

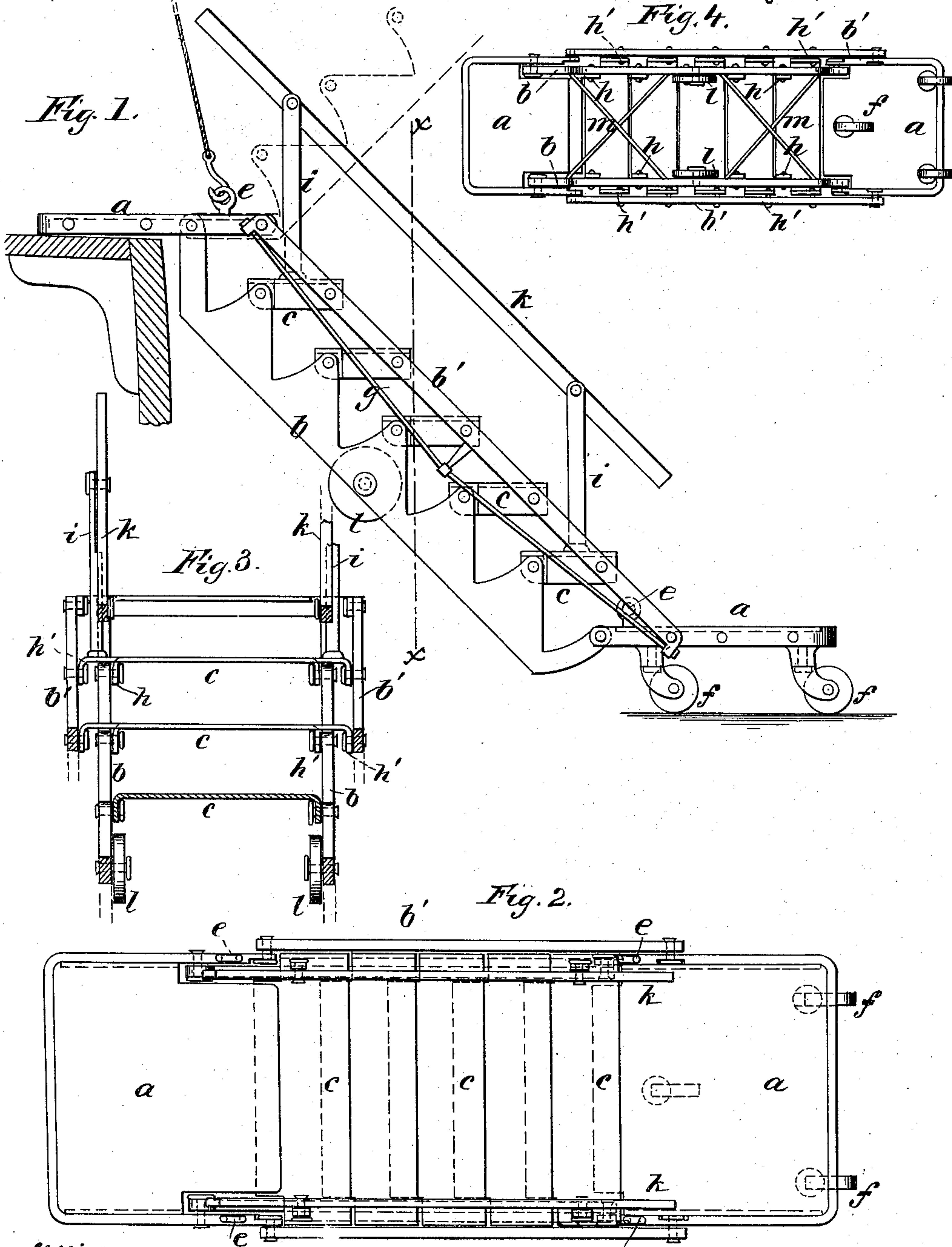
(No Model.)

2 Sheets—Sheet 1.

T. I. KNIGHT.
GANGWAY FOR SHIPS.

No. 298,212.

Patented May 6, 1884.



