

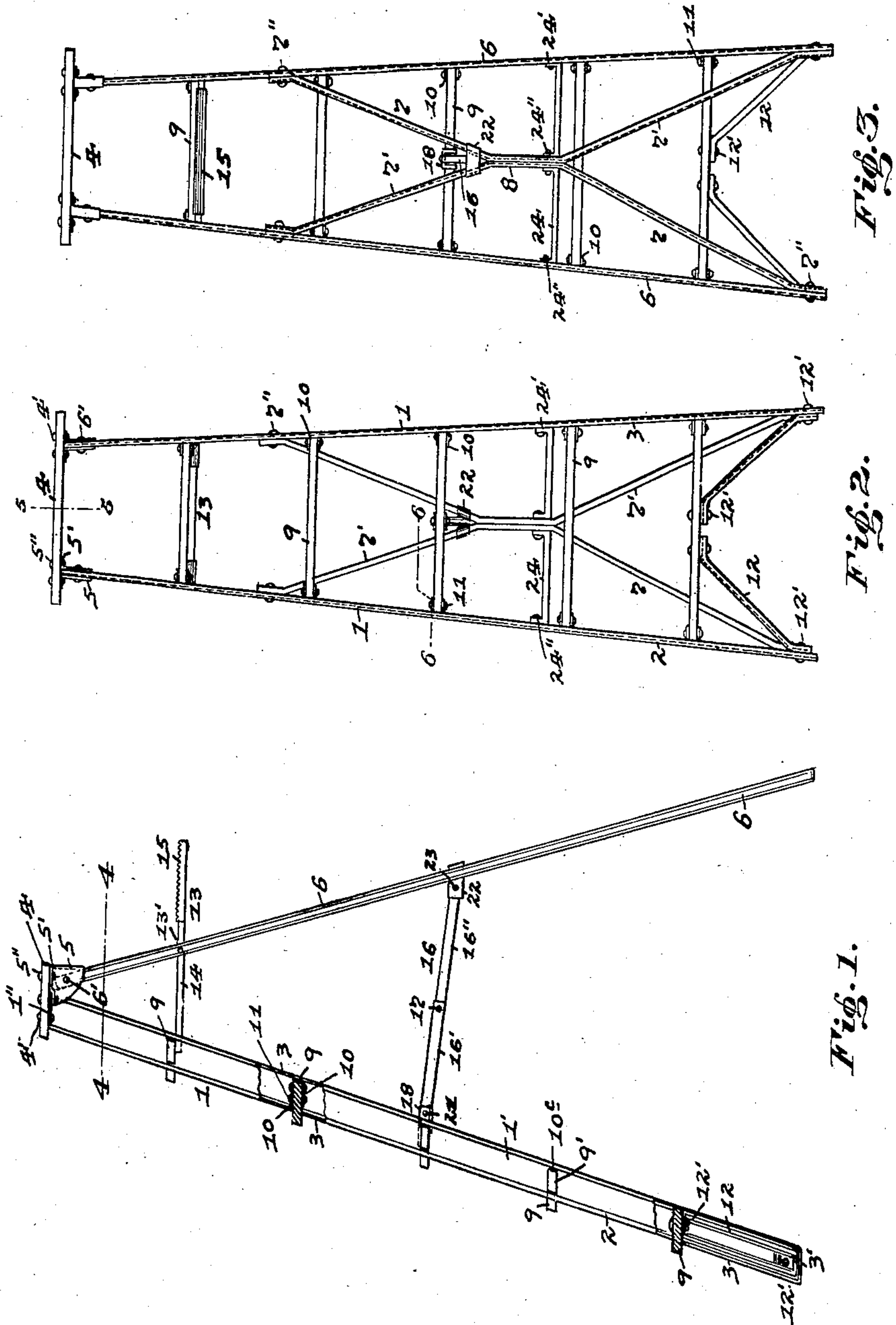
No. 884,120.

PATENTED APR. 7, 1908.

H. ADLER.
LADDER.

APPLICATION FILED AUG. 12, 1905.

