No. 751,597. PATENTED FEB. 9, 1904.

G. WRIGHT & H. C. WHITE.

ELECTRIC SWITCH.

APPLICATION FILED JUNE 13, 1903.

NO MODEL. 4 SHEETS—SHEET 1.

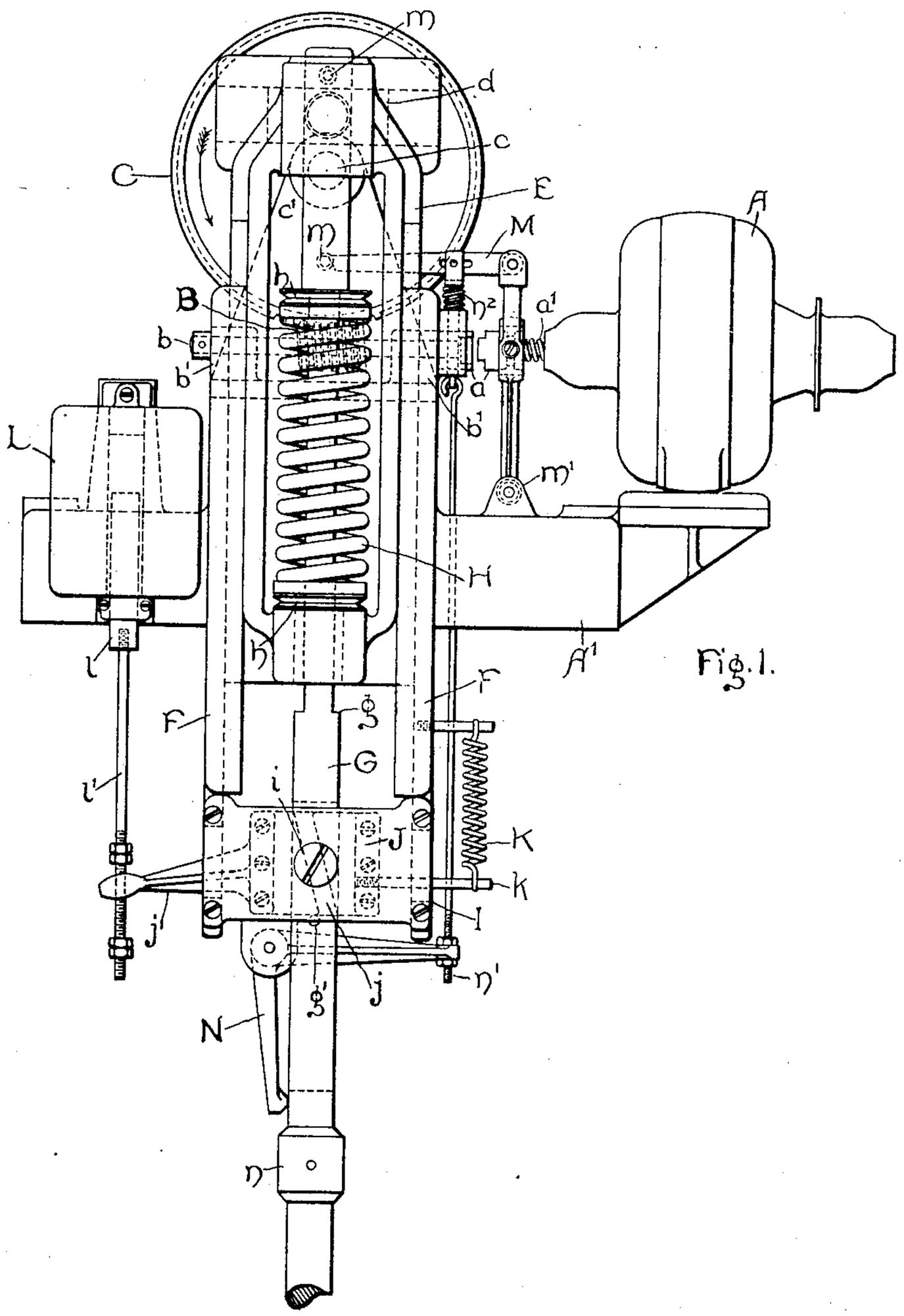

Fig. 1.

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NO MODEL. 4 SHEETS—SHEET 2.

