F. W. SMITH.

ELECTRIC SWITCH.

APPLICATION FILED FEB. 25, 1909.

951,851.

Patented Mar. 15, 1910.

2 SHEETS—SHEET 1.

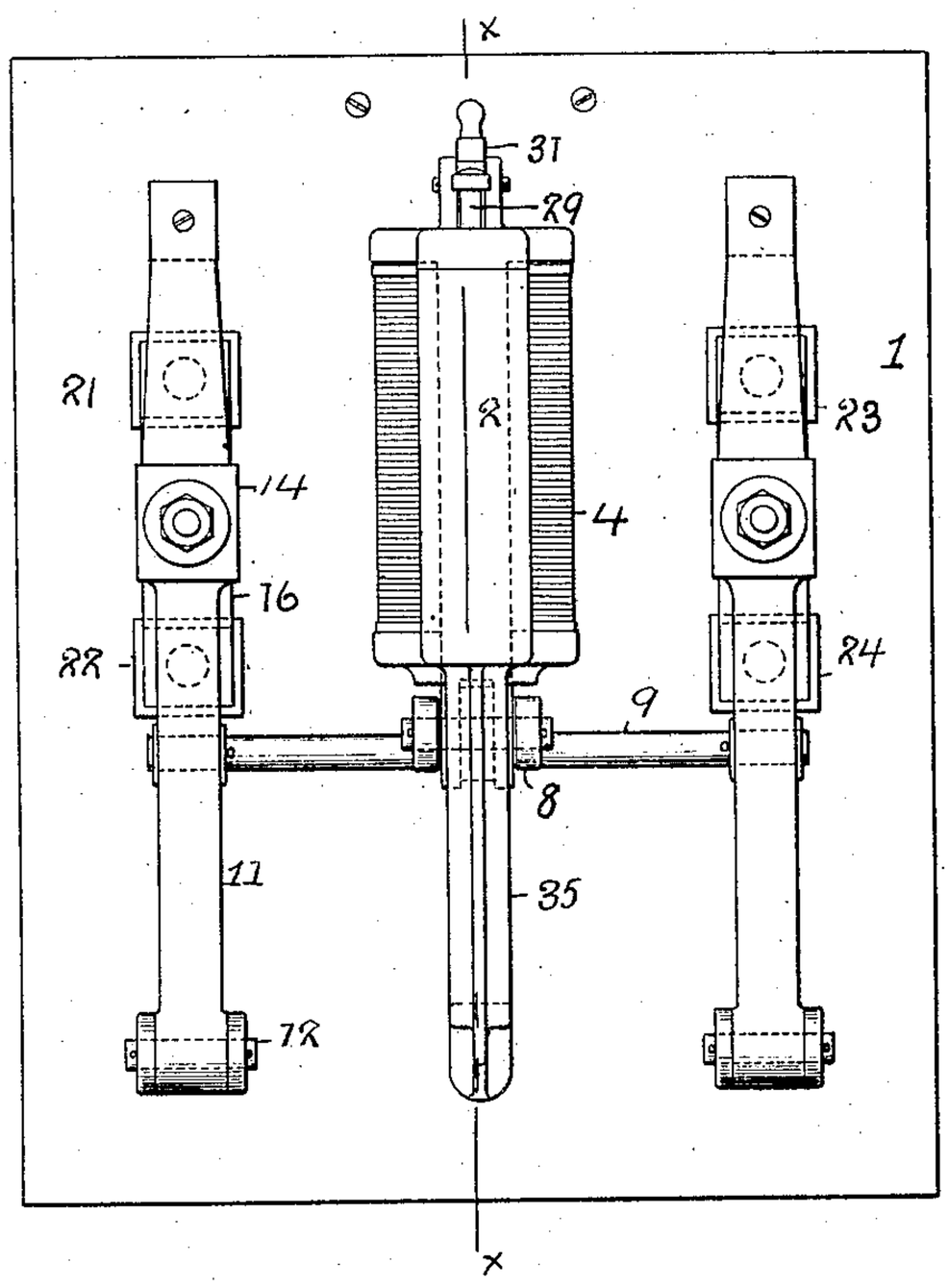

FIG. 1.

