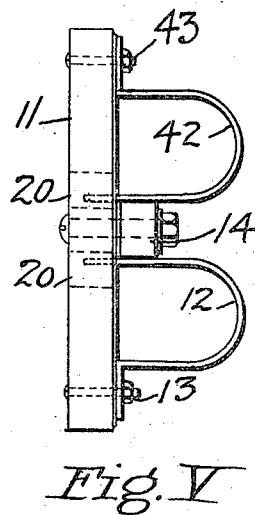
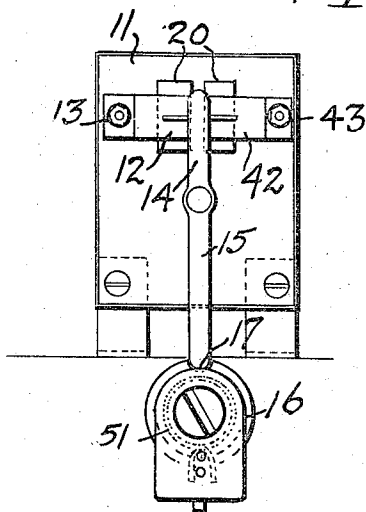
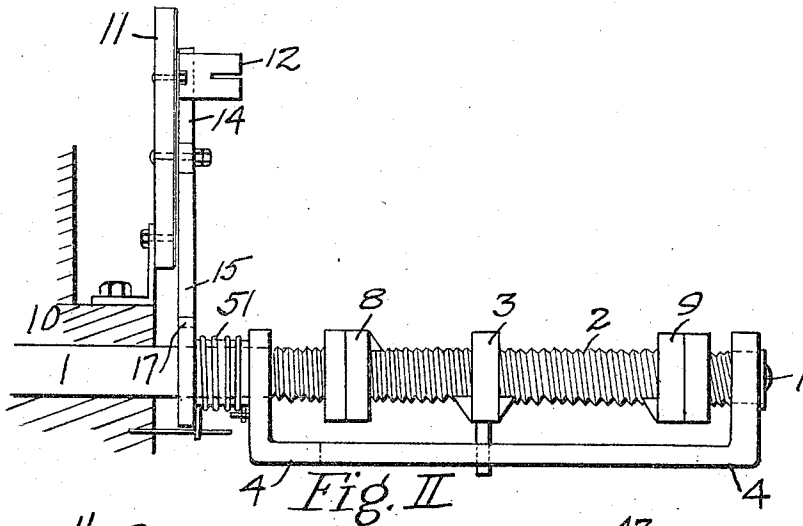
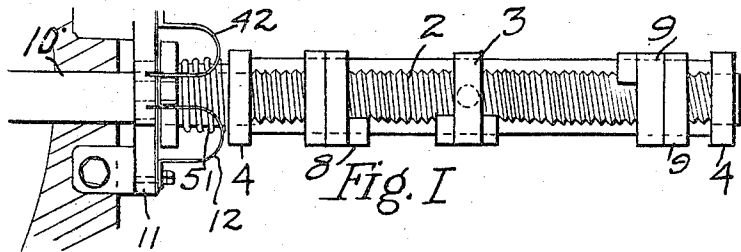


W. N. DICKINSON.
LIMIT SWITCH MECHANISM.
APPLICATION FILED JUNE 17, 1916.

1,249,043.

Patented Dec. 4, 1917.

2 SHEETS—SHEET 1.



WITNESSES:
F. M. Aker
S. R. Ray

Fig. IV.

