

June 14, 1949.

E. E. ALEXANDER

2,473,128

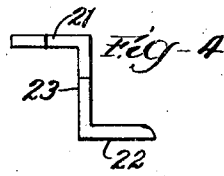
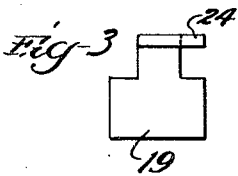
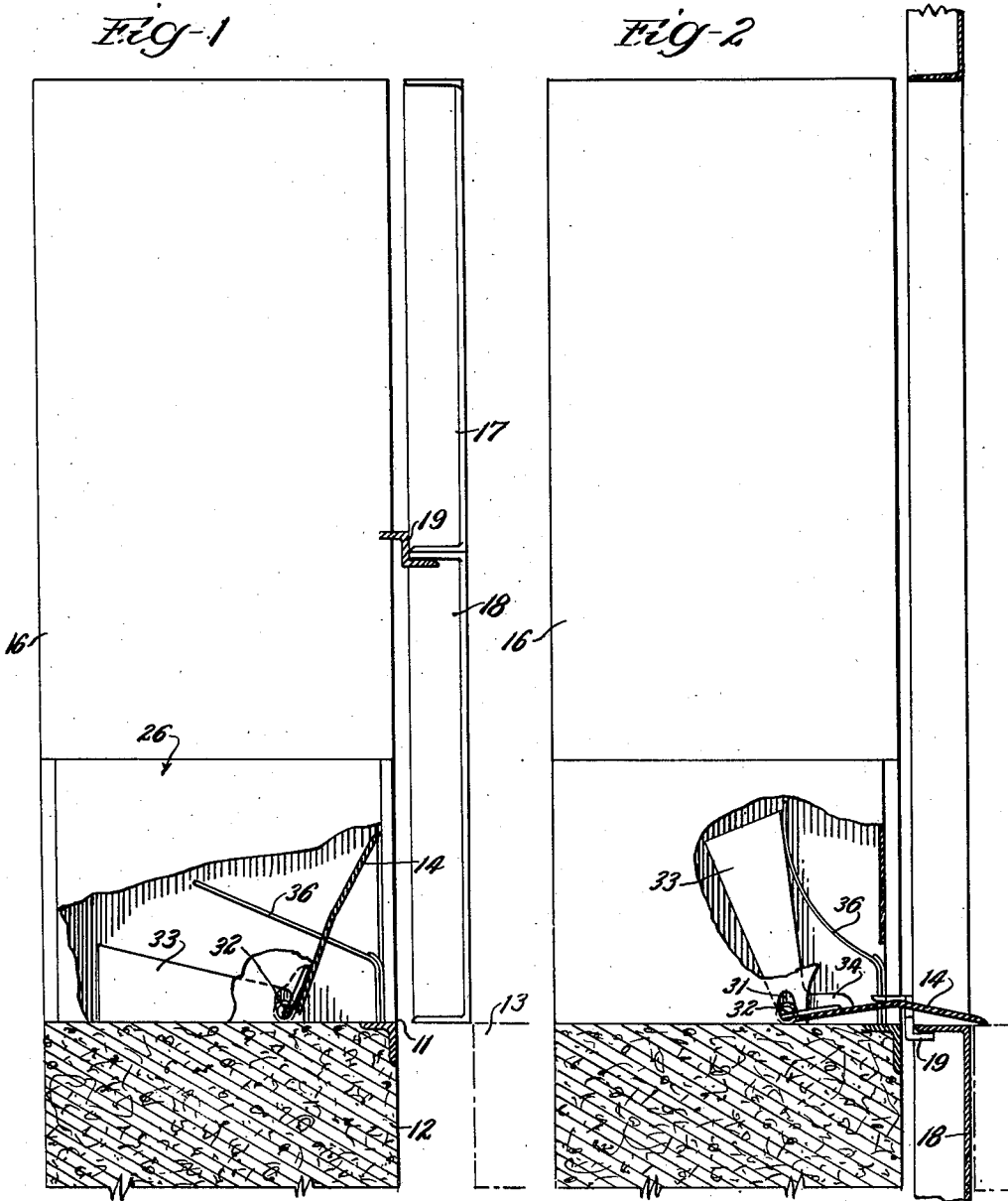
ELEVATOR DOOR BRIDGE

