

T. ZIMMERMAN.
SWITCH.

APPLICATION FILED MAR. 4, 1915.

1,362,661.

Patented Dec. 21, 1920.

2 SHEETS—SHEET 1.

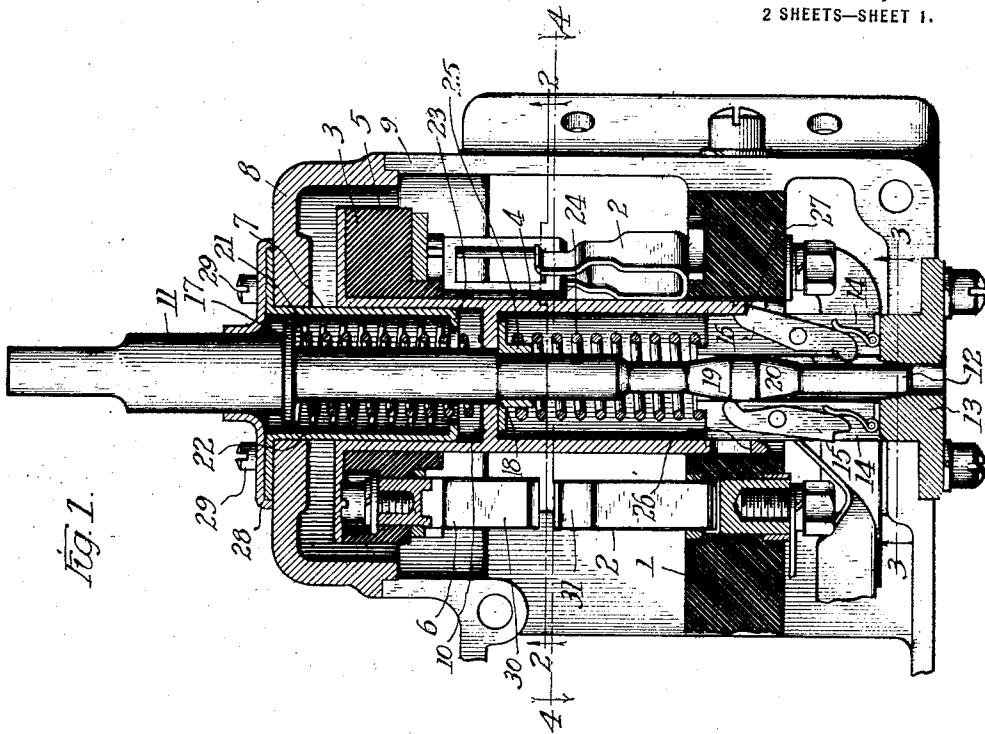


Fig. 1.

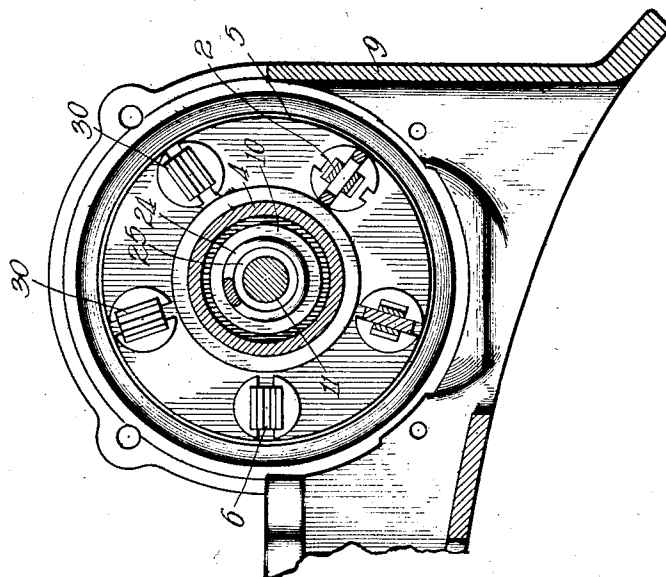


Fig. 2.

Witnesses:
Robert A. Weir
Jesse A. Holton

Inventor
Thomas Zimmerman
Edwin B. H. Tower Jr.
Atty.

