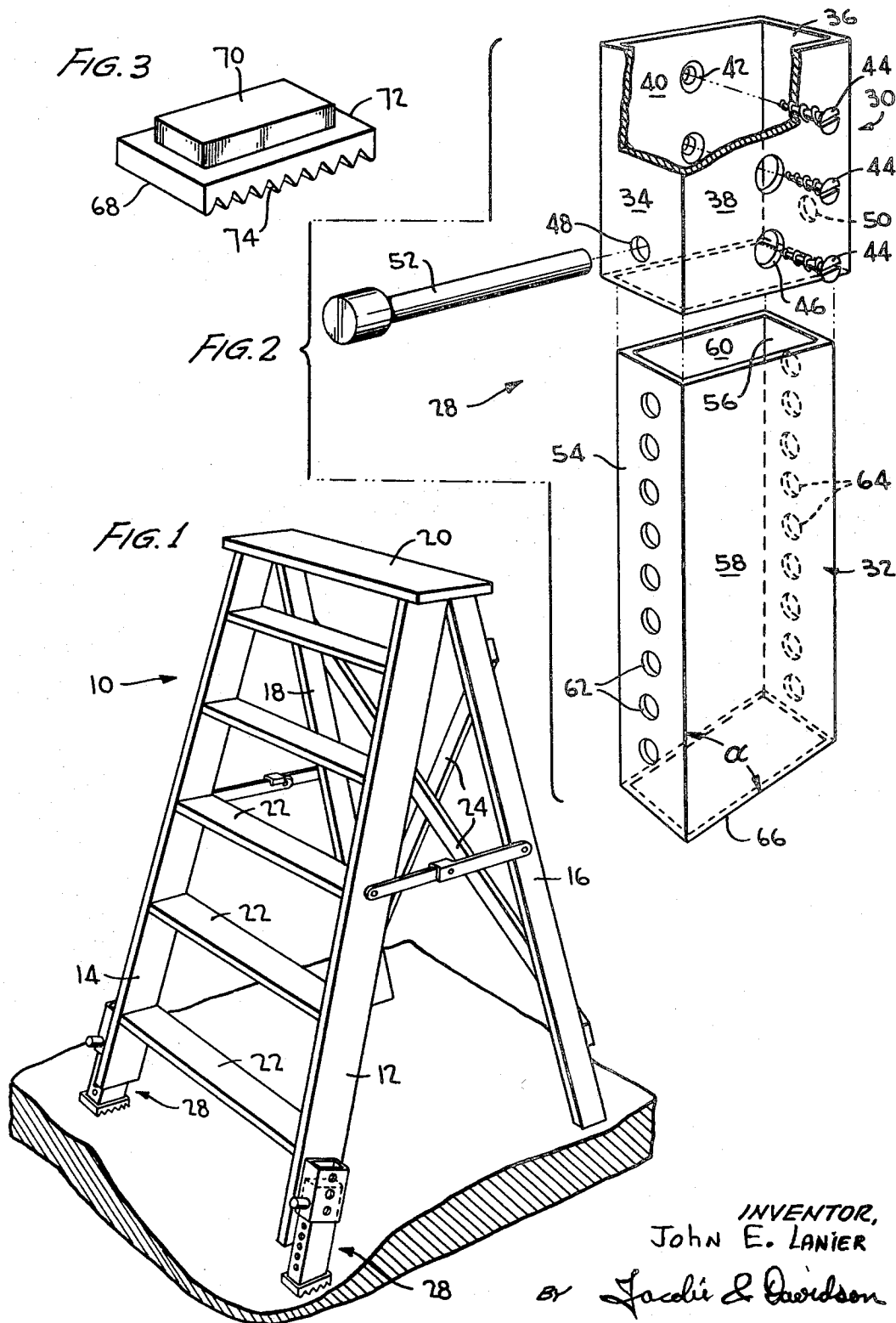


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LEVELING ATTACHMENT FOR SUPPORTS, SUCH AS
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LEVELING ATTACHMENT FOR SUPPORTS, SUCH AS LADDERS, SCAFFOLDS, TRESTLES, AND THE LIKE

