R. W. & L. R. BALCH.

CAR STEP REGISTER.

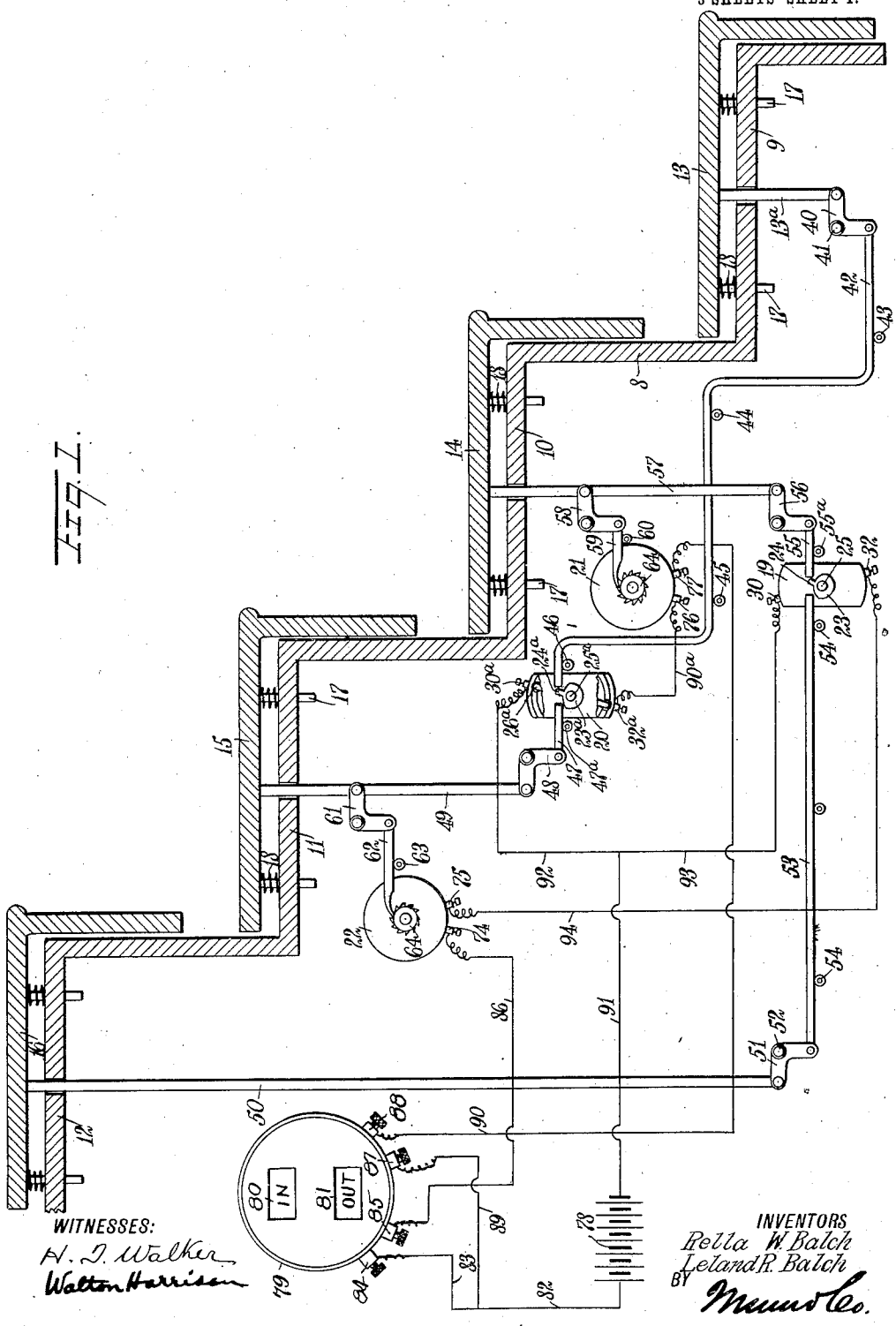
APPLICATION FILED AUG. 20, 1910.

