April 24, 1945. J. E. CURRIE 2,374,473

ELEVATOR OVERLOAD AND BLOCKAGE APPLIANCE

Filed May 14, 1942

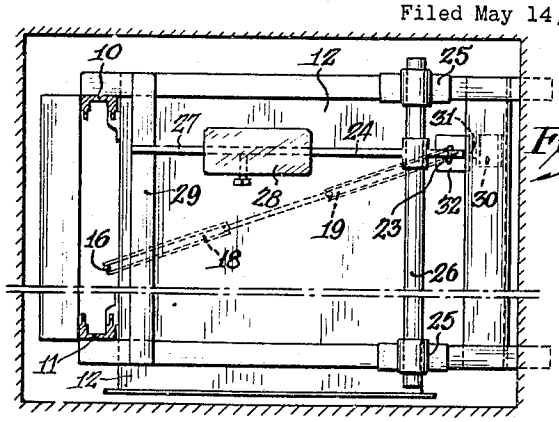


Fig. 2.

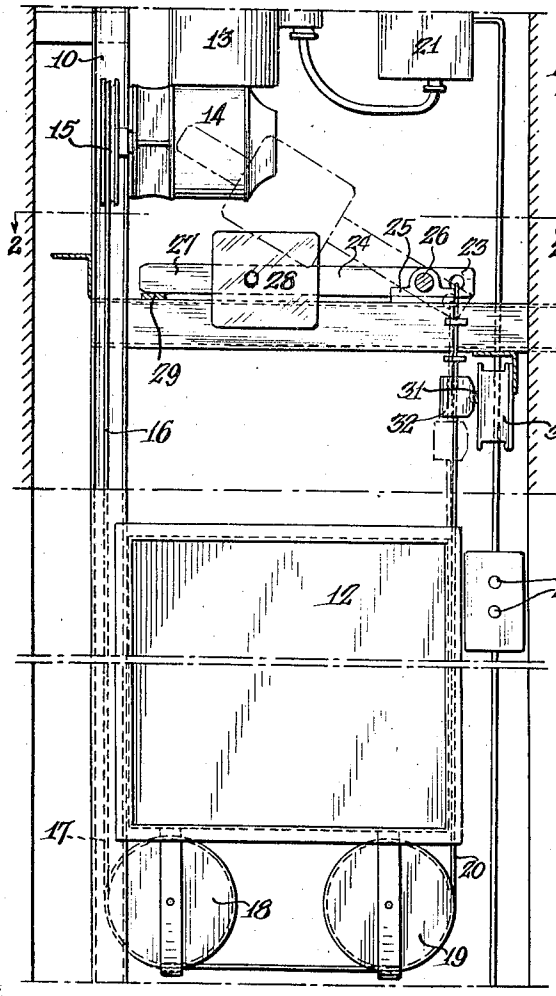


Fig. 1.

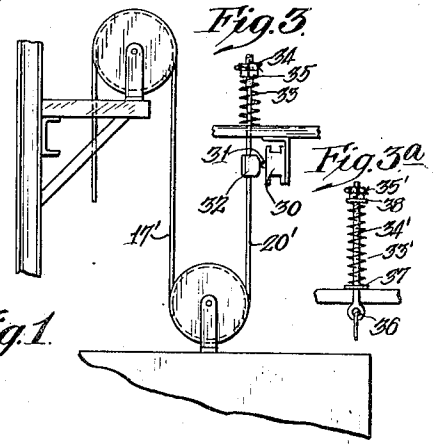


Fig. 3. Fig. 3a

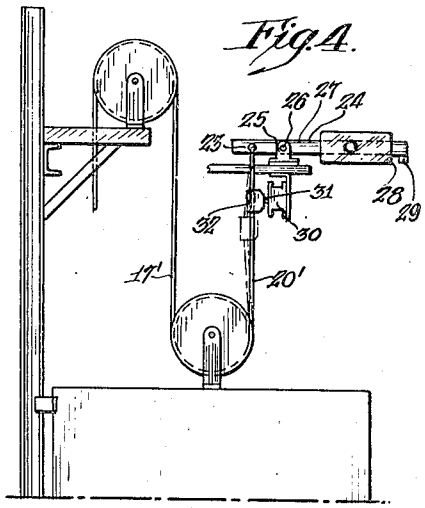


Fig. 4.

