No. 606,932. Patented July 5, 1898.

T. MAXON.

EXTENSION STEP FOR CARS.

(Application filed Feb. 12, 1898.)

(No Model.)

Fig. 1.

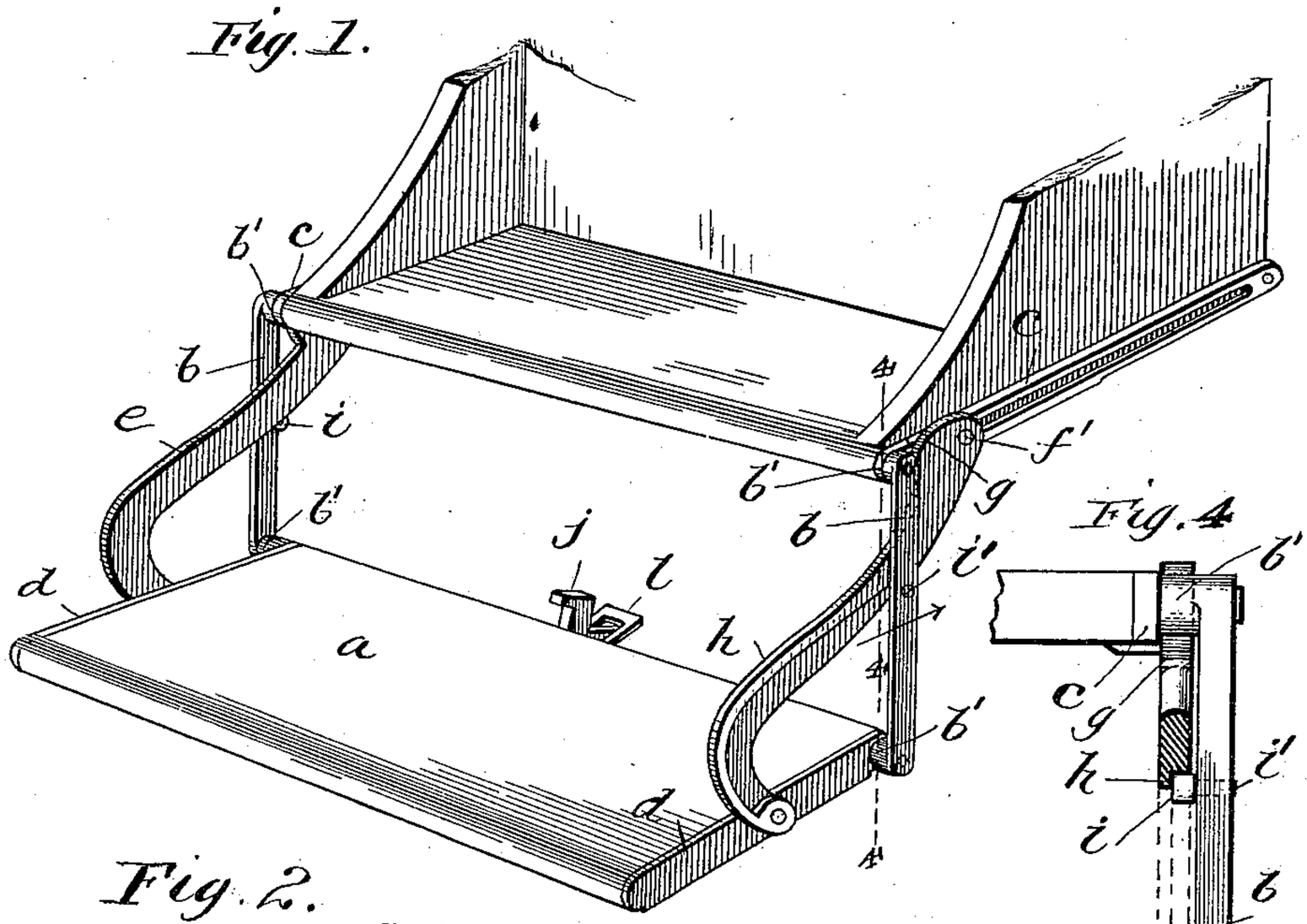


Fig. 2.

