No. 828,449. PATENTED AUG. 14, 1906.

J. S. BANCROFT.

PERFORATING MACHINE.

APPLICATION FILED OCT. 29, 1903.

4 SHEETS—SHEET 1.

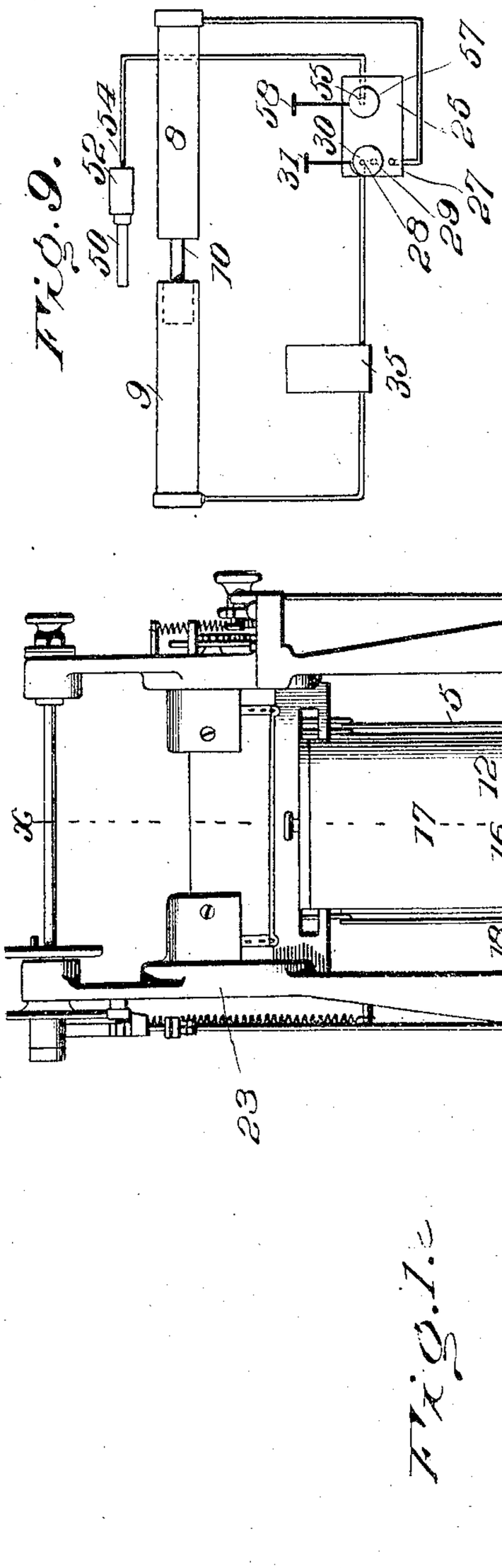

FIG. 2.

FIG. 1.

Witnesses

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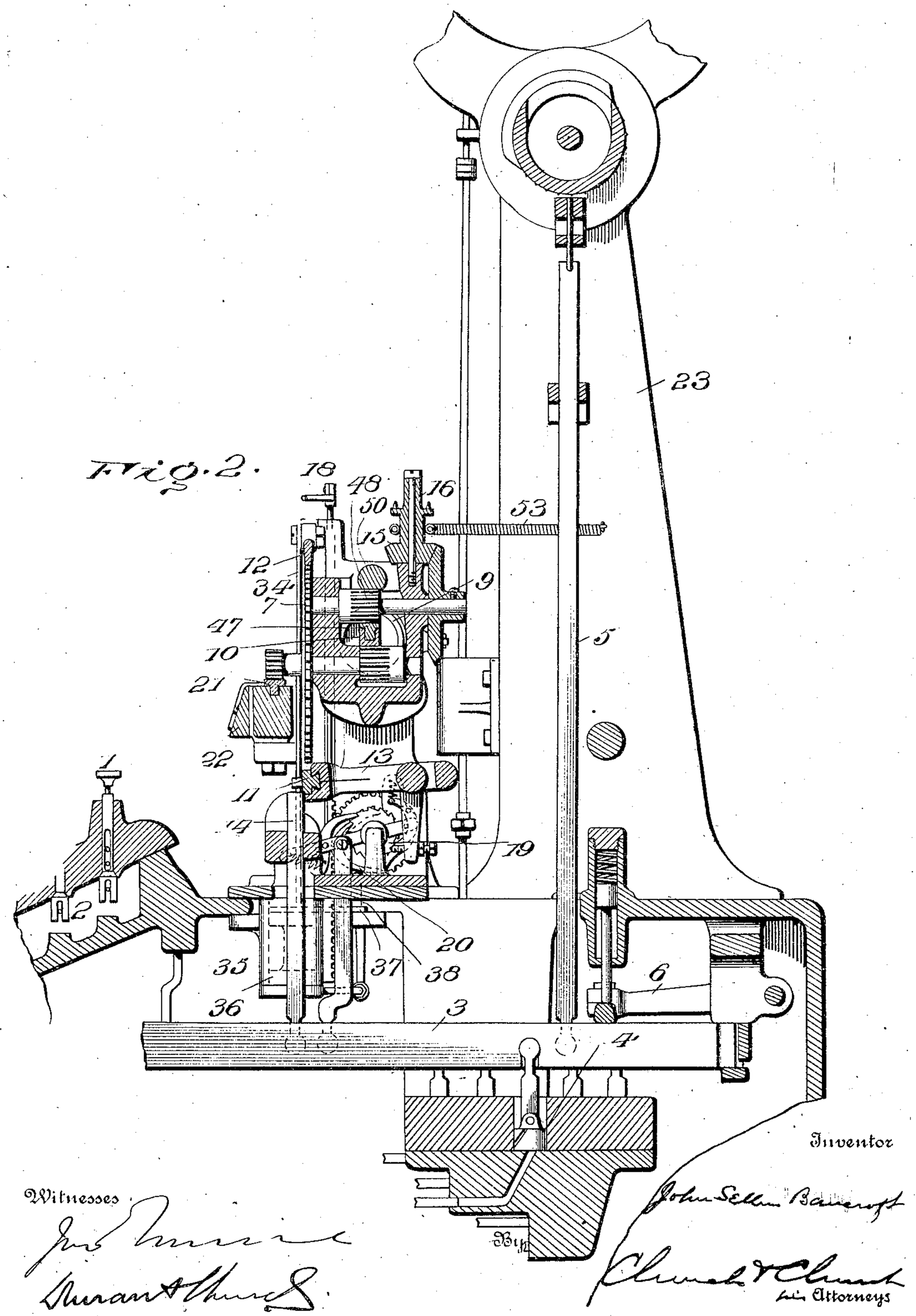
4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

