July 25, 1950 S. L. SAXTON ET AL 2,516,726

STAIRWAY ELEVATOR

Filed Jan. 8, 1949 2 Sheets-Sheet 1

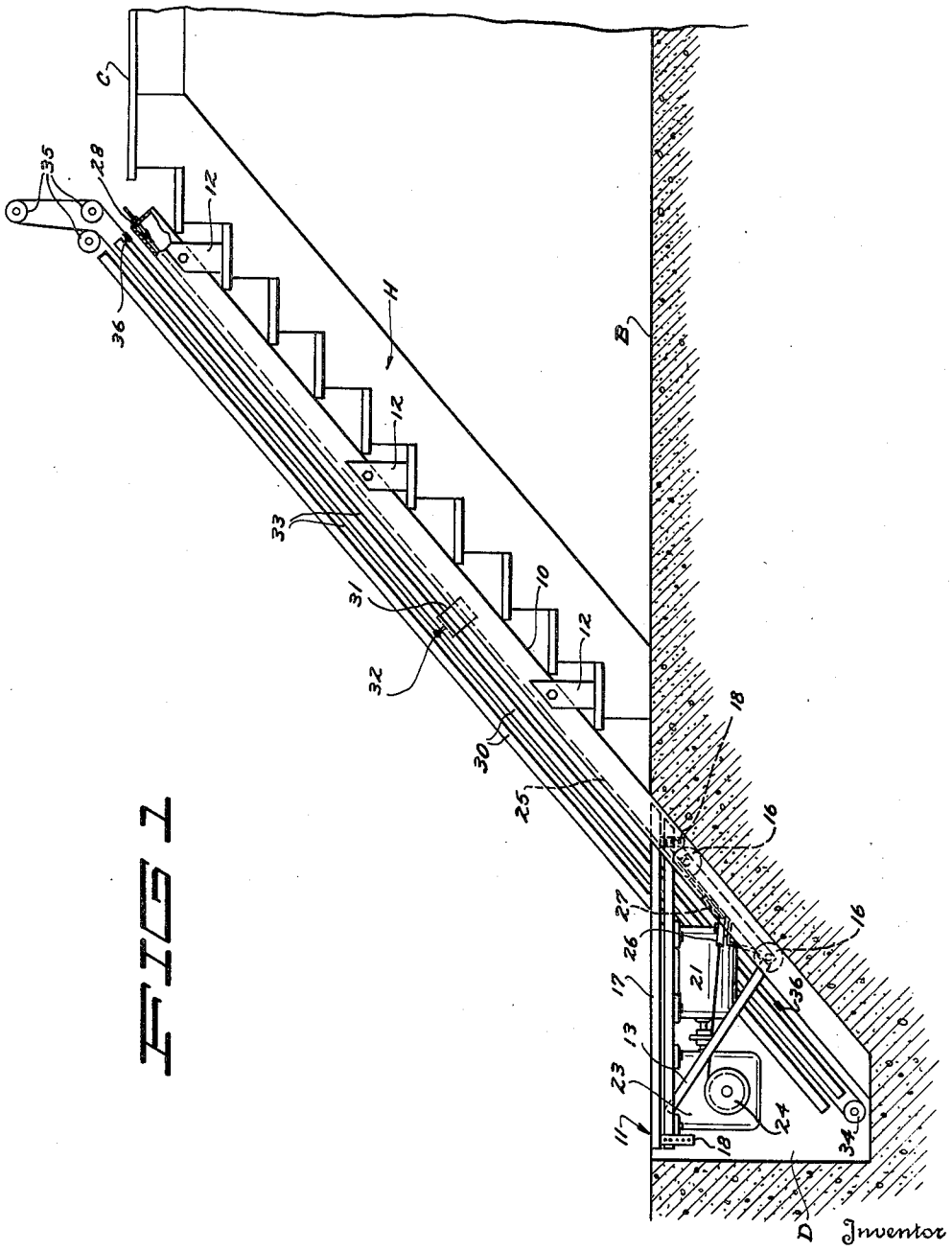


FIG 1

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Filed Jan. 8, 1949 2 Sheets-Sheet 2

