No. 654,325. Patented July 24, 1900.

W. F. RICHARDS.

AUTOMATIC SWITCH FOR ELECTRIC CAR LIGHTING APPARATUS.

(Application filed Mar. 12, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

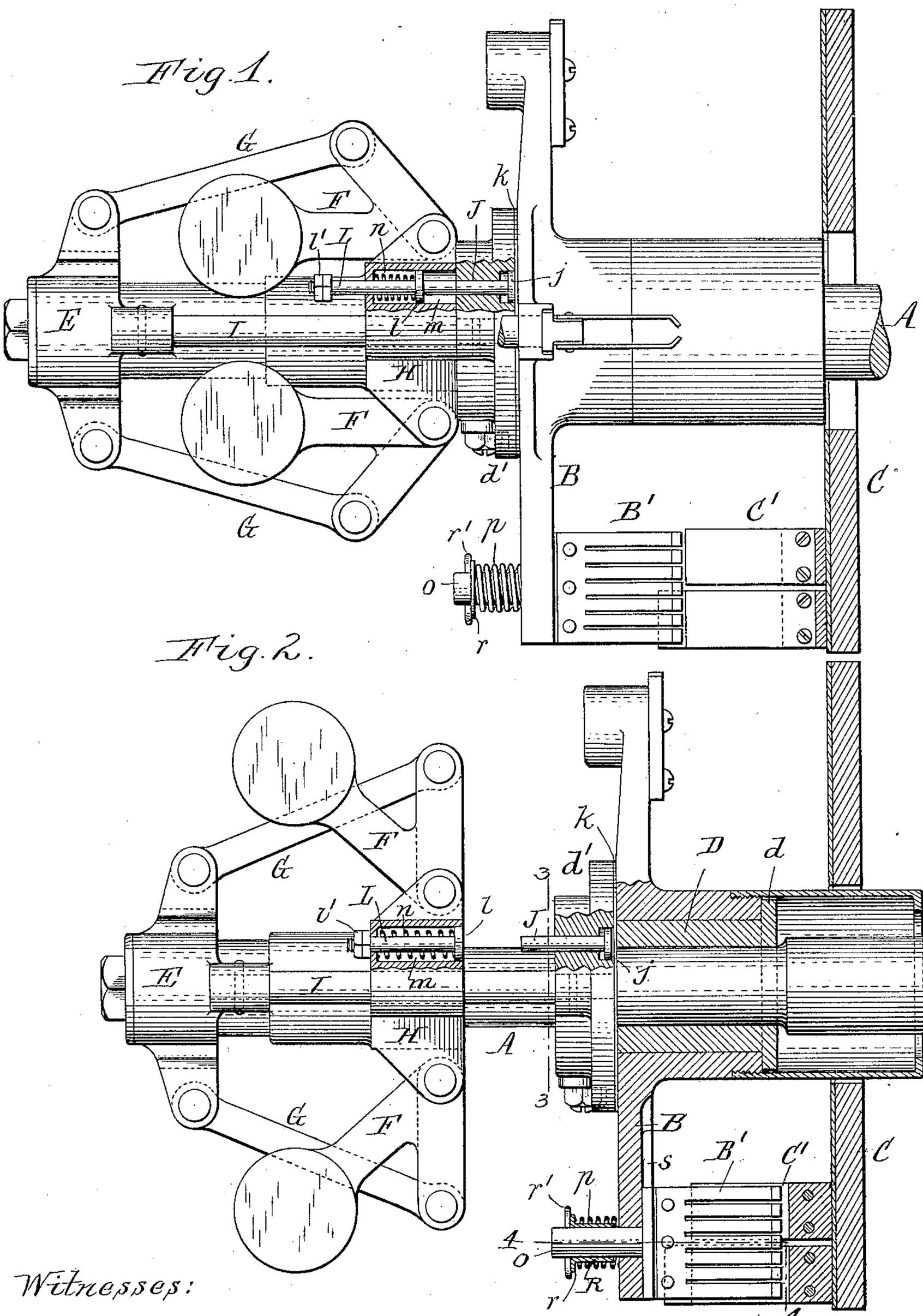

Fig. 2.