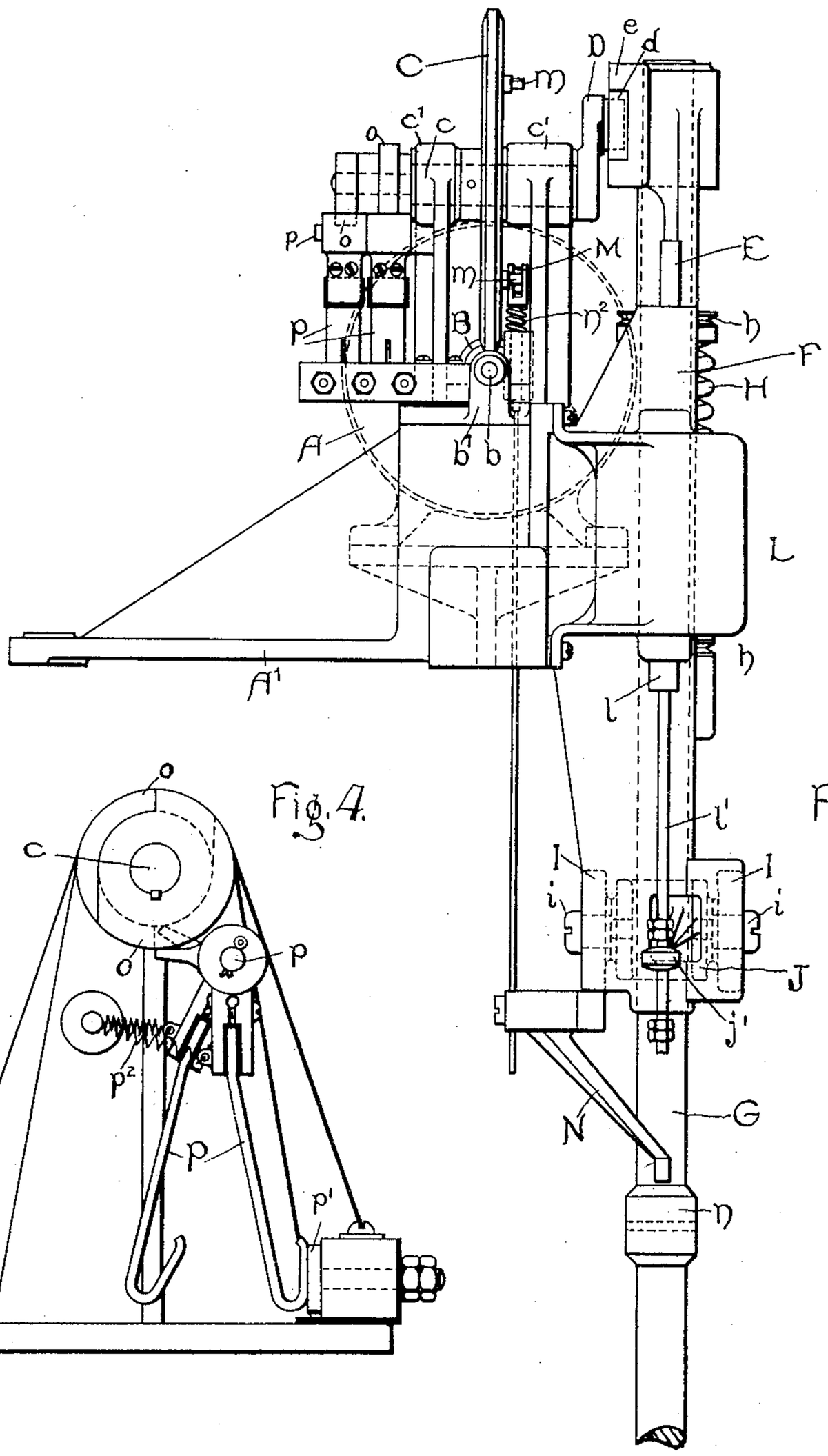

Fig. 2.

Fig. 4.

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NO MODEL. 4 SHEETS—SHEET 3.

Fig. 3.

