

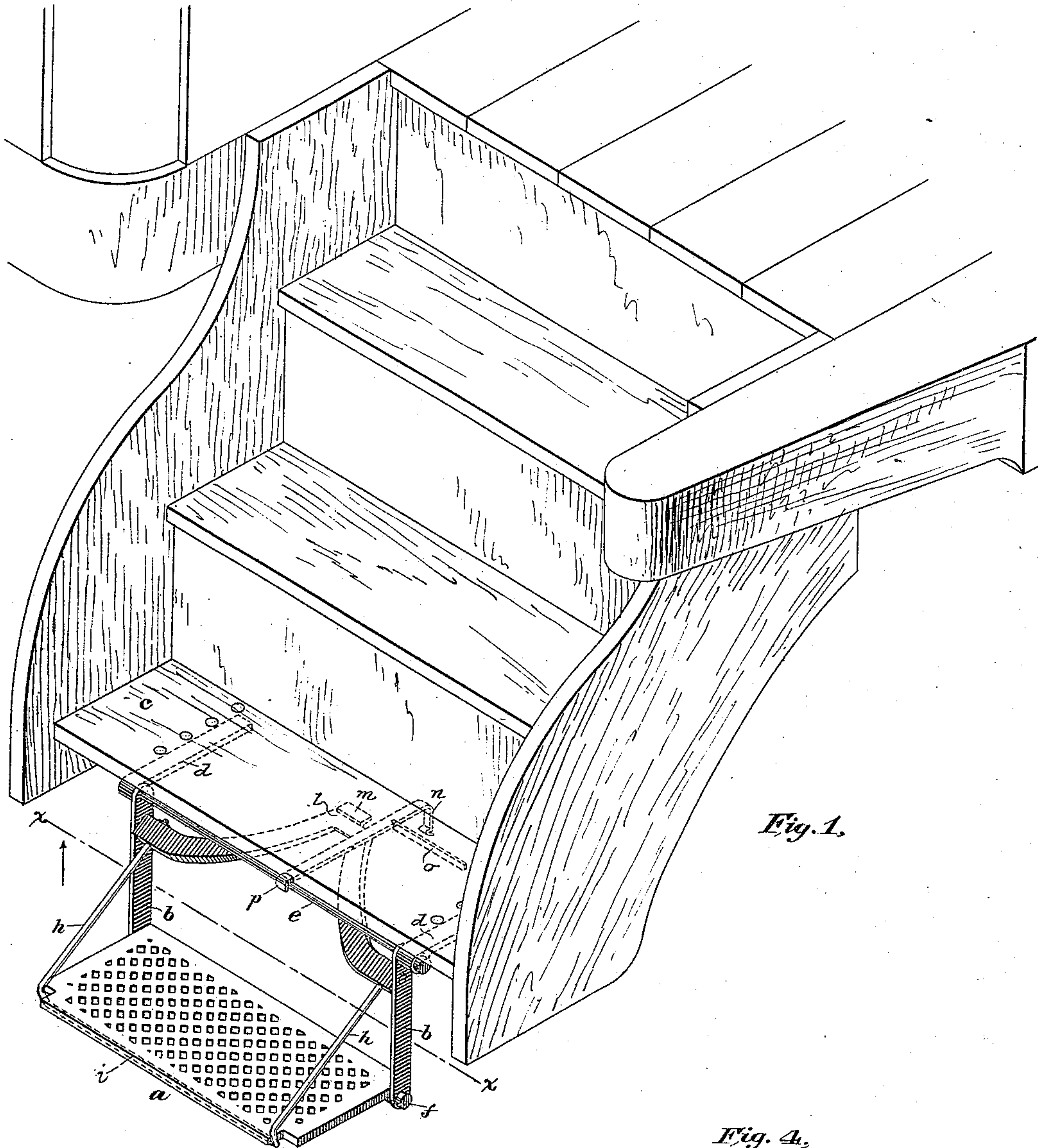
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