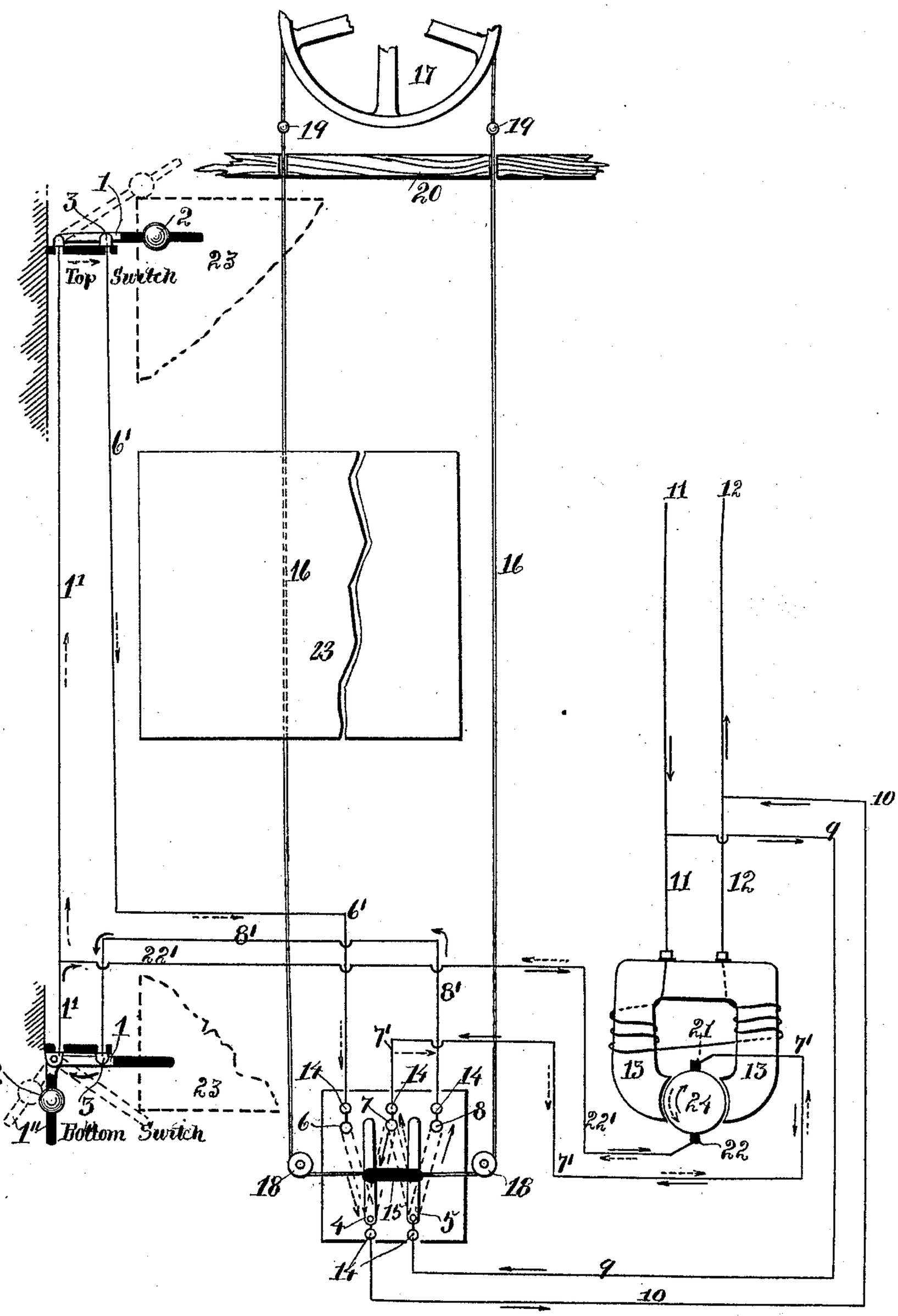
(No Model.)

E. MARSHALL.

ELECTRICALLY OPERATED ELEVATOR.

No. 528,547. Patented Nov. 6, 1894.



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ELIAS MARSHALL, OF BOSTON, MASSACHUSETTS.

ELECTRICALLY-OPERATED ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 528,547, dated November 6, 1894.

Application filed January 20, 1894. Serial No. 497,533. (No model.)

To all whom it may concern:

Be it known that I, ELIAS MARSHALL, of Boston, in the county of Suffolk, State of Massachusetts, have invented certain new and useful Improvements in Electrically-Operated Elevators, of which the following is a specification.