FIG 2

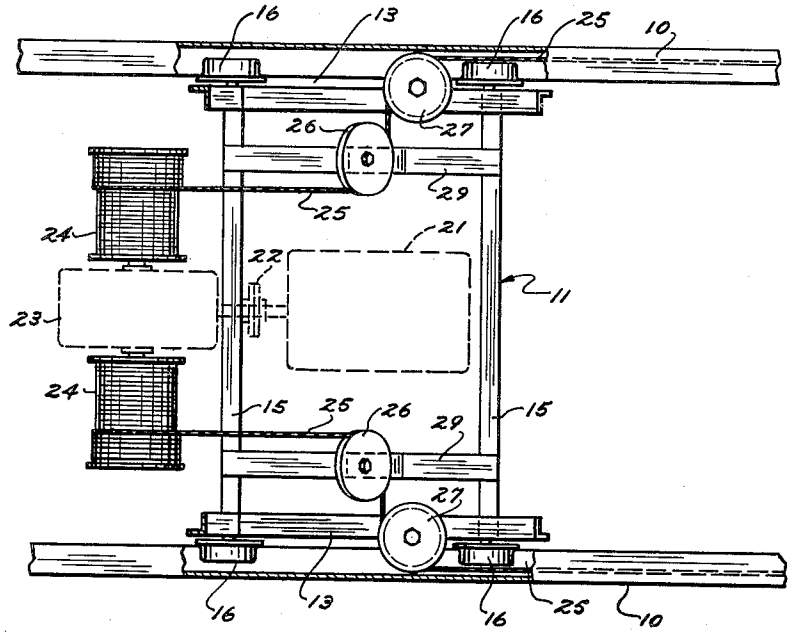
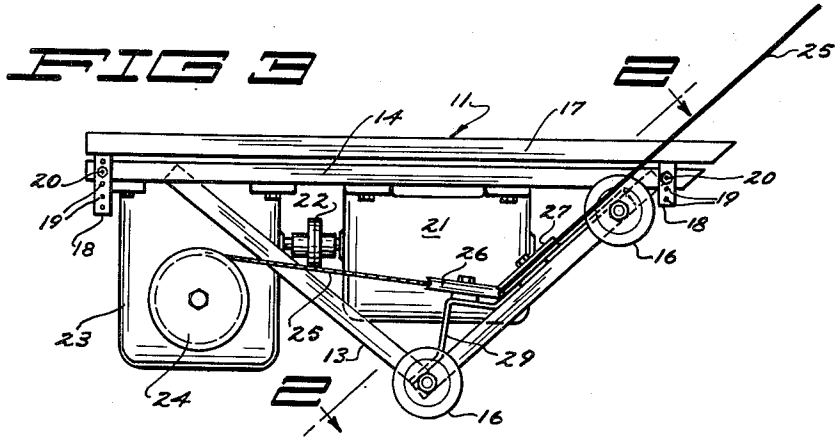


FIG 3



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Patented July 25, 1950

2,516,726

UNITED STATES PATENT OFFICE

2,516,726

STAIRWAY ELEVATOR

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Application January 8, 1949, Serial No. 69,868

14 Claims. (Cl. 187—12)

1

This invention relates to improvements in elevators for application to and use in stairways for transporting cargo and other loads from floor to floor.

The primary object of the invention is to provide an elevator which is particularly convenient to install in and on existing stairways, requiring a minimum of installation time and expense, and which in no way interferes with normal foot travel along the stairway. Another object is to provide an elevator of this character embodying a carriage or carrier of a self-contained nature in that a power unit, winches and cable connections are built into the carriage to travel therewith, this further simplifying the installation. A further object is to provide various detailed improvements in operating and control mechanisms for elevators of this kind.

These and other more detailed and specific objects will be disclosed in the course of the following specification reference being had to the accompanying drawings, in which—

Fig. 1 is a side elevation and sectional view of a stairway elevator according to our invention as installed in a stairway.

Fig. 2 is an enlarged, angularly viewed plan of the load carrier or carriage with the floor plate and certain other elements removed and parts shown in dotted lines, the adjacent portions of the tracks for the carriage being also shown, and the view being taken approximately along the line 2—2 in Fig. 3.

Fig. 3 is an enlarged side elevation of the carriage alone.

Referring now more particularly and by reference characters to the drawing we have shown our improved stairway elevator as arranged in conjunction with an ordinary stairway having a flight or stair of steps A arising from a floor B and leading to a landing or upper floor C.

The stairway elevator has as its primary supports a pair of parallel rails 10 which act as a track on which is arranged a carriage, designated generally at 11. The rails 10 are channel-shaped in cross section and are supported parallel with the stairs A upon brackets 12 secured to and arising from the treads of certain steps. Thus the rails are firmly mounted in transversely spaced relation on the stairs, with the rail channels opening inwardly or in facing relation as shown in Fig. 2. The rails, for a one flight elevator, will terminate at about the head of the stairs and at their lower end, the rails run below the stairs, some distance into a recess or pit D formed in and below the floor B. The purpose

2

of the recess D is, as clearly shown in Fig. 1, to enable the carriage 11 to stand flush with the floor B when in the lowered position, but if this is not required then, of course, the recess may be omitted. Loading of the carriage will be facilitated in most cases, however, by the arrangement shown and it is preferable for other reasons also.

