

No. 803,876.

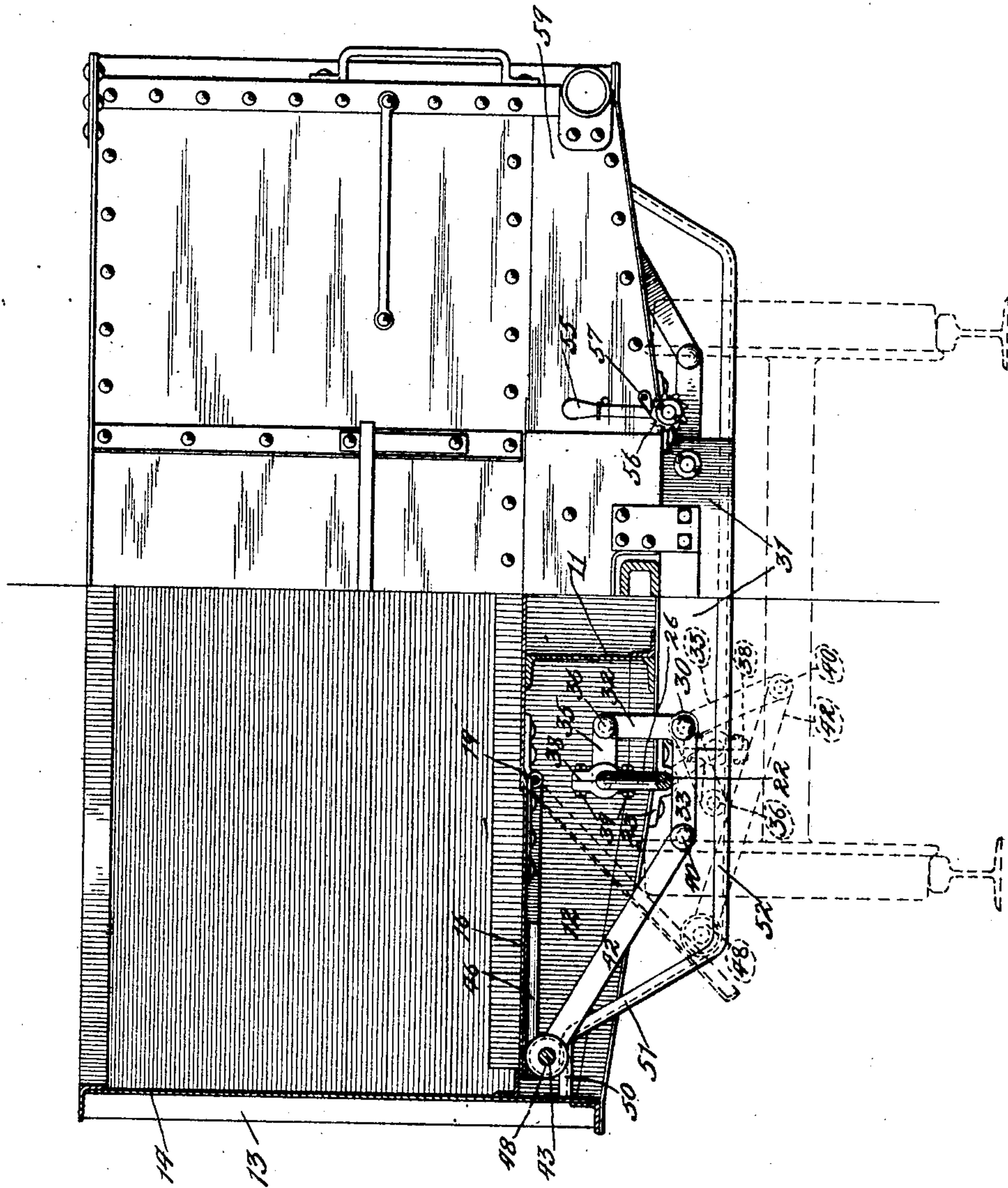
PATENTED NOV. 7, 1905.

