E. L. DUNN.

AUTOMATIC LIMIT SWITCH.

APPLICATION FILED SEPT. 18, 1913. RENEWED NOV. 8, 1917.

1,275,407.

Patented Aug. 13, 1918.

2 SHEETS—SHEET 1.

Fig. 1.

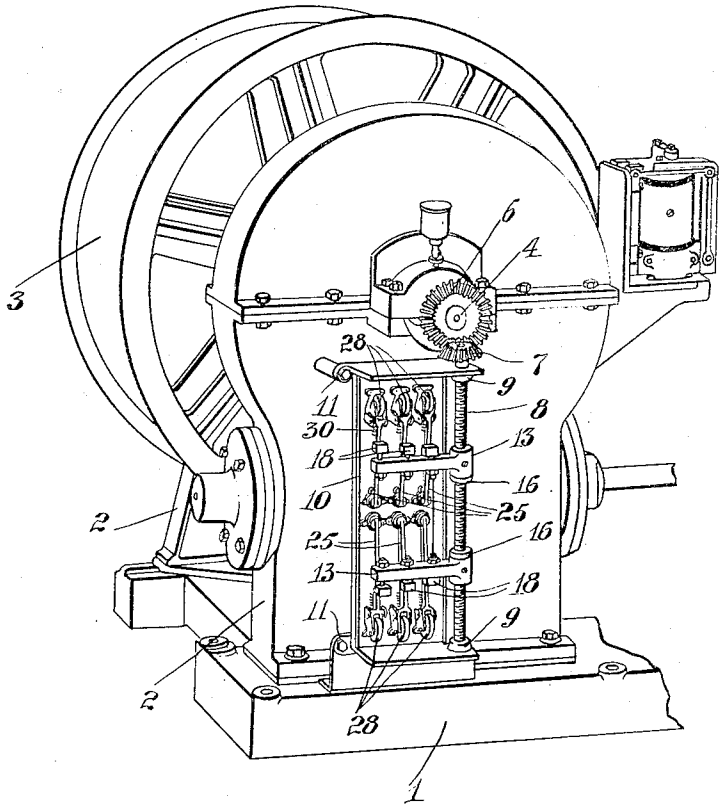
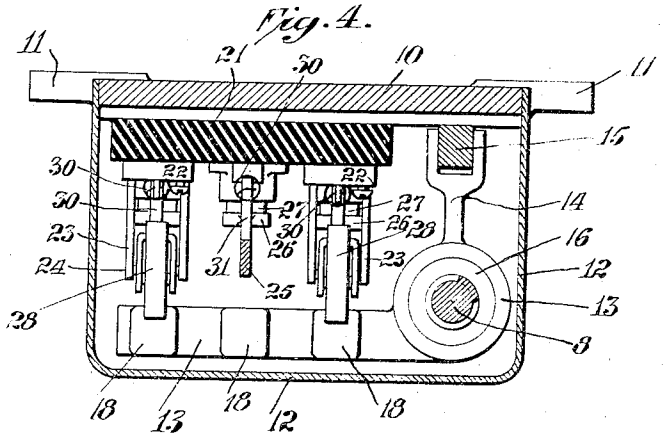


Fig. 4.



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Fig. 3.

