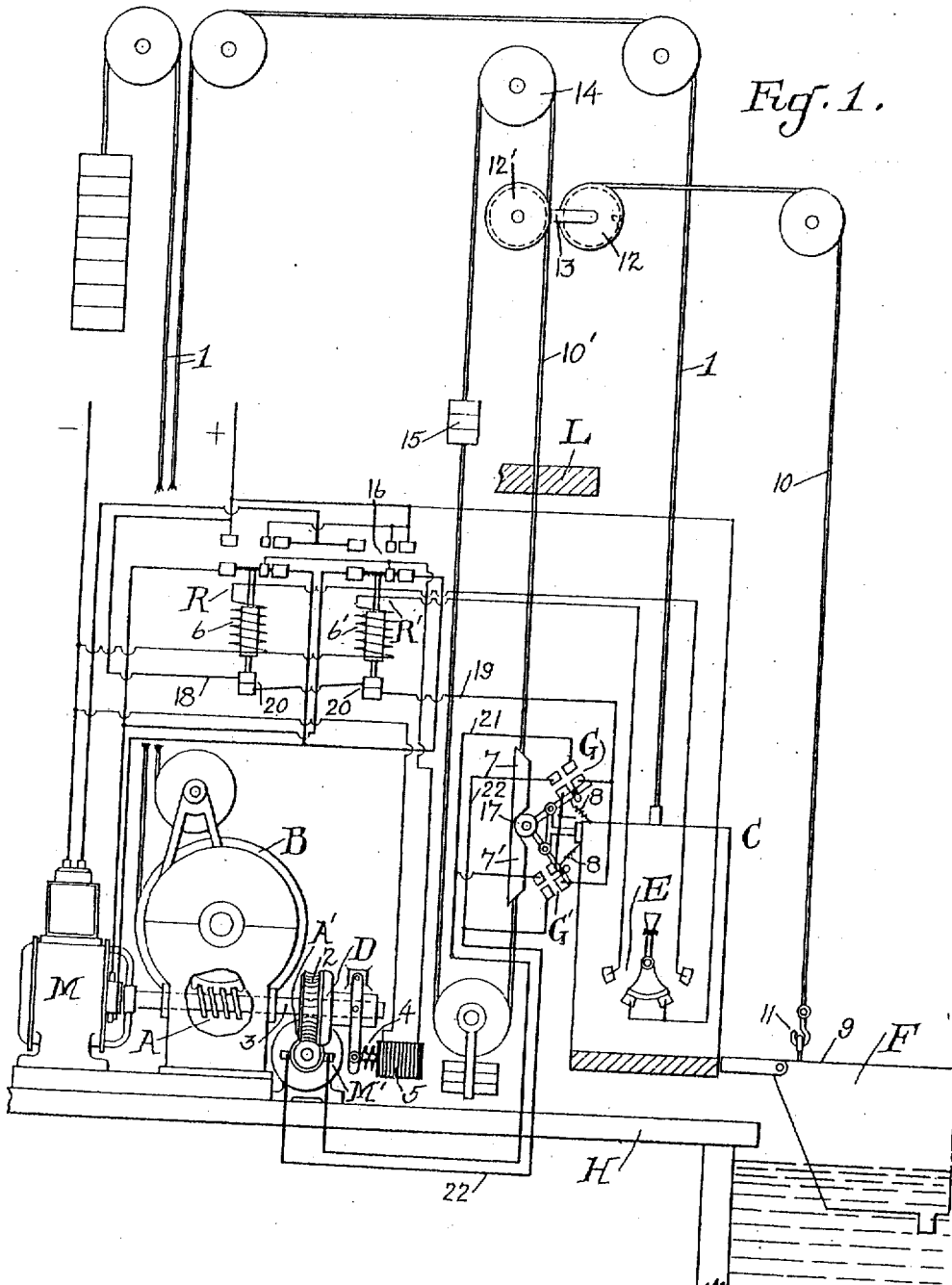


1,305,594.