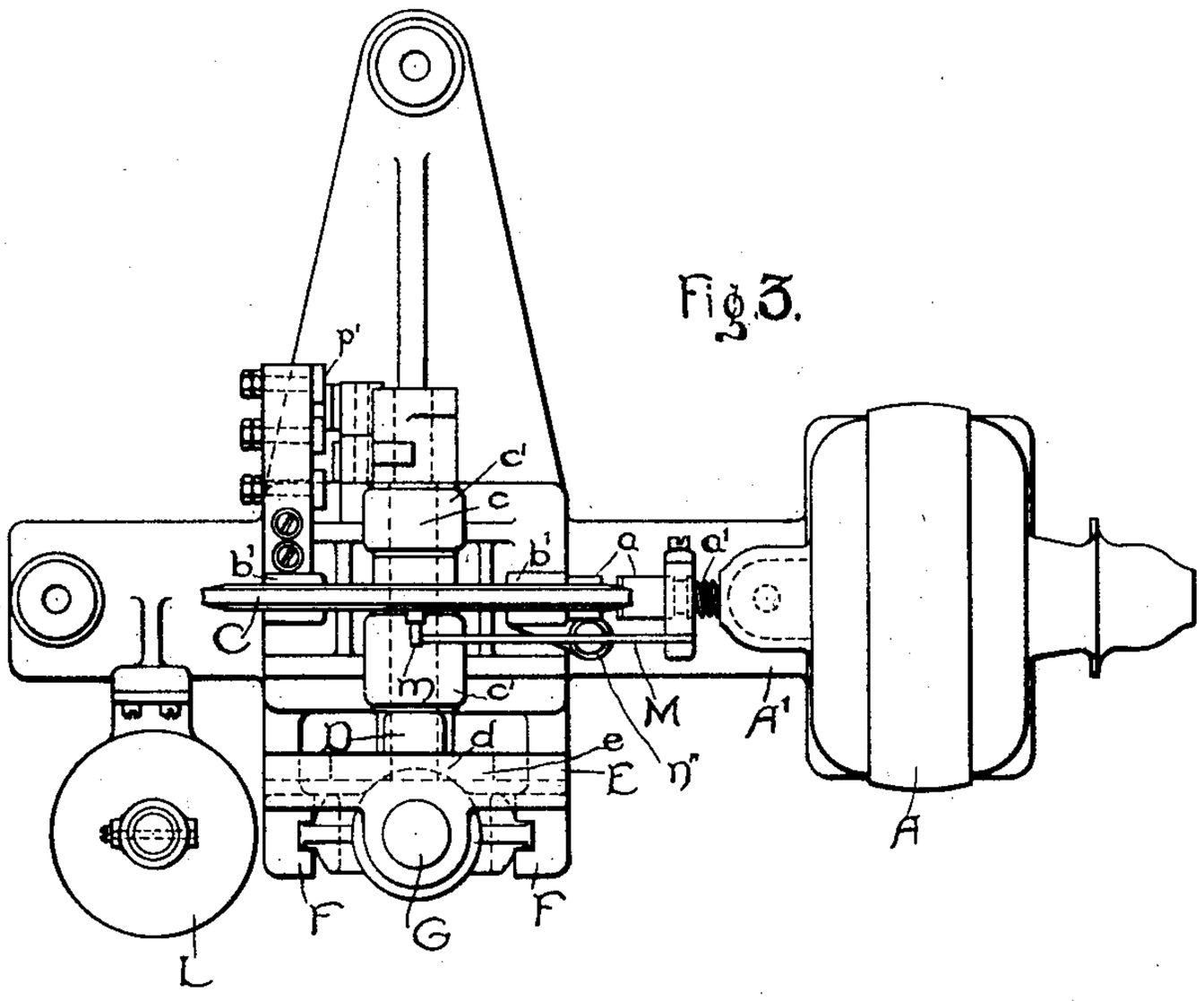
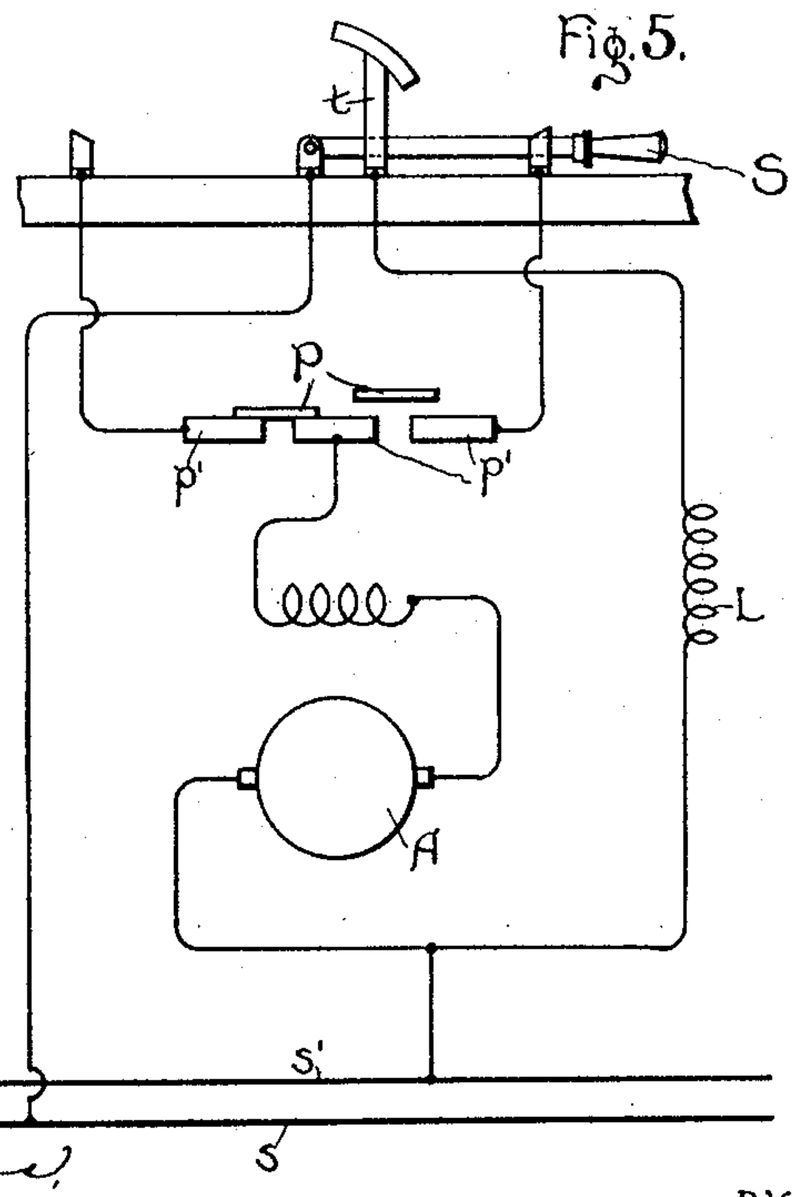