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ABSTRACT OF THE DISCLOSURE

A leveling attachment for supports, such as ladders, scaffolds, trestles and other structures for ascending, constituted by a pair of telescopically interfitting slidable members, the inner one of which may be selectively extended into a leveling position for the associated support so that the latter may be oriented in the desired upright position when located upon terrain which is not level. The extended position of the inner member can be selectively fixed, allowing for any desired degree of leveling of the support. When the leveling attachment is not in use, this inner member is retracted relative to the surrounding outer member and maintained in an ineffectual position.

Background of the invention

The present invention pertains to an improved leveling attachment for supports, typically ladders, scaffolds, trestles and similar support structures, wherein such leveling attachment enables the support to be properly positioned when located upon uneven or inclined surfaces.

Obviously, it is not always possible when using a support, such as a ladder, to place such in an upright position so that it is sufficiently level to insure for its stability. This is especially the case when the ladder must be placed upon uneven or inclined surfaces, when working at the location of the steps of a house or apartment, and at other places where the ground is not level. The prior art has, therefore, attempted to cope with these difficulties by providing a ladder attachment which would enable the ladder to be placed in proper upright position. However, the solutions which have been proposed to date have not adequately solved the problem in a manner which is attractive not only from the standpoint of the user, but also from that of the manufacturer. More precisely, while certain known physical constructions which deal with this problem do provide leveling of the ladder upon uneven surfaces, nonetheless the mechanism provided for this purpose is either complicated in structure, and therefore also difficult to use, but further considerably increases the overall costs and weight of the ladder structure such that the unit can no longer be considered interesting from the standpoint of the consumer.

Summary of the invention

Now, it is a primary object of the present invention to provide an improved leveling attachment for a support which overcomes the drawbacks of the prior art structures.

A further, more specific object of the present invention is the provision of an improved leveling attachment which is so simple to use that even the most unskilled person will not encounter any difficulty in properly leveling the associated support, and wherein the physical structure of such leveling attachment does not appreciably increase either the cost or overall weight of the support structure with which it is used.

A further object of the present invention concerns an improved leveling attachment for a support, typically a ladder, whereby it is possible to easily erect the ladder in a substantially upright or vertical position possessing

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great stability, so that it is possible to work with the ladder even upon inclined or other surfaces where the ladder without such an attachment could not be safely erected in vertical position, and wherein, the components of the leveling attachment, when not in use, may be retracted into an ineffectual position, but all parts retained upon the ladder structure itself so that there is no likelihood of misplacing or losing any of the components of the leveling attachment.

In order to implement these and still further objects of the invention which will become more readily apparent as the description proceeds, the inventive leveling attachment comprises a pair of telescopically interfitted, relatively slidable outer and inner members. The outer member advantageously encircles the inner member so that there is sliding contact between such members, with such outer member being adapted to be rigidly attached to the support for leveling thereof. Further, at least the lower end of the outer member is open to enable a portion of the inner member telescopically received therein to be selectively extended through such lower open end an amount sufficient for carrying out leveling of the associated support. In order to selectively fix the chosen degree of extensibility of the inner member externally of the outer member both members are advantageously provided with apertures or equivalent structure which can be aligned such that appropriate locking or fixing means, for instance in the form of a bolt or the like, can be piercingly thrust through the aligned cooperating openings of the aforesaid inner and outer members.

