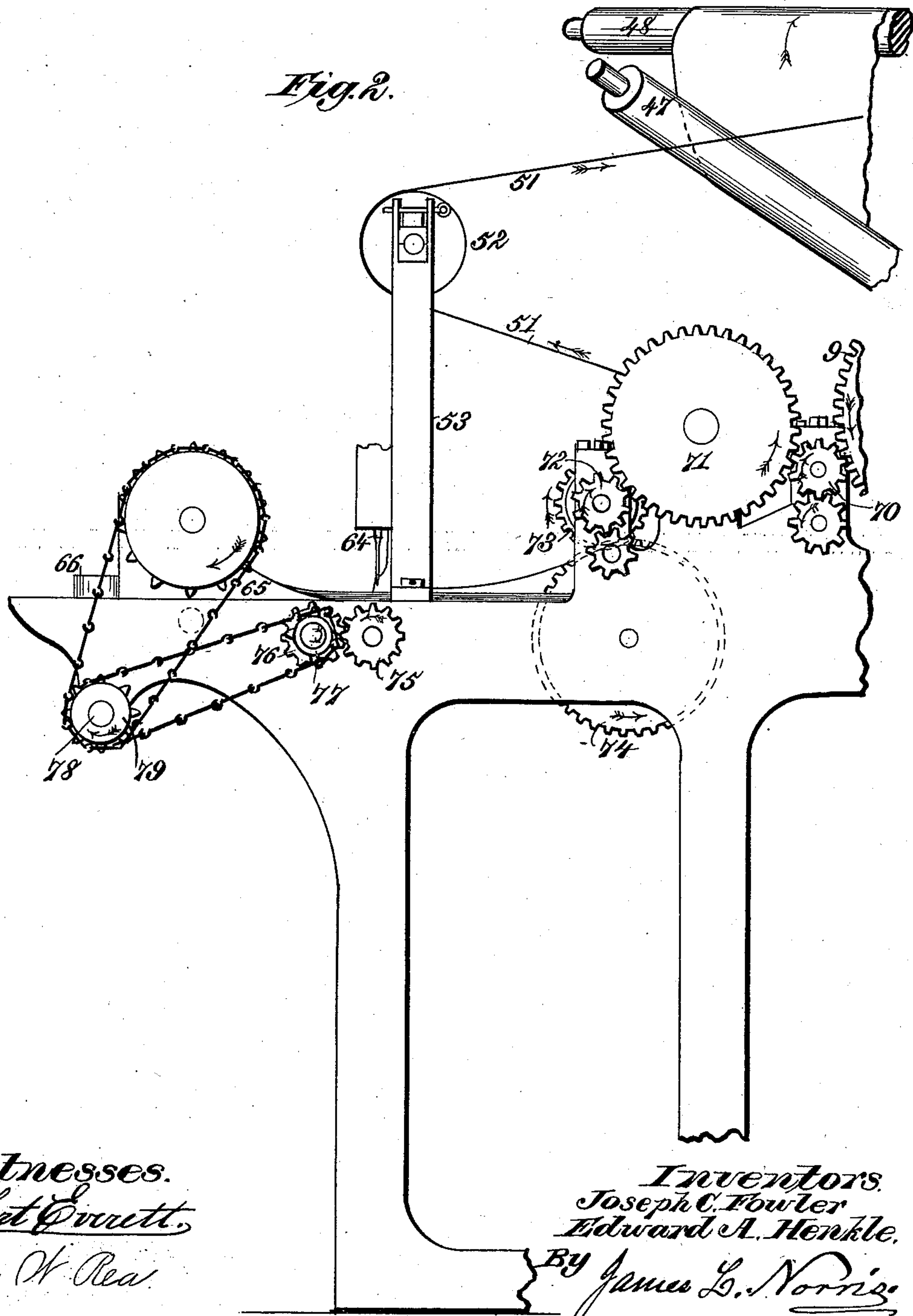
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8 Sheets—Sheet 3.

J. C. FOWLER & E. A. HENKLE.
PRINTING MACHINE.

No. 373,353.

Patented Nov. 15, 1887.



Witnesses.
Robert D. Pratt.
Geo. W. Rea.

Inventors.
Joseph C. Fowler
Edward A. Henkle.
By James L. Norris
Atty.

(No Model.)

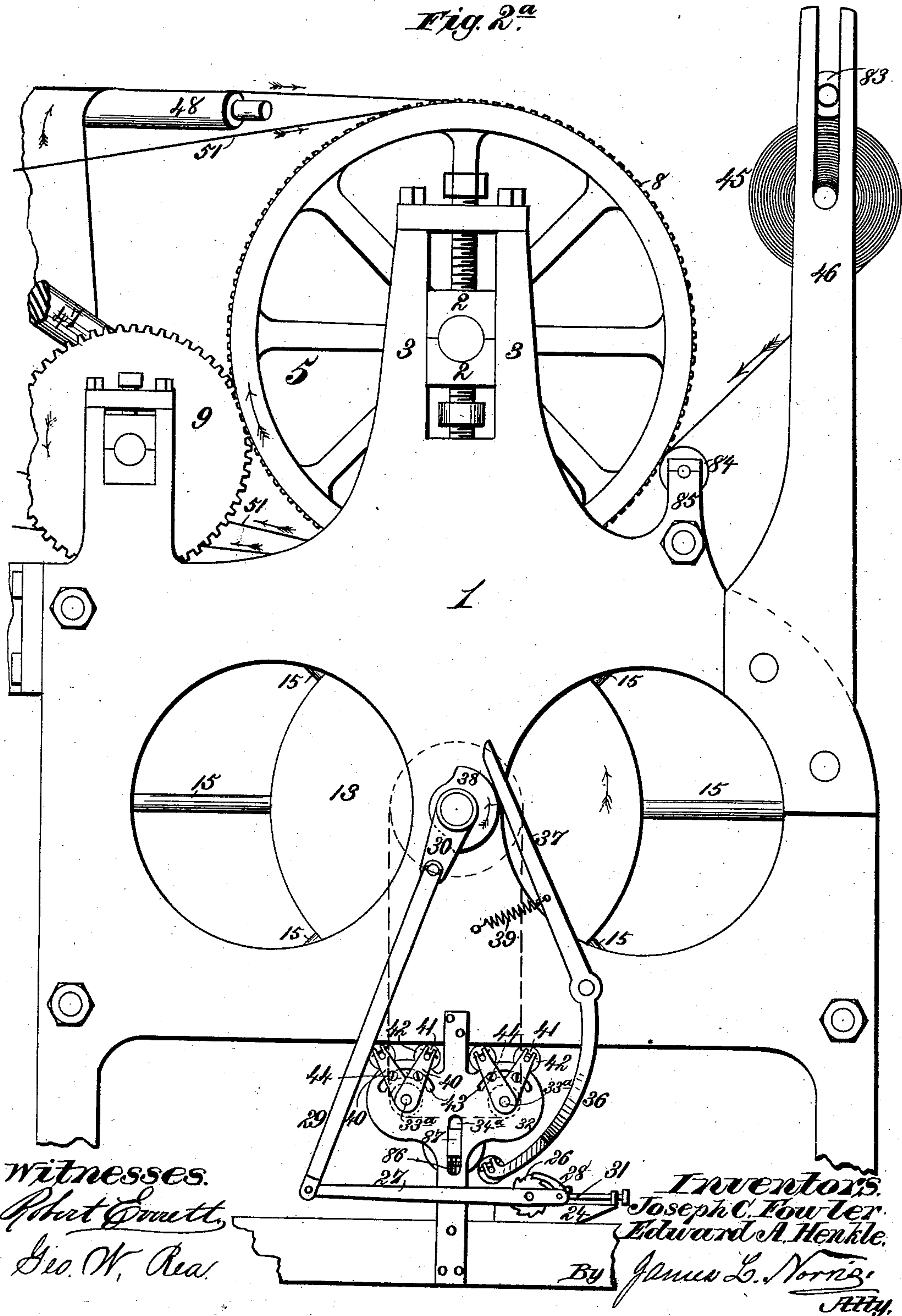
8 Sheets—Sheet 4.

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Fig. 2^a



(No Model.)

