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SAFETY DEVICE FOR CONVEYERS.

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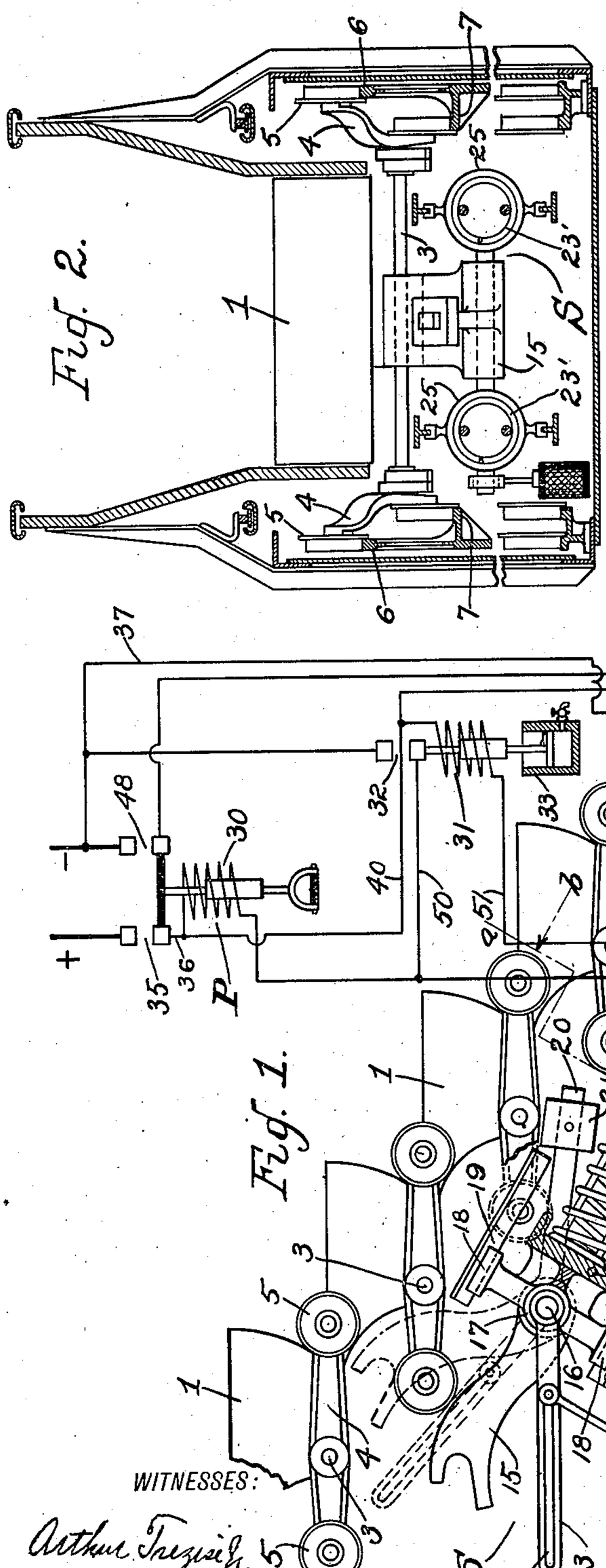

Fig. 2.

Fig. 1.

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SAFETY DEVICE FOR CONVEYERS.

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Application filed December 12, 1913. Serial No. 806,199.

To all whom it may concern:

Be it known that I, ARTHUR E. HANDY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a new and useful Improvement in Safety Devices for Conveyers, of which the following is a specification.

My invention relates to improvements in safety devices for reversible type of inclined conveyers, commonly called "escalators," adapted to convey either passengers or freight between different elevations, and it is particularly adapted for use in conjunction with escalators having an electric power unit for driving the same.