Patented June 3, 1919.
 2 SHEETS—SHEET 1.

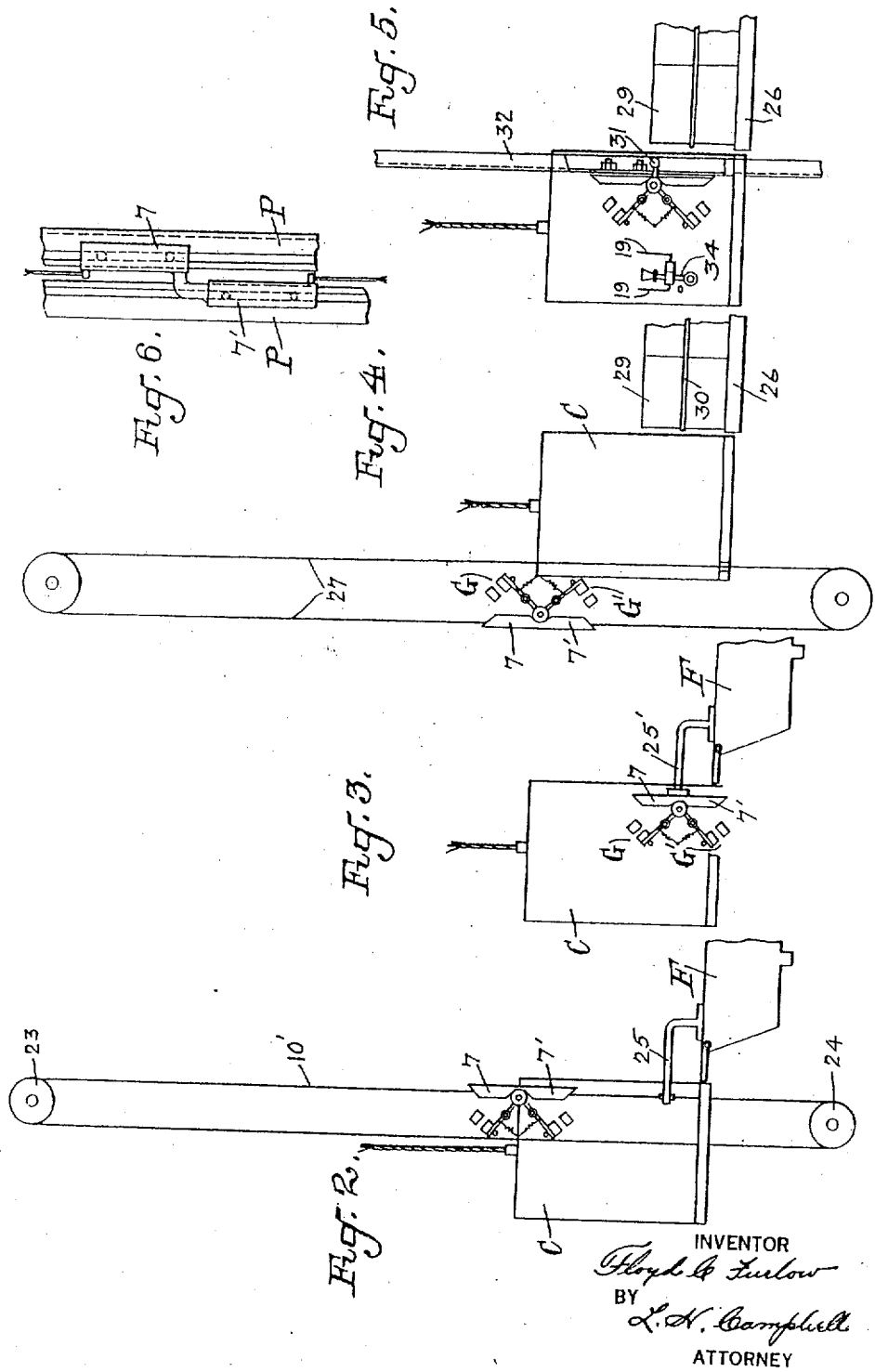


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VARIABLE LANDING DEVICE.
APPLICATION FILED FEB. 9, 1917.