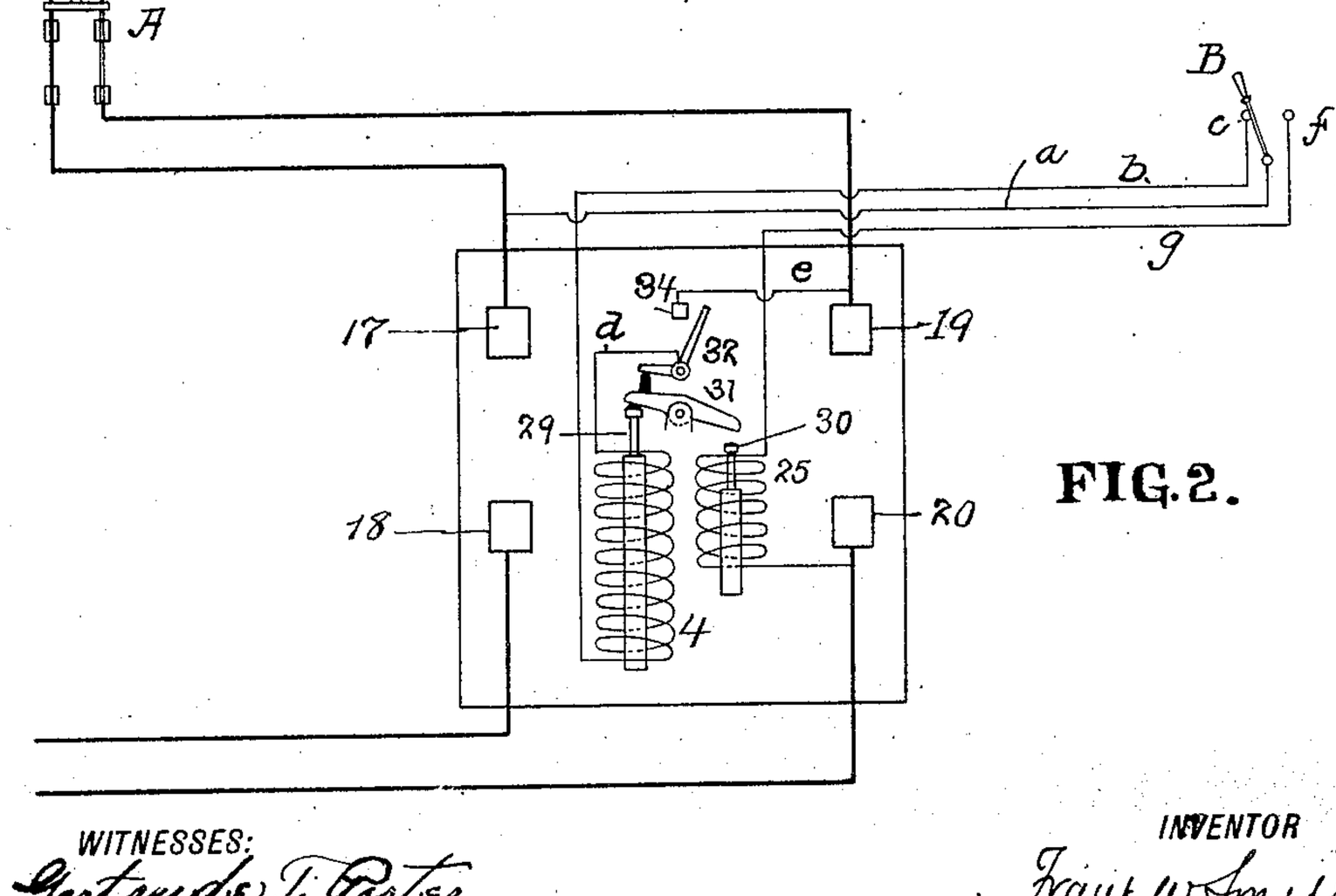

FIG. 2.

