Nov. 1, 1927. 1,647,365

J. E. KALGREN

STEPLADDER SUPPORT ASSEMBLING MACHINE

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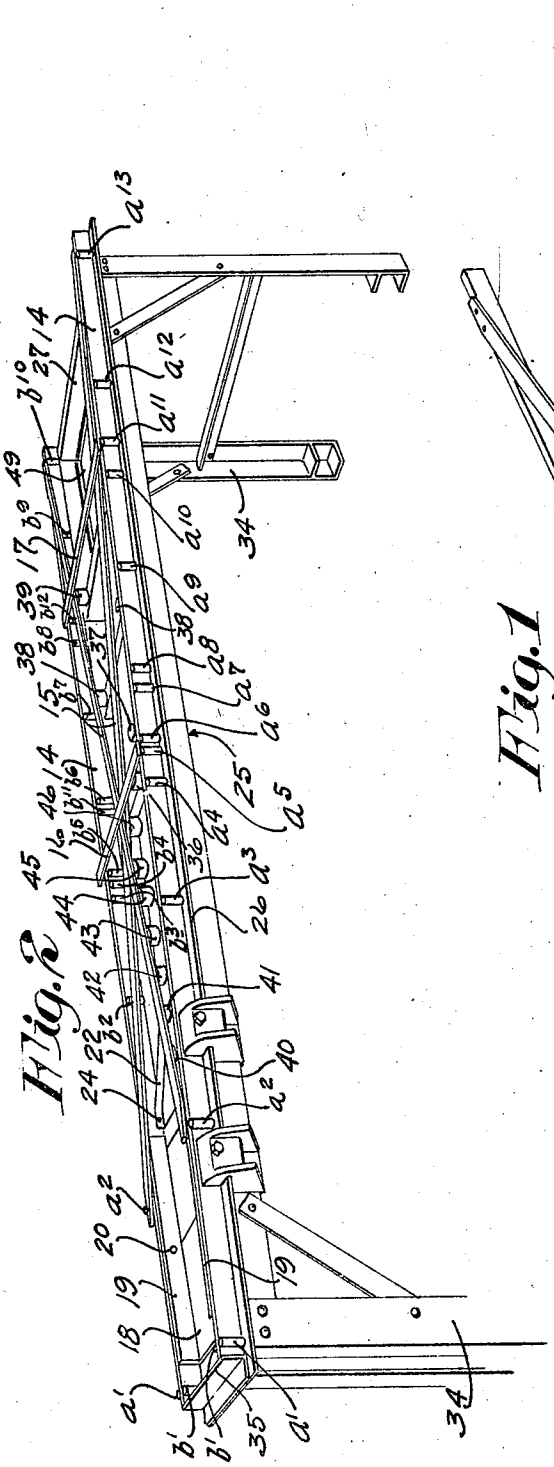


