

No. 834,193.

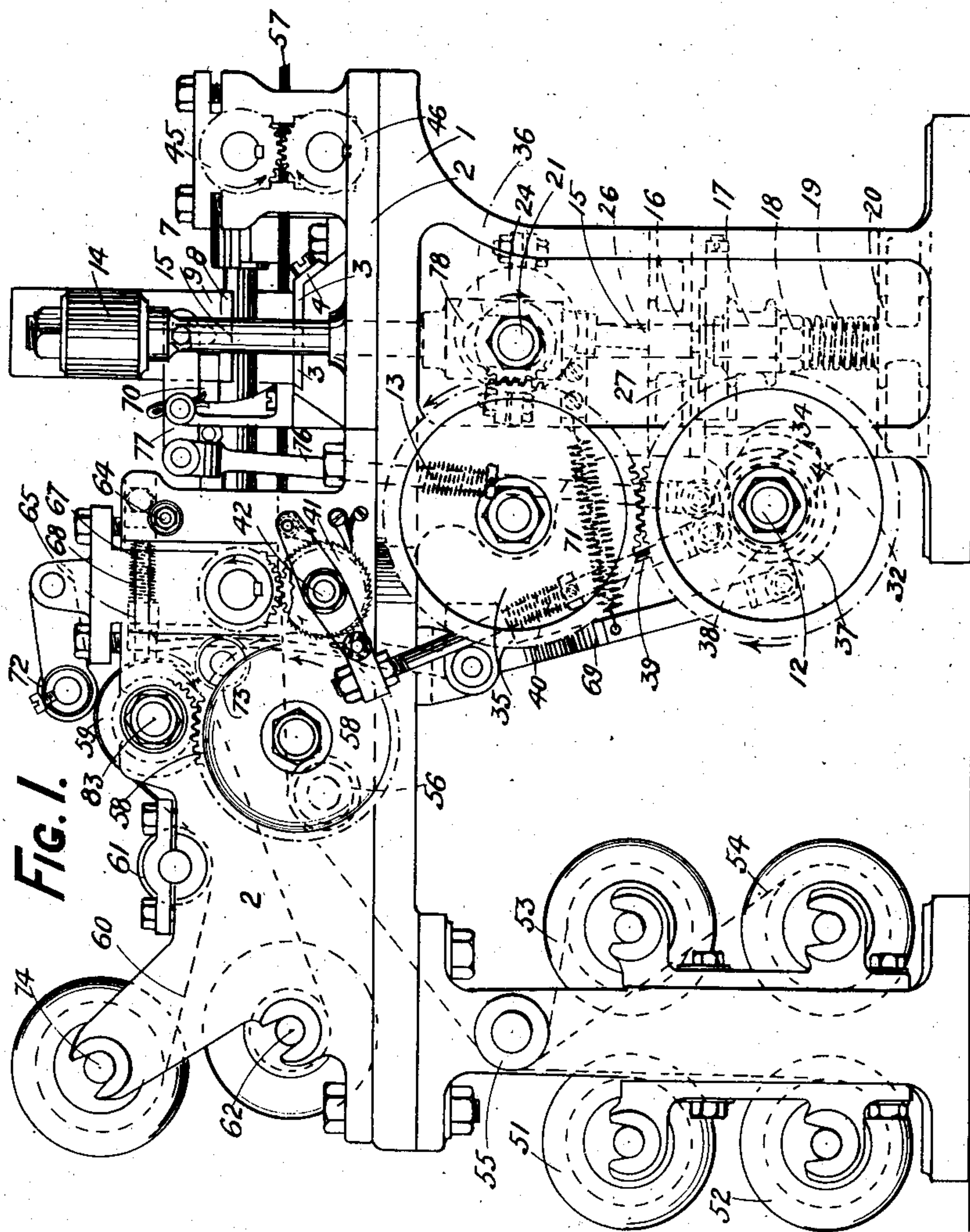
PATENTED OCT. 23, 1906.

W. W. COLLEY.

MACHINE FOR PERFORATING PAPER AND METAL SHEETS
FOR USE IN PLAYING MUSICAL INSTRUMENTS.

APPLICATION FILED MAR. 29, 1905.

7 SHEETS—SHEET 1.



Witnesses.