Fig. 5.



WITNESSES:

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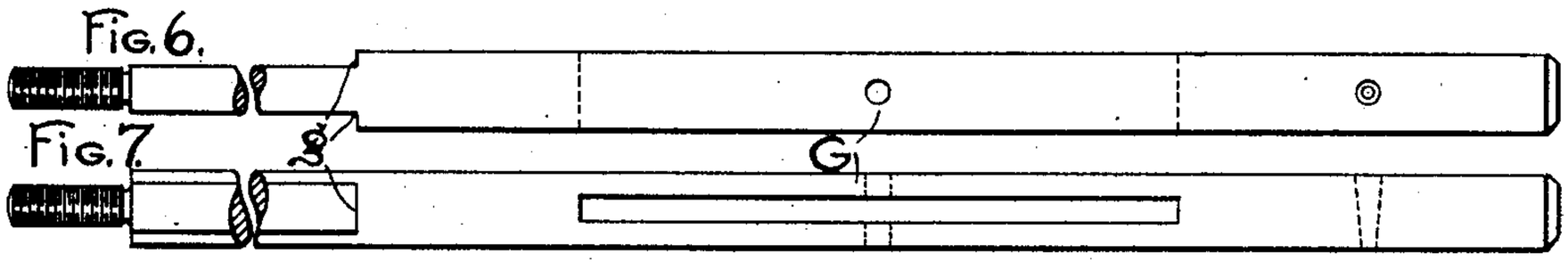
NO MODEL. 4 SHEETS—SHEET 4.

Fig. 6.

Fig. 7.