Fig. 2

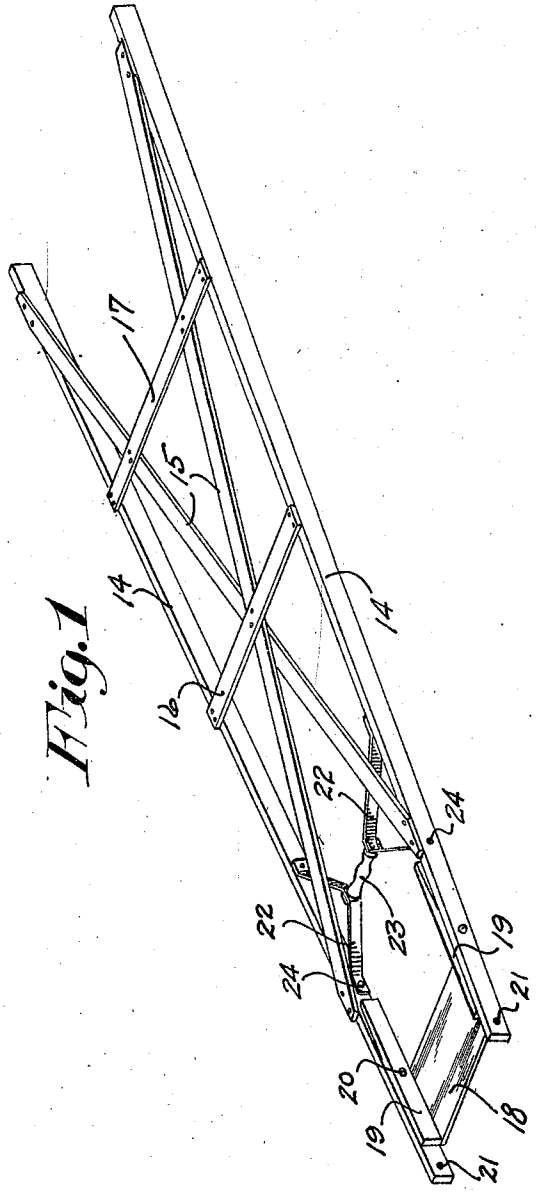


Fig. 1

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Fig. 3

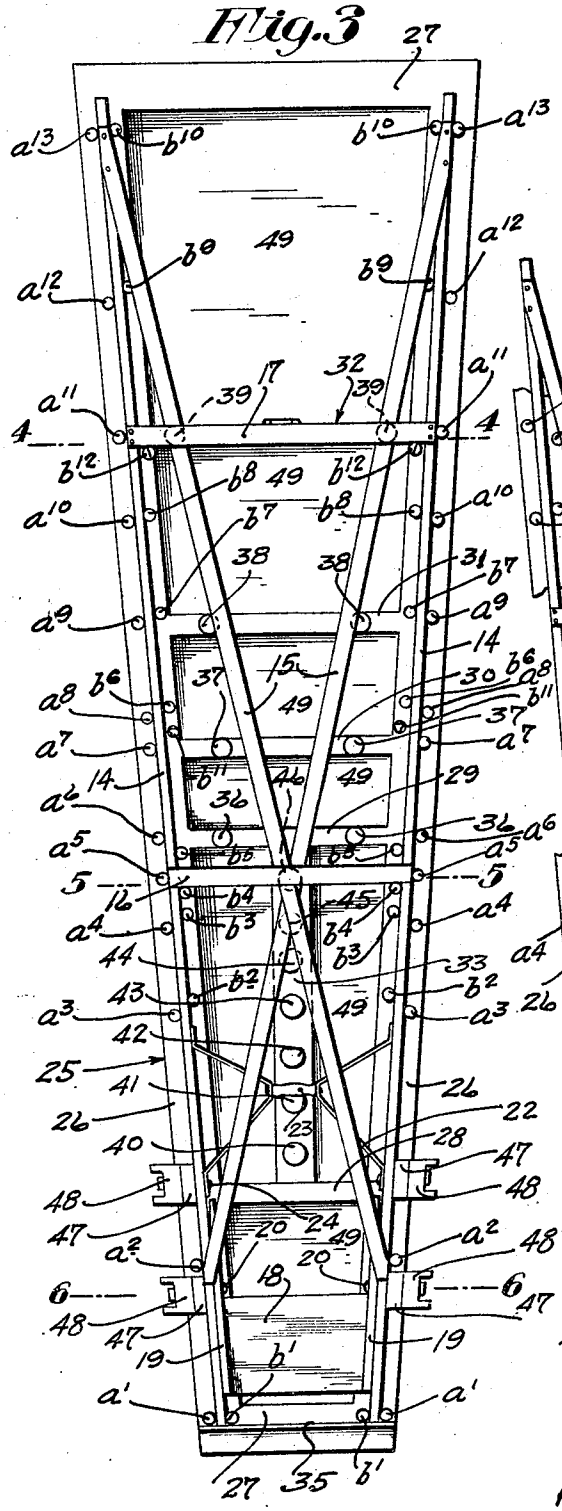
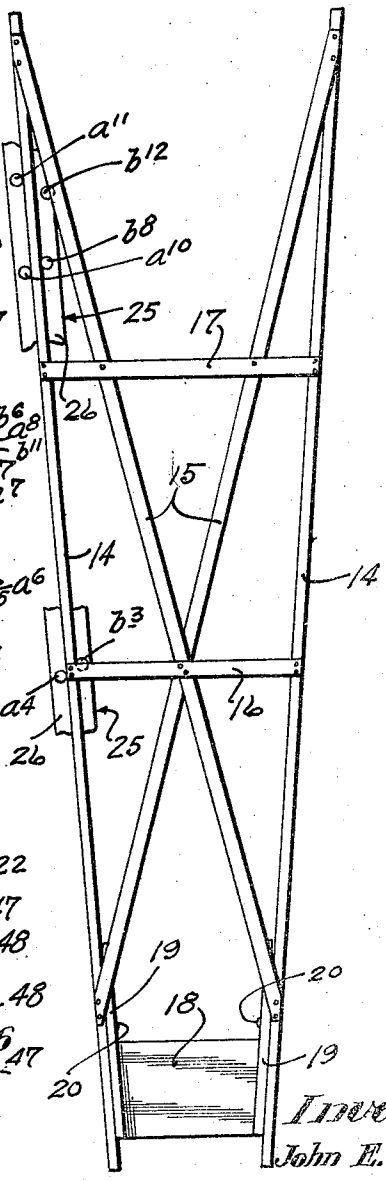