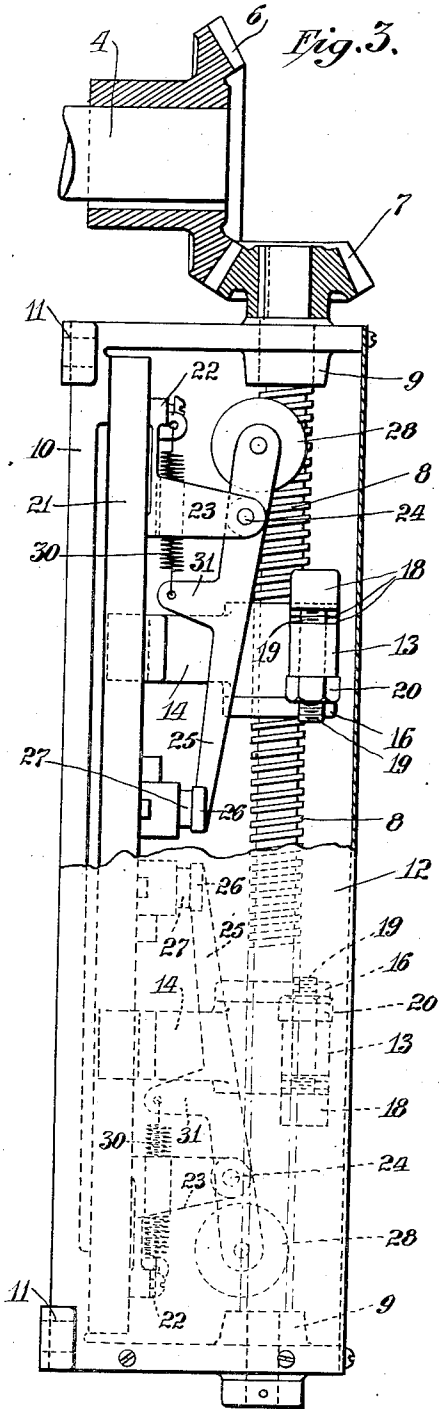
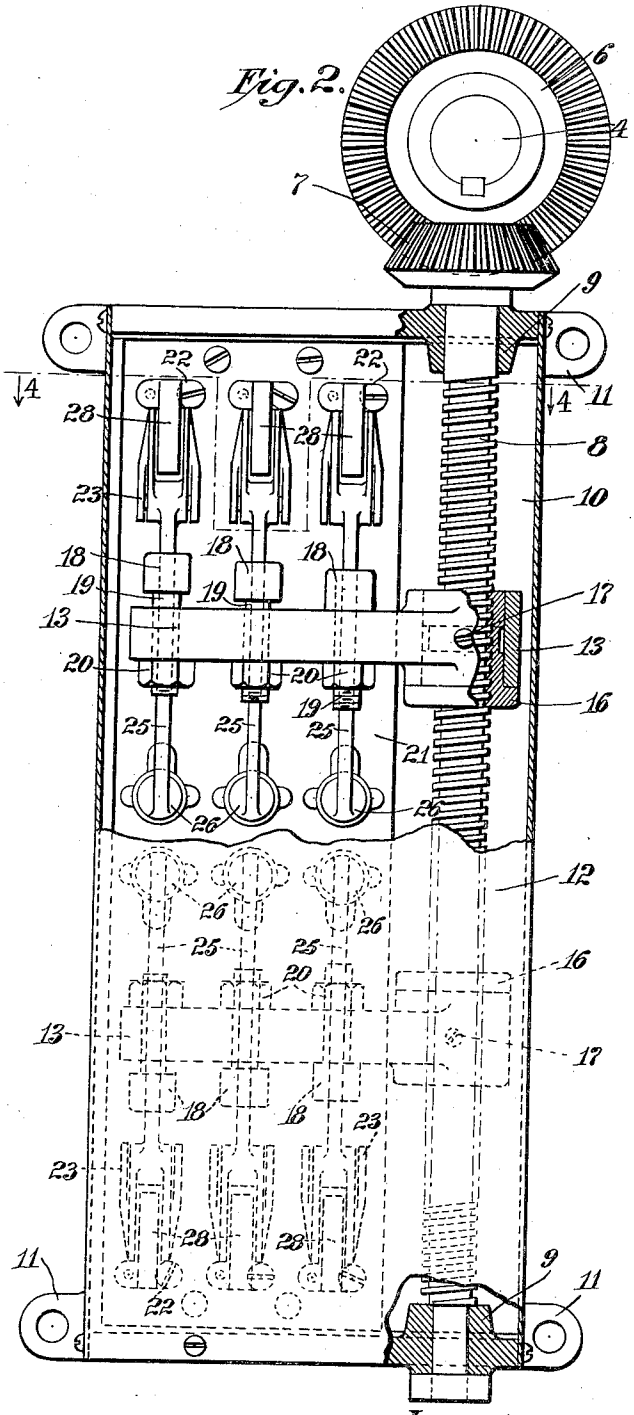


Fig. 2.



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UNITED STATES PATENT OFFICE.

EDWARD L. DUNN, OF WORCESTER, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO STANDARD PLUNGER ELEVATOR COMPANY, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

AUTOMATIC LIMIT-SWITCH.

1,275,407. Specification of Letters Patent. Patented Aug. 13, 1918.

Application filed September 18, 1913, Serial No. 790,455. Renewed November 8, 1917. Serial No. 200,995.

To all whom it may concern:

Be it known that I, EDWARD L. DUNN, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Automatic Limit-Switches, of which the following is a full, clear, and exact specification.

This invention relates to an automatic limit switch for elevators, more especially intended for drum elevator machines wherein the circuits are automatically opened as the car approaches either limit, in order to prevent over-running.

These limit switches are usually geared to the machine so as to be operated thereby, and it is desirable to enable these switches to be easily adjusted or set so as to open the circuits at the proper time. With some forms of elevator control an automatic slowing of the motor is effected, as by inserting resistance in the armature circuit or strengthening the field, before the circuits are opened to stop the motor and apply the brake. It is also desirable to associate these limit switches as closely as possible with the winding machine and to render them not only compact but readily accessible and adjustable.

The invention of this application is directed to the accomplishment of the foregoing objects, as will be more fully understood in connection with the description of the accompanying drawings, wherein—

Figure 1 represents an elevator winding machine equipped with this invention;

Fig. 2 is a front elevation of a preferred form of the limit switch with the cover partly removed, and partly in section;

Fig. 3 is a side elevation; and

Fig. 4 is a cross section on line 4—4 of Fig. 2, seen from above.