Filed May 10, 1946

2 Sheets-Sheet 1

Fig-1

Fig-2



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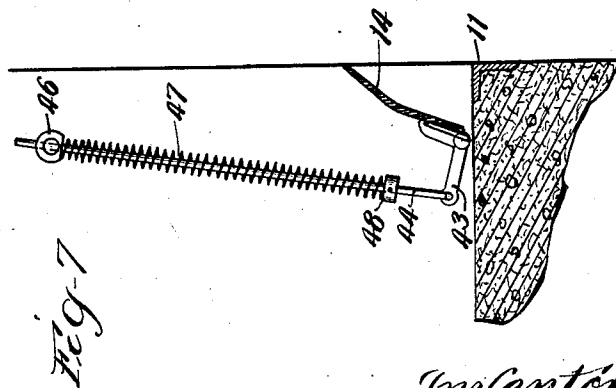
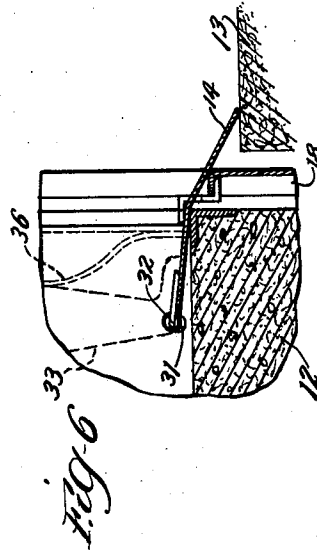
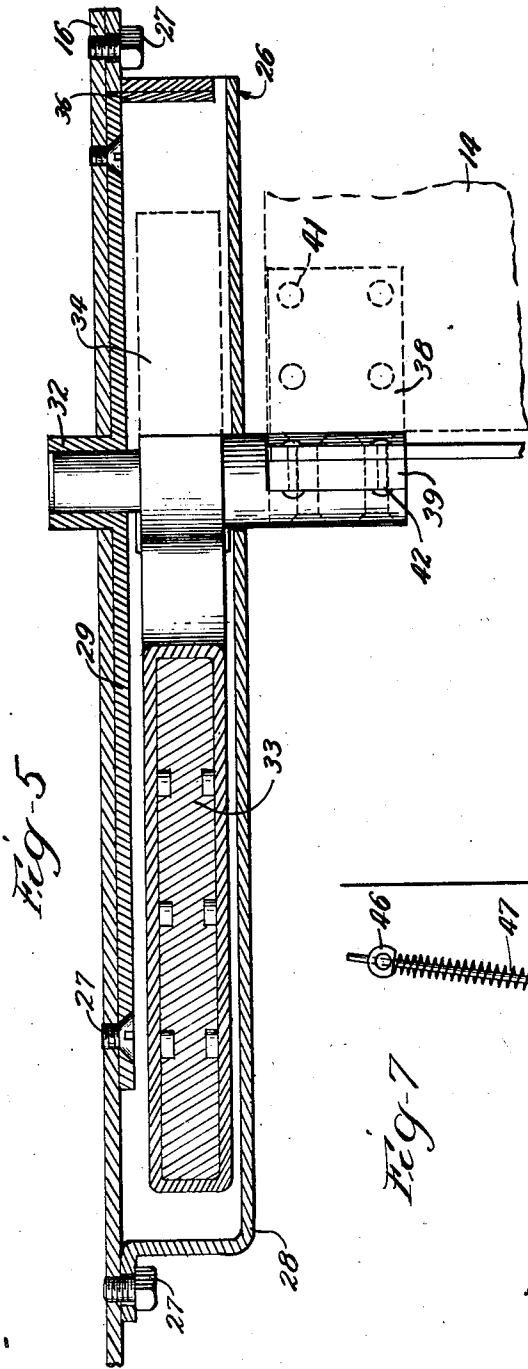
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ELEVATOR DOOR BRIDGE

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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ELEVATOR DOOR BRIDGE

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1 Claim. (Cl. 20—66)

1

It has been found necessary to provide means for bridging the gap normally existing between an elevator car floor and a building floor at approximately the same level in order to permit the passage of heavy loaded trucks across the gap as well as to prevent accidents to individuals. Since the load which must be borne by these bridge mechanisms is, in many cases, substantial, the bridge must be of heavy construction and as a result difficulty has been experienced in securing satisfactory ease of operation. Furthermore, such mechanisms have often been damaged due to misalignment of the elevator car floor with the building floor caused by either careless operation or by the shifting of the elevator as the load is added or withdrawn.

Among the objects of my invention is the provision of a simple and effective elevator door bridge mechanism which can be inexpensively constructed, easily operated, and which incorporates means permitting the use of the bridge mechanism even while a substantial degree of misalignment exists between the elevator car floor and the building floor without damage to the bridge mechanism.