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Myron G. Clear

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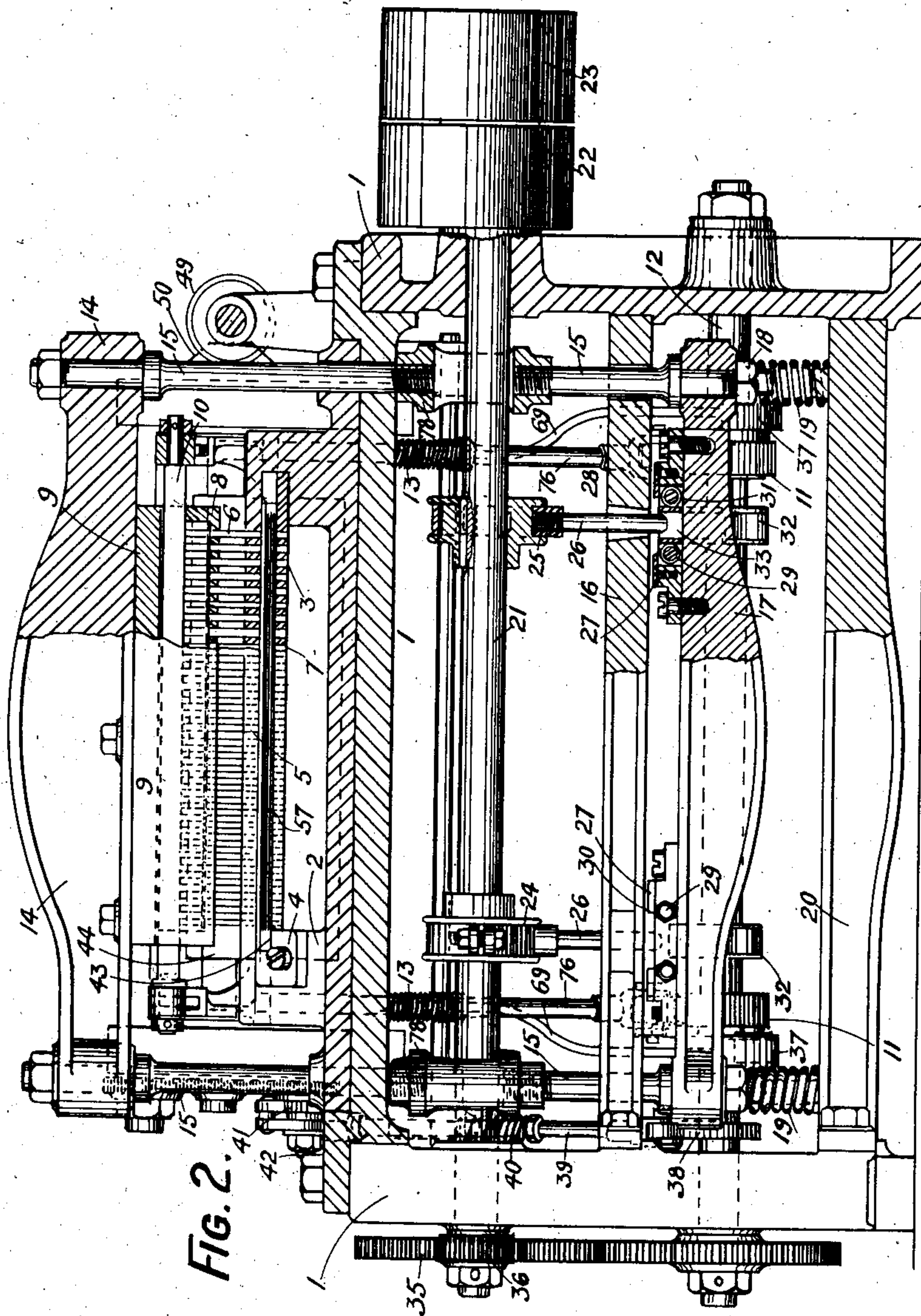


FIG. 2.

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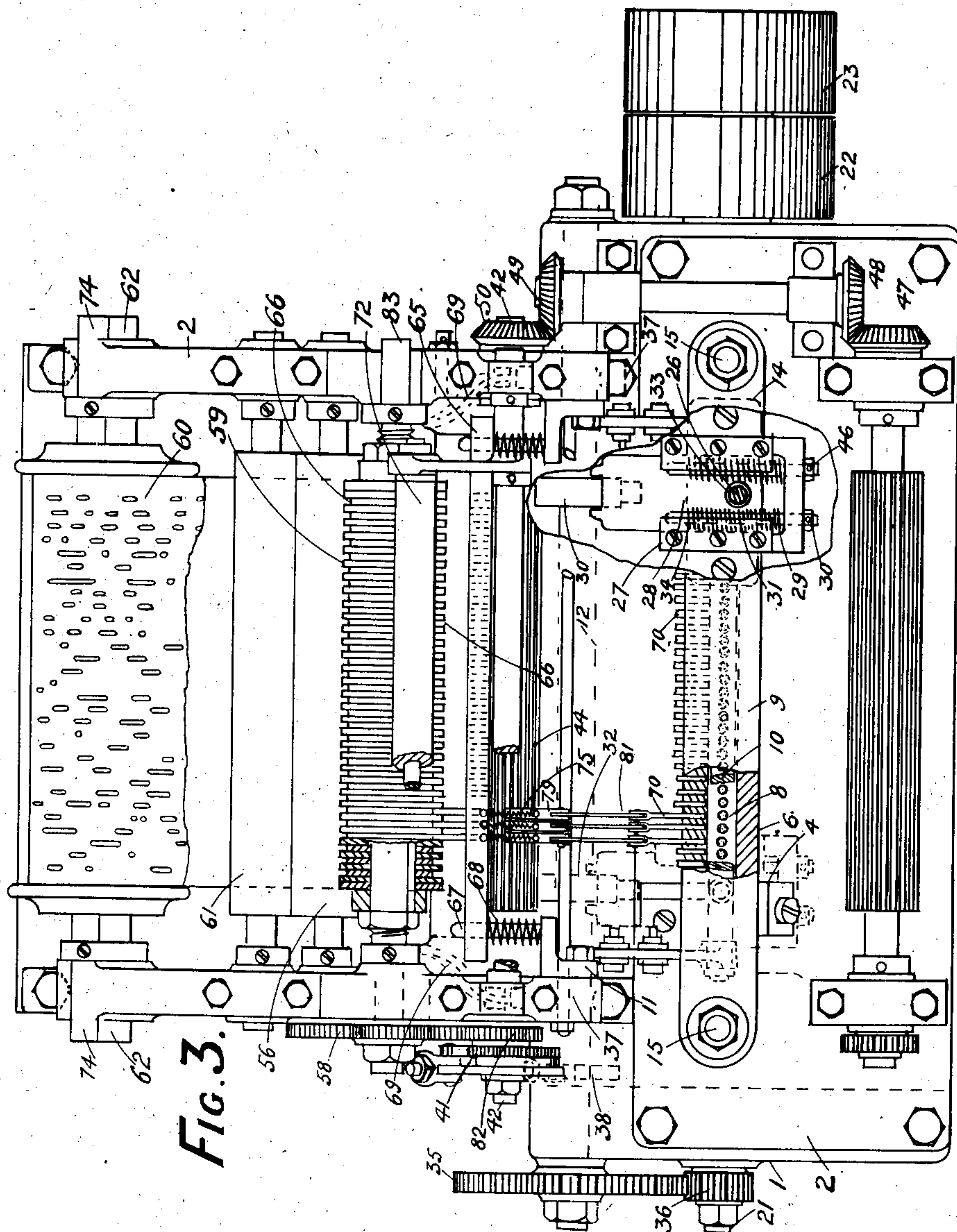


FIG. 3.

