

July 1, 1930.

H. A. W. WOOD

1,768,650

INCLINED ELEVATOR

Filed Dec. 23, 1926

7 Sheets-Sheet 1

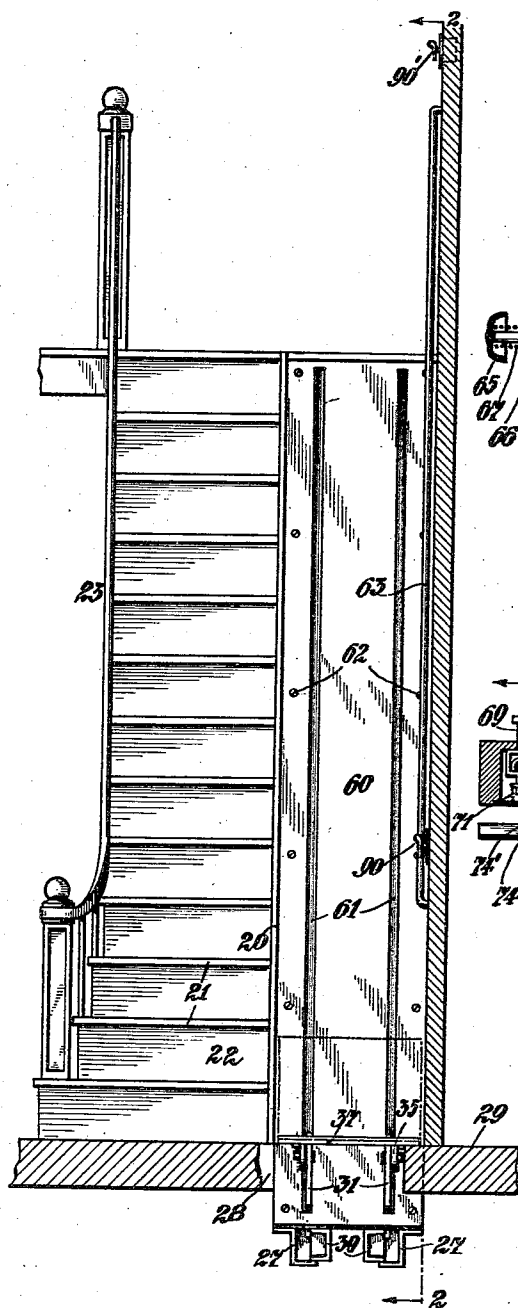


Fig. 1.

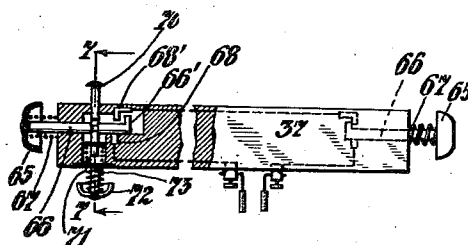


Fig. 6.

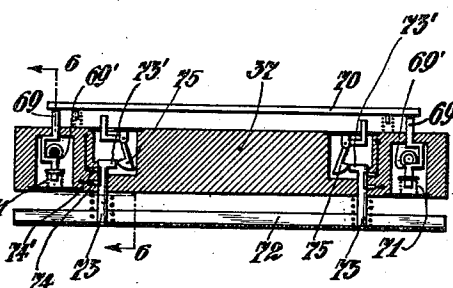


Fig. 7.

INVENTOR
HENRY A. WISE WOOD

BY
Alfred S. Bond
ATTORNEY

July 1, 1930.

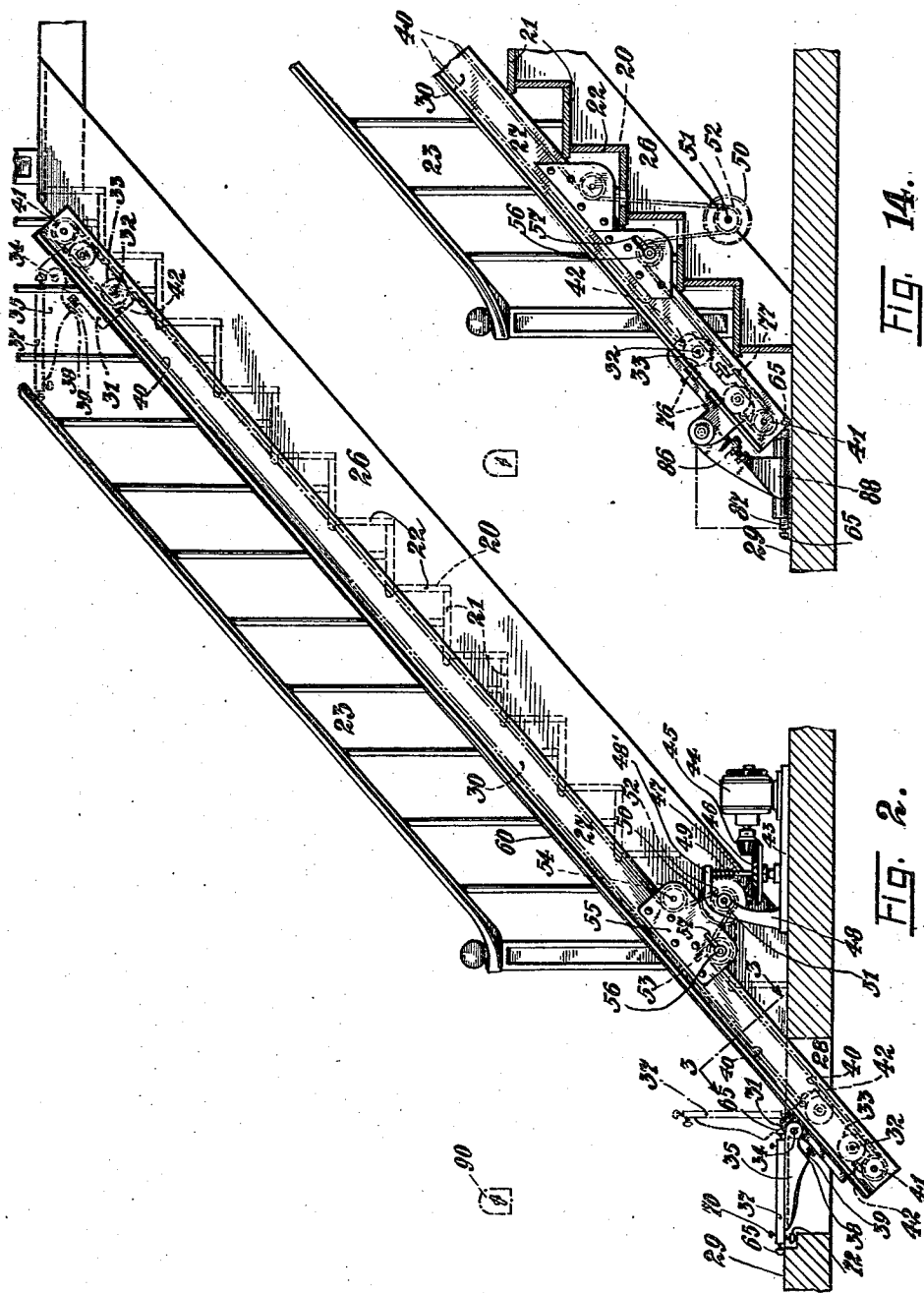
H. A. W. WOOD

1,768.650

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Filed Dec. 23, 1926

7 Sheets-Sheet 2



INVENTOR
HENRY A. WISE WOOD

HENRY A. WISE WOOD

BY

BY
A. Russell Bond
ATTORNEY

ATTORNEY

July 1, 1930.