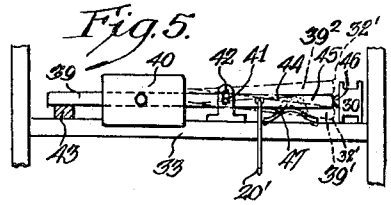


Fig. 5.

Inventor:
James E. Currie

Witness:
Walter Clisby

by W. Stuart Jackson and Son
Attorneys

Patented Apr. 24, 1945 2,374,473

UNITED STATES PATENT OFFICE

2,374,473

ELEVATOR OVERLOAD AND BLOCKAGE APPLIANCE

James E. Currie, Philadelphia, Pa.

Application May 14, 1942, Serial No. 442,930

4 Claims. (Cl. 187—29)

My present invention is intended to prevent starting or continuing to run a dumbwaiter when it is overloaded and to protect it either in case the elevator engages an obstruction on the way up or if for any reason there is a slackening in the lifting cable. By the present invention in any such case the power is cut off and the brake is applied.

One purpose of the invention is to support the control mechanism by which the power is cut off and by which the brake is applied upon the machine, that is, upon the fixed or stationary part of the equipment as distinguished from supporting it upon the dumbwaiter car which is to be controlled.

A further purpose is to anchor the lifting cable for the dumbwaiter at one end through a yielding fastening and to safeguard the car by means which is made effective through the yield of the fastening.

A further purpose is to connect the safety mechanism with a return stretch of a cable, which cable passes beneath one or more sheaves carried by the car. I thus terminate the cable through safety devices spaced from the car, freeing the car from complication by the control mechanism as well as doubling cable strength for a given size cable.

A further purpose is to mount the safety control mechanism with the "machine" rather than upon the car, so as to facilitate installation, repairs, adjustments and replacements.

A further purpose is to provide a compact mechanism which will fit within the overhead machine space above the elevator car, eliminating electrical or special mechanical connections or fittings from the car.

A further purpose is to provide simple and direct adjustment so that the same mechanism may be suited for use with various capacities of elevator cars.

Further purposes will appear in the specification and in the claims.

I have preferred to illustrate the invention by a single form only with slight variations therefrom, selecting a form which is practical, efficient, simple and inexpensive but which has been selected primarily because of its excellence in illustration of the principles therof.

Figure 1 is a fragmentary front elevation, partly in section, of a preferred embodiment of the invention.

Figure 2 is a fragmentary section upon line 2—2 of Figure 1.

Figure 3 is a fragmentary front elevation showing a single pulley above the elevator car, as distinguished from the side pulleys below the car in Figures 1 and 2. A compression spring provides compensation.

Figure 3a is a fragmentary view of a second spring form.

Figure 4 is a fragmentary elevation showing a slack condition of the cable.

Figure 5 is a front elevation of a modified form.

In the drawing similar numerals indicate like parts.

The invention is applied to an existing form of dumbwaiter, shown for purposes of illustration only, to give one setting for the structure. In this figure vertical guides 10 and 11 cooperate with a dumbwaiter car 12 lifted and allowed to lower, by a motor 13 and gear reducer 14 operating through a sheave 15 and a steel cable 16.

In Figures 1 and 2 one stretch 17 of the cable passes down one side of the dumbwaiter about the loose pulleys 18 and 19 and in a second, terminal, stretch 20, up along the other side of the dumbwaiter to a yielding anchorage.

The anchorage opposes downward pull of the cable by a counterweight or spring so that additional cable pull or slacking of the cable may be used to open a circuit.

In the embodiment chosen for illustration, the electric circuit to the motor passes through a magnetic control 21 and the car is operated by pressing one or other of two push buttons 22.

Except for the yielding anchorage of the terminal cable stretch all of the above is old in the art.

In Figures 3 and 4 a single supporting pulley 18' only is shown as mounted on the car, and it is located above the car, stretches 17' and 20' leading to and from it and the terminal stretch 20' being yieldingly anchored.

In my invention I provide a cut-out switch in the electric circuit between the buttons 22 and the motor, by which the circuit may be interrupted if the pull on the terminal cable stretch be excessive or if this stretch be slacked. The cut out switch is opened by a spring or by gravity and its closure is cable-controlled, i. e., normal cable pull on the cable within designed limits causing the cut out switch to remain in closed position, and variation of the cable pull so that the pull exceed or fall below these limits releasing the switch so that the circuit opens.