The carriage 11 comprises a framework made up of V-shaped side frames 13 joined and rigidly connected at their upper ends by side bars 14 and cross-connected by cross bars 15, all as best shown in Figs. 2 and 3. At the lower center, and upper forward side of the side frames 13 flanged wheels 16 are journaled and these are so placed and dimensioned that they may run freely in the channels in the rails 10. The entire carriage may thus travel a path parallel with the stairs and will be held by the upper and lower flanges of the rails against displacement. The carriage, per se, is completed by a flat floor plate or platform 17 which at its corners has depending brackets 18 fitting down alongside the side bars 14. These brackets 18 have spaced apertures 19 to receive bolts 20 by which they are secured to the side bars and it will be noted that by properly placing the bolts 20 in the apertures 19 the platform 17 may be leveled up with the floor B and may be tilted as may be necessary to accommodate the structure to stairs of different pitch angles.

Mounted on the underside of the carriage beneath the platform or floor plate 17 is a reversible electric motor 21 having a connection 22 to a worm drive unit 23, also mounted below the platform, and the unit 23 has winch drums 24 on opposite sides driven by the motor. The worm drive unit 23 acts as a self-locking drive for the winch drums, and cables 25 are wound over the drums, passing off around pulleys 26 and 27 at each side, upwardly inside the channels in the rails 10 and anchored at their upper ends as at 28 (Fig. 1) to the upper side of the rails. The pulleys 26 are mounted upon angularly formed mounting straps 29 secured to the carriage framework so that the pulleys have their axes almost vertical and feed the cables to the winch drums to best advantage. The pulleys 27 on the other hand are supported on the side frames 13, outwardly with respect to the pulleys 26 and project outward into the channels of the rails 10 between the wheels 16, thus to guide the cables into and out of said channels. There is no tendency for the cables to run off as they pass between the pulleys 26—27, however, due to the fact that the lower edges of the pulleys

27 line up (Fig. 3) with the forward edges of the pulleys 26.

The operation of the motor 21 in one direction to wind the cables 25 upon the winch drums 24 will obviously pull the carriage upwardly along the stairs, whereas reversing the motor will run the drums 24 in the opposite direction to pay off the cables and allow the carriage to descend. The entire lift or drive mechanism of the motor, gear unit and winch travels with the carriage and thus there are no installation problems of locating these elements about the premises as is the case in all other elevators of this type of our knowledge. However, the electrical supply to the motor must be taken through a trolley-like arrangement to ducts 30 arranged on a side wall of the stairway parallel with one of the rails 10 as seen in Fig. 1. This involves no problem inasmuch as equipment for this purpose is commercially available. Included as a part of the electrical system is, however, a conventional control and motor reversing switch 31 and this switch has an oppositely swingable control arm 32 which operates both to start and stop the motor 21, and to reverse its direction of rotation. For actuating the switch arm 32 we provide an endless control rope 33 running over a lower pulley 34 and over upper pulleys 35 at the head of the stairs. The rope 33 is attached to the switch arm and runs alongside the stairway so that it may be reached at any point and pulled to actuate the switch arm, thus starting, stopping and reversing the motor at will. Stops 36 are also provided on the rope 33 at such points that when engaged by the approaching carriage these stops will pull the rope in proper direction to stop the motor. Thus the stops act to automatically limit the upward and downward travel of the carriage, halting it flush with the respective floor surfaces B and C.

It will be noted from the foregoing that we have thus provided an elevator structure which may be readily installed in and on the stairway and which will convey loads from floor to floor very conveniently. Cargo may be loaded or unloaded by wheeled trucks and when the elevator is not in use the stairway is left comparatively unobstructed to ordinary foot travel.

It is understood that suitable modifications may be made in the structure as disclosed, provided such modifications come within the spirit and scope of the appended claims. Having now therefore fully illustrated and described our invention, what we claim to be new and desire to protect by Letters Patent is:

1. For a stairway having a pit at its lower end and channel-like rails extending upwardly therefrom to the head of the stairway, an elevator carriage having wheels running in said rails, a motor and winches driven thereby and mounted on the carriage to travel therewith, and cables operated by the winches, said cables extending up through the channels in the rails and being anchored adjacent the upper ends of the rails.

2. For a stairway having a pit at its lower end and channel-like rails extending upwardly therefrom to the head of the stairway, an elevator carriage having wheels running in said rails, a motor, a worm gear drive unit operated by the motor and a winch mechanism driven by the drive unit, and cables operated by said winch mechanism and running up along the rails and secured adjacent upper ends thereof, the said motor, drive unit and winch mechanism being all mounted on the carriage and traveling therewith.