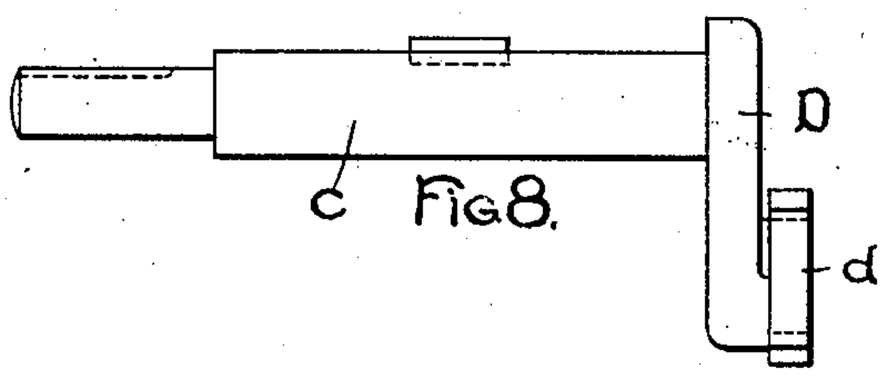
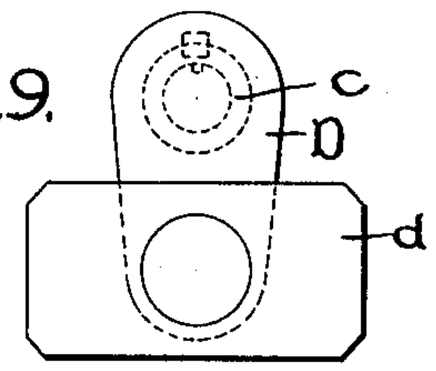


Fig. 8.

Fig. 9.



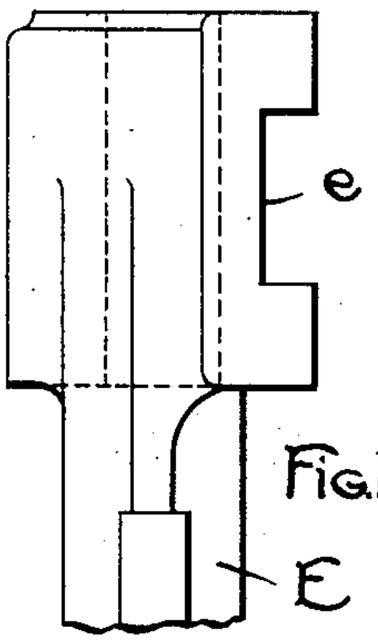


Fig. 10.

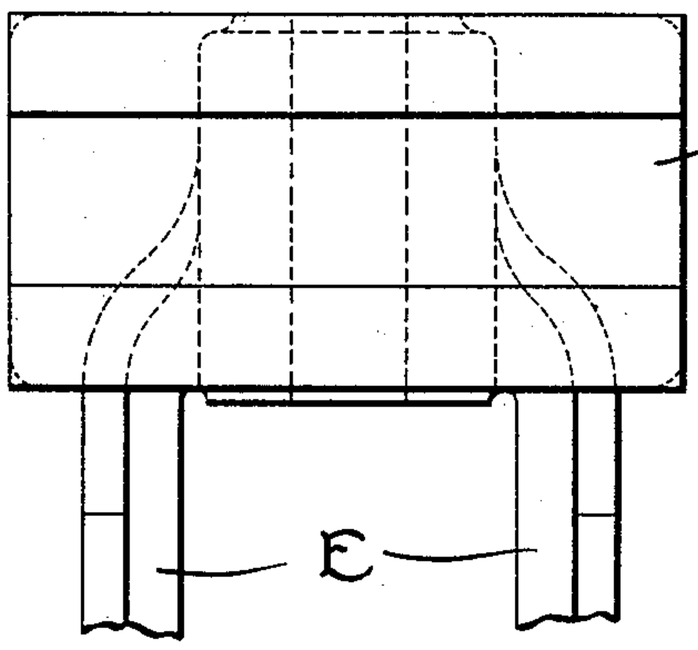


Fig. 11.

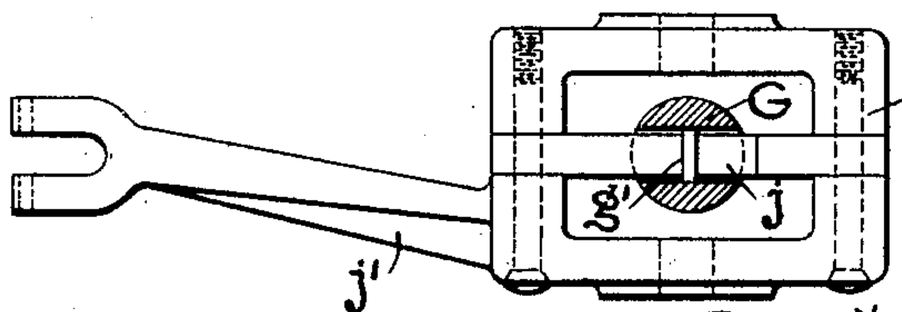


Fig. 12.

