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F. M. ARCHER.

TOLL APPARATUS FOR METERS.

No. 582,713. Patented May 18, 1897.

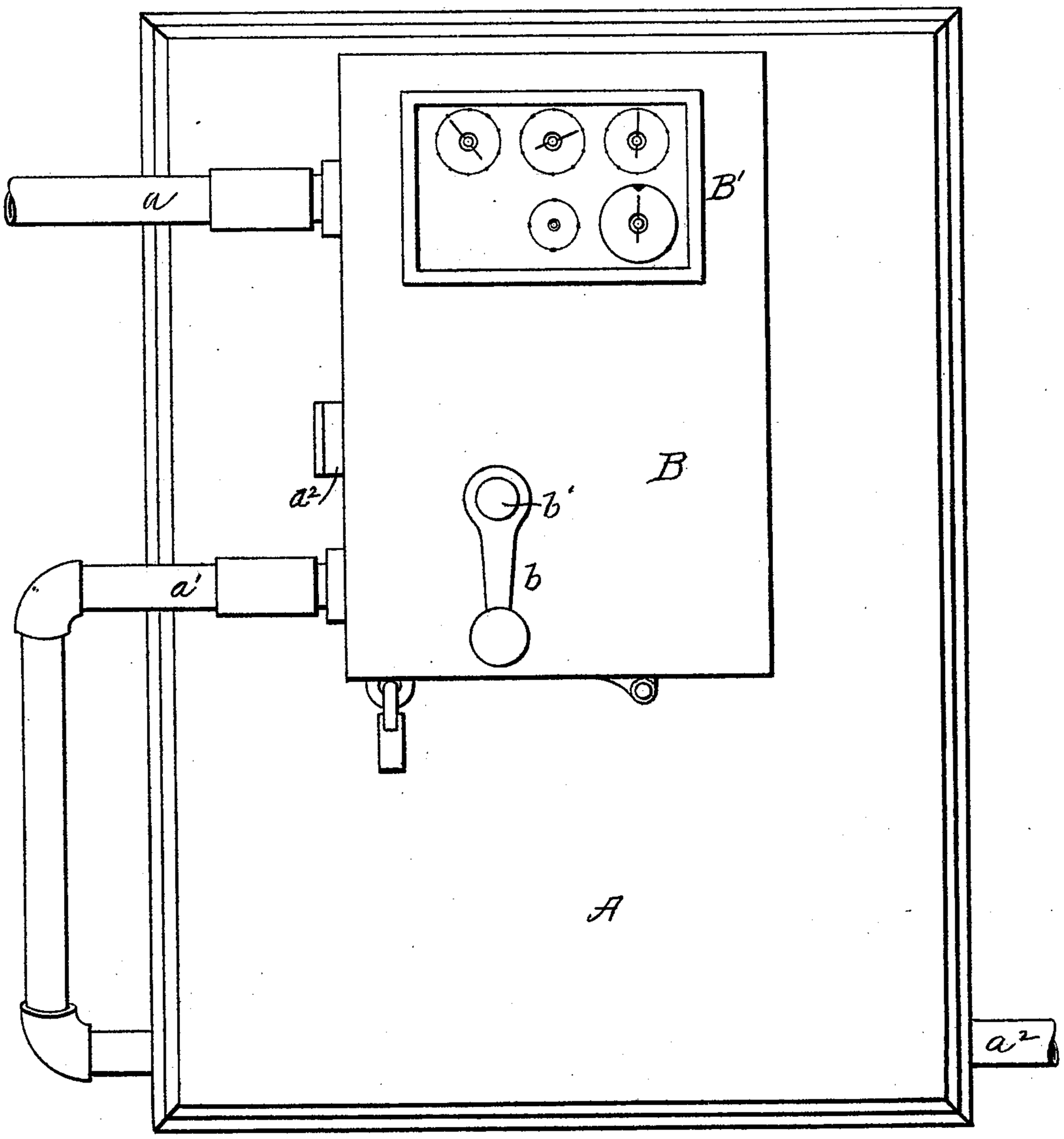

Fig. 1.