Under abnormal conditions, as for example, upon interruption in the source of power supply, a heavily loaded escalator will tend to run away, caused by the heavy load thereon, which tends to drive the escalator at an abnormal rate of speed and in a descending direction, and one of the objects of this invention is to provide means operable automatically under abnormal conditions for effecting the retardation and final stopping of the escalator, without subjecting the passengers to sudden shocks, or jar, which might tend to throw them in a manner to cause injury thereto.

Other objects of the invention are as follows: to associate with the safety device a means operable automatically to disconnect the driving unit from its source of power supply upon each operation of the safety device; and to provide means automatically to prevent the operation of the escalator in a descending direction unless the safety device is in normal inoperated position.

Still other objects of the invention will appear hereinafter, the novel combinations of elements being set forth in the appended claims.

Referring to the drawings, Figure 1 shows a fragmentary side elevational view of an escalator with my invention applied thereto; Fig. 2 is a sectional front elevational view of Fig. 1, taken on the line *a*—*a* looking in the direction of the arrows *b*—*b*.

My invention is applicable to any of the types of inclined conveyers or escalators now commonly used, and therefore a general description only of the escalator proper will be given, the type herein shown being a well know construction, and fully described in a patent granted to C. D. Seeberger, No. 1,025,316.

A series of steps 1 are connected by links 2 to form an endless conveyer. Each step is provided with an axle bar 3 carrying at each end a yoke 4, provided with bearings for the wheels 5, coöperating with the tracks 6 and 7. The links 2 associated with the steps mesh with driving sprockets 10, driven by a motor M, through a worm and gear connection. The electromagnetic brake apparatus B may be of any well known type, and in this instance comprises a brake band 11 normally applied by a spring 13 to a brake pulley 12, and released therefrom upon the energization of the magnet winding 14, which is connected in parallel through the conductors 40′ and 40″ with the shunt terminals of the motor.

A Ssfety device S, is in the form of a shock absorber, and comprises a dog 15 keyed to a transverse shaft 16, suitably journaled in bearings 17, formed integrally with guide shoes 18, adapted to be guided in their movement by guide rails 19. The dog 15, as shown in dotted line in Fig. 1 is in position to be engaged by the axle 3. An arm 20 formed integrally with the dog 15 is provided with an adjustable weight 21 adapted to rock the dog into the path of movement of the axles 3, the movement of the dog to this position being limited by a stop 53. An electromagnet 22, operatively connected to a lever 23, fixed to the shaft 16, is adapted to rock the dog 15, out of the path of movement of the axle 3, as shown in full lines in Fig. 1. Heavy coil springs 23′ are supported by rods 54 suitably secured to plates 55 formed integrally with each one of the bearings 17. These springs are interposed between the plates 55 and the abutment 26′, and are adapted to be compressed when the dog is engaged by the axle, and thereby retard the movement of the escalator and bring the same to a final stop. A slot 28 in the lever 23 permits a movement of the dog without disrupting the operative connection between the electromagnet and said lever. Contacts 24 and 25 carried by a switch C are normally in electrical engagement with contacts 26 and 27, respectively, and when the safety device operates, are moved out of electrical contact therewith, and the contact 28 carried by said switch is moved into electrical engage-

ment with contact 29, the closing of the two latter contacts being effected before the contacts 24 and 26 are open-circuited, for a purpose hereinafter described.

The various other switches, etc., shown in Fig. 1 comprises a manually operated potential switch P, having a self holding winding 30, a reversing switch R, adapted to reverse the current through the motor M in a well known manner, an electro-magnet 31 having normally open contacts 32, and provided with a dashpot 33, and normally open contacts 34, adapted to be close circuited when the electromagnet 22 is energized. + and — designate a source of current supply.

