

No. 630,578.

Patented Aug. 8, 1899.

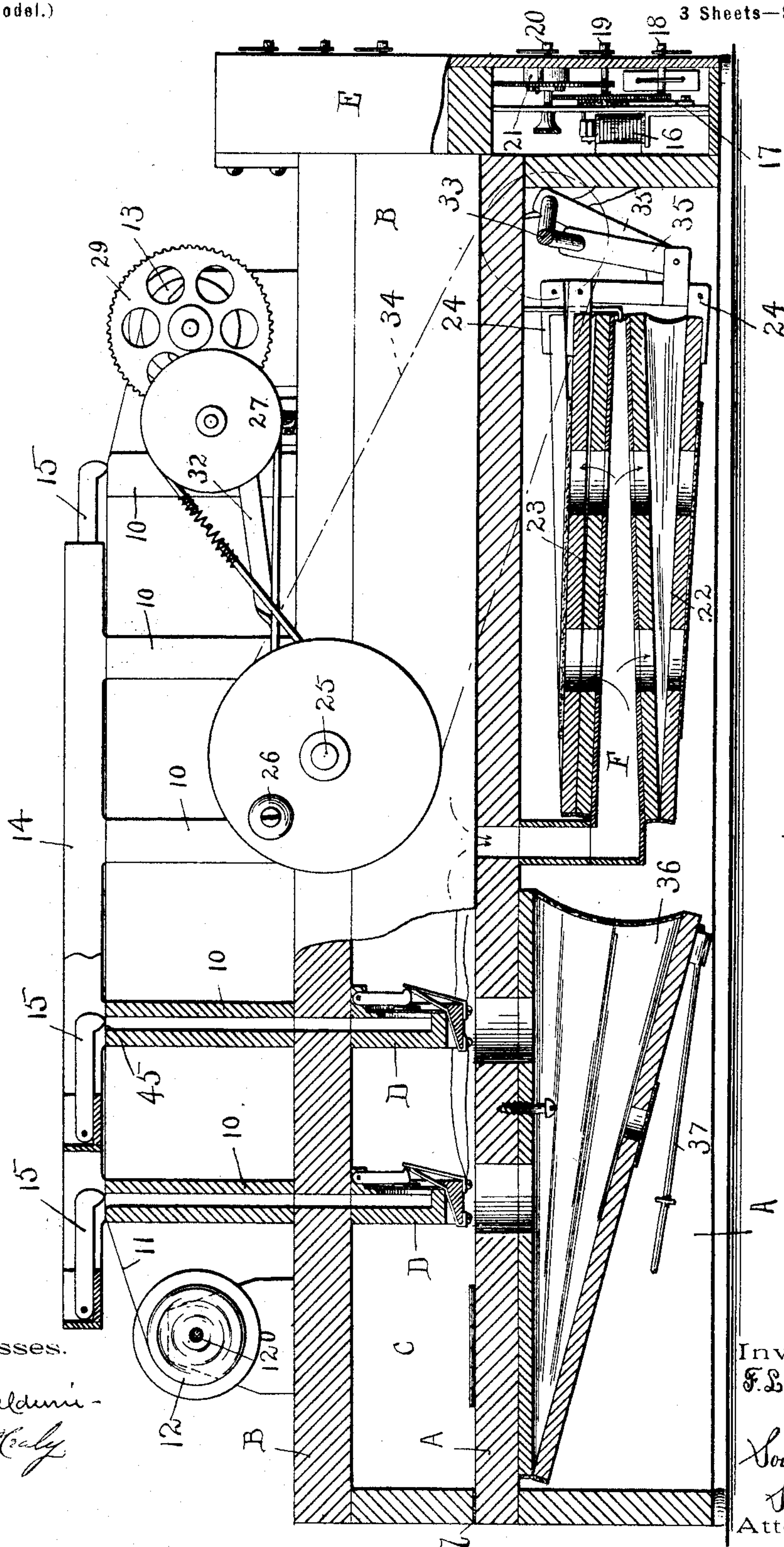
F. L. WILDER.

COUNTING AND DETECTING APPARATUS.

(Application filed Sept. 24, 1897.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses.

