Jan. 2, 1934. W. HARTING 1,942,210

UNIVERSAL FOLDING LADDER

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FIG. 1.

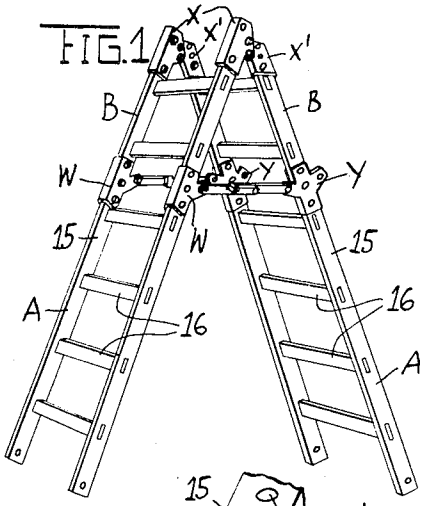


FIG. 2.

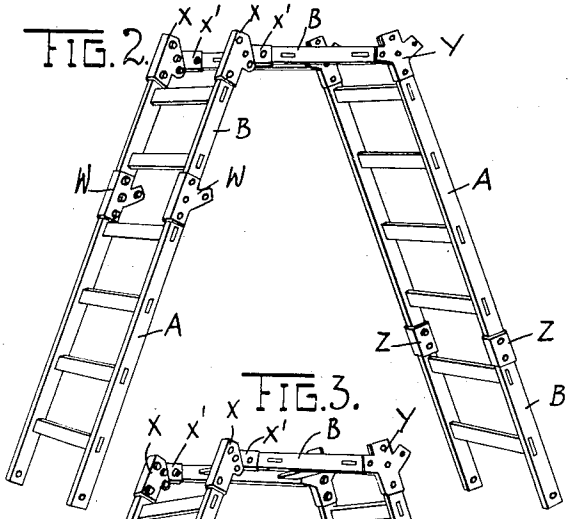


FIG. 3.

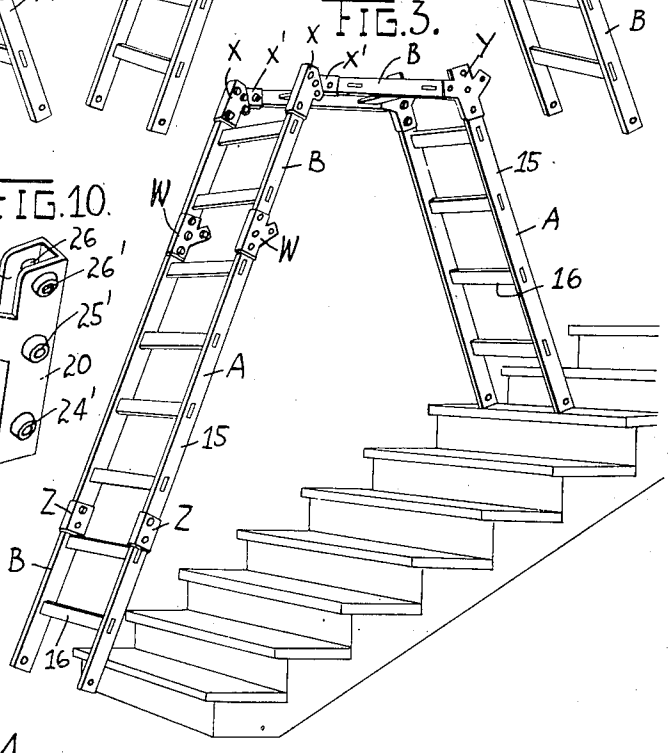


FIG. 9.

