

No. 801,631.

PATENTED OCT. 10, 1905.

C. C. ANTHONY.

APPARATUS FOR CONTROLLING THE OPERATION OF RAILWAY SWITCHES.

APPLICATION FILED MAR. 6, 1905.

4 SHEETS—SHEET 1.

Fig:1

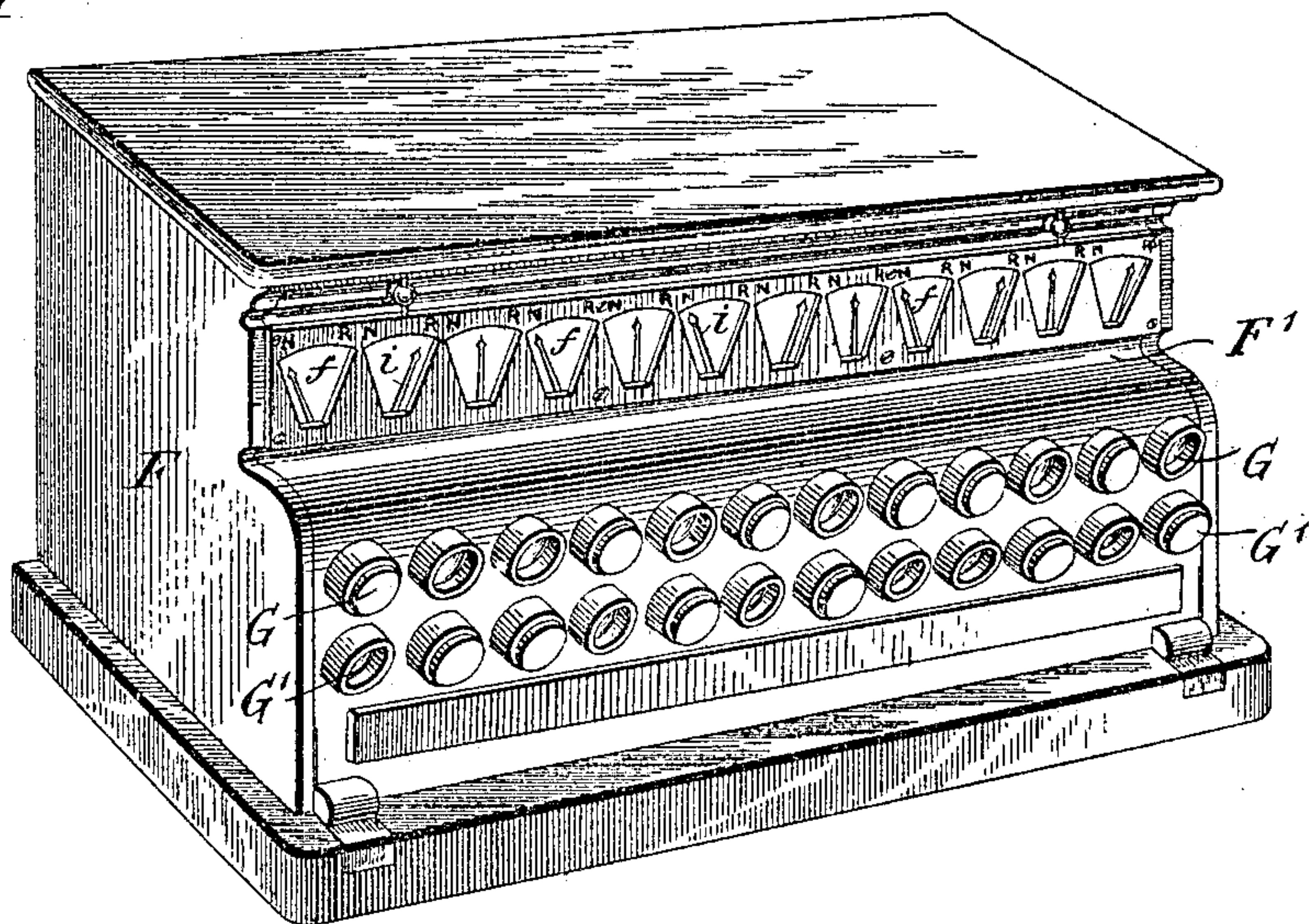
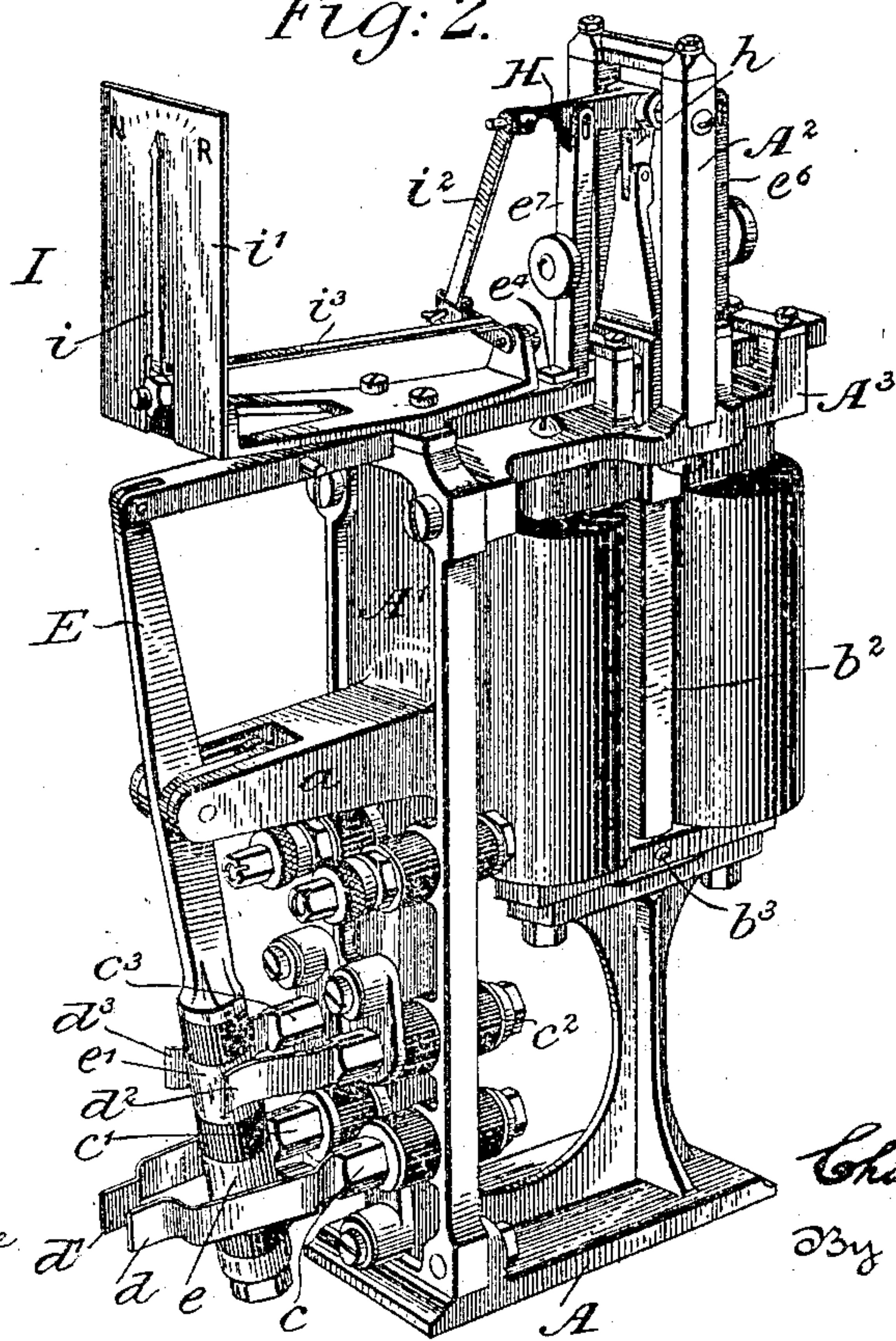


Fig:2.



