(No Model.) 2 Sheets—Sheet 1.

B. G. BEMIS & O. D. CUMMINGS.

LADDER.

No. 452,826. Patented May 26, 1891.

Fig. 1.

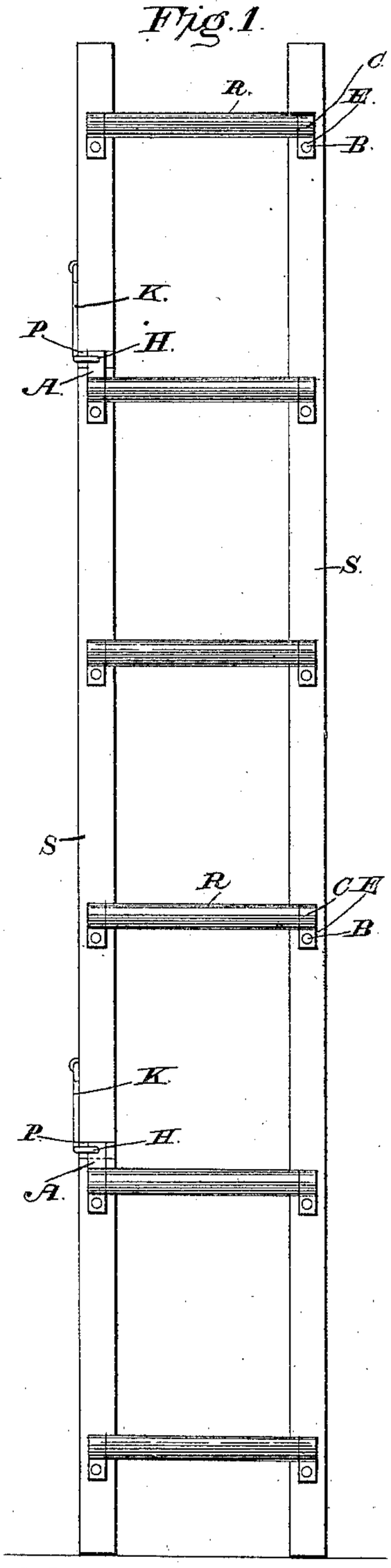
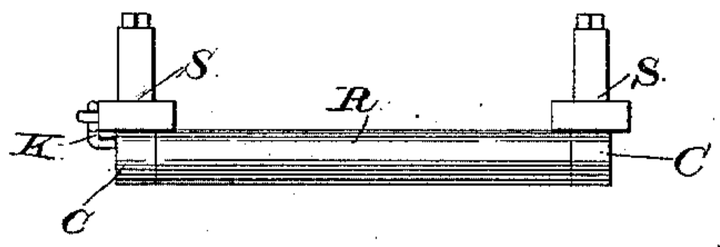


Fig. 3.



