July 23, 1946. F. F. TURNER 2,404,415

OVERLOAD SAFETY SWITCH FOR ELEVATORS

Filed June 24, 1943

FIG-1-

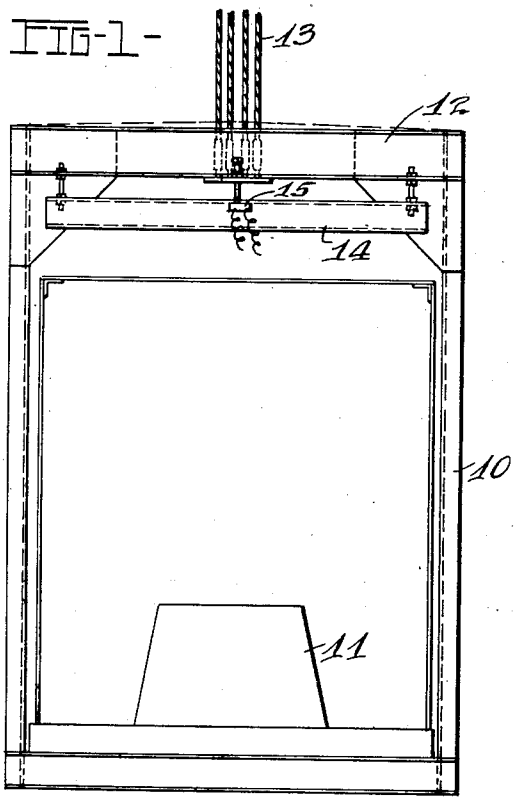


FIG-2-

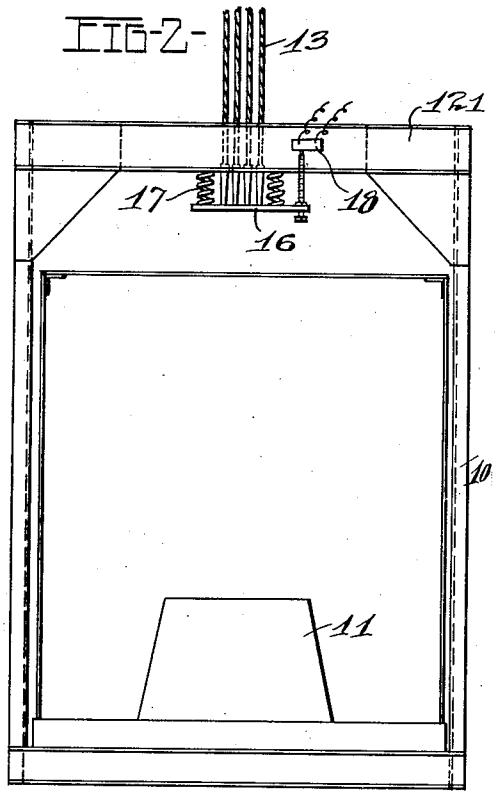


FIG-3-

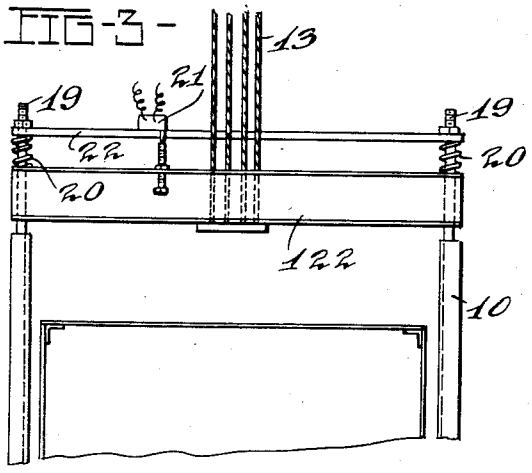
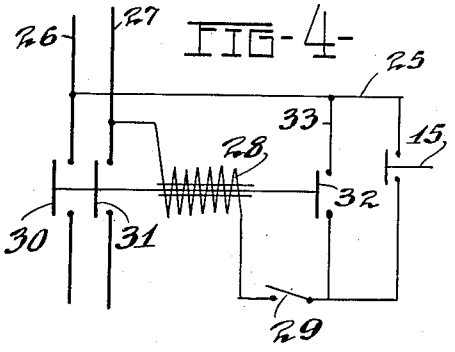


FIG-4-



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OVERLOAD SAFETY SWITCH FOR ELEVATORS

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1 Claim. (Cl. 187—29)

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This invention relates to a safety device to prevent the starting of an overloaded elevator. The object of the invention is to avoid the starting of an elevator car when overloaded.

When an elevator car is overloaded, and it is started in the down direction, there is danger that it cannot be stopped at the desired floor but will continue downward into the pit, from which it cannot be raised by the regular elevator motor. This involves much trouble and delay before the elevator is in use again, even where no injury to the apparatus is inflicted.

