L. I. GREGG & E. A. DE VOSS.

AUXILIARY CAR STEP.

APPLICATION FILED SEPT. 18, 1909.

969,362.

Patented Sept. 6, 1910.

2 SHEETS—SHEET 1.

Fig. 2.

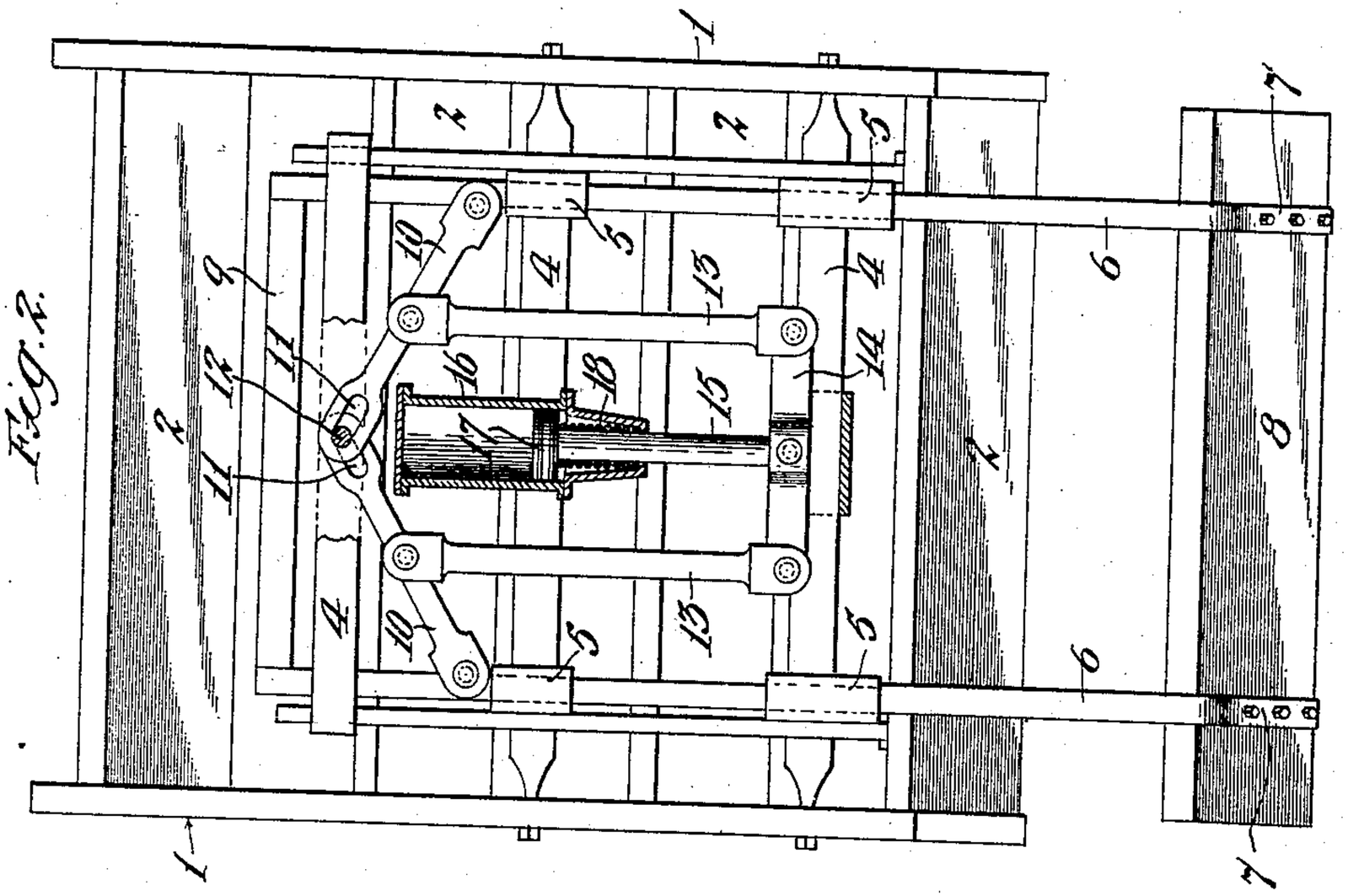
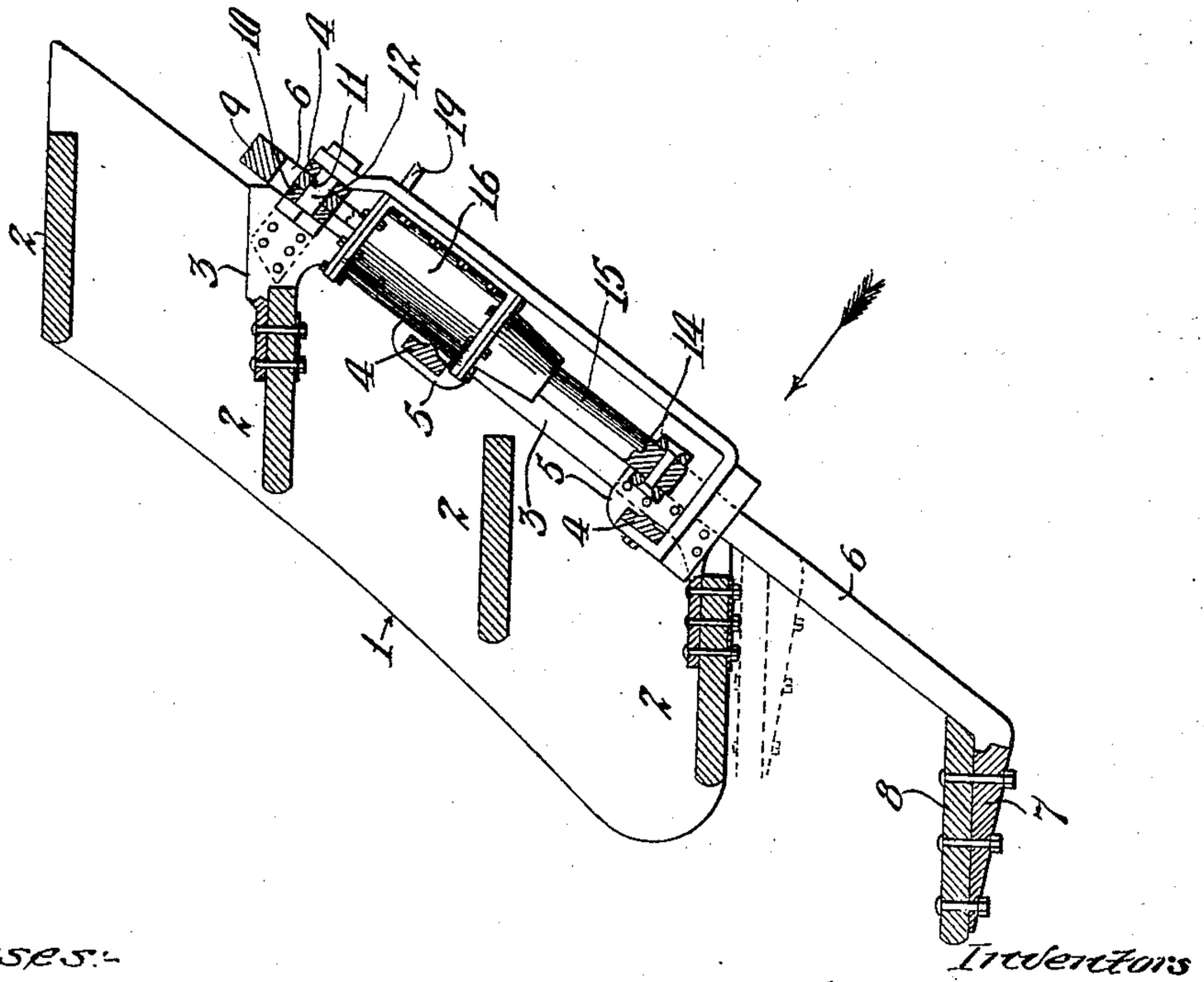


Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 3.

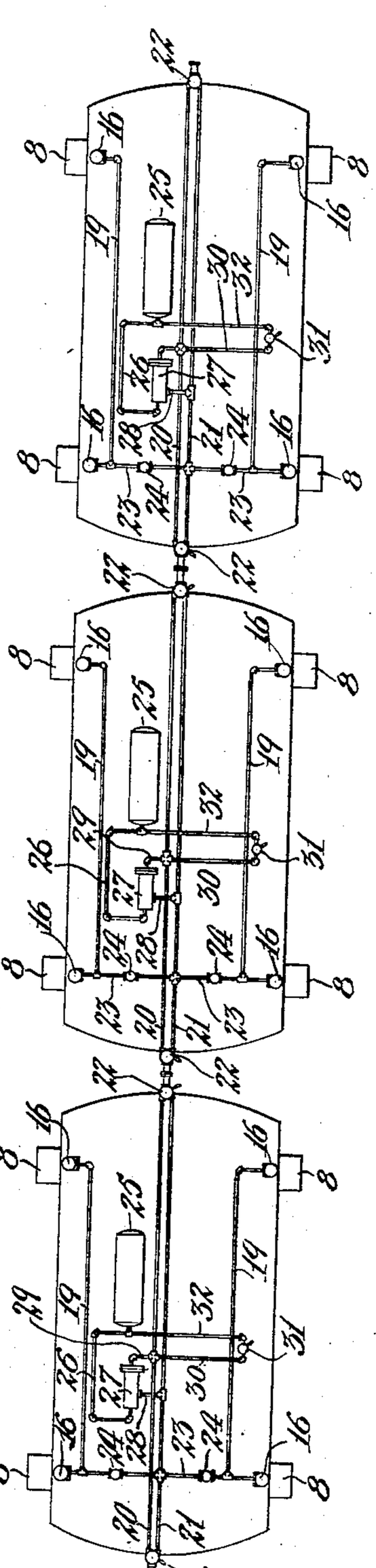


Fig. 5.

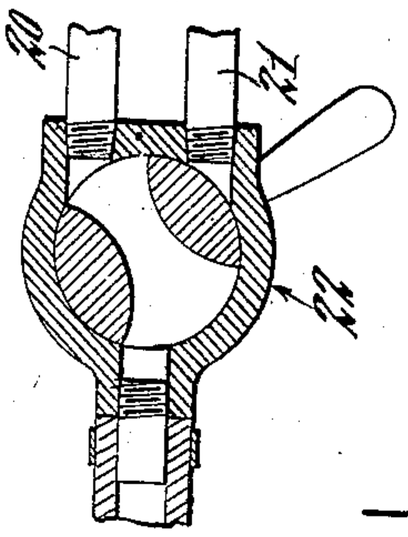


Fig. 6.

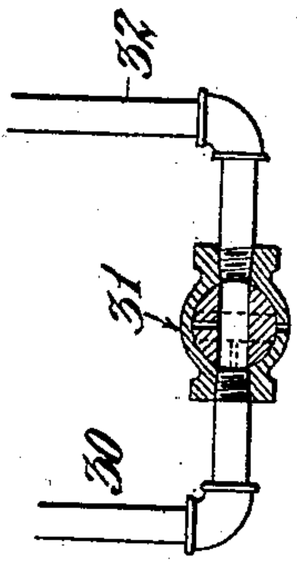
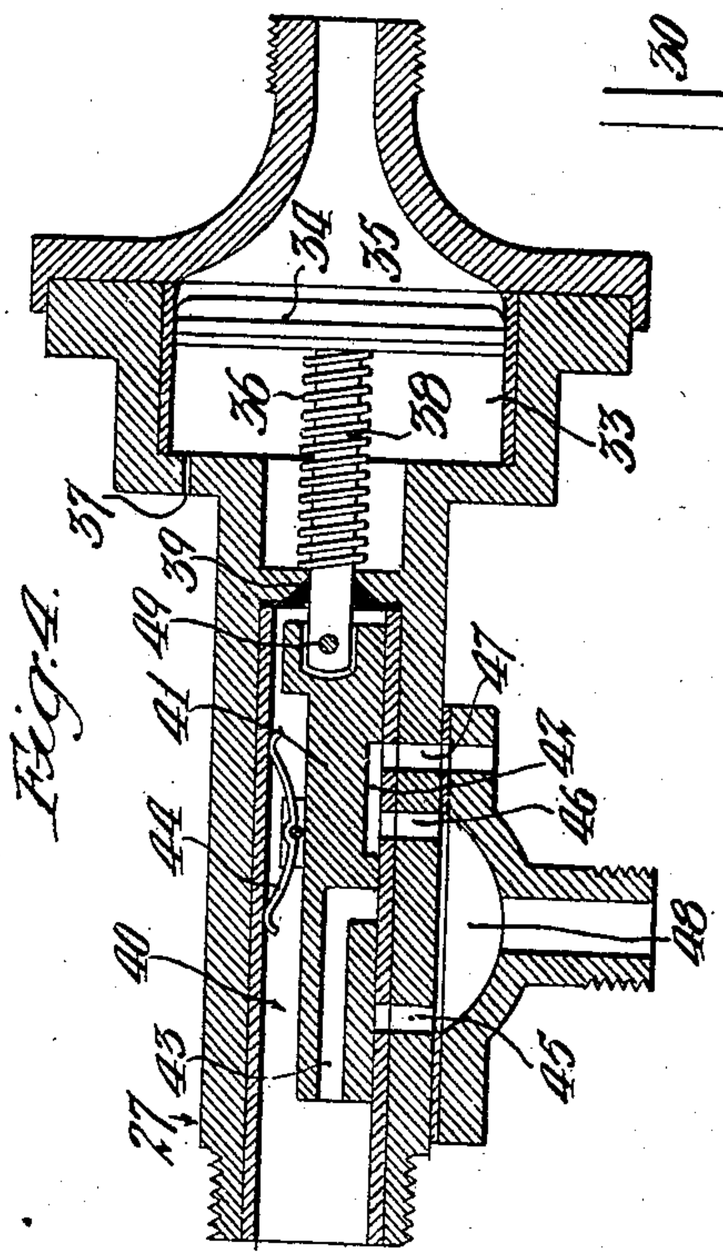


