

(Model.)

4 Sheets—Sheet 1.

T. M. FOOTE.

PERFORATOR.

No. 270,213.

Patented Jan. 9, 1883.

Fig. 1.

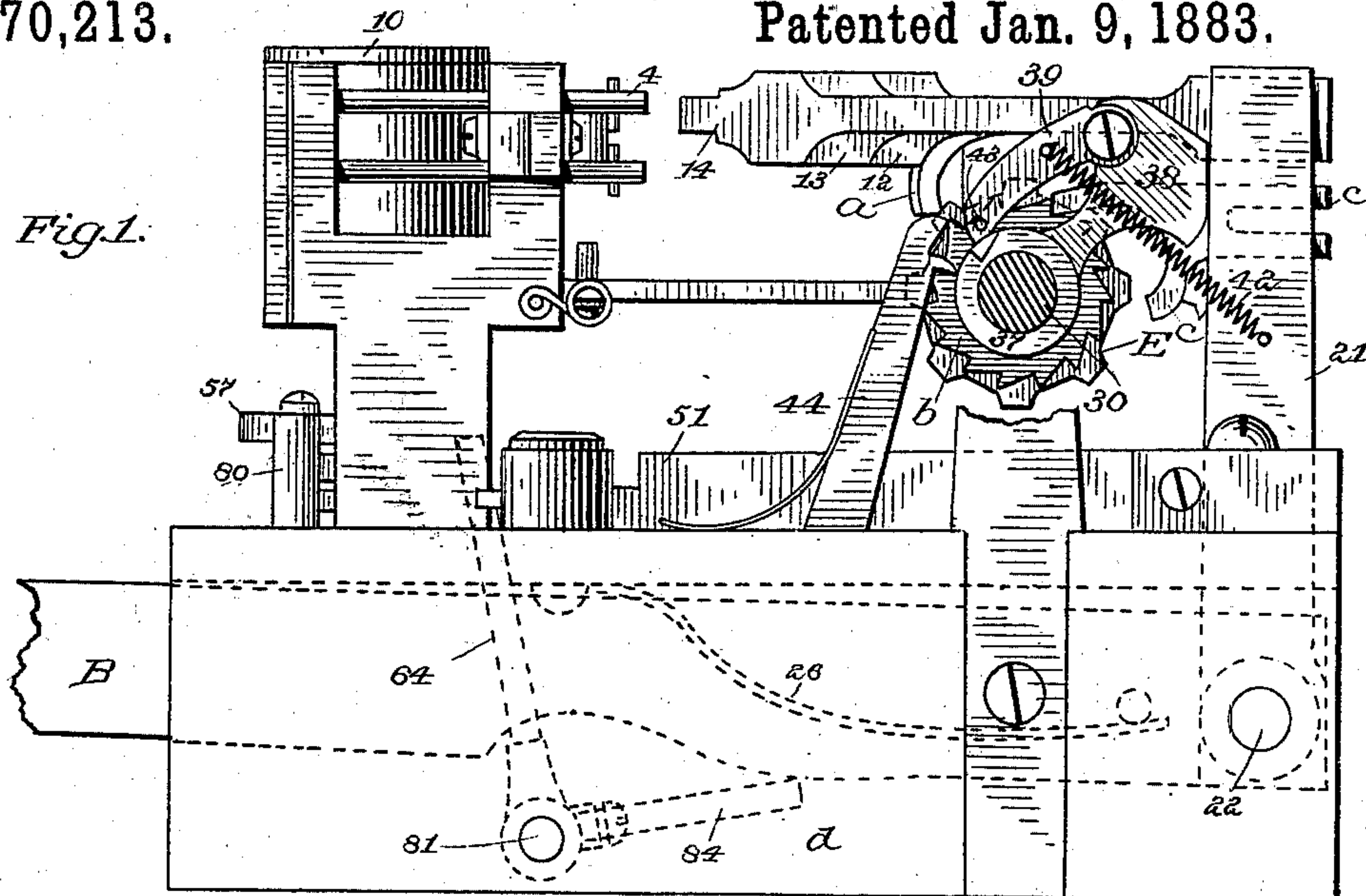


Fig. 2.

