R. I. WRIGHT & H. F. STRATTON.

SAFETY LIMIT SWITCH.

APPLICATION FILED OCT. 30, 1912.

1,113,592. Patented Oct. 13, 1914.

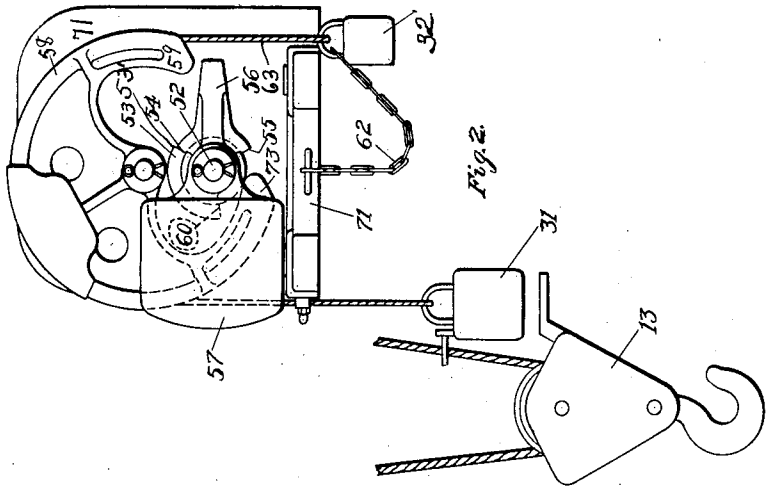


Fig. 2.

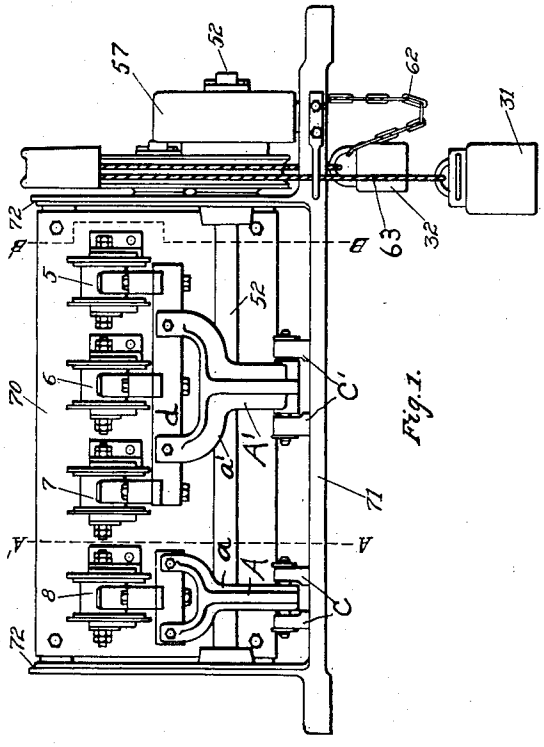


Fig. 1.

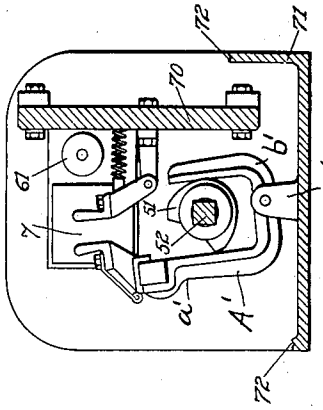


Fig. 4.

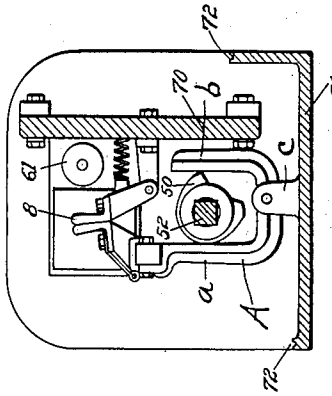


Fig. 3.

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UNITED STATES PATENT OFFICE.

REUBEN I. WRIGHT AND HARRY F. STRATTON, OF CLEVELAND, OHIO, ASSIGNORS TO THE ELECTRIC CONTROLLER AND MANUFACTURING COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

SAFETY LIMIT-SWITCH.

1,113,592. Specification of Letters Patent. Patented Oct. 13, 1914.

Application filed October 30, 1912. Serial No. 728,682.

To all whom it may concern:

Be it known that we, REUBEN I. WRIGHT and HARRY F. STRATTON, citizens of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented new and useful Improvements in Safety Limit-Switches, of which the following is a specification.

Our invention relates to improvements in safety limit switches, particularly in that type which are used to stop an electric motor driven mechanism when it has reached a certain limit of travel.

More especially, it applies to apparatus for stopping the hoist motion of an electric traveling crane when the hook block has reached its top limit of travel, to prevent the injury of the hoisting mechanism against an overtravel of the hook block, and to insure persons walking beneath the crane from injury caused by falling objects resulting from such overtravel.

One of the objects of our invention is to provide a switching device which will insure the making of the proper connections regardless of the speed of the mechanism when the limit of travel is reached.

