

(No Model.)

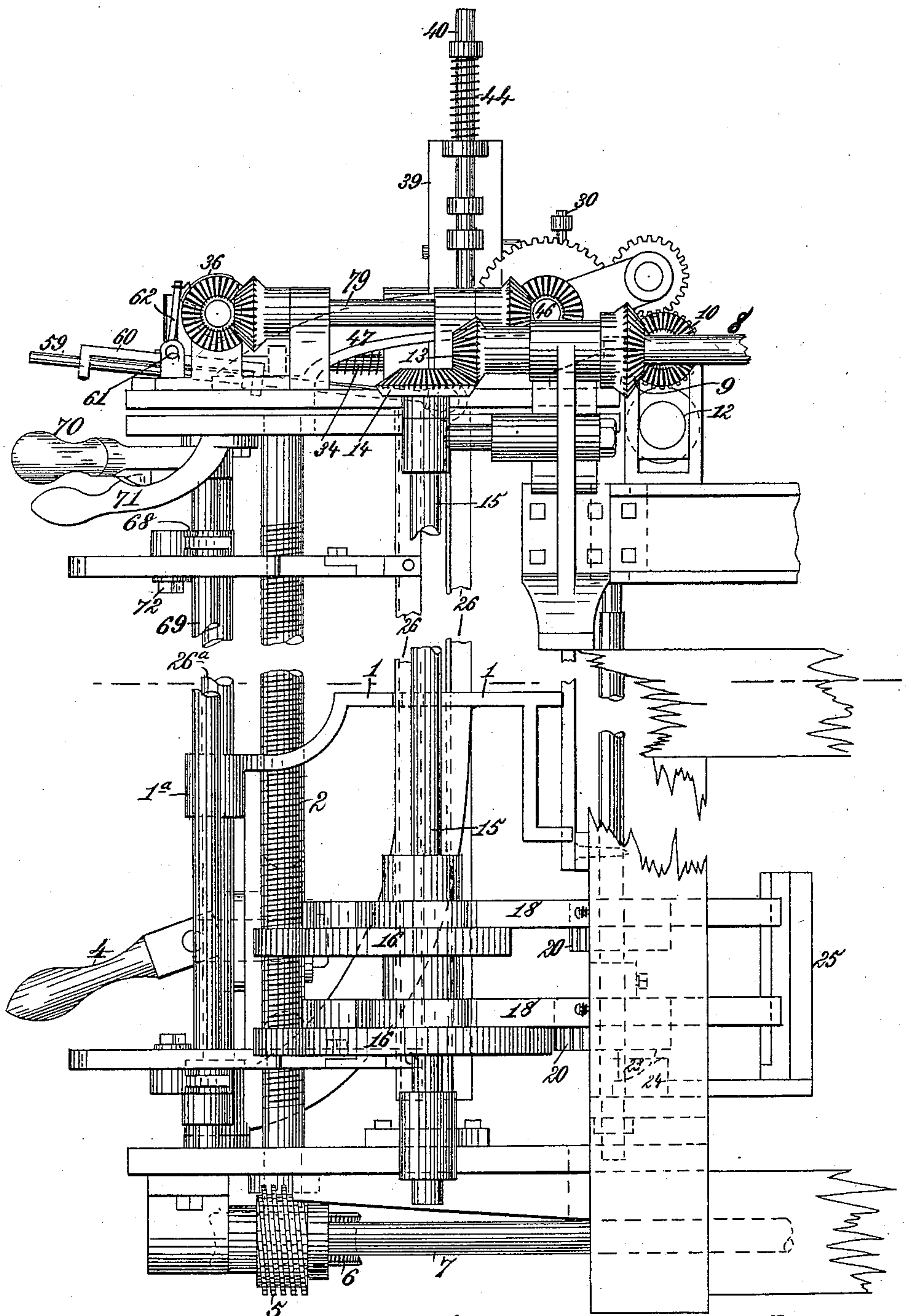
3 Sheets—Sheet 1.

L. F. FALES.

MACHINE FOR FEEDING AND SEPARATING PAPER.

No. 447,766.

Patented Mar. 10, 1891.



Witnesses.

Fig. 1.

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By

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Atty

Dennie Sumbly.
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(No Model.)