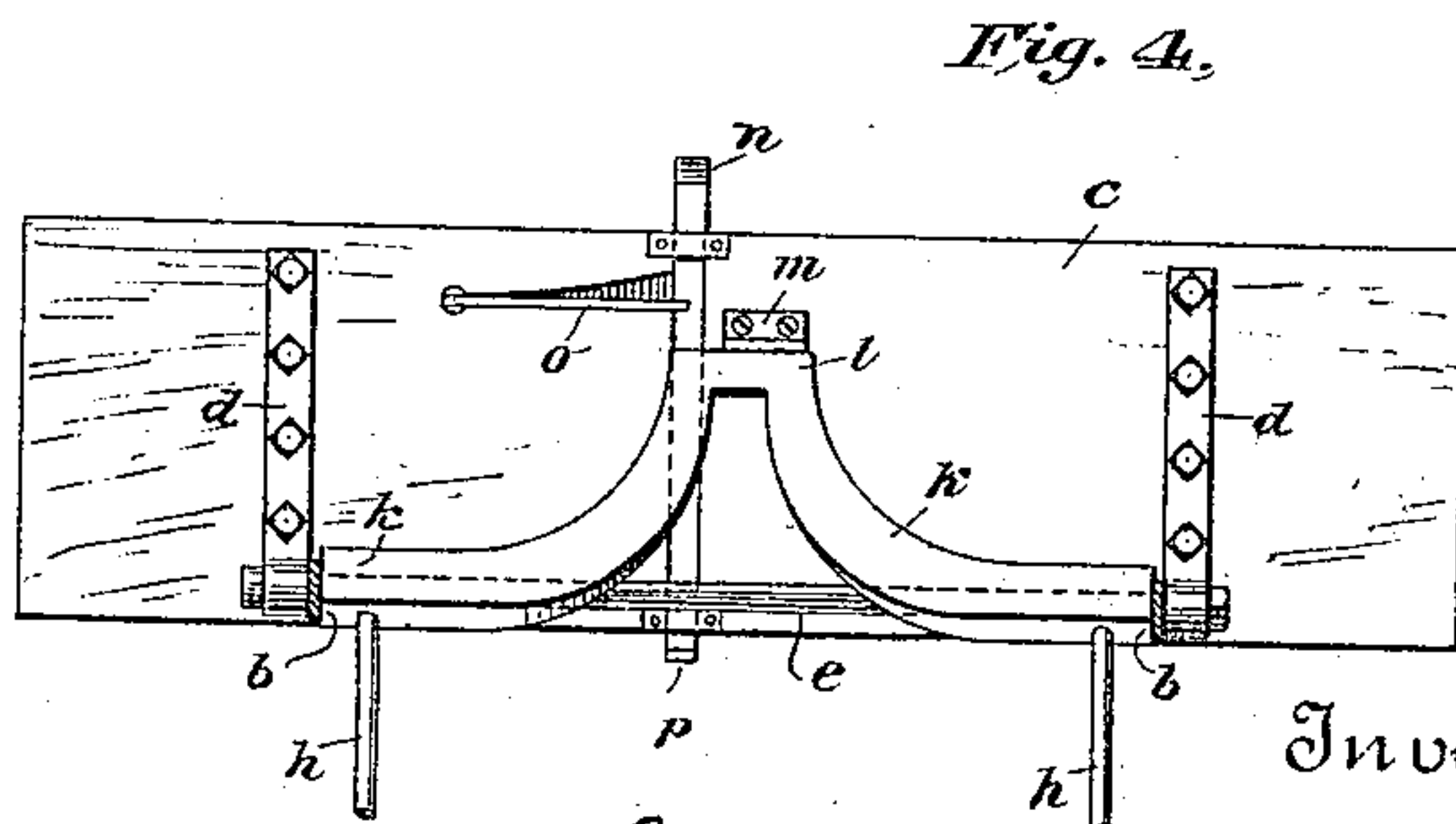
W. N. CANDEE.  
EXTENSION STEP FOR CARS.