Witnesses:
H. F. Dalku
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Inventor:
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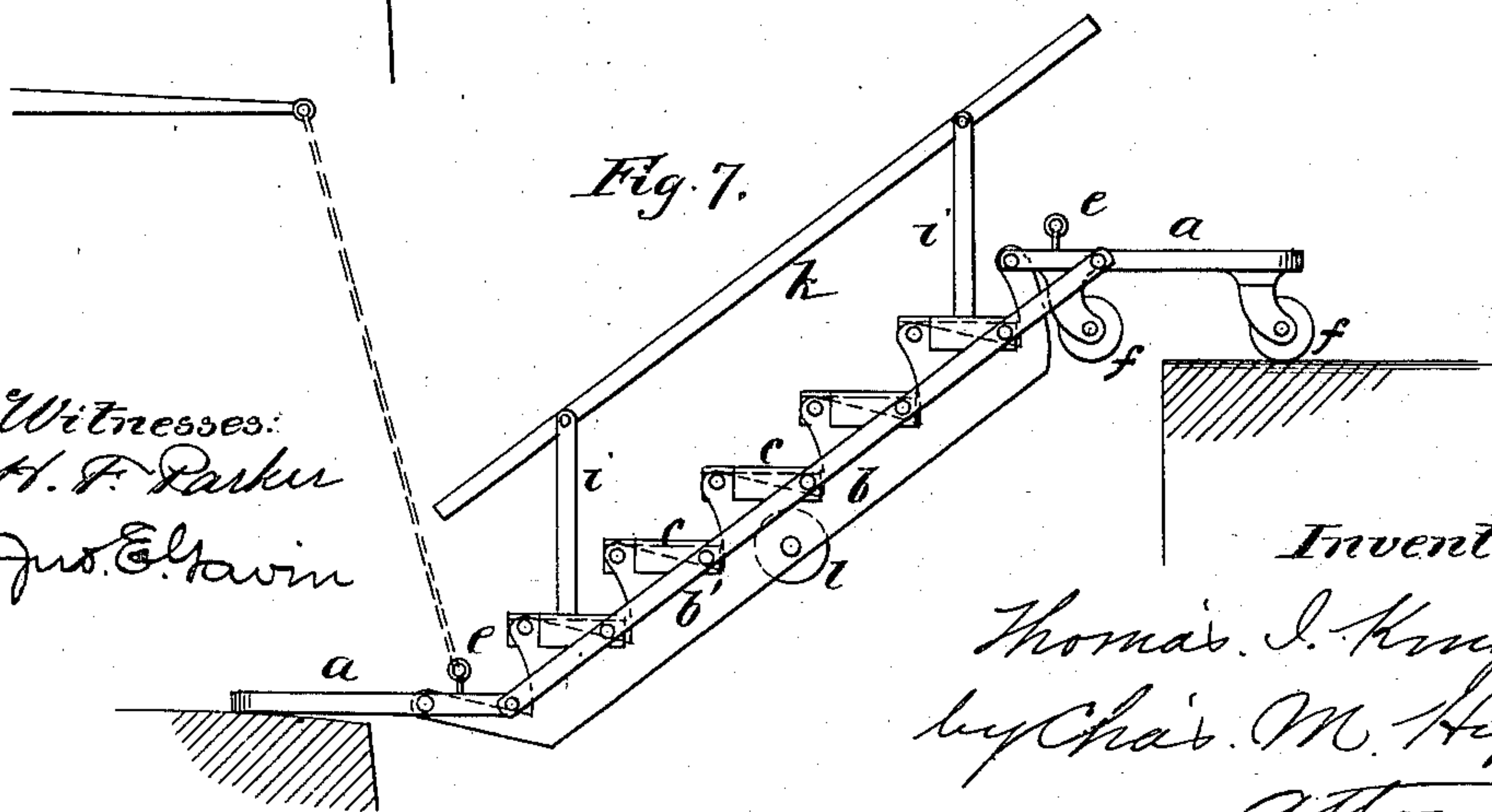
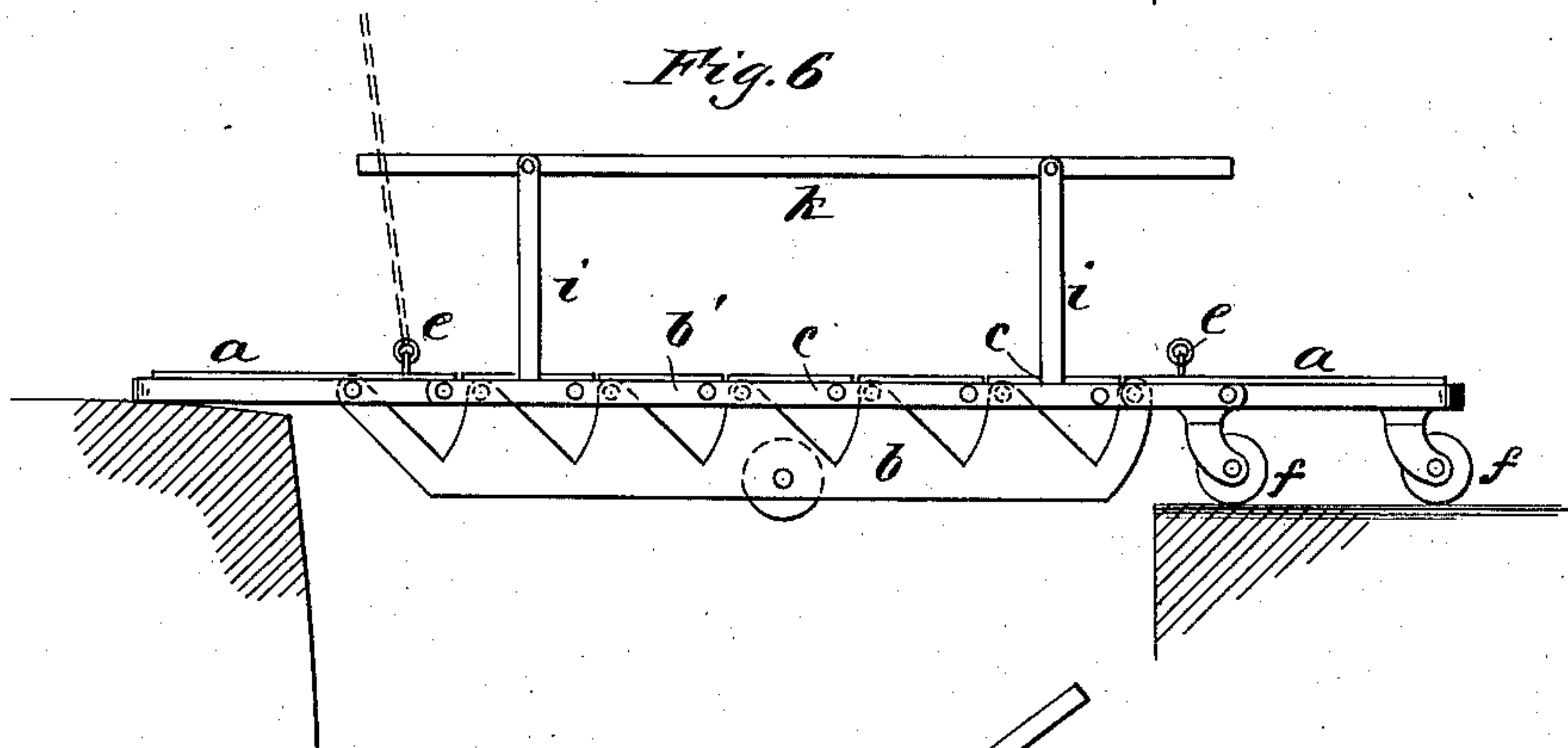
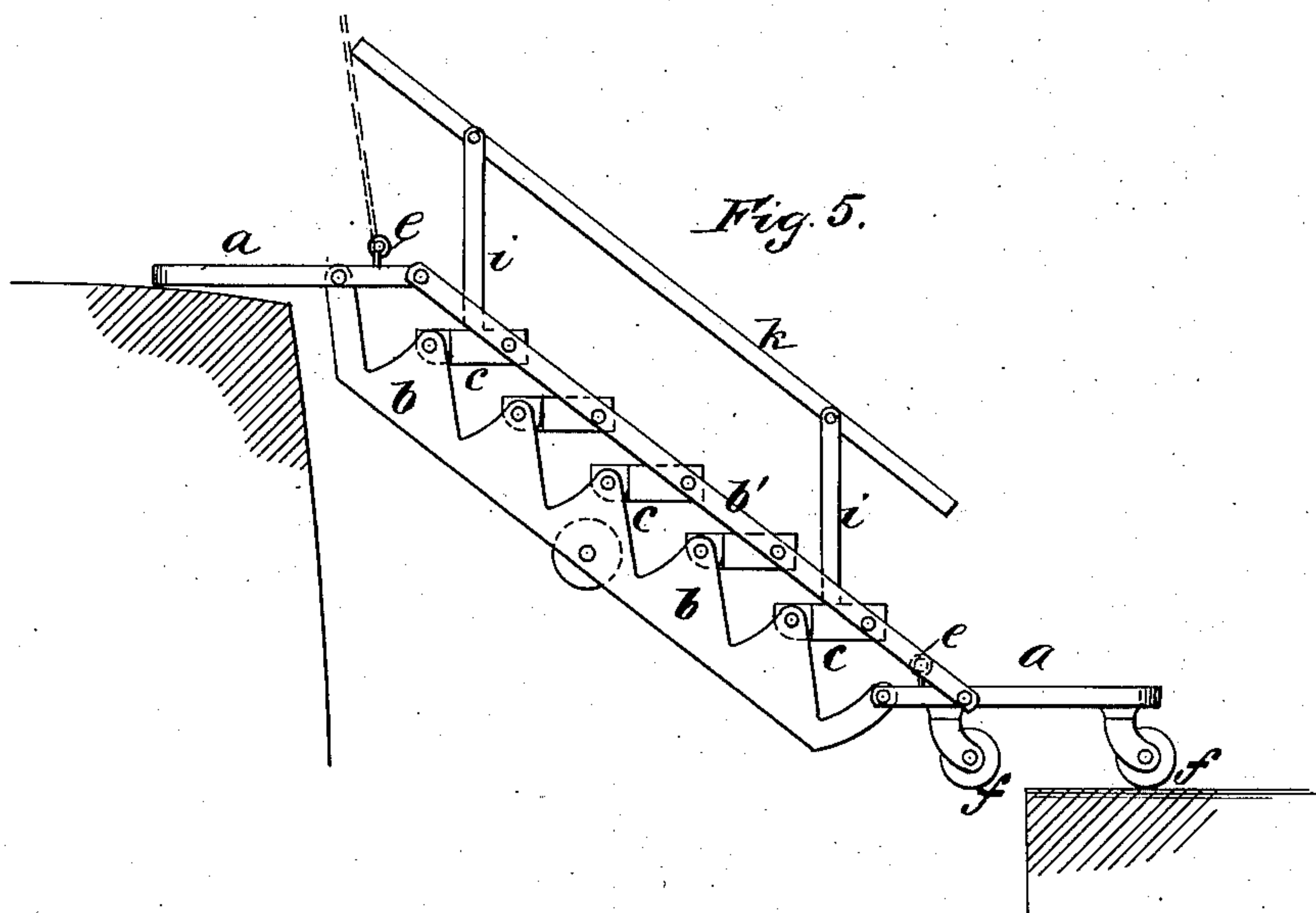
(No Model.)

