May 14, 1929. H. K. SMITH 1,712,942

COLLAPSIBLE LADDER

Filed Dec. 29, 1927

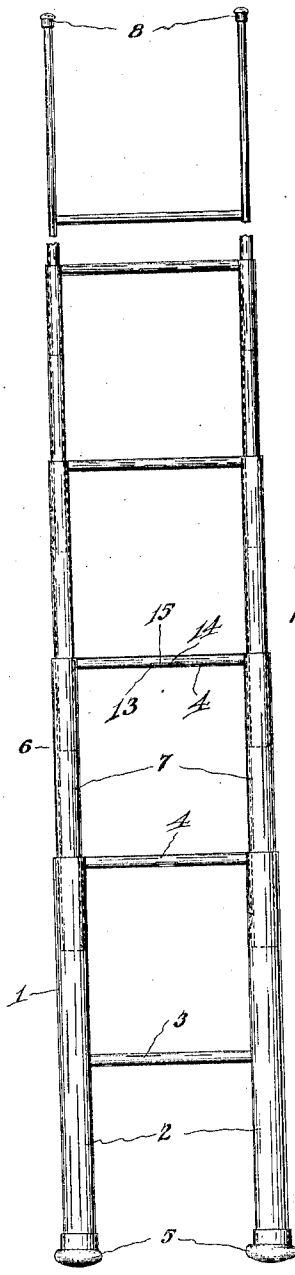


FIG. 1.

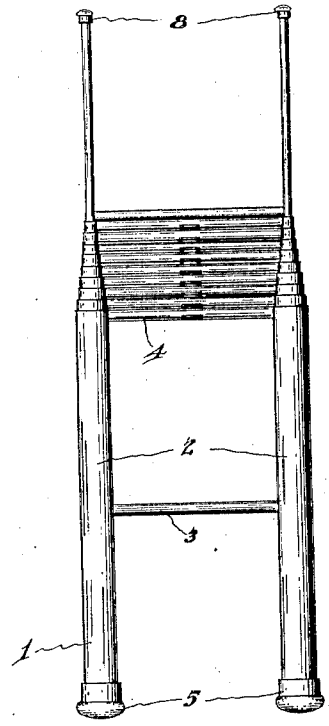


FIG. 2.

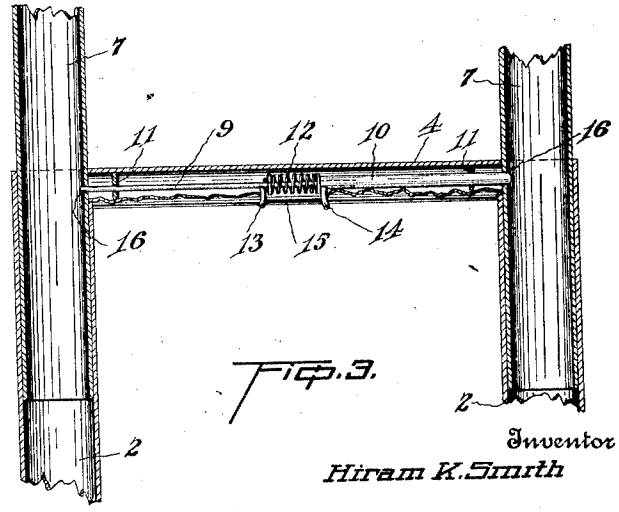


FIG. 3.

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UNITED STATES PATENT OFFICE.

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COLLAPSIBLE LADDER.

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This invention relates to an extensible and collapsible ladder, and its object is to provide a construction which is such that the same may be so collapsed as to take up a minimum space, may be quickly manipulated, is light in weight, rigid in construction and cheap to manufacture. A further object is to provide an efficient locking means for locking the relatively movable parts in the position to which they are adjusted and which locking means is concealed and readily adjustable, and is so positioned as to permit of a maximum extension and collapsing movement of the ladder section.

With the above and other ends in view, the invention consists in the matters hereinafter set forth and more particularly pointed out in the appended claim, reference being had to the accompanying drawing in which—

Figure 1 is a front elevation of the ladder in extended position with parts broken away to shorten the figure;

Fig. 2 is a similar view showing the ladder in collapsed condition, and

Fig. 3 is an enlarged sectional view of a portion of the ladder showing the locking means in elevation.

A ladder embodying the present invention comprises a series of sections the side members of which are preferably of tubular construction, these members of each section being of a diameter to fit and slide within the tubular members of the section below. The tubular side members of each section are connected by a single transverse member or rung and it is the particular positioning or connection of this rung to the side members of each section which permits of a maximum collapsing movement of the sections.

As shown in the drawing a bottom section 1 comprises tubular side members 2 of the desired diameter and length and these side members are connected by transverse tubes 3 and 4, the ends of which are rigidly secured to the side members, preferably by welding the ends of the tubes 3 and 4 to the adjacent sides of the tubes 2. The over-all length of the side members 2 is such that the ladder when collapsed may be easily handled and will not be of such a length as to be unwieldy. The members 3 and 4 form rungs connecting the side members 2 and the upper rung 4 is positioned at the extreme upper ends of the members 2. The lower ends of the side members 2 are provided with caps 5 which may be of rubber or other suitable material adapted to protect the surface upon which the ladder is set and cover the lower ends of the members 2 to prevent them from injuring that surface and also to prevent the foot of the ladder from slipping when it is set up.