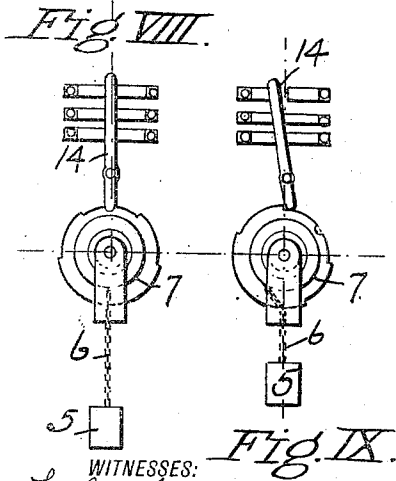
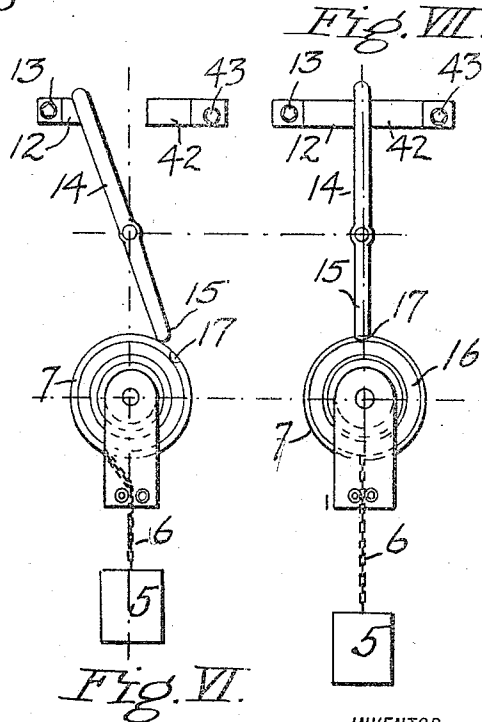
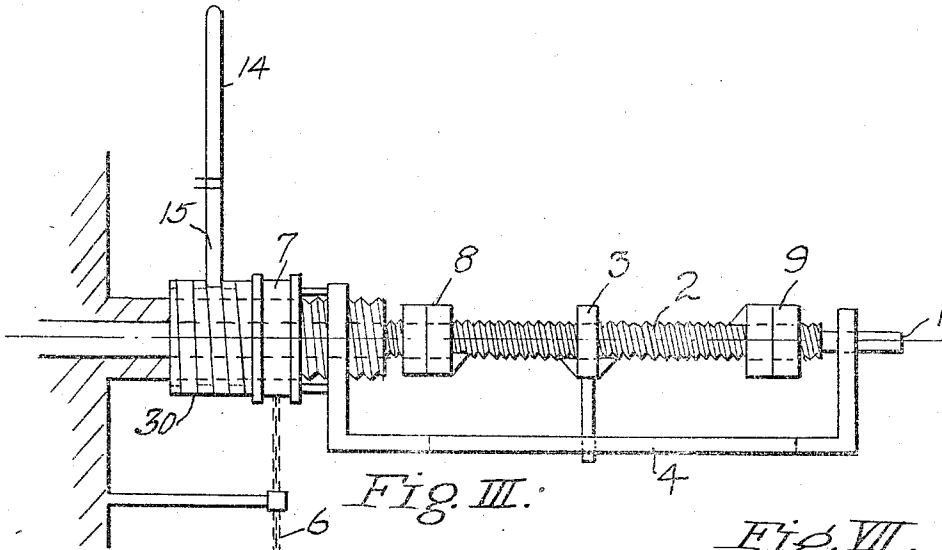
INVENTOR
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BY
Edw. J. Bunker
HIS ATTORNEY

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UNITED STATES PATENT OFFICE.

WILLIAM NOBLE DICKINSON, OF BROOKLYN, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO STANDARD PLUNGER ELEVATOR COMPANY, A CORPORATION OF MASSACHUSETTS.

LIMIT-SWITCH MECHANISM.

1,249,043.

Specification of Letters Patent.

Patented Dec. 4, 1917.

Application filed June 17, 1916. Serial No. 104,344.

To all whom it may concern:

Be it known that I, WILLIAM NOBLE DICKINSON, a citizen of the United States, a resident of the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Limit-Switch Mechanisms, of which the following is a specification, reference being made to the accompanying drawing, forming a part thereof.

My invention relates to limit switch mechanisms for elevators, dumb-waiters or similar apparatus and where it is desired to automatically shut off the power at a predetermined point irrespective of the operator, and has for its object the production of a stop motion switch which will operate under the requirements of certain conditions, which apparatus now available will not meet.

I shall describe my device as applied to a drum type of electric elevator, but wish it distinctly understood that I do not mean to limit myself thereby, as it will be evident to those skilled in the art that my invention has other applications.

In such electric elevators, the hoisting cables are attached at one end to the car and at the other end to the hoisting drum. The automatic stop motion device is applied to the machine, direct or through gearing or other means and is designed to automatically bring the drum to rest, and hence the car, at predetermined limits of travel in the event that the operator neglects to bring the machine to rest by means of the control in the car. This is accomplished by opening the main circuit leading to a mechanically controlled switch or switches. These are sometimes so arranged that when the machine is automatically brought to rest, in either direction by means of such device, it cannot again be started in either direction by means of the ordinary control device, placed at the disposal of the operator, on the car, while at other times, the device is so arranged, that should it automatically bring the machine to rest with the car going, say in the up direction, the operator could start it in down direction by means of the ordinary form of control placed at his disposal, whether on the car or at a landing, and vice versa. In practically all of these arrangements, however, arranged, a threaded shaft or sleeve is provided which may be an ex-

