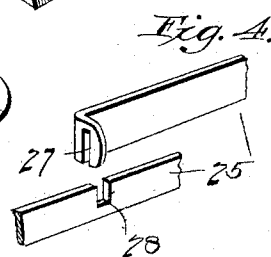
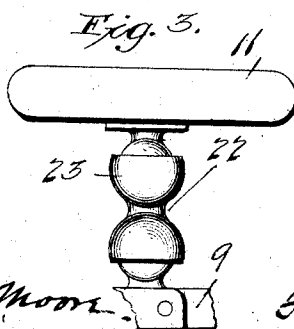
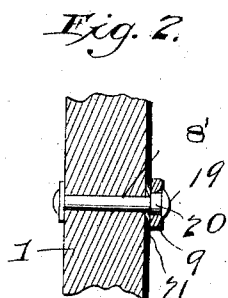
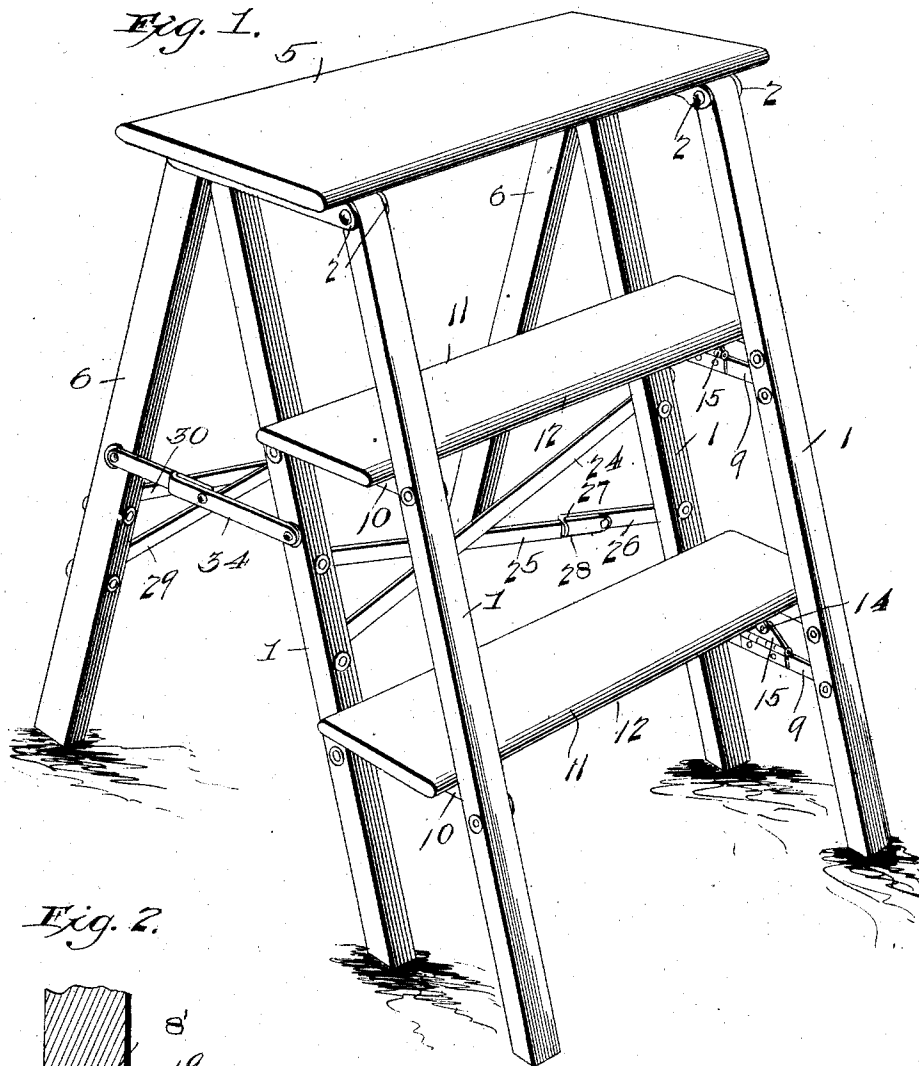


No. 864,898.