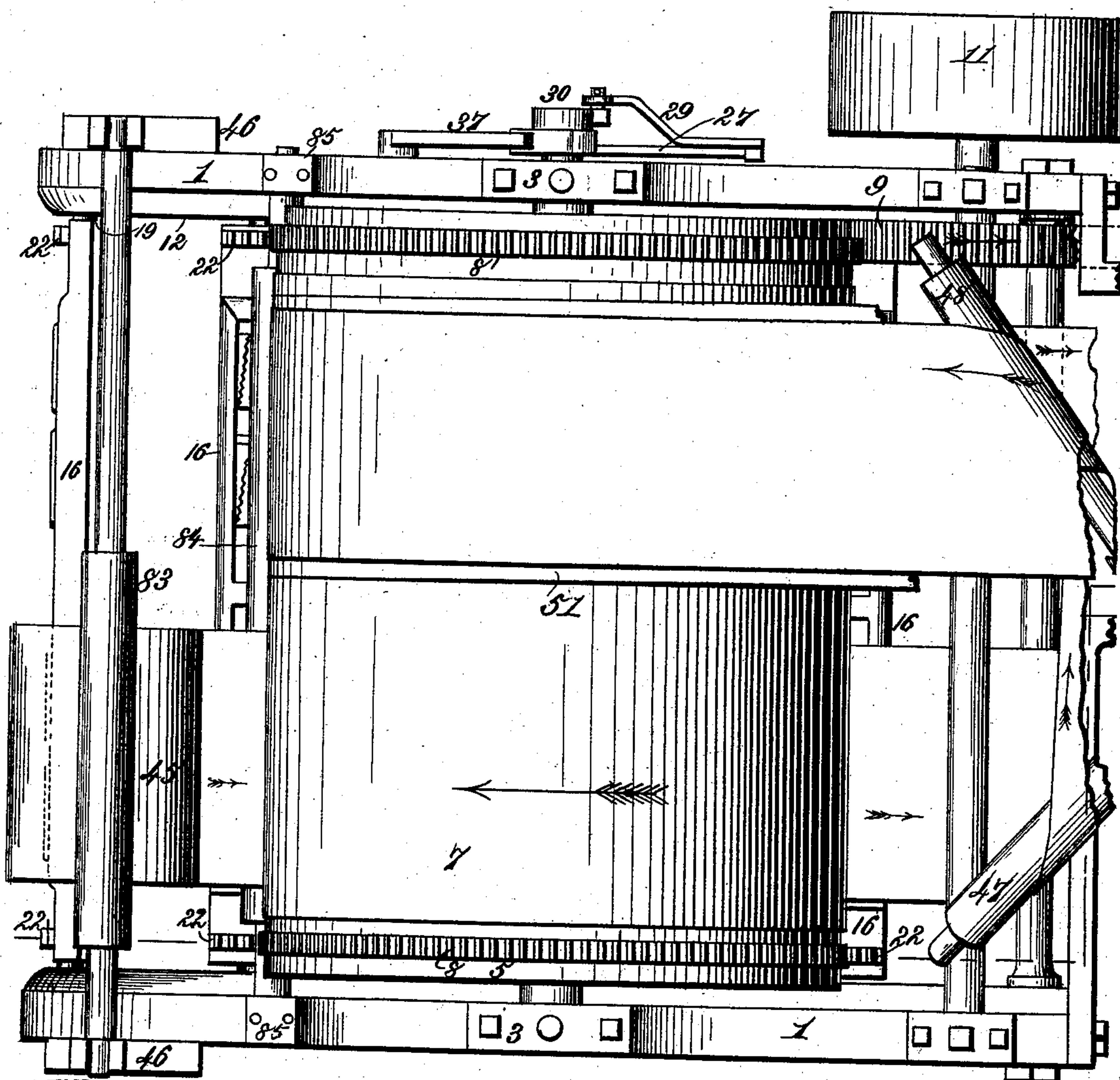
8 Sheets—Sheet 5.

J. C. FOWLER & E. A. HENKLE.
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Fig. 3.



Witnesses:
Robert Emmett,
Geo. W. Rea.

Inventors:
Joseph C. Fowler,
Edward A. Henkle,
By James L. Norris,
Atty.

(No Model.)

8 Sheets—Sheet 6.

J. C. FOWLER & E. A. HENKLE.
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No. 373,353.

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Fig. 3.

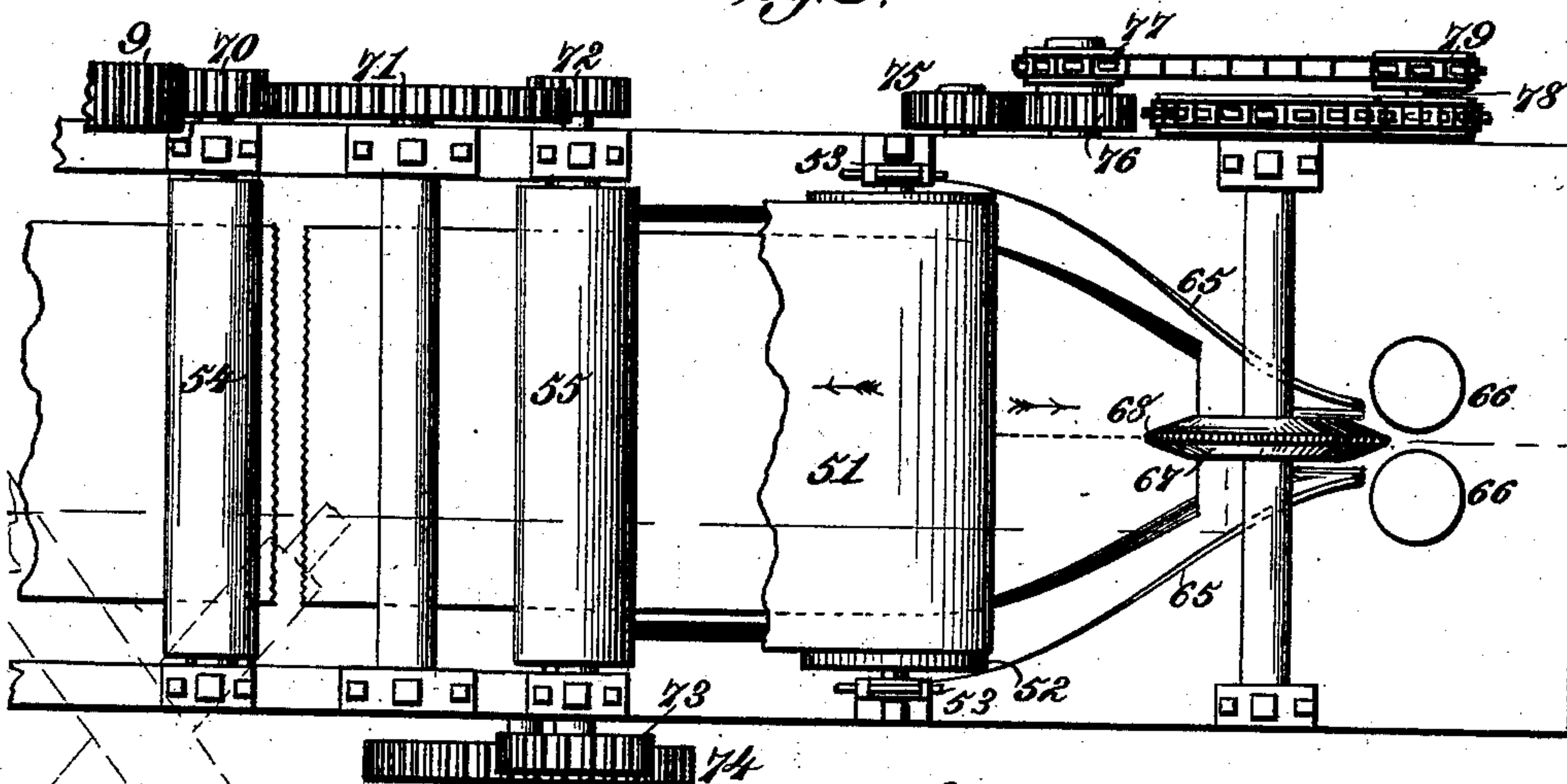


Fig. 4.

