

No. 635,373.

Patented Oct. 24, 1899.

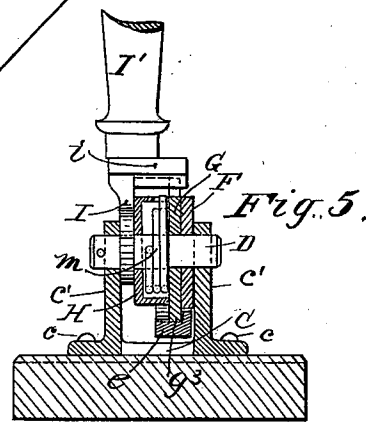
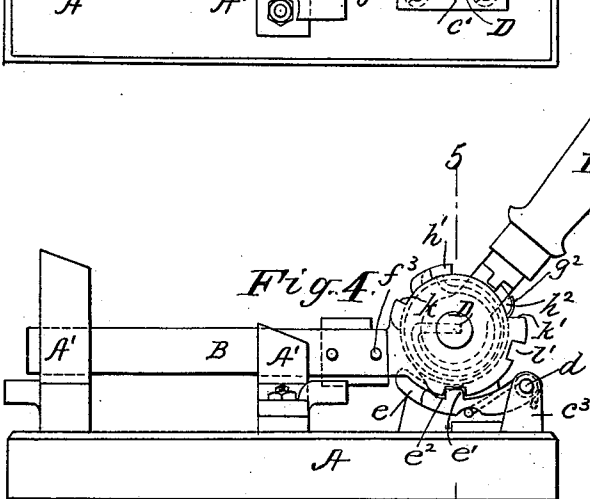
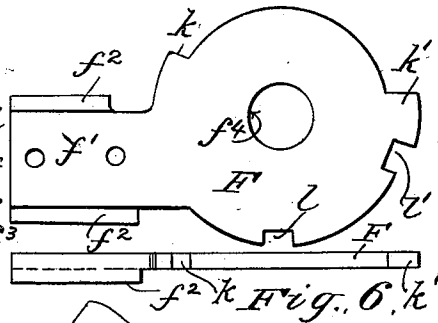
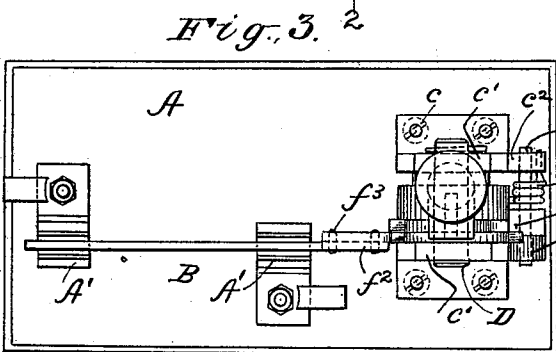
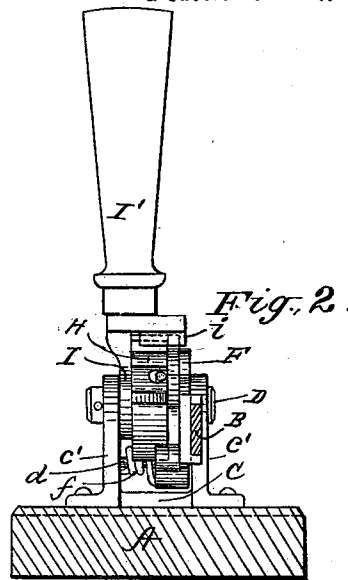
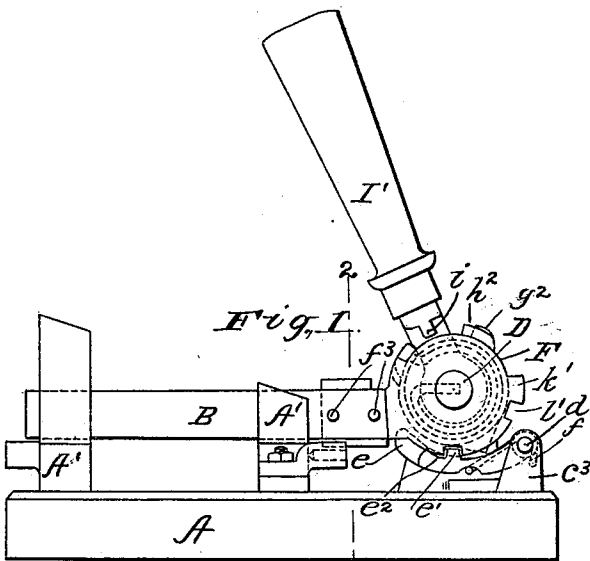
L. W. DOWNES & W. T. SHERMAN.