No. 442,571.

Patented Dec. 9, 1890.



*Fig. 1.*



*Fig. 4.*

Witnesses

Geo. W. Breck.  
Henry W. Lloyd.

Inventor

William Norman Candee  
By his Attorneys  
Witter Kenyon.

(No Model.)

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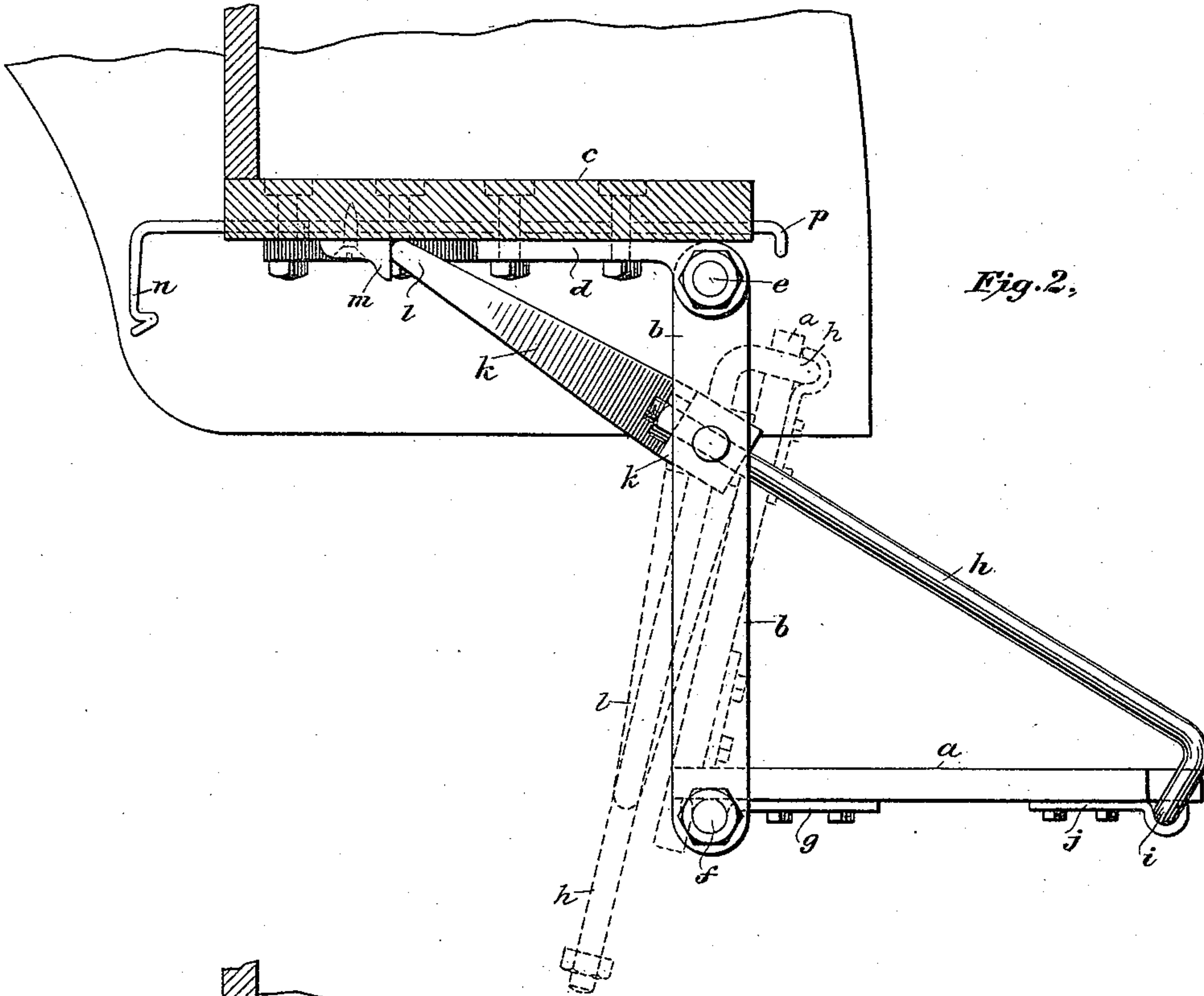


