No. 808,076. PATENTED DEC. 26, 1905.

W. G. FELKNER & J. T. BUTLER.

FOLDING STEP FOR PUBLIC CARRIERS.

APPLICATION FILED APR. 22, 1905.

3 SHEETS—SHEET 1.

Fig. 1.

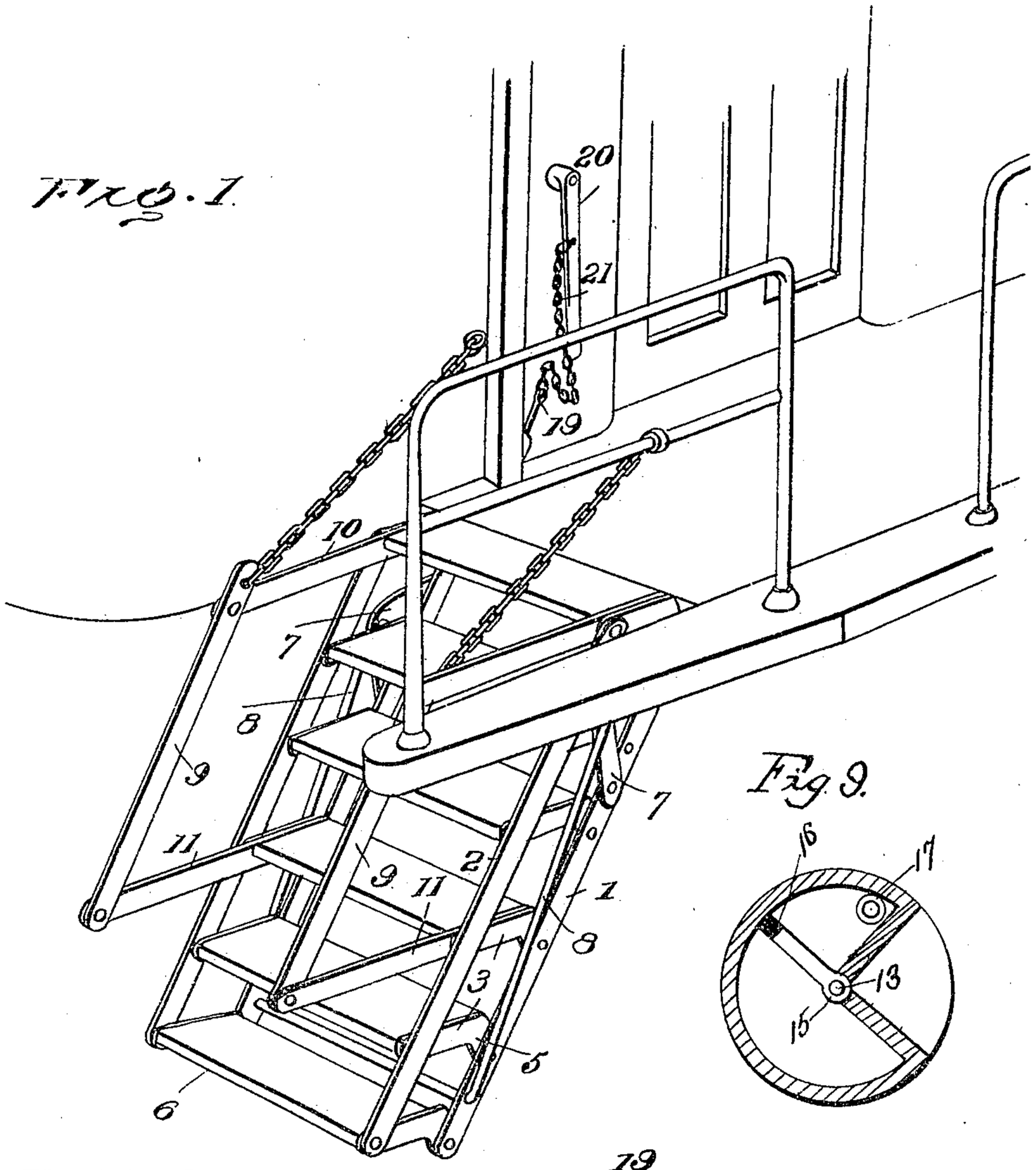
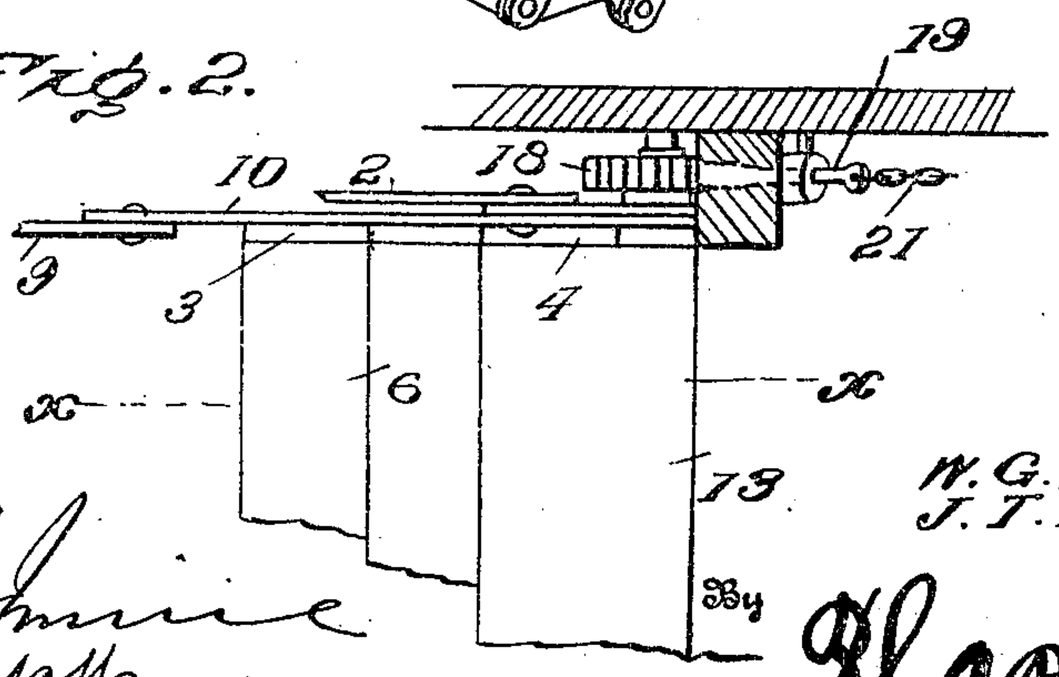