A. CAMPBELL.
MECHANISM FOR OPERATING CAR FLOOR DOORS.

APPLICATION FILED AUG. 16, 1905.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

Wm. Perry
J. B. Wei

Inventor:

Argyle Campbell

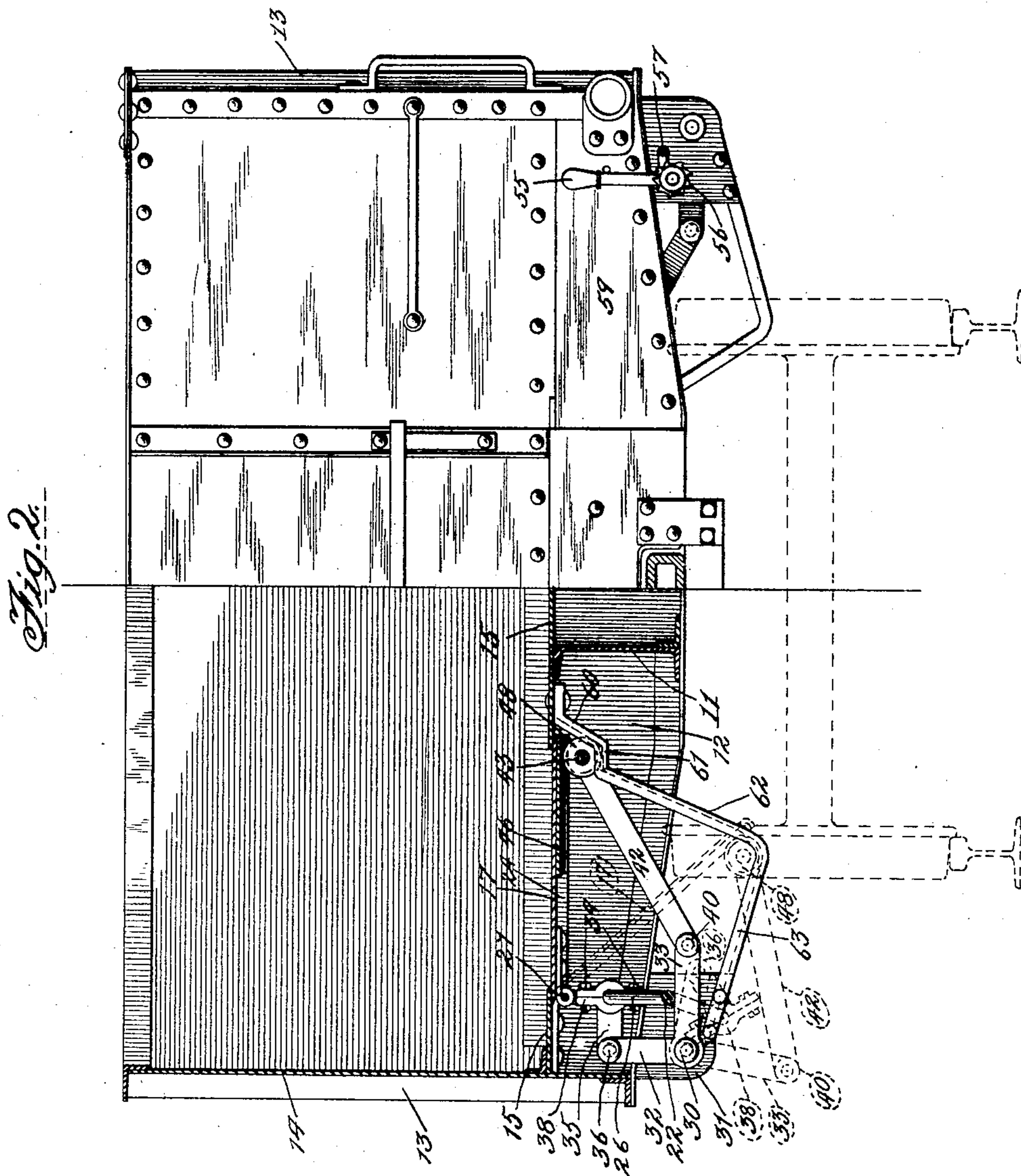
By Cheever & Co.

Atty.

A. CAMPBELL.
MECHANISM FOR OPERATING CAR FLOOR DOORS.

APPLICATION FILED AUG. 16, 1905.

4 SHEETS—SHEET 2.



Witnesses:

Wm D. Perry
J. B. Weir

Inventor:
Argyle Campbell

By *Cheever & Coe*

Attys

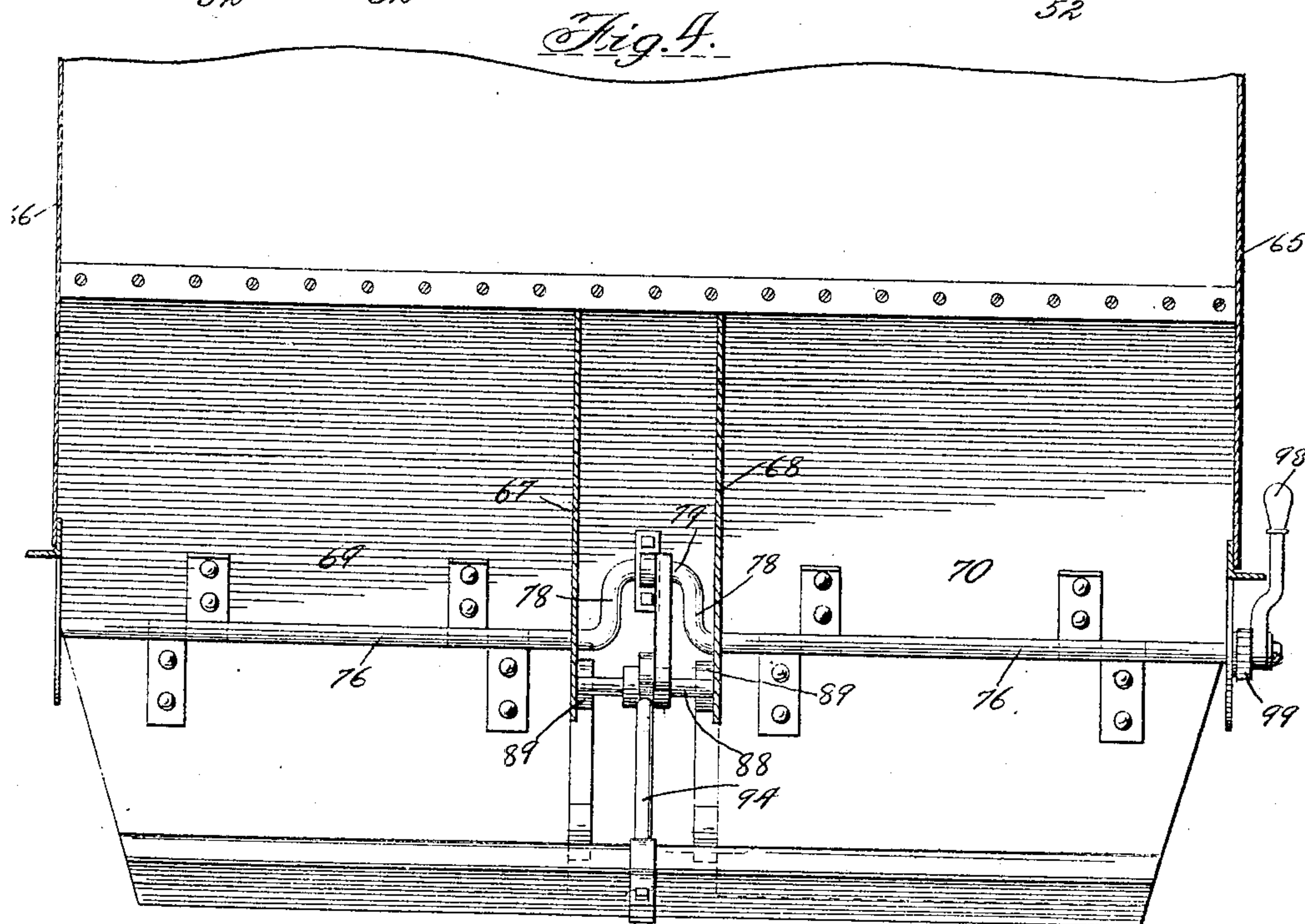
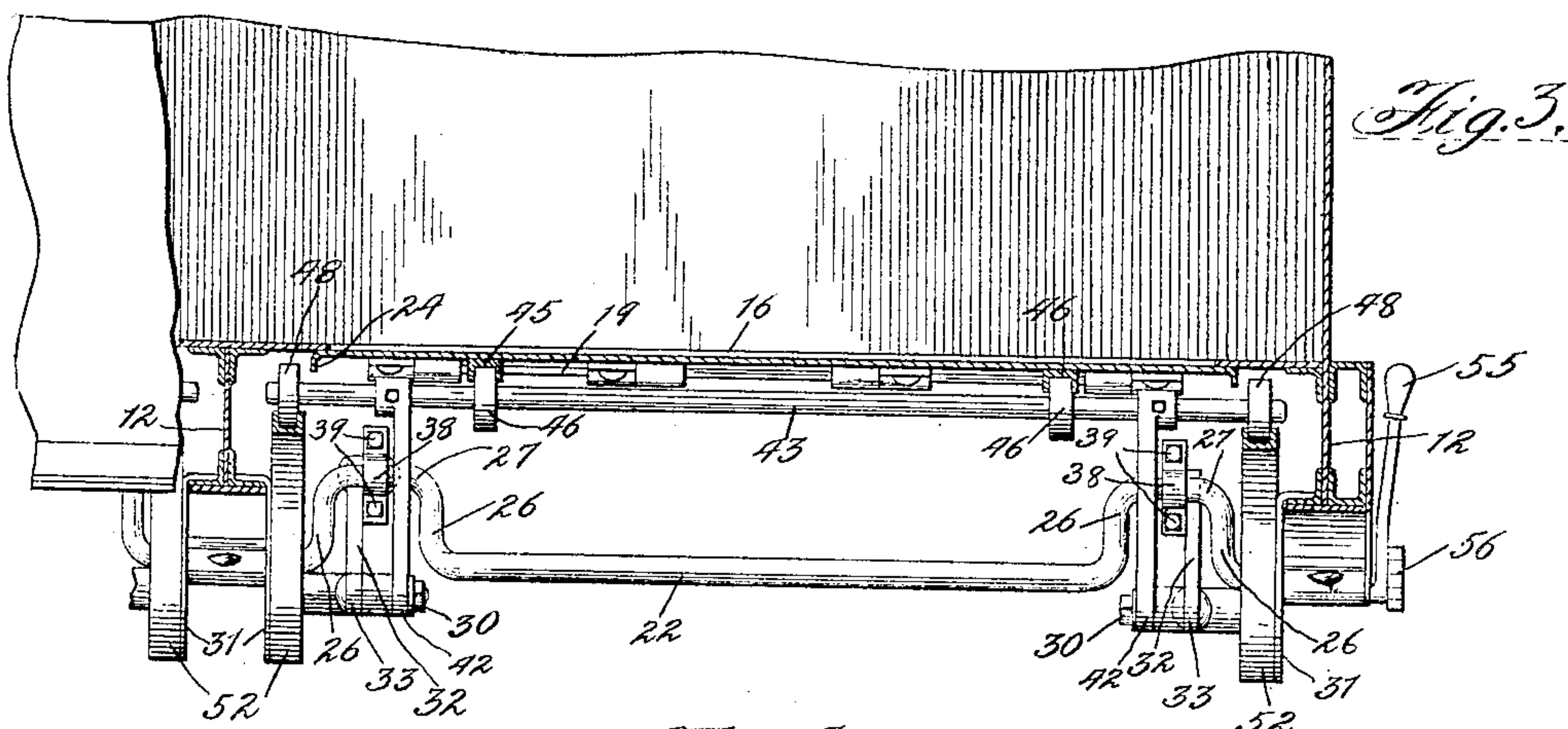
No. 803,876.