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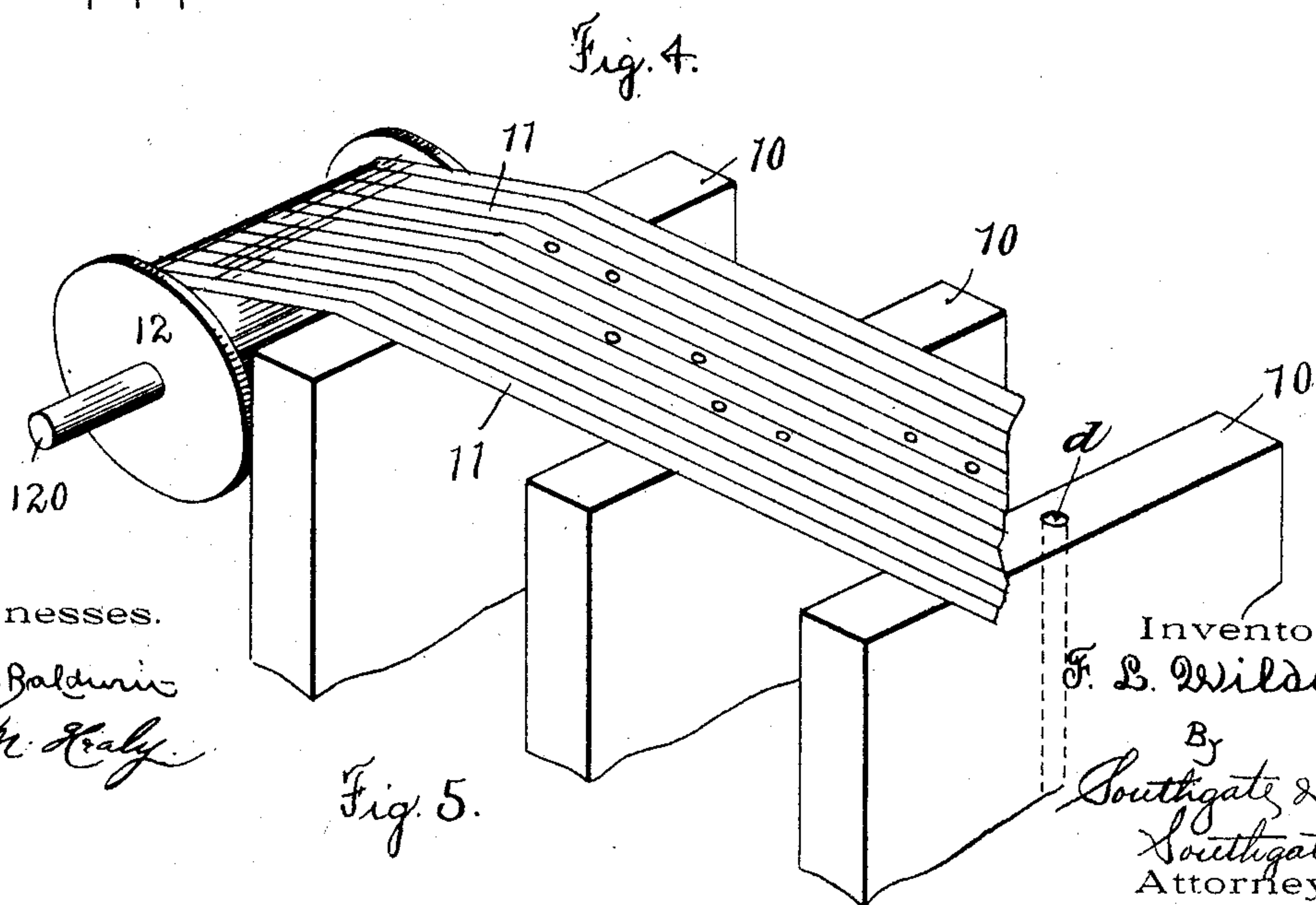
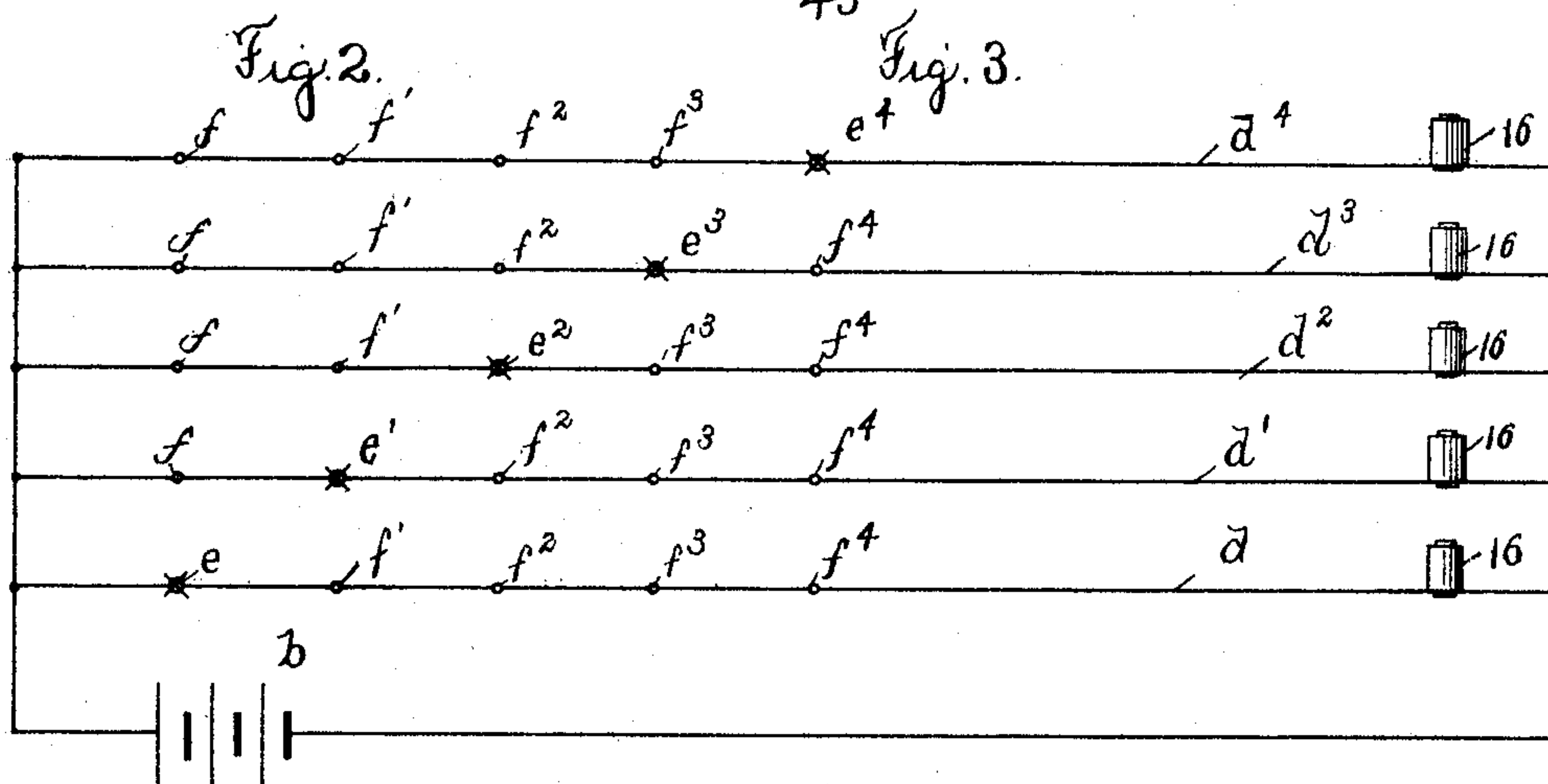