H. A. W. WOOD

1,768,650

INCLINED ELEVATOR

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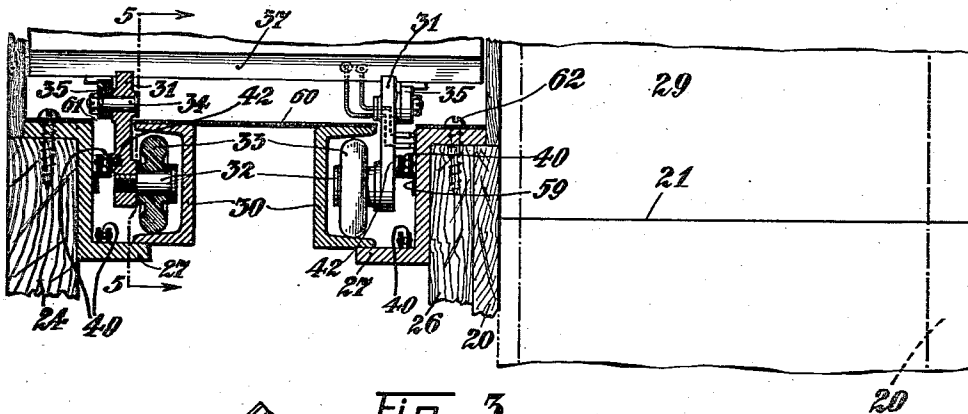


Fig. 3.

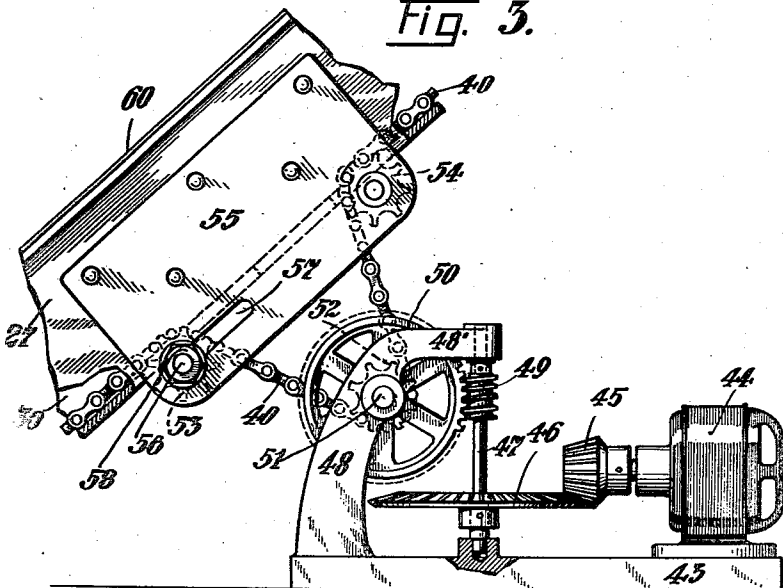


Fig. 4.

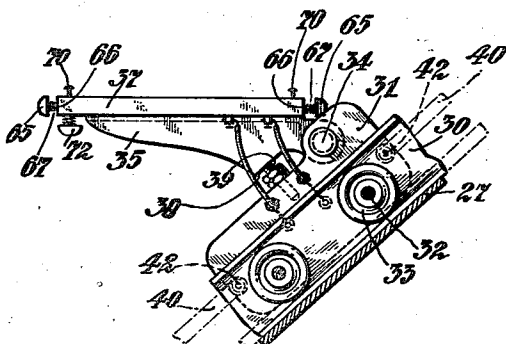


Fig. 5.

INVENTOR
HENRY A. WISE WOOD
BY
Samuel Bond
ATTORNEY

July 1, 1930.

H. A. W. WOOD

1,768,650

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7 Sheets-Sheet 4

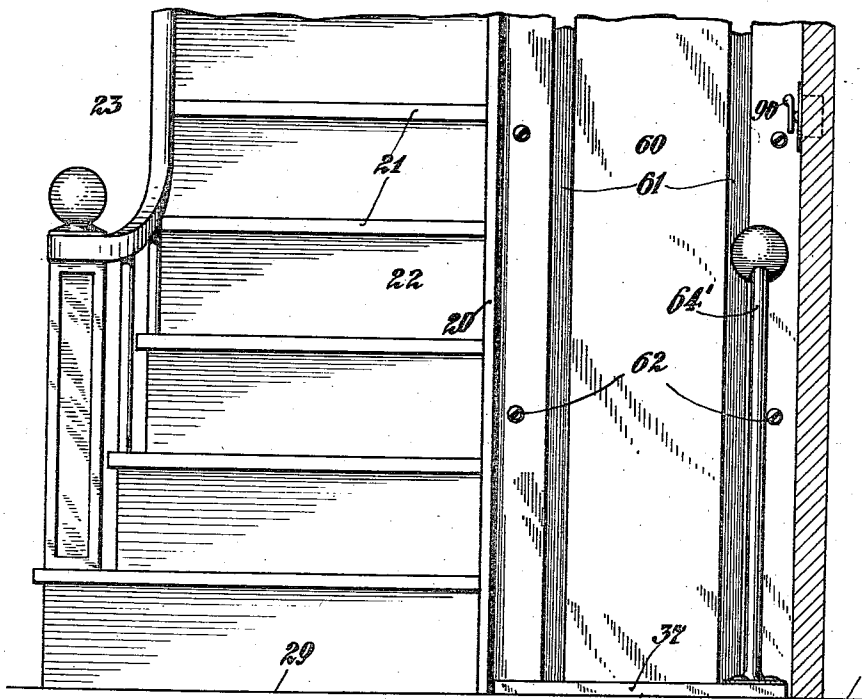


Fig. 8.