Fig. 4

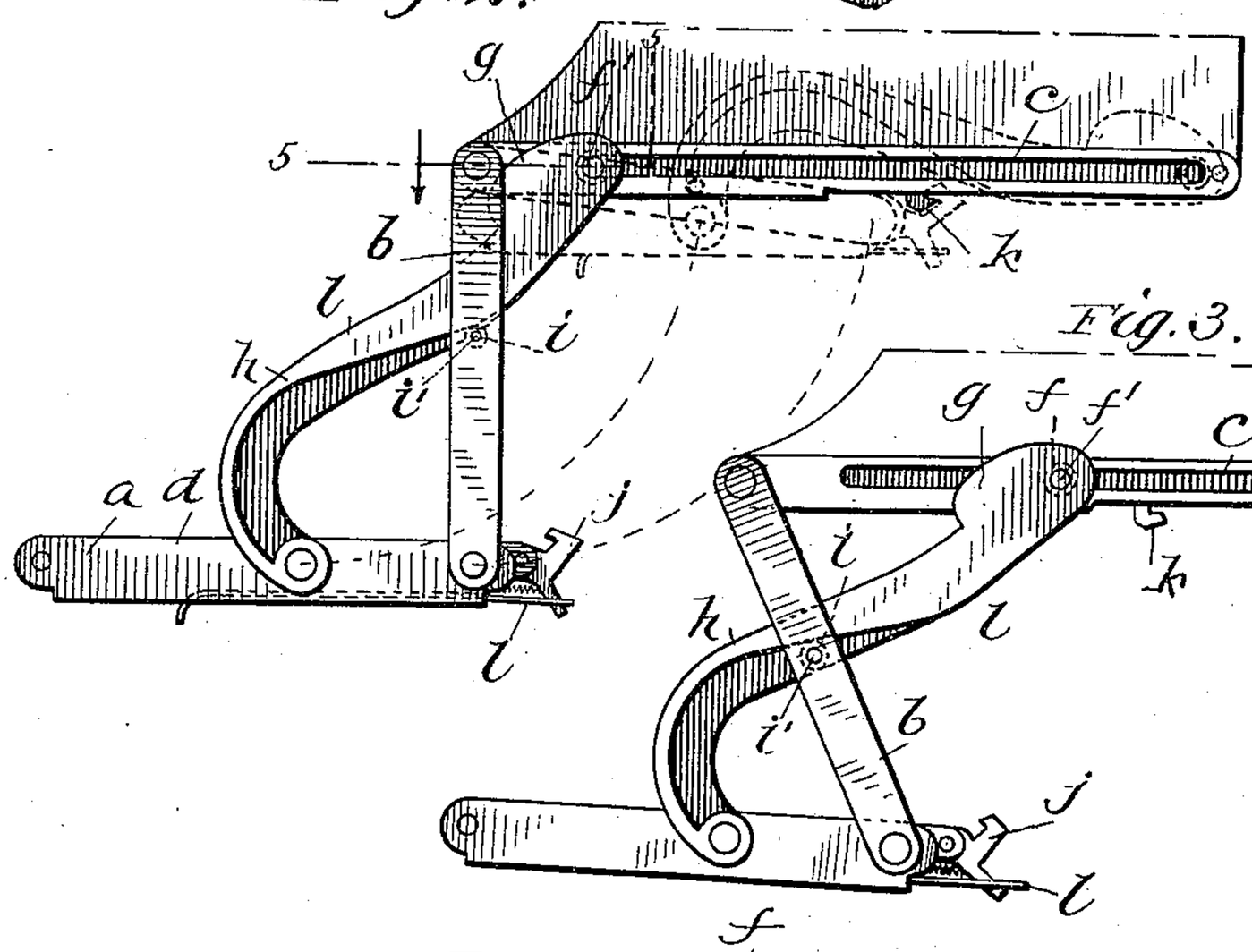
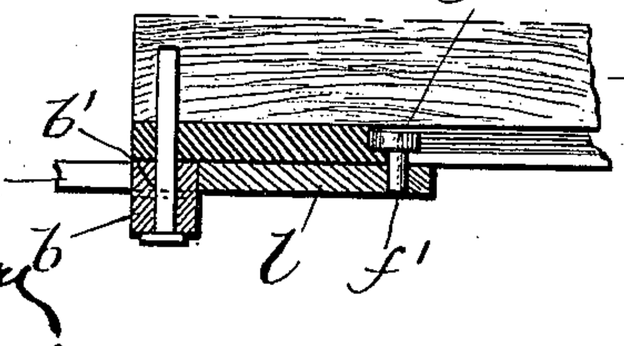