PATENTED NOV. 7, 1905.

A. CAMPBELL.
MECHANISM FOR OPERATING CAR FLOOR DOORS.

APPLICATION FILED AUG. 16, 1905.

4 SHEETS—SHEET 3.



Witnesses:

W. D. Perry
J. B. Weir

Inventor:

Argyle Campbell

By *Cheever & Cox*

Attys.

No. 803,876.

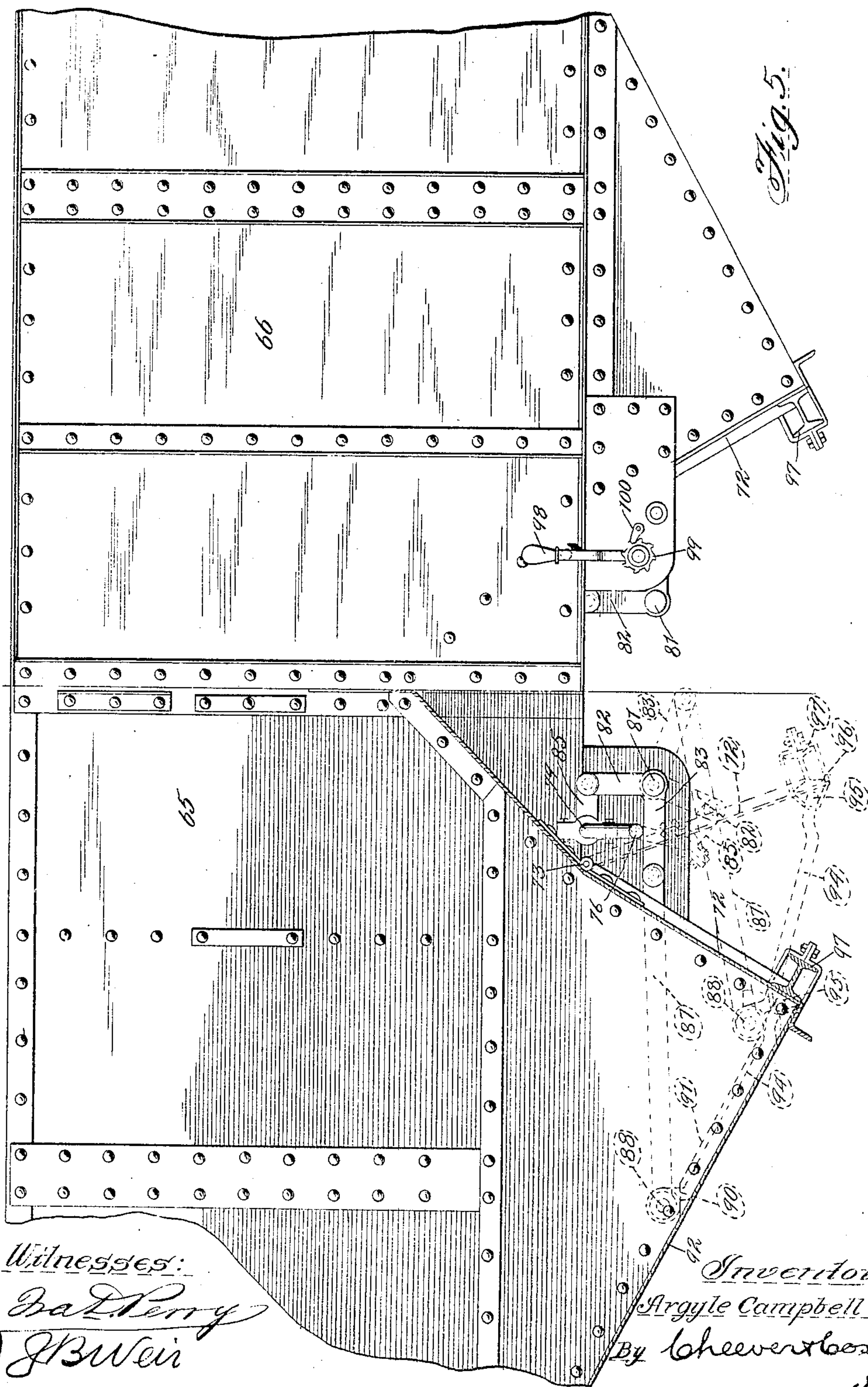
PATENTED NOV. 7, 1905.

A. CAMPBELL.

MECHANISM FOR OPERATING CAR FLOOR DOORS.

APPLICATION FILED AUG. 16, 1905.

4 SHEETS—SHEET 4.



Witnesses:
Wm. L. Perry
J. B. Weir

Inventor:
Argyle Campbell
By Cheever & Co.
Attys.

UNITED STATES PATENT OFFICE.

ARGYLE CAMPBELL, OF CHICAGO, ILLINOIS.

MECHANISM FOR OPERATING CAR-FLOOR DOORS.

No. 803,876.

Specification of Letters Patent.

Patented Nov. 7, 1905.

Application filed August 16, 1905. Serial No. 274,429.

To all whom it may concern:

Be it known that I, ARGYLE CAMPBELL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Mechanism for Operating Car-Floor Doors, of which the following is a specification.

My invention relates to mechanism for operating car-floor doors both in the type of cars in which the doors of the floor are level and in cars of the hopper type.

The object of my invention is to provide such a mechanism which can be easily and cheaply made, which is efficient in operation, and not readily liable to get out of order.

It consists in such a mechanism in which the door or doors in the floor of the car can be operated with substantially a uniform force applied to the operating-lever during all portions of its stroke and in means by which the operating mechanism serves to automatically lock the door or doors of the floor in closed position.

My invention further consists in the details of construction which will be hereinafter more fully described and claimed as the specification proceeds.

Referring to the drawings, Figure 1 is an end view, partially in section, of a car having flat floor-doors pivoted near the longitudinal center of the car and adapted to swing downward to discharge load at the side of the car, the same having the operating mechanism of my invention applied thereto. Fig. 2 is a corresponding view of a car in which the flat floor-doors are pivoted near the side of the car parallel to the longitudinal center of the car and adapted to swing downward to discharge load between the rails. Fig. 3 is a partial section side view of the car shown in Fig. 1. Fig. 4 is a central sectional end view, and Fig. 5 is a partly-sectional side view of a car of the hopper type having the mechanism of my invention applied thereto.