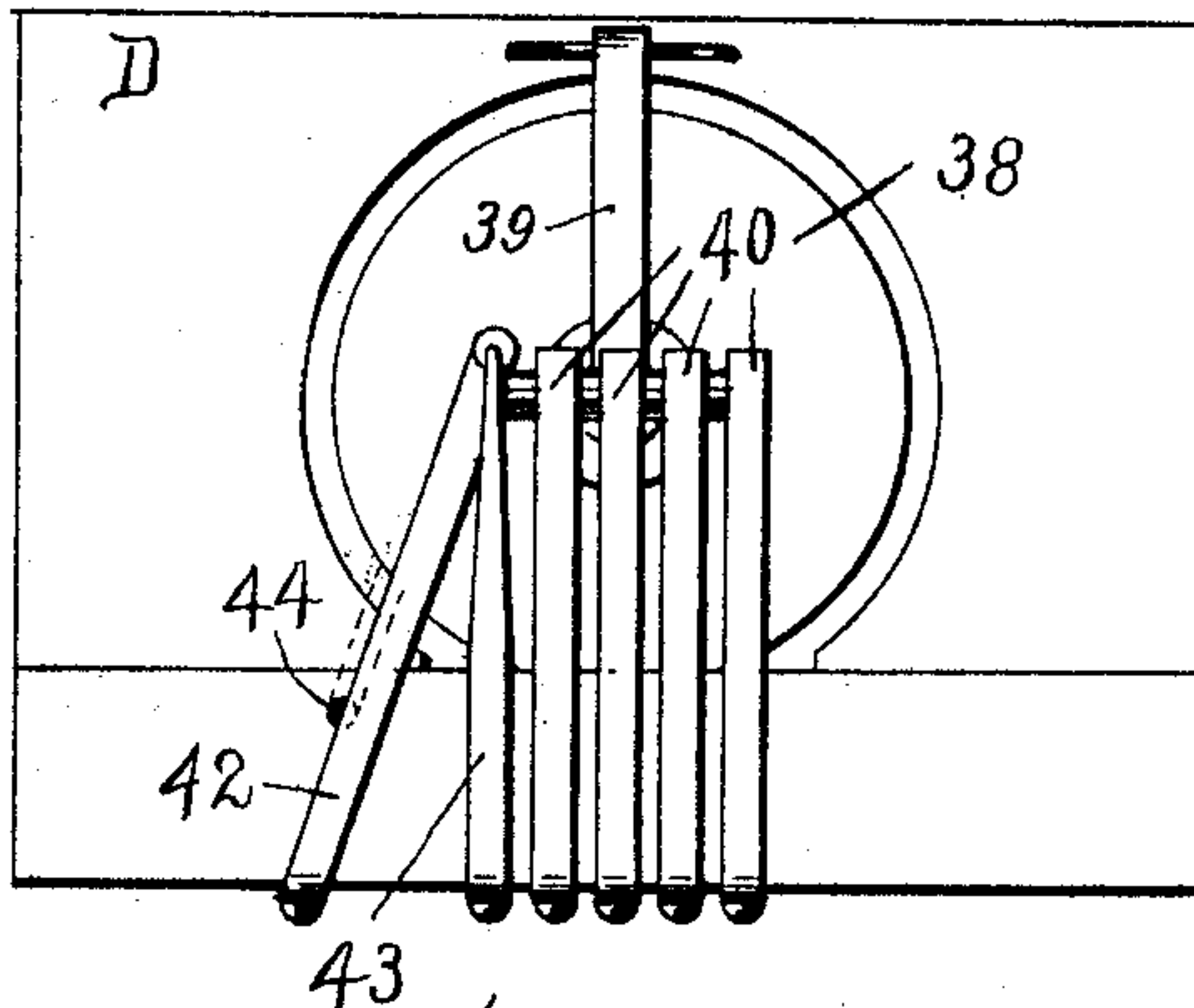
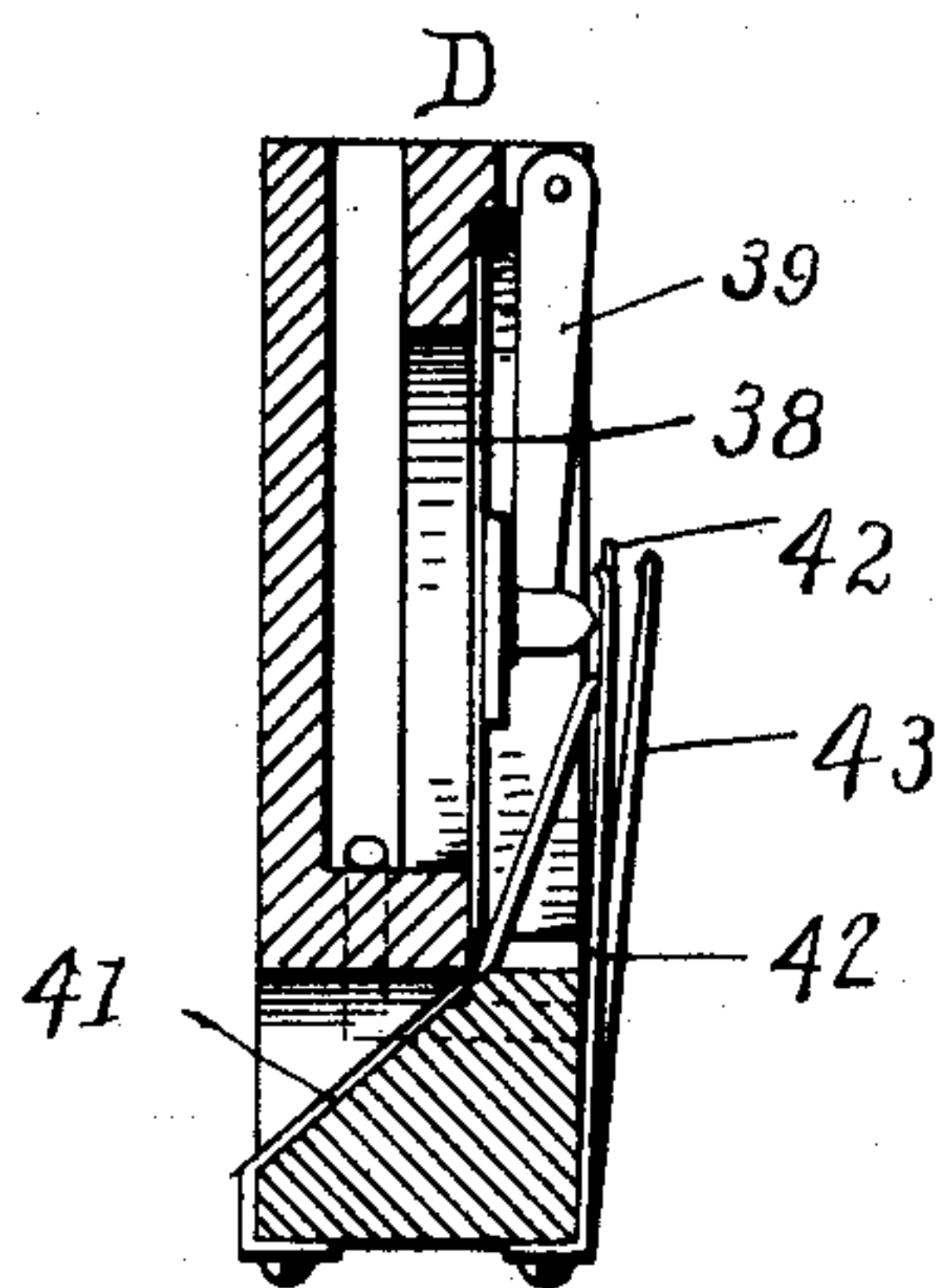
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3 Sheets—Sheet 2.



