Nov. 13, 1934. J. H. PARSONS 1,980,595

FIRE ESCAPE

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Fig. 1.

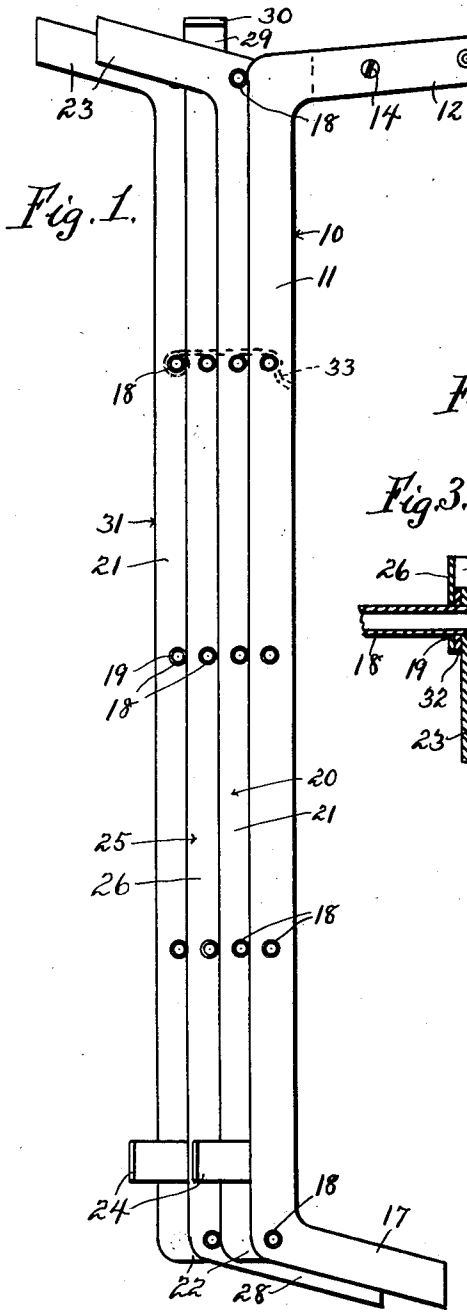


Fig. 2.

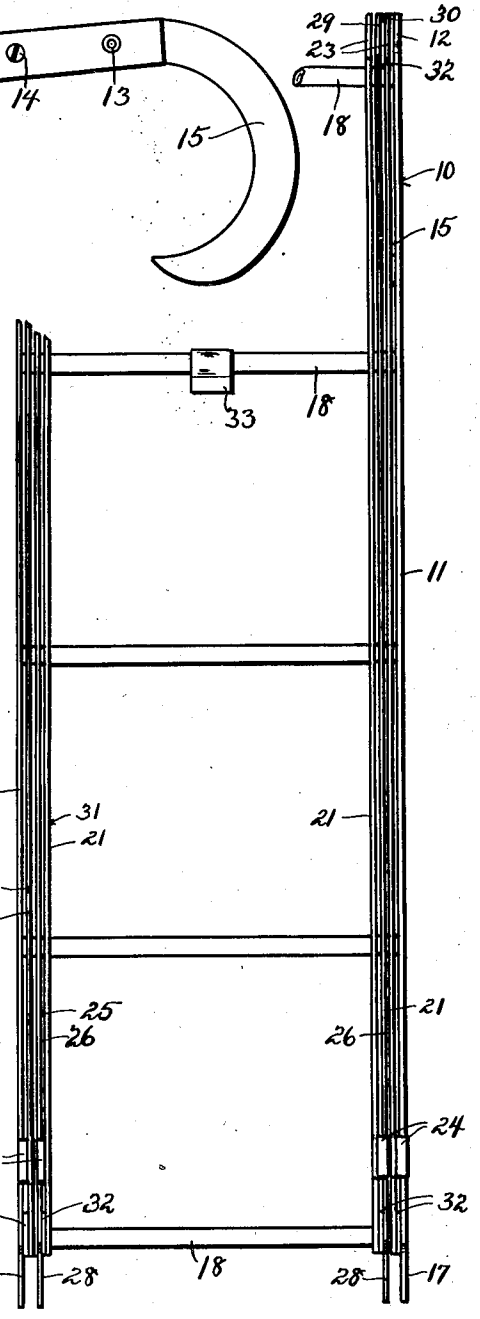


Fig. 3.