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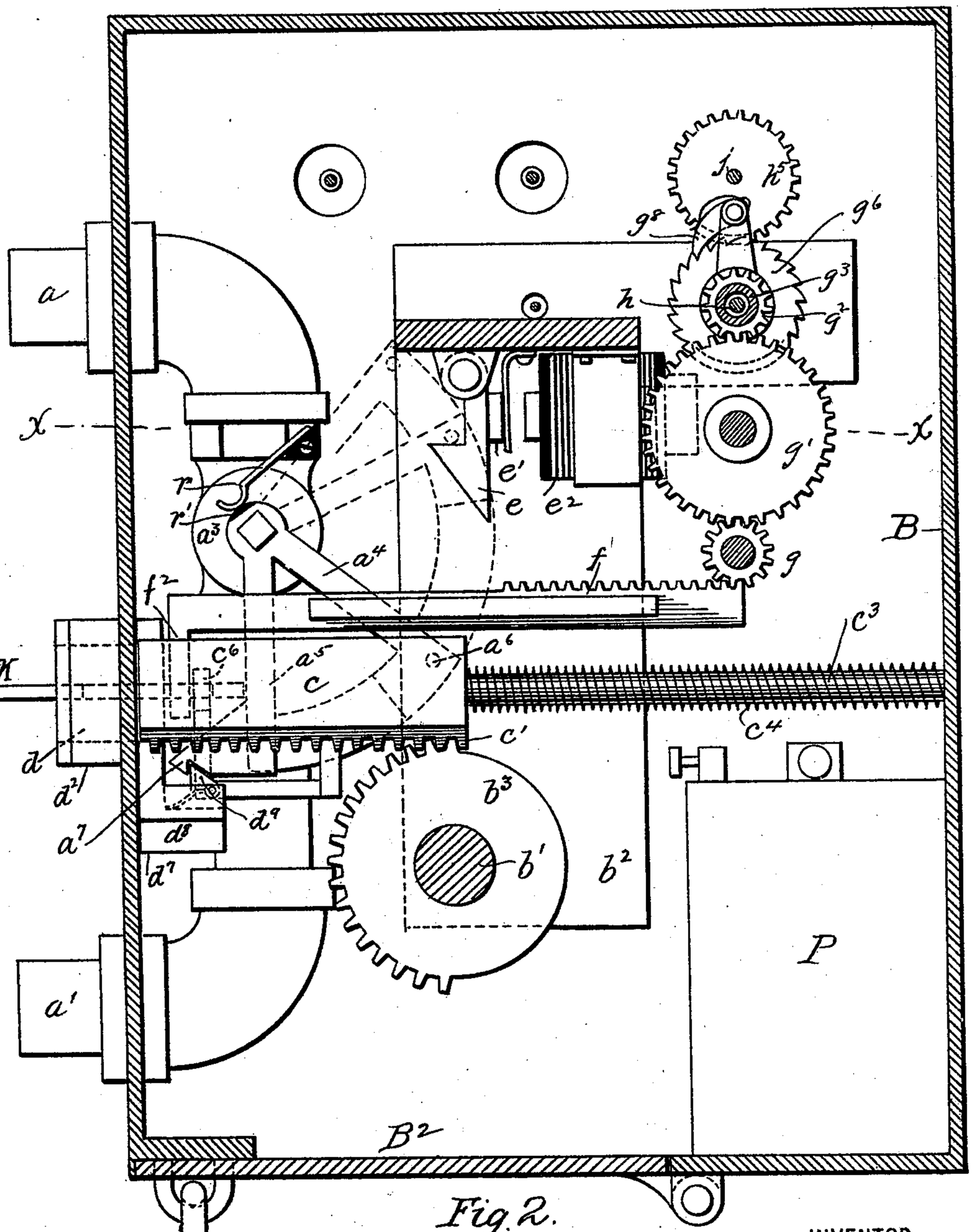

Fig. 2.

