Nov. 20, 1928. 1,691,976

S. KRAMER

LADDER

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Fig. 1.

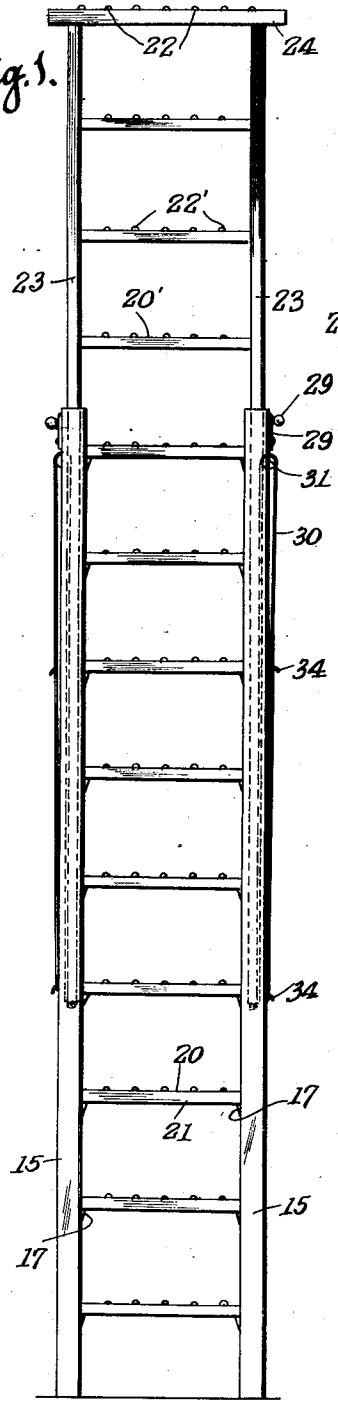



Fig. 2.

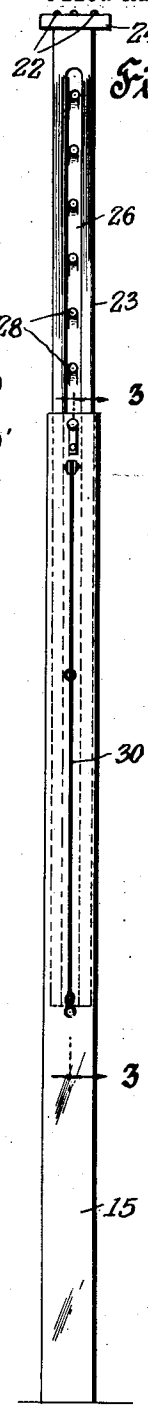



Fig. 3.

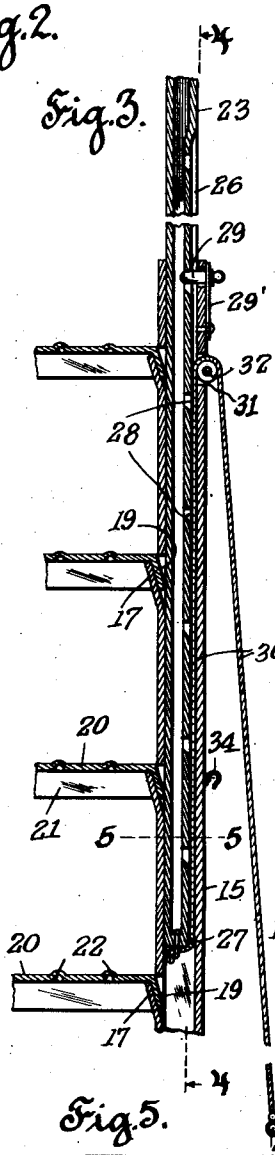



Fig. 4.

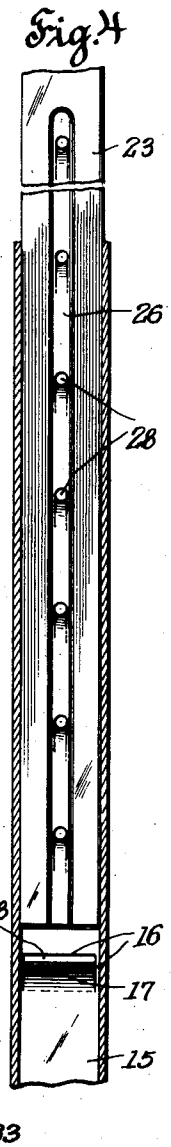
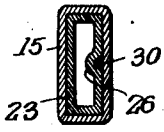



Fig. 5.




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Fig.6.

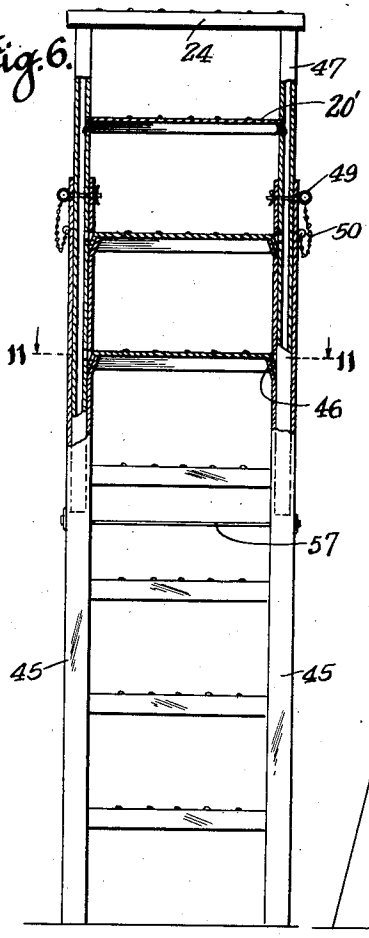



Fig.7.