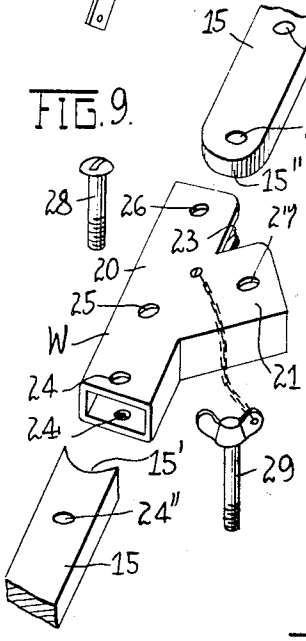
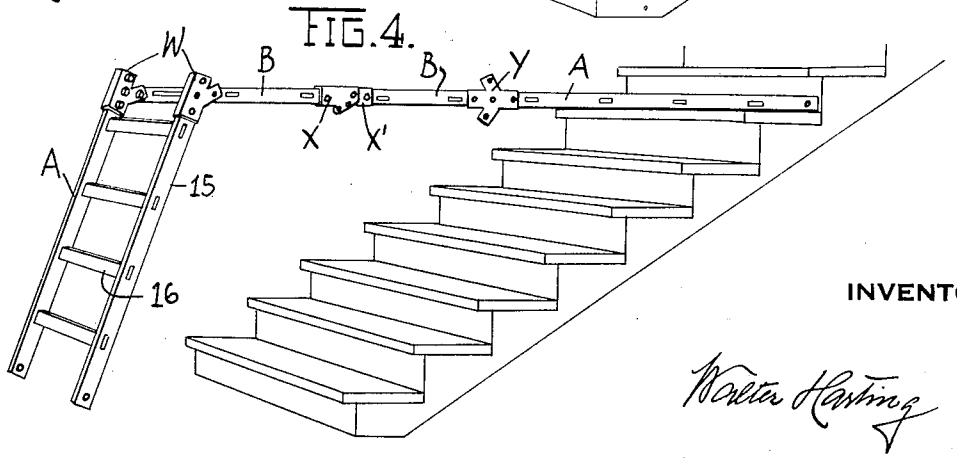


FIG. 10.

FIG. 4.



INVENTOR

Walter Harting

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FIG.5.

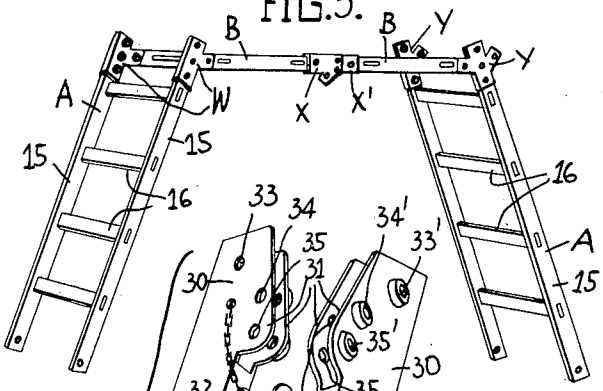


FIG.11.

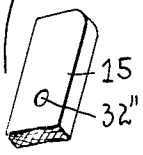


FIG.14.

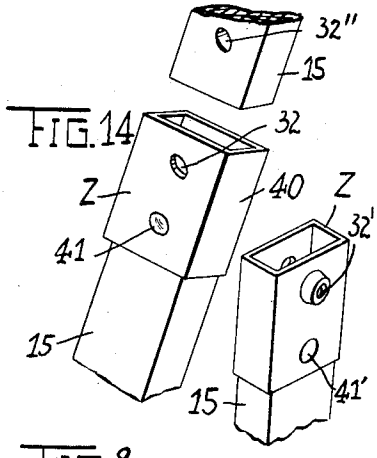


FIG.8.

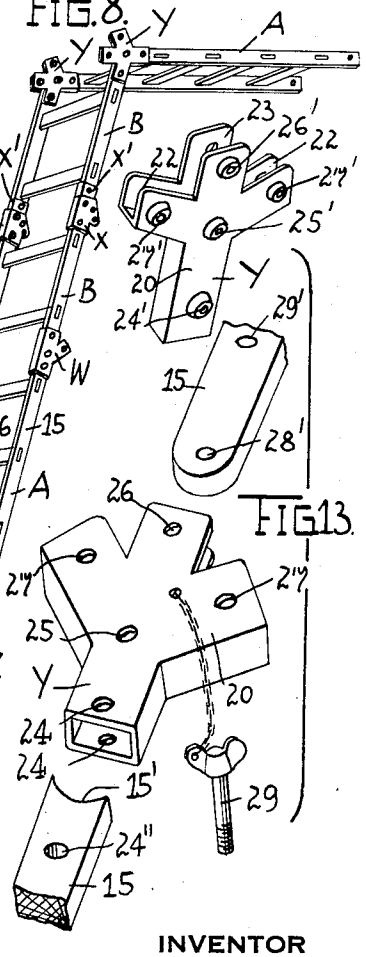


FIG.7.

