

June 27, 1967

W. J. S. JOHNSON ET AL

3,327,810

SELF-SUPPORTED LADDER

Filed May 10, 1966

4 Sheets-Sheet 1

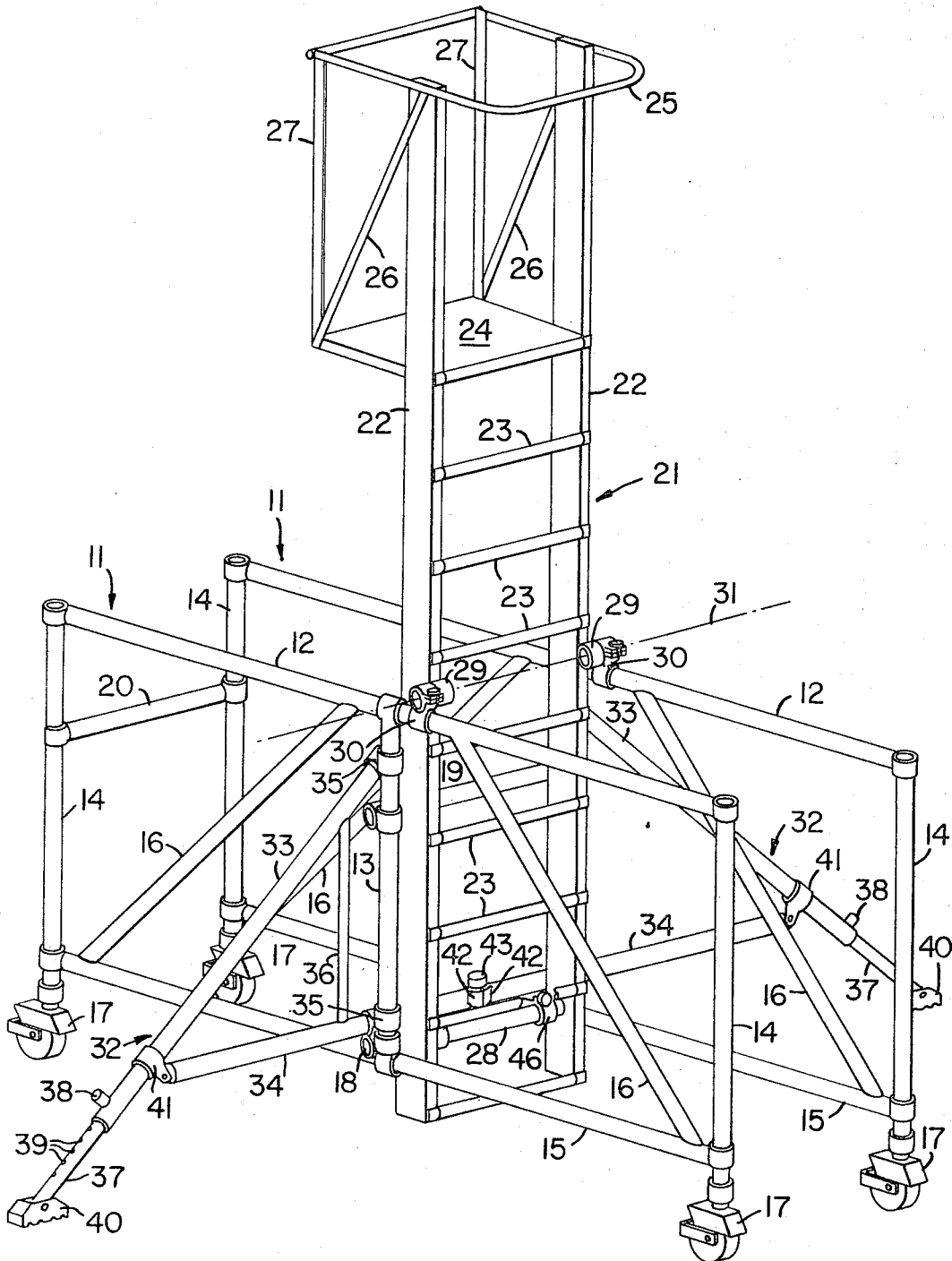


FIG. 1

INVENTOR.
WALLACE J. S. JOHNSON
BY ROBERT E. FISHER
