

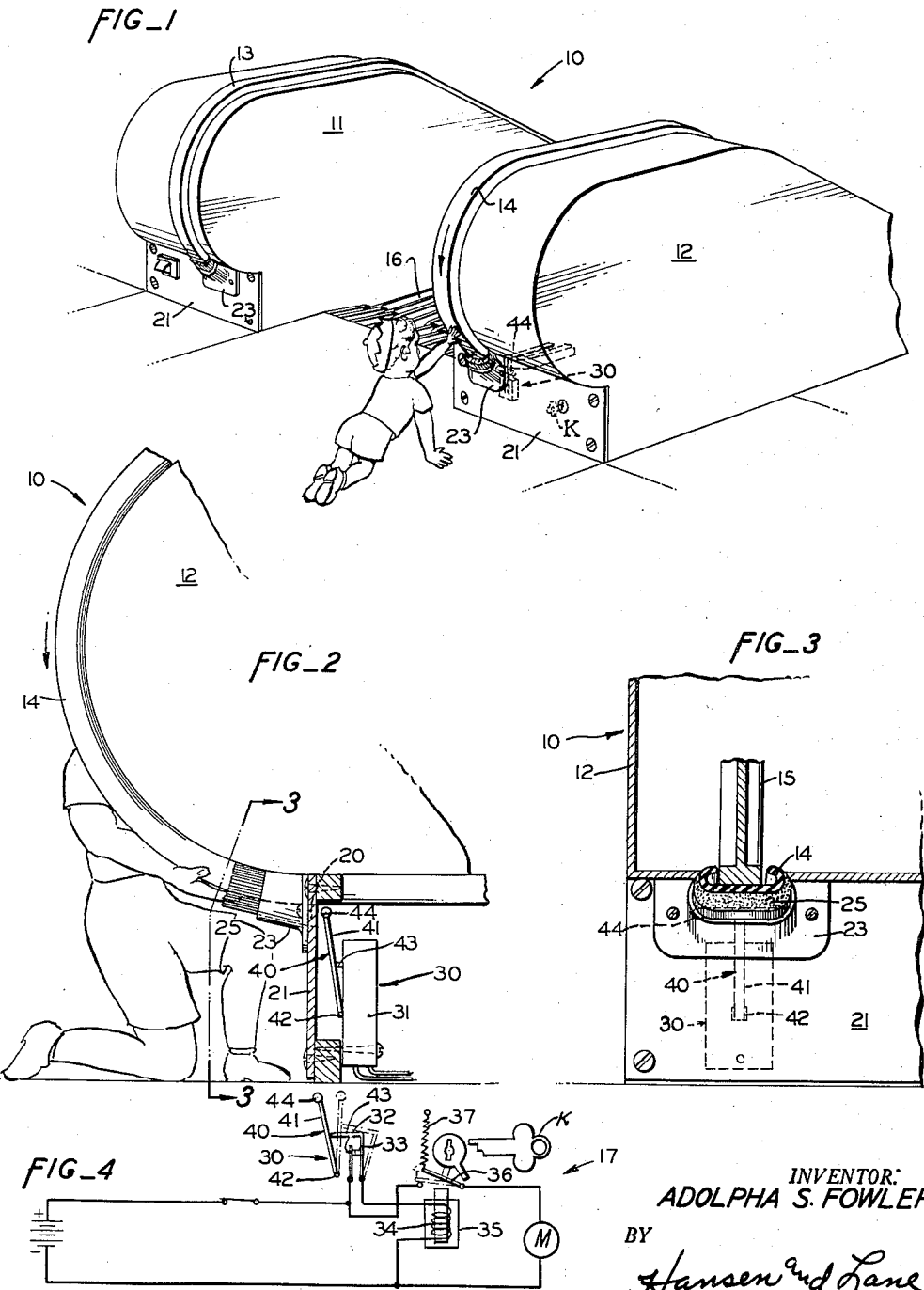
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SAFETY STOP FOR MOVING STAIRWAY

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SAFETY STOP FOR MOVING STAIRWAY

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3 Claims. (Cl. 198—16)

This invention relates to a safety device for moving stairs and more particularly to a device for automatically stopping such type of stairs upon detection of an object between the handrail thereof and its return escutcheon.

In conventional moving stairways, the handrails therefor move conjointly with the steps. These handrails are usually endless rubber belting guided along the top of the balustrades and trained around newel wheels at each end thereof. As these endless belt handrails travel over the exit newel wheel they enter an opening provided in an exit escutcheon for return in concealment toward the entrance newel wheel.