Referring now to Figs. 1, 2, and 3, numeral 11 indicates one vertical member of a central girder running lengthwise of the car, this girder being intersected between the ends of the car by a plurality of cross-bearers and bolsters 12. Rising from the ends of these cross-bearers are the stakes 13, to which are secured the sides 14 of the box-car, which may be made in any of the common forms of construction. Across the tops of the cross-bearers and central girder I place the floor

proper, 15, having openings in it for the doors 16 in Fig. 1 and 17, Fig. 2, for discharging the load, which are operated by the device of my invention, the doors in Fig. 1 being hinged at 19 near the longitudinal center line of the car and adapted to swing downward to the dotted-line position shown to discharge load at the side of the car, while the door 17 in Fig. 2 is hinged at 21 parallel to the central line of the car and near the side 14 of the car and adapted to swing downward toward the center of the car to the dotted lines, as shown, to discharge load between the rails.

In applying the device to the car illustrated in Figs. 1 and 3 I journal in or on the successive cross-bearers 12, heretofore referred to, a shaft 22, adapted to turn on its axis in bearings 23, said shaft being thus journaled upon each of the successive cross-bearers or bolsters of the car and extending in one or more sections from end to end of the car. Between each pair of journal-bearings for this shaft and usually between the edges 24 of each door 16 I form in this shaft 22 at least one pair of crank-arms 26, connected by a common crank-pin 27. In the particular structure here shown there are two sets of these crank-arms 26, connected by a common crank-pin 27 between each journal-bearing.

Pivotally mounted at 30 on each cross-bearer or bolster 12 or an extension thereof, 31, I place a series of bell-cranks having two arms 32 and 33, preferably at right angles to each other, the arm 32 being preferably shorter than the arm 33. I connect the outer end of bell-crank arm 32 with the crank-pin 27, near which the particular bell-crank is mounted, by means of a link 35, this link being journaled on the bell-crank arm 32 by the pin, rivet, or bolt 36 and to the crank-pin 27 by the coupling or bearing 38, loosely secured about the crank-pin 27 by means of the bolts 39. Pivoted to the outer end of each bell-crank arm 33 on a pin, rivet, or bolt 40 is a rod 42, extending in the full-line position of Fig. 1 diagonally upward toward the outer end of one of the doors 16.

Mounted upon the outer ends of each pair of rods 42 between each pair of cross-bearers and usually journaled therein is a shaft 43. On each of these shafts 43 I journal, preferably, four rollers, consisting of one pair of rollers 45, mounted on the shaft between the edges 24 of a door 16 and adapted to bear in the tracks 46, mounted upon the under side

of the door, as shown in Fig. 3, the other pair of rollers 48 being preferably mounted near the opposite ends of the shaft 43, as shown, and adapted to travel in a track consisting of the horizontal portion 50 near the side of the car, the inclined portion 51 extending downward toward the center of the car and the horizontal portion 52 extending horizontally under the portion 31 of the cross-bearers or bolsters, to which it is secured by any suitable means.

In the operation of the device when applied as shown in Figs. 1 and 3 the parts are normally in full-line position, as shown, with the rollers 48 resting upon the horizontal portion 50 of the track and the rollers 45 directly supporting the outer edges of the door 16, to which the particular portion of the mechanism under consideration is applied. In this position the bell-crank arms 33 and the rods 42, attached to them, are in approximately a straight line, and therefore not easily deflected from that line by the pressure of the load upon the floor-door 16 upon the rollers 45, thereby, in connection with the flat horizontal portion of the track 50, locking the floor-doors 16 in raised position, as shown in full lines.

On the end of each shaft 22 there is rigidly secured a hand-lever 55, which the operator may take hold of and move in one direction to move the mechanism just described from the full-line position of Fig. 1 to the dotted-line position of the same figure, thereby allowing the floor-doors to settle downward under the action of the load upon them to the dotted-line position shown and adapted to be moved in the opposite direction to restore the mechanism and the doors resting upon it from the dotted-line position to the full-line position. I provide a ratchet-wheel 56, rigidly secured upon the end of each shaft 22, and a pawl 57, pivoted at 58 to the end sill 59 of the car, and by throwing this pawl 57 into contact with the ratchet-wheel I am able to lock the mechanism in stationary position, with the floor-doors in any position which may be desired between dotted-line and full-line position. This pawl also assists the mechanism heretofore described in locking the doors in normal or full-line position. By the use of this construction I am able to obtain a much more efficient direction of pressure upon the under side of the door than could possibly be obtained by connecting the rod 42 to crank-pin 27, and I further obtain the locking effect heretofore described without sacrificing the efficient application of power to the under side of the door.