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Fig. 3.

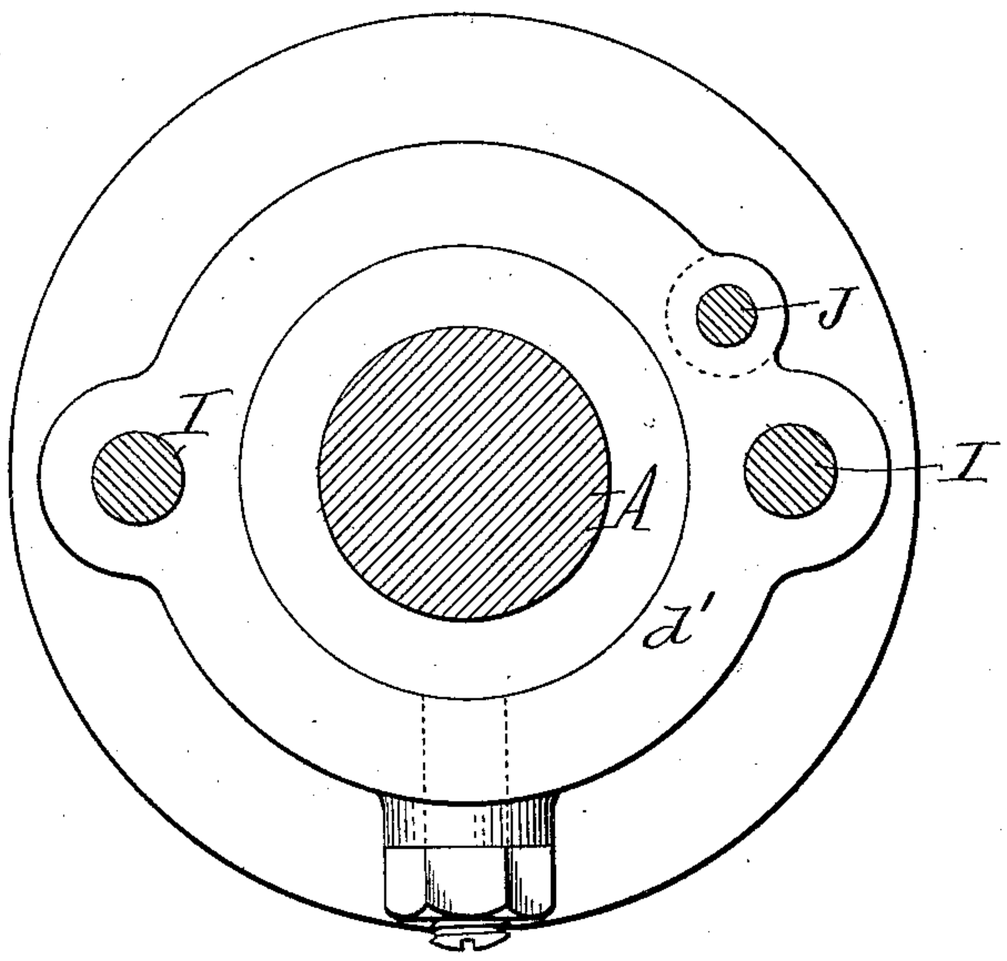


Fig. 5.

