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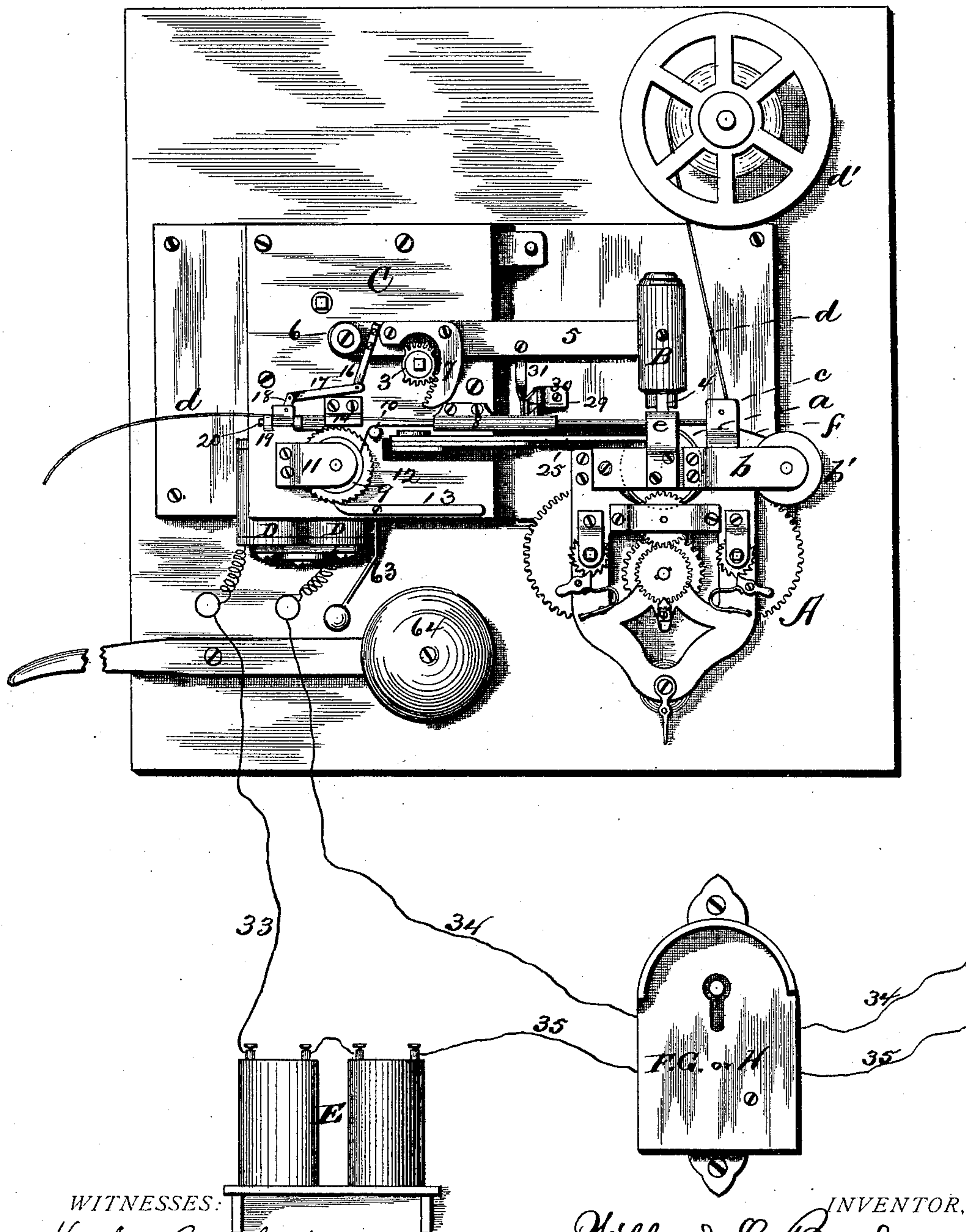
5 Sheets—Sheet 1.

W. L. BUNDY.
WATCHMAN'S TIME RECORDER.

No. 488,687.

Patented Dec. 27, 1892.

Fig. 1.



WITNESSES:

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C. B. Winne.