Patented June 3, 1919.
2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

FLOYD C. FURLOW, OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO OTIS ELEVATOR COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

VARIABLE-LANDING DEVICE.

1,305,594.

Specification of Letters Patent.

Patented June 3, 1919.

Application filed February 9, 1917; Serial No. 147,574.

To all whom it may concern:

Be it known that I, FLOYD C. FURLOW, a citizen of the United States, residing in Montclair, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Variable-Landing Devices, of which the following is a specification.

The invention relates to improvements in elevator apparatus, and is directed more particularly to that class of work wherein a stopping point for the elevator car, or in other words, the landing height or elevation, is caused to vary from time to time, as for example in the case in the operation of stacking material in a warehouse; or in loading or unloading a boat or barge; and the object of the invention is to provide means to operate and control the elevator car to stop the latter level with such landings, the controlling apparatus being arranged for adjustment manually at will or automatically in accordance with the variation in the height of the stopping point, and in this manner bring the car level with the landing in each instance as the height of the latter varies.

In the accompanying drawings, Figure 1 illustrates in a more or less diagrammatic manner, a typical electric elevator system, in which the car landing controlling apparatus is arranged for adjustment automatically in accordance with a variable landing, the latter in the present instance being in the form of a barge; Figs. 2, 3 and 4 are diagrammatic illustrations of modified arrangements; Figs. 5 and 6 illustrate diagrammatically other modified arrangements whereby the controlling apparatus to level the car with a landing can be adjusted manually.

Referring to Fig. 1, a counterweighted elevator car C, is connected to the electric motor M, through a well known worm and gear wheel connection A, and winding drum B, to which the hoisting cable 1 is connected. Auxiliary apparatus to operate the car independently of the motor M, comprises an electric motor M', which is adapted to operate the hoisting drum B, through the intermediary of a supplemental worm and gear connection A', an electrically controlled clutch mechanism D, and worm and gear connection A. The worm wheel 2 is mounted free on the worm shaft 3, and the clutch mechanism D, through the action of the

spring 4, establishes a connection between the worm wheel 2 and worm shaft 3. An electro-magnet 5 operates the clutch to disconnect the worm wheel 2 from the worm shaft 3. It will be pointed out, that while I have illustrated herein one well known type of clutch mechanism such as D, there may be substituted therefor, a mechanism of the rotary brake type, such as is illustrated and described in my co-pending application, Serial No. 59,738, the said application also illustrating and describing in detail the main and auxiliary driving apparatus, heretofore described herein only in general.

The direction of rotation of the hoisting motor M is controlled by means of electro-magnetic reversing switches R, R', the circuits for their operating windings 6, 6', respectively, being controlled from the car by a manually operable switch E.

Controlling mechanism for the auxiliary motor M', comprises reversing switches G, G', movable with the elevator car, these switches being held normally open by springs 8. These switches are off-set from each other and are adapted to be actuated mechanically by means of adjustable cams 7, 7', provided with guide rails P, see Fig. 6. These cams are off-set from each other, the cam 7 coacting with the switch G, to close the latter and control the auxiliary motor M' to operate the car in a descending direction, the cam 7' coacting with the switch G' to close the latter and control the auxiliary motor to operate the car in an ascending direction.

The cams are operatively connected with a barge F positioned at a dock or wharf H, in a manner to effect movement or adjustment thereof in accordance with the variation in height of the deck 9 of the barge, or in other words, as the deck level raises or lowers, a corresponding movement of the cams is effected. This connection comprises a rope or cable 10, one end of which is connected to the barge by a hook and eye connection 11, and the other end to a pulley 12 fixed on a shaft 13. An additional rope or cable 10' is connected at one of its ends to the cam 7, thence makes a number of turns around a pulley 12' fixed on the shaft 13, thence around an idler 14 to a cam counter-weight 15.