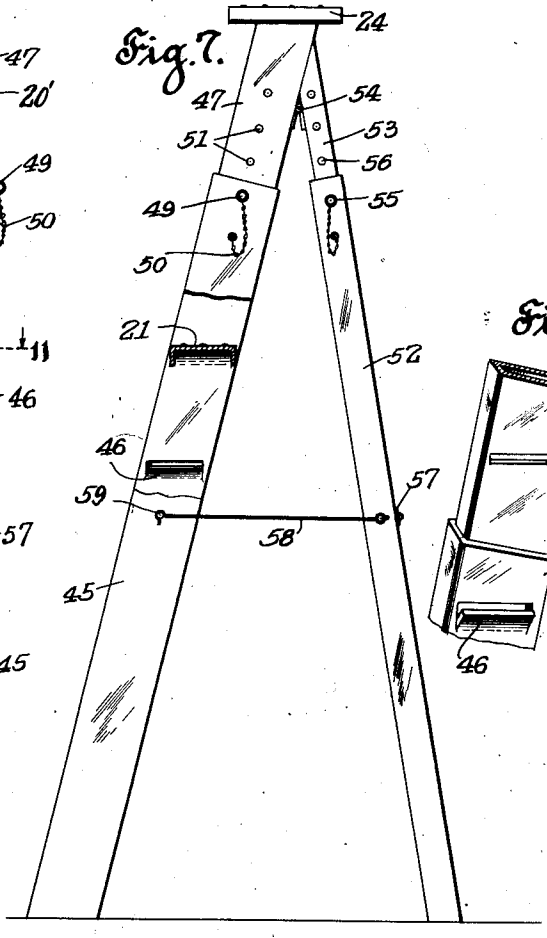



Fig.8.




Fig.9.

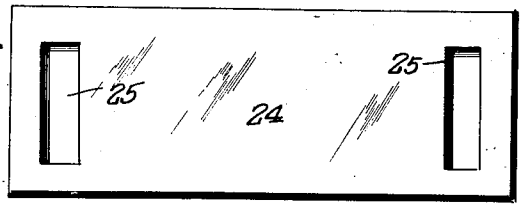



Fig.10.

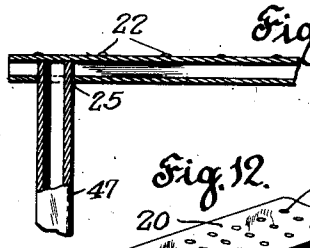



Fig.11.

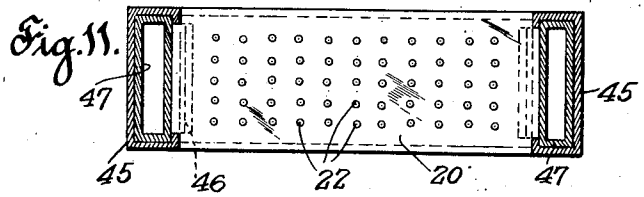
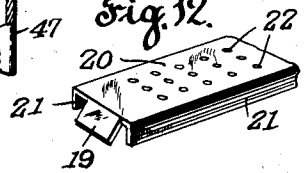



Fig.12.




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Patented Nov. 20, 1928. 1,691,976

# UNITED STATES PATENT OFFICE.

SAMUEL KRAMER, OF NEWARK, NEW JERSEY.

## LADDER.

Application filed August 3, 1926. Serial No. 126,778.

This invention relates to ladders in general and more especially to those capable of being extended in length and of either a single straight type, used in connection with an unrelated support, or the self-contained type known as step ladders.

It is one object of the invention to provide an all-metal ladder having tubular telescopic sides provided with conveniently operated extending means and automatic, positive devices for retaining the parts in length adjustment.

A further feature is in the provision of a novel and practical form of rung or tread interengaged with ladders of knock-down construction in a firm and secure manner, but capable of disassociation at will, these rungs being light although exceedingly strong and provided with nodes or corrugations on their tread surface affording security from slipping.

Other advantages are to be found in the economical disposition of metal, cheapness of construction and pleasing appearance exhibited by the embodiments hereinafter described and shown in the accompanying drawings, forming a material part of this disclosure, and in which:—

Figure 1 is a front elevational view of a knock-down extension ladder made in conformity with the invention.

Figure 2 is an edge view of the same.

Figure 3 is an enlarged fragmentary longitudinal sectional view taken substantially on line 3—3 of Figure 2.

Figure 4 is a similar sectional view taken on line 4—4 of Figure 3.

Figure 5 is a transverse sectional view taken on line 5—5 of Figure 3.

