May 28, 1929. W. BRUNS 1,715,159

RETIRING CAM

Filed Oct. 27, 1927

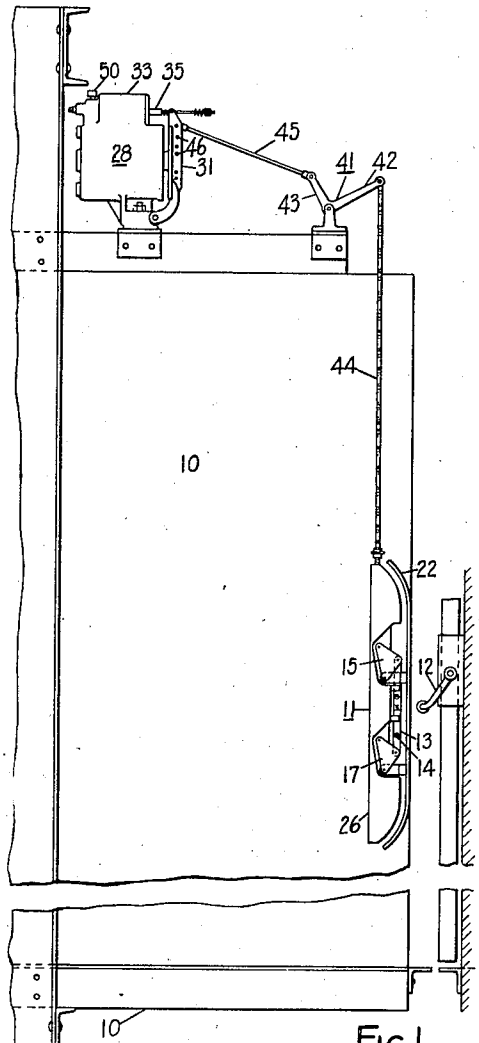


FIG. 1

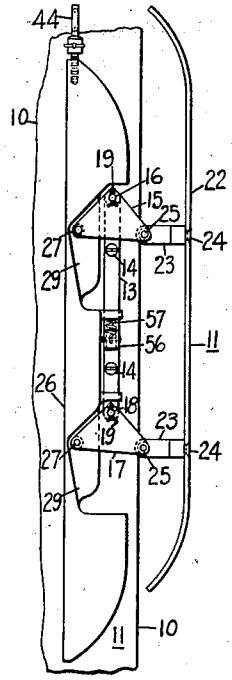


FIG. 2

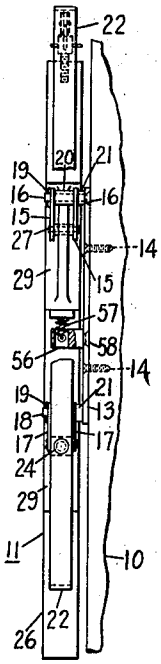


FIG. 3

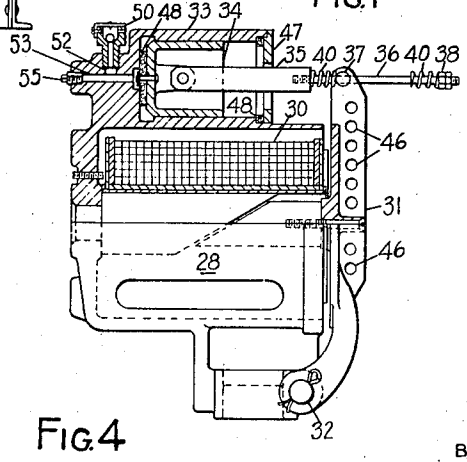


FIG. 4

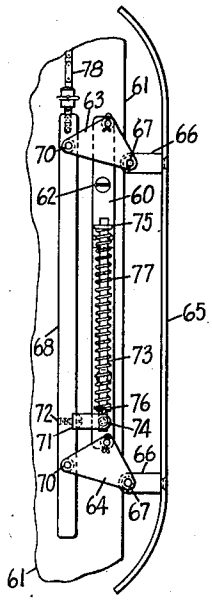


FIG. 5

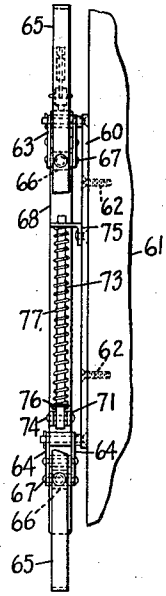


FIG. 6

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UNITED STATES PATENT OFFICE.

WILLIAM BRUNS, OF NEW YORK, N. Y., ASSIGNOR TO OTIS ELEVATOR COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

RETIRING CAM.

Application filed October 27, 1927. Serial No. 229,175.

This invention relates to retiring cams and particularly to retiring cams for use in elevator systems.