According to a preferred embodiment of the present invention the inner and outer members preferably possess a cross-sectional configuration which prevents relative rotational movement between these two members, and further, the inner member advantageously incorporates a pair of confronting parallel faces, each of which is equipped with a series of vertically aligned apertures, with each aperture on one face being coaxially aligned with a corresponding aperture at the opposite confronting face. Also, the outer member may advantageously incorporate a pair of confronting parallel faces, with each such face having at least one aperture which is coaxially aligned with the other aperture at the opposite confronting face. By virtue of this physical structure, it is possible to incrementally displace the inner member in telescopic fashion with regard to the outer member through selective increments, determined by the spacing between each two neighboring apertures of the aforesaid series or group of apertures, and into alignment with the coaxial apertures at opposite faces of the outer member, whereafter the bolt or otherwise is passed through the thus selectively aligned apertures to affix the inner member in the chosen position. The preferred embodiment of leveling attachment also contemplates providing the outer member with an open upper end to enable the inner member to be displaced through such open upper end and into an ineffectual position, opposite the direction of displacement of such inner member when placed into its leveling position, and affixed in such ineffectual position in the same manner previously considered during locking of the inner member in its leveling position. The just-considered degree of freedom of displacement of the inner member relative to the outer member allows for a construction where the outer member can be made shorter than the inner member, thereby resulting in a saving in material and weight, while at the same time affording the advantageous possibility of maintaining all components of the leveling attachment fixed to the ladder or otherwise even when not in use. The danger of misplacing or losing any of the members of the attachment unit is thus completely eliminated or at least extensively minimized.

Brief description of the drawing

The invention will be better understood, and objects other than those set forth above, will become apparent, when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawing wherein:

FIGURE 1 is a schematic view of a support, here shown in the form of a ladder, having a leveling attachment secured to the front legs thereof in order to place such ladder in upright position even though it is located upon an uneven or inclined surface;

FIGURE 2 is an enlarged, exploded view of a preferred embodiment of leveling attachment designed according to the teachings of the present invention and employed with the ladder structure of FIGURE 1; and

FIGURE 3 is an enlarged view schematically illustrating a possible form of anti-skid member, shown as a so-called cleat, which may be secured to the bottom of the inner telescopic member of the leveling attachment of FIGURE 2, to improve the stability of the ladder structure.

Description of the preferred embodiment

In describing the preferred embodiment of leveling attachment of the present invention the support structure which has been chosen purely for illustrative purposes, and probably because it constitutes one of the most likely structures with which the leveling attachment would be used, is a ladder. However, it is to be clearly understood that use of the leveling attachment is in no way intended to be limited to this specific type of support, and in fact, ladders of completely different construction from that appearing in the accompanying drawing could be used.

Turning attention now to FIGURE 1, it will be recognized that the therein depicted ladder 10 comprises two upstanding front legs or side pieces 12 and 14 and two upstanding rear legs 16 and 18, all of which terminate at an upper, substantially flat shelf or crosspiece 20. A number of spaced, substantially parallel step members 22 extend transversely between the front legs 12 and 14 in the usual manner. Extending between the rear legs 16 and 18 of the ladder 10 is a pair of diagonal struts or crossite members 24, here shown arranged in the form of an X, thereby providing sufficient stability for the ladder unit.

In the exemplary environment of use of the ladder shown in FIGURE 1, the terrain or surface 26 is uneven, sloping downwardly from the right to the left of the drawing. Thus, it is necessary to extend the front ladder legs 12 and 14 a sufficient amount in order to place the ladder 10 in the desired level position, and with adequate stability so that the user can safely climb up the ladder without fear of its tilting over or shifting.

To this end, each front leg 12 and 14 is advantageously equipped with a leveling attachment 28 designed according to the teachings of the present invention. Of course, all four legs 12, 14, 16 and 18 of the ladder 10 could be provided with such a leveling attachment 28, yet it is usually only necessary to equip the front legs of the ladder with a pair of these leveling attachments 28 since the possibility generally exists to turn the ladder 10 into a position where these leveling attachments can be used. As already explained, the ladder 10 could be of a different type, for instance composed of a pair of upstanding side pieces or legs between which there are attached the parallel rungs or rounds. In this instance, preferably both legs would be furnished with the inventive leveling attachment.