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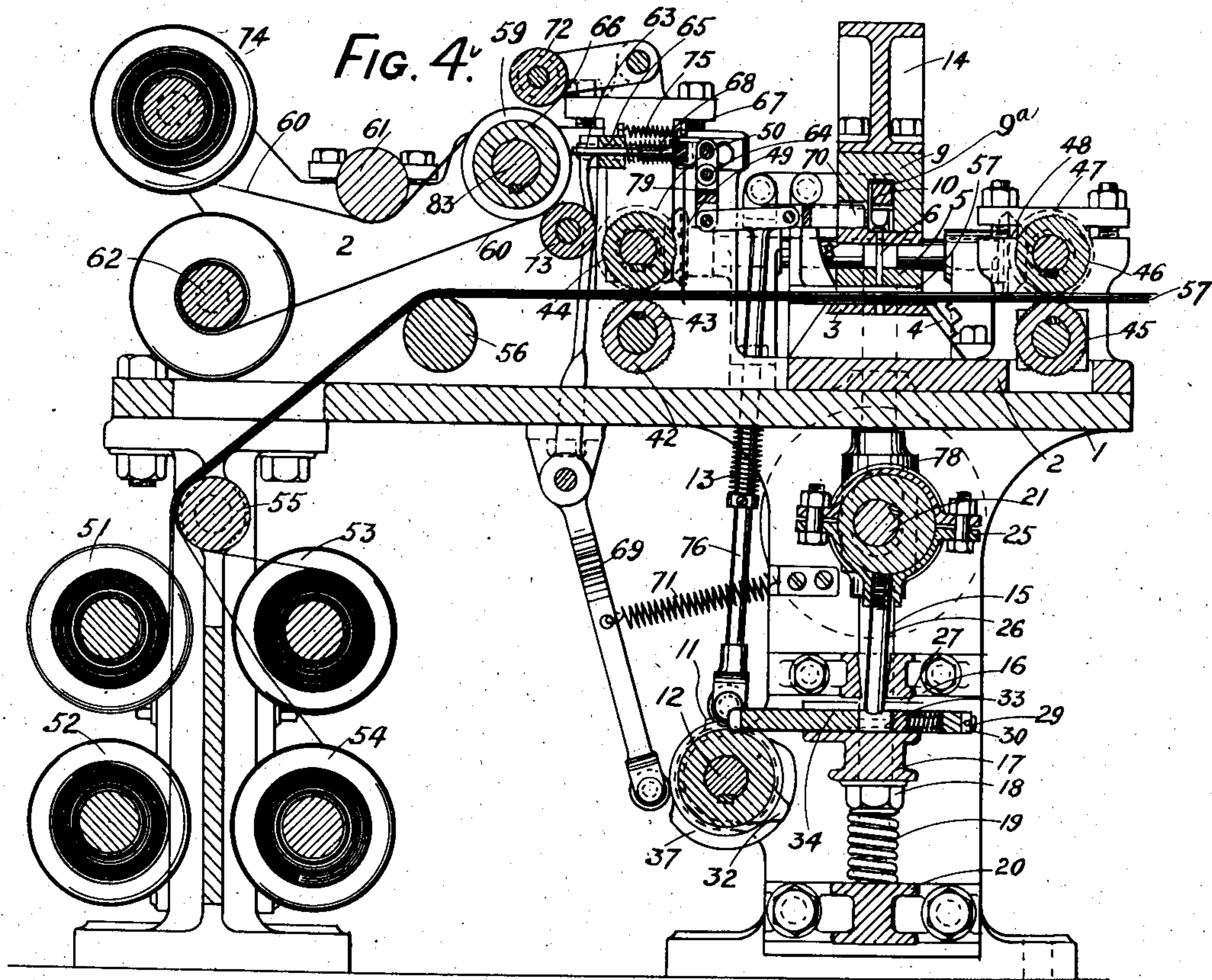
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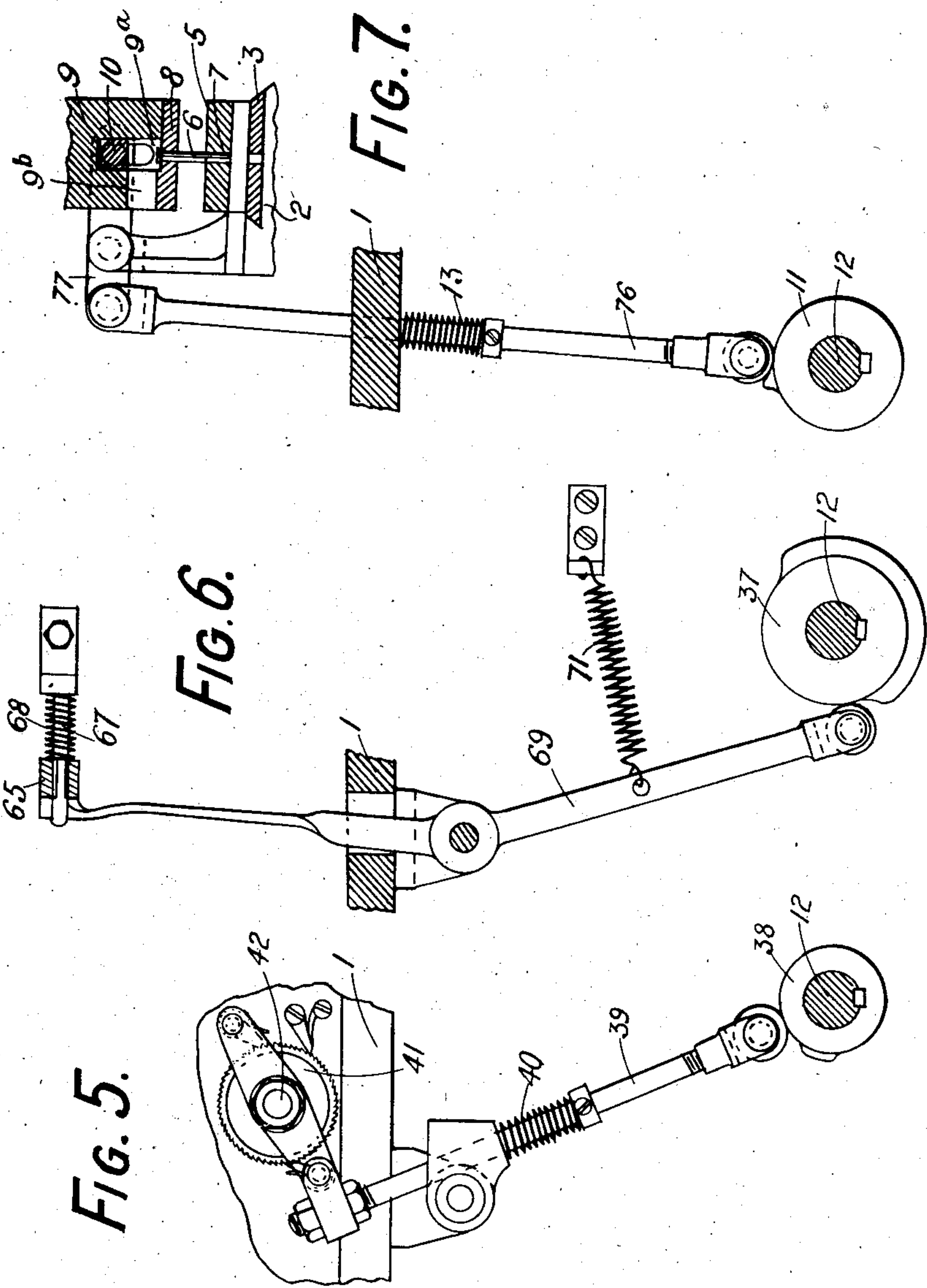
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7 SHEETS—SHEET 5.



