No. 609,136. Patented Aug. 16, 1898.

F. M. BICKELBERGER.

FOLDING CAR STEP.

(No Model.) (Application filed Mar. 25, 1898.)

Fig. 1.

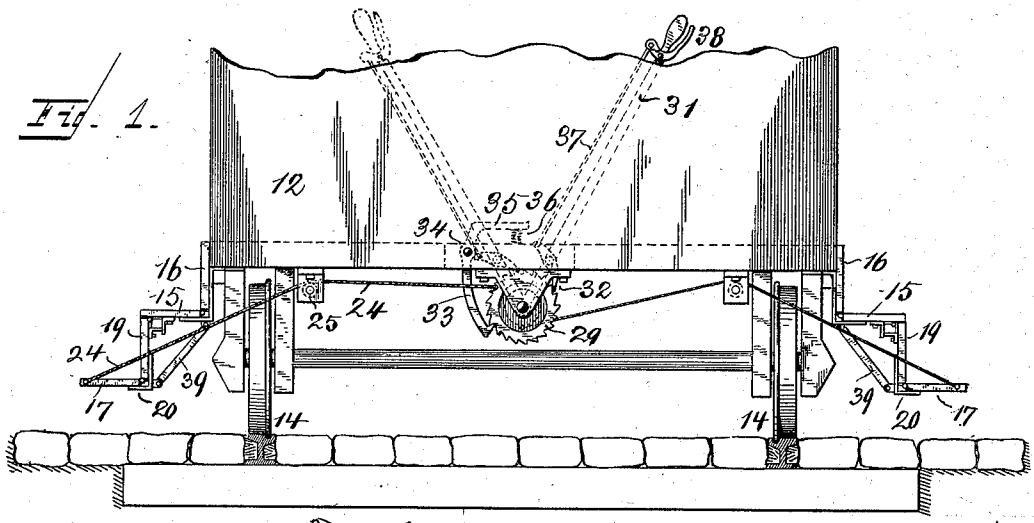


Fig. 2.

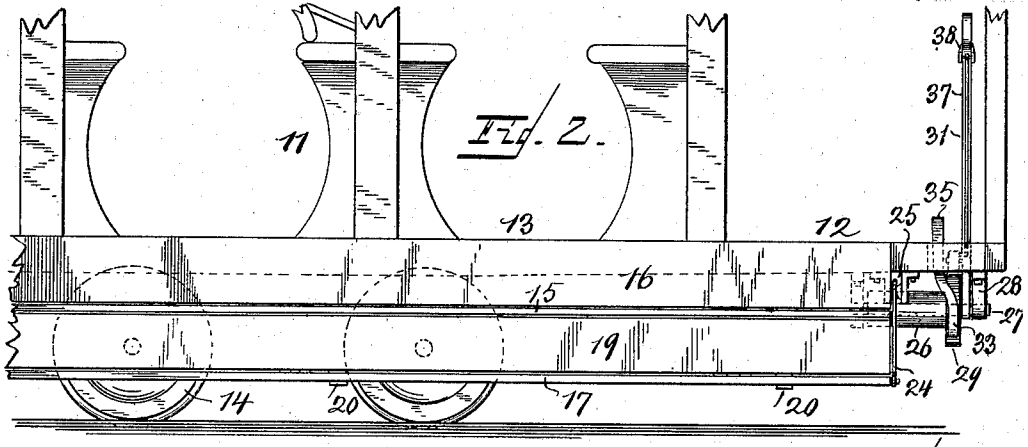


Fig. 3.

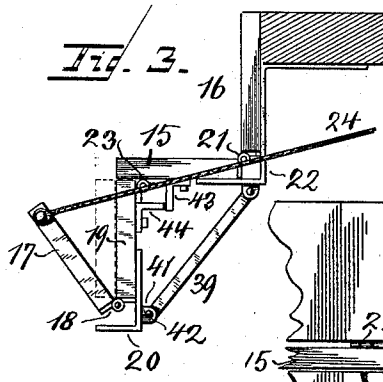


Fig. 6.

