June 23, 1931. H. E. HALL 1,810,960

ELEVATOR CONSTRUCTION

Filed Oct. 22, 1930 2 Sheets-Sheet 1

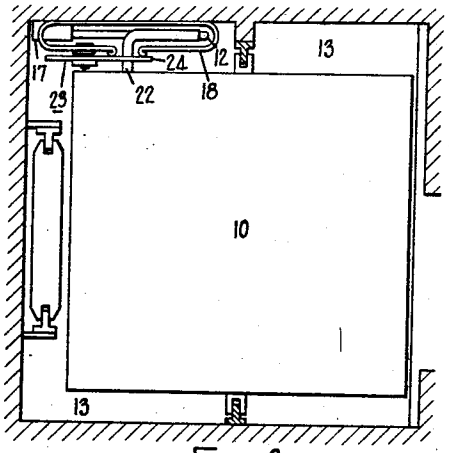


FIG. 2

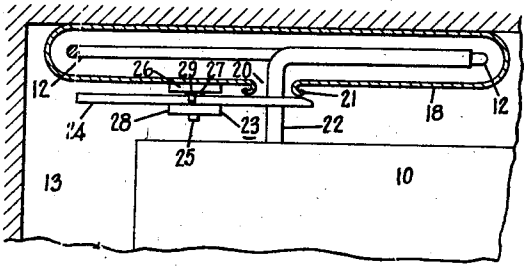


FIG. 3

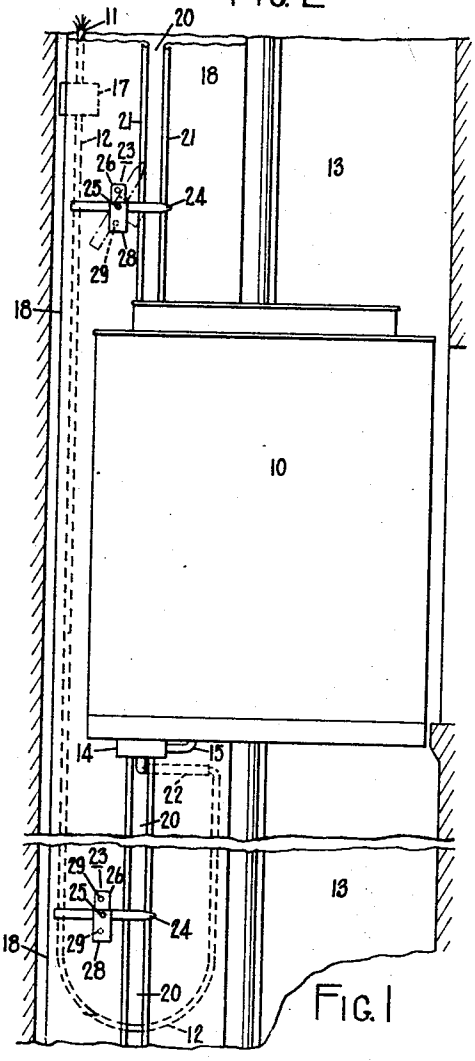


FIG. 1

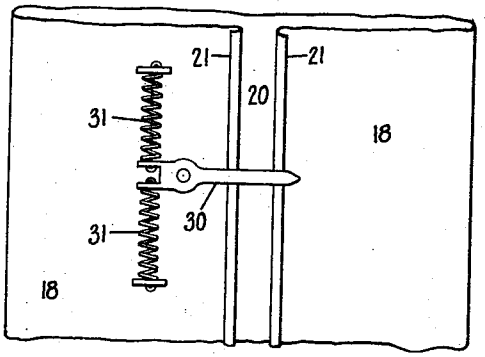


FIG. 4

Harry Edward Hall INVENTOR

BY Matthews & Bradley ATTORNEY

June 23, 1931. H. E. HALL 1,810,960

ELEVATOR CONSTRUCTION

Filed Oct. 22, 1930 2 Sheets-Sheet 2

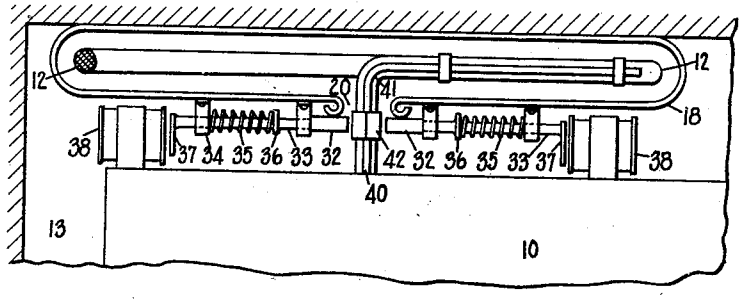


FIG. 6

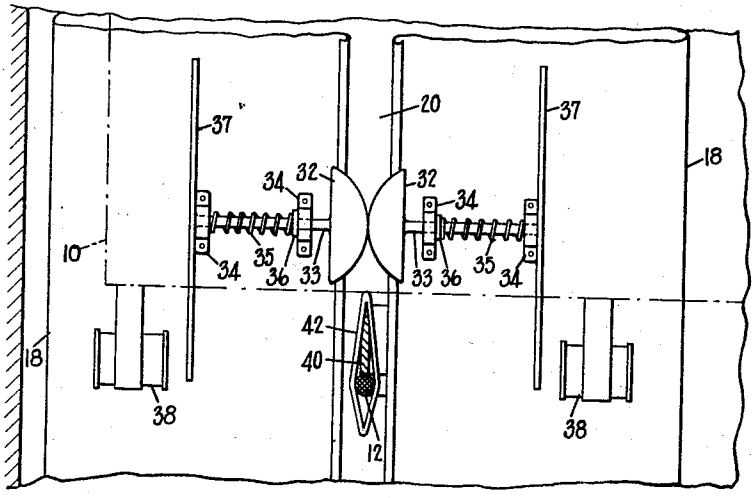


FIG. 5

Harry Edward Hall INVENTOR

BY Walter E. Bradley ATTORNEY

Patented June 23, 1931 1,810,960

UNITED STATES PATENT OFFICE

HARRY EDWARD HALL, OF ENGLEWOOD, NEW JERSEY, ASSIGNOR TO OTIS ELEVATOR COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY

ELEVATOR CONSTRUCTION

Application filed October 22, 1930. Serial No. 490,427.

The present invention is directed to elevators and relates especially to the travelling cables or any similar flexible members depending from the elevator car in the hatchway.

It is desirable in certain elevator installations to provide a chute or similar means for confining flexible members depending from the elevator car, such as the travelling cable or the like, to a limited portion of the hatchway. This restricts the amount of swinging motion of the depending flexible members, thereby preventing entanglement of these members with objects disposed within or protruding into the elevator hatchway. Such arrangement is useful in elevator installations on shipboard, wherein considerable swaying of the cables is likely to occur due to the pitch and roll of the ship, and in installations wherein a plurality of elevator cars are arranged in the same hatchway so that the travelling cable of one car must pass another car. It is also useful in installations wherein the hatchway is exposed, thus subjecting the travelling cable to the air currents which traverse the hatchway.