2 Sheets—Sheet 2.

T. I. KNIGHT.
GANGWAY FOR SHIPS.

No. 298,212.

Patented May 6, 1884.



Witnesses:
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UNITED STATES PATENT OFFICE.

THOMAS I. KNIGHT, OF NEW YORK, N. Y.

GANGWAY FOR SHIPS.

SPECIFICATION forming part of Letters Patent No. 298,212, dated May 6, 1884.

Application filed September 6, 1883. (No model.)

To all whom it may concern:

Be it known that I, THOMAS I. KNIGHT, of New York city, New York, have invented certain new and useful Improvements in Ships' Gangways, of which the following is a specification.

My invention relates to folding or adjustable gang-planks adapted to extend from a ship's deck to the wharf or dock, and to yield or adjust itself to the rise or fall of the ship by the action of the tide, or by the shipment or unshipment of her cargo, and yet always keep the steps of the gangway level throughout such changes of position. Heretofore gangways of this character have been constructed simply on the principle of the parallel ruler, with two parallel side bars, to which the steps are linked; but they have involved a somewhat complicated construction, and the steps have been capable of a limited range of movement in but one direction only—that is, the steps have been capable of a range of movement from a position in which they are all on the same level to form a level or horizontal gang-plank to a position in which they form a descending stairs more or less steep, according as the ship varies in its height above the dock. In my improvement, however, the range of movement is very much greater, and is reversible, so as to yield with the movement of the ship whether it rises above or descends below the dock, so that the gangway is well adapted for great tidal changes, and will yield from the said position in which the steps are all on the same line or level to an inclined position in either direction in which the steps form a stairs either ascending or descending from the ship; and my invention lies mainly in this reversible construction, and also in certain details of construction relating to the guard or railing and the means for suspending the gangway, as hereinafter fully set forth.