The section 6 of the ladder directly above the foot section comprises tubular side members 7 of a diameter to fit and slide freely within the members 2 and these side members 7 are connected together at their extreme upper ends by means of a transverse tubular rung corresponding to the rung 4. The section 6 may therefore telescope within the section 1 to nearly its full length, or until the rung 4 strikes the upper ends of the tubes 2.

Sections similar to the section 6 are provided thereabove, each section having side members 7 of tubular form which are of an external diameter to fit and slide freely within the tubular side members of the next section below and the ladder is thus made of a series of sections, each arranged to telescope within the section below and the number of sections is such as to provide the desired length for the ladder, the single rung or transverse member which connects the side members of each section being positioned at the extreme upper end of said side members to that section so that the maximum of telescopic movement of the several sections is secured.

The upper ends of the extreme upper section may also be provided with knobs 8 similar to the knobs 5 to prevent injury to the surface against which the ladder is set when the same is in use.

To lock the several sections in their extended or collapsed position, locking means is housed within each upper rung of each section said locking means comprising a rod 9 adapted to telescope within a sleeve or tube 10, said rod and tube being positioned and held axially within the rung 4 by means of bearing disks 11 welded or otherwise secured within the tubular rung adjacent each end thereof and sleeved upon the rod 9 is coiled spring 12 interposed between a laterally extending finger piece 13 on the rod and the adjacent end of the sleeve 10, said sleeve 10 is also provided with a finger piece 14 at its inner end and these finger pieces project laterally through a slot 15 in the lower side of the tubular rung. The outer ends of the rod 9 and sleeve 10 are adapted to engage

within openings 16 in the tubular side members 7 of the section above, the wall of the tubular side members of this section below to which the rung 4 is welded at its ends, being cut away at the end of the rung so that the ends of the rod 9 and sleeve 10 may engage freely within these openings 16 and prevent further relative movement of the sections. When the several sections are collapsed or telescoped, to the position shown in Fig. 2, the ends of the locking rods and sleeves engage within the openings in the side members of the sections and thus lock the several sections in the position to which they have been adjusted. When the ladder is extended to the position shown in Fig. 1 the rods 9 and sleeves 10 of the several locking members positioned within the several rungs, engage other openings in the side members of the sections and thus hold these sections in the position to which they are extended.

With this construction and arrangement a very strong ladder is provided which may be collapsed into a small space and which is constructed entirely of thin tubing, making it very strong and rigid, yet light to handle. Such a ladder is particularly adapted for use by electricians and others working within a building where it is necessary to move the ladder from place to place and where it is desirable that such a ladder may be collapsed into a small space, further facilitating its convenient handling. By welding the tubular rungs to the tubular side members, the ladder may be cheaply constructed and by locking these rungs at the extreme upper ends of the several sliding sections the maximum of telescopic movement is secured. Further by locking the locking means within the several rungs, such locking means is concealed and protected against injury, at the same time facilitating the adjustment thereof and permitting of a maximum of collapsing movement, said locking means because of its location within each rung being out of the way of the adjacent sections where it does not interfere with the full collapsing movement of the sections. The only portion of the locking means which projects from each tubular rung, are the fingers 13 and 14 and these fingers extend downwardly through a slot in the rung in such a position that they do not interfere with the full collapsing movement of the section above, the rung of that section lying parallel with and close to the rung of the section below when said sections are fully collapsed. These finger pieces are always in a position where they may be readily grasped by the operator to withdraw the ends of the rod 9 and sleeve 10 from the opening 16 and the spring 12 exerts a force tending to move the rod and sleeve relatively in opposite directions so that their ends will snap into the openings when the sections are moved to bring the opening 16 into position to be engaged thereby.

Obviously the side members of each section of the ladder may be other than cylindrical in cross section and the rungs of the ladder may have any desired cross sectional configuration but preferably all of these members forming the ladder are tubular, the side members for telescoping movement and the rung members for receiving and concealing the locking means. Other changes may be made within the scope of the appended claim without departing from the spirit of the invention and I do not therefore limit myself to the particular construction shown.

Having thus fully described my invention what I claim is:—

A ladder comprising a foot section having tubular side members connected by a plurality of rungs, the upper of said rungs being tubular and secured at its ends to the side members at the extreme upper end of said side members, a series of sections each comprising tubular side members of a diameter to fit and slide within the tubular side members of the adjacent section below, and said side members being connected at their extreme upper ends by a single tubular rung, locking means housed within each of the tubular rungs and comprising a locking rod and a locking sleeve to receive the adjacent end of said rod, said rod and sleeve having laterally projecting fingers and a coiled spring sleeved upon the rod between the finger thereon and the end of the sleeve, said tubular rung being formed with a longitudinal slide intermediate its ends through which the fingers project laterally and downwardly from the sleeve and rod, said tubular side members of each section being formed with openings to receive the ends of the locking rod and sleeve, and caps on the lower ends of the side members of the lower sections.

In testimony whereof I affix my signature.

HIRAM K. SMITH.