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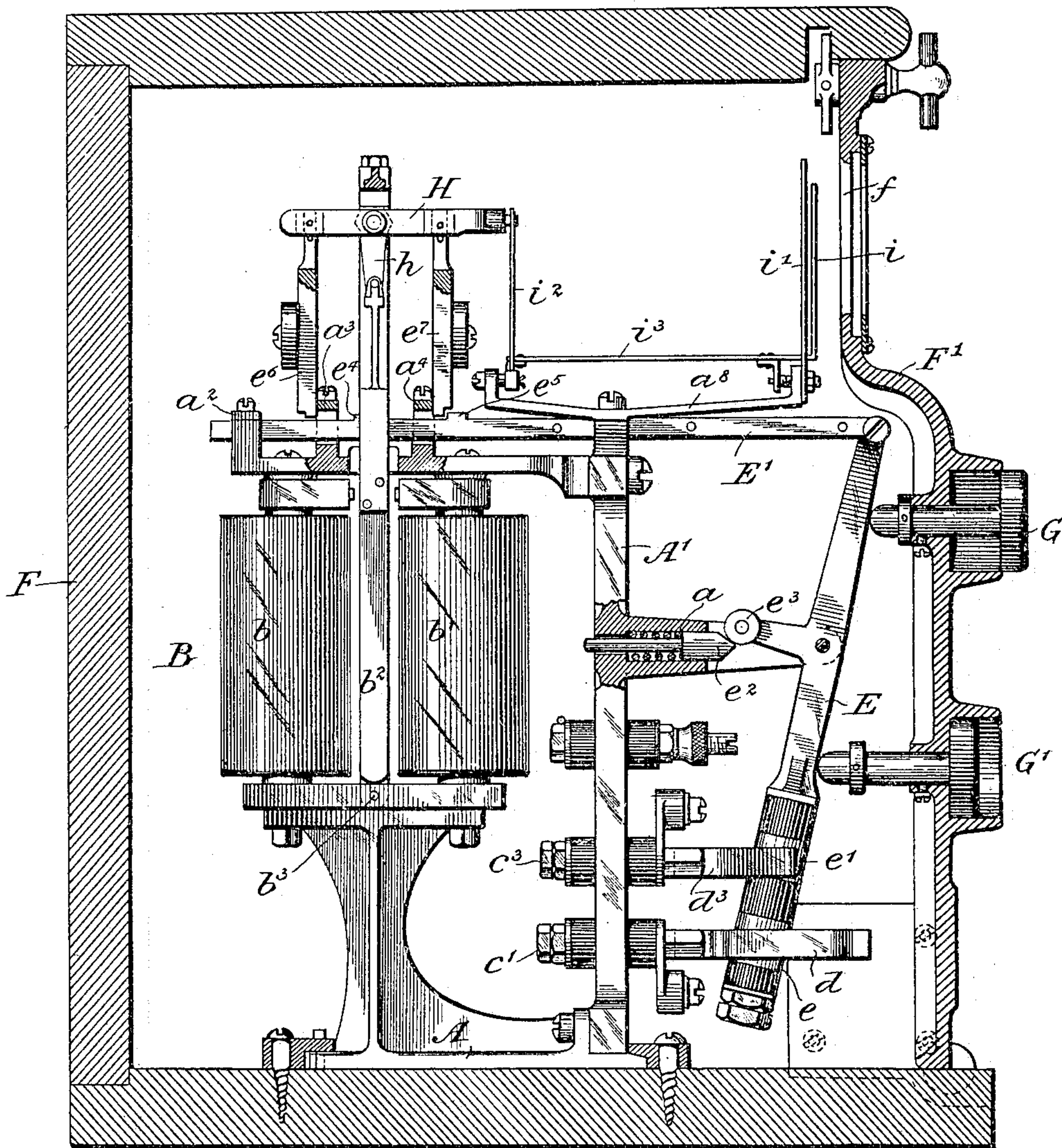
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4 SHEETS—SHEET 2.

Fig. 3.



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4 SHEETS—SHEET 3.

Fig:4.