3 Sheets—Sheet 2.

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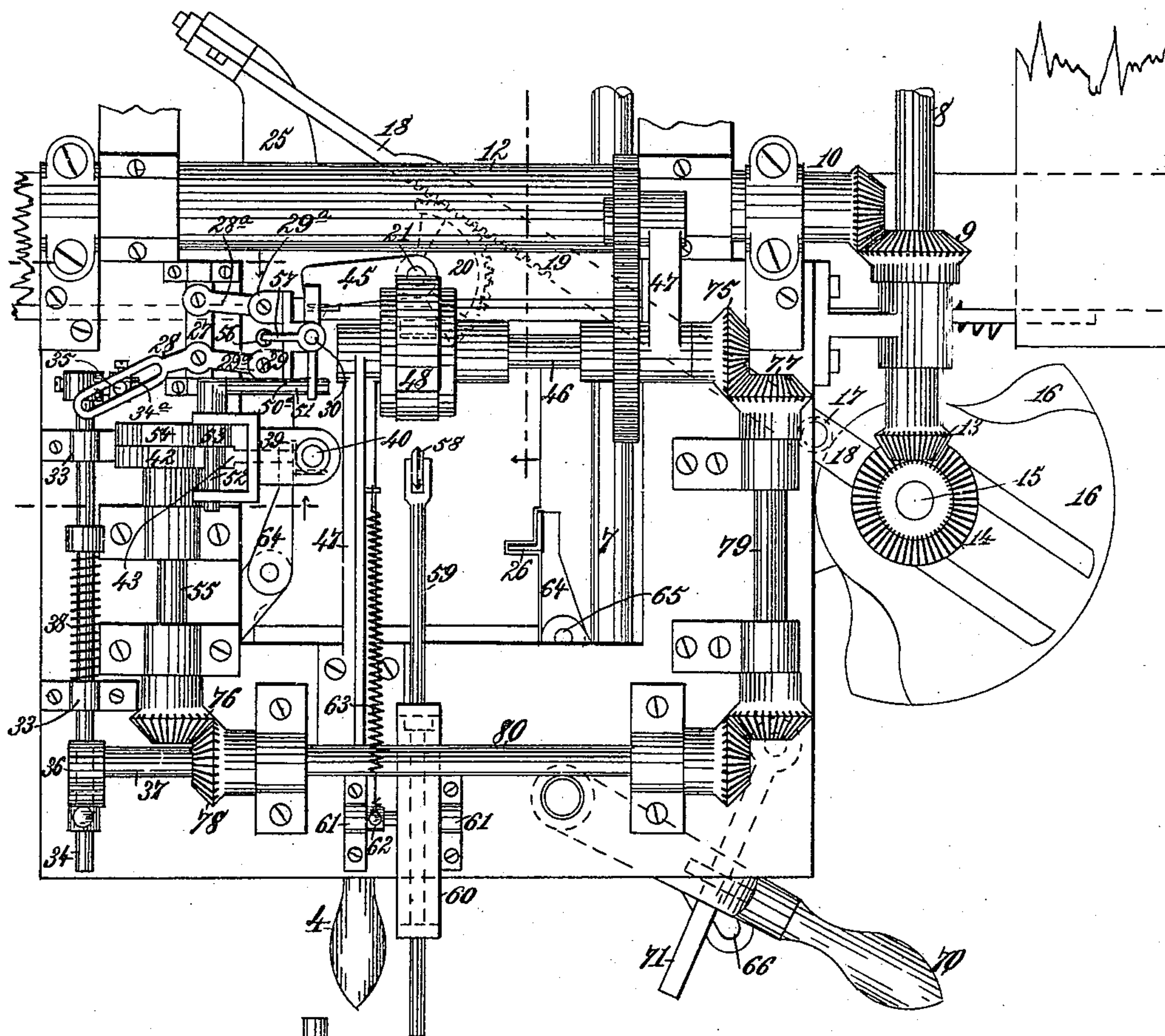


Fig. 2.

