

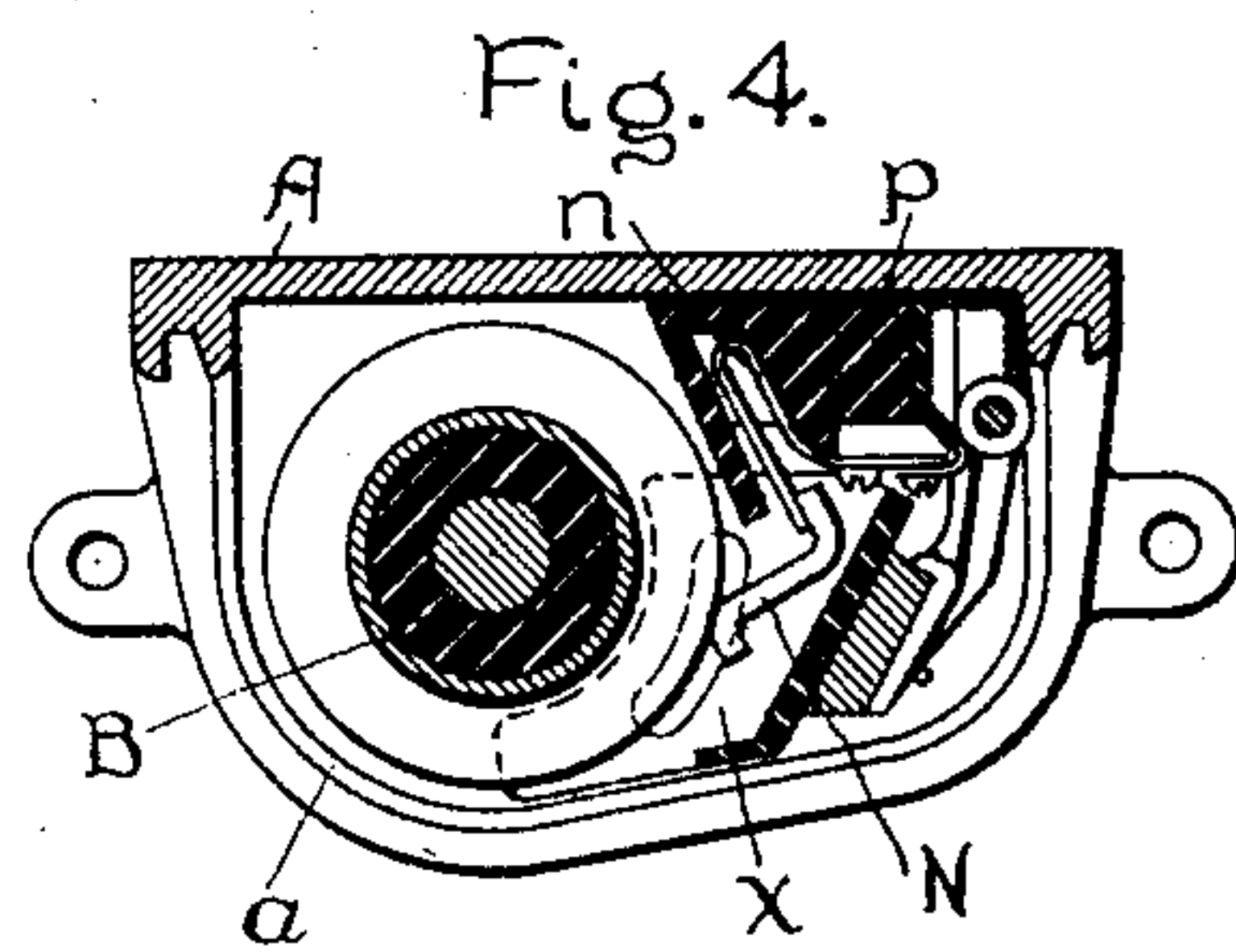
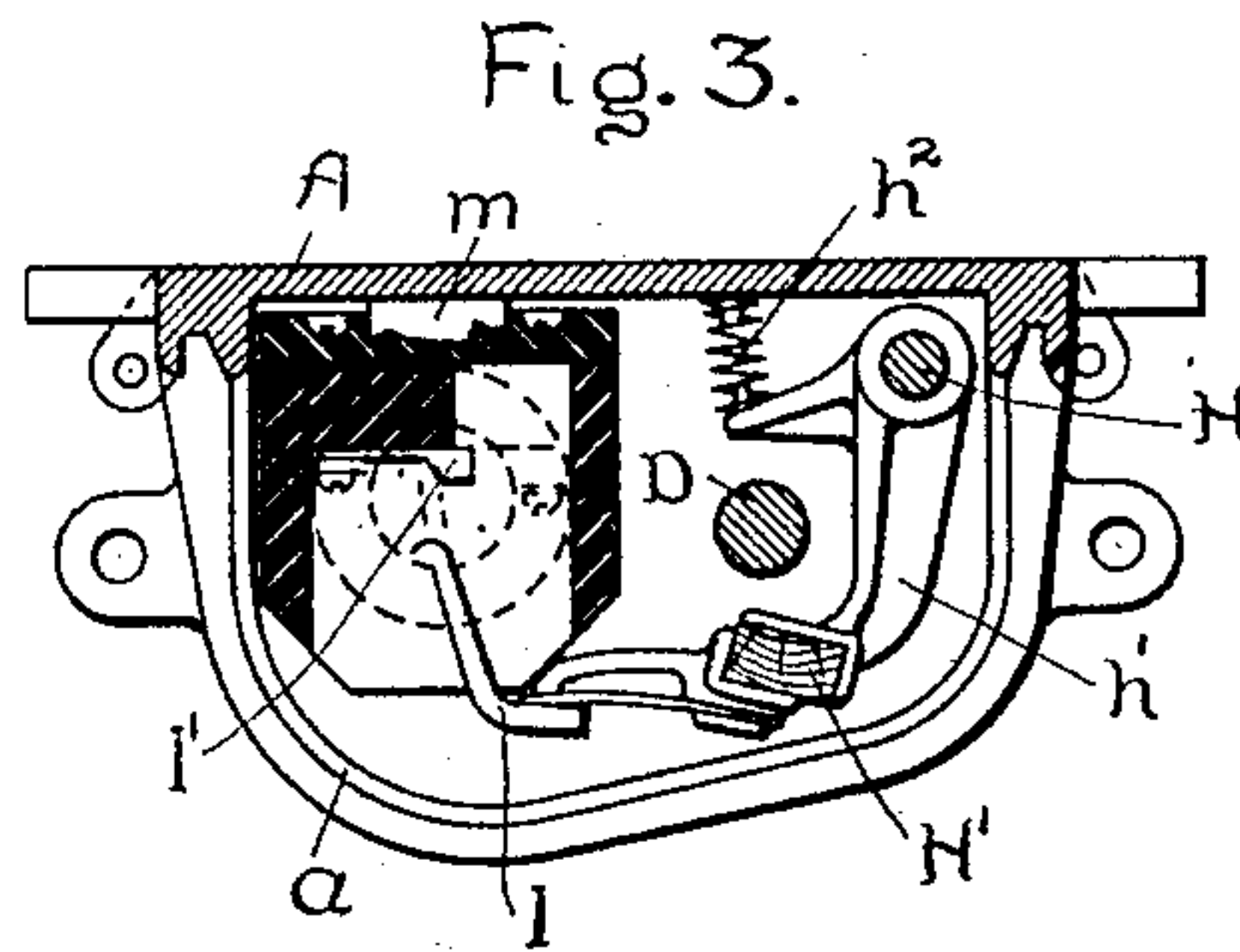