Fig. 8



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STEPLADDER SUPPORT ASSEMBLING MACHINE

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Fig. 13

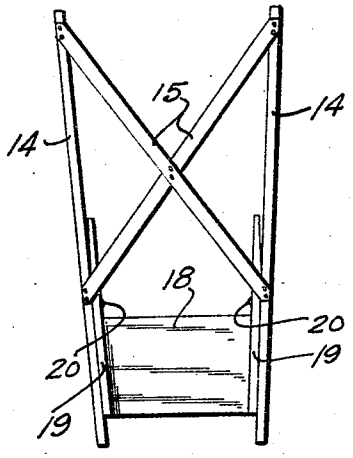



Fig. 7

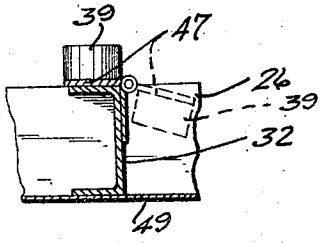



Fig. 4

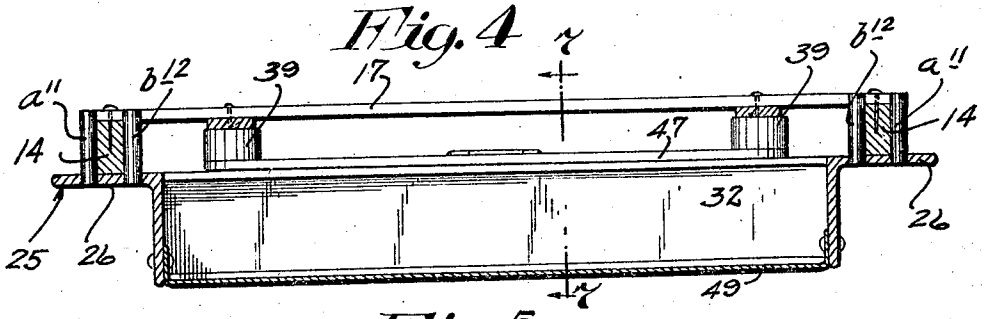



Fig. 5

