United States Patent

[11] 3,547,226

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[54] **FIRE ESCAPE LADDER**
4 Claims, 14 Drawing Figs.

[52] **U.S. Cl.** **182/164**
[51] **Int. Cl.** **E06c 1/383**
[50] **Field of Search** 182/163, 164, 196, 160, 159, 228; 287/103, 103A

[56] **References Cited**

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266,183	10/1882	Moore	182/163
320,114	6/1885	Bormann et al.	182/164
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Primary Examiner—Reinaldo P. Machado
Attorney—Charles E. Temko

ABSTRACT: A collapsible fire escape ladder formed completely from metallic stampings, and including a plurality of step plate elements interconnected by articulated links. The links are pivotally interconnected at points substantially medial with respect to the distance between adjacent parallel step plates when the ladder is in extended condition. The step plates are provided with elongated longitudinally extending openings which provide space for accommodation of the jointed portions of the interconnected links when the ladder is collapsed, and function as a hand grip when the ladder is in extended condition. The invention also includes an articulated joint construction in which a pair of locking tabs on one elongated link are passed through a rectangular opening in a second elongated link, and the sides of the opening are then deformed to reduce the effective width thereof, thereby preventing subsequent disassociations.

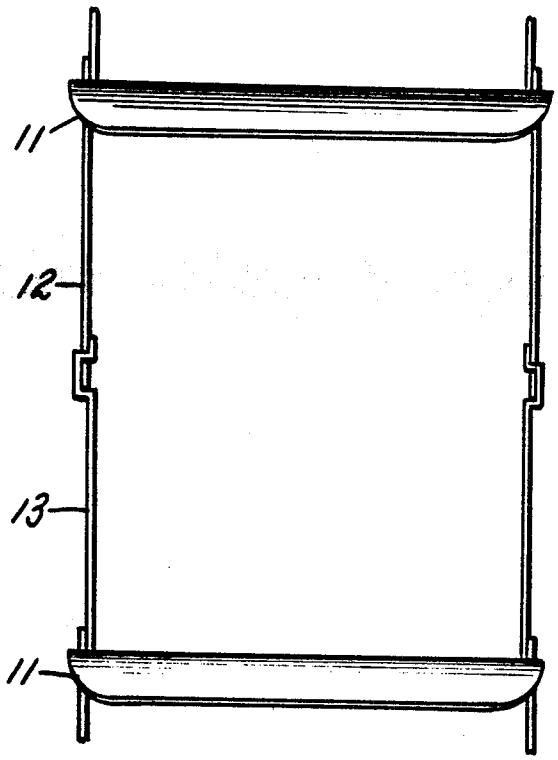


Fig. 1

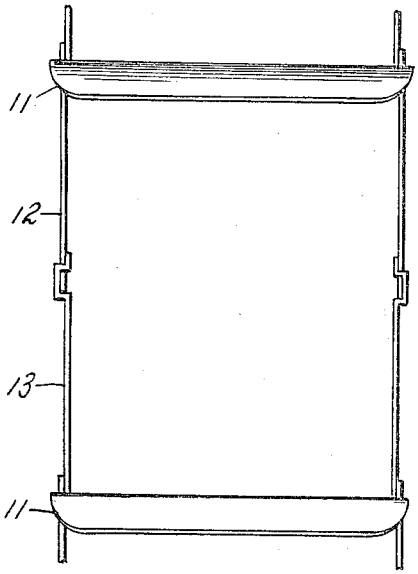


Fig. 2

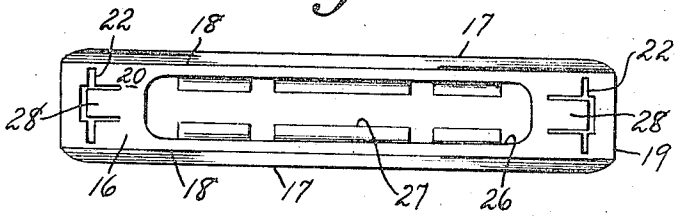
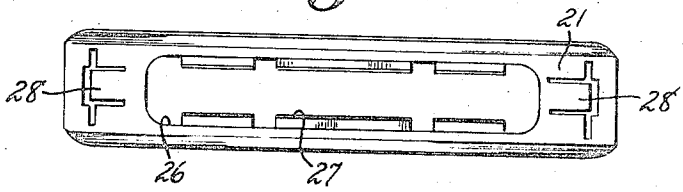