WITNESSES:

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INVENTOR

Frank W. Smith

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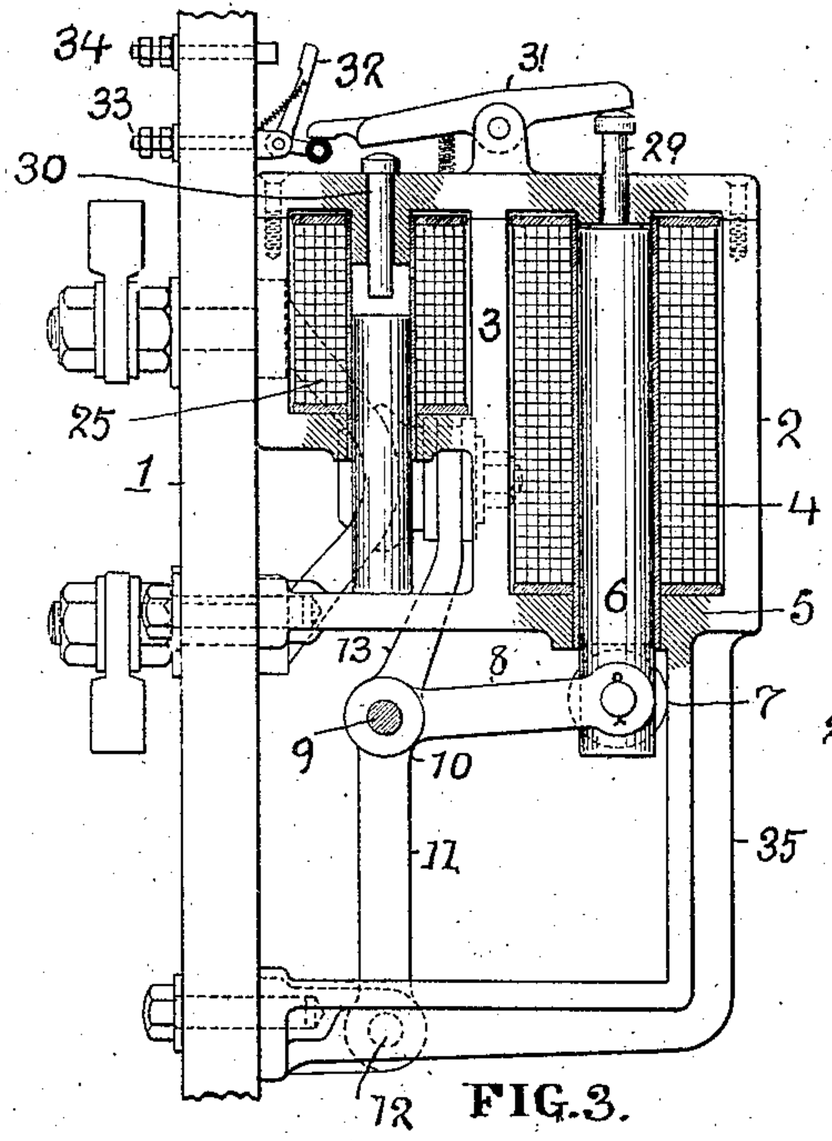

FIG. 3.