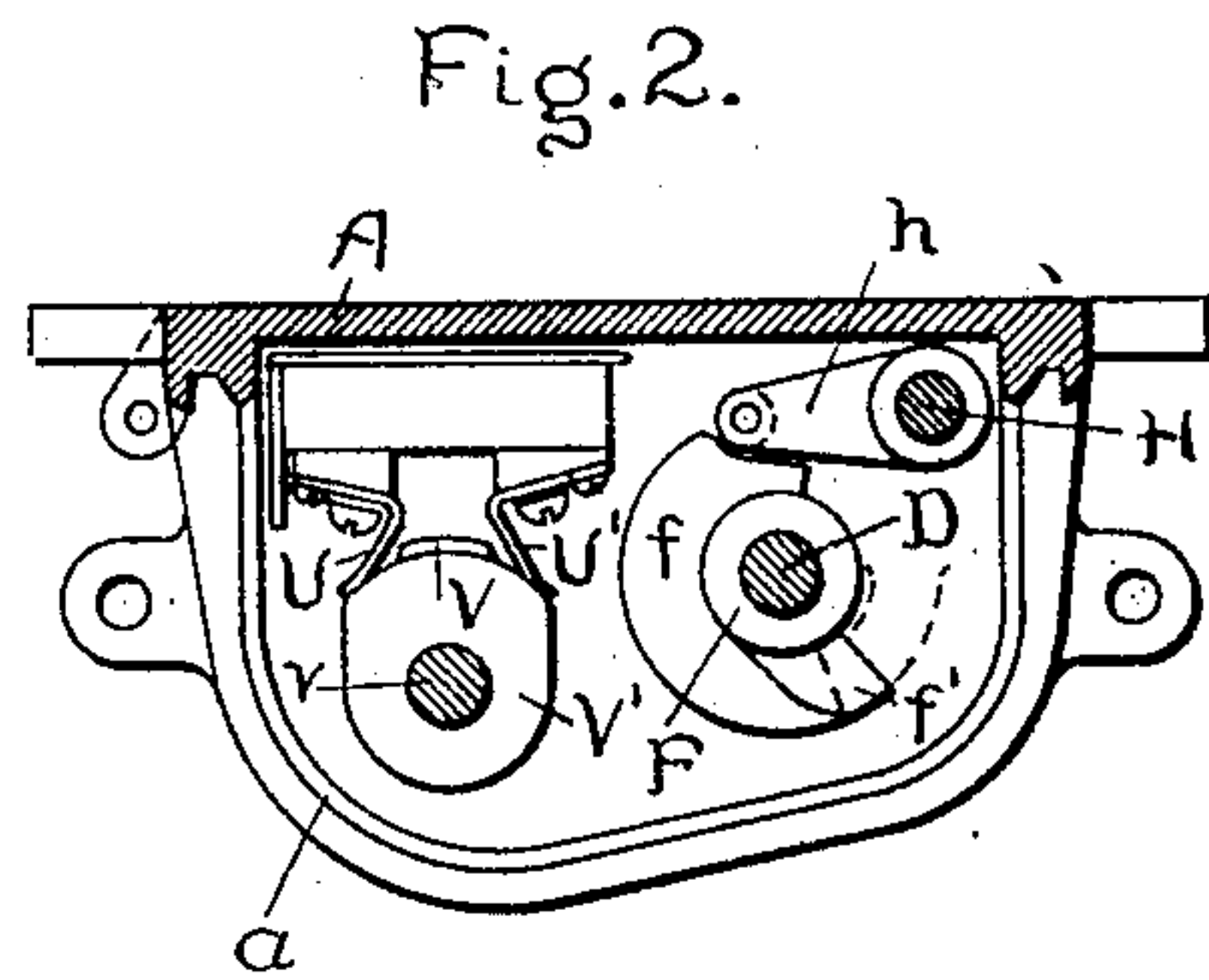
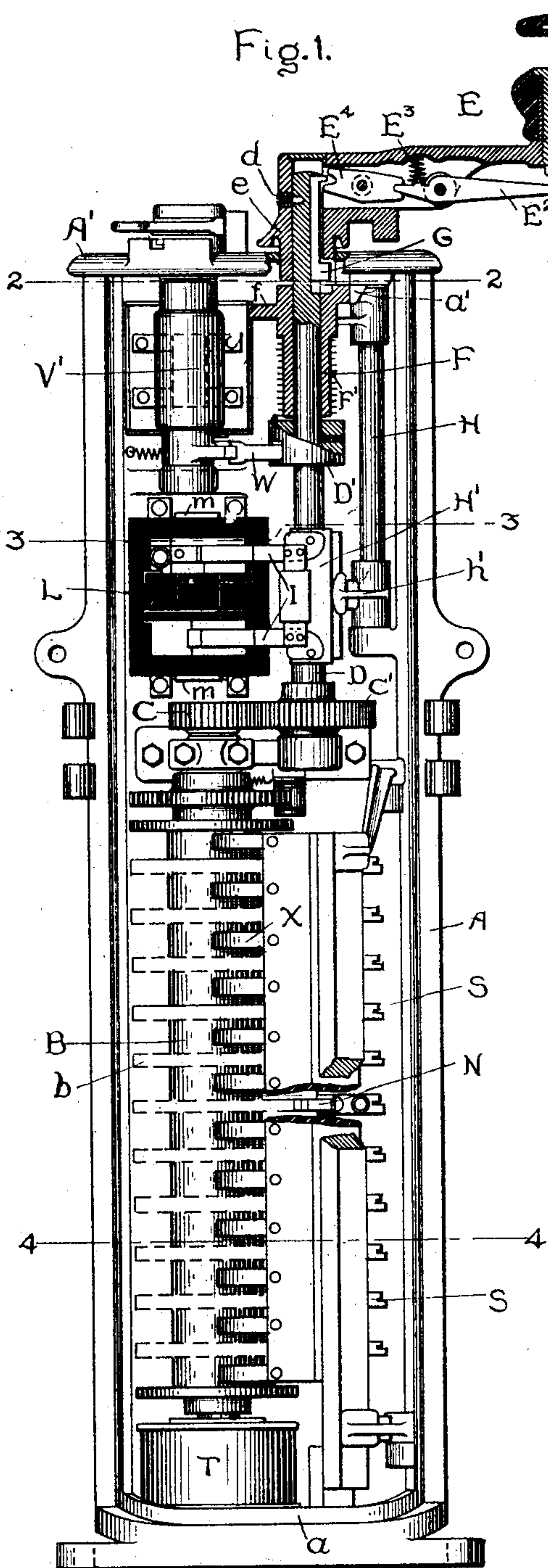
No. 750,947.