In the construction of Fig. 2, in which the floor-doors are pivoted toward the side of the car and drop downward to discharge load at the center of the track, as heretofore described, exactly the same mechanism just described is applied to this car except that the track on

which the rollers 48 travel takes the form 60, 61, 62, and 63, this track in its various parts, however, performing the same function as is performed on the tracks 50, 51, and 52 in Fig. 1.

As heretofore stated, I have in Figs. 4 and 5 applied the device of my invention to the ordinary hopper type of car, consisting in two longitudinal half portions 65 and 66, which are in turn divided internally by the plates 67 and 68 into two lateral hoppers 69 and 70, thereby really divided into four compartments, each of which is emptied by the turning of a door 72, pivoted at 73. In the application of my device to this type of car I journal a pair of transverse shafts 76 in place of the longitudinal shaft 22, heretofore described, each of these shafts having at its center between the plates 67 and 68 crank-arms 78, connected by a common crank-pin 79, corresponding with the crank-pin 27, heretofore described. Adjacent to these shafts at 81 I journal a bell-crank 82 83, identical with bell-crank 32 33, heretofore described, and connect the outer end of bell-crank arm 82 with crank-pin 76 by a link 85, identical with link 35, heretofore described. To the end of each bell-crank arm 83 I connect a rod 87, corresponding with rod 42, heretofore described. The outer end of each of these rods 87 is secured to a short shaft 88, bearing two rollers 89, adapted to travel on a track 90 91, formed upon the outside edges of plates 92, forming the stationary bottom of the hopper between the plates 67 and 68, as shown in Fig. 4. Between the rollers 89, heretofore described, and secured to the shaft 88 is a rod 94, pivotally mounted at 95 to the lower edge 96 of the door 72 or, more properly speaking, to a bar or rod 97, running across the car and connecting each bar and transverse doors together, as shown in the figures. Each of these shafts 76 is equipped with a hand-lever 99 and pawl 100, exactly corresponding with the lever 55, wheel 56, and pawl 57 of Fig. 1.

It will be seen that the portions 90 of the track used in the device of Figs. 4 and 5 correspond exactly in function with the horizontal portions 50 and 61 on the tracks heretofore described, and that the inclined portions 91 of the present track correspond with the portions 51 and 62 of the former tracks, and that all of the parts are substantially identical in function except the rod 94, which is added to connect the shaft 88 with the hopper-doors proper.

When the operator desires to dump the load in a car of the type shown in Figs. 4 and 5, he simply releases the pawl 100, takes hold of the lever-handle 98, and gives it a turn in the proper direction to move the parts from the full-line position to the dotted-line position at the left of Fig. 5, thereby allowing the load in hoppers 69 and 70 of hopper 65 to flow down the inclined bottom 92 and out of the

car. To close the doors, the operator simply moves the lever 98 in the opposite direction.

It will be noted that in the preferred normal position in all the types of cars just described the crank-arm on the operating-shaft 5 connected to the hand-lever is parallel to the bell-crank arm to which it is connected and that the link connecting these two parts is at right angles to both. It will also be noted 10 that the bell-crank arms are at right angles to each other. It will further be noted that in both forms of construction the shaft for operating the door, the bell-crank, and the movable shaft traveling in the cam-track are 15 all mounted with their axes in different imaginary planes parallel to each other.

In the preferred form of construction here shown I make the proportions of the important parts upon the following scale: the main- 20 shaft crank-arm 7, the link connecting it to the first bell-crank arm 6, the first or shorter bell-crank arm 9, and the second bell-crank arm 12. With these proportions I have in practice been able to obtain very satisfactory 25 results.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a car, in combination with a car body 30 or frame having a normally load-carrying door hinged thereto, adapted to swing to a different position to discharge the load; a shaft journaled parallel to the hinge of the door, means for rotating said shaft, a crank-arm on 35 said shaft, a crank-pin on said crank-arm, a bell-crank pivoted in a line parallel to the axes of the hinges of said door and said shaft, a link connecting said crank-arm with one of 40 said bell-crank arms, a rod having one end pivotally connected to the second arm of said bell-crank normally in approximately a straight line therewith, the opposite end of 45 said rod being guided along a cam-track and connected to a mechanism which engages the car-door which is to be moved.

