

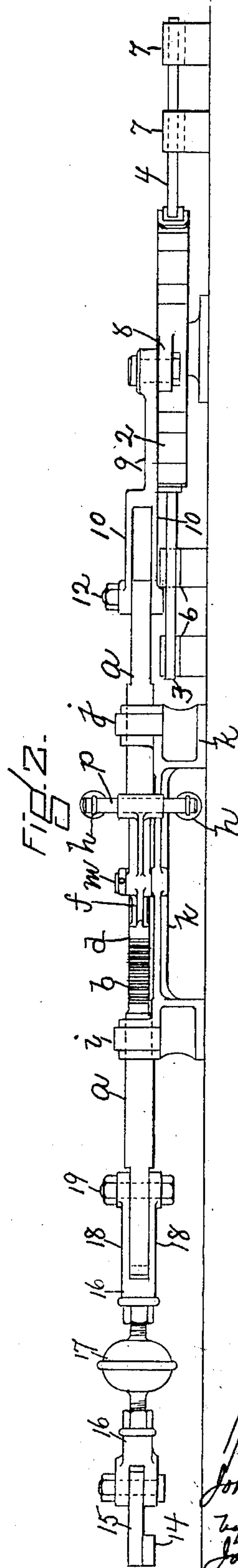
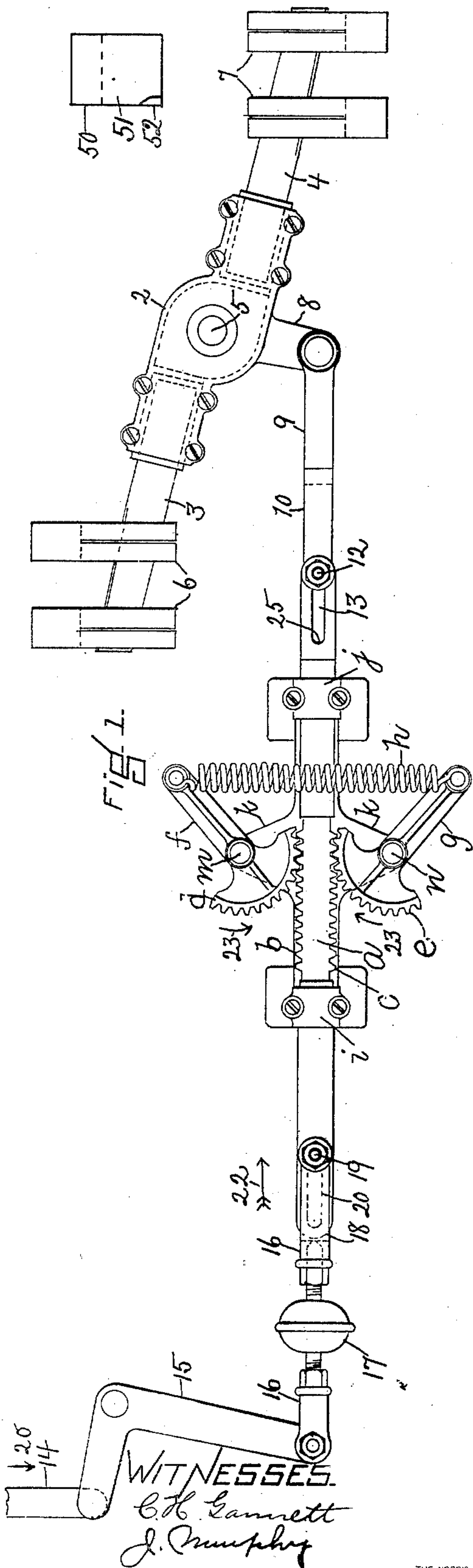
No. 675,614.

Patented June 4, 1901.

J. M. ANDERSEN.
ELECTRIC SWITCH.

(Application filed Jan. 17, 1900.)

(No Model.)



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UNITED STATES PATENT OFFICE.

JOHAN M. ANDERSEN, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO ALBERT ANDERSON, OF SAME PLACE.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 675,614, dated June 4, 1901.

Application filed January 17, 1900. Serial No. 1,726. (No model.)

To all whom it may concern:

Be it known that I, JOHAN M. ANDERSEN, a citizen of the United States, residing in Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Electric Switches, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention is herein shown as embodied in an electric switch adapted to be used in elevator systems employing an electric motor to drive a pump which takes water from a storage tank or well and pumps the same into a tank from which it is taken to operate the elevator.