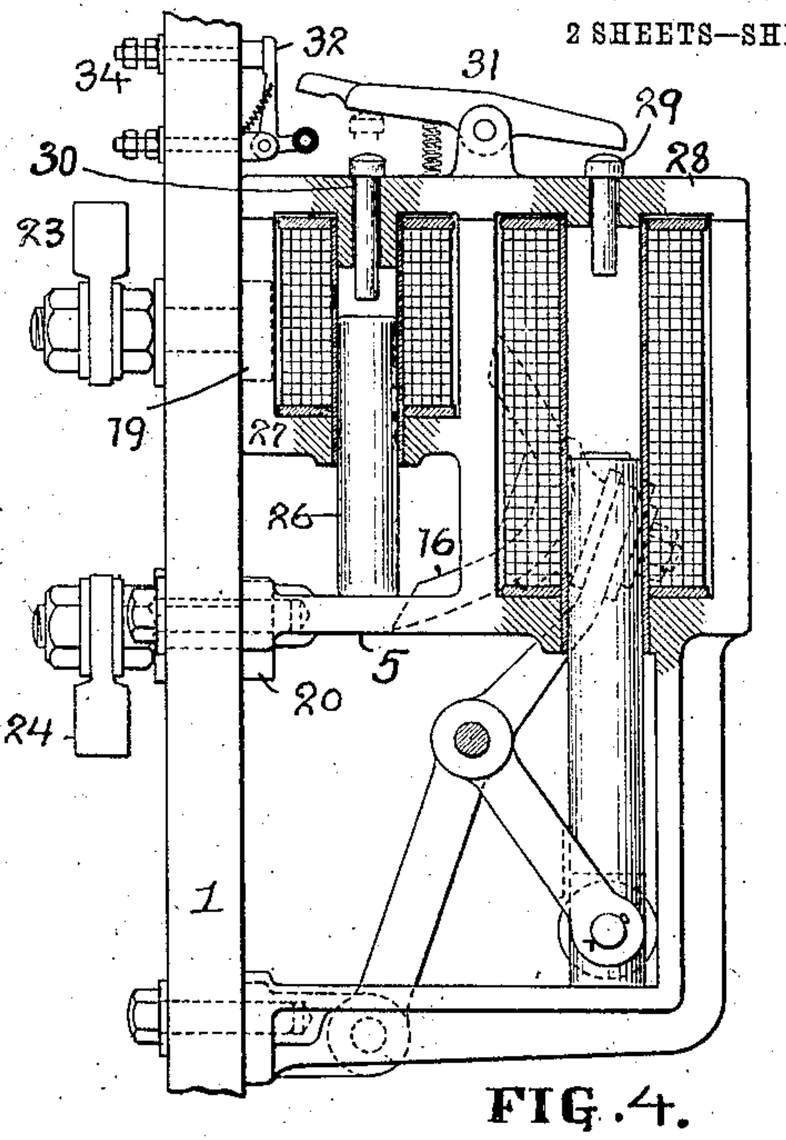

FIG. 4.

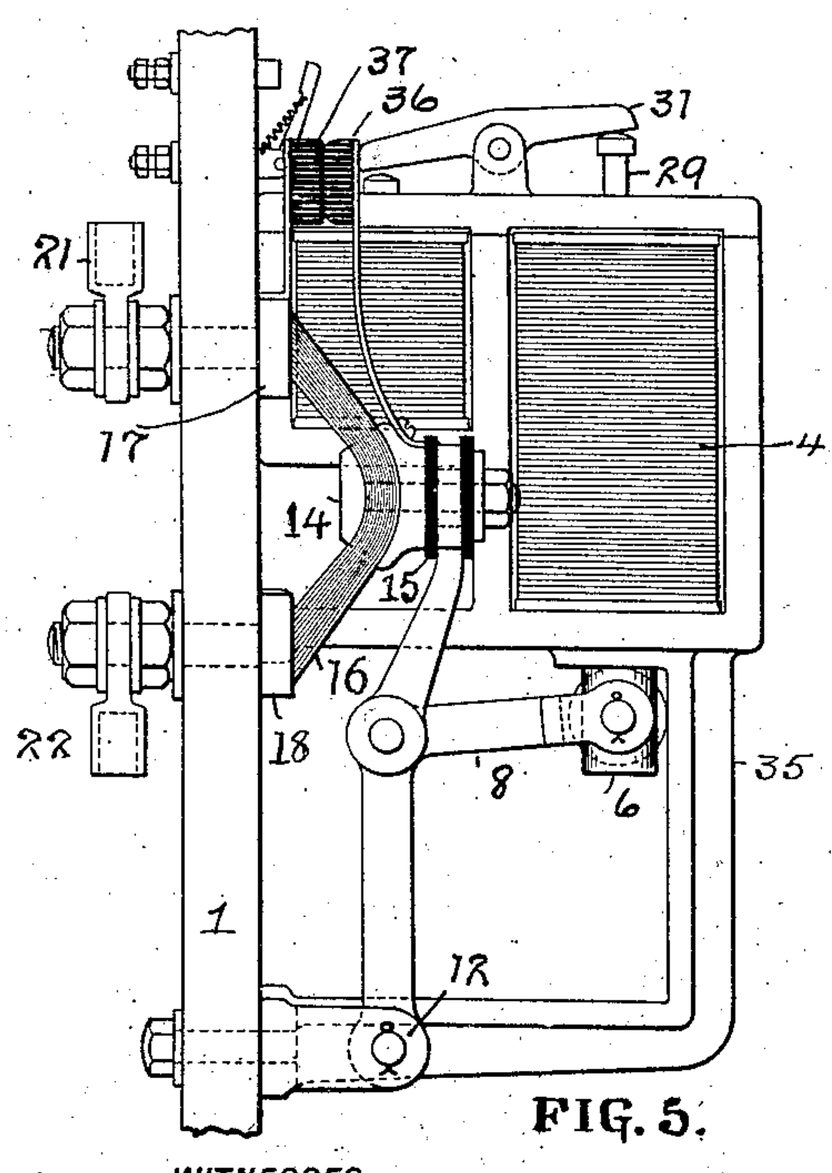

FIG. 5.