Fig. 9.

Fig. 2.



Witnesses

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3 SHEETS—SHEET 2.

FIG. 3.

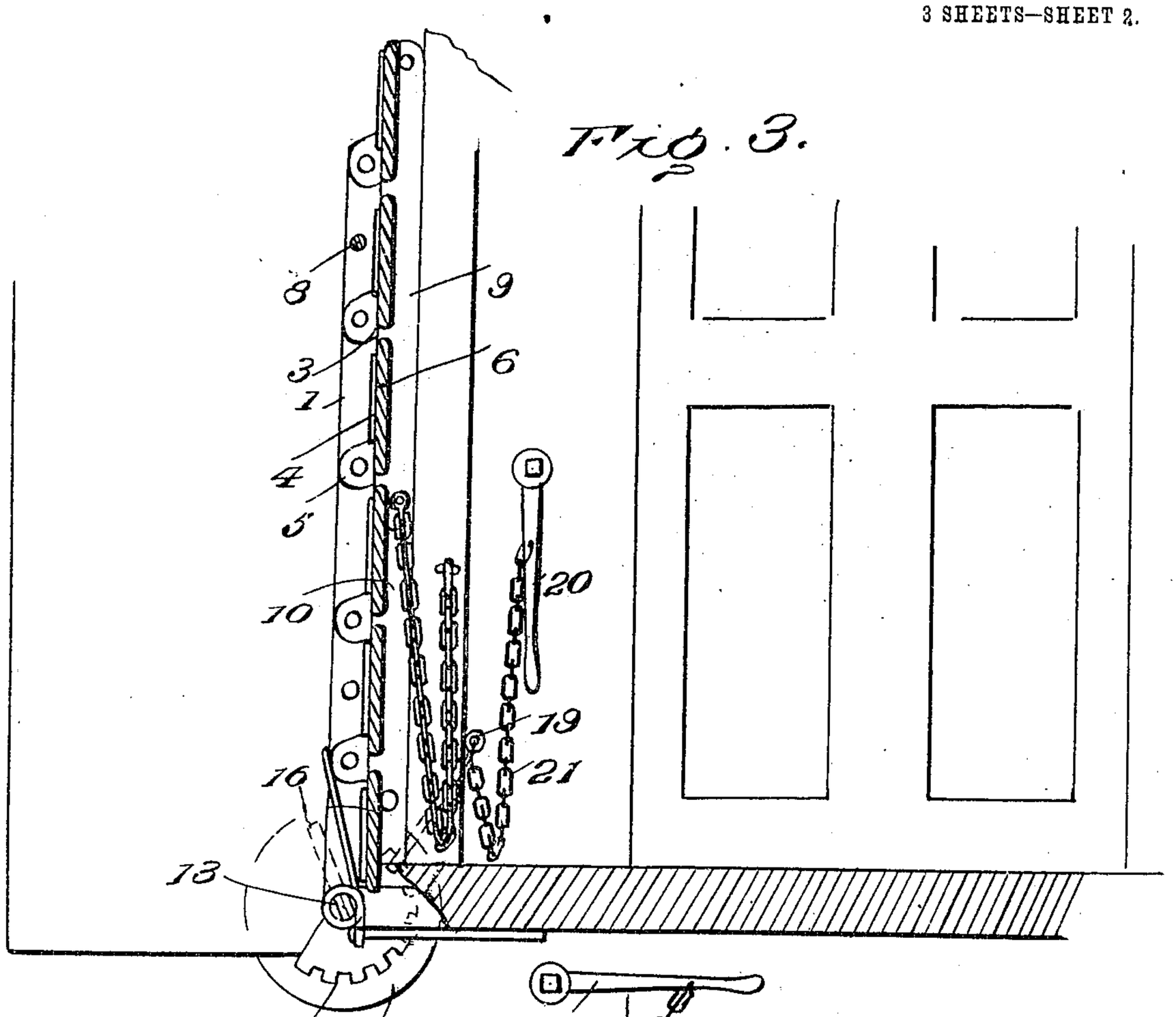
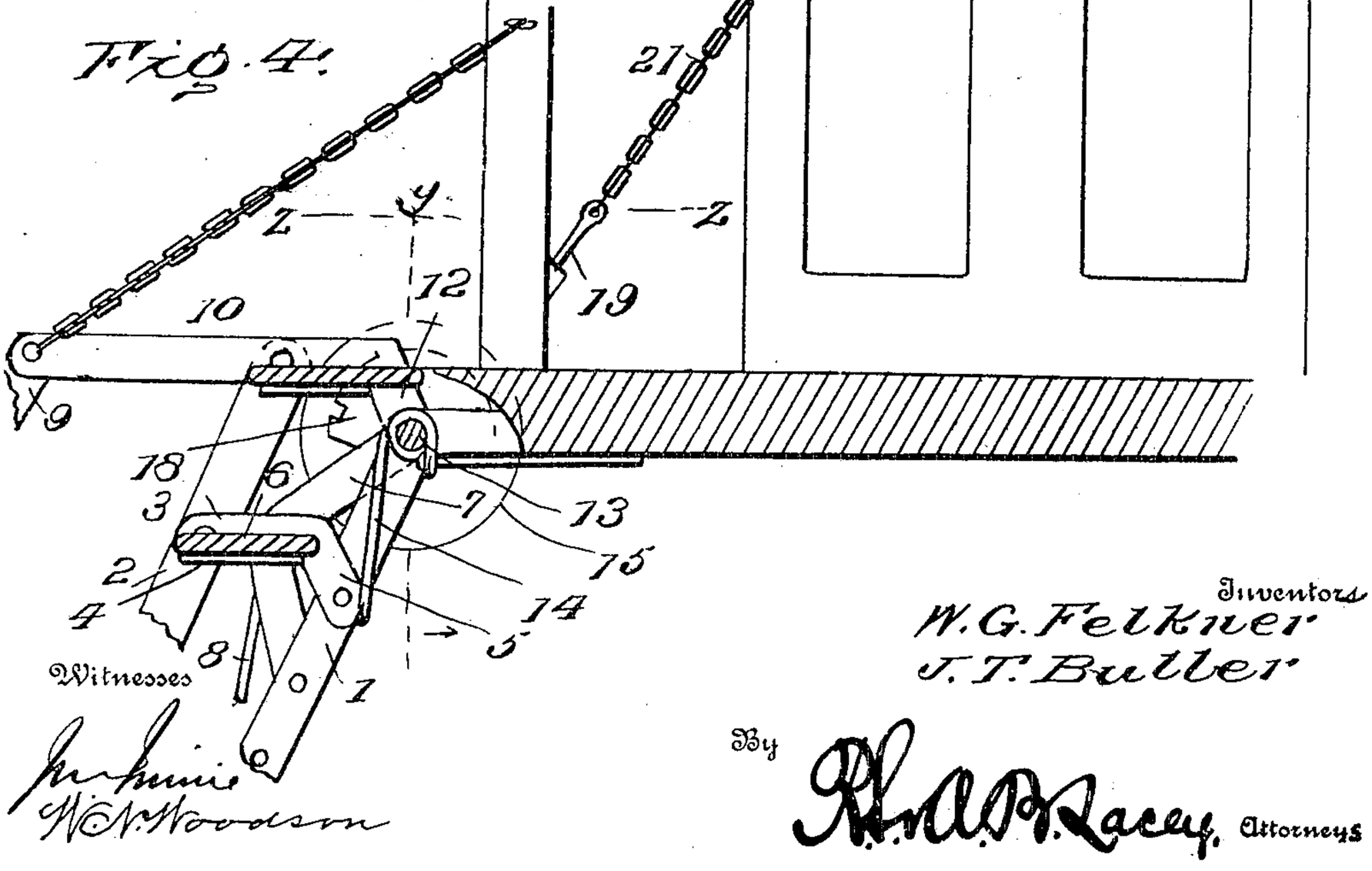