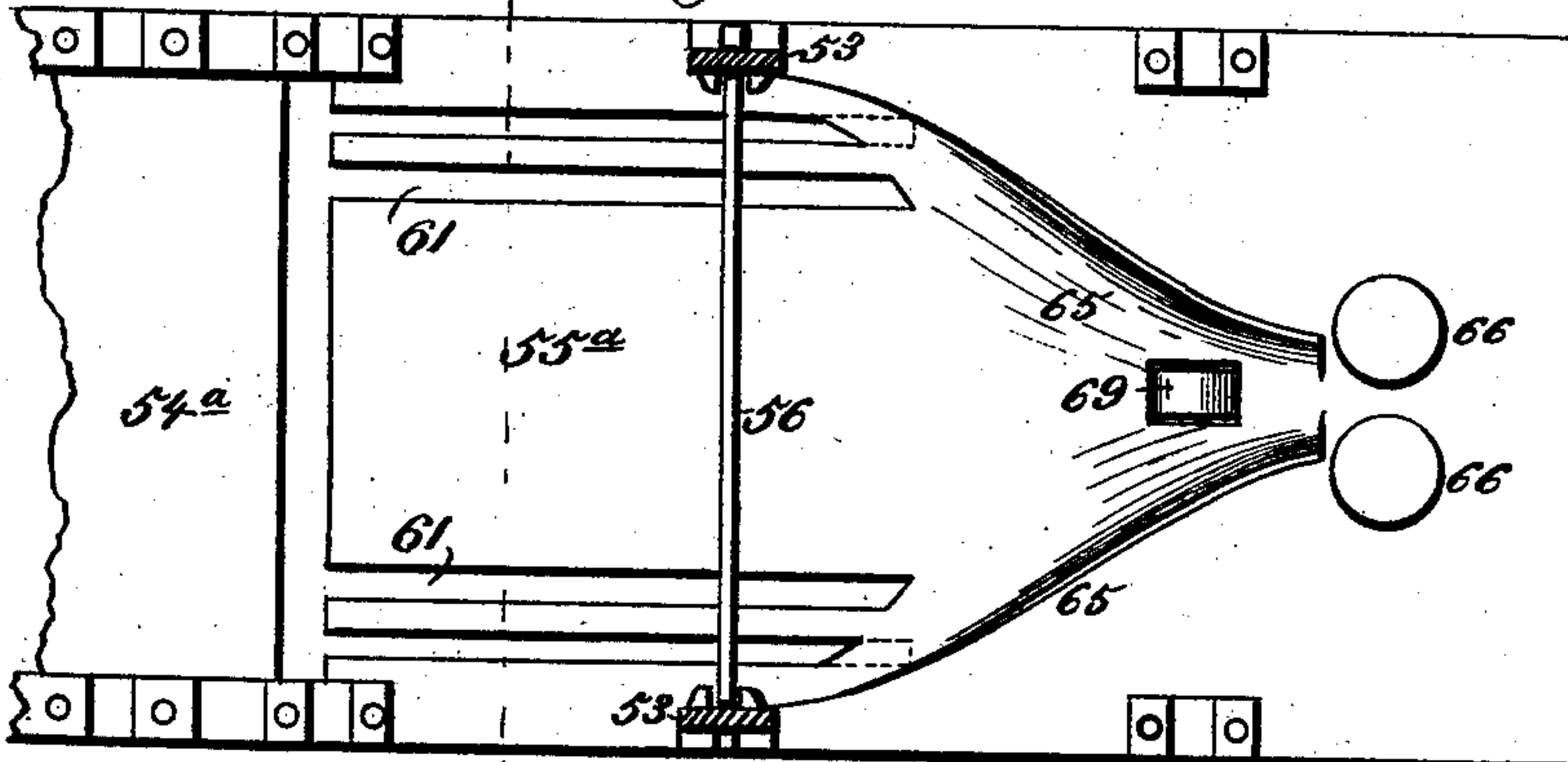
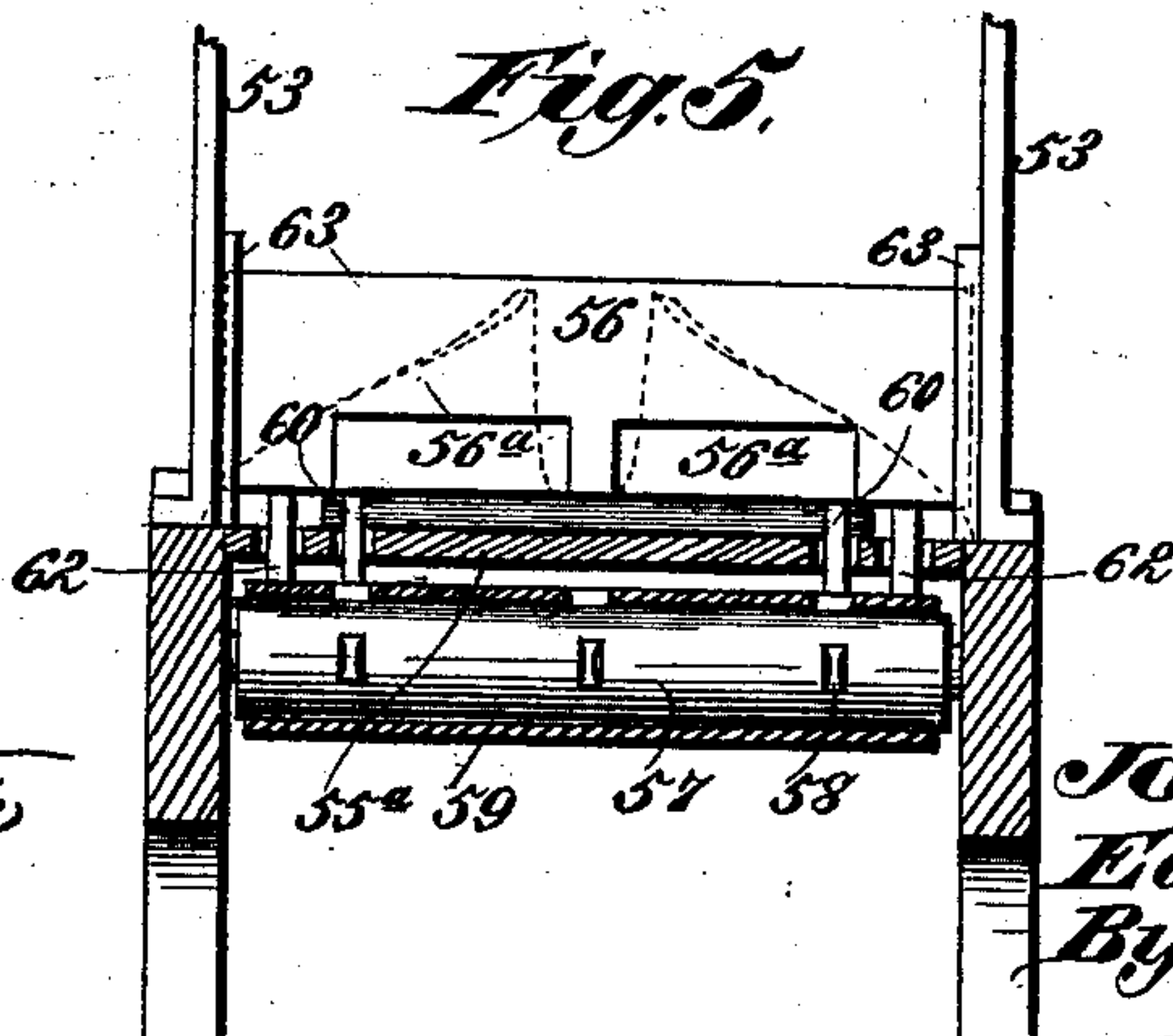


Fig. 5.



Witnesses.
Robert Emmett,
Geo. W. Rea.

Inventors,
Joseph C. Fowler
Edward A. Henkle,
By *James L. Norris,*
Atty.