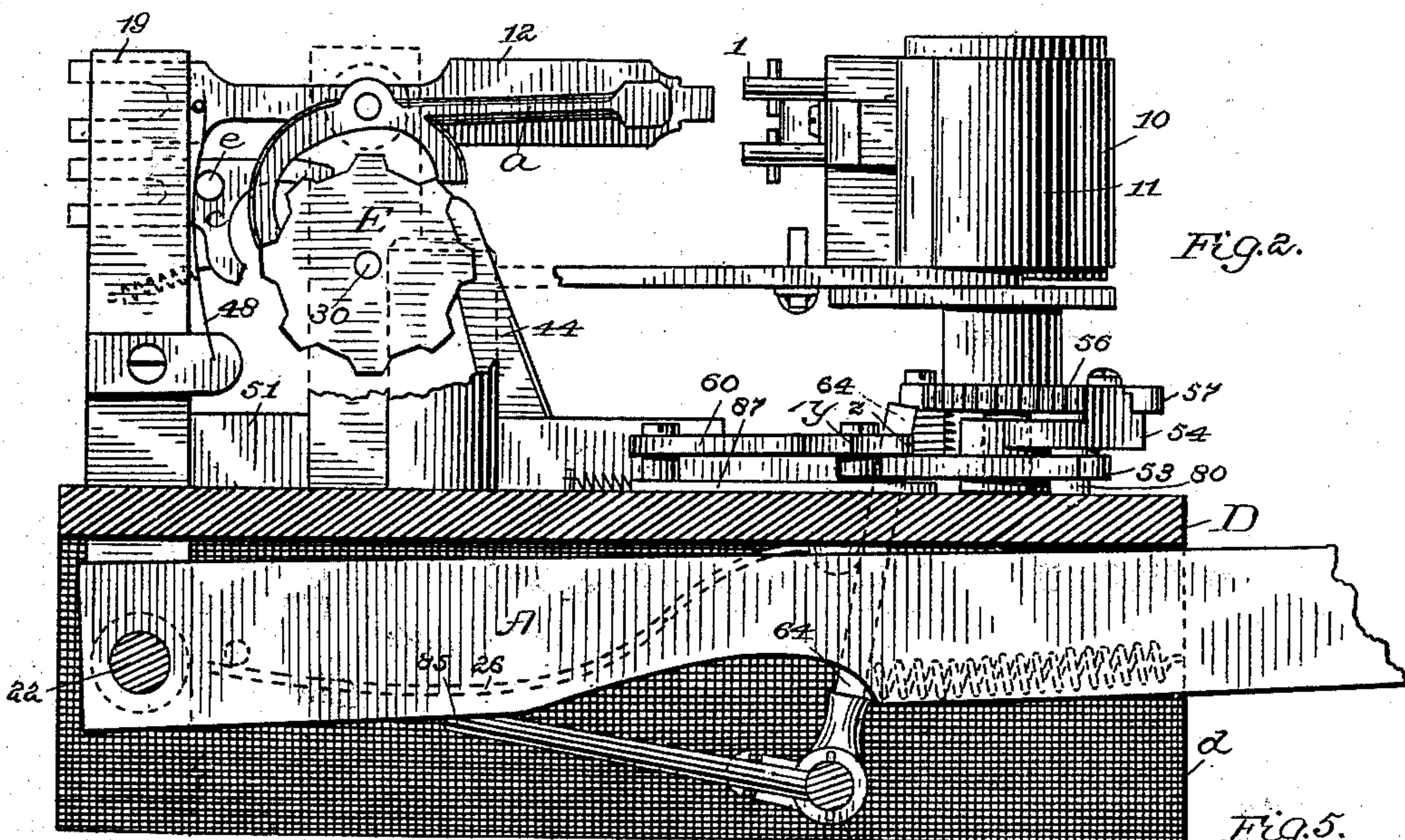


Fig. 3.