Generally speaking I attain outstanding ease of operation by providing a counterbalance which acts about a pivot point of the bridge, changing its effective moment about the pivot as the moment of the bridge about the same point changes, so that the bridge is always substantially counterbalanced. To minimize the possibility of injury to the bridge or its pivots, the bearing in which the bridge is journalled is vertically elongated to permit displacement of the pivot point upwardly against the counterbalance in instances where the bridge has been lowered into contact with the floor and the load is applied to the unsupported overhanging edge of the bridge. Thus instead of overloading the bridge and its bearings, the bridge is permitted to pivot about the edge of the floor bringing the unsupported edge downwardly until firm support is reached and permitting the pivot point to move upwardly in the elongated slot for a similar distance.

Reference is made to the drawings in which

Figure 1 is a partially sectioned end view showing the general arrangement of parts with the bridge in raised position;

Figure 2 is a similar view showing the bridge in lowered position;

Figure 3 is a face view of a clip;

Figure 4 is a side view of a clip;

Figure 5 is a horizontal section through the

2

counterbalance and pivot assembly, the position of the parts when the bridge is in raised position being shown in full lines, and when in lowered position shown in dotted lines;

Figure 6 is a partially sectioned end view indicating the disposition of parts when the bridge is lowered into contact with a misaligned floor; and

Figure 7 is a partially sectioned end view showing a modification of my device.

In compliance with R. S. 4888, I describe herein certain specific applications of my invention as, for example, the application of my invention to an elevator door in a building, but it is to be understood that the details as well as the form and disposition of parts herein described may be modified within the limits of the appended claims without departing from the scope of my invention.

To span the gap normally existing between the edge 11 of a building floor 12 and an elevator car floor 13, I provide an arched bridge 14 of sufficient width to span the gap. The bridge 14 is disposed in a doorway between door jambs 16 and will, in most instances, extend substantially across the space between the jambs 16. Slidably mounted upper and lower doors 17 and 18 are provided in the doorway, the lower door 18 carrying a clip generally designated 19. The clip 19 may suitably comprise an upper leg 21 and a lower leg 22 connected by a web 23. The upper leg 21 is provided with a laterally extending ear 24 and is somewhat narrower than the web 23. The lower leg 22 may be attached to the upper portion of the lower door 18 as by welding and in such manner as to permit the upper leg 21 with the ear 24 to project outwardly.

The bridge 14 is provided with slots in the path of the clip 19 of a width substantially equal to the upper leg 21 but narrower than the width of the upper leg with the ear 24 so that as the door 18 is lowered, the ear 24 will engage the bridge 14 adjacent the sides of the slot therein and move the bridge from a raised to a lowered position.

Opposed housings, generally designed 26, are attached to each of the door jambs 16 as by bolts 27. Each housing 26 includes a flanged cover 28 and may include a backplate 29 when required by the structure of the door jamb. Vertically elongated openings 31 are formed in the cover 28 and in the backplate 29, if one is employed, adjacent the level of the floor 12. Stub shafts 32 are journalled in the openings 31 and extend outwardly through the housings 26 a short dis-

3

tance. A counterbalance 33 extends laterally from each of the shafts 32 and is preferably formed integral with the shafts. The counterbalance is enclosed within the housing 26 by the cover 28 and may suitably taper outwardly from the shaft. If desired, a foot 34 may also be formed integral with the shaft 32 and extends laterally therefrom at an angle to the counterbalance to limit the travel of the counterbalance as the shaft 32 is rotated.

A spring 36, preferably of the cantilever type, is attached at one end to the housing 26, the free end of the spring extending inwardly therefrom into the path of the counterbalance 33 and positioned to engage the face of the counterbalance only after the counterbalance has completed a predetermined portion of its movement. The bridge 14 is rigidly attached to the shafts 32 by clamps 37 which include a relatively flat plate 38 and arms 39 extending upwardly from the plate 38 around the shaft 32. The plate 38 may be attached to the lower surface of the bridge adjacent each inner corner as by rivets 41 and extends under the shaft 32 which may be provided with a flat surface to mate with the plate 38. The arms 39 are integral with the plate 38 and extend upwardly around the shaft 32 being drawn into frictional engagement therewith by bolts or rivets 42.

In normal operation the floor of the elevator car 13 may be brought to the level of the building floor 11 and the doors 17 and 18 separated. As the lower door 18 descends the clip 19 engages the bridge 14 drawing the bridge downwardly over the upper end of the lower door 18 as seen in Figure 2, and bringing the free end of the bridge 14 into contact with the elevator car floor 13. As the bridge 14 is lowered, the counterbalance 33 is raised and in the latter portion of its travel comes in contact with the free end of the spring 36, which is compressed or stressed by movement of the counterbalance, reaching a maximum at the point where the bridge completes its downward movement. The angle formed between the counterbalance and the bridge 14 is in excess of 90° in order that the center of gravity of the counterbalance will not pass the center of rotation of the bridge even when the bridge reaches its lowest position. The bridge 14 is usually of substantial construction and appreciable weight since it must support relatively heavy loads. It is obvious that the moment of the bridge about the shafts 32 will increase as the bridge is lowered, the increase being proportional to the change in the cosine of the angle between the bridge and the floor 11. The spring 36 is therefore employed to increase the moment of the counterbalance as the bridge approaches its lowered position and by properly selecting the spring 36, I am able to maintain the bridge in substantially balanced relationship at any point between its terminal positions.

