W. T. DONALDSON.

DETECTOR FOR ELEVATORS AND CONVEYERS.

APPLICATION FILED FEB. 7, 1921.

1,422,091.

Patented July 11, 1922.

2 SHEETS—SHEET 1.

Fig. 1

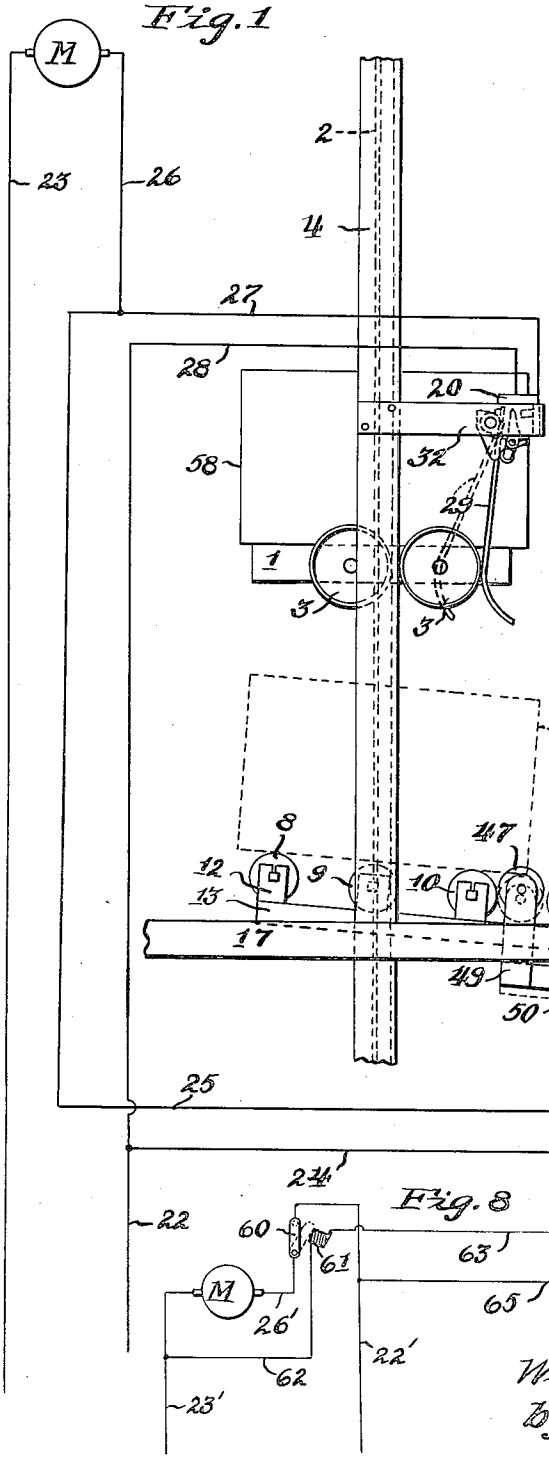


Fig. 2

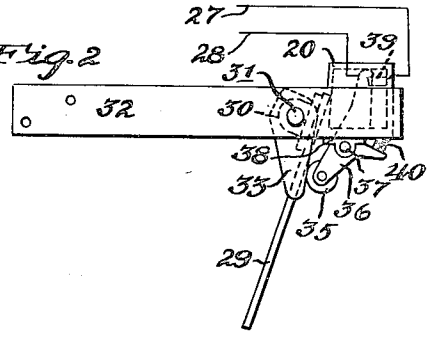
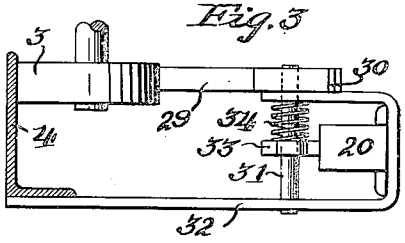


Fig. 3



Inventor:
William T. Donaldson,
by: John E. Stryker
his Attorney.