A suitable chute for confining the travelling cable is one in the form of a solid walled sheath extending vertically of the hatchway and having a central slot throughout its length. The sheath is preferably shallow and wide with a junction box arranged at one side thereof to suspend the hatchway end of the cable from a point remote from the central slot. The other end of the travelling cable depends from a support fixed to the elevator car and extends through the slot to the center of the chute and thence to a point near the opposite side of the chute from the hatchway junction box.

The present invention is directed to preventing the elevator travelling cable or similar flexible member from getting out of the chute through the slot.

The invention is useful, for example, in high rise installations which necessitate long travelling cables and in installations subject to air currents in which perforated or openwork chutes are provided to reduce the wind resistance offered by the chute, thereby subjecting the cables to air currents.

One feature of the invention is to provide guard means for the slot of the chute for retaining the travelling cable in the chute.

Another feature is the provision of a plurality of guards for the slot arranged at intervals along the chute.

A third feature resides in the provision of guard means for the slot which do not restrict the vertical movement of the traveling cable.

Other features and advantages will be apparent from the following description and appended claims.

For the purpose of illustrating the genus of the invention typical concrete embodiments are shown in the accompanying drawings in which:

Figure 1 is a diagrammatic representation of a portion of an elevator hatchway with an elevator car therein;

Figure 2 is a top plan view of the apparatus shown in Figure 1;

Figure 3 is an enlarged horizontal section, illustrating the arrangement of guard means for the slot of the traveling cable chute;

Figure 4 is an elevational detail of another form of guard means;

Figure 5 is an elevational detail of still another form of guard means; and

Figure 6 is a top plan detail of parts shown in Figure 5.