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Fig. 5.

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3 Sheets—Sheet 3.

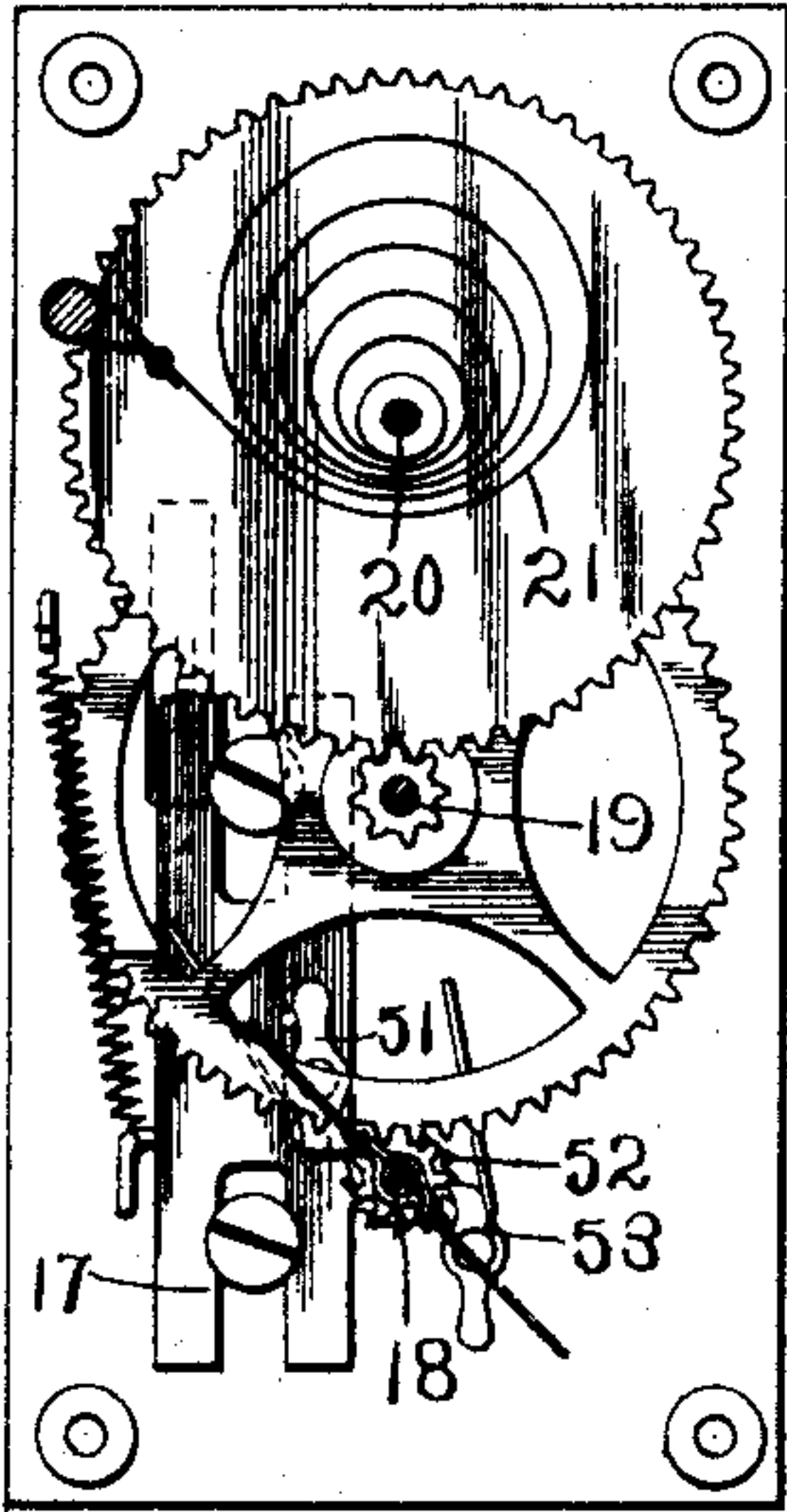


Fig. 7.

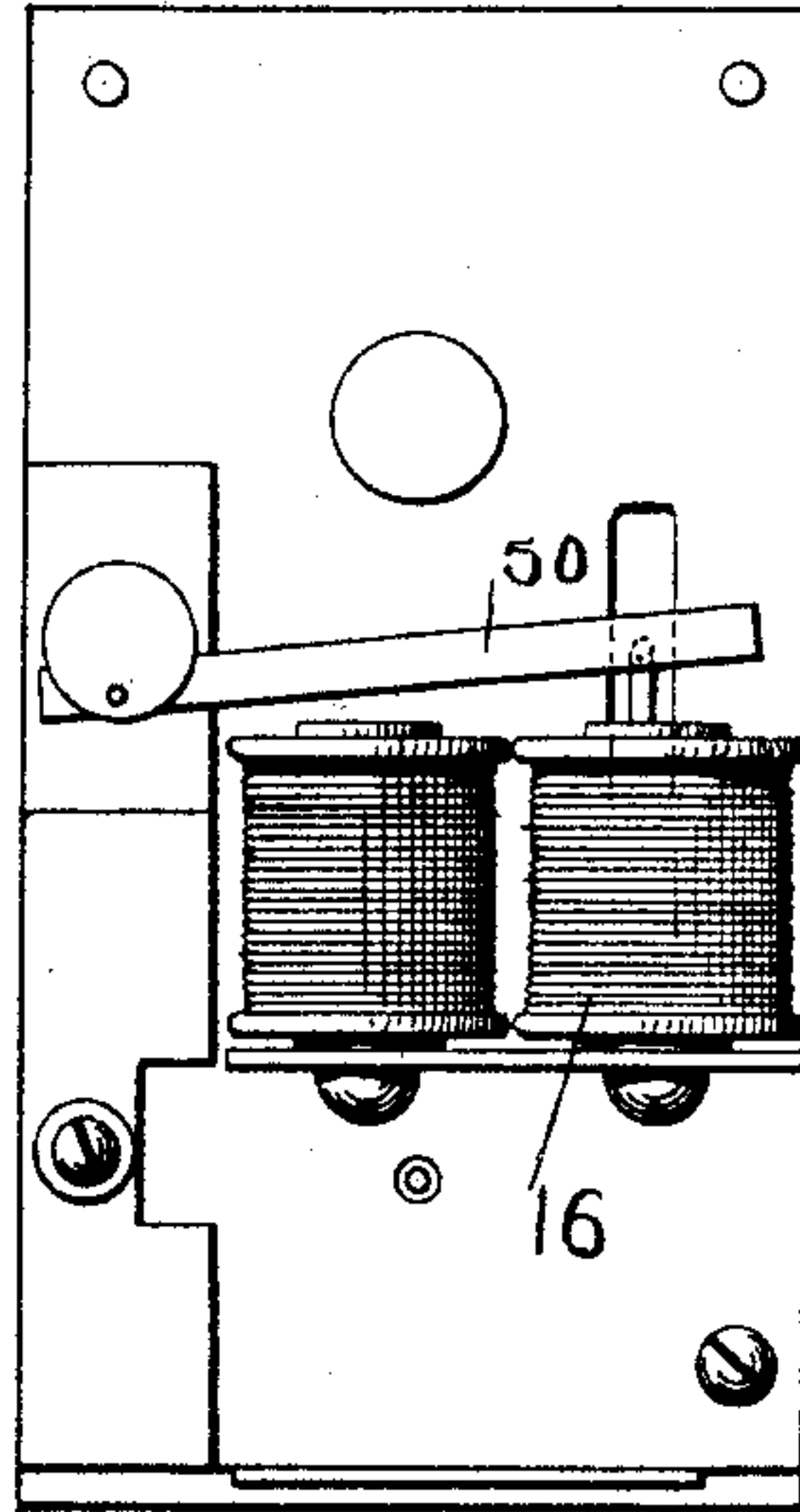


Fig. 8.