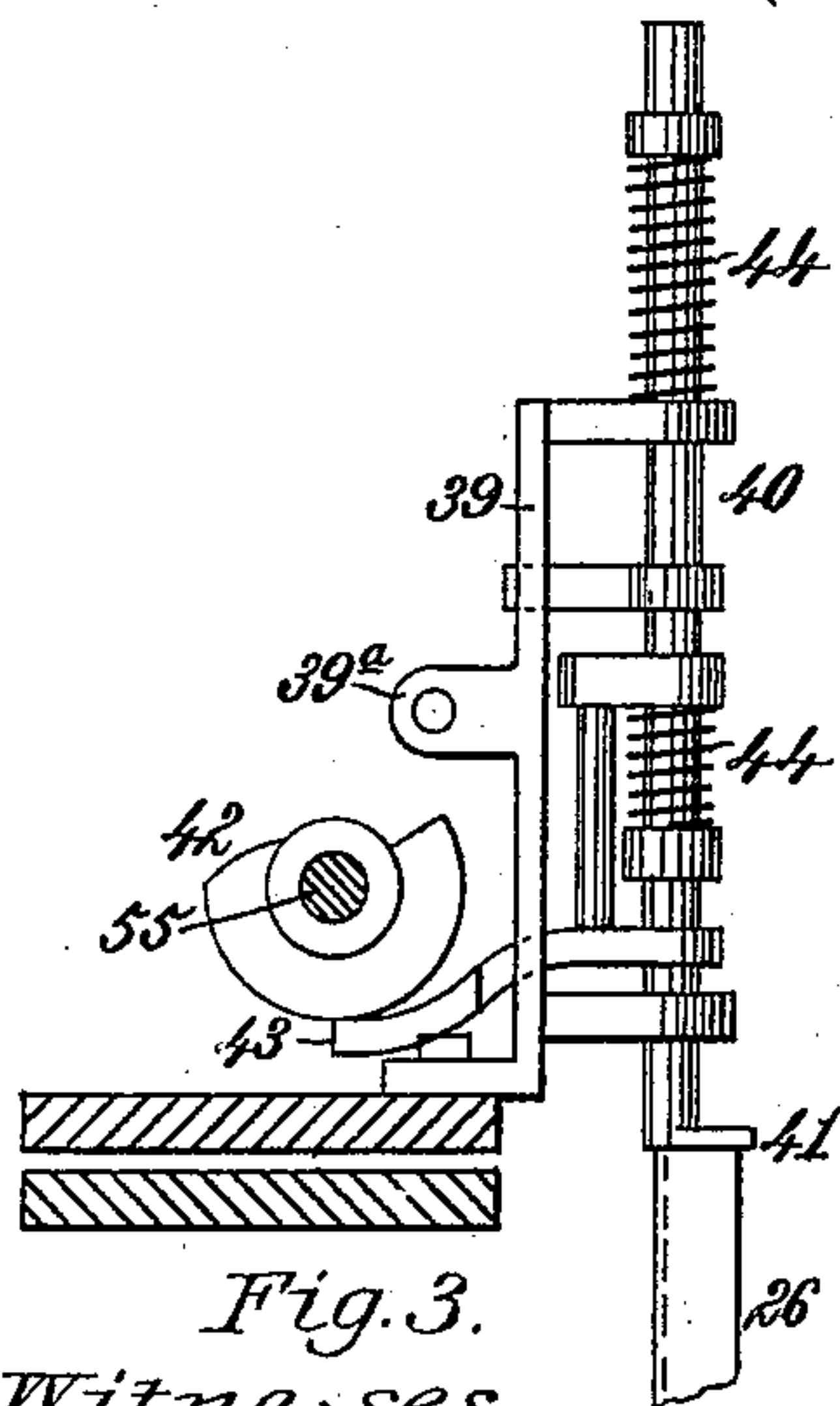


Fig. 3.

Witnesses.

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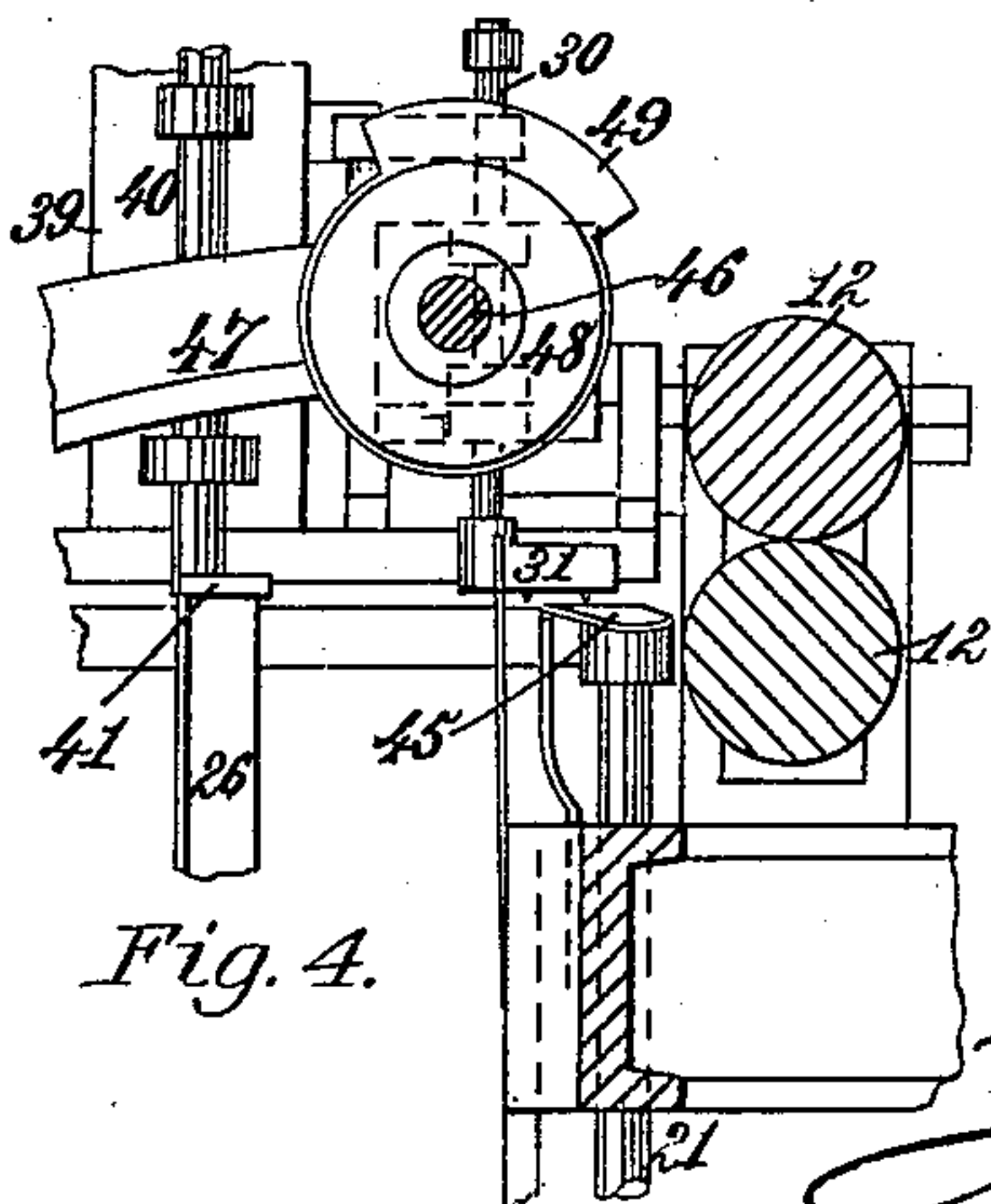


Fig. 4.