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Fig. 4.

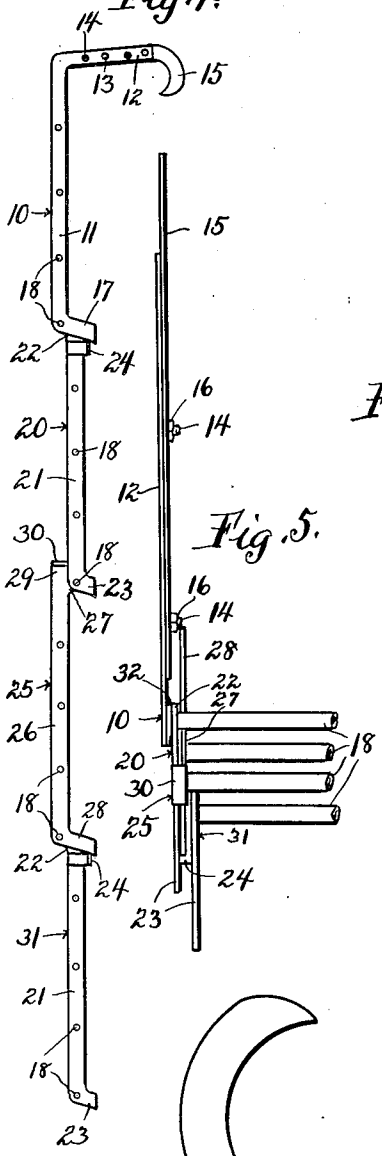


Fig. 5.

Fig. 6.

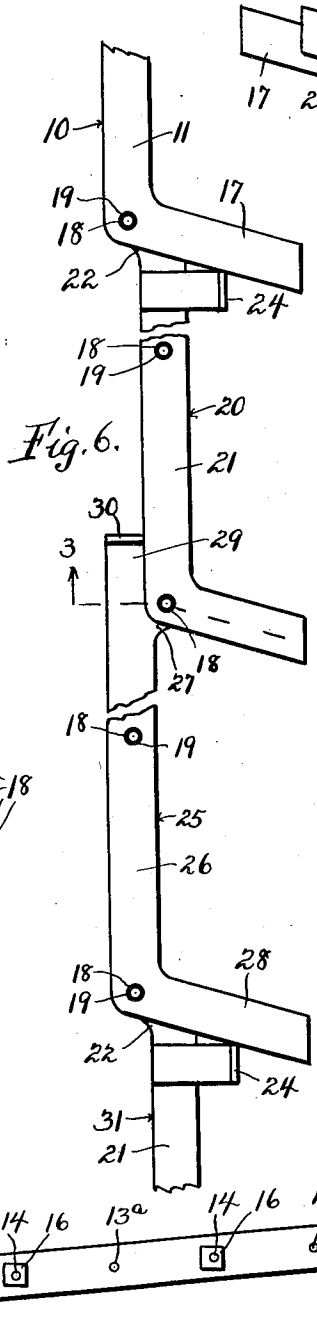
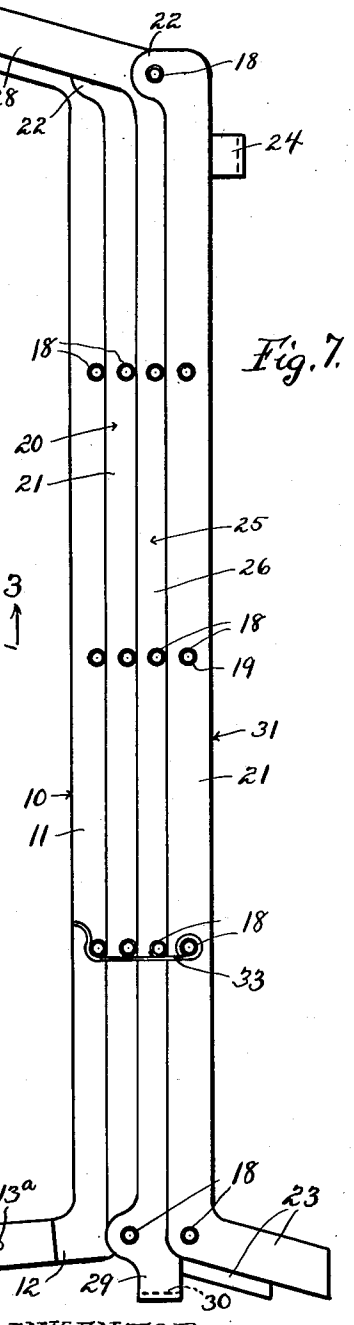


Fig. 7.