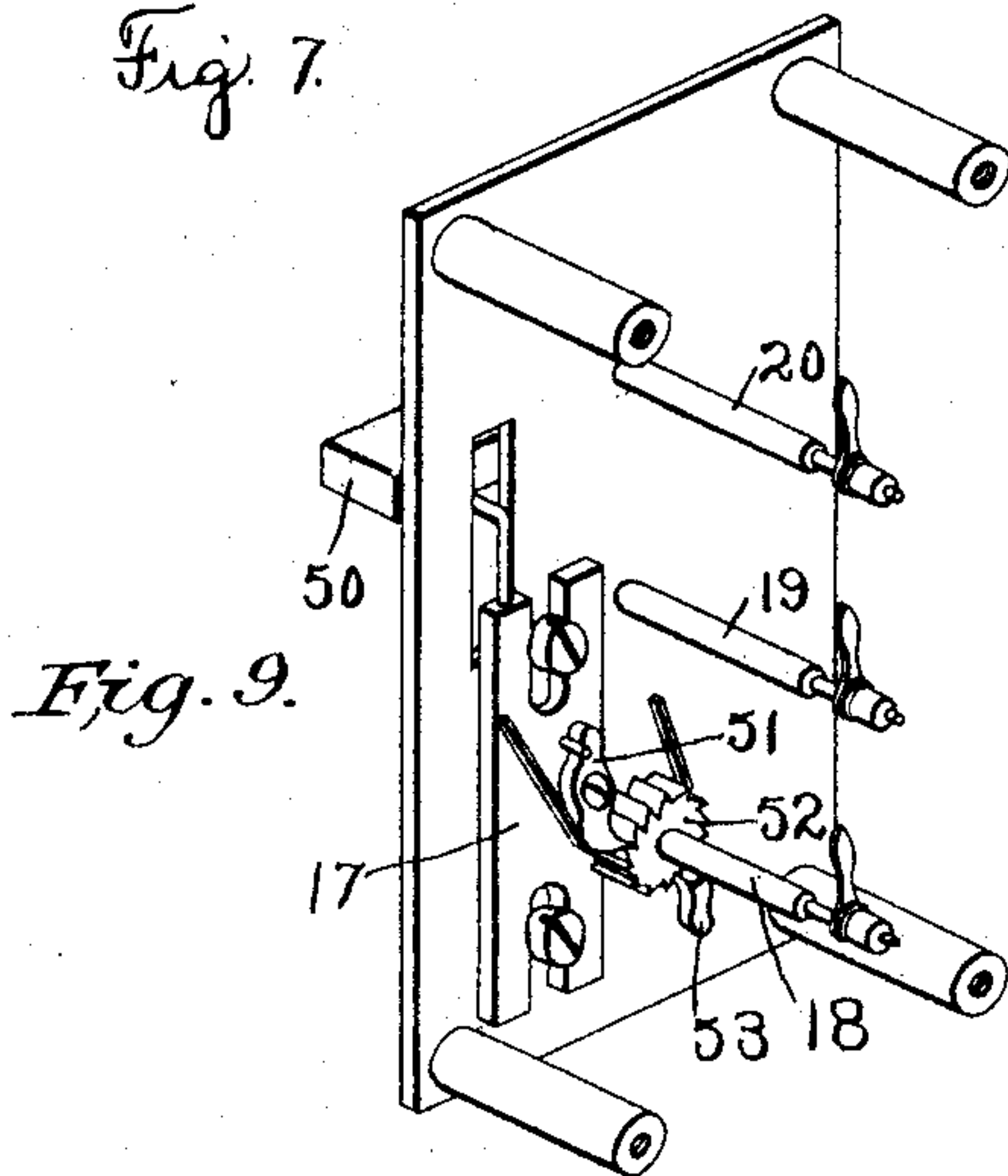


Fig. 9.

Fig. 10.