INVENTOR,

Willard L. Bundy

BY

Smith & Denison
his ATTORNEYS

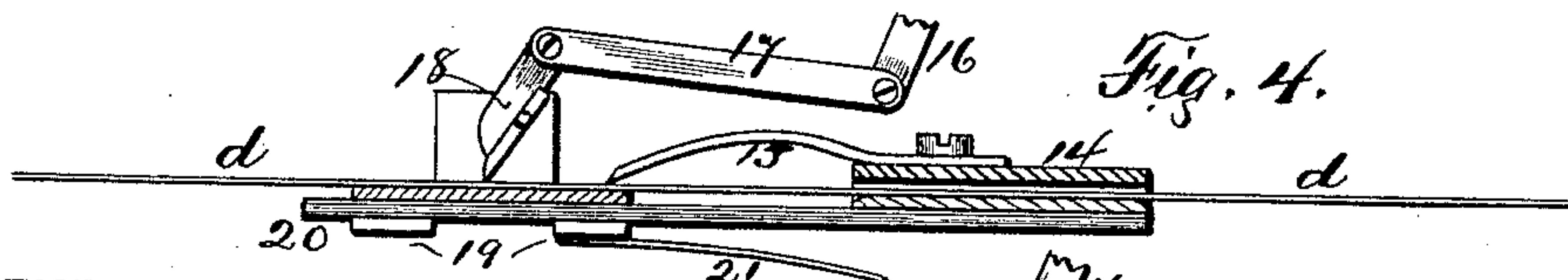
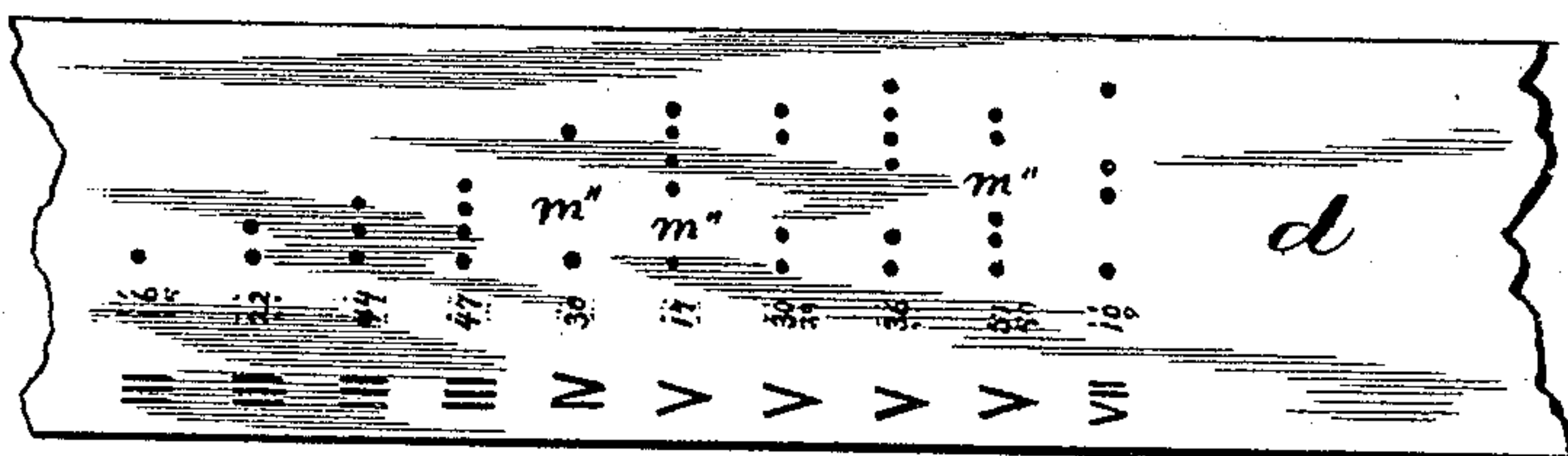
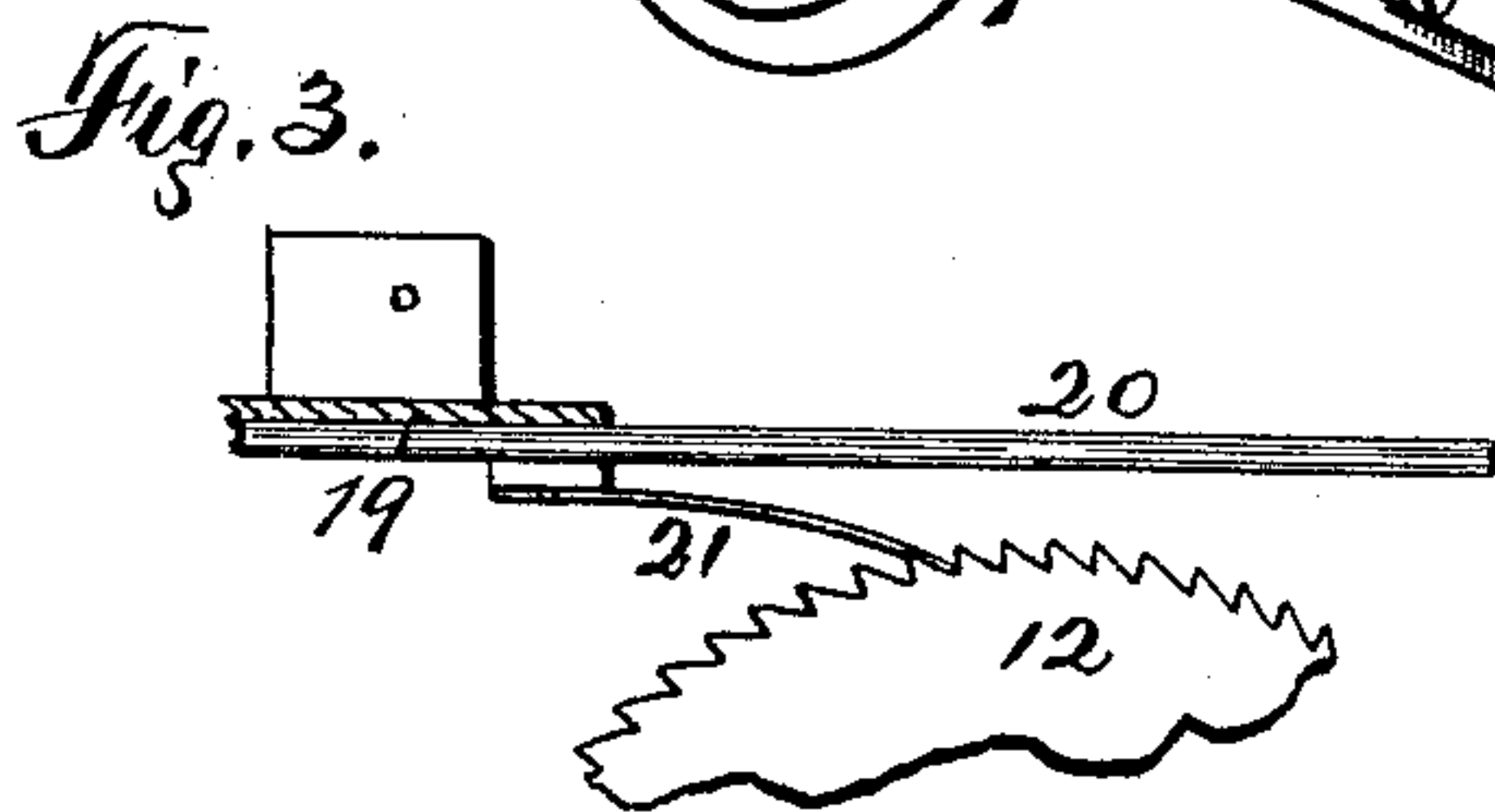
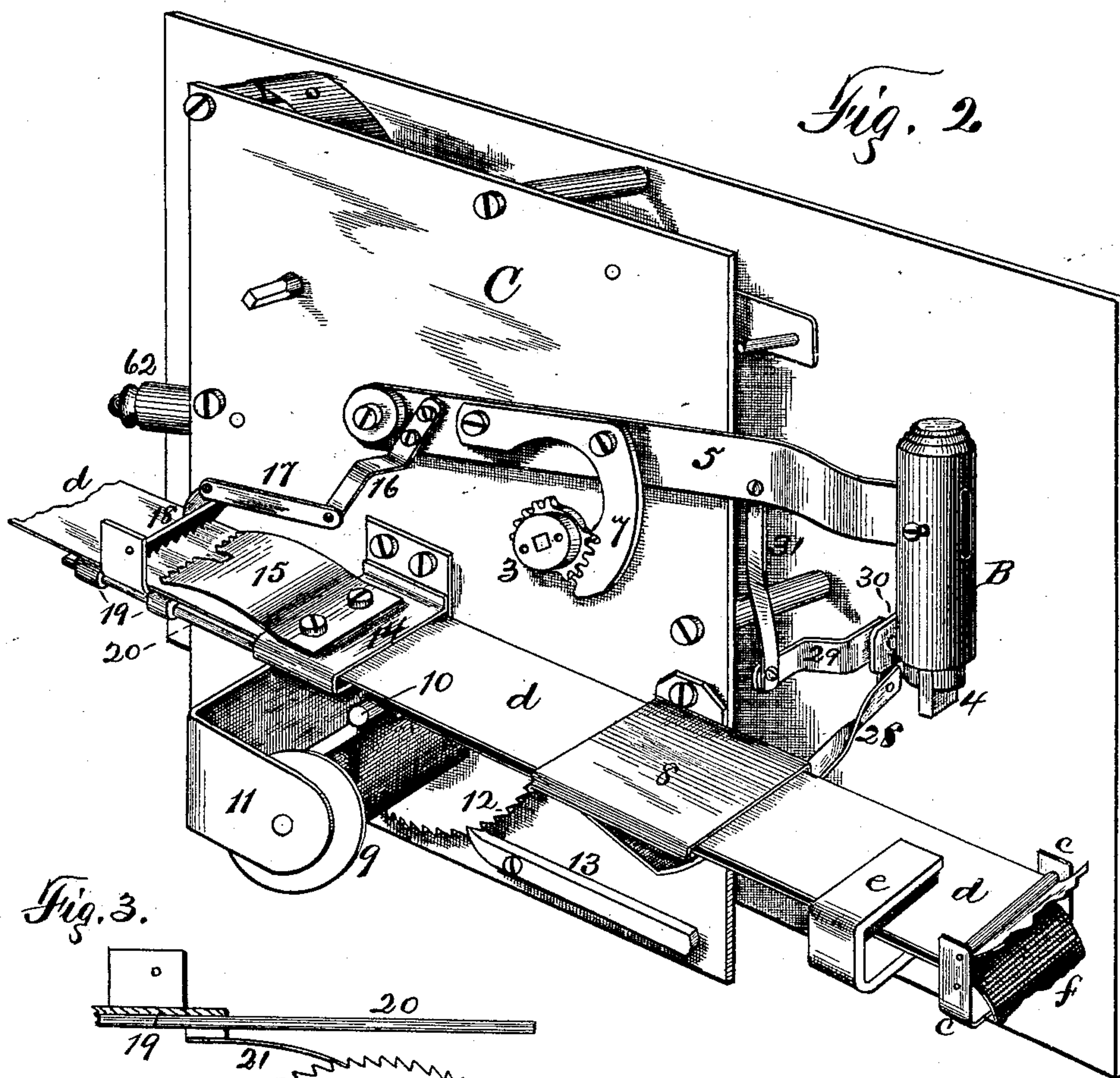
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W. L. BUNDY.
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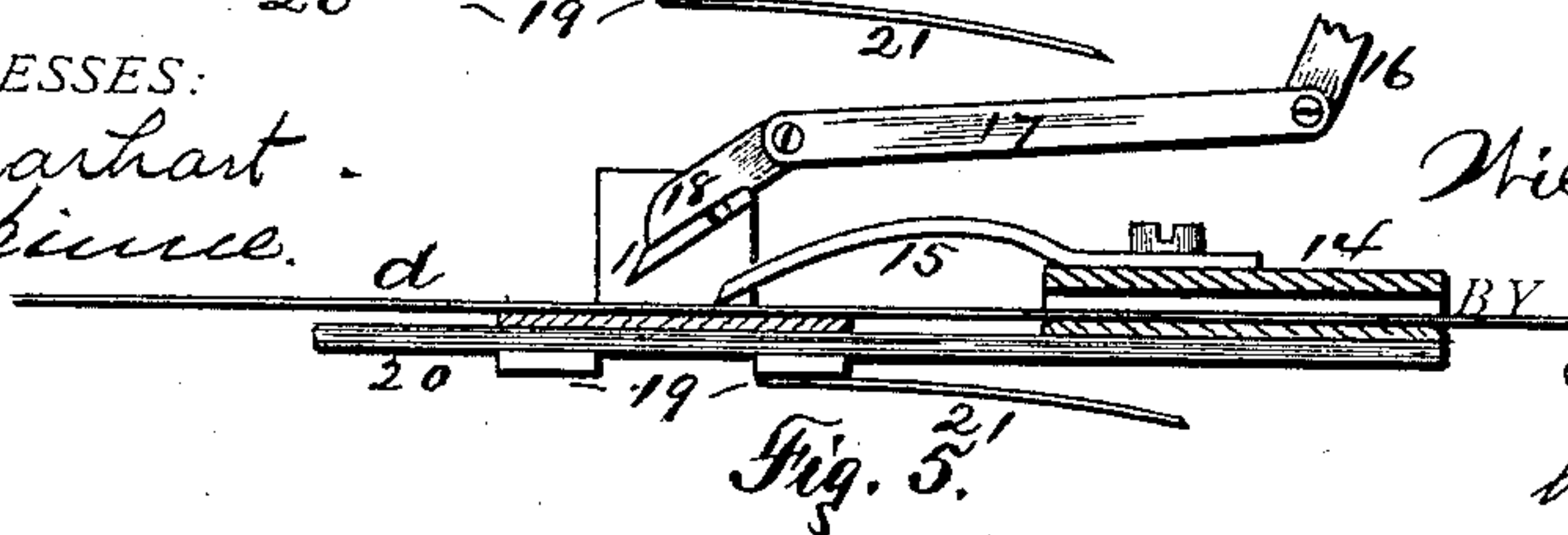
Patented Dec. 27, 1892.