GERALD L. CLAXTON

Mellin, Moore & Weisenberger
ATTORNEYS

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W. J. S. JOHNSON ET AL

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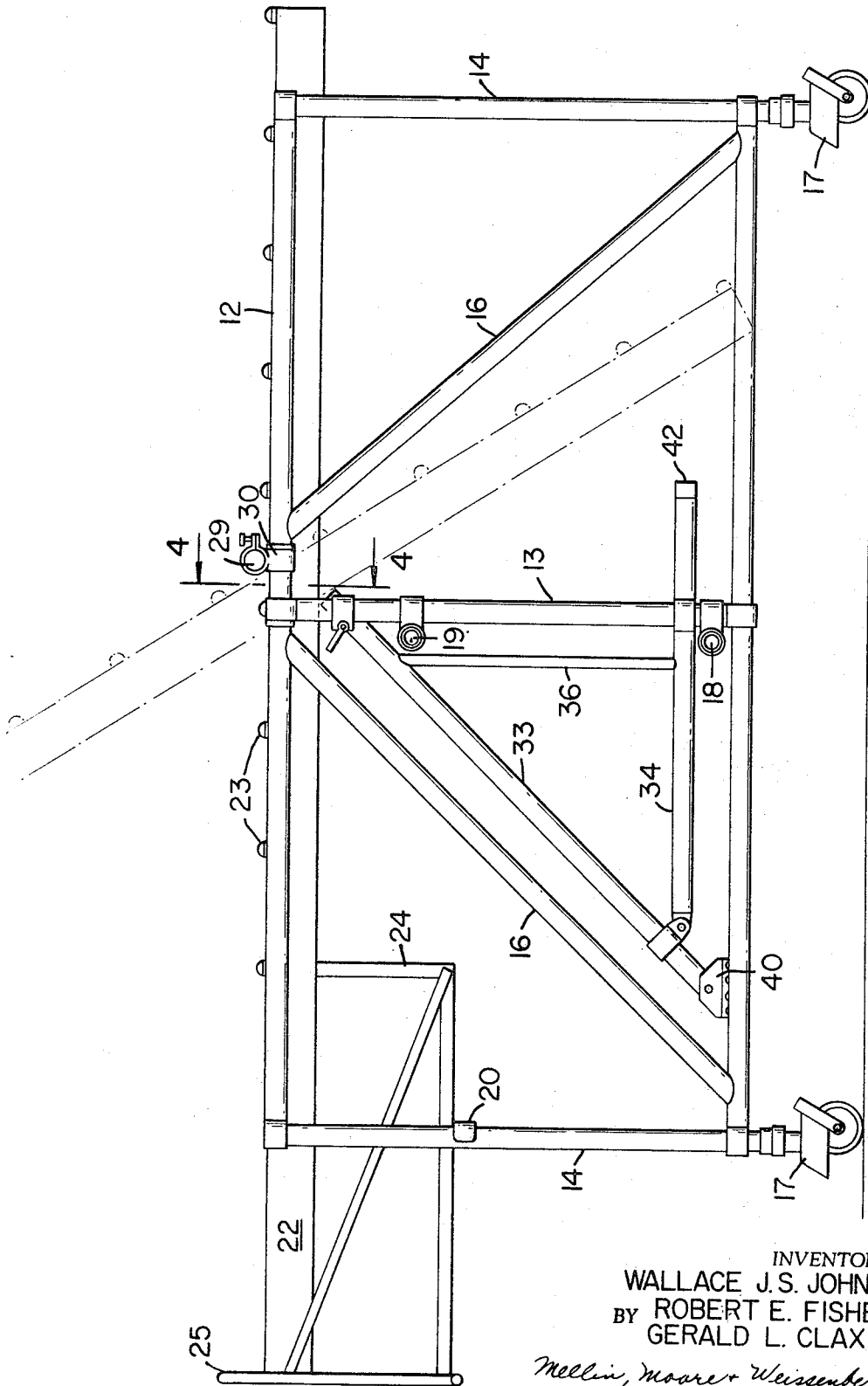