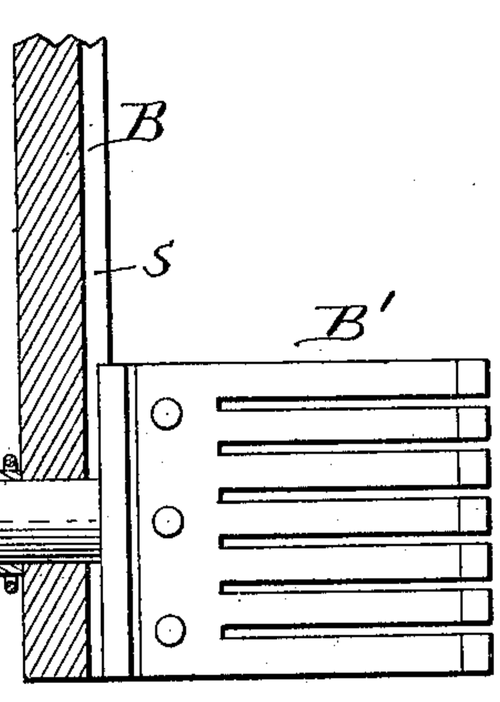
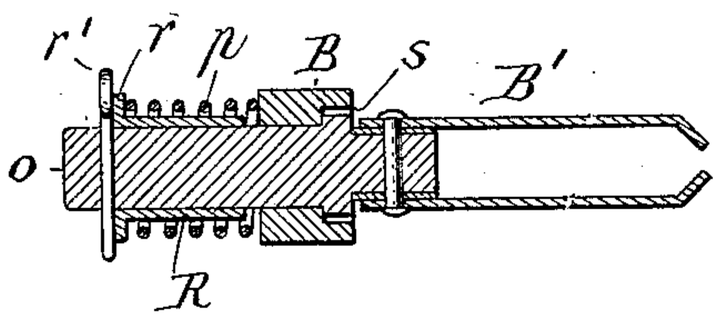


Fig. 4.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC SWITCH FOR ELECTRIC CAR-LIGHTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 654,325, dated July 24, 1900.

Application filed March 12, 1900. Serial No. 8,385. (No model.)

To all whom it may concern:

Be it known that I, WILLARD F. RICHARDS, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Automatic Switches for Electric Car-Lighting Apparatus, of which the following is a specification.

This invention relates to the automatic switches which are employed in connection with the electric car-lighting apparatus of railway-cars, and which consist of a reversible switch-lever which coöperates with two sets of contacts on the switchboard of the dynamo of the lighting apparatus, so that the lever connects the contacts of one set when the armature-shaft of the dynamo runs in one direction and connects those of the other set when the shaft runs in the opposite direction. Automatic switches of this kind are shown and described in Letters Patent of the United States No. 602,182, dated April 12, 1898, and No. 617,121, dated January 3, 1899, both granted to E. J. Preston and A. B. Gill, to which reference is made for a full description of such a switch. A switch of this kind having a governor similar to that herein shown is shown and described in an application for patent filed by me June 5, 1899, Serial No. 719,434. In this class of switches the oscillating switch-lever is mounted loosely on a carrying-sleeve which is free to slide on the armature-shaft, but which is compelled to turn therewith, so that upon starting the dynamo the switch-lever is caused to turn in the same direction as the armature-shaft by the frictional contact of the lever with the shaft until the lever strikes a stop on the switchboard. This stop arrests the lever in the proper position to bring its contact-plugs in line with a set of opposing contact-sockets of the switchboard preparatory to the forward movement of the lever produced by the centrifugal governor which controls the sliding movement of the lever. As the switch-lever is loose on its carrying-sleeve, it is liable to rebound or become displaced upon striking against one or the other of its stops, and when this occurs the contact-plugs of the lever are thrown out of register with their companion sockets on the switchboard and do not properly enter the same when the lever is moved inwardly by the spreading weights of the centrifugal governor.

The principal object of my invention is to provide a simple checking device for the switch-lever which, while permitting the automatic reversing movements of the lever, exerts sufficient pressure upon the same to hold it against displacement in either of its extreme positions, thereby insuring the proper entrance of its contact-plugs into the opposing contact-sockets.

Another object of my invention is to improve the construction of the contact-plugs carried by the switch-lever.

In the accompanying drawings, consisting of two sheets, Figure 1 is a side elevation of the switch-lever and its governor, partly in section, showing the lever in its outer position, in which the friction pin or shoe operates upon the same. Fig. 2 is a sectional elevation of the parts, showing the friction-pin out of engagement with the switch-lever. Fig. 3 is a transverse section in line 3 3, Fig. 2. Fig. 4 is a longitudinal section in line 4 4, Fig. 2. Fig. 5 is a fragmentary sectional elevation of the switch-lever and one of its contact-plugs, showing the position of the plug in the act of leaving the switchboard-socket.

