W. A. HARMON.

LADDER.

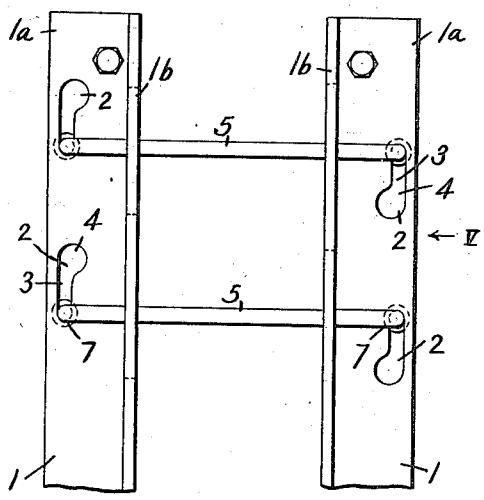
APPLICATION FILED MAY 13, 1916.

1,280,456.

Patented Oct. 1, 1918.

2 SHEETS—SHEET 1.

Fig. 1.



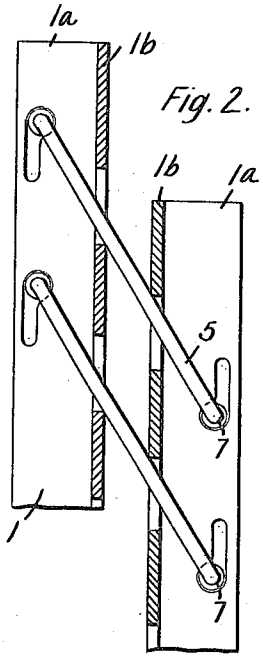


Fig. 4.

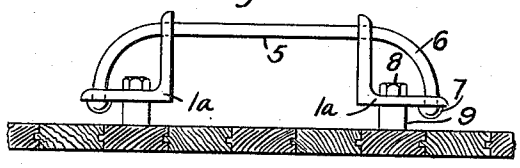


Fig. 3.

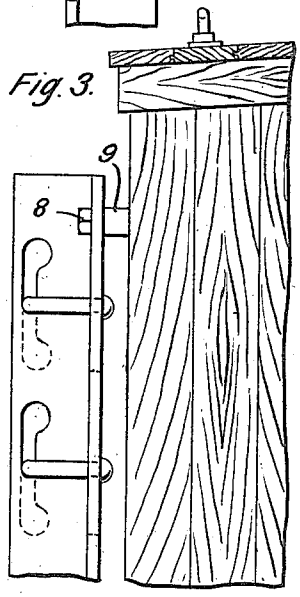
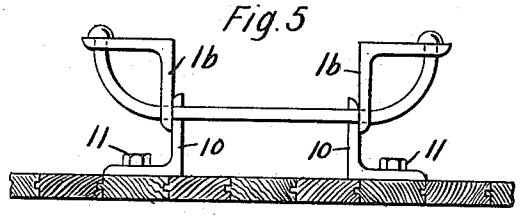


Fig. 5



WITNESSES:

Fred H. Miller

D. C. Davis

INVENTOR

William A. Harmon

BY

Owen W. Kennedy

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

W. A. HARMON.

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2 SHEETS—SHEET 2.

Fig. 6.

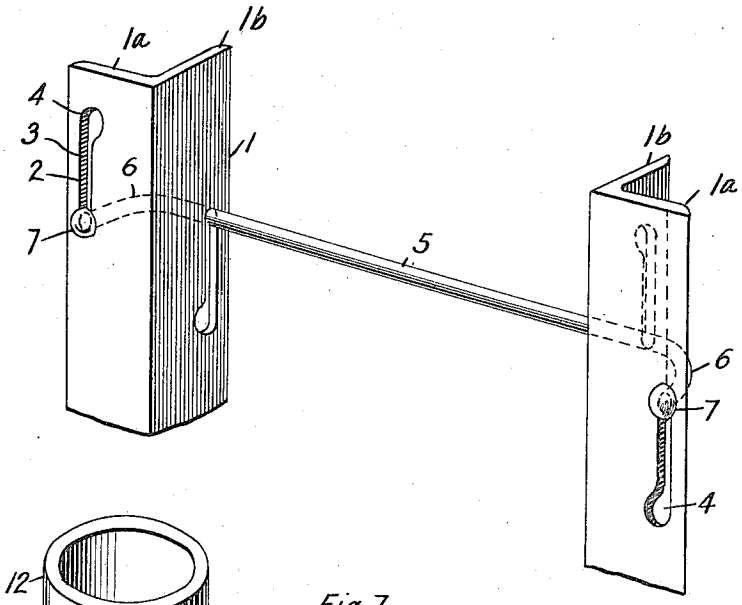


Fig. 7.