Fig. 3.

Fig. 5.



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UNITED STATES PATENT OFFICE.

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EXTENSION-STEP FOR CARS.

SPECIFICATION forming part of Letters Patent No. 606,932, dated July 5, 1898.

Application filed February 12, 1898. Serial No. 670,091. (No model.)

To all whom it may concern:

Be it known that I, THOMAS MAXON, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Extension-Steps for Cars, of which the following is a specification, reference being had therein to the accompanying drawings, in which—

Figure 1 is a perspective view showing the step extended; Fig. 2, a side view of the same, the step being shown in its folded position in dotted lines; Fig. 3, a side view showing the step in the act of being folded up; and Figs. 4 and 5, detail sectional views taken, respectively, on the lines 4 4 of Fig. 1 and lines 5 5 of Fig. 2.

The object of the invention is to improve and simplify the devices for suspending the supplemental step, whereby said step will be held more rigidly when extended and will be entirely out of the way when folded up against the permanent steps, as and for the purposes hereinafter set forth.

Referring to the drawings by letters, *a* is the supplemental step, and *b* a pair of swinging links pivotally suspending the step from the lower end of the permanent or immovable steps, one link being used at each end of the step and their upper ends being pivoted to the lowermost permanent step at or near its forward edge and their lower ends being pivoted to the ends of the supplemental step near its rear edge. Each link is provided at each end with a cylindrical boss *b'*, formed on the inner side of the link and bearing, respectively, against the plates *c* and *d*, carried, respectively, by the permanent and movable steps, said bosses being concentric with the pivots of the links and serving to set the links away from the steps. Also connecting the movable step to the permanent steps is a pair of arms *e*, one arm being employed at each side and both arms being curved downward and rearward at their lower ends. These arms at their lower ends are pivoted to the movable step about midway between its rear and its front edge and at their upper ends are pivotally and slidingly connected to the plates *c*, attached to the permanent steps, said plates *c* extending rearward on the permanent steps in a horizontal position and each being slotted longitudinally for the reception of a roller *f*, carried on the pivot-pin *f'* of the arm, said slot being rabbeted on its inner side to retain the roller in the slot. These arms work between the links and the adjacent edges of the steps, the bosses *b'* setting the links out far enough to avoid interference between the links and arms at the point where they intersect. Each link at its upper end, on its front edge, is provided with a cam-like projection *g*, which when the step is extended bears against the upper boss *b'*, said boss serving as a stop and thereby taking the strain off the pivot-pin carrying the roller *f*. Each arm on its outer side is formed with a cam-like flange *h*, which has a curvature somewhat similar to that of the arm and is adapted to engage and bear upon a roller *i*, journaled on a pin *i'*, projecting inward from the adjacent side of the link about midway the ends of the same.

It will be observed that when the movable step is extended the links *b* are substantially vertical, the movable step projects out horizontally from the links, and the arms *e* extend diagonally upward, crossing the links at a point above their center, the cams *g* on the upper ends of these arms bearing solidly against the upper bosses *b'* and the cam-flanges *h* resting firmly upon the rollers *i*. In this position a weight placed upon the supplemental step will be evenly distributed between the arms and the links, the arms and links being firmly interlocked, and thereby affording a rigid support for the movable step. To fold the step up under the main steps, it is simply necessary to press upward and backward upon the same, whereby the links will swing upward and backward and the upper ends of the arms will slide rearward in the slotted plates, these movements being continued until the step lies close up under the main steps and the arms and links lie at the side of the permanent steps, as shown in dotted lines in Fig. 2. As the arms move backward and upward the rollers *i* travel along the flanges *h* and serve to guide and steady the parts in their movements. To hold the step in its folded position, I may employ any suitable devices—such, for instance,

as a pivoted spring-actuated catch *j* on the rear edge of the step and adapted to engage a hook *k*, depending from the under side of the main steps, said catch being connected to a sliding rod *l*, extending forward on the under side of the movable step, so that the catch may be conveniently disengaged from the hook without reaching under the steps.

