April 6, 1954 I. C. THOMPSON 2,674,347

STAIR ELEVATOR

Filed May 25, 1946 3 Sheets-Sheet 1

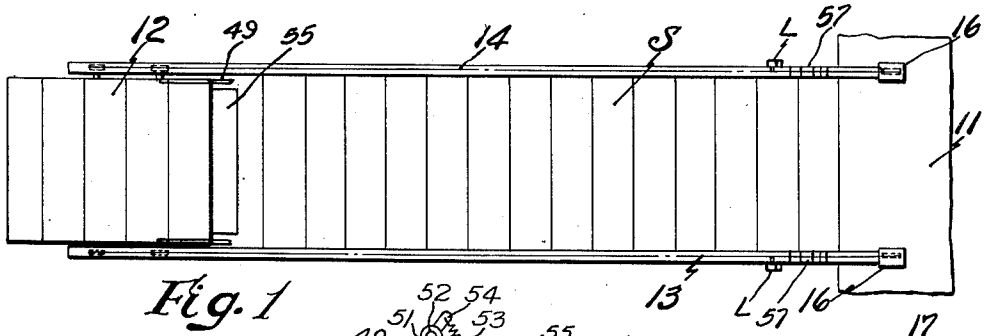


Fig. 1

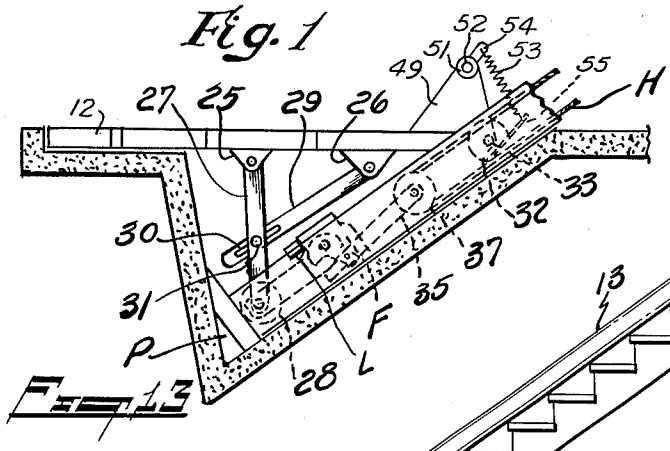


Fig. 3

Fig. 2

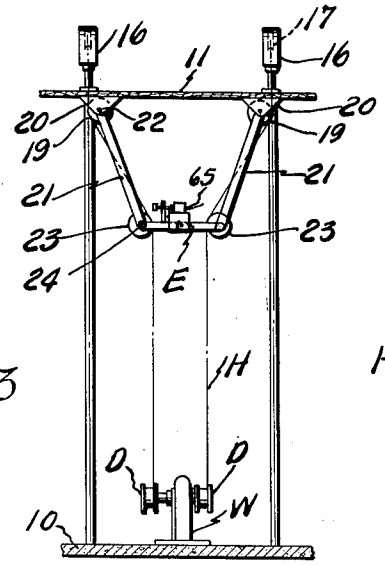


Fig. 3

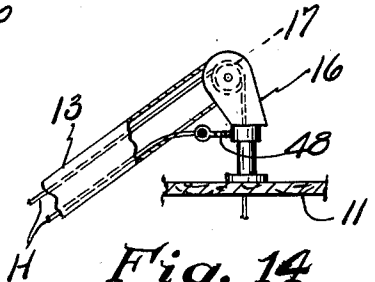


Fig. 14

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STAIR ELEVATOR

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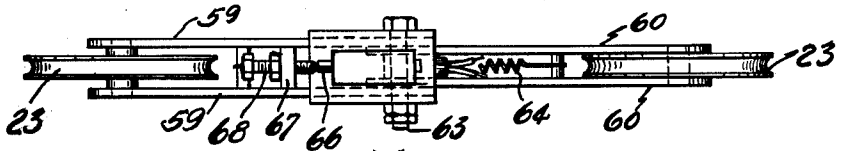