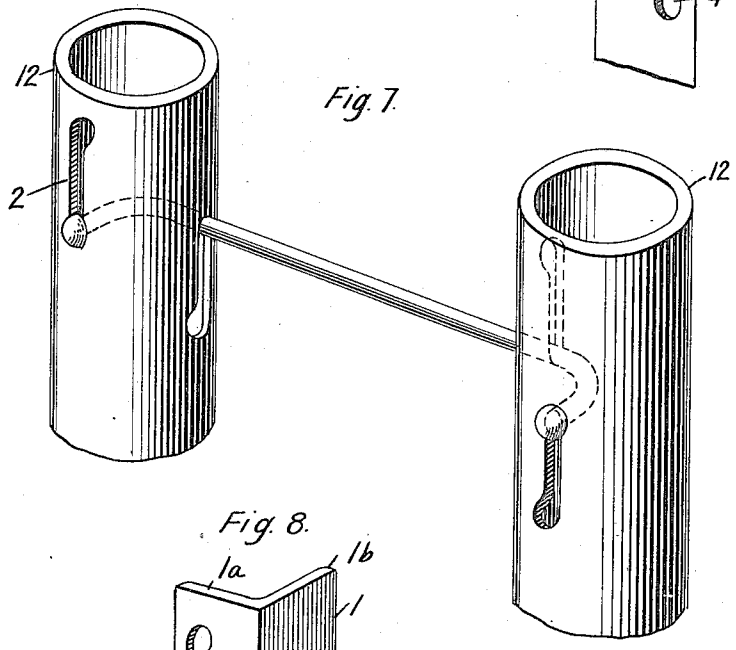
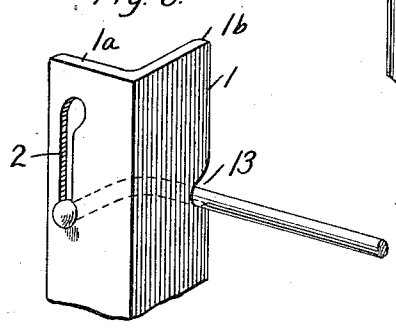


Fig. 8.



WITNESSES:

Fred H. Miller

D. C. Davis

INVENTOR

William A. Harmon

BY

Owen W. Kennedy

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM A. HARMON, OF DIXIE, GEORGIA.

LADDER.

1,280,456. Specification of Letters Patent. Patented Oct. 1, 1918.

Application filed May 13, 1916. Serial No. 97,263.

To all whom it may concern:

Be it known that I, WILLIAM A. HARMON, a citizen of the United States, and a resident of Dixie, in the county of Brooks and State of Georgia, have invented a new and useful Improvement in Ladders, of which the following is a specification.

My invention relates to ladders and particularly to ladders of the type usually employed in connection with railway freight cars, fire escapes or similar structures.

One of the objects of my invention is to provide a ladder so constructed that the stiles and rungs comprising the same may be quickly and readily assembled in locked relation to each other without the employment of any auxiliary fastening devices, such as bolts or rivets.

A further object of my invention is to provide a ladder which is entirely rigid when once applied to its associated structure and which is capable of withstanding the hardest service without any possibility of the rungs becoming loose and turning in the stiles.

In the accompanying drawings, Figure 1 is a view in front elevation of a portion of a ladder constructed in accordance with my invention; Fig. 2 is a view, similar to Fig. 1 showing a ladder being assembled; Fig. 3 is a view showing a portion of a railway freight car or other similar structure with my ladder applied thereto; Fig. 4 is a plan view of the ladder shown in Fig. 3; Fig. 5 is a plan view showing a modification of the means for supporting the ladder; Fig. 6 is a perspective view, showing a portion of a completed ladder and Figs. 7 and 8 are perspective views, similar to Fig. 6, showing modification in the structure of the ladder.