Fig. 4.



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UNITED STATES PATENT OFFICE.

LOUISE I. GREGG, OF SANTA MONICA, AND EDWIN A. DE VOSS, OF LOS ANGELES, CALIFORNIA.

AUXILIARY CAR-STEP.

969,362. Specification of Letters Patent. **Patented Sept. 6, 1910.**

Application filed September 18, 1909. Serial No. 518,434.

To all whom it may concern:

Be it known that we, LOUISE I. GREGG, a citizen of the United States, residing at Santa Monica, and EDWIN A. DE VOSS, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Auxiliary Car-Step, of which the following is a specification.

This invention relates to auxiliary car steps and the object of the invention is to provide auxiliary steps in addition to the regular steps of a car, which extra or auxiliary steps may be raised or lowered as occasion requires and to accomplish the raising and lowering of the steps by compressed air, so that by the simple manipulation of a valve all steps on either one or both sides of a car or train may be lowered when the train comes to a stop at a station, and by another turn of the valve the steps may all simultaneously be raised.

Referring to the drawings: Figure 1 is a vertical section through the regular steps showing an auxiliary step and its operating mechanism attached to the regular steps with the auxiliary step shown in its lower or extended position. Fig. 2 is an elevation looking toward the step shown in Fig. 1 in the direction of the arrow in Fig. 1. Fig. 3 is a diagrammatic view of a train with three cars showing the piping and connections. Fig. 4 is a cross section through the operating valve. Fig. 5 is a detail view of the two-way valve. Fig. 6 is a sectional view through the manually operated valve.

Referring to Figs. 1 and 2, 1 designates the stiles of the regular steps to which are attached treads 2. Secured to two of the treads 2 is a frame 3 which is provided with cross arm 4. At the end of each cross arm 4 is a guide 5 and mounted in each pair of guides 5 is a step bar 6. The lower end of each step bar 6 is provided with a foot 7 and secured thereto is an auxiliary step or tread 8. The step bars 6 are adapted to be moved longitudinally in the guides 5 to extend the auxiliary step 8 into the position shown in Fig. 1 or to raise the same underneath the lower step 2 into the position shown in dotted lines in Fig. 1. A cross bar 9 connects the upper ends of the step bars.

Pivotally connected to each step bar 6 near its upper end is an arm 10, both arms 10 being slotted at 11 and slidably engaging a stationary bolt 12. Pivotally secured to the arms 10 are two links 13, the lower end of each link 13 being pivotally secured to a yoke 14, the latter being fixed at the lower end of a piston rod 15 which extends through the tapered end of a cylinder 16, the cylinder 16 being secured to the frame 4. At the upper end of the piston rod 15 is a piston 17 and a coil spring 18 is interposed between the lower end of the cylinder and the piston 17, the spring 18 being strong enough to normally hold the piston 17 elevated with the step 8 raised under the lower step 2, so that as the car travels along the step 8 will not strike against stones or obstacles near the track. Communicating with the upper portion of each cylinder 16 is a pipe 19.