An inspection of the exploded view of FIGURE 2 will more cogently reveal the specific physical structure of the diagrammatically depicted leveling attachment 28 shown in FIGURE 1. Specifically, the leveling attachment 28 of FIGURE 2 is intended to be affixed to the leg 12 of the ladder 10 and will be seen to comprise

a hollow outer member 30 into which there is telescopically interfitted a similar shaped hollow inner member 32 normally possessing a greater length than the outer member 30. In the exemplary embodiment, both of the outer and inner members 30, 32 are shown to possess a quadrangular cross-sectional configuration, but other configurations would of course be conceivable. It is, however, desirable that the cross-section of these members 30, 32 be selected such that they cannot rotate about their longitudinal axis relative to one another. This is advantageous from the standpoint of insuring for easy alignment of the fixing apertures or holes provided at these members, and as will be more fully explained hereinafter.

Considering the outer member 30 more closely, such comprises a first pair of confronting, substantially parallel faces 34, 36 and a second pair of confronting parallel faces 38, 40. Since the outer member 30 is to be attached to the leg 12 of the ladder 10, the face 40 is provided with a series of vertically aligned, spaced countersunk bores 42 adapted to receive a suitable fastening element, such as the flat head screw 44 or the like. To facilitate insertion and tightening of the screw 44 in the associated countersunk bore 42 the opposite face 38 of the outer member 30 is provided with a corresponding number of vertically aligned openings 46 disposed substantially coaxial with the associated countersunk bores 42. It should be apparent that the outer member which is to be attached to the opposite ladder leg 14 would be similarly constructed, in other words, the face intended to bear flushly against the surface of the ladder leg 14 would be provided with the countersunk bores 42 and the opposite face with the access apertures or holes 46. The remaining two faces 34 and 36 of the outer member 30 are each provided with at least one aperture or hole 48 and 50 respectively, intended to receive a fixing means, here shown in the form of a suitable locking pin or bolt 52.

It will be recalled that the inner member 32 possesses a similar cross-sectional configuration to that of the outer member 30, yet is of course dimensioned smaller so that it can fit with sliding contact and in telescopic fashion inside of the outer member 30. Accordingly, the inner member 32, which is also advantageously hollow in order to reduce the weight of the overall leveling attachment unit, comprises a first pair of parallel faces 54 and 56 which confront one another and a second pair of likewise confronting parallel faces 58 and 60. When the inner member 32 is fitted within the hollow outer member 30, the parallel faces 54 and 56 bear against the faces 34 and 36, whereas the other parallel faces 58 and 60 bear against the faces 38 and 40. In order to selectively fasten the inner member 32 within the outer member 30 and in a manner to afford selective regulation of the degree of telescopic penetration of such inner member 32 into the outer member 30, each of the parallel faces 54 and 56 are provided with a series of vertically aligned openings or apertures 62 and 64 respectively. The spacing between the neighboring holes 62 or 64 of the series of holes on the respective faces 54 and 56 is advantageously chosen such that it is possible to vary the degree of extensibility of the inner member 32 through given increments, determined by the distance between each two neighboring apertures 62 or 64. Since the front legs of the ladder are usually at an inclination with respect to the horizontal, it will be recognized that the face 54 encloses an angle α with regard to the bottom edge or portion 66 which is less than 90°.

Now, during use of the invention leveling attachment 28 when encountering a situation where the associated ladder leg is to be extended thereby, it is merely necessary to slide the inner member 32 relative to the fixed outer member 30 into a position which substantially levels the ladder and wherein one of the apertures 62 and 64 are in alignment with the apertures 48 and 50 respectively. Thereafter, the locking bolt or fixing means