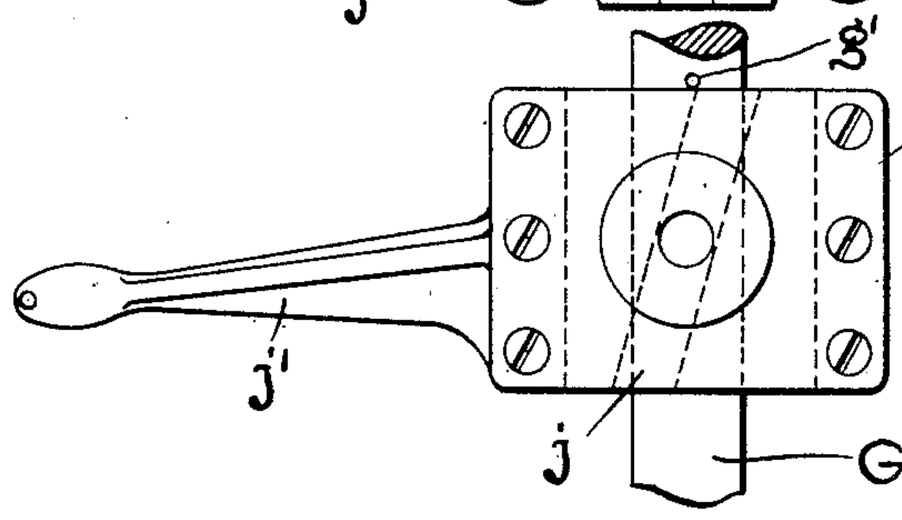


Fig. 13.

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No. 751,597. Patented February 9, 1904.

UNITED STATES PATENT OFFICE.

GILBERT WRIGHT AND HAROLD C. WHITE, OF PITTSFIELD, MASSACHUSETTS, ASSIGNORS TO STANLEY ELECTRIC MANUFACTURING COMPANY, OF PITTSFIELD, MASSACHUSETTS, A CORPORATION OF NEW JERSEY.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 751,597, dated February 9, 1904.

Application filed June 13, 1903. Serial No. 161,281. (No model.)

To all whom it may concern:

Be it known that we, GILBERT WRIGHT and HAROLD C. WHITE, citizens of the United States, and residents of Pittsfield, Massachusetts, have invented certain new and useful Improvements in Electric Switches, of which the following is a specification.

The object of our invention is to provide means for opening and closing a switch which shall be simple in construction and reliable in operation, which shall give a quick and positive movement to the switch-blades both on opening and closing the circuit, and which shall permit the operation from a distance of switches of large capacity or high voltage with convenience and safety to the operator.

Referring to the drawings, Figure 1 shows an end elevation of the structure embodying our invention. Fig. 2 shows a side elevation of the same. Fig. 3 shows a plan view of the same. Fig. 4 shows the automatic motor cut-out switch. Fig. 5 shows a diagram of the control-circuit, and Figs. 6 to 13 show detailed views of certain parts.

In the drawings, A represents a small electric motor, preferably of the direct-current series type. This motor is mounted on frame A′. It carries at the end of its shaft one member of clutch *a*. This clutch member is keyed to the shaft so as to permit of its axial movement on the shaft. It is forced outward and normally held in engagement with the other member of the clutch by spring *a′* on the motor-shaft. The other member of clutch *a* is carried on the end of shaft *b*, which is mounted on bearings *b′* on the frame A′. Carried by shaft *b* is a worm B, which meshes with the worm-wheel C. Worm-wheel C is carried by shaft *c*, which revolves in bearings *c′* on frame A′. Also carried by shaft *c* is the crank D, on the end of which is pivoted the member *d*. This member *d* engages plate *e*, carried by the member E. *d* is free to move horizontally only in member *e*, which forms a guide therefor, and consequently as crank D revolves the member E is given a vertical reciprocating motion. These parts are shown in detail in Figs. 8 to 11. E moves up and down within the guides F, which are supported from frame A′. Moving within member E and guided thereby is the rod G, which at its lower end is connected to the switch. The switch is not shown, since it may be of any well-known type and is in no wise necessary to the understanding of our invention. The central part of rod G is flattened on two sides, as shown in the detail drawings, Figs. 6 and 7. This part is surrounded by a spiral compression-spring H, which is held between washers *h h*. These washers are free to move vertically on rod G, but are limited in the extent of their movement by shoulders *g g*. Washers *h h* are adapted to be engaged by the ends of the sliding member E. Thus it is obvious that if rod G is held stationary and the slide E is reciprocated the spiral spring H will be compressed first in one direction and then in the other. Also supported from frame A′ are the plates I, carrying the pivots *i*. Mounted on pivot *i* is the member J, which surrounds rod G. Member J is composed of plates having a transverse opening *j*.