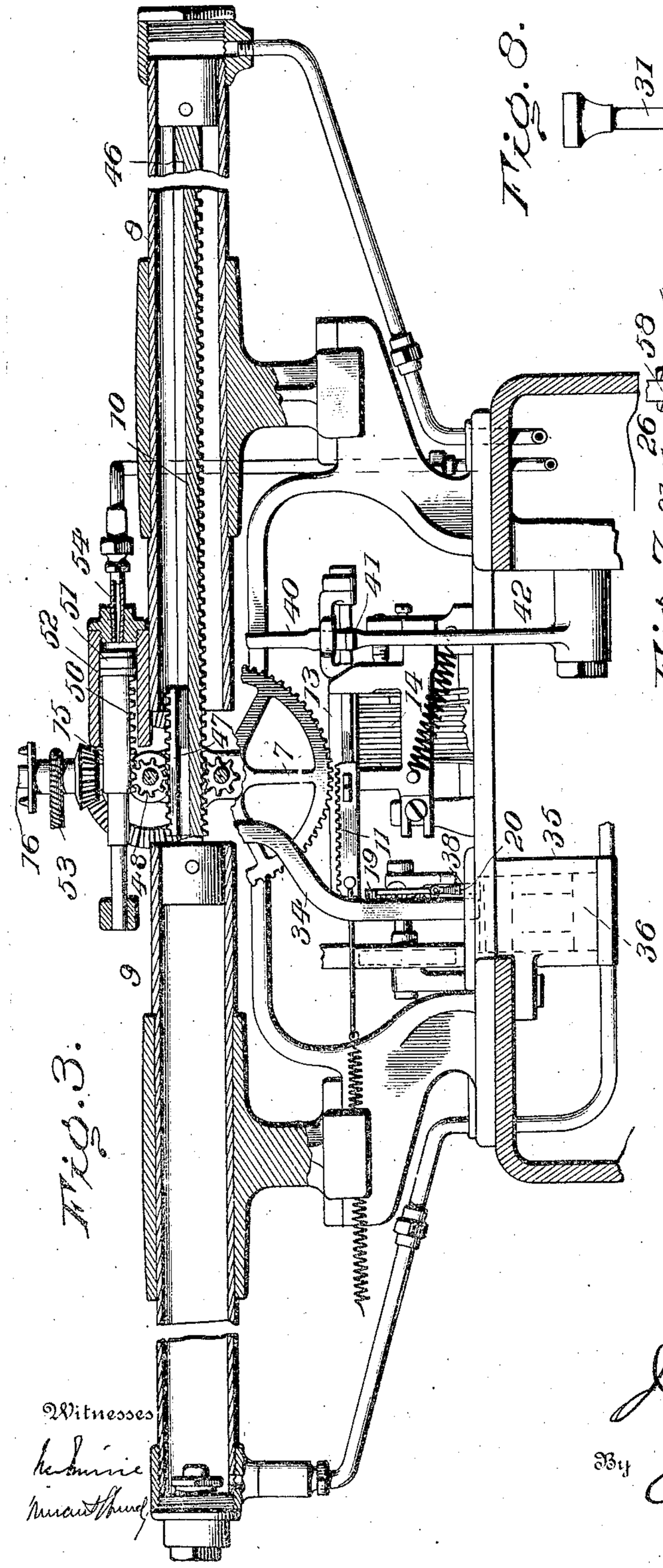

Fig. 3.

