Nov. 17, 1931. F. G. HEALY 1,832,204

ESCALATOR

Filed April 14, 1928 2 Sheets-Sheet 1

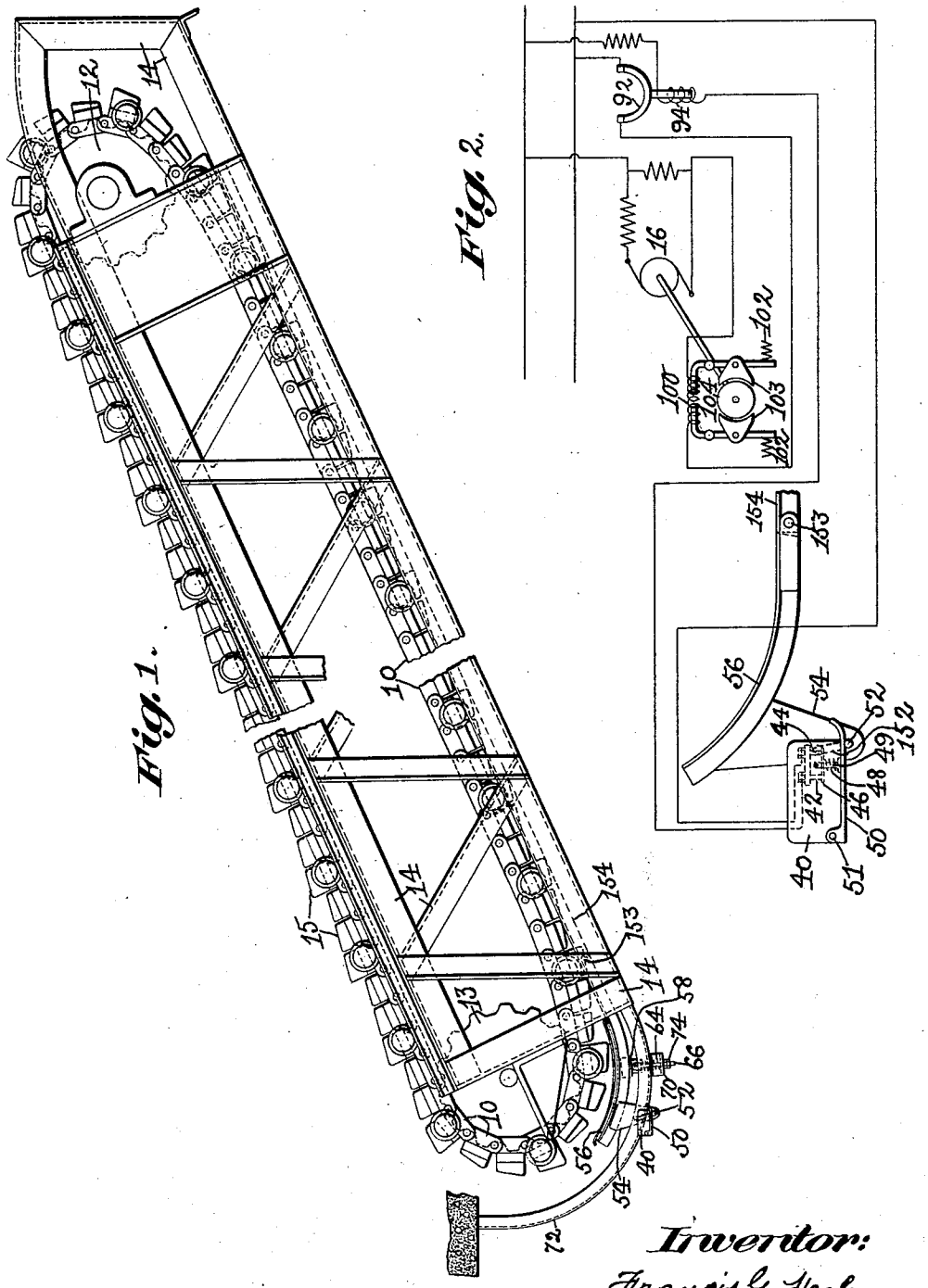


Fig. 1.

Fig. 2.

