

[54] **ADJUSTABLE STAIR ASSEMBLY**
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Attorney—Gravely, Lieder & Woodruff

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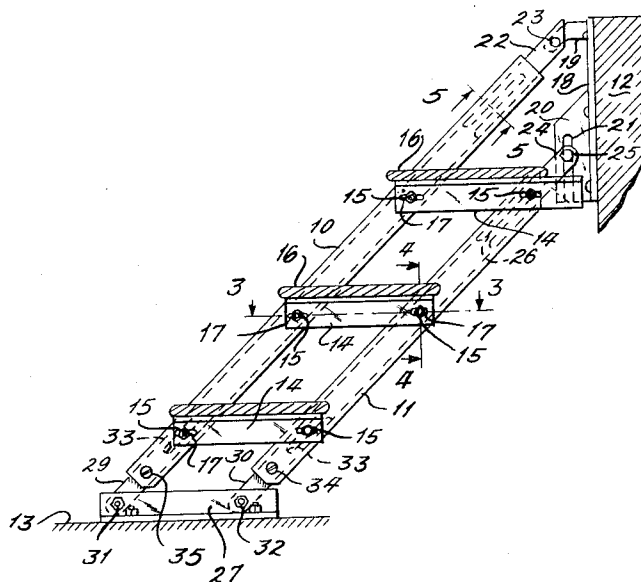
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[57] **ABSTRACT**

An adjustable stair assembly in which the stair treads are adjustably supported on stringers so that the exposed tread surface may be selectively determined in proportion to the riser dimension from tread to tread, and the stringers are telescoped into upper and lower supports which anchor the assembly in the desired final position. In the assembly the stringers are used in pairs at each end of the treads and in conjunction with the upper and lower telescoping supports are selectively spaced to obtain the desired riser dimension and exposed tread width within acceptable standards of riser to tread dimensional ratios.