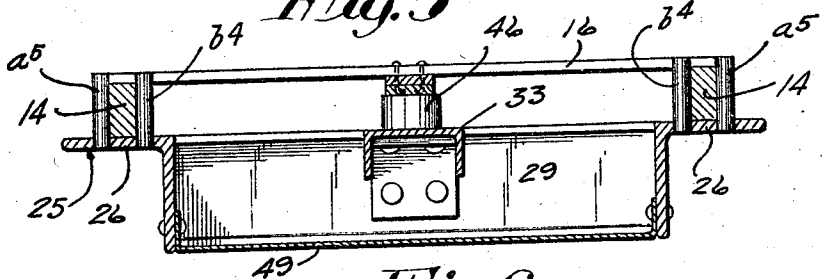
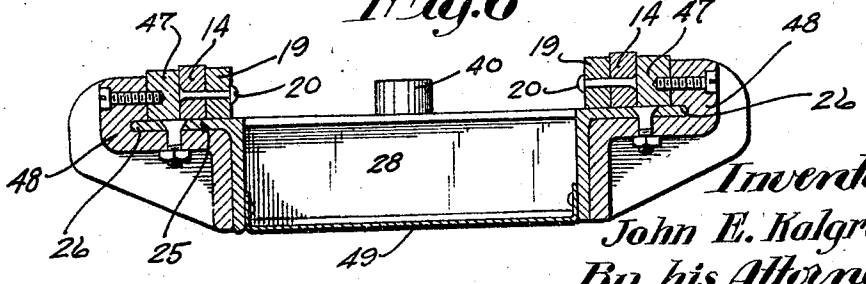



Fig. 6




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Fig. 12

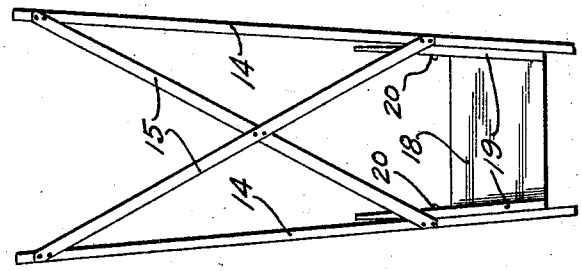



Fig. 11

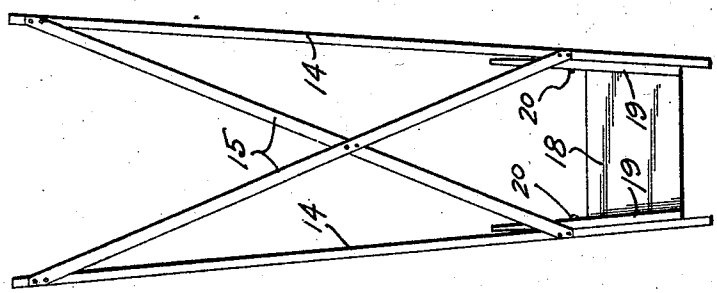



Fig. 10

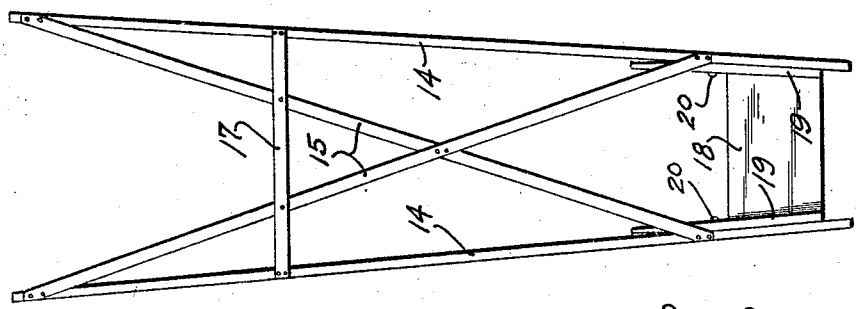
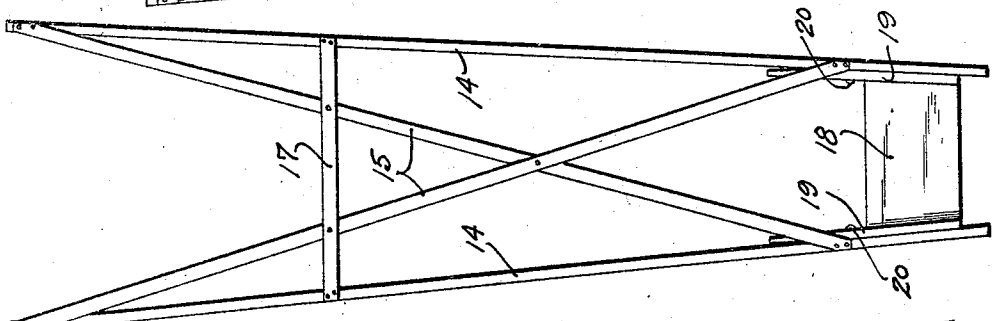