PATENTED SEPT. 3, 1907.

F. B. KOUES.
FOLDING STEP LADDER.
APPLICATION FILED AUG. 28, 1906

2 SHEETS—SHEET 1.



Inventor

Witnesses

Wm Douglas Moore
Raphael Davis

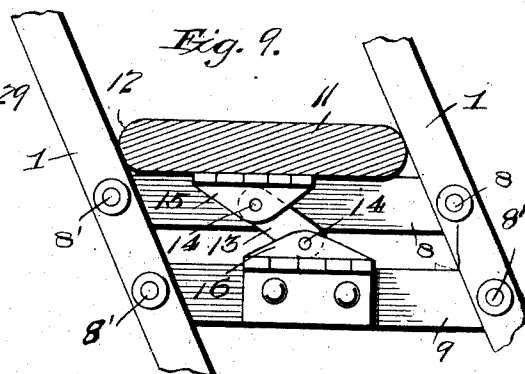
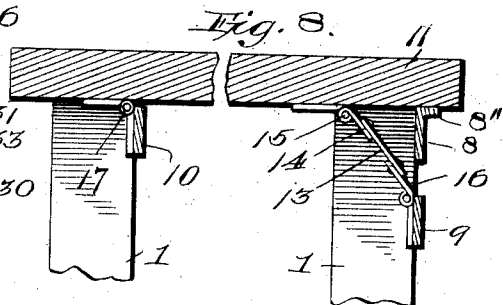
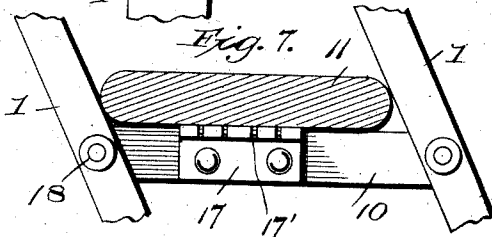
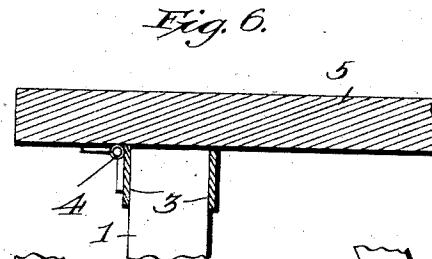
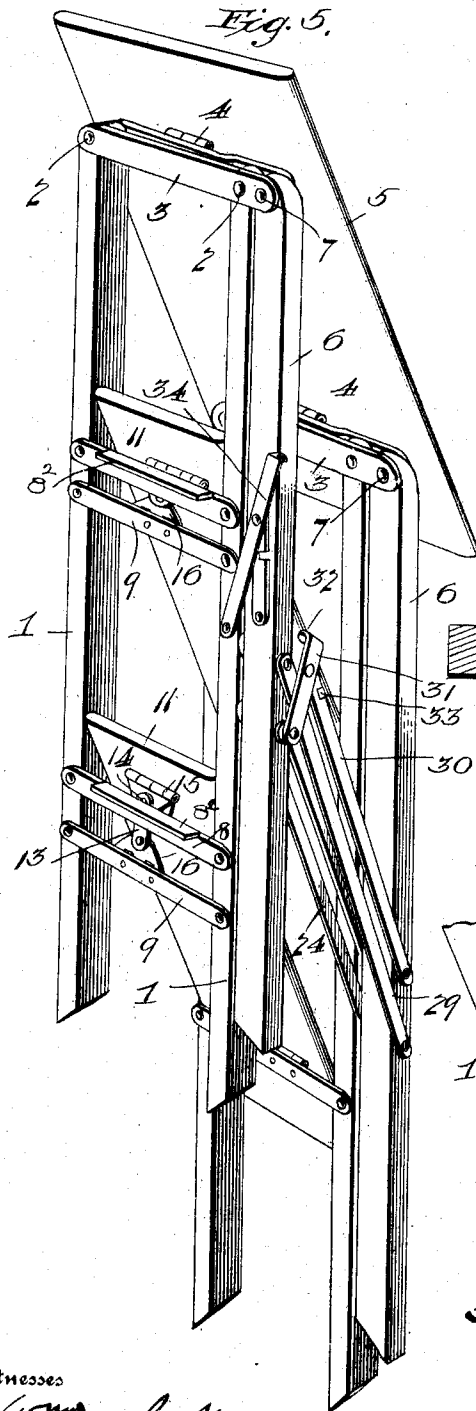
Frank B. Koues

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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

FRANK B. KOUES, OF RUTHERFORD, NEW JERSEY.

