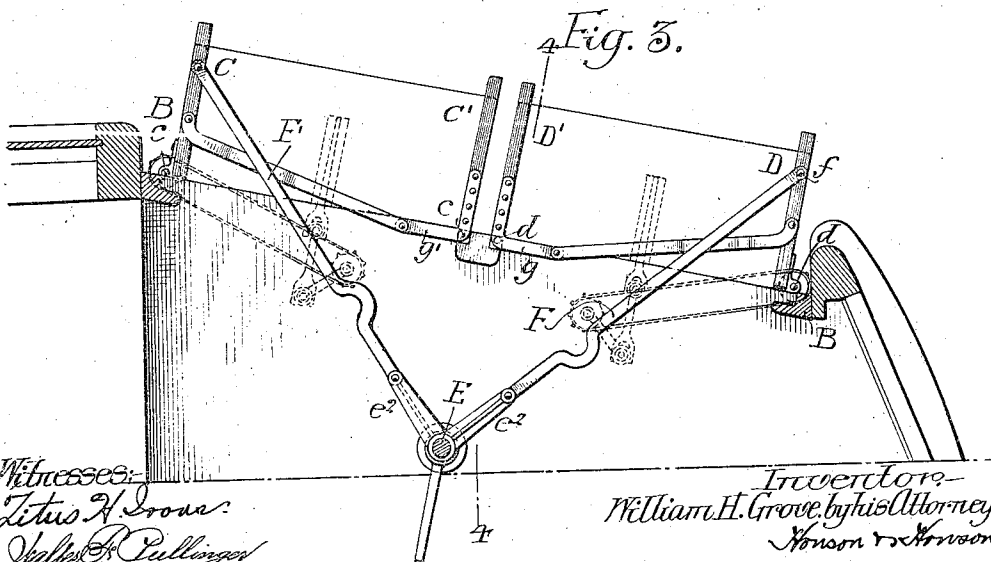
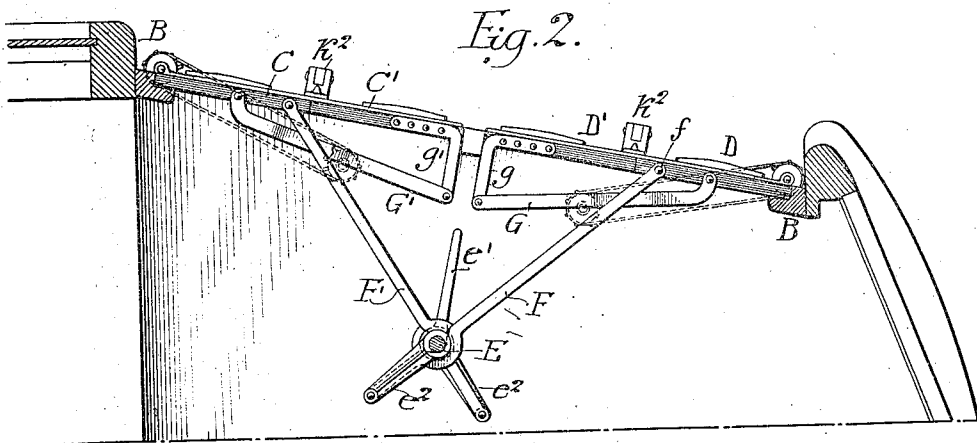
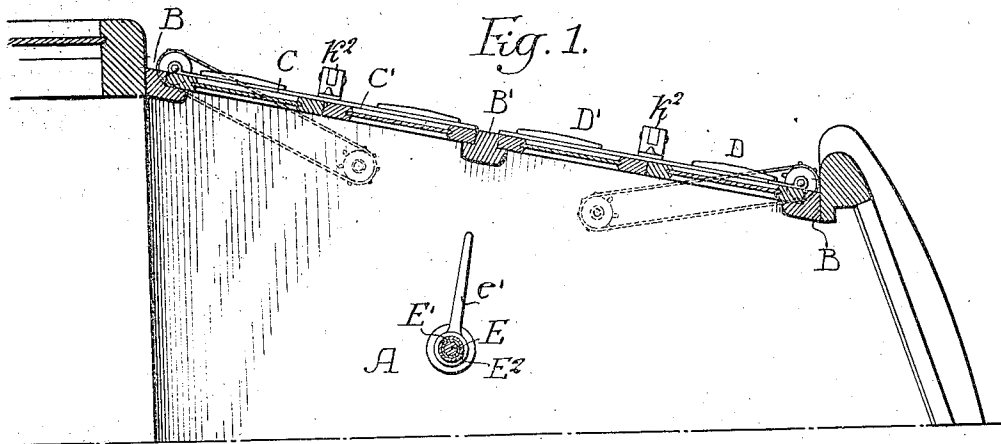