Fig. 9




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Patented Nov. 1, 1927. 1,647,365

# UNITED STATES PATENT OFFICE.

JOHN E. KALGREN, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO J. R. CLARK COMPANY, OF MINNEAPOLIS, MINNESOTA, A CORPORATION OF MINNESOTA.

## STEPLADDER-SUPPORT-ASSEMBLING MACHINE.

Application filed March 4, 1927. Serial No. 172,734.

My present invention has for its object to provide an extremely simple and highly efficient machine for use in assembling step ladder supports for step ladders proper and securely holding the same while the parts thereof are connected. Said machine is especially designed for use in conjunction with my step ladder assembling machine described and broadly claimed in my copending application filed Feb. 16, 1927, under Serial Number 168,662.

Generally stated, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

In the accompanying drawings, which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a perspective view of a step ladder support;

Fig. 2 is a perspective view of the improved step ladder support assembling machine with the parts of the step ladder support shown in Fig. 1 assembled therein;

Fig. 3 is a plan view of the parts shown in Fig. 2;

Fig. 4 is a transverse vertical section taken on the line 4—4 of Fig. 3, on an enlarged scale;

Fig. 5 is a transverse vertical section taken on the line 5—5 of Fig. 3, on an enlarged scale;

Fig. 6 is a transverse vertical section taken on the line 6—6 of Fig. 3, on an enlarged scale;

Fig. 7 is a detail view in transverse vertical section taken on the line 7—7 of Fig. 4, on an enlarged scale, with the anvil shown in an inoperative position by means of broken lines; and

Figs. 8, 9, 10, 11, 12, and 13 are plan views of the step ladder supports for different sized step ladders, all of which have been assembled in the machine.

In the drawings there are shown several step ladder supports of different lengths, all of which have been assembled in the improved machine without changing the adjustment thereof. In the trade, step ladders are referred to by the length thereof and for convenience, the step ladder supports shown in Figs. 1, 2 and 3 will hereinafter be referred to as the ten foot ladder support, which is the longest that can be assembled in the machine shown, and the ladder supports shown in Figs. 8, 9, 10, 11, 12 and 13 will hereinafter be referred to as the eight, seven, six, five, four and three foot ladder supports.

Each ladder support shown comprises two laterally spaced standards 14 in converging relation and a pair of crossed-brace bars 15, the end portions of which bear on the outer edges of said supports and are nailed thereto. The outer edges of the bars 15, at their end portions, are beveled flush with the outer faces of the standards 14. It is important to note that the two standards 14 of each support have the same convergence, and that the transverse width between the upper or converging ends of said standards are all the same.

It will also be noted that the upper ends of the crossed-brace bars 15 are all the same distance from the upper ends of the standards 14. In addition to the bars 15, the eight and ten foot ladder supports have upper and lower transverse tiebars 16 and 17, respectively, which overlie the bars 15 and are nailed thereto, as well as the standards 14 on which they rest. The upper transverse tiebars 16 intersect the crossed-brace bars 15 at their points of intersection. In the six and seven foot ladder supports, the upper transverse tiebars 16 are dispensed with and the three, four and five foot ladder supports do not have any transverse tiebars.