7 Claims, 7 Drawing Figures



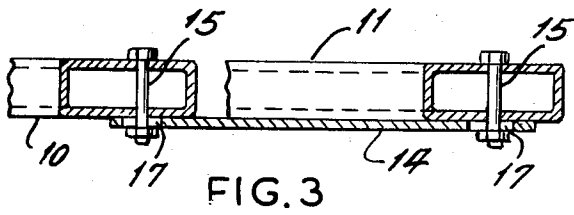


FIG. 3

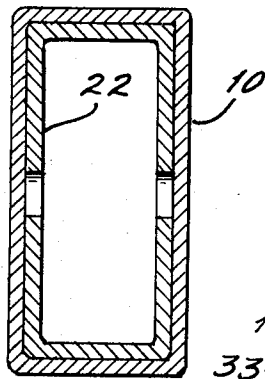


FIG. 5

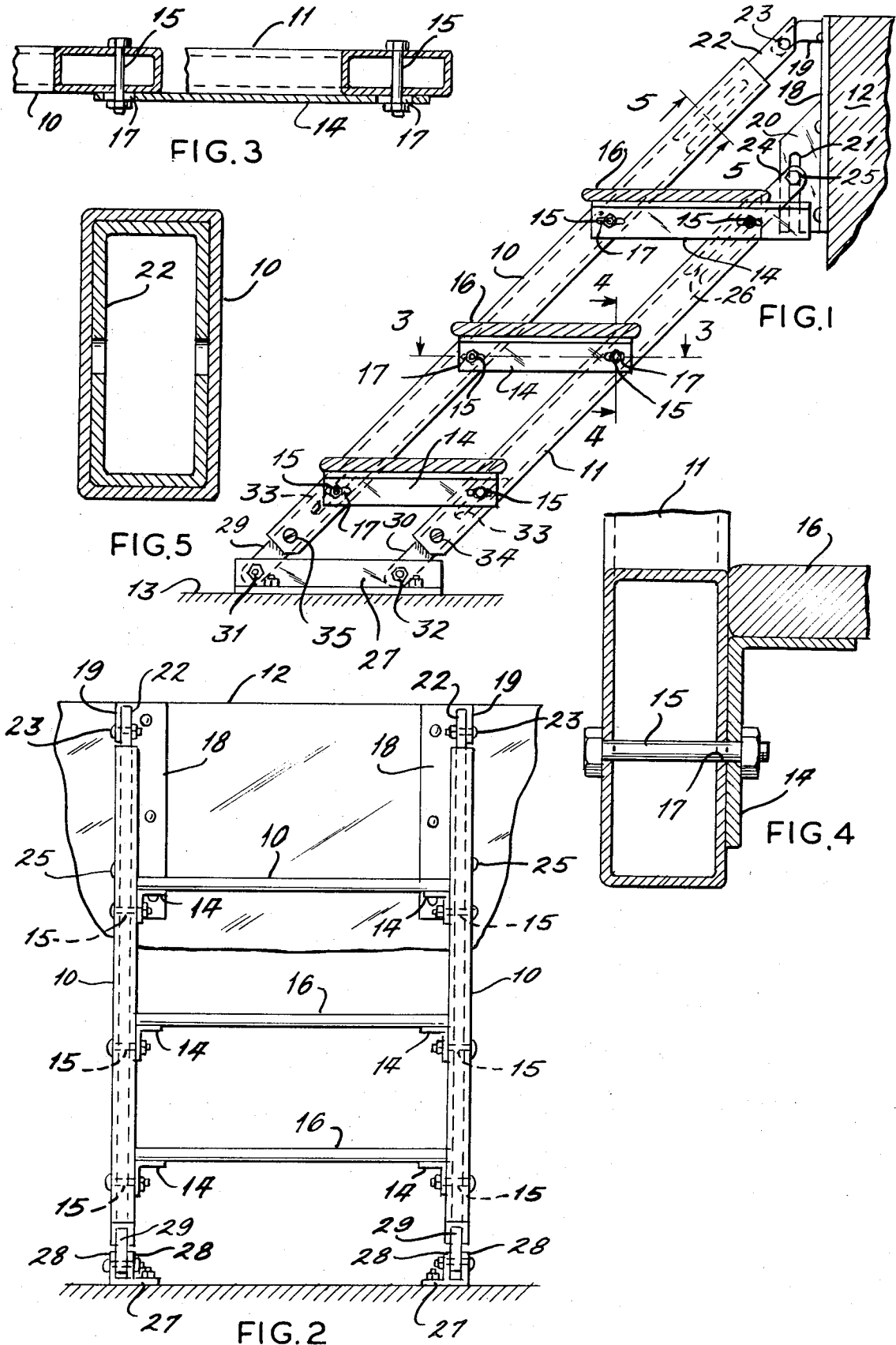


FIG. 1

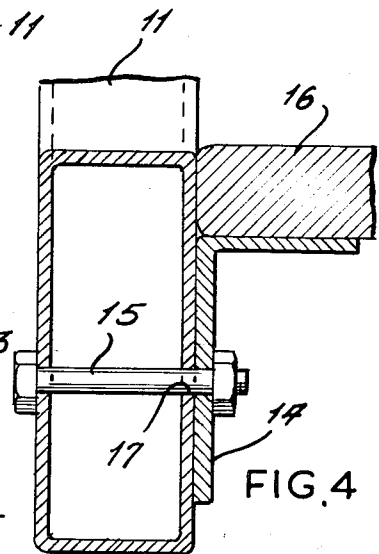
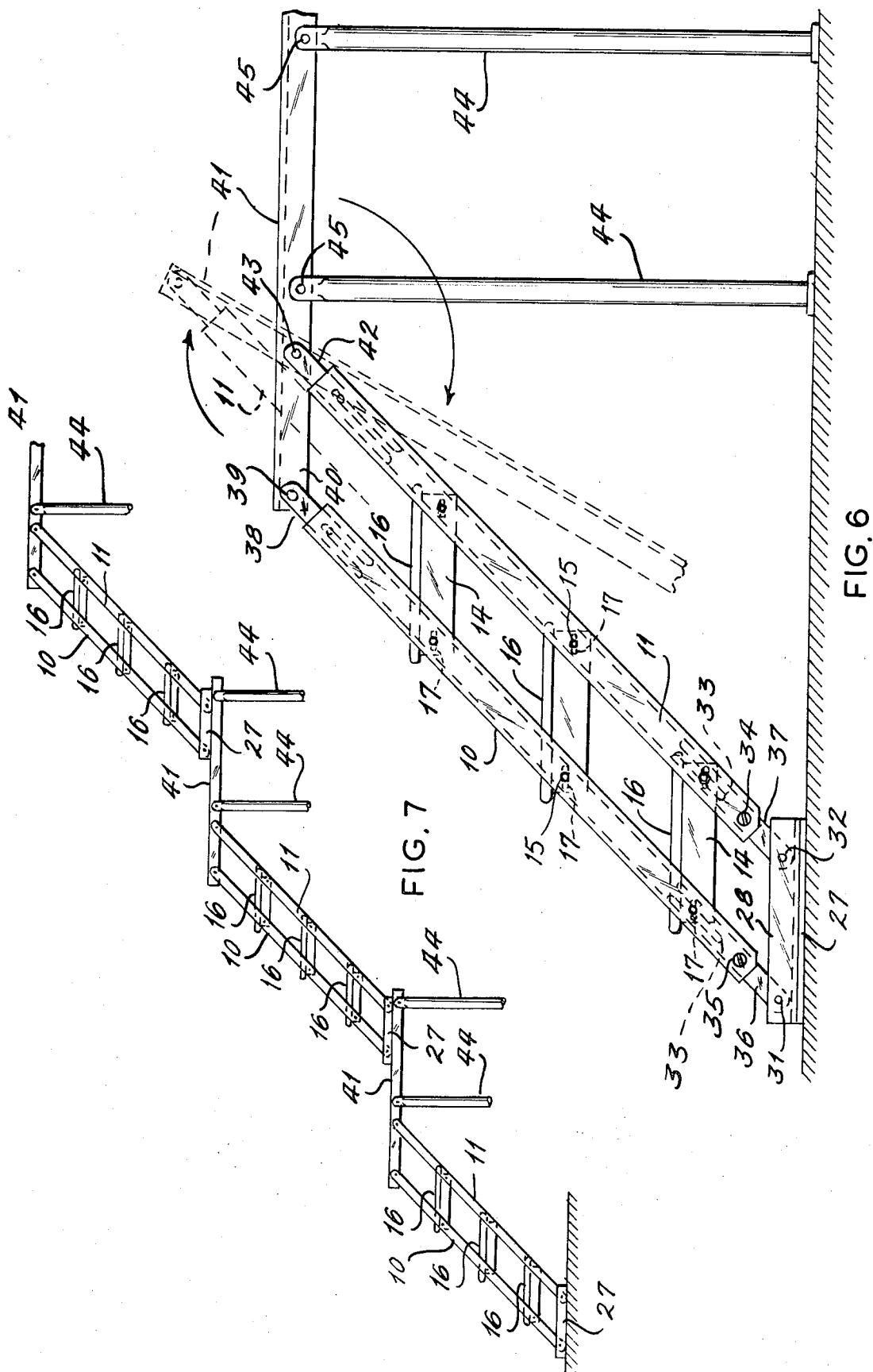


FIG. 4

FIG. 2



ADJUSTABLE STAIR ASSEMBLY

BRIEF DESCRIPTION OF THE INVENTION

This invention relates to adjustable stair assemblies and is particularly concerned with the provision of stair components which will afford a range of stair angles in one assembly to accommodate several arrangements from low to high angle stairs.

It has been a continuing problem in the erection of stairs that for a given pitch of the stairs all of the components, such as stringers, treads and stringers attachments, need to be cut on the job site to match the rise between different levels. Notching of the stringers to support the treads is often difficult and tends to result in treads not all being level. The time needed to notch the stringers properly is costly and skill is required to accomplish the work correctly.