The ladder comprises stiles 1 preferably in the form of angle bars, that are respectively provided with slots 2 in the flanges thereof, as best shown in Figs. 1 and 2. Each slot 2 is formed with a straight portion 3 having substantially parallel sides and an enlarged substantially circular portion 4. The slots in the adjacent flanges 1^a and 1^b of each stile are arranged so that the enlarged portions 4 of adjacent slots lie on opposite sides of a horizontal plane passing through the ends of the slots, as best shown in Fig. 6. When the stiles are arranged in parallel relation, it is apparent that the slots in the respective pairs of parallel flanges also have their enlarged portions 4 on opposite sides of a horizontal plane passing through the ends of the slots. Rungs 5 are respectively provided at their ends with curved portions 6 that extend in substantially the same direction and terminate in enlarged heads 7 of a diameter somewhat less than the enlarged portions 4 of the slots 2 but greater than the width of the straight portions 3.

In assembling a ladder, the rungs 5 are first inserted in each slot of the flange 1^b of a stile 1. The rungs are then passed through the flange 1^b at an angle to the axis of the stile and by revolving the rungs or the stile through an angle of 90°, the enlarged portions 7 of the rungs 5 are caused to pass through the enlarged portions 4 of the slots 2 in the adjacent flange 1^a. When all of the rungs have been positioned in a single stile 1, they will project in parallel relation from the wall 1^b of the stile and at an angle thereto, as best shown in Fig. 2. The other stile 1 is then moved toward the first stile with its flange 1^b in parallel relation to the flange 1^a of the stationary stile, so that the enlarged portions 4 of the slots 2 register with the free heads 7 of the rungs 5. The second stile is then moved upwardly toward the first stile, at the same time revolving it through an angle of 90°. In this manner, the enlarged portions 4 of the slots in the flange 1^a of the second stile are caused to register with the heads 7, as shown in Fig. 2. The stiles are then moved away from each other while still maintaining their parallel relation. During this movement, the body portions of the rungs 5 will slide through the straight portions 3 of the slots while the enlarged portions 7 will be caused to remain outside of the slots, as will be readily understood. When all of the rungs reach a horizontal position, further movement of either of the stiles is impossible, as each rung will simultaneously engage the ends of the slots in the flanges of each stile. The ladder having been completely assembled as previously described, the stiles are then secured to the wall of a railway freight car or other similar structure by means of bolts 8 passing through the flanges 1^a and spacing washers 9, as shown in Figs. 3 and 4.

A modification in the method of securing the stiles to the wall of the car is shown in Fig. 5 wherein short angle bars 10 are secured in spaced relation to the flanges 1^b of

each stile, one flange of each angle-bar 10 being secured to the wall of the car by means of bolts 11.

A modification in the form of the stiles is shown in Fig. 7 wherein tubular stiles 12 are employed. The arrangement of the slots 2 is the same as described with reference to Fig. 6, the slots in each stile being displaced substantially 90° from each other around the periphery thereof. A further modification is shown in Fig. 8 wherein only the flange 1^a of each stile is provided with slots 2, the adjacent flange 1^b being provided with notches 13 located in substantially the same horizontal plane as the bottom of the slot 2. In using the modified stiles shown in Figs. 7 and 8, the assembly of the ladder is accomplished in the same manner as described with reference to Fig. 2.

From the foregoing, it is apparent that when a ladder constructed in accordance with my invention is once secured to the wall of a car or similar structure, it will be quite impossible for the rungs to work loose or turn in the slots. Furthermore, the enlarged heads of the rungs will prevent the rungs from pulling through the slots with consequent distortion of the rungs, so that the ladder will, at all times, provide a safe and durable structure.

While I have shown my invention in several forms it is not so limited but is susceptible of various other modifications that may come within the scope of the appended claims.

I claim as my invention:

1. A ladder comprising a stile provided with two sets of slots, each slot having a portion wider than the remainder thereof, the slots of one set having their larger portions at the opposite ends from those of the other set of slots in the said stile and the ends of the smaller portions of adjacent slots of each set lying in the same transverse planes, and rungs in locking engagement with adjacent slots of the said stile.