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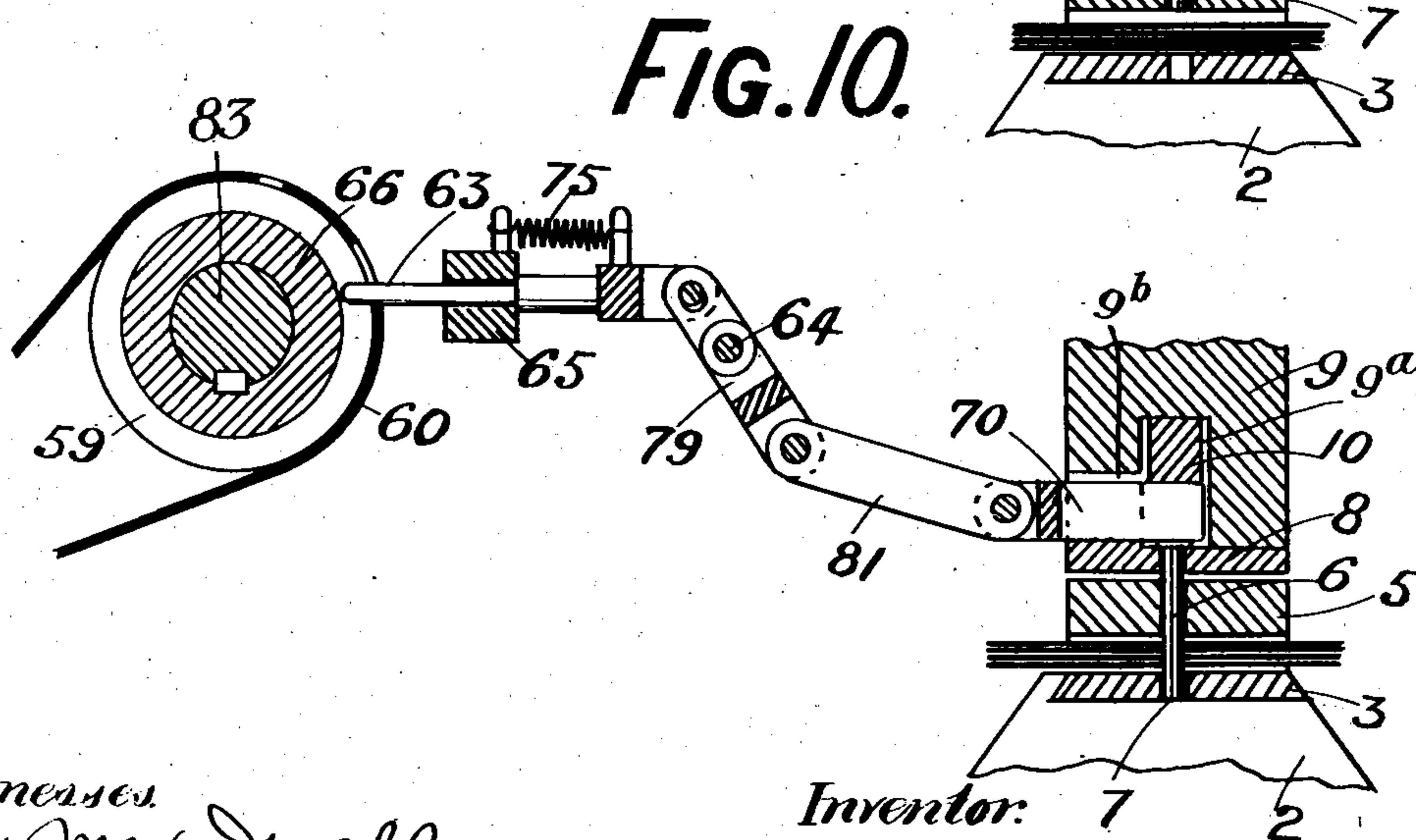
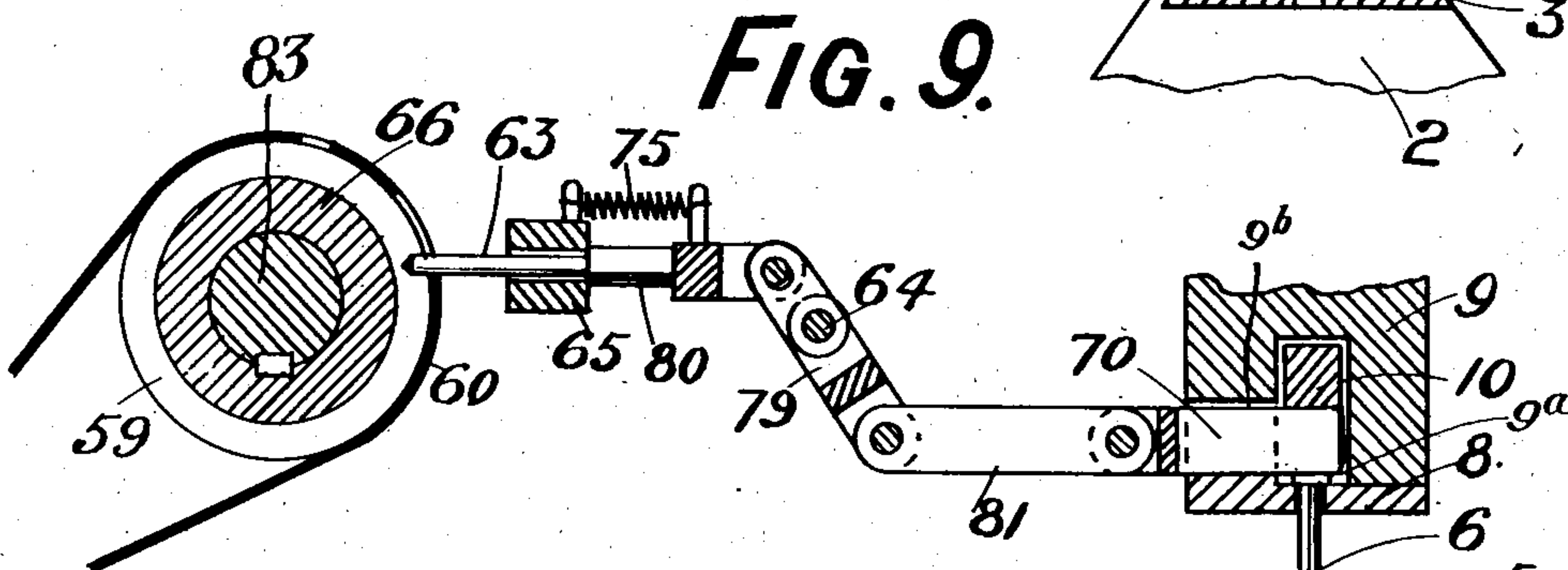
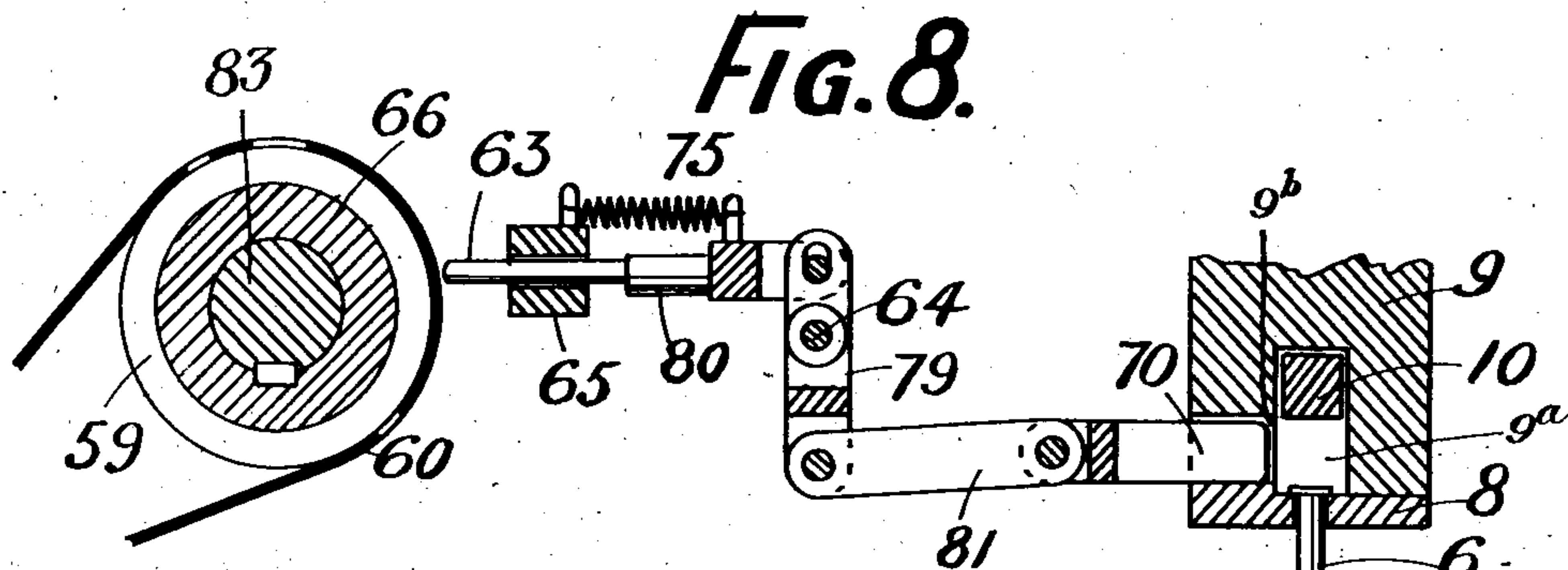
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7 SHEETS—SHEET 6.