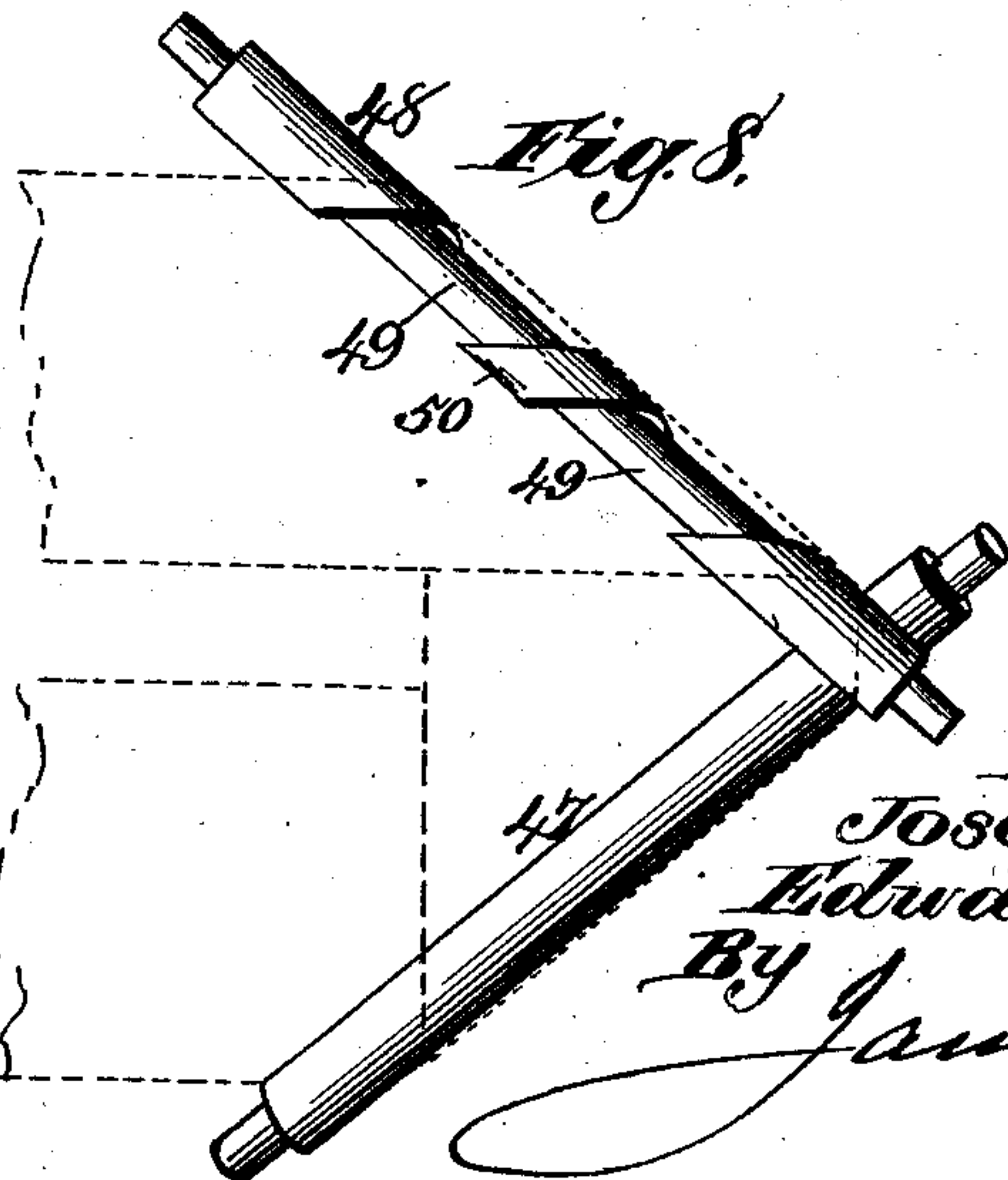
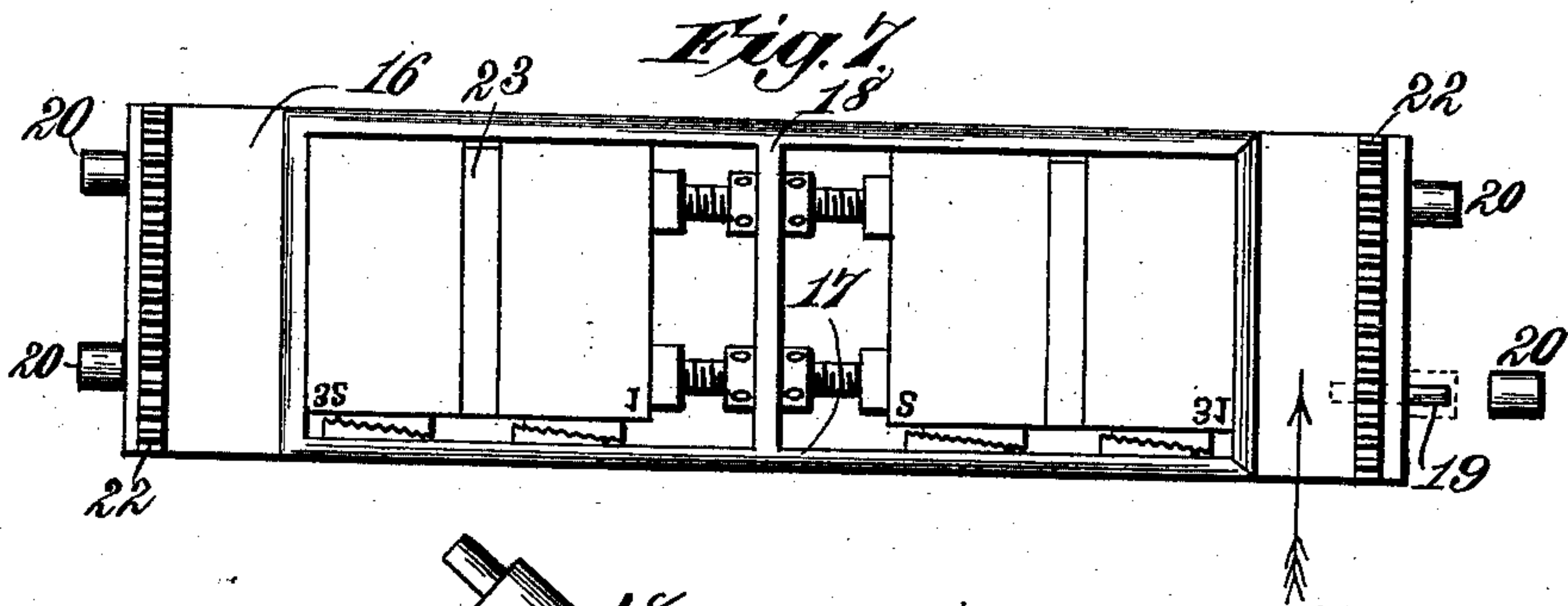
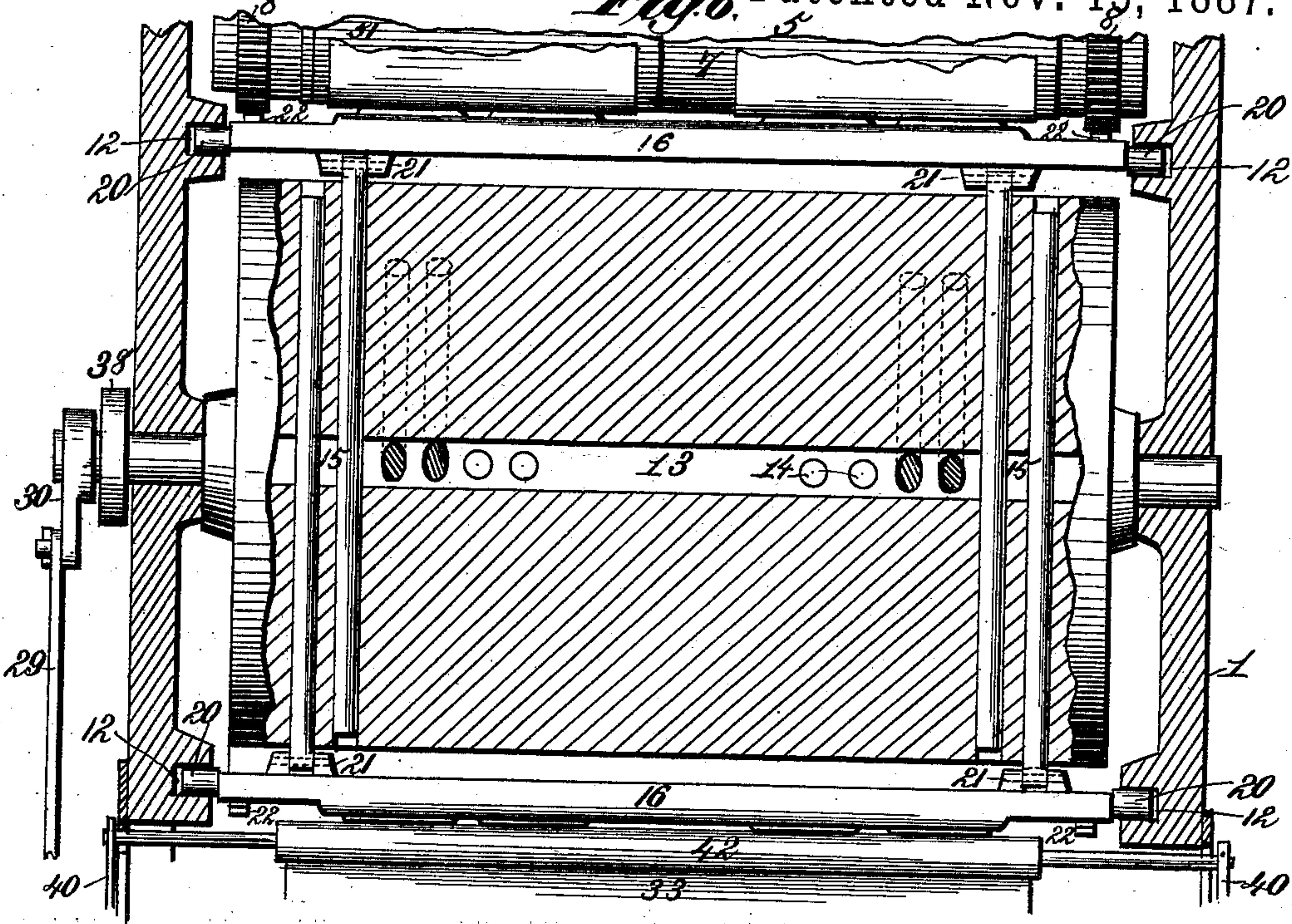
(No Model.)

8 Sheets—Sheet 7.

J. C. FOWLER & E. A. HENKLE.
PRINTING MACHINE.

No. 373,353.

Patented Nov. 15, 1887.



Witnesses.
Robert Emmett.
Geo. W. Rea.

Inventors.
Joseph C. Fowler.
Edward A. Henkle.
By *James L. Norris.*
Atty.

(No Model.)

8 Sheets—Sheet 8.

J. C. FOWLER & E. A. HENKLE.
PRINTING MACHINE.

No. 373,353.