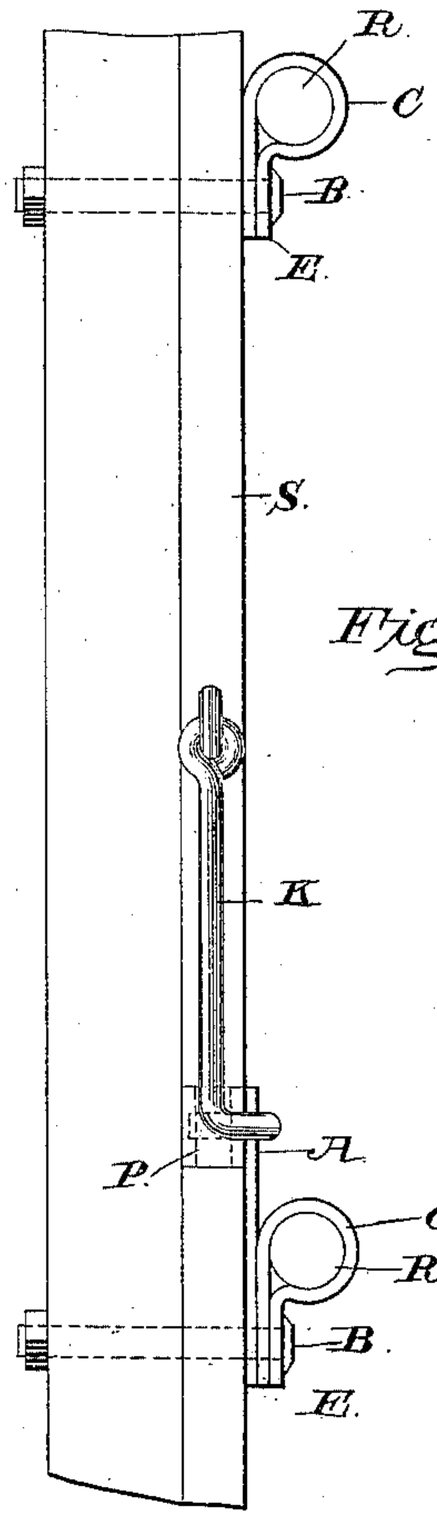
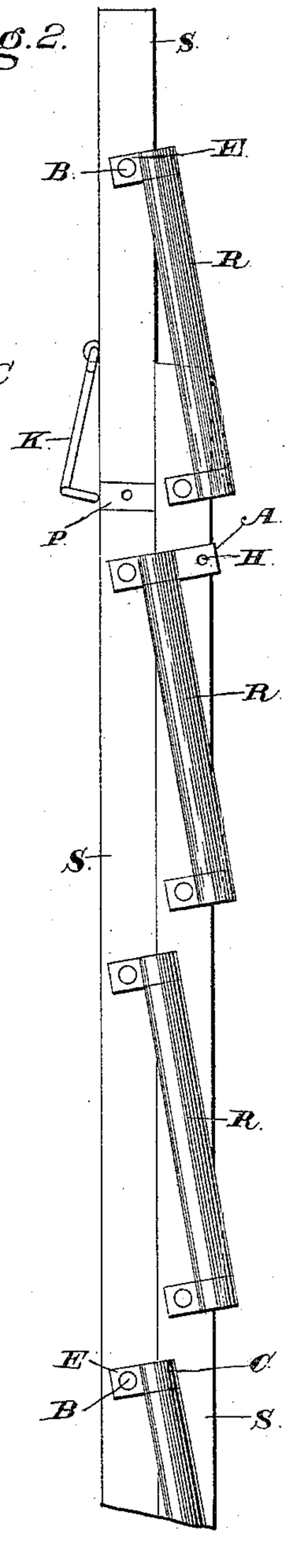


Fig. 4.

Fig. 2.



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By their Attorneys,
A. Howson & Co.

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

(No Model.) 2 Sheets—Sheet 2.

B. G. BEMIS & O. D. CUMMINGS.

LADDER.

No. 452,826. Patented May 26, 1891.

Fig. 5.

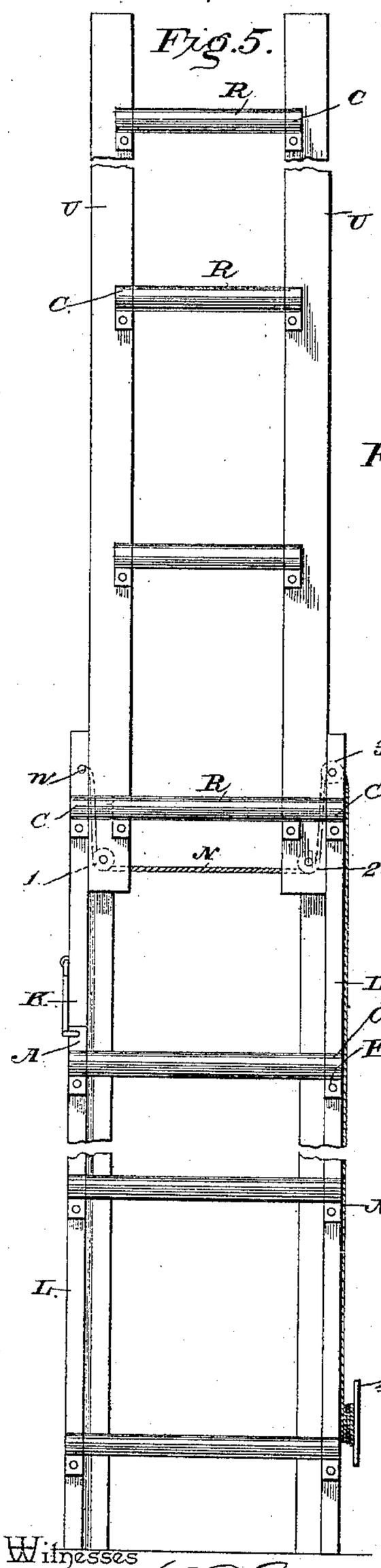


Fig. 6.