FIG. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

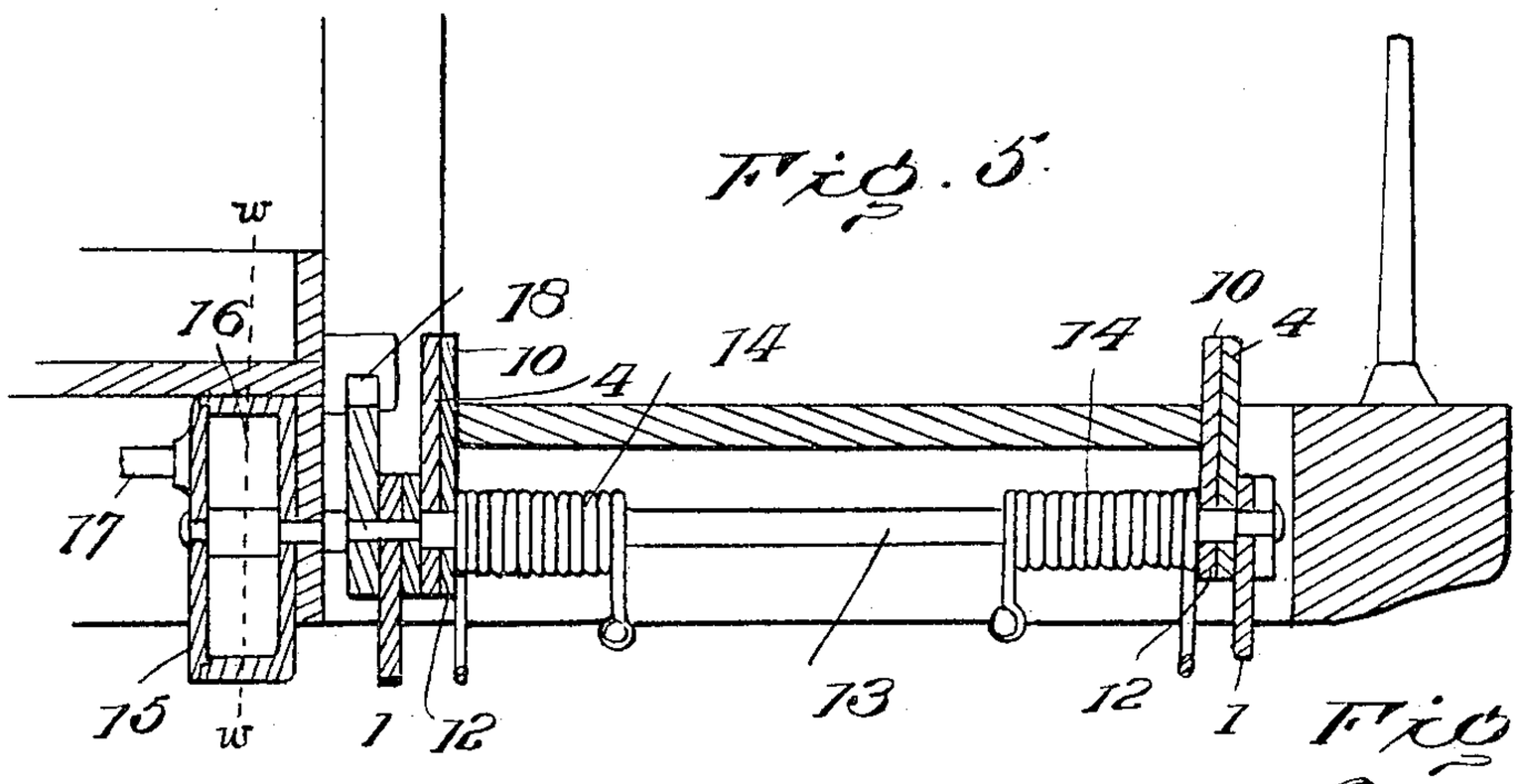

Fig. 6.