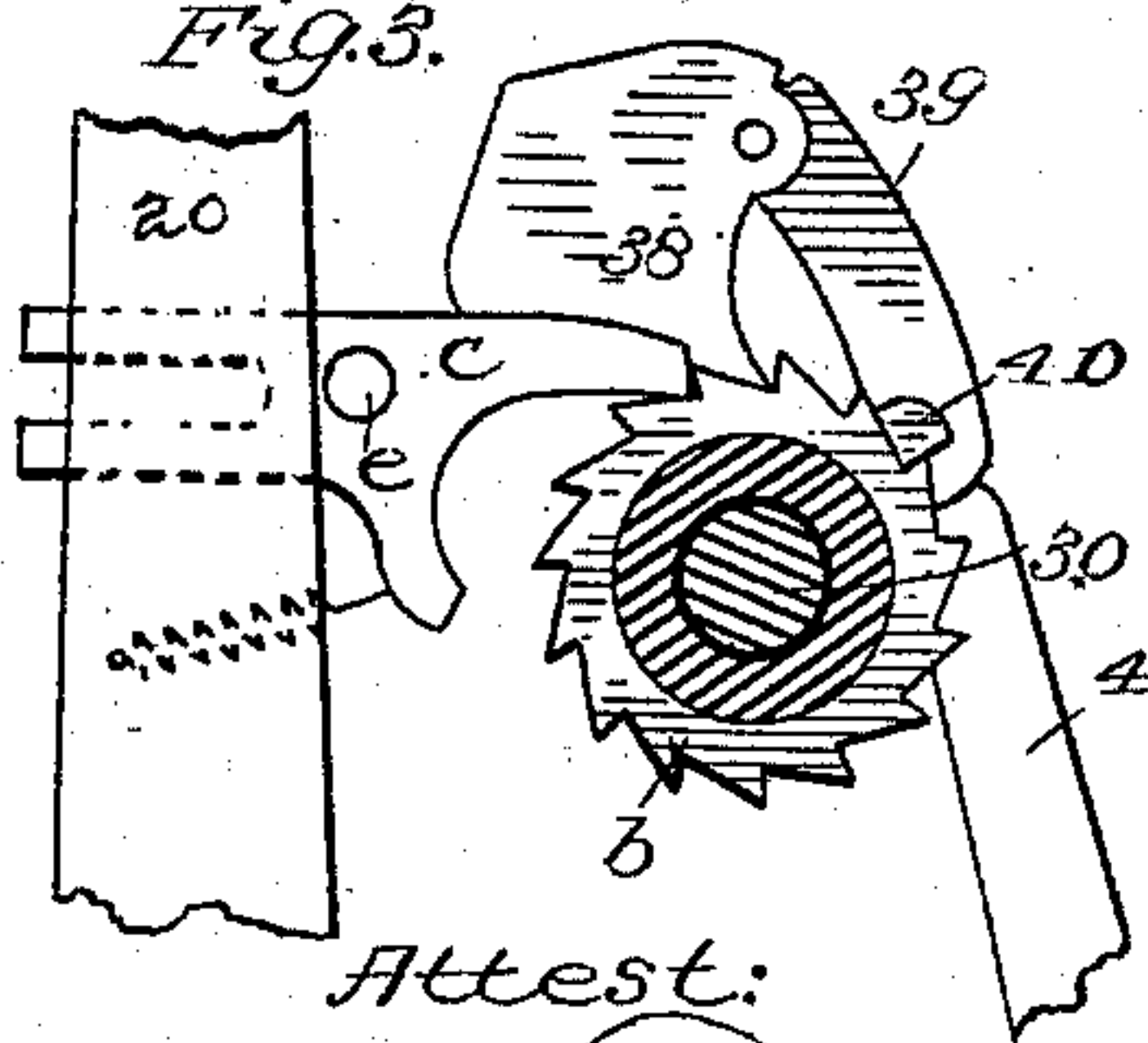
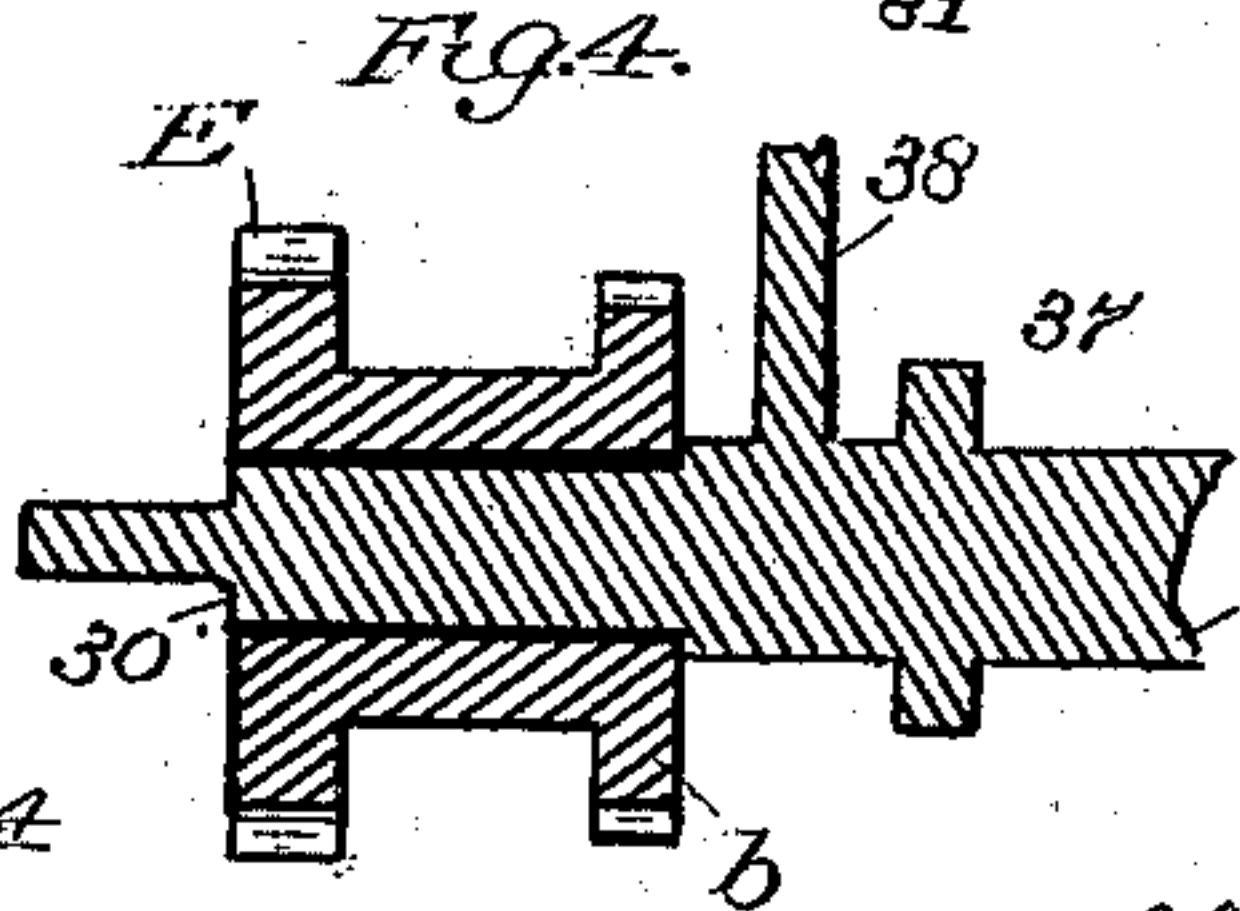


Fig. 4.



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(Model.)