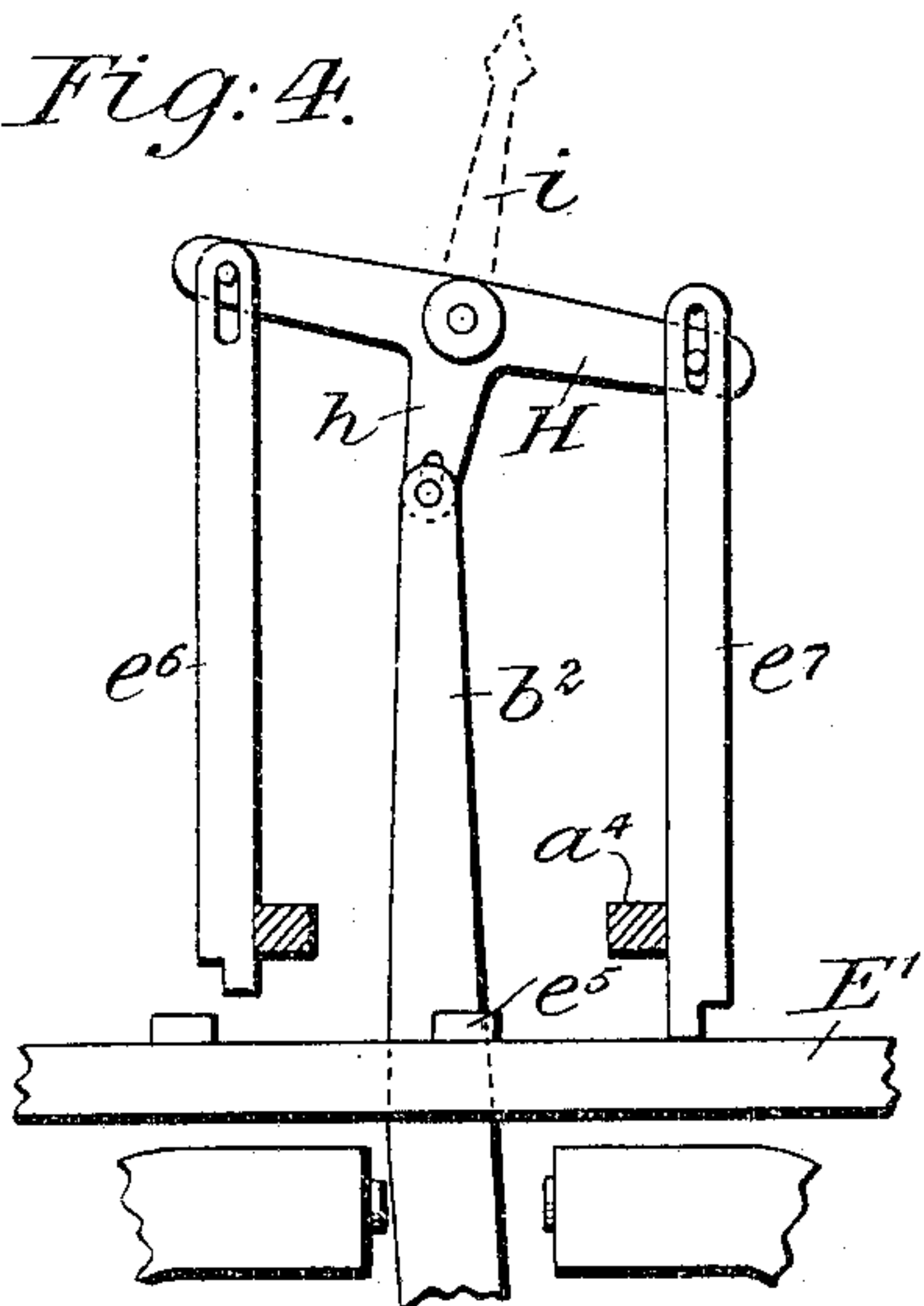


Fig:5.

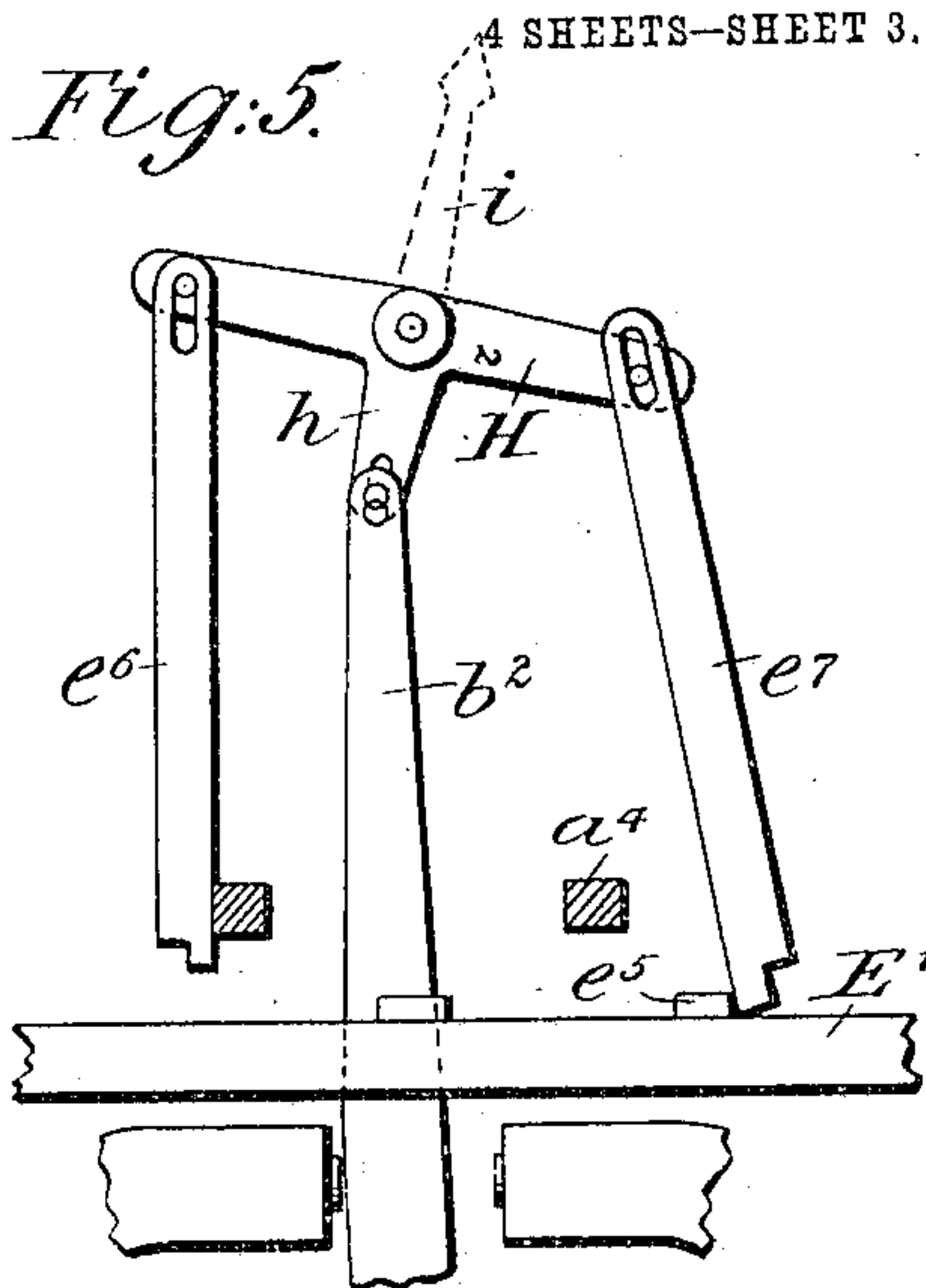


Fig:6.