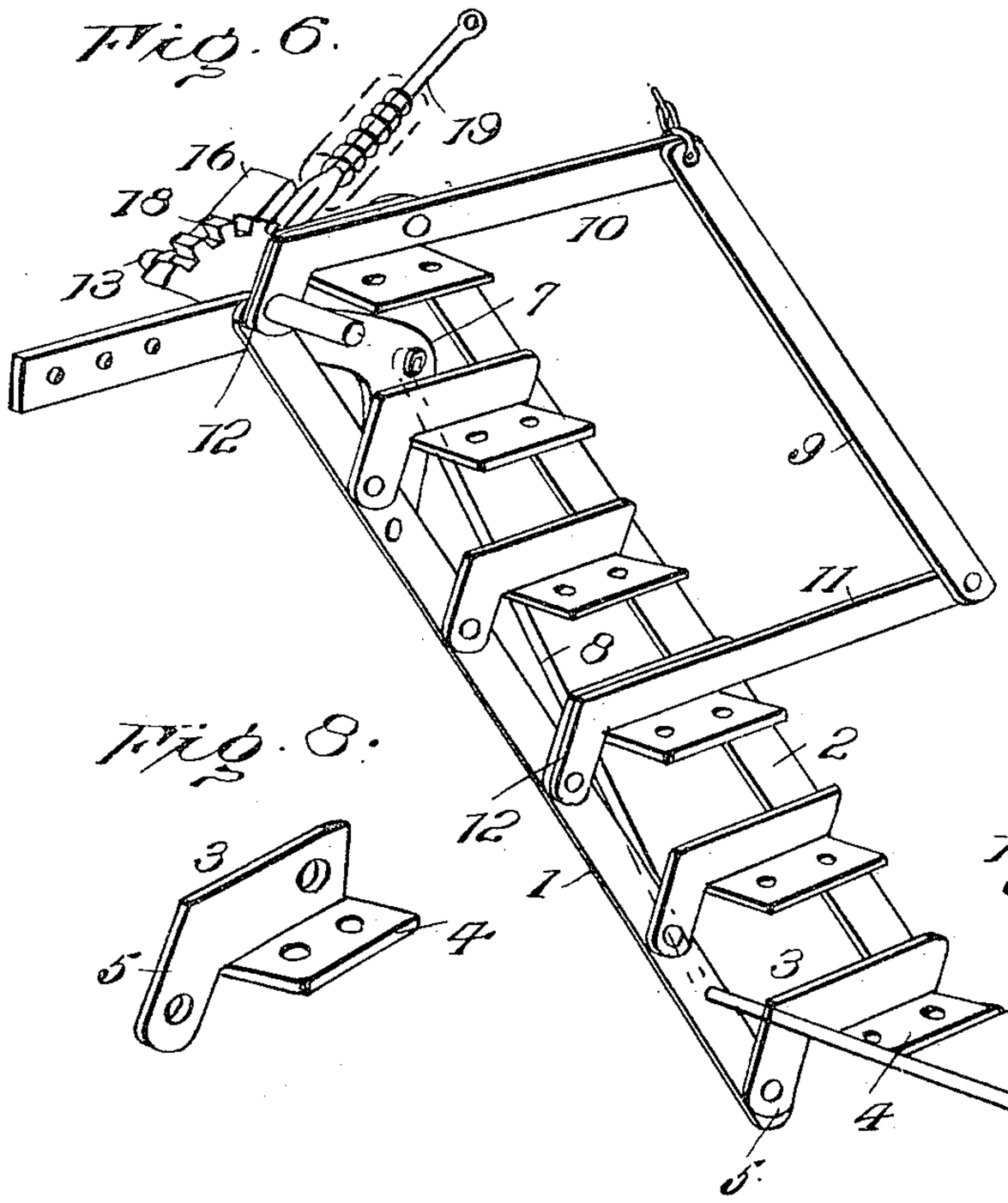

Fig. 7.

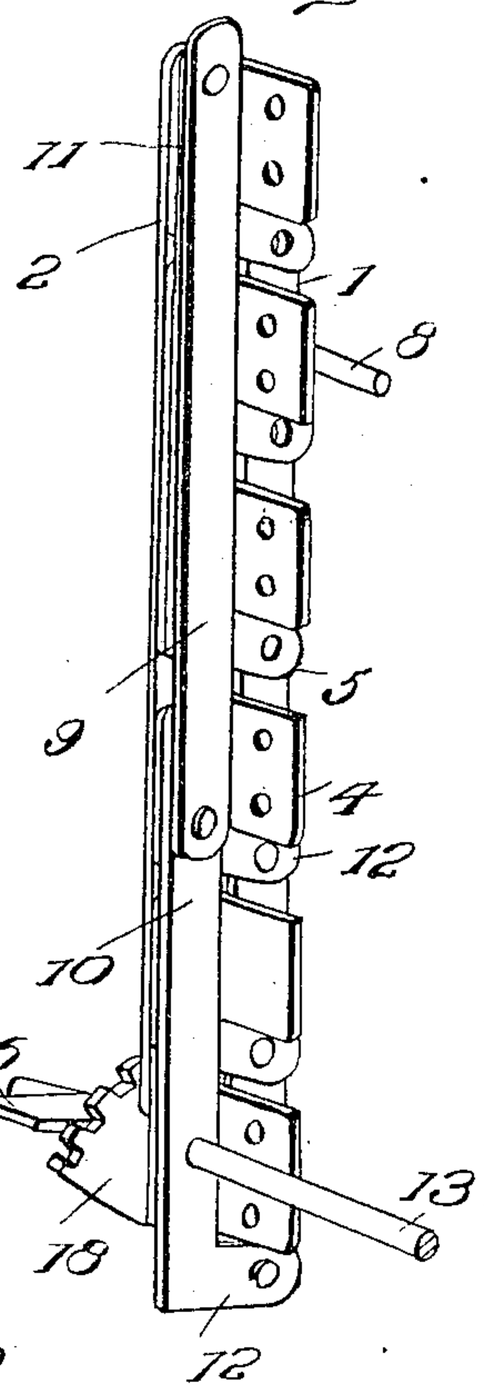

Fig. 8.

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UNITED STATES PATENT OFFICE.

WILLIAM G. FELKNER AND JAMES T. BUTLER, OF SEBREE, TEXAS.

FOLDING STEP FOR PUBLIC CARRIERS.

No. 808,076. Specification of Letters Patent. Patented Dec. 26, 1905.

Application filed April 22, 1905. Serial No. 256,952.

To all whom it may concern:

Be it known that we, WILLIAM G. FELKNER and JAMES T. BUTLER, citizens of the United States, residing at Sebree, in the county of Jack and State of Texas, have invented certain new and useful Improvements in Folding Steps for Public Carriers, of which the following is a specification.