2 SHEETS—SHEET 1.



WITNESSES

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INVENTOR

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2 SHEETS—SHEET 2.

Fig. 4.

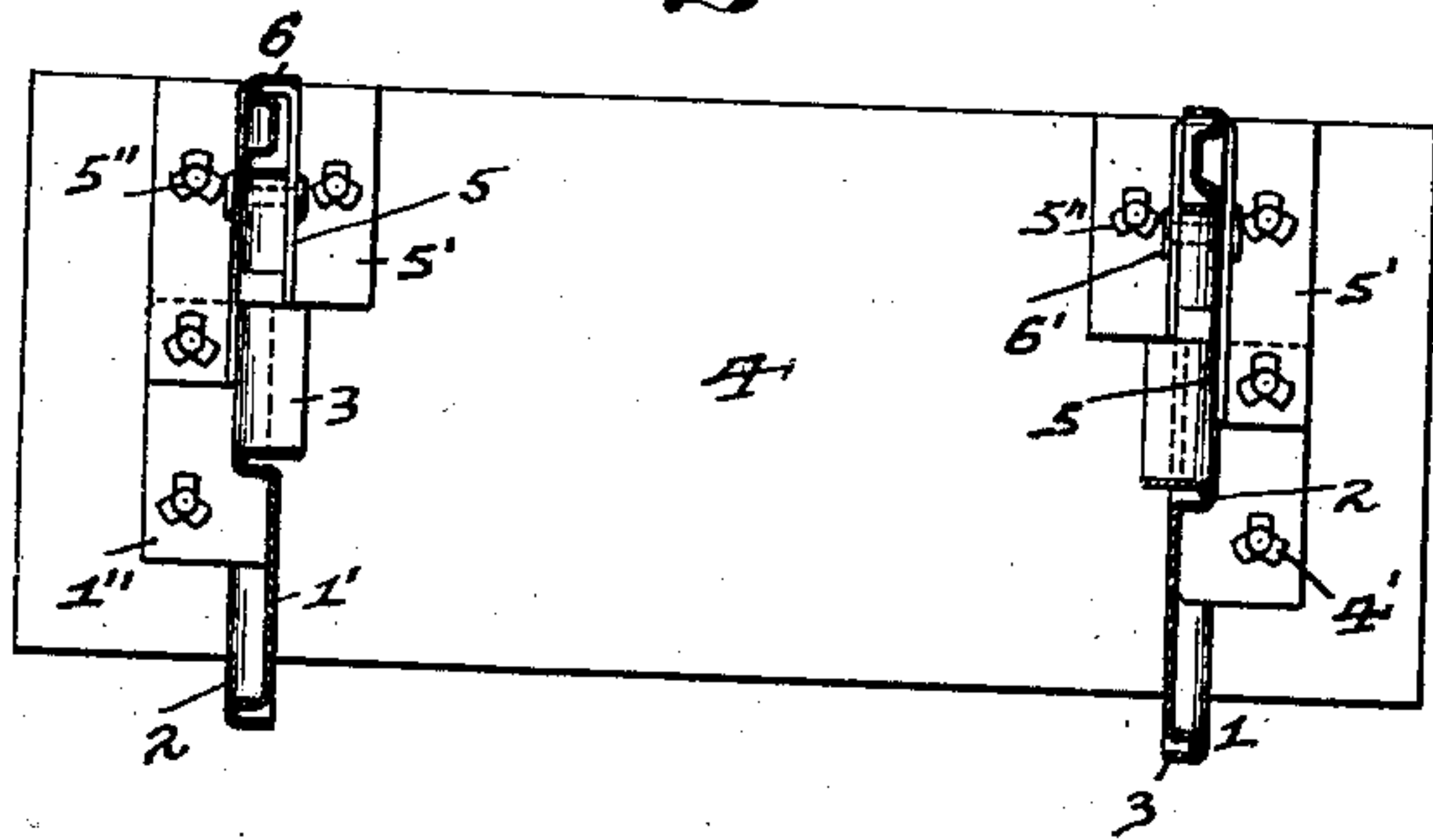


Fig. 5.