52 is passed through the thus aligned apertures 48, 62, 64 and 50 to positively fix the selected position and the degree of downward extension of the inner member 32. It will be recognized that the fixing apertures 48, 50, 62 and 64 have advantageously been chosen positioned on those respective faces 34, 36 and 54, 56 of the outer and inner members 30 and 32 respectively, which allows the locking pin 52 to extend substantially transversely with respect to the steps 22 or equivalent structure of the ladder 10. As a result, there is provided for greater stability of the interlocking relationship between the telescoping members 30 and 32, especially since the locking pin 52 is supported at no less than four distinct locations and within four aligned apertures. According to a further aspect of the invention, it is preferable to construct the outer member 30 to be open at both of its ends. Consequently, when the inner member 32 is to be brought into an ineffectual or inoperative position, it is merely necessary to displace such upwardly towards or through the other open end at the top of the outer member 30 and to interlock these members 30, 32 with one another by means of the locking pin 52 in a manner similar to that previously considered. Hence, even when the leveling attachment 28 is not in use there can be safely guaranteed that all components thereof will be secured to the ladder, thereby eliminating or at least substantially minimizing the likelihood that parts will become lost, misplaced or detached.

Finally, to further improve the stability of the ladder it is advantageous to provide the lower end of the inner member 32 with an anti-slip or skid element, a so-called cleat 68 as shown by way of example in FIGURE 3. This cleat 68 may be formed of rubber to provide a high coefficient of friction and has an upwardly projecting portion 70 intended to be force fitted into the bottom portion 66 of the inner member 32 as well as a further larger body portion 72 provided at its underface with a series of teeth 74 or equivalent structure intended to bear upon the ground 26 or other surface upon which the ladder structure 10 is erected. Of course, the cleat 68 of FIGURE 3 is but illustrative of one possible form of anti-skid element or member, and any other similar device suitable for insuring that the ladder will not unintentionally slide around can be employed.

It should now be apparent from the foregoing discussion of the inventive leveling attachment for a support that such is readily capable of fulfilling all of the objects mentioned heretofore, while providing many advantageous features from the standpoint of both structure and operation. Specifically, this leveling attachment provides a light-weight unit which does not appreciably increase the overall weight of the associated support, is easy to use, provides great stability for the support, all parts of the leveling attachment may be carried by the support, even when not in use, and the device itself can be easily mounted and detached.

While there is shown and described a preferred embodiment of the invention, it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the scope of the following claims. Accordingly,

What is claimed is:

1. A leveling attachment for a support, such as a ladder, scaffold, trestle and the like, comprising: a pair

of telescopically interfitted, relatively slidable hollow outer and inner members of substantially quadrangular cross-sectional configuration, said outer member having an upper and lower end, at least said lower end being open; a portion of said inner member being extendable through said open lower end of said outer member and encircled thereby; each of said quadrangular-shaped members having first and second pairs of confronting substantially parallel faces, said first pair of parallel faces of said inner member each being provided with a series of apertures therein axially aligned with one another; said first pair of parallel faces of said outer member each having at least one aperture therein positioned for coaxial alignment with said series of apertures in said first pair of parallel faces of said inner member; said second pair of parallel faces of said outer member each being provided with a series of aligned bores therein; means for rigidly attaching said outer member to the support for leveling thereof, said means including fastening elements adapted to be inserted and tightened in said series of bores provided in one face of said second pair of parallel faces of said outer member, the series of aligned bores provided in the other face of said second pair of parallel faces of said outer member facilitating the insertion and tightening of said fastening elements; and means cooperating with said series of apertures axially aligned with one another in both faces of said first pair of parallel faces of said inner member and with said at least one aperture in both faces of said first pair of parallel faces of said outer member for selectively fixing the regulated telescopic interfitted relationship between said inner and outer members to perfect leveling of the support.

2. A leveling attachment for a support as defined in claim 1, wherein said outer member is also open at its upper end, said inner member being telescopically extendable through said open lower end when leveling the support and through said open upper end when said inner member is to be brought into an ineffectual position.

3. A leveling attachment as defined in claim 1, wherein said apertures of said inner and outer members are located in a position such that said fixing means is piercingly inserted through a given group of said apertures which are in axial alignment with one another, so that said fixing means extends in a substantially transverse direction through said respective pairs of parallel faces of said members.

4. A leveling attachment as defined in claim 1, wherein said inner member has a bottom portion enclosing an angle which is less than 90° with respect to one of the faces of said pair of confronting faces provided with a series of apertures, and an anti-skid member carried by said bottom portion of said inner member.

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