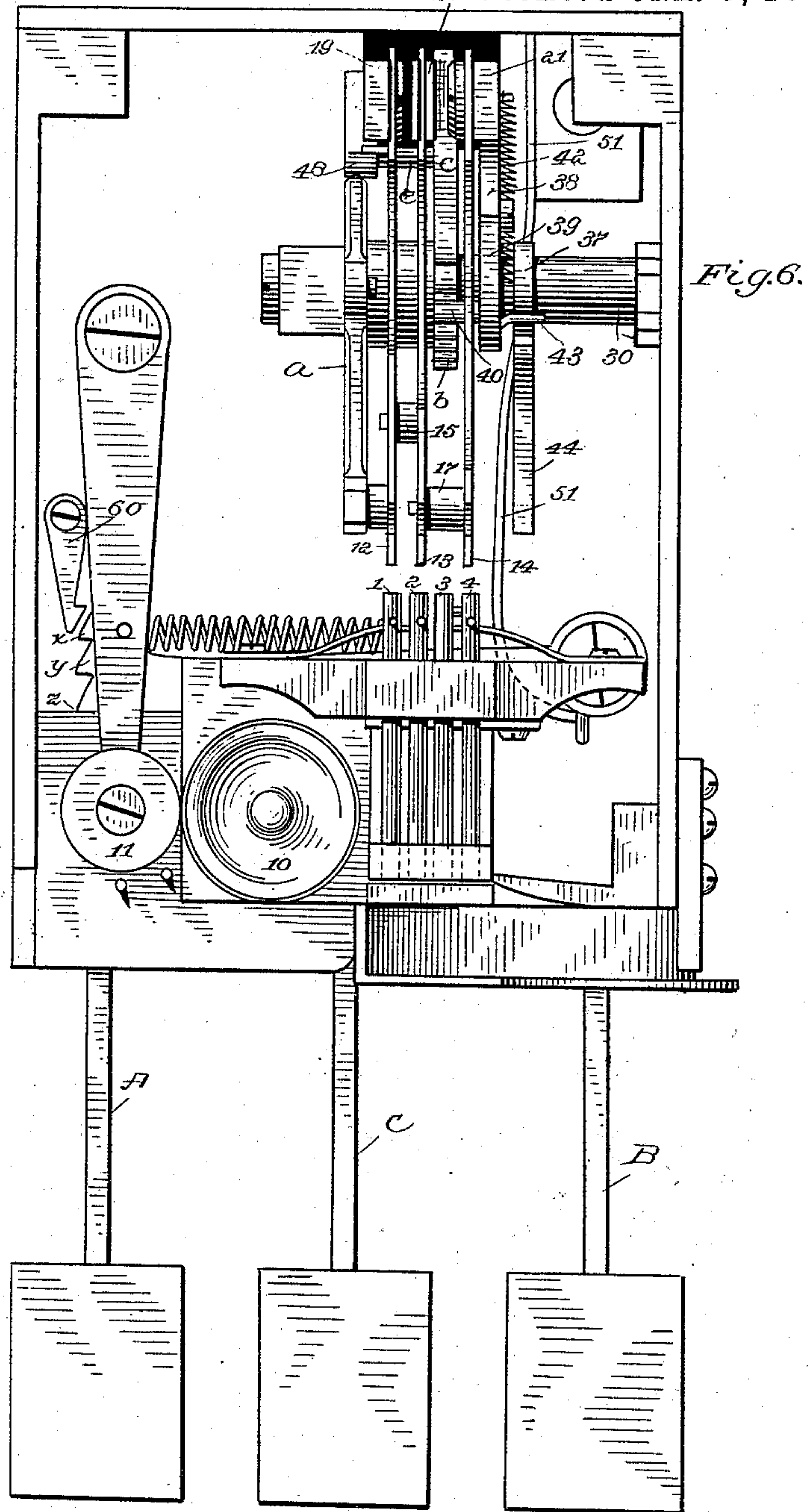
4 Sheets—Sheet 2.

T. M. FOOTE.

PERFORATOR.

No. 270,213.

Patented Jan. 9, 1883.



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T. M. FOOTE.
PERFORATOR.

4 Sheets—Sheet 3.

No. 270,213.

Patented Jan. 9, 1883.