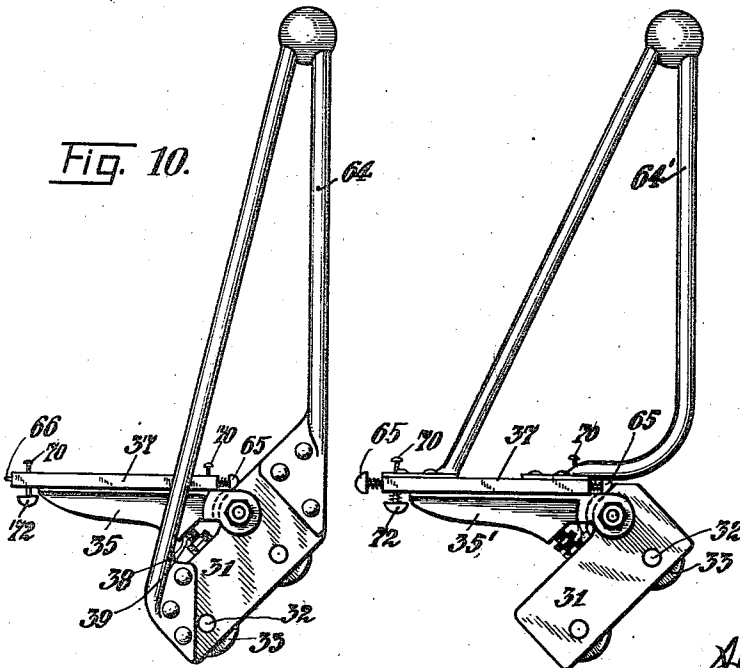


Fig. 10.

Fig. 9.

INVENTOR
HENRY A. WISE WOOD

BY
Amwell Bond
ATTORNEY

July 1, 1930.

H. A. W. WOOD

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INCLINED ELEVATOR

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7 Sheets-Sheet 5

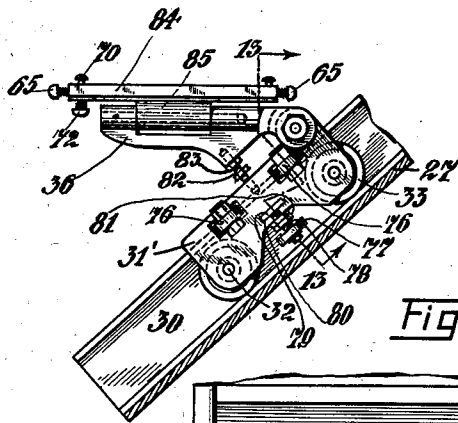


Fig. 12.

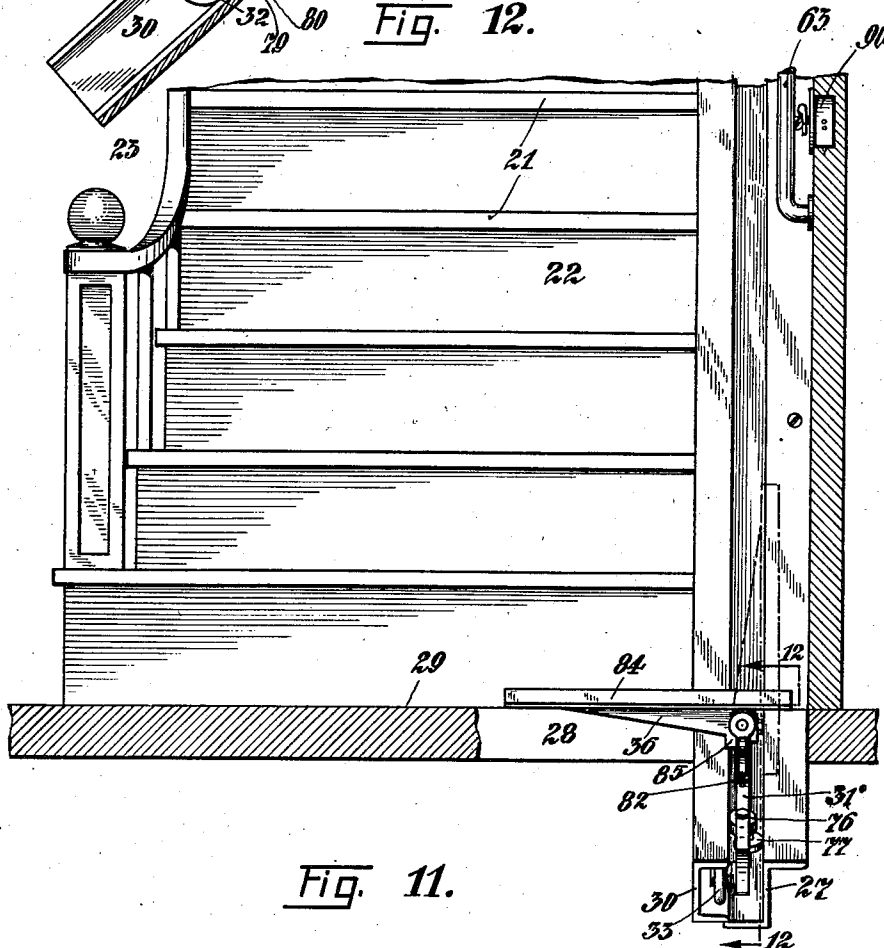


Fig. 11.

INVENTOR

HENRY A. WISE WOOD

BY

Alfred B. Bane
ATTORNEY

July 1, 1930.

H. A. W. WOOD

1,768,650

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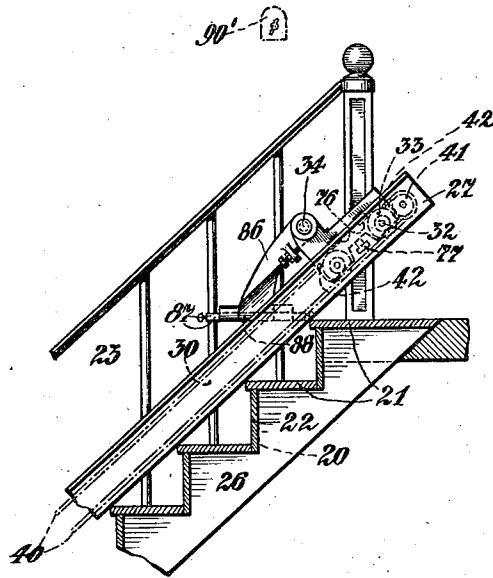


Fig. 15.

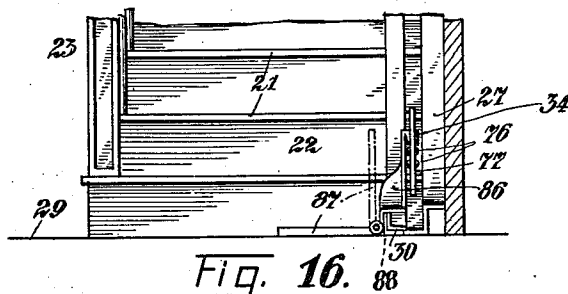


Fig. 16.