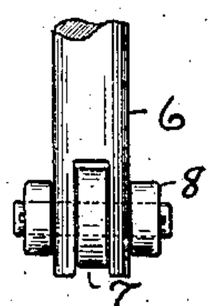

FIG. 6.

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UNITED STATES PATENT OFFICE.

FRANK W. SMITH, OF NEW YORK, N. Y.

ELECTRIC SWITCH.

951,851. Specification of Letters Patent. Patented Mar. 15, 1910.

Application filed February 25, 1909. Serial No. 480,045.

To all whom it may concern:

Be it known that I, FRANK W. SMITH, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Electric Switches, of which the following is a specification.

The invention relates to electric switches and consists in the improved construction hereinafter set forth, wherein a switch arm normally breaking circuit by gravity is moved into circuit closing position by a solenoid and mechanically there retained by a link mechanism, which may be released by other electromagnetically controlled mechanism to permit the switch arm to return to normal position and so break circuit.

The invention more particularly consists in the various combinations recited in the claims.

In the accompanying drawings—Figure 1 is a front elevation of my improved electric switch. Fig. 2 is an electrical diagram showing the circuit connections. Fig. 3 is a section on the line x, x, of Fig. 1, showing the switch arms in circuit closing position. Fig. 4 is a similar section showing the switch arms in position to open circuit. Fig. 5 is a side elevation, and Fig. 6 is a detailed view of the roller carrying end of the core of the main solenoid.

Similar characters of reference indicate like parts.

1 is the base or back plate. 2 is a frame of magnetic material secured on said base. The frame is divided into two sections by the partition 3. In the outer section is disposed the main solenoid 4, through which and through an opening in the lower horizontal member 5 of the frame passes the core 6. The lower end of the core 6 is bifurcated to receive a roller 7, the pin of which passes through said bifurcations and also through bifurcated arms on the end of a link 8. The opposite end of link 8 is pivoted to a rod 9 which in turn is received by the switch arms 10. The lower portions 11 of said switch arms are pivoted at 12 to the base. The upper portions 13 carry blocks 14 insulated from said portions by washers 15, and said blocks carry two armed spring plates 16 which are disposed to meet pairs of fixed contacts 17 and 18, 19 and 20. Said fixed contacts have rods extending through the base, which serve as binding posts for the terminals 21, 22, 23, 24, attached thereto by the usual nuts. In the inner section of the frame 2 is disposed the smaller auxiliary solenoid 25, the core 26 of which passes through an opening in a horizontal intermediate frame member 27 and when the solenoid is not energized rests on the lower horizontal frame member 5.

The upper frame member 28 is detachable and is secured in place by screws, as shown in Fig. 2. A headed pin 29 passes through member 28 and into the solenoid 4, and a similar headed pin 30 enters solenoid 25. A two armed lever 31 is pivoted in a lug on member 28 and its arms extend over pins 29 and 30.

32 is a bell crank circuit closer, pivoted at its angle to a rod 33 which extends through the base and serves as a binding post for the attachment of a circuit terminal. The upper arm of said circuit closer has connected to it a helical spring which normally keeps said arm against a fixed contact 34, to the supporting rod of which the opposite circuit terminal is connected. The horizontal arm of bell crank 32 extends beneath a projection on lever 31. Finally under lever 31 is a helical spring which normally holds the arm of said lever above pin 29 in depressed position.

The circuits, as shown in Fig. 2, are as follows: The plus and minus conductors from main switch A are connected to fixed contact terminals 17, 19 and continue from contacts 18, 20. The minus conductor is connected by wire a to switch lever B. A contact c in the path of switch lever B is connected by wire b to one terminal of solenoid 4, the other terminal of which is connected by wire d to circuit closer 32. The fixed contact 34 of said circuit closer is connected by wire e to the positive conductor in proximity to contact 19. Another contact f in the path of switch lever B is connected by wire g to one terminal of solenoid 29, the other terminal of which is connected to the positive conductor in proximity to contact 20.