This invention involves the use of certain ordinary electrical appurtenances or devices peculiarly in circuit with each other and the armature of the driving motor of the elevator machinery; and consists in the association, electrically, of said appurtenances hereinafter specified, to attain a means whereby the vertical movement of the elevator is governed, *i. e.*, is prevented traveling farther than that it was designed to do, *i. e.*, the object of this invention is to prevent the elevator or car traveling beyond the two extreme points of its required vertical movement. Thus the essence of this invention is in causing the elevator or car to alternately break and effect a connection of the driving motor's armature circuit, as presented by the matter comprising this application.

The accompanying drawing is a diagram conveying the essence of this invention.

The switches lettered "Top switch" and "Bottom switches" are to be placed in the elevator well or hatchway and secured to the wall in any desirable place and efficient manner, but, are to be so secured, at a point, not greater than the highest point and the lowest point, that the elevator is designed to travel, and these switches illustrated are ordinary single pole knife switches adapted for this special purpose, as any other circuit breaking and connecting switch may be adapted or mechanically arranged to attain the same end as the above noted knife switches, and, this mention to other switches is made to infer that the switches as illustrated are not claimed to be new, nor is the mechanism of the three point switch hereinafter described. Thus let the conclusion be that the electrical appurtenances employed to attain this invention, are those already in use capable of being adapted for various purposes.

The "top switch" has the knife (1) elongated and provided with the weight (2) to snap the knife in contact with the contact point (3) when the elevator travels in an opposite direction. The "bottom switch," (which has the same numerals of reference) has the knife portion (1) elongated to cause the elevator to engage it to effect breaking of the armature circuit as with the "top switch;" and has an opposite arm (1″) provided with the weight (2) for the same purpose as with the "top switch."

The circuit of this invention, is between the driving motor armature supply and return circuit, and the poles of the armature which is one of the essential features of this invention, the object of which is to make the elevator through engaging the above mentioned switches, break the armature circuit at either end of its travel and thus attain a safety means, capable of preventing the elevator machinery to operate other than between the ordinary travel of the car.

The drawing shows the armature circuit dead or broken by the three point switch not having its conducting levers (4) and (5) in contact with the conducting points (6), (7) and (8), as illustrated in full lines.

(9) is the armature supply wire, and (10) the return wire. The armature supply wire and return wire are respectively in circuit with the motor-fields, supply, and return wires respectively represented by the numerals (11), (12) and (13).

It is customary to keep the fields of a reversible motor permanently charged when employed for service, and to reverse the flow of the current through the armature to attain a reversible motor, which principle as illustrated is employed and attained by the customary use of the three point switch. (14) denotes binding posts on the said switch, which are respectively in circuit with the three points and levers of the switch. (15) represents a non-conducting connecting rod, employed to keep the three point switch levers equally apart.

There are various ways to mechanically operate the three point switch from the elevator or car, and for clearness of comprehension it has been an object to employ the simplest means to attain the end throughout in this application, to obviate if possible, confusion. Thus the means illustrated to permit the elevator attendant to control the action of the elevator within certain limits, consists in an

ordinary shipping cable (16) passing over the wheel (17) axially retained at the top of the well or hatchway, and passing over the idlers (18), and having its both ends connected to the ends of the non-conducting rod (15), respectively, and in order to ship the three point switch levers efficiently, the shipping cable has secured to it in the manner illustrated the stops (19) which alternately contact the cheek-beam (20), (through which both ends of the cable move)—and permit the cable to be moved only equal to the efficient movement of the levers of the three point switch or current reversing switch through the cheek-beam preventing a passage of the stops secured on the shipping cable.

I will now describe the electrical circuits, viz: Mention has been already made that the armature supply wire and return wire were in circuit with the motor's fields supply and return wire. Such are also in circuit with the three point switch levers (4) and (5) respectively. The point (8) of the three point switch is in circuit with the contact point (3) of the "bottom switch" through the wire (8′); and the point (7) is in circuit with the armature brush (21) through the wire (7′); and the point (6) is in circuit with the contact point (3) of the "top switch," through the wire (6′). The wire (1′) is in circuit with the "top switch" knife and the "bottom switch" knife, and the wire (22′) is in circuit with the wire (1′) and the armature brush (22). These circuits and electrical appurtenances reciprocally attain the following results in conjunction with the elevator, and elevator operating mechanisms, viz:

First. As before mentioned the three point switch levers shown in full lines are out of contact with the three points of the switch and thus all machinery is at rest, as effected by the manipulation of the shipping cable by the attendant.