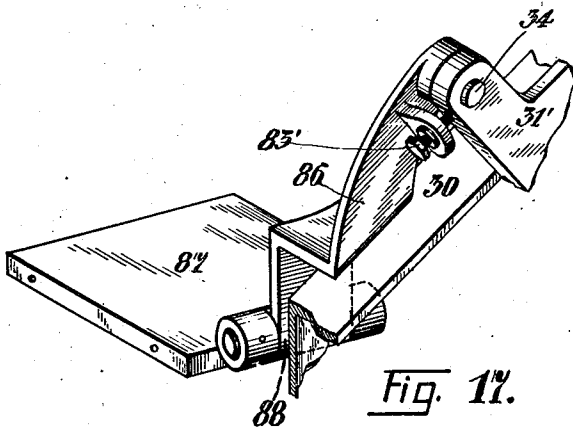


Fig. 17.

INVENTOR
HENRY A. WISE WOOD

BY
Alfred B. Bond
ATTORNEY

July 1, 1930.

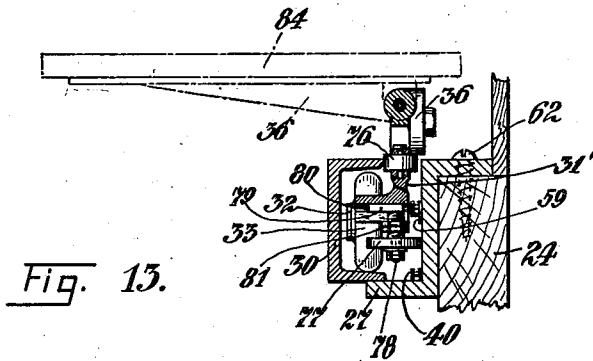
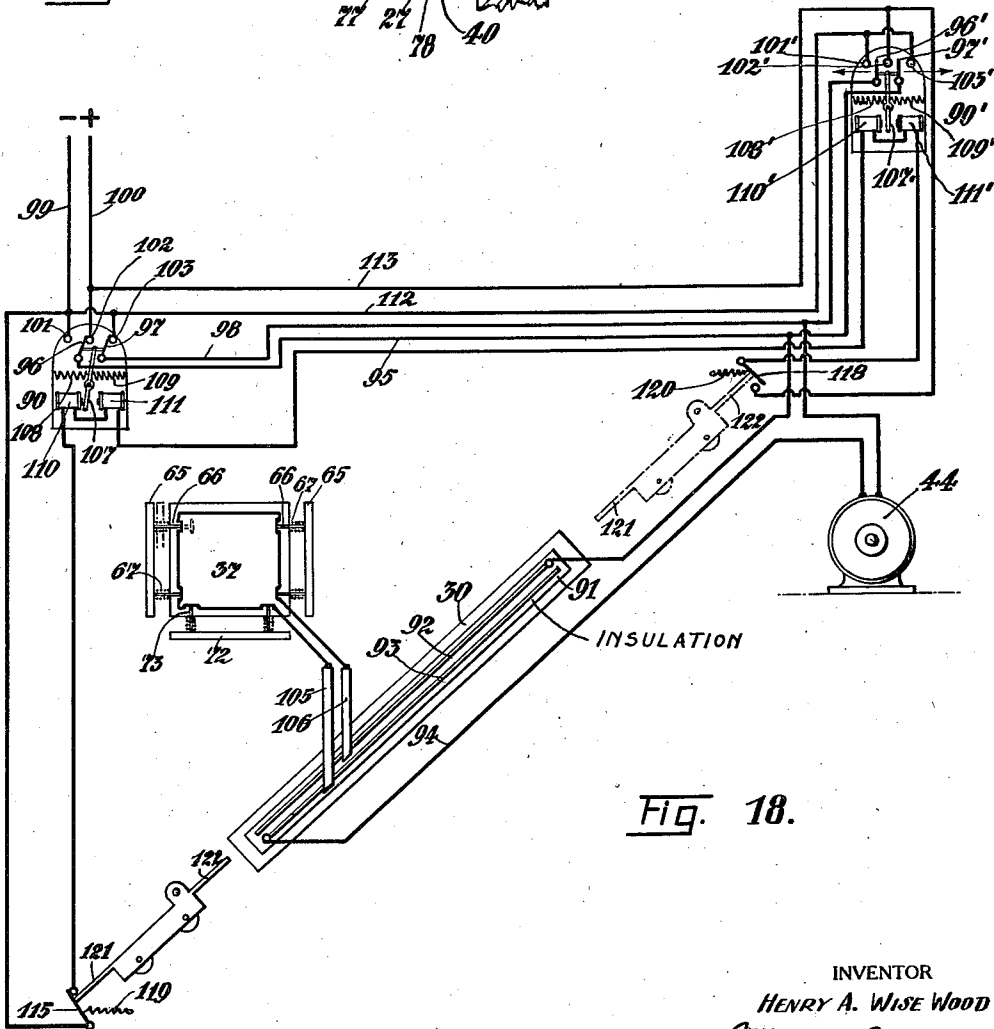
H. A. W. WOOD.

1,768,650

INCLINED ELEVATOR

Filed Dec. 23, 1926

7 Sheets-Sheet 7



INVENTOR

HENRY A. WISE WOOD

BY
Alfred B. Bond
ATTORNEY

UNITED STATES PATENT OFFICE

HENRY A. WISE WOOD, OF NEW YORK, N. Y.

INCLINED ELEVATOR

Application filed December 23, 1926. Serial No. 156,635.

My invention relates to improvements in inclined elevators and particularly to elevators of a type which may be installed as an adjunct to a stairway in a dwelling house or other building.

There is a present day tendency to limit dwelling houses to single floor buildings, because of the annoyance of climbing stairs from one floor to another. Dwellers in city apartments have been accustomed to having all their rooms on a single floor, and when such persons move into a house of two or more stories they find stair climbing extremely arduous. To be sure some of the more elaborate residences are equipped with elevators for the convenience of the occupants, such elevators being usually of automatic type requiring no attendant, but the expense of installing elevators in dwelling houses is beyond the means of the vast majority of home owners.

It is an object of my invention to provide a substitute for the ordinary household lift which will be very simple and inexpensive in initial outlay and which can be operated at a very moderate cost.

Another object of my invention is to provide an elevator which can be applied to existing buildings. The ordinary vertical elevator cannot be installed without considerable alteration of a building, particularly as it requires an elevator shaft, which in turn necessitates the provision of space in hallways for access to the shaft. I aim to overcome these objections by providing an inclined lift which will occupy a part of the space devoted to the stair case. Ordinarily the main stair case is wide enough to permit of utilizing a portion thereof for a lift, and in one form of my invention I cut away a portion of the stair case and install therein my improved inclined lift, while in another form of my invention the lift is installed without disturbing the existing stairway and when not in service, folds out of the way, so

that the entire stairway is available for ordinary use.

Another object of my invention is to provide a platform which travels up an incline parallel with the stairs. When installed in a dwelling house, this traveling platform will be particularly useful in moving trunks, furniture or other loads. The load may be placed on the platform and an attendant may walk up the stairs alongside the traveling platform steadying the load or even carrying part of the load if the latter be too bulky to be supported on the platform.

Another object of my invention is to provide a conveyer with a platform carried thereby and angularly adjustable thereto. It will be understood that stairways differ somewhat in inclination, and the angular adjustment permits of setting the platform to a truly horizontal position regardless of the inclination of the stairway.

