H. W. CRANE.

ELECTRIC SWITCH.

APPLICATION FILED AUG. 16, 1917.

1,283,682. Patented Nov. 5, 1918.

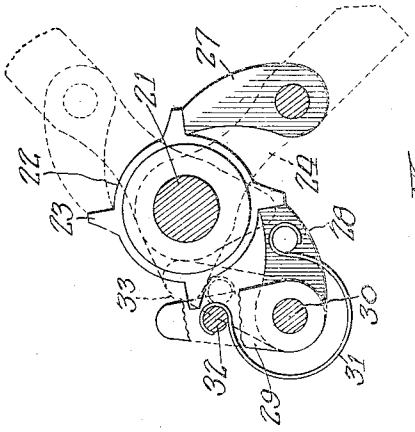


Fig. 3

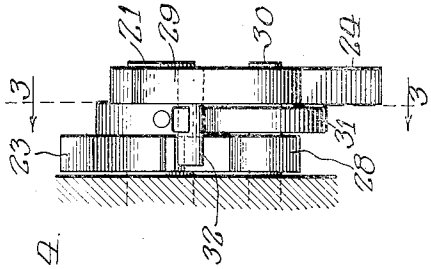


Fig. 4

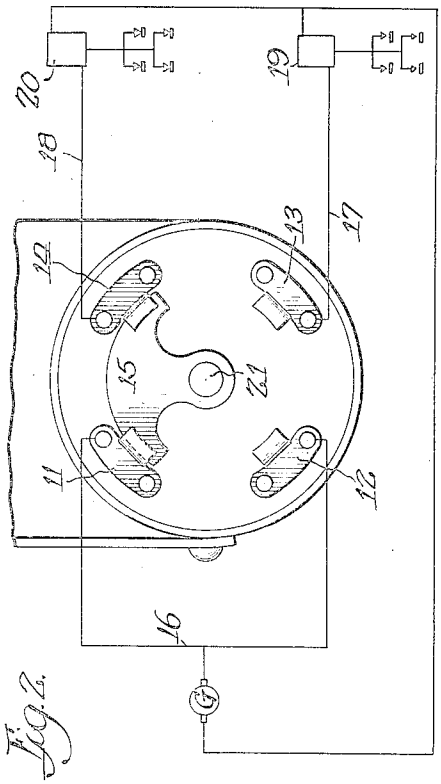


Fig. 2

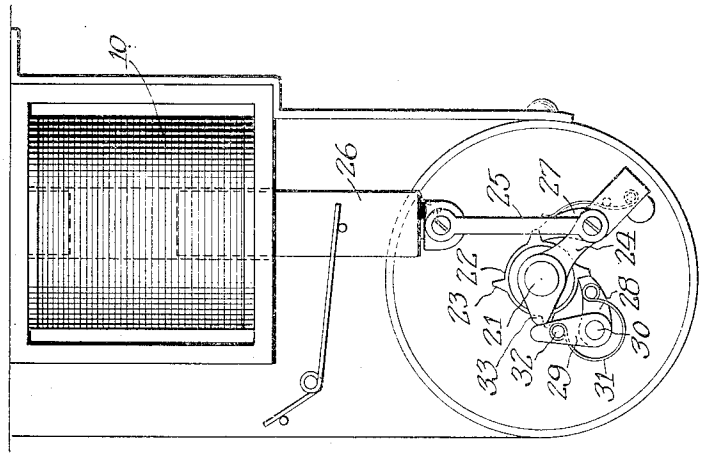


Fig. 1

Witness

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UNITED STATES PATENT OFFICE.

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ELECTRIC SWITCH.

1,283,682. Specification of Letters Patent. Patented Nov. 5, 1918.

Application filed August 16, 1917. Serial No. 186,520.

To all whom it may concern:

Be it known that I, HERBERT W. CRANE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electric Switches, of which the following is a specification.

My invention relates to electric switches and has particular reference to a novel three-way solenoid switch.

An object in the present construction is to provide a three-way switch which may be operated by successive movements of the switch blade in the same direction. To secure this desired result, four switch points are provided, the switch blade successively engaging two only of such points. A device such as herein disclosed is particularly useful in connection with apparatus such as disclosed in my co-pending application Serial No. 186,518, filed of even date herewith entitled Operating means for doors. In that construction it is used as a high voltage reversing switch.

One of the important features of the invention is to provide means in a switch of this kind for preventing over throw and reverse throw. This desired result is accomplished in a very simple manner, as will be appreciated from the description hereinafter.