Like letters of reference refer to like parts in the several figures.

A is the armature-shaft of the dynamo.

B is the switch-lever, B′, one of its contact-plugs, and C the switchboard having the contact-sockets C′, which receive the plugs B′.

D is the sleeve mounted on the armature-shaft and carrying the switch-lever. This sleeve is free to slide on the shaft for moving the switch-lever toward and from the switchboard, and the lever is confined against endwise movement on the sleeve by a flange *d*, formed at the inner end thereof, and a collar *d*′, secured to its outer end.

E is the longitudinally-movable head of the centrifugal governor; F, the weighted elbow-levers, having their short arms connected with said head by links G, and H is the stationary collar or bracket, which is secured to the armature-shaft and to which said weighted levers are pivoted in such manner that the head is shifted inwardly by the outward

movement of the weights and outwardly by the inward movement of the weights.

I represents longitudinal rods which connect the collar *d'* of the carrying-sleeve D with the sliding head E, so that the sleeve and the switch-lever mounted thereon are compelled to move longitudinally with the governor-head.

J is a friction pin or shoe arranged to slide in the collar *d'* lengthwise of the armature-shaft and adapted to bear at its inner end against the adjacent end of the hub of the switch-lever B, preferably through the intervention of a thin steel wear-plate *k*, loosely interposed between said hub and the inner face of said collar, so as to retard the oscillating movement of the reversible switch-lever in swinging from one extremity of its movement to the other. This friction-pin is provided at its inner end with a flat head *j* to increase its bearing-surface, and the pin is guided loosely in an opening formed in the collar *d'*, as shown.

L is a yielding pressure rod or plunger, which is arranged in the collar or bracket H in line with the friction-pin J and against which the projecting outer end of this pin abuts in the retracted or outermost position of the switch-lever, as shown in Fig. 1, so that said plunger exerts a yielding pressure against the friction-pin and causes the latter to force the wear-plate *k* against the hub of the switch-lever. The pressure-rod L slides in a socket *m*, formed in the bracket H, parallel with the armature-shaft, and is provided at its front or inner end with a head *l*, while its rear end passes through an opening formed in the closed rear end of said socket and is provided with nuts *l'*, forming a stop which limits the inward movement of the pressure-rod. *n* is a spring surrounding this rod between the head *l* and the closed outer end of the socket *m* and resisting the outward movement of said rod.

When the dynamo is at rest, the weighted governor-levers F are in their innermost position, the sliding governor-head E is in its outermost position, and the switch-lever is in its initial or retracted position, in which the collar *d'* of the carrying-sleeve D bears against the bracket H, as shown in Fig. 1. In this position of the parts the outer end of the friction-pin J bears against the pressure-rod L, which latter occupies its outer position, and the spring *n* of this rod is compressed and exerts its pressure against the hub of the switch-lever through the friction-pin. When the switch-lever is caused to turn with the armature-shaft by the starting of the dynamo, the friction-pin retards or checks the rotary movement of said lever to such a degree as to prevent the same from rebounding from one or the other of the stops which determine its stroke, thereby preventing accidental displacement of the lever and holding the same in the proper position to insure the entrance of its contact-plugs into the opposing contact-sockets of the switchboard. When the sliding switch-lever is moved toward the switchboard by the spreading of the governor-weights due to the increasing speed of the dynamo, the friction-pin J recedes from and leaves the pressure-rod L, as shown in Fig. 2. In this position of the lever its contact-plugs are in engagement with the contact-sockets of the switchboard, and no checking device is therefore required under these conditions.