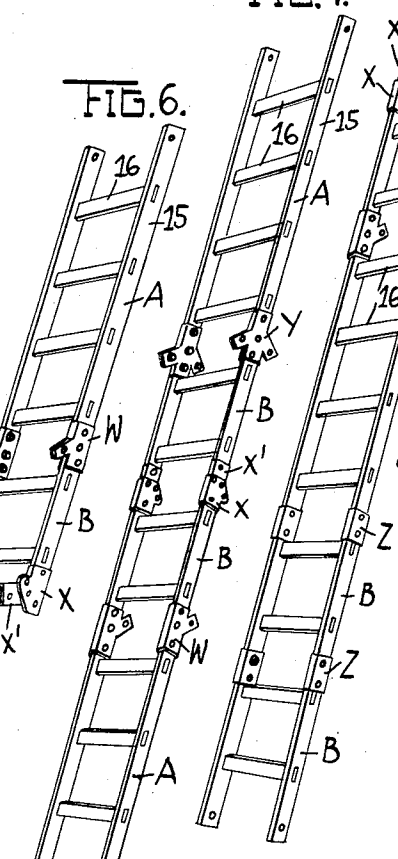


FIG.6.

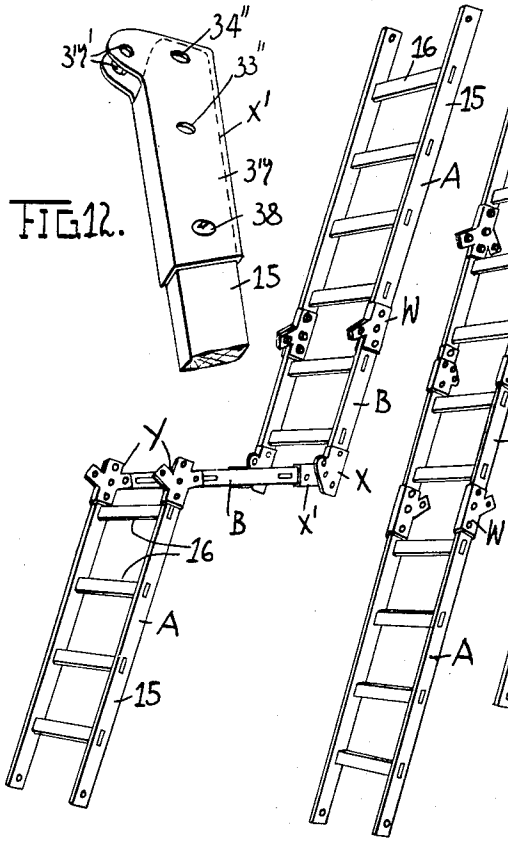


FIG.12.

FIG.13.

INVENTOR

Walter Harting

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UNITED STATES PATENT OFFICE

1,942,210

UNIVERSAL FOLDING LADDER

Walter Harting, New York, N. Y.

Application July 28, 1932. Serial No. 625,265

3 Claims. (Cl. 228—26)

This invention relates to ladders and has as one of its objects to provide a ladder composed of sections arranged to permit of length extension when required or to be folded for use as a step ladder.

A further feature is in the provision of means whereby the structure may be arranged to present a raised platform or stage, either independently or in connection with an end support, as for instance a series of steps such as a stairway.

Another purpose is to produce socket connections for the adjoining ends of the ladder sections whereby certain of such sections may be disposed at an angle with the other sections or in register as desired, and maintain a firm and rigid connection at the joints irrespective of their disposition.

These objects are attained by the novel construction and combination of parts hereinafter described and shown in the accompanying drawings, forming a material part of this disclosure, and in which:—

Figure 1 is a perspective view of an embodiment of the invention arranged as a double step ladder.

Figure 2 is a similar view of the same when disposed to present a raised platform.

Figure 3 shows another like view when the device is used in connection with a flight of stairs over which the platform is raised.

Figure 4 shows the same when extended to constitute a staging.

Figure 5 is a view similar to Fig. 2, but showing the ladder shortened and the platform extended.

Figure 6 shows a ladder offset in its length with a platform intervening.

Figure 7 is a perspective view of the ladder as fully extended.

Figure 8 is a similar view but showing a platform at its upper end.

Figure 9 is a perspective view showing a group of the details constituting one type of the joint connector.

Figure 10 is a perspective view showing the opposite side of the joint connector.

Figure 11 is a similar view of a group used in another type of connector.

Figure 12 is a view of a socket arm engageable with the connector shown in Fig. 11.

Figure 13 is a perspective view of another group of connector elements where two branches are engaged.

