H. B. SHREVE.

SAFETY SWITCH.

APPLICATION FILED JAN. 11, 1913.

1,114,813. Patented Oct. 27, 1914.

Fig. 1.

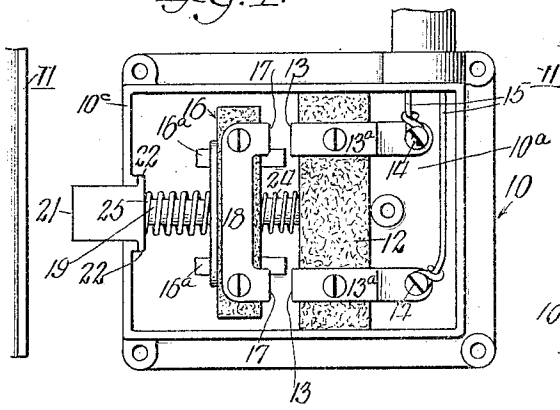


Fig. 2.

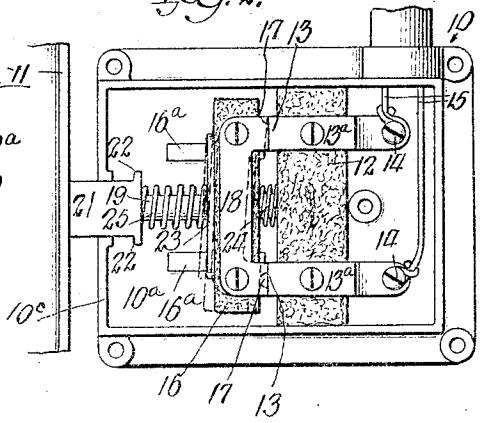


Fig. 3.

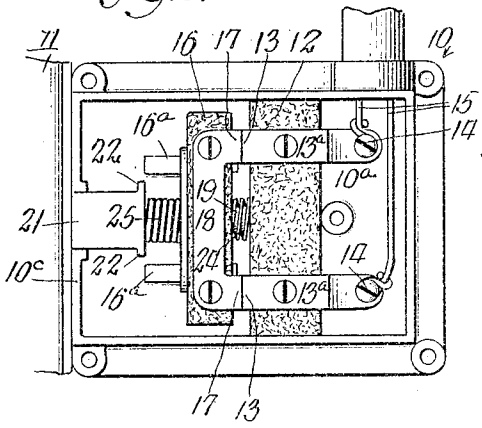


Fig. 4.

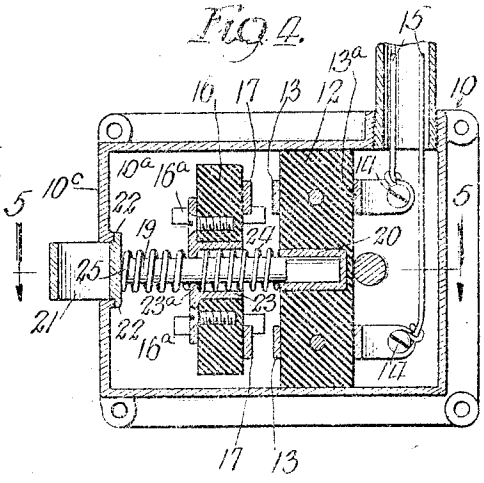
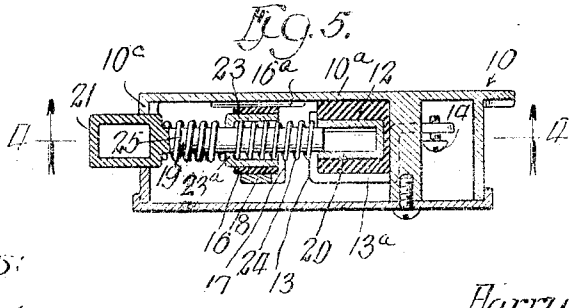


Fig. 5.



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UNITED STATES PATENT OFFICE.

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SAFETY-SWITCH.

1,114,813. Specification of Letters Patent. Patented Oct. 27, 1914.

Application filed January 11, 1913. Serial No. 741,412.

To all whom it may concern:

Be it known that I, HARRY B. SHREVE, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Safety-Switches; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to certain novel improvements in electric safety switches more particularly intended for use in connection with elevator systems, to stop or prevent movement of the elevator when any of the doors or gates opening into the elevator-shaft are opened or stand in open position.