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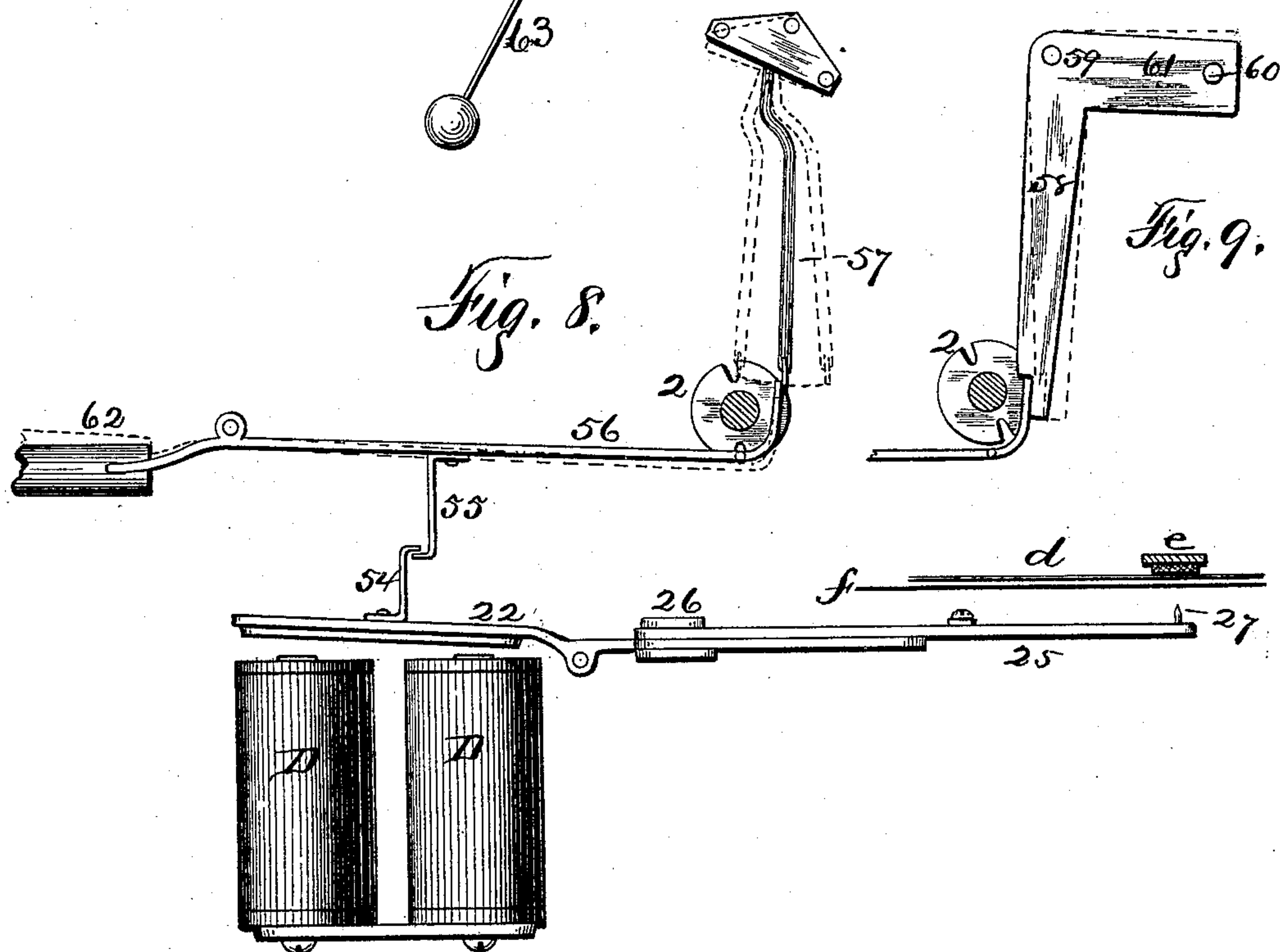
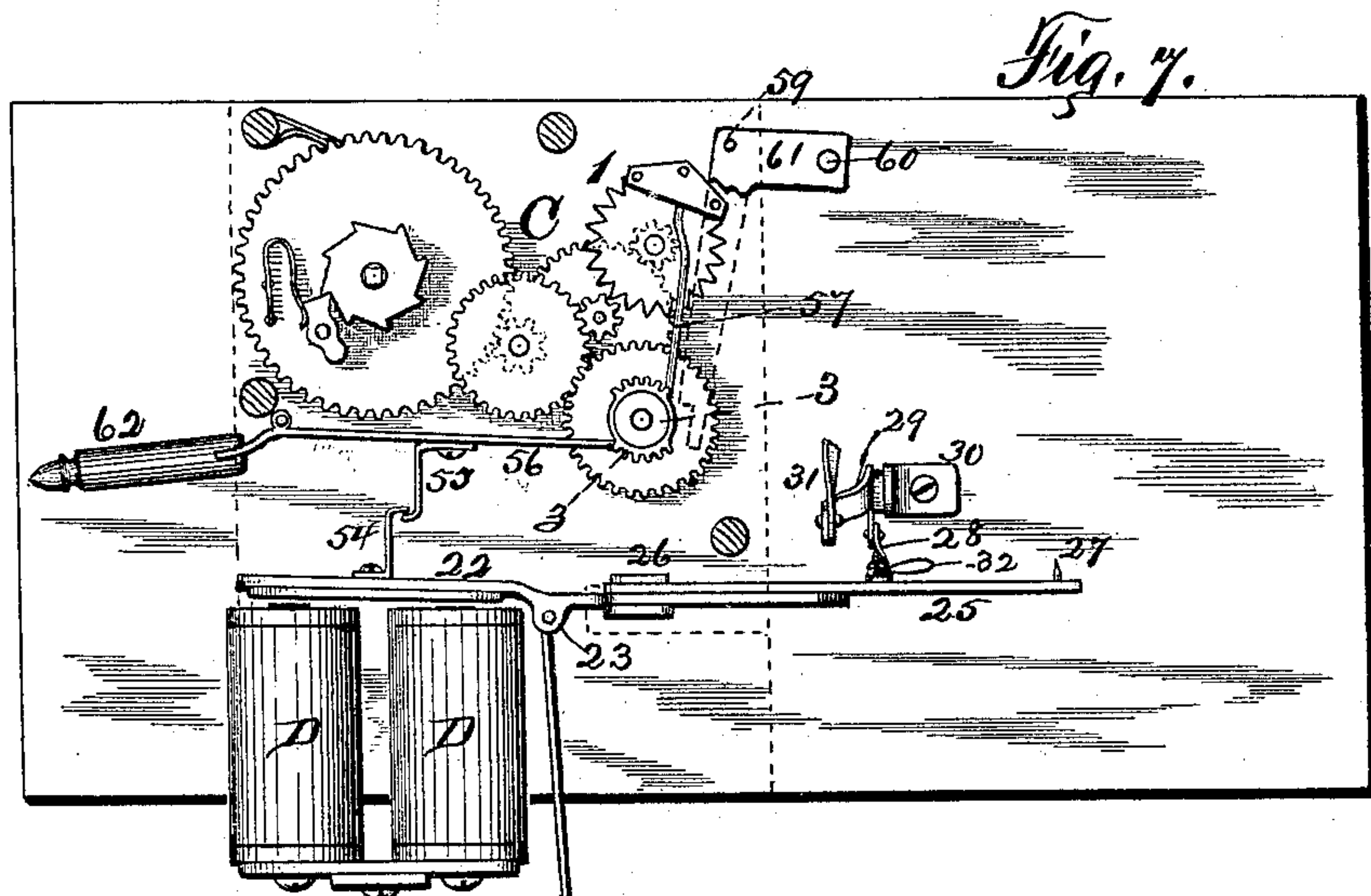
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W. L. BUNDY.
WATCHMAN'S TIME RECORDER.

No. 488,687.

Patented Dec. 27, 1892.



WITNESSES:

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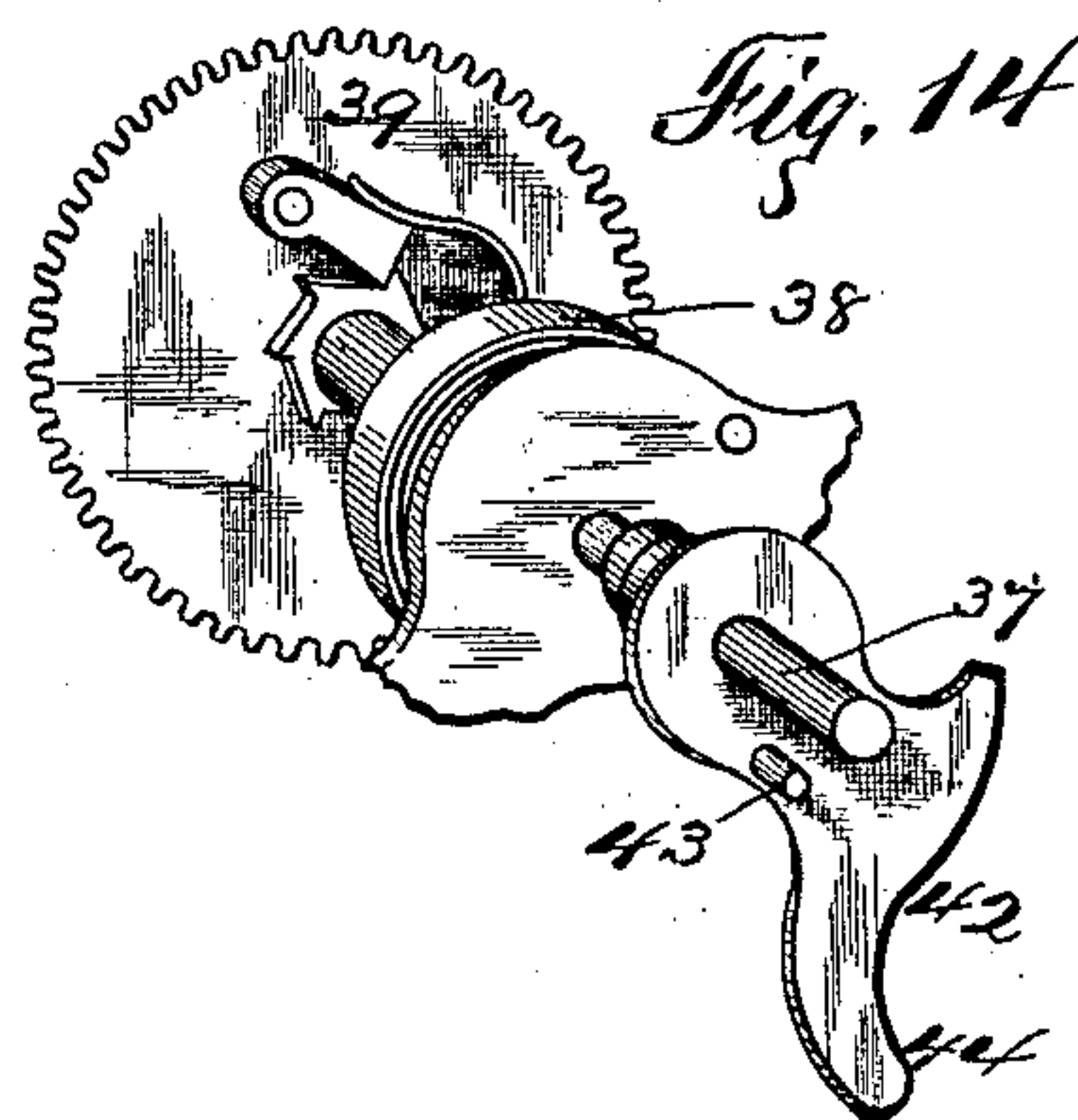
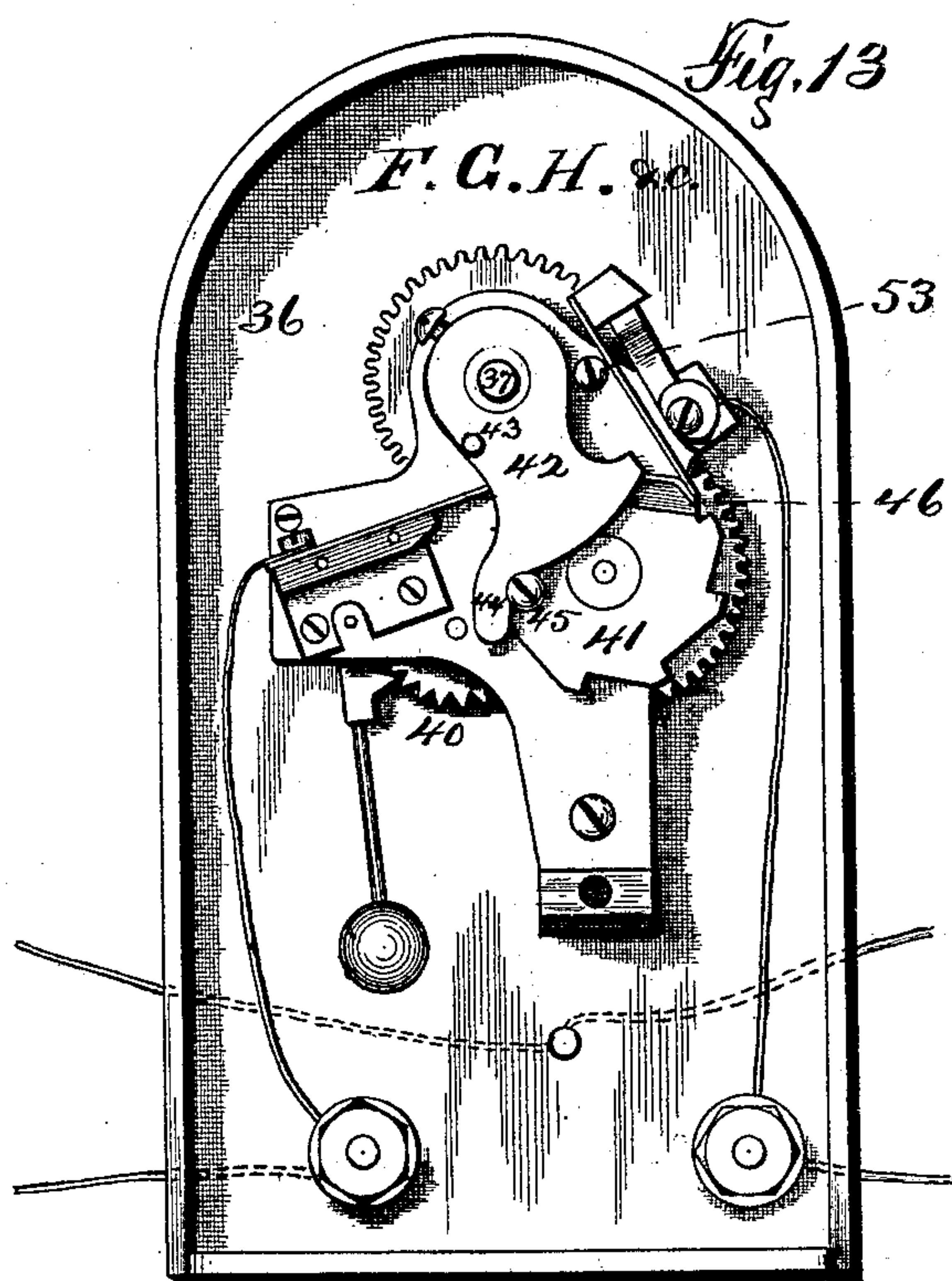
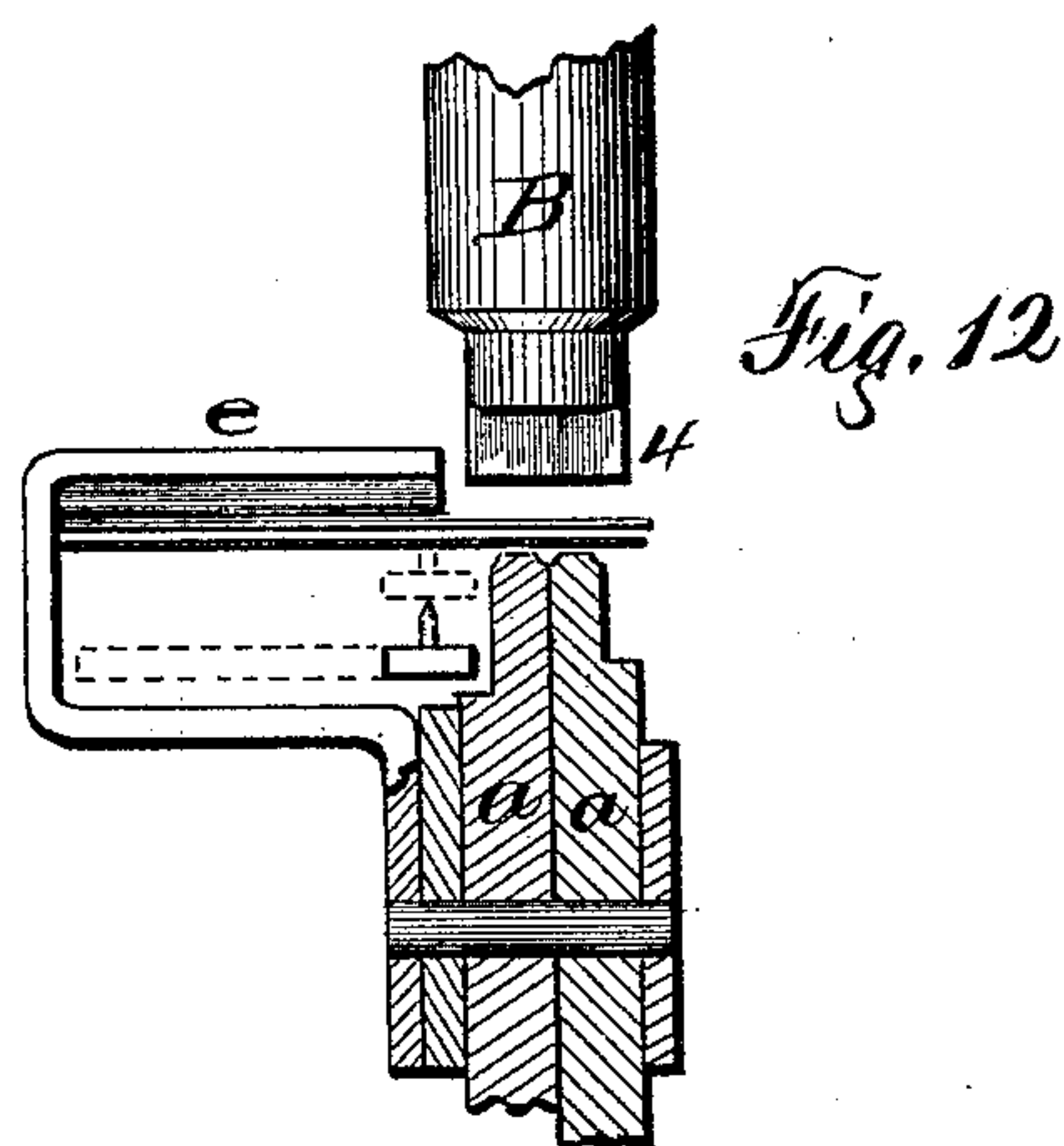
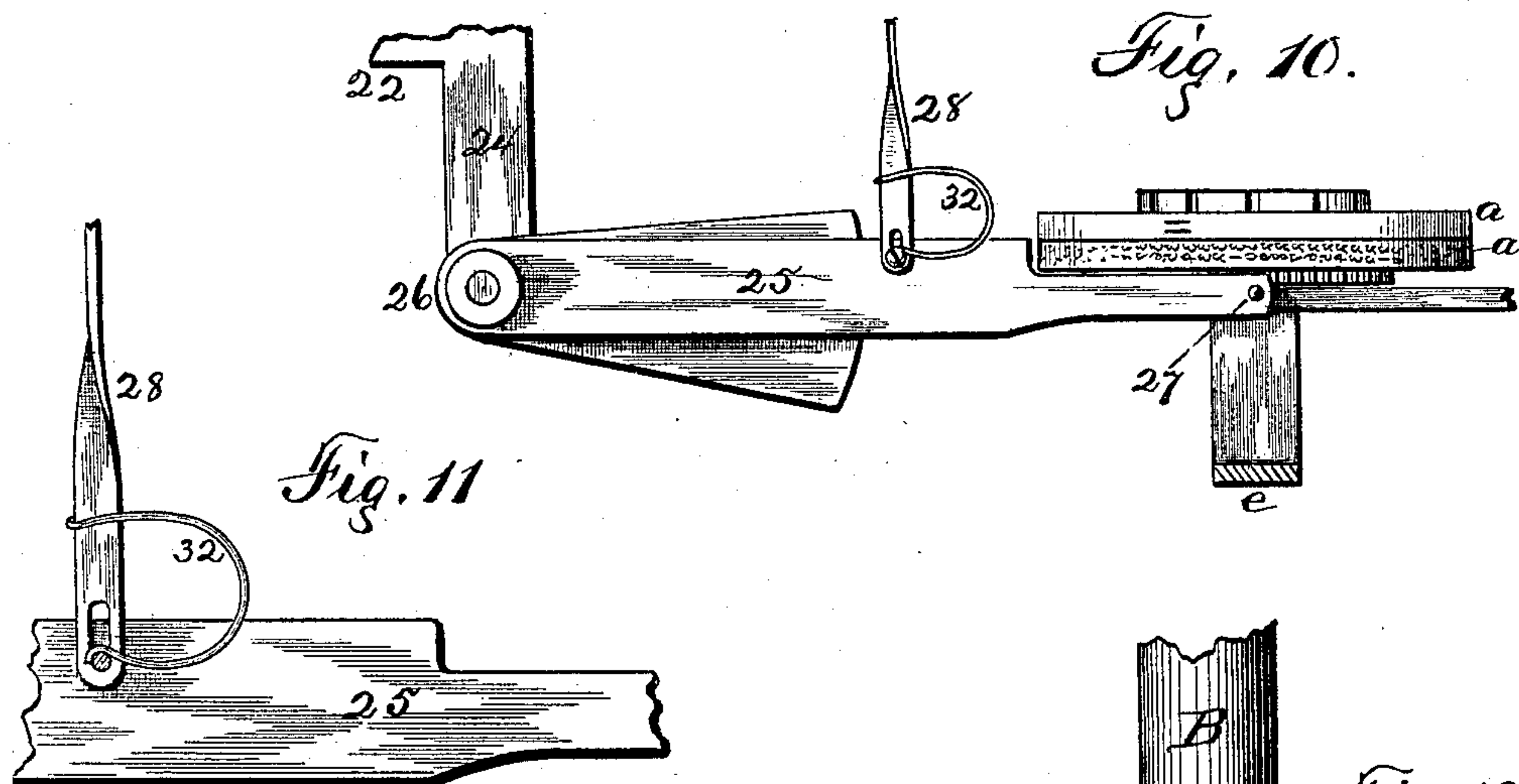
(No Model.)