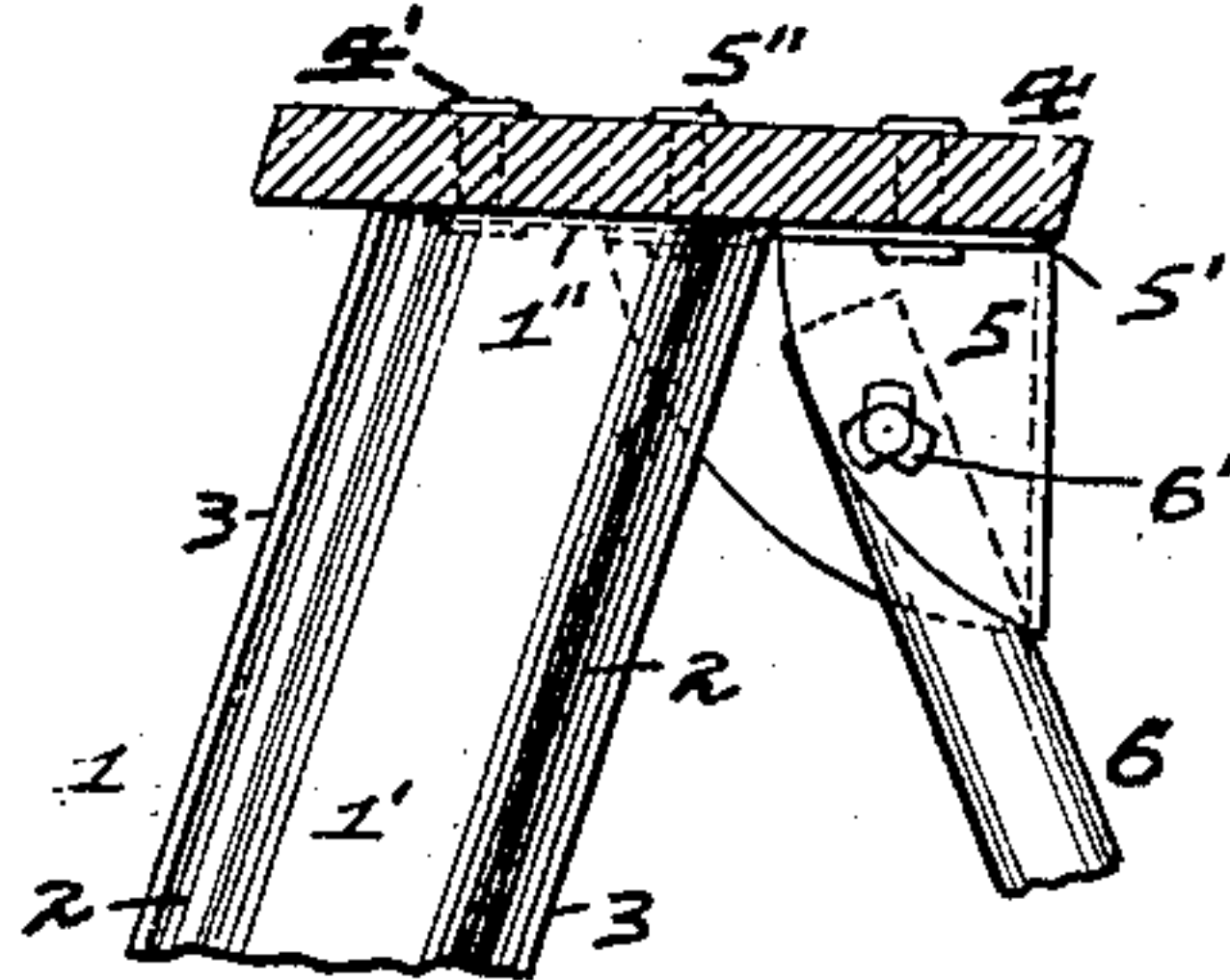


Fig. 6.