The invention will be more readily understood by reference to the accompanying drawings wherein;

Figure 1 is a side elevation of a solenoid switch such as contemplated by me;

Fig. 2 is a view of the switch from a reverse side;

Fig. 3 is an enlarged elevation of the means for throwing and preventing over throw and reverse throw, the view being taken on the line 3—3 of Fig. 4, and

Fig. 4 is a side elevation of the construction shown in Fig. 3.

The device shown in the drawings is intended for actuation by a solenoid 10 mounted in a suitable frame, which serves also to support the switch. The switch has four points, 11, 12, 13, and 14, adapted to be successively bridged by the blade 15. The points 11, 12, are connected to a high voltage line 16 while the points 13, 14, are connected to lines 17 and 18 respectively in circuit with reversing switches 19, 20.

The switch-blade 15 is fixed to a shaft 21, to the opposite end of which, as shown in Fig. 1, a ratchet 22 is secured. The ratchet is provided with teeth or lugs 23, the number corresponding to the number of points on the switch. As a means for actuating the ratchet, I provide the arm 24 fulcrumed on the shaft 21 and connected by means of a link 25 to the solenoid core 26. A pawl 27 is connected to the arm 24 and serves to engage successive teeth 23 on the ratchet.

Means should be provided for preventing overthrow and reverse throw of the ratchet, and to this end I mount two pawls 28, 29, on the same fixed pivot 30, a single spring 31 being utilized for maintaining the pawls in proper position. The pawl 28 engages the teeth to the rear of the pawl 27 and prevents back travel or reverse throw of the ratchet. Pawl 29 is provided with a pin 32, which in addition to the function of holding the end of the spring 31, normally lies just outside of the arc of movement of the teeth 23. As a means for preventing the pin 32 from engaging with the teeth except at the proper time, I provide a cam 33 on the arm 24 which coöperates with the pawl 29 and holds it away from the ratchet. When, however, the arm is oscillated by the solenoid, the pawl 29 is permitted to swing inwardly and the pin 32 will engage with the tooth 23 to prevent overthrow, that is, throw through more than 90 degrees.

The system provides an extremely simple means for accomplishing the actuation of a three-way switch having four points. The arrangement of the switch is such that there are two dead points and two live points, these being alternately arranged.

While the device is shown in connection with means for reversing the operation of a motor, it may be employed in other situations with equal facility, and I do not wish to be limited, except as indicated in the appended claims.

I claim:

1. A three-way solenoid switch adapted for step-by-step operation, comprising in combination a plurality of contacts, a contact piece, a ratchet rigid therewith, an arm, a pawl carried thereby, a cam on said arm, and a second reversely-positioned pawl adapted normally to be retained out of engagement with the teeth on said ratchet by said cam and to move into the arc of rotation of the ratchet teeth when said arm is moved, substantially as described.

2. In an electric switch, the combination

of a solenoid having a core, a lever, one arm of which is connected to said core, a ratchet wheel connected to said lever, a switch blade operable by said ratchet wheel, a plurality of contacts adapted to be successively bridged by said blade, a pawl carried by said lever, a pawl pivoted adjacent to said ratchet, said pawl having a portion adapted to lie in the arc of rotation of the ratchet while the ratchet is being rotated, the other arm of said lever being positioned to maintain said last named pawl out of the arc of rotation of said ratchet when the parts are in their normal inactive position, substantially as described.

3. A three-way switch adapted for step-by-step actuation in one direction, comprising in combination a plurality of contact points, a blade adapted successively to bridge two of such points, a ratchet having a plurality of teeth, an arm, a solenoid for actuating the same, a pawl carried by the arm, and two pawls each mounted on a fixed pivot, one pawl serving to prevent reverse throw and the other serving to prevent overthrow, and means operable by the movement of the arm for permitting the overthrow pawl to come into operative position, substantially as described.

4. A switch adapted for step-by-step actuation in one direction, comprising in combination four contact points, a blade adapted to successively bridge two only of such points, a ratchet having a plurality of teeth, an arm fulcrumed on the ratchet shaft, said arm having a cam, a pawl carried by the arm, a pair of pawls mounted on a fixed pivot and serving to prevent over-throw and reverse throw, the cam on the arm coöperating with the over-throw pawl to maintain the same out of engagement with the ratchet, except when the ratchet is being rotated, substantially as described.

Signed at Chicago, Ill., this 14th day of August, 1917.

HERBERT W. CRANE.

Witness:
L. J. CHASE.