As indicated diagrammatically in Fig. 3, each car is provided with four sets of auxiliary steps designated at 8, each cylinder being diagrammatically indicated at 16 and the two cylinders 16 on each side of the car are connected by a pipe 19.

Extending longitudinally along each car are two pipes 20 and 21 which are connected at each end by a two-way valve 22, shown in detail in Fig. 5. A branch pipe 23 connects each pipe 21 with the pipes 19 and two valves 24 are located in the pipe 23 one one each side of the car for the purpose of shutting off air to either side of the car in case it is not desired to work the steps on both sides. When both valves 24 are opened the steps on both sides of the car will be operated.

25 designates a reservoir holding compressed air which is connected by a pipe 26 with one end of an operating valve 27. A pipe 28 connects another point of the operating valve 27 with the pipe 21. A pipe 29 connects another point of the valve 27 with the pipe 20 and a branch pipe 30 leads from the pipe 20 to a valve 31 and a branch pipe 32 leads from the reservoir 25 to the valve 31.

The operating valve 27 shown in detail in Fig. 4 comprises a piston chamber 33 in which is a piston 34, on one side of which is a chamber 35, and the piston is normally held at the extreme end of its stroke closing the passage 35 by means of a coil spring 36. The cylinder 33 has atmospheric communication through a port 37. A piston rod 38 extends from the piston 34 through a stuffing

box 39 into a valve chamber 40 within which is a slide valve 41 having a passage 42 and a passage 43, the valve 41 being held against its seat by a curved spring 44. The valve chamber 40 is provided with ports 45, 46 and 47, ports 45 and 46 communicating with a chamber 48 and port 47 communicating with the atmosphere. The end of the valve chamber 40 is open and communicates with the pipe 26. The chamber 48 communicates with the pipe 28 and the chamber 35 communicates with the pipe 29.

The operation of the device is as follows: The steps are normally all held raised by the respective springs 18, no air being admitted to the cylinders 16 as each cylinder valve 41 stands in the position shown in Fig. 4, shutting off communication between chambers 40 and 48. When it is desired to operate the steps of a car, the valve 31 is opened which permits air to pass from tank 25 through pipe 32, through valve 31, to pipe 30, to pipe 29, and to chamber 35, whereupon it moves piston 34 to the left, sliding valve 41 to the left with it, and placing port 43 in register with port 45, whereupon compressed air passes from tank 25, through pipe 26 into chamber 40, through ports 43 and 45 into chamber 48, thence through pipe 28 to pipe 21 and from pipe 21 through pipes 23 and pipes 19 to the respective cylinders 16, thereby depressing pistons 17 and lowering the steps through the mechanism previously described. As air thus passes from pipe 21 to pipes 23 it also flows from pipe 21 through the two-way valve 22 and thence to the next car where it enters pipe 20 at the two-way valve 22 and flows through pipe 20 to the pipe 29 of the second car and thence from pipe 29 to the chamber 35 and operates piston 34 of the second car, thereby actuating valve 27 of the second car in a manner similar to the first car and thus lowering the steps on the second car also. And from the second car air passes also through the pipe 21 to the two-way valve 22 to the third car and operates the valve 22 of the third car in the manner just described for the second car. Thus, by opening the valve 31 of one car the steps will be lowered on the series of cars in succession. Should any of the cars be reversed in position from that shown in Fig. 3, the two-way valves of that car should be reversed, so that pipe 20 of that car will be in communication with pipe 21 of the adjoining cars. If it should be desired to operate the steps only on one side of the train, the valves 24 on the side it is not desired to operate them should be closed so that air will be prevented from passing to the cylinders 16 on the side that it is desired not to operate the steps. After the steps have been lowered in the manner described, they may be restored by closing valve 31, so that air can escape through valve 31 to the atmosphere, thereby removing pressure in pipe 30 and thus relieving pressure against valve 34, whereupon spring 36 moves piston 30 to the right and thus moving slide valve 41 to the right and closing port 45 and placing chamber 48 in communication with the atmosphere, thus allowing air to escape from pipes 19 to pipe 23, to pipe 21, to pipe 28, to chamber 48 and ports 46 and 47, to the atmosphere, thereby permitting springs 18 to expand and raise the steps 8 into position shown in dotted lines in Fig. 1. At the same time that valve 31 is open, air is also allowed to escape from pipe 20 to pipe 30 thence to atmosphere through valve 31.

