March 5, 1946. M. E. BAKER 2,396,034

EXTENSIBLE LADDER

Filed Jan. 12, 1945 2 Sheets-Sheet 1

Fig 1

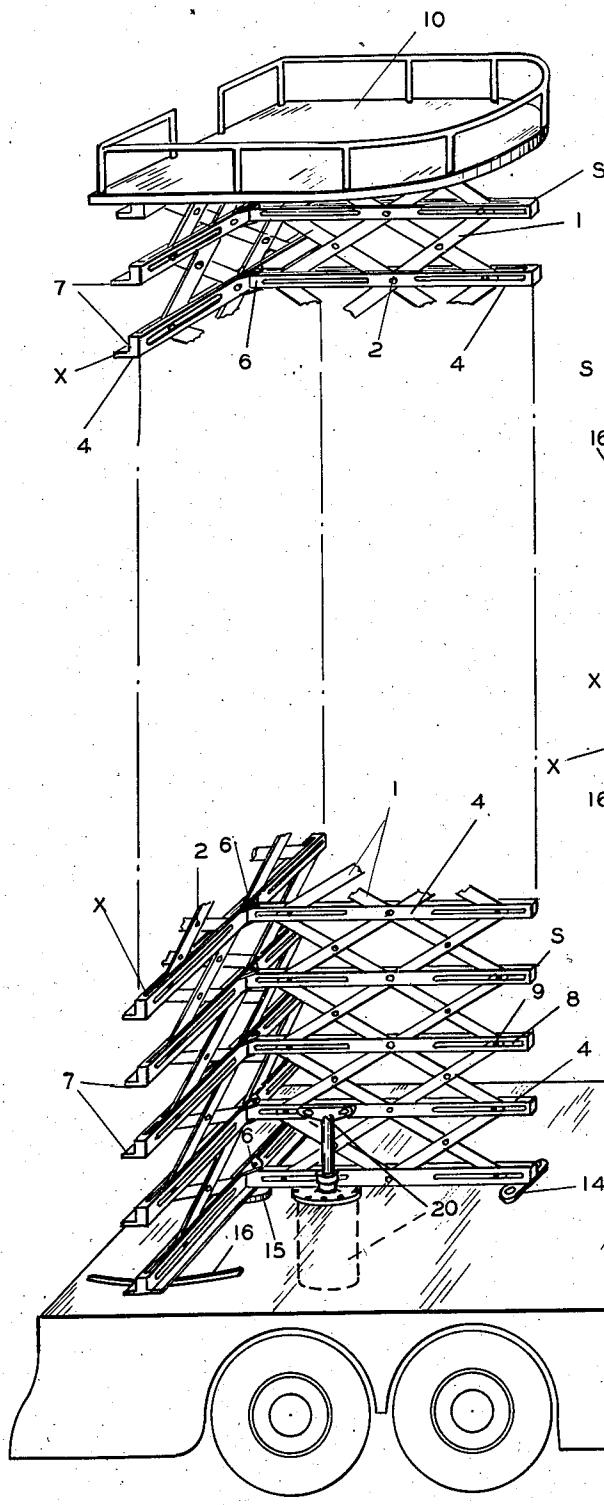
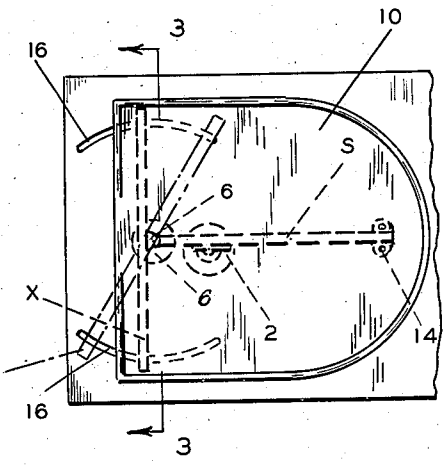