Each ladder support is provided with a pail shelf 18 having a pair of supporting arms 19 which project rearward therefrom and are intermediately pivoted by rivets 20 to the standards 14. Said supporting arms 19 have the same convergence as the standards 14 to which they are pivoted, closely fit therebetween, and together with the pail shelf 18 are adapted to fold between said standards. The pail supports 18 and their arms 19 are all of the same size, irrespective of the ladder supports to which they are attached. When in use, the pail support 18 is turned horizontally outward of the ladder support and the free ends of their supporting arms 19 engage the under surface of the next to the top step of the ladder proper as an abutment, and thus hold the pail support 18 in a horizontal position.

Holes 21 are bored in the standards 14 near the upper ends thereof to receive rivets for attaching the same to knees, not shown,

rigidly secured to step ladders proper, as shown in the above identified copending application. To limit the spreading movement of a step ladder proper and its support they are connected by a pair of toggle levers 22 which in turn are connected at their intermediate pivots by a transverse handle 23. The same arms of the toggle levers 22 are secured by rivets 24 to the standards 14 and the other arms thereof are to be attached to the step ladder proper. The toggle levers 22 are adapted to fold between the standards 14 below the supporting arms 19 when assembling a ladder support, as best shown in Fig. 1.

It may be here stated that the thickness of the stock from which the standards 14 are formed is all the same, irrespective of the length of the standards, and that the width of said stock is all the same, with the exception of that of the ten foot ladder support which is a little wider in order to give the same the required strength.

Referring now in detail to the improved step ladder support assembling machine, the numeral 25 indicates a bed comprising a pair of converging side members 26, and a pair of parallel end members 27 rigidly connecting said side members. These members 26 and 27 are formed from commercial angle bars, the horizontal flanges of which are turned outward and the vertical flanges of which are turned downward. Said bed 25 further includes transverse members 28, 29, 30, 31 and 32, which extend between the side members 26 and are rigidly secured thereto. Each of said transverse members is in the form of a channel bar, the web of which is in a vertical position and the upper surface of its top flange is flush with the upper surfaces of the side member 26.

Between the transverse members 28 and 29 is a central longitudinal member 33 in the form of a channel bar rigidly secured to said transverse members 28 and 29, with the upper surface of its web flush with the upper surfaces of said transverse members. The bed 25 is supported on legs 34 rigidly secured thereto and suitably braced. The upper surfaces of the members 26 and 27, and the transverse members 28 to 32, inclusive, as well as the central member 33 are all in the same plane and afford a true flat working surface for the assembly of step ladder supports thereon.

At the narrow end of the bed 25 and projecting thereabove is a transverse abutment 35 in the form of an angle bar, the horizontal flange of which is turned outward, rests on the respective end member 27 and is rigidly secured thereto. All the standards 14, irrespective of their length, are endwise positioned by the abutment 35.

Mounted on each transverse member 29, 30, 31, and 32 of the bed 25 is a pair of laterally spaced anvils 36, 37, 38 and 39, respectively, and mounted on the central member 33 are longitudinally spaced anvils 40 to 46, inclusive. The pair of anvils 39 are mounted on a bar 47 which rests on the top of the transverse member 32 and is hinged thereto for movement between the side members 26 and below the top of the bed 25, as shown by broken lines in Fig. 7.

Secured to the side members 26 of the bed 25 are two diverging outer rows of longitudinally spaced upstanding pins $a^1$ to $a^{13}$, inclusive, and also secured to said side members are two diverging inner rows of longitudinally spaced pins $b^1$ to $b^{10}$, inclusive. There is further secured to the side members 26 between the pins $b^5$ and $b^6$ of each inner row, a pin $b^{11}$ and between the pins $b^8$ and $b^9$, a pin $b^{12}$.