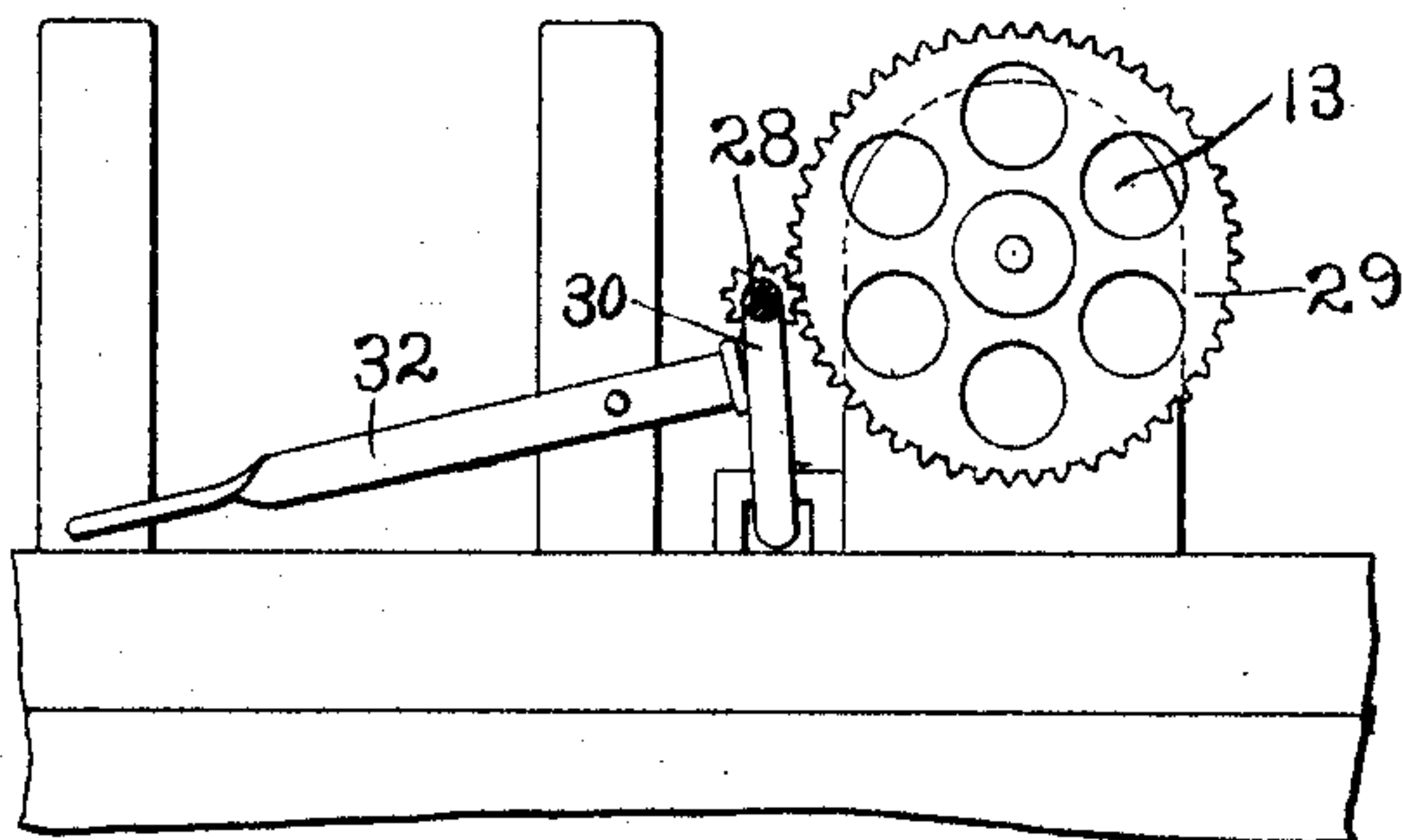
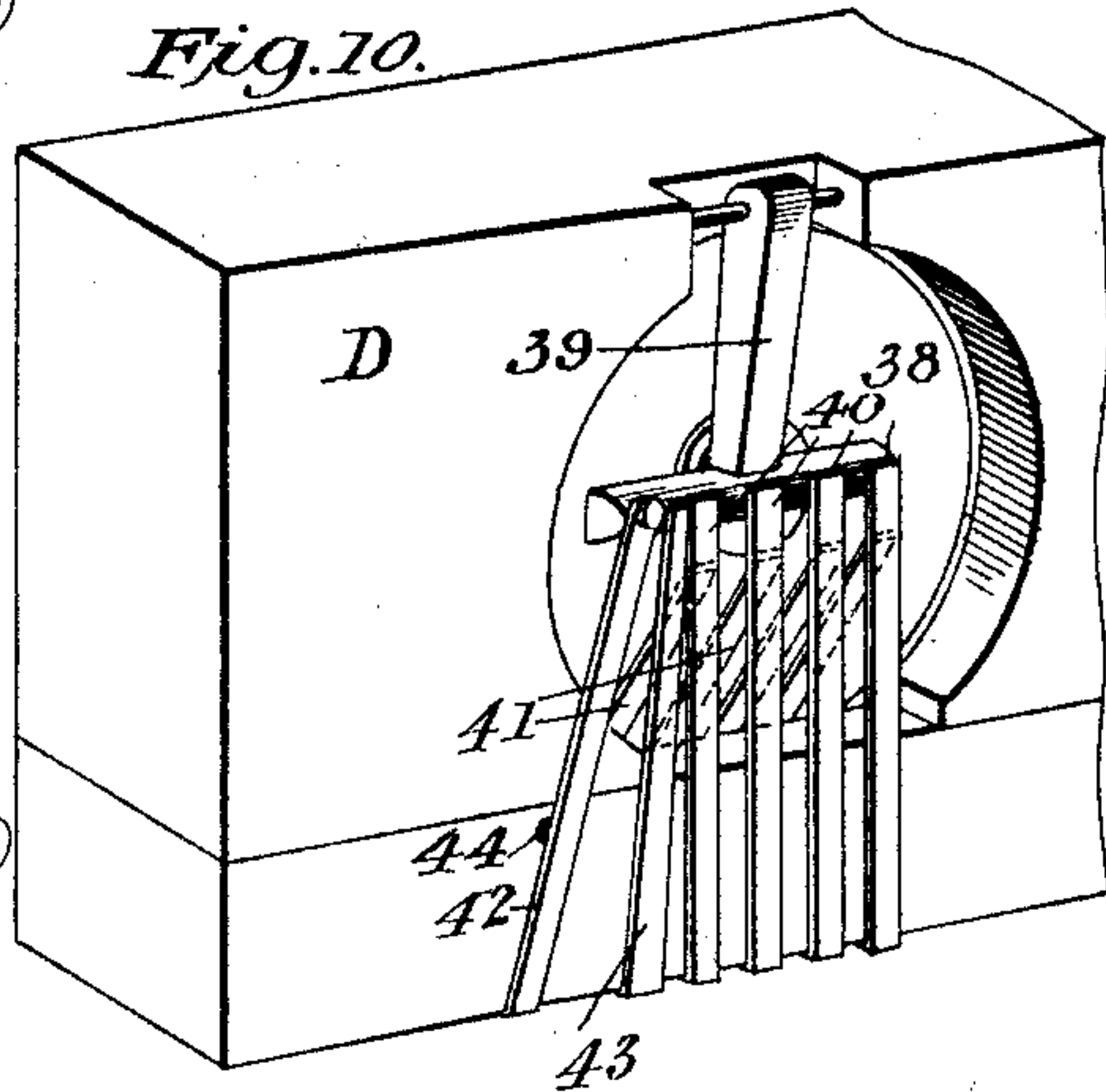


Fig. 6.

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UNITED STATES PATENT OFFICE.

FRANK L. WILDER, OF WORCESTER, MASSACHUSETTS.

COUNTING AND DETECTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 630,578, dated August 8, 1899.

Application filed September 24, 1897. Serial No. 652,834. (No model.)

To all whom it may concern:

Be it known that I, FRANK L. WILDER, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Counting and Detecting Apparatus, of which the following is a specification.

My invention relates to a counting and detecting apparatus for registering the number of perforations in a strip of paper; and the especial object of my invention is to provide a registering mechanism which will correctly register the number of votes indicated by the perforations made in a strip of paper by an automatic voting-machine and which will detect and throw out of the count all perforations indicating that two candidates have been simultaneously voted for for the same office. To these ends my invention consists of the parts and combinations of parts, as hereinafter described, and more particularly pointed out in the claims at the end of this specification.

In the accompanying two sheets of drawings, Figure 1 is a side view, partially in section, of a counting and detecting apparatus constructed according to my invention. Fig. 2 is a sectional view of one of the pneumatics on an enlarged scale. Fig. 3 is a side view of the same. Fig. 4 is a diagrammatic view illustrating the electrical connections preferably employed. Fig. 5 is a perspective view illustrating the manner in which the perforated paper passes over the tracker-boards. Fig. 6 is a detail view of the winding-gearing. Fig. 7 is a transverse sectional view of one of the electrical registering devices that I may employ. Fig. 8 is a rear view of the same; and Fig. 9 is a perspective view of the framework of one of the electrical registering devices, the gearing connecting the shafts thereof being omitted for the sake of clearness.