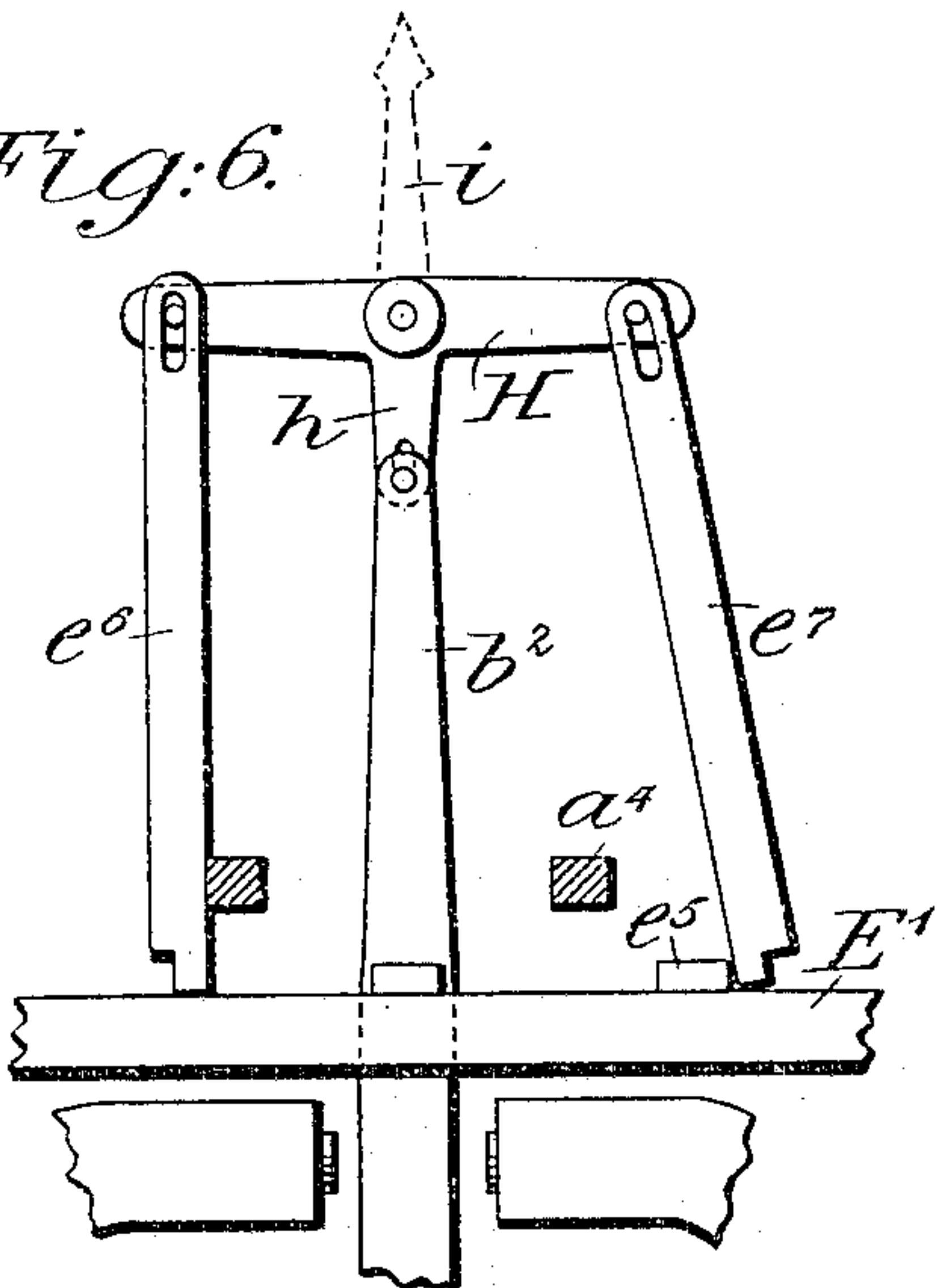


Fig:7.

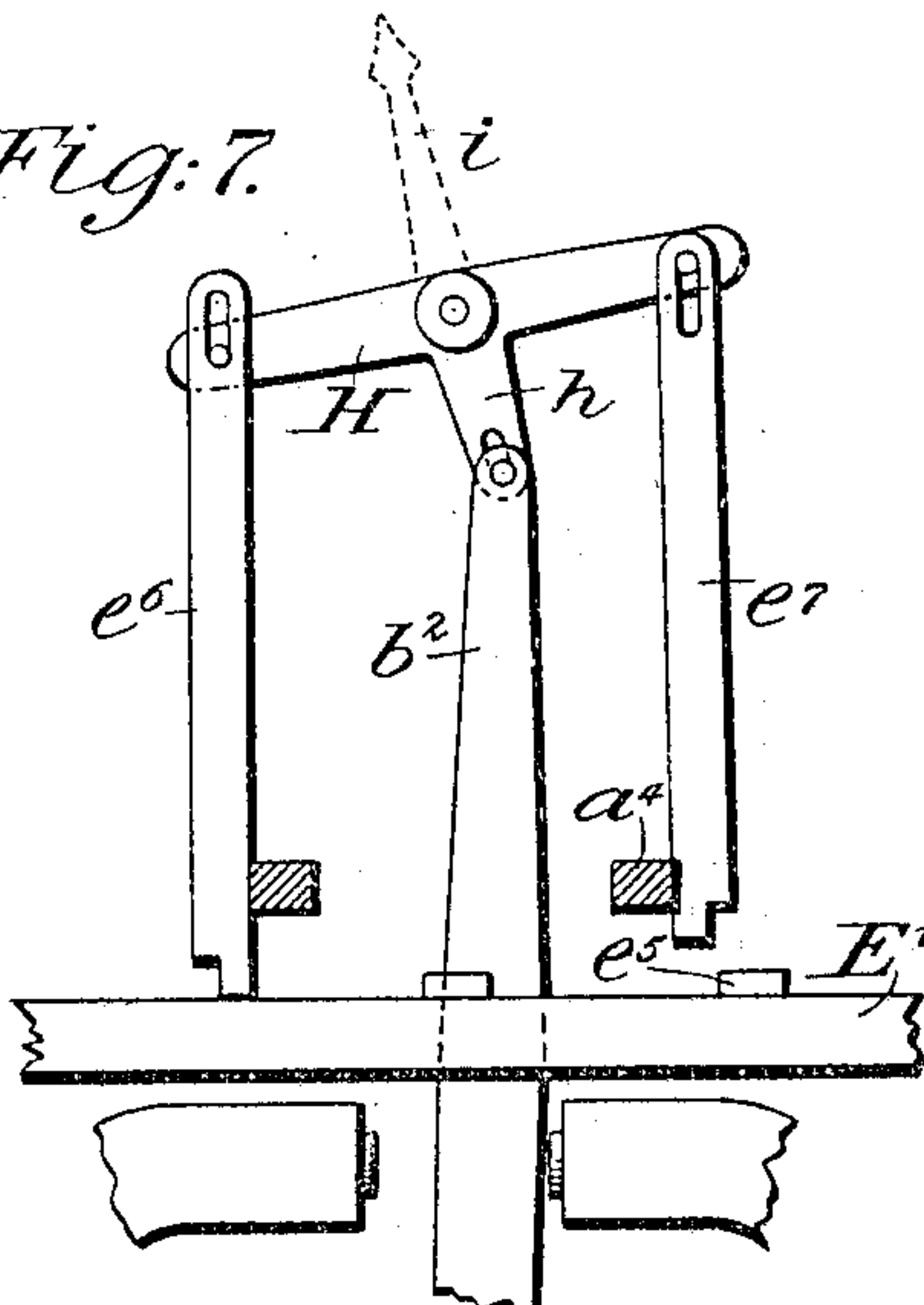
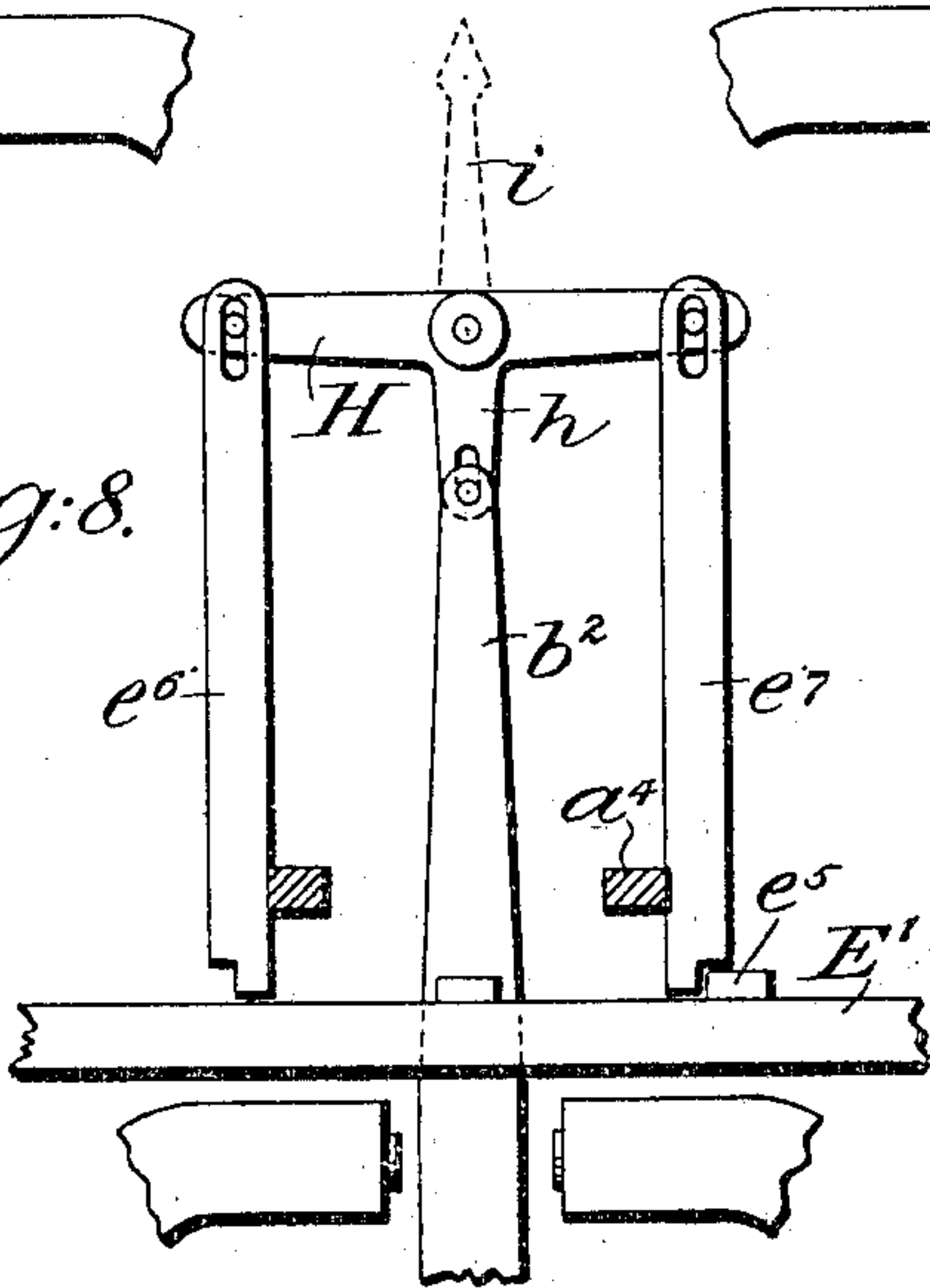