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W. L. BUNDY.
WATCHMAN'S TIME RECORDER.

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Patented Dec. 27, 1892.



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(No Model.)

5 Sheets—Sheet 5.

W. L. BUNDY.
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Patented Dec. 27, 1892.

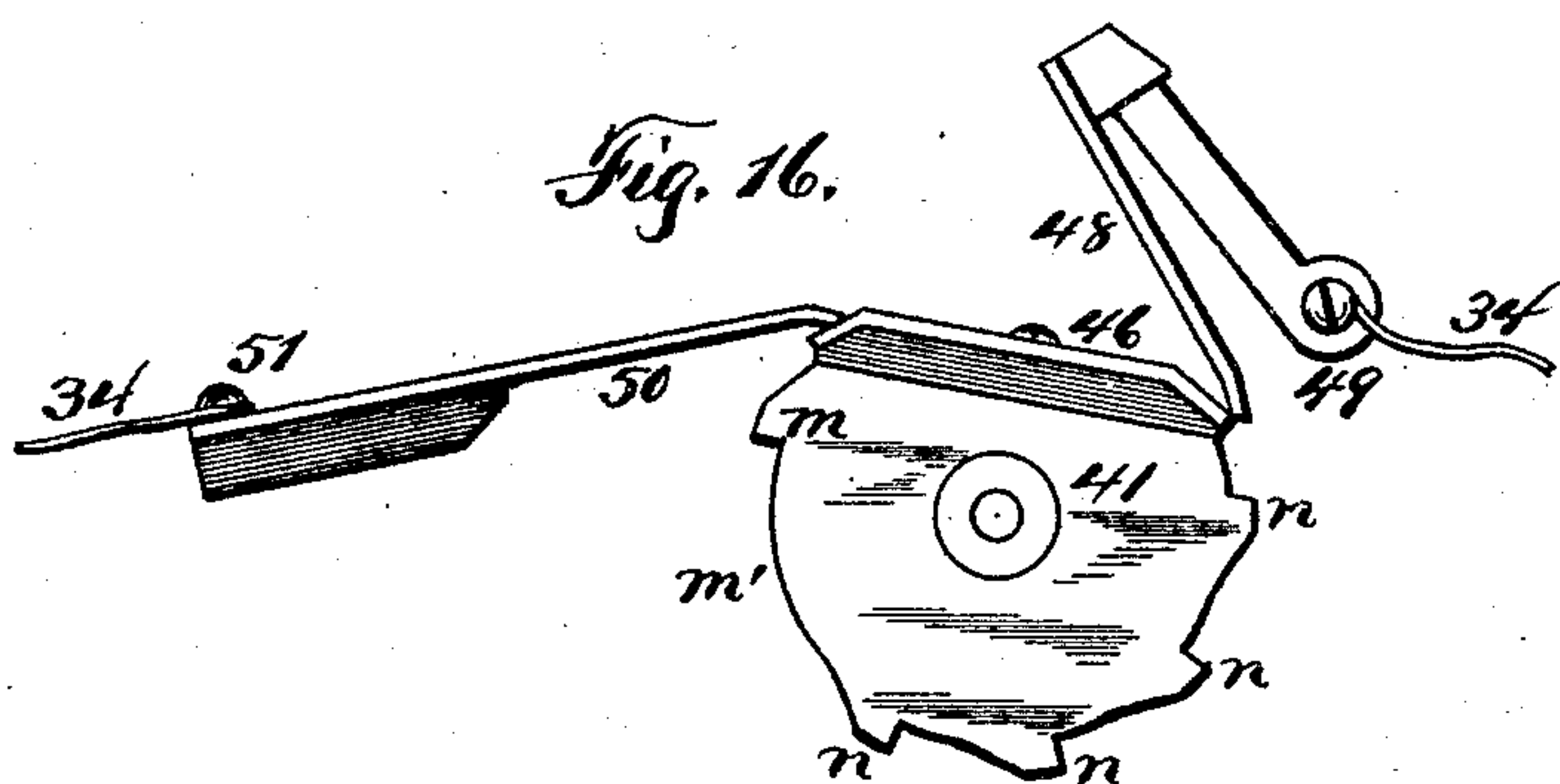
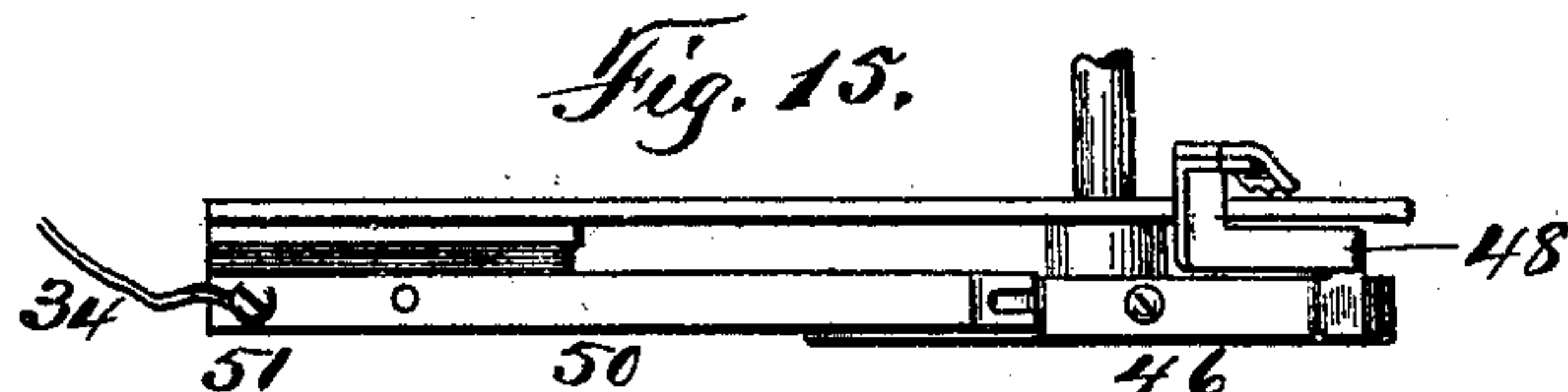
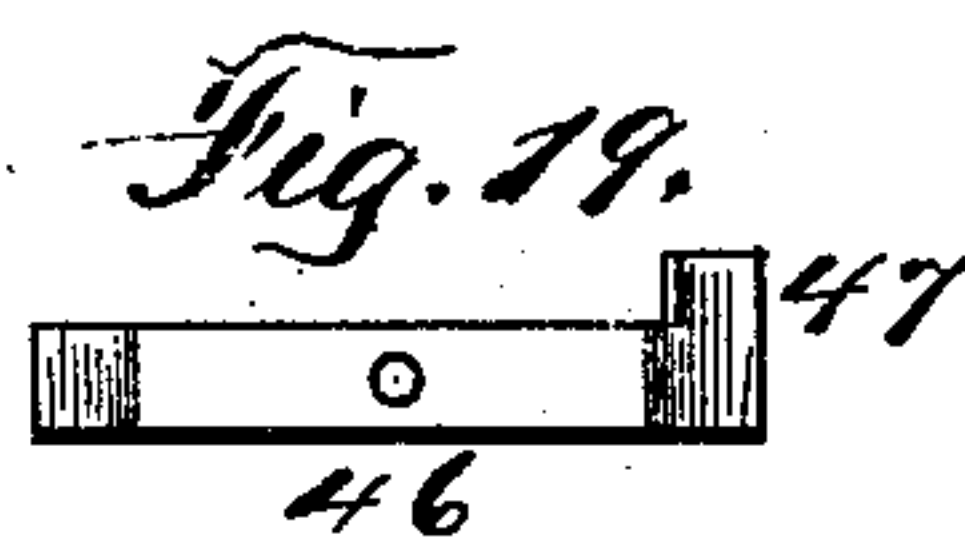
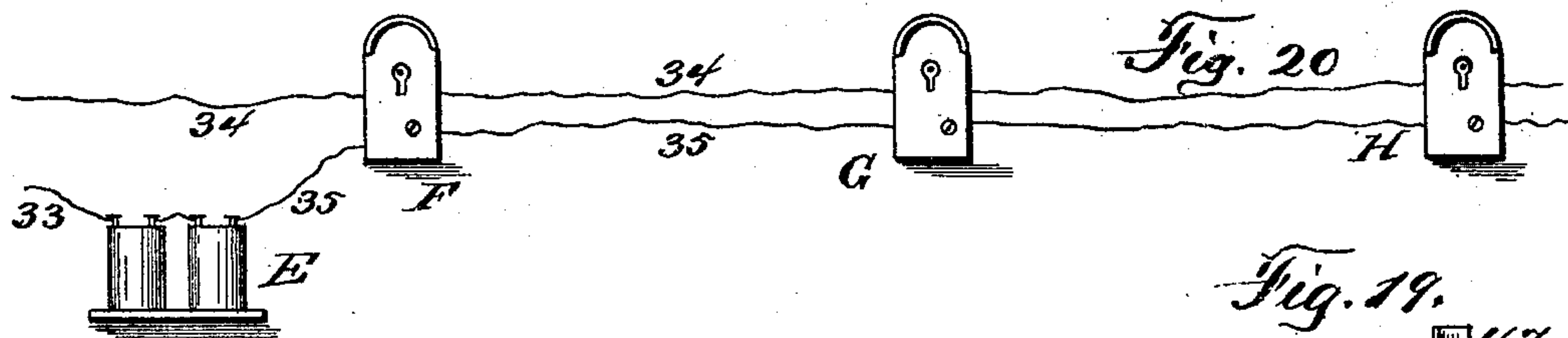