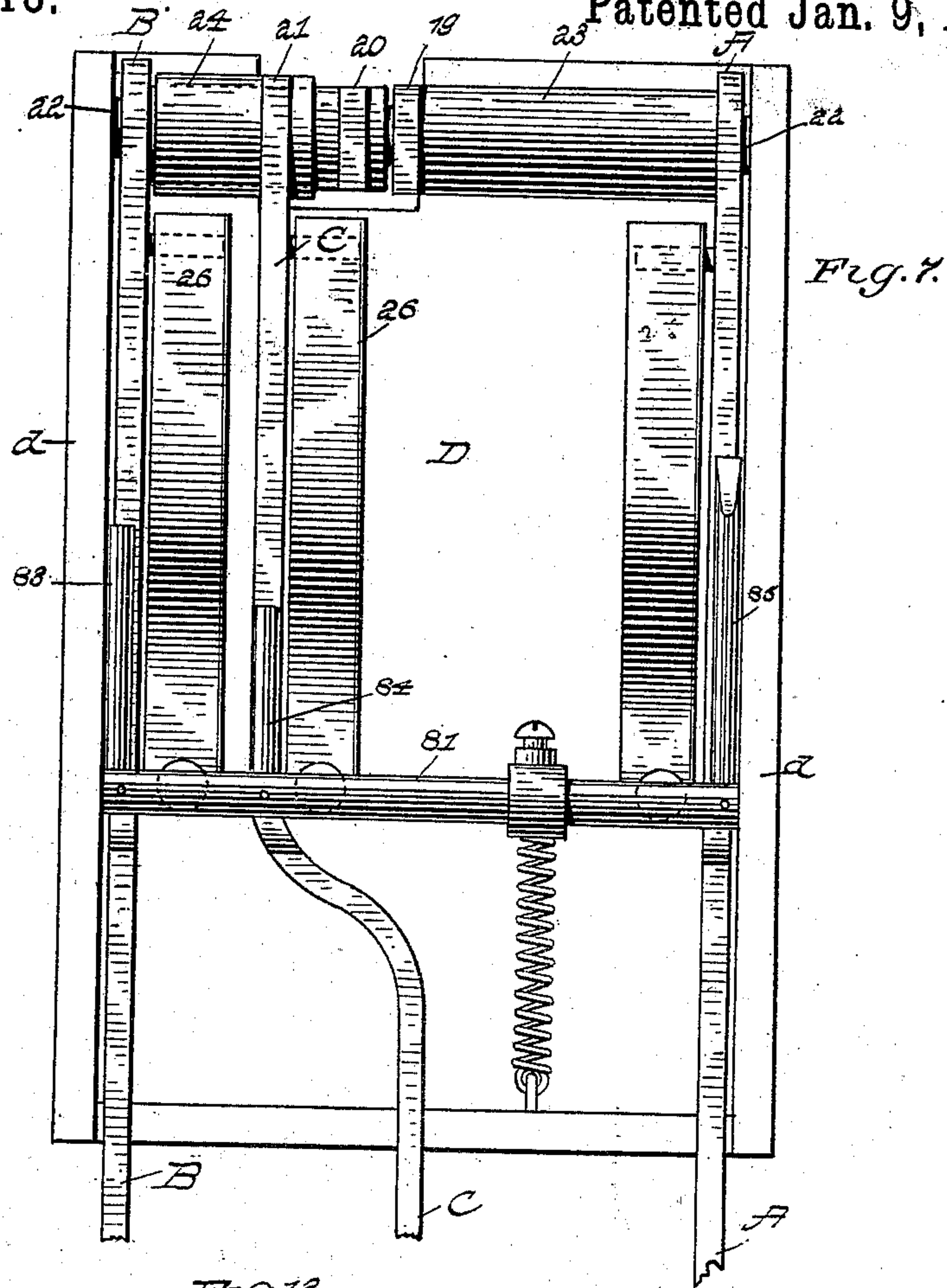
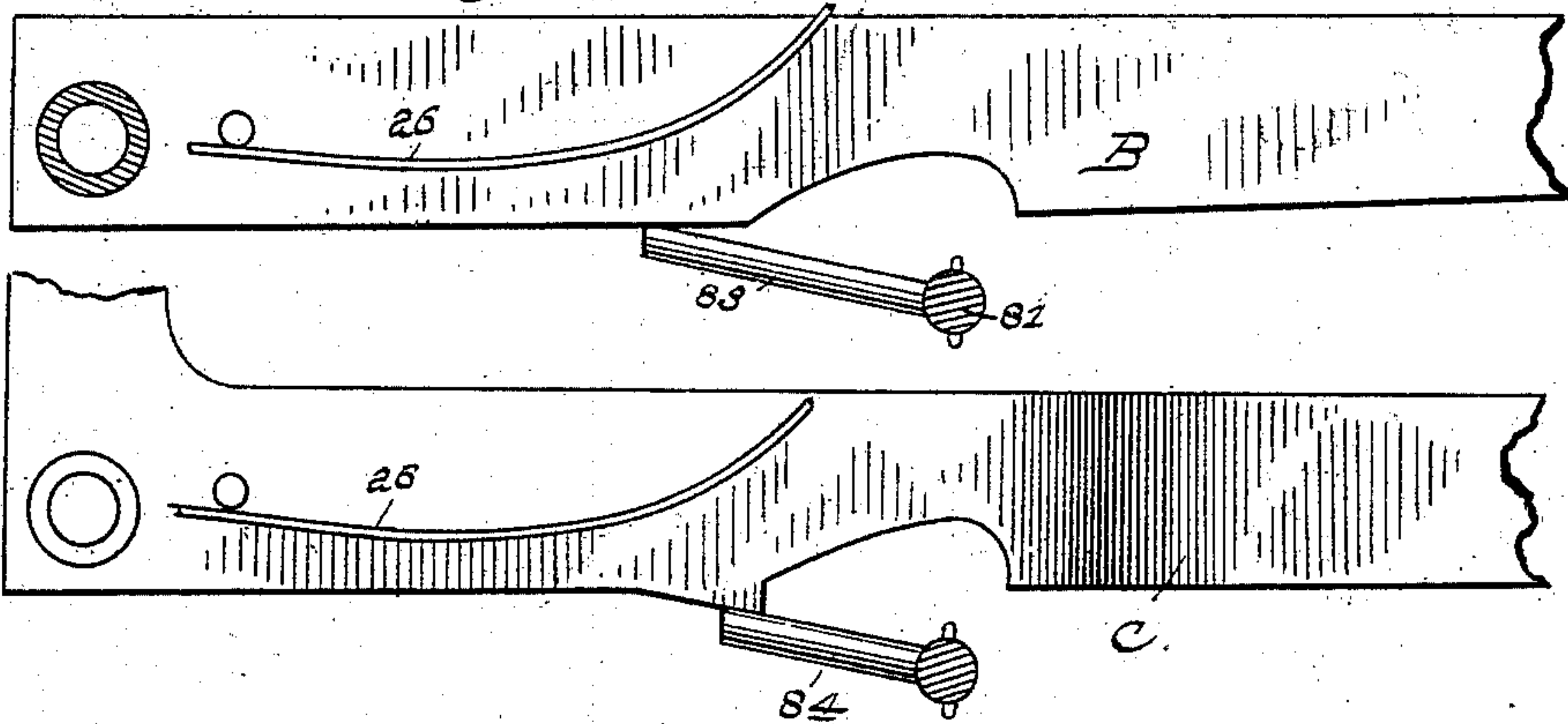


Fig. 7.



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(Model.)