Fig. 2,

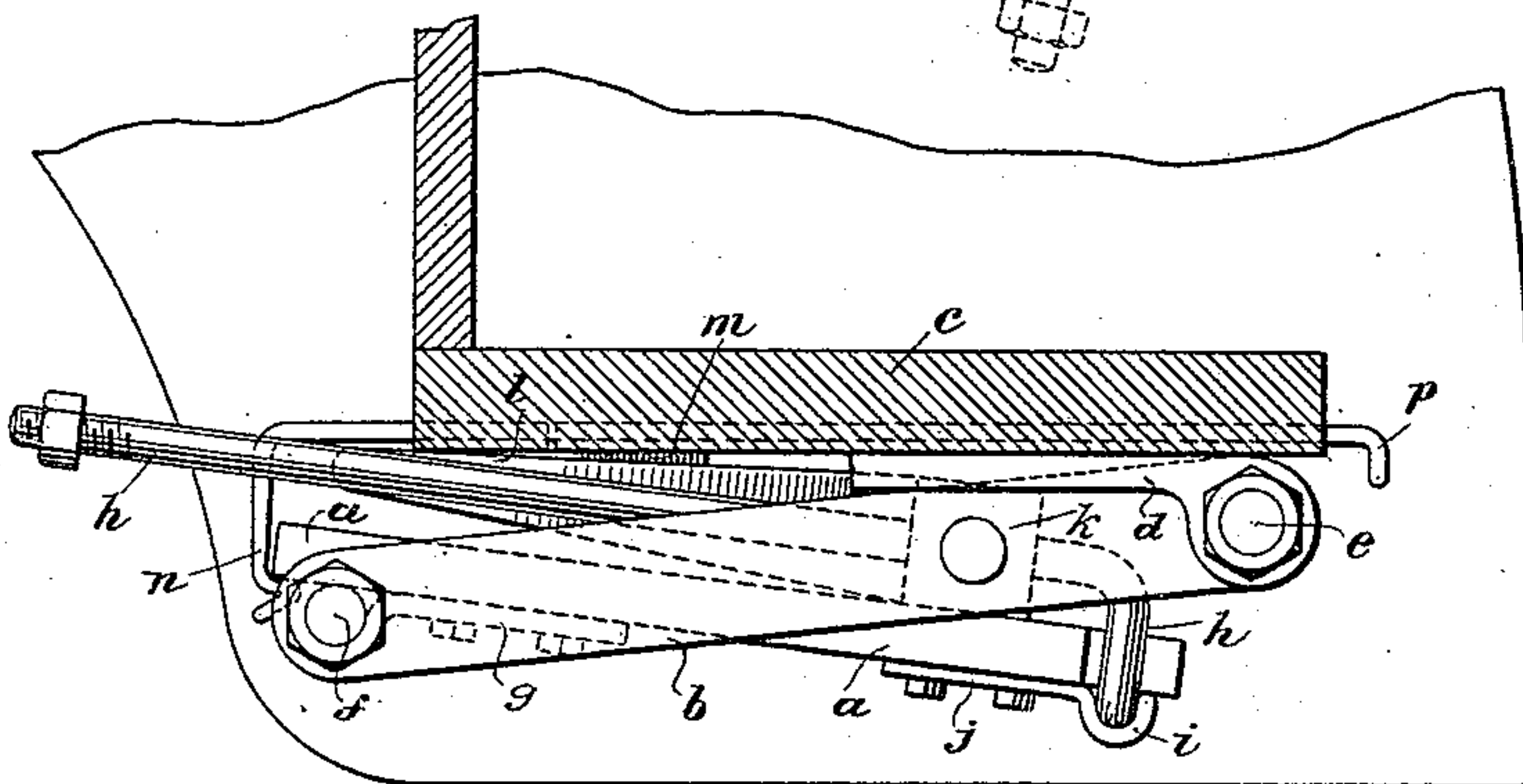


Fig. 3,

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# UNITED STATES PATENT OFFICE.

WILLIAM NORMAN CANDEE, OF BUFFALO, ASSIGNOR OF ONE-HALF TO E. P. PUTNAM, OF HOLLAND PATENT, NEW YORK.