The present invention locates the switch closing mechanism outside the car where it will be free from car movement and within the tension

control of the cable terminal. In order to get it free from the car it is made movable with the yielding of the cable terminal. At the same time the looping of the cable beneath one or more car-supported pulleys divides the car support between two cable stretches and, correspondingly, makes the strain on the yielding support less than would otherwise be required.

Several forms of resilient cable terminal support are shown in Figures 1, 3, 3a and 5 and a different position of the parts is shown in Figure 4.

In Figures 1 and 4 the cable is attached to the operating end **23** of a counterweight lever arm **24** which is mounted upon any fixed support **25** by a pivot **26**. The weight arm **27** carries a weight **28** which is adjusted along the length of the arm so as to permit the same size of automatic control mechanism to be adjusted to dumbwaiters of different size and capacity.

If the arm **27** rest upon a stop **29** no movement of the arm will take place until the pull from the dumbwaiter exceeds the weight which the counterbalance is intended to support. If this occur before the dumbwaiter starts the car cannot be started, or if it occur by reason of an obstruction encountered by the dumbwaiter during its travel, the dumbwaiter will stop at that point.

Some part of the system thus far described, movable with the yieldingly supported cable terminal stretch, is used to close the cut out switch. In all of the figures except in Figure 5 the closing means is mounted on the cable near enough to its end to be given lateral support by the fastening of the cable end. It will be described first as it applies to Figures 1 and 4.

Close to the terminal stretch is mounted a cut out switch **30** whose closing is effected by pressing an operating member **31** which may in fact be merely a button, but which, to distinguish from the buttons **22**, will be called a plunger.

The cable carries a block or pressure bar **32** preferably when it moves acting as a cam which normally rides in front of the switch plunger **31**, engaging it and holding the cut out switch closed.

Because in the forms shown, as in Figure 5 for example, this bar will engage the plunger from above or below while the bar is moving vertically and uses chamfered corners **32'** to advantage this bar is called a cam, notwithstanding that the function of the chamfered corners can be performed by rounding the projection of the plunger as in the illustration.

Movement of the plunger of the cut out switch closes the circuit at a point between the buttons **22** and the motor.

The circuit passes through a magnetic control box **21**. When the pressure bar is in its normal position therefore this circuit is closed and the elevator can be operated through buttons **22**.

Cut out switches in the circuit from buttons **22** to the motor are not new and when this circuit is interrupted at this cut out switch the stoppage of the car and application of the brake occur as in existing systems.

If the dumbwaiter meets an obstruction on its downward stroke the cable is slacked, allowing the cable near its end to sag away from the plunger to some such position as is seen in Figure 4, again allowing the switch plunger to be pressed out by a spring or by gravity to the open position of the cut out switch.

In Figure 3 the place of the counterweight arm is taken by a spring **33** resting upon any suitable frame member. In its simplest form the cable here ends in a bolt **34** to which the cable is attached. The bolt passes through the spring and is held by a nut **34'**. The cable thus constantly tends to compress the top of the spring.

One form of the invention by which the spring can be pre-set is shown in Figure 3a, in which the bolt **34'** passes through the spring **33'** and frame member and terminates in an eye **36**. The spring rests upon the frame member or upon a washer **37**.

At the opposite end of the bolt the nut **34'** rests upon the washer **38** which engages the upper end of the spring. The nut is tightened to a preliminary setting corresponding to that proper for maximum load. Any load over maximum or any load applied by obstruction pulls the bolt down farther through the spring, permitting movement of the pressure bar to a position where it no longer engages the plunger and no longer maintains the switch closed. The cable is attached to the eye **36**. The operation in case of slackening of the cable is exactly the same as in Figures 1 and 4.

In Figure 5 the lever 39, carrying counterweight **40** adjustable along its length, is pivoted upon a pin **41** resting normally in the lower end of a slot **42**. The lever is supported upon any suitable frame member. The lever at its counterweight end rests normally upon a stop **43**. The cable is attached directly to the operating end **44** of the lever and in normal position the counterweight is not lifted and the lever rests as seen in full lines in Figure 5. In this position the end **45** of the lever engages a cut out switch plunger **46** and holds the cut out switch closed. When the weight upon or within the elevator becomes excessive the weight **40** is raised and the end **45** is lowered permitting the switch plunger to fall or to be pushed to open switch position, interrupting the circuit. This is shown in dotted position **39'**.