g′ is a pin carried on rod G, which normally bears against member J, as shown in Fig. 1, and thus prevents the motion of rod G. Pin *g′* is, however, adapted to pass through slot *j*, and consequently when member J is tipped so that slot *j* will register with pin *g′* the pin will pass through the slot and rod G will be released. These parts are shown in the detail drawings, Figs. 12 and 13. Member J is normally held in position shown in Fig. 1 by spring K, which is attached to the rocker J by arm *k*.

L is a tripping-coil consisting merely of a solenoid with its core *l*. Core *l* carries a rod *l′*, which at its lower end is attached to rocker J by arm *j″*. Thus it is evident that when tripping-coil L is energized the core *l* will be drawn up and rocker J will be tipped so that slot *j* will register with pin *g′*. Carried by worm-wheel C are the pins *m*, which as the worm-wheel C revolves in the direction shown by the arrow are adapted to engage the lever

M. This lever is pivoted at m' and carries a collar surrounding the member of clutch a, carried by the motor-shaft. Thus when either of the pins m engages lever M the members of clutch a are forced out of engagement and spring a' is compressed. The means by which the clutch is restored to engagements are as follows: Supported from frame A′ is the bell-crank lever N. One end is engaged by cam n on rod G as rod G moves up and down. When cam n strikes lever N, rod n' is pulled down, drawing down with it lever M. Lever M is thus thrown out of engagement with pin m, and spring a' forces the members of clutch a into engagement. After cam n has passed the end of lever N spring n^2 restores the lever M to the proper position to be engaged by the succeeding pin m.

Fig. 4 shows the construction of the automatic motor cut-out switch, which is operated by the revolution of the shaft c. Pivoted on stud p are the switch members P P, adapted to engage contacts p'. Switch members P are normally held out of engagement with contacts p' by springs p^2. Carried on shaft c are the cams o o, which as shaft c revolves force switch members P P alternately into engagement with contacts p'.

Referring now to Fig. 5, the operation will be evident. S represents the control-switch, the central contact of which is connected to one of the controlling-busses s. The outer contacts of switch S are connected to the two outer contacts p' of the automatic motor cut-out switch. The middle contact p' of the automatic motor cut-out switch is connected through the motor to the control-bus s'. The fourth contact t of control-switch S is connected through the tripping-coil to the control-bus s'. Contact t is so arranged that it is out of engagement with control-switch S when the control-switch S is closed on either of its outside contacts, and it engages the control-switch S only as switch S is moved from one outside contact to the other. Assuming all parts to be in the position shown in Fig. 1, with switch-rod G at its lowest position, with spring H upwardly compressed by slide E, which is at its highest position, and with the members of clutch a thrown out of engagement by the stop m, the arrangement of circuits is that shown in Fig. 5. It will be seen that both the motor and the tripping-coil are open-circuited. If now it is desired to reverse the position of the main switch, control-switch S is thrown over to the opposite position. In passing to this position it first engages contact t, closing the circuit through the tripping-coil. The core of the tripping-coil is thus pulled up, rocker J is tipped, slot j registers with pin g', rod G is released and is forced upward with a quick positive movement by the expansion of spring H, thus opening or closing the main switch, as the case may be. In its passage upward cam n on rod G engages lever N, thus throwing the members of clutch a into engagement, as has been previously described. As control-switch S reaches its opposite position the circuit will be closed through the motor. The motor will therefore begin to revolve, driving worm-wheel C and rotating crank D. Slide E will thus move downward, and as its upper end is now in engagement with the upper washer h spring H will be again compressed in a downwardly direction. This will continue until worm-wheel C and crank D have rotated one hundred and eighty degrees, when the second pin m will engage lever M and will throw the members of clutch a out of engagement. At the same time cams o will operate the switch members P, releasing one and closing the other, thereby opening the circuit of motor A. Motor A is therefore allowed to come to rest under its own friction. During these operations switch-rod G is restrained from movement by pin g', which is now in engagement with the top of rocker J. Thus it is evident that when control-switch S is again restored to its original position the reverse movement of rod G will take place, closing or opening the switch, as the case may be, with a quick, positive movement, and all parts will be restored to the original position, as shown in Fig. 1. It will be seen that with a simple structure and with a simple arrangement of the control-circuit we are able to secure a reliable mechanism which will automatically stop in the correct positions and which will operate in either direction with a quick and positive movement. It is obvious that instead of the manual control-switch any well-known type of magnetic circuit-breaker may be used, if desired. Such circuit-breakers are well known in the art and do not require any description.