Second. The current conducting levers of the three point switches or current reversing switch shown in dotted lines in contact with the contact points (7) and (8) respectively, represent that the car attendant has shipped the shipping cable to cause the car—(which is represented by the numeral (23) and drawn in dotted lines)—to travel downward, through the following course of the current as directed by the three point switch to the armature (24) viz: The three point switch being in the above noted condition, the current passes from the motor fields supply wire (11) along the armature supply wire (9), over the lever (5) and the point (8) of the three point switch, along the wire (8′), through the contact point (3) and knife (1) of the "bottom switch" along the wire (1′), over the wire (22′) to the armature brush (22) through the armature causing same to rotate as represented by the arrow in full lines, which also throughout the drawing above noted indicates the present course being explained; out by the armature brush (21) over the wire (7′), the point (7) and the lever (4) and out by the return wire (10) in circuit with the motor fields return wire (12), thus completing this circuit and imparting the above noted movement of the car. Should the elevator be at its top point of travel as represented in the drawing by the dotted lines, when the current directing levers (4) and (5) of the three point switch, were moved as previously explained, the current of the above mentioned circuit could not pass the contact point (3) of the "top switch" owing to the elevator having disengaged the knife therefrom as represented by the dotted position of the knife and said elevator. Thus the wire (1′) would be dead, and should the car be about midway or at any point between its extreme travel, the current could respectively pass through the above noted contact point and knife, but yet this same wire (1′) would be dead and also the wire (6′) between the point where the wire (22′) is connected to the said wire (1′) and the contact point (6) of the three point switch. Consequently it will be seen that this circuit as represented by the arrows in full lines as above mentioned or described, permits the elevator attendant to control the movement of the car between its two extreme points, while the "top" and "bottom" switches make positive what these two extreme points of the elevator's movement shall be.

Third. Upon the elevator or car about arriving at its lowest point, through the above described second condition of the armature's circuit, the downward moving car contacts the elongated portion of the knife of the "bottom switch" and thus disconnects the knife from connection or contact with the contact point (3), hence immediately breaking the circuit of the second condition above noted, consequently causing the elevator and operating machinery to become at rest, though the three point switch remains as previously described, which result is represented by the dotted lines denoting the elevator engaging the knife of the "bottom switch."

Such being the case this connection mentioned of the levers or contacting of same with the points (7) and (8) of the three point switch is dead and hence of no import. Thus the only movement from the present condition that the car can have is to move upward which will necessitate a reverse movement of the armature from that previously mentioned which end is attained as represented by the levers (4) and (5) in dotted lines being in contact with the conducting points (6) and (7) of the three point switch, as effected through the manipulation of the shipping cable. This change in the current's circuit just mentioned being effected, the current passes from the armature supply wire (9), over the lever (5), through the point (7), over the wire (7′), through the armature brush (21) and the armature in the opposite direction than by the above noted second (2d) condition, as represented by the arrows in dotted lines denot-

ing this current course now being described. The current coursing in the direction now being explained causes the armature to rotate in the direction denoted by the arrow in dotted lines, which also represents the direction of the flow of the current through the armature, which passes out over the brush (22), along the wire (22′) to wire (1′), up to the conducting point (3), over the knife of the "top switch," along the wire (6′), through the point (6) and the lever (4) of the current-reversing-switch or three point switch, and over the return wire (10) in circuit with the return wire of the motor's fields, accomplishing an upward movement of the elevator.

Such are the results, and that which is attained by this invention, and having described the same as explicitly as possible,

I claim—

1. In an elevator mechanism, the combination with an electrically operated elevator mechanism, of a three point switch or current reversing switch, "top" and "bottom" elevator well or hatchway switches; the current reversing switch being operated from the car, and the above named electrical appurtenances or devices being a part of the armature or driving motor circuits, substantially as, and for the purpose described.

2. In an electrically operated elevator mechanism, the combination of the "top" and "bottom" switches positioned in the elevator well or hatchway, the current reversing switch in operative controlment from the elevator, the armature of the driving motor, and the fields thereof, and of efficient electrical circuits and connections in association with aforesaid electrical means, substantially as and for the purpose described.

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

ELIAS MARSHALL.

Witnesses:

EUZEBIUS A. KELLOGG,

THOMAS W. HOBDAY.