Fig:8.



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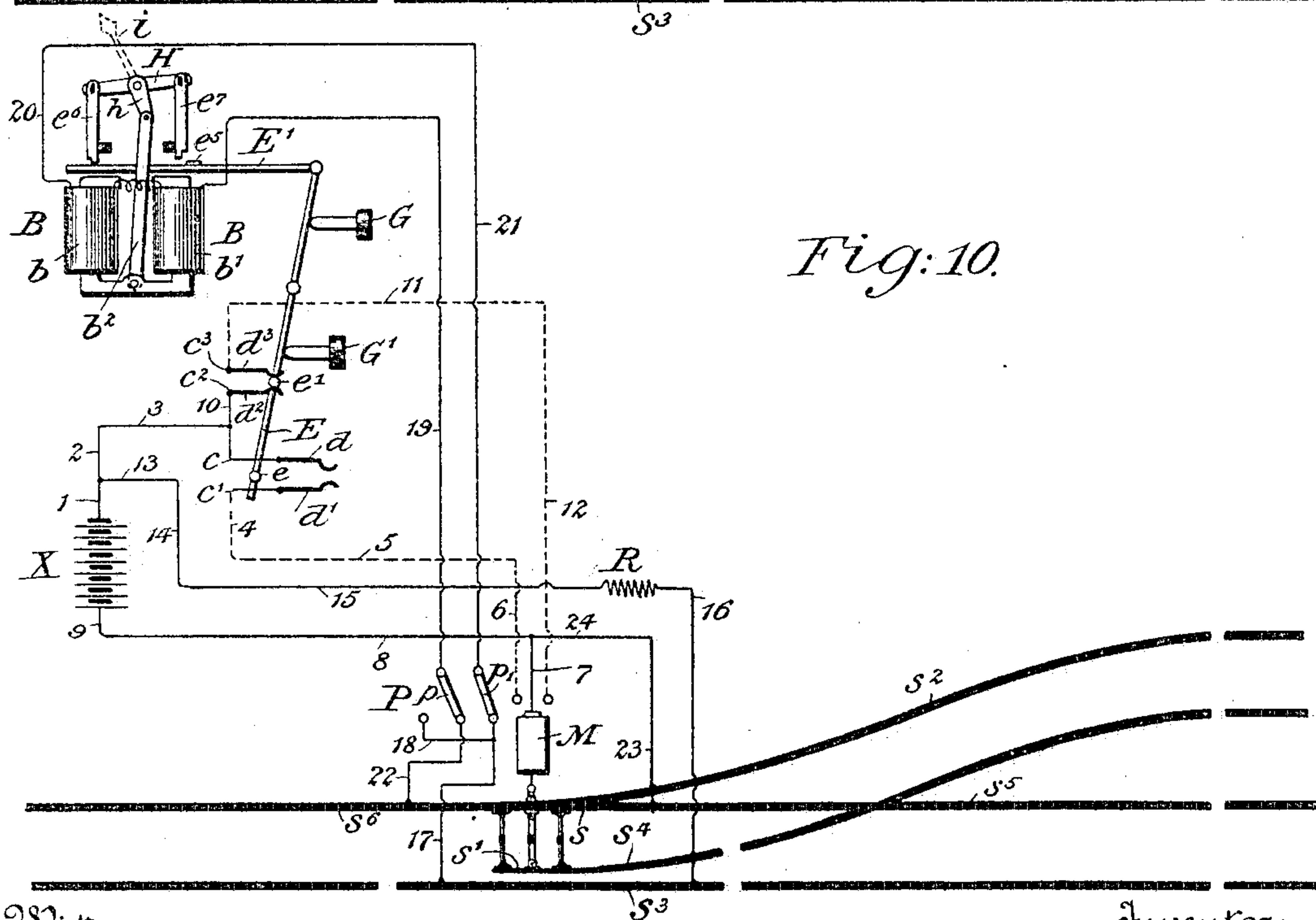
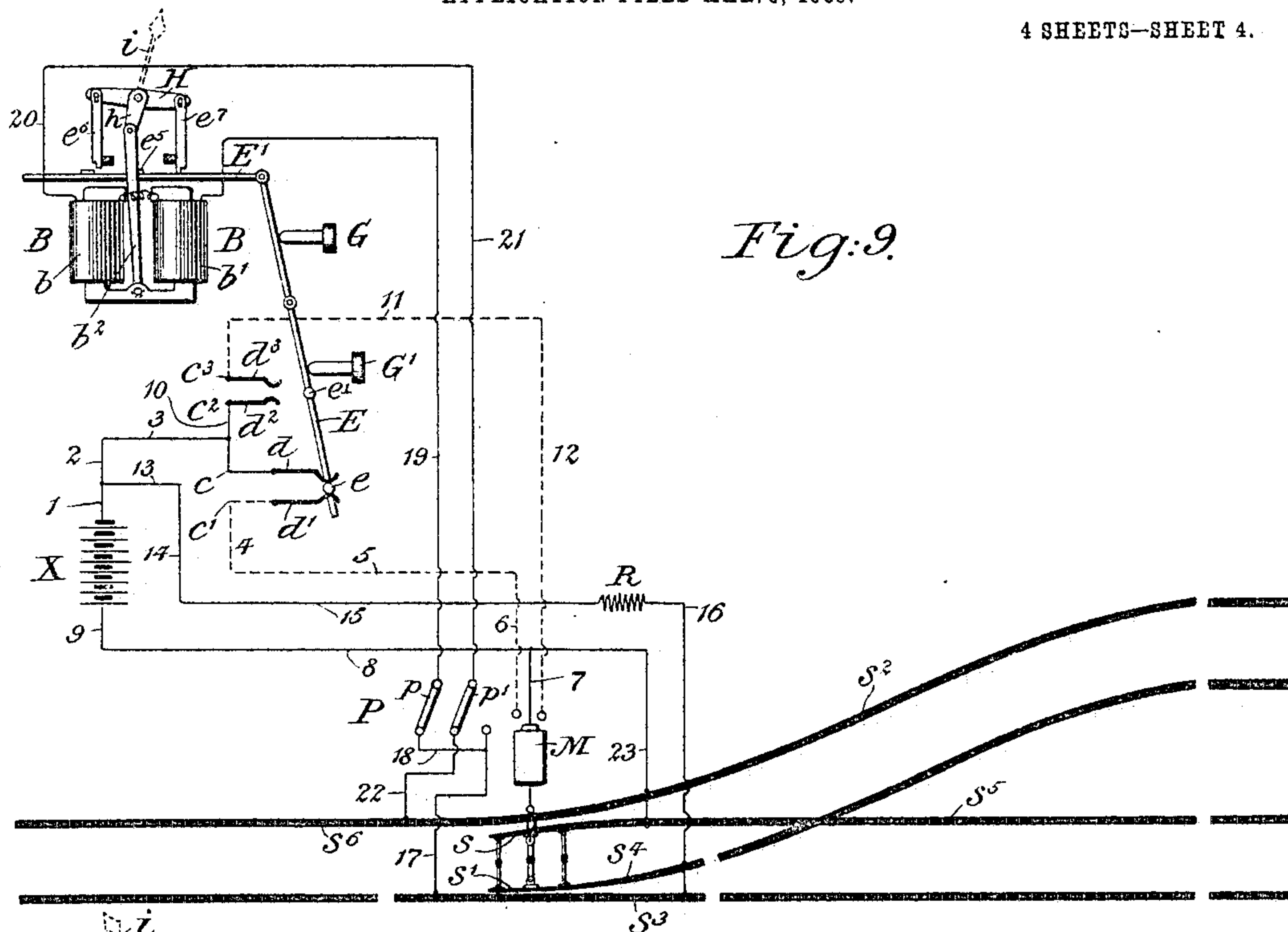
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C. C. ANTHONY.