ELECTRIC SWITCH.

(Application filed Jan. 28, 1899.)

(No Model.)

2 Sheets—Sheet I.



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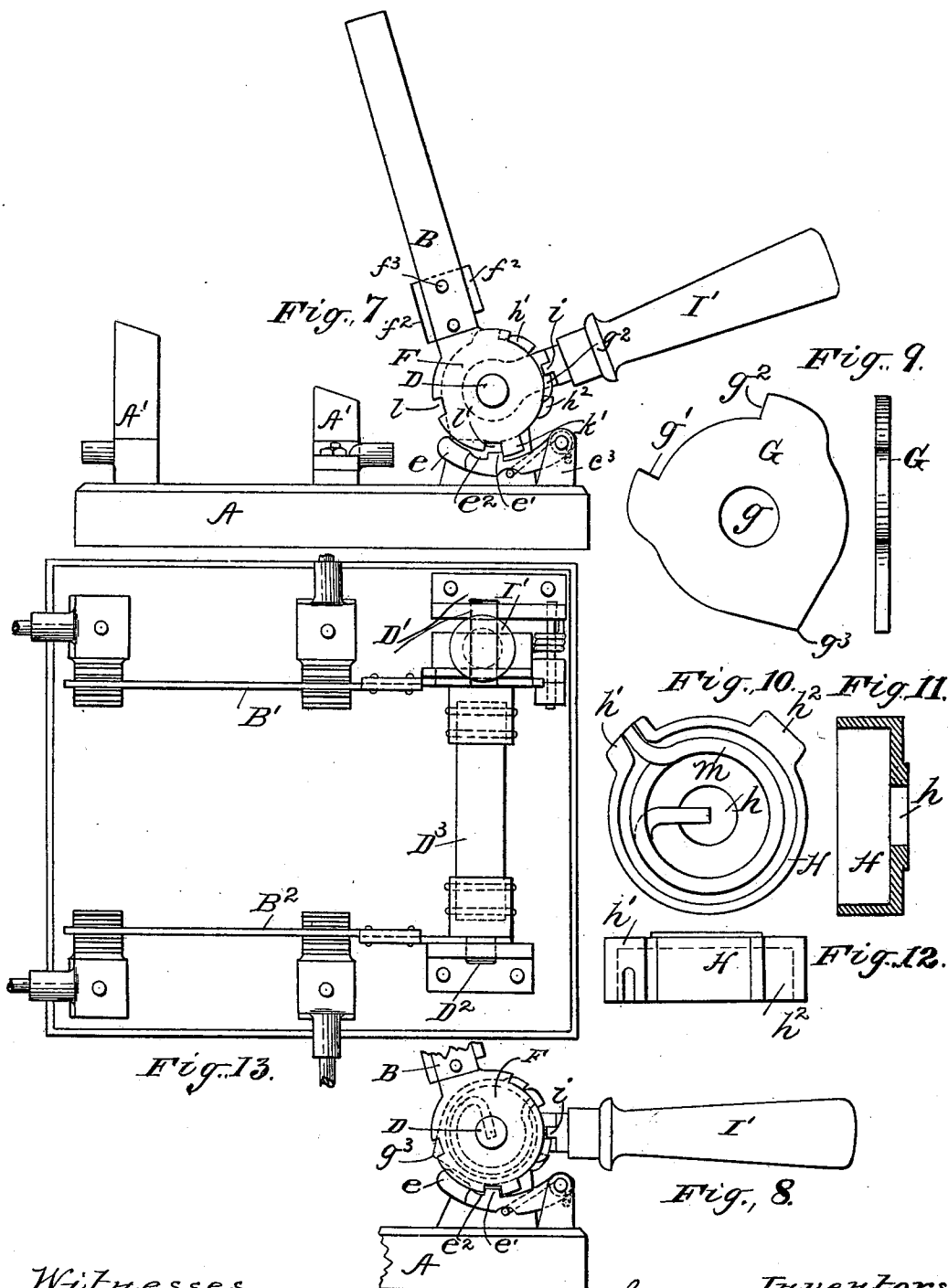
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