Another object of my invention is to provide an inclined lift which may be carried in stock in variable lengths, so that it may be fabricated in a manufactory, sold in quantities without regard to the location in which it is to be installed, and applied by local builders without the necessity of altering any essential parts.

Another object of my invention is to provide hand controlled means for starting the lift in either direction desired and automatic means for stopping the lift when it reaches the top or the bottom of the stairway.

Another object of my invention is to provide safety devices for automatically stopping the lift when any obstruction is encountered thereby, so as to prevent injury to persons or objects which might happen to be in the path of the traveling platform.

Another object of my invention is to encase the principal operating parts of the elevator or inclined lift so as to present a neat appearance and prevent accidents due to entanglement with such parts.

With these and other objects in view which will appear hereinafter, I shall now describe certain embodiments of my invention in connection with the accompanying drawings and shall define the scope of my invention in the accompanying claims.

Figure 1 is a front elevation of a stair case with my improved lift installed therein, part of the floor at the foot of the stairs being broken away for purposes of illustration;

Fig. 2 is a view in vertical section taken on line 2—2 of Fig. 1;

Fig. 3 is a view in cross section taken on the line 3—3 of Fig. 2 and looking down the stairway;

Fig. 4 is a side view of the driving gear used to operate my improved lift;

Fig. 5 is a view in section taken on the line 5—5 of Fig. 3;

Fig. 6 is a side view of the platform partly broken away substantially along the line 6—6 of Fig. 7 to show certain safety devices, and illustrating diagrammatically a portion of an electric circuit controlled by said devices;

Fig. 7 is a view in cross section taken on the line 7—7 of Fig. 6;

Fig. 8 is a fragmentary front elevation of a slightly different form of my invention installed in a stairway, and showing in particular, a post or hand support secured to the platform;

Fig. 9 is a side view of the platform and hand support secured thereto, and a carriage on which the platform is mounted.

Fig. 10 is a view similar to Fig. 9 but showing the hand support secured to the carriage;

Fig. 11 is a fragmentary view of another alternative form of my invention illustrating a lift having a single chainway and a platform that projects laterally over the stairs, part of the floor at the foot of the stairs being broken away to reveal certain details;

Fig. 12 is a view in section taken on the line 12—12 of Fig. 11;

Fig. 13 is a cross sectional view taken on the line 13—13 of Fig. 12;

Fig. 14 is a fragmentary side elevation of another alternative form of lift which may be installed above the stairs and without cutting into the staircase, the view showing the platform at the bottom of the stairway;

Fig. 15 is a view similar to Fig. 14, but showing the platform at the top of the stairway;

Fig. 16 is a fragmentary front elevation of the lift shown in Fig. 14;

Fig. 17 is a perspective view of the platform shown in Figs. 14 to 16 inclusive; and

Fig. 18 is a diagram showing the electric circuits used in my improved lift.

The particular embodiment of my invention illustrated in Figures 1 to 7 inclusive, may be called a "double chainway" lift. In

the drawings I show a staircase comprising the customary stair stringers which are notched to support the stair treads 21 and risers 22. The staircase shown is of the type which is bordered on one side by a wall, while the opposite or outer side carries a balustrade 23. Normally three stringers are used to support the stairs but in the present instance the treads and risers extend from the outer stringer to the center stringer only, while the balance of the staircase between the center stringer and the wall is left open (or is cut away) to receive my improved lift. The inner stringer 24, (Fig. 3) i. e., the one against the wall, is not notched, and secured to the adjacent face of the center stair stringer 20, is a furring strip 26.

My improved lift comprises in general a pair of chainways, driving mechanism for operating the chainways, and a platform carried by the chainways. Supported on the stringer 24 and on the furring strip 26, respectively, are two Z-beams 27, which extend the full length of the stairway, and project through an opening 28 cut into the floor 29 at the lower landing of the stairway. Supported on and secured to the lower flange of each Z-beam is a channel beam 30 with the flanges of the latter facing inward toward the Z-beam, the two beams thus forming a conduit or casing for the chainway.

Traveling in each conduit is a carriage comprising a body 31 in the form of a vertical plate bearing a pair of studs 32, on which are mounted a pair of wheels 33. The wheels 33 are adapted to run on the lower flange of the channel beam 30 and as the flange is usually tapered in cross section, the wheels 33 are preferably formed with rounded tread surfaces. The wheels are of such diameter that they will just clear the upper flange of the channel while rolling along the lower flange thereof. The upper flange thus forms a guide to prevent fore-and-aft tipping of the carriage. Each plate 31 projects above the upper surface of the Z-beam and channel beam, and near the rear end thereof carries a pin 34, on which is hinged a bracket 35. Secured to the brackets 35 is a platform 37 which ties the two carriages together. Each bracket 35 is formed with a shoulder 38 which normally rests upon an adjustable stop 39. The stop 39 may consist of a bolt screwed into the bracket 31 and locked at the desired adjustment by means of lock nuts. By this means the angle of the platform with respect to the carriage, may be varied. As explained above, different stairways vary in steepness, and hence the necessity of the adjustable stops 39 to set the platform to a truly horizontal position.

To propel each carriage along its conduit, I provide a chain belt 40, which passes around a pair of sprocket wheels 41, located respectively at the upper and lower ends of the

conduit, the opposite ends of the chain being connected respectively to pins 42 carried by the carriage. At a convenient location adjacent the chainways I place driving mechanism for driving the chains 40. Usually the space under a stairway is employed for closet room and in this closet the driving mechanism may be conveniently installed, where it will be out of the way and not likely to be tampered with.

The driving mechanism, as shown clearly in Figure 4, includes a base 43, on which is mounted an electric motor 44. The motor shaft carries a bevel pinion 45 which engages a bevel gear 46. The latter is secured to a vertical shaft 47, which is journaled at its lower end in the base 43 and at its upper end in an extension 48' of one of a pair of brackets 48 carried by the base 43. Secured to the shaft 47 is a worm 49 which engages a worm gear 50 keyed to a shaft 51 journaled in the brackets 48. Secured upon the shaft 51 are two driving sprocket wheels 52, one for each chain 40. The lower reach of each chain 40 passes through an opening in the bottom of the conduit and about a pair of opposed idler sprocket wheels 53 and 54. These sprocket wheels are journaled in a pair of plates 55, secured respectively to opposite sides of the conduit. The chain is then looped about the driving sprocket wheel 52. Thus when the motor 44 is actuated the sprocket wheels 52 drive the chains 40 at a reduced speed by reason of the step-down gearing between the motor and the shaft 51.