The operation of the elements thus far designated is as follows: Moving the car

switch handle toward the right closes a circuit for the reversing switch operating winding 6', this causing the reversing switch to close its contacts and thereby close a circuit to the hoisting motor M, to effect operation of the car in an ascending direction. At the same time a circuit is closed by the auxiliary contacts 16, for the clutch magnet 5, which operates to disconnect the worm wheel 2 from the shaft 3. The elevator car is brought to rest by returning the car switch to its center position, the auxiliary worm and gear through the clutch mechanism serving at this time as a braking device for the car. An additional electro-mechanical brake of the usual type may be provided, this brake being applied directly to the shaft of the auxiliary motor M', this brake being omitted to avoid unnecessary complication.

We will assume now, that the elevator car is stopped at the floor landing L, and it is desired to bring the car to the deck level 9. To accomplish this result the car switch is moved toward the left and closes a circuit for the reversing switch winding 6, this causing the reversing switch R to close its contacts and close a circuit to the hoisting motor M, to effect operation of the car in a descending direction, the clutch magnet 5, operating as before described to disconnect the worm wheel 2 from the shaft 3. The car now descends and brings the roller 17 associated with the switch G, into engagement with the cam 7. If at this time the car switch E is in central position, so that both of the reversing switches are in open position, a circuit is closed to the auxiliary motor M', the circuit being traced as follows: from + main, wire 18, to wire 19, by way of back contacts 20 on the reversing switches R, R', switch G, to wire 21, through armature of auxiliary motor to wire 22, switch G, and thence by wire 22 to the line. The clutch magnet 5, now being deenergized permits the spring 4 to operate the clutch mechanism to connect the worm 2 with the shaft 3. The auxiliary motor M now operates the car at a comparatively slow rate of speed in a descending direction. When the car platform comes level with the deck 9 of the barge, the roller 17 at this time rides off of the cam 7 and a spring 8 opens the switch G, and in this manner the circuit to the auxiliary motor is opened and the car brought to rest.

If for any reason whatsoever, the car should coast past the deck level 9, the roller associated with the switch G' will coast with the cam 7' thereby closing the switch G', and in this manner effect an operation of the auxiliary motor in a reverse direction to that just described, thus causing the car to ascend and stop level with the deck level 9.

With reference now to the connection between the barge and the cams 7, 7', it will be seen that for each movement of the barge to change the height of its deck level, a corresponding movement is likewise imparted to the cams by the said connection this resulting in bringing the car always level with the deck level 9.

In the modification illustrated in Fig. 2, opposite ends of a rope or cable 10' forming a loop around the top and bottom idlers 23, 24, respectively, are connected to the cams 7, 7'. A bar 25, forms a rigid connection between the barge F and cable 10', whereby the latter acts to adjust the cams 7, 7', in accordance with the movement of the barge as it raises or lowers.

In the modification illustrated in Fig. 3, the use of a flexible connection between the barge and cams 7, 7' is eliminated, simply by attaching the cams directly to a rigid member 25' fastened to the deck of the barge F.

Figs. 4 and 5 illustrate diagrammatically a condition met with in a storage warehouse where the height of the landing or stopping point of the car is varied by the operation of stacking the goods, which often times are in the form of bales, etc. In Fig. 4, the floor of the warehouse is designated by the reference numeral 26. The cams in this instance are adapted to be adjusted manually from the car by means of a cable 27, the cable passing through the car. The baled goods are designated 29, there being two tiers, and as each tier is completed, a board 30 or any other suitable means is laid on the top thereof, to form a track way to facilitate movement of hand trucks. As each tier is completed the cams are adjusted or moved upwardly by hand from the car by means of the cable 27.