LOUIS W. DOWNES, OF PROVIDENCE, AND WILLIAM T. SHERMAN, OF EDEN PARK, RHODE ISLAND, ASSIGNORS TO THE D. & W. FUSE COMPANY, OF PROVIDENCE, RHODE ISLAND.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 635,373, dated October 24, 1899.

Application filed January 28, 1899. Serial No. 703,726. (No model.)

To all whom it may concern:

Be it known that we, LOUIS W. DOWNES, a resident of the city of Providence, and WILLIAM T. SHERMAN, a resident of Eden Park, State of Rhode Island, have invented a new and useful Improvement in Electric Switches, which invention is fully set forth in the following specification.

Our invention relates to improvements in electric switches, and particularly to such as enable the switch-blade to be moved with great rapidity in the act of opening or closing a circuit. It is well known that if with a high-tension current the blade of the switch moves away from the contact-jaws at only a moderate velocity the tendency is to form and maintain an arc between the blade and contacts, the heat of which, if allowed to continue for a small fraction of a second, has a tendency to increase the volume of the flame or arc by the volatilization of the metal terminals, blistering or destroying the latter. Various methods and apparatus have been devised for overcoming this difficulty, among them quick-acting switches employing spring-actuated blades and wherein the spring is set to a considerable tension before acting upon the blade.

With the object of improving upon switches of the type last mentioned above by providing a construction that is superior to those heretofore proposed in points of compactness, simplicity, cheapness of manufacture, durability, and effectiveness in operation we have devised the switch which is shown in the accompanying drawings, wherein—

Figure 1 is a side elevation of a single-pole switch, showing the same in the closed position and part of the support removed. Fig. 2 is a vertical sectional view on line 2 of Fig. 1 looking to the right. Fig. 3 is a top plan view. Fig. 4 is a side elevation similar to Fig. 1, but showing the handle moved over toward the right, as in the act of opening the switch. Fig. 5 is a vertical sectional view on line 5 of Fig. 4. Fig. 6 shows detail views of the plate to which the pole or blade of the switch is attached. Fig. 7 is a side elevation of the switch, showing the parts in the position

which they occupy just after the pole or blade has been raised to break the circuit. Fig. 8 is a fragmentary side elevation showing the position assumed by the several parts when they finally come to rest with the switch open. Fig. 9 shows detail views of the actuating-cam. Fig. 10 is an elevation, and Fig. 11 a sectional view, of the cup-casing for the actuating-spring, the spring being shown in the casing in Fig. 10. Fig. 12 is a top plan view of Fig. 10. Fig. 13 is a top plan view of a two-pole switch embodying my invention.

Referring to Figs. 1 to 11 of the drawings, A is a base, upon which are mounted two contacts A' A', each consisting of two spring-jaws, between which switch pole or blade B is adapted to engage to complete the circuit from one contact to the other.

C is a casting secured on base A by screws *c*, Figs. 3 and 5, and having two upwardly-extending arms *c'* *c'*. A shaft D is loosely mounted in bearings in the upper ends of arms *c'*. Frame C also has ears *c²* *c³* thereon, between which extends a pin *d*, constituting the pivot of a detent or catch *e*, having a rectangularly-shaped tooth *e'* on its upper surface, at one edge thereof, as shown in Figs. 1, 4, and 5, and an incline *e²*. (Shown best in Fig. 7.)

f is an actuating-spring for the detent *e*, one end of said spring engaging under the detent, the convolutions thereof surrounding pin *d*, and the other end being fixed in ear *c²*, as clearly shown in Fig. 3.