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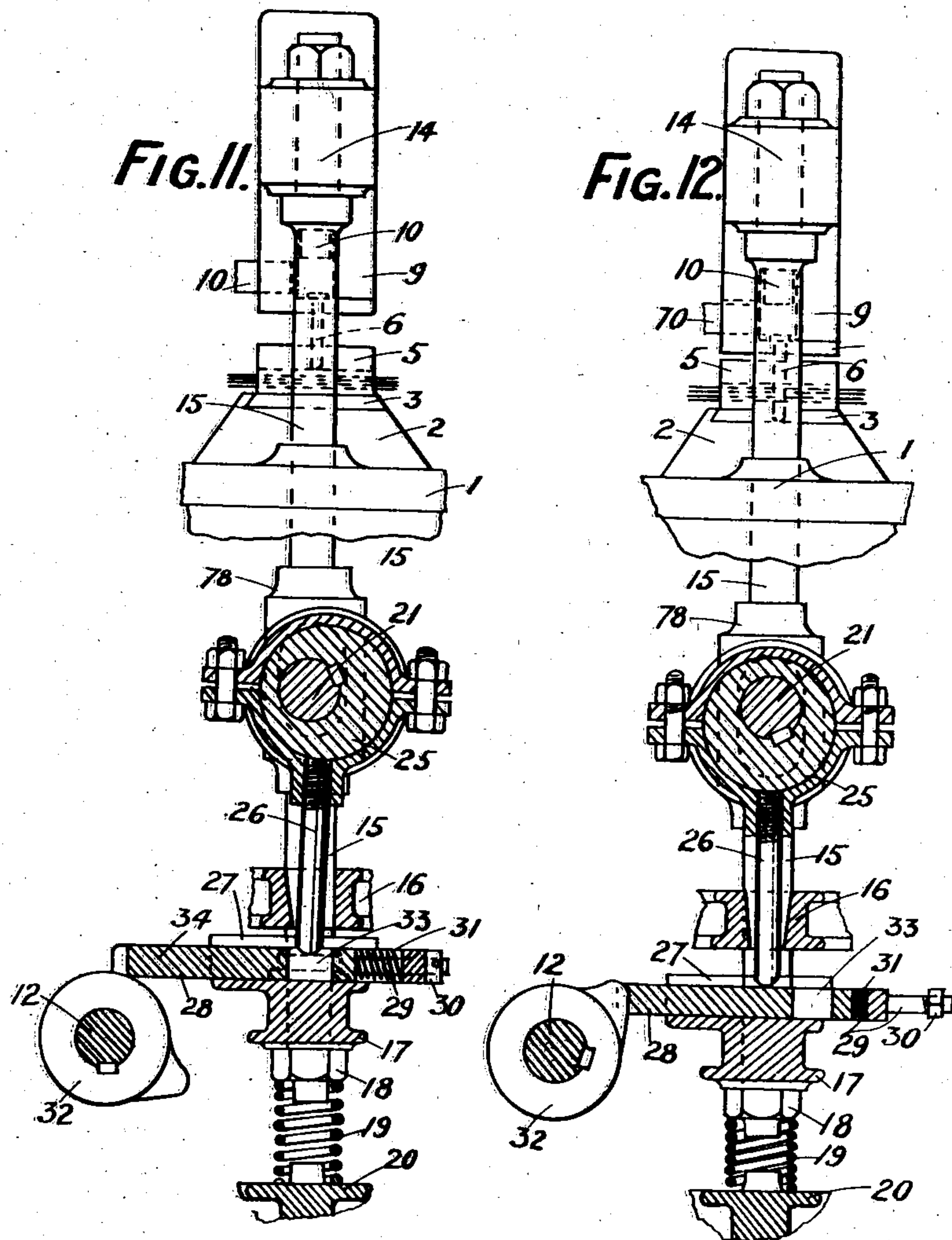
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7 SHEETS—SHEET 7.