In speeding up production for war purposes, heavy loading of elevators is unusually common, so that some safety device is needed. A device which would in itself render the elevator inoperative upon there being exerted upon the floor of the car and excessive weight would not produce the desired results. When an elevator is started or accelerated upward, the inertia of the load in the car adds to the pressure due to the weight of load, so that the lifting device is normally arranged to have a starting or accelerating lifting force greater than the dead weight of the maximum permissible load. For this reason, a device set to render the elevator motor inoperative when a downward pressure was exerted on the car equal to the weight of a normal load would stop the car immediately after starting even though the dead weight of the load was much under that permissible, while a device set for the maximum permissible downward pressure on the car would permit its starting when greatly overloaded, and would not even stop the motor after the car started in the downward direction.

The purpose of this invention is to avoid these difficulties and prevent the starting of an overloaded car in either the upward or downward direction while not interfering with the normal operation of the car when the load is not excessive.

Minor objects and the details of the invention will appear as the description proceeds.

In the accompanying drawing forming a part of this specification, Fig. 1 is a diagrammatic elevation, partly in section, of an elevator car showing one mounting of my safety switch. Figs. 2 and 3 are views similar to Fig. 1, but showing different mountings of the switch. Fig. 4 is a wiring diagram indicating the relation of my new safety device to the normal operating mechanism of an electric elevator.

In the form shown in Fig. 1 there is indicated an elevator car 10 containing a load 11. At the top of the car there is shown a crossbeam 12 by

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which the car is suspended from the usual cables 13. Beneath beam 12 there is a switch beam 14, securely fastened to beam 12 at its ends. A micro-switch 15 is mounted upon beam 14 and is opened by relative movement of the central portions of beams 12 and 14. If necessary, the micro-switch may comprise desirable and suitable means for multiplying the relative movement of the beams.

It will be readily understood that as soon as an excessively loaded car is suspended from the cables, beam 12 is sprung slightly and its central portion moves upward relatively to beam 14, which is not affected by the weight in the car.

In Fig. 2 there is shown an arrangement wherein plate 16 is directly suspended from cables 13 and the distance between that plate and beam 121 is governed by the degree of compression of springs 17. Switch 18 is opened when the springs are compressed unduly.

Fig. 3 indicates another arrangement wherein the ends of beam 122 are attached to the car by bolts 19 and the springs 20 about bolts 19 are compressed by the weight of the car, opening switch 21 on crossbeam 22 when the weight is excessive.

These different arrangements do not exhaust the possibilities, but are by way of illustration only. However, the arrangement shown in Fig. 1 is preferred because it is most easily applied to many elevators now in use, and it operates substantially independently of the location of weight in the car.

If the safety switch located and operated as described was in a circuit necessary for both the starting and the continued operation of the motor, it would be open to the objection noted above, because it would stop the motor when accelerating with normal load, or else allow the starting of the motor with excessive load. To avoid this, the safety switch is located in a circuit the closing of which is necessary for starting the motor but not necessary for the continued operation of the car. One way in which this can be done is indicated in Fig. 4.

In that figure the safety switch 15 is shown located in a circuit 25 leading from power line 26 to power line 27 through switch coil 28 and starting switch 29. With safety switch 15 normally closed, the closing of starting switch 29 energizes coil 28 and closes power line switches 30 and 31, thereby energizing the motor of the elevator. At the same time switch 32 is closed in bypass circuit 33, so that the current continues through coil 28, regardless of whether switch

15 is opened or closed, until the motor is stopped in the normal manner.

In this way, it will be seen that the safety switch operates to prevent the starting of the elevator motor when the car is overloaded, without interfering in any way with the operation of the car after the motor has started.

It will be readily understood that changes may be made to adapt the arrangement to the wiring system otherwise in use with the elevator, the essential feature illustrated being that there is a safety switch normally closed in a circuit essential to the starting of the motor, and a bypass circuit for the safety switch, the bypass being provided with a normally open switch which is closed by the starting of the motor.

Having disclosed the invention so that those skilled in the art can make and use the same, what I claim is:

In an electric elevator apparatus, a car having a top cross member to which suspension cables are centrally attached, said member being attached at its ends to rigid car frame parts and being capable of flexing intermediate its ends to assume a longitudinal bow when the car is subjected to a predetermined overload condition, a second cross member fixedly connected at its ends to the first member near the ends of said first member and remaining substantially rigid during flexing of the first member, and a normally closed micro switch in a circuit which must be closed for the elevator to operate, said switch being disposed adjacent to the longitudinal center of said cross members and being operable by a flexing of the first cross member relative to the other under predetermined overload conditions to open the switch.

FLOYD F. TURNER.