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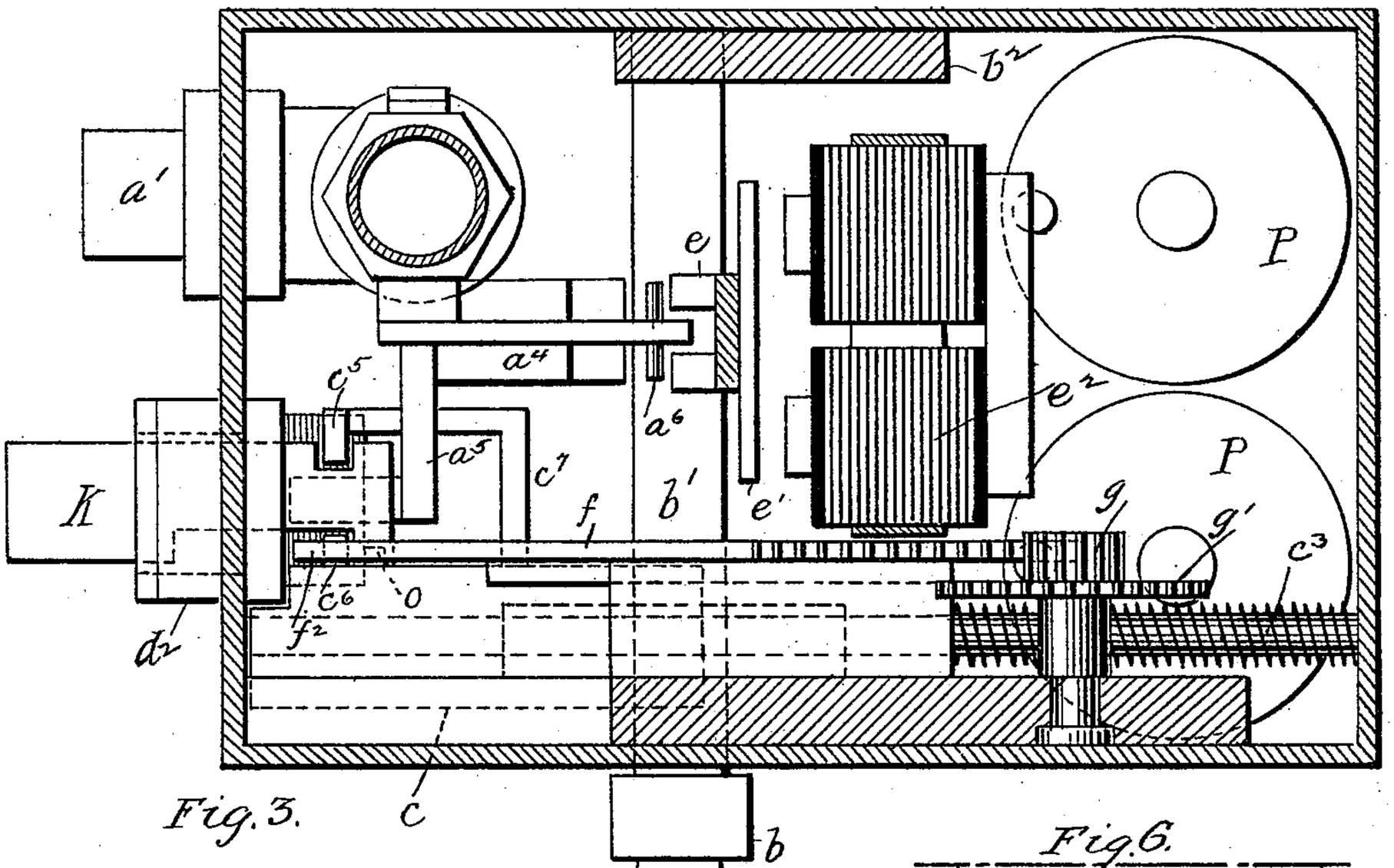

Fig. 3.