1,005,681.

Patented Oct. 10, 1911.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

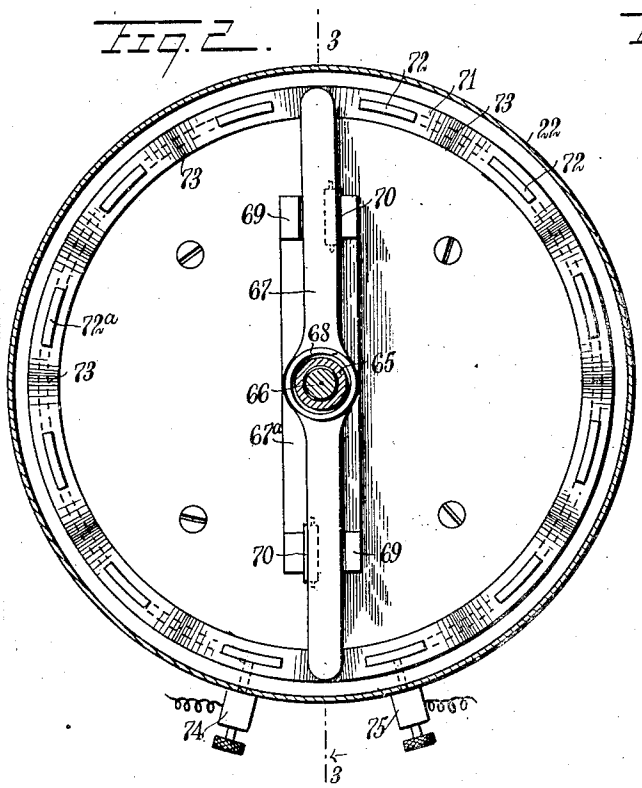


Fig. 3.

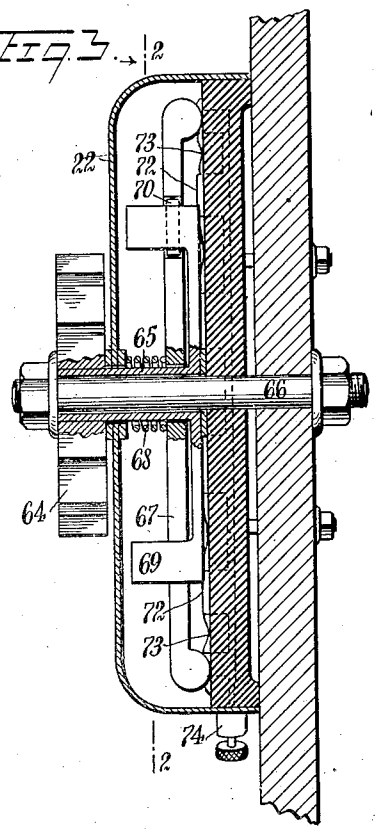
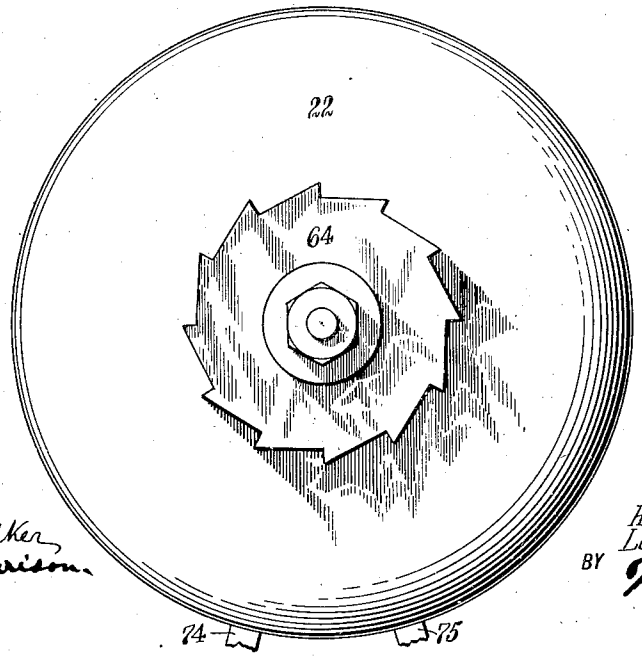