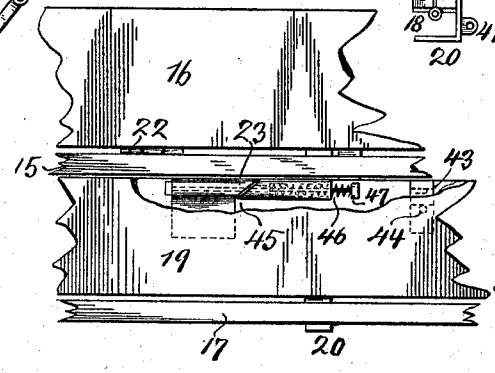


Fig. 4.

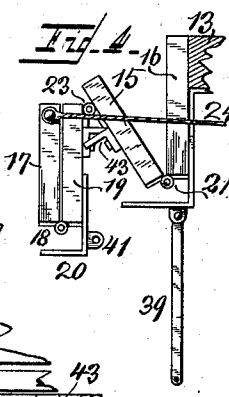
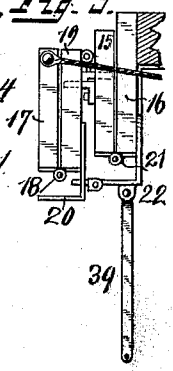


Fig. 5.



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UNITED STATES PATENT OFFICE.

FRANK M. BICKELBERGER, OF HYDE PARK, OHIO, ASSIGNOR OF ONE-HALF TO WILLIAM BAUER, OF OAKLEY, OHIO.

FOLDING CAR-STEP.

SPECIFICATION forming part of Letters Patent No. 609,136, dated August 16, 1898.

Application filed March 25, 1898. Serial No. 675,077. (No model.)

To all whom it may concern:

Be it known that I, FRANK M. BICKELBERGER, a citizen of the United States, and a resident of Hyde Park, Hamilton county, State of Ohio, have invented a certain new and useful Folding Car-Step; and I do hereby declare the following to be a clear, full, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, attention being called to the accompanying drawings, with the reference-numerals marked thereon, which form a part of this specification.

The object of this invention is to provide for street-cars and similar conveyances a folding step or steps to be used either in place of the rigid ones used at present or to be added to them.

It relates particularly to such street-cars which are open at the sides to be entered thereat by means of steps running along such sides. The floor of some of these cars is at considerable height from the ground to provide the necessary room for the running-gear and for the motor in case of electric cars. For convenient mounting and entering this height makes at least two steps desirable, if not necessary; but the second step is in most cases objectionable, if not entirely impracticable, on account of the increased lateral projection, which interferes with the general traffic of the street. The aim of my invention is therefore to overcome this objection by providing an additional step which is in place and projects only for the short time when actually needed for use by a passenger, after which it is quickly swung out of the way. The effect of my invention may also be so extended in this way that the present permanent steps may also be swung inwardly with the added one either every time after use or only when the car is run into the sheds or barns after service. In such case the resulting decrease in width of the car is quite an advantage, inasmuch as, especially in large systems, the required space for storage and size of barns is materially reduced.

In the following specification, and particularly pointed out in the claims, is found a full description of my invention, its operation, parts, and construction, which latter is also illustrated in the accompanying drawings, in which—

Figure 1 is a front view of the lower part of a car provided with my improvements. Fig. 2 is a side elevation of Fig. 1. Figs. 3, 4, and 5 show enlarged end views of the steps in different positions. Fig. 6 is an enlarged front elevation of a portion of the steps, showing manner of hinging.