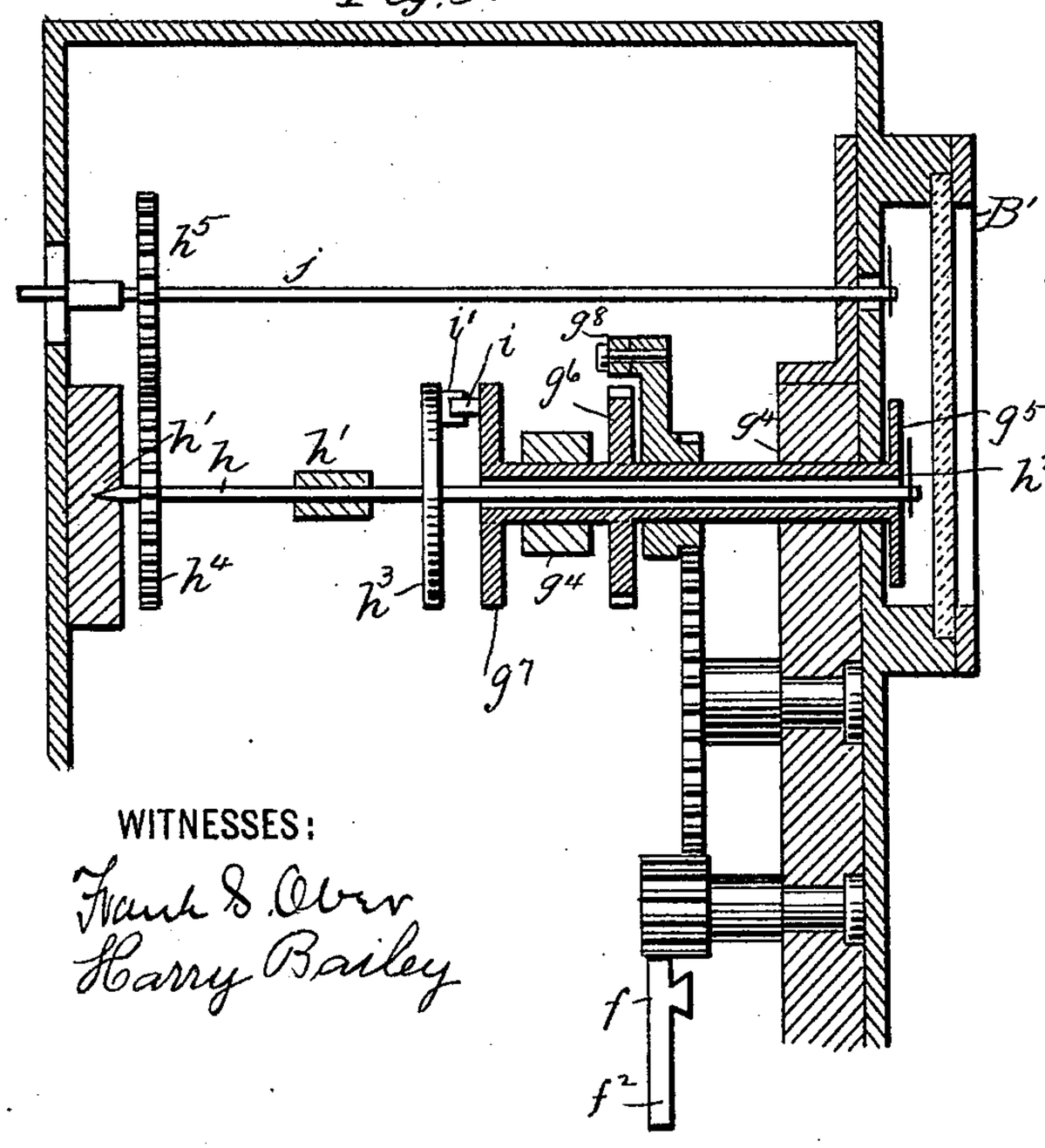

Fig. 5.

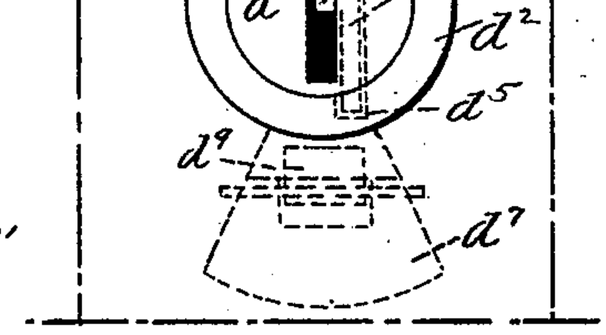

Fig. 6.