# APPARATUS FOR CONTROLLING THE OPERATION OF RAILWAY SWITCHES.

APPLICATION FILED MAR. 6, 1905.

4 SHEETS—SHEET 4.



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# UNITED STATES PATENT OFFICE.

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APPARATUS FOR CONTROLLING THE OPERATION OF RAILWAY-SWITCHES.

No. 801,631.

Specification of Letters Patent.

Patented Oct. 10, 1905.

Application filed March 6, 1905. Serial No. 248,464.

*To all whom it may concern:*

Be it known that I, CHARLES C. ANTHONY, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Controlling the Operation of Railway-Switches, of which the following is a specification.

My invention relates to apparatus for controlling the operation of railway-switches, and especially to that class of apparatus which is termed in the art "push-button machines." This class of apparatus, as is well known, is especially adapted for use in yards where cars, and especially freight-cars, are distributed onto tracks branching from what may be termed a "main" track. Such machines usually comprise a circuit-controller operated by two push-buttons and an indicator for the two positions of the switch-rails.

An object of my invention is to prevent movement of the circuit-controller, and hence a movement of the switch rail or rails, while a train or car is adjacent or is passing over the switch rail or rails.

Another object is to use the indicator to show whether the circuit-controller is free to be moved and also whether or not the switch-rails have moved in response to a movement of the circuit-controller.

I will describe such an apparatus embodying my invention and then point out the novel features thereof in claims.

In the accompanying drawings, Figure 1 is a perspective view of a push-button machine. Fig. 2 is a perspective view of an apparatus for controlling and indicating the operation of a railway-switch and embodying my invention. For each railway-switch there is provided an apparatus like that illustrated in Fig. 2 and which for convenience may be termed a "unit," and the several units or only one such unit is inclosed in a cabinet and constitutes a push-button machine. Fig. 3 is a view, partly in side elevation and partly in vertical section, of the apparatus shown in Fig. 2 and a transverse sectional view of a cabinet. Figs. 4, 5, 6, 7, and 8 are each diagrammatical views showing different conditions of the indicator and a lock for the circuit-controller. Fig. 9 is a diagrammatical view of a portion of what may be termed a "main" railway-track, a

branch track leading therefrom, a railway-switch controlling the main and branch tracks, an apparatus for moving the railway-switch, a controlling apparatus like that illustrated in Fig. 2, and an arrangement of circuits for connecting the controlling apparatus with the apparatus operating the railway-switch and with the track-rails adjacent the railway-switch. Fig. 10 is a view similar to Fig. 9, but showing a different condition of the circuits and apparatus.

Similar characters of reference designate corresponding parts in all of the figures.

Referring now more particularly to Figs. 2 and 3, A designates a base on which is supported a suitable form of electric motor B, and A' a vertically-arranged support extending upward from the base A.

$c$   $c'$   $c^2$   $c^3$ , &c., designate binding-posts which are carried by the support A' and suitably insulated therefrom.

$d$   $d'$  designate two contact-springs electrically connected with the binding-posts  $c$   $c'$ , and  $d^2$   $d^3$  two contact-springs electrically connected with the binding-posts  $c^2$   $c^3$ .

E designates a lever fulcrumed intermediate its ends in a bifurcated extension  $a$ , projecting outwardly from the support A' and carrying bridge-pieces  $e$   $e'$ , suitably insulated from each other and the lever E, which bridge-pieces are adapted upon operations of the lever to alternately engage the contacts  $d$   $d'$   $d^2$   $d^3$ .

The contacts  $d$   $d'$ , &c., the lever E, and the bridge-pieces  $e$   $e'$  constitute what I herein term a "circuit-controller," which is intended to control the operation of an apparatus M, provided for operating the switch-rails  $s$   $s'$ . Any other form of circuit-controller may be employed, provided that it will on one operation close one operating-circuit on the apparatus M and on a second operation close another operating-circuit and open or disable the operating-circuit previously made. The apparatus M may be any of the well-known type of apparatus which are employed to move switch-rails, and the motive power therefor may be fluid-pressure or electricity.

One operating-circuit for the apparatus M (see Fig. 9) may be traced as follows: battery X, wires 1 2 3, binding-post  $c$ , contact-spring  $d$ , bridge-piece  $e$ , contact-spring  $d'$ , binding-post  $c'$ , wires 4 5 6, apparatus M, and wires 7, 8, and 9 to battery. This operating-circuit



may be termed the "reverse" operating-circuit, and when closed the apparatus M moves the switch-rails  $s s'$  to their reverse position. (See Fig. 9.) When the switch-rails are in this position, an indicator I denotes their position by a pointer  $i$ , comprised in the indicator, moving under the letter "R," suitably placed on a plate  $i'$  with reference to the movement of the pointer. (See Fig. 1.)