FIG-2

INVENTOR
WALLACE J. S. JOHNSON
BY ROBERT E. FISHER
GERALD L. CLAXTON

Mellin, Moore & Weissenberger
ATTORNEYS

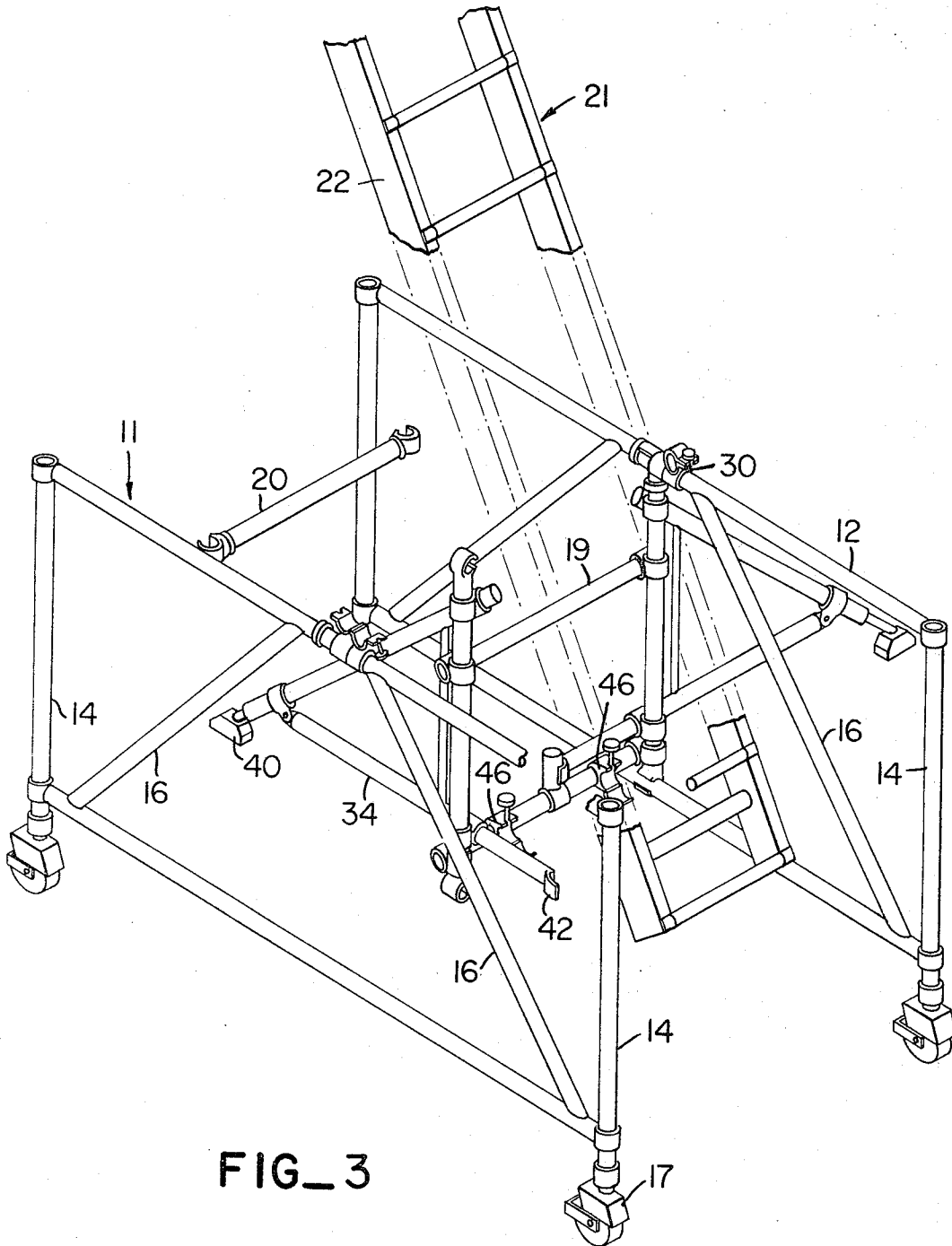
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FIG_3