The elevator winding machine comprises a base 1 carrying uprights 2 on which is journaled a drum 3 keyed to the shaft 4 which is driven by motor. The brake, the motor controlling switch circuits and their accessories are of usual construction and not necessary to be further described herein. One end of the shaft 4 (or any other shaft geared to the motor) is extended outwardly and provided with a bevel gear 6 which drives a somewhat smaller bevel gear 7 carried by a vertical screw-shaft 8. Journaled in bearings 9 are end plates carried by a base 10. The base 10 may have feet 11 by which it will be secured to one of the uprights 2, and will also be provided with a removable cover 12 inclosing the moving parts of the switch. The shaft 8 is provided with two cross-heads 13, which are in the form of right-angle levers having the short ends 14 adapted to engage a stationary guide 15 carried by the base 10. Each lever is provided with a nut 16 threaded to travel on the screw-shaft 8, and also with a set-screw 17 by which the nut can be clamped to the lever. By loosening the set-screw 17, it will be seen that the nut 16 can be screwed up or down on the shaft 8 when the machine is at rest and thereby position of the cross-head 13 adjusted to vary the time of stop or operation of the switches which are to be controlled. One cross-head 13 operates at the upper end of travel when moving in one direction, and the other cross-head operates at the other end of the travel when moving in the opposite direction, it being seen that the shaft 8 will be revolved in one direction when the elevator is going up and in the other direction when the elevator is going down. Each cross-head is provided with one or more strikers 18, carried by screws 19 threaded therein and locked by nuts 20. Thus, the position of strikers 18 can be adjusted toward and from the cross-head 13 so that their distances from the cross-head can be adjusted. 21 is an insulating base provided with suitable terminals as 22 and uprights 23 in which are mounted on pivots 24 a series of switch levers 25. Each lever carries a movable contact 26 coöperating with a stationary contact 27 carried on the base 21. Each switch lever 25 carries a fiber or non-conducting roller 28 which is disposed, when the switch is closed as seen in Fig. 3 in the path of striker 18. On account of the difference in leverage between the roller 28 and the pivot 24 and between the pivot 24 and the contact 26, it will be seen that a very slight movement of the roller by the striker will cause a wide and relatively quick opening of the switch, so that destructive arcing will be prevented even in case a circuit carrying heavy current is broken. 30 is a spring attached to the base 21 and an arm 31 of lever 25 for holding the switches normally closed, it

being seen that these several switches can be set to open in succession, and they also close successively when the elevator is reversed. The construction herein shown embodying three switches at each end is adapted first to partially slow down the motor by the actuation of the first switch, with a further slowing down upon the actuation of the middle switch, and a final opening of the motor circuits and application of the brake upon actuation of the last switch. It will be seen that first by adjusting the general position of the cross-head on the screw and then by separately adjusting the strikers 18 a very exact regulation of the stopping of the motor can be accomplished.

The advantages of this construction are that the apparatus is very compact by reason of the relative arrangement of the screw-shaft 8, cross-heads and switches, so that it can be easily mounted directly on the machine and also this construction is especially adapted to be directly driven by toothed gearing, without requiring belts or chains which always have an objectionable back lash.

Within the scope of the appended claims various modifications and changes may be made without departing from the scope of the invention.

Having thus described my invention, I declare that what I claim as new and desire to secure by Letters Patent, is:—

1. The combination of a base carrying a threaded shaft, a crosshead engaged therewith so as to be reciprocated thereby, a guide for said crosshead, a plurality of independently adjustable strikers carried by said crosshead, and a plurality of switches disposed parallel to said shaft and disposed to be actuated independently by said strikers at times determined by the respective adjustments of said strikers relatively to said crosshead.

2. The combination of a base, a mechanically driven screw shaft, a plurality of independently adjustable crossheads engaged with said screw shaft and reciprocated thereby, and a plurality of alined lever switches arranged longitudinally of said shaft and between said base and said crossheads, each switch at the end adjacent the end of said shaft having an actuating projection disposed in the path of one of said crossheads, whereby a switch will be actuated as each crosshead approaches one end of said screw.

3. The combination of a base, a mechanically driven screw shaft, a plurality of crossheads engaged with said screw shaft and reciprocated thereby, said crossheads embodying a releasable connection whereby to permit longitudinal adjustment relatively to the screw shaft, a plurality of pairs of alined lever switches arranged longitudinally of said shaft and between said base and said crossheads, the switches of each pair of the ends adjacent the end of said shaft having each an actuating projection disposed in the path of one of said crossheads, and having each a contact at their adjoining ends, and an adjustable striker for each switch carried by said crossheads, whereby the switches of each pair can be variably actuated as the crossheads approach the respective ends of said screw.

4. In elevator control mechanism, the combination with vertical base members supporting a horizontal winding shaft, of a vertical screw driven from said shaft, a panel and guide supported by one of said base members, a plurality of sets of alined switch members on said panel oscillating in planes substantially parallel to said screw, relatively adjustable cross pieces on said screw in sliding contact with said guide and having extensions moving across the face of said panel, and strikers carried by said extensions and engaging said switch levers to operate them.

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

EDWARD L. DUNN.

Witnesses:

A. E. FAY.

C. F. WESSON.