The electric switch embodying this invention is especially applicable for use in connection with an elevator system employing a pressure-tank into which water is forced by the pump until the pressure reaches a predetermined point, whereupon the switch is automatically opened by mechanism, as will be described and which constitutes the chief feature of this invention. The mechanism referred to is constructed, as will be described, so as to insure a quick make-and-break movement of the switch under all conditions, thereby avoiding liability of injury to the switch and stopping of the elevator system due to burning out of the switch, which in switches as now constructed and used for this purpose and known to me is caused by the contact blade or blades being engaged with and disengaged from the coöperating terminal or terminals in such manner as to reduce the surface contact of the blade with the terminal without effecting a complete engagement with or disengagement from the terminal or terminals, consequently reducing the current-carrying capacity of the blade or blades, which results in overheating and burning out of the switch.

This invention has for its object to avoid the above-mentioned defect and to provide mechanism for actuating the blade or blades in such manner as will insure the blade or blades being withdrawn from and engaged with the terminal or terminals substantially in an instant and for the full width of the blade—that is, when the actuating mechanism moves

the contact-blade into engagement with its coöperating terminal it does so substantially in an instant, and effects engagement of the blade for its entire width or for substantially its entire width, so that it will carry the current employed to operate the motor without danger of overheating or burning out of the switch, and when the blade is disengaged from the terminal it is removed from contact therewith substantially in an instant. These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 is an elevation of an electric switch and its actuating mechanism embodying this invention, and Fig. 2 an under side view of the switch and its actuating mechanism shown in Fig. 1.

The actuating mechanism which forms the essential feature of this invention consists of a reciprocating bar *a*, provided in the present instance with rack or gear teeth *b c* on opposite sides or surfaces, with which engage segmental gears *d e* on the ends of levers or arms *f g*, united at their outer ends by springs *h*. In the present instance two sets of springs *h* are shown as connected to the ends of pins or rods *p*, extended through the levers or arms *f g*. (See Fig. 2.)

The rack-bar *a* is movable in suitable guides *i j*, attached to a frame *k*, carrying the pivots or shafts *m n* for the segmental gears. The rack-bar *a* is loosely yet positively connected at one end to the switch and at its opposite end to the mechanism which actuates it.

In the present instance the switch referred to is shown as a lever 2, provided with contact-blades 3 4 on opposite sides of the pivot 5, which coöperate with circuit-terminals 6 7. The switch-lever 2 has an arm 8, to which is pivotally connected a rod or bar 9, having forks or arms 10 at its opposite end, between which the bar *a* extends and to which the bar *a* is connected by a pin 12, carried by the forked arms of the bar 9 and extended through a slot 13 in the bar *a*. It will thus be seen that the reciprocating bar *a* is capable of being moved the length of the slot 13 without moving the switch-lever, and thereafter further movement of the bar *a* in the

same direction will move the switch-lever. The opposite end of the rack-bar *a* is connected in a similar manner with the mechanism employed to move the bar *a*, which mechanism is shown in the present instance as a rod 14, elbow-lever 15, connecting-rod 16, provided with an interposed insulator 17, the rod 16 having forks or arms 18, carrying a pin 19, which extends through a slot 20 in the bar *a*. (See dotted lines, Fig. 1.) As above stated the switch is especially adapted to control the circuit of an electric motor employed in a hydraulic system—such, for instance, as shown and described in United States Patent No. 399,716, dated March 19, 1889, in which case the rod 14 is connected to the piston-rod *d'* shown in said patent.

The switch 2, as herein shown, is closed and the motor is employed to take water from the storage tank or well B' shown in said patent and force it into the pressure-tank B, also shown in said patent, until the pressure has reached a predetermined point, whereupon the piston-rod *d'* and rod 14 are moved in the direction indicated by arrow 20, Fig. 1, and the rack-bar *a* is moved in the direction indicated by arrow 22, thereby turning the spring-connected levers *f g* on their pivots in the direction indicated by arrows 23.

By means of the slot 13 the rack-bar *a* is permitted to move a distance sufficient to bring the arms or levers *f g* in the same plane through their pivots and at right angles to the rack-bar without producing movement of the switch-lever. During the movement of the levers from the position shown to that just described—namely, in the same plane normal to the rack-bar—the springs *h* are expanded or placed under tension, which is greatest at the central position of the said levers.