It is preferred to connect the piston rod 38 with the slide valve 41 by a pivotal connection 49 to permit the slide valve 41 to accommodate itself to a perfect fit with its seat in chamber 40.

What we claim is:

1. In combination with a car and its regular steps, a frame secured to the regular steps, step bars slidable on said frame, an auxiliary step formed on said step bars, a cylinder connected to said frame, a piston in the cylinder, a piston rod extending from the piston, a yoke formed on the piston rod, links connected to said yoke, a pair of arms pivoted to the step bars, said links being pivotally connected to said arms, said arms being slotted, a stationary pin engaging the slotted portion of said arms, and means for supplying compressed air to said cylinder.

2. In combination with a car and its regular steps, a frame secured to the regular steps, step bars slidable on said frame, an auxiliary step formed on said step bars, a cylinder connected to said frame, a piston in the cylinder, a piston rod extending from the piston, a yoke formed on the piston rod, links connected to said yoke, a pair of arms pivoted to the step bars, said links being pivotally connected to said arms, said arms being slotted, a stationary pin engaging the slotted portion of said arms, means for supplying compressed air to said cylinder and exhaust compressed air from the cylinder, and a spring for returning said piston.

3. In combination with a car and its regular steps, an auxiliary step associated with the regular steps, a pneumatic device for moving said auxiliary step with relation to the regular steps, a valve for controlling admission of air to said pneumatic device, said valve comprising a valve chamber with a slide valve therein formed with ports 43 and 42, said valve chamber being formed with ports 45, 46 and 47, a piston in said valve casing connected with the slide valve for operating the latter, a spring for actuating said piston in one direction, a compressed air supply on the car, a pipe 26 lead-

ing from the compressed air supply to said valve chamber, pipes 28, 21, 23 and 19 leading from ports 45 and 46 to said pneumatic device, the pressure side of said piston having connection with said air supply, and a valve 31 in the latter connection.

4. In combination with a car and its regular steps, an auxiliary step associated with the regular steps, a pneumatic device for moving said auxiliary step with relation to the regular steps, a valve for controlling admission of air to said pneumatic device, said valve comprising a valve chamber with a slide valve therein formed with ports 43 and 42, said valve chamber being formed with ports 45, 46 and 47, a piston in said valve casing connected with the slide valve for operating the latter, a spring for actuating said piston in one direction, a compressed air supply on the car, a pipe 26 leading from the compressed air supply to said valve chamber, pipes 28, 21, 23 and 19 leading from ports 45 and 46 to said pneumatic device, the pressure side of said piston having connection with said air supply, a valve 31 in the latter connection, a pipe 20 communicating with the latter connection, and a two-way valve 22 at each end of the car between the pipes 20 and 21.

5. In combination with a car and its regular steps, an auxiliary step associated with the regular steps, a pneumatic device for moving said auxiliary step with relation to the regular steps, a valve for controlling admission of air to said pneumatic device, said valve comprising a valve chamber with a slide valve therein formed with ports 43 and 42, said valve chamber being formed with ports 45, 46 and 47, a piston in said valve casing connected with the slide valve for operating the latter, a spring for actuating said piston in one direction, a compressed air supply on the car, a pipe 26 leading from the compressed air supply to said valve chamber, pipes 28, 21, 23 and 19 leading from ports 45 and 46 to said pneumatic device, the pressure side of said piston having connection with said air supply, a valve 31 in the latter connection, a pipe 20 communicating with the latter connection, a two-way valve 22 at each end of the car between the pipes 20 and 21, and a valve 24 in each pipe 23 between pipes 19 and 21.

6. Car step operating apparatus comprising a plurality of auxiliary steps for the respective cars, pneumatic means for operating the respective auxiliary steps, a compressed air supply and connections therefrom to the pneumatic operating means, a pneumatically operated valve for each car for controlling the admission of air through the connections to the associated pneumatic operating means, a manually operated valve for controlling admission of air to one of said pneumatically operated valves, and a connection controlled by and extending from the latter valve to another of said pneumatically operated valves for conducting air to the latter valve when the first one operates.

In testimony whereof, we have hereunto set our hands at Los Angeles, California, this 11th day of September, 1909.

LOUISE I. GREGG.
EDWIN A. DE VOSS.

In presence of—
P. H. SHELTON,
FRANK L. A. GRAHAM.