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

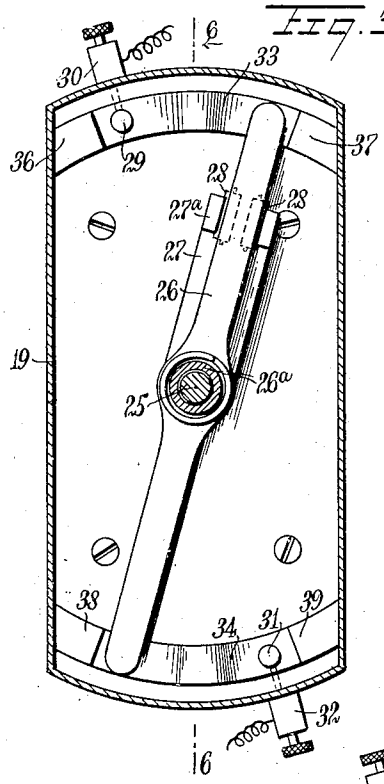


Fig. 6.

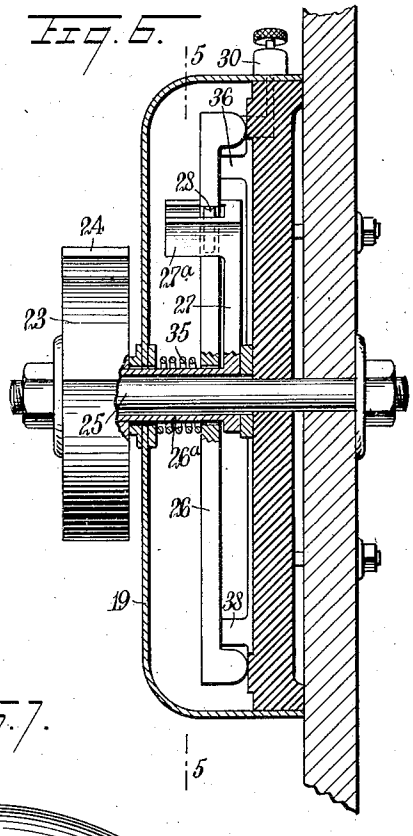
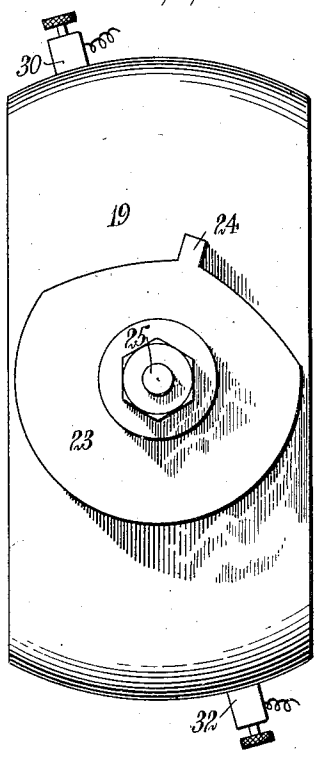


Fig. 7.



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UNITED STATES PATENT OFFICE.

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CAR-STEP REGISTER.

1,005,681. Specification of Letters Patent. Patented Oct. 10, 1911.

Application filed August 20, 1910. Serial No. 578,104.

To all whom it may concern:

Be it known that we, RELLA W. BALCH and LELAND R. BALCH, both citizens of the United States, and residents of Neillsville, in the county of Clark and State of Wisconsin, have invented a new and Improved Car-Step Register, of which the following is a full, clear, and exact description.

Our invention relates to car step registers of the kind used more particularly for counting the number of passengers or other persons passing along a given path.

Our invention comprehends more particularly an electric system including counting mechanism for registering the number of persons passing in each of two directions, yet maintaining the registry of those passing in one direction separate from those passing in the opposite direction over the same route, this result being accomplished by aid of the same mechanism.