W. T. DONALDSON.

DETECTOR FOR ELEVATORS AND CONVEYERS.

APPLICATION FILED FEB. 7, 1921.

1,422,091. Patented July 11, 1922.

2 SHEETS—SHEET 2.

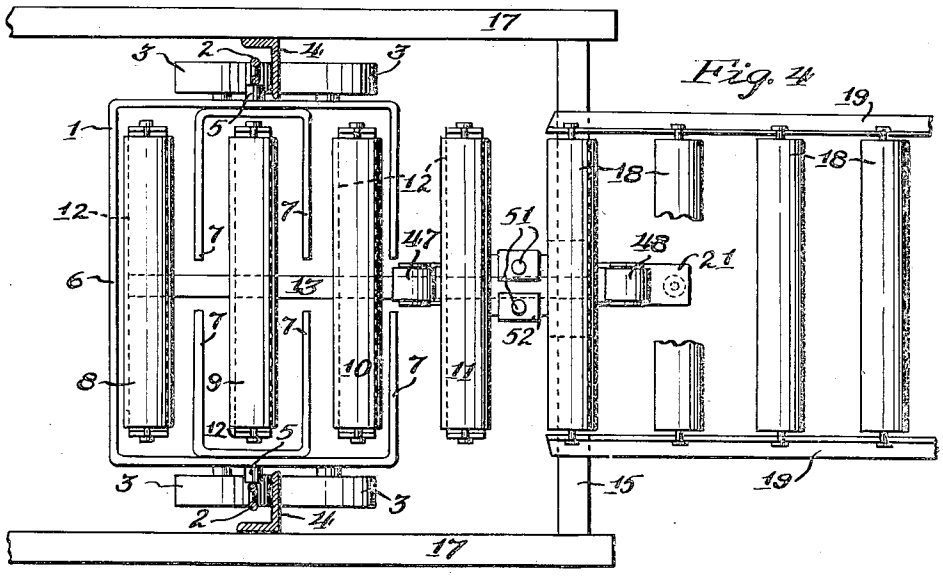


Fig. 4

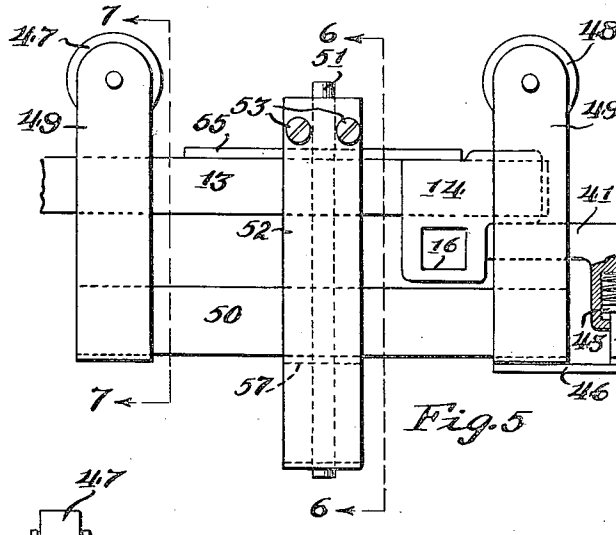


Fig. 5

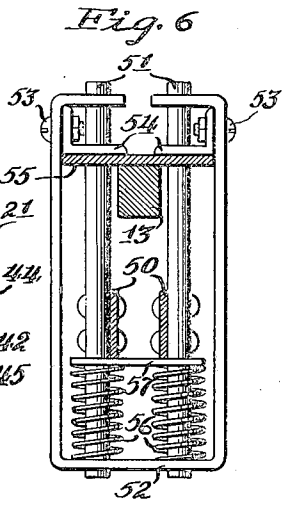


Fig. 6

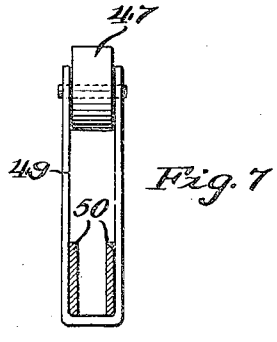


Fig. 7

Inventor:
William T. Donaldson,
by: John E. Styles
his Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM T. DONALDSON, OF ST. PAUL, MINNESOTA, ASSIGNOR TO STANDARD CONVEYOR COMPANY, A CORPORATION OF MINNESOTA.