Patented Nov. 15, 1887.

Fig. 9.

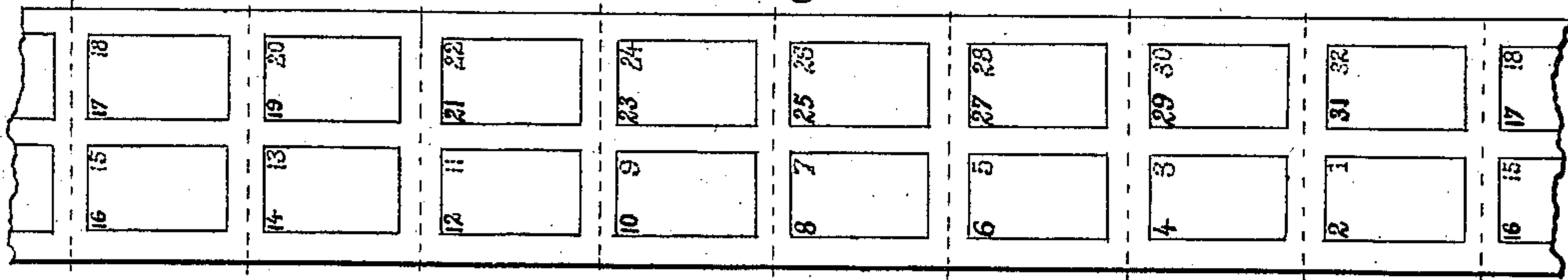


Fig. 10.

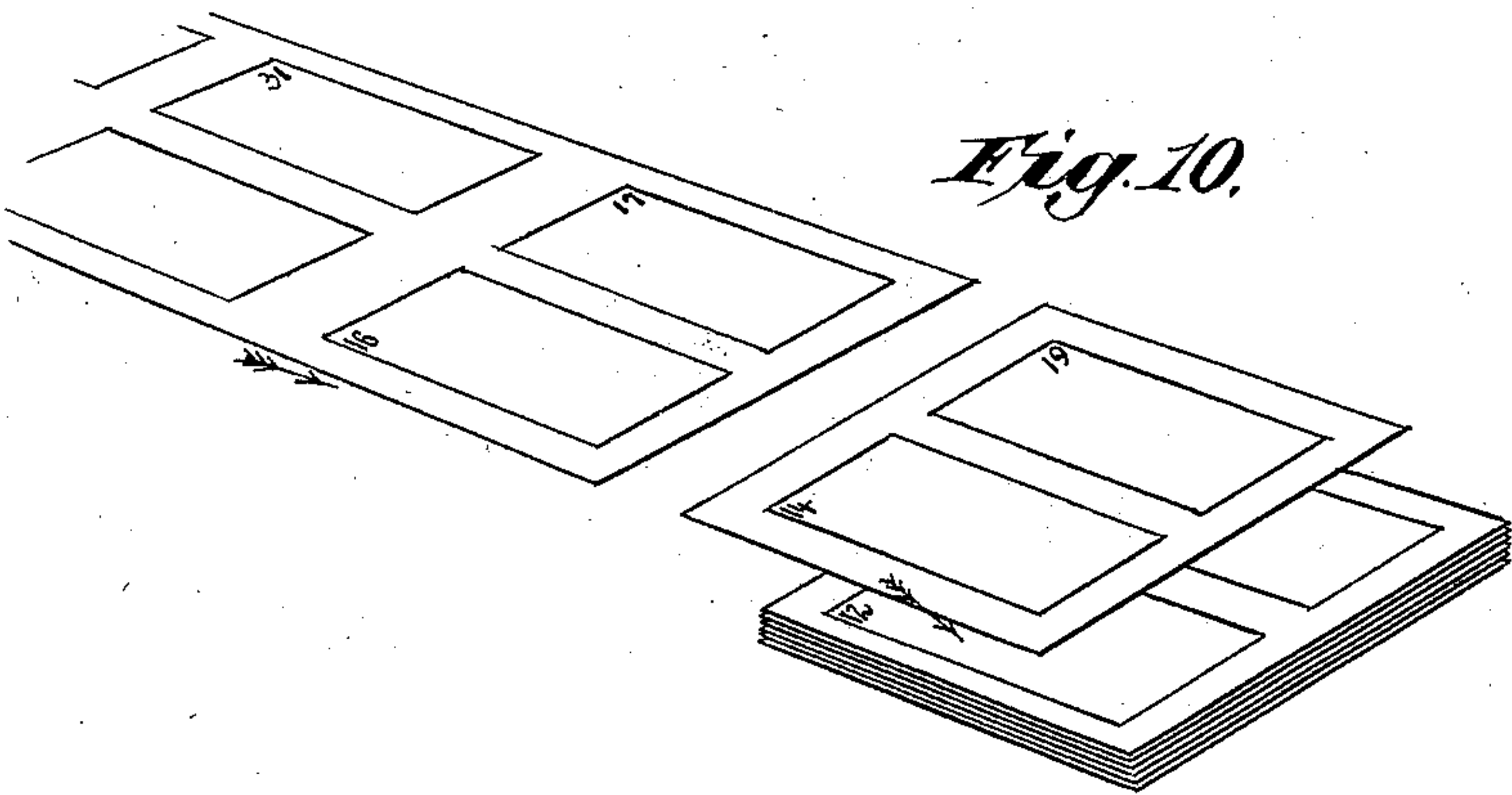
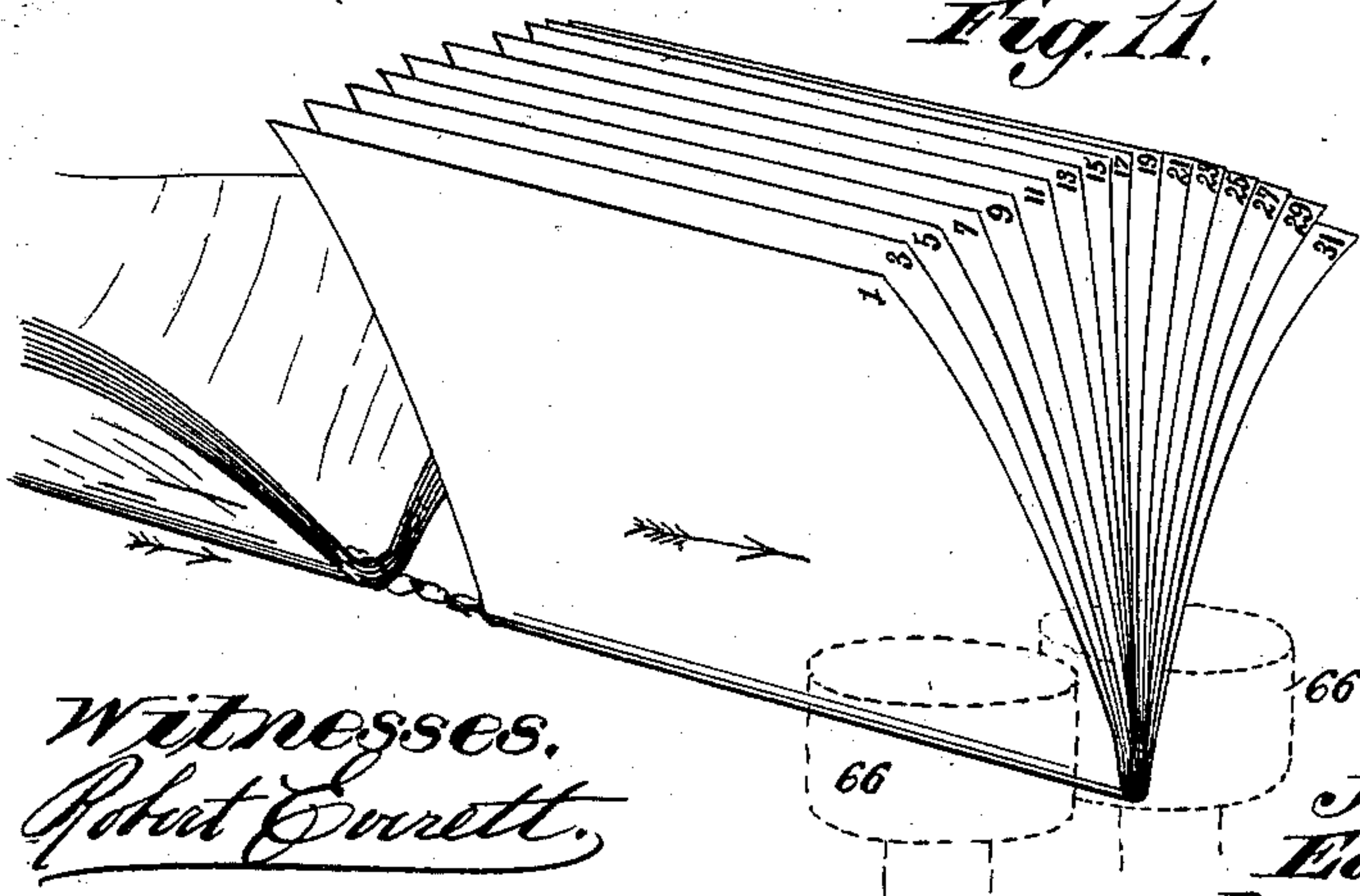


Fig. 11.