## EXTENSION-STEP FOR CARS.

SPECIFICATION forming part of Letters Patent No. 442,571, dated December 9, 1890.

Application filed May 6, 1890. Serial No. 350,804. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM NORMAN CANDEE, a citizen of the United States, residing in Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Extension-Steps for Railroad-Cars and other Similar Uses, of which the following is a full, clear, and exact specification, reference being had to the accompanying drawings, which form part hereof.

My invention relates to extension-steps—that is, steps which are capable of being extended into a position where they can be used when desired and of being moved back or out of the way when there is no longer any need for them.

My improved step is especially adapted for use on railroad-cars, although it may be employed in many other situations, as in vehicles of different kinds, or even in connection with structures other than vehicles.

The object of my invention is to provide an extension-step which can be readily applied to the lowest fixed step of an ordinary railroad-car, or in any other suitable situation; which can be easily and with but slight exertion of force or strength pushed or folded back underneath the step above it or out of the way without requiring the use of any mechanism for so moving the step; which will be locked in its position when folded back, and thus held in such position; which can be easily unlocked from such position and moved out, so as to be ready for use, by means of only a slight exertion of force or strength and without requiring any mechanism to so move it into operative position; which will be simple and economical in its construction, containing but few parts and having no complicated arrangement of devices, and which will be strong and durable, and when extended into operative position will be firmly held and braced, so as to give firm and solid support to the person stepping on it.

Another object of my invention is to provide an extension-step that when not in use will occupy only a small space and will not project from the structure to which it is attached.

My invention consists of a suitable step

having supporting and operating devices, all as hereinafter described and claimed.

My invention is clearly shown in the accompanying drawings.

Figure 1 is a perspective view of my improvement attached to the lowest step of a railroad-car. Fig. 2 is a side view of the same with the fixed step shown in section and indicating by dotted lines the position of the extension-step when half-closed. Fig. 3 is a similar view showing the extension-step fully closed. Fig. 4 is a sectional view on the line *xx* of Fig. 1, looking from below.

I shall now describe my improved extension-step as applied to the lowest step of a railroad-car, such as is shown in the drawings.

Referring to the drawings, *a* is a step made of any suitable form, material, and dimensions. I prefer to make this step of cast-iron, perforated, as shown in the drawings. Where the step is to be applied to a fixed step, as would be the case when it was used on a railroad-car, I prefer to make my extension-step somewhat smaller than the step to which it is attached.

*b b* are supporting-arms, which are connected at their upper ends by a hinge-joint to the under side of the fixed step *c*, and which are connected at their lower ends by hinge-joints to the inner end of the step *a*.

In the drawings I have shown the form of hinge-joints which I prefer to use, although any other form of hinge-joint may be employed.

*d d* are strips of iron, which are fastened in any suitable way to the under side of the step *c*. These strips *d d* are curved at their outer ends so as to form loops or eyes, through which the rod *e* passes. The rod *e* is thus supported firmly by the strips *d d*. The supporting-arms *b b* are pivoted at their upper ends upon the rod *e*.

*f* is a rod which is attached to the rear end of the step *a* by means of the clamping-strips *g g*, fastened to the under side of the step *a* and holding the rod *f* against the step *a*. The rod *f* projects beyond the step *a*, and the supporting-arms *b b* are pivoted at their lower ends to the ends of the rod *f*. The forward end of the step *a* is supported by the



rods *h h* and the connecting-rod *i*. The rods *h h* and the connecting-rod *i*, I prefer to make in a single piece by making the rod of the proper length and bending it into proper shape. The rod *i* is connected with the front end of the step *a* by a hinge-joint. This joint can be of any suitable construction. In the form shown in the drawings I have employed two clamps *j j*, fitted with suitable bearings for the rod *i* and fastened to the step *a* by bolts. The rod *i* turns in its bearings between the clamps *j j* and the step *a*. The rods *h h* are fitted to slide in bearings in the brace-arm *k*. The upper ends of the rods *h h* are threaded and provided with nuts. By this means the downward movement of the forward end of the step *a* is limited, so that when the step is extended it will be level. The extent of motion of the forward end of the step *a* may be adjusted to some extent by the nuts on the ends of the rods *h h*. In place of using nuts, the ends of the rods *h h* may be enlarged, so as to form heads, which will thus prevent the ends of the rods *h h* from slipping through their bearings in the brace-arm *k*; but I prefer to use nuts.