Attempts have been made in the past to provide prefabricated stair assemblies, but such attempts have not resulted in entirely solving the many problems which are found in actual practice due to wide variances in the floor to floor spacing and the pitch preferences found best for different people.

Accordingly the adjustable stairs of this disclosure embodies the unique feature of providing the stair stringers with slip members at both ends so that the stringers which carry the treads may be moved to a desired pitch angle with a concomitant adjustment in the effective length of the stringers, whereby the pitch angle of the stringers is given a range within the best ratio of tread width to riser height.

The presently preferred stair assembly solves the many problems by arranging the several components of the stair so that job site adjustments may be made quickly and positively. In a presently preferred embodiment, the bottom and top supports for the stringers are made to telescope in the stringers so that the final pitch of the stair may be selected to suit the needs of those who use the stairs.

While stairs are most often required for use in permanent buildings, homes and like structures, there exists a need for stairs in connection with portable homes, and trailers to make access safer and more convenient. Therefore, another preferred embodiment of the present adjustable stair combines the stair assembly with a cooperating upper landing or porch, the new combination being detachable and foldable when it is desired to move the trailer or portable home.

These and other features of the adjustable stair of this invention will be more particularly set forth in the drawings and accompanying description.

DESCRIPTION OF THE DRAWINGS

Several preferred embodiments of the present adjustable stair will be disclosed in the drawings, wherein:

FIG. 1 is a side elevational view of an adjustable stair assembly providing access between an upper and lower level in a building;

FIG. 2 is a front elevational view of the stair assembly seen in FIG. 1;

FIG. 3 is a typical fragmentary sectional view taken at line 3—3 in FIG. 1;

FIG. 4 is another fragmentary sectional view of the stair assembly seen at line 4—4 in FIG. 1;

FIG. 5 is a typical fragmentary sectional view of the telescoping components of the stair assembly seen at line 5—5 in FIG. 1;

FIG. 6 is a side elevational view of a modified stair assembly showing the combination of stairs and porch-type upper landing, and in which view the folding characteristics of the assembly has been indicated in broken outline; and

FIG. 7 is a somewhat schematic view in side elevation of the combination of a plurality of the stair assembly of FIG. 6.

DESCRIPTION OF THE STAIR ASSEMBLY

In the view of FIGS. 1 and 2, the adjustable stair assembly herein preferred comprises tubular stringers 10 being longer than the lower stringers 11 in order to accommodate the pitch of the stairs between the elevated level 12 and the lower level 13. Each pair of stringers supports tread brackets 14 formed from angular members. The vertical legs of the brackets 14 are connected by suitable bolts 15 (FIGS. 3 and 4) to the adjacent stringers 10 and 11, while the horizontal legs of these brackets 14 provide surfaces for the support of the ends of treads 16. The bolts 15 attaching the rear ends of the several brackets 14 to the lower stringers engage in horizontally directed slots 17 while the bolts 15 attaching the front ends of the several brackets 14 to the longer upper stringers 10 engage in similar horizontally directed slots 17. The provision of slots 17 allows for accommodating the fore and aft location of the treads 16 for adjustments of the pitch angle of the stringers.

The stair assembly of FIG. 1 is uniquely adjustable for various pitch angles by means of telescoping or slip members received in the ends of the respective stringers. Thus, at the upper level 12, anchor plates 18 (FIGS. 1 and 2) are secured to the vertical face of the structure of level 12, and these plates are aligned with the respective pairs of stringers 10 and 11. Each plate 18 carries an upper bracket 19, and a lower bracket 20 having a vertically elongated slot 21 therein. The upper brackets 19 support slip members 22 which are pivotally secured by bolts 23 at the upper ends. The lower end of each slip member 22 telescopes into the adjacent open end of stringer 10 (FIG. 5) a sufficient distance to provide a strong union of the two cooperating parts. The lower bracket 20 supports a slip member 24 which is pivotally mounted at its outer end by a bolt 25 riding in the elongated slot 21. The inner end of the slip member 24 telescopes into the open end of the adjacent stringer 11, and this inner end is provided with an elongated slot 26 so as to pass the tread bracket bolt 15.