Fig. 18.

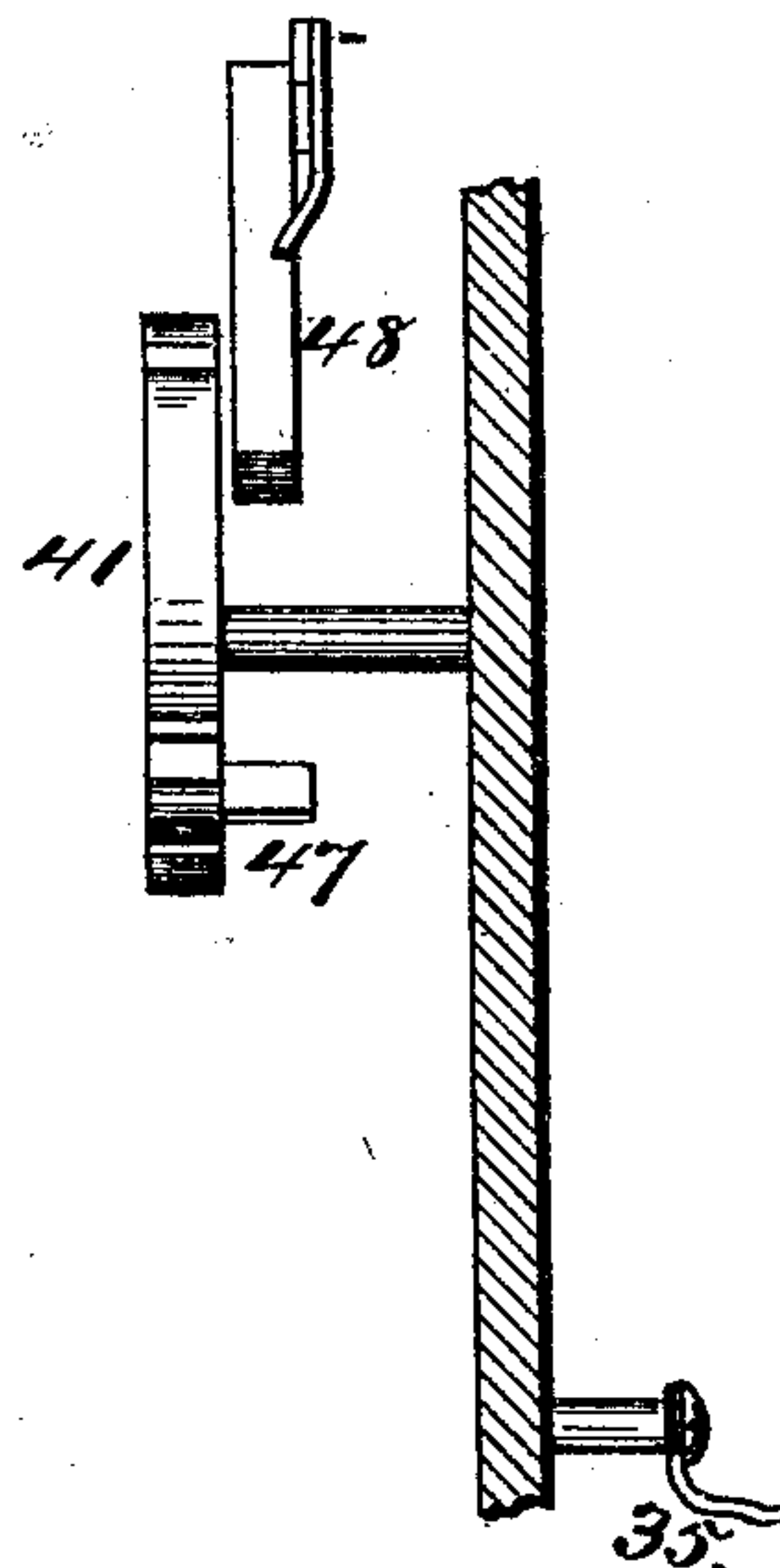


Fig. 17.

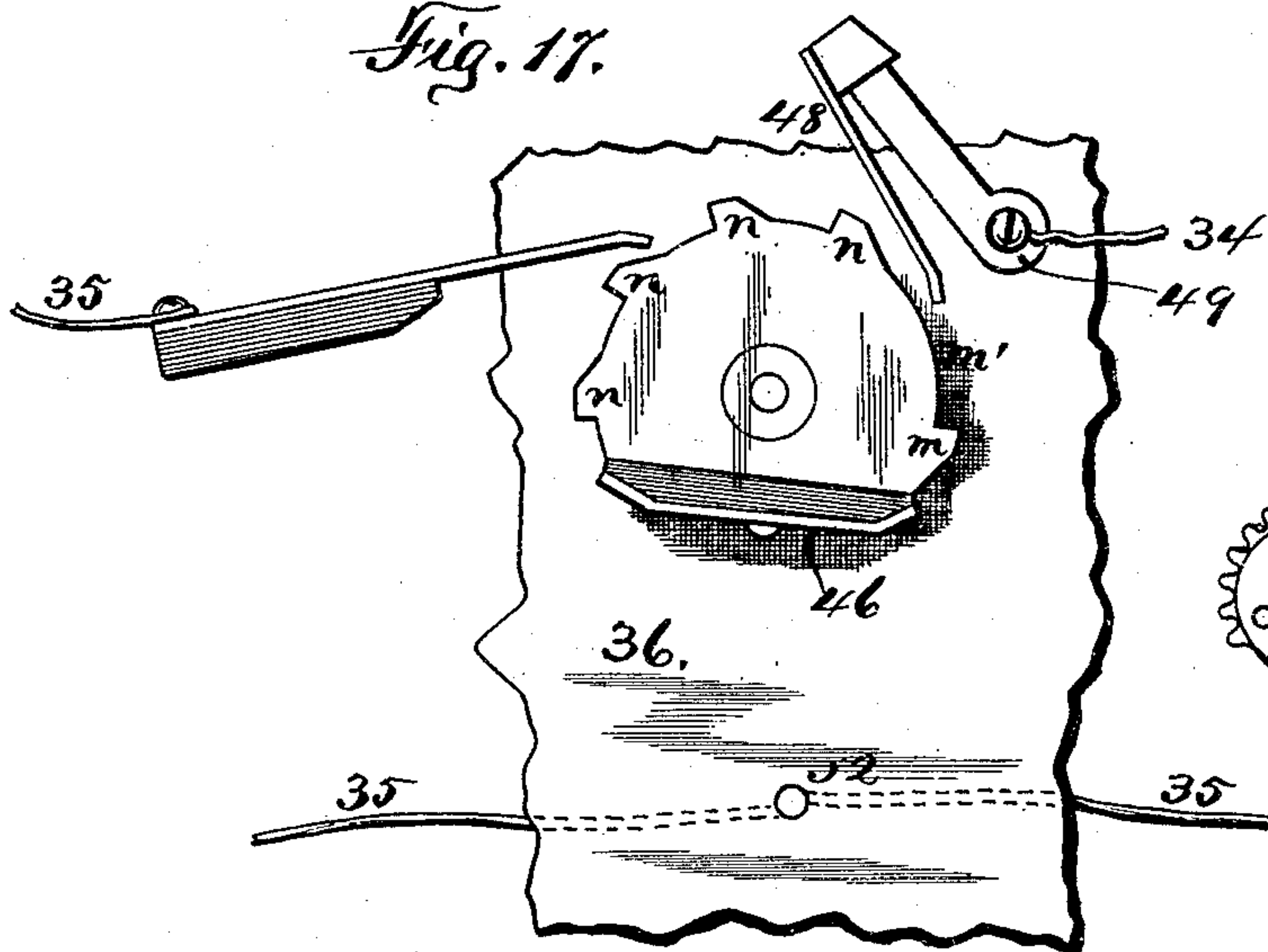
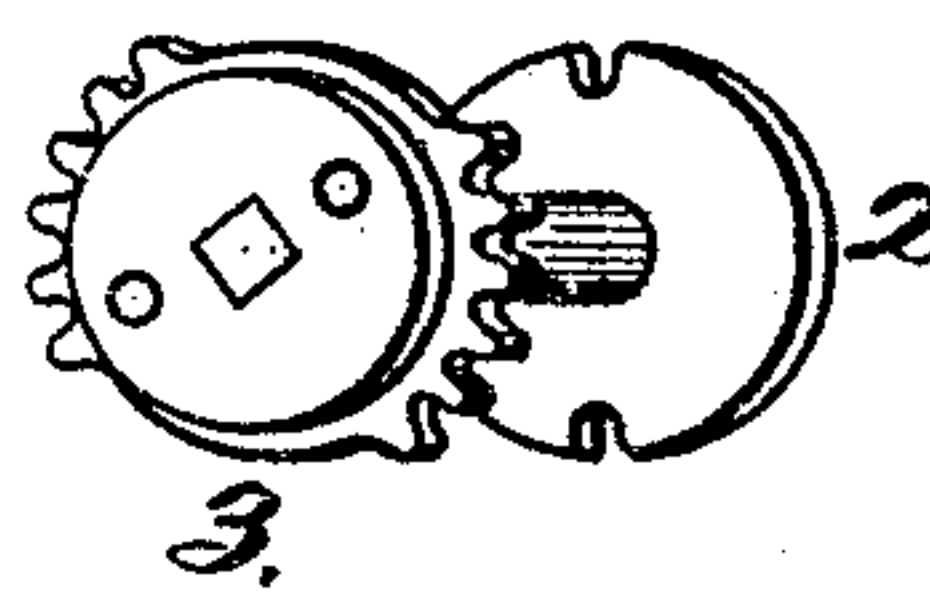


Fig. 21.