Witnesses.

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UNITED STATES PATENT OFFICE.

WALTER WILLIAM COLLEY, OF LONDON, ENGLAND.

MACHINE FOR PERFORATING PAPER AND METAL SHEETS FOR USE IN PLAYING MUSICAL INSTRUMENTS.

No. 834,193.

Specification of Letters Patent.

Patented Oct. 23, 1906.

Application filed March 29, 1905. Serial No. 252,750.

To all whom it may concern:

Be it known that I, WALTER WILLIAM COLLEY, a subject of the King of Great Britain, residing at London, England, have invented
5 certain new and useful Improvements in Machinery for Perforating Paper and Metal Sheets for Use in Playing Musical Instruments; and I do hereby declare the following to be a full, clear, and exact description of the
10 invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in the arrangement of machinery for perforating the rolls of paper used in the mechanical
15 playing of music and is also suitable for perforating thin metal sheets or bands of metal for the same purpose. The said arrangement of machinery embodies various details of invention hereinafter set out, reference being
20 made to the accompanying drawings.

In the drawings, Figure 1 illustrates a view in side elevation of the complete machinery; Fig. 2, a front elevation thereof,
25 partly in section; Fig. 3, a plan view with portions broken away; Fig. 4, a longitudinal sectional view of the machinery; Fig. 5, a detail view of the ratchet-operating mechanism; Fig. 6, a detail view of the follower-pins' returning mechanism; Fig. 7, a similar
30 view of the reciprocating mechanism for the cross-bar; Fig. 8, a sectional detail showing the position of one of the follower-pins, interlocking fingers, and punches when the follower-pin is in engagement with the imperforate
35 portion of the stencil; Fig. 9, a similar view showing the position of the parts when the follower-pin rests in a perforation of the stencil, the finger being projected within the recessed member to form an interlock between the cross-bar and a punch and the recessed member being in a position just prior to downward reciprocation; Fig. 10, a similar
40 view to Fig. 9, showing the position of the parts immediately after perforation; Fig. 11, a detail end view of the cross-heads and operating connections, partly in section, and showing the position of the interlocking plate when the cross-head-operating plunger reciprocates out of operative engagement with the
45 cross-head; and Fig. 12 is a similar view showing the position of the interlocking plate interposed between the cross-head plunger and cross-head.

1 is the main frame, upon the top of which 55 is bolted a secondary frame 2.

3 is a die-plate, for the perforating pins or punches, secured upon a raised portion of the secondary frame by bent clips 4, comprising
60 downwardly-extending ears formed integral with the plate 3. (See Figs. 1, 2, and 3.)