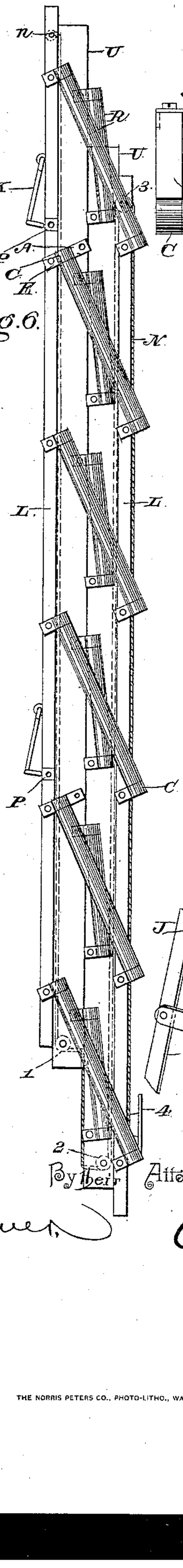


Fig. 7.

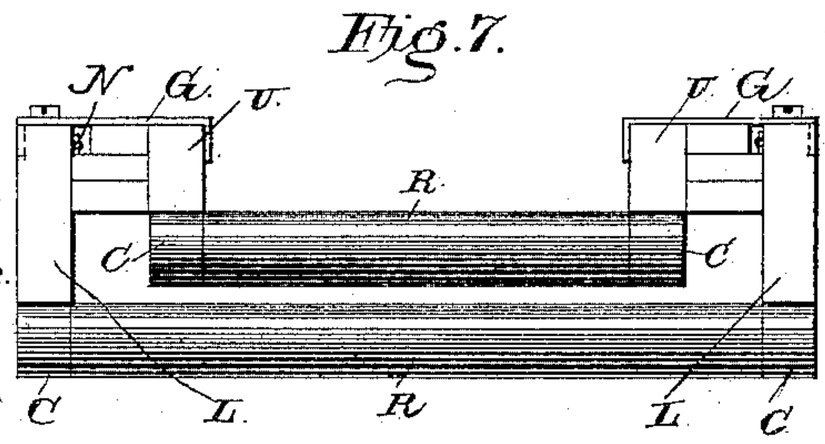


Fig. 8.

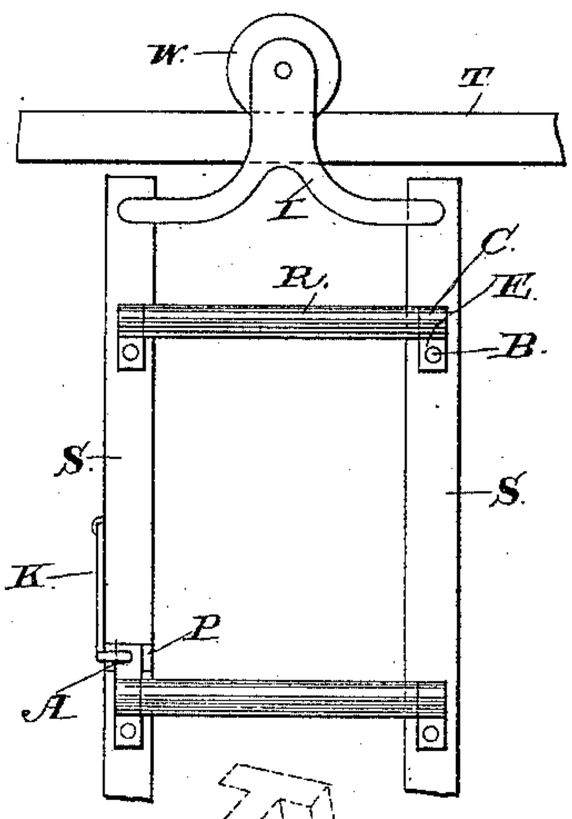
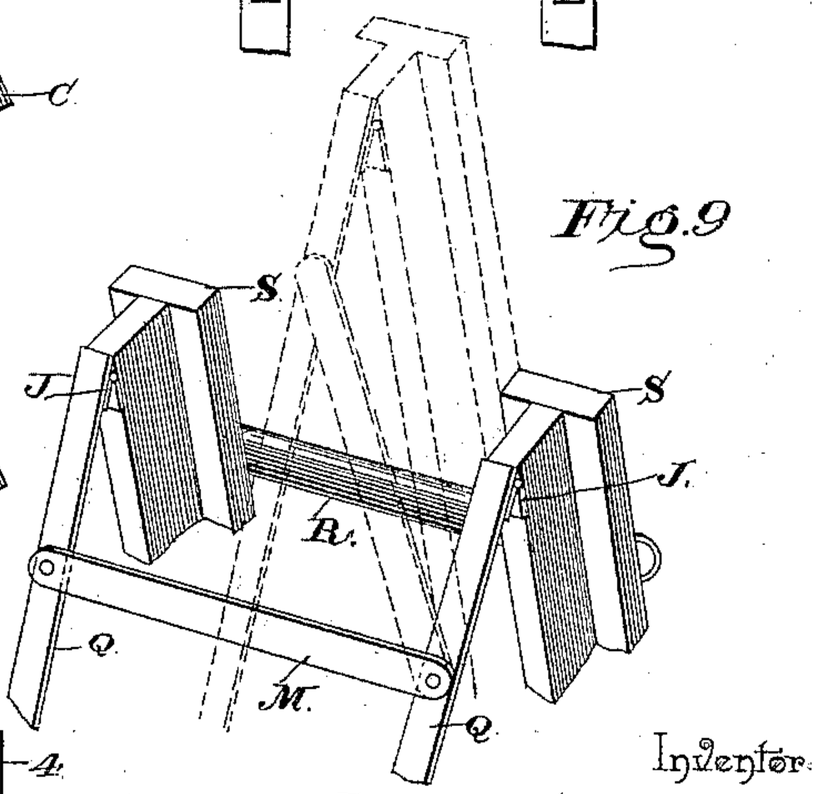