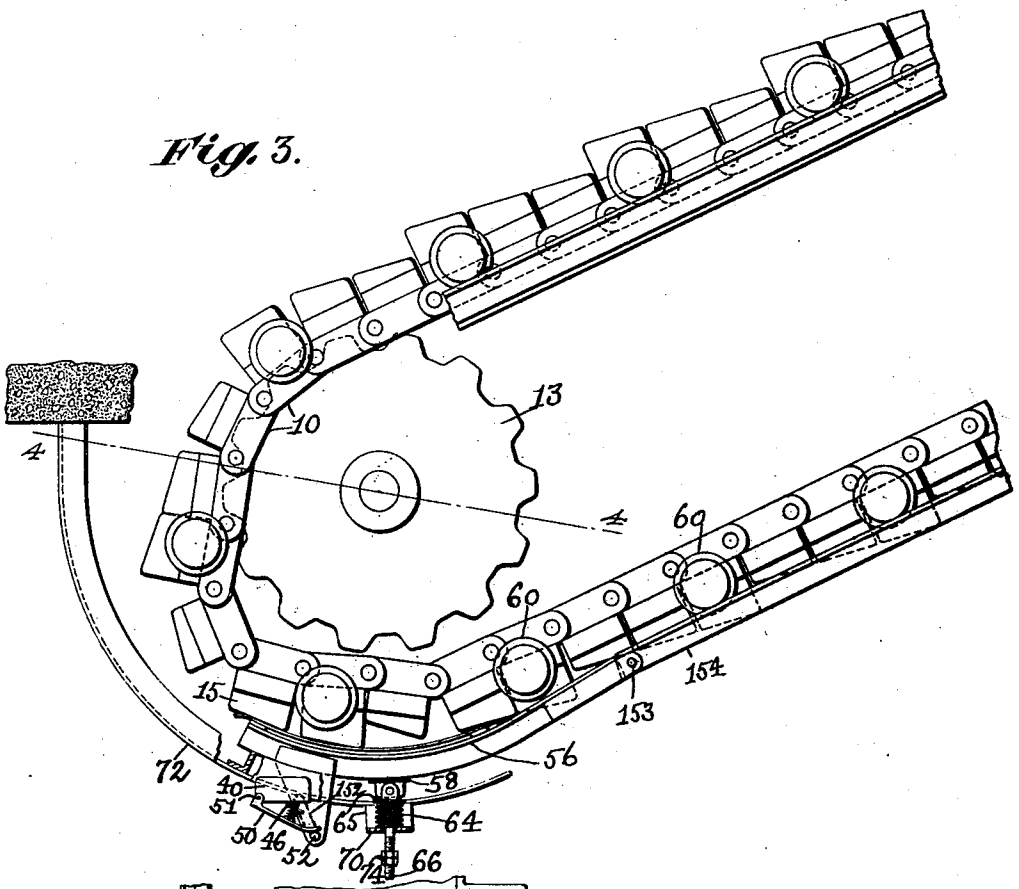
Inventor:
Francis G. Healy
by Jas. H. Churchill
atty.

Nov. 17, 1931. F. G. HEALY 1,832,204

ESCALATOR

Filed April 14, 1928 2 Sheets-Sheet 2

Fig. 3.



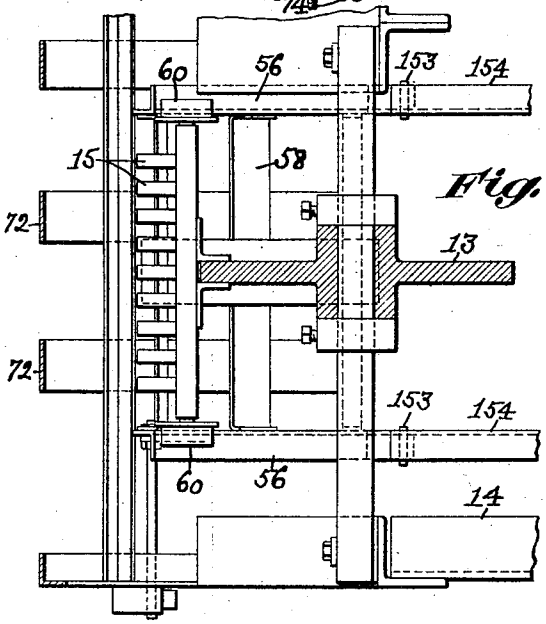


Fig. 4.

Inventor:
Francis G. Healy
by Jas. A. Churchill
Atty.

Patented Nov. 17, 1931 1,832,204

UNITED STATES PATENT OFFICE

FRANCIS G. HEALY, OF ARLINGTON, MASSACHUSETTS

ESCALATOR

Application filed April 14, 1928. Serial No. 269,920.

This invention relates to a safety device for inclined conveyers and particularly for escalators.

The invention has for an object to provide a novel, efficient, relatively inexpensive safety device for inclined conveyers, and particularly for an escalator of the ascending type, which is capable of operating more rapidly in the event of breakage of the conveyor than any of the other types of safety devices which have heretofore been proposed for use in connection with such conveyers and known to me.