INVENTOR
WALLACE J. S. JOHNSON
BY ROBERT E. FISHER
GERALD L. CLAXTON

Mellin, Moore & Weissenberger
ATTORNEYS

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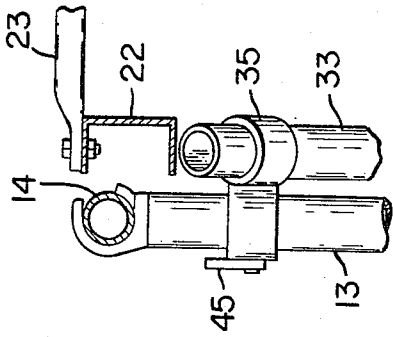
W. J. S. JOHNSON ET AL

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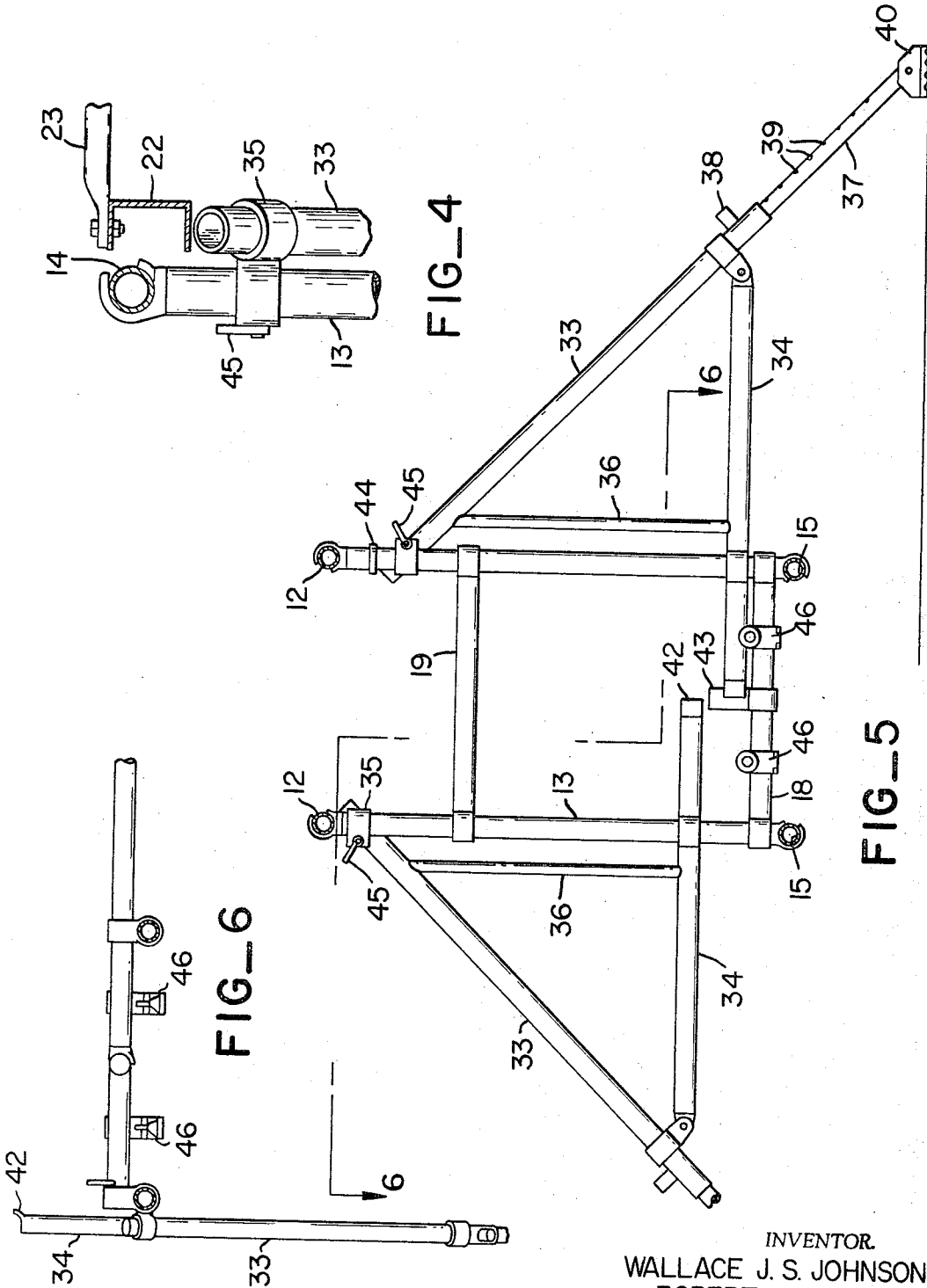
SELF-SUPPORTED LADDER