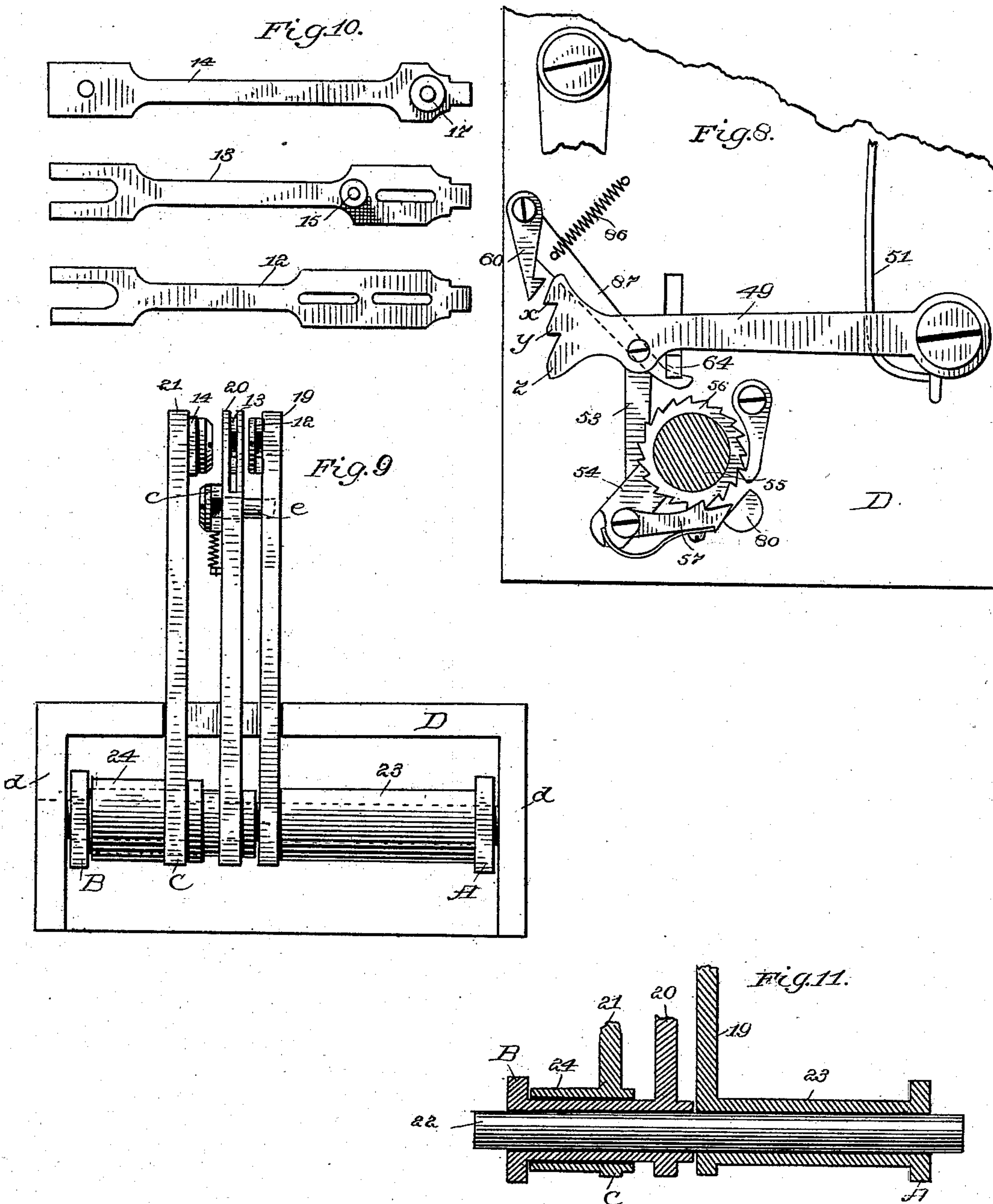
4 Sheets—Sheet 4.

T. M. FOOTE.

PERFORATOR.

No. 270,213.

Patented Jan. 9, 1883.



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UNITED STATES PATENT OFFICE.

THEODORE M. FOOTE, OF BROOKLYN, NEW YORK.

PERFORATOR.

SPECIFICATION forming part of Letters Patent No. 270,213, dated January 9, 1883.

Application filed May 8, 1882. (Model.)

To all whom it may concern:

Be it known that I, THEODORE M. FOOTE, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Perforators; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention relates to perforators of that class which are adapted to punch fillets in two lines of perforations, such as are ordinarily used in the Foote & Randall system of telegraphy. As is well-known, in this system the impulses required to form dots and dashes alternate in polarity between any two successive marks, and the record is made wholly by transmitted impulses.

The object of my invention is to provide a perforator which shall fulfill all the requirements of that system with only three keys, and, further, to simplify the construction of the apparatus and to improve it in certainty of operation.

In the leading features the invention herein set forth is the same as that shown in an application filed by me in the United States Patent Office on the 27th day of April, 1882, and entitled "improvement in perforators."

The present invention consists in the organization of the machine to accomplish the purpose stated, of improvements in details of construction and combination.

In the accompanying drawings, Figures 1 and 2 are substantially elevations of opposite sides of the machine. Figs. 3, 4, and 5 represent details of parts shown therein, all these being on Sheet 1. Fig. 6 on Sheet 2 is a top view. Fig. 7 of Sheet 3 is a bottom view. Figs. 8, 9, and 10, Sheet 4, are views of details. Fig. 11 is a section of Fig. 9, and Fig. 12 detail view.