Referring to the drawings, the elevator car 10 is provided with rails for guiding it during its travel up and down the hatchway 13. The travelling cable 12 which contains conducting wires leading to and from the elevator car is illustrated as a single cable

but it is to be understood that several cables may be provided, depending upon the requirements of the particular installation. This cable is usually connected to a junction box 14 on the bottom of the elevator car. A conduit 15 leads from the junction box 14 to the car switch or other control or signal mechanism in the car. This conduit contains conducting wires joined to the travelling cable conducting wires at the junction box 14. The other terminal of the travelling cable is at a junction box 17 secured to a side wall of the hatchway 13, usually at the approximate center of the vertical travel of the car. Cable 12 is suspended at junction box 17 in such manner as to take the load off the conducting wires. A conduit 11, illustrated as leading from the junction box 17, is indicative of the connection from the travelling cable to the control or signal apparatus outside the car.

To confine the travelling cable to a limited portion of the hatchway 13, a vertical sheath or chute 18 is provided in the hatchway to enclose the cable. This chute 18 is preferably constructed of fairly heavy gauge metal, is made shallow and wide as illustrated in Fig. 3 and is secured at intervals to the hatchway wall in any suitable manner. It is provided with a central opening 20 extending vertically throughout its length and the edges 21 of the chute bordering the opening 20 are preferably rolled. The chute may be of open work or perforated construction, for example in installations where the hatchway is exposed, to reduce the wind resistance offered by the chute.

Junction box 17 is arranged at one side of the chute to suspend the fixed end of the travelling cable at a point remote from the slot 20. The other end of the travelling cable is supported from the elevator car in such manner as to cause the cable to depend into the chute at the other side thereof. This support may be in the form of a pipe, bracket or any other suitable means. In Figures 1, 2 and 3 a pipe, designated 22, has been shown. This pipe is supported from the bottom of the car and is provided with a right angle bend as illustrated in Figures 2 and 3. The pipe extends from the junction box 14 to the center of the chute and thence to a point in the chute on the opposite side from the junction box 17. Travelling cable 12 is enclosed in the pipe so that it is caused to depend in the chute from one side thereof. With the travelling cable depending from the junction box 17 at the other side of the chute, both strands of the cable are suspended from points removed from the central opening 20 of the chute. This arrangement causes the bight of the cable to traverse the slot 20 at all times.

To prevent the travelling cable or any portion thereof from getting out of the chute through slot 20, a number of guards 23 are provided at intervals along the slot. In the embodiment shown in Figures 1, 2 and 3, each of the guards, designated 23, comprises a lever 24 pivoted at its center to the chute 18 in such a manner as to cause one end of the lever to traverse the opening 20 of the chute. The lever is mounted to rotate freely on a pin 25 which extends outwardly from a mounting plate 26 secured to the chute adjacent the slot 20. Washers 27 are disposed between the lever and plate to space the lever but a slight distance from the rolled edges 21 of the chute so as to prevent the travelling cable from leaving the chute. The lever 24 may be maintained in a horizontal position by any suitable means. As illustrated in Figures 1, 2 and 3 this means is a centering weight 28 depending from the pivot pin 25 and secured to the lever 24 at right angles to its length. During the operation of the elevator car, the support 22 for the travelling cable engages the respective levers 24 rotating them to a position to uncover the slot, thereby permitting the support to pass by the guard. As soon as the support has passed a guard, the centering weight 28 for the guard returns the guard lever to a horizontal position. Stops in the form of screws or pins 29 are secured to each mounting plate 26 above and below the pivot pin 25 to limit the rotation of lever 24.

Referring to Figure 4 of the drawings, another form of guard is shown. This guard is also in the form of a lever, designated 30. This lever is pivoted to the chute 18 so as to traverse the slot 20 in the same manner as before. Lever 30 is biased into horizontal slot-traversing position by centering springs 31 each of which engages the free end of the lever and a lug on the chute. The travelling cable support 22 is adapted to brush this lever to one side during the travel of the car in either direction, and springs 31 return these levers to their normal positions after the support passes the guard. Lever 30 is preferably constructed of aluminum or some light alloy and its mass reduced as much as possible. This diminishes its inertia so that very little noise will result from impacts of the support 22 and the levers.