In the operation of elevators it is frequently desirable to operate door locks, door closer engines, and the like from the elevator car. To accomplish this a retiring cam may be mounted on the elevator car for cooperation with the devices at the various landings. When the elevator car is running, the retiring cam is retracted so that it clears the devices located in the hatchway and when the car stops at a landing, the retiring cam is extended to operate the devices at that landing.

One feature of the invention is the provision of a retiring cam that exerts a constant operating force as it moves from its retracted position to its extended position.

A second feature of the invention is the provision of a retiring cam that occupies a minimum of space, and requires a minimum of force to operate it.

A third feature of the invention is the provision of a retiring cam that is of simple, compact and sturdy construction, reliable in operation, and which may be operated an unlimited number of times without replacement.

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

In the drawings:

Figure 1 illustrates the retiring cam applied to an elevator car and shows the cam in its retracted position;

Figure 2 is a view in front elevation of the retiring cam in its extended position;

Figure 3 is a view in side elevation of the retiring cam with portions broken away to illustrate certain structural details;

Figure 4 is a view in part sectional elevation of the cam operating magnet;

Figure 5 is a view in front elevation of a modification of the retiring cam in its extended position; and

Figure 6 is a view in side elevation of the modification of the retiring cam with portions broken away to illustrate certain structural details.

Referring to Figure 1, an elevator car 10 is provided with a retiring cam 11 arranged to operate a door lock operating lever 12. Retiring cam 11 is provided with a plate 13 securely fastened to elevator car 10 by screws 14. as clearly shown in Figures 2 and 3. A pair of triangular levers 15 are pivotally supported at their apexes on the upper portion of plate 13 by means of a pin 16. A similar pair of triangular levers 17 are in like manner pivotally supported on the lower portion of plate 13 by means of a pin 18. The triangular levers constitute, in effect, right angle bell cranks with their fulcrums at the pivotal supports 16 and 18. Collars 20 serve to space the triangular levers of each pair from each other, and collars 21 serve to space each pair of triangular levers from plate 13. Cotter pins 19 hold the levers securely in position. A cam plate 22 is provided with two supporting arms 23 rigidly secured to the cam plate by riveting over portions 24 of arms 23. Two supporting arms 23 of the cam plate are pivotally connected to corresponding vertices of triangular levers 15 and 17 by means of pins 25. A cam weight 26 is pivotally connected to corresponding vertices of triangular levers 15 and 17 by means of pins 27. Cam weight 26 is provided with recesses 29 to accommodate the triangular levers. By this construction downward movement of the weight causes the triangular levers to swing about their supporting pins and move the cam to its extended position.

A retiring cam magnet 28 for moving the cam into its retracted position is adjustably mounted upon the car 10. The construction of the magnet is clearly shown in Figure 4. The magnet is provided with a coil 30 and an armature 31, the armature being pivotally connected to the magnet frame by means of a pin 32. A dash-pot, which serves both to limit the movement of armature 31 and to retard its motion in one direction, is supported by the magnet frame. A dash-pot cylinder 33 is formed integrally with the magnet frame, although it may be formed as a separate element. A piston 34 is placed within the cylinder 33 for reciprocating movement. Piston rod 35, which is pivotally connected to piston 34, is provided with a rod 36 screwed into its end. Armature 31 is operatively connected to rod 36 by means of a pivot pin 37, the pin being bored to accommodate rod 36. Piston rod 35 serves as one abutment for armature 31 and nuts 38 as the other abutment. Buffer springs 40 are placed between the armature and the abutments to lessen the impact of

the armature as it swings from one abutment to the other to move the piston. A bell crank 41 is pivotally supported by car 10, one arm 42 of the bell crank being connected to cam weight 26 by a chain 44, the other arm 43 of the bell crank being pivotally connected to armature 31 by means of a rod 45. The point at which rod 45 is connected to armature 31 may be varied by changing the pivotal connection of rod 45 from one to another of holes 46. The motion of piston 34 in its inward movement is limited by the end of the dash-pot cylinder and in its outward movement by dash-pot cylinder head 47. Rubber washers 48 are provided to absorb the impact caused by piston 34 being brought to a stop at the ends of its movement. A ball check valve 50 is screwed into passage 52, the passage 52 being connected with the interior of the cylinder by means of passage 53. An apertured plug 55 is screwed into the end of passage 53.