W. H. GROVE.  
 MEANS FOR OPERATING THE DOORS AND STEPS OF PASSENGER CARS.  
 APPLICATION FILED JULY 28, 1910.

993,361.

Patented May 30, 1911.

2 SHEETS—SHEET 1.



Witnesses:  
 Titus H. Brown  
 Walter A. Cullings

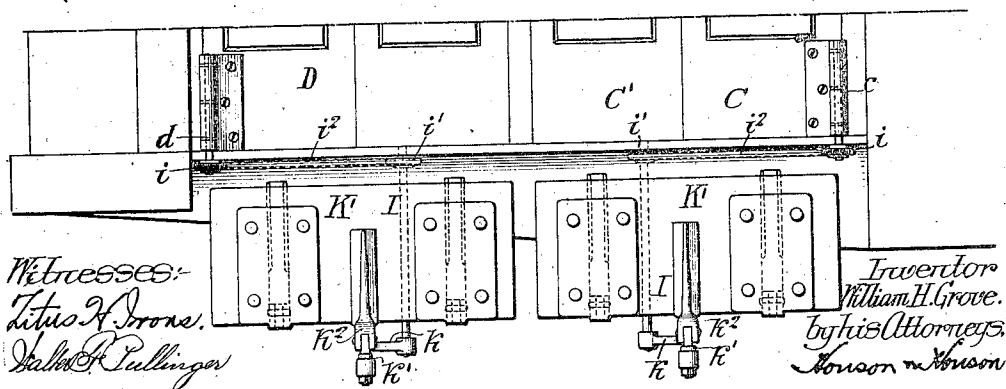
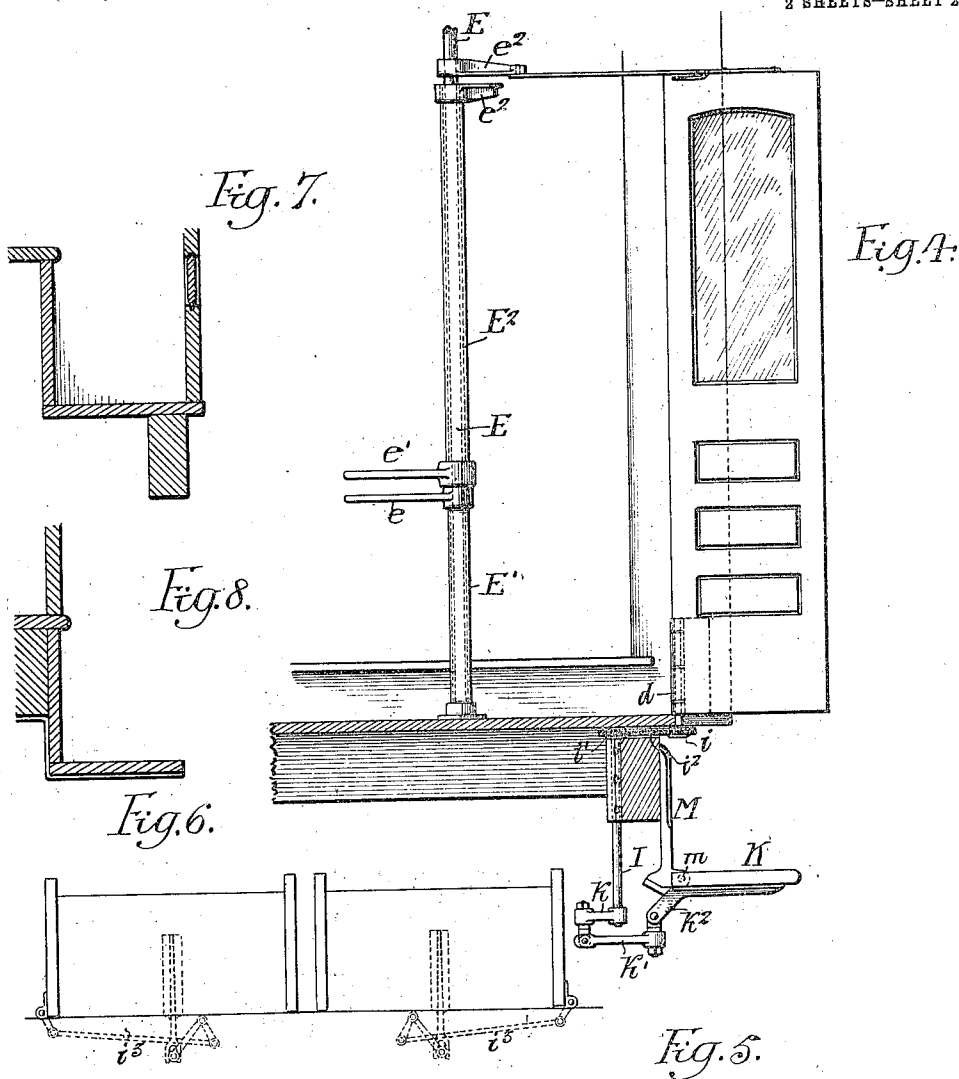
Inventor:  
 William H. Grove, by his Attorneys,  
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# UNITED STATES PATENT OFFICE.