Public carriers or conveyances—such as cars, and more particularly those of the type designed for passenger traffic on steam-operated railways—have a string of steps at each end upon both sides to facilitate ingress and egress. These steps are usually stationary and for safety terminate some distance from the ground or plane of the railway-bed. Hence a platform is required at each station or a stool or like device provided for the convenience of passengers to enter and leave the car, so as to avoid the high steps between the ground and the lowest tread of the steps.

This invention provides folding steps which may be lowered to within a short distance of the ground, thereby obviating the necessity for platforms, stools, or like provision to overcome the last or the initial high step, as when leaving or entering a car equipped with the stationary steps in vogue.

The invention further contemplates the utilization of the folding steps to provide a vertical closure at each side of the platform when folded or elevated, thereby interposing a barrier to prevent a person entering or leaving the car when in motion, so as to lessen the casualties from this cause.

The invention also provides means whereby the steps may be lowered by the engineer through the instrumentality of a motor, a valve, and suitable connections between the cab and the several motors of the different steps.

For a full description of the invention and the merits thereof and also to acquire a knowledge of the details of construction of the means for effecting the result reference is to be had to the following description and accompanying drawings.

While the invention may be adapted to different forms and conditions by changes in the structure and minor details without departing from the spirit or essential features thereof, still the preferred embodiment is shown in the accompanying drawings, in which—

Figure 1 is a perspective view of the rear end portion of a railway-car equipped with folding steps constructed in accordance with this invention, said steps being lowered. Fig. 2 is a horizontal section of the steps on the line *z z* of Fig. 4, showing a fragmentary portion thereof. Fig. 3 is a vertical transverse section of the steps, showing the same folded to provide a closure. Fig. 4 is a vertical transverse section of the upper portion of the steps on the line *x x* of Fig. 2 looking in the direction of the arrows. Fig. 5 is a detail section of the head portion of the steps and the cooperating parts on the line *y y* of Fig. 4 looking in the directions of the arrows. Fig. 6 is a detail perspective view of a side portion of the steps, the treads being omitted. Fig. 7 is a perspective view of the parts shown in Fig. 6, illustrating their position when the steps are folded. Fig. 8 is a detail perspective view of a link and tread-support. Fig. 9 is a detail view of the motor for operating the steps on the line *w w* of Fig. 5.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The steps comprise similar side portions and treads, the same being so proportionate as to admit of compact folding and ready manipulation. Each side portion comprises companion bars 1 and 2 and connecting-links 3, the latter being pivoted at their ends to the respective bars. Each of the links 3 has an offstanding portion 4 to provide a tread-support and a pendent terminal portion 5 to give proper set to the treads when the steps are lowered into position to admit of a person ascending or descending. The treads 6 are fastened in any substantial manner at their ends to the supports 4, which latter preferably underlap their ends. A bracket 7 is provided at the head of the steps and is secured, by preference, to the inner or rear bar 1, and a brace 8 connects said bracket with the lower portion of the rear bar 1. A rail 9 is located at each side of the steps and is connected to the bars 1 and 2 by means of arms 10 and 11, the latter having bent portions 12 at their inner ends corresponding to the bent ends 5 of the links 3. The rails 9 and their supporting-arms are adapted to fold and unfold with the steps, as shown most clearly in Figs. 6 and 7.

A shaft 13 is arranged at the head of the steps, and the latter are rigidly attached thereto, so as to turn therewith. Movement of the shaft in one or the other direction effects a corresponding movement of the steps. Suitable means coöperate with the shaft 13

for controlling its movements, as well as the movements of the steps. These means consist of a counterbalance and a motor. The counterbalance in the preferable form consists of a spring or series of springs 14 of the coil type, one end having connection with the steps and the other with a suitable portion of the car structure. The motor comprises a cylinder or casing 15 and a piston 16, the latter being fast to the shaft 13 and having a close fit within the casing or cylinder 15. A pipe 17 connects with an end portion of the cylinder or casing 15 for supplying a motive medium thereto, such as steam or compressed air, the latter being admitted in the rear of the piston 16, so as to exert a pressure thereon and throw the steps from an upright position, as indicated in Fig. 3, into operative position, as shown in Fig. 1. The pipe 17 may be the usual train-pipe and may extend to the locomotive, so as to be under control of the engineer, whereby when required steam or other motive medium may be turned on and supplied to the motive for throwing the steps into operable position. The counterbalance 14 normally exerts a force to hold the steps closed or folded, and when said steps are released from the restraining influence holding them in operative position the counterbalance comes into play and returns the steps to normal or folded position. The cylinder or casing 15 is preferably of sector form, corresponding approximately to the radial movement of the steps in opening and closing. A toothed plate 18 is fast to the shaft 13, and a spring-actuated latch 19 is provided for coöperation therewith, so as to positively hold the steps in desired position. An operating-lever 20 is loosely connected by chain 21 with the latch 19 and provides convenient means for withdrawing said latch out of engagement with the teeth of the plate 18 when it is required either to lower or elevate the steps.