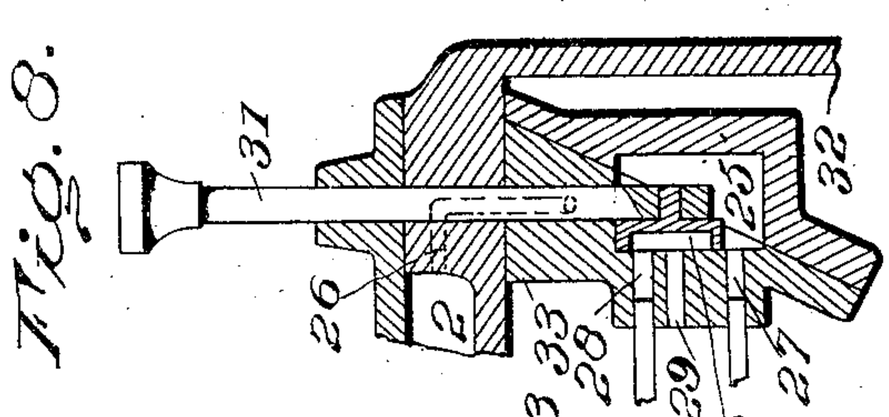

Fig. 8.

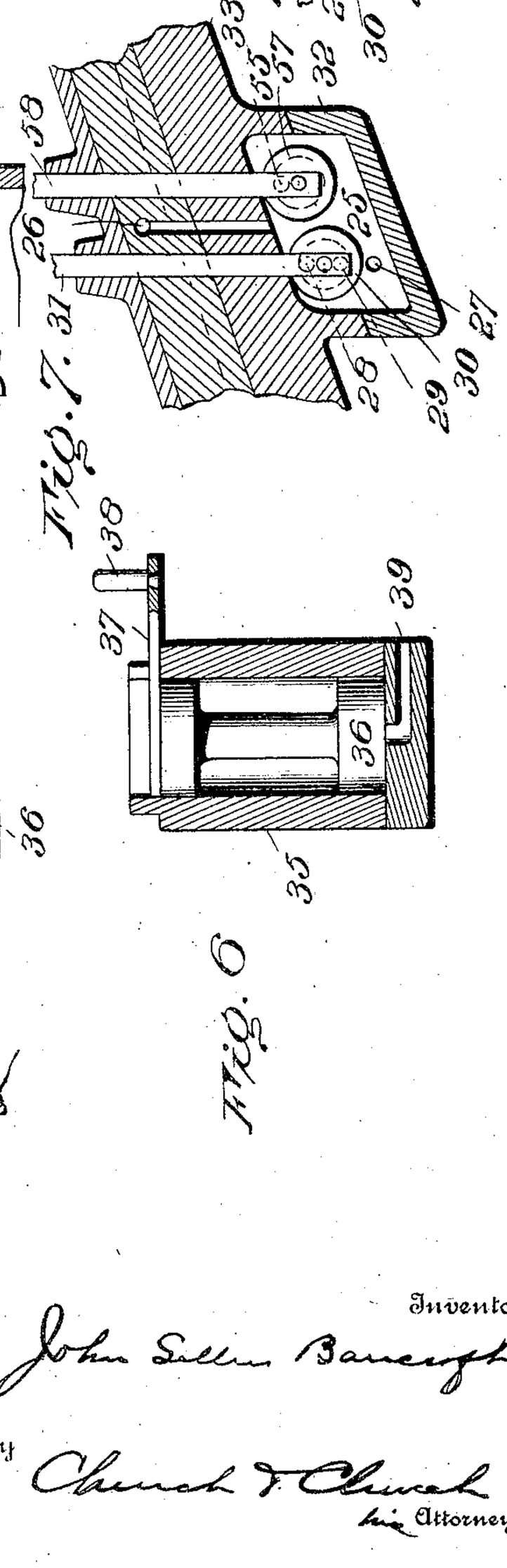

Fig. 7.

Fig. 6

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4 SHEETS—SHEET 4.

Fig. 4.