DETECTOR FOR ELEVATORS AND CONVEYERS.

1,422,091. Specification of Letters Patent. Patented July 11, 1922.

Application filed February 7, 1921. Serial No. 442,917.

To all whom it may concern:

Be it known that I, WILLIAM T. DONALDSON, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented new and useful Improvements in Detectors for Elevators and Conveyers, of which the following is a specification.

My invention is particularly designed for use at a discharge station of a straight lift freight elevator of the type wherein the packages are automatically delivered to and removed by a gravity conveyer.

My object is to provide simple and efficient means for preventing breakage of the elevator or the packages when congestion occurs at a discharge station of such elevator.

More particularly my object is to provide coacting electrical switches arranged to stop the elevator motor when, for any reason, a package is abnormally detained on the discharge station.

Other objects of my invention will appear and be more fully pointed out in the following specification and claims.

The drawings, forming a part of this specification, illustrate what I at present believe to be the best form of my device but it will be readily understood that many modifications are possible within the broad scope of my invention.

Referring to the accompanying drawings Figure 1 is a side elevation of my device mounted on the frame of an elevator of common type, the electrical connection with the elevator motor being shown diagrammatically; Fig. 2 is a detail elevation of the upper limit switch; Fig. 3 is a plan view of the same showing the adjacent elevator guide wheel; Fig. 4 is a plan view showing the detector proper mounted near the junction of a conveyer section and a discharge station of the elevator, the elevator tray being shown in position for passing the discharge station; Fig. 5 is an elevation of the detector proper partially in section and showing its mounting; Fig. 6 is a section taken on the line 6—6 of Fig. 5; Fig. 7 is a section taken on the line 7—7 of Fig. 5 and Fig. 8 is a diagram of an alternate wiring arrangement for my improved detector.

The elevator illustrated in the drawings is of the type wherein a series of elevator trays 1 is carried by an endless chain 2; (see Figs. 1 and 4) said trays having pairs of wheels 3 journalled on their ends. These wheels 3 roll upon opposite faces of guide angles 4 of the elevator frame, the chains 2 being connected by bosses 5 to the middle of each of the ends of the elevator trays 1. The trays 1 are grid-like and formed in two sections connected by a bar 6. The inwardly projecting bars 7 of the tray are arranged to pass between adjacent rollers of the discharge station.

The discharge station consists of four rollers 8, 9, 10 and 11 journalled in the upwardly projecting ends of yokes 12, said yokes being rigidly secured to the upper surface of a beam 13. This beam is connected at one end by a casting 14 to a beam 15 which passes through a square hole 16 (Fig. 5) in said casting and is supported at its ends in horizontal bars 17, of the elevator frame.

In Figures 1 and 4 a gravity conveyer section, for conducting the packages or boxes away from the discharge station, is shown. This section consists of rollers 18 mounted between side rails 19 and placed in line with the discharge station.

My detector consists generally of two electrical switches 20 and 21 connected in one of the power lines 22, 26 of the elevator motor M; the other power line leading to said motor being indicated by the numeral 23. A wire 24 connects one side of the switch 21 with the wire 22, the other side of said switch being connected by a wire 25 to a wire 26 leading to the motor. The junction of the wires 26 and 25 is connected by a wire 27 to one side of the switch 20, the other side of said switch being connected by a wire 28 to the junction of wires 22 and 24.

