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A. N. CHAMBERLAIN & W. L. HALL.

FOLDING LADDER.

APPLICATION FILED SEPT. 18, 1902.

NO MODEL.

Fig. 1.

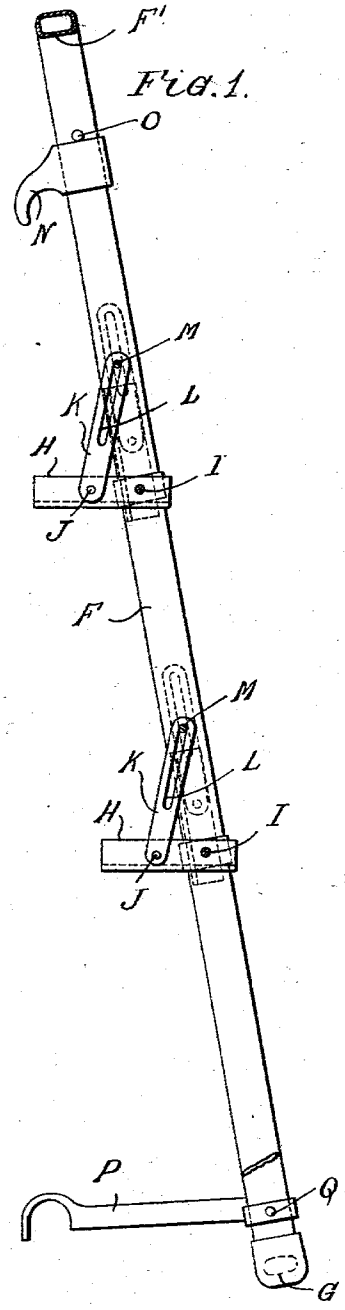
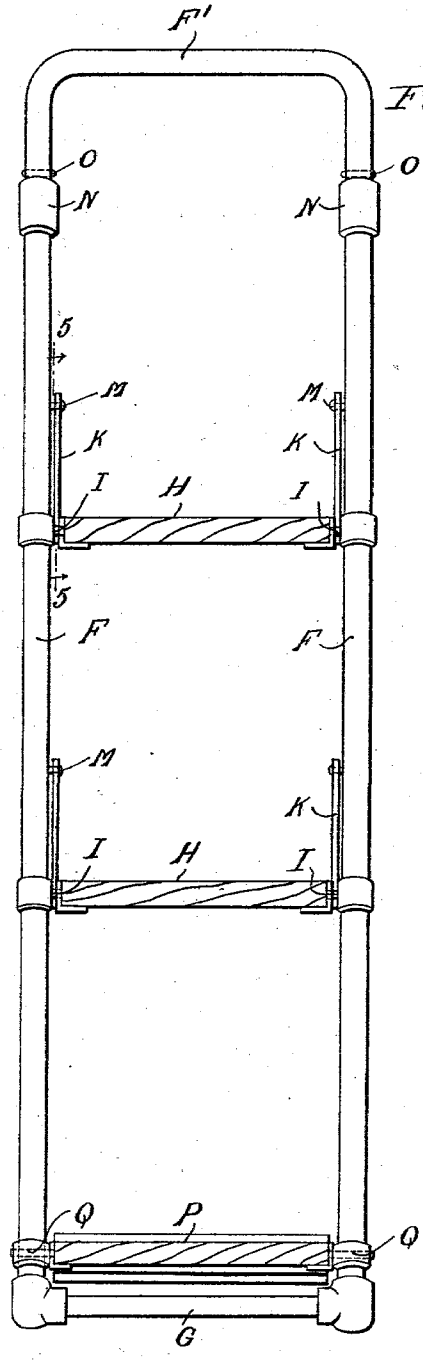


Fig. 2.



WITNESSES:

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ARTHUR NEVILLE CHAMBERLAIN AND WILLIAM LANGLEY HALL, OF BIRMINGHAM, ENGLAND, ASSIGNORS TO HOSKINS & SON, LIMITED, OF BIRMINGHAM, ENGLAND.

FOLDING LADDER.

SPECIFICATION forming part of Letters Patent No. 720,891, dated February 17, 1903.

Application filed September 18, 1902. Serial No. 123,805. (No model.)

To all whom it may concern:

Be it known that we, ARTHUR NEVILLE CHAMBERLAIN and WILLIAM LANGLEY HALL, ships'-berth manufacturers, both of Neptune Works, Upper Trinity street, Birmingham, in the county of Warwick, England, have invented certain new and useful Improvements in Folding Ladders, of which the following is a specification.

This invention relates to folding ladders more especially adapted to afford convenient access to the upper berths of a cabin on board ship.