The bottom of the stair assembly is connected to the surface of level 13 by shoes 27 formed with spaced up-standing legs 28 which receive therebetween (FIG. 2) the ends of slip member 29 for stringer 10 and slip member 30 for stringer 11. Each slip member 29 is pivotally supported between the legs 28 of shoe 27 by a bolt 31, and a bolt 32 pivotally connects the slip member 30 between legs 28 of the same shoe 27. Each slip member 29 and 30 telescopes into the end of the cooperating stringers 10 and 11 respectively, and each is formed with an elongated slot 33 so as to pass upwardly beyond the bracket bolts 15 as seen in FIG. 1.

The installation of the stair assembly of FIG. 1, which assembly may be made at the factory and transported to the job site in such condition, is achieved by securing the upper plates 18 to the vertical face of level 12 such that the top tread 16 is at the desired step-up distance

or rise from level 12. The stringers 10 and 11 at each side of the treads 16 may then be moved out to the desired pitch angle by slidably telescoping the stringers 10 and 11 on the respective slip members 22 and 24. During the installation all bolts are sufficiently loose to allow for the telescoping adjustments required. The bottom shoes 27 are next fixed in place on the surface of level 13 by telescoping adjustment of the respective slip members 29 and 30 in the bottom ends of stringers 10 and 11. At this time, the bolts 23 and 25 at the level 12 are tightened, as are the bolts 31 and 32 at the level 13. Following this bolt tightening operation, stringers 11 are adjusted longitudinally up or down on the slip members 24 and 30 to the desired setting and set screw 34 at slip members 30 are set in place to retain the stringers 11. Next stringers 10 are longitudinally positioned on the slip members 22 and 29, and set screw 35 is set in place. The final adjustment of the position of treads 16 is carried out along the direction of slots 17 and the several bolts 15 are tightened. After this operation all bolts are tightened to secure the components in the final positions.

In FIG. 6 parts and components similar to those described in FIG. 1 will be designated by similar reference numerals. The assembly of this view includes stringers 10 and 11 which support the angle brackets 14 for the treads 16. The lower ends of the stringers 10 and 11 are supported by shoes 27 having upstanding spaced legs 28. A slip member 36 is pivotally connected between legs 28, and its end is telescoped into the open end of stringer 10 and secured by a set screw 35. Similarly the stringer 11 is connected by a slip member 37 telescoped therein, and the end is pivotally connected between the legs 28 of shoe 27. The stringer 11 is secured by set screw 34. The slip members 36 and 37 are provided with bolts 31 and 32 respectively which constitute the pivots at the shoe 27.

The upper end of stringer 10 is supported by a slip member 38 telescoped therein. The outer end of the slip member 38 is pivotally bolted by bolt 39 to a joist 40 which is one of several joists for carrying the deck 41 of the upper landing or porch. Likewise, the upper end of stringer 11 is supported by slip member 42 telescoped therein, and the upper end is pivotally connected by bolt 43 to a porch joist 40.

The porch or upper landing deck 41 is suitably supported on a plurality of legs 44 connected by bolts 45 to the joist 40. When the porch legs 44 are properly set and the bolts 45 tightened, the stair assembly is adjusted to the desired pitch angle by sliding the stringers 10 and 11 on the slip members to the desired rise between treads 16. After this adjustment the shoes 23 are secured, and all bolts are tightened along with set screws 34 and 35. Of course, and as noted above, the treads 16 are adjusted by moving each one in the direction of the horizontal slots 17. It is understood that the elevation of the porch deck 41 will be suitable for the entrance to the mobile home or trailer (not shown). Porch supporting legs 44 are, of course, of a suitable length to meet the requirements.