The car illustrated is a so-called "summer-car"—that is, one open at both sides, as shown in Fig. 2. 11 are the seats of the same; 12, the platform; 13, the floor, and 14 the wheels of one of the trucks. There is in such cars usually a so-called "running-board," which is the equivalent to one step, as at 15, for instance. Such step is secured to a board or riser 16, but in most cases it is insufficient to permit comfortable entrance to the car, as before stated. For these reasons I provide a second step 17, hinged by ordinary hinges 18, suitable for the purpose, to a riser 19, depending from the under side of step 15. When down, as shown in Fig. 1, this step 17 rests on brackets 20, rigidly secured to riser 19. Hinges 18 are so connected as to permit step 17 to be folded up against riser 19, as shown in Fig. 3, where it is shown while moving to assume such a position, and in Figs. 4 and 5 where it has arrived thereat. Where it is desirable to extend this capacity to fold up also to step 15, then this latter is also hingedly secured to board 16 by suitable hinges 21 and supported when down in the same manner as step 17—that is, on brackets 22, secured to board 16. In such case it becomes necessary to make the connection of riser 19 to step 15 also by hinges (indicated at 23) in order to permit the former to drop inwardly on folding of the steps, as shown in Fig. 4, where it is about moving into such a position, and in Fig. 5, where it has assumed the same.

For the purpose of folding the steps to assume a position as shown in Fig. 3 or Fig. 5 there is provided a chain or rope 24 near the outer edge of each lower step—that is, of 17—which from each side runs upwardly over a guide-pulley 25, and thence inwardly to a winding-drum 26, to which they are secured. This drum is mounted upon a shaft 27, supported in bearings 28, depending from the

under side of the car-floor. To raise the step, it is only necessary to rotate this winding-drum to cause the ropes to wind up thereon, for which purpose a ratchet-wheel 29 and means to rotate it are provided. This ratchet-wheel is so mounted as to cause drum 26 to rotate with it, and for its rotation there is an operating-lever 31, carrying a pawl 32, adapted to engage the ratchet-wheel. This lever 31 is loosely mounted on shaft 27, and by swinging it back and forth (see dotted lines in Fig. 1) rotation of the ratchet and drum is readily obtained. In order to hold this drum in position when the movement of the levers in one direction has been exhausted and while the same is swung back to obtain another purchase on the ratchet-wheel, there is a locking-pawl 33, pivoted at 34, and having an upper part 35, forming, with the other part, an angle-lever. Below this upper member 35 there is a spring 36, which holds the pawl against the ratchet-wheel, but yields to permit rotation of the same when the ropes are wound. Platform 12 is sufficiently cut out to receive these parts and permit their movements. If the lower step is only to be folded up, then rotation of the winding-drum is stopped after such step has arrived in a position as shown in dotted lines in Fig. 3. If the upper one is also to be folded, then such rotation proceeds, when the continued pull on step 17 acts also against riser 19 and reaches, through the latter, finally step 15, causing the same to turn up, as shown in Fig. 4, until it assumes a position as shown in Fig. 5.

To lower the steps, it is only necessary to release the ratchet-wheel from the engagement of the two pawls to permit free rotation of the drum and unwinding of the ropes, whereupon the steps drop into their proper positions. For so releasing the pawls it is only necessary in case of pawl 33 to step upon member 35, which forms a treadle, whereupon said pawl swings outwardly. It is readily carried back again by the depressed spring 36 as soon as the pressure on the treadle is released. In case of pawl 32 a rod 37 is provided, operated by a pivoted handle 38, and acting upon such pawl in a manner usual in such ratchet movements.

If the steps are of considerable length, it may be desirable to have ropes and a winding-drum at both ends, in which case it is only necessary to extend shaft 27 to the other end with a winding-drum fixedly mounted at each of its ends. One ratchet-wheel, also fixedly mounted, will then effect rotation of the two drums.