PATENTED FEB. 2, 1904.

F. E. CASE.
ELECTRIC CONTROLLER.
APPLICATION FILED SEPT. 16, 1901.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses.

Erving R. Gurney.
Marcel H. Emulsion

Inventor:
Frank E. Case.

by *Albert G. Davis*
Atty.

No. 750,947.

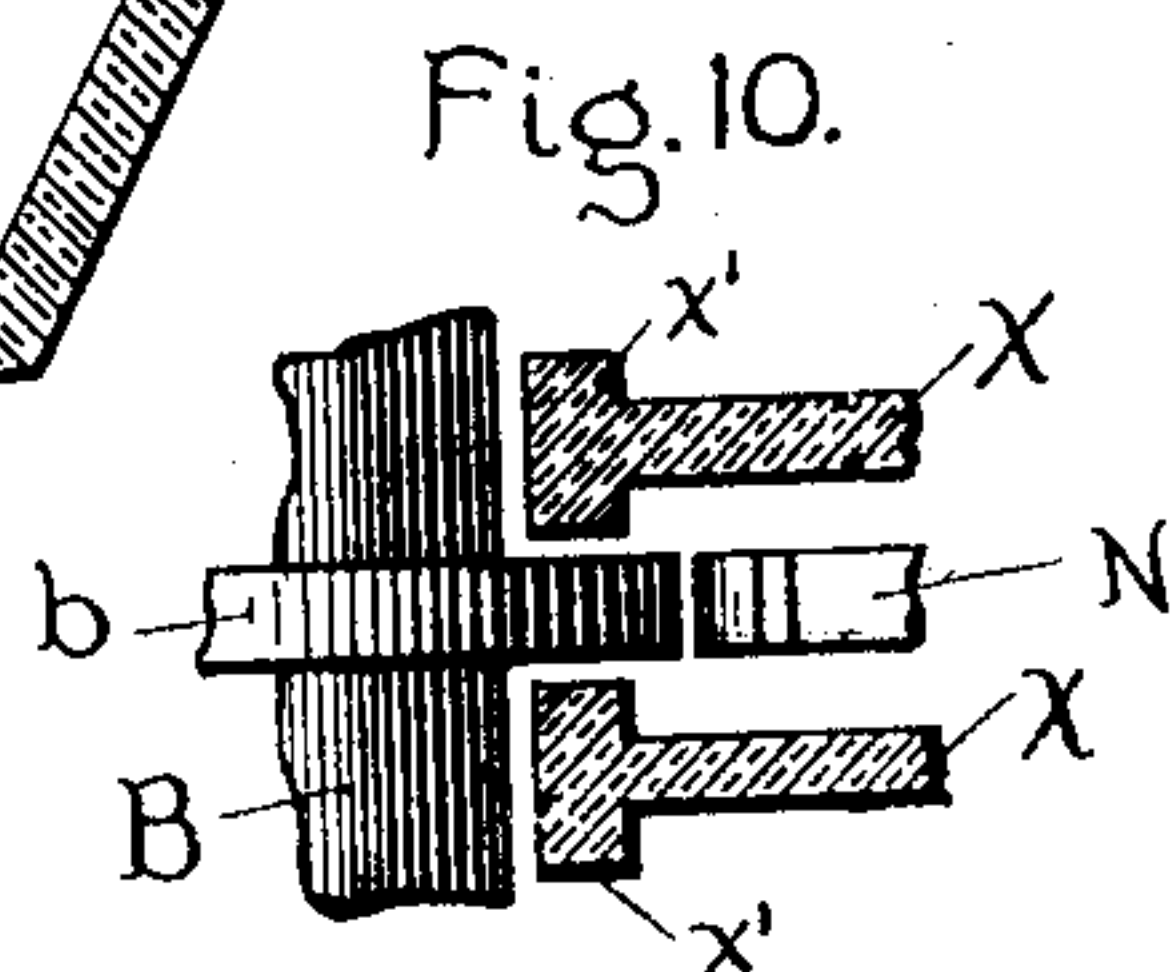