The circuit at the switch 20 is adapted to be broken whenever an elevator tray 1, in passing said switch, actuates a lever 29 which projects into the path of one of the wheels 3 on said tray. This lever 29 (Figs. 2 and 3) is rigidly mounted on a bracket 30, said bracket being splined on a shaft 31. The shaft 31, the switch 20 and adjacent mechanism are supported by an arm 32 which is riveted to the outer surface of one of the vertical guide angles 4. Fast on the shaft 31 is a lever 33 for actuating the switch 20, while a spring 34, coiled about the shaft 31 and secured at one end to said

shaft and at its other to the arm 32, is provided to resiliently hold the lower end of the lever 29 in its dotted line position shown in Figure 1. The lower end of the lever 33 is adapted to engage a small roller 35 journalled in the lower end of the contact bar 36 of the switch 20. This bar 36 is pivoted on a pin 37 in small brackets 38 mounted on the lower surface of the switch housing. The upper end of the bar is adapted to make and break the electrical connection with the terminal 39 of the wire 27. The wire 28 is connected electrically with the bar 36 and a small spring 40 tends to hold the bar 36 in contact with the terminal 39. Thus normally, the springs 34 and 40 hold the bar 36 in contact with the terminal 39 and complete the circuit between the wires 27 and 28, but when an elevator tray 1 passes the lever 29, the circuit between said wires is broken.

The switch 21 is rigidly connected to the casting 14 by an arm 41 formed integral with the switch housing. The switch proper consists of a metallic spindle 42 formed with a head 43 and held downward by a spring 44 within the housing. The spindle 42 is connected electrically with the wire 24, and its lower end is adapted to make contact with a button 45 connected electrically with the wire 25. This button is mounted on the upper surface of a plate 46 which is secured to the under surface of the detector proper but is insulated therefrom.

The detector proper consists of two rollers 47 and 48 which are journalled in the upper ends of two identical, U shaped supports 49 (Figs. 5 and 7). These supports 49 are rigidly mounted on the ends of a pair of substantially horizontal bars 50, the latter being riveted at their middle points to a pair of vertical rods 51 (Fig. 6) which are slidable at their ends in a rectangular guide 52. The guide 52 is fastened by bolts 53 to a pair of angles 54 which are rigidly secured to the upper surface of a horizontal plate 55. This plate is fastened to the upper surface of the bar 13 and the rods 51 are slidable in suitable perforations in said angles and plate. A pair of coiled springs 56 surround the lower ends of the rods 51, abut against the guide 52 and resiliently support a plate 57. This plate is perforated to receive the rods 51 and supports the bars 50 on its upper surface. Boxes or packages are indicated by the numeral 58 (Figure 1). The spring 44 is provided to give resiliency to the spindle 42 thus insuring a firm contact with the button 45 and preventing shock when the springs 56 return the detector to normal position.

It is, of course, apparent to any one familiar with this art that the switches may be placed in an open circuit instead of a closed circuit as shown in Figure 1. Such alternate arrangement is shown in Fig. 8. The switches 20′ and 21′ are here shown in series in a normally open circuit and the power line 22′, 26′ is provided with a switch 60 which will open when current passes through the coil of an electro-magnet 61, said coil and switches 20′, 21′ being arranged in the circuit 62, 63, 64, 65 extending from the power line 23′ to power wire 22′.

Operation.

In use the rollers 47 and 48 project slightly above the upper periphery of the adjacent conveyer rollers and the springs 56 are so designed that a box or package 58 on the discharge station or adjacent conveyer rollers 18 or both will necessarily press upon either the roller 47 or 48 or both and depress the bars 50. This will separate the button 45 from the spindle 42 and break the electrical connection between the wires 24 and 25 at the switch 21.