To this end, the safety device includes a control switch and mechanism for operating the same actuated, in the event of breakage of the conveyer, by movement of a portion of the conveyer in its normal direction of travel.

When embodied in an inclined escalator, the control switch is arranged to be operated, in the event of chain-breakage, by the lower lap of the escalator chain.

The control switch is preferably arranged to control the motor circuit and the application of brakes to the motor armature, and in the event of breakage of the escalator chain, the sudden decrease in the load upon the motor operates to speed the motor up, with the result that a portion of the escalator chain is moved at a much higher speed in the direction of its normal travel and provision is made for utilizing the slack developed by such movement to actuate the control switch and open the motor circuit and also permit the application of the brakes to the armature.

These and other features of this invention will be pointed out in the claims at the end of this specification.

Fig. 1 is a side elevation of a sufficient portion of an ascending escalator equipped with the present safety device to enable the invention to be understood;

Fig. 2, a wiring diagram illustrative of the control switch and connections to the motor;

Fig. 3, an enlarged detail in side elevation of the lower portion of the escalator chain illustrating the operation of the control switch by the slack developed in the lower lap of the chain; and

Fig. 4, a sectional detail on the line 4—4 of Fig. 3.

While the different features of the present invention are applicable to different forms of inclined conveyers in which it is desirable to control the descent of the conveyer in the event of breakage thereof, the invention is primarily designed for use in connection with the escalators now commonly used to convey passengers from different levels in subways, elevated structures, stores and the like. As is well known such escalators are provided with an inclined, endless escalator chain running over upper and lower sprockets.

As herein illustrated, the invention is shown and will be described as embodied in a safety device in which provision is made for opening the motor circuit and for applying brakes to the armature of the motor in the event of breakage of the upper lap of the chain. Nevertheless if found desirable the invention may be embodied in safety devices for actuating other controlling devices for the escalator or other conveyer.

Referring now to the drawings, which illustrate the invention as embodied in a safety device applied to an escalator of the standard ascending type at present generally used, 10 represents an endless chain adapted to travel over an upper sprocket 12 and a lower sprocket 13, both the sprockets 12 and 13 being suitably journaled in a framework 14 by which the escalator is supported. The chain 10 has operatively connected therewith tread members 15 upon which the passengers stand. The escalator is driven by an electric motor represented diagrammatically at 16 in Fig. 2, and which is connected through suitable gearing, not shown, to the upper sprocket 12 to drive the same. The construction and operation of the escalator per se may comprise that illustrated in the patent to Seeberger No. 1,025,316, or that illustrated in the patent to Reno No. 804,266 dated November 14, 1905.

In other types of safety devices heretofore proposed and of which I am aware, the initiation of the operation of the safety device or devices was controlled by the reverse movement of the lower half of the upper length or

lap of the chain in the event of chain-breakage, and in practice some lapse of time occurred between the chain-breakage and the actual operation of the safety devices.

In the illustrated escalator, provision is made for operating the safety device by the accumulation of slack in the lower lap of the escalator chain in the event of chain-breakage, and it has been found that a safety device actuated in this manner is rendered operative much more quickly than any of the prior safety devices known to me, for the reason that upon chain-breakage the motor speeds up, due to the sudden decrease in load thereon, and operates to cause the lower lap of the chain to pile up or to develop slack in the lower end thereof in a rapid and positive manner.

In the present safety device in which provision is made for operating it by the weight of the slack portion of the chain thus developed, it has been found that the motor circuit can be opened before reverse motion has been imparted to the lower section of the upper lap of the chain. In other words, upon chain-breakage in an escalator equipped with the present safety device, it is possible to stop the motor before the lower section of the upper lap of the chain moves any appreciable amount.

The present safety device in addition avoids the liability of the motor becoming damaged and of the operating mechanism becoming damaged, and insures the stopping of the motor and the application of brakes to the armature thereof in a minimum time after chain-breakage has occurred.

As herein shown, the safety device includes a circuit-controlling switch, indicated generally at 40 and including a pair of contacts 42, 44 and a movable switch member 46, which is normally held in engagement with the contacts 42, 44 by a spring 48 surrounding a stud 49 and bearing upon the under side of the switch member 46.