In these drawings a convenient base of the machine is shown at D d d, in the top and sides of which are bearings and supports for the fixed and moving parts.

The three key-levers are marked respectively A, B, and C. They are all pivoted at their rear ends upon a shaft, 22. The lever A is fixed to a sleeve, 23, on the opposite end of which is a vertical arm, 19. The lever C is directly connected to or formed with a like arm, 21. Lever B is fixed to a sleeve on the shaft 22, beneath the sleeve 24, and to the in-

ner sleeve is attached a like vertical arm, 20, these vertical arms forming, with their respective key-levers, practically bell-crank levers, and their upper ends are tipped forward on depression of the key-levers. To their upper ends are connected pushers 12, 13, and 14, 12 and 13 by means of slotted ends bearing upon headed pins in the arms, and 14 by a simple pin-connection. These three pushers are connected to each other by a pin, 15, in pusher 13 entering a slot in pusher 12, and by a pin, 17, in pusher 14 entering a slot in pusher 13, so that the pusher 12 may be advanced alone. Pusher 13 may carry pusher 12 with it by reason of the pin being normally in the forward end of the slot, and pusher 14 may carry both pushers with it for like reason. The rear slots in the pushers allow movement independently of their moving arms, and they are carried back by means of a spring, 48. (Shown in Fig. 2.) The arms are held back and the keys are kept normally raised by means of springs 26 bearing underneath pins set in the sides of the key-levers, as shown in Figs. 2 and 7. In front of the pushers are two rows of punches. (Shown in Figs. 1, 2, and 6, and marked in order, 1 2 3 4.) These are of ordinary construction, playing freely through guide-blocks into a die, and being retracted by springs, as shown in Fig. 6. Punches 1 and 2 are capable of independent action; but punches 3 and 4 are connected to each other by a pin, so that they move together. The lower row is a duplicate of the upper. The system for which it is intended and the principle of the machine require that the upper and lower punch, 1, should act alternately independently of the others, that the upper and lower punches, 1 and 2, should act together, alternating with their fellows in the lower line, but all four of the punches in each row should be capable of acting together by means of a single key, C; but each set must alternate in action with the single or double punch of the opposite row, and the set of fours must not alternate with each other—that to say, if either key A or B be depressed, and thereby operate a punch or punches in the lower line, and then key C be depressed, it will operate all four punches in the upper line, and if depressed again, without an intermediate depression of either of the other keys, it will punch again in the same line,

and will not, so to speak, alternate with itself like the other keys. This is for the obvious purpose of doubling the space-dash between letters formed by the four punches, so as to form a dash between words. This alternation is accomplished by punch-shifting mechanism in principle like that shown in my application aforesaid. This punch-shifting mechanism is, first, a lever, *a*, Figs. 2 and 6, which has two bent arms, adapted to bear upon the notched periphery of a wheel, *E*, on a shaft, 30. The arms are so related to the wheel that the forward one rides upon a tooth while the rear is in the recess between two teeth, as shown in Fig. 2, and then the forward end of the lever is thrown up and all the pushers, by reason of their aforesaid pin-connections, are elevated in line with the upper row of punches. A movement of the wheel *E* one step reverses the position of the arms of lever *a* in respect to the wheel *E* and depresses the forward end of said lever, bringing all the pushers down in line with the lower line of punches, and this shifting of the pushers vertically must happen every time the wheel *E* moves one step. The wheel *E* receives this step-by-step movement by means of a ratchet-wheel, *b*, fixed on a sleeve with wheel *E*. The pawl *c*, Fig. 3, of this ratchet is connected to the arm 20 by means of a slotted end similar to that of the pushers 12 and 13. It has a pin, *e*, extending across just in front of arms 19 and 20, so that either of these arms, when tipped forward, will carry the pawl with it and move the wheel *E* one step; but the conditions under which the arm 21 operates are substantially the same, so far as it relates to the working of the pushers, as those described in my aforesaid application, and it is provided with a similar mechanism. (Shown in Figs. 1 and 6.) An arm, 38, is fixed on the shaft 30, its rear end being prolonged to bear against the arm 21. A spring, 42, attached to its pawl draws it back into connection with the arm, the pawl having an arm, 40, engaging with the teeth of the ratchet *b*. A pin, 43, on the other side of the pawl, opposite the arm 40, is adapted to come in contact with the upper end of a spring-arm, 44, when the pawl 39 is thrown forward. Upon the sleeve or hub of the arm 38 is a wheel, 37, having a notch which receives a spur upon the spring-arm, by means of which, when the arm has been thrown forward, the sleeve or hub is held and the arm prevented from returning until the spur upon the spring-arm is released from the notch in the wheel. The arrangement is such that the pin 43 comes into contact with the upper end of the spring-arm when the spur is in the notch. At the same time the arm opposite the pin 43 rests in the space between the teeth of its ratchet-wheel. This connection just described continues through repeated movements of the key *C* and until one of the other keys is operated. Either of the other keys being operated, its proper pawl turns the shaft, and with it advances the ratchet-wheel one tooth. As the

tooth advances the arm 40 rides upon it, which lifts the pawl, and through the pin 43 raises the spring-arm, with its spur, from the notch, thereby releasing the sleeve and allowing the pawl 39 to be drawn back by its spring into contact with the arm 21 by key *C*. It will be apparent, therefore, that the key *C* cannot operate the devices which raise or lower the pushers twice in succession. Therefore, if the key *C*, upon depression, operate through the pushers the upper row of pushes, an immediate repetition of this movement will punch the same row; but if, after the depression of the key *C*, another key be depressed, then by the release of the pawl 39 and its arm these latter will be in position to be operated again by the arm 21 of the key *C*, whereby the pusher-shifting devices are brought into operation, and alternation in the operation of the punches is effected.