Other arrangements of guards may be employed, if desired. For example, guards which are noiseless in operation may be provided. Such guards are particularly suitable for passenger elevator installations. In Figures 5 and 6 a magnetically operated guard is illustrated in which mechanical contacts between the travelling cable support and the guard are obviated. In the illustrated embodiment the guard comprises a pair of cams 32 which cover the slot 20. These cams are mounted on a pair of rods 33 which are in turn slidably mounted in bearing members 34 so fixed to the chute, on op-

posite sides of the slot, as to dispose the rods 33 in the same horizontal plane. Cams 32 are biased into slot covering position by a pair of springs 35 mounted on the rods 33 between the two outside bearing members 34 and stop rings 36 fixed to said rods to engage the two inside bearing members 34 when the cams are closed. A pair of elongated plates 37 are fixed to the outside ends of rods 33 at right angles thereto. A pair of magnets 38 are carried by the elevator car and are positioned to attract the plates 37 outwardly as the cable support passes the guard. The plates extend equal distances above and below the rod ends and are of sufficient length so that an outward pull exerted on the ends of the plates opens the guard prior to the passage of the travelling cable and its support between the cams. The magnets are laterally spaced so as to allow a slight clearance between the plates and magnets when the plates are drawn outwardly to open the guard, as illustrated in Figure 6. The magnets 38 are constantly energized during operation of the car to open the guards as the plates 37 come under the influence of the magnets. The two inside bearing members 34 may be set to form stops to limit the outward movement of the cams, rods and plates.

The guards may be mechanically operated in the event of failure of the magnets to withdraw the cams. To this end the cams 32 are in the form of segments and so disposed that the centers of their curved surfaces contact when the guard is closed. This allows the cable and its support to wedge the cams to open position and to pass through the guard in either direction. The form of cable support shown in the first three figures may be employed, but preferably the type shown in Figures 5 and 6 is utilized. This support consists in a plate member 40 having its upper edge secured flush with the bottom surface of the elevator car floor by a right angle bracket or other suitable means. Support plate 40 has a right angle bend 41 therein and extends through slot 20 of chute 18 to the center of the chute and thence to a point near the side, as set forth in describing the pipe 22. Travelling cable 12 is secured to the bottom edge of support plate 40 by straps or other suitable fasteners. The upper edge of support 40 is tapered to a narrow edge at the point where the support passes between the guard cams, as shown in Figure 5, and a guide strap 42 surrounds the support and cable at this point. The guide strap is a little wider than the cams and tapers to a blunt point above and below the travelling cable to act as a wedge for opening the guard cams in case the magnets are not energized.

Since the attractive force exerted by each magnet on a plate varies inversely as the square of the distance between them it may be found desirable to reduce the air gap between magnets 38 and plates 37. To this end the throw of plates 37 may be reduced by inserting a lever system, affording the proper mechanical advantage, between the plate and guard bars to effect the withdrawal of said bars. In place of the two guard bars illustrated in Figures 5 and 6, a single sliding bar crossing the slot 20 may be employed in connection with a lever system having additional levers projecting into the path of the travelling cable support to cause the operation of the lever system and thus withdraw the latch bar in the event of failure of the energization of the magnets.

The arrangements above described are also suitable for defining the paths of movement of other flexible members depending from the car or counterweights such as, for example, the air hose employed to conduct air to the gate operating mechanism, compensating cables depending from the car and counterweight or other similar members.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. In an elevator installation, a hatchway, a body adapted to travel up and down the hatchway, a flexible member attached to said body and depending therefrom into the hatchway, a chute for said flexible member, and means for preventing egress from the chute of any portion of said member within the chute.

2. In an elevator installation, a hatchway, an elevator car adapted to travel up and down in said hatchway, a travelling cable depending from said car and a wall of said hatchway, a chute for said travelling cable for confining said cable to a limited portion of the hatchway, said chute being disposed along said wall of the hatchway, and means for preventing egress from the chute of any portion of said cable within the chute.

3. In an elevator installation, a hatchway, an elevator car adapted to travel up and down in said hatchway, a travelling cable communicating between the elevator car and a junction in the hatchway, a chute for said cable disposed adjacent the elevator car and parallel with the hatchway, said chute having a central opening extending throughout its length, a support for the car end of the cable extending into said chute through said opening, and means for preventing any

portion of said cable from swinging out of said chute through said opening.