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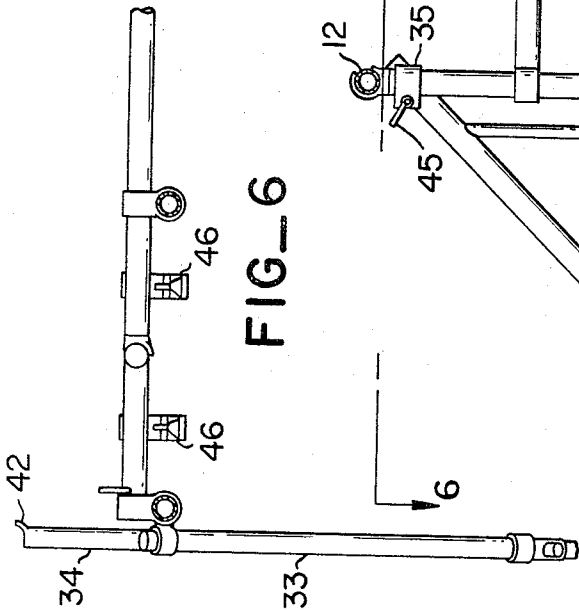


FIG_4



FIG_5

FIG_6



INVENTOR

WALLACE J. S. JOHNSON
BY ROBERT E. FISHER
GERALD L. CLAXTON

Mellin, Moore & Weissberger
ATTORNEYS

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3,327,810

SELF-SUPPORTED LADDER

Wallace J. S. Johnson and Robert E. Fisher, Berkeley, and Gerald L. Claxton, Albany, Calif., assignors to Up-Right, Inc., Berkeley, Calif., a corporation of California

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6 Claims. (Cl. 182-17)

This invention relates to a self-supported ladder with safety features not provided by self-supported ladders of the prior art. One safety feature prevents pivoting or swinging the ladder into a vertical position for use, unless the outriggers are extended. The other safety feature prevents use of the ladder unless it is positively secured in a vertical or service position. These safety features, as well as additional features of the invention, are brought about by a subtle and ingenious design and interrelationship between the component members.

The prior art is best represented by United States Patent No. 2,964,122 filed January 7, 1958 and issued December 13, 1960. While the self-supported ladder disclosed in the patent is similar to the present invention, it lacks the inventive features referred to above. Thus the ladder of the prior art may be swung or pivoted into a vertical service position without extension of the outriggers. In other words, it is possible to use the ladder without concurrent use of the outriggers and that practice is unsafe since the stability of the ladder is considerably decreased if the outriggers are not used. Moreover, the mounting of the ladder of the prior art is such that it can be suspended by gravity in a vertical service position and appear to be positively secured in that position. Thus the ladder of the prior art might be used without positively securing it in a vertical service position and, when so used, the ladder remains reasonably stable until the user reaches the top. With the user up the ladder, the center of gravity of the ladder and its user is shifted as compared to the center of gravity of the ladder alone. When that occurs the ladder pivots into a horizontal position with great risk to the user.