Fig. 9.



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UNITED STATES PATENT OFFICE.

BERTIE G. BEMIS AND ORSON D. CUMMINGS, OF CHARLESTOWN, NEW HAMPSHIRE.

LADDER.

SPECIFICATION forming part of Letters Patent No. 452,826, dated May 26, 1891.

Application filed December 17, 1890. Serial No. 375,034. (No model.)

To all whom it may concern:

Be it known that we, BERTIE G. BEMIS and ORSON D. CUMMINGS, citizens of the United States, residing at Charlestown, in the county of Sullivan and State of New Hampshire, have invented a new and useful Ladder, of which the following is a specification.

This invention relates to ladders, and more especially of that class which are adapted to be folded for storage; and the object of the same is to produce an improved ladder of this same general construction.

To this end the invention consists of the details of construction hereinafter more fully described and claimed, and as illustrated in the drawings, wherein—

Figure 1 is a front elevation of a single ladder open. Fig. 2 is a similar view showing the ladder closed. Fig. 3 is an upper end view of Fig. 1. Fig. 4 is an enlarged side elevation of the locking devices. Fig. 5 is a front elevation of an extension-ladder extended and opened. Fig. 6 is a similar elevation showing the latter telescoped and closed. Fig. 7 is an upper end view of Fig. 5. Fig. 8 is an elevation of the upper end of a step-ladder, showing a wheel secured thereto for running on a track. Fig. 9 is a perspective detail of the upper end of a folding step-ladder.

Referring to the said drawings, the letter S designates the side bars of a ladder. In Fig. 3 these side bars are shown as consisting of a flat front member and another member secured thereto at right angles, whereby the section of each side bar is of T shape.

The letters C designate metallic cleats, whose ends E are pierced, and through them pass bolts B, which also pass through the two members of the side bars, whereby the cleats are pivotally connected thereto and are capable of being turned around the bolts. The heads of the cleats may have openings of any shape to receive the ends of the rungs R, which are firmly held therein. One or more of the cleats are provided with arms A, having holes H, and plates P, provided with similar holes, are secured to one of the side pieces S. When the ladder is open, as shown in Fig. 1, these holes register with each other, and a hook K, which is linked to the side piece, is seated in each pair of holes to hold the ladder in this position. To close the ladder, the hooks are removed and one side piece moved relatively to the other, as shown in Fig. 2.

This improved ladder may be made extensible by providing upper and lower side pieces U and L, respectively. Fig. 7 shows that the lower side piece is of T shape, but standing transversely to the ladder and the front web of the T extended forward a considerable distance, whereas the upper section is of U shape, embracing the shank of the T, but with its rear member slightly shorter than its front member. Guides G are connected to the lower member and extend in rear of the upper member, their hooked ends serving to keep said member in position. To the front face of the upper member are pivoted cleats C, which receive rungs R, and the sections are permitted to be folded or opened and locked, all in the manner above described. In this case, however, the rungs of the upper section are in a vertical plane in rear of those of the lower section, as best seen in Fig. 7, whereby the two sections are allowed to telescope without the rungs interfering. A hoisting rope or chain N is connected at *n* to the upper end of the left side piece of the lower section, passes thence down in rear of the shank of the T in the opening formed by the short rear member of the U-shaped section, over a pulley 1 at the lower end of the left side piece of the upper section, across and over a pulley 2 at the other side, thence upwardly in the corresponding opening at the other side of the ladder, over a pulley 3 in the upper end of the right-hand side piece of the lower section, down the right-hand side of said section, and is connected to a cleat 4 at the base of the lower section. By drawing upon this rope the upper section will be raised whether the two sections are closed or open. The same means as above described are preferably used for holding the ladder open.