More particularly stated, our invention comprehends a number of steps provided with depressible platforms, these platforms being too narrow to accommodate more than one person at a time, and electric indicating mechanism connected with the various platforms and controllable by movements of the same for the purpose of counting or indicating the persons depressing the platforms with their feet as the persons move along.

Our invention further comprehends arranging the mechanism just mentioned so that when a person depresses one or two of the platforms and then retraces his steps, no indication will be recorded. If, however, the person depresses a predetermined larger number of steps, his passage will be registered and if he then retraces his steps another indication will be made signifying his return.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a view partly in section and partly diagrammatic, showing our improved device in its entirety; Fig. 2 is a detail showing the construction of the switch 22, the view being taken on the line 2—2 of Fig. 3, looking in the direction of the arrow; Fig. 3 is a section on the line 3—3 of Fig. 2, looking in the direction of the arrow; Fig. 4 is an elevation of the switch shown in Figs. 2 and 3; Fig. 5 is a detail showing another electric switch forming a part of our apparatus; Fig. 6 is a view of the same switch, being a section on the line 6—6 of Fig. 5, looking in the direction of the arrow; and Fig. 7 is an elevation of the switch, shown in Figs 5 and 6.

A stairway 8 comprises terraces 9, 10, 11, 12, and over these are disposed depressible platforms 13, 14, 15, 16, hereinafter referred to as steps. Each step is provided with guide pins 17 rigidly connected with it and extending through holes in the terraces below the platform. Spiral springs 18 encircle the guide pins 17 and are compressed whenever a passenger steps upon the platform.

At 19, 20 are electric switches made substantially alike and used for controlling the distribution of electric currents, as hereinafter described, for actuating the counting mechanism. At 21, 22 are two other electric switches used also for controlling the distribution of various currents associated with the counting mechanism. The switch 19 is provided with a collar 23 having a lug 24 integral therewith and extending upwardly therefrom, this collar being mounted rigidly upon a rocking shaft 25. A contact arm 26 (see Figs. 5 and 6) is mounted rigidly upon a sleeve 26^a, the latter being secured to a carriage arm 27, this carriage arm being provided with upturned lugs 27^a disposed upon opposite sides of the contact arm 26. The carriage arm 27 is further provided with rollers 28 for facilitating its freedom of motion relatively to the contact arm 26.

At 29 is a contact button which is connected with a binding post 30. At 31 is another contact button similarly connected with a binding post 32.

At 33, 34 are arcuate guide members of insulating material upon which the contact buttons 29, 31 are secured.

A spiral spring 35 presses constantly upon the contact arm 26. The arcuate members 33, 34 (see Fig. 5) are provided with shoulders 36, 37, 38, 39 which serves as limiting stops for the contact arm 26.

Mounted rigidly upon the step 13 and extending downwardly therefrom is a rod 13^a which at its lower end is suitably connected with a bell crank 40, this bell crank being journaled upon a pivot pin 41 and connected with a shifting rod 42, this shift-

ing rod being bent into a general conformity somewhat analogous to that of the stairway 10 and rests upon rollers 43, 44, 45, 46. The shifting rod 42 is so arranged that when the step 13 is depressed, so as to rock the bell crank 40, the shifting rod as a whole is moved slightly to the left according to Fig. 1. Another shifting rod 47 rests upon a roller 47ª and is pivoted to the lower end of a bell crank 48. This bell crank is pivotally connected with a rod 49 which is connected with the step 15 and like the rod 13ª extends vertically through the stairway. Connected with the step 16 and extending downwardly therefrom through a hole in the stairway is a long rod 50 which at its lower end is pivotally connected with the bell crank 51, the latter being journaled upon a pin 52. A shifting rod 53 is pivotally connected with the lower portion of the bell crank 51 and rests upon rollers 54. One end of the shifting rod 53 is adjacent to the lug 24 and by pressing this lug to the right may cause the collar 23, and consequently the contact arm 26 (see Fig. 5), to rock to the right. A shifting rod 55, by pressure against the opposite side of the lug 24, may cause this lug and parts controllable by it to move to the left.