5 is a guide-plate for the punches, set above the die-plate 3 to leave a space between for the paper to pass through and be perforated; 6, the perforating pins or punches, formed
65 with a flat head and flat point 7. These are mounted to bodily move freely through the perforations of a perforated plate 8, attached to the bottom of a cross-piece or recessed member 9. This recessed member 9 is bolted
70 to the under side of an upper cross-head 14. The cross-piece or recessed member 9 is slotted, as at 9^a, along its bottom face, forming a longitudinal passage in which is intermittently operated the cross-bar 10 to press
75 down the pins or punches before perforation, the pin-heads coming into a countersink in the punch-plate 8 to come flush with the top of it. The recessed member 9 is also provided on its side face with the laterally-disposed slots 9^b, communicating with the passage-way 9^a for a purpose hereinafter referred to, and it will be observed that the plate 8 forms a bottom closure for both the longitudinal slot 9^a and the transverse slots
80 9^b. (See particularly Figs. 2 and 3 and in detail in Figs 8 to 10.) This cross-bar 10 is pivoted at each end to one end of pivoted levers 77, Figs. 1 and 7, the other end of the levers being pivoted to reciprocating connecting-rods 76, (hereinafter designated as the
85 "cross-bar" rods,) in the bottom of each of which is a usual roller to engage one of a pair of cams 11, keyed on a counter-shaft 12. By the rotary movement of the cams the bar 10
90 is depressed onto the heads of the punches 6. After depression and release from the cams the bar 10 is lifted to the top of its bed by the action of the springs 13 engaging the cross-bar rod 66. (See Fig. 7.) The upper cross-
95 head 14 is connected by pillar-rods 15 to a lower cross-head 17 and secured by outside nuts 18. The cross-heads are retained in their working position by the pillars passing through guideways in frame and in
100 stretcher 16. These pillar-rods are formed in two lengths, connected by the intermediate connections 78. Each of these intermediate
105

connections has an elongated eye for the main driving-shaft 21 to pass through. These two cross-heads 14 and 17 are held up by the strong springs 19, supported on bottom cross-girder 20, secured in frame 1.

Carried within the main frame are several rolls of paper 51 52 53 54 to be perforated. Each roll of paper is reeled with four superposed layers, so that the four rolls will unroll sixteen bands of paper, these all being collected by the guide-rollers 55 56, over which they pass as a single layer and are conducted through the machine to be simultaneously perforated, the paper being first drawn by fluted feed-rollers 43 44 and after perforation by a second set of feed-rollers 45 46. As the layer of perforated paper 57 passes from these latter rollers it is again separated into sheets and reeled up onto separate reels in any usual way. These two sets of feed-rollers are geared together outside the main frame to run in unison by gearing 47 48 49 50, operated by spindle 42, which passes across machinery and is keyed to a ratchet-wheel 41. Carried within the upper frame 2 is a circumferentially-grooved roller arranged to be revolved. This roller is preferably built up of disk rings 59, held spaced apart by interposed smaller disk rings 66 to form circumferential grooves, the whole of the rings being drawn together on a spindle 83 by screw-nuts. My object in building up a roller as described is to enable the width of the grooves to be varied to suit different perforations, and so avoid the necessity of making a separate roller for different tunes, the variation being effected by wider or narrower rings 66.

60 is the working stencil-roll, carried on a reel on spindle 74. This stencil regulates the notation perforating of the paper, as herein-after explained. The stencil as drawn from its reel passes under guide-roller 61 and partially round the grooved roller, being supported upon the circumference of the larger rings 59, the tension of the stencil being regulated by usual tension-rollers 72 73. The stencil is drawn by the intermittent rotary movement of the grooved roller and is then rewound onto another reel carried on spindle 62. This spindle is not operated from the moving parts of the machinery, but would be fitted with an ordinary crank-handle (not shown) to be turned by the attendant as required to wind up the stencil.

70 represents interlocking fingers working through the guide openings or slots 9^b in front of the recessed cross member 9, herein-before described. These fingers, Figs. 8, 9, 10, when moved into the longitudinal slot 9^a of the recessed member 9 secure the perforating-pins 6 during the action of perforating by coming over their heads. Each of these fingers is connected to the bottom end

of a lever 79 by intermediate connecting-levers 81. The levers 79 are carried by a pivot cross-shaft 64. The upper end of each lever 79 is connected to a rod 80, having a portion of the free end reduced, as at 63, to form a tracer or follower-pin for the stencil, suitable springs 75 being provided normally tending to force said follower-pins beyond the stencil.

In Fig. 3 three completed fingers and parts are shown; but it is to be understood that the number in the machinery illustrated will include in complete form the broken-off portions shown—that is, one to each groove in the roller.

41 is a ratchet-wheel with fine teeth carried on one end of spindle 42. This wheel is operated by double pawls, Figs. 1 and 5, carried in a carrier on top of connecting-rod or ratchet-operating bar 39, the movement of the pawls being effected by cam 38, keyed on counter-shaft 12, the pawls being brought back by spring 40. This ratchet-and-pawl movement operates all the rotating parts in the upper frame 2. At the back of the ratchet-wheel, keyed, on the spindle 42, is a gear-wheel 82, which gears with an intermediate gear-wheel 58, carried on a stud-pivot gearing with gear-wheel on spindle 83 of grooved roller.

The cross-heads 14 and 17 are intermittently depressed to force the pins 6 through the layer of paper 57 by a quick blow in the following manner: Arranged to reciprocate upon top of cross-head 17 in guideways 27 are two interlocking slides 28, Figs. 4, 11, and 12, normally held in one position by springs 31 on short rods 29, the springs being secured by nuts 30. (See Fig. 11.) Each of these slides has a hole 33. The reciprocating movement is effected by cams 32 on counter-shaft 12. Keyed on main driving-shaft 21 are two strap-eccentrics 24 25, having pendant cross-head-operating plungers 26, which pass through guide-holes in stretcher 16. The holes 33 in slides are rather larger than the plungers and are normally in a line with bottom of them, so that they may pass through by the eccentric movement; but when the slides are pressed in by cam 32, Fig. 12, the plungers engage the solid part 34 of slides, and thereby presses down top and bottom cross-heads, effecting the perforation of the paper. This action is, once to three revolutions of the main driving-shaft, effected by counter-shaft 12, being geared at one to three from main driving-shaft by outside gearing 35 36, Fig. 2. As the plungers 26 are withdrawn the bottom springs 19 lift up the cross-heads, thereby withdrawing the punches from the paper. All of the displaced interlocking fingers 70 and follower-pins 63 are intermittently moved to the positions shown at Fig. 8 by the shifting-bar 65,

through which the follower-pins 63 pass and are guided. This bar is operated by being connected to pivoted levers 69, operated by cams 37, having an extra long bearing to hold the follower-pins back while the other parts of the machinery are moving to draw the stencil and paper. When this rod 65 is operated, it engages the shoulders formed by the reduced end of the follower-pins. (See Fig. 9.)