The general features of this type of switch are familiar and include a switch mechanism proper which is usually fixed in the elevator-shaft and a member carried by the door or gate, the switch mechanism being so arranged that the electric circuit controlled by the switch is broken whenever the door or gate is opened and remains thus until the door or gate has been moved into closed and locked position, the member carried by the door engaging and operating a movable member of the switch to close the circuit. The electric circuit controlled by the switch embraces the motor which operates the elevator and also a brake-mechanism which is normally inoperative as long as the electric circuit is closed.

The invention consists of the novel features of the switch as hereinafter described and more particularly pointed out in the appended claims.

In the drawings:—Figure 1 is a front elevation of the improved switch mechanism with the front cover of the casing that incloses the switch mechanism removed, and with the parts of the switch shown in position as when the circuit is open. Fig. 2 is a similar view showing the parts in position as when the circuit is closed. Fig. 3 is a view like Fig. 2 showing the parts of the switch in closed position but with the members which operate it at a final limit of their movement. Fig. 4 is a view representing a vertical section through the switch in a plane indicated by the line 4—4 of Fig. 5. Fig. 5 is a cross-section through the switch in a plane indicated by the line 5—5 of Fig. 4.

Referring now to that embodiment of my invention illustrated in the drawings, 10 indicates a casing or housing that incloses the switch mechanism and is adapted to be attached to the wall of the elevator shaft in a position in alinement with a switch operating bar or arm 11 carried by the movable door or gate. These are so arranged relatively to each other, that when the door is moved to closed position, the arm 11 will operate the switch to close the circuit.

12 indicates a block of insulating material which extends transversely of the casing 10 and is rigidly connected to the bottom wall 10^a of said casing in any suitable manner. On the front edge of said block 12 (the left-hand edge as shown in the drawings,) are fixed two contact members 13, 13 which are spaced apart and constitute terminals of the electric circuit of the elevator system. Said contact members as shown are parts of flat bars 13^a, 13^a, which, having their ends bent downwardly and engaged against the front edge of said block, are attached by suitable screws to the top of the block and have their other end parts bent downwardly and engaged against the rear edge of said block and then offset parallel to the bottom wall of the box and spaced therefrom to provide supports for binding posts 14, 14 by means of which they are connected with the conductor wires 15, 15 of the electric system. Said bars 13^a, 13^a, are so dimensioned and spaced apart and the block 12 itself is made of such thickness that a suitable air space or gap for insulation purposes is provided between said bars and the bottom wall, side walls and cover plate of the box.

16 indicates a movable insulation block arranged to slide on the bottom wall of the casing which is preferably provided with parallel spaced bearing ribs 16^a rising therefrom and extending longitudinally of the box.

17, 17 indicate contact members fixed on the rear edge of the block 16 in line with the fixed contact members 13, 13 and adapted for contact therewith when the movable block 16 is moved toward the fixed block 12 for that purpose. Said contact members 17, as shown in the drawings, form part of a plate 18 which is of U-form with the legs of the U bent downwardly against the rear

edge of the block 16 and the transverse member of the U engaged against and attached by suitable screws to the top face of said block. In this case, as in the case of the fixed contact members, the metal U-plate providing the contact members 17, 17 and the movable block 16 itself are so proportioned and dimensioned with reference to the bottom and side walls of the casing and the cover-plate thereof that an efficient air-gap is provided for the purpose of insulating the contact members 17, 17 and the part of the plate connecting them from the metallic walls of the casing.

The movable insulation block 16 is mounted on a reciprocable plunger-rod 19 which is located midway between the two contact members 17, 17. Said plunger-rod has reciprocatory bearing at its rear end in a sleeve 20 secured in a suitable aperture or recess opening through the front edge of the fixed insulation block 12. The forward end of the plunger-rod is, as shown, made integral with a buffer-block 21 that projects through and has bearing in an opening formed in the front side wall 10^c of the casing. Said buffer-block has laterally extending shoulders 22 at its rear end which are adapted for engagement against the inner surface of the said front side wall 10^c and act to limit the outward movement of the plunger. The buffer-block 21 is in line with the movable arm 11 carried by the door or gate of the elevator-shaft and is adapted to be struck thereby when said door or gate is moved to closed position.

The plunger rod 19 extends through and has bearing in a sleeve 23 fixed in a suitable aperture in the movable insulation block 16. Said sleeve is made slightly larger in internal diameter than the diameter of the plunger-rod so as to provide a loose bearing for said rod. This permits a loose play of the movable switch member on the plunger-rod adapting it to swing into a position at a slight angle to its normal position at right angles to said plunger-rod for a purpose presently to be explained.