Fig. 5

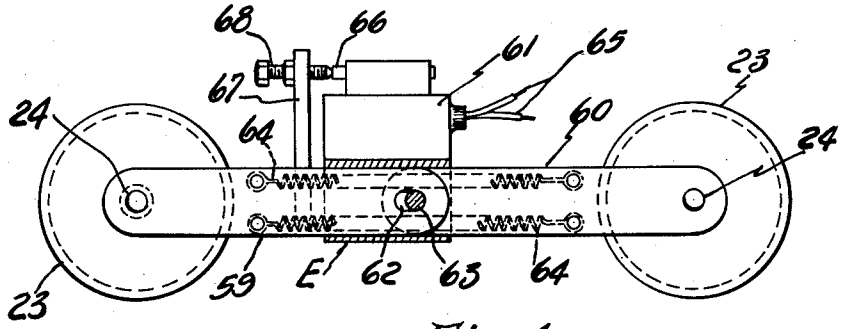


Fig. 4

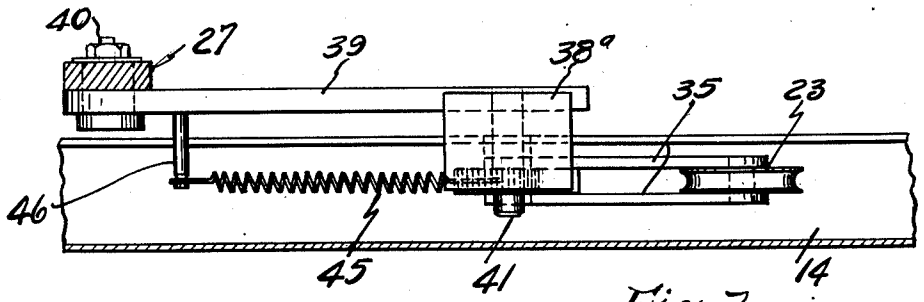


Fig. 7

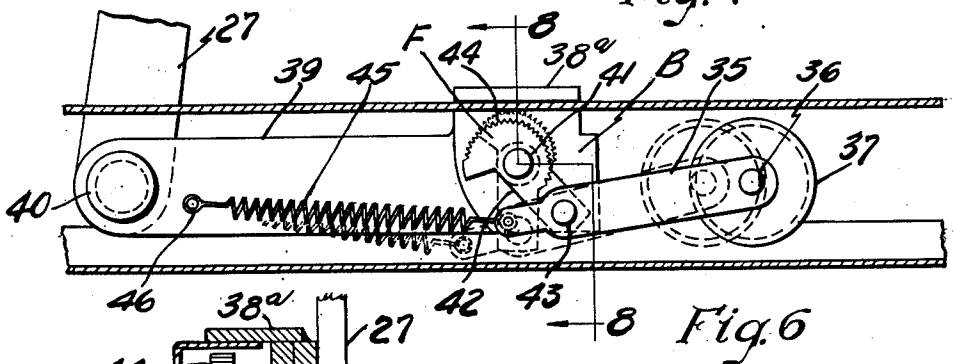


Fig. 6

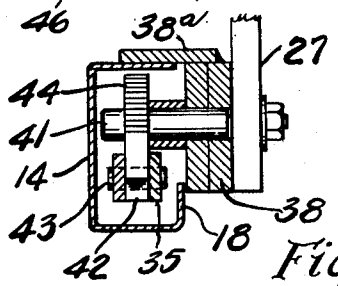


Fig. 8

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STAIR ELEVATOR

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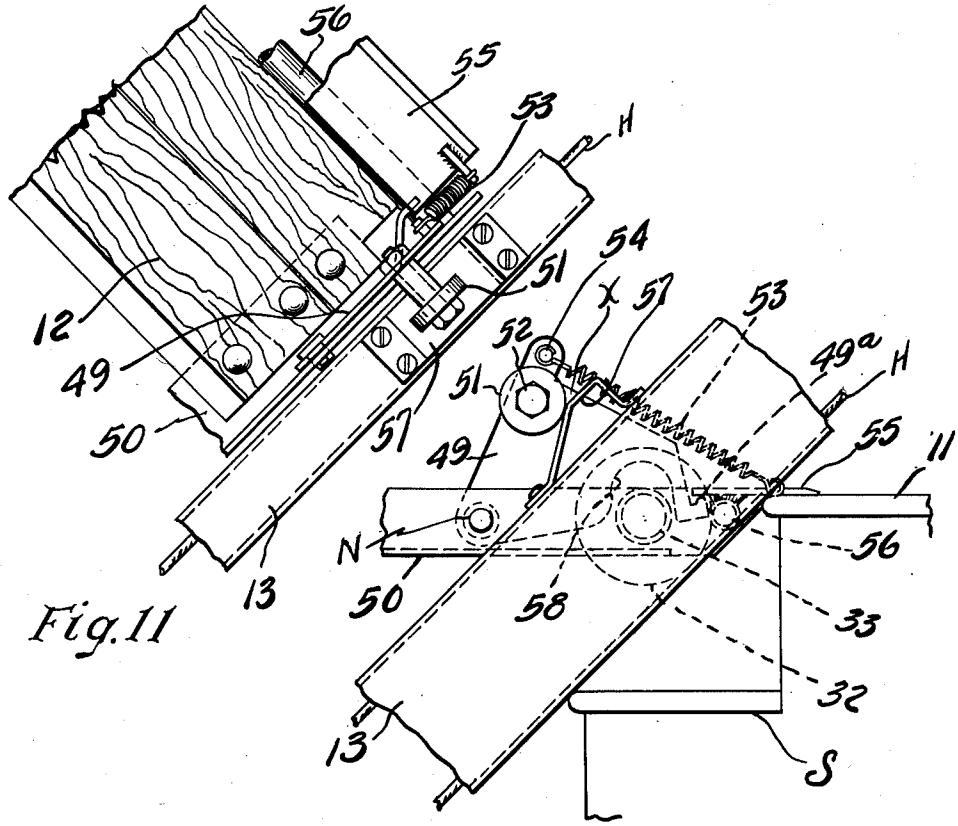


Fig. 11

Fig. 10

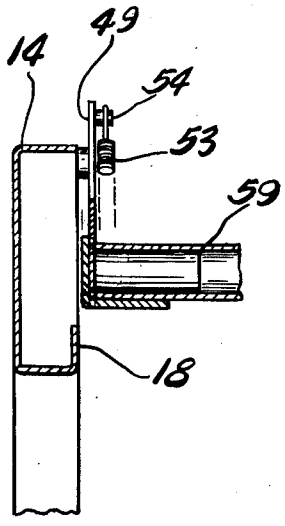


Fig. 12

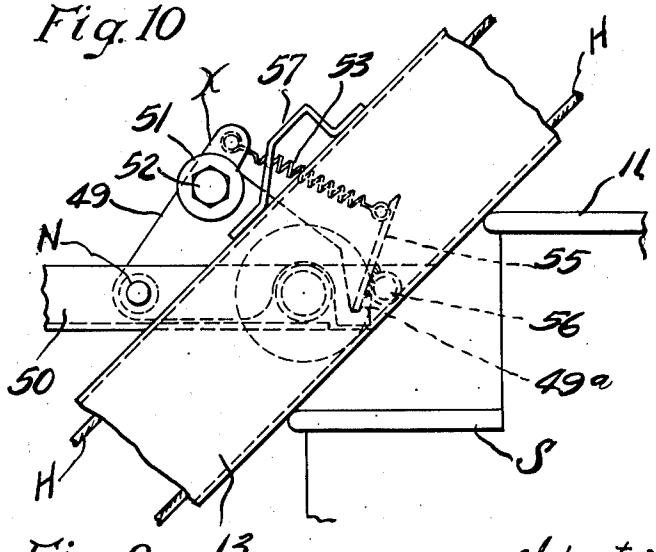


Fig. 9

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2,674,347

UNITED STATES PATENT OFFICE

2,674,347

STAIR ELEVATOR

Irving C. Thompson, Bay City, Mich., assignor, by mesne assignments, to Lloyd C. Schwartz, Bay City, Mich.

Application May 25, 1946, Serial No. 672,179

9 Claims. (Cl. 187—12)

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This invention relates to stair elevators such as installed in stairways for elevating heavy or light materials from the basement to the first floor, or from one floor to another.