FOLDING STEP-LADDER.

No. 864,898.

Specification of Letters Patent.

Patented Sept. 3, 1907.

Application filed August 28, 1906. Serial No. 332,323.

To all whom it may concern:

Be it known that I, FRANK B. KOUES, a citizen of the United States, and a resident of Rutherford, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Folding Step-Ladders, of which the following is a specification.

This invention relates to folding step ladders, and has for its object to provide a folding step ladder so constructed that its several parts may be folded up into as compact a space as possible.

The invention further has for its object to provide a folding step ladder in which danger of collapsing is avoided when in use, the weight of the person on the ladder serving to bind the parts more firmly together and making the ladder absolutely non-collapsible.

These objects are accomplished by the particular construction and arrangement of the steps and stiles having such a relation to each other that they cooperate to hold the parts firmly in position when the ladder is in use.

The invention consists in a folding step ladder and in details thereof constructed and arranged as hereinafter set forth in the claims.

Referring to the accompanying drawings in which similar figures of reference refer to like parts, Figure 1, Sheet 1, is a perspective view of a step ladder constructed in accordance with this invention and shown in position for use. Fig. 2 is a detail view showing the construction and arrangement of the pivot pin for one of the side straps. Fig. 3 is a detail view of a modification of the brace for the step. Fig. 4 is a detail view showing the knuckle joint for one of the straps. Fig. 5 is a perspective view showing the ladder in folded position. Fig. 6 is a detail view partly in section showing one of the hinge connections for the top step. Fig. 7 is a detail view showing the laterally movable hinge at one end of the steps. Fig. 8 is a detail view showing the hinge and brace connection at the ends of one of the steps. Fig. 9 is a detail view showing the brace connection of one of the steps with the stiles when the step is in position for use.

In carrying out this invention the step ladder is provided with double stiles 1, at each end of the steps, the upper ends of the stiles being pivoted as at 2, to the ends of a double strap 3 to which is hinged by the hinges 4 the top step 5.

6 are the folding legs of the step ladder which are hinged at the point 7 to the ends of the straps 3.

The double stiles 1, 1, are connected together at one side of the ladder, adjacent to each step, by the straps 8, and 9, consisting of thin strips of metal, and pivoted at 8' to the stiles 1, so as to permit of a movement to accommodate them to the movement of the stiles from a vertical to an inclined position. The stiles 1, 1, on the opposite side, adjacent to each step,

are pivotally connected together by a single metallic strap 10.

11 indicates the steps, each step being connected at one end to a strap 9 by a brace 13, having one end pivoted at 14 to a hinge 15 on the underside of the step, and the other end pivoted at 14 to a hinge 16 on the strap 9. The steps 11 are connected at their opposite end by a hinge 17, having a sliding joint 17', to permit of adjustment of the step, when the stiles 1, 1, are tilted into and out of vertical position. The edges of the steps 11 are rounded, as at 12, so as to accommodate them to the wedging movement between the double stiles 1, 1.

The distance of the top surface of the step above the line connecting the pivots of straps 9, 10 to the stiles, causes the front stiles to impinge upon the front edges of the steps, when the stiles are tilted back from a vertical position, and because of the yielding connection of the steps to the straps 8, 9, 10, the steps may be pushed back by the forward stiles until their rear edges engage the front of the rear stiles, and the steps are thus pinched, or wedged between the front and back stiles, when said stiles are tipped from a vertical to an inclined position.

The straps 8 are preferably formed with a flange 8² so as not to cut into the wood of the step which rests thereon.