These pins $b^{11}$ and $b^{12}$ are slightly offset inward from the inner rows of the pins $b^1$ to $b^{10}$, inclusive. The pins $a^1$ to $a^{13}$, inclusive, and $b^1$ to $b^{10}$ of each double row are parallel and laterally spaced to receive and hold therebetween one of the standards 14 with its upper end in engagement with the abutment 35 to endwise position said standard. Obviously, these two double rows of pins hold the standards of the ladder support assembled in proper laterally spaced and converging relation.

Before the parts of a ladder support are assembled in the improved machine, they are all cut and finished to the proper size, and the holes 21, together with the holes for the rivets 20 and 24 are bored in the standards 14.

In addition to the positioning of the standards 14 on the bed 25, the pins $a^2$ to $a^{10}$, inclusive, and the pins $b^2$ to $b^{10}$, inclusive, perform other important functions, as will presently appear.

In assembling a step ladder support, the standards therefore are first laid between the double rows of pins with their upper ends in engagement with the abutment 35. Next, a pair of the brace bars 15 are laid on the standards 14 in crossed relation, as shown in Fig. 1. To endwise position the crossed-brace bars 15, the tapered lower ends thereof for a three foot ladder are inserted between co-operating pairs of pins $a^3$ and $b^2$; for a four foot ladder, between the co-operating pairs of pins $a^4$ and $b^3$; for a five foot ladder, between the co-operating pairs of pins $a^5$ and $b^6$; for a six foot ladder, between the co-operating pairs of pins $a^9$ and $b^7$; for a seven foot ladder, between the co-operating pairs of pins $a^{10}$ and $b^8$; for an eight foot ladder, between the co-operating pairs of pins $a^{12}$ and $b^9$; and for a ten foot ladder, between the co-operating pairs of pins $a^{13}$ and $b^{10}$.

It will be noted that the outer pins of these co-operating pairs for endwise posi-

tioning the crossed-brace bars 15 are set slightly nearer the abutment 35 than the inner co-operating pins, to permit the tapered lower end portions of said bars to be inserted therebetween, as best shown in Fig. 1. These co-operating pairs of pins are so spaced from the abutment 35 that the upper ends of the crossed-brace bars 15, irrespective of their length, terminate the same distance from said abutment. The pins $a^2$ afford abutments to be engaged by the upper end portions of the crossed-brace bars 15 to properly position the same on the standards 14. The anvils 40 to 46, inclusive, underlie the crossed-brace bars 15 for the three, four, five, six, seven, eight, nine and ten foot ladders, at their points of intersection, to afford supports for said bars at the time they are being connected by nails, and to clinch said nails when they are being driven through the crossed-brace bars 15. By reference to Fig. 3 it will be noted that the crossed-brace bars 15 have their point of intersection directly over the anvil 46.

The co-operating pairs of pins $a^4$ and $b^3$ afford abutments for positioning the transverse tiebars 16 of an eight foot ladder on the standards 14 and directly over the anvil 46. In the eight and ten foot ladders, the crossed-brace bars 15 are not connected at their points of intersection until the transverse bars 16 have been positioned therein and then all of said bars are connected by nails, and the nails clinched by the underlying anvils 45 and 46, respectively.

The co-operating pairs of pins $a^6$ and $b^5$ afford abutments for positioning the transverse tiebars 17 on the standards 14 for a six foot ladder and directly over the anvils 36. The co-operating pairs of pins $a^7$ and $b^{11}$ afford abutments for positioning the transverse tiebar 17 for a seven foot ladder on the standards 14 thereof and directly over the anvils 37. For an eight foot ladder, the co-operating pairs of pins $a^9$ and $b^7$ afford abutments for positioning the transverse tiebar 17 on the standards 14 thereof and directly over the anvils 38. The co-operating pairs of pins $a^{11}$ and $b^{12}$ afford abutments for positioning the transverse tiebar 17 on the standards 14 of a ten foot ladder and directly over the anvils 39.

