To all whom it may concern:

Be it known that I, GEORGE A. CULVER, citizen of the United States of America, and resident of Beatrice, Gage county, Nebraska, have invented new and useful Folding Car Steps, of which the following is a specification.

The object of this invention is to provide an improved construction for folding steps adapted especially for use on vestibuled railway coaches.

A further object of this invention is to provide improved folding steps for cars adapted to be lowered and raised automatically by raising and lowering the trap door.

A further object of this invention is to provide an improved construction for car steps adapted to be lowered to within a short distance of the rail level when the car door is opened, and to be folded or oscillated upwardly out of the way when the door is closed.

My invention consists in the construction, arrangement and combination of elements hereinafter set forth, pointed out in my claims and illustrated by the accompanying drawing, in which—

Figure 1 is a side elevation illustrating my improved steps in position for use on a railway car, dotted lines indicating the steps in folded or raised position. Fig. 2 is a front view of the steps in open or lowered position. Fig. 3 is a front view of the steps in folded or raised position.

In the construction and mounting of the steps as shown the numeral 10 designates generally the floor of a railway coach of any construction, supported by spaced transverse sills 11, 12, between the outer ends of which the floor is cut away in a common manner to provide space for the steps, said space being covered by a hinged trap door 13. In the embodiment illustrated I have employed a single stationary step 14 fixed to and between the sills 11, 12 at the rear of the space covered by the trap door 13, and leading down a short distance from the level of the floor 10. Bracket plates 15, 16 are fixed to the bottoms of the sills 11, 12 and extend downwardly therefrom immediately in front of the fixed step 14, and a shaft 17 is journaled for rotary oscillation in the lower extremities thereof. A flight of steps, in this instance composed of three treads and risers carried by side plates 18, 19, is mounted between the brackets 15, 16, and are fixed to and for oscillation with the shaft 17.

The steps are so constructed and arranged as to lead, when in open position, from the stationary step 14 to within about seven inches of the rail, indicated by the line 20, on which the car is standing; and when in raised or folded position to occupy more nearly a horizontal position, with the lower ends of the steps in juxtaposition to the lower margin of the vestibule door 21, indicated by dotted lines in Fig. 1; in which position the lowermost portion of the steps is about seventeen inches from the level of the rail 22.

The shaft 17 projects at one end beyond the bracket 16 and a crank arm 22 is fixed thereto. A lug 23 is fixed to the lower side of the trap door 13 adjacent the hinged margin thereof. A lug 24 is fixed to the lower side of the sill 12, and a lever 25 is fulcrumed intermediate of its ends to said lug. A link 26 pivotally connects one end of the lever 25 to the crank arm 22, and a link 27 pivotally connects the opposite end of said lever to the lug 23. Thus the folding or pivoted steps are connected to the trap door 13 in such a manner that when the door is raised to open position the steps are lowered to operative position as shown in Fig. 2; and when the door is lowered to closed position the steps are raised out of the way as shown in Fig. 3.

The sill 13 and other frame members may be slotted or cut away to provide for the free play of the lever 25 and link 27, so that they may occupy substantially the positions shown in Fig. 2.

An apron or guard 28 preferably is fixed to and projects downwardly from the frame at the rear of the pivoted steps to form a closure for the steps when in raised position, to prevent the entrance of snow and other undesirable substances to the steps.

In use this construction provides a step that reaches to a position much nearer the ground or platform than do or can the ordinary permanent steps, and in this way prevents many accidents to passengers while alighting from the car. It also obviates the use of a portable step or box such as is sometimes used, and eliminates the consequent trouble and inconvenience to the trainmen. It provides an adequate step that folds out of the way when not in use.
use, and is operated to and from position for use without any additional move or thought on the part of the attendant, in the act of operating the trap door 13. It may be added to any each without any structural changes, simply by removing the permanent steps and adding the brackets and connections.

I claim as my invention—

1. A device of the class described, comprising, in combination with a car frame, a trap door hinged thereto, a crank shaft journaled in said frame, a flight of steps fixed to said shaft, and pivotal connections between said door and crank shaft, whereby when said door is opened said steps are lowered to position for use.

2. A device of the class described, comprising a frame, a trap door pivoted thereto, a crank shaft journaled for rotary oscillation beneath said door, steps fixed to said crank shaft, a lever fulcrumed on said frame, pivotal connections between said lever and the floor, and pivotal connections between said lever and the crank shaft.

3. A device of the class described, comprising a frame, a trap door hinged thereto, a flight of steps pivoted intermediate of its ends beneath said door, and pivotal connections between said door and steps whereby said steps are in vertical position when the door is open and in substantially horizontal position when said door is closed.

4. A device of the class described, comprising a car frame, a trap door hinged thereto, a flight of steps pivoted intermediate of its ends beneath said door, a lever fulcrumed intermediate of its ends on said frame, pivotal connections between said lever and the door, pivotal connections between said lever and the steps, and an apron or guard fixed at the rear of said steps to said frame.

5. A device of the class described, comprising a car frame, a trap door hinged thereto, a crank shaft journaled for rotary oscillation in said frame, a flight of steps fixed intermediate of its ends to said shaft, a lever fulcrumed on said frame, pivotal connections between said lever and the door, and the crank shaft.

6. A device of the class described, comprising a support, an operating member hinged thereto, brackets on and extending downwardly from said support, a crank shaft journaled for rotary oscillation in said brackets, steps fixed to said crank shaft, a lever fulcrumed on the support, pivotal connections between the lever and said crank shaft, and pivotal connections between the lever and said operating member.

7. A device of the class described, comprising a support, an operating member hinged thereto, brackets on and extending downwardly from said support, a crank shaft journaled for rotary oscillation in said brackets, a flight of steps fixed intermediate of its ends to said shaft, a lever fulcrumed on the support, a link pivotally connecting one end of said lever to said crank shaft, and a link pivotally connecting the opposite end of said lever to said operating member.

8. A device of the class described, comprising a car floor, a trap door hinged thereto, a stationary step fixed at one margin of said floor beneath said door, a pair of brackets fixed to and extending downwardly from said floor, a flight of steps pivoted intermediate of its ends to said brackets and adapted to cooperate with said fixed step, an arm fixed to said pivoted steps, a lever fulcrumed on the car frame, a link pivotally connecting one end of said lever to the trap door, and a link pivotally connecting the other end of said lever to said arm.

Signed by me at Des Moines, Iowa, this thirty-first day of May, 1915.

GEORGE A. CULVER.

Witnesses:

EARL M. SINCLAIR,

R. B. DENNIS.