Figure 14 is a similar view of plain, straightway connections, the view illustrating both sides of the connector.

These drawings indicate graphically some of the very many arrangements, suited to a wide variety of purposes, that the structure may be set for, and these views also show the simplicity and the small number of elements used.

In these drawings the numeral 15 designates the ladder sides and 16 the rungs or steps throughout.

The construction preferably consists of two lengths of ladder section, relatively long and short, designated respectively A and B, the former having four rungs and the latter two rungs, so designed that the ends of their side elements may be connected to extend in register or at an angle in order to produce the various structures required.

The connecting elements are of several shapes designated by the letter W in the group shown in Figs. 9 and 10, X in Fig. 11, together with the socket arm X' in Fig. 12, Y in Fig. 13 and Z in Fig. 14.

The connector W comprises a four walled, straight hollow socket 20 having an angular branch 21 open at its upper side 22, as is also the adjacent side of the main, straight element, as at 23. Formed in the side walls of the connector are openings 24—25—26—27, these openings, on one side having screw threaded bosses 24'—25'—26'—27' to receive plain screws 28, or if preferred, screws 29 having winged heads for ready manual operation.

When the connector is applied, the lower section of the ladder side is preferably concave, as at 15' and the corresponding upper section is rounded convexly, as at 15'', to fit.

A single opening 24'' is brought into register with the connector openings 24—24' and a screw 28 inserted; similarly, an opening 28' in the upper section coincides with the openings 25—25' to receive a screw 28, while the upper opening 29' may be brought into register with either of the openings 26—26' or 27—27' and held by the screw 29 in whichever position may be desired.

The connector X is likewise a hollow casing 30 having edge flanges 31 and is provided with openings 32—33—34—35, having threaded bosses 32'—33'—34'—35' to receive screws 36, and the adjacent ends of the ladder sides are suited to enter the connector to be held by screws passing through openings in the ladder side ends.

A connector X' having an angular socket 37 is secured on the end of the connecting section 15 by a screw 38, the connector X' being engaged to

the connector X by a screw passing through the openings 34—34'—35—35' and corresponding openings in the outer, offset elements 37' of the connector X'.

The two-way connector Y is of the same type as the connector W except it is provided with two extending arms arranged at opposite angles.

The plain connector Z is merely a straight portion of a rectangular tube 40 having openings 41—41'—32—32' to receive rivets or screws used in securing the ladder sections 15 rigidly together when extended in alinement. One of the sections 15 is formed with a pin or screw receiving aperture 32'.

All of the single or double branched connectors are preferably made of metal castings, properly proportioned for strength and appearance, and well suited to engage the several ladder sections firmly, retaining them in fixed angular adjustment or alinement in an obvious manner, and it will be apparent that the sections may be united to present a supporting structure for many purposes, or be compactly folded.

While certain preferred embodiments of this device have been shown and described, it will be understood that changes in the form, arrangements, proportions, sizes and details thereof may be made without departing from the scope of the invention as defined in the appended claims.

Having thus described the invention, what is claimed as new and desired to secure by Letters Patent, is:—

1. The combination with a pair of ladder sections having apertures in their ends, of connectors adapted to connect the ends of one ladder section to the ends of the other ladder section, each of said connectors including a base housing adapted to slide over part of the adjacent ladder section, removable pins for locking the ladder sections to said connector, each of said connectors having a branch housing, the base housing being open next to said branch housing and the branch housing being open next to the base housing, whereby one of said ladder sections may be swung over to fit into said branch housing, and means for locking the last mentioned ladder section in said branch housing.

2. A connector for connecting adjacent ends of ladder sections, said connector comprising a rectangular housing having a pin-receiving aperture adjacent each end adapted to receive a pin for connecting the ladder sections to the housing, said housing having a branch intermediate its length extending at an angle to the main part of the housing, said branch having a pin-receiving aperture, said branch and said housing having facing openings whereby the ladder extending into one end of said housing may be swung over into the branch housing or from the branch housing over into the base housing according to the angle at which the ladder sections are to be connected.

3. A connector for connecting ladder sections together, said connector comprising a main housing provided with a pair of branches arranged at opposite sides near one end, said branches having one open face, and said main housing being open at the part facing the branch housing whereby one ladder section may be connected to one end of said housing and the other ladder section may be connected at the opposite end and caused to extend in alinement therewith or be swung to either side of said branch housings.

WALTER HARTING.