2. A ladder comprising a stile provided with a plurality of pairs of slots, each slot having a portion wider than the remainder thereof, the ends of the smaller portions of each pair of slots lying in the same transverse plane and the larger portions of each pair of slots being at opposite ends, and rungs respectively provided with an enlarged end-portion adapted to pass through only the larger portions of said slots, the said end-portion being in locking engagement with the sides of the smaller portion of one slot of each pair.

3. A ladder comprising a pair of stiles respectively provided with two sets of slots, each slot having a portion wider than the remainder thereof, the slots of one set in each stile having their larger portions at the opposite ends from those of the other set of slots in the same stile and from the corresponding set of slots of the other stile when the stiles are in complemental relation, and the ends of the smaller portions of the slots of both sets in both stiles lying in the same transverse planes when the stiles register with each other and rungs coacting with the slots in the said stiles.

4. A ladder comprising a pair of stiles respectively provided with a plurality of pairs of slots, each slot having a portion wider than the remainder thereof, the ends of the smaller portions of each pair of slots in the same stile and of the corresponding pairs of slots when the stiles register with each other lying in the same transverse plane and the larger portions of each pair of slots in the same stile and of corresponding slots of different stiles when the stiles are in complementary relation being at opposite ends and rungs coacting with the respective pairs of slots.

5. A ladder comprising a stile provided with two sets of slots, one set lying in a longitudinal plane which is at an angle to the longitudinal plane in which lies the other set of slots, each slot having a portion wider than the remainder thereof, the slots of one set having their larger portions at the opposite ends from those of the other set of slots in the said stile and the ends of the smaller portions of adjacent slots of each set lying in the same transverse planes, and rungs in engagement with said slots and having their ends sufficiently bent to cross the planes of both sets of slots.

6. In a ladder, the combination with a pair of stiles respectively provided with a plurality of pairs of slots, each slot having a portion wider than the remainder thereof, the ends of the smaller portions of each pair of slots in the same stile and of the corresponding pairs of slots when the stiles register with each other lying in the same transverse plane and the larger portions of each pair of slots in the same stile and of corresponding slots of different stiles when the stiles are in complementary relation being at opposite ends, of a plurality of detachable rung members respectively provided at their ends with bent portions in locking engagement with a pair of slots in each stile when the ends of the smaller portions of both pairs lie in the same transverse plane, the said rungs and said stiles being turnable with respect to each other only when the larger portions of both pairs of slots lie in the same straight line.

7. In a collapsible ladder, the combination with a pair of stiles respectively having a plurality of holes extending transversely therethrough, of a plurality of detachable rung members respectively provided at their ends with bent hole-engaging portions of a size capable of being initially passed

through the holes in the stiles by a turning movement and shaped so that by a shifting movement transverse to the inserting movement the rungs may be locked so that they cannot be withdrawn from the holes.

8. In a collapsible ladder, the combination with a pair of stiles respectively having a plurality of holes extending transversely therethrough, of a plurality of detachable rung members respectively provided at their ends with bent hole-engaging portions of a size capable of being initially passed through the holes in the stiles by a turning movement and shaped so that by a shifting movement transverse to the inserting movement during the assemblage of the ladder the said stiles and said rungs are locked against withdrawal of the rungs when the holes in different stiles register with each other and the rungs lie in planes substantially transverse to the longitudinal axes of the stiles.

9. In a collapsible ladder, the combination with a pair of stiles respectively having a plurality of holes extending transversely therethrough, of a plurality of detachable rung members respectively provided at their ends with bent hole-engaging portions of a size capable of being initially passed through the holes in the stiles by a turning movement and shaped so that by a shifting movement transverse to the inserting movement during the assemblage of the ladder the said stiles and said rungs are locked against withdrawal of the rungs when the holes in different stiles register with each other and the rungs lie in planes substantially transverse to the longitudinal axes of the stiles, and the said rungs and said stiles are turnable with respect to each other only when the rungs are displaced from the transverse planes.

In testimony whereof, I have hereunto subscribed my name this 27th day of April, 1916.

WILLIAM A. HARMON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."