In order to take up slack in the chain, the sprocket wheel 53 is mounted on a shaft 56 which may be adjusted along slots 57 in the plates 55, and be secured at the desired adjustment by means of nuts 58 threaded thereon and bearing against the plates 55. The lower reach of each chain 40 is adapted to rest on the floor of the chainway casing, i. e., on the lower flange of the Z-beam. An angle iron 59 is secured to the face of the Z-beam to provide a support for the upper reach of the chain, and thus prevent whipping of the chain and clanking noises as the lift is operated. To close the space between the channel beams 30, I provide a plate 60 which extends across the entire upper face of the two chainways and is formed with a pair of slots 61, as shown in Fig. 1, just wide enough for the carriage plates 31 to pass therethrough. The plate 60 is held in place by means of lag screws 62, which pass through the upper flanges of the Z-bars and into the members 24 and 26 respectively, thereby securing the chainways to said members.

A hand rail 63 may be secured to the wall to provide support for a person riding on the platform 37. If desired the hand rail 63 may be dispensed with and a post or hand support 64 substituted. This post would then be secured to the carriage 31, as shown in Fig. 10.

The motor 44 may be started from either the upper or the lower landing of the staircase, by means presently to be described, to propel the platform either up or down the incline. As this lift is to be used in the household, special precautions have to be taken to prevent injury to the occupants of the building. If, for instance, the lift were coming down, there might be danger of trapping a child or an object under the platform. For this reason the platform is hinged so that it will swing up to vertical position in case any obstruction should lie in its path. The vertical position of the platform is shown in broken lines in Fig. 2. However, as a further precaution against accident, I provide trips at the forward and rear edges respectively, of the platform. Each trip is in the form of a bumper rail 65 supported on pins 66, which have sliding engagement with the platform, and springs 67 serve to hold the rail spaced from the forward edge of the platform. Each pin 66 engages an electric contact 68 and is formed with a shoulder 66', which normally engages an electric contact 68', thereby closing an electric circuit through said contacts. When, however, the bumper is pressed inward to the position shown in Fig. 6, the circuit is broken and, as will be explained hereinafter, the motor is stopped. The sets of electric contacts are connected in series, as will be explained below, so that the contact circuit will be broken when either or both of the pins 66 are pressed inward. It is desirable to keep the contact circuit open until the obstacle which has tripped the bumper is safely removed, hence I provide a latch for holding the bumper in tripped position. To this end I use a vertical latch pin 69 (Fig. 7) for each pin 66. The latch pins for each bumper are connected at the top by a rail 70 and each latch pin is formed with an offset through which the pin 66 passes. A spring 71 presses each pin 69 upward so that the lower shoulder 69' of the offset always bears against the pin 66. Each pin 66 is formed with a notch into which the shoulder 69' snaps when the bumper is tripped, thus holding the bumper until the rail 70 is depressed to release the pins 66. A similar spring-pressed bumper 72 is provided at the bottom of the platform near the forward edge thereof. This bumper is carried on pins 73, each of which normally close the circuit of a pair of electrical contacts 74 and 74' which are connected in series with the contacts 68 and 68'. Each pin is formed at its inner end with a shoulder 73' adapted when the pin is pressed upward, to be engaged by a hooked end of a bell-crank lever 75. The opposite end of the bell-crank lever projects in the path of the forward rail 70, so that when said rail is depressed, it rocks the bell-cranks 75 clear of the pins 73 releasing the bumper 72.

In Figs. 8 and 9, I have shown an alterna-

tive form of my invention in which the platform 37 is not hinged, but is secured to fixed brackets 35' mounted on the carriage 31. Because the platform is not hinged, a post or hand support 64' may be secured directly to the platform 37 adjacent the wall. In this case the platform will not swing up when encountering an obstacle and bumpers 65 and 72 alone are depended upon to prevent accidental injury or damage.

In Figs. 11, 12 and 13, I have shown another form of my invention in which only a narrow portion of the stairs is cut into to provide for my improved lift. In place of a pair of chainways, I provide a single chainway adjacent the wall, and a platform is carried by the chainway which projects out over the stairs. This platform may be swung up out of the way, as shown by dotted lines in Fig. 11, thus making practically the entire width of the stairway available for ordinary purposes.

The construction of the single chainway is practically identical with that of the two chainways described above, but the carriage is modified to provide for the turning moment due to the lateral projection of the platform. As shown in Figs. 12 and 13, the carriage 31' is not only supported on the wheels 33, but is provided with a pair of rollers 76 which bear against the edge of the upper flange of the channel beam, while a third roller 77 bears against the face of the Z-beam. The roller 77 is carried on a stud 78 which depends from a slide 79 movable in transverse ways 80 formed in the carriage, so that the roller may be adjusted laterally to set the carriage 31' upright. The stud 78 is threaded to receive a pair of lock nuts 81 by which the slide 80 is locked at the desired adjustment. Hinged to the carriage 31' is a bracket 36 which is held at the desired angular adjustment with respect to the carriage 31' by means of a right-and-left hand screw 82, the opposite ends of this screw being threaded into the carriage and the bracket respectively. A lock nut 83, serves to hold the screw 82 at the desired adjustment. Hinged to the bracket 36 on a substantially horizontal axis parallel to the plane of the carriage, is a platform 84 which carries a lug 85 bearing against the bracket 36 and serving to hold the platform in horizontal position when lowered into position for use. The platform rides just above the stairs, and to provide against accident, it is equipped with bumpers 65 at the forward and rear edges thereof, and a bumper 72 at the bottom near the forward edge.

Still another form of my invention is shown in Figs. 14 to 17 inclusive. In this form it is not necessary to cut into an existing stairway, for a single chainway is provided, similar to that shown in Figs. 11 to 13, but the chainway is supported above the line

of the stairs, while the platform hangs below the chainway in close proximity to the stairs. The carriage 31' supports a bracket 86 which hangs down over the edge of the chainway. The platform 87 is hinged to the lower edge of bracket 86 on a horizontal axis parallel to the plane of the carriage 31', and is formed with lugs 88 which bear against the bracket 86 when the platform is in horizontal position. The platform may be swung up clear of the stairway to the position shown by broken lines in Fig. 16. A set screw 83' provides for adjusting the platform angularly in the plane of travel, and lateral angular adjustment is provided by the adjustable roller 77. Safety bumpers are provided on the platform identical with those described above.

To control the lift, I provide a three-way switch 90 (Fig. 1) near the lower landing, and a similar switch 90' near the upper landing. These switches normally occupy a neutral or "off" position, but either one of them may be turned in one direction for propelling the lift upward and in the opposite direction for propelling the lift downward. An automatic stop is provided at each end of the chainway, which is operated by contact with the carriage when it reaches the end of its run in either direction, to stop the motor. In addition to this, provision is made for stopping the motor whenever any of the bumpers 65 or 72 strikes an obstruction. This system of control applies to each of the various forms of my invention so far described.