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UNITED STATES PATENT OFFICE

1,980,595

FIRE ESCAPE

John H. Parsons, Ridley Park, Pa.

Application February 13, 1933, Serial No. 656,454

2 Claims. (Cl. 228—44)

My invention relates to new and useful improvements in a fire escape, and particularly a folding ladder of unique design for use in cases of emergency in contradistinction to fire escapes that are in position for use at any and all times as a ladder or stairs. The present device may be permanently installed on the outside of a building, but when not in use is to be folded up or it may be located in a room or compartment so as to be projected through an open window and hung on to the window sill or other suitable place and permitted to automatically unfold when necessary or desirable to make use thereof.

An object of the invention is to so construct a folding ladder that the sections thereof will automatically unfold upon release of a suitable holding means.

Another object of the invention is to provide a sectional foldable ladder in which the sections fold upon one another in a zig-zag fashion so that when in a folded condition the connections between adjacent sections are alternately at the top and bottom of the structure.

Another object of the invention is to provide a folding ladder structure, particularly for use as a fire escape, wherein the center of gravity of the sections is beyond or outside of the points of connection of the sections with one another so that all of the sections will automatically unfold upon release of a holding device.

Another object of the invention is to construct the parts of the ladder in a manner that when the structure is folded, it may be placed in a standing position upon a floor or other supporting surface without the probability of the structure falling over.

Another object of the invention is to provide certain of the ladder sections with stops whereby adjacent sections will be brought to rest in their relative endwise locations to prevent the sections from swinging past an approximately vertical line during the opening movements.

Another object of the invention is to provide adjustable hangers, preferably in the form of hooks, so that the structure may be accommodated to window sills or other supporting devices of varying thicknesses and shapes.

Another object of the invention is to provide feet on the several sections which will engage the surface of a wall or other structure for spacing the sections from the surface against which the ladder rests to provide the necessary "toe room" for a person using the ladder. By "toe room" is meant a space into which the toe of a person's foot projects when the ball or other part of the foot is resting upon a rung.

A further object of the invention is to provide a simple and effective holding device or means for maintaining the ladder in a folded condition.

A still further object of the invention is to provide a tubular rung which will be light in weight relative to its strength or capability of supporting considerable weight.

One of the advantages of the structure is that it is light in weight and may be easily lifted, transported and placed in position for use by persons of ordinary strength.

With these and other ends in view, this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, I will describe its construction in detail, referring by numerals to the accompanying drawings forming a part of this application in which:—

Fig. 1 is a side elevation of a fire escape constructed in accordance with my invention and shown folded.

Fig. 2 is a view of the same, looking at what may be termed the front thereof or edgewise of the sides of the ladder sections with portions broken away.

Fig. 3 is a section on the line 3—3 of Fig. 6.

Fig. 4 is a side elevation, on a reduced scale, of the fire escape as it would appear in position for use.

Fig. 5 is a top end view of one side of the folded ladder.

Fig. 6 is an enlarged fragmentary and broken view of the fire escape similar to the illustration in Fig. 4.

Fig. 7 is a vertical sectional view of Fig. 1, in a reversed position illustrating how the folded structure can stand up.

In carrying out my invention as herein embodied, 10 represents the upper section of the fire escape ladder when the device is considered as in an extended or operative condition as shown in Fig. 2, and said section includes a pair of side rails 11, preferably formed of thin narrow strips of metal provided at their upper ends with angular or oblique arms 12 which extend outwardly beyond the ends of the side rails.

Said arms form parts of the suspension means or hangers for the fire escape and each arm has a series of holes 13 therein to receive suitable fastening devices, such as bolts 14, the latter

being projected through some of the holes and through the shank portions of the hooks 15 and said hooks may be held in their adjusted positions by nuts 16 threaded on to the bolts 14, it being understood that said hooks have holes 13*a* similar to those in the arms and spaced so that they may register with different ones of the holes in the arms.