It is conventional practice, where conditions require the shifting of commodities and/or materials from one floor to another to utilize a vertically movable elevator mechanism, and special provision must be made for such installation. This entails elevator shafts and wells, together with a cage or platform and the necessary forms of protective means or devices.

Where installation is made in a building already constructed, remodeling of the interior is necessary, and furthermore, the considerable space occupied by the shaft and well is unavailable for other purposes.

One of the salient objects of the invention is to design an apparatus of the character described which may be installed in a stairway passage of practically any type, either in newly constructed or old buildings, and which will convey packages or materials of any nature, either up or down, as circumstances may require.

Another object of the invention is to design a stairway elevator which can be installed over the stairway and by means of which merchandise of any nature may be raised or lowered, yet leaving the stairway proper open for use in the conventional manner.

A further object is to design a practical and substantial apparatus provided with automatic braking apparatus and which will operate in a manner to eliminate any possibility of damage to load, or injury to persons carried thereby or engaged in the operation thereof.

A still further object is to provide a stairway elevator of simple construction, which is composed of few parts, whereby the cost of manufacture and installation is reduced to a minimum.

Still a further object is to provide equalizing means for equalizing the individual operating cables as the device is operated.

A further object still is to design simple and practical means for tripping the switch and cut off the power when the elevator platform has reached the limit of its upward travel.

With the above and other objects in view, the present invention consists in the combination and arrangement of parts, hereinafter more fully described, illustrated in the accompanying drawings, and more particularly pointed out in the appended claims, it being understood that changes may be made in the form, size, proportion, and minor details of construction, without

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departing from the spirit, or sacrificing any of the advantages of the invention.

In the drawings:

Fig. 1 is a plan view showing my stairway elevator installed over a stairway.

Fig. 2 is a side-elevational view thereof.

Fig. 3 is a rear-elevational view showing the cable equalizing means, the stairway being omitted.

Fig. 4 is an enlarged, detail, side-elevational view of the cable equalizing means.

Fig. 5 is an enlarged plan view thereof.

Fig. 6 is a side-elevational view illustrating the elevator safety mechanism.

Fig. 7 is a top, plan view thereof.

Fig. 8 is a transverse-sectional view taken on the line 8—8 of Fig. 6.

Fig. 9 is an enlarged, fragmentary, side-elevational view of the elevator showing the trip mechanism.

Fig. 10 is a view similar to Fig. 9 showing the mechanism in tripped position.

Fig. 11 is a fragmentary, plan view of the mechanism illustrated in Fig. 10.

Fig. 12 is a fragmentary, part-sectional plan view of the trip mechanism, etc.

Fig. 13 is an enlarged, side-elevational view of the pit and platform.

Fig. 14 is a fragmentary, part-sectional, side-elevational detail view showing the cable anchoring means.

Referring now more specifically to the drawings in which I have shown one embodiment of my invention. The numeral 10 indicates a floor with a stairway S leading from a floor 10 to an upper floor 11 located a predetermined distance above it.

A relatively small pit P is provided in the floor 10 as shown and the elevator platform 12 forms a cover for said pit when in lowered position as shown in Figs. 1 and 2 of the drawings.

The elevator is designed so that it can be installed directly over a stairway so that the stairway may be used in the conventional manner when the elevator is not in operation, said elevator comprising spaced-apart side rails 13 and 14, the lower ends of which are anchored in the pit, the upper ends being secured to vertically disposed standards 15 provided on the floor 11, these standards also forming a mounting for the sheaves 17 which are revolvably journaled therein.

The side rails 13 and 14 are substantially channel-shaped in cross section (see Fig. 8), excepting that the lower section is closed by

means of an upwardly projecting web 18 as shown.

Spaced-apart sheaves 19 are journaled in brackets 20 that are secured to the floor 11, and links 21 are pivotally secured to the brackets 20 by means of pins 22, sheaves 23 being journaled on pins 24 provided on the lower ends of the links 21, and a horizontally disposed equalizing bar E connects the lower ends of the links 21 as shown.