Accordingly, it is an object of the present invention to provide a self-supported ladder which cannot be swung into a vertical service position unless its outriggers are extended.

It is a further object to provide a self-supported ladder which is unstable in a vertical service position and which will not maintain a vertical service position unless it is positively secured, to thereby give visible warning to the user of the lack of security.

It is a further object to provide a self-supported ladder in which the outriggers are positively stopped in an extended position 90° from the side panels.

It is a further object to provide a self-supported ladder wherein one outrigger is movable past the extended position, through 180°, to thereby allow swinging the ladder into a vertical position and, at the same time, allow placement of the ladder with one side panel adjacent a wall.

Each of the foregoing objects is fulfilled by the specific embodiment which appears in the drawings, wherein:

FIG. 1 is a perspective view showing the present invention with the ladder in a vertical or service position with both outriggers extended;

FIG. 2 is a side view of the present invention and shows the ladder in a horizontal or storage position with the outriggers in a retracted position parallel to and spaced inwardly from the side panels. FIG. 2 also shows (in phantom) an intermediate ladder position which represents the limited extent to which the ladder may be swung or pivoted with the outriggers retracted;

FIG. 3 is an exploded perspective view of the present invention;

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FIG. 4 is a partial sectional view taken on the line 4-4 of FIG. 2 and shows the engagement between the ladder and the retracted outrigger which prevents swinging the ladder into a vertical service position unless the outriggers are extended;

FIG. 5 is a view of the outrigger section with both outriggers extended and with one outrigger lifted upwardly on its associated vertical member to clear the outrigger stop and allow swinging the outrigger through 180°; and

FIG. 6 is a partial top view of the outriggers section showing one outrigger swung through 180° in a position parallel to a side panel and outwardly spaced therefrom to allow swinging the ladder into a vertical service position and placement of the invention adjacent a wall.

The invention comprises a pair of horizontally spaced side panels, each of which have an upper horizontal member and an interior vertical member. An outrigger is offset mounted to each of the interior vertical members for pivotal movement about the interior vertical member from a retracted or storage position to an extended or service position, and the outriggers are off-set inwardly from their associated vertical members when in the retracted position. Means is provided for stopping the outriggers in an extended position at 90° from their associated side panel. A ladder is pivotally mounted to the upper horizontal member of each side panel for movement about a horizontal axis perpendicular to the side panels, from a horizontal or storage position to a vertical or service position and the pivotal movement of the ladder defines a path which intersects the retracted position of the outriggers. And finally, means is provided for releasably securing the ladder in its horizontal or storage position as well as in its vertical or service position.

The invention may be conveniently understood by first referring to FIGS. 1, 2 and 3. With reference primarily to FIG. 1, the invention includes two parallel and horizontally spaced side panels 11. Each of the side panels includes an upper horizontal member 12, an interior vertical member 13, two exterior vertical end members 14, a lower horizontal member 15 and a pair of diagonally extending bracing members 16. Each of the foregoing members is welded at its ends to a fitting or directly to its connecting member and each side panel includes a pair of casters 17 which may be locked against rotation.

The side panels are secured in spaced parallel relationship by means of horizontal members 18, 19 and 20. Horizontal members 18 and 19 are secured at their ends to vertical members 13. Horizontal member 20 is secured at its end to vertical end members 14 and also serves as a means for supporting the ladder in a horizontal or storage position which may be seen with reference to FIG. 2.

Ladder 21 is pivotally mounted to upper horizontal members 12 and includes side members 22 and a series of steps or rungs 23. Ladder 21 also includes a platform 24 which extends in one direction only from ladder 21 and includes a safety rail 25 and platform and rail supporting members 26 and 27 respectively. A lower horizontal member 28 is provided to serve as a rigid connecting member between side members 22 and also as a portion of the means for securing ladder 21 in its vertical service position shown in FIG. 1.