WITNESSES:

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Geo M. Blowers

Willard L. Bundy INVENTOR,

BY
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his ATTORNEY.

UNITED STATES PATENT OFFICE.

WILLARD L. BUNDY, OF BINGHAMTON, NEW YORK, ASSIGNOR TO THE
BUNDY MANUFACTURING COMPANY, OF SAME PLACE.

WATCHMAN'S TIME-RECORDER.

SPECIFICATION forming part of Letters Patent No. 488,687, dated December 27, 1892.

Application filed October 19, 1891. Serial No. 409,118. (No model.)

To all whom it may concern:

Be it known that I, WILLARD L. BUNDY, of Binghamton, in the county of Broome, in the State of New York, have invented new and useful Improvements in Watchmen's Time-Detectors, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description..

My invention relates to watchmen's time recorders, adapted to record the time of the watchman's visits to the different stations throughout a factory, and to that particular class in which all of the stations are located, in open circuit, upon two wires, and in which the record is made of the time when the circuit is broken at any station, such recording apparatus being located in the office of the firm, or at some fixed central point.

My object is in the first instance to avoid the multiplicity of wiring necessary where each station is separately wired to the central station, by locating all of the stations upon two wires in open circuit, which passes through all of the station boxes, and when such circuit is broken at any station by the operation of its key, the combined action of the station mechanism and its motor, and of the central recording mechanism, will record the number of the station, by signs, symbols or characters, and the hour and minute when the key was turned at the station, such record being made upon a continuous strip of paper, by means of an impression hammer and a printing ribbon, said paper and ribbon being automatically fed along through under the impression hammer: means being also provided in the station box to break the circuit and make it a fixed number of times, so that a record of the number of the station is made at the same time that the time is recorded; and in which each station while being operated, forms its own circuit with the battery and recording mechanism independent of the stations beyond it, such circuit being intermittent by reason of a rotating stepped cam, and a spring finger making a contact with the steps thereon, successively, and breaking it between said steps.

My invention consists in the several novel features of construction and operation hereinafter described and which are specifically

set forth in the claims hereunto annexed. It is constructed as follows, reference being had to the accompanying drawings, in which

Figure 1, is a front elevation of the recording apparatus, the battery and a single station. Fig. 2, is a plan perspective of the impression and paper feed mechanism. Fig. 3, is a detail of the mechanism for rotating the ribbon spool and feeding the ink ribbon. Fig. 4, is a sectional detail, partly in side elevation, of the paper feeding mechanism, in its normal position. Fig. 5, is a like view of the same, showing the feed bar drawn back, ready to engage with the paper to feed it forward. Fig. 6, is a plan of a part of the paper strip. Fig. 7, is a front elevation of the electro-magnet and the motor mechanism released intermittently by the operation of the armature, the face plate shown in Fig. 2, and the paper feed and hammer being removed. Fig. 8, is a detached plan elevation of the electro-magnet, armature, printing or impression bar connected to the armature and actuated thereby, and the trip mechanism for releasing the motor to operate the impression hammer, the operation of the armature, and to lock the motor after each impression. Fig. 9, is a detached detail for the mechanism for locking the trip bar while the motor is operating the impression hammer. Fig. 10, is a top plan view of the time wheels and station indicator bar—detached. Fig. 11, is a detail of the vibration take up between the connecting rod and the station indicating bar. Fig. 12, is a vertical sectional detail of the time wheels, impression hammer, impression pad, and vibratory marker, the dotted lines indicating its elevation, and also the horizontal dotted lines indicating the extent of the swing thereof. Fig. 13, is a front elevation of a station box, with the cover removed. Fig. 14, is a plan perspective of the motor drive gear, key shaft, motor spring and the swinging finger, and stop combined, secured upon the shaft, all in, the station box. Fig. 15, is a top plan of the rotating cam and the contact fingers in contact with the insulated contact plate upon the cam. Fig. 16, is a front elevation of the same parts shown in Fig. 15, showing these parts all in open circuit upon the wire, and ready to be operated by the motor to break the

circuit when the key is inserted and turned. Fig. 17, is a front elevation of the rotating cam, partially rotated, and the left hand spring contact finger out of contact, between two of the cam teeth upon the cam, as well as the other contact finger, and the negative wire at the bottom, through which a circuit is made every time the left hand finger makes a contact with one of the cam teeth. Fig. 18, is an elevation of Fig. 17, looking at it from the right, showing the finger on the right out of contact with the cam. Fig. 19, is a detached top plan view of the contact plate secured upon the rotating cam, showing its side projection. Fig. 20, is an elevation showing a battery and several stations upon a single circuit. Fig. 21, is a plan perspective of the segmental gear and the stop wheel upon the same shaft.

"A" is a clock, shown in the drawings as erected upon a suitable backing, and (a) are time wheels, having figures or type upon their peripheries corresponding to hours and minutes, said wheels being connected in any ordinary manner to the clock work, so that they are at all times synchronous with the time of the clock work. A bracket (b) in front and a like one in rear, (not shown) together carry the ribbon spool (b') between them. Vertical and parallel arms (c) (front and rear) carry a guide roller, under which the paper strip (d) passes from the reel (d'). An impression pad (e), the form of which is best seen in Fig. 12, is mounted and extends over the top of the ribbon and paper.

"B" is the impression hammer, comprising a hammer body, slotted across the bottom to receive a piece of rubber or other elastic substance (4), which constitutes the working face of the hammer, and this body is adjustably mounted upon the bar (5) which is pivotally mounted upon the outer casing of the motor "C," at (6).

"C" is the impression hammer motor, comprising a spring wheel, and a train of gearing actuated thereby, to operate an escapement (1) (Fig. 7) and to rotate a trip wheel (2), and also the lifting gear (3), provided with segmented gear teeth on two opposite sides, and with intermediate smooth spaces, as shown in Figs. 1, 2 and 7. A rack bar (7) concentric with the gear (3), and provided with the same number of teeth as each toothed segment of the gear, is secured to the hammer bar, so that when the motor rotates said gear over to the left, (Fig. 2) the hammer is lifted, until the segment and rack become disengaged, when the hammer falls by gravity, its face striking upon the paper strips (d) directly on the printing line of the time wheels, and makes an impression upon the under side of the paper strip, the ink ribbon (f) lying between the said strip and the time wheels. From the printing line the paper and ribbon pass through a guide (8) mounted upon the casing, and then the ribbon is deflected over a roller (10), (Fig. 2) down onto the spool (9), mounted

upon a shaft having its bearings in the spring bracket (11), and in the motor casing, said shaft being provided with a rack-gear (12), and (13) is a gravity pawl pivoted on said casing and engaging with said gear and preventing any backward rotation of the spool. The paper strip also passes along through a guide (14), supported upon the casing. A spring finger (15) is secured upon this guide, in such manner that its toothed free end engages with and prevents any backward movement of the paper.

To feed the paper strip forward, I secure an arm (16) to the hammer bar, and pivotally connect a connecting rod (17) to said arm, and to an arm upon a rocking multiple toothed dog (18), which dog is mounted on trunnions in the vertical sides of a slide (19). This slide is mounted upon guide rods (20) extending from the guide (14), and a bar, (not shown) extends across under the paper and forms the bottom of the slide the support of the paper, and the bearing against which the dog teeth bear. As the hammer bar raises, it lifts the arm (16), draws upon the connecting rod (17), first rocking the dog (18) and releasing the teeth from the paper, then drawing the slide (19) back toward and nearly to the end of the finger (15). Then when the hammer bar is released, and falls, the first effect as to this feed mechanism, is to rock the dog (18) over until it engages firmly with the paper and then to shove the slide away from the finger (15), drawing the paper along with it, and feeding it a distance equal to the throw of the feed dog, as for instance, as shown in Fig. 6, from one record to the next.

In Fig. 3 I show my ribbon feed mechanism, which is in addition to the paper feed mechanism. A spring push pawl (21) is secured to the slide (19), underneath, its point engaging with the rack gear (12), in such manner that when the slide is drawn back by the raising of the hammer bar, the pawl will rotate the spool a distance equal to the draw of said slide, and then as the hammer falls, the pawl will snap over the rack teeth into engagement with another tooth.