A second operating-circuit for the apparatus M (see Fig. 10) may be traced as follows: battery X, wires 1 2 3 10, binding-post  $c^2$ , contact-spring  $d^2$ , bridge-piece  $e'$ , contact-spring  $d^3$ , binding-post  $c^3$ , wires 11 12, apparatus M, and wires 7, 8, and 9 to battery. This operating-circuit may be termed the "normal" operating-circuit, and when closed the apparatus M moves the switch-rails  $s s'$  to their normal position. (See Fig. 10.) When the switch-rails are in this position, the indicator I denotes their position through its pointer  $i$  moving under the letter "N," suitably placed on the plate  $i'$  with reference to the movement of the pointer. (See Fig. 1.)

As shown in the drawings, the circuit-controller is operated by means of push-buttons G G', which are suitably mounted in the front wall F' of a casing F, containing the several units. One push-button G engages the lever E on one side of its fulcrum, and the other push-button G' engages the lever E on the other side of its fulcrum. It will be seen from the drawings that when the push-button G is operated the lever E is moved to close the operating-circuit comprising the bridge-piece  $e$ , and when the push-button G' is operated the lever E is moved to close the operating-circuit comprising the bridge-piece  $e'$ .

The lever E is provided with a roller  $e^3$ , which coacts with a spring-pressed plunger  $e^2$ . The roller  $e^3$  and plunger  $e^2$  constitute a means for holding the lever E in the position to which it has been moved.

E' designates a rod connected with the lever E, so as to have movement with the lever E and which I have herein termed a "locking-rod." Locking means are provided for the rod E', which when engaging the rod prevent movement thereof, and consequently of the lever E. These locking means, as shown, comprise projections  $e^4 e^5$ , carried by the locking-rod, and arms  $e^6 e^7$ . The arms  $e^6 e^7$  are shown as being pivotally mounted at one of their ends to a lever H, which is fulcrumed between its ends and is rocked on its fulcrum by the motor B. The lever H is fulcrumed in a frame A<sup>2</sup>, extending upwardly from a plate A<sup>3</sup>, which is bolted to and extends laterally from the support A'. The plate A<sup>3</sup> is provided with suitable guides for the locking-rod and carries retaining-straps  $a^2 a^3 a^4$  for holding the locking-rod in the guides. Two of these retaining-straps  $a^3 a^4$  coact with the arms  $e^6 e^7$  in locking the rod. The arms  $e^6 e^7$  are weighted

or otherwise provided with means which act to bring them to a vertical position. These weights or means also act to bring the lever H to a horizontal position when the motor B is deenergized, and thus have the arms  $e^6 e^7$  in position to lock the rod E' against movement. This will be explained later on. The lever H is also availed of to operate the pointer  $i$ , this being accomplished through the link  $i^2$ , which connects the lever H with an arm  $i^3$ , carrying the pointer. The arm  $i^3$  is suitably journaled, so as to be rocked or oscillated upon a movement of the lever H. The plate  $i'$  is suitably supported from a bracket  $a^8$ , carried by the support A' and is held in front of an opening  $f$ , provided in the wall F' of the cabinet.

The motor B is an electric motor and, as shown, comprises coils  $b b'$  and a polarized armature (permanent magnet-armature)  $b^2$ , which is located between the pole-pieces of the coils  $b b'$ . If desired, the armature  $b^2$  may be an electromagnet, in which case a permanent and U-shaped magnet would be substituted for the coils  $b b'$ , between the ends of which the electromagnetic armature would be placed.

As shown in the drawings, the polarized armature  $b^2$  is pivotally mounted at  $b^3$  and is pivotally connected with an arm  $h$ , carried by the lever H. It will be seen, therefore, that when the armature is rocked on its pivot by being alternately attracted to the pole-pieces of the coils  $b b'$  the lever H will be rocked on its fulcrum, and with it the arms  $e^6 e^7$  and the pointer  $i$ , and that when the coils  $b b'$  are deenergized—that is, when no current is flowing through them—the armature  $b^2$  will be in a neutral position, the lever H in a horizontal position, and the pointer  $i$  in a middle position between the letters "N" and "R" on the plate  $i'$ . This is brought about by the weighted or otherwise biased arms  $e^6 e^7$ .

The rocking of the armature  $b^2$  is obtained by reversing the direction of flow of current through the coil or coils of the electric motor, and this reversal in direction of flow may be obtained through a pole-changing device P. The pole-changing device is operated either from the switch-rails  $s s'$  or the apparatus M, it being suitably connected with either the switch-rails or apparatus M. Therefore when the switch-rails  $s s'$  are in one position, the pole-changer P will be in such position as to cause current to flow through the coils in one direction and the armature  $b^2$  to be attracted to one of the coils  $b b'$  and the pointer to be under "N" or "R" on the plate  $i'$ , and when the switch-rails are in their other position a reverse flow of current will be had in the coils and a consequent reverse movement of the armature  $b^2$  and parts connected therewith obtained.

Fig. 4 illustrates diagrammatically the position of the armature  $b^2$ , pointer  $i$ , and lock-



ing-rod E' when the switch-rails are in their reverse position., (See Fig. 9.) Fig. 5 illustrates diagrammatically the position of the locking-rod and parts when the push-button G' has been operated to close the operating-circuits on the apparatus M to have it move the switch-rails to their normal position. Fig. 6 illustrates diagrammatically the position of the parts when the pole-changer is being shifted, which causes a break in the motor-circuit B, and Fig. 7 the position of the parts after the pole-changer has been completely shifted, due to a complete movement of the switch-rails to their normal position. (See Fig. 10.) Fig. 8 illustrates diagrammatically the position of the parts (after indicating "normal" for the switch-rails) should a break or short circuit be established in the motor-circuit. In this position the arm  $e^7$  will be engaged by the projection  $e^5$  and forced against the strap  $a^4$ , and thereby prevent movement of the rod E' upon an attempted movement of the lever E by the push-button G.

Circuits for the motor B may be traced as follows in Figs. 9 and 10: In Fig. 9 the circuit for the motor B to have it move the pointer to denote the reverse position of the switch-rails may be traced, starting from one pole (the + pole) of battery X, as follows: wires 1 13 14 15, ohmic resistance R, wire 16, track-rail  $s^3$ , wires 17 18, arm  $p$  of pole-changer P, wire 19, motor B, wires 20 21, arm  $p'$  of pole-changer P, wire 22, track-rail  $s^6$  to  $s^5$ , and wires 23, 8, and 9 to the other pole of the battery. Current flowing through this circuit will operate the motor and have it move the pointer  $i$  under letter "R." A train bridging the rails  $s^2 s^3 s^4 s^5$ , &c., adjacent the switch-rails will short-circuit the motor, which, becoming deenergized, permits of the lever H moving to a horizontal position and the pointer  $i$  to a position between the letters "N" and "R." (See Fig. 8.) In this position the locking-rod E' is held against movement. Of course when the pole-changer is being operated there will be a momentary break in the circuit, and the motor, becoming deenergized, permits of the lever H moving to a horizontal position and the pointer  $i$  to its middle position. (See, for example, Fig. 6.)