On shaft D, between the arms *c'* *c'*, are mounted, first, a plate F, carrying the switch pole or blade B; second, a cam-disk G; third, cup-shaped casing H, and, fourth, a handle-plate I. All of these parts, with the single exception of plate F, are mounted loosely on shaft D, which passes through suitable openings therein.

We will now describe the construction and functions of the several parts more in detail.

Plate F, which is most clearly shown in Fig. 6, has a central opening *f¹*, in which shaft D is fixed, and an extension *f'*, said extension having parallel flanges *f²* *f²* along opposite edges thereof. Switch-blade B rests at one

end against the flat face of extension f' , fitting closely between flanges $f^2 f^2$, and is secured in place by rivets $f^3 f^3$. On the upper edge of the plate F are two shoulders—one, k , in proximity to the extension f' and the other formed by one edge of a projecting tooth k' . In the under edge of the plate are formed two rectangularly-shaped notches $l l'$, the latter being contiguous to tooth k' . These notches are adapted to be engaged by detent-tooth e' to positively lock the plate, and hence shaft D and blade B, in the open or closed positions of the latter, in a manner to be more fully explained hereinafter.

The cam-disk G, which is of the peculiar shape most clearly shown in Fig. 9, has a central opening g , through which shaft D loosely passes, and has on its upper edge two shoulders $g' g^2$, facing each other. The cam-surface on the lower edge of plate G rises from opposite directions to apex or point g^3 . In operation the cam-surface is adapted to act against the upper face of detent e , as clearly shown in Figs. 1, 4, 5, and 7, to disengage detent-tooth e' from notches $l l'$ in the edge of plate F.

Cup-shaped casing H (see Figs. 9 and 10) has a central opening h , through which shaft D loosely passes, and has two elongated lugs $h' h^2$ projecting from its peripheral surface. In this casing and about the shaft D is located a coiled spring m , secured at opposite ends in openings in lug h' and shaft D, respectively, as clearly shown in Figs. 1 and 9.

Handle-plate I carries a handle I' and is formed with an overhanging part, on the under side of which is a tooth i' , adapted by engagement with the shoulders, teeth, and lugs on the several parts to operate said parts in a manner that will be best understood from the explanation of the operation given below.

The operation of the switch is as follows: The switch being closed, as shown in Fig. 1, the detent-tooth e' by engagement with notch l locking it in that position, the operator grasps handle I' and moves it to the right. In this movement the tooth i on the handle-plate first strikes lug h^2 , (see Fig. 4,) rotating casing H. In its further movement tooth i strikes shoulder g^2 on cam-disk G, thereby rotating the cam. Thus as the handle moves around to the right it not only winds up spring m , but also moves point g^3 of the cam-disk around against the incline e^2 on detent e , finally after the spring has reached a considerable tension disengaging tooth e' from notch l . Plate F and shaft D, being thereby released, will be rotated under the action of spring m , throwing the blade B upwardly, by a sudden and very rapid movement, to the position shown in Fig. 7, the tooth k' striking the detent-tooth e' , (detent e being now released by cam-disk G,) and the latter dropping into notch l' to lock the switch in its open position, as shown in Fig. 8. To close the switch, the handle I' is moved to the left, Fig. 7, the tooth i' making contact with lug h' and shoulder g' in succession, rotating

casing H and cam-disk G, thereby distending spring m to a considerable tension and moving detent e to disengage its tooth e' from notch l' . At this instant, plate F being released, the spring acts to lower the blade B to the position shown in Fig. 1 with a very rapid movement. In the movement of the plate F the shoulder k and tooth k' , by coming in contact with the tooth i while handle I' is still in the grasp of the operator, act to bring the plate F and blade B to a stop without strain or shock to the other parts of the switch.