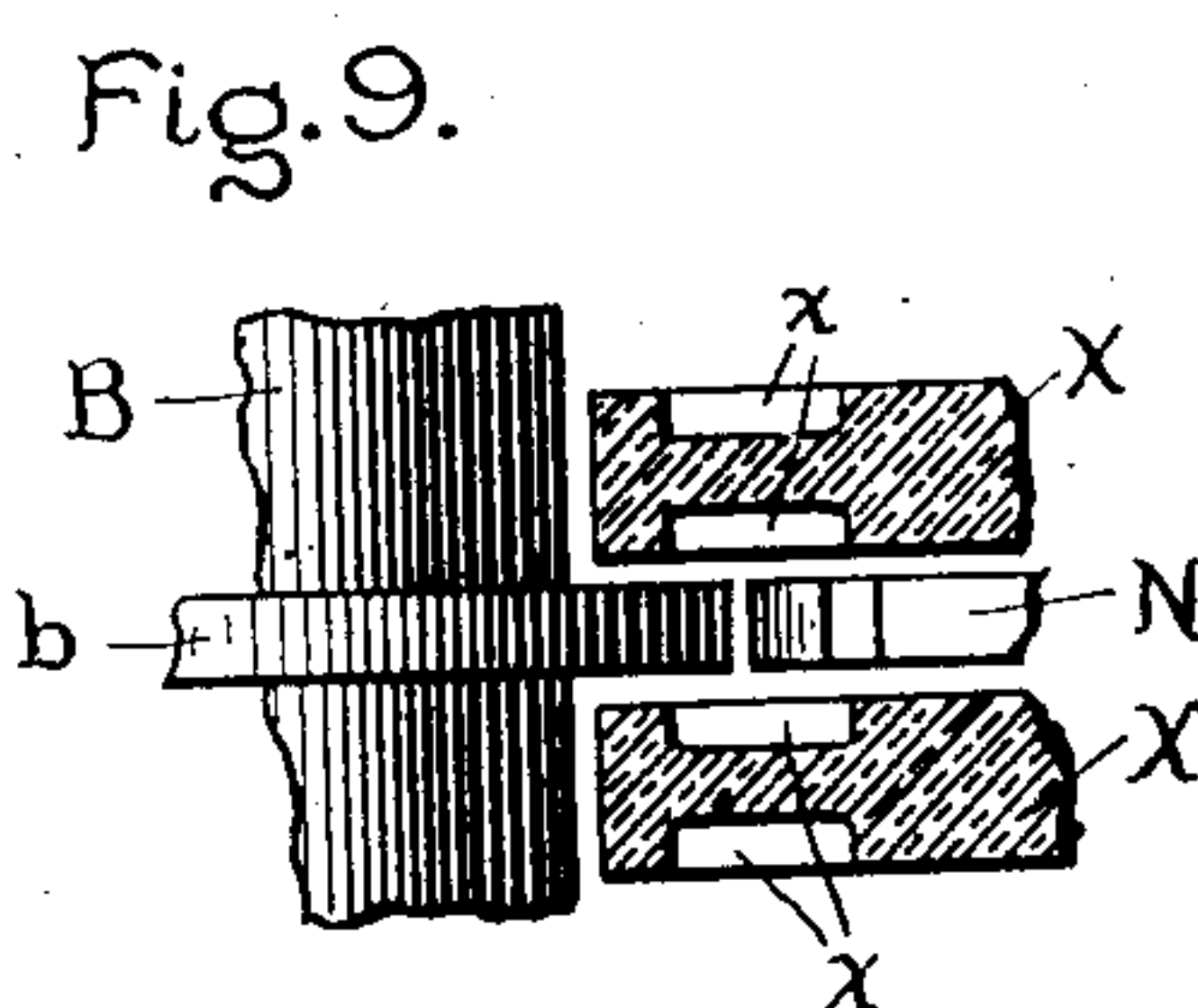
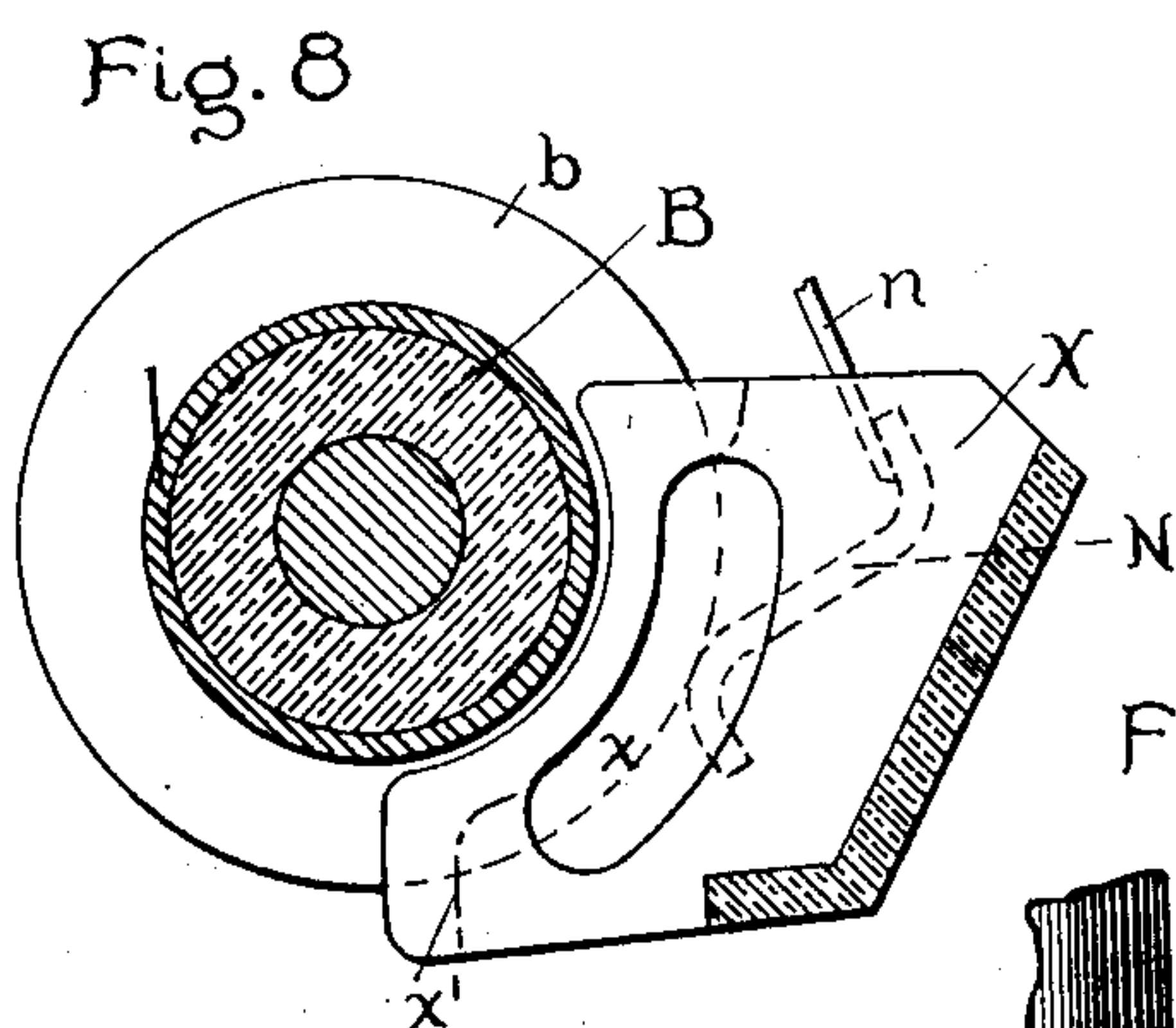
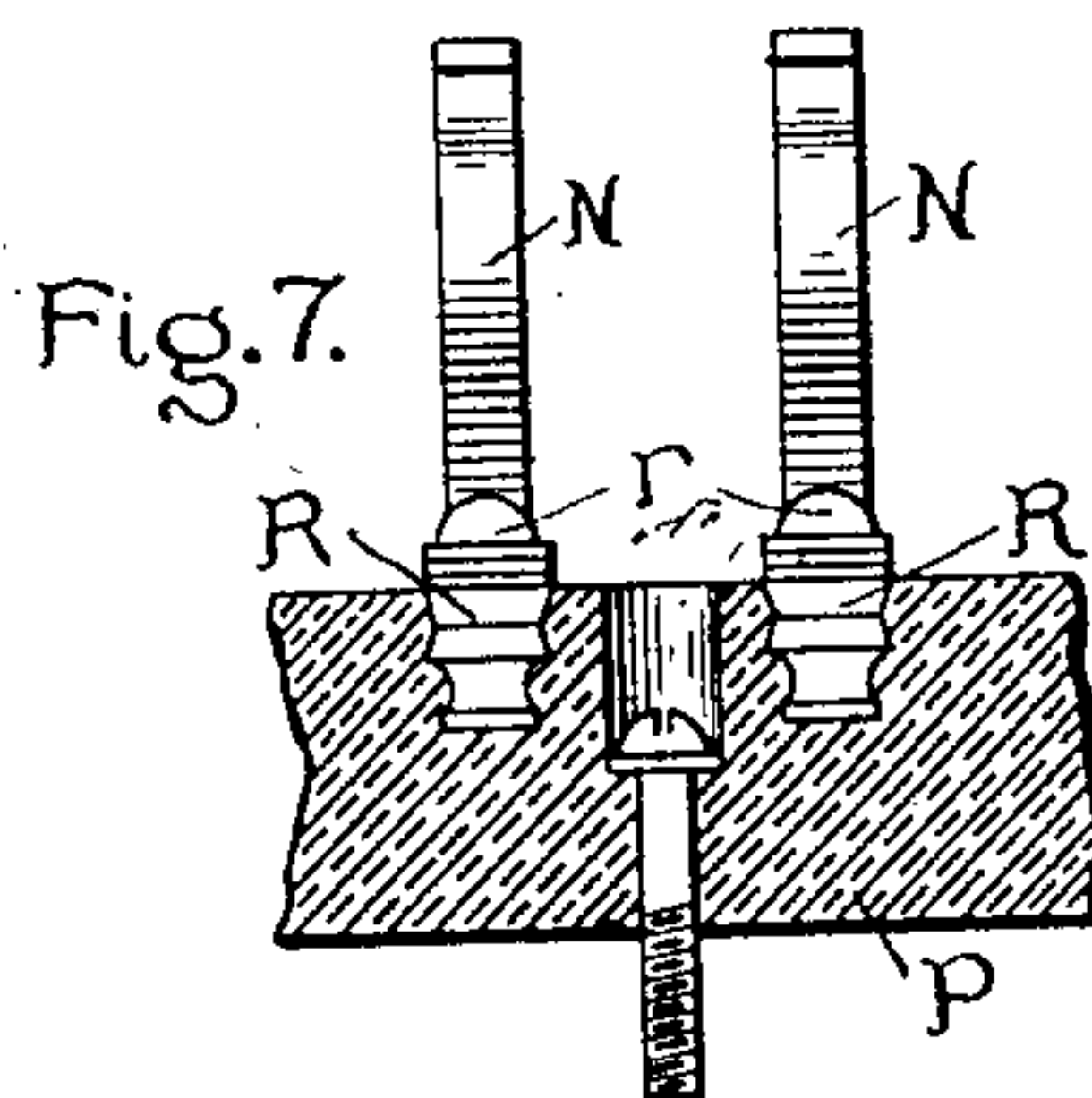
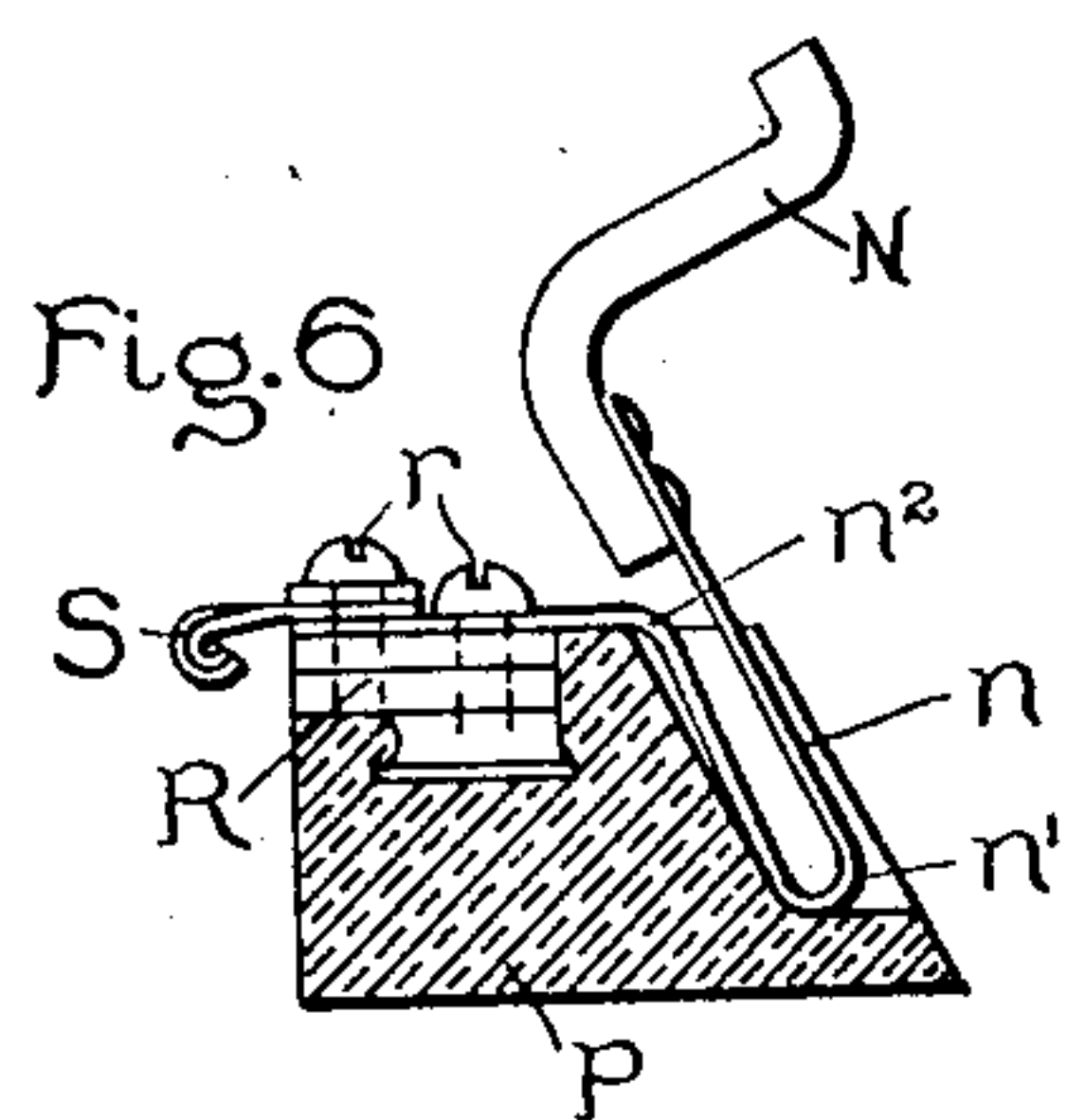