It will thus be apparent that as elevator trays, carrying boxes, descend one of the wheels 3 on the first tray will strike the lever 29 and open the switch 20. This does not, however, stop the motor M because the current now flows by the wires 22 and 24, the switch 21 (said switch being normally closed) and wires 25 and 26 to the motor, returning over the wire 23. After the first tray has passed the lever 29 the switch 20 will again be closed under the action of the springs 34 and 40 and the first box 58 will be deposited on the discharge station rollers 8, 9, 10 and 11, the bars 7 of the tray 1 passing between said rollers. The box 58, being now in the dotted line position shown in Figure 1, will bear upon the roller 47 and depress the bars 50 thus opening the circuit at the switch 21. This will not ordinarily discontinue the operation of the elevator because the current now flows by the wires 22 and 28, the switch 20 and wires 27 and 26 to the motor M. In the normal operation the box 58 immediately moves by gravity away from the discharge station over the rollers 18 to any desired point. As soon as the boxes have passed the roller 48 the switch 21 again closes under the action of the springs 56.

If, as sometimes happens, the boxes become obstructed or congested on the discharge station, so that one of them projects into the path of the elevator trays, the switch 21 will be held open and when the succeeding elevator tray and box arrives opposite the lever 29, the switch 20 will also be opened. This, as will be readily understood brakes the connection between the power wire 22 and the motor M and before the last mentioned tray has reached the obstructing box on the discharge station the elevator will stop, thus preventing damage to the elevator or boxes which would otherwise result.

The switch 20′ in the alternate wiring arrangement is adapted to close when an elevator tray engages the lever 29 and the switch 21′ is adapted to close when a box is on the discharge station or adjacent portion of the gravity conveyer. Closing the switch 20′ when the switch 21′ has been previously closed energizes the magnet 61 through the circuit 62—65 and stops the motor M by opening the switch 60.

It will be understood that when the words "power line" are used in the specification and claims they are intended to include any auxiliary or control line leading to the motor as well as a line leading directly to the motor.

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

1. The combination with an electrical elevator having a series of trays and a conveyer arranged to receive packages therefrom, of switches connected in the power line of the motor of said elevator, a detector mounted near the junction of said elevator and conveyer and arranged to actuate one of said switches and actuating means projecting into the path of said trays for operating another of said switches.

2. The combination with an electrical elevator and a conveyer adapted to receive packages therefrom, of a switch mounted on the frame of said elevator and arranged to be actuated by the passage of an elevator tray and a second switch near the junction of said elevator and conveyer and arranged to be actuated by packages on said conveyer, said switches being in circuit with the motor so that when both switches are actuated the motor will be stopped.

3. The combination with an electrical elevator having a series of trays and a conveyer arranged to receive packages therefrom, of two switches connected in circuit with the motor of said elevator, a detector mounted near the junction of said elevator and conveyer and arranged to actuate one of said switches, and resilient means projecting into the path of said trays for actuating the other of said switches.

4. The combination with an electrical elevator having a series of trays and a roller conveyer projecting into the path of said elevator trays and arranged to discharge packages therefrom, of two switches connected in the power line of the motor of said elevator, a detector projecting above the adjacent rollers near the junction of said elevator and conveyer and arranged to throw one of said switches when a package is on said conveyer and a lever arranged to engage elevator trays and to throw the other of said switches.

5. The combination with an electrical elevator and a conveyer adapted to discharge packages from said elevator, of a switch arranged to be opened by the passage of an elevator tray, a second switch near the junction of said elevator and conveyer, rollers projecting above said conveyer and arranged to open said second switch when packages are on said conveyer, said switches being connected in the power line of the motor of said elevator so that when both said switches are open at the same time said elevator will stop.

6. The combination with an electrical elevator and a conveyer adapted to receive packages from said elevator, of a switch arranged to be thrown by the passage of an elevator tray, a second switch near the junction of said elevator and conveyer, a resilient support for rollers connected with said second switch and rollers on said support and projecting above said conveyer, said switches being arranged to stop the motor of said elevator when a package remains in the path of said trays.

In testimony whereof, I have hereunto signed my name to this specification.

WILLIAM T. DONALDSON.