Referring to Figs. 7, 8 and 10, I now describe my station indicating mechanism. "D" is an electro-magnet, of which (22) is the armature pivotally mounted at (23), thence extending to the right, with an offset (24) (Fig. 10) and thence to the right again creating a support for the impression bar (25), which is pivotally connected to the armature at (26), and extends over far enough to bring the printing stud or type (27) into the printing line. Then as the hammer bar rises by means of the connecting rod (28) (Fig. 2) the bell crank (29) pivoted upon the stud (30), and the lever (31) pivotally connected to the bell crank and to the bar (5), said bar is swung outwardly upon the pivot (26), bringing the stud (27) over to the outer edge of the paper; and as the hammer bar falls, said bar is drawn

back to its normal position as shown in Fig. 10. This swings the impression bar so that it is capable of making imprints at different points, as shown in Fig. 6, as hereinafter described; and the spring (32) takes up all concussion incident to the swing, return or stopping. "E" is the battery; (33) the wire connecting it to the electro-magnet; (34) is the wire leading from the magnet through all of the stations, "F," "G," "H" &c. (Fig. 20); and (35) is the return wire leading back through all of them to the battery; the ends of the wires on the right in Fig. 20 being connected together, so that all of the stations are upon these two wires, and in open circuit normally.

As the station mechanisms are in the main, precisely alike, I will only describe one, pointing out the point of difference, which lies in a single variance of form of one part, such variation accomplishing a variance of operation whereby the number of each of the stations is indicated. Upon the casing (36) (of ordinary construction), I mount the station mechanism, consisting of a front and back plate, a key shaft (37), a spring (38) wound thereon, a drive gear (39) connected to the shaft by the spring pawl mechanism shown in Fig. 14, a train of clock work gearing whereby the escapement wheel (40) is rotated, and its pendulum actuated, and whereby the cam toothed gear (41) is rotated. A finger (42) is secured upon the key shaft, provided with a stud (43) with which the bit of the key engages, and with a horn (44) which is normally in engagement with the pin (45), upon the gear (41) thereby preventing said gear from rotation while in such engagement. Upon one side of this gear the contact plate (46) is secured and insulated from the remainder thereof, having also the sloping ends and a plane intermediate surface, as shown in Figs. 16 and 17, and further provided with a side arm (47), as shown in Fig. 18. Upon the front plate of the frame, I insulate and secure the contact finger (48), which is normally in contact with one end of the plate (46), through the binding screw (49) and wire (34). Opposite this I suitably insulate and secure upon the front plate of said frame, the spring contact finger (50), which is normally in contact with the other end of the plate (46) through the binding post (51), and the wire (34); so that these two fingers and said plate normally create a connection between the sections of the wire (34). The wire (35) is connected to the back of the box casing by a screw (52), but is not insulated therefrom, and as the gear (41) is not insulated, the main portion aside from the plate (46), can be brought into circuit with the wire (34), and this is done as follows: When the key is inserted and turned, the finger (42) is swung around until it strikes the stop pin (53), releasing the gear (41), which then rotates freely, and the spring also operates to throw

the finger back to its normal position. When the contact fingers (48) and (50), by the rotation of the gear (41) become disconnected from the plate (46) and the arm thereon the circuit of the two parts of the wire (34) is broken. Then as the spring contact finger (50) comes into engagement with the first cam tooth of said gear, a new circuit is made, during such engagement, through the body of said gear its arbor, the casing plate (36), binding screw (52) and that part of the wires (34) and (35) upon the left, (Fig. 13) see also Figs. 16 and 17. Each time that a circuit is thus made by the contact finger (50), the armature of the electro-magnet D is operated and this operates to throw up the impression bar and by bringing the type stud (27) into contact with the ribbon, and thus make an impression or imprint of the type character or sign, upon the under side of the paper strip. While the gear (41) is thus rotating and the armature (22) is being vibrated by the circuits made and broken by the contact finger, successively making and breaking contact with the cam teeth thereon and the push bar (28) is actuated as aforesaid to swing the impression bar (25) laterally upon its pivot (26), and inasmuch as said bar or the type-stud thereon is actuated vertically by the vibration of said armature, it follows that each time it is so vibrated said stud makes an imprint or mark upon the paper strip, and that the successive imprints upon the paper will be in a line across the paper, and that their number will be the same as the number of the cam teeth on said gear (41); and that their arrangement with reference to each other is wholly controlled by the arrangement of the cam teeth, or the manner in which they are grouped on either side of the space (m'), as will be seen by reference to Fig. 6. Thus in Fig. 16, the cam gear by the tooth (m), will make a dot as shown in Fig. 6, the space (m') will create a space (m'') on the paper strip (Fig. 6) and then the four successive teeth (n), being arranged equi-distant from each other, will consequently make four imprints upon the paper, and thus record upon the paper that station (14) was operated, and the imprint of the time wheels shows that it was done at five o'clock and seventeen minutes. By omitting all of the teeth (n), the single tooth (m) will record the operation of the station (1); by making the gear with two teeth (m), it will record the operation of station (2); one tooth (m) a space, and one tooth (n) will record station (11); two teeth (m) and two teeth (n), will record station (22) and so on. Inasmuch as the body of this cam gear is not insulated, and the wire (35) is not insulated from the back of the casing, it follows, that each time the finger (48) makes a contact with a cam tooth, a circuit is made through the cam gear, its shaft, the casing back, and the wire (35) on the left, and the wire (34) on that side through the battery and electro-magnet, entirely inde-

pendent of the extensions of the wires (34) and (35) on the right, which circuit is broken as the finger breaks contact with each cam tooth, and is finally broken when both of the fingers make contact with the contact plate upon the gear as in Fig. 16. As will be seen by Fig. 18, the finger (48) does not touch the gear while it is in rotation, and only makes contact with the arm thereon at any time.

By reference to Fig. 8 it will be seen that when the armature is first depressed, the standard and lip (54) thereon being normally in engagement with the arm and lip (55) upon the weighted and pivoted lever (56) will draw down the inner end of said lever, pulling the pin out of engagement with the notch in the stop wheel (2) upon the shaft, which carries the lifting gear (3) (Fig. 7) releasing said wheel to be rotated by the motor, and at the same time release the pendulum (57) of the escapement (1), from engagement with the lever, so that it can vibrate as indicated by the dotted lines, and at the same time the pawl (58) pivoted at (59), and provided with a weighted or counter-balancing arm, will swing in and catch the inner end of the lever and hold it out of engagement with the stop wheel (Fig. 9) until the hammer bar, rising, engages with the stud (60) upon the arm (61) of the pawl and forces said pawl and lever apart, when the weight (62) will raise the inner end of this lever, so that it will first stop the pendulum and escapement, and then the stop wheel, just at the time when the hammer has been raised clear of the paper, by the engagement of the first tooth of the gear segment brought around by such half rotation, with the rack bar on the hammer bar (5). It will be seen that the striker (63) is secured to the armature (22), and vibrates with each movement thereof so that it strikes the bell (64) and sounds an alarm each time that a circuit is made by the finger (50) upon any of the points of the stepped cam and said armature is thereby vibrated as aforesaid.

What I claim and desire to secure by Letters Patent is,

1. In a watchman's detector, a segmental gear rotated by a motor, a hammer mounted upon a bar, a rack bar upon said hammer bar, with which said gear engages, in combination with an arm secured to the bar, a slide, a toothed pawl pivotally mounted in said slide, and a connecting rod connecting said pawl to said arm.

2. In a watchman's detector, a segmental gear rotated by a motor, a hammer mounted upon a bar, a rack bar upon said hammer bar with which said gear engages, in combination with a swinging impression bar, a bell crank lever, a rod connecting it to said bar and a connecting rod between said helve and bell crank lever.

3. In a watchman's detector, a motor, a hammer bar raised thereby, a slide through which the paper strip passes, a toothed pawl

pivotally mounted in said slide, and an arm secured to said hammer bar, and a connecting rod between said arm and said pawl, and a push pawl secured to said slide, in combination with the ribbon spool, and the rack gear thereon, with which said push pawl engages.

4. The combination with the motor and the notched stop wheel, upon its shaft, of a lever pivotally mounted and adapted to engage with one notch of said wheel, and the armature of an electro-magnet connected to said lever.

5. The combination with the motor, the notched stop wheel upon its shaft, and the motor escapement pendulum, of a weighted lever pivotally mounted and adapted to engage with one notch of said wheel, and with which said pendulum normally engages, and the armature of an electro-magnet connected to said lever.

6. The combination with the motor, the notched stop wheel upon its shaft, and the motor escapement pendulum, of a weighted lever pivotally mounted and adapted to engage with a notch on said wheel, and with which said pendulum normally engages, the armature connected to said lever and the swing pawl engaging the end of said lever when released from said wheel.

7. The combination with the motor, the notched stop wheel upon its shaft, and the motor escapement pendulum, of a weighted lever pivotally mounted, and adapted to engage with a notch on said wheel, and with which said pendulum normally engages, the armature connected to said lever and the swing pawl engaging the end of said lever when released from said wheel, and the hammer helve adapted to engage with said swing pawl and disengage it from said lever.

8. In a watchman's detector, the combination of a weighted lever pivoted upon the casing, and adapted to engage with the stop wheel, the armature of an electro-magnet connected thereto and a swing pawl engaging with the end of said lever when disengaged from the stop wheel by the operation of the armature.

9. In a watchman's detector, a weighted lever pivoted upon the casing, a stop wheel with which it engages, a swinging pawl engaging with said lever when disengaged from said wheel, and an armature normally engaging with said lever, and operating to disengage it from said wheel, and an impression bar secured to said armature, and vibrated vertically by the vibration of the armature.

10. In a watchman's detector, a weighted lever pivoted upon the casing, a stop wheel with which it engages, a motor operating it, a swinging pawl engaging said lever when disengaged from said wheel, and an armature normally engaging said lever and operating to disengage it from said wheel, and an impression bar pivoted upon the armature and

swung vertically by the vibration of the armature.

11. In a watchman's detector, a battery, an electro magnet, an armature, and an impression bar pivoted upon the armature and laterally movable thereon and vibrated vertically by it, in combination with type wheels synchronous with a clock, the paper strip, the

ink ribbon, and the vertically operated impression hammer.

In witness whereof I have hereunto set my hand this 11th day of September, 1891.

WILLARD L. BUNDY.

In presence of—

HOWARD P. DENISON,
C. W. SMITH.