Ladder 21 is pivotally mounted to upper horizontal member 12 or side panels 11 by means of outwardly projecting studs or projections 29 secured to side members 22. Projections 29 are accommodated by a bracket 30 which includes two passages askew at 90°. Upper horizontal members 12 are accommodated in one passage while projections 29 are releasably accommodated in the other passage. Ladder 21 is accordingly mounted to upper horizontal member 12 of side panels 11 for pivotal movement about a horizontal axis 31 which is perpendicular to side panels 11, from a horizontal or storage position

shown in FIG. 2 to a vertical or service position shown in FIG. 1.

A pair of outriggers 32 is provided for stability. Each of the outriggers 32 includes an inclined member 33 and a horizontal member 34. The inclined member 33 and horizontal member 34 of each outrigger is off-set and pivotally mounted to its associated vertical member 13 at upper and lower joints 35. An interior vertical member 36 is provided between inclined member 33 and horizontal member 34 of each outrigger 32 to thereby maintain a rigid and positive angular relationship between inclined member 33 and horizontal member 34. Inclined member 33 includes an inner telescopic member 37 which may be telescopically and incrementally positioned. For that purpose a spring loaded index 38 is provided and includes a projection (not shown) that extends through incrementally spaced openings 39, unless retracted, to thereby fix the position of telescopic member 37 longitudinally of inclined member 33. A shoe or bearing surface 40 is pivotally connected to telescopic member 37 at its exterior end to provide a non-slipping surface for engaging the ground or floor which supports the self-supported ladder assembly.

Horizontal members 34 of outriggers 32 are connected at one end by means of bracket 41 to inclined member 33 and extend beyond the off-set pivotal connection 35 a distance equal to one-half the spacing between side panels 11. They terminate at a quadrant shaped extension 42 for a purpose to be described below.

As best understood with reference to FIG. 4, the pivotal connection between outriggers 32 and their associated vertical members 13 at off-set pivotal connection 35 is critical. The offset mounting of outriggers 32 insures that, with the outrigger 32 in its retracted or storage positions as shown in FIGS. 2 and 4, the outrigger is in the path of ladder 21 as it is pivoted from the horizontal position of FIG. 2 to the vertical service position of FIG. 1. Thus if an attempt is made to pivot ladder 21 into the vertical service position with the outriggers 32 retracted, side members 22 engage inclined member 33 as shown in FIG. 4. Thus ladder 21 cannot be placed in the vertical service position unless outriggers 32 are extended to remove them from the path of ladder 21.

As best seen in FIGS. 1, 3 and 5, a stud or vertical projection 43 is provided mid-way between side panels 11 on horizontal member 18. Stud 43 serves as a stop to prevent outriggers 32 from angular movement in excess of 90°. As outriggers 32 are moved from the retracted position and as that movement approaches 90°, quadrant extensions 42 approach stud 43 and engage it when outriggers 32 reach 90°. Accordingly, positive means for stopping outriggers 32 in their extended position is provided. Moreover, the interaction between stud 43 and quadrant extensions 42, with one exception to be explained below, prevents positioning of outriggers 32 out of the path of ladder 21 but in a parallel relationship to side panels 11. In other words, in normal operation, outriggers 32 cannot be pivoted beyond 90° to thereby allow pivoting ladder 21 into a vertical service position with the outrigger 32 out of its extended position.

The exception referred to above is provided to allow use of the ladder against a wall with but one outrigger extended. That use may be best understood with reference to FIGS. 5 and 6. One outrigger 32 (shown in the left in FIG. 5) is slidable upwardly on its vertical member 13 to allow its quadrant extension 42 to clear or by-pass stud 43. A similar upward movement of the other outrigger 32 (shown on the right in FIG. 5) is prevented by collar 44. With the outrigger 32 moved upwardly on its vertical member 13, it may be swung through 180° or 90° beyond the extended position, to assume the position shown in FIG. 6. Thus the outrigger is removed from the path of ladder 21 to thereby allow pivoting of the ladder into the vertical service position, while allowing the ladder to be placed adjacent a wall.

The pivotal movement of outriggers 32 about vertical

members 13 is accomplished by loosening the upper joint 35 by means of release 45 which is tightened after the outrigger 32 is extended.