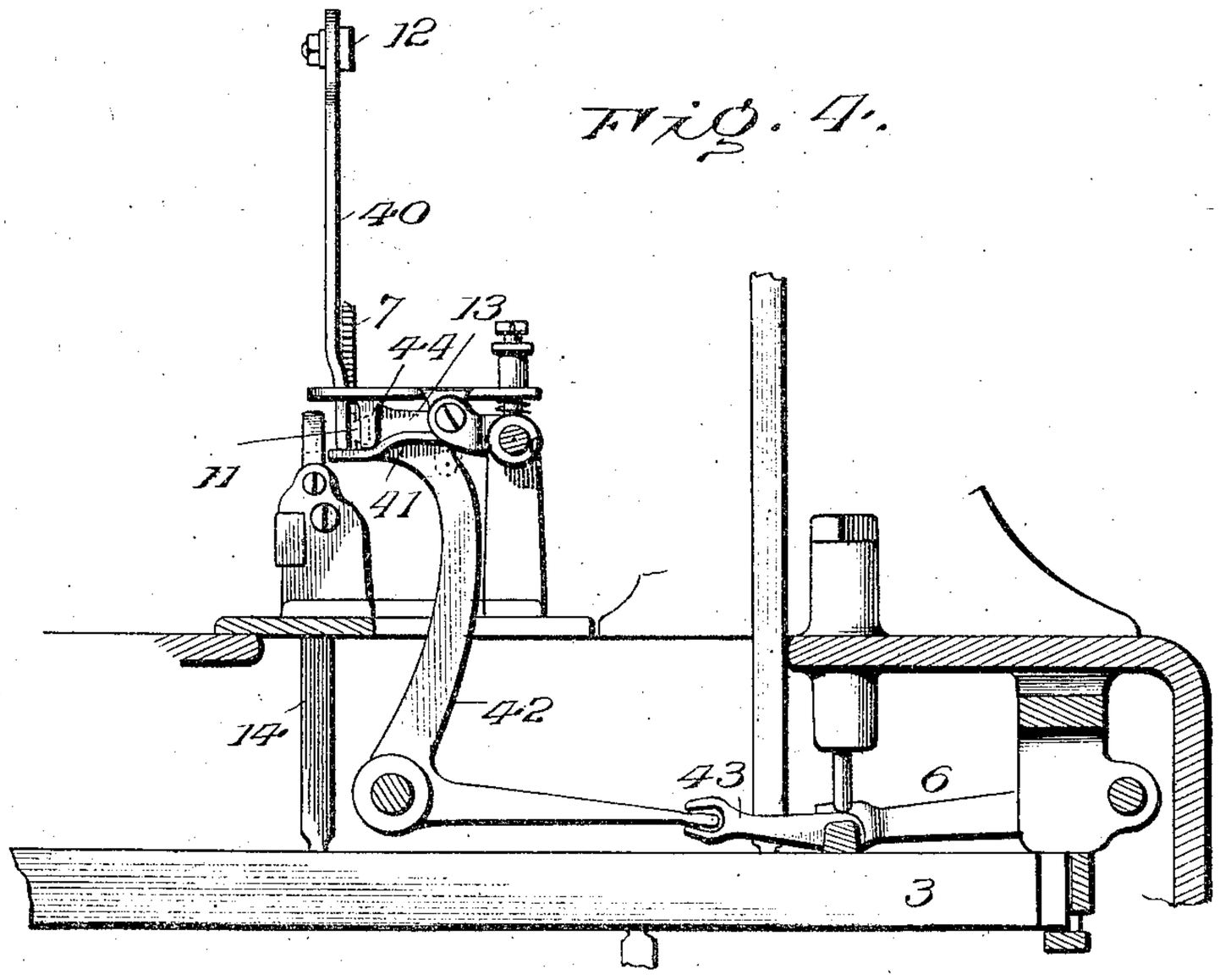
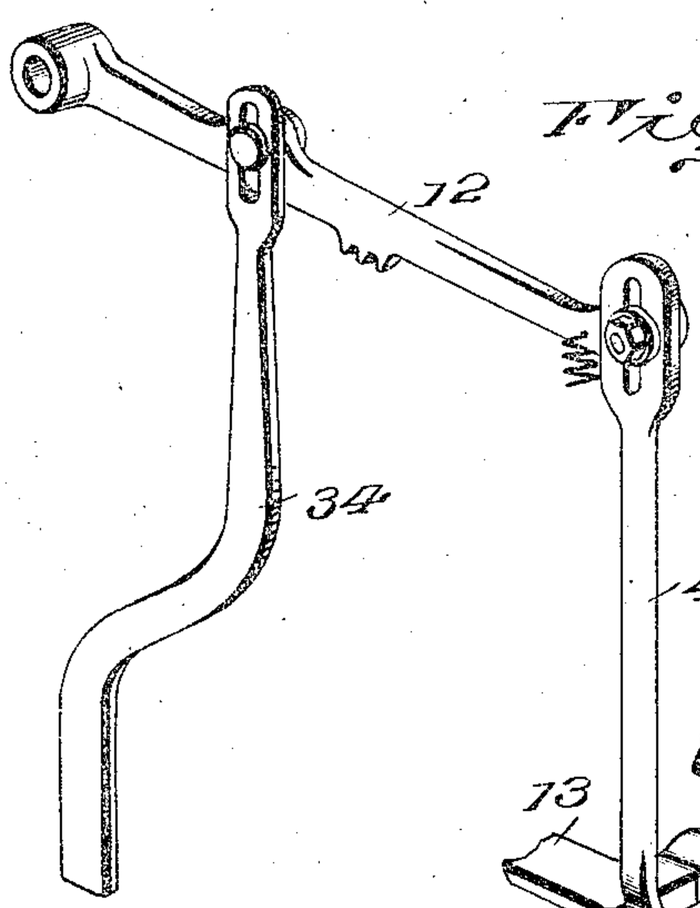
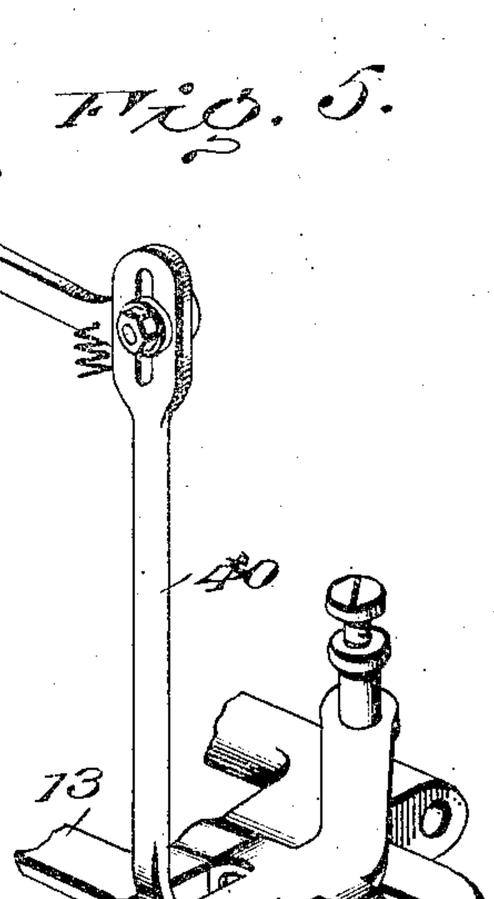