The stud 49 is carried by a plate 50 pivoted at 51 to be capable of being swung from the position illustrated in Figs. 1 and 2 to that illustrated in Fig. 3. The plate 50 is maintained in a raised position by the engagement with the underside of the plate of a pin 52 secured in a bracket 54 attached to a hinged section 56 forming a part of the escalator track. The hinged section 56 constitutes the actuating member for the switch, and in the illustrated escalator a pair of such hinged sections 56 are provided, which are connected by a cross or tie bar 58 to move as a unit (see Fig. 4). The hinged sections 56 are maintained in a normal or raised position, forming the lower end of the escalator track upon which the rollers 60 for the escalator chain run, by a spring 64 interposed between a plate 65 on a bolt 66, pivoted to the under portion of the cross piece 58, and a supporting cross plate or bar 70 secured to the under side of the escalator guards 72.

The normal or raised position of the hinged sections 56 may be adjustably determined by suitable nuts 74 upon the bolts 66.

In the illustrated escalator, the control switch 40 is arranged, when thrown, to open the motor circuit, and by reference to Fig. 2, it will be observed that when the circuit is opened at the terminals 42, 44, the holding coil 94 of a potential switch 92 is deenergized, thus permitting the switch 92 to open the motor circuit and deenergize the solenoid 100, permitting the springs 102 to cause the application of the brakes 103 to the drum 104 on the motor shaft.

As above stated the present invention insures the control of the escalator in the event of chain-breakage in a rapid, highly efficient and positive manner, and in practice it has been found that the control switch 40 was thrown in less than a second after chain-breakage and that the motor was stopped within a period of a second and a half.

The hinged section 56 of the track is preferably made adjustable with relation to the path of the chain 10, so that as the chain becomes worn in service and the slack therein is taken up in the usual or normal manner, the hinged section 56 may then be adjusted to meet the new condition of the escalator chain, and yet have the hinged section in operative relation to the switch 40.

To this end the pin 52 is adjustable in a curved slot 152 in the bracket 54, the slot 152 having the pivot 153 for the hinged section 56 as a center.

The hinged section 56 of the track is pivoted to the lower end of a stationary section 154 secured to the framework 14.

As represented in Figs. 1 and 2, the pin 52 is at the lowermost end of the curved slot 152, as the hinged section 56 is in its uppermost position and the chain is in its initially adjusted position.

When the chain becomes worn in service and it is adjusted to a new position, a nut (not shown) on the pin 52 is backed off, and the hinged section 56 is lowered by adjusting the nuts 74, and when the hinged section 56 is properly positioned with relation to the new path of the chain, the nut on the pin 52 is turned up to fasten the latter to the bracket 54.

In this adjusted position of the hinged section 56, the lower end of the curved slot 152 will be below the pin 52, which in this adjusted position engages the plate 50 to hold the motor switch 40 closed.

While the preferred embodiment of the invention has been illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention what is claimed is:

1. An escalator having, in combination, an inclined endless conveyer, an escalator track for the lower lap of the conveyer having a hinged section capable of downward movement, a spring for maintaining said section in a normal position, and a motor control switch operatively connected with said hinged section to be actuated upon depression of the same by weight of the lower lap of the conveyer in the event of chain breakage and independently of reverse movement of the upper lap of said conveyer.

2. An escalator having, in combination, an endless conveyer chain, upper and lower sprockets for driving the same, a track to support the lower lap of said chain having a stationary upper section and a movable lower section pivoted to the stationary section, means for yieldingly supporting the free end of said movable section, a motor control switch operatively connected with said movable track section to be maintained closed while the movable section is in its elevated position and to permit said switch to be opened by the weight of the lower lap of the chain moving the pivoted track section downward and independently of the reverse movement of the upper lap of said chain.

3. An escalator having, in combination, an endless conveyer chain, upper and lower sprockets for driving the same, a track to support the lower lap of said chain having a hinged section provided with a bracket, a spring to elevate said hinged section, a control switch, and a device carried by said bracket and co-operating with said control switch to normally close the same and to permit said switch to be opened by the lower lap of the chain under abnormal conditions of the latter and independently of the reverse movement of the upper lap of said chain.

4. An escalator having, in combination, an endless conveyer chain, upper and lower sprockets for driving the same, a track to support the lower lap of said chain having a hinged section provided with a bracket, a spring to elevate said hinged section, a control switch, and a device carried by said bracket and adjustable thereon, said device co-operating with said control switch to normally close the same and to permit said switch to be opened by the lower lap of the chain under abnormal conditions of the latter and independently of the reverse movement of the upper lap of said chain.

5. An escalator having, in combination, an inclined endless conveyer, an escalator track for the lower lap of the conveyer having a section capable of downward movement, a spring for maintaining said movable section in a normal position, and a motor control switch operatively connected with the said movable section to be actuated upon depression of the same by weight of the lower lap of the conveyer in the event of chain breakage and independently of reverse movement of the upper lap of said conveyer.

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

FRANCIS G. HEALY.