The operation is as follows: The main switch A being closed, and the switch lever B closing circuit with contact c, the solenoid 4 raises its core 6, lifting the end of link 8, and so swinging the switch arms 10 to cause the spring contacts 16 to meet and close circuit at the fixed contacts 17, 18, 19, 20. As the link 8 is raised, the roller 7 runs along

the straight vertical edge of a guide bar 35 which may be integral with frame 2 and extends downwardly therefrom for a suitable distance, after which it turns at right angles and is secured to the base. When the core 6 has reached the limit of its upward movement, the link 8 stands horizontal and transfers the thrust of the spring contacts 16 and switch arms 10 to the fixed guide bar 35. In taking this position, the core 6 lifts pin 29 thus tilting lever 31 to swing the bell crank 32 and so open circuit at 34, thus de-energizing the solenoid 4. The core 6, however, cannot drop by gravity because of the thrust of the toggle link 8 on the bar 35. The position of the parts is now as shown in Figs. 2 and 3. The switch B is now shifted to close contact at *f*. This energizes auxiliary solenoid 25 which raises its core 26 which strikes pin 30 and tilts lever 31 in the opposite direction, thereby causing said lever to press down on pin 29. Pin 29 then pushes down core 6 of solenoid 4 which carries down the end of link 8. As soon as this link is moved below a horizontal position, its thrust against bar 28 is released, and the core 6 freely falls by gravity carrying the link 8 down with it and so retracting switch arms 10, as shown in Fig. 4. When the lever B is swung back to make contact at *c*, solenoid 4 is again energized and the operation already described is repeated.

In order to prevent sparking when the spring contact arms 10 are separated from the fixed contacts, I attach to each arm by a leaf spring, a wiping carbon contact 36, Fig. 5, which when circuit is closed, meets a similar contact 37 similarly supported on the base.

I claim:

1. In an electric switch, a pivoted circuit closing switch arm, a fixed guide bar, a link pivoted at one end to said arm and bearing at its other end on said bar, electromagnetic means for moving the end of said link along said bar to carry said arm into and lock the same in circuit closing position, and electromagnetic means for releasing said arm.

2. In an electric switch, a pivoted circuit closing switch arm, a fixed guide bar, a roller movable along said bar, a link between said roller and said arm, a solenoid, a vertically moving core therein connected to said roller and operating to raise the same to cause said link to move said switch arm and lock the same in circuit closing position, a second solenoid, a vertically moving core therein, and mechanism controlled by said second solenoid core for releasing said arm.

3. In an electric switch, a pivoted circuit closing arm, a link pivoted to said arm, a vertical bar for guiding said link and receiving the thrust thereof, a solenoid, a vertically moving core for said solenoid connected at its end to said link, a second solenoid, a vertically moving core therein, and intermediate mechanism for transmitting motion from said second solenoid core to said first solenoid core to cause said first core to be moved downwardly upon the lifting of said second core by its solenoid.

4. In an electric switch, a pivoted circuit closing arm normally held by gravity in open circuit position, a main solenoid, a core therefor, a link mechanism between said core and said arm for moving said arm into circuit closing position and there retaining said arm, an auxiliary solenoid, a core therefor, sliding pins entering the said solenoids, a support for said pins, and a pivoted lever having opposite arms respectively in proximity to said pins: whereby when said main solenoid core is attracted to operate said link mechanism to move said switch arm into circuit closing position, said core shall actuate its associated sliding pin to tilt said lever and thereby move the other sliding pin into said auxiliary solenoid, and thereafter when circuit is closed through said auxiliary solenoid, the core thereof is attracted to actuate its associated sliding pin to tilt said lever in the reverse direction and thereby move the first named sliding pin to move the main solenoid core to release said link mechanism and permit said switch arm to return by gravity to open circuit position.

In testimony whereof I have affixed my signature in presence of two witnesses.

FRANK W. SMITH.

Witnesses:
MAY T. MCGARRY,
GERTRUDE T. PORTER.