I now proceed to describe the devices and combinations for moving the fillet. The plan requires that key *A* should move the fillet one space, sufficient for a single dot, that the key *B* should cause it to move twice that distance, and key *C* four times the distance. Further, it is requisite that the movement of the fillet-moving mechanism should take place after the depression of the key-levers, or rather after they begin to rise, and that a sufficient time should elapse after the return movement of the keys and before the fillet-moving mechanism operates to allow the punch-springs to withdraw the punches from the fillet. To fulfill these conditions I pivot upon the bed-plate a lever, 49, which a spring, 51, tends constantly to press forward. A link, 53, connects this lever to an arm, 54, carrying the pawl 57, said arm being pivoted upon the shaft 55, which carries the ratchet 56 and the drive-wheel 10. The forward movement of the pawl and wheel is stopped by a post, 80. It will be understood, more particularly by reference to Fig. 8, that the forward movement of the paper is caused by the spring 51. The backward movement of the lever 49 for the purpose of giving the pawl 57 a new hold upon the ratchet is effected by an arm, 64, which is set on a rock-shaft, 81, Figs. 1 and 2, underneath the plate. From this rock-shaft arms 83, 84, and 85, Figs. 7 and 12, extend along toward the rear underneath the key-levers. They differ in length according to the amount of backward movement each key-lever is required to give to the rock-shaft and lever 49—that is to say, arm 85 extends farthest to the rear and bears upon a part of the lever *A* where it receives least motion; arm 83 is shorter and bears upon lever *B* where it receives more motion; arm 84 is the shortest and receives most motion, all from substantially the same amount of movement of the key-levers. These movements are determined with sufficient accuracy by the arrangement of the arms 83, 84, and 85 to give an exact amount of movement to the arm 64 to fulfill the required conditions—that is to say, arm

85 will push back the pawl 57 over one notch of the ratchet 56, arm 83 over two notches, and arm 84 over four notches, giving corresponding forward movement through the invariable
 5 action of the spring 51; but in order that this forward movement may not take place immediately upon the beginning of the return movement of the key-levers, and before the punches have retreated from the paper, I provide a temporary stop consisting of a pawl, 60, taking
 10 into notches *x y z*. It is drawn in by a spring, 86, attached to an arm, 87, of the pawl 60. The notches correspond in position to the three different movements heretofore described of
 15 the arm 64. The arm 87 projects slightly in front of the arm 64, and is left by the lever in its backward movement against the lever 49, after the pawl has engaged with a tooth; but when any key has moved part of the way on
 20 its rise, and the lever 64 is on its return, it strikes against the arm 87 and throws the pawl out of connection with the notch, thus allowing the spring 51 to give the forward movement to the fillet. A pressure-roller, 11,
 25 bears against the fillet, as in my aforesaid application.

Having thus described my invention, what I claim is—

1. In a perforator, two series of punches arranged to punch in two lines, a pusher connected with one key, and thereby operating upon a punch of the upper or lower series, a shifting mechanism connected to said key-lever and operated thereby for shifting the pushers on successive depressions of the said key-lever alternately from one series to the other, and the fillet-moving mechanism set in motion by the said key-lever and acting upon its rise, a second pusher connected to a second
 30 key-lever and to the first pusher, and a shifting mechanism connected also to said key-lever, whereby both pushers are made to operate on their proper punches in the upper and lower series alternately upon successive depressions of the said second key-lever, and connection between said fillet-moving mechanism and said second key-lever, whereby the fillet
 40 is moved twice the distance of the first key, a third pusher connected to the first and second
 45 and to the third key-lever, whereby depression of said third key-lever will operate all the punches of one series, a shifting mechanism having connection with said third key-lever independent of the connection therewith of the other two, whereby said third key-lever
 55 alternates in its action upon the series of punches with the other key-levers, but does not alternate upon successive depressions of itself, and, finally, fillet-moving mechanism connected to said third key-lever, whereby on
 60 return from its depression the fillet is moved four times the distance of the movement caused by the first key-lever, all these parts being organized in the machine substantially as described.

2. In the described machine, the pusher-shifting mechanism consisting of the lever *a*, wheel *E*, ratchet *b*, and the pawl *c*, substantially as described.

3. The combination, in the described perforator, of the lever *A*, connected to the series of pushers, as described, the wheel *E*, ratchet *b*, and the described pawl-connections with the arms 19 20, the arm 38, pivoted on the same shaft with wheel and ratchet before mentioned, the pawl 39, with its stop mechanism, and the arm 21, the parts being adapted to operate in the machine substantially as set forth.

4. The paper-moving mechanism consisting of the lever 49 and its pawl-and-ratchet connection with the shaft of the fillet-moving wheel, the arm 64, set in the rock-shaft 81 and the unequal arms set in said rock-shaft and bearing upon the key-levers, whereby unequal movement is imparted to the fillet-mover, substantially as described.

5. The combination, with the arm 49 and its described connections with the fillet-moving wheel, and with the lever 64 and mechanism connecting said lever to the key-levers, of the pawl 60, with its arm 87, and spring 86 in described connection with the lever 64, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THEODORE M. FOOTE.

Witnesses:

OWEN MCBREEN,
 THEO. E. GREEN.