In Fig. 5, as in all the other cases, the switches G, G' are fixed on the elevator car. This figure also shows an arrangement whereby the cams can be readily adjusted by hand from the warehouse floor or from the top of each tier as the case may be. For this operation a handle 31 is provided by means of which the cams may be raised or lowered on the guide rails 32. Suitable fastenings 33 are provided to secure the cams in place on the guide rail after being adjusted to proper position.

A suitable switch such as 34 may be provided in any convenient place such as in the elevator car, this switch being in circuit with the feed wire 19 leading to the switches G, G'. This switch is normally in closed position, but is opened when the cams are being adjusted to proper position, and in this manner the circuit to the auxiliary motor is open while making such adjustment.

The car leveling apparatus together with

the automatically operated leveling cams, may be used in connection with ordnance apparatus to bring the ammunition hoist or carrier always level with the breech of the gun, irrespective of the position or inclination of the gun.

Having thus described the invention and without limiting myself to the precise details of construction and arrangements of parts, what I claim is new and desire to secure by Letters Patent of the United States is:—

1. In elevator apparatus, the combination with the car, means to operate the car, auxiliary means to operate the car, a landing having a variable elevation, and means movable in accordance with the landing to control the auxiliary means and level the car with the landing.

2. In elevator apparatus, the combination with the car, means to operate the car, auxiliary means to operate the car, means comprising a cam and coacting switch to control the auxiliary means, and means to adjust one of the said members.

3. In elevator apparatus, the combination with the car, means to operate the car, auxiliary means to operate the car, coacting means in the hatchway and on the car to control the auxiliary means to level the car with the landing, and means to adjust one of the said coacting means at will.

4. In an elevator, the combination with the car, means to operate the car, auxiliary means to operate the car, coacting means in the hatchway and on the car to control the auxiliary means, a landing having a variable elevation, and means to adjust one of the coacting members in accordance with the variation in elevation of the landing.

5. In an elevator, the combination with the car, means to operate the car, auxiliary means to operate the car, coacting members in the hatchway and on the car to control the auxiliary means, a landing having a variable elevation, and a connection between one of the coacting members and the landing.

6. In an elevator, the combination with the car, means to operate the car, auxiliary means to operate the car, means comprising a coacting cam and switch to control the auxiliary motor to level the car with a landing, and means to adjust the cam to change the stopping point of the car.

7. In an elevator, the combination with the car, motor means to operate the car, auxiliary means to operate the car, means com-

prising a coacting cam and switch to control the auxiliary means, a landing having a variable elevation, and a connection between the cam and landing to move the cam correspondingly.

8. In an elevator, the combination with the car, motor means to operate the car, auxiliary means to operate the car, means comprising a cam in the hatchway, and coacting switch to control the auxiliary means to raise and lower the car, one of the said controlling members being capable of adjustment at will to change the stopping point of the car.

9. In an electric elevator to serve floor landings of variable heights, the combination of the car, motor mechanism, and an electric control mechanism for the motor, comprising a switch controlled by the position of the car, a cam positioned to close the switch to cause the motor to operate the car and to release the switch to allow it to open to permit the car to come to a stop level with a landing, the cam being automatically, variably adjustable to accord with the variable heights of the landing.

10. In an electric elevator, to serve floor landings of variable heights, the combination of the car, motor mechanism, and an electric control mechanism for the motor, comprising a switch controlled by the position of the car, a cam positioned to close the switch to cause the motor to operate the car and to release the switch to allow it to open to permit the car to come to a stop level with a landing, means to move the cam to change the stopping position of the car, to accord with the variable heights of the landing.

11. In an electric elevator, to serve floor landings of variable heights, the combination of the car, motor mechanism, and an electric control mechanism for the motor, comprising switches controlled by the position of the car, cams placed to close the switches to cause the motor to operate the car and to release the switches to allow them to open to permit the car to come to a stop level with a landing, the cams being automatically, variably, vertically adjustable to accord with the variable heights of the landings.

In testimony whereof, I have signed my name to this specification in the presence of a subscribing witness.

FLOYD C. FURLOW.

Witness:

ERNEST L. GALE, Jr.