2. In a car, in combination with a car body 50 or frame having a normally load-carrying door hinged thereto, adapted to swing to a different position to discharge the load; a shaft journaled parallel to the hinge of the door, means for rotating said shaft, a crank-arm on 55 said shaft, a crank-pin on said crank-arm, a bell-crank pivoted in a line parallel to the axes of the hinges of said door and said shaft in such a position that one of its arms is approximately parallel to the crank-arm on the 60 shaft, a link connecting said crank-arm and said bell-crank arm at approximately a right angle to each, a rod having one end pivotally connected to the second arm of said bell-crank 65 normally in approximately a straight line therewith, the opposite end of said rod being guided along a cam-track and connected to mechanism which engages the car-door which is to be moved.

3. In a car, in combination with a car body or frame having a normally load-carrying door 70 hinged thereto, adapted to swing to a different position to discharge the load; a shaft journaled parallel to the hinge of the door, means for rotating said shaft, a crank-arm on said shaft, a crank-pin on said crank-arm, a 75 bell-crank pivoted in a line parallel to the axes of the hinges of said door and said shaft, a link connecting said crank-arm with one of said bell-crank arms, a rod having one end 80 pivotally connected to the second arm of said bell-crank normally in approximately a straight line therewith, the opposite end of said rod being connected to a mechanism 85 which engages the car-door which is to be moved, a roller carried by said rod and a cam-track on which said roller is adapted to travel as the door is opened or closed said cam being 90 so shaped that when the load-door is closed the roller is on a portion of the track so shaped 95 as to assist in locking the foregoing mechanism and door as described.

4. In a car, in combination with a car body 100 or frame having a normally load-carrying door hinged thereto, adapted to swing to a different position to discharge the load; a shaft journaled parallel to the hinge of the door, means for rotating said shaft, a crank-arm on 105 said shaft, a crank-pin on said crank-arm, a bell-crank pivoted in a line parallel to the axes of the hinges of said door and said shaft in such a position that one of its arms is approximately parallel to the crank-arm on the 110 shaft, a link connecting said crank-arm and said bell-crank arm at approximately a right angle to each, a rod having one end pivotally 115 connected to the second arm of said bell-crank normally in approximately a straight line therewith, the opposite end of said rod being 120 connected to mechanism which engages the car-door which is to be moved, a roller carried by said rod and a cam-track on which said 125 roller is adapted to travel as the door is opened or closed, said cam being so shaped that when 130 the load-door is closed the roller is on a portion of the track so shaped as to assist in locking the foregoing door and mechanism as described.

5. In a car, having a longitudinal girder or 115 girders a plurality of cross-bearers intersecting the same and a plurality of normally load-carrying floor-doors between the cross-bearers pivoted on axes parallel to the longitudinal 120 center line of the car a shaft running lengthwise of the car journaled on the cross-bearers near the door-hinges, a pair of crank-arms 125 each with a common crank-pin between them on said shaft, between each pair of cross-bearers, where there is a floor-door to be 130 moved; a bell-crank pivoted on each cross-bearer with one arm adjacent to the crank-arms on said shaft, a link connecting said crank-pin and said crank-arm, a shaft bodily movable crosswise of the car below the door

to be opened and closed, rollers on said shaft bearing on the under side of the floor-door, other rollers on said shaft adapted to travel in a cam, a cam for said last-mentioned rollers mounted below the plane of said car-floor and a rod connected to the second arm of said bell-crank and to said shaft, said second bell-crank arm and said rod being in approximately a straight line when the door is closed.

6. In a car, having a longitudinal girder or girders a plurality of cross-bearers intersecting the same and a plurality of normally load-carrying floor-doors between the cross-bearers pivoted on axes parallel to the center line of the car; a shaft running lengthwise of the car journaled on the cross-bearers near the door-hinges, two pairs of crank-arms each with a common crank-pin between them on said shaft between each pair of cross-bearers where there is a floor-door to be moved; a bell-crank pivoted on the cross-bearers with one arm approximately parallel to the adja-

cent crank-arm upon the shaft a link connecting said crank-pins and bell-crank arms at approximately a right angle to each, a shaft bodily movable crosswise of the car below the door to be operated, rollers on said shaft bearing on the under side of said floor-door, other rollers on said shaft adapted to travel in a cam-track, a cam-track below the plane of the car-floor in which said last-mentioned rollers are adapted to travel and a rod connected to the second arm of said bell-crank and to said shaft said bell-crank arm and said rod being in approximately a straight line when the door is closed.

In witness whereof I have hereunto subscribed my name in the presence of two witnesses.

ARGYLE CAMPBELL.

Witnesses:

CAROLYN RAFFERTY,
DWIGHT B. CHEEVER.