Witnesses.
Robert Everett.

Geo. W. Rea.

Inventors.
Joseph C. Fowler.
Edward A. Henkle.

By James L. Norriss.
Atty.

UNITED STATES PATENT OFFICE.

JOSEPH C. FOWLER AND EDWARD A. HENKLE, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNORS TO THE AMERICAN PRINTING PRESS COMPANY, OF SAME PLACE.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 373,353, dated November 15, 1887.

Application filed February 15, 1887. Serial No. 227,747. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH C. FOWLER and EDWARD A. HENKLE, citizens of the United States, residing at Washington, in the District of Columbia, have invented new and useful Improvements in Printing-Machines, of which the following is a specification.

Our invention relates to printing-presses, and the purpose thereof is to provide automatic mechanism for printing from a continuous web, for reversing the sheet and carrying it back beneath the impression-cylinder and printing upon the opposite side, and for ultimately cutting, arranging in book form, stitching and folding, the entire series of steps being accomplished automatically. It is also our purpose to provide a machine having a series of continuously-traveling press-beds or form-tables moving in an approximately elliptical race or orbit, means being provided whereby the press-beds shall receive positive movement from the impression-cylinder successively, whereby the cylinder-surface shall have an exact rolling contact with the press-beds, while the latter shall move during the period occupied in making the impression in a horizontal plane beneath the cylinder.

Our invention also contemplates the provision of novel inking mechanism, whereby a stated amount of ink shall be supplied to each form, and to combine with the printing apparatus perforating and separating devices, whereby each sheet, printed on both sides and containing four pages, shall be separated from the web and arranged in piles composed of eight of such sheets or "signatures" accurately arranged in readiness for the operation of the stitching and folding apparatus.

In combination with the separating mechanism we provide devices whereby the successive piles of eight signatures each are conveyed beneath the stitching-needle, their removal from the table being accomplished without interruption to the action of the other parts of the apparatus, and with the sewing-machine we combine novel creasing and folding devices, all of which will be more fully set forth hereinafter.

Our invention contemplates, in short, automatic mechanism for printing from a continuous web upon one side, reversing the sheet and printing upon the other side, separating the sheets, assembling them in piles of eight sheets, and stitching and folding, the impressions being effected with such accuracy and the register being so perfect that the press is adapted to book-printing as well as to other kinds.

The invention consists in the several novel features of construction and combinations of parts, hereinafter fully set forth, and definitely pointed out in the claims following this specification.

Referring to the drawings accompanying this application, Figure 1 is a vertical section through one end of the machine, taken in a plane at right angles to the axis of the impression-cylinder. Fig. 1^a is a similar section taken through the other end of the machine, the section plane being a continuation of that in Fig. 1, and the two figures taken together being a section of the entire machine. Fig. 2 is a side elevation of the delivery end of the machine; and Fig. 2^a is a side elevation of the feed end, the two figures taken together being an elevation of the complete machine, taken from the farther side of Figs. 1 and 1^a. Fig. 3 is a plan view of that end of the machine shown in Fig. 1; and Fig. 3^a is a plan of the other end, the two figures taken together being a plan of the entire machine. Fig. 4 is a plan view of the end of the machine shown in Fig. 3^a, the offset-web and separating-rolls being removed to show the table. Fig. 5 is a cross-section of Fig. 4 on the line *xx*. Fig. 6 is a partial vertical section of Fig. 1 in a plane passing through the axis of the driving-cylinder. Fig. 7 is a detail plan view of one of the press-beds, showing the construction and the manner of imposition. Fig. 8 is a detail of the web-reversing rolls, with the web in dotted lines. Fig. 9 is a plan of a portion of the printed web, showing by dotted lines the lines of perforation and ultimate separation and the paging. Fig. 10 is a detail perspective of the web as it appears while undergoing sepa-

ration and collation, the separated sheets or signatures being shown piled together. Fig. 11 is a perspective of the printed, separated, and stitched sheets, one section being shown passing between the creasing-rolls, while the next or succeeding section is passing through or between the folding-wings, the latter not being shown in this figure.

In the said drawings, the reference-numeral 1 denotes the frame of the machine, upon which the operative parts are supported. Mounted in adjustable journal-boxes 2, sliding in slotted supports 3, is a shaft, 4, carrying an impression-cylinder, 5. This cylinder is of any usual construction so far as regards its contact-surface, and is provided with the ordinary reels, 6, for attaching the blankets and tympan-sheet 7. Upon or near each end of the cylinder is formed or mounted a rack, 8, with one of which is meshed a motor-gear, 9, carried by a shaft, 10, upon one end of which is mounted a pulley, 11, which may be belted to any suitable source of power.

Beneath the impression-cylinder, on or within the frame 1, on each side, is formed an elliptical race or orbit, 12, and mounted centrally within said race is a cylinder, 13, having its axis in the same vertical plane with the shaft of the impression cylinder. In the body of the cylinder 13, and arranged as hereinafter described, are formed diametrical bores 14, which receive piston-rods 15, fitting within said bores and capable of moving longitudinally therein.

Moving in the race 12 are the press-beds 16, each composed of an oblong, rectangular, metal plate, upon which is mounted the twin chase 17, having a central dividing-rib, 18. Upon each end of the bed are studs 19, upon which are placed friction-rolls 20. These rolls travel in the race 12, by which the beds are supported at both ends and carried successively beneath the impression-cylinder. Upon the under face of each bed are formed ears or lugs 21, arranged at about equal distances from the ends. Pivoted to these lugs are the outer ends of the piston-bars 15, and as the press-beds are carried beneath the impression-cylinder and around in the race 12 said pistons will draw out of and pass into the bores 14 in the cylinder 13. Rotation is communicated to the cylinder 13 by means of these rods in the manner presently to be described, and, on the other hand, those press-beds which have passed from beneath the impression-cylinder, as well as those which are approaching it, are carried around in the race 12 by means of said rods 15, as shown in Fig. 1. It will be seen that the press-beds upon opposite sides of the line passing through the contact-point of the impression-cylinder will substantially balance each other, so that the strain upon the cylinder 13 is not material, nor is there any essential drag upon the motor-gears.

Upon each end of each press-bed is formed a rack, 22, so arranged as to mesh with the

rack 8 upon the corresponding end of the impression-cylinder. As the cylinder 13 revolves and brings these racks upon one bed in mesh with the racks on the cylinder, the press-bed immediately following will, as it enters the horizontal portion of the race 12, gain upon the bed passing beneath the cylinder until, as the racks 22 upon the press-bed are passing out of mesh with the racks 8 on the impression-cylinder, the following press-bed comes into contact practically with the preceding bed, and the racks 22 on the former become practically continuous of the similar racks on the latter, whereby the teeth of the racks on the impression-cylinder take into the racks of the following bed without the loss of a single intervening tooth. In like manner, as the racks 22 pass out of mesh with the racks 8 of the impression-cylinder, the press-bed carrying them begins to gain in speed of movement in the race 12, so that when the bed receiving impression is central beneath the cylinder the preceding and the following beds are separated from it by an interval approximately measured by the space shown in Fig. 1. As the bed preceding that which receives the impressions travels farther in the race 12, this interval of separation increases until the center of the bed reaches the longer diameter of the elliptical race, from which point its speed decreases until the center of said bed reaches the vertical line passing through the axes of the cylinder 13 and of the impression-cylinder. At this point, as well as at the point immediately above, the beds move at their slowest speed, while upon each side of said points, above and below, the beds have respectively a constantly-increasing and a constantly-decreasing rate of speed. It will be seen, therefore, that as the rear edge of one press-bed reaches the central line, at which point the impression-cylinder is tangent to its type-surface, the forward edge of the following bed has so far gained upon it that the two separate racks 22 form a continuous rack practically, the teeth of said racks being so formed that there is at each end a half interval, 22^a, into which one of the teeth on each of the racks 8 passes. The arrangement of the piston-bars 15 is substantially shown in Fig. 6. The radial openings 14, being formed in the cylinder 13 at angles of forty-five degrees with each other, as in Fig. 1, the bars carrying one press-bed are placed in the bores adjacent to the ends of the cylinder. Those carrying the bed on the opposite side of the cylinder lie in the bores formed parallel with and a little nearer to the center than those just mentioned, and so on throughout the series. In all cases, however, the bars of each pair are arranged at equal distances from the ends of the roll to prevent any side-thrust upon the cylinder 13.