A car or like carrier or conveyance equipped with folding steps in accordance with this invention does not require a platform, stool, or like appliance to facilitate entrance to or exit from the steps when entering or leaving the same, since the steps may be lowered to adapt themselves to the ground or road-bed adjacent to the track when the train is standing to receive passengers or provide for their leaving the train. When the steps are closed, the treads 6 unitedly form a closure, as indicated clearly in Fig. 3, to interpose a barrier to prevent any one from entering the car or leaving the same, with the result that casualties and fatalities arising from persons boarding or leaving moving trains are wholly obviated or reduced to the smallest contingencies. When the car or train reaches a station and the motive medium is turned on by the engineer or other person assigned for this duty, a pressure is created upon the piston 16, and upon release of the toothed plate 18 from the catch 19 the steps immediately and automatically lower. As the steps lower they overcome the resistance of the counterbalance, and when the proper position is reached the operating-lever 20 is released and the catch 19 permitted to engage a tooth of the plate 18, thereby holding the steps lowered. The motive medium is cut off after all the steps have been operated, and preliminary to starting the catches 19 are released by operating the levers 20, thereby permitting the counterbalance 14 to come into play, whereby the steps are automatically folded or returned to normal position, as indicated in Fig. 3, and are secured by the catch 19 in the manner stated. When folded, the steps assume a vertical position at the ends of the platform to provide a door to prevent a person falling off or being thrown from the platform when rounding a curve or the car receives a side lurch. Moreover, a vertical folding involves a simple and compact structure and obviates the necessity for doors or other form of closure at the ends of the platform, besides reducing the danger to the smallest amount. The bars 1 and 2 provide a positive support for the treads 6 at the front and at the rear, and the portion of the links 3 with the bent ends 5 enables the bars to come together to aline when the steps are folded vertically.

Having thus described the invention, what is claimed as new is—

1. In combination with a car or like carrier having an end platform, steps to admit of egress and ingress to the car, the same comprising side portions and treads, each side portion consisting of companion bars and connecting-links, corresponding side bars having pivotal connection at one end with the car and the links having said treads attached thereto, means for raising and lowering the steps by a turning movement to occupy either a vertical or operative position, and means for turning the treads simultaneousiy with the turning of the steps to cause them to assume a horizontal position when the steps are lowered and to aline perpendicularly when the steps are raised or folded into a vertical position.

2. In combination with a car or like carrier having an end platform, folding steps comprising side portions and treads, each side portion consisting of companion bars, one of each is pivoted to the car and both bars having a relative movement toward and from each other as the steps are raised or lowered by a turning movement, upper and lower arms having pivotal connection with the respective bars, and rails having pivotal connection with the outer ends of said arms, the bars, arms, rails and treads having a movement simultaneous with the turning of the space, substantially as specified.

3. In folding steps of the character de-

scribed, the combination of similar side pieces, each comprising parallel bars and pivotally-connecting links, each provided with a deflected terminal portion, and treads supported by means of said links.

4. Folding steps for cars and the like comprising similar side pieces, each consisting of parallel bars and connecting-links, the latter having integral tread-supports and deflected or bent terminals, and treads attached to corresponding tread-supports and connecting the side pieces.

5. Folding steps for cars and the like comprising similar side pieces, each comprising parallel bars and connecting-links, treads supported by said links, and rails connected with corresponding side bars and adapted to fold and unfold therewith.

In testimony whereof we affix our signatures in presence of two witnesses.

WILLIAM G. FELKNER. [L. S.]
JAMES T. BUTLER. [L. S.]

Witnesses:
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WILLIAM G. POUNDS.