When the home or trailer is to be moved, the porch and stair assembly is released from its erected setting by loosening all bolts sufficiently to allow the deck 41 to be pivoted (as shown in broken line) in a clockwise direction about the bolt 43 for slip member 42 of

stringer 11 to its folded position. This folding action causes the stringer 10 and all treads 16 to be folded inwardly until the stringer 10 lies adjacent the stringer 11.

FIG. 7 illustrates an organization of a plurality of stair assemblies, each one being similar to the assembly of FIG. 6. The difference is that the successively higher porch decks 41 require longer supporting legs 44. In view of the similarities of the several components of the disclosure in FIG. 7 to the detailed disclosure of FIG. 6 only the major components have been indicated by similar reference numerals to shorten the description thereof.

In the various forms of the stair assembly shown it is to be understood that as the pitch angle is lowered or made less steep the pairs of stringers are moved closer together and at the same time the exposed tread is increased while the riser dimension is decreased. Conversely, when the pitch angle is increased or made steeper the exposed tread decreases and the riser height increases. It is generally understood that the riser dimension for acceptable stairs may vary between 7 and 11 inches, and the tread depth should be not less than about 10 inches. The dimensions stated have been found to be suitable for the greatest number of people, taking into account age, physical conditions, and eye sight.

When effecting an adjustment in the pitch angle, the slip members at the lower level shoes merely pivot, while the stringers may be slipped longitudinally thereof to adjust the riser dimension of the first tread above the lower level surface. On the opposite or upper ends of the stringers a compound adjustment must be made to take care of the change in spacing between stringers, as well as the proper longitudinal location of the stringers on the slip members. In the several views of the accompanying drawings the adjustable stair has been shown with three treads for simplicity. It is understood that the assembly may be constructed with appropriate length stringers 10 and 11 to support any number of treads 16 deemed sufficient to provide access between an upper and a lower level.

What is claimed is:

1. An adjustable stair assembly to provide access between upper and lower levels comprising a pair of stringer members for each side of said stair assembly, upper level support means for the upper ends of said pairs of stringers, first means interconnecting said upper level support means and the adjacent ends of each pair of said stringers, lower level support means for the lower ends of said pairs of stringers, second means interconnecting said lower level support means and the adjacent ends of said pair of said stringers, said pairs of stringers being adjustable relative to each other in each pair and to at least one of said first and second means to accommodate a desired pitch angle for said stair assembly, said at least one of said first and second means including bolt means, said bolt means on being tightened holding said stringers at the desired pitch angle, and stair treads spanning said pair of stringers.

2. The stair assembly of claim 1 wherein said stringers are tubular members, and said second means telescopically fit into the adjacent ends of said tubular stringer members for sliding adjustment to said desired pitch angle for the assembly.

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3. The stair assembly of claim 2 wherein set screws secure said tubular members to said second means whereby the tubular members are secured against longitudinal displacement.

4. The stair assembly of claim 1 wherein the upper level support means is a porch deck extending horizontally from said first members, and leg means engaged and support said porch deck in horizontal set position.

5. The stair assembly of claim 4 wherein said first and second means slidably engage the respective adjacent ends of said stringer members and said first means pivotally engage said deck, whereby said deck is foldable about one of said stringer members at each side and causes the remaining one of said stringer member to fold into adjacency with said one stringer member, whereby said stair assembly is foldable into collapsed position.

6. An adjustable stair assembly between upper and lower levels comprising two pairs of stringer members, one pair at each side of the stair assembly, first support

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means slidably engaged with the upper ends of said pairs of stringer members and pivotally connected to the upper level, second support means slidably engaged with the lower ends of said pairs of stringer members and pivotally connected to the lower level, bracket means pivotally connected to and spanning the stringer members of each pair thereof, treads supported on said bracket means and extending generally horizontally between said pairs of stringer members to form the supporting stair surfaces, bolt means constituting the pivotal connections for tightening to retain the stair assembly in position.

7. The stair assembly of claim 6 wherein said stringer members are tubular and said first and second support means telescopingly slide in said stringer members, whereby said stair assembly is rendered adjustable to a selected pitch angle for adjusting the rise between said treads.

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