3. For a stairway having a pit at its lower end and channel-like rails extending upwardly therefrom to the head of the stairway, an elevator carriage having wheels running in said rails, a motor, a worm gear drive unit operated by the motor and a winch mechanism driven by the drive unit, and cables operated by said winch mechanism and running up along the rails and secured adjacent upper ends thereof, the said motor, drive unit and winch mechanism being all mounted on the carriage and traveling therewith, and pulleys on the carriage guiding the cables between the winch mechanism and the rails.

4. A stairway elevator comprising inclined rails, a carriage having wheels running on the rails whereby the carriage may travel up and down the rails, a motor, a winch mechanism driven by the motor, cables extending from the winch mechanism along the rails and anchored at upper ends adjacent the upper ends of the rails, and the said motor and winch mechanism being mounted on the carriage to travel up and down therewith as the cables are respectively wound upon or payed off from the winch mechanism.

5. A stairway elevator comprising inclined rails, a carriage having wheels running on the rails whereby the carriage may travel up and down the rails, a motor, a winch mechanism driven by the motor, cables extending from the winch mechanism along the rails and anchored at upper ends adjacent the upper ends of the rails, and the said motor and winch mechanism being mounted on the carriage to travel up and down therewith as the cables are respectively wound upon or payed off, a control switch for the motor, and an endless control rope arranged alongside the stairway and connected to operate the control switch.

6. A stairway elevator comprising inclined rails, a carriage having wheels running on the rails whereby the carriage may travel up and down the rails, a motor, a winch mechanism driven by the motor, cables extending from the winch mechanism along the rails and anchored at upper ends adjacent the upper ends of the rails, and the said motor and winch mechanism being mounted on the carriage to travel up and down therewith as the cables are respectively wound upon or payed off from the winch mechanism, and the said carriage including a framework carried by the wheels and supporting the motor and winch mechanism and a platform adjustably mounted upon the framework.

7. For a stairway elevator having inclined rails and a carriage operatively arranged for travel on said rails up and down a stairway, the improvement which comprises a platform supported on the carriage for up and down and tilting adjustments with respect to the carriage.

8. In a stairway elevator having inclined rails mounted upon the stairway and a carriage supported on the rails for up and down travel, means for moving the carriage, the said carriage having a frame, a platform mounted upon the frame, bracket members depending from the platform, means attaching the bracket members to the frame, and said bracket members having vertically spaced openings to accommodate said fastening means whereby the platform may be adjusted up and down and tilted with respect to the frame.

9. In an elevator of the character described, spaced rails having channels, a carriage, wheels on the carriage to run in said channels, a power winch on the carriage, and cables wound on said winch and running therefrom up inside the rail

channels to the upper ends of the rails and secured thereto.

10. In an elevator of the character described, spaced rails having channels, a carriage, wheels on the carriage to run in said channels, a power winch mechanism having spaced winch drums and a power drive therebetween, and a cable wound on each drum and extending therefrom up inside the channel of the adjacent rail and secured to the upper end of the rail.

11. In an elevator of the character described, spaced rails having channels, a carriage, wheels on the carriage to run in said channels, a power winch mechanism having spaced winch drums and a power drive therebetween, a cable wound on each drum and extending therefrom up inside the channel of the adjacent rail and secured to the upper end of the rail, and pulleys on the sides of the carriage guiding the respective cables from the drums into the rail channels.

12. In an elevator of the character described, spaced inclined rails having facing channels, a carriage for travel up and down along the rails, the carriage comprising a platform and a supporting frame structure having V-shaped sides, rollers on the sides of the frame structure adapted to travel in said channels, a motor driven winch mechanism on the carriage, and cables wound on said winch mechanism and secured at their ends adjacent the upper ends of the rails.

13. In an elevator of the character described, spaced inclined rails having facing channels, a carriage for travel up and down along the rails,

the carriage comprising a platform and a supporting frame structure having V-shaped sides, rollers on the sides of the frame structure adapted to travel in said channels, a motor driven winch mechanism on the carriage, cables wound on said winch mechanism and secured at their ends of the rails, and angularly related guide pulleys on each side of the frame structure for guiding the cables.

14. In an elevator of the character described, inclined rails, a carriage travel mounted on the rails for up and down movements therealong, the said carriage having a platform and a supporting frame structure therefor, a motor on the frame structure, axially aligned and transversely spaced winch drums on the frame structure, a drive unit between the winch drums and coupled to the motor, a cable wound on each drum and extending therefrom up along the rails to points of attachment adjacent the upper ends thereof, and means extending along one rail for supplying operating current to the motor.

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