The brace-arm *k* is pivoted in any suitable way at its ends in the supporting-arms *b b*, and is provided with bearings near its ends for the rods *h h*. The brace-arm *k* is provided with an upper portion *l*, which is adapted to bear against the under side of the fixed step *c* when the step *a* is extended in operative position. This brace-arm *k* is made of considerable strength, so as to bear the strain which is brought upon it through and by means of the rods *h h*, and is preferably made of malleable iron. It is evident that the brace-arm *k* may be considerably varied in shape, the essential features of it being its two ends pivoted in the supporting-arms *b b* and provided with bearings for the rods *h h*, and the upper portion *l*, adapted to bear on the under side of the fixed step *c*.

I prefer to make the brace-arm *k* in the form shown in the drawings, as I believe this to be the form possessing the greatest strength and also requiring the least amount of material; but the parts of the brace-arm *k* between the upper portion *l* and the bearings for the rods *h h* may be greatly varied in form.

*m* is a block or lug fastened to or projecting from the under side of the fixed step *c* and operating as a stop to prevent the upper portion *l* of the brace arm *k* from being forced backward out of its proper position when the step is extended. This block *m* may be dispensed with, although I prefer to use it as an element of additional strength.

*n* is a catch for locking the step *a* underneath the fixed step *c* when the former is not in use. This catch *n* is provided with a spring *o* to hold it in its locking position and with an arm *p*, extending to the front end of the fixed step *c*, whereby the step *a* can be unlocked from its non-operative position by simply pressing upon the forward end of the arm

*p*, and thus moving back the catch *n*. This locking device can be greatly varied in form; or, in fact, any locking device suitable for this purpose can be used in its place.

The operation of my improved extension-step is as follows: Assuming that the step is extended in operative position, as shown in Fig. 1, to push the step back out of the way the step *a* is turned up, moving on the hinge-joints at the rear of the step. The rods *h h* are thus caused to slide through their bearings in the brace-arm *k*. As the outer end of the step *a* is raised, the brace-arm *k* turns on the pivots at its ends and the inner ends of the rods *h h* and the upper portion *l* of the brace-arm *k* are depressed. When the outer end of the step *a* has been brought close to the upper ends of the supporting-arms *b b*, the rods *h h* and the brace-arm *k* will be brought close to the rear or upper surface of the step *a*, so that all parts of the device, including the step *a*, the supporting-arms *b b*, the rods *h h*, and the brace-arm *k*, will have been brought together into a very small and compact form. The parts are shown in this position in Fig. 2 in the dotted lines. By pressing upon the under or outer surface of the step *a* it can then be turned upon the hinge-joints at the upper ends of the supporting-arms *b b* and swung up underneath the fixed step *c*, where it will be caught and held by the catch *n*, as shown in Fig. 3. When the step is to be used again, a slight pressure upon the sliding arm *p* will move back the catch *n*, and thus unlock the step *a*, which will swing down, turning upon the hinge-joints at the upper ends of the arms *b b*. The step *a* can then be easily turned down into operative position, and the arms *h h* and brace-arm *k* will at the same time be moved into positions where they will support the step *a*, as shown in Fig. 1.

Some parts of my improved step may be used alone or in other combinations. Thus, the entire middle portion of the brace-arm *k* between the bearings for the rods *h h* might be dispensed with and some other device employed to prevent the supporting-arms *b b* from swinging on the hinged joints at their upper ends when the step is extended.

When my complete invention is employed, it will be observed that the arms *h h* and the brace-arm *k* lie at all times in the same general plane, being caused to swing down or up together around the same center. When the step is folded up, the different parts are caused to lie flatly against one another, and thus to occupy a very small space.