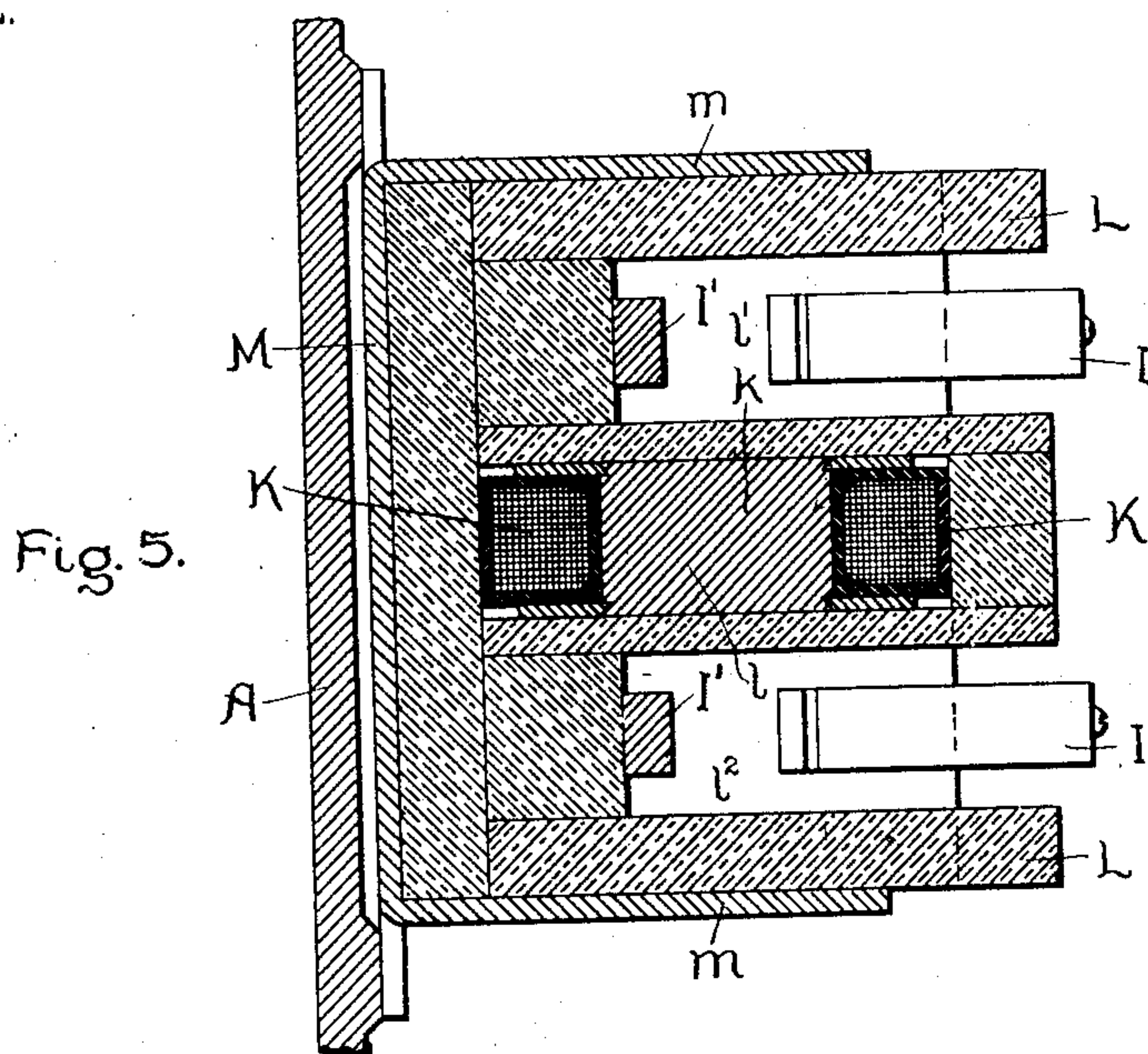
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F. E. CASE.
ELECTRIC CONTROLLER.