In Fig. 8 is shown a track T such as is sometimes used in hardware or other stores, upon which track travels a grooved wheel W, and said wheel is journaled in an iron frame I, whose ends are pivotally connected to the side pieces S of the simple ladder above de-

scribed, or which may be connected to an extension-ladder, if desired

In Fig. 9 an inclined brace Q is shown, connected by hinges J with the upper end of each side bar S of the simple ladder, and these braces are connected at one or more points by metallic straps M, whose ends are pivoted to the braces, as shown. When the ladder is closed, as shown in dotted lines, the inclined braces will close also, the straps M permitting this movement.

Ladders constructed in accordance with the above description will possess great strength with little liability to warp or to bend on account of the shape of their side pieces. They may be closed, so as to occupy but little space, or opened and locked securely in this position, so as to be used the same as an ordinary ladder. These functions are also embodied in the extension-ladder above described, which ladder also possesses a further advantage in the specific arrangement of the hoisting-rope, because said rope works between the sections in an opening and is thereby not chafed or worn, and also because said rope will operate the sections whether they are open or closed. The wheel W of Fig. 8 is for an obvious and well-known purpose, and yet the iron I, to which said wheel is journaled, is pivotally mounted at its ends in the side pieces of the ladder, so that the latter can be folded after the wheel is lifted off the track. The step-ladder shown in Fig. 9 can also be folded, as seen in dotted lines, the inclined rear brace in no wise preventing.

What is claimed as new is—

1. In a ladder, the combination, with each of the sides of two or more pieces, bolts therethrough, rungs, cleats secured on the ends of said rungs, and extensions of said cleats pivotally mounted on said bolts, of means for holding the ladder in open condition, substantially as described.

2. In a ladder, the combination, with the side pieces, bolts therethrough, rungs, cleats secured on the ends of said rungs, and extensions of said cleats pivotally mounted on said bolts, of a perforated arm on one of said cleats, a perforated plate secured to the side piece, and a hook adapted to enter the perforations when the ladder is open, substantially as described.

3. In an improved folding ladder, the combination, with the side pieces, bolts therethrough, rungs, cleats secured on the ends of said rungs, and extensions of said cleats pivotally mounted on said bolts, of an inclined brace hinged to the upper end of each side piece, metallic straps pivoted at their ends to said braces, and means for holding the ladder in open condition, substantially as described.

4. In a ladder, the combination, with the side pieces, bolts therethrough, rungs, cleats secured on the ends of said rungs, and extensions of said cleats pivotally mounted on said bolts, of an iron I, pivotally connected at its ends with the side pieces, a wheel journaled in said iron, and means for holding the ladder in open condition, substantially as described.

5. In a ladder, the combination, with an upper and a lower section telescoping into each other, of rungs, cleats secured on the ends thereof, extensions of said cleats pivoted to the side pieces of the ladders, and means for holding said ladders in open condition, substantially as described.

6. In an extension-ladder, the combination, with a lower section having T-shaped side bars and an upper section having U-shaped side bars sliding on the shanks of the T's, one edge of each upper side bar being cut away and leaving a vertical opening, of a rope or chain connected to the upper end of one side piece of the lower section, passing downwardly in one of said openings, over a pulley in the lower end of one side piece of the upper section, across and over a similar pulley in the other side piece, upwardly in the other of said openings, over a similar pulley in the upper end of the other side piece of the lower section, and down to a cleat within reach of the operator, as set forth.

7. In a ladder, the combination, with a lower section whose side pieces are of approximately T-shaped cross-section, with their shanks in alignment and extending inwardly, an upper section whose side pieces are of approximately U-shaped cross-section, opening outwardly and embracing said shanks, and guides connected to one section and loosely embracing the other, of rungs secured to the front face of the upper section and to the front edges of the side pieces of the lower section and extending across those on the upper section, substantially as described.

8. In a ladder, the combination, with a lower section whose side pieces are of approximately T-shaped cross-section, with their shanks in alignment and extending inwardly, an upper section whose side pieces are of approximately U-shaped cross-section, opening outwardly and embracing said shanks, and guides connected to one section and loosely embracing the other, of rungs pivotally connected to the front faces of the upper section and to the front edges of the side pieces of the lower section and extending across those on the upper section, and means for moving said ladders longitudinally and said side pieces transversely, substantially as described.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in presence of two witnesses.

BERTIE G. BEMIS.
ORSON D. CUMMINGS.

Witnesses:
EDWARD COOLY,
HERBERT W. BOND.