It is evident that where no lower step is needed and it were desirable to fold up the one step 15, then the same raising mechanism might be employed, in which case ropes 24 would simply connect to the edges of step 15. It is clear that in case of two folding steps there must be means to brace the lower one to prevent it when down from swinging inwardly by reason of the hinged connection of its riser 19 to step 15. If the upper step 15 is to be folded up only when the car is run in after service, then a simple brace 39 may be used, pivotally hinged at one of its ends and temporarily connected to a lug 41 by means of a pin 42, to be released thereat, as shown in Fig. 5, when the car is not in use. If the two steps are to be folded up also during general use, then it becomes preferable to employ automatically-acting means to obviate the necessity for the conductor to manually operate such device each time when the steps are required. For such purpose I provide brackets 43 on the under side of step 15, against which pins 44 on the back of riser 19 abut, thus preventing the latter from swinging inwardly. For folding up it becomes necessary that pins 44 be disengaged and clear brackets 43, which is accomplished by a limited lengthwise movement of riser 19 sufficient to cause such pins to slip off the brackets, so that when the steps close inwardly said pins swing past the brackets. This lengthwise movement is automatically obtained by shaping the adjoining ends of the hinge-barrels of hinges 23, as shown at 45 in Fig. 6, so that when riser 19 turns on step 15 the inclined ends of those adjoining barrels slip apart, as may be readily understood. Since step 15, to which one set of barrels connects, cannot move, it follows that the other set of them, on which hangs riser 19 with step 17, must yield, the resulting movement being sufficient to cause pins 44 to slip off of brackets 43. To cause the parts to assume again their normal positions, there is a spring 46 provided around each hinge-pin 47, which draws the two sections of each hinge endwise together, thus causing again a lengthwise movement of the riser, which brings pins 44 in front of brackets 43 to act there for the purpose explained.

While the car illustrated shows steps on each side, it is clear that the construction is substantially the same if steps are provided on one side only.

Having described my invention, I claim as new—

1. A car-step hingedly connected to its riser to permit it of being folded up, brackets rigidly connected to and projecting from the latter on which it rests when in position for use and means to turn such step to an elevated position.

2. A car-step hingedly connected to permit it of being folded up, means to support it when in position for use, a winding-drum mounted on the car, a flexible connection between it and the step, a ratchet-wheel so mounted as to rotate with the drum, an operating-lever to rotate the two, a pawl on said lever to engage the ratchet-wheel, a locking-pawl to prevent the drum from unwinding and means to release the latter from the engagement with such pawl.

3. A car having two steps on one side, each step having a riser to which it is hingedly se-

cured, brackets on each riser to support the steps thereon when in position for use, hinges whereby the riser of the lower step connects to the upper step, braces to prevent the lower step from swinging on the upper step when in position for use and means to fold steps and risers up against each other and against the side of the car.

4. A car having two steps on one side, each step having a riser to which it is hingedly secured, brackets connected to and projecting forwardly from each riser and upon which the steps rest when in position for use, hinges whereby the riser of the lower step connects to the upper step, means to fold steps and risers up against each other and against the side of the car and means acting automatically between the two steps, to hold the lower one rigid on the upper one when in position for use and to release the same to permit closing up.

5. A car having two steps on one side, each step having a riser to which it is hingedly secured, brackets on each riser to support the steps thereon when in position for use, hinges whereby the riser of the lower step connects to the upper step, the adjoining ends of the two sections of such hinges being inclined as shown at 45 to cause them to slip apart when one turns on the other, whereby the riser of the lower step receives a corresponding lengthwise adjustment, the hinge-pins of such hinges being of a sufficient length to permit such separation of the hinge-sections, a spring 46 to draw them together, means to fold steps and risers up against each other and against the sides of the car, a bracket 43 on the upper step and a pin 44 on the riser of the lower step, the two adapted to engage or disengage each other by the longitudinal movement of the lower step due to the separation of the hinge-sections as and for the purpose explained.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

FRANK M. BICKELBERGER.

Witnesses:
C. SPENGEL,
ARTHUR KLINE.