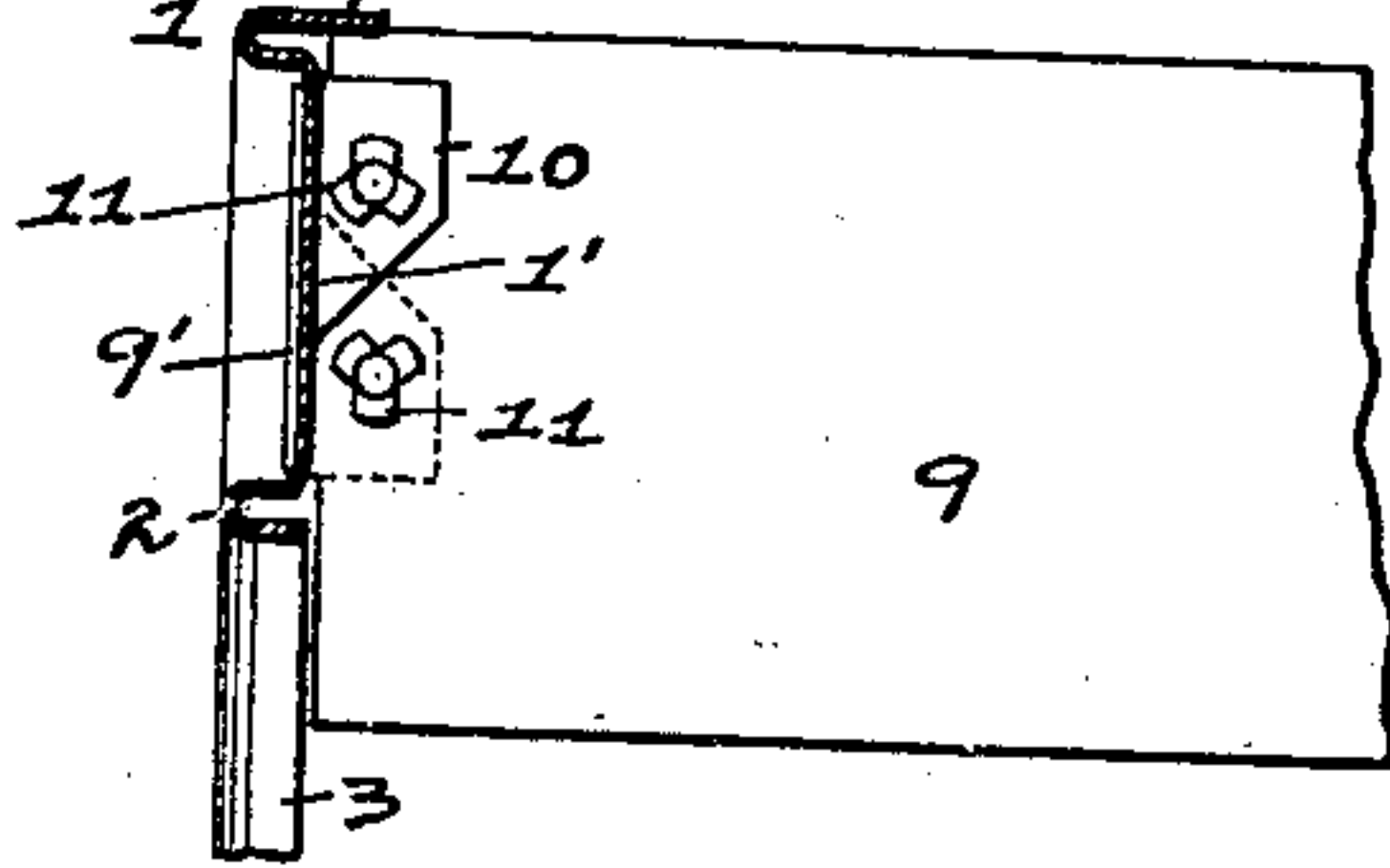


Fig. 8.