APPLICATION FILED SEPT. 16, 1901.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses.

Erving P. Gurney.
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Inventor.
Frank E. Case.

by *Allen H. Davis*
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UNITED STATES PATENT OFFICE.

FRANK E. CASE, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 750,947, dated February 2, 1904.

Application filed September 16, 1901. Serial No. 75,488. (No model.)

To all whom it may concern:

Be it known that I, FRANK E. CASE, a citizen of the United States, residing at Schenectady, in the county of Schenectady and State of New York, have invented certain new and useful Improvements in Electric Controllers, of which the following is a specification.

This invention relates to devices for controlling the power-circuit of an electric motor, and especially an electric-railway motor.

The invention is in some respects an improvement upon that shown in my Patent No. 655,389, granted August 7, 1900, in which is shown a controller having on its shaft a sleeve rotatable independently of the shaft, a spring tending to throw the sleeve back to a normal position, a switch controlling the trolley-circuit and arranged to be closed when the sleeve is rotated forward with the controller-shaft and opened when said sleeve is returned to its normal position, a latch on the controller-handle for locking the sleeve to the shaft, and a push-pin in the handle, which when depressed by the hand of the motorman engages the latch with the sleeve; but if for any reason the motorman removes his hand the latch is disengaged by a spring and the spring-actuated sleeve at once snaps back to its normal position and opens the power-circuit. To reset the device, the controller-handle must be turned back to the "off" position.

The advantages of this invention are fully set forth in my patent aforesaid and need not be repeated here.

My present improvements relate to the blow-out for extinguishing the arc at the main circuit-closing switch, to an improved construction of the arc-deflectors in the arc-circuits, and to improvements in the construction and arrangement of the parts of the motor-controller and the mechanism for operating the main circuit-closing switch, as will be hereinafter more fully described, and clearly set forth in the appended claims.

In the accompanying drawings, Figure 1 is a front elevation of my improved controller with the casing-cover removed, certain parts being broken away and in section. Figs. 2, 3, and 4 are cross-sectional plan views on the

lines 2 2, 3 3, and 4 4, respectively, in Fig. 1. Fig. 5 is an axial section of the blow-out magnet and the main circuit-closer. Fig. 6 is a side elevation of one of the contact-fingers, showing its support in section. Fig. 7 is a front elevation of the same with the support in section. Fig. 8 is a cross-section of the main cylinder, showing a modified arc-chute. Fig. 9 is a vertical sectional elevation of the same, and Fig. 10 is a similar view of a modified construction.

The several working parts of the controller are supported by a back A, which has suitable edge flanges *a* to retain in proper position a cover. (Not shown.) The main cylinder B carries the usual contact-segments *b* and is geared by cog-wheels C C' to an operating-shaft D, which is out of alignment with said cylinder and which runs up into the hub *e* of the operating-lever E. The cylinder, as shown in the drawings, has a greater angular movement than that of the operating-shaft D. The hub is rotatable in an opening in the cap-plate A' of the casing and is fastened to the shaft D, as by a screw *d*. Rotatably mounted on the shaft is a sleeve F, maintained yieldingly in a normal position by a helical spring F', which is connected at one end with the sleeve and at the other end with the shaft, preferably by means of a collar D', secured to said shaft. The sleeve F carries a cam *f* and a lug *f'*, the latter serving as a stop by abutting against a stationary lug *a'* on the cap-plate.

It is found that the constant upward pressure of the push-pin tires the hand of the motorman, so that the connections between the pin and the sleeve have been modified to afford him relief in this respect. The push-pin has been given a broad knob E', on which the palm of the hand rests easily and which virtually forms a part of the handle. The pin *e'* rests on the long arm of a lever E², fulcrumed on the operating-lever E. A spring E³ bears on the short arm of the lever and keeps the pin and knob normally raised. A toothed rocker E⁴ also is fulcrumed on the operating-lever and engages with the short arm of the lever E². The other end of the rocker engages with a lug on a bolt G, slidable in a

keyway in the shaft D and adapted to enter a notch in the upper end of the sleeve F and lock said sleeve to the shaft. This will occur whenever the knob E' is depressed provided the controller is in the off position.

It will be seen that the lever and the rocker make it possible to operate the bolt with very little effort and that the upward pressure on the knob is small, owing to its resting on the long arm of the lever E², while the full power of the spring E³ is transmitted to the bolt by the rocker.

Adjacent to the shaft D is a rock-shaft H, carrying an arm h, which bears against the cam f, whereby the movement of the cam will rock the shaft. At some convenient point on the shaft is an arm h', against which bears a spring h². On said arm is fastened a block of insulation H', on which are mounted two connected spring contact-fingers I, coöperating with stationary contacts I' and forming therewith a double-break circuit-closing switch for closing and opening the power-circuit by the rocking of the shaft H. When the motorman places his hand on the handle, he depresses the push-pin and shoves the bolt down into the notch in the sleeve F. The rotation of the handle operates first to close the switch and then to control the motor-circuits by means of the cylinder B. If at any time the motorman removes his hand from the handle, the sleeve F is unlocked and the spring instantly turns the sleeve backward until the lug f' strikes the stop a', in which position the cam is out of engagement with the arm h and the circuit-closing switch is thrown open by the spring h².

In order to promptly extinguish the arc which forms on the separation of the contacts I I' of this switch, a blow-out magnet is provided, preferably a flat coil K, having a core k and fitting into a central compartment l in a box L, of fiber or other insulating material. A strip of sheet-iron M may be placed under the box with upwardly-extending ends m to form a path for the magnetic flux which streams across the open compartments l' l² on each side of the coil-compartment l. In these compartments l' l² are the stationary contacts I' in line with the core k, so that when the movable fingers I make and break contact with them they are in position to have the arc at once blown out.

The main contact-fingers N are so constructed and mounted as to give a high degree of resiliency in as compact a form as possible. This is accomplished by mounting the fingers on one end of a spring n, which is doubled upon itself in lines substantially tangent to the cylinder B. The other end of the spring is bent away nearly at right angles and secured to a suitable support. The spring thus has two points of flexure at n' n².

I prefer to use for this support a block P, of insulation, in which are embedded bases R, of metal, to each of which a spring n is at-

tached. Each base is preferably undercut or flanged, as shown, in order that it may be firmly held when the insulation P is molded around it, each base being thus insulated from the others. Screws r are tapped into these bases and secure the springs n and the terminals S for the leads.

In order to reduce the leakage of lines of magnetic force from the main blow-out magnet T, the casing, including the back A and the cover, (not shown,) are made of non-magnetic material.

The reversing-switch has two pairs of stationary contact-fingers U U' and a bridging-contact V, having its edges flanged and embedded in a rotatable barrel V', eccentrically mounted on the shaft v. An interlock W of any desired construction is arranged between the reversing-switch and the shaft D.

The arc-deflectors X are provided with shallow recesses x adjacent to the point where the fingers N make contact with the segments b. These recessed deflectors can therefore be placed quite close to the contacts, since the recesses provide the requisite space for the arc, while the main portion of the deflectors is still of the thickness necessary to prevent warping. The recesses also protect the main cylinder, the arc being confined by the edges of the recesses, and thus compelled to spread lengthwise of the recess. As a modification the entire deflector can be recessed out except at the edge, where a flange x' is left to keep the arc from striking the cylinder, as shown in section in Fig. 10 and in dotted lines in Fig. 8.

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

1. In combination, a controller for electric circuits, an operating-handle therefor, a double-break switch, a blow-out coil between the two pairs of contacts of said switch, a strip of magnetic material having its ends in line with the core of the said coil, the switch-contacts being located between the ends of said strip and the ends of said core, and means operated upon the release of said handle for opening said double-break switch.

2. The combination with a controller for an electric circuit, of a double-break switch having a flat blow-out coil between the two pairs of contacts of said switch, a piece of magnetic material opposite each end of the core of said coil, the switch-contacts being located between the ends of said core and the adjacent pieces of magnetic material, means actuated by the controller for closing the circuit at the double-break switch, and means operated independently of the controller for opening the circuit at the double-break switch.

3. The combination with a box of insulation, of a blow-out coil in said box, a strip of magnetic metal having its ends in line with the core of said coil, and switch-contacts located between said ends and said core.

4. In combination, a controller-cylinder having contact-segments thereon, contact-fingers adapted to engage said segments, and an arc-deflector having a shallow recess adjacent to the points of contact of said fingers and segments.

5. The combination with a controller-cylinder and contact-fingers, of arc-deflectors provided with recesses on their opposite faces adjacent to the point of contact.

6. In a controller, a plurality of arc-deflectors, placed near to the contacts, and provided with recesses in their opposite faces.

7. In a controller, an arc-deflector having its edge thicker than the portion adjacent to the contacts.

8. In a controller, an arc-deflector having its edge closer to the side of the contacts than is the surface adjacent to said contacts.

9. In combination, a controller, a sleeve carrying a cam mounted on the controller-shaft, means for rotating said sleeve independent of said shaft, a rock-shaft, a double-break switch one member of which is mounted on said rock-shaft, an arm on said rock-shaft engaging said cam to hold said switch in its closed position, and means for rotating said rock-shaft to open said switch when the sleeve carrying said cam is allowed to return to the position corresponding to the "off" position of the controller.

10. In combination, a controller for an electric circuit, a handle for operating said controller, a switch independent of said controller for opening said circuit when the controller-handle is released in any operative position of the controller, a cam mounted on the controller-shaft operatively connected with said switch to operate said switch to close the circuit upon the first movement of the controller from its "off" position, also to hold said switch in its closed position so long as the cam is in any position other than that corresponding to the "off" position of the controller.

11. In combination, a controller, a handle for operating said controller, an independent switch for opening the controller-circuit at any operative position of the controller, a sleeve carrying a cam which controls the operation of said switch, a lever pivoted in said handle, a push-pin in said controller-handle operatively connected with the long arm of said lever, means for connecting the short arm of said lever to said sleeve when said push-pin is depressed in the "off" position of the controller-handle, said connecting means comprising a rocker pivoted in said handle and a bolt slidably mounted in a keyway in the controller-shaft.

12. In combination with a controller-handle,

a push-pin, a lever having its long arm operatively connected with said push-pin and its short arm operatively connected through a rocker pivoted in said handle with a bolt slidably mounted in a keyway in the controller-shaft, said bolt being adapted to be connected with a sleeve on the controller-shaft when the controller-handle is in its "off" position.

13. In combination with a controller-handle, a push-pin having a broad knob on which the operator's hand is adapted to rest, means for maintaining said push-pin in an elevated position, a lever having its long arm operatively connected with said push-pin, and means for connecting the short arm of said lever with a sleeve on the controller-shaft, said connecting means comprising a rocker pivoted in said handle and a bolt slidably mounted in a keyway in the controller-shaft.

14. In combination, a controller-casing, a controlling-cylinder in the lower part of said casing, an operating-shaft for said cylinder out of alinement therewith but geared thereto and extending through the cap-plate of said casing, and a circuit-closing switch and a reversing-switch located above said cylinder and adjacent to said operating-shaft.

15. In combination, a controller-casing, a controlling-cylinder in the lower part of said casing, an operating-shaft for said cylinder out of alinement therewith but geared thereto and extending through the cap-plate of said casing, a circuit-closing switch and a reversing-switch located above said cylinder and adjacent to said operating-shaft, and an interlock between said reversing-switch and said operating-shaft.

16. In combination, a controller-casing, a controlling-cylinder therein, an operating-shaft for said cylinder out of alinement therewith and geared thereto so that the cylinder has a greater angular movement than that of the operating-shaft, and a circuit-closing switch located in said casing above said cylinder and adjacent to said operating-shaft.

17. In combination, a controller-casing, a controlling-cylinder within said casing, an operating-shaft for said cylinder out of alinement therewith but geared thereto and extending upward through the cap-plate of the controller-casing, a circuit-closing switch above said cylinder and adjacent to said operating-shaft, and means for operating said circuit-closing switch from said operating-shaft.

In witness whereof I have hereunto set my hand this 12th day of September, 1901.

FRANK E. CASE.

Witnesses:

ALEX. F. MACDONALD,
HELENA SHIELDS.