WILLIAM H. GROVE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE J. G. BRILL COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

MEANS FOR OPERATING THE DOORS AND STEPS OF PASSENGER-CARS.

993,361.

Specification of Letters Patent.

Patented May 30, 1911.

Application filed July 28, 1910. Serial No. 574,337.

*To all whom it may concern:*

Be it known that I, WILLIAM H. GROVE, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Means for Operating the Doors and Steps of Passenger-Cars, of which the following is a specification.

The object of this invention is to provide means for operating pivoted doors at the side of platforms of passenger cars or other vehicles and to simultaneously move the steps into and out of position.

While my invention is particularly adapted for use in operating doors at the platforms of passenger cars, it will be understood that it may be used for actuating doors for other purposes without departing from the essential features of the invention. Furthermore, the door operating mechanism may be used either with or without the step mechanism.

In the accompanying drawings:—Figure 1, is a sectional plan view of a passenger car illustrating the doors at one side of the platform; the doors being in a closed position; Fig. 2, is a view similar to Fig. 1, but taken on the line at the top of the platform, showing the doors closed; Fig. 3, is a view similar to Fig. 2, showing the doors open; Fig. 4, is a sectional view on the line 4—4, Fig. 3; Fig. 5, is a side elevation of the platform, showing the steps raised out of position and the doors closed; Fig. 6, is a view illustrating a modification of the step actuating mechanism; and Figs. 7 and 8, are views of modifications illustrating my invention when the doors are used with a fixed step.

A is the platform of a car.

B is the door frame and B' is the central post of the frame.

C, C' and D, D' are the doors; one pair of doors being between one post and one side of the frame and the other being between the center post and the other side of the frame. In the present instance D, D' are the doors closing the ingress passageway and C, C' are the doors closing the egress passageway. The doors are hinged at *d, d'* and *c, c'* respectively, and are arranged to open outward as indicated in Fig. 3.