It is at the opening of the exit escutcheon that accidents often occur due to persons, usually children, continuing to hold the rubber handrail until their hand gets caught between the open sides of the escutcheon and the moving handrail. To deter such accidents the escutcheon has been provided with a brush consisting of many bristles which extend toward the oncoming belt to engage a person's hand and cause a slight but harmless pricking effect so that he will withdraw his hand before it enters the exit opening with the belt. While this has proven satisfactory in most instances there have been numerous situations in which children, out of sight of their mothers who are busy shopping, play around the moving handrails and allow their hands to pass beyond the bristles surrounding the handrail. Sometimes these children have a toy car or small wheeled vehicle which appears to be traveling when its wheels turn upon engagement with the moving handrail. On one occasion I discovered the parts of such a toy beyond the bristled escutcheon. Moreover, the child to whom the toy belonged had gotten his arm caught between the handrail and the open edges of the exit escutcheon. He had apparently attempted to retrieve his toy and being unaware of the danger put his hand into the opening and his arm was then drawn inward by the moving belt.

The present invention has as its object to prevent the moving belt from drawing one's arm through the restricted opening in the exit escutcheon.

Another object is to provide a safety shut off for the moving stairway when any object enters between the moving handrail and the edges around the opening in the exit escutcheon.

Another object is to provide a detector paddle just inside the exit opening and adjacent the moving handrail as it enters the same to engage any object exiting with the handrail. In this connection it is a further object to provide a normally on microswitch operatively connected with the detector paddle and adapted to break circuit when the detector paddle is engaged by an object entering the exit opening with the handrail.

These and other objects of the present invention will become apparent in the following description when read in the light of the drawings in which:

Fig. 1 is a perspective view of the exit end of a moving stairway.

Fig. 2 is a vertical section through one handrail balustrade of the moving stairway shown in Fig. 1 and illustrating my new safety stop associated therewith.

Fig. 3 is a vertical section transverse to that shown in Fig. 2 and taken along line 3—3 thereof.

Fig. 4 is a wiring diagram of a circuit embodying a part of my new safety device.

Referring to Fig. 1, the moving stairway 10 comprises a pair of balustrades 11 and 12 including handrails 13 and 14, respectively, each trained around a pulley or newel wheel 15 in the usual manner at the upper and lower ends of the stairway. The stairway 10 is of any well known design in which the treads 16 are linked together as an endless conveyor also trained around suitable pulleys, gears or other such media drivingly connected to an electric motor M arranged in a circuit 17 having a suitable source of electrical energy.

As best seen in Figs. 2 and 3 each handrail 13—14 consists of an endless strand of rubber contoured to fit the palm of a person's hand. As seen in Fig. 1, these handrails 13—14 are moving in an upward direction toward the exit end of the stairway. It will thus be seen that each handrail 13—14 goes around its exit pulley 15 (in a counter-clockwise direction) and passes through an exit opening 20 formed in the upper vertical wall 21 of the particular balustrade with which it is associated.

Ordinarily the exit opening 20 for each handrail 13—14 is finished with an escutcheon plate 23 and more recently these escutcheon plates have been provided with a brush 25 consisting of numerous relatively stiff bristles adapted to engage a person's fingers or hand. These bristles are disposed (Figs. 2 and 3) to wipe along the handrail with their free ends facing in the direction of the oncoming belt so that a person will naturally or instinctively withdraw his hand when it engages the bristles.

While this mode of safeguarding accidents has proven satisfactory in most cases it has not deterred children from playing around the same. Most inquisitive children have a desire to find out where the moving belt goes and are so fascinated that they lose all sense of the dangers of getting their hands between the bristles and the moving handrail. Once this occurs the friction between the rubber handrail and their hand or any object they may insert into the exit opening 20 will tend to cause these objects to be drawn through the same.

The present invention contemplates the provision of a safety stop for moving stairways for automatically stopping the same when any object passes through the exit opening 20 by the foregoing action. This safety stop designated 30 embodies a micro switch 31 secured behind the vertical wall 21 in which the exit opening 20 is formed. The micro switch 31 is provided with the usual switch contacts 32—33 which are normally disposed in closed or circuit completing position. These contacts 32—33 complete circuit to the coil 34 of a relay 35 for holding the switch arm 36 associated therewith in circuit closing or completing position. The switch arm 36 is normally urged away from the armature of the coil 34 by a spring 37 but when pressed toward the same, against the action of the spring 37, will be maintained thereby in circuit closing position to complete circuit to the motor M.

