May 30, 1939. W. B. CAST 2,160,124

KNOCK-DOWN LOAD SUPPORT

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Fig. 1.

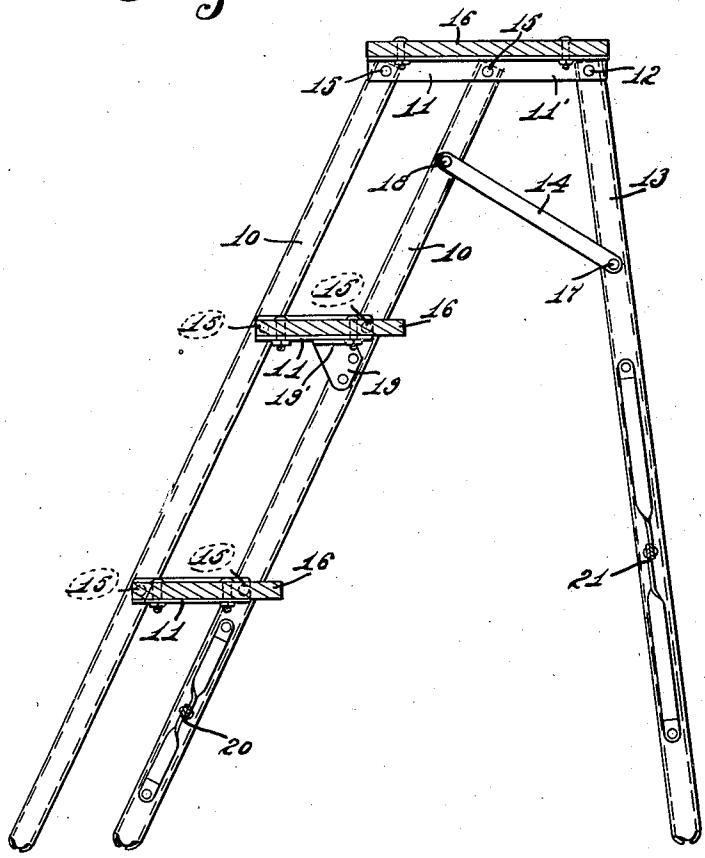
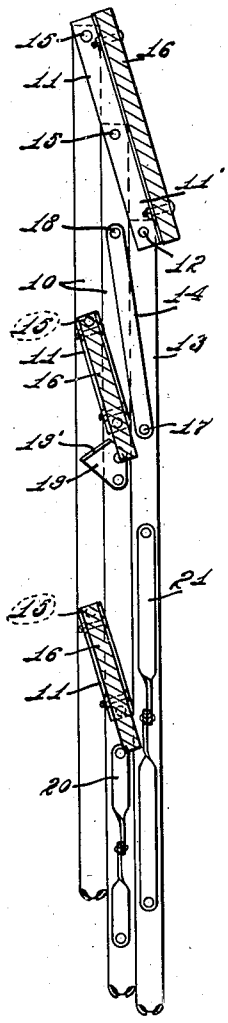


Fig. 2.



INVENTOR.
William B. Cast,
BY
Hood & Hahn.
ATTORNEYS.

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Fig. 3.

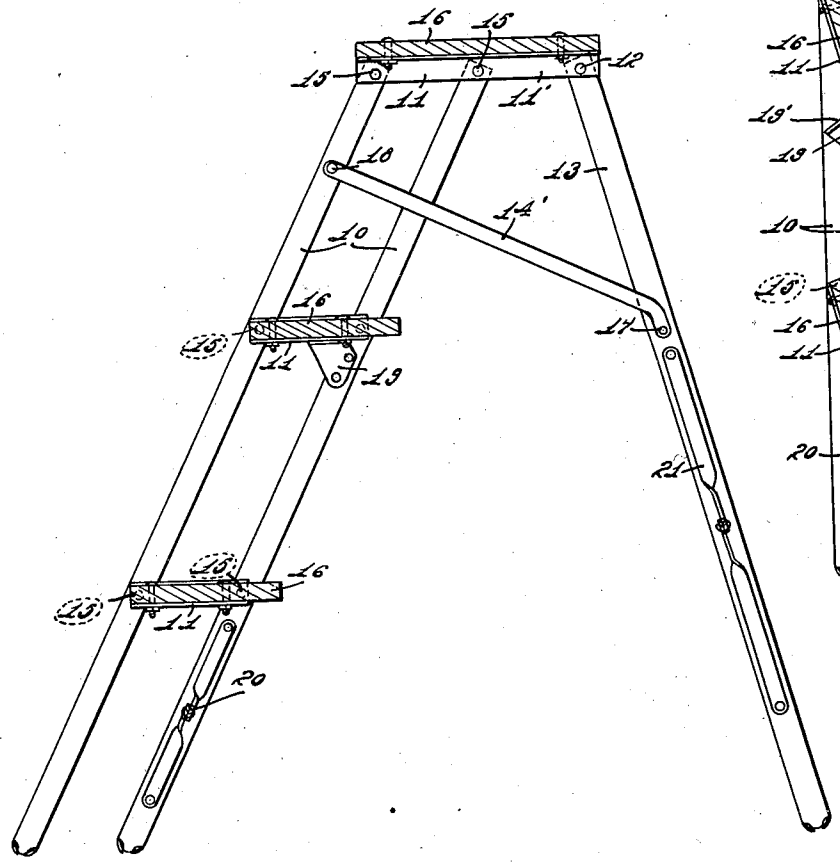
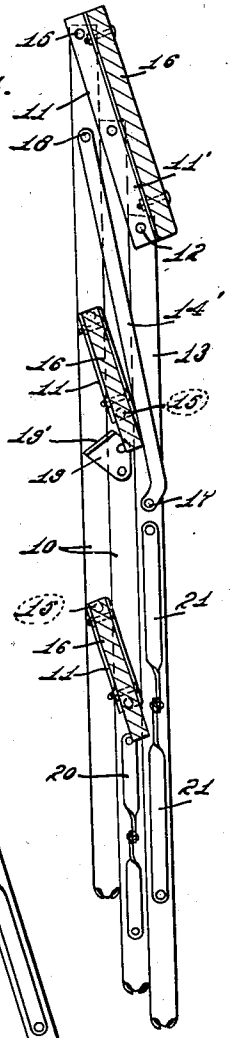