Fig. 5.





Witnesses

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UNITED STATES PATENT OFFICE.

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PERFORATING-MACHINE.

No. 828,449. Specification of Letters Patent. Patented Aug. 14, 1906.

Application filed October 29, 1903. Serial No. 179,049.

To all whom it may concern:

Be it known that I, JOHN SELLERS BANCROFT, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Perforating-Machines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures of reference marked thereon.

This invention relates to an improved line measuring and indicating mechanism for perforating and other machines, and is more especially designed for use in connection with the keyboard-perforator of Patent No. 654,115 as a substitute for the actuating and control mechanisms therein illustrated.

The invention has for its principal objects to simplify the mechanism and render the same more readily accessible for adjustment and repair; to render the escapement device more certain and positive in action, so as to prevent racing and inaccuracies in measurement; to protect the indicator or chart and its carrying mechanism from the destructive effect of inertia by utilizing the line-measuring devices as a gage instead of as a motor in effecting the adjustments of the indicator element, and generally to reduce cost of construction and increase durability and efficiency in action.

With these ends in view the invention consists in the construction and arrangements of parts hereinafter described, the novel features being set forth in the claims.

In the accompanying drawings, illustrating the preferred form of embodiment, Figure 1 is a front elevation of a keyboard perforator to which the improvements have been applied. Fig. 2 is a transverse vertical section on the line x x, Fig. 1, including a portion of the base and keyboard. Fig. 3 is a rear elevation, partly in section, of the line measuring and indicator mechanism. Fig. 4 is a side elevation of the escapement and control devices of the units-wheel. Fig. 5 is a view in perspective of a portion of the escapement devices including the holding-pawl, units-rack carrier, and the lifting-cam. Fig. 6 is a sectional view of the release-cylinder for the space-counter or pointer-adjusting mechanism. Fig. 7 is a sectional view of the valve-chest, showing the justification or final-measurement valve and the resetting-valve. Fig. 8 is a transverse sectional view showing the resetting-valve and the parts controlled thereby. Fig. 9 is a diagrammatic view showing the connections between the justification and resetting valves and the cylinders controlled thereby.

Similar numerals indicate like parts in the several figures.

The improvements are shown applied to the keyboard-perforator of Patent No. 654,115, to which reference is made for a detailed description of the construction and operation of the machine as a whole.

For purposes of identification it will suffice to mention that 1 designates the series of valved finger-pieces; 2, the pressure-chamber; 3, the punch-levers; 4, the punch-lever cylinders; 5, the punch-bars; 6, the rocking frame overlying and actuated by each punch-lever and controlling the paper-feed valve; 7, the units-wheel; 8, the motor-cylinder; 9, the motor-return cylinder; 10, the motor-rack; 11, the units-rack; 12, the units-wheel-locking pawl; 13, the units-rack carrier; 14, the series of stop-bars for measuring the advance of the units-rack; 15, the justification-scale or chart-actuating pinion; 16, the shaft carrying the justification-scale; 17, the justification-chart; 18, the movable pointer; 19, the space-counter or pointer-adjusting mechanism; 20, the space-counter-holding pawl; 21, the line-rack; 22, the line-scale, and 23 the paper-tower and die-plate support.

As heretofore constructed, the machine was equipped with a reversing-shaft located within the base and provided with two valves controlling the motor and motor-return cylinders and two arms controlling the units-wheel and space-counter-retaining pawls, said reversing-shaft being in turn controlled by the valve of a resetting-key through a piston, cylinder, and return-spring. Moreover, the stop-bars were provided with projections acting upon a pivoted blade or wing on the units-rack carrier for elevating the units-rack and locking-pawl, while the justification chart-actuating pinion was driven from the motor-rack through a pick-up which compelled the chart and its driving mechanism to follow the movements of said motor-rack

during a portion of its traverse. In the manufacture and practical use of the machines as thus constructed numerous defects were developed and among others difficulty of adjusting and maintaining the reversing-shaft and its connections in working order, due to its somewhat complex structure, the multiplication of valves and ports, the necessity for coördinate adjustments as between the several elements, and the inaccessibility of the parts. A tendency to racing on the part of the units-wheel was developed due to imperfect action of the escapement devices and resulting in mutilation of the units-wheel, and the inertia incident to the quick starting and stopping of the justification-scale and its carrying mechanism tended to rupture the latter and to impose additional labor upon the measuring devices. To overcome these and other defects incident to the prior construction, the elements above mentioned have been dispensed with and the new system or form of control mechanism about to be described has been provided.