The lower ends of the rails 11 are provided with angular or oblique feet 17 which wherever possible will contact with the surface of the wall of a building or other object against which the fire escape may have to rest.

In the side rails 11 are supported a number of rungs 18 which are preferably formed from sections of suitable tubing with their ends projected into suitable spaced holes 19 in said side rails.

To the lower end of the upper ladder section 10 or to the end provided with the feet 16 is connected one end of another ladder section 20.

Said second ladder section 20 includes a pair of side rails 21, one end of each of which is hingedly or pivotally connected to the ladder section 10, preferably by journalling the ends of the ladder section rails 21 on one of the rungs of the ladder section 10 and in so doing the parts are arranged with the center of gravity of the ladder section 20 off the center of its hinge or pivot line. To accomplish this, I have shown by way of illustration offset portions 22 at the ends of the ladder section 20 which connect with the ladder section 10, and therefore if the two sections are in a substantially vertical position and there is nothing to hold the section 20, said section will automatically unfold or swing outward from the section 10 to accomplish the purpose of the invention.

At the ends of the side rails 21 opposite the offsets 22, said rails are provided with oblique feet 23 similar to the feet 17, but slightly shorter in length because when the ladder is in an open condition as shown in Fig. 2, the section 20 will be out of endwise alignment with the section 10.

Like the section 10, the said section 20 is provided with tubular rungs 18 supported in the side rails.

In order to prevent the section 20 of the ladder from swinging past an approximately vertical line in the extended condition of the ladder, I provide the adjacent ends of the two sections with cooperating parts, and for purposes of illustration I have shown the section 20 as having stops 24 of any suitable formation carried by the side rails 21, either formed integral therewith or secured thereto, for coaction with any suitable parts of the section 10 when the two sections are in relative endwise locations, and by way of illustration I have shown the stops 24 as coacting with the contiguous edges of the feet 17, all of which will be apparent by reference to Figs. 4 and 6.

To the end of the ladder section 20, having the feet 23 thereon, is hinged, pivoted or swingingly connected another ladder section 25 which like the other sections includes a pair of side rails 26 for supporting the tubular rungs identical with the ones previously described and therefore designated by the numeral 18. Where the ladder section 25 is connected to the section 20, the ends of the side rails are provided with offset portions 27 in order that the center of gravity of the section 25 shall be outside of or beyond the center of the pivot points. The ends of the side rails 26 opposite the offset portions or projections 27 are provided with oblique feet 28 for the same purpose as the others heretofore set forth.

The ends of the rails 26 adjacent the offset portions or projections 27 extend beyond said projections, or the points of connection between the sections 25 and 20, and constitute extensions 29 on which are formed stops 30 to engage some suitable part of the section 20, as the front edges of the rails 21, to assist in maintaining adjacent sections in their relative endwise positions when the fire escape is opened or extended as in Fig. 4.

Any number of these ladder sections may be connected together so as to fold up in zig-zag fashion as illustrated in Figs. 1 and 7, and in order to further illustrate the idea, I have shown another ladder section 31 which is pivoted at one end to the end of the section 25 having the feet 28. Many of these sections are duplicates of one another and in actual practice I believe that all except the upper section 10 the alternate ones of the others should be duplicates. The section 31, in particular, is a duplicate of section 20 and therefore the different elements are designated by the same numerals.

The angles of the feet 23 are such that when the folded structure is inverted and set upon a surface, such as a floor, said structure can be supported in an upright position on the feet 23 and the arms 12 or the hooks 15 carried by the latter, without the probability of the device accidentally falling due to jarring or when a person brushes against the same while passing.

Wherever, or if found desirable, washers 32 may be placed between adjacent side rails of the connected sections.

In order to hold the structure in a folded position as shown in Figs. 1, 2 and 7, a suitable fastening means may be used and for convenience of illustration, I have shown a catch 33 pivoted on one of the rungs of one of the sections, it preferably being on a rung of the section which is the lowermost one when the ladder is extended so that when the structure is folded, the nose of the catch will engage and ride over the top rung of the upper section 10 and which may be readily disengaged when necessary or desirable.