The shifting rod 55 engages an antifriction roller 55ª and is pivotally connected with a bell crank 56. A rod 57 is pivotally connected with this bell crank and extends upwardly from it to the step 14. Another bell crank 58 is pivotally connected with the rod 57. A pawl 59 is pivotally mounted upon the bell crank 58 and engages an anti-friction roller 60. A bell crank 61 is pivotally connected to the rod 49 and is also pivotally connected with a pawl 62, the latter resting upon an antifriction roller 63. The pawl 62 engages a ratchet wheel 64 forming part of the electric switch 22 and used for actuating the latter.

The ratchet wheel 64 is mounted rigidly upon a revoluble sleeve 65 (see Figs. 2, 3), this sleeve encircling a center pin 66 extending entirely through the switch 22 and its ratchet wheel 64. Mounted upon the sleeve 65 is a contact arm 67. A spiral spring 68 engages the contact arm and presses constantly against it. A carriage arm 67ª is disposed parallel with the contact arm 67 and is provided with upturned lugs 69, the latter being located upon opposite sides of the contact arm.

At 70 are rollers for promoting a limited freedom of movement as between the contact arm 67 and the carriage arm 67ª.

A ring 71 of insulating material is studded with stationary contact members 72 of arcuate form, these contact members being metallically connected together and separated at the surface from each other, as indicated in Fig. 2. The ring 71 is provided with depressions 73 disposed intermediate the contact points 72, as will be understood from Fig. 3. The arrangement of the parts is such that whenever the ratchet wheel 64 is turned step by step in a contraclockwise direction according to Figs. 2 and 4, the contact arm 67 moves step by step from one of the depressions 73 to the next depression 73, and in so doing momentarily engages and disengages one of the contact members 72. Each successive movement of the contact arm 67, therefore, brings it momentarily into engagement at its opposite ends with two of the contact members 72, 72ª, and then immediately breaks the said engagement so as to leave the ends of the contact arm insulated from the adjacent contact members.

At 74, 75 are binding posts which are respectively in communication with the contact members 72ª, 72, as will be understood from Fig. 2.

The switch 21 (see Fig. 2) is of the same construction as the switch 22 and therefore need not be described in detail. It is actuated by aid of the pawl 59 and is provided with two binding posts 76, 77.

At 78 is a battery and at 79 is an indicator which is provided with two distinct counting mechanisms 80, 81 provided respectively with legends "In" and "Out", the counting mechanism 80 being used for registering all passengers who go up the steps and the counting mechanism 81 registering all passengers who go down the steps. The counting mechanisms being of the usual construction employed where counters are to be operated electrically, need not be described in detail.

Connected with the battery 78 is a wire 82 and connected with the latter is a wire 83 which leads to a binding post 84 upon the counting mechanism 80. This counting mechanism is provided with another binding post 85 from which a wire 86 leads to the binding post 74 of the switch 22. The counting mechanism 81 is provided with binding posts 87, 88. A wire 89 is connected with the binding post 87 and with the wires 82, 83. A wire 90 is connected with the binding post 88 of the counting mechanism 81, and also with the binding post 77 of the switch 21. A wire 91 is connected with the battery 78 and with wires 92, 93. The wire 93 leads to the binding post 30 of the switch 19 and the wire 92 leads to the switch 20. This switch being substantially like the switch 19 will not be described. The wire 92 leads to a binding post 30ª of the switch 20, this binding post being like the binding post 30 of the switch 19 except that it is located upon the opposite side of the switch.