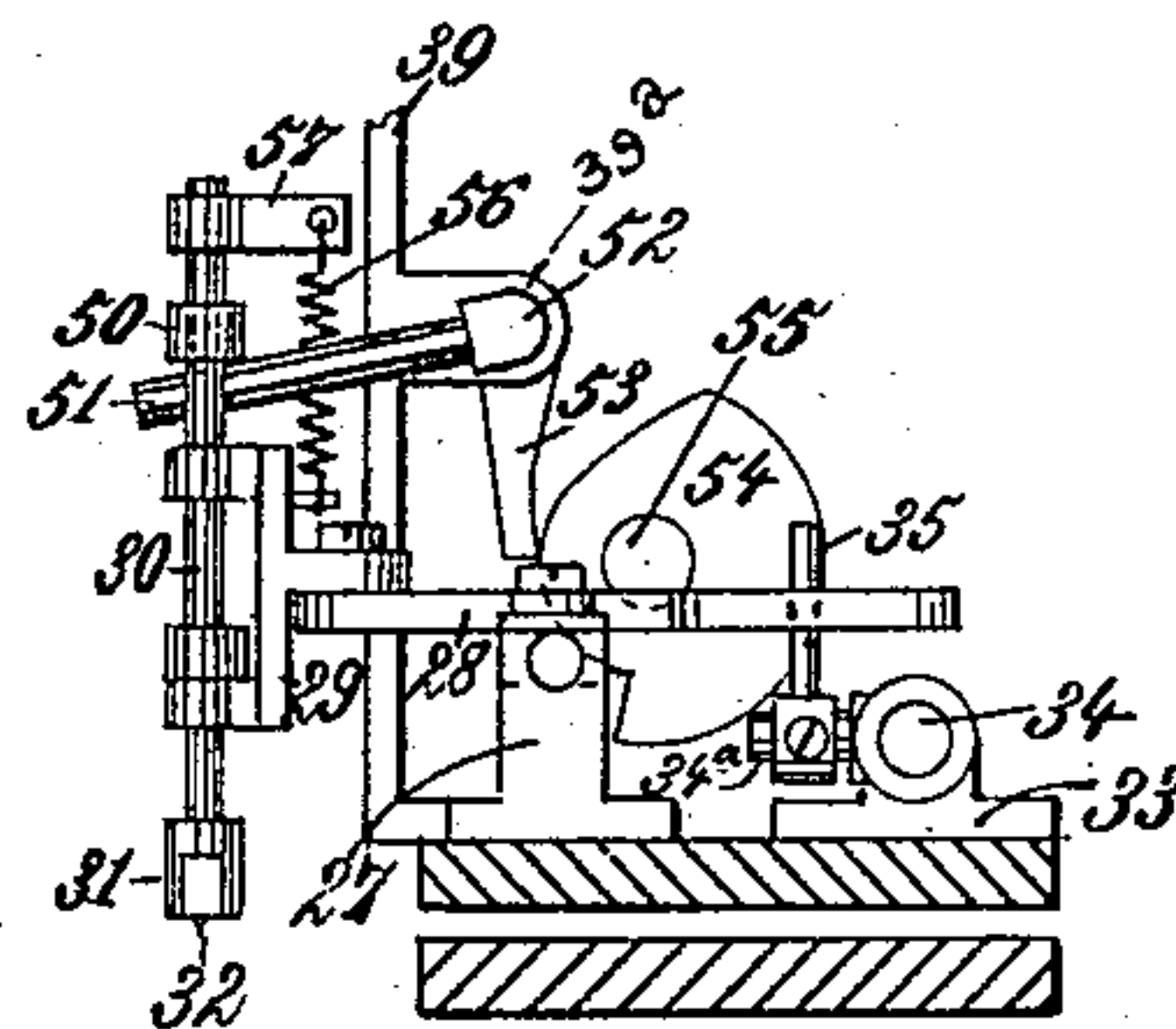


Fig. 5.

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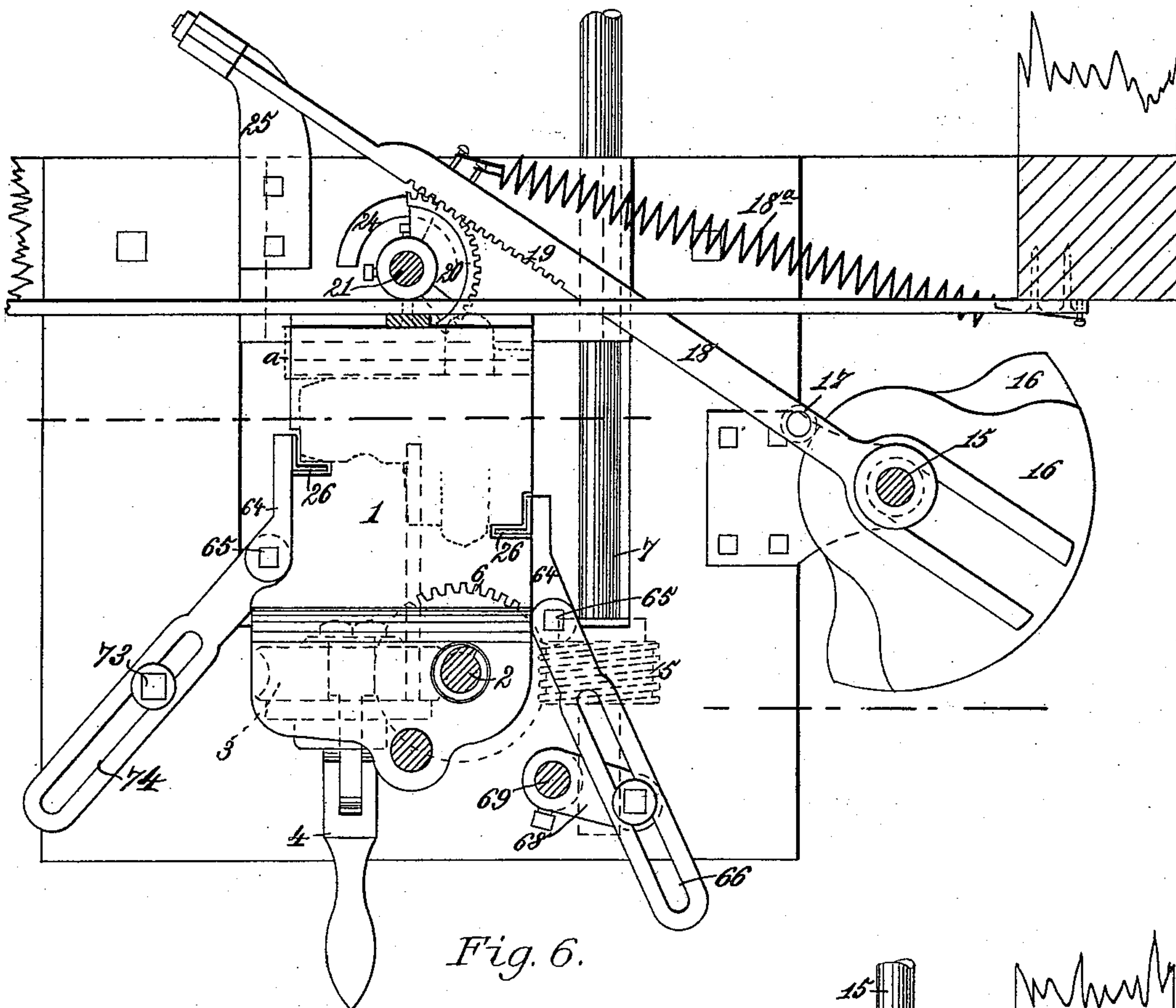