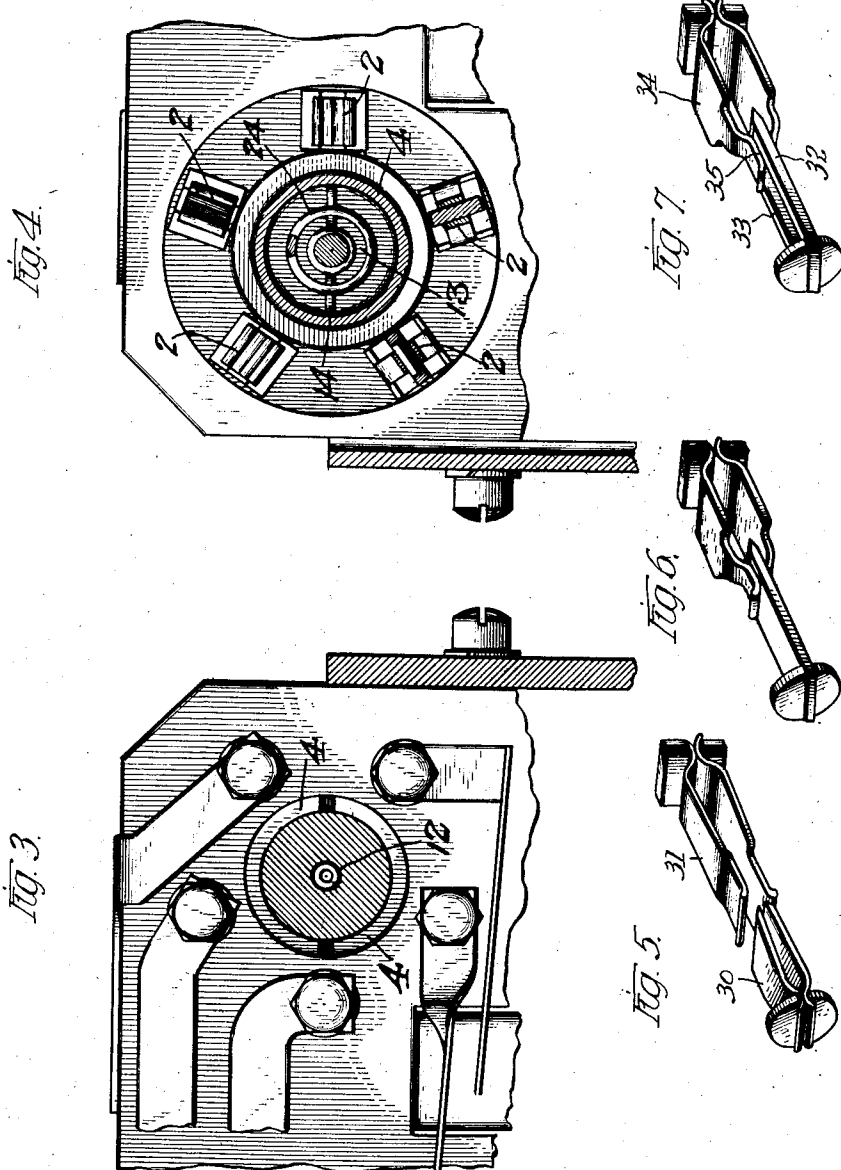
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UNITED STATES PATENT OFFICE.

THOMAS ZIMMERMAN, OF NIAGARA FALLS, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO U. S. LIGHT & HEAT CORPORATION, OF NIAGARA FALLS, NEW YORK, A CORPORATION OF NEW YORK.

SWITCH.

1,362,661.

Specification of Letters Patent.

Patented Dec. 21, 1920.

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To all whom it may concern:

Be it known that I, THOMAS ZIMMERMAN, a citizen of the United States, residing at Niagara Falls, in the county of Niagara and State of New York, have invented new and useful Improvements in Switches, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

This invention relates to switches and with regard to certain more specific features thereof, to manually operated, double snap switches.

It is one of the objects of the invention to provide a simple and reliable switch having an instantaneous action in opening and closing which is irrespective of the character of the pressure applied by the operator.

It is another object of the invention to provide a switch that may be readily manufactured and assembled.

Still another object lies in the provision of improved contact structure, whereby the making and breaking arcs, if any, are drawn across points not in engagement during the period of activity of the switch as a conductor.

Other objects will be in part obvious and in part pointed out hereinafter.

In the drawings, wherein is shown one of the various possible embodiments of the invention—

Figure 1 is a vertical central sectional view of a switch embodying the invention.

Fig. 2 is a view in transverse section, taken on the line 2, 2, of Fig. 1.

Fig. 3 is a view in transverse section taken on line 3, 3 of Fig. 1.