In or upon the base is formed a valve chest or chamber 25, Figs. 7 and 8, communicating through a duct 26 with the pressure-chamber 2 or other source of pressure and containing a port 27, leading to the motor-cylinder 8, a port 28, leading to the motor-return cylinder 9, and an exhaust-port 29, leading to atmosphere. A valve 30, connected to the resetting-key 31, controls the ports 27, 28, and 29, so that when at one extreme of its movement or in normal position the valve will cover and establish communication between ports 28 and 29 and uncover port 27, thus admitting pressure to the motor-cylinder and opening the exhaust to the motor-return cylinder, and when the valve is actuated by the key it will reverse conditions, opening the exhaust to the motor-cylinder and admitting pressure to the motor-return cylinder, thereby reversing the motion of motor-rack 10 and restoring the parts to initial or starting position.

For convenience of adaptation the resetting-key 31 is preferably located to one side of the bank of keys 1, Fig. 1, and the valve-chest, formed partly in the side wall 32 of the base and partly in a bar or block 33, secured thereto, as shown in Figs. 7 and 8, and the form of valve preferred is of the D type, comprising a circular cup-shaped structure sliding in contact with the face of the valve-chest and pivotally attached to the valve-stem, so as to be free to rotate, and thus insure proper seating. Other forms or types of valves may, if desired, be substituted, providing direct control of the motor and motor-return cylinders by the resetting-key is retained; but the resetting action cannot be effected until the locking or holding pawls of the units-wheel and the space-counter have been released. To accomplish this, the lifting-link 34 is cut off above the top surface of the base and bent to one side, as seen in Figs. 3 and 5, so as to bring its end in proximity to the tail of the space-counter-holding pawl 20. Bolted or otherwise secured to the frame is a cylinder 35, Figs. 2, 3, and 6, containing a loose piston 36, carrying a plate or arm 37, provided with a pin 38. The head of this piston is located below and in line with the end of lifting-link 34, and the pin 38 stands in line with the tail of pawl 20, so that when the piston advances the two holding-pawls 20 and 12 are withdrawn to release the space-counting and line-measuring devices and permit their return to initial position. The admission and withdrawal of pressure in cylinder 35 is controlled by valve 30 of the motor and motor-return cylinders, as by connecting its port 39 with the pipe leading to the motor-return cylinder, so that the thrust of the piston and release of the holding-pawls will take place slightly in advance of the return movement of the motor-rack, lost motion and the throttled escape of air from the motor-return cylinder favoring such action.

As the lifting-link 34 no longer engages the units-rack carrier 13, means must be provided for withdrawing the holding-pawl 12 when the units-rack 11 is moved into engagement with the units-wheel, so that the latter may be advanced by the motor until arrested by a stop-bar 14 engaging the units-rack to measure the space represented by the stop-bar. To accomplish this, a second link 40 is attached to the outer or free end of holding-pawl 12, Figs. 1, 3, 4, and 5, with its lower end properly guided and resting normally upon a lifting-cam 41, carried by one arm of bell-crank lever 42, the other arm of said lever being jointed to an extension 43 of the rocking frame 6, so that each time a punch is operated lever 42 will be vibrated on its pivot. Cam 41 is formed with two substantially arc-shaped surfaces of different radii and connected by an inclined section. Link 40 normally rests in contact with the surface of lesser radius, and as the cam advances it raises the link to the higher plane, thereby withdrawing the holding-teeth from the units-wheel and releasing the latter.

To secure coördination between the units-rack and holding-pawl in their action upon the units-wheel, and thus insure the engagement of the one in advance of the withdrawal of the other to prevent the escape of the units-wheel and render the action more certain and positive, the lugs or engaging shoulders on the stop-bars and the blade or wing on the units-rack carrier have been dispensed with and their office of lifting the rack-bar carrier transferred to the cam 41. This is attained by furnishing the units-rack carrier with an arm or projection 44, Figs. 4 and 5, engaging cam 41 in rear of link 40, so that when said cam is advanced the incline will

first engage and fully elevate the units-rack carrier to insure engagement of the units-rack with the units-wheel before engaging and elevating the units-wheel pawl and on the reverse motion will reëngage the locking-pawl before withdrawing the units-rack, thus insuring control of the units-wheel.

The distance traversed by the motor-rack corresponds proportionally to the line value of the stop-bars successively brought into action, and heretofore the motor-rack was arranged to act, through a pick-up, as a driver for the justification-scale, the latter advancing intermittingly in unison with the motor-rack. The motions thus communicated to the scale not only tended to confuse the operator, but was a source of frequent damage, owing to the inertia of the parts subjected to the sudden starting and stopping of the motor-rack. To overcome these and other defects, the motor-rack has been deprived of its function as a driver and utilized as a gage for positioning the justification-scale, the latter remaining stationary until all the perforations for a line have been formed and the motor-rack brought to a position corresponding with the amount of matter contained in the line, thus forming a gage for said line, whereupon the justification-scale or its controlling device is advanced into contact with the gage thus formed to position the scale.