An essential feature of this invention lies in arranging the supporting-arms so that they intersect the supporting-links and providing means for locking the two together at the point of intersection, said means in the present instance consisting of a pin carried by the link and provided with a roller engaging a flange on the arm. By this construction the support afforded the step is very firm and the strain is properly distributed. Instead of using the roller *i* a pin alone may be employed and instead of engaging under the cam *h* on the side of the arm the pin may engage under the lower edge proper of the arm, the lower edge serving as a cam.

Another feature lies in providing a stop to engage the front edge of the arms at their upper ends when the step is extended, thereby relieving the pivot at the upper end of the arm from strain and locking the parts together. For convenience I prefer to extend the front edges of the arms, as at *g*, and have the extensions rest directly against the bosses *b'* at the upper ends of the links.

Another feature lies in providing the arms with cam-flanges *h*, which engage the rollers carried by the links and serve to support and guide the parts during the folding and unfolding movements.

It will be observed that changes in the construction may be made without departing from the spirit of the invention. For instance, the rollers *f* may be omitted and headed pins alone used; but it is obvious that rollers are most advantageous.

It will be observed that it is essential that the arms be strong and without pivotal joints and that the connection between the arms and links be a free one.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with a support, of an extension-step, depending links pivotally connecting the rear corners of the step to said support, rigid arms pivoted to the step at their lower ends and extending continuously upward and rearward intersecting the links and pivotally and slidingly connected to the support, means for limiting the forward movement of the arms, and a device carried by the links and engaging under the arms where they cross the links.

2. The combination with a support, and a supplemental step, a pair of links pivotally connecting its rear edge to said support, arms pivotally connected at their lower ends to the step and extending upward and rearward and slidingly connected to the support, each of said arms being provided with a curved cam, and a device carried by each link and engaging under the cam carried by the adjacent arm, as and for the purposes set forth.

3. The combination of a support, a movable step, depending links connecting the step to the support, said links being set out from the ends of the step and support, and a pair of arms pivotally connected at their lower ends to the step and extending upward and rearward between the links and the step and support, means for slidingly engaging the upper ends of said arms to the support, and means for locking the links and arms together when the step is extended, substantially as described.

4. The combination of a support, an extensible step, a pair of links suspending the step from the support, a pair of swinging arms pivotally connected at their lower ends to the step and extending upward and rearward past the links and slidingly connected to the support, a cam-like projection on the forward, upper edge of each link and a stop carried by the support and adapted to engage said cam-like projections, as and for the purposes set forth.

5. The combination of a support, such as a permanent step, a slotted plate carried on each side of the support, a pair of depending links pivotally swung from said plates, a supplemental step having its rear edge connected to the lower ends of said links, said links being provided with a boss at each end to set the links away from the steps, a pair of arms pivotally connected at their lower ends to the movable step and slidingly connected at their upper ends to said slotted plates, the upper front edges of said arm being provided with cam projections abutting against the inward-extending bosses of the links, and a device carried by each link and engaging under the adjacent arm, as and for the purposes set forth.

6. The combination of a support, a movable step, a pair of links suspending the step from the support, a pair of swinging arms connected at their lower ends to the step and extending upward and rearward past the links and slidingly connected to the support, and a stop carried by the support in front of each arm and adapted to receive the forward pressure of said arm and relieve its connecting device, as and for the purposes set forth.

In testimony whereof I hereunto affix my signature this 9th day of February, 1898.

THOMAS MAXON.

Witnesses:
RUFUS SWITZER,
J. T. WILSON.