Fig. 4 is a view in transverse section taken on the line 4, 4, of Fig. 1.

Figs. 5, 6 and 7 are perspective views of the different types of contacts employed.

The present embodiment of the invention shown and described includes a fixed contact support 1, upon which are mounted five stationary contacts 2. A contact carrier 3 comprises a tubular member 4, having fixed therewith an insulation block 5 and five contacts 6 positioned opposite the contacts 2 respectively and movable to engage therewith. The tubular member 4 of the carrier has an exterior slide bearing on the fixed support 1 and an interior slide bearing on a second

tubular member 7, which in turn is secured to the top 8 of the housing 9 and depends therefrom. About centrally of the tubular member 4, a transverse projection 10 is provided through which a plunger 11 is adapted to move and the lower end 12 of this plunger has a slide bearing on a bushing 13 secured to the housing 9 in fixed relation to the fixed support 1. This bushing extends upwardly for a considerable distance and provides a second interior slide bearing for the lower end of the tubular member 4. The bushing 13 is also diametrically slotted as indicated at 14, and pivoted between the walls formed by the slot or slots 14 are two latches 15 and 16 which are adapted to cooperate with the contact carrier 3, in a manner hereinafter to be described.

The operating plunger 11 comprises a flange 17 at or near the top 8 of the housing, a shoulder 18 and cam portions 19 and 20. A coil compression spring 21 surrounds the plunger 11 and bears against the flange 17 and projection 10 of the carrier. A coil compression spring 22 bears against the flange 17 of the plunger and an inwardly projecting flange 23 on the second tubular member 7. A third coil compression spring 24 is arranged about the plunger 11 below the transverse projection or flange 10 of the carrier, and bears against the upper face of the bushing 13 and a flange on a flanged collar 25 loosely mounted on the plunger 11 and adapted to be actuated by the same by means of the shoulder 18.

The latch 15 is spring-pressed to cooperate with the latch portion 26 of the tubular member 4 and the latch 16 is spring-pressed to cooperate with the latch portion 27 of said member. The tubular member 7 is held in position by a cap 28 attached to the top 8 of the housing as by means of screws 29.

It will be noted that the above described construction provides five pairs of contacts, and upon reference to Figs. 5, 6 and 7 of the drawings it will be seen that the contacts of one of these pairs are adapted to have continual engagement. This pair is shown in Fig. 6. Three of the pairs of contacts correspond to the one shown in Fig. 5, which comprises a bifurcated male contact mounted on the carrier and a bifurcated female contact mounted on the fixed support 1. The remaining pair is shown in

Fig. 7 and comprises a male contact 32 mounted on the carrier 3 and recessed as indicated at 33, and a bifurcated female contact 34 mounted on the fixed support 1, having a comparatively short contacting surface 35. The contact pairs shown in Figs. 5 and 7 are also clearly shown in Fig. 1, and it will be noted that upon engagement of the contacts comprising the pair shown in Fig. 5, the contacting surface 35 of the other pair passes out of engagement with the male contact 32. Accordingly, while the contacts 30 and 31 are in engagement, the contact surface 35 of contact 34 rests in the recess 33 on the contact 32.

In the operation of the switch, the plunger 11 is moved downwardly, and because of the fact that the latch 16 is holding the carrier 3 against downward movement, the coiled spring 21 is compressed. The coiled spring 22 is also compressed as the tubular member 7 is stationary. The compression of these two springs continues to store power until such time as the cam 20 rides against the lower end of the latch 16, and acting against the action of the spring which normally controls this latch, moves the latter out of operative engagement with the tubular member 4 of the carrier. This releases the carrier and permits it to be moved downwardly under the influence of the spring 21, it being obvious that this movement is substantially instantaneous and that the contacts will be engaged quickly and with considerable force, thus obviating the possibility of arcing and burning of the contacts. The downward movement of the plunger 11, carrying with it the flanged collar 25, also compresses the coiled spring 24 and permits the latch 15 to be urged by its spring into engagement with the latch portion 26 on the carrier 3. When the operator releases the plunger 11, the spring 22 will immediately restore the plunger to its original position. Upward movement of the flanged collar 25 is, however, temporarily prevented by the transverse projection 10 of the carrier, which at this time is in its lowermost position. However, as soon as the plunger is restored to its full original position, the cam 19 of the plunger releases the latch 15 and the carrier 3 is then free to move upwardly to disconnect the contacts under the influence of the spring 24, which is then under considerable compression. This completes the cycle of operation.