Other objects and advantages of our invention will be hereinafter set forth.

Referring to the accompanying drawings, Figure 1 is a front elevation of our preferred form of limit stop, with the cover removed. Fig. 2 is an end elevation of the same. Fig. 3 is a sectional view of Fig. 1 taken on the line A A, with the blowout shield of the switch 8 removed, showing the switch 8 in its normal position. Fig. 4 is a sectional view on the line B B′, with the blowout shield of the switch 5 removed, showing the switches 5, 6, and 7 in their normal position.

On the drawing, 52 represents a square horizontal shaft carrying with it the cams 50 which turn between the upright arms *a* and *b* of the U-shaped switch carrying member A pivoted to the lugs *c* on the bottom of the frame 71. The shaft 52 also carries other cams 51 which turn between the arms *a′* and *b′* of the switch-carrying member A′, pivoted to the lugs *c′*, the cams being arranged and constructed to hold one member A or A′ with the switch or switches it carries open, and the other with the switch or switches it carries closed, as shown on Figs. 3 and 4.

The arm *a* supports at its top the movable contact of the switch 8; and the arm *a′* supports the movable contacts of the switches 5, 6, and 7, these contacts being secured to the bar *d* on the arm *a′*.

The shaft 52 near one end supports so as to move therewith the segment 53 having the opposite ends 53′ and 60. The outer end of the shaft beyond the segment is round and pivotally supports the arm 56, which is provided with the heavy weight 57 on the opposite side of the shaft 52. The arm 56 carries two shoulders 54 and 55, one on each side, arranged to move in the path of the ends of the segment 53. There is some lost motion between one end of the segment 53 and one of the shoulders 54, 55. As shown on Fig. 2, the lost motion is between the end 60 and the shoulder 55.

The sheave 58 is mounted on the end of the casing so as to oscillate in a vertical plane including the arm 56. The cord 63 passes over the sheave and has the weights 31 and 32 attached to its ends, the weight 31 being heavier than the weight 32. The sheave is interrupted between the ends 59 and 73 between which the arm 56 lies and by which the arm is operated.

When the hook-block 13 in rising engages the bottom of the weight 31, it lifts the latter, permitting the weight 32 to turn the sheave 58 to the right. The end 59 of the sheave rim soon engages the top of the arm 56 and causes the same to rotate somewhat more than 90°, whereupon the weight 57 passes its dead center and falls so as to lie 180° from the position shown on Fig. 2. In falling the weight causes the segment 53 to be rotated to the right by reason of the engagement of the shoulder 55 with the end 60 of the segment. The parts come to rest with the weight 57 at the right, and the arm 56 at the left, the shoulder 54 being separated from the end 53′ of the segment 53 to provide the lost motion required to restore the parts to their original position. The switch 8 is now open and the switches 5, 6, and 7 are closed.

When the block 13 descends, the weight 31 rotates the sheave to the left, the end 73 soon engaging the arm 56 and causing the

weight to pass the dead center and fall to its original position. In falling the shoulder 54 engages the end 53′ and rotates the segment and the shaft 52 back to the left, restoring the switches 5, 6, 7, and 8 to their original conditions.

In both movements of the switches the weight causes their quick operation. The movement of the switches depends on gravity and is, therefore, independent of the speed of the weights 31 and 32. The contacts of the switches will be operated quickly regardless of whether the hook-block 13 runs slowly or rapidly.

61 represents a blow-out coil for the switch contacts. The relatively stationary contacts are mounted on the slate or other insulating plate 70, supported by the frame 71. 72 are grooves to receive the edges of a cover, not shown. The chain 62 prevents the weight 32 from falling, if the cable 63 should break or otherwise become disconnected from the weight 31 or 32.

We claim—

1. In a switch, a shaft, a member oscillatable thereon and having a weight on one side of the shaft and an arm on the other side thereof, an oscillatable member having its ends disposed at opposite sides of the arm and arranged to engage either side of the said arm and move the weight to and slightly past its dead center, a pair of shoulders carried by the shaft, a pair of shoulders carried by the weight and arranged to engage the first named shoulders and move the shaft when the weight has been moved substantially to its dead center, and contact operating means carried by the shaft.

2. In a switch, stationary and movable contacts, cam surfaces connected with the movable contact, a cam for engaging said surfaces to open and close the contacts, a shaft for turning the cam, a weight, and means whereby the weight engages the shaft for moving the cam only when it has passed beyond its dead center.

3. In a gravity-operated switch, a weight, a shaft operated thereby, means whereby said shaft is rotated by the weight only when the center of gravity of the weight is descending, operating cams carried by the shaft, switch contacts, and means whereby said cams open or close the contacts whenever the shaft is turned by said weight.

4. In a mechanically-operated switch, stationary and movable contacts, an operating shaft, a cam carried by said shaft, cam surfaces by which a movement of the cam either causes the contacts to open or to close, a weight eccentrically mounted on said shaft, and means whereby said weight engages the shaft to turn it when the weight has passed its median position.

Signed at Cleveland, Ohio, this 28 day of October 1912.

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