In Fig. 13 we have shown a switch having two poles B' and B^2 , the pole B^2 being connected to a short shaft D^2 , connected to shaft D' (corresponding to shaft D already referred to) by coupling D^3 , of any insulating material, preferably hard fiber. In other respects the construction and operation of the double-pole switch are the same as that of the single-pole switch already described.

What we claim as our invention is—

1. In an electrical switch, a shaft rotatably mounted in suitable bearings, a switch-blade movable with said shaft, contacts for said switch-blade, an actuating-spring coiled about and having one end secured to the shaft, an operating-lever adapted by movement in opposite directions to move the other end of the spring and thereby place the same under tension for rotating the shaft to open and close the switch, a detent for locking the blade in its open or closed position, and means acting on the detent to automatically release the blade when the spring has been set to a predetermined tension both in opening and closing the switch, substantially as described.

2. In an electric switch a shaft rotatably mounted in suitable bearings, a switch-blade movable with said shaft, contacts for said switch-blade, a plate on the shaft having notches in the edge thereof, a detent engaging said notches to lock the switch-blade in its open or closed position, an actuating-spring coiled about and having one end secured to the shaft, a handle adapted by movement in opposite directions to move the other end of the spring and thereby place the same under tension for rotating the shaft to open or close the switch, and a cam operated by said handle and acting on the detent to disengage it from the notches in the plate after the spring has been set to a predetermined pressure, as set forth.

3. In an electric switch, the combination with a shaft rotatably mounted in suitable bearings, a switch-blade movable with said shaft, contacts for the switch-blade, a notched plate fixed to the shaft, a detent engaging said notched plate to lock the blade in its open or closed position, a spring one end of which is secured to the shaft, an inclosing casing for the spring to which its other end is secured, said casing being rotatable on the shaft, an operating-cam for the detent mounted loosely on the shaft, and an operating-handle movable on the shaft as a pivot and hav-

ing thereon a tooth adapted to travel in the path of projections on the spring-inclosing casing and cam, whereby on movement of the handle the actuating-spring is first set to a predetermined tension and the detent then disengaged from the notched plate, freeing the shaft so that it may be rotated by the spring, substantially as described.

4. In an electric switch the combination with a shaft rotatably mounted in suitable bearings, a switch-blade movable with said shaft, contacts for the switch-blade, a notched plate fixed to the shaft, a detent engaging said notched plate to lock the blade in its open or closed position, a spring one end of which is secured to the shaft, an inclosing casing for the spring to which its other end is secured, said casing being rotatable on the shaft, an actuating-cam for the detent mounted loosely on the shaft, and an operating-handle movable on the shaft as a pivot and having thereon a tooth adapted to move between two projections on the spring-inclosing casing and two projections on the cam, whereby movement of the handle in opposite directions for opening or closing the switch, respectively, acts first to set the spring to a predetermined tension and then to rotate the cam to disengage the detent from the notched plate, freeing the shaft so that it may be rotated by the spring, substantially as described.

5. In an electric switch a rotatable shaft

journalled in bearings in the upper ends of two supporting-arms between which the parts mounted on the shaft are located, a notched plate fixed on said shaft and carrying a switch blade or pole, contacts for said pole, a spring-actuated detent adapted to engage the notches in the notched plate to lock the switch-blade in its open or closed position; a cam-disk loosely mounted on the shaft and adapted to move said detent out of engagement with the notched plate, an actuating-spring connected at one end to the shaft, an inclosing casing for the spring to which its other end is connected, said casing being mounted loosely on the shaft, an operating-handle mounted to turn on the shaft and having a tooth overhanging the edges of the cam-disk and spring-inclosing casing, and projections on said disk and casing with which the tooth is adapted to engage to rotate said parts when the handle is moved in a direction either to open or close the switch, whereby the spring is first wound to a predetermined pressure and the detent then removed to release the notched plate and blade, substantially as described.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

LOUIS W. DOWNES.

WILLIAM T. SHERMAN.

Witnesses:

HENRY W. HAYES,

HENRY A. PALMER.