In certain classes of automatic voting-machines—as, for example, in the so-called “Mc-Tammany” voting-machine, the use of which is legalized in Massachusetts—the votes are recorded by pressing in a series of buttons to form perforations in a strip of paper, which paper is fed forward before the next person is allowed to vote. One objection to the use of the so-called “automatic voting-machines”

as at present constructed resides in the fact that a voter in some instances may vote for several candidates for the same office. This is objectionable, especially in places requiring a majority vote to elect. To overcome this defect in the operation of automatic voting-machines it has been proposed to provide the voting-machines with automatic locking devices which will permit but one button corresponding with each office to be voted for to be pressed in. These button-locking devices do not always work efficiently and in all cases render the voting-machines unduly complicated.

The especial object of my present invention is therefore to provide a counting and registering mechanism which will detect and throw out from the count all instances in which two candidates have been voted for for the same office.

A counting and detecting mechanism constructed according to my invention comprises the combination of a winding mechanism for the strip of perforated paper, a series of pneumatics controlled by said perforated paper, electric connections controlled by said pneumatics, and electrical registering devices controlled from said electric connections.

Referring to the drawings and in detail, I have illustrated a counting and detecting apparatus which comprises a base-piece A. Hinged to the base-piece A is a cover or box B, which forms a vacuum-chamber C. The pedestal or base-piece A is provided with leather strips *l*, so that the joint between the base-piece A and the box B will be comparatively tight.

Located in the vacuum-chamber C are a plurality of pneumatics D. Extending up from each of the pneumatics D is a tracker-board 10. Each tracker-board 10 is provided with a duct *d*, leading down to its pneumatic D. The ducts *d* of the tracker-boards 10 are located in different relative vertical planes, so that each of the several ducts *d* may cooperate with a different series of perforations widthwise of the paper, as indicated by parallel lines in Fig. 5.

The strip of perforated paper 11 may be wound upon a spool 12, having a shaft 120, and can be drawn from the spool 12 over the tracker-boards 10 to a receiving-spool 13 by

means of winding connections hereinafter described.

Mounted above the tracker-boards 10 is a frame 14, pivotally mounted in which are pressure-fingers 15 for holding the strip of perforated paper down on the tracker-boards 10.

Secured to one end of the box B is a casing E, which contains the electrical registers.

The electrical registering devices may be of any ordinary or approved construction. As illustrated, each of the electrical registering devices comprises a magnet 16, having its armature 50 connected to depress a normally-lifted spring-slide 17. The spring-slide 17 may be provided with an ordinary pawl 51 for engaging a ratchet-wheel 52, mounted on the primary shaft 18 of the register. The shaft 18 is provided at its outer end with an indicating-hand in the ordinary manner and is geared to turn shafts 19 and 20, which are also provided with the ordinary registering-hands. A spring 21 may be coiled upon the shaft 20, so as to normally oppose the advance of the registering-hands. By means of this construction whenever the holding-pawl of the shaft 18 is released the spring 21 will tend to turn the hands back to their zero position.

The bellows F for exhausting the air from the vacuum-chamber C comprises sections 22 and 23, which are connected by yoke-pieces 24. An equalizing-bellows 36 is normally held down by a spring 37, so as to maintain a substantially uniform tension in the vacuum-chamber C.

Any of the ordinary forms of gearing may be employed for winding the perforated paper and for operating the bellows F. As illustrated, a main driving-shaft 25 can be turned by handle 26. Driven from the driving-shaft 25 by means of a cross-belt is a shaft 27, which is journaled in rocking arms 30. Mounted on the shaft 27 is a driving-pinion 28 for engaging a gear 29 of the receiving-spool 13. A spring-section introduced into the cross-belt normally tends to hold the driving-pinion 28 out of engagement with its gear 29. A shifting handle 32 is pivoted in position to force the driving-pinion 28 into engagement with its gear 29, when the shifting handle 32 is moved down to the position illustrated in Fig. 1. A crank-shaft 33 is driven from the shaft 25 by means of a belt 24, (indicated by dotted lines,) and the crank-shaft 33 is connected to operate the bellows F by means of links 35.

The electrical connections controlled by the pneumatics D are most clearly illustrated in Figs. 2 to 4, inclusive. As shown in Figs. 2 and 3, each of the pneumatics D comprise a flexible diaphragm 38, which is arranged to actuate a pivoted arm or lever 39. Resting upon and actuated by a cross-piece are a plurality of spring-arms, which form part of the circuit-breaking devices. There is a normally-closed contact through each circuit-breaking device. As illustrated, each circuit-breaking device comprises one of the spring

contact-arms 40, which normally rests upon and engages a cooperating contact-strip 41. By means of this construction when the diaphragm of a pneumatic is forced outwardly each spring contact-strip 40 will be moved out of engagement with its contact-piece 41, so as to break contact therewith. Also resting upon the cross-piece of each of the pivoted levers 39 is a spring contact-arm 42, which forms part of a circuit-making device. The circuit-making devices are normally open or out of contact. As illustrated, each circuit-making device comprises a spring contact-arm 42, which is arranged normally out of contact with an arm 43, but is secured in such position that it can be pushed out to be brought into contact therewith. By means of this construction it will be seen that when the diaphragm of a pneumatic moves its pivoted lever outwardly the contact between each of the spring-arms 40 and its cooperating contact-piece 41 will be broken, and thereafter the contact-arm 42 will be pushed out into engagement with its contact-piece 43—that is to say, cooperating with each of the pneumatics of a counting and detecting apparatus constructed according to my invention is a circuit-making device and a plurality of circuit-breaking devices, the parts being so arranged that the circuit-breaking devices will be first actuated and the circuit-making device will be actuated immediately thereafter.

The electrical connections in a counting and detecting apparatus constructed according to my invention are indicated diagrammatically in Fig. 4. As shown in this figure, *b* designates the battery, connected with which are five circuits *d*, *d'*, *d''*, *d'''*, and *d⁴* for energizing the magnets 16 of the electrical registering apparatuses. Cooperating with the electric connections as thus constructed are five pneumatics, the first pneumatic being arranged to operate to control the four circuit-breaking devices *f* and the circuit-making device *e*, a second pneumatic being arranged to control the four circuit-breaking devices *f'* and the circuit-making device *e'*, the third pneumatic being arranged to control the four circuit-breaking devices *f''* and the circuit-making device *e''*, the fourth pneumatic being arranged to control the four circuit-breaking devices *f'''* and the circuit-making device *e'''*, and the last pneumatic being arranged to control the four circuit-breaking devices *f⁴* and the circuit-making device *e⁴*.

The tracker-boards 10 are arranged in such relative relation that if the strip of perforated paper 11 contains an instance of double voting, or rather an instance in which two candidates have been voted for for the same office, two perforations will be simultaneously brought into operative position on top of the tracker-boards, so that two of the pneumatics D will be simultaneously brought into action; but as the circuit-breaking devices controlled by the pneumatic are operated slightly before

the circuit-making devices the circuits controlled by each pneumatic will be broken, so that the electrical registering devices will remain unaffected, and the perforations indicating that two candidates have been simultaneously voted for for the same office will be thrown out and not counted.