By removing the overload the cable terminal will be lifted by the counterweight and the pressure bar will again close the cut out switch, thus re-establishing the operating circuit.

It will be seen that various weights of cars and various permissible loads correspondingly can be handled by merely changing the position of the counterweight on its bar. Stoppage or retardation due to an obstruction has the same effect as overload and puts the safety into operation.

Operation of the lever in Figure 5 to lift weight **40** overcomes a light spring **47**.

If the car meets an obstruction while travelling down, the driving mechanism will continue to pay out cable while the car remains stationary. This sets up a slack or loose cable condition which removes the pressure of the pressure bar against the cut out plunger, thus shutting off the machine and setting the brake. In Figure 5 where the pressure bar is the end of the lever, the spring **47** lifts the operating end of the counterweight lever to the position seen at 39^2. Thus the cable slack again permits the switch plunger to move, and the cut out switch is opened. This movement of the lever with slacking of the cable is permitted by relative movement of the pin **41** and the walls of slot **42**.

As will be seen, two stretches of cable are effective at all times to support the car and the end of the cable is held yieldingly at a point which is relatively fixed and which is free from car movement. This permits mounting of the automatic control mechanism entirely free from the car structure and therefore effectively with or as a part of the "machine" as distinguished from the car.

It will be evident that the pressure bar is im-

portant because of its pressure function rather than because of its cam function and that the cam corners or edges are a convenience in that they assist in wedging the plunger into switch closing position as a convenience in the assistance rather than as a necessary adjunct of the pressure bar.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I therefore claim all such in so far as they fall within the reasonable spirit and scope of my invention.

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

1. In an elevator car of dumbwaiter type, a cable supporting the car, providing a downwardly extending driving stretch and an upwardly extending anchored stretch, a pulley between the stretches and carried by the car, means for driving the cable, a terminal for the anchored end of the cable yieldingly supporting the cable end, providing restrained lengthwise movement of the cable, a pivoted bar to which the cable is attached, a pivot for the bar, a counterweight for the bar on the end of the bar opposite to the attachment, an electric control circuit, a cut out switch in the control circuit adapted to close the control circuit and means dependent for its position upon the pull of the anchored end of the cable engaging the switch to hold the switch closed with normal pull of the cable.

2. In an elevator car of dumbwaiter type, a cable for supporting the car, providing a downwardly extending driving stretch and an upwardly extending anchored stretch, a pulley between the stretches and carried by the car, means for driving the cable, a terminal for the anchored end of the cable yieldingly supporting the cable end, providing restrained lengthwise movement of the cable, a counterweighted bar to which the cable is attached, a pivot for the bar, a counterweight for the bar on the end of the bar opposite to the attachment, a pressure bar carried by the cable, an electric control circuit and a switch controlling the circuit to close it and normally closed by the pressure bar.

3. In an elevator car of dumbwaiter type, a cable supporting the car providing a downwardly extending driving stretch and an upwardly extending anchored stretch, a pulley between the stretches, carried by the car, means for driving the cable, a terminal for the anchored end of the cable yieldingly supporting the cable end, the terminal being free from the car, providing restrained lengthwise movement of the cable, a circuit controlling the driving of the cable, a cut-out switch for the cable driving circuit adapted to close and open it having switch closing movement transversely with respect to the direction of cable extension, and means movable coincidently with the cable and to approximately the same extent as the end of the cable, located opposite the switch to close the switch in one cable position and transversely out of operating engagement with the switch closing means in other positions of the cable end.

4. In an elevator of dumbwaiter type, a car, a cable supporting the car, providing a downwardly extending driving stretch and an upwardly extending anchored stretch, a pulley between the stretches, carried by the car and affording the support to the car from the cable, means for driving the cable, a terminal for the anchored end of the cable, which terminal is free from the car, yielding means at the terminal tending to support the cable and providing restrained lengthwise movement of the cable, a control switch for the means for driving the cable, an operating button for the control switch and means carried by the cable engaging the operating button in one position of the cable with its lengthwise movement and not engaging the button in a second lengthwise position of the cable.

JAMES E. CURRIE.