Fig. 3



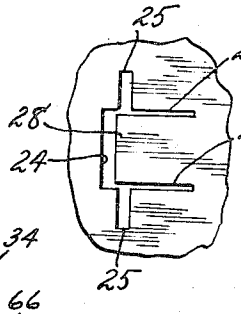


Fig. 4

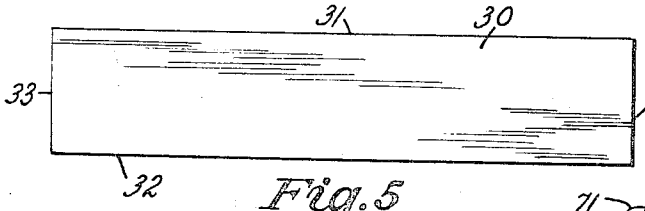


Fig. 5

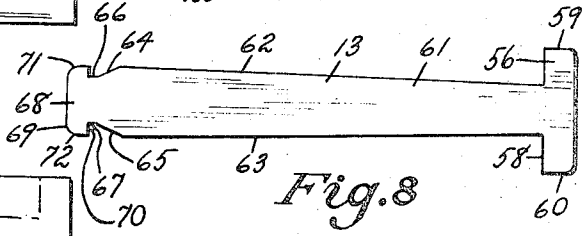


Fig. 8

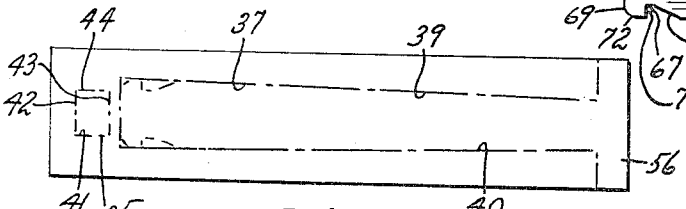


Fig. 6

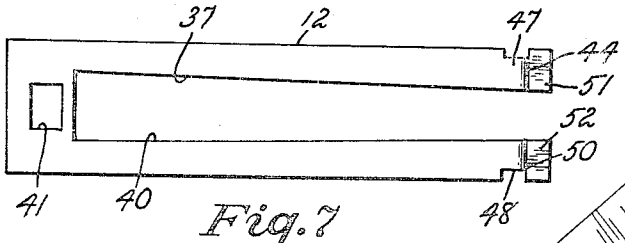


Fig. 7

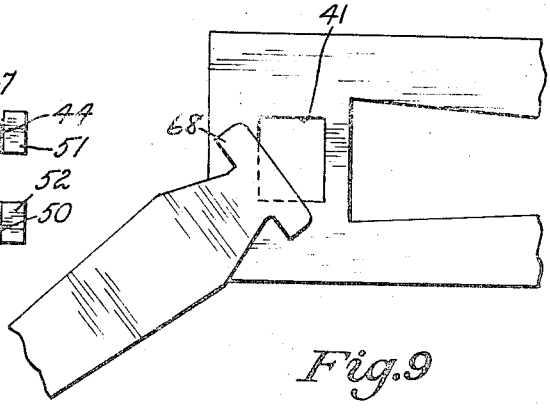


Fig. 9

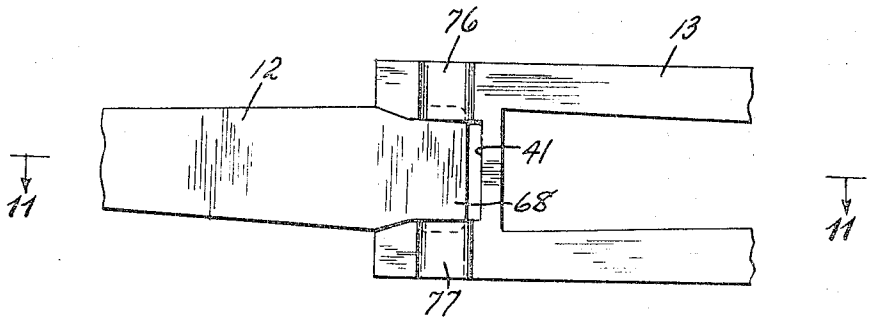


Fig. 10

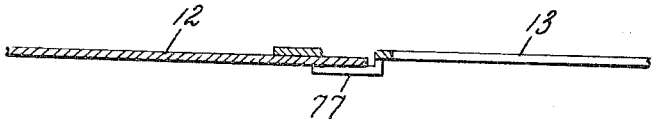


Fig. 11

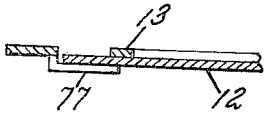


Fig. 12

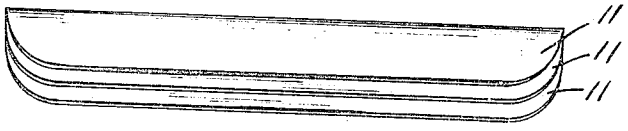


Fig. 13

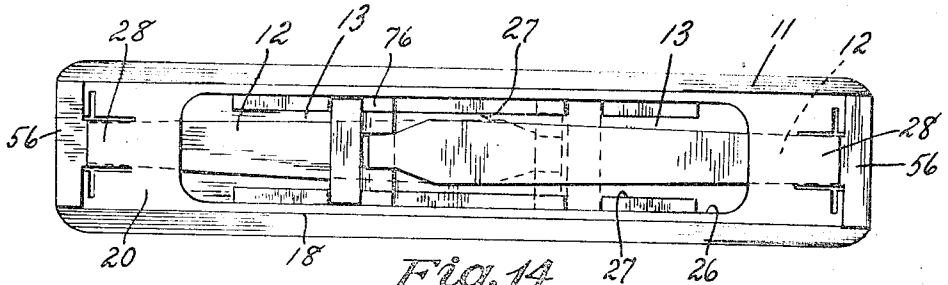


Fig. 14

FIRE ESCAPE LADDER

This invention relates generally to the field of collapsible fire escape ladders of the type disclosed in U.S. Pat. No. 266,183, granted Oct. 17, 1882 to E.J. Moore. Devices of this type are well known in the art, in the inventionalized and specific constructional details which permit improved ease of manufacture, ready extensibility, and reduction in overall size when not in use.

It is among the principal objects of the present invention to provide an improved fire escape ladder which may be fabricated substantially entirely from low cost metal stampings.

Another object of the invention lies in the provision of an improved fire escape ladder of the class described in which the individual step plate elements provide openings in which portions of the articulated linkage interconnecting adjacent step plate elements may be stored when in folded condition, and which may provide manually engageable openings to assist the user when ascending or descending the ladder.

Yet another object of the invention lies in the provision of an improved fire escape ladder construction of the class described, in which the overall cost of manufacture may be of a low order, considerably below that of existing prior art devices, thereby permitting consequent wide sale, distribution and use.

A further object of the invention lies in the provision of an improved fire escape ladder construction in which the individual step plate elements are of tapered configuration, to permit nesting of adjacent elements, thereby effectively reducing the overall space required for storage of the ladder.

A feature of the disclosed embodiment lies in the high utilization of sheet metal material during the manufacture thereof, resulting in a minimum of scrap.

Another feature of the disclosed embodiment lies in the fact that the ladder is semirigid when in extended condition, to provide step plates which are flat and perpendicular to the plane of a wall against which it is positioned.

These objects and feature, as well as other incidental ends and advantages, will more fully appear during the progress of the following disclosure, and be pointed out in the appended claims.

In the drawing, to which reference will be made in the specification, similar reference characters have been employed to designate corresponding parts throughout the several views.