4. In an elevator installation, a hatchway, an elevator car adapted to travel up and down in said hatchway, a travelling cable depending from said car and a wall of said hatchway, a chute for said travelling cable disposed along the wall of said hatchway, said chute having a vertical slot therein, the car end of said cable extending into said chute through said slot and said slot extending throughout the path of travel of said car end of the cable, guards disposed at intervals along said slot for preventing any portion of said cable from swinging out of said slot, and means actuated in accordance with car movement for operating each of said guard means to uncover said slot as the car end of said cable passes that guard means.

5. In an elevator installation, a hatchway, an elevator car therein, a flexible member hanging in the hatchway with one end attached to the car and the other end attached to a point in the hatchway, a chute for said flexible member for confining said member to a limited portion of said hatchway, said chute having a central slot extending throughout its length for admitting the car end of said member, a plurality of guards for said slot for retaining said member within said chute, said guards being disposed at intervals along said chute and each guard being biased into slot-covering position, and means carried by said car for moving each of said guards out of path of movement of the car end of said member as said car end of said member passes such guard.

6. In an elevator installation, a hatchway, an elevator car adapted to travel up and down in said hatchway, a travelling cable depending from said car and a point on a wall of said hatchway, a chute for said travelling cable disposed along said wall of the hatchway, said chute being flat and wide and having a central slot extending throughout its length for admitting the car end of said cable, a support for said car end of the cable extending into said chute through said slot to one of the sides of said chute remote from said slot, means for supporting the other end of said cable from within said chute at the opposite side thereof, a plurality of guards disposed at intervals along said chute, each of said guards being positioned to extend across said slot and being movable out of slot covering position, a part of said support for the car end of the cable being adapted to move each of said guards out of slot covering position as the car end of the cable passes such guard, and means for returning each guard to slot covering position after the car end of the cable has passed that guard.

7. In an elevator installation, a hatchway, a body adapted to travel up and down in the hatchway, a flexible member attached to said body and depending therefrom into the hatchway, a chute for said flexible member, a slot in said chute extending throughout the path of travel of the body-attached end of the flexible member, and a plurality of levers extending across said slot and disposed at intervals along said chute for preventing egress from the slot of any portion of said member within the chute.

8. In an elevator installation, a hatchway, an elevator car adapted to travel up and down in said hatchway, a travelling cable depending from said car and a wall of said hatchway, a chute for said travelling cable for confining said cable to a limited portion of the hatchway, said chute being disposed along said wall of the hatchway, a slot in said chute extending throughout the path of travel of the car-attached end of said travelling cable, a plurality of levers pivoted at intervals to said chute and biased into positions traversing said slot to prevent egress from the slot of any portion of said travelling cable within the chute, and means carried by said car for moving each of said levers about its pivot into position to uncover the slot as the car-attached end of the cable passes that lever.

9. In an elevator installation, a hatchway, an elevator car therein, a flexible member hanging in the hatchway with one end attached to the car and the other end attached to a point in the hatchway, a chute for said flexible member for confining said member to a limited portion of said hatchway, said chute having a central slot extending throughout its length, a plurality of guards disposed at intervals along said chute and biased into slot covering positions to prevent egress from said chute of any portion of said flexible member within said chute, magnetic means carried by said car for retracting said guards out of slot-covering positions to prevent the car attached end of said flexible member from contacting said guards.

10. In an elevator installation, a hatchway, an elevator car therein, a flexible member hanging in the hatchway with one end attached to the car and the other end attached to a point in the hatchway, a chute for said flexible member for confining said member to a limited portion of said hatchway, said chute having a central slot extending throughout its length, a plurality of guards disposed at intervals along said chute and biased into slot covering positions to prevent egress from said chute of any portion of said flexible member within said chute, each of said guards being provided with magnetizable means, magnets carried by said car for cooperating with magnetiza-

ble means of the respective guards to retract said guards out of slot-covering positions to prevent the car-attached end of said flexible member from contacting said guards and a support for conducting the car-attached end of said flexible member through said slot to a point within said chute remote from the slot, said support having a part adapted to move said guards out of slot-covering position in the event of failure of said magnets to retract said guards.

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

HARRY EDWARD HALL.