Fig 2



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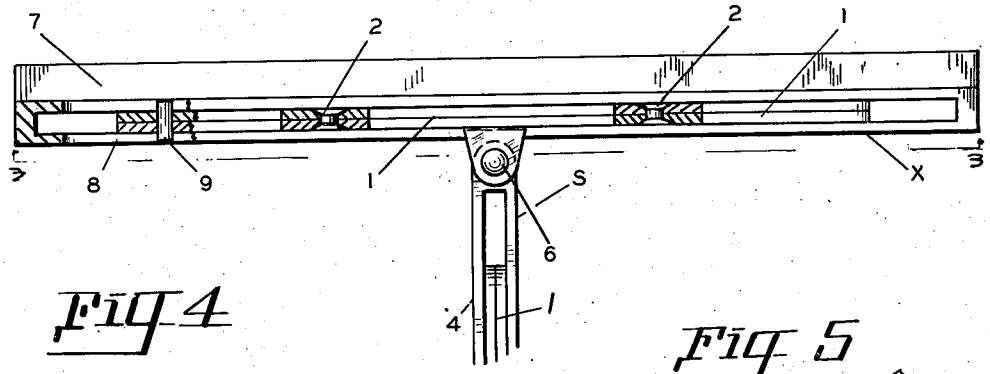
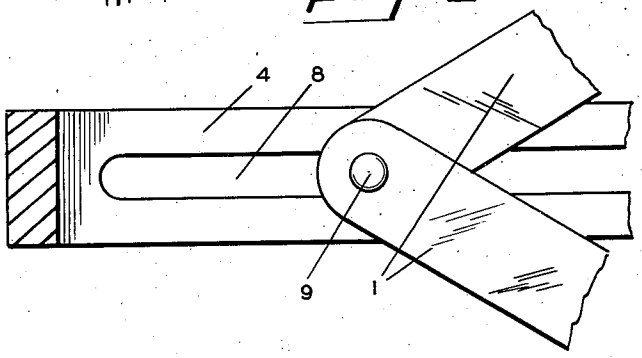


Fig 4

Fig 5



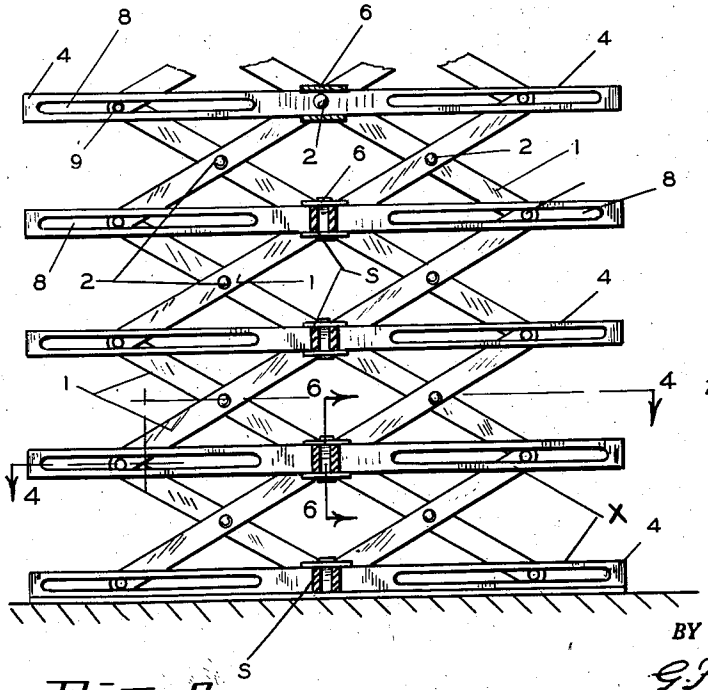


Fig 3

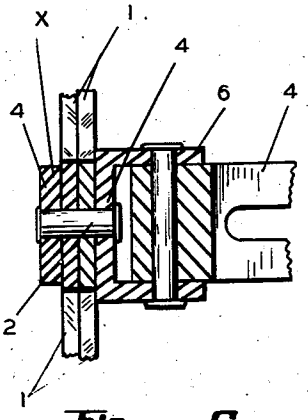


Fig 6

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2,396,034

EXTENSIBLE LADDER

Melyn E. Baker, Portland, Oreg.