Fig. 6.

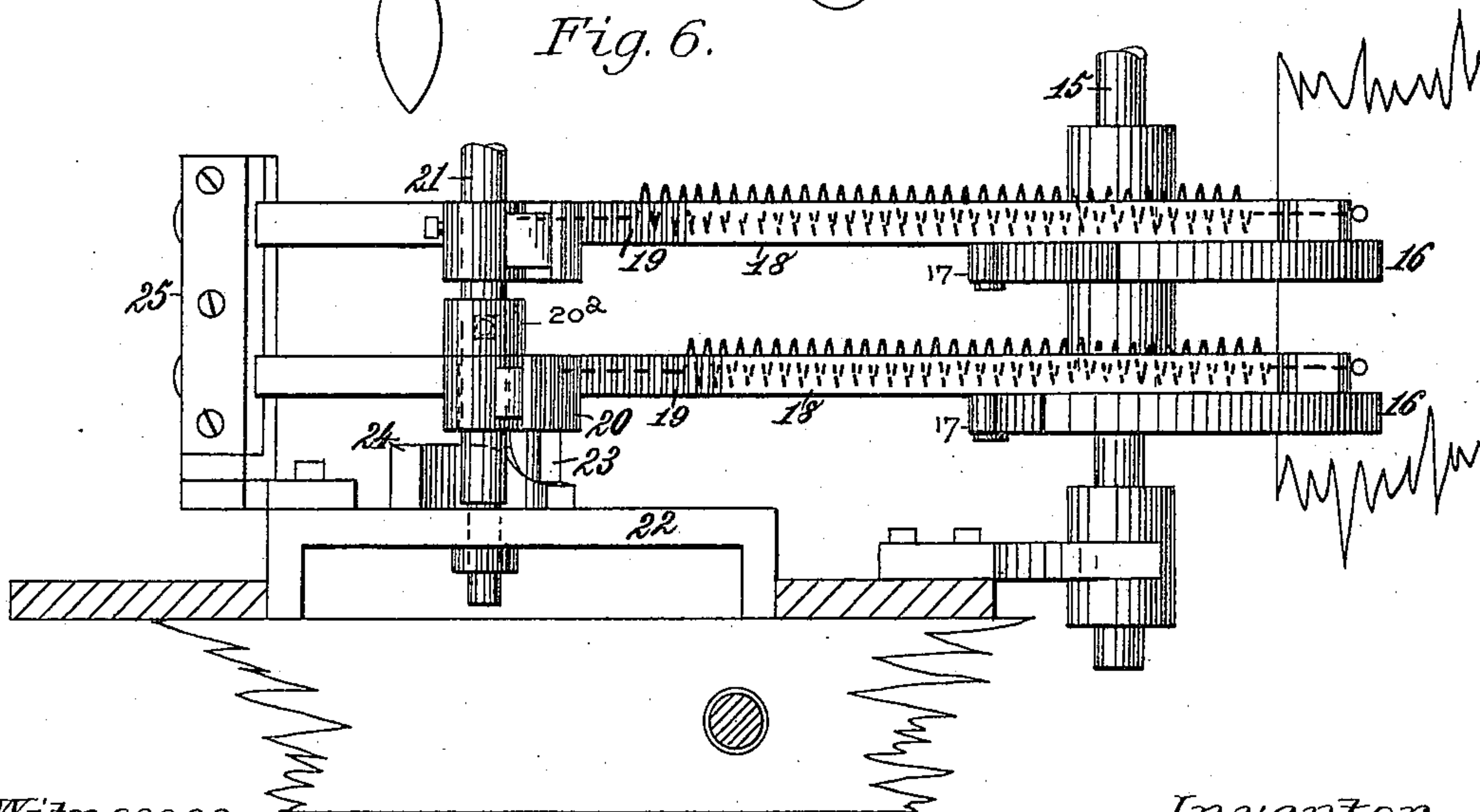


Fig. 7.