Fig. 4.



INVENTOR.
William B. Cast,
BY
Hood & Hahn.
ATTORNEYS.

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KNOCK-DOWN LOAD SUPPORT

William B. Cast, Parkville, Mo.

Application December 3, 1938, Serial No. 243,681

6 Claims. (Cl. 228—37)

The primary object of my invention is to produce a collapsible stepladder of rigid and substantial construction primarily available as an article of kitchen furniture so dimensioned as to be comfortably available as a stool, the construction being such that, although readily and very compactly foldable, it will nevertheless be substantial and stable under applied loads.

When the invention is understood, it will be immediately apparent that its fundamental feature may be utilized as a collapsible frame-work for various purposes.

The accompanying drawings illustrate my invention as incorporated in a three-step stepladder, the upper step of which is available as a seat.

Fig. 1 is a vertical section of an embodiment of my invention with the parts extended in position for support of applied loads;

Fig. 2 a vertical section showing the parts in collapsed or folded position;

Fig. 3 a vertical section of a modification with the parts extended; and

Fig. 4 shows the collapsed relation of the parts shown in Fig. 3.

The fundamental combination of my invention comprises two parallel uprights or stiles 10, 10, at least one of which is a load-supporting member, connected by parallel links 11, 11, in desired number, at least one of which is long enough to provide an extension 11' projected beyond the vertical uprights 10, and to which is pivoted, at 12 at a point substantially spaced from the pivot of the adjacent upright, a supporting leg 13 connected by a spacer 14 with one of the uprights 10, most conveniently the adjacent upright 10, as shown in Figs. 1 and 2, but possible as shown in Figs. 3 and 4.

Each of the links 11 is pivotally connected to uprights 10 at 15, 15 to form the well known "parallel link" structure.

The leg 13, to be effective to thoroughly stabilize the structure when in extended position, should have its lower end spaced considerably more distant from the lower end of the adjacent upright 10 than the spacing between the upper ends of that upright 10 and leg 13, and the lower end of leg 13, when projected, should lie beyond the vertical plane of the end of the projected portion 11' to which the upper end of the leg 13 is connected but, in order that the most compact folded relationship may be automatically attained, the spacer 14 must be so positioned and proportioned that the desired ends may be attained.

Ordinarily an embodiment of my invention will require the use of two of the units, which I have described above, arranged in parallel vertical planes and connected by load-receiving elements such as steps 16 which are secured to and extended between the links 11 in the same horizontal plane. Conveniently, these links may be made of angle iron, the lower links having their horizontal arms at the lower edges of the vertical arms and the upper links 11, 11' having their horizontal arms at the upper edges of their vertical arms.

In embodiments of my invention in which there are links 11 intermediate the lowest link 11 and the links 11—11', it appears to be necessary, so far as I have been able to discover, that the spacer 14 shall be closely subjacent the links 11—11' and that it be very carefully proportioned and positioned in order to insure a folding of the leg 13 into parallelism and contact with the adjacent upright 10 while at the same time being so controlled that in projected position the lower end of upright 10 shall occupy the position noted above. As shown in Figs. 3 and 4, the desired nestability of parts may be obtained by properly shaping spacers 14'.

I have found that the desired ends may be attained by proportioning the parts as shown in the drawings, the spacer 14 being pivoted at 17 to leg 13 and at 18 to the adjacent upright 10, the spacing between pivot 15 of the aforesaid upright 10 and pivot 18 being considerably less than the spacing between pivots 12 and 17.