The operation will now be described: The various parts as shown in Fig. 1, and with the dog in dotted line position, represents the normal positions thereof, the full line position of the reversing switch R, being for the ascending direction of travel of the escalator, and the dotted line position for descending direction of travel. The main line switch is closed manually, and a self holding circuit for the winding 30, thereof, is established as follows: through contacts 35, conductor 36, winding 30, contacts 26 and 24, conductors 52 and 37 to minus line. A circuit for the electromagnet 22 is also established as follows: from the junction 36′, conductor 37′, electromagnet 22, conductor 38, contacts 27, and 25, conductors 39, 52 and 37 to minus line. The electromagnet 22 being energized will now operate and rock the dog out of the path of movement of the axles 3, and also clos the contacts 34. The switch R is thrown to dotted line position, thereby closing circuits through the armature of the motor (which is preferably a shunt field motor) shunt field, and winding 14 of the brake magnet; the circuit for the armature being as follows: -|- conductor through contacts 35, conductor 40, through switch to conductor 41, contacts 34, conductors 42 and 43, through a rheostat and the armature to conductors 44 and 45, through switch to conductor 46, contacts 48 to minus line. The shunt field circuit is established through contacts 49 and to the minus line, and the brake circuit across the shunt field in a well known manner. It is to be here noted that in the operation of the motor to drive the escalator in a descending direction, the armature circuit is included through contacts 34, hence, the escalator cannot be started in a descending direction if the safety device is operated, but the operation thereof in an ascending direction is permissible. Continuing now with the operation, the brake will release, permitting the motor to run, to effect the operation of the escalator in a descending direction. Say now, for example, the escalator is heavily loaded and traveling at a rate of about 90 or 100 feet per minute, which in practice is about the average rate of speed of escalators at the present time, and if any abnormal conditions should arise, such as the one heretofore recited for example, the potential switch will open, the brake will be applied, but is not of sufficient strength to stop the escalator under the conditions set forth, and the electromagnet 22 now being deënergized, the weights 21 will now rock the dog 15 into position to be engaged by one of the axles 3, and the heavy springs 23 will now bring the escalator to a gradual stop without shock or jar to the passengers. The initial operation of the safety device effects the automatic operation of the switch C, to open-circuit contacts 24, 26, and 25 27, respectively. The circuit for the electro-magnet 22 being through contacts 25, and 27, it is thus seen that said electro-magnet cannot be again energized until the safety device is in normal inoperated position, whereby the switch C is again automatically returned to normal position, and consequently the escalator cannot be started in a descending direction, even if through error the operator tries so to do, until the electro-magnet 22 is again energized, which will effect the closing of contacts 34, which are contained in the motor circuit, for the descending direction of travel of the escalator. To return the safety device to normal position the escalator is started in an ascending direction, the potential switch is closed and a circuit is established for the winding of the electromagnet 31 as follows: conductors 36 and 40, winding 31, conductor 51, contacts 29 and 28, conductors 52 and 37, to minus line. The electro-magnet 31 will now close contacts 32, which establish a circuit for the potential switch, and with the switch R in full line position, the brake will release and the motor will operate the escalator in an ascending direction, and the contacts 28 and 29 will maintain the circuit of the winding 31, closed, until the switch C is returned to normal position, the contacts 32 automatically maintaining the potential switch circuit therethrough during the movement of the safety device to its normal position, whereafter the contacts 24 and 26 maintain said circuit. The escalator having ascended enough to return the safety device to normal position, the contacts 25 and 27 being again in electrical engagement will again close the circuit for the electro-magnet 22 therethrough, which will operate to rock the dog out of the path of movement of the axles 3. It will thus be seen that the potential switch circuit is maintained through contacts 32 during the movement of the safety device to normal position, and thereby eliminating prolonged attendance of the operator during said operation.

It will be seen that prevention of the

operation of the escalator in a descending direction after the safety operates affords absolute protection against damage to the escalator or safety device, which would result should the operator through oversight start the escalator in said direction. Numerous other abnormal conditions might arise causing the safety device to operate, upon each operation of which the opening of the potential switch is automatically effected, and in this instance I provide the dashpot 33 to cause a sluggish action of the electro-magnet 31, and preventing the closing of contacts 32, while the contact 24 is being moved out of engagement with contact 26, this lapse of time permitting the opening of the potential switch before the contacts 32 are closed, but said contacts maintaining a closed circuit for the winding of the potential switch during the movement of the safety device C to normal position.