A winch W is located on the floor 10 below the equalizing bar and includes winding drums D as shown, said drums being driven from a motor M, and a brake C is connected to the motor for application when the mtor stops, and while in the present instance I have shown an electric motor as the source of power supply, it will be understood that any desired source of power may be utilized.

Pairs of depending brackets 25 and 26 respectively are formed on the bottom face of the platform 12, and legs 27 are pivotally connected to the brackets 25, offset rollers 28 being journaled on the lower ends of the links, and are mounted for travel in the side rails 13 and 14. Links 29 are pivotally connected to the brackets 26, each link being slotted as at 30, and a bolt 31 serves to secure the link to the leg 27 so that the legs can be adjusted to maintain the platform level.

Grooved rollers 32 are provided on the front end of the platform, these rollers being mounted for travel in the side rails 13 and 14 and are journaled on pins 33 mounted in brackets 34 as usual, and a tripping mechanism S (see Figs. 9 and 10), is mounted thereon and is actuated in a manner to be presently described.

An automatic brake mechanism B is mounted in the side rails 13 and 14 and comprises spaced-apart links 35, one end of these links being pivotally connected to the axle pin 36 on which the grooved sheave 37 is journaled and over which the hoist cable H is trained.

Slides 38 are mounted on the side rails as shown, and include an overlying section 38a that rides on the upper edge of the rail. An arm 39 forms a part of the brake mechanism B, the free end of said arm being connected to the leg 27 by means of the pin 40. A pin 41 is mounted on the slide 38, and a brake element F is rockably mounted thereon, said element being formed with a leg 42, and pins 43 serve to pivotally connect said legs to the links 35 at a point intermediate their length, said element being formed with a cam-shaped head, the rim of which is formed with fine, closely spaced teeth 44 to provide sharp biting action with the side rails when in engaged position.

A coil spring 45 is anchored to the ends of the links 35 and to the lever 39 at the point 46, so that should one of the cables break or the mechanism otherwise disengage to release the platform, the brake element F will engage the side rails and hold the platform in position thereon.

The lift cables H operate in the side rails 13 and 14, one end of each cable being connected to an eye bolt 48 provided on the standard 16, thence the cable leads downwardly beneath the grooved roller 32, thence around the grooved sheaves 37, and thence upwardly and over the sheaves 17, and thence to the winch.

Limit switches L are provided at the top and bottom of the side rails for cutting off the power when the platform reaches the top and bottom of the rails. A plate 49 is pivotally connected to the angle 50 which forms a part of the platform 12, and a roller 51 is journaled on a pin 52 provided on the plate 49, a spring 53 being anchored to the plate 49 at the point 54, and to the plate 55 which is welded on the shaft 56, said plate overlying the respective floors when the elevator is in position for loading or unloading.

Raised brackets 57 are mounted on the upper edge of the tracks 13 and 14 in the path of travel of the roller 51 as the platform travels upwardly on the rails, said brackets serving to trip the plate so that it swings downwardly and over the floor.

The plate 49 is formed as clearly shown in Figs. 9, 10, and 11 of the drawings, the lower edge being shaped as at 58 to fit over the shaft 33, and a hook extension 49a engages the edge of the plate 55 to swing it downwardly when the plate 49 is swung up, (see Fig. 10), the spring 53 serving to swing the plate upwardly to position shown in broken lines in Fig. 9 of the drawings when the elevator is in motion.

The safety brake mechanism B is automatic in operation, and should the cable H break or the mechanism jam, the pull on the rollers 37 will be released and the springs 45 will pull the links 35 downwardly, as indicated in broken lines in Fig. 6 of the drawings, and this in turn rocks the brake element F on the pin 41 so that the cam-shaped toothed face 44 engages and bites into the upper flange of the side rails, thus holding the platform in this position until the mechanism is repaired, when it again swings to original position.

The equalizing bar E comprises opposed pairs of levers 59 and 60, the inner ends of which are slidably mounted in the housing 61, one pair of levers being slotted as at 62, and these levers are connected by a pin 63 as usual.

The sheaves 23 are mounted on the ends of the levers 59 and 60, and springs 64 are anchored to each pair of levers and tend to pull them towards each other, whereas, the cables "H" tend to elongate said lever arrangement.