The contact-plugs B' of the switch-lever are preferably capable of a rotary or swiveling movement on the lever, so that they can accommodate themselves to any imperfections or irregularities of the switchboard-sockets, as described and shown in my pending application for patent hereinbefore referred to.

o is the rearwardly-extending stud of the contact-plug, which is journaled in an opening of the switch-lever and which is also capable of sliding lengthwise in said opening.

p is a spring applied to the projecting portion of the stud *o* and tending to hold the plug against the front side of the switch-lever. This spring bears at its front end against the rear side of the switch-lever and at its opposite end against a flange *r*, formed on the outer end of a stop-sleeve R, which surrounds the projecting portion of the stud. This stop-sleeve abuts at its outer end against a pin or cotter *r'*, passing through the stud *o*. The head of the contact-plug B' is seated in a longitudinal groove or depression *s*, formed in the front side of the switch-lever and made somewhat wider than said head, so as to permit the plug to turn or swivel to a limited extent.

Heretofore the cotter *r'* has been arranged to bear directly against the rear side of the switch-lever. In case of any imperfection in the stud of the plug or the opening in which it turns the stud is liable either to be held too tightly by the cotter and bind or to fit too loosely and wabble on the lever. By lengthening the stud of the plug and interposing the spring *p* between the cotter *r'* and the switch-lever the cotter cannot cause binding of the stud, while the spring, which is under tension at all times, draws the plug against the lever and holds it in its proper position. When the switch-lever is retracted and the contact-plug is withdrawn from the contact-socket of the switchboard, the lever slides on the stud of the plug and further compresses its spring *p* until the lever comes in contact with the inner end of the stop-sleeve R, as shown in Fig. 5, when the lever positively withdraws the plug from its socket. When the sliding switch-lever thus recedes from the switchboard, the stop-sleeve R relieves the spring and prevents the entire withdrawal of the contact-plug from the groove *s* of the switch-lever. For this purpose this sleeve is made of such a length that on the normal position of the parts shown in Fig. 2 the distance between the inner end of the stop-sleeve and the rear side of the

switch-lever is less than the depth of the groove.

I claim as my invention—

1. The combination with the armature-shaft of a dynamo, of an oscillating switch-lever mounted on said shaft and capable of sliding lengthwise thereof, a centrifugal governor mounted on the dynamo-shaft and connected with said switch-lever, and a frictional checking device arranged to retard the oscillating movements of said switch-lever, substantially as set forth.

2. The combination with the armature-shaft of a dynamo, of a reversible switch-lever mounted on said shaft and capable of a combined sliding and oscillating movement, a friction-pin carried by said switch-lever and adapted to press against the same for checking its oscillating movement, and a yielding pressure-rod carried by the armature-shaft and arranged in line with said friction-pin, substantially as set forth.

3. The combination with the armature-shaft of a dynamo, of a carrying-sleeve mounted on said shaft and provided at its outer end with a collar or flange, a reversible switch-lever mounted on said sleeve, a longitudinal friction-pin guided in said collar and adapted to press against said switch-lever for checking its oscillating movement, a centrifugal governor having weighted levers and connected with said carrying-sleeve, a bracket carrying said weighted levers and secured to the armature-shaft, and provided with a longitudinal socket which is arranged in line with said friction-pin, a pressure-rod guided in said socket, and a spring surrounding said pressure-rod and resisting the outward movement thereof, substantially as set forth.

4. The combination with a contact-socket, of a switch-lever carrying a contact-plug which is adapted to enter said socket and which is provided with a rearwardly-extending stud capable of sliding in an opening of said lever, and a spring applied to said stud and tending to hold the plug against the lever, substantially as set forth.

5. The combination with a switch-lever, provided in its front side with a groove, of a swiveling contact-plug having its head seated in said groove and provided with a rearwardly-extending stud which is journaled in an opening of said lever, a stop-sleeve applied to said stud on the rear side of the switch-lever and permitting a limited sliding movement of the stud in its opening, and a spring surrounding the stud and said sleeve and resisting the forward movement of the stud, substantially as set forth.

Witness my hand this 3d day of March, 1900.

WILLARD F. RICHARDS.

Witnesses:
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CLAUDIA M. BENTLEY.