In the drawings annexed, Figure 1 is a side elevation of my improved adjustable gangway, shown in its inclined position descending from the ship to the dock. Fig. 2 is a plan view thereof, and Fig. 3 is a cross-section on line *x x* of Fig. 1. Fig. 4 is an inverted plan view on a smaller scale. Figs. 5, 6, and 7 are side elevations showing the ladder in the different positions which it is adapted to assume, Fig.

5 showing its position when the ship is higher than the dock, Fig. 6 when the ship is level with the dock, and Fig. 7 when the ship is below the dock.

Referring to Fig. 1, the chief parts of the gangway consist of platforms *a a* at each end, a pair of parallel bars, *b b'*, on each side, and steps *c c* between the platforms, the steps and platforms being all jointed in parallel lines to the side bars, as illustrated. The end platforms, *a a*, are preferably of rectangular form, a little longer than the steps and about the same width, and the opposite ends of the side bars, *b b'*, are jointed to the approaching ends of the platforms at a distance apart about equal to the width of the steps, leaving the outer ends of the platforms overhanging or projecting beyond the bars and steps, as shown, forming landings at the top and bottom of the series of steps, as shown best in Figs. 1 and 2. The steps *c c* are preferably made of strong sheet metal, with the ends bent down at right angles, forming stiffening and attaching ears, which are jointed near each corner to the side bars, *b b'*, as shown. The platform and steps are thus jointed to the side bars at equal distances and in parallel lines, so that the structure forms a folding step-ladder capable of assuming different inclinations with the steps always parallel and level, as shown in Figs. 1 and 5, or of being placed in a perfectly flat position with the steps in line, as in Fig. 6.

On the inner end of each of the platforms is fixed a pair of suspending-eyes, *e e*, which project from the platforms at a point midway between the points at which the side bars are pivoted thereto, and in these eyes is secured the tackle whereby the gangway is suspended from the rigging of the ship in the usual way that gangways are suspended, as indicated by dotted lines in Figs. 1, 5, and 7. When the gangway is thus suspended from the ship, the overhanging end of the upper platform will rest on the deck of the ship, while the lower platform rests on the dock, as shown; and it will be noted that as the suspending strain is exerted centrally on the folding structure of the gangway by reason of the central position of the eyes *e e*, the steps firmly maintain whatever position they assume, yet are free to shift with the varying positions of the ship with

reference to the dock, and, furthermore, the weight of persons walking up or down the steps has no tendency to shift the position of the steps, as the weight is applied equally on each bar. The lower platform, *a*, is preferably provided with rollers or casters *f f*, which rest on the surface of the dock, and adapt that end of the gangway to roll easily thereon, whereas the upper platform is shown without rollers and rests flatly on the deck of the ship; but this may also be provided with rollers similar to the lower platform.

Referring now to Figs. 5 and 6, it will be noted, with what has been already described, that the folding structure of the gangway is such that it will assume a perfectly flat position, with all the steps level, similar to a common gang-plank, when the ship's deck is nearly level with the dock, as shown in Fig. 6, and that should the ship rise with the tide, or by the removal of her cargo, above this level, the gangway will still adapt itself to this change and assume an inclination corresponding to the rise of the ship above the dock, yet always keeping the steps level and forming a descending stairs to the dock, as seen in Fig. 5. In addition, however, to the above two results, which have been accomplished heretofore, my improved gangway has a still further capacity of being reversible, or yielding also to the movement of the ship in the reverse direction—that is, to descend below the dock, as seen in Fig. 7, where the steps will still keep in a level position and form a stairway ascending from the ship to the dock—so that the gangway has thus a great range of adjustment from one direction of incline to the opposite direction of incline, which is an important improvement of great value in ports in which there are great tidal changes, or for vessels of deep draft, which load very deeply. In order to accomplish this reversible construction, it will be noted, by referring to Figs. 3, 4, and 7, that in this ladder the side bars, *b b'*, are not placed in the same plane with each other, but in planes side by side, and that the upper bar, *b'*, is slender and strengthened by a truss-rod, *g*, while the lower bar is wide, and is notched with a series of deep indentations or zigzag notches corresponding to the steps of the ladder, which are jointed thereto at the angles of said notches. Consequently the lower bar can pass by the upper bar and the steps can fall into the notches of the lower bar, as seen in Fig. 7, thus giving a reverse inclination from that shown in Fig. 5.