tension of the drum shaft, or spur geared or miter geared or chain geared, or otherwise depending for its motion upon the turning of the drum carrying the lifting cable or some part of the elevator system to which the machine or cable transmit motion. On this threaded shaft or sleeve a nut is threaded which is normally prevented from revolving with the thread when the drum is in motion, by means of a weight, spring or other device, but which travels laterally along the shaft or sleeve in one direction or the other as the shaft is revolved, until it comes into contact with a locking device, either adjustable or otherwise, which causes it to revolve with the shaft and thus operate, either directly or indirectly, the switches, levers, or other devices essential to the accomplishment of the desired result of speed changing or stopping or regulation required. In electric elevators, the customary form of this accomplishment end of the device includes a cam and a switch or several cams and switches or other direct or intermediately operating devices for the up motion and a similar set for the down motion or motion in the opposite direction. In some of these the circumferential motion of the part actuated by the traveling nut, when it is actuated to revolve with the threaded shaft, is limited to less than 180 degrees, while in others, a geared or an intermittent motion is introduced between the part actuated by the threaded shaft and the switch or mechanical stopping device, to permit of a greater movement than 180 degrees of the part actuated by the threaded shaft.

In my device a similar traveling nut and locking devices are used but I provide a means for opening the switch which is not limited to any degree of travel of the drum.

Having set forth my invention I will now specifically set forth an embodiment thereof.

In the drawings:

Figure I is a top view of my limit switch mechanism.

Fig. II is a side view thereof.

Fig. III is a similar side view showing a modification of some of the details thereof.

Fig. IV is a front view of my switch.

Fig. V is a top view thereof.

Figs. VI and VII show the switch open and shut.

Figs. VIII and IX show a modification of the switch in open and closed positions.

In the carrying out of my invention 1 is an extension of a drum shaft or other revolving member of a machine, which it is desired to stop, revolving at a predetermined time. The shaft 1 is threaded at 2 and is provided with a traveling nut 3 adapted to travel along the thread and be guided by the yoke 4. This yoke 4 may be held against turning by any known means, but I indicate a weight 5 in Figs. VI, VII, VIII and IX (and by spring 51 in Figs. I and II) which is attached by chain 6 to the drum 7. The drum 7 is secured to the yoke 4 so that when the nut 3 is traveling along the thread 2 the weight 5, through gravity, holds the yoke 4 from turning. On the thread 2 I provide nuts 8 and 9, with means for securing them in any adjusted position on the shaft 1. When the traveling nut 2 engages either of these nuts the yoke turns with the shaft. As all of these details are more or less common to electric drum elevators it is not necessary to further describe them.

The shaft 1 turns in bearing 10 to which may be secured a suitable insulated switch board 11 having two spring contacts 12 and 42. Contact 12 is provided with terminal 13 which may be connected to the circuit controlling the up motion of an elevator or the motion in one direction of a machine to which my automatic limit is attached; the other spring contact 42 is provided with terminal 43 which is connected to the circuit controlling the down motion of an elevator or motion in the opposite direction to that which is connected to terminal 13. Pivotedly mounted to the switchboard 11 I provide a lever arm 14 adapted to contact with both the spring contacts 12 and 42 on one end; the other end 15 is so designed that it will ride on the cam 16 and when it is in the cam dwell 17 the lever is in a vertical position. This lever arm is connected to one side of an electrical circuit. The cam 16 is connected to, and adapted to turn with, the yoke 4 when the traveling nut 3 engages either nut 8 or 9, as will be readily understood. The spring contacts are so arranged that when the lever end 15 rides up out of the cam dwell 17 one contact is compressed, remaining always in contact with lever 14, while the lever leaves the opposite contact and that circuit is broken, opening the circuit then operating the machine. This will be clearly understood by referring particularly to Figs. VI and VII; the latter illustrating the relative position of the parts when the machine is normally running. The former illustrates the relative position of the parts when the nut 3 has engaged either limit nut 8 or 9 and through the yoke 4 the cam 16 is turned and the dwell 17 forces the lever 15 out upon the cam face which opens the circuit controlling the motion of the car, and the revolutions of the shaft 1.

To give a leeway to my device I provide two slots 20 in the switchboard 11 and project the spring contacts so that they operate therein and follow the switch when it is moved either to the right or left, until the end of the spring comes in contact with the edge of the slot, whereat, it is stopped in movement and the lever leaves it, breaking the contact and opening the circuit operating the machine; but still permitting a reversal of the machine because the contact on the opposite side is in contact with the switch lever.

It will be readily seen that the shaft 1 may revolve 360 degrees without any change in the position of the switch arm, with this construction. When it is desired or necessary to provide more than 360 degrees turning of the cam without affecting the switch a spiral cam face is provided, illustrated in Fig. III, at 30, the arm 14 so mounted that it can travel along the spiral after the end 15 comes out of the cam dwell 17. It will also be obvious that where speed control is desired, in stopping automatically a high speed member, the spring contacts may be of any number; the upper contacts being opened first, the next lower set second, and so on. For a thorough understanding of this feature, reference should be made to Figs. VIII and IX.