Figure 6 is a front elevational view of a step ladder, partially broken away to show an incorporation of the invention.

Figure 7 is a side elevational view of the same.

Figure 8 is a fragmentary perspective view of one of the ladder sides showing the telescopic sections.

Figure 9 is a bottom plan view of the uppermost step drawn to an increased scale.

Figure 10 is a fragmentary sectional view showing the connection between the top step and frame side.

Figure 11 is a transverse sectional view taken on line 11—11 of Figure 6.

Figure 12 is a partial perspective view of one of the treads in detail.

The ladder in its simplest form, as shown in Figures 1 to 5 inclusive, consists of a pair of straight metal tubes 15, of oblong rectangular shape in cross-section and of any requisite length.

Each tube is sheared on one of its longer sides, as at 16, the metal being bent to produce outwardly inclined supports 17 arranged at suitable uniform intervals, their upper edges being disposed at right angles with the tubes and presenting narrow openings 18 therebetween.

Removably engageable in these openings are angular tenons 19 formed midway the width of the ends of treads or steps 20 made of heavy sheet metal having down turned reenforcing flanges 21 along both of their longitudinal edges and provided with a plurality of nodes 22 struck from the material to extend above the surface, this tread being shown in detail in Figure 12.

In assembling the ladder elements the tenons 19 are passed through the spaces 18 in both of the ladder sides and pressed down until the edge of the supports 17 are in contact with the underside of the treads, the ends of which abut the upper marginal edges of the openings 18 thereby interengaging the elements firmly together thus maintaining the sides in rigid spaced relation and affording a secure support to the steps, the ensemble obviously being of knock-down construction.

It is to be noted that the tenons 19 do not extend into the space between the walls of the tubes which are entirely clear throughout their length to receive telescopically therein, similar but smaller tubes 23 having a series of transverse slots arranged at intervals apart corresponding in all respects to the openings 18 and in which are received corresponding tenons on the ends of treads 20′ having corrugations 22′, the only difference being that the treads of the upper section are slightly longer than the treads 20 of the lower section.

The uppermost tread 24 is of sheet metal of similar but larger cross section than the sides 15 and in its lower side are openings 25 to receive the extreme upper ends of the upper sections 23 which abut the inner surface of the upper wall, this wall or surface having nodes 22 of the type mentioned.

Centrally in the outer walls of the upper sections 23 are depressed grooves 26 extending from their closed bottoms 27 nearly to their tops and formed through the bottoms of the

grooves, at regularly spaced intervals, are a plurality of openings 28 bevelled outwardly at their lower edges to readily receive rounded points of detent pins 29 provided with extending knobs and mounted in flat springs 29′ fixed on the outer sides of the lower sections of the ladder through which the pins pass.

A pair of cords 30 are fixed to the lower closed ends of the upper sections, these cords being partially enclosed in the grooves 26 by the adjacent walls of the lower sections through which they pass by means of openings 31 to engage over pulleys 32 fixed on the lower sections near their tops, the cords extending downwardly along the ladder sides.

The ends of the cords carry rings 33 which upon being pulled serve to raise the inner section of the ladder and these rings may be engaged with hooks 34 fixed in the lower section as shown in Figures 1 and 2.

The extensible step ladder shown in Figures 6 and 7 is substantially of the same construction as that previously described, the same consisting of a pair of flat channel sides 45 having inreaching sheared supports 46 to carry the treads 20, but it is noted that the supports are arranged horizontally parallel with the bevelled bottoms of the ladder sides and not at right angles to the sides.

The upper elements 47 carry between them a series of treads 20′ removably set in slots 48 and have at their tops an overhanging platform 24 as described.

Pins 49 held by chains 50 pass through openings in the outer elements and engage selectively with any of a series of corresponding openings 51 in the upper section sides.

A pair of angular supports 52, telescopically receive upper sections 53, connected near their tops by hinges 54 with the upper elements of the main front portion of the ladder and are provided with pins 55 engageable in openings 56 in the upper elements.

The rear supports are preferably secured together by tie rods 57 and are further provided with pivoted hooks 58 engageable with studs 59 set in the front lower sections 45.

Although the foregoing is descriptive of two forms of the invention, it will be understood that other changes and variations may be resorted to within the spirit of the invention in its broadest scope as included in the appended claims.

Having thus described my invention and set forth the manner of its construction and application, what I claim as new and desire to secure by Letters Patent, is:—

1. A ladder comprising a pair of metal tubes of rectangular cross section, said tubes having a plurality of equally spaced transverse openings in their adjacent sides, integral supports inclined outwardly from said tubes below the openings, a plurality of metal treads, and tenons on the ends of said treads to engage said supports through the openings.

2. A ladder comprising a pair of metal tubes, a plurality of integral spaced supports sheared from the adjacent sides of said tubes, said supports being inclined outwardly therefrom to present narrow open spaces at their upper edges, a plurality of metal treads and tenons on the ends of said treads bent angularly downwardly to removably engage in the mentioned open spaces of said supports.

This specification signed and witnessed this twenty-eighth day of July, 1926.

SAMUEL KRAMER.