The forms used in this press are made up in the manner shown in Fig. 7, which is known as "quiring imposition." They are locked in the twin chase of the press-bed by any suitable kind of quoin, care only being taken that

the coffin "spaces" or "gutters" 23 shall be equal, and that each pair of forms shall be at the same distance from the center bar, 18, of the twin chase.

5 The devices for inking the forms will now be described. The ink is taken from a fount, 24, of any suitable construction, placed, preferably, beneath that portion of the frame in which the race 12 is arranged. As shown, this fount is
10 composed of a box, in which is journaled a fount-roller, 25, which lies partly in the ink. On the shaft of this roller is mounted a ratchet, 26, and on the end of the said shaft, outside the ratchet, is pivoted a lever, 27, carrying a pawl,
15 28, which is thrown into engagement with the ratchet 26. The other end of the lever 27 is connected to a pitman, 29, carried by a crank, 30, on the journal of the cylinder 13. At each revolution of the crank the end of the lever is
20 vibrated, retracting the pawl 28, to engage it with a different tooth, and then raising the pawl to give partial revolution to the ink-roller 25. A scraper, 31, adjustable toward
25 and equalizes that which adheres to roller-surface. Journaled in suitable supporting-plates, 32, are two distributing-rolls, 33, having their surfaces separated by a suitable interval, but both having contact with a vibrat-
30 ing roll, 34, which has constant revolution, and also a longitudinal reciprocation simultaneous with its rotation, these movements being produced by any known combination of devices. Ink is supplied from the fount roller
35 25 to the vibrating roll 34 by a ductor-roll, 35, journaled in a frame, 36, which is pivotally mounted on the machine-frame, as shown in Fig. 2^a, said frame having a cam-arm, 37, resting upon a cam, 38, carried by a journal of
40 the cylinder 13. A spring, 39, draws this lever toward the cam and gives vibration to the frame in one direction, while the cam moves it in another. The cam 38 and the crank 30 are so timed relatively to each other that the
45 ductor 35 will be thrown against the fount roll 25 at the moment the latter receives partial revolution by the vibration of the lever 27. The ductor is revolved by contact with the inking-roller and receives a supply of ink,
50 after which the cam 38 actuates the lever 37 and throws the ductor against the vibrating roll 34, by which the ink is evenly and smoothly supplied to both the rollers 33.

Pivotally mounted upon the projecting journals 33^a of the rolls 33 are radial arms 40, two of such arms being placed at each end of each roll, as shown in Fig. 2^a. The ends of these arms are provided with slots 41, to receive the journals of the form-rollers 42, the peripheries
60 of which rest upon the surfaces of the rollers 33, the force with which they bear upon the said rolls being varied in any suitable manner. Between the pivotal bearing for said arms and their slotted extremities are formed arc-shaped slots 43, concentric with the axes of
65 the roll shafts, upon which the arms 40 are mounted. These slots are cut in the plate

32, which affords support to the vibrator and distributor-rolls. Screws 44 pass through
70 apertures in the arms 40 and through the slots 43, binding-nuts being turned upon the ends of said screws, so as to bear against the inner face of the plate 32 and lock the arms 40 in position at any point in said slots. It will be
75 seen that by causing the ends of said arms to approach the vertical line drawn through the axis of the journal 33^a the form-rollers 42, carried by said arms, will be raised, while by an opposite adjustment their peripheries will
80 be brought into a lower horizontal plane.

The supporting-plates 32 are so arranged that the form-rollers 42, when at about the medium point of adjustment, will have their peripheries brought into or nearly into the same horizontal plane with the type-surfaces
85 of the forms as they pass beneath the cylinder 13 in the race 12, as shown in Fig. 1. The "set" of the form-rollers, or the degree of force with which they impinge upon the type, may be very easily, accurately, and delicately ad-
90 justed by the means described.

The fount-roll is of metal, preferably steel, while the ductor is of composition, as also may be the vibrator; but we may use wood, metal, or other suitable material for the distributor-
95 rolls. The form-rollers are of composition.

The paper used upon this press is taken in a continuous web from a roll, 45, having its axis supported in standards 46 at the feed end of the machine. The web is of the width
100 required for printing two of the pages imposed in the forms described, and it is carried under the impression-cylinder upon one side or half thereof to print pages 2 and 31 from the forms upon the corresponding end of the press-bed.
105 It is then carried over a roll, 47, arranged as shown in Figs. 1, 1^a, and 3, which has contact with the unprinted surface. Leaving this roll, the web is carried at right angles to its former line of travel or directly across the press, pass-
110 ing under, and then partly around a second roll, 48, arranged at such an angle with the roll 47 that the direction of travel of the web is again changed by a right angle, as shown more clearly in Fig. 3. By the peculiar ar-
115 rangement of these rolls the web is taken as it comes from the impression-cylinder after being printed upon one side and is carried back and over and beneath said cylinder to form the perfected page. As the second roll,
120 48, is in contact with the printed face of the sheet, which may not be so perfectly dried as to prevent blurring, we form the roll 48 as follows: The printed surface having marginal spaces and a central space corresponding to
125 the coffin-space or gutter of the form, we form the roll 48 with a spiral channel, 49, passing twice around the roll at a pitch equal to the angle which the paper makes with the roll-axis. The channels 49 are of a little
130 greater width than the width of the printed pages, and a central spiral rib, 50, is left on the roll, which gives support to the web at its center, enabling it to travel over the roll with-

out buckling or blurring. Both rolls 47 and 48 are mounted upon any suitable support, and they are arranged at such distance from the impression-cylinder that the web is printed on both sides by the same press-bed. In other words, the first impression is made by the forms upon one end of one of the beds, and the web passes over the reversing-rolls and over the cylinder in time to receive the impression on its reverse face from the forms on the other end of the same bed, the latter having in the meantime made a complete circuit of the race or orbit 12. The same press-bed, therefore, carries forms which print pages 1 and 32 and pages 2 and 31, the latter being upon the reverse side and forming the perfected sheet. In order to secure perfect accuracy of feed, movement, or travel, we may, if desired, use any suitable form of guide at any point over which the web passes.

In order to prevent offset upon the tympan-sheet, we provide an offset web or blanket, 51, which passes around the cylinder and over a roll, 52, mounted at a convenient distance upon standards 53. This blanket runs only on that half of the impression-cylinder over and under which the web passes to print the perfected page. As the sheet comes from the press the second time it passes to a pair of perforating-rolls, 54, driven by the motor gear 9, and by these rolls, which are of the ordinary construction, the web is perforated from side to side between the successive perfected sheets. At the moment after this operation is complete the end of the sheet, which passes over and is guided and supported by an inclined table, 54^a, is seized by a pair of separating-rolls, 55, which lie just beyond the lower edge of the table 54^a. These rolls revolve at a speed somewhat greater than the rate at which the web is driven by the perforating-rolls, the consequence being that the perforated sheet is separated along the line of perforation between the two sets of rolls 54 and 55. These separated portion is carried through the separating-rolls and dropped upon a table, 55^a, being thrown against a gate, 56, by which their edges are brought into line.

Beneath the table 55^a are placed rolls 57, having sprocket-teeth 58, and over said rolls is carried an apron or wide belt, 59, which moves parallel with and just beneath the under surface of the table. Upon this apron, at fixed intervals, are mounted fingers 60, which project above the top of the table 55^a, slots 61 being provided in the latter in which said fingers move. The interval separating these fingers 60 upon the apron and the speed at which the latter moves are so adjusted that after eight sheets, containing thirty-two pages, have been laid upon the table 55^a a pair of these fingers enters the slots 61 and impinges upon the edges of the sheets lying upon the table. An instant before this takes place, however, a pair of cam-plates, 62, also mounted upon and traveling with the apron, engages with the lower edge of the gate 56, which

risers in guideways 63, the cam-plates 62 having inclined edges upon which the gate rides up. As the latter is raised far enough the fingers 60 engage with the separated sheets, as already described, and push the entire pile forward on the table, their ends passing under the raised gate 56, which is then dropped by the cams 62 and rests upon the moving pile of sheets. In order to prevent slurring after the gate falls, the edges of the latter are slightly cut away, as shown at 56^a in Fig. 5. These portions are removed over the printed portions only, and in printing pages of varied width the gate may be replaced by another cut-away to correspond with the width of the form. During the time occupied by the passage of the sheets beneath the gate the perforation of the web and the separation of the successive sheets are still going on, each sheet being delivered by the separating-rolls upon the top of the moving pile carried by the fingers 60, but prevented from passing the gate by the fact that portions of the latter rest upon the surface of the piled sheets in motion.

Stitching apparatus of any known and suitable kind is arranged upon the delivery side of the gate 56, the needle-bar 64 being arranged centrally of the piled sheets, and being driven in any suitable manner to form a continuous line of stitching, and between the successive sections to form the looped machine-stitches to connect the several sections together. A presser-foot having the usual roll is employed with the needle; but these parts being of the well-known construction they have not been shown. After the stitching of the section is completed it is to be folded centrally along the line of stitching. For this purpose we provide, first, a folding roll acting in conjunction with folding wings, and afterward subject the folded and partly folded section to the action of a pair of creasing-rolls, by which the operation is completed.