As the doors are closed, the upper surface of the lower door 18 moves the bridge 14 upwardly, the spring 36 assisting in moving the counterbalance 33 downwardly. When the bridge is in raised position, the moment of the counterbalance is sufficiently great to maintain the free end of the bridge within the plane of the edge 11 of the floor 12 but in the lowered position, the combined weight of the door 18 and the bridge 14 is sufficient to maintain the bridge in lowered position.

As previously mentioned, the bridge 14 is arched, the peak of the arch being approximately

4

midway between the two edges and generally parallel to the edge 11. One of the primary purposes of this arched construction is to permit the free edge of the bridge to contact an elevator floor 13 when the floor 13 is depressed below the level of the building floor 12 as shown in Figure 6. The misalignment of floors may either be caused by careless operation of the elevator, or by shifting of position of the elevator as the load thereon is increased or decreased.

I prefer to form the bridge 14 in such manner that the distance from the peak of the arch to the shafts 32 is substantially equivalent to the distance from the shafts 32 to the edge 11 so that the bridge may assume the position illustrated in Figure 6. It is, of course, possible that the elevator car floor 13 may be depressed below the point which can be reached by the free end of the bridge 14 and that while in this condition the free end could be subjected to a relatively heavy load. If this should occur, the bridge 14 will pivot about the edge of the floor 11 until it contacts the floor 13 thus causing the shafts 32 to rise in the elongated openings 31. This avoids a concentration of stress on either the shafts 32 or the bearing edges of the openings. The truck can then be moved along the outer portion of the bridge 14 until it passes the floor edge 11 at which time the bridge will pivot about the edge 11 and assume its normal position. It is, of course, obvious that upward movement of the shafts 32 when the bridge is in lowered position will be resisted by the counterbalance and that in normal circumstances only the lower portion of the openings 31 will serve as journal surfaces for the shafts.

Springs other than the cantilever type may be employed either in place of or in conjunction with the counterbalance 33. For example, an arm 43 may be formed rigid with the shaft 32 extending laterally therefrom adjacent the counterbalance 33. A rod 44 is pivoted to the end of the arm 43 and extends upwardly through a pivoted guide 46 secured to the housing 26 or the door jamb 16 above the shaft 32. A coil spring 47 is telescoped over the rod 44 and may be restrained in position by a collar 48, the other end of the spring 47 being restrained by the pivoted guide 46. With this type of structure, the counterbalance 33 can, if desired, be eliminated since the strength and reaction characteristics of the spring may be selected to counterbalance the variable moment of the bridge 14 in any position.

If the counterbalance 33 is employed, I may employ a spring somewhat shorter than the distance between the collar 48 and the pivoted guide 46 when the bridge is in raised position so that the spring will not affect the movement of the parts until the counterbalance has completed a predetermined portion of its travel. It will be found that for most purposes an ordinary coil spring will be satisfactory. If the counterbalance is employed, the arm 43 may be eliminated and the rod 44 pivoted directly to the counterbalance.

The foregoing detailed description has illustrated the application of my invention to elevator doors in buildings, but it is obvious that it is equally usable on an elevator car and I therefore do not wish to be understood as limiting myself solely to the use of my invention in buildings.

I claim:

An elevator door bridge of the type adapted to be moved from a raised position to a lowered position to span the gap between an elevator car floor and a building floor, said bridge being hinged

5

along its inner margin to one of said floors and having a counterweight mounted on the opposite side of the hinge and projecting in a substantially horizontal direction above said one floor when the bridge is in raised position, thereby to effectively counterweight the bridge in such position, and spring means effective after the bridge has moved a given distance toward its lower position for yieldingly and increasingly resisting continued movement of the bridge to its lowered position, thereby to supplement and complement the decreasing effectiveness of the counterweight due to its shortened lever arm, and to spring-bias the bridge, when in lowered position, toward its raised position.

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6

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,152,012	Doren	Aug. 31, 1915
1,529,122	Fischer	Mar. 10, 1925

FOREIGN PATENTS

Number	Country	Date
151,899	Switzerland	1932