The off-set mounting of ladder 21 to upper horizontal members 12 of side panels 11 represents an additional safety feature. To provide the safety feature it is essential that mounting projections 29 be off-set from side members 20 in a direction opposite the direction of extension of platform 24 from side members 22. In other words, it is essential that the center of gravity of ladder 21 be constantly maintained to one side of axis 31. With the embodiment shown, the center of gravity is always to the left of axis 31 (see FIGS. 1 and 2). Ladder 21 accordingly always has a tendency to assume the horizontal or storage position. If the ladder is pivoted into the vertical service position and not positively secured in that position, it will automatically pivot about axis 31 (by gravity) into the horizontal position shown in FIG. 2. Thus, unless the ladder is positively secured in the vertical service position, it cannot be used. The design provides a highly noticeable warning to the user that the ladder is not secured and prevents inadvertent use without positively securing it in the service position.

Means for securing the ladder in the vertical position is shown in FIGS. 1, 3, 5 and 6 and includes shackles 46 permanently secured to lower horizontal member 18 and releasably engageable with horizontal member 28 of ladder 21.

The self-supported ladder described is designed to be movable through doorways when in the storage position with outriggers 32 retracted. Accordingly the horizontal spacing between side panels 11 is chosen to be less than standard door widths. Casters 17 provide a convenient means for moving the invention from one site to another. When the self-supported ladder is to be used, outriggers 32 are extended to thereby allow pivoting ladder 21 into the vertical service position. Ladder 21 will not maintain the vertical service position unless it is positively secured at lower horizontal member 28 by means of shackles 46. Accordingly, the present invention provides safety features not provided by ladders of the prior art and in addition it provides the feature of capacity for use adjacent a vertical wall as described above.

Variations may be made in the design of the present invention without departing from its scope and such variations are contemplated if within the scope of the appended claims.

We claim:

1. A self-supported ladder which comprises:

- (a) a pair of horizontally spaced side panels, each of said side panels having an upper horizontal member and an interior vertical member;
- (b) an outrigger off-set mounted to each of said interior vertical members for pivotal movement about said interior vertical member from a retracted position to an extended position, said outrigger being off-set inwardly from said vertical member when in said retracted position;
- (c) means for stopping said pivotal movement of said outriggers in said extended position;
- (d) a ladder;
- (e) means mounting said ladder to said upper horizontal members for pivotal movement about a horizontal axis perpendicular to said side panels from a horizontal position to a vertical position, said pivotal movement of said ladder defining a path intersecting said retracted position of said outriggers; and
- (f) means for releasably securing said ladder in said horizontal position and in said vertical position.

2. The self-supported ladder of claim 1 wherein said means mounting said ladder to said upper horizontal member is off-set from said ladder to thereby define an off-set mounting means, and said ladder includes a platform extending transversely of the longitudinal axis there-

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of in a direction opposite to the top of extension of said off-set ladder mounting means.

3. The self-supported ladder of claim 2 wherein said outriggers include an inclined member and a horizontal member, each pivotally and off-set mounted to said vertical member, said horizontal member being secured to said inclined member and extending beyond said vertical member a distance substantially equal to one-half of the distance between said horizontally spaced side panels, and wherein said means for stopping said pivotal movement of said outriggers in said extended position includes a vertically extending projection secured mid-way between said side panels in the path of said horizontal members.

4. The self-supported ladder of claim 3 wherein one of said outriggers is vertically slidable on said vertical member a distance greater than the height of said projection.

5. The self-supported ladder of claim 4 wherein said

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inclined members are telescopic and include bearing surfaces mounted to the exterior end thereof.

6. The self-supported ladder of claim 5 wherein said means for releasably securing said ladder in said horizontal position comprises a horizontal member extending between said side panels at one end thereof and said means for releasably securing said ladder in said vertical position comprises a pair of shackles for engaging and securing the lower portion of said ladder with said ladder in said vertical position.

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REINALDO P. MACHADO, *Primary Examiner.*