Mounted within the chainway or, in the case of a double chainway lift, within one of the chainways, is a plate of insulating material 91 (see Fig. 18) on which are carried two contact rails 92 and 93 respectively. The rail 93 is connected to one terminal of the motor by means of the lead 94, while the other rail is connected by the lead 95 to one contact arm 96 of the switch 90. The other arm 97 of the switch is connected by a lead 98 to the other terminal of the motor. Current is led into the switch from the service lines to three contact points 101, 102 and 103. The contact points 101 and 103 may be connected to the negative service line 99, and the contact 102 to the positive service line 100. When the switch is turned clockwise, as viewed in Fig. 18, the positive line is connected through arm 96 and lead 95 to the rail 92, and the negative line through arm 97 and lead 98 to the motor. The circuit from rail 93 to rail 92 is completed through the bumper-controlled contact devices on the platform, by means of contact fingers 105 and 106, which bear respectively on the rails 93 and 92. As shown in the diagram the contacts 68, 68', 74 and 74' are all connected in series across the fingers 105 and 106. The circuit is normally closed through the contacts 68 and 68', so that when the switch 90 is turned in the clockwise direc-

tion, the motor will be actuated to propel the carriage in one direction, say the downward direction. When, however, the switch 90 is turned in counter clockwise direction, the arm 97 connects the lead 98 with the positive service line 100 and the arm 96 connects the lead 95 with the negative service line. Thus the direction of rotation of the motor is reversed and the carriage is propelled in the opposite direction, or up the incline. At any time during the operation of the motor, if a bumper is pressed inward the current of the motor will be interrupted, bringing the motor to a stop. The motor cannot then be started again until one or other of the rails 70 is depressed to permit the bumper to spring out to a normal position. The switch 90 is provided with a third arm 107 against which bear a pair of opposed springs 108 and 109. These springs tend to return and hold the switch in neutral position. After the switch has been turned either to the right or to the left, it is held in set position by means of one or the other of two magnets 110 and 111, which serve to hold the arm 107 (which is of soft iron) by magnetic attraction.

The switch 90' is similarly formed with contact arms 96' and 97' electrically connected to the arms 96 and 97 respectively, and carries a pair of negative contact points 101' and 103' connected by a lead 112 to the negative service line 99 and a positive contact point 102' connected to the positive service line 100 by a lead 113. The switch 90' also carries an arm 107' of soft iron, supported in neutral position between magnets 110' and 111' by opposed springs 108' and 109'. The magnets 110, 111, 110', 111' serve merely to hold the switches in set position, but are not strong enough to pull the soft iron arms out of neutral position. Said magnets are all connected in series across the service lines 99 and 100. The circuit of the magnets may be traced from the line 99 through lead 114, switch 115, lead 116, magnets 110 and 111, lead 117, magnets 110' and 111', switch 118, lead 119, and lead 113, to line 100.

The switch 115 is located at the bottom of the chainway and the switch 118 at the top. These switches are adapted to be operated by the carriage when it reaches the bottom and top respectively, of its run. The switches 115 and 118 are normally held closed by springs 119 and 120 respectively. The carriage is provided with oppositely projecting arms 121 and 122, which are adapted to strike the switches 115 and 118 respectively, and open said switches to stop the operation of the motor. Said arms are adapted to snap past the switches 115 and 118 so that said switches are opened momentarily by the carriage and then return to closed position. As soon as either of the switches 115 and 119 is opened, the circuit of the magnets is broken permitting the three-way switch 90 or 90'

which is in active position, to return to neutral and break the circuit of the motor. Thus the circuit of the motor will be broken whenever the carriage reaches the end of its run. An automatic brake (not shown) may be provided for stopping the motor when the motor circuit is opened.

In operation, whenever it is desired to operate the lift, the operator turns the three-way switch 90 to bring the carriage to him, if it chances to be at the opposite end of its run, and then, after loading the platform 37, he turns the adjacent three-way switch in the opposite direction to carry him or any load that he may have placed on the platform to the other end of the run. When the carriage reaches the end of this run, it automatically throws the switch 115 or 118, as the case may be, to release the three-way switch, thereby bringing the motor to a stop and stopping the carriage. If at any time during the run an obstacle is encountered by any of the bumpers on the platform, the motor will be stopped until such obstacle is removed. Thereupon the platform may be started again on its course by depressing one or other of the rails 70. In the meantime the three-way switch will have been held in closed position by one or the other of the magnets 110, 111, 110', 111', so that as soon as the rail 70 is depressed, to reestablish the motor circuit, the lift will proceed on its way to the end of the run.

It will be understood that various structural changes and modifications could be made in the form of my invention and particularly in the means for controlling the motor, and I wish it to be understood that I consider myself at liberty to make such variations, alterations or modifications as fall within the spirit and scope of the appended claims.

I claim:

1. An elevator comprising a conduit formed with a slot, a conveyer within the conduit, a platform exterior to the conduit, means projecting through the slot and connecting the platform with the conveyer, and means for adjusting the platform angularly with respect to the conduit.

2. An elevator comprising an inclined conduit formed with a slot, a conveyer within the conduit, a platform exterior to the conduit, means projecting through the slot and connecting the platform with the conveyer, and means for adjusting the platform angularly with respect to the conduit.

3. An elevator comprising a conduit formed with a slot and interiorly with a track, wheels engaging the track, a carriage supported by the wheels and projecting through the slot, a platform exterior to the conduit and hinged to the carriage, a stop on the carriage against which the platform normally rests, and means for propelling the carriage.