Where the fire escape is to be permanently fastened to a building by means of the upper section 10, it is unnecessary to pass the same through a window in case of emergency, but where the fire escape is maintained within a building, the folded structure as shown in Fig. 1 is projected through a window and the hooks 15 caused to engage the window sill or other appropriate part of the building wall. The hooks 15 being adjustable on the arms 12, they may be adjusted to fit the size of the window sill before the time the fire escape may be needed for emergency purposes.

Assuming the folded structure to be on the outside of a building and supported in or near a window or other exit, as soon as the catch 33 is disengaged the ladder sections will begin to unfold due to the center of gravity of the several sections being outside of or beyond the lines of their hinged or pivotal connection with adjacent sections.

Because of the zig-zag folding arrangement of the sections, all of the sections will begin to open at one time, first actually moving away from the wall of the building and then swinging back toward or against the same and this action will prevent any of the sections becoming entangled in vines, trellises or the like, located on the wall

of the building and which might otherwise interfere with the proper actuation of the fire escape. Also due to the zig-zag arrangement of folding the structure it cannot be folded up incorrectly, thereby positively insuring proper assemblage of the parts when in condition for storage or when not actually in use.

As the fire escape unfolds, the stops 24 on section 20 will engage some part of the section 10, as for instance, the feet 17, thereby limiting the inward movement of the section 20, and if the feet 23 of said section 20 fall in the location of a window in the building, the limiting of the inward movement of the section 20 will prevent the feet 23 from breaking the window panes which might permit flames to reach the locality of the fire escape.

As soon as the next section 25 has reached its operative position, the stops 30 thereon will engage suitable parts of the section 20, as the forward edges of the side rails 21 thereof, in order to limit the arc of the swinging movement thereof. These stops will bring the section 26 to rest in its relative endwise position with respect to the section 20, but it will be noted that the section 26 is limited in its swinging motion reverse to that of the section 20. This arrangement of stop continues throughout the length of the fire escape so that alternate sections are arrested in their movements in a reverse direction to each other.

While the fire escape may be made of any number of sections in suitable or desirable lengths, it would seem advisable that the fire escape be made only to accommodate the height between two stories of a building. In other words, one fire escape will take care of the distance between the second story and the ground, while another fire escape will function between the third and second stories of a building, and so on for the number of stories or floors in the building. After the lower fire escape has been placed in position for use, the one above can be released and its lower section can overlap the upper section of the fire escape below it, thereby completing a fire escape from the uppermost floor to the ground. If the occupants, or others, have the time or inclination, all of the fire escapes may be fastened or chained to one another and for this purpose some fastening device, such as a chain, may be attached to the several fire escapes. It will be noted that each succeeding lower section of the fire escape is mounted inside of the preceding upper section and therefore the narrowest section of an upper fire escape will readily fit in between the side rails of the widest section of a lower fire escape.

Of course I do not wish to be limited to the exact details of construction herein shown and described as these may be varied within the limits of the appended claims without departing from the spirit of my invention.

Having thus fully described my invention, what I claim as new and useful is:—

1. A fire escape comprising a plurality of ladder sections including side rails and rungs mounted therein, said sections pivotally connected end to end by rotatably mounting the side rails of one section upon an end rung of the preceding section, said sections being foldable on one another in zig-zag fashion with the center of gravity of all but the uppermost section off the center of their pivot points, whereby said sections will automatically swing outward for unfolding, adjustable suspension means at the upper end of the uppermost section, feet projecting inwardly from the lower ends of each section when considered with the ladder in an extended condition, stops carried by some of the sections and cooperating with adjacent sections to limit the opening movements of the sections, and a catch carried by one section and cooperating with another section to maintain all of the sections in their folded positions.

2. A fire escape comprising a plurality of ladder sections including side rails and rungs mounted therein, said sections being pivotally connected end to end by rotatably mounting the side rails of one section upon an end rung of the preceding section, the side rails of each succeeding section being positioned inside of the side rails of each preceding section whereby said sections are foldable on one another in zig-zag fashion with the center of gravity of the sections off the center of their pivot points whereby said sections will automatically swing outward for unfolding, stops carried by certain of the sections for cooperation with contiguous sections to limit the unfolding movements of the sections, and feet projecting inwardly from the lower ends of each section when considered with the ladder in an extended condition.

JOHN H. PARSONS.