As illustrated in the present adaptation, the driving or pick-up mechanism is omitted and the following substituted therefor: The motor-rack is provided with a gaging-shoulder 46 and a rack 47, the latter loosely supported and guided in ways upon said motor-rack. The teeth of rack 47 mesh with those of pinion 48 in the train of gears leading to the justification-scale carrier 16, and said pinion is also engaged by the teeth of a rack 50, connected to a piston 51, working loosely in a cylinder 52. A retracting-spring 53 is connected with the train of gearing, and a conduit 54 connects cylinder 52 and port 55 in valve-chest 25, Fig. 7. This port 55 is controlled by the valve 57 of a key 58. Pressure within valve-chest 25 holds valve 57 normally elevated and covering port 55, so that piston 51, rack 47, and the justification-scale remain in retracted positions, to which they are brought by spring 53, the loose fit of the piston permitting return motion and serving as a cushion. Thus they remain while the perforations for the line are being formed and shoulder 46 advanced to final position. Upon the completion of the line key 58 is depressed, admitting pressure to the cylinder 52 and causing the advance of the justification-scale until its motion is arrested by the contacting of rack 47 with shoulder 46, the latter thus operating as a shiftable gage for positioning the scale. So long as key 58 remains depressed the scale will be held steadily in position; and when released the parts are returned by the spring ready for the completion of another line of perforations.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a measuring mechanism such as described the combination with a motor-return cylinder and measuring devices coupled therewith, including an escapement mechanism provided with a holding means, of a piston for disengaging said holding means, and a valve common to said motor-return cylinder and said piston for controlling the inlet and exhaust.

2. In a measuring mechanism such as described the combination with a measuring device provided with an escapement mechanism including a holding or retaining means, motor and motor-return cylinders whose pistons are coupled with said measuring devices, and a motor for withdrawing said retaining means, to permit the return of the measuring device, of a valve controlling the admission of pressure to said retaining-device motor and to said motor-return cylinder.

3. In a measuring mechanism such as described the combination of the following elements, to wit; a measuring mechanism, comprising a units-wheel, a units-rack, a holding-pawl, and stops for admeasuring the advance of the units-rack; motor and motor-return cylinders coupled with said units-wheel; a piston for retracting the holding-pawl; and a valve controlling the admission of pressure to said motor and motor-return cylinders and to the cylinder of said retracting-piston.

4. In a measuring mechanism such as described the combination of the following elements, to wit; a measuring device comprising a units-wheel, a units-rack, a holding-pawl and stops for admeasuring the advance of the units-rack; motor and motor-return cylinders provided with pistons coupled with said measuring device; a piston and cylinder for the holding-pawl; a valve controlling said motor, motor-return and holding-pawl cylinders; and a key coupled with said valve to actuate the latter.

5. In a measuring and indicating mechanism such as described the combination of the following elements, to wit; a line-measuring mechanism provided with motor and motor-return cylinders, an escapement, and controllable means for admeasuring the advance movements of said mechanism; an indicator device provided with means for advancing and retaining it in advanced position; a piston operating upon the holding members of the escapement and indicator device; and a valve controlling the application of pressure to said piston and the motor and motor-return cylinders.

6. In a measuring and indicating mechanism such as described, the combination of the

following elements, to wit: a line-measuring mechanism provided with motor and motor-return cylinders, release and retaining devices and admeasuring means; a scale connected for adjustment with said line-measuring mechanism; an indicator coöperating with said scale and provided with feeding and retaining devices; a piston for releasing the retaining devices of the line measuring and indicator mechanisms; and a single valve directly controlling said piston and the motor and motor-return cylinders.

7. In a measuring mechanism for perforating-machines such as described the combination with the units-wheel, holding-pawl, units-rack and units-rack carrier, of a cam operatively connected to said units-rack carrier and holding-pawl, for effecting successive movements thereof.

8. In a measuring mechanism such as described the combination with the line-measuring devices including units-wheel, holding-pawl, units-rack and units-rack carrier, of means for successively moving said units-rack carrier and holding-pawl into and out of engagement with the units-wheel, said means including two supporting-surfaces in different planes with an intermediate incline.

9. In a measuring mechanism for perforating-machines such as described the combination of the following elements, to wit; a line-measuring mechanism embodying a motor device, units-wheel, holding-pawl, units-rack, units-rack carrier, and a series of stop-bars; a series of levers coupled with said stop-bars; a rocking frame common to said levers; and a bell-crank coupled with said rocking frame and provided with a stepped cam acting upon the units-rack carrier and holding-pawl.

10. In a measuring mechanism such as described the combination of the following elements, to wit; a line-measuring mechanism including a units-wheel, units-rack, units-rack carrier, holding-pawl and a series of stop-bars for admeasuring the movements of the units-rack; and an actuating-cam common to the units-rack carrier and holding-pawl, for successively operating said members.