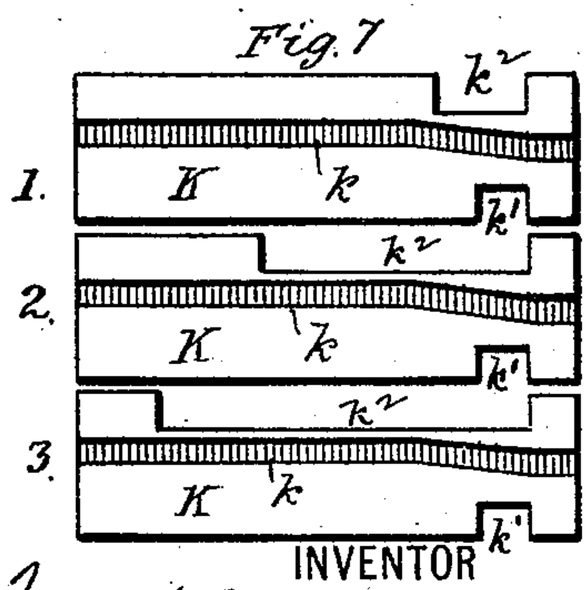

Fig. 7

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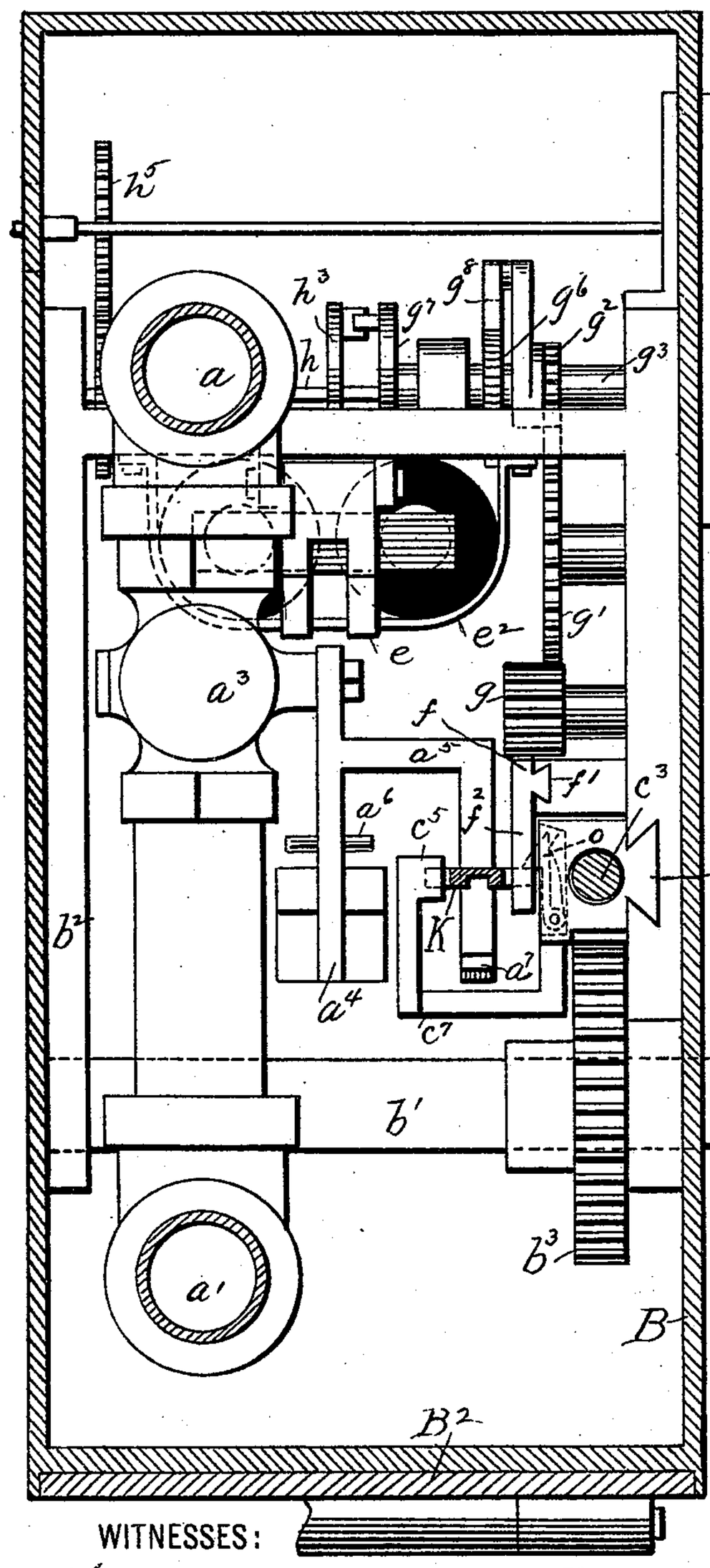

Fig. 4.