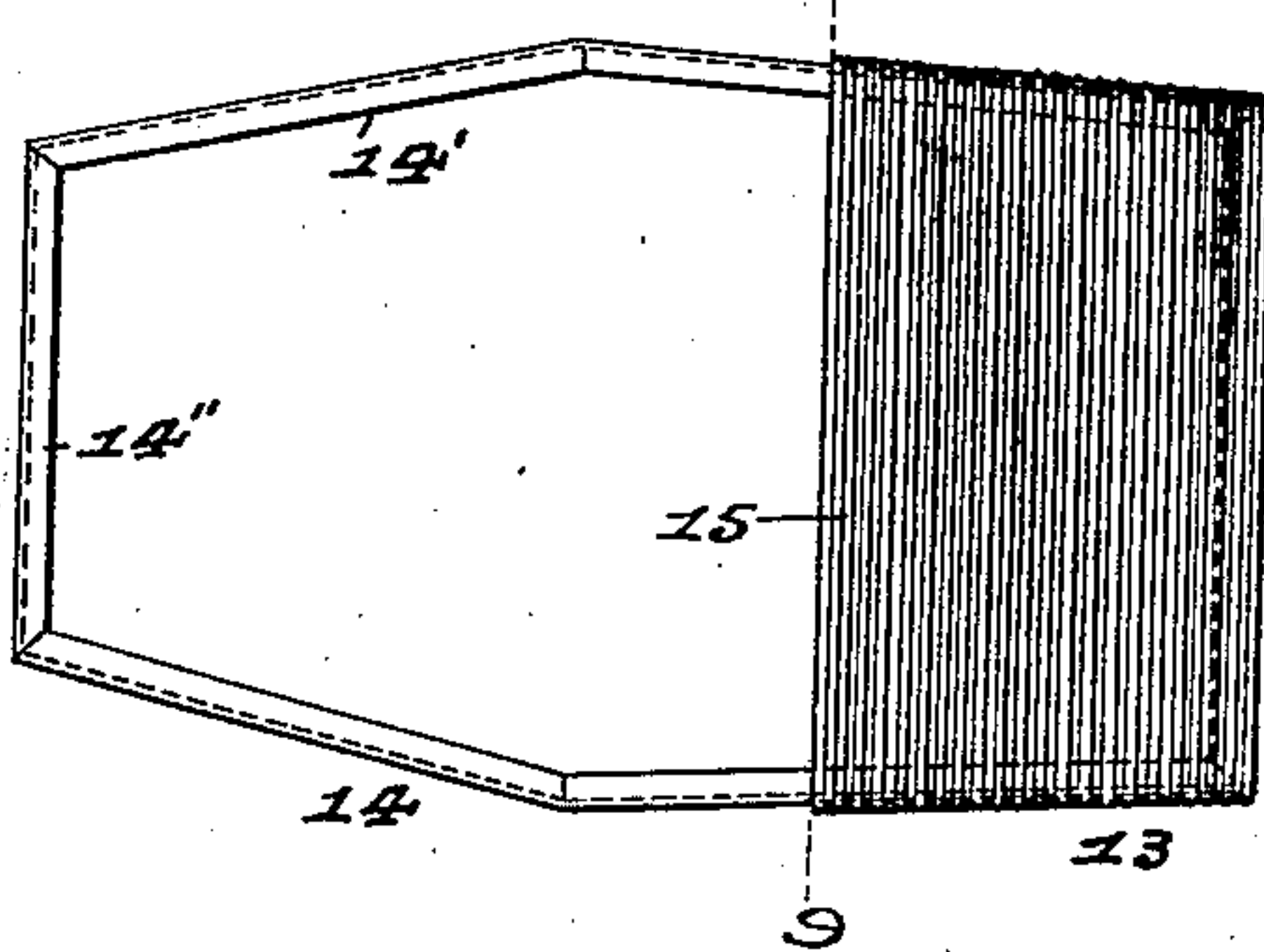


Fig. 7.