A switch (not shown) is mounted in the housing 61, and the usual leads 65 are connected thereto. A contact 66 is mounted on said housing 61, and a post 67 is mounted between the links 59, a threaded contact 68 being in engagement with the member 66, but if for any reason the links are pulled from each other, the contact will be broken and the current cut off accordingly. This equalizer mechanism swings as a bridle to suit the cable tension and maintains it constant at all times.

The operation of the elevator is substantially as follows:

When it is desired to elevate merchandise or materials from one floor to another, the platform 12 is first loaded, and the motor M is then energized to drive the drums D, winding the cables H thereon, and drawing the platform up the inclined trackways 13 and 14.

When the rollers 51 come into engagement with the bracket 57, the member 59 is swung upwardly about the pivot point N and the hook extensions 49a engages the inner edge of the extension plate 55, swinging it downwardly to cover any cracks between the front edge of the platform 12 and the floor 11, and a limit switch L cuts off the power, the brake C holding the platform in this position so that the elevator can be unloaded.

From the foregoing description, it will be understood that I have perfected a very simple,

practical, and inexpensive stair elevator for elevating merchandise of all kinds from the floor to floor.

What I claim is:

1. A stairway elevator comprising in combination, spaced-apart rails adapted to be secured to extend the length of a stairway, a platform, rollers carried by the platform and movable in said rails, automatic braking mechanism connected to the rear rollers of said platform and engageable with said rails when applied, links connected to said brake mechanism, flexible lines connected to said links and normally holding the brake out of engagement with the rails, drums adjacent the stairway and on which the lines are wound, equalizing means interposed between the ends of the rails and the drums and over which the flexible lines lead for equalizing the tension of the individual lines and maintaining them constant, and means for driving said drums.

2. The combination set forth in claim 1 in which the links are spring-retracted in a direction opposite the upward travel of the elevator, and a slide associated with the braking mechanism for sliding contact with said rails.

3. The combination defined in claim 1 in which the rollers on the front end of the platform are grooved to accommodate the flexible lines.

4. The combination defined in claim 1 in which an extension strip is connected to the front end of the platform, means normally holding said strip in raised position, and means for swinging it horizontally at a point directly adjacent the upper end of the rails.

5. A stairway elevator comprising in combination, spaced-apart rails mounted over a stairway and extending from one floor to another, a platform assembly, grooved rollers on the platform and mounted for travel in said rails, power driven winding drums adjacent the stairway and flexible cables connected to the platform and windable on said drums, a motor connected to the drums, means for equalizing the tension on said cables, a switch, and mechanically actu-

ated means associated with said equalizing means for actuating said switch to open the motor circuit when the cable pull exceeds a predetermined load.

6. The combination as set forth in claim 5 in which an automatic brake mechanism is associated with the platform, said brake mechanism including a cam-shaped toothed member formed with a depending leg, said brake mechanism being held in retracted position by the cable pull on the platform, and resilient means also attached to said leg for swinging the toothed cam member in engagement with the said rail upon cessation of said cable pull.

7. The combination as defined in claim 5 in which a normally retracted extension strip is hingedly secured to the front edge of the platform, brackets mounted on the side rails, and trip mechanism mounted on the platform and engageable with said brackets for swinging said strip to horizontal position.

8. A stairway elevator comprising in combination, spaced-apart rails adapted to be secured to extend from one floor to another, a platform assembly having rollers mounted thereon and movable in said rails, standards on the upper floor in alignment with said rails and sheaves mounted on said standards, cables anchored to the standards and connected to said assembly, winding drums adjacent the rails, a cable equalizing bridle adjacent said standards and through which the cables lead to the winding drums, and a motor for driving said drums.

9. The combination defined in claim 8 in which the equalizing means includes a housing, a switch provided thereon, opposed horizontally disposed links mounted in said housing, one of said links having limited horizontal movement with relation to the other, and adapted when fully extended to open the motor circuit, sheaves on the outer ends of the links, and resilient means connecting the opposed links and normally tending to draw them towards each other.

No references cited.