Application January 12, 1945, Serial No. 572,519

5 Claims. (Cl. 228—19.2)

This invention relates to an extensible ladder that employs a novel application of the principle of a "lazy-tongs," a system of jointed bars capable of great extension. Originally such a device was for picking up something without stooping, but is now applied to various devices used in machinery, lattice work, etc. Thus the principle is old but herein the construction is believed new.

Expressed in terms of usefulness, it is an object of this invention to employ the lazy-tongs principle in an extensible ladder, by additions of horizontal steps or bars that serve as rungs of a ladder.

The lazy tongs principle in its simple form results in an extensible structure having a fair stability in one direction, that is lengthwise, of the jointed bars of which it is composed, with almost zero stability in the other direction unless the bars are made quite wide and therefore heavy and even then, too small for more than limited usefulness. It is, therefore, another object to greatly stiffen the extensible ladder made after and employing a modified lazy-tongs system, by making the bars in a double column and adding horizontal bars.

The foregoing and other objects that will be apparent, constitute the purposes of this invention.

Drawings illustrating it in its best form, as now known, accompany and form a part of the disclosure herein, showing its application to a rescue ladder for use in safely removing persons trapped above a conflagration in hotels, lodging houses, apartments and like structures.

Ordinary extension ladders will often have to extend upwards through flame belching windows, hence are unusable. Extension ladders mounted on a truck are in common use, but are limited to the rescue of at most three persons at a time, by getting on and backing the truck. So I have illustrated my invention as applied to and constructed for that purpose; but as stated, it is not so limited and the novel structural features can, of course, be devoted to any useful purpose.

In the drawings:

Fig. 1 shows the invention in perspective, with the center part broken away to avoid repetition, mounted on the rear end of a flat bodied truck. The top part shows the loading platform and the bottom shows the system of extensible bars, with a diagrammatically illustrated operating means;

Fig. 2 is a reduced scale diagram of Fig. 1 in plan, particularly showing that there are two lazy-tong members, hinged together in T formation and that the cross of the T is pivoted to and swingable with respect to the shank by virture of a plural set of hinges;

Fig. 3 is a fragmentary view of an extension ladder according to the invention, being part of a section of Fig. 4, on the line 3—3, Fig. 4;

Fig. 4 is a section of Fig. 3 on the line 4—4, Fig. 3;

Fig. 5 is an enlarged view of the joint indicated by numeral 9 in Figs. 3 and 4, being the end pivotal joint of the double lazy-tongs system of jointed bars; and

Fig. 6 is an enlarged view of the hinged joint, numeral 6, of which one is used at every contact point of the shank and cross of the T formation.

Further describing the drawings; as will be seen at once from Figs. 1 and 2, the lazy-tongs principle is modified by being made double laterally. This reduces the amount of extensibility to that of a single lazy-tong structure having a bar length of approximately one-half that used here; but the stability is so greatly enhanced that it is well worth while. These bars 1, are all counterparts of each other and at every inside intersection are joined by a pivot connection 2. Only a few of the bars are so designated and a less number of joints bear the numeral 2, but the lazy-tongs principle is so old that further numerals are deemed unessential. The terminal pivots bear numeral 9 as noted supra.

The double lazy-tongs shown in Fig. 3, is greatly strengthened in every direction by the horizontal bars 4, which can be made straight faced to serve as rungs of a ladder when extended in the manner shown in Fig. 1, lower part, or in Fig. 3; or may have steps 7, by the angle construction shown in Fig. 4.