The relay 35 may be of any conventional design in which some manual means, such as a key K is employed to set the switch arm 36 in circuit closing position. Consequently, when the contact arms 32—33 of the micro switch 31 are separated to open or cut off the circuit to the coil 34 of the relay 35 the power to the motor M is cut off until the relay 35 is again manually reset. It will thus be seen that irrespective of whether the micro

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switch 31 returns to normal (closed) position or not, once the relay switch arm 36 assumes circuit breaking position it cannot reset itself even though the coil 34 is again energized by closing of the micro switch 31.

Referring now to Figs. 2, 3 and 4, a detector paddle 40 is associated with the micro switch 31. This detector paddle 40 comprises a lever 41 pivotally mounted as at 42 on one side wall of the micro switch housing adjacent an insulated button or rod 43 extending from one contact arm 33 of the micro switch. This detector lever or paddle 40 has an enlarged upper or extreme end 44, preferably in the form of a cross bar so as to provide a T head which will span the normal width of the handrail 13—14 with which it is associated. The T head 44 is disposed just beneath the underside of the particular handrail so as to clear the same during pivotal movement of the lever 41 about its axial mounting 42. Moreover, the T head 44 is disposed immediately behind the vertical wall 21 just inside the opening 20 formed therein so as to be engaged by any object passing there-through.

With the foregoing arrangement any object, particularly a person's hand, passing through the opening 20 between the bristles of brush 25 and the surface of the moving handrail 13—14 will engage the T head 44 and rock the lever 41 (clockwise Fig. 2) toward the insulated button or rod 43 extending from the one contact arm 33 of the micro switch 31. Thus the button 43 is pressed to separate the contact points on the two arms 32—33 to break circuit to the coil 34 of relay 35. In this manner movement of the handrails 13—14 as well as the moving stair treads 16 is stopped and accidents averted.

While I have described my safety stop arrangement in specific detail and in conjunction with one particular form of moving stairway, it will be apparent that it is susceptible to modifications, alterations, and/or variations without departing from the spirit of my invention. I, therefore, desire to avail myself of all modifications, alterations, and/or variations as fairly come within the purview of the appended claims.

What I claim as new and desire to protect by Letters Patent is:

1. In a moving stairway having a moving handrail passing through an exit opening formed in a vertical wall and a motor in an electrical circuit for driving said stairway and handrail, a safety stop for said motor comprising a switch including a pair of normally closed contacts arranged in said circuit, a detector paddle movably mounted adjacent said switch and adapted on relatively

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slight movement to urge one of said contacts away from the other, said detector paddle having a surface disposed closely adjacent said handrail and just inside the exit opening formed in said vertical wall and adapted substantially on engagement by an object entering said opening with said handrail to move said one contact away from the other and thereby open the circuit to said motor.

2. In a moving stairway having an endless moving handrail trained over a pulley at the exit end of a balustrade and passing into the balustrade through an opening formed in a vertical wall of the latter, and an electrical circuit including a motor drivingly connected to said stairway and handrail, the combination therewith of a safety stop for said motor comprising a normally closed switch including a pair of contacts connected in said circuit for maintaining a closed circuit to said motor, a detector paddle pivotally mounted adjacent said switch, an enlarged head on the free end portion of said detector paddle closely juxtaposed to the underside of said handrail just inside said opening for engagement by an object entering said balustrade with said handrail through said opening, and an insulated button on one of said contacts engageable by said detector paddle and movable to separate said contacts for breaking said circuit to said motor substantially on engagement of said entering object with said free end portion of said paddle.

3. In a moving stairway driven by an electric motor arranged in an electrical circuit, the combination, with the moving handrail of such stairway and a balustrade having an exit opening through which said handrail passes into the balustrade, of a safety stop for said motor comprising a pair of normally closed contacts connected in said electrical circuit for maintaining the latter in closed circuit condition for energizing said motor, and a detector paddle pivotally mounted adjacent said pair of normally closed contacts with its free end disposed closely adjacent the surface of said handrail within the balustrade and closely adjacent said exit opening for engagement by an object moving with said handrail through said opening and operable substantially on engagement by said object to pivot said detector paddle toward one of said contacts for separating the same from the other one of said contacts to break said electrical circuit to said motor.

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