Witnesses.

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UNITED STATES PATENT OFFICE.

LEWIS F. FALES, OF WALPOLE, MASSACHUSETTS.

MACHINE FOR FEEDING AND SEPARATING PAPER.

SPECIFICATION forming part of Letters Patent No. 447,766, dated March 10, 1891.

Application filed February 28, 1890. Serial No. 342,055. (No model.)

To all whom it may concern:

Be it known that I, LEWIS F. FALES, a citizen of the United States, residing at Walpole, in the county of Norfolk and State of Massachusetts, have invented new and useful Improvements in Machines for Feeding and Separating Paper, of which the following is a specification.

My invention relates to mechanism for feeding and separating sheets of paper arranged in the form of a stack or pile to enable the separate sheets to be introduced or fed to a machine by which some further operation may be performed thereon, such as a ruling-machine, a folding, ruling, or other form of apparatus.

It is the purpose of my invention to provide automatic mechanism by which a series of separate sheets of paper or other material arranged in a pile or stack may be separately and successively removed from the stack, or sufficiently separated from the remaining sheets piled thereon to enable the feeding devices, of any suitable construction, to engage with said sheet and deliver it to feed-rolls or carry it to the point where a further operation is to be performed thereon.

The invention consists in the novel features of construction and new combinations of parts hereinafter fully described and claimed, reference being made to the accompanying drawings, in which—

Figure 1 is a side view of a machine embodying my invention. Fig. 2 is a plan view of the parts shown in Fig. 1. Fig. 3 is an end view showing the devices which hold the main body of the paper sheet in position. Fig. 4 is a detail side elevation showing the devices by which the sheet is removed from the holding mechanism in Fig. 3. Fig. 5 is a detail view showing the shoe which impinges upon the flap of the sheet and pushes it forward to enable the separator to raise it. Fig. 6 is a partial plan view showing the position of the sheets and the guides holding them in place, together with the means for operating the swinging plate. Fig. 7 is a partial end elevation showing the means for raising and swinging the shaft and plate shown in Fig. 6.

In the said drawings, the reference-numeral 1 designates a feed-platform of suitable form and size, which is arranged to move vertically

by means of a screw-shaft 2, journaled in suitable supports in the machine-frame, and meshing with a worm-wheel 3, mounted upon a bearing dropped from the feed-platform 1. Mounted upon the bracket 3 is a clutch and clutch-lever 4, by which the connection between the wheel or bracket and the threaded shaft may be rendered positive and the wheel rigidly locked when it is desired to feed the platform upward, or loosened so that the platform will have no motion in either direction. The feed-platform is guided by sleeves 1^a moving upon smooth vertical guide-bars 2^a. Revolution is imparted to the threaded shaft 2 by means of a worm and worm-gear 5 and 6, the former carried by a shaft 7, which forms the main shaft of the machine. Motion is communicated from the driving-shaft 7 to a shaft 8, parallel with the shaft 7. The second driving-shaft 8 is geared by a miter-pinion 9 to the prolonged end 10 of a feed-roll 12, which carries a similar miter-gear meshing with the pinion 9. Upon the end of the shaft 8 is mounted a miter-gear 13, meshing with a somewhat larger similar gear 14, keyed upon the upper end of a vertical shaft 15, which is driven from the shaft 8. Upon the shaft 15 are mounted two cams 16, the form of which is shown in Fig. 2. These cams act upon friction-rolls 17, mounted upon slide-bars 18, retracted by springs 18^a, and having racks 19, which engage or mesh with the segment-gears 20, carried by a shaft 21, (see Figs. 6 and 7,) which is stepped upon a plate 22, but may have vertical movement in its bearings, the segment-gears 20 being of sufficient width to permit such rise and fall, as shown in Fig. 7. Upon one of the segment-gears, which is loose on the shaft, is mounted a lifting-cam 23, acting upon a curved cam 24 and lifting the shaft 21 at each action of the said gear, a collar 20^a being firmly clamped upon the shaft 21, immediately above the lower segment-gear 20, against which collar said gear has bearing in order to raise and lower the shaft as the cam 23 rides upon the cam-plate or lift 24. The other segment-gear 20 is tight upon the shaft which runs with said gear. The ends of the slide-bars 18 are supported and move in a bracket 25, bolted to the frame of the machine.