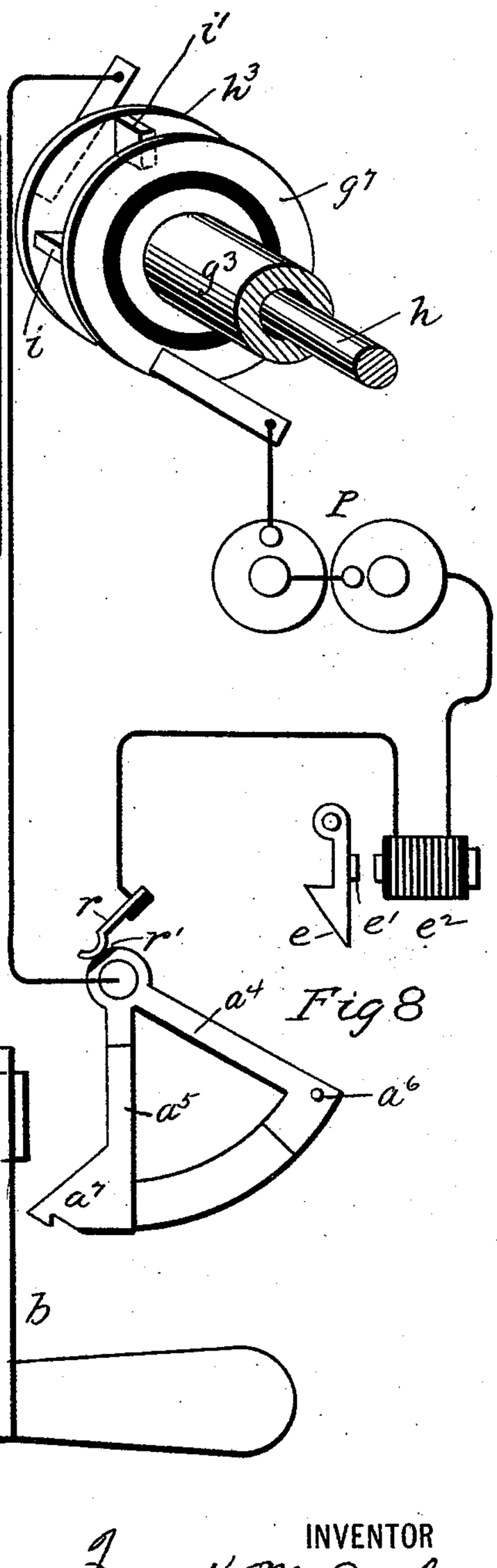

Fig 8

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UNITED STATES PATENT OFFICE.

FRANK M. ARCHER, OF NEW YORK, N. Y., ASSIGNOR TO SIEGFRIED SILBERBERG, OF SAME PLACE.

TOLL APPARATUS FOR METERS.

SPECIFICATION forming part of Letters Patent No. 582,713, dated May 18, 1897.

Application filed May 11, 1896. Renewed December 28, 1896. Serial No. 617,294. (No model.)

To all whom it may concern:

Be it known that I, FRANK M. ARCHER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Toll Apparatus for Meters, of which the following is a full, clear, and exact description.

This invention relates to toll apparatus for fluid-meters of that class in which it is necessary to insert or deposit a coin or other token in order to get a supply of the fluid commodity. It is desirable to operate such devices with a token other than a coin, for the temptation to dishonest persons to break into the receptacle is not then so great. The token, whatever it may be, will be worth a certain amount of money, but as it is not a legal tender the temptation to secure it by breaking into the apparatus is not great.

It has heretofore been proposed to operate gas-meters by means of a coin, the insertion of the coin permitting the quantity of gas to flow which the coin pays for. In all such devices known to me, however, the apparatus is constructed to operate by a coin of a single denomination—for instance, a silver twenty-five-cent piece. If more gas or water is desired than a single twenty-five-cent piece will pay for, it is necessary to insert a second or a third before it can be obtained. It is also found in practice that coins of the same denomination vary in size, due to wear or to the fact that they belong to different series. In accordance with my invention I propose to use for a token a metal plate of peculiar design, which may be regarded as a key, and to construct the apparatus to be operated by keys of several designs. In this way any quantity of the fluid may be obtained by inserting a key of corresponding design or value, the several keys representing different values.

The invention consists of the construction and combination of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of the meter, showing the casing containing my improved apparatus applied to the outside thereof. Fig. 2 is a side elevation of the apparatus constituting my invention, the cover-plate of the case being removed. Fig. 3 is a section on line $x\,x$ of Fig. 2. Fig. 4 is an end elevation of the apparatus with the end of the casing removed. Fig. 5 is a section through the counting mechanism in the upper part of the casing. Fig. 6 is a front view of the key-cylinder. Fig. 7 shows three different designs of key. Fig. 8 is a diagram of the circuits.

A represents what I will designate a "gas-meter."

B is the casing containing the apparatus constituting my invention, which is securely fastened to that wall of the gas-meter in which appears the dials indicating the amount of gas consumed.

a is the inlet-pipe, which, for the purpose of my invention, is passed first into the case B and through the same, then out by pipe a' and into the meter A, the exit to the consumer being by pipe a^2. The section of pipe that passes through the case B is provided with a valve a^3, by which the flow of gas may be permitted or cut off.

On the outside of case B is a crank-handle b on the end of the shaft b', extending transversely through the casing, mounted in a suitable frame b^2. Upon this shaft is a pinion b^3, engaging with a rack c' on the carriage c. This carriage is mounted upon a dovetail guide c^2, formed in the frame, and upon a rod c^3, mounted parallel to the guide. This carriage is adapted to reciprocate from one end of the guide to the other in the case, it being moved in one direction by means of the crank and pinion and returned by a spring c^4, surrounding the rod. The carriage is provided with two lugs c^5 and c^6, standing opposite each other, with a space between them, the lug c^5 being on the end of an angular bracket c^7, offset from the carriage. In the front end of the casing B is set a key-cylinder d, provided with a keyhole d'. This is adapted to rotate in a barrel or sleeve d^2, fixed in the end wall of the casing. A radial bolt d^3 is provided to lock the cylinder in the sleeve and prevent its rotating by entering the notch d^5 in the sleeve. The projection d^6 from this bolt extends into the key way or hole d'. The key-cylinder has attached to it inside the case a weight d^7, which tends to hold the keyhole in its normal vertical position, and this weight carries a bracket d^8, upon which is placed a spring-dog d^9.