When the segmental levers are in their central position normal to the rack-bar *a*, the end 25 of the slot 13 is at such time in engagement with the pin 12, and on the continued movement of the rack-bar in the direction of the arrow 22 the switch-lever is positively moved by said rack-bar, and its contact-blades are gradually moved toward the free end of the circuit-terminals until the frictional resistance between the blade and its terminal has been reduced sufficiently to be overcome by the power of the springs *h*, which have in the meantime been moved to the opposite side of the position normal to the rack-bar, and when said spring-power operates it completes the movement of the rack-bar suddenly and disengages the contact-blades from their terminals substantially in an instant, the slot 20 permitting the rack-bar *a* to be so moved without injurious effect on the actuating mechanism for the rack-bar, which at that time may have reached the limit of its movement in the direction to open the switch.

The switch when opened as described has its blade 4 thrown into engagement with a holding device 50, provided with two spring

fingers or jaws 51 52, which retain the switch in its open position until disengaged therefrom, as will be described.

When the pressure falls below the predetermined point, the rod 14 is moved so as to move the rack-bar in the direction opposite to that indicated by arrow 22, and at the beginning of such movement the pins 12 19 engage the outermost end walls of the slots 13 20, so that during the movement of the rack-bar *a* in the direction opposite to that indicated by arrow 22 the entire mechanism between the rod 14 and the switch-lever 2 moves as one piece until the levers *f g* have reached their position normal to the rack-bar, during which movement the lever 2 is being gradually moved, and its blade 4 is gradually moved out of engagement with the holding-jaws 51 52, and at or about the time the levers *f g* have passed their position normal to the rack-bar the springs *h* overcome the frictional resistance of the jaws 51 52 and disengage the blade 4 therefrom and move the switch substantially in an instant and force the blades 3 4 into full engagement with their cooperating terminals, as represented in Fig. 1.

The slot 20 permits the rack-bar to be moved quickly to close the switch without injury to its actuating mechanism, which at such time might be stationary, and the slot 13 permits movement of the rack-bar independent of the switch.

It will be noticed that the quick movement or throw of the switch is effected by the springs *h* after they have passed the point of greatest tension and while said tension is diminishing; but it will also be noticed that this spring-power is being gradually augmented by the increasing leverage obtained by the change of position of the levers *f g* from their position normal to the rack-bar. Consequently the rack-bar is moved in both directions with great force and substantially in an instant by the springs, and therefore the switch is both opened and closed substantially in an instant and with sufficient power to insure a full opening and a full closing of the same, thus avoiding the danger of burning out of the switch and delays consequent thereto.

I have herein shown my invention as embodied in an electric switch employed for a particular purpose; but I do not desire to limit my invention in this respect, as it is evident that the bar *a* and spring-actuated levers engaging it may be used in other connections.

I claim—

1. The combination with an electric switch, of mechanism to operate it comprising a rack-bar having teeth on opposite sides, pivoted levers or arms provided with gear-teeth in engagement with the teeth on the rack-bar, a spring connecting said levers or arms, and means to effect a loose yet positive connection between said rack-bar and switch, substantially as and for the purpose specified.

2. The combination with an electric switch,

of mechanism to operate it comprising a reciprocating device loosely yet positively connected to said switch, a spring to effect movement of said reciprocating device, and means
5 connected with said spring and with said device to increase the effective work of the spring while said spring is decreasing in tension, substantially as described.

3. The combination with an electric switch,
10 of mechanism to operate it comprising a bar, levers or arms on opposite sides of said bar and connected therewith, a spring connecting said levers or arms, and means to effect a loose yet positive connection between said
15 bar and switch, for the purpose specified.

4. The combination with an electric switch, of mechanism to operate it comprising a bar loosely yet positively connected to said switch, a spring coöperating with said bar to effect
20 movement of the bar independent of the

switch and means to increase the effective work of the said spring as the tension of the said spring decreases, substantially as described.

5. The combination with a longitudinally- 25 reciprocating bar, a spring to move it, and levers or arms on opposite sides of said bar connected therewith and joined together by said spring, whereby the effective work of said spring on said reciprocating bar is accom- 30 plished while the tension of said spring is diminishing, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHAN M. ANDERSEN.

Witnesses:

JAS. H. CHURCHILL,
J. MURPHY.