The sheets are piled or stacked upon the

platform 1, and are held in position by vertical angular guides 26, arranged upon each side of the platform, and, if desired, let into the edges thereof by means of a cut and a countersink, Fig. 6. Upon a bracket 27, mounted on the frame of the machine, is pivoted a horizontally-swinging bent lever-arm 28, upon the end of which is pivotally mounted a frame 29, having two lugs 29^a, one of which is pivoted to the end of the lever 28 and the other to the end of a link or parallel arm 28^a, also pivoted at its other end upon the bracket 27 and swinging with the lever-arm 28, thereby imparting substantially rectilinear horizontal movement to the frame 29. This frame carries a vertically-movable bar 30, upon the lower end of which is a rigid shoe 31, having points 32 projecting downward. These points overhang the pile of blanks stacked upon the feed-platform 1, and, as shown in the drawings, they are located over that portion of the pile located at or near the front or delivery edge of the platform. Upon or within bearings 33 on the machine-frame is arranged a slide-bar 34, and projecting from this bar is a pin 34^a, carrying a vertical finger 35, which reciprocates within a slot in the end of the arm 28, swinging the latter and carrying the frame 29 horizontally in two directions or toward and from the feed-rolls 12. The bar 34 is moved in one direction by a cam 36 on the end of a shaft 37 and in the opposite direction by a spring 38, coiled on said bar 34. Mounted on the machine-frame is a bracket 39, which projects over the blanks as they lie upon the platform 1. In this bracket slides an arm 40, having a step 41, which lies within or near one of the angular guides 26 and rests upon the blanks, being thrown downward by a cam 42, acting upon a curved arm 43, projecting from the arm or bar 40, and raised by springs 44, coiled on the latter.

Upon the upper end of the shaft 21 is mounted a plate 45, which swings horizontally and rises and falls as the shaft turns under the impulse of one of the segment-gears 20, and is raised and dropped by the other and similar gear. Upon a shaft 46, mounted in bracket-arms 47, is arranged a roll 48, having a raised surface or portion 49. Upon the bar 30 is arranged a collar 50, from which projects a finger 50^a, beneath which lies a lifting-arm 51, carried by a rock-shaft 52, which is journaled in lugs 39^a on the bracket 39. An arm 53 on the rock-shaft bears upon the surface of a cam 54, carried by a shaft 55, journaled in bearings on the machine-frame, whereby the lifting-arm 51 is raised at each revolution of the cam, raising the shoe 31, and as the cam passes off the arm 53 dropping the same partly by gravity and partly by the action of a spring 56, connected to a finger 57 on the bar 30 and to the frame 29.

The operation of the parts thus described is as follows: The sheets or blanks, of whatever form, are arranged upon the feed-platform in a stack or pile, lying between the

guides 26, which preferably inclose or surround the angles of the pile, the edges of the blanks or sheets lying close to the front or delivery edge of the platform. In the present case I have shown the mechanism adapted to feeding blanks used for making paper boxes, having the form shown by dotted lines in Fig. 6, the flaps *a* of said blanks being placed next the front edge of the platform. The platform 1 being fed vertically at a proper speed by the action of the screw-shaft 2, the frame 29 is swung rearward by the action of the slotted lever 28, Fig. 2, having an arm 29^a, which is pivotally connected at its end to the said frame. A link 28^a, having pivotal engagement with the frame 29 and with the bracket supporting the lever 28, secures a substantially rectilinear movement, the swing of the lever being such as to bring the frame far enough toward the rear to cause the shoe 31 to overhang the flaps *a*, or the edges of the paper sheets, of whatsoever form, which lie adjacent to the edge of the platform. As the parts reach the position set forth, the cam 54, which has lifted the arm or bar 30, passes off the arm 53 and drops said arm, bringing the shoe 31 down upon the uppermost blank and causing the point 32 to enter and partly penetrate the same. By the revolution of the shaft 37 the cam 36 upon its end is caused to draw upon the cam-slide or bar 34, and thereby swing the slotted lever 28 toward the front, thereby drawing the upper blank or sheet slightly toward the front, and causing the flap or edge to project slightly beyond the front edges of the pile upon the platform. At this moment, or immediately succeeding the movement last described, whereby the upper blank is drawn partly off the pile, the shaft 15 has reached that point in its revolution at which the cams 16 begin to act upon the rack-bars 18. It will be seen by examining Fig. 2 that the lower cam 16 upon said shaft is expanded or widened upon each side in such manner that the lower rack-bar 18 begins to move longitudinally a little before the like movement of the upper rack-bar is initiated, whereby the cam 23, Fig. 7, is caused to partly mount the curved cam 24 before the upper rack-bar imparts a rotary movement to the shaft 21 carrying the plate 45. At the moment that this upward movement of the shaft begins the plate 45 lies in the position shown in Fig. 2 with its end directly beneath the edge of the upper blank or sheet, which has been drawn somewhat off the pile, and which is therefore raised by said plate sufficiently to permit the latter to pass beneath the same when its rotation begins without any danger of disturbing the sheets lying beneath. The plate 45 is turned until it lies substantially beneath the periphery of the friction-roll 48, where it is held by the concentric edges of the cams 16 until the raised portion 49 of the roll engages the surface of the blank and sweeps it off the pile, advancing it to the feed-rolls 12, which carry it to

the mechanism by which the next succeeding operation is to be performed. The prolonged throw and relief surface of the lower cam 16 as compared with the upper cam, not only effects the lift of the plate 45 somewhat in advance of the rotation, as already set forth, but holds said plate a short time after rotation ceases and before the reverse movement begins. A sharp-edged roll or wheel 58 rests upon the body of the blanks as the latter are piled upon the platform and rolls upon their rearward edges to prevent the sheets from sluing. This roll or wheel is carried by an arm or lever 59, which is mounted in a frame 60, having pivotal bearing in boxes 61, arranged on the frame of the machine. A finger 62 rises from this frame and is connected to a spring 63, by the tension of which the wheel is held down upon the blanks. The guides 26 upon one side of the platform are supported by levers 64, Figs. 2 and 6, which are provided with pivotal joints 65. The ends of these levers are provided with slots 66, and in one of these slots lies a crank-pin carried by a crank-arm 68 on a shaft 69. To this shaft is rigidly connected a lever 70, held in normal position by a latch 71. The lower end of each guide is supported by a duplication of the parts described. The crank-pins are firmly clamped at suitable points in the slots 66 by bolts 72, and by operating the lever 70 the guides will swing outward like a gate. The guides on the other side may be similarly mounted and operated, or they may be simply clamped upon supports 73, passing through the slots 74 of similar levers, whereby they may be adjusted to any point desired to adapt them to the size of the sheet.