The switch 20 is provided with a collar 23ª, a lug 24ª, a center pin 25ª, a contact arm 26ª, a stationary contact button 29ª and

a binding post 32^a, these parts corresponding substantially to the collar 23, lug 24, center pin 25^a, contact arm 26, contact button 29, and binding post 32 of the switch 19. The difference is that in the switch 20 the binding posts 30^a, 32^a are located upon the opposite side of the casing from the binding posts 30, 32 in the switch 19, and the contact buttons 29^a, 31^a are positioned accordingly. When the lug 24^a of the switch 20 is rocked to its extreme position to the right—that is, in a clockwise direction according to Fig. 1—the contact arm 26^a connects the binding post 32^a with the binding post 30^a, and when the lug 24^a is rocked in a contraclockwise direction electrical communication is broken through the switch 20. With the switch 19 the action is quite similar to that just described for the switch 20. When the lug 24 is rocked to the left communication is established from the wire 93 to wire 94; whereas, when the lug 24 is rocked to the right electrical communication through the switch 19 is broken.

The operation of our device is as follows: When the various parts are in their normal position of inactivity, they appear as indicated in Fig. 1. All of the steps 13, 14, 15, 16 are now raised into their uppermost positions. Each step is thus wide enough to accommodate a single passenger at a time, and it is presumed that not more than one passenger is upon the steps at a single moment. If the passengers crowd each other, and especially if two passengers get upon the same step at the same time, the registration of the number of passengers will be only approximate. If, however, as is usually the case, passengers going up or down the steps act one at a time, the device will register all of those going up and will separately register all of those coming down. Suppose that the device is used in connection with a railway car. In this case the indicator 79 will register the number of persons who leave the car and walk down the steps, and will also register the exact number of persons who go up the steps and enter the car. We will first follow the cycle of operations taking place when a passenger goes up the steps to enter the car. In ascending he first places his weight upon the step 13. This depresses the step in question and through agency of the rod 13^a causes the bell crank 40 to rock slightly in a clockwise direction according to Fig. 1. The shifting rod 42 is thus moved slightly to the left, a result easily accomplished because the shifting rod rests upon the antifriction rollers 43, 44, 45, 46. This movement of the shifting rod turns the lug 24^a slightly in a contraclockwise direction and this shifts the position of the contact arm 26^a in the same direction, and the switch 20 is thus left open. The passenger next places his weight upon the step 14, depressing the latter. This causes the bell crank 58 to rock slightly in a clockwise direction and force the pawl 59 slightly to the left, thereby turning the ratchet wheel 64 one step in a contraclockwise direction. Referring now to Fig. 2, it will be seen that in doing this the contact arm 67 is shifted one step in a contraclockwise direction, the result being that communication is momentarily established between one of the contact members 72^a and one of the contact members 72, communication being instantly broken. That is to say, the contact arm 67 makes a so-called "wiping contact" between two contact members, thereby momentarily establishing metallic communication through the switch 21 as a whole. Depression of the step 14 also causes the bell crank 56 to rock in a clockwise direction so that the shifting rod 55 pushes the lug 24 to the left and thus closes the switch 19. The successive depression of the steps 13, 14 alone, however, is not sufficient to establish any electrical communication whatever between the counting mechanism 79 and the battery 78. This is because the depression of the step 13 merely opens the switch 20 and depression of the step 14 merely closes the switch 21 for a moment and leaves the switch 19 closed. No complete circuit can now be traced. The passenger now places his weight upon the step 15, thereby depressing it and causing the rod 49 to descend. This rocks the bell crank 61 slightly in a clockwise direction and the bell crank 48 in a contraclockwise direction. The result is that the ratchet wheel 64 of the switch 22 is turned one step in a contraclockwise direction, thereby causing the mechanism of the switch 22 (see Fig. 2) to momentarily establish and immediately break metallic communication between the wires 86 and 94. The rocking movement of the bell crank 48 in a contraclockwise direction causes the lug 24^a to move to the right, thereby closing the switch 20 and leaving it closed. The following circuit is now completed: battery 78, wire 91, wire 93, binding post 30, switch arm 26 (now occupying its extreme position in a contraclockwise direction), binding post 32, wire 94, switch 22 (closed momentarily only while step 15 is depressed), wire 86, binding post 85, counting mechanism 80, binding post 84, wire 83, wire 82, back to battery 78. This causes the counting mechanism to register one passenger going in. The passenger next places his weight upon the step 16, and by so doing causes the bell crank 51 to rock slightly in a contraclockwise direction. This movement causes the shifting rod 53 to turn the lug 24 to the right or in a clockwise direction, thereby restoring it to its normal position. Any number of passengers going into the car simply cause the

mechanism to repeat the cycle of operations above described, the result being that each passenger is registered.