FIG. 1 is a fragmentary view in elevation of an embodiment of the invention, showing the individual step plates in extended relation.

FIG. 2 is a top plan view of one of the step plate elements comprising the embodiment.

FIG. 3 is a bottom plan view of a step plate element.

FIG. 4 is a fragmentary enlarged view in elevation corresponding to the left-hand portion of FIG. 2, in illustrating the details of a shaped opening therein.

FIG. 5 is a view in elevation of a rectangular blank of material employed in the formation of first and second link elements interconnecting adjacent step plate elements.

FIG. 6 is a view in elevation showing the result of a first blanking operation forming a first link element.

FIG. 7 is a view in elevation showing the result of a second stamping operation on the structure shown in FIG. 6.

FIG. 8 is a view in elevation showing a completely formed second link element.

FIG. 9 is a fragmentary view in elevation showing the engagement of the structure of FIGS. 7 and 8.

FIG. 10 is a fragmentary view in elevation showing the result of a final stamping operation securing the structure shown in FIG. 8 in engagement with the structure shown in FIG. 7.

FIG. 11 is a fragmentary sectional view as seen from the plane 11–11 in FIG. 10.

FIG. 12 is a sectional view corresponding to that seen in FIG. 11, but showing the component parts in altered relative position.

FIG. 13 is a side elevational view of the device in collapsed condition.

FIG. 14 is a top plan view thereof in similar condition.

In accordance with the invention, the device, generally indicated by reference character 10 comprises broadly: a plurality of step plate elements 11, a plurality of first link elements 12, and a plurality of second link elements 13.

The step plate elements 11 are substantially similar, each including a centrally disposed tread member 16, and a pair of side flanges 17, interconnected by fold lines 18 to the tread member 16. The entire element 11 is preferably formed as a single metallic stamping from sheet stock, to be bounded by a continuous peripheral edge 19, an outer surface 20 and an inner surface 21. A pair of slotted openings 22 are positioned within the tread member 16 adjacent opposite ends, the details of which are best seen in FIG. 4 in the drawing. Each opening 22 includes a pair of longitudinal slot portions 23, a transverse slot portion 24 interconnecting the same, and a pair of laterally extending slot portions 25. Disposed between the openings 22 is a centrally disposed generally avoid opening 26, the edges 27 of which are rolled (see FIG. 3) to permit the opening 26 to be manually engaged as a hand grip while ascending or descending the ladder. The slot portions 23—24 define a bendable tab 28 which facilitates the engagement of the link elements 12 and 13 therewith.