The transverse tiebars 17 for six, seven, eight and ten foot ladders intersect the crossed-brace bars 15 thereof directly over the anvils 36, 37, 38 and 39, and said bars, at their points of intersection, are connected by nails which are clinched by the respective anvils. It will be noted that the pins $b^3$ have their faces notched at their upper ends to receive the transverse tiebar 17 for an eight foot ladder, to properly edgewise position the same on the standards 14.

By reference to Fig. 3 it will be noted that the pins $b^{11}$ and $b^{12}$ are notched to afford clearances for the crossed-brace bars 15 for the five and eight foot ladders. The pins $a^{11}$ and $b^{12}$ and $a^{13}$ and $b^{10}$ are slightly higher than the other pins in order to afford abutments for the crossed-brace bars 15 and the transverse tiebar 17 of a ten foot ladder, for the reason that the stock in the standards 14 therefore is slightly wider than that used in the standards for the other ladders.

When assembling a support for an eight foot ladder, the anvils 39 are turned into inoperative positions to afford clearance for the crossed-brace bars 15 thereof. To afford supports for the standards 14 at the time the arms 19 and toggle levers 22 are being secured thereto, and to upset the rivets 20 and 24 by which they are attached to said standards, there is secured to each side bar 26, by brackets 47, a pair of longitudinally spaced anvils 48 arranged to be engaged by the outer faces of the standards 14.

The bed 25 is provided with a bottom plate 49 and the transverse members 28 to 32, inclusive, divide said bed into a plurality of compartments in which may be kept nails, rivets, tools and other objects.

From the above description, it is evident that step ladder supports for step ladders of various lengths may be very quickly and accurately assembled and thus held while the parts thereof are connected. It is evident that no adjustments of the machine are required to perform the various different functions for which it is designed. The above described invention has, in actual usage, proven highly efficient for the purpose had in view.

What I claim is:

1. A step ladder support assembling machine comprising a bed having devices for positioning a pair of standards in diverging relation, and a stop for endwise positioning said standards with their converging ends in predetermined laterally spaced relation irrespective of their length, certain of said devices being arranged to afford abutments to endwise and edgewise position the upper ends of a pair of crossed-brace bars on said standards for attachment thereto a predetermined distance from the stop irrespective of the length of the crossed-brace bars.

2. The structure defined in claim 1 in which certain other of said devices are arranged to afford abutments to edgewise position the lower ends of said crossed-brace bars on the standards.

3. A step ladder support assembling machine comprising a bed having devices for laterally and endwise positioning a pair of standards, and a pair of side anvils at the outer faces of said standards to offset rivets used in attaching members to the standards.

4. A step ladder support assembling ma-

chine comprising a bed having two diverging double rows of pins, the pins of each row being laterally spaced to hold a standard positioned therebetween, a stop for the converging ends of the standards for endwise positioning the same, certain of the pins in said rows being arranged in laterally and longitudinally spaced pairs to afford abutments between which the upper ends of a pair of crossed-brace bars may be inserted to endwise position said bars on the standards for attachment thereto, certain other of said pins being arranged to afford abutments to edgewise position the lower ends of the crossed-brace bars on the standards for attachment thereto, and a plurality of longitudinally spaced anvils over which crossed-brace bars of different lengths extend at their intersections.

5. The structure defined in claim 4 in which certain other of said pins are arranged to afford transversely and longitudinally selective pairs of abutments for edgewise and endwise positioning transverse tiebars of different lengths on the standards for attachment thereto.

6. The structure defined in claim 4 in which certain other of said pins are arranged to afford transversely and longitudinally selective pairs of abutments for edgewise and endwise positioning transverse tiebars of different lengths on the standards for attachment thereto, and longitudinally and transversely spaced pairs of anvils over which crossed-brace bars and transverse bars of different lengths extend at their intersections.

In testimony whereof I affix my signature.

JOHN E. KALGREN.