The sleeve 23 has at its front end an inwardly extending flange 23^a which forms a seat for coiled springs 24 and 25 mounted on the plunger-rod,—the first, namely, the spring 24 being placed on said rod at the rear of said flange and the second, namely, the spring 25 being placed on said rod in front of said flange. The rear end of the spring 24 engages against the fixed insulation block 12 while the forward end of the spring 25 engages against the rear end of the buffer-block 21. The latter spring is heavier than and is not so easily compressible as the spring 24, the purpose of which difference will now appear.

The operation of my improved switching mechanism is as follows: The parts normally stand in the relative positions indicated in Fig. 1 when the door or gate is in open position. In this position the movable contacts 17 are separated from the fixed contacts 13 and the electric circuit open. As the door moves toward closed position the arm 11, just before the door or gate reaches the final limit of its closed position, strikes the forward end of the buffer-block 21 and moves the plunger-rod 19 inwardly. In this movement of the plunger-rod, the spring 25 being heavier than the spring 24, said spring acts as a strut or post to carry the movable block 16 with the plunger-rod, the spring 24 being compressed to permit this movement. In the movement of the block 16 the contact members 17 are brought into engagement with the contact members 13 and the parts are so proportioned that the said contacts may be brought into contactual relation without compressing the spring 25 and before the buffer-block 21 and the plunger-rod 19 has reached the full limit of its inward movement. A further movement of said buffer-block and plunger-rod will be permitted by reason of the compressibility of the spring 25 which comes into action after the contactual relation of the fixed and movable contact members has been brought about. Thus some variation in the final position of the arm 11 carried by the door or gate is permissible without danger of failure of the operation of the parts as described.

On account of the flexibility of the movable insulation block 16 on the plunger-rod 19 and its capability of assuming a position at an angle to its right angular position on said rod, the proper closing of the switch is insured in case, by reason of arcing or otherwise between the opposing contact members a lug or excrecence is formed on one or the other so that one pair of opposing contact members are brought into engagement before the other. Under these circumstances the two opposing contact members, one of which carries the said lug or excrecence will engage first before the plunger-rod has reached its final position, and the other contact member of the movable switch member will be carried forward notwithstanding the stoppage referred to until it is brought into engagement with its associated fixed contact member, the parts assuming such position as indicated in dotted lines in Fig. 2.

I claim as my invention:—

1. A switch device of the kind described comprising the combination of a casing, of a fixed insulation block secured within said casing, laterally spaced contacts carried by said block, a movable insulation block in said casing, laterally spaced contacts carried thereby each in line with and adapted for contact with one of the first named contacts, a reciprocable plunger in said casing on which said movable insulation block is

loosely mounted, a buffer fixed on said plunger projecting without said casing and provided with stops to limit its outward movement, a spring interposed between said movable insulation block and said fixed insulation block, and a more rigid spring interposed between said buffer block and said movable insulation block.

2. A switch device of the kind described comprising the combination of a casing, of a fixed insulation block secured within said casing, laterally spaced contacts carried by said block, a movable insulation block in said casing, laterally spaced contacts carried thereby each in line with and adapted for contact with one of the first named contacts, a reciprocable plunger in said casing on which said movable insulation block is loosely mounted, said plunger being provided with a buffer at one end which projects without said casing, means for limiting the outward movement of said plunger, and yielding means acting to resist movement of the movable insulation block in either direction on said plunger.

3. A switch device of the kind described comprising the combination of a casing, of a fixed insulation block secured within said casing, laterally spaced contacts carried by said block, a movable insulation block in said casing, laterally spaced contacts carried thereby each in line with and adapted for contact with one of the first named contacts, a reciprocable plunger in said casing on which said movable insulation block is loosely mounted, said plunger being provided with a buffer at one end which projects without said casing, means for limiting the outward movement of said plunger, yielding means interposed between said two insulation blocks acting to resist the movement of one toward the other, and yielding means interposed between said movable block and a fixed part of said plunger acting to resist movement of said block toward the buffer end of said plunger, the latter being capable of greater resisting force than the first named yielding means.

In testimony that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 30th day of December, A. D. 1912.

HARRY B. SHREVE.

Witnesses:
GEORGE R. WILKINS,
T. H. ALFREDS.