E is a vertical shaft mounted in a suitable tube E' and extending from the floor of the platform to the roof thereof. On the upper portion of the shaft is a tubular shaft

E<sup>2</sup>. On the shaft E is a hand lever *e* and on the tubular shaft E<sup>2</sup> is a hand lever *e'*. At the upper end of the shaft E is an arm *e*<sup>2</sup> connected by a link *R* to one of the doors D at *f*; the link being open to allow it to extend around the shaft E when the door is in a closed position, as in Fig. 2. On the door D' is a bracket *g* which extends inward, as shown in Fig. 2, and connecting this bracket with the door D is a link *G* which is bent at right angles where it joins the door D. By this construction when the operating lever *e* is turned it turns the shaft E and forces the door D open, and, as the door opens, the door D' will follow, as the doors are connected by the link *G*. The doors will then assume the position illustrated in Fig. 3.

The tubular shaft E<sup>2</sup> has an arm *e*<sup>2</sup> connected by a rod F' to the door C and the door C' has a bracket *g'* connected by a link *G* to the door C; this construction being similar to the link construction of the doors D, D', so that when the tubular shaft E<sup>2</sup> is turned the doors C, C' will be opened or closed. The operating levers *e, e'* also act as guards when moved in the two positions so as to separate the passengers entering and leaving the car. Fixed rails on the platforms may also be used, if found necessary, and these rails may be shaped in any manner desired.

On the pivot *d* of the door D is a sprocket wheel *i* and on a shaft I on the underside of the platform is a sprocket wheel *i'*. Extending from one sprocket wheel to the other is a chain *i*<sup>2</sup>. On the end of the shaft I is a lever K connected to the arm *k'*, which is in turn connected to a projection *k*<sup>2</sup> on the underside of the step K. This step is pivoted to a bracket *m* on hangers M secured to the platform of the car. When the door is opened motion will be imparted through the chain *i*<sup>2</sup> to the shaft I and will lower the step to the position illustrated in Fig. 4. When the door is closed the step will be turned on its pivot out of operative position.

The step K' opposite the ingress passageway is operated from the door C in substantially the same manner as the step K, and the shaft I has an arm *k* connected by a link *k'* to a projection *k*<sup>2</sup> on the step K'. In place of the sprocket chain, the shafts I may be connected by rods *i*<sup>3</sup> attached to arms, as clearly shown in Fig. 6, without de-

parting from the essential features of the invention.

The doors may be used without the folding steps and the steps may be either on the inside of the line of the door, as in Fig. 7, or outside the line of the door, as in Fig. 8, but I prefer to use the folding step as it makes it impossible for anyone to ride on the steps when the doors are closed.

10 I claim:—

1. The combination in a passenger car, of a platform, two pairs of doors at one side of the platform, means for independently operating each pair of doors, a movable step in front of each doorway, and means connecting said steps with the doors so that when the doors are open or closed the steps will be lowered or raised.

2. The combination in a passenger car, of a platform, two pairs of hinged doors at the side of the platform, a vertical shaft connected to one pair of doors, a tubular vertical shaft connected to the other pair of doors, operating arms on each of said shafts, a pivoted step opposite each pair of doors, means under the platform connecting each step with one of the pivots of the door so that the steps will be lowered and raised on opening and closing the doors.

3. The combination in a platform, of two pairs of doors at one side thereof, two vertical shafts, one mounted within the other, one of said shafts being connected to one pair of doors and the other shaft being connected to the other pair of doors, and a step opposite each door, each step being hinged, a connection between each step and the pivot of one door of each pair so that on opening and closing the door the step will be lowered and raised.

4. The combination in a passenger car of a platform, a pair of doors at the side of the platform, means for opening and closing said doors, a sprocket wheel on the pivot of one of said doors, a pivoted step at the front of said doors, a vertical shaft connected to said step, a sprocket wheel on said shaft, and a chain passing around said sprocket wheels so as to lower and raise the step when the doors are opened and closed.

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

WM. H. GROVE.

Witnesses:

WALTER S. ADAMS,  
THEODORE N. GRASER.