My improved step is light and simple in its construction, and at the same time strong and durable. When in non-operative position it occupies very little space and does not project so as to be in the way. When in operative position it need not occupy as much space as an ordinary fixed step, although its dimensions can be modified to suit any situation. It requires no mechanism of any kind to op-



erate it, but is adapted to be easily moved into or out of operative position by the hand with the exertion of only a slight amount of force.

5 Such an extension-step is of great utility on railroad-cars, in which the lowest fixed step is often necessarily high above the ground, so that without an extension-step the passengers are often compelled to step up or down a much  
10 greater distance than they can do comfortably or even safely.

What I claim as new, and desire to secure by Letters Patent, is—

1. In an extension-step device for railroad-  
15 cars or other similar uses, the combination of a suitable step, supporting-arms hinged at one end to the step and at the other end to the object to which the step is to be applied, rods hinged to the forward end of the step,  
20 and bearings in which the rods slide, the bearings being pivotally connected with the supporting-arms, substantially as shown and described.

2. In an extension-step device for railroad-  
25 cars or other similar uses, the combination of a suitable step, supporting-arms hinged at one end to the step and at the other end to the object to which the step is to be applied, rods hinged to the forward end of the step, bearings in which the rods slide, the bearings being  
30 pivotally connected with the supporting-arms, and a catch to lock the step in non-operative position, substantially as shown and described.

3. In an extension-step device for railroad-  
35 cars or other similar uses, the combination of a suitable step, supporting-arms hinged at one end to the step and at the other end to the object to which the step is to be applied, rods hinged to the forward end of the step,  
40 and a brace-arm pivoted at its ends in the supporting-arms and provided with bearings in which the rods slide, and also provided with an upper portion to bear against the object to  
45 which the step is applied, substantially as shown and described.

4. An extension-step for railroad-cars or other similar uses, consisting of a suitable step, supporting-arms hinged at one end to  
50 the step and at the other end to the object to which the step is to be applied, rods hinged to the forward end of the step, a brace-arm

pivoted at its ends in the supporting-arms and provided with bearings in which the rods slide, and also provided with an upper por- 55  
tion to bear against the object to which the step is applied, and a catch to lock the step in non-operative position, substantially as shown and described.

5. In an extension-step device for railroad- 60  
cars or other similar uses, the combination of the step *a*, the supporting-arms *b b*, hinged to the step *a* and to the object to which the step is applied, the rods *h h*, the connecting-rod *i*, hinged to the forward end of the step *a*, the  
65 arm *k*, pivoted to the supporting-arms *b b* and provided with bearings in which the rods *h h* slide, and the catch *n*, to lock the step in non-operative position, substantially as shown and described. 70

6. An extension-step for railroad-cars or other similar uses, consisting of the step *a*, the supporting-arms *b b*, hinged to the step *a* and to the object to which the step is applied, the rods *h h*, the connecting-rod *i*, hinged to 75  
the forward end of the step *a*, the brace-arm *k*, pivoted at its ends to the supporting-arms *b b* and provided with bearings in which the rods *h h* slide and with an upper portion *l* to bear against the object to which the step is 80  
applied, and the catch *n*, to lock the step in non-operative position, substantially as shown and described.

7. An extension-step consisting of the step *a*, the rod *f*, fastened to the rear end of the 85  
step, the supporting-arms *b b*, pivoted on the rod *f*, the strips *d d*, fastened to the object to which the step is to be applied, the rod *e*, supported in the ends of the strips *d d*, the arms *b b* being pivoted on the rod *e*, the rods *h h*, 90  
provided with nuts at their inner ends, the connecting-rod *i*, hinged to the forward end of the step *a*, the brace-arm *k*, pivoted at its ends to the supporting-arms *b b* and provided with bearings in which the rods *h h* 95  
slide and with an upper portion *l* to bear against the object to which the step is to be applied, the stop *m*, the catch *n*, the spring *o*, and the arm *p*, all substantially as shown and described.

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Witnesses:

EDWIN SEGER,  
HERBERT H. GIBBS.