It is obvious that various changes can be made in the details of construction and arrangement of parts without departing from the spirit and scope of my invention. I therefore wish not to be limited to the precise details of construction and arrangement of parts herein shown and described.

What I claim and desire to protect by Letters Patent of the United States is:—

1. The combination with an inclined electrically driven reversible conveyer, an electrically operated buffer device adapted to be put under pressure by the conveyer for effecting the retardation of the latter when the latter tends to run away, and automatic means for preventing the operation of the conveyer in a descending direction unless said device is in normal inoperated position.

2. The combination with an inclined electrically driven reversible conveyer, an electrically operated buffer device adapted to be put under pressure by the conveyer for effecting the retardation of the latter when the latter tends to run away, and automatic means actuated by said electrically controlled yielding means for preventing the operation of the conveyer in a descending direction unless said device is in normal inoperated position.

3. The combination with an inclined electrically driven reversible conveyer, an electrically operated buffer device adapted to be put under pressure by the conveyer for effecting the retardation of the latter when the latter tends to run away, the circuit to said buffer device being automatically broken when the buffer device is operated, thereby preventing the operation of the conveyer in a descending direction unless said buffer device is in normal inoperated position.

4. The combination with an inclined conveyer, an electric power unit for driving the same, a source of current supply therefor, a main line potential switch, electrically controlled yielding means for effecting the retardation of the conveyer when the latter tends to run away, and means for automatically effecting the opening of the potential switch simultaneously with the operation of said yielding means.

5. The combination with an inclined conveyer, an electric power unit for driving the same, a source of current supply therefor, a main line potential switch, electrically controlled yielding means for effecting the retardation of the conveyer when the latter tends to run away, and means actuated by said electrically controlled yielding means for automatically effecting the opening of the potential switch simultaneously with the operation of said yielding means.

6. The combination with an inclined reversible conveyer, an electric power unit for driving the same, a source of current supply therefor, a main line potential switch, a reversing switch for said power unit, electrically controlled yielding means for effecting the retardation of the conveyer when the latter tends to run away, means for automatically effecting the opening of the potential switch simultaneously with the operation of the yielding means, and automatic means for preventing the operation of the conveyer in a descending direction unless said yielding means are in normal position.

7. The combination with an inclined reversible conveyer, an electric power unit for driving the same, a source of current supply therefor, a main line potential switch, reversing switches for said power unit, electrically controlled yielding means for effecting the retardation of the conveyer when the latter tends to run away, means actuated by said yielding means for automatically effecting the opening of the potential switch simultaneously with the operation of the yielding means, and automatic means for preventing the operation of the conveyer in a descending direction unless said yielding means are in normal position.

8. The combination with an inclined reversible conveyer, an electric power unit for driving the same, a source of current supply therefor, a main line potential switch, reversing switches for said power unit, electrically controlled yielding means for effecting the retardation of the conveyer when the latter tends to run away, means for automatically effecting the opening of the potential switch simultaneously with the operation of the yielding means, and automatic means actuated by said yielding means for preventing the operation of the conveyer in a descending direction unless said yielding means are in normal position.

9. The combination with an inclined reversible conveyer, an electric power unit for driving the same, a source of current supply

therefor, a main line potential switch, reversing switches for said power unit, electrically controlled yielding means for effecting the retardation of the conveyer when the latter tends to run away, means actuated by said yielding means for automatically effecting the opening of the potential switch simultaneously with the operation of the yielding means, and automatic means actuated by said yielding means for preventing the operation of the conveyer in a descending direction unless said yielding means are in normal position.

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

ARTHUR E. HANDY.

Witnesses:
W. H. BRADY,
EDGAR W. SMITH.