The construction of the contacts with respect to the surfaces susceptible of arcing is to be noted. On the male contacts there are beveled edges and on the female contacts the edges are flared, and while the entire device is designed for the purpose of obtaining instantaneous action and thereby obviating the possibility of sparking, the contacts are particularly designed to cooperate

with the instantaneous action thereof for the purpose of maintaining clean contacts, being so shaped that if an arc should be drawn it would be across points not in engagement during the period of activity of the switch as a conductor.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

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

1. In a switch, in combination, a fixed contact, a movable contact, coaxial springs adapted under different phases of operation to move said movable contact in opposite directions, said springs being mounted between different abutments whereby to be mutually unopposed, locking means adapted to hold the contacts in unengaged and engaged positions, a single manually operable member and means whereby movement of said member in one direction causes the loading of said springs, said member controlling the effectiveness of the locking means.

2. In a switch, in combination, a fixed contact, a movable contact, coaxial springs adapted under different phases of operation to move said movable contact in opposite directions, said springs being mounted between different abutments whereby to be mutually unopposed, a lock holding the movable contact out of engagement with the fixed contact, a manually operable member, and means whereby movement of said member in one direction causes said springs to store power to move said movable contact into and out of engagement with said fixed contact and releases said lock.

3. In a switch, in combination, a pair of relatively movable contacts, coaxial springs mounted between different abutments whereby to be mutually unopposed, said springs being adapted under different phases of operation to cause engagement and disengagement of said contacts, locking means adapted to secure said contacts against relative movement while energy is being stored in said springs, and a manually operable member, movement of which in one direction causes energy to be stored by said springs and controls the operation of the locking means.

4. In a switch, in combination, a fixed contact support, a contact arranged thereon, a carrier having a contact, said carrier comprising a movable sleeve, latches cooperating with said sleeve alternately to secure the carrier in different positions, a plurality

of mutually unopposed spring means reacting against said sleeve in opposite directions, and a plunger movable to cause compression of the spring means, one of said spring means being mounted to react between said plunger and said carrier, one of said spring means being mounted to react between said plunger and a fixed abutment.

5. In a switch, in combination, a fixed contact support, a contact arranged thereon, a carrier having a contact, said carrier comprising a movable sleeve, latches cooperating with said sleeve alternately to secure the carrier in different positions, a plurality of mutually unopposed spring means reacting against said sleeve in opposite directions, and a plunger movable to cause compression of the spring means and operate the latches, one of said spring means being mounted to react between said plunger and said carrier, one of said spring means being mounted to react between said plunger and a fixed abutment.

6. In a switch, relatively longitudinally movable contacts, coaxial mutually unopposed spring means arranged to react on said contacts in relatively opposite directions, movable means adapted by movement in one direction to load up said spring means for reaction in said opposite directions and positively acting means preventing engagement or disengagement of the contacts until an amount of power is stored by said spring means sufficient to cause substantially instantaneous relative movement of said contacts.

7. In a switch, relatively longitudinally movable contacts, coaxial mutually unopposed spring means arranged to react on said contacts in relatively opposite directions, and means comprising latches and a plunger cooperatively associated with said latches and spring means adapted to actuate said spring means to store power and preventing engagement or disengagement of the contacts until an amount of power is stored by said spring means sufficient to cause substantially instantaneous relative movement of said contacts, said plunger being adapted by movement in one direction to load up said spring means for reaction in said opposite directions.

8. In a switch, in combination, a contact carrier comprising a tubular member having a transverse portion and latch portions, a coiled compression spring on each side of said transverse portion, latches movable into and out of engagement with the latch portions of said tubular member, and an operating plunger comprising portions adapted upon movement in one direction to compress both springs and subsequently operate one of said latches to permit one of the compressed springs to actuate the carrier.

9. In a switch, in combination, a contact

carrier comprising a tubular member having a transverse portion and latch portions, a coiled compression spring on each side of said transverse portion, latches movable into and out of engagement with the latch portions of said tubular member, and an operating plunger comprising portions adapted upon movement in one direction to compress both springs and subsequently operate one of said latches to permit one of the compressed springs to actuate the carrier and upon movement in the opposite direction to operate another of said latches to permit the other compressed spring to actuate the carrier in the opposite direction.