In a counting and detecting apparatus constructed according to my invention it is of course desirable that there should be a slight dwell in the action of the pneumatic between the time it operates its circuit-breaking devices and its circuit-making device, and I have arranged the air-passages and vents for the pneumatics with an especial view of accomplishing this result. As illustrated, each of the pneumatics D is provided with a small vent 44, which is partly covered by the spring contact-arm 42, so that as said spring contact-arm 42 is moved away from the vent 44 the pressure on the diaphragm of the pneumatic will be relieved and the action of the pneumatic somewhat retarded, and in order to allow as long a time for the pneumatics to operate as possible the air-passages in the tracker-boards 10 are slightly grooved or chamfered at their upper ends, as at 45.

The operation of a complete counting and detecting apparatus constructed according to my invention is as follows: The strip of paper which has been punched or perforated on a voting-machine is wound on the spool 12. The end of the strip is connected to the receiving-spool 13. The driving-shaft 25 may then be turned by its handle 26, so that by means of the belt 34 and driving connections before described the bellows F will be operated to exhaust the air from the vacuum-chamber C. This also, through the vents 44, will exhaust the air from the channels in the tracker-boards 10, and the pressure on the opposite sides of the diaphragms of the pneumatics D will be balanced, so that said pneumatics will remain in their normal position, as illustrated in Fig. 2. While the driving-shaft 25 is turned by the handle 26, the strip of perforated paper through the driving connections before described will be drawn from the spool 12 and will be wound upon the receiving-spool 13. The passages or ducts down through the tracker-boards 10 are located in different relative transverse planes to cooperate with perforations in different transverse lines along the strip of paper, as illustrated in Fig. 4. During the winding of the paper whenever a perforation is brought over the duct or channel of a tracker-board 10 atmospheric pressure will be admitted to said duct or channel, and a rush of air down through the tracker-board 10 will push out or distend the diaphragm of a pneumatic D. The apparatus which I have herein illustrated comprises five tracker-boards and pneumatics, and, as before explained, each pneumatic is arranged to operate four circuit-breaking devices and a single circuit-making device. A circuit-breaking device comprises a spring-

arm 40 and a contact-arm 41, normally in engagement therewith. The circuit-making device operated by each pneumatic comprises a spring-arm 42 and a contact-piece 43, normally out of engagement therewith. The circuit-breaking devices of each pneumatic control the circuits or registering electrical connections of each of the other pneumatics—that is to say, when a pneumatic D is operated by a perforation in the paper, permitting a rush of air to descend its tracker-board channel, the spring-arms 40 will first be moved out of engagement with the contact-arms 41. This will break the electrical connections of each of the other pneumatics, and thereafter by a further distention of the diaphragm of the pneumatic the spring-arm 42 will be brought into engagement with the contact-arm 43 to close an electric circuit through the magnet of the registering apparatus corresponding with the pneumatic being operated. In the preferred construction the spring-arm 42 partially closes or covers the vent 44 of the pneumatic D, as illustrated in Fig. 3, for the purpose of retarding or slowing up the action of the pneumatic, and this construction operates as follows: The first rush of air down through the channel in a tracker-board operates at once to distend or push out the diaphragm of a pneumatic D. As the diaphragm is moved out, however, the vent 44 is opened wider, so as to enlarge the opening between the channel in the tracker-board and the vacuum-chamber C, thus permitting the rush of air down through the channel in the tracker-board to be more or less divided, part of the air being freely admitted to the vacuum-chamber C.

Whenever during the operation of the device perforations are simultaneously brought into register with the ducts or passages of two or more of the tracker-boards, two or more pneumatics will be simultaneously operated, and as the circuit-breaking devices operate slightly in advance of the circuit-making devices all the electrical circuits will be broken or opened, so that the registering devices will not be affected—that is to say, the circuit-breaking devices of the first pneumatic will break the circuit controlled by the second pneumatic, so as to render its circuit-making device inoperative, and likewise the second pneumatic will break the registering circuit of the first pneumatic, rendering the circuit-making device inoperative, and the two will mutually coact in detecting and throwing out instances in which two candidates have been voted for for the same office.

I am aware that many changes may be made in the construction and arrangement of counting and detecting apparatuses without departing from the scope of my invention as expressed in the claims. For example, I have illustrated a counting and detecting apparatus embodying five pneumatics. It is obvious, however, that the number of pneumatics employed in a machine constructed

according to my invention can be increased or changed as desired in accordance with the work to be done. I do not wish, therefore, to be limited to the form which I have shown and described; but

What I do claim, and desire to secure by Letters Patent of the United States, is—

1. In a device of the class described, the combination of a winding mechanism for a strip of perforated paper, a series of pneumatics controlled by said perforated paper, electrical connections controlled by the pneumatics, and electrical registering devices controlled by said electrical connections, substantially as described.

2. In a counting and detecting apparatus, the combination of a plurality of normally open electric circuits, a pneumatic for each of said circuits, and circuit making and breaking connections controlled by each pneumatic, whereby each pneumatic will cut out the other circuits before completing its own circuit, substantially as described.

3. In a counting and detecting apparatus, the combination of a plurality of normally open electric circuits, a pneumatic for each of said circuits, a winding mechanism for a strip of perforated paper to control said pneumatics, and circuit making and breaking connections controlled by each pneumatic, so that each pneumatic will cut out the other circuits before completing its own circuit, substantially as described.

4. The combination of a winding mechanism for a strip of perforated paper, a series of pneumatics controlled by said perforated paper, a plurality of electrical registering devices, a normally open electric circuit con-

trolled by each pneumatic, and a plurality of circuit-breaking connections operated by each pneumatic so that each pneumatic will cut out the other circuits before completing its own circuit, substantially as described.

5. In a device of the class described, the combination of a pneumatic, a plurality of circuit-breaking devices comprising spring contact-fingers normally engaging stationary contact-pieces, and a circuit-making device comprising a spring contact-piece cooperating with and normally out of engagement with a stationary contact-piece, said parts being arranged so that the circuit-breaking devices will be operated before the circuit-making devices, substantially as described.

6. In a device of the class described, the combination of a pneumatic, and a plurality of spring contact-arms cooperating therewith, one of said spring contact-arms being arranged to throttle the vent of said pneumatic, substantially as and for the purpose set forth.

7. In a device of the class described, the combination of the main driving-shaft, a movably-mounted shaft driven therefrom by means of a spring-belt, the tension of said spring-belt normally tending to hold the driving-gear out of mesh, and means for locking the driving-gear in mesh, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

FRANK L. WILDER.

Witnesses:

LOUIS W. SOUTHGATE,
PHILIP W. SOUTHGATE.