The stem of the valve a^3 carries a weighted arm a^4, having an angular projection a^5, normally standing directly behind the space between the two lugs c^5 and c^6. The end of this angular extension bends forward and is provided with a hook a^7, which engages with the spring-dog d^9 and prevents the arm of the valve from moving. The arm is also provided with a pin a^6, and it is adapted to swing into the position shown in dotted lines in Fig. 2, where it is caught and held by a spring-hook e, to which is attached an armature e' for an electromagnet e^2.

f represents a reciprocating rack-bar mounted to slide parallel with the key-carriage c in a guide f'. The forward end of the rack has a downward projection f^2, which stands immediately in front of and in the same plane with the lug c^6 on the carriage. This rack engages with a pinion g, having the same number of teeth as the rack. The pinion in turn engages with an idler g', which engages with another pinion g^2, placed loosely upon a sleeve g^3. The sleeve is mounted in bearings g^4 g^4 and projects through the outer casing, where it is fitted with a disk g^5. It also carries a ratchet-wheel g^6 and another disk g^7 at its opposite end. The ratchet-wheel is located close to the pinion g^2, and the latter carries a pawl g^8, that engages with the ratchet.

h represents a shaft having bearings at h' and passing loosely through the sleeve g^3. The outer end of this shaft carries an index h^2, and adjacent to the disk g^7 it carries a disk h^3. These two disks carry each a contact-lug i and i', which when together close an electric circuit, as will be hereinafter described. Upon the shaft h is also a gear-wheel h^4, meshing with a wheel h^5, of similar size, on a shaft j. The shaft j is an extension from one of the registering-shafts of the meter—say, for instance, the shaft which in rotating once indicates a thousand feet of gas. All of the shafts of the registering device will be extended to indicate on dials in frame B′ on the outside of frame B, in which is also located the disk g^5 and the index h^2.

The token for operating this mechanism is in the form of a key. (Shown in Fig. 7.) It consists of a metal plate K, having a cam-groove k extending throughout its length and provided near its forward end with two notches k' and k^2. The former of these is always of the same size and fits the lug c^5, carried by the carriage. The other notch varies in length in accordance with the value of the key or the quantity of gas it is capable of permitting to flow. In the cavity in the side of the carriage immediately back of the lug c^6 is a spring-hook o, the function of which will be referred to in the description of the operation which follows.

Let us assume the price of gas to be one dollar per thousand feet and that a consumer may procure at his pleasure keys K, that cost either one dollar, fifty cents, or twenty-five cents apiece. Such keys will entitle him to one thousand, five hundred, and two hundred and fifty feet of gas, respectively. If he wishes a dollar's worth of gas, he will use key No. 1 in the group, Fig. 7. He passes the key into the keyhole d', and as it moves in cam-groove k' engages with the bolt d^3 and unlocks the key-cylinder. The key is forced inward until it passes between lugs c^5 and c^6 and is stopped by the angular projection a^5 on the valve-handle. He then rotates the key a quarter-turn, thus bringing its notches k' and k^2 into engagement with the lugs c^5 and c^6 and the notch k^2 also into engagement with the projection f^2 on the rack f. When the key reaches its horizontal position, it springs under the hook o and cannot be rotated in the reverse direction by the weight on the cylinder. In thus rotating the cylinder the spring-dog d^9 is carried out of engagement with the hook on the end of the angular extension of the valve-handle and releases the latter. The customer then rotates the crank b and moves the carriage c as far as possible. By reason of the engagement between the key and the lugs on the carriage and between the key and the rack f both the key and the rack move with the carriage, the key being drawn into the casing out of the reach of the customer and the rack rotating pinion g. The end of the key is also abutting against the angular projection a^5 on the valve-stem, and in consequence the valve-stem is swung upward until its pin a^6 catches over the hook e. This opens the valve in the pipe and permits the gas to flow. Now inasmuch as the notch k^2 in the key just fits over the two lugs c^6 and f^2 the rack f commences to move as soon as the key and valve do, and thus makes a full stroke, rotating pinions g and g^2 a full rotation. A full rotation is consequently given to the ratchet-wheel g^6 and the sleeve g^3, and the contact-lug i is carried from its position in front of the lug i' around to a position immediately back of it. When the handle b is released, the spring c^4 carries the carriage c and the rack f back to their normal positions. Manipulation of the crank will now accomplish nothing, as the valve-arm is in its raised position and the apparatus cannot be interfered with.