The link elements 12 and 13 are formed as metallic stampings, and the shape of each element is such as to permit maximum utilization of metallic sheet stock. Thus, each rectangular blank of material 30 (FIG. 5) may be used to form a pair of first and second link elements. The blank 30 is bounded by longitudinal edges 31 and 32, as well as end edges 33 and 34. Referring to FIG. 6, a first stamping operation forms a tapered three-sided opening 37 bounded by an end edge 38, and a pair of side edges 39 and 40. The same operation forms a smaller rectangular opening 41 bounded by end edges 42 and 43, as well as side edges 44 and 45.

Referring to FIG. 7, a subsequent operation forms a pair of oppositely disposed notches 47 and 48, offset connecting portions 49 and 50, and locking tabs 51 and 52. The distance between the opposed inner ends of the notched portions 47 and 48 corresponds to the length of the transverse slot portion 25.

Referring to FIG. 8, the scrap remaining from the operation resulting in the structure illustrated in FIG. 6, and illustrated in dashed lines in that FIG., is then employed to form the second link element 13. A larger locking tab 56 has been previously formed, the same being bounded by end edges 57 and 58, as well as side edges 62 and 63, and the subsequent stamping operation forms converging edges 64 and 65, parallel edges 66 and 67 and a smaller locking tab 68. The tab 68 is bounded by an outer edge 69, an inner edge 70, and rounded side edges 71 and 72.

Referring to FIG. 9, there is illustrated the assembly of the first and second link elements 12—13. The effective width of the smaller locking tabs 68 corresponds to the distance between diagonally opposed corners of the opening 41, whereby insertion of the former through the latter may be performed by placing the same such that the principal axes of each lie at a mutual angle. As seen in FIG. 10, once inserted, the elements are placed in coaxial alignment, and a further stamping operation offsets the connecting portions 76 and 77, thereby effectively reducing the size of the opening 41 and preventing subsequent disengagement of the smaller locking tab 68. This operation also facilitates the hinging action, and permits one of the links to be rotated relative to the other through substantially 180°, while yet maintaining the total thickness of the joint in such condition to remain at approximately three times the thickness of the sheet material from which the links are formed. The opposite ends of the links are engaged within the slotted openings 22 to be maintained in condition by the tab 28, while yet permitting pivotal motion at the line of interconnection.

Referring to FIGS. 13 and 14, when the device is collapsed condition, the individual step platform elements 11 are nested.

The thickness of the joint, when in the position shown in FIG. 12 is accommodated by the opening 26, in the case of the links interconnecting one side of the platform elements, and in the opening in the platform element nested immediately therebelow in the case of the links on the opposite side. By employing proper configuration, each step plate element and associated linkage need occupy less than one-fourth inch when the device is collapsed, thus permitting a 16 foot ladder, for example, to have a total height of 4 inches in such condition.

I wish it to be understood that I do not consider the invention limited to the precise details of structure shown and set forth in this specification, for obvious modifications will occur to those skilled in the art to which the invention pertains.

I claim:

1. In a collapsible fire escape ladder, a plurality of step plate elements, each including a planar tread member and a pair of side flanges interconnected to said tread member along the longitudinal edges thereof in diverging relation, whereby said step plate elements may be placed in mutually nesting relation, each of said tread members having a centrally disposed opening therein, a plurality of pairs of elongated links interconnecting said step plate elements to lie in mutually parallel relation when said ladder is in extended condition, said pairs of links being interconnected for pivotal movement substantially medially between adjacent step plate elements by joint means, said joint means lying at least partially within an opening in a step plate element when said elements are placed in nesting relation, to provide maximum collapsibility.

2. Structure in accordance with claim 1, said opening in said step plate elements being of sufficient size to provide a hand grip when said ladder is in extended condition.

3. Structure in accordance with claim 1, said links being of planar configuration, the planes of which lie substantially parallel to the planes of said tread members when said ladder is in collapsed condition.

4. An articulated joint construction for pivotally interconnecting corresponding first and second elongated links having first and second end portions, respectively; said first end portion having a rectangular opening therein bounded by side edges substantially perpendicular to the axis of said first link, and a pair of end edges substantially parallel thereto, said edges being interconnected at four corners; said second end portion having a pair of laterally extending locking tabs, the combined width of which is greater than the length of said rectangular opening as measured between said end edges, said tabs being passable between diagonally opposite corners of said rectangular opening, the material adjacent to said end edge being deformed out of the plane of said first elongated link to reduce the effective distance between said diagonally opposite corners, after engagement of said locking tabs to prevent disengagement thereof.