By referring to Figs. 3 and 4 it will be seen that the ends of the steps *c c* have two series of hinging-lugs, *h h'*, one within the line of the other, corresponding to the position of the two side bars, *b b'*, and that the back corners of the steps are notched to form the back pair of lugs, *h*, which are jointed to the lower side bar, *b*, whereas the outer and front lugs, *h'*, are hinged to the upper side bar, *b'*, the lower side bar thus lying in a plane between the two

series of lugs, as illustrated. The several aforesaid joints of the side bars with the steps and platforms are made by means of strong free-fitting bolts or rivets, as will be readily understood.

In order to provide this folding stairs with a suitable guard or banister, I affix, preferably, to each end of the first and last step a post or standard, *i i*, which posts rise rigidly from the said steps and at right angles therefrom, and to the top of each pair of standards on the respective sides of the stairs is jointed the guard or banister rail *k*, which rails are of about the same length as the side bars *b'*, and thus form an effective guard to afford a safe grasp for the hand to persons in ascending or descending the steps, and which guards will also adjust or adapt themselves to the adjustments of the stairs, as will be readily understood by referring to Figs. 5, 6, and 7.

If desired, the posts *i i* might arise from any other convenient steps of the stairs or from the end platforms, *a a'*, instead of from the steps shown.

It will be noted that both platforms *a a* are provided with a set of suspending-eyes, *e e*, in corresponding positions, so that the gangway may be suspended from either end, as occasion requires. It may be also seen by referring to Figs. 1, 4, 5, 6, and 7 that the lower side bars, *b b*, are provided with rollers *l l* at the middle thereof, which will enable the gangway, when flattened out as seen in Fig. 6, to be easily rolled along the dock and turned into any position desired, and thus easily moved from place to place when not in actual use as a ladder or stairs.

I prefer to make all parts of the gangway of wrought or sheet metal, which will produce a very strong, light, and cheap construction; but, if desired, the steps and platforms may be made of wood, with suitable iron fittings on the ends to strengthen the same and form a better jointure with the side bars. The lower side bar, *b*, may be made of one piece of metal in the solid form shown, or it may be made of light corrugated metal, or from a slender bar bent in zigzag shape and suitably strengthened by bracing or trussing, as will be understood.

Referring to Fig. 4, it will be seen that I prefer to stiffen the lower side bars, *b b*, and hold them rigidly at the proper distance apart by the crossed diagonal braces *m*, which will render this frame-work of the stairway very strong and stiff.

What I claim as my invention is—

1. An adjustable or folding step-ladder or stairs formed with two series of parallel side bars placed in different planes, in combination with steps jointed to the respective bars, forming a jointed reversible step-ladder capable of assuming opposite inclinations, substantially as herein set forth.

2. In a folding step-ladder, the combination, with parallel side bars and steps hinged there-

to at the respective corners, of the overhang-
ing platforms *a a*, hinged at each end of said
side bars parallel with said steps, substantially
as herein shown and described.

5 3. A reversible folding or adjustable ladder
formed with the outer side bars, *b'*, and inner
side bars, *b*, having a notched or stepped form,
with steps *c c*, having hinging-ears at differ-
ent planes on their respective corners jointed
10 to the respective bars, substantially as and for
the purpose set forth.

4. A folding step-ladder having parallel side
bars with parallel steps jointed thereto, the
said steps being formed of sheet metal, with
15 their ends bent at right angles, forming hing-
ing-lugs, which are jointed to said bars, sub-
stantially as herein set forth.

5. The combination, in a folding step-ladder,
with parallel side bars and a parallel series of
steps jointed thereto, of the suspending-eyes 20
e e, fixed in the final steps connecting the side
bars, and midway between the said bars, sub-
stantially as and for the purpose set forth.

6. In a folding step-ladder substantially
such as described, the posts *i i*, arising from 25
the steps, with the banister rail or rails *k k*
jointed thereto, substantially as and for the
purpose set forth.

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