The correct notation of the perforations in the paper is effected by the perforations of the stencil 60, as follows: At the commencement of work the parts of the machinery are sufficiently moved to cause the bar 65 to move the fingers 70 and follower-pins 63 to the positions shown at Fig. 8. The machinery being then started the ratchet-and-pawl action moves the grooved roller to draw the stencil one-tenth of an inch, after which the bars 65 are released from their cams 37 and move back by the springs 68, carried on short fixed rods 67, Figs. 3 and 6, and springs 71. The points of follower-pins 63 being then drawn against the stencil by their springs 75 pass through the note-holes in stencil coming opposite to them and into a groove in roller, Figs. 9 and 10, which operate the levers 79 to move their connected fingers 70 into the openings in recessed cross member 9 to come over the heads of pins 6, Figs. 9, 10, and secure them for perforating the paper when the cross-head 14 is brought down, as before described. Figs. 9 and 10 illustrate these positions immediately before and after the perforation. It will thus be understood that any point 63 bearing against the unperforated portion of the stencil 60 will keep back its finger from coming over the head of a pin, and consequently during the perforating movement such unsecured pins will rise when their points come on the top of the layer of paper and so will not perforate. Consequently an exact reproduction of the stencil is produced in the paper perforated. As the movement of the stencil is but a tenth of an inch at a time, this will enable short or long notes to be produced, as several punchings will be required for a hole. It will be understood that there is no draw of the stencil until the whole of the follower-pins are withdrawn from its perforations, which, as has been explained, is done by the operation of the shifting-bar 65 before the ratchet-wheel moves. 22 23 are fast and loose driving-pulleys on main shaft.

Having now described my invention, what I desire to secure by Letters Patent of the United States is—

1. In a machine of the character described, a vertically-reciprocating cross-head, carrying a plurality of loose perforating-pins, and a cross-bar associated with said cross-head and intermittently operated to press down said perforating-pins, substantially as described.

2. In a machine of the character described, a plurality of bodily-movable punches, a cross-bar operatively disposed above said punches, and means for intermittently pressing down said cross-bar to bring said punches, during one stroke, into operative relation with the work to be punched, and at another stroke to force said punches through the work, substantially as described.

3. In a machine of the character described, a plurality of bodily-movable punches, a cross-bar disposed above said punches, a cross member operatively associated with said cross-bar, means for pressing down said cross-bar independently of said cross member, and means for operating said cross member and cross-bar conjointly, substantially as described.

4. In a machine of the character described, a plurality of bodily-movable punches, a cross member, with a longitudinal slot disposed above said punches, a cross-bar within said slot, means for pressing down said cross-bar independently of said slotted cross member, means for interlocking said cross-bar, cross member, and a plurality of said punches, and means for operating said slotted cross member when so interlocked, substantially as described.

5. In a machine of the character described, a cross-head, a cross-bar within said cross-head, a plurality of bodily-movable punches carried by said cross-head, a plurality of interlocking fingers disposed adjacent said cross-bar and punches, means operated by the stencil for projecting one or more of said interlocking fingers between said cross-bar and said punches, means for operating said cross-bar, and means for withdrawing said interlocking fingers, substantially as described.

6. In a machine of the character described, a plurality of bodily-movable punches, a cross member provided with a longitudinal slot disposed above said punches, and a plurality of transverse slots opening into said longitudinal slot, a cross-bar within said longitudinal slot, a plurality of interlocking fingers located within said transverse slots, means for operating said cross-bar independently, means for interposing one or more of said interlocking fingers between said cross-bar and corresponding punch, and means for operating said slotted member when the parts are so interlocked, substantially as described.

7. In a machine of the character described, a plurality of bodily-movable punches, a cross-bar disposed above said punches, interlocking means between said punches and said cross-bar, a cross-head device operatively associated with said cross-bar, a plunger-rod reciprocated, by the main shaft of the machine, adjacent said cross-head device, and an interlocking slide operating between

said cross-head device and plunger-rod to intermittently operate said cross-head device, substantially as described.

8. In a machine of the character described, 5 a plurality of punches, a cross-bar disposed above said punches, interlocking fingers operated by the stencil cooperating with said cross-bar and punches, a cross-head device cooperating with said cross-bar, a plunger-rod reciprocated, by the main shaft of the 10 machine, adjacent said cross-head, and a spring-controlled cam-operated interlocking slide provided with a recessed portion and operating between said plunger-rod and 15 cross-head, substantially as described.

9. In a machine of the character described, a vertically-reciprocating cross-head, carrying loose perforating-pins, and a cross-bar associated with said cross-head and inter- 20 mittently operated to press down said pins, in combination with a circumferentially-grooved roller, comprising a spindle, a plurality of disks thereon, a plurality of smaller spacing-disks interposed therebetween, and 25 means for holding said disks rigidly assembled, substantially as described.

10. In a machine of the character described, a plurality of bodily-movable punches, a cross-bar disposed above same, follower-pins 30 cooperating with the stencil of the machine, interlocking fingers adapted to be interposed

between the said cross-bar and punches, connections between said follower-pins and interlocking fingers, driving means, a cam-controlled reciprocating rod for initially operating 35 said cross-bar independently, means for operating said cross-bar when in interlocked relation with said punches, a cam-controlled pivoted lever for withdrawing said follower-pins from the perforations of said stencil and 40 withdrawing said interlocking fingers from interlocked relation with said cross-bar and punches, and cam-controlled means for intermittently feeding the work beneath said punches when the parts are so withdrawn, 45 substantially as described.

11. In a machine of the character described, rigidly-connected upper and lower cross-heads, a driving-shaft disposed between said cross-heads, and means for vertically recip- 50 rocating said cross-heads from said driving-shaft, comprising a pair of cams, plungers attached to said cams, and spring-controlled, cam-operated, interlocking slides having slots therein, substantially as described. 55

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

WALTER WILLIAM COLLEY.

Witnesses:

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