These horizontal bars 4, are each slotted on both ends as shown at 8, and the outer pivotal connections 9, are long enough to engage the slots 8, thereby maintaining horizontal relative relationship of the bars 4, at whatever degree of extension. When made of cast aluminum alloy as suggested, they will be much stronger if made double as shown, with the lazy-tongs base between their two parts, but when made of wood for ordinary uses, nothing is thought gained by the double construction that will compensate the extra cost. It is an inescapable fact, however, that extreme extension can place the bars 4, so far apart that only a very active person could use them as a ladder.

A most important element of stability is the hinge 6, previously mentioned, which ties the cross X, and the shank of the T formations together without interfering with their extensibil-

ity. This hinged connection increases the strength of the extended structure many times, makes possible a platform 10, which will be anchored to the shank S, and the hinge 6, but not to the cross X, though it can rest on top of the topmost horizontal bar 4, as shown in the upper part of Fig. 1.

The truck in outline, at the bottom of Fig. 1, has a platform 12, and the shank portion of the ladder, designated by S, is securely fastened to it at 14. The other part or cross X, will be pivoted at 15, coaxially with the row of hinges 6, and bearing plates 16, diagrammatically indicate that it is swingable. That is to provide for backing the truck angularly when configurations of a building or obstructions make it expedient. A hydraulic cylinder 20 diagrammatically indicates a preferred means for making the ladder extensible, because however heavily loaded, it can then be lowered easily and smoothly. The hydraulic cylinder also serves to apply a hydraulic lock in any position.

This invention can be made to operate at its best by constructing as much of it as possible, particularly the bars of both kinds, of the aluminum alloys that are light, strong and will stand a high temperature for a reasonable time without weakening or distorting.

Having illustrated and described my invention so that those familiar with the art to which it appertains may make and use it, what I claim as new and desire to secure by Letters Patent, is:

1. An extensible ladder comprising a lazy-tong system of pivotally connected jointed bars, there being two sets of bars hinge connected by the hinges between the ends of one set and the center portion of the other set, at least one set of the lazy-tong bars bearing horizontal bars for steps of a ladder pivotally connected to the central set of lazy-tong pivots and slot connected to the lateral terminal pivots of the lazy-tong bars.

2. An extensible ladder comprising a lazy-tong system of pivotally connected extensible jointed bars according to the lazy-tong principle, there being two sets of bars connected so that one set is normal to and jointed in T formation to the other, at least one set of the lazy-tong bars bearing horizontal bars for steps of a ladder pivotally connected to the central set of lazy-tong pivots and slot connected to the lateral terminal pivots of the lazy-tong bars.

3. An extensible ladder comprising a lazy-tongs system of pivotally connected extensible jointed bars, the lazy-tongs being made double, laterally, there being two sets of lazy-tong bars hinge connected in T formation so that one set is normal to the other when the hinges are in median position, each pair of extensible lazy-tong bars bearing a horizontal bar pivotally connected to its center and slidably engaged with a pair of terminal pivotal connections that raise and lower concurrently with the center.

4. An extensible ladder comprising two sets of double lazy-tong bars jointedly connected together in T formation to mutually stabilize each other, each pair of bars of the lazy-tong system of bars being pivotally connected to a horizontal bar by its central pivot and slidably engaged with a terminal pivot of said double system of bars, to maintain horizontal relationship with said central pivot.

5. An extensible, collapsible structure for a ladder comprising two sets of double lazy-tong bars pivotally arranged, each set being a counterpart of the other set, the ends of one set connected to the center of the other set, said sets arranged to be concurrently raised and lowered in vertical planes at a substantial angle to each other so that the sets mutually support each other, each pair of bars of the lazy-tong system of bars in at least one set of double bars being pivotally connected to a horizontal bar with said horizontal bar slidably connected to a terminal lateral pivot of the said double system of bars.

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