11. In a line-measuring mechanism for perforating-machines the combination of the following elements, to wit; an escapement mechanism including a motor device, units-wheel coupled therewith, units-rack, units-rack carrier, holding-pawl and a series of stop-bars for admeasuring the movements of the units-rack; an actuating-cam for reciprocating the units-rack carrier and holding-pawl relatively to the units-wheel; a series of actuating devices for the stop-bars; and transmitting devices intermediate the series of stop-bar-actuating devices and the cam, for setting the latter in motion each time a stop-bar is actuated.

12. In a measuring and indicating mechanism such as described the combination of the following elements, to wit; a controllable line-measuring mechanism; an indicating mechanism independent of the line-measuring mechanism; and means for advancing said indicating mechanism into contact with the line-measuring mechanism or a part connected therewith, the latter serving as a gage for positioning the indicator.

13. In a measuring and indicating mechanism such as described the combination with a line-measuring mechanism operating as a gage for determining the adjusted positioning of a movable scale or chart, of scale or chart actuating devices independent of the line-measuring mechanism, and means for effecting the advance of said actuating devices until arrested by the line-measuring mechanism.

14. In a measuring and indicating mechanism such as described the combination of the following elements, to wit; a line-measuring mechanism provided with a stop or abutment serving as a gage; a scale or chart actuating mechanism independent of the line-measuring mechanism and movable with relation thereto; and controllable motor devices for advancing said scale-actuating mechanism to the position indicated by said gage.

15. In a measuring and indicating mechanism such as described the combination of the following elements, to wit; a line-measuring mechanism provided with an impelling-motor and an escapement; a movable scale or chart provided with actuating devices, including a motor operating in opposition to the motor of the line-measuring mechanism; means carried by the line-measuring mechanism for interrupting the advance of the chart or scale actuating devices to gage the position of the scale or chart; and means for energizing the motor of the actuating devices, to effect an advance of the chart or scale while the line-measuring mechanism is at rest.

16. In a measuring and indicating mechanism such as described the combination of the following elements, to wit; a key-controlled line-measuring mechanism, a chart or scale actuating mechanism disconnected from the line-measuring mechanism and provided with an independent motor; a part or member of the line-measuring mechanism projecting into the path traversed by a part or member coupled with the chart or scale actuating mechanism and serving as a gage to admeasure the advance of said actuating mechanism; and means for inaugurating the motion of said actuating mechanism after the line-measuring mechanism has come to rest.

17. In a measuring and indicating mechanism such as described the combination of the following elements, to wit; a line-measuring mechanism; an indicating mechanism; independent motors for said mechanisms; keys controlling the advance of the line-meas-

uring mechanism; and a separate key controlling the advance of the indicating mechanism.

18. In a measuring and indicating mechanism such as described the combination of the following elements, to wit; a line-measuring mechanism provided with a motor, motor-rack units-wheel, escapement and stop bars; an independently-movable indicator mechanism provided with a motor and a member movable in opposition to the motor-rack, when the latter is effecting measurement of the line, and adapted to contact with said motor-rack for determining the position of the indicator; means for retaining said indicator mechanism in retracted position while the line-measuring mechanism is in operation; and means for causing an advance movement of said indicator mechanism after the completion of the line measurements and while the motor-rack is in fixed position.

19. In a measuring and indicating mechanism such as described the combination of the following elements, to wit; a key-controlled line-measuring mechanism provided with a units-wheel, motor-rack, motor, escapement and stop bars; an indicator mechanism provided with retracting means, a rack and a motor, the latter opposed in its action to that of the line-measuring mechanism; a shoulder or abutment on the motor-rack, serving as a gage to admeasure the advance of the indicator mechanism; and means for controlling the indicator-motor, to cause the advance of the indicator mechanism.

20. In a measuring and indicating mechanism such as described the combination of the following elements, to wit; a line-measuring mechanism provided with stop-bars, an escapement, units-wheel, motor and motor-return cylinders, and a motor-rack; an indicating mechanism provided with an indicator or scale, a motor, transmitting mechanism and a rack, the latter guided to reciprocate independently of the motor-rack, in position to engage a shoulder or abutment thereon; keys controlling the stop-bars and escapement of the line-measuring mechanism; and a separate key controlling the motor of the indicating mechanism.

21. In a measuring and indicating mechanism such as described the combination of the following elements, to wit; a line-measuring mechanism comprising stop-bars, escapement, units-wheel, motor and motor-return cylinder and a motor-rack; an indicating mechanism independent of the line-measuring mechanism and including an indicator-motor, and rack, the latter movable in opposition to said motor-rack, to contact with a gaging shoulder or abutment carried thereby; a series of controlling-keys for the stop-bars and escapement; a key controlling the indicator-motor; and a separate key controlling the motor and motor-return cylinders.

22. In a measuring and indicating mechanism for perforating machines such as described the combination of the following elements, to wit; a line-measuring mechanism provided with a units-wheel, an escapement including a holding-pawl, stop-bars, motor and motor-return cylinders, and a motor-rack; an indicating mechanism provided with a movable indicator or scale, a motor and rack; a pointer coöperating with the movable indicator or scale with actuating devices therefor; means for releasing the holding devices or pawls of the line-measuring and pointer mechanisms; a series of keys controlling the stop-bars; a valve controlling the indicator-motor; and a valve controlling the motor and motor-return cylinders and the releasing devices of the line-measuring and pointer mechanisms.

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