In a folding ladder constructed in accordance with this invention each side is formed of one or more tubes, bars, or their equivalent and the steps or treads are pivoted thereto at their front or back corners or along their front or back edges. The two sides of the ladder are preferably additionally stayed together by means of transverse stays or struts or equivalent connecting-pieces, upon which in some cases the steps are hinged. The ladder is folded by turning the steps on their pivots into a plane parallel to the sides, so as to stow them in between the said sides flush or approximately flush with the latter. In the construction shown only one tube or bar is employed at each side of the ladder-steps; but it will be understood that two or more may be used. The construction shown, however, is designed more particularly with a view to providing a folding ladder of great lightness, and hence one tube or bar to the side is used. In this construction the steps are pivoted to the sides and supported by slotted links working on pins carried by the sides at a higher position. It will be understood that the steps may be hinged upon transverse stays or struts, if desired. The sides may be bent around at the upper and lower ends or may be stayed together by corner-pieces suitably joined by a cross-bar, or the lower ends may obtain their necessary support on the deck.

The ladder is preferably supported on each side by hooks, which may be sliding or fixed, to engage upon the front framing of the upper berth and by a pivoted stay having a hook at its outer end to engage upon the front framing of the lower berth, the length of this stay being preferably arranged to give the necessary angle and form the support for the lower step. When the sides of the ladder are continued down to the floor, these stays are not necessary and the bottom step is made similar to the others.

In the accompanying drawings, Figure 1 is a front elevation of the ladder in its open condition, and Fig. 2 a vertical section.

As shown in the drawings, each side of the ladder is preferably composed of a single bar F, although two bars suitably fixed together may be used. The two sides F F are preferably formed in one piece bent around at the upper end of the ladder at F′ and connected by a transverse stay-piece G at their lower ends, as shown. The stay-piece G may in some cases be omitted. The steps H are preferably pivoted forwardly at each end at I to the sides F F and in this case are also supported rearwardly of points I I on pivots J, shown as carried by links K, working by means of slots L on pins M, carried by the sides F at a higher position.

The ladder is adapted to engage with the front rail of the upper berth by means of a sliding hook N, mounted on each side F and having its range of movement limited by stops O, or fixed hooks may be fitted at this point.

The desired angle of the ladder for use is maintained by constructing the lower step or one of the lower steps in the form of a hooked stay, such as shown at P, pivoted at Q to the sides F. This hooked stay P, which may, if desired, be pivoted to the sides, engages with the front frame of the lower berth. This hooked stay P may, if desired, be made separate from the step H and pivoted independently thereof to the sides F. When necessary, the ladder can be extended below this point and an additional step or steps be fitted in the same manner as those above.

What we claim, and desire to secure by Letters Patent, is—

1. In a folding ladder, the combination of ladder sides, steps hinged between said sides on a line connecting the ladder sides and al-

ways at right angles thereto, and links adapted to support said steps angularly to said sides, each of said links having a connection at its upper end to the ladder side, and at its lower end to one of said steps, one of said connections adapted to permit the link and step to move into a plane approximately coincident with that of the sides, whereby to fold the ladder.

2. In a folding ladder, the combination of ladder sides, steps hinged between said sides on a line connecting the ladder sides and always at right angles thereto, and links connected at their upper ends by a pin-and-slot connection to the ladder sides and also pivoted at their lower ends to the ends of said steps rearwardly of the said sides, the ladder being folded by turning said steps upward and forward into approximately the same plane as the ladder sides, substantially as set forth.

3. A portable folding ladder comprising a supporting ladder-frame consisting of two side bars and transverse bars rigidly connecting the side bar, steps pivoted on said transverse bars so as to unfold outwardly and downwardly into a substantially horizontal position, links connected at their upper ends by a pin-and-slot connection to the ladder sides and pivoted at their lower ends to the sides of the steps, supporting-hooks sliding on the upper ends of the sides of the ladder-frame, stops on the ladder sides for limiting the movement of said sliding hooks, and an extended stay pivoted to the lower end of the ladder-frame so as to unfold outwardly and downwardly with its end abutting against the supporting-wall when the ladder is in use, substantially as set forth.

In witness whereof we have hereunto signed our names in the presence of the subscribing witnesses.

ARTHUR NEVILLE CHAMBERLAIN.
WILLIAM LANGLEY HALL.

Witnesses as to the signature of Arthur Neville Chamberlain:

ROBERT HENRY STEWART,
ARCHIBALD GEORGE BARLOW.

Witnesses as to the signature of William Langley Hall:

THOMAS BATEMAN,
ROBT. M. SHORT.