We do not desire to limit ourselves to the particular construction and arrangement of parts here shown, since changes therein which do not depart from the spirit of our invention and which are within the scope of the appended claims will be obvious to those skilled in the art.

Having thus fully described our invention, we claim as new and desire to protect by Letters Patent—

1. In combination, a reciprocating rod, a switch mechanism operated thereby, a spring adapted to engage said rod to force it in either direction, electroresponsive means adapted to compress said spring, and means for releasing said rod to permit its movement under the influence of said spring.

2. In combination, a reciprocating rod, a switch mechanism operated thereby, a spring adapted to force the rod in either direction, electroresponsive means adapted to compress said spring, and means adapted to restrain the movement of said rod during the compression of said spring and to release said rod.

3. In combination, a reciprocating rod, a

switch mechanism operated thereby, a spring adapted to force the rod in either direction, electroresponsive means adapted to compress said spring, a catch adapted to engage and to restrain the movement of said rod during the compression of said spring, and electroresponsive means for disengaging said catch.

4. In combination, a spring-operated reciprocating rod, a switch mechanism operated by the movement of said rod, electroresponsive means for compressing the spring in either direction, and means for releasing said rod.

5. In combination, a spring-operated reciprocating rod, a switch member operated by the movement of said rod, electroresponsive means for compressing the spring in either direction, a catch adapted to restrain the movement of said rod during the compression of the spring, and electroresponsive means for disengaging said catch.

6. In combination, a spring, a reciprocating member adapted to compress said spring in either direction, a motor for driving said reciprocating member, a clutch between said member and said motor, means for disengaging said clutch when said spring is compressed, a rod tending to move in either direction when the spring is compressed, means for releasing said rod, and a switch mechanism operated by the movement of said rod.

7. In combination, a spring, a reciprocating member adapted to compress said spring in either direction, a motor for driving said reciprocating member, a clutch between said member and said motor, means for disengaging said clutch when said spring is compressed, a rod tending to move in either direction when said spring is compressed, a catch for restraining the movement of said rod during the compression of said spring, electroresponsive means for disengaging said catch, and a switch mechanism operated by the movement of said rod.

8. In combination, a spring, a switch-rod operated thereby, a member adapted to compress said spring, a motor for driving said member, a clutch between said member and said motor, means for disengaging said clutch when said spring is compressed, means for releasing said rod, and means actuated by the movement of said rod for reëngaging said clutch.

9. In combination, a reciprocating rod, a switch mechanism operated thereby, an electric motor, means driven by said motor adapted to urge said rod in either direction, a catch for restraining the movement of said rod, and electroresponsive means for disengaging said catch.

10. In combination, a rod, a switch mechanism operated thereby, a spiral spring surrounding and engaging said rod, a reciprocating member adapted to engage and compress said spring at either end, means for restraining the movement of said rod during the compression of said spring, and means for releasing said rod.

11. In combination, a rod, a switch mechanism operated thereby, a spiral spring surrounding and engaging said rod, electroresponsive means for engaging and compressing said spring at either end, a catch engaging said rod, and electroresponsive means for disengaging said catch.

Signed at Pittsfield, Massachusetts, this 11th day of June, 1903.

GILBERT WRIGHT.
HAROLD C. WHITE.

Witnesses:
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R. E. HAYNES.