As the gas is consumed it is registered foot by foot by the shaft j. The motion of this shaft is communicated uniformly to the shaft h, and as soon as the contact-lug i on the disk h^3 has made a complete rotation and connected with the lug i' on disk g^7 an electric circuit, including battery P and magnet e^2, will be closed, as shown in Fig. 8, and the hook e will be drawn away from the pin on the valve-arm and the latter will fall by its own weight to its normal position. In falling the valve-arm opens the circuit again at r r', in which condition it remains until the arm is again lifted. The consumer by observing the disk g^5 and the index h^2 may note the consumption of the thousand feet of gas

he has paid for and be prepared to insert another key as soon as the valve closes.

A fifty-cent key is formed with a notch such that after the extension f^2 on the rack has been struck by the end of the notch the rack will commence to move and turn the sleeve g^3 a half-rotation, at which time the key will fall into the receptacle and the valve-arm will have been carried up into engagement with the hook *e*. Likewise a twenty-five cent key will not commence to operate upon the rack *f* until the key has only one-third of its length remaining in the key-cylinder, which length will suffice only to move the rack and rotate the sleeve g^3 a quarter-turn, and the consumer will obtain only two hundred and fifty feet of gas. The keys fall upon the bottom of case B, which is provided with a locked door B^2 for removing them.

Having thus described my invention, I claim—

1. In a toll apparatus for meters, the combination of a shaft adapted to register the consumption of material flowing, a contact-point carried by said shaft, a second contact-point whose position may be set with respect to that of the first, and means whereby a key or token may be used to fix the relative positions of the two contact-points, substantially as described.

2. In a toll apparatus for meters, the combination of a shaft adapted to register the consumption of material flowing, a contact-point carried by said shaft, a second contact-point capable of being set at various positions with respect to that of the first, and means whereby a series of tokens designed with reference to certain values respectively, are adapted, when used, to respectively fix the relative positions of the two contacts, substantially as described.

3. In a toll apparatus for meters, the combination of a shaft adapted to register the consumption of material flowing, a contact-point carried by said shaft, a second contact-point whose position may be set with respect to that of the first, and means whereby a token designed with reference to a certain value is adapted, when used, to fix the relative positions of the two contact-points, a valve and an electromagnetic apparatus in the circuit controlled by said contact-points, for controlling said valve, substantially as described.

4. In a toll apparatus for meters, the combination of a shaft adapted to register the consumption of material flowing, a contact-point carried by said shaft, a second contact-point capable of being set at various positions with respect to that of the first, means whereby a series of tokens designed with reference to certain values respectively, are adapted, when used, to respectively fix the relative positions of the two contacts, a valve and an electromagnetic apparatus in a circuit controlled by said contact-points, for controlling said valve, substantially as described.

5. In a toll apparatus for meters, the combination of a valve and valve handle or arm, a latch for retaining the same in its open position, a registering device, means whereby the movement of the registering device will release the latch and permit the valve to close, a setting mechanism for determining when the registering device shall so act and means whereby a key or token may act simultaneously to open the valve and to set the setting mechanism, for the purpose set forth.

6. In a toll apparatus for meters, the combination of a valve and valve handle or arm, a latch for retaining the same in its open position, a registering device, means whereby the movement of the registering device will release the latch, a setting mechanism for determining when the registering device shall so act and means whereby a key or token may act simultaneously to open the valve and set the setting mechanism and a manually-operated shaft through which the key or token is moved to so act upon the valve and setting mechanism, substantially as described.

7. In a toll apparatus for meters, the combination of a key-carriage, a valve-handle standing in the path of movement of the key, a setting mechanism for determining when the valve shall be closed, and means whereby a series of keys of varying design may each move the valve-handle a full stroke while at the same time moving the setting mechanism a portion of a stroke depending upon the design of the key.

8. In a toll apparatus for meters, the combination of a registering-shaft carrying an electrical contact, a second shaft, carrying a corresponding contact, gearing for rotating the second shaft to set its contact in a certain position with respect to the other, and means whereby a key or token may be manually operated to engage with and move said gearing, substantially as described.

9. In a toll apparatus for meters, the combination of a registering-shaft carrying an electrical contact, a second shaft carrying a corresponding contact, gearing for rotating the second shaft to set its contact in a certain position with respect to the other, and means whereby a key or token may be manually operated to engage with and move said gearing, an electric circuit of which said contacts are the terminals, a magnet in said circuit and a cut-off valve controlled by said magnet substantially as described.

10. In a toll apparatus for meters the combination of a carriage for a key or token, a rack-bar adapted to engage with said key or token and means whereby the key or token is moved coextensively with the carriage, but differentially with respect to the rack-bar, in accordance with the characteristic of the key or token.

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

FRANK M. ARCHER.

Witnesses:
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HARRY BAILEY.