The operative mechanism is driven by the quadrilateral arrangement of shafts 46 and 55, carrying miter-gears 75 and 76, respectively, which mesh with similar gears 77 and 78 upon shafts 79 and 80.

The essential problem in the case is the insertion of the plate 45 between the upper sheet or blank and the pile on which it lies.

What I claim is—

1. In a paper-feeding machine, the combination, with a feed-platform supporting a pile or stack of sheets or blanks, of means, substantially as set forth, for advancing or projecting the edge of the upper sheet beyond the edge of the stack, and a plate or support rising beneath said projected edge and then passing between the upper sheet and the pile or stack, substantially as described.

2. In a paper-feeding machine, the combination, with a feed-platform supporting and feeding a pile or stack of sheets or blanks, of means, substantially as set forth, for advancing or projecting the edge of the upper sheet beyond the edge of the pile or stack, a plate rising beneath said projected edge and then passing between the upper sheet and the pile or stack, and a roll having a raised surface portion revolving above and engaging the sheet

to feed it off the plate, substantially as described.

3. In a machine for feeding paper, the combination, with a table supporting and feeding a pile or stack of sheets or blanks, of a swinging vertically-movable shoe having points or pricks upon its lower surface, a swinging and vertically-rising separating-plate mounted on a vertical shaft near the feed-edge of the table, and a feed-roll having a raised surface portion engaging the blank as the separating-plate passes under the edge of the sheet, substantially as described.

4. In a machine for feeding paper, the combination, with a table supporting and feeding a pile or stack of sheets or blanks, of means, substantially as set forth, for feeding said table upward, a swinging vertically-movable shoe mounted in a frame over the edge of the blanks or sheets and having points upon its lower surface, a separating-plate carried by a rock-shaft, a cam raising said rock-shaft, and a feed-roll having a projecting surface portion rotating above said separating-plate, substantially as described.

5. In a machine for feeding paper, the combination, with a table or platform supporting and feeding a pile or stack of sheets or blanks, of a threaded shaft feeding said table upward, a spring-raised stop resting upon the blanks or sheets and having an arm engaging a cam depressing said stop, a separating-plate carried by a vertical rock-shaft, a cam raising said shaft, a shoe carried by a vertical rock-shaft and having points engaging the flaps of the blanks, a cam-slide rocking said shaft, and a feed-roll having a raised surface portion revolving over the separating-plate as the latter swings under the raised edge or flap of the blank, substantially as described.

6. In a machine for feeding paper, the combination, with a vertically-fed table or platform carrying the blanks, of a vertical shaft arranged in a frame overhanging the table, a cam-slide rocking the horizontal arm carrying said frame, a bell-crank and cam lifting the shaft in said frame, a vertical shaft carrying upon its end a separating-plate arranged in front of the edges of the blanks, cams lifting and turning said plate as the shoe rises with the flap of a blank attached to its points, and a feed-roll engaging the flap of the blank as it rests on the inserted separating-plate, substantially as described.

7. In a machine for separating and feeding sheets or blanks of paper, the combination, with a table or platform carrying the piled sheets, of mechanism, substantially as set forth, for raising said table, a separating-plate mounted on a vertical rock-shaft having a fast and a loose segmental gear, the latter provided with a lifting-cam, spring-retracted slide-bars having racks meshing with said gears, a separating-plate carried by said rock-shaft and rising and turning in close proximity to the edges of the upper blanks, a ris-

ing and horizontally-swinging shoe having points raising the flap or edge of the upper blank, and a feed-roll having a raised surface portion which bears against the separating-plate as it lies under the raised edge of the blank, substantially as described.

8. In a machine for feeding paper, the combination, with a table having a fixed upward feed, of a sharp-edged wheel mounted on a bar arranged in a spring-tilted frame, its edge resting on the surface of the upper blank, a step thrown downward by a cam on the edge of said blank and raised therefrom at intervals by a spring, a shoe having points engaging the flap or edge of the upper blank, a bell-crank lever raising said shoe, a cam-slide swinging the frame carrying said shoe, a separating-plate turning beneath the raised flap of the blank, a cam-lift raising said plate as it lies under said flap, means, substantially as described, for turning the plate after it has lifted the flap sufficiently to pass beneath the same, a feed-roll having a projecting surface

portion engaging the flap, and feed-rolls between which the blank passes, substantially as described.

9. In a machine for feeding paper, the combination, with a rising and falling separating-plate, of a vertically-movable rock-shaft, on the end of which the plate is mounted, a spring-retracted slide-bar having a rack meshing with a segment-gear fast on said shaft, a similar slide-bar having a rack meshing with an independent segment-gear loose on the rock-shaft and provided with a lifting-cam, and two cams carried by a vertical shaft, upon which are slipped the slotted ends of the slide-bars, said cams bearing against friction-rolls on the bars, substantially as described.

In testimony whereof I have affixed my signature in presence of two witnesses.

LEWIS F. FALES.

Witnesses:

CHAS. F. THAYER,
WILLARD J. LEWIS.