By this arrangement, the steps 16, carried by the lower links 11, may be considerably wider than the length of the links with the excess width projected toward leg 13, without interfering with the movement of the spacer 14 to collapsed position, with the leg 13 brought parallel to and in contact with the adjacent upright 10, as is clearly indicated in Figs. 2 and 4.

In order to brace the structure in extended position, I secure to the inner upright 10 a plate 19 having a finger 19' in position to be engaged by the adjacent link 11, when the parts are extended, to prevent further swinging movement of the link 11. Ordinarily only one of these stops is required in connection with each unit, as indicated, although it will be readily understood that such a stop may be provided for each link 11 if desired.

It will also be understood that instead of the stops 19, 19' being carried by the inner upright 10 in position to limit downward movement of a link 11 relative to inner upright 10, a similar

bracket might be mounted on the outer upright 10 in position to limit downward movement of that upright relative to one of the links 11.

Where, as in the stepladder illustrated, two of the collapsible structures which I have described are used, cross bracing is obtained by an X-brace 20 extending from the lower end of one of the uprights 10 of one of the units to the corresponding upright 10 of the other unit; and by an X-brace 21 extending between the two legs 13, preferably below the pivots 17.

I claim as my invention:

1. A collapsible load-supporting structure comprising a pair of parallel uprights, at least one of which is ground engaging, two or more parallel horizontal links pivotally connected to and spacing said uprights with an upper one of said horizontal links projected beyond its pivotal connection with one of said uprights, a leg pivotally suspended from the projected end of said last-mentioned horizontal link at a point substantially spaced from the pivotal point of the next adjacent upright, a spacer pivoted to said leg and to one of said pair of uprights in such relation that the structure may be collapsed to substantial parallelisms, and stop means arranged to limit expansive movement of the parts.

2. A collapsible load-supporting structure comprising two parallel units each of which comprises a pair of parallel uprights, at least one of which is ground engaging, two or more parallel horizontal links pivotally connected to and spacing said uprights, with an upper one of said horizontal links projected beyond its pivotal connection with one of said uprights, a leg pivotally suspended from the projected end of said last-mentioned horizontal link at a point substantially spaced from the pivotal point of the next adjacent upright, and a spacer pivoted to said leg and to one of said pair of uprights in such relation that the structure may be collapsed to substantial parallelisms, load-receiving elements connecting the horizontal links in horizontal pairs, and stop means arranged to limit expansive movement of the parts.

3. A collapsible seat and ladder structure, comprising two parallel units, each of which comprises a pair of parallel uprights, two or more parallel horizontal links pivotally connected to and spacing said uprights with the upper one of said horizontal links projected beyond its pivotal connection with one of said uprights, a leg pivotally suspended from the projected end of said last-mentioned horizontal link at a point substantially spaced from the pivotal point of the next adjacent upright and a spacer pivoted to said leg and one of said uprights in such relation that the structure may be collapsed to substantial parallelisms; steps connecting links in horizontal pairs, the upper step supported by the two projected links being broader than a subjacent step, and means for limiting expansion movement of the parts.

4. In a collapsible load-supporting structure, a pair of spaced units each including a spaced pair of parallel members, a plurality of parallel links pivotally connected with said parallel members with a selected link projected beyond its pivotal connection with one of said members, a leg member pivotally connected with said projected portion at a point substantially spaced from the pivotal point of the next adjacent of the parallel members, a spacer pivoted to the leg member and to one of said parallel members in such relation that all of said members may be collapsed in substantially close parallelisms, a plurality of parallel elements connecting the links of the two units in pairs and stop means arranged to limit expansive movement of said members.

5. A collapsible load-supporting structure including spaced pairs of parallel members, a plurality of parallel links pivotally connecting said parallel members in pairs, including means laterally spacing the parallel members of the respective pairs and with two selected links projected beyond their pivotal connection with corresponding members of the respective pairs, leg members pivotally connected with said projected links at points substantially spaced from the pivot of the next adjacent one of the parallel members, a spacer pivoted to one leg member and to one of said parallel members in such relation that said parallel members may be collapsed in substantially close parallelism with the leg members, and stop means arranged to limit expansive movement of said members.

6. A collapsible load-supporting structure, comprising a pair of uprights, at least one of which is ground engaging, two or more parallel horizontal links pivotally connected to and spacing said uprights with an upper one of said horizontal links projected beyond its pivotal connection with one of said uprights, a leg pivotally suspended from the projected end of said last-mentioned horizontal link at a point substantially spaced from the pivotal point of the next adjacent upright, a spacer pivoted to said leg and to one of said pair of vertical links in such relation that the structure may be collapsed to substantial parallelisms, and stop means carried by one of the uprights and projected into the expansive path of movement of one of the horizontal links to limit expansive movement of the structure.

WILLIAM B. CAST.