The straps 8, 9 and 10 are connected to the stiles 1 by a pivot pin 18 having a head 19 and a shoulder 20 located in the strap with a washer 21 between the shoulder 20 and the stile 1, all as shown in Fig. 2. This form of pivot pin serves to provide a pivotal bearing for the straps which will not bind. In lieu of the brace 13 and its hinges the brace 22 having its ends formed with ball-bearings 23 may be employed as shown in Fig. 3. The double stiles 1 are held in expanded position by the strap 24 and the folding strap consisting of the parts 25 and 26 hinged together and provided with the knuckle joint consisting of the hook 27 engaging the socket 28. The folding legs 6, 6 are braced by the strap 29 and the knuckle-jointed strap consisting of the parts 30 and 31, hinged together and having the hook 32 engaging the slot 33. The hook 32 projecting inward when the parts are in expanded position is located beneath the straps 29 and serves as a lock. When the parts are in folded position as shown in Fig. 5, the hook 32 will be out of the way of and not jam against the legs 6. The stiles 1 and the legs 6 are held in extended position by means of knuckle-jointed braces 34.

It will be seen that by means of the foregoing described construction that the steps 11 serve to lock the double stiles in expanded position; the steps 11, when the stiles are moved into inclined position, serving to lock said stiles 1, 1, in position, their rounded edges 12 wedging firmly between the stiles 1, 1, as

shown in Fig. 9. The sliding hinge 17 distributes the wedging action of the steps 11, in conjunction with the hinged brace 13. When the stiles 1, 1, are unfolded, and in position for use, the braces 13 will aid in preventing the steps from collapsing, or moving lengthwise. The double hinge arrangement of the stiles and the top step permit of a complete folding of the several parts into a compact form.

When the ladder is being opened for use, a straight push down, and weight brought to bear upon the steps keeps them from rising, as they must do to collapse. This whole action, involving the wedging of the steps, and the pushing back of the braces 13, expands the steps and stiles, if they are not opened to their full extent, and extends, and locks the knuckle joint braces. The ladder is thus securely locked in expanded position by the weight of a person mounting the steps.

Having described my invention I claim:—

- 20 1. A folding step-ladder, provided with double folding stiles, and steps connected thereto, to permit the stiles, and steps to fold laterally, and the stiles to tilt to and from a vertical position to wedge the steps between the double stiles, whereby they are locked in expanded position, as set forth.
- 25 2. A folding step-ladder, provided with double folding stiles, and steps connected thereto, to permit the stiles, and steps to fold laterally, and the stiles to tilt to, and from a vertical position, to wedge the steps between the
- 30 double stiles, whereby they are locked in expanded posi-

tion, one end of the steps being connected with said stiles by a hinged brace, and the other end by a hinge, as set forth.

3. A folding step-ladder, provided with double, laterally folding tilting stiles, and laterally folding steps, connected thereto; and a laterally folding top step; said double stiles being pivotally connected to the top step, and the steps being hinged to the double stiles, the latter being adapted to tilt to, and from a vertical position, to wedge the steps between the double stiles, whereby they are locked in expanded position, as herein set forth.

4. A folding step-ladder, provided with double, laterally folding stiles, each pair of double stiles being connected, adjacent to one end of each step, by a pivoted strap, and adjacent to the other end of each step, by two pivoted straps, in combination with laterally folding, rocking steps, each step being connected at one end to a pivoted strap by a sliding hinge, and at the other end by a jointed brace, hinged to the step, and to the lower one of the two pivoted straps, each step resting at both ends upon a pivoted strap, as herein set forth.

5. In a folding step-ladder, a pair of crossing brace straps, one being single, and the other knuckle-jointed, the knuckle-joint having a projection, which serves to lock the two straps together, as herein set forth.

6. A folding step-ladder, provided with double, folding stiles, in combination with folding, rocking steps, each step being connected with the stiles, at one end by a hinge, and with the stiles, at the other end, by an inclined brace, having universal joints, as herein set forth.

Signed at New York city, in the county of New York and State of New York this 10th day of August A. D. 1906.

FRANK B. KOUES.

Witnesses:

WM. DOUGLAS MOORE,
RAPHAEL DAVIS.