10. In a switch, in combination, a contact carrier comprising a tubular member having a transverse portion and latch portion, a coiled compression spring on each side of said transverse portion, a latch movable into and out of engagement with the latch portion of said tubular member, an operating plunger comprising portions adapted upon movement in one direction to compress both springs and subsequently operate said latch to permit one of the compressed springs to actuate the carrier, a second tubular member fitting within the first said member, and an auxiliary coiled compression spring arranged to be acted upon by said plunger and react upon said second tubular member.

11. In a switch, in combination, a contact carrier comprising a tubular member having a transverse portion and latch portions, a coiled compression spring on each side of said transverse portion, latches movable into and out of engagement with the latch portions of said tubular member, an operating plunger comprising portions adapted upon movement in one direction to compress both springs and subsequently operate one of said latches to permit one of the compressed springs to actuate the carrier and upon movement in the opposite direction to operate another of said latches to permit the other compressed spring to actuate the carrier in the opposite direction, a second tubular member fitting within the first said member, and an auxiliary coiled compression spring arranged to be acted upon by said plunger and react upon said second member.

12. In a switch, in combination, a fixed support, contacts thereon, movable contacts, a carrier therefor comprising a tubular member longitudinally movable and having an interior and an exterior bearing, said interior bearing comprising a second tubular member fitting within the first, said exterior bearing being provided in the fixed support, a plunger arranged within said tubular members, latches controlled by said plunger arranged to secure the carrier automatically in positions of contact engagement and contact disengagement, a transverse projection

on said first tubular member, a member loosely mounted on said plunger below the transverse projection of said tubular member and adapted to be carried downwardly 5 by a shoulder on said plunger, and three coiled springs, two above said transverse projection, one reacting between said projection and said plunger and the other reacting between said second tubular member 10 and said plunger, and one below said projection reacting against the member loosely mounted on said plunger.

13. In a switch, in combination, a fixed contact, a movable contact, mutually unopposed 15 power-storing devices adapted to urge said movable contact in opposite directions, locking means adapted to hold said contacts in unengaged or engaged positions, and a single longitudinally movable member adapted 20 upon movement in one direction to cause loading of said devices, said member in its longitudinal movement being adapted to control the effectiveness of said locking means.

14. In a switch, in combination, a fixed 25 contact, a movable contact, coaxial mutually unopposed springs adapted to urge said movable contact in opposite directions, means adapted to hold said movable contact in unengaged and engaged positions, and a single 30 member adapted by a movement in one direction to load said springs, said member controlling the effectiveness of said holding means.

15. In a switch, in combination, a fixed 35 contact, a movable contact, coaxial mutually unopposed springs adapted to urge said movable contact in opposite directions, means adapted to hold said contact in unengaged position, and a single member adapted by 40 a movement in one direction to load said springs, said member controlling the effectiveness of said holding means.

16. In a switch, in combination, a fixed 45 contact, a movable contact, coaxial mutually unopposed springs adapted to urge said movable contact in opposite directions, means adapted to hold said contact in engaged position, and a single member adapted by a

movement in one direction to load said springs, said member controlling the effectiveness of said holding means. 50

17. In a switch, a fixed contact, a movable contact, means for holding said movable contact in either open or closed position, controlling means for said holding means, 55 energy-storing means for urging said movable contact to closed position, energy-storing means for urging said movable contact to open position, and energy-storing means for biasing said controlling means to a certain position, said energy-storing means being coaxial and mutually unopposed. 60

18. In a switch, in combination, a fixed contact, a movable contact, a carrier for said movable contact, a plunger, a spring 65 reacting between said plunger and said carrier adapted to move said carrier in one direction when said plunger is moved in that direction, a slider on said plunger, a spring 70 between said slider and a fixed portion of said switch, said slider being adapted to move said carrier in the opposite direction, locking means for said carrier, said locking means being responsive to said plunger.

19. In a switch, in combination, a fixed 75 contact, a movable contact, a carrier for said movable contact, a plunger, a spring reacting between said plunger and said carrier adapted to move said carrier in one direction when said plunger is moved in that direction, a slider on said plunger, a spring 80 between said slider and a fixed portion of said switch, said slider being adapted to move said carrier in the opposite direction, locking means for said carrier, said locking 85 means being responsive to said plunger, and spring means reacting between said plunger and a fixed part of said switch for biasing said plunger to a certain position.

In witness whereof I have hereunto subscribed my name in the presence of two witnesses. 90

THOMAS ZIMMERMAN.

Witnesses:

JESSE A. HOLTON.

MISS FAIRCHILD.