The operation of the retiring cam is as follows:

Assume the car to be at a landing as shown in Figure 1 and magnet 28 to be energized. The magnet, acting through rod 45, bell crank 41 and chain 44, holds cam weight 26 at its upper position, thus holding cam plate 22 in its retracted position. To cause cam plate 22 to operate lever 12, the magnet is deenergized, permitting cam weight 26 to move downwardly pulling the chain with it. As the weight moves downwardly it swings triangular levers 15 and 17 about their pivotal supports to force cam plate 22 into its extended position. At the same time, armature 31 swings to its outward position and as it approaches the end of its outward movement it engages buffer spring 40, causing piston 34 to move to the right as viewed in Figure 4. The piston upon engaging head 47, through rubber washer 48, stops the weight in its downward movement. A stop 56, provided with a buffer spring 57, is supported upon plate 13 by riveting over projecting portion 58 of stop 56, the stop serving under any circumstances to prevent excess downward movement of the cam weight. The weight is gently brought to a stop by the suction created in the dash-pot as the piston moves to the right. The force of this suction may be varied by inserting plugs, formed with larger or smaller apertures, within passage 53. The unrestricted movement of the armature before it engages buffer spring 40 allows a rapid extension of cam plate 22, while the dash-pot acting at the end of the armature movement prevents weight 26 from being brought to a stop too suddenly.

To retire cam plate 22, the magnet is again energized causing the armature to swing to its inner position. Weight 26 is lifted to its upper position swinging triangular levers 15 and 17 about their pivots, causing the cam plate to move into its retracted position. The armature in swinging inwardly engages buffer spring 40, causing piston 34 to move to the left as viewed in Figure 1. The piston upon engaging the end of the cylinder stops weight 26 in its upward movement. Stop 56 again acts as a safety to prevent excess upward movement. The movement of the piston to the left is substantially unretarded but this may be governed by varying the size of the ball check valve employed.

Referring to Figures 5 and 6, a retiring cam is illustrated in which a spring, instead of a weight, is used to move the cam plate to its extended position. A plate 60 is securely fastened to car 61 by means of screws 62. Triangular levers 63 are pivotally supported on the upper portion of plate 60 and triangular levers 64 are pivotally supported on the lower portion of plate 60. A cam plate 65, provided with rigid projecting arms 66, is pivotally supported at corresponding vertices of triangular levers 63 and 64 by pins 67. So far the structure is identical with that illustrated in Figures 2 and 3. However, instead of the weight, a bar 68 is used to connect corresponding vertices 70 of the triangular levers. A U-shaped bracket 71 is secured to bar 68 by means of a screw 72. A rod 73 is pivotally connected at one end to bracket 71 by pin 74 and is guided at its opposite end by a bracket 75, which bracket is supported by plate 60. A spring seat 76 is secured to rod 73. A compression spring 77 is inserted between seat 76 and bracket 75, tending to force bar 68 to its lowest position. A chain 78 connects bar 68 with an operating device, as for example a magnet.

In operation, upon energization of the magnet, bar 68 is pulled to its upper position against the compression of spring 77, moving cam plate 65 to its retracted position. Upon deenergization of the magnet, the spring, with bracket 75 as an abutment, acting against seat 76 forces bar 68 to its lower position, causing triangular levers 63 and 64 to move about their pivotal supports. As the levers so move, cam plate 65 is forced into its extended position.

It is to be noted that with the retiring cam of this invention, as illustrated in Figure 1, the force exerted in a horizontal direction by the cam plate is constant throughout its movement from retracted to extended position. As the weight falls under the influence of gravity it acts through the bell crank levers to move the cam plate. Thus, assuming the arms of the bell crank lever to be of equal length, the vertical component of the movement of the cam weight is equal to the horizontal component of the movement of the cam plate. Then since the cam

weight is constant, the force that the cam plate may exert in a horizontal direction is also constant.

In the case where a spring is employed, substantially the same results are obtained provided the spring is of sufficient length and under sufficient initial compression.

Attention is called to the fact that as the force exerted by the cam is constant, it is only necessary to design a cam so that this constant force will overcome the maximum opposing force, and it makes no difference in what portion of its movement the cam contacts with the element to be moved or operated.

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. A retiring cam comprising; a cam plate; actuating means for moving the cam plate to its extended position; a substantially right angle bell crank lever connecting said cam plate and said actuating means; and retarding means brought into action as the cam plate nears its extended position to cause a gradual stop of said cam plate and actuating means.

2. A retiring cam comprising; a support; a cam plate; a cam weight for moving said cam plate to its extended position; a right angle bell crank lever, fulcrumed on said support, and connecting said cam plate and said cam weight; a dash-pot; and a lost motion connection between said cam weight and dash-pot to cause the operation of the dash-pot just before the cam plate reaches its extended position to bring said cam plate and weight to a gradual stop.

3. A retiring cam comprising; a support; a cam plate; a cam weight for moving said cam plate to its extended position; a pair of right angle bell crank levers, fulcrumed on said support, and connecting said cam plate and said cam weight; a member connected to said weight to be moved thereby about a pivot during extension of said cam plate; a dash-pot having an extended piston rod; and a buffer spring arranged on said rod in the path of movement of said member about said pivot, said spring being spaced from said member when the cam plate is in retracted position to allow rapid extension of the cam plate and upon engagement by said member just before the cam plate becomes fully extended causing the operation of the dash-pot to bring the weight and cam plate to a gradual stop.

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

WILLIAM BRUNS.