Suppose, now, that a passenger leaves the car and walks down the steps. In doing this he places his weight upon the step 16. This causes the bell crank 51 to rock in a contraclockwise direction and move the shifting rod 53 to the right. This is usually an idle movement, as the lug 24 is generally at the right. The passenger next places his weight upon the step 15. This rocks the bell crank 61 in a clockwise direction and the bell crank 48 in a contraclockwise direction, the net result being that the switch 22 is momentarily closed and then left open and the switch 20 is left closed. No circuit can yet be traced. The weight of the passenger now being shifted to the step 14, the rod 57 is depressed and the bell cranks 58, 56 are each rocked in a clockwise direction. The result of this movement is that the switch 21 is momentarily closed and then left open, the switch 19 being closed and so remaining. The following circuit is now completed: battery 78, wire 91, wire 92, binding post 30^a, contact arm 26^a (switch 20 now closed), binding post 32^a, wire 90^a, binding post 76 (switch 21 closed for a moment only), binding post 77, wire 90, binding post 88, counting mechanism 81, binding post 87, wires 89, 82, back to battery 78. This actuates the indicator 79 so as to register the passenger going out. The weight of the passenger being now placed upon the step 13, the bell crank 40 is rocked in a clockwise direction, the shifting rod is moved slightly to the left, and the lug 24^a is pushed to its limit to the left, thereby opening the switch 20. If, now, another passenger goes to ascend the steps and in doing this places his weight upon the step 13, he moves the shifting rod 42 to the left, but the movement is an idle one because the lug 24^a is already in its extreme position to the left and the switch 20 is already opened. This is immaterial, however, since even if the lug 24^a were to the right the first thing accomplished by a passenger placing his weight upon the step 13 would be to cause the shifting rod 42 to move the lug 46 to the left.

From the foregoing description it will be noted that if a passenger in leaving the car merely takes two steps downward, the indicating mechanism is not affected. If, however, he takes three steps downward, the counting mechanism registers his departure. If, therefore, after merely stepping downward two steps he goes back into the car, the counting mechanism is not affected; whereas, if he takes three steps downward and then returns to the car, he is first registered as departing from the car, and second as returning thereto. Similarly, a passenger leaving the ground and starting up the steps does not affect the counting mechanism unless he reaches the third step, in which event he is registered as entering the car. If, now, he retraces his steps he is again registered as leaving the car.

Having thus described our invention, we claim as new and desire to secure by Letters Patent:

1. A car step register, comprising a plurality of depressible steps, an electric switch connected with one of said steps and adapted to be closed by the depression thereof, another electric switch connected with another of said steps and adapted to be closed by depression of the latter, an electric indicator, and a circuit including said indicator and both of said switches, said circuit being completed by the closure of both of said switches.

2. A car step register, comprising a plurality of depressible steps, an electric switch connected with one of said steps and adapted to be closed by depression thereof, a second electric switch connected with another of said steps and provided with a wiping contact to be opened and closed each time said last-mentioned step is depressed, an electrically operated indicator, an electric circuit connected with said indicator and including both of said switches, and means controllable by depression of a third step for opening said first-mentioned switch.

3. A car step register, comprising a depressible step, an electric switch to be closed by depression thereof, a second depressible step, an electric switch to be both closed and opened by movements of the latter, a third depressible step, means controllable thereby for opening said first-mentioned electric switch, an electric indicator, and a circuit connected with said indicator and with both of said switches, and controllable by the conjoint action of said switches for actuating said indicator.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

RELLA WILLIAM BALCH.
LELAND RELLA BALCH.

Witnesses:
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WM. A. CAMPMAN.