It will be perceived that a quick opening of the circuit or a slow opening of the circuit, or actuation of mechanical parts may be obtained by the arrangement of the shape of the cam dwell and in its simplest form, the circuit may be held open in either direction during almost 360 degrees of revolution of the actuating part, while if one end of the yoke to which the cam is mounted, is threaded or otherwise arranged, to produce a lateral movement along the shaft as it is revolved, such as is shown in Fig. III, a switch may be held open in either direction for more than 360 degrees of revolution of the actuating yoke or for any number of revolutions which might be desired. As a matter of fact the shape of the cam attached to the yoke as illustrated in its simplest form, could be so arranged that even without the introduction of a spiral bearing at one or both ends of the yoke, this same result could be attained as the switch lever could not re-assume a vertical position even though the cam in its simplest form were revolved through more than 360 degrees as having once been thrown out of vertical position it would not be resumed until the dwell of the cam had been brought into mesh relation with the switch lever from a direction opposite to that by which the switch lever was thrown out of vertical position. Should, however, the cam, as illustrated in Figs. VI and VII be revolved through greater than 360 degrees to the extent of having the dwell

17 in the cam reach or pass the contact end
 15 of the switch lever it would be returned
 to the vertical position so soon as the cam
 was revolved in the opposite direction, a
 5 sufficient distance to bring the center of the
 cam in line with the center of the axis of
 the switch lever, by the centering device
 employed or by other means, and if motion
 were continued the switch lever would be
 10 thrown in the opposite direction by the con-
 tinued movement of the cam toward its orig-
 inal position. I call attention to this point
 as under certain conditions it might prove
 desirable to take advantage of this feature.
 15 It will further be clear that while the draw-
 ings of my invention indicate a switch arm
 leading from one side of an electric circuit
 to the two contacts which control the up
 movement and the down movement of the
 20 elevator, the breaking of the circuit to
 either of which stationary contacts will stop
 the movement of the elevator in its respec-
 tive operation while still maintaining the
 contact intact to permit of the movement of
 25 the elevator in the opposite direction, these
 circuits are permissible of changes which
 will occur to those skilled in the art and
 further it will be clear that by lengthening
 the arm or broadening the arm, a multiplic-
 30 ity of contacts may be arranged on either
 or both sides of the switch lever, in such
 manner that circuits will be opened and
 closed either simultaneously or in different
 time relation, due to either angular displace-
 35 ment of the switch arm by a single dwell in
 the cam or by different dwells or different
 formation of the cam surface for the pur-
 pose of the electrical connections or the
 mechanical movements by means of the
 40 switch arm or its counterpart, in a mechan-
 ical device to meet the requirements of the
 individual case. It will be clear that the
 contacts or mechanical movements affected
 by angular displacement or the switch arm
 45 or its counterpart may be either fixed or ad-
 justable as requirements may demand.

The stop motion switch illustrated and
 described is in the form which I desire to

construct it, but any changes or modifica-
 tions may be made without departing from 50
 the salient features of my invention; and I,
 therefore, intend the following claims to
 cover such modifications as naturally fall
 within the lines of invention.

I claim:

1. In a limit switch, of the class described, 55
 in combination, a journaled screw, a nut on
 the screw suitably held from revolving dur-
 ing a portion of its travel without interfer-
 ing with its longitudinal movement on the 60
 screw, adjustable striking nuts mounted on
 the screw to limit the movement of the
 traveling nut without revolving, a pivotedly
 mounted lever arm, two spring contacts, both 65
 contacting with the before-mentioned arm
 in its central position, a cam adapted to
 move the lever arm in either direction and
 normally hold it in its central position,
 means operated by the traveling nut when it 70
 revolves for moving the cam, whereby con-
 tact between the lever and one of the before-
 mentioned spring contacts is continuous
 while the contact between the lever and the
 opposite spring contact is broken.

2. In a limit switch, of the class described, 75
 in combination, a screw mounted so as to
 revolve in either direction, a nut on the
 screw with means to normally prevent its
 revolving without interfering with its longi-
 tudinal travel, adjustable stops to limit the 80
 travel of the nut without revolving the nut,
 a pivotedly mounted lever, a plurality of
 contacts oppositely opposed contacting with
 the before-mentioned lever in its central po-
 sition, means to normally hold the lever in 85
 its central position, means to move the lever
 out of its central position when the traveling
 nut contacts with its stop and revolves with
 the screw.

In testimony whereof, I have signed my 90
 name to this specification in the presence of
 two subscribing witnesses.

WILLIAM NOBLE DICKINSON.

Witnesses:

F. McALEER,
 P. D. CASE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
 Washington, D. C."