4. An elevator comprising a conduit formed with a slot and interiorly with a track, wheels engaging the track, a carriage supported by the wheels and projecting through the slot, a platform exterior to the conduit and hinged to the carriage, a stop on the carriage against which the platform normally rests, a conveyer belt in the conduit and attached to the carriage, and means for driving the conveyer belt.
5. An elevator comprising a conduit formed with a slot and interiorly with a track, wheels engaging the track, a carriage supported by the wheels and projecting through the slot, a platform exterior to the conduit and hinged to the carriage, a stop on the carriage against which the platform normally rests, an idler wheel at each end of the conduit, a conveyer belt passed about and supported by the idler wheels and secured at opposite ends thereof to the carriage, and means for driving the belt.
6. An elevator comprising a conduit formed with a slot and interiorly with a track, wheels engaging the track, a carriage supported by the wheels and projecting through the slot, a platform exterior to the conduit and hinged to the carriage, a stop on the carriage against which the platform normally rests, an idler wheel at each end of the conduit, a conveyer belt passed about and supported by the idler wheels and secured at opposite ends thereof to the carriage, means for driving the belt, and means for taking up slack in the belt.
7. An elevator comprising a conduit formed with a slot and interiorly with a track, wheels engaging the track, a carriage supported by the wheels and projecting through the slot, a platform mounted on the carriage, a sprocket wheel at each end of the conduit, a chain passed about the sprocket wheels and secured at opposite ends thereof to the carriage, a driving wheel engaging the chain, and a motor operatively connected with the driving wheel.
8. In combination, a guideway in the form of a trough, a carriage, wheels mounted in tandem on the carriage, the guideway being formed with a track for the wheels to roll upon, rollers mounted on the carriage and bearing respectively against opposite sides of the guideway, and means for adjusting one of the rollers to adjust the carriage angularly with respect to the conduit.
9. In combination, a guideway in the form of a trough, a carriage, wheels mounted in tandem on the carriage, the guideway being formed with a track for the wheels to roll upon and at one side with a flange overlying the wheels, a pair of rollers mounted on the carriage and bearing against the edge of said flange, another roller mounted on the carriage near the bottom thereof and bearing against the opposite side of the guideway, and means for adjusting the latter roller laterally to vary the position of the carriage angularly with respect to the guideway.
10. An elevator comprising a guideway, a carriage, means for propelling the carriage along the guideway, a platform hinged to the carriage on a substantially horizontal axis parallel to the plane of travel of the carriage, a stop upon which the platform normally rests, and means for adjusting said axis angularly with respect to the carriage.
11. An elevator comprising a guideway, a carriage, means for propelling the carriage along the guideway, a bracket mounted on the carriage, means for adjusting the bracket angularly in the plane of travel of the carriage, a platform hinged to the bracket on a substantially horizontal axis parallel to said plane, and a stop against which the platform normally rests.
12. An elevator comprising a guideway, a carriage, means for propelling the carriage along the guideway, a bracket mounted on the carriage, means for adjusting the bracket angularly in the plane of travel of the carriage, means for effecting angular adjustment of the bracket transversely to said plane, a platform hinged to the bracket on a substantially horizontal axis parallel to said plane, and a stop against which the platform normally rests.
13. An elevator comprising a guideway, a carriage, means for propelling the carriage along the guideway, a bracket mounted on the carriage, means for adjusting the bracket angularly in the plane of travel of the carriage, means for angularly adjusting the carriage transversely to said plane, a platform hinged to the bracket on a substantially horizontal axis parallel to said plane, and a stop against which the platform normally rests.
14. In combination, a guideway, a carriage, wheels disposed in tandem on the carriage, the guideway being formed with a track for the wheels to roll upon and with a flange at one side overlying the wheels, a pair of rollers mounted on the carriage and bearing against said flange, another roller mounted on the carriage near the bottom thereof and bearing against the opposite side of the guideway, means for adjusting the latter roller to vary the position of the carriage angularly with respect to the guideway, a platform mounted on the carriage, and means for adjusting the platform angularly in the plane of the guideway.
15. In combination, a guideway, a carriage, wheels disposed in tandem and supporting the carriage, the guideway being formed with a track upon which the wheels roll and with a flange at one side overlying the wheels, a pair of rollers mounted on the carriage and bearing against said flange, another roller mounted on the carriage near the bottom

thereof and bearing against the opposite side of the guideway, means for adjusting the latter roller to vary the position of the carriage angularly in a direction transverse to the plane of the guideway, a bracket mounted on the carriage, means for adjusting the bracket angularly in said plane, a platform hinged to the bracket on a horizontal axis parallel to said plane, and a stop against which the platform normally rests.

16. An elevator comprising a conveyer, a platform carried by the conveyer, a trip carried by the platform for stopping the conveyer, and a latch for holding the trip in tripped position.

17. An elevator comprising a conveyer, a platform carried by the conveyer, a trip carried by the platform for stopping the conveyer, a latch for holding the trip in tripped position, and means for releasing the latch.

18. An elevator comprising a conveyer, a platform carried by the conveyer, a trip at the forward edge of the platform for stopping the conveyer, and means for holding the trip in tripped position.

19. An elevator comprising a conveyer, a platform carried by the conveyer, trips at the forward and rear edges respectively of the platform for stopping the conveyer, latches adapted respectively to hold the trips in tripped position, and means for releasing said latches.

20. In combination with a stairway, an inclined conveyer paralleling the stairway, a platform carried by the conveyer and overlying the stairway and a trip carried at forward edge of the platform said trip operating on engagement with an obstruction to stop the conveyer.

21. In combination, a stairway, an inclined conveyer paralleling the stairway, a platform carried by the conveyer and overlying the stairway and trips carried by the platform at the forward and rear edges thereof, said trips each operating on engagement with an obstruction to stop the conveyer.

22. In combination, a stairway, an inclined conveyer paralleling the stairway, a platform carried by the conveyer and overlying the stairway, and trips mounted respectively at the front and rear edges of the platform and under the forward edge of the platform, said trips each operating on engagement with an obstruction to stop the conveyer.

23. An elevator comprising an inclined guideway, a carriage, a motor adapted to propel the carriage along the guideway, a three-way reversing switch for starting the motor, means urging the switch to neutral position, retaining means for holding the switch in active position, and means at each end of the guideway and operable by engagement with the carriage for releasing said retaining means.

24. An elevator comprising an inclined guideway, a carriage, a motor adapted to propel the carriage along the guideway, a three-way reversing switch for starting the motor, spring means urging the switch to neutral position, an electro-magnet operating to hold the switch in active position, and means operable by engagement with the carriage at the end of the guideway for momentarily de-energizing the electro-magnet to release the switch.

25. An elevator comprising an inclined guideway, a carriage, a motor adapted to propel the carriage along the guideway, a three-way reversing switch for starting the motor, spring means urging the switch to neutral position, an electro-magnet operating to hold the switch in active position, and a trip on the carriage and operating on engagement with an obstruction to interrupt the circuit of the electro-magnet.

26. An elevator comprising an inclined guideway, a carriage, a motor adapted to propel the carriage along the guideway, a three-way reversing switch for starting the motor, spring means urging the switch to neutral position, an electro-magnet operating to hold the switch in active position, a trip on the carriage and operating on engagement with an obstruction to interrupt the circuit of the motor, and means for restoring the trip to normal position to re-establish the motor circuit.

27. An elevator comprising an inclined guideway, a carriage, a motor adapted to propel the carriage along the guideway, a three-way reversing switch for starting the motor, spring means urging the switch to neutral position, an electro-magnet operating to hold the switch in active position, a trip on the carriage operating on engagement with an obstruction to interrupt the circuit of the motor, and means operable by engagement with the carriage at the end of the guideway for momentarily de-energizing the electro-magnet to release the switch and open the circuit of the motor.

28. An elevator comprising an inclined guideway, a carriage, a motor adapted to propel the carriage along the guideway, a three-way reversing switch for starting the motor, spring means urging the switch to neutral position, an electro-magnet operating to hold the switch in active position, a trip on the carriage operating on engagement with an obstruction to interrupt the circuit of the motor, means on the carriage for restoring the trip to normal position to re-establish the motor circuit, and means operable by engagement with the carriage at the end of the guideway for momentarily de-energizing the electro-magnet to release the switch and open the motor circuit.

29. An elevator comprising an inclined conveyor, a propelling motor therefor, a plat-

form carried by the conveyor, trip means under the platform operable by engagement with an obstacle to stop the motor, a latch for holding such trip in tripped position, and
5 means on the platform for releasing said latch.

Signed at New York, in the county of New York and State of New York, this 18th day of December A. D. 1926.

10 HENRY A. WISE WOOD.

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