Upon each side of the table 55^a, beyond the gate 56, are placed the folding-wings 65, which consist of plates of wood or metal, the edges of which rise and converge at an easy angle toward the delivery end of the machine. These wings raise the outer edges of the piled sheets or sections as they pass beneath the feeding-roll, beginning with the forward corners, as shown in Fig. 1^a, and bring them into a folded position, or approximately so, after which the folded edge is seized by a pair of rolls, 66, mounted upon vertical axes and arranged just beyond the creasing-roll. By these folding-rolls the crease is formed perfectly and the section is completed, as shown in Fig. 11. The leaves of each "section," after passing beneath the gate 56, are perforated by the initial stitch of the sewing mechanism before the gate is dropped, so that all buckling or wrinkling of the top sheet is prevented. The free passage of the fingers 60 is permitted by the cut-away portions 56^a, as shown in Fig. 5.

The feeding-roll 67 consists of a disk turning on a horizontal axis having a milled or

rubber edge, 68, which runs over the central line of the page, a friction-roll, 69, being placed beneath to give easy passage to the moving section.

5 The perforating-rolls 54 are driven from the motor-gear 9, as shown in Fig. 2, the upper roll having a pinion, 70, meshing with said gear. This pinion also meshes with a gear, 71, by which motion is transmitted to the separating-rolls 55 through a pinion, 72, on the shaft of the upper of said rolls. On the other end of said shaft is a gear, 73, meshing with a gear, 74, on one of the rolls 57, carrying the apron 59. Upon the shaft of the other of said rolls 57, and on the other side of the machine, is mounted a gear, 75, which meshes with a gear, 76, by which a sprocket, 77, is driven, communicating motion to the shaft 78 of a sprocket, 79, which drives the feeding-roll. The same shaft 78 also drives a miter-gear, 80, (see Fig. 1^a.) which meshes with a similar miter, 81, on the shaft of one of the creasing-rolls. These rolls are geared together by pinions 82, one of which is shown in Fig. 1^a.

25 We may apply tension to the web by a friction-roll, 83, resting by gravity on the web-roll, and a second roll, 84, may be mounted on standards 85 and brought to bear against the web as it meets the impression-cylinder.

30 The vibrating roll 34 may be adjusted vertically in slots 34^a by means of the ordinary set-screw, 86, bearing against the journal-box 87 and tapped into the supporting-frame.

By reference to Figs. 3 and 3^a it will be seen that the delivery end of the machine-frame is narrowed down to accommodate the width of the single web as it comes the second time from the impression-cylinder.

40 The devices employed for inking the forms of this press may be applied to other forms of printing mechanism without essential change.

What we claim is—

1. The combination, with a continuously-rotating impression-cylinder and a gear meshing with and imparting motion thereto, of a series of press-beds passing successively beneath the same, an elliptic race or orbit in which said beds are guided, a cylinder having diametrical bores or apertures and journaled within said orbit, and pistons having longitudinal movement in said apertures and pivotally connected to the press-beds, the beds and cylinder being provided with gear-teeth, which are in mesh during the impression on each bed, substantially as described.

2. The combination, with a continuously-rotating impression-cylinder having a rack of gear-teeth at or near each end, of a series of press-beds passing beneath said cylinder, each having racks meshing with those on the cylinder, an elliptic race or orbit in which said beds move, a cylinder journaled centrally within said orbit, and having diametrical bores or apertures, pistons pivotally connected to the press-beds and moving longitudinally in said apertures, and means for giving a posi-

tive rotation to said cylinder, substantially as described.

3. The combination, with a printing mechanism for printing on a continuous web, of a perforating-roll under which the printed sheet is fed, a pair of separating-rolls running at a surface speed greater than the feed of the sheet, and a section-feed, whereby the separated sheets are removed in equal piles or sections, substantially as described.

4. The combination, with a printing mechanism for printing on a continuous web, of a perforating-roll beneath which the printed sheet is fed, a pair of separating-rolls running at a surface speed greater than the feed of the sheet, a section-feed removing the separated sheets in equal piles or sections, and a stitching apparatus to which the sections are fed by the section-feed, substantially as described.

5. The combination, with a printing mechanism for printing on a continuous web, of a perforating-roll beneath which the printed sheet is fed, a pair of separating-rolls running at a surface speed greater than the feed of the sheet, a section-feed removing the separated sheets in equal piles or sections, a stitching device operating on the sections as they are moved by the section-feed, a feed-roll to which the sections pass from the stitches, a pair of folding-wings which bring the leaves together as the section passes beneath the feed-roll, and a pair of creasing-rolls between which the folded edge of the section passes, substantially as described.

6. The combination, with a constantly-revolving impression-cylinder having gear-teeth on or near each end, of a series of press-beds, each having a rack at each end meshing with the rack on the cylinder during the period of impression, an elliptical race or orbit in which the press-beds move, said race having a horizontal portion beneath the impression-cylinder, a cylinder journaled centrally in said orbit, and having diametrical bores and pistons pivotally connected to the press-beds and moving in the said bores, the impression-cylinder being journaled in the central vertical plane passing through the orbit, and the racks on the press-beds being of such length that at the tangent point of said cylinder they will form practically continuous racks, substantially as described.

7. The combination, with a press-bed, of inking mechanism consisting of a vibrating roll, two distributing-rolls having contact with said vibrating roll, and form-rollers riding upon the surface of each distributing-roll and adapted to receive adjustment toward and from each other, substantially as described.

8. The combination, with distributing-rolls, of form-rollers riding upon the surface of said distributing-rolls, arms pivotally mounted upon the axes of said rolls and supporting the journals of the form-rollers, and means for adjusting said arms to separate the form-rollers or cause them to approach each other on the

peripheries of the distributing-rollers, substantially as described.

9. The combination, with one or more ink-distributing-rolls and a press-bed, of form-rollers rolling upon the peripheries of the distributing-rolls, arms pivotally mounted upon the journals of the distributing-rolls and supporting the journals of the form-rollers, arc-shaped slots in the frame supporting the distributing-rolls, and set-screws passing through said slots and through the pivoted roller-arms, whereby the latter may be adjusted and fastened at any desired angle with each other, substantially as described.

10. The combination, with an ink-fount, of a roll journaled to turn therein, a ratchet on the shaft of said roll, a lever fulcrumed on said shaft, and having on its end a pawl engaging the ratchet, a pitman connected to the other end of the lever, a ductor-roll journaled in a vibrating frame, a vibrating roll in engagement with one or more distributing-rolls, and a cam on the press-shaft, whereby the ductor is thrown from the vibrating roll against the fount-roll at the moment the latter is rotated by the pawl-carrying lever, substantially as described.

11. The combination, with the impression-cylinder and a series of press-beds moving beneath it, each bed carrying a twin chase, of reversing-rolls arranged in the feed-lines from both ends of the impression-cylinder, one of said rolls being plain surfaced and the other cut away between a central portion and each end, whereby the continuous web is printed on one side and reversed to be carried under the other end of the cylinder and printed on the other side, the margins and central space of each sheet being supported in the center and ends of the second reversing-roll, substantially as described.

12. The combination, with a printing mechanism for printing on a continuous web, of perforating-rolls operating between the perfected sheets, separating-rolls running at greater speed, a slotted table which receives the separated sheets or signatures, a vertically-mov-

able gate against which said sheets are piled, and an endless apron carrying cam-plates which raise said gate and fingers which move in the slots of the table and carry the piled sheets under the raised gate, substantially as described.

13. The combination, with a printing-press for printing upon a continuous web, and with automatic mechanism for separating the printed sheets, piling them in sections, and feeding the successive sections forward, of stitching mechanism having continuous action, whereby the successive sections are stitched and connected together, substantially as described.

14. The combination, with the printing, separating, feeding, and stitching mechanism, substantially as described, of folding-wings which rise and converge from the stitching-needle toward a feeding-roll arranged centrally within the mouth of the folding-wings, and a pair of creasing-rolls turning on vertical axes which receive the folded edge of each section and complete the fold, substantially as described.

15. The combination, with a race or orbit of substantially oblate form, and having its longer diameter in a horizontal plane, of a cylinder journaled centrally within said orbit and having diametrical bores or apertures, a series of pistons moving longitudinally in said bores, press-beds pivotally connected to said pistons, and having supports moving in the race or orbit, and an impression-cylinder having its axis in the same vertical plane with the shorter diameter of the orbit, said cylinder having gear-teeth meshing with racks on the press-beds, whereby each press-bed as it approaches the cylinder will gain upon the preceding bed and become practically continuous therewith at the point where both are tangent to the cylinder, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

JOSEPH C. FOWLER.
EDWARD A. HENKLE.

Witnesses:

JAMES L. NORRIS,
J. A. RUTHERFORD.