When the pole-changer is operated to move the arms  $p p'$  from the positions shown in Fig. 9 to the positions shown in Fig. 10, the direction of flow of current will be changed, and consequently there will be a reverse movement of the armature to move the pointer under the letter "N." It is possible that when one of the buttons G or G' is pushed in the switch-rails by reason of some obstruction may fail to make a complete movement and may remain in an intermediate and unsafe position. In such a case it may be very desirable that the other button be pushed in so as to restore the switch-rails

to their original position and that locking-rod E' be not locked so as to prevent such operation. If, for example, the switch-rails were checked in their movement from the reversed to the normal position, the parts would continue in their relative positions. (Shown in Fig. 6.) The continuance of the pointer in this position would show that the switch-rails had not made their full movement, and it will be seen that the arm  $e^7$  would not be in a position to be engaged by the projection  $e^5$ . Consequently the circuit-controller would be free to be moved by means of button G to the position shown in Fig. 9, so as to return the switch-rails to their original reversed position.

The track-rails adjacent the switch-rails may be included in a separate track-circuit, the relay of which may operate a circuit-controller—for example, its armature—to open and close the indicator-circuits. The purpose in this invention of controlling the indicator circuit or circuits by the presence of a train on the track-rails adjacent the switch-points is to lock the circuit-controller against operation, and thereby prevent the switch-rails being moved under a train. Wherever I use the term "train-controlled means" in the claims, I wish to be understood as meaning any arrangement on which the train acts to deprive in any manner the indicator-circuit of current—as, for example, by short-circuiting the battery, and thus lock the circuit-controller against movement—one form of such means being illustrated in Figs. 9 and 10.

My invention may be said to comprise a circuit-controller for alternately opening and closing the operating-circuits of an apparatus for moving switch-rails, a lock for said circuit-controller, and an electric motor which when deenergized permits the lock operating to prevent an operation of the circuit-controller. The circuit for the electric motor is preferably controlled by a car or train adjacent the switch-rails. My invention may also be said to comprise in connection with the foregoing an indicator and an electric motor, the armature of which by reverse movements operates the indicator, and means for affecting the circuit of the electric motor to cause the reverse movements of the armature.

What I claim as my invention is—

1. In a push-button machine, the combination with a circuit-controller, an electric motor, an indicator operated by said motor and a lock for said circuit-controller effective when said motor is deenergized.

2. The combination with a push-button machine comprising a circuit-controller, an electric motor, an indicator operated by said motor, and a lock for said circuit-controller; of circuits for said electric motor and train-controlled means for controlling the circuits for the motor.



3. In an apparatus for controlling the operation of switch-rails, the combination with a circuit-controller, of means for operating said controller to open and close a plurality of circuits, an electric motor, an indicator operated by said electric motor, and a lock for said circuit-controller ineffective when said motor is energized and effective when said motor is deenergized. 65
4. In an apparatus for controlling the operation of switch-rails, the combination with a circuit-controller, of push-buttons for operating said circuit-controller to open and close a plurality of circuits, an electric motor, an indicator operated by said electric motor, and a lock for said circuit-controller ineffective when said motor is energized and effective when said motor is deenergized. 70
5. The combination with apparatus for moving switch-rails having operating-circuits, of means for controlling its operation comprising a circuit-controller for controlling said operating-circuits, means for operating said circuit-controller, an electric motor having a polarized armature, an indicator operated by the movements of said armature, an indication-circuit for said electric motor and means for reversing the flow of current in said circuits for obtaining reverse movements of the armature. 75
6. The combination with apparatus for moving switch-rails, operating-circuits therefor, a circuit-controller for the operating-circuits, means for operating the circuit-controller, an indicator for the positions of the switch-rails, an electric motor having an armature capable of reverse movements by a reversal of current in the motor for operating said indicator, a circuit for said electric motor and means for effecting said circuits to produce reversals of current therein. 80
7. The combination with apparatus for moving switch-rails having operating-circuits, of means for controlling its operation comprising a circuit-controller for controlling said operating-circuits, means for operating the circuit-controller, an electric motor, having an armature capable of reverse movements, a circuit for said electric motor, means for affecting said circuit to produce reverse movements of said armature, a lock for said circuit-controller ineffective to prevent operation of circuit-controller when said electric motor is energized and effective when deenergized, and train-operated means for controlling said circuit to cause the electric motor to be deenergized. 85
8. The combination with apparatus for moving switch-rails having operating-circuits, of means for controlling its operation comprising a circuit-controller for controlling said operating-circuits, means for operating the circuit-controller, an electric motor, having an armature capable of reverse movements, a circuit for said electric motor, means for affecting said circuit to produce reverse movements of said armature, train-operated means for controlling said circuit to cause the electric motor to be deenergized, a lock for said circuit-controller ineffective to prevent operation of the circuit-controller when said electric motor is energized, ineffective when said electric motor is deenergized by the means for affecting said circuit to produce reverse movements of said armature, and effective when deenergized by said train-operated means for controlling said circuit. 90
9. In an apparatus for controlling and indicating the operation of railway-switches, the combination of a circuit-controller, a lock for said circuit-controller, an indicator, and an electric motor for operating said indicator when energized and when deenergized having the lock operate. 95
10. The combination with an apparatus for moving a railway part or appliance, a circuit-controller and circuits for controlling the operation of the apparatus, an electric motor the movable part of which has reversed movements when current is reversed in the electric motor, an indicator for the positions of the part or appliance operated by the electric motor and having a neutral position when the electric motor is deenergized, and means operated by the part or appliance for producing a reversal of current in the electric motor. 100
11. The combination with an apparatus for moving a railway part or appliance, a circuit-controller and circuits for controlling the operation of the apparatus, an electric motor the movable part of which has reverse movements when current is reversed in the electric motor, an indicator for the positions of the part or appliance operated by the electric motor and having a neutral position when the electric motor is deenergized, means operated by the part or appliance for producing the reversal of current in the electric motor, and means under the control of a train for deenergizing the electric motor. 105
12. The combination with an apparatus for moving a railway part or appliance, a circuit-controller and circuits for controlling the operation of the apparatus, a lock for the circuit-controller, an electric motor for operating the lock upon reversals of current in the electric motor and permitting the lock to become effective when deenergized, an indicator for the positions of the part or appliance, also operated by the electric motor upon reversals of current in the electric motor and having a neutral position when the motor is deenergized, and means operated by the part or appliance for producing reversals of current in the electric motor. 110
13. The combination with an apparatus for moving a railway part or appliance, a circuit-controller and circuits for controlling the operation of the apparatus, a lock for the circuit-controller, an electric motor for operating the lock upon reversals of current in the electric motor and permitting the lock to become effective when deenergized, an indicator for the positions of the part or appliance, also operated by the electric motor upon reversals of current in the electric motor and having a neutral position when the motor is deenergized, and means operated by the part or appliance for producing reversals of current in the electric motor. 115



eration of the apparatus, a lock for the circuit-controller, an electric motor for operating the lock upon reversals of current in the electric motor and permitting the lock to become effective when deenergized, an indicator  
5 for the positions of the part or appliance, also operated by the electric motor upon reversals of current in the electric motor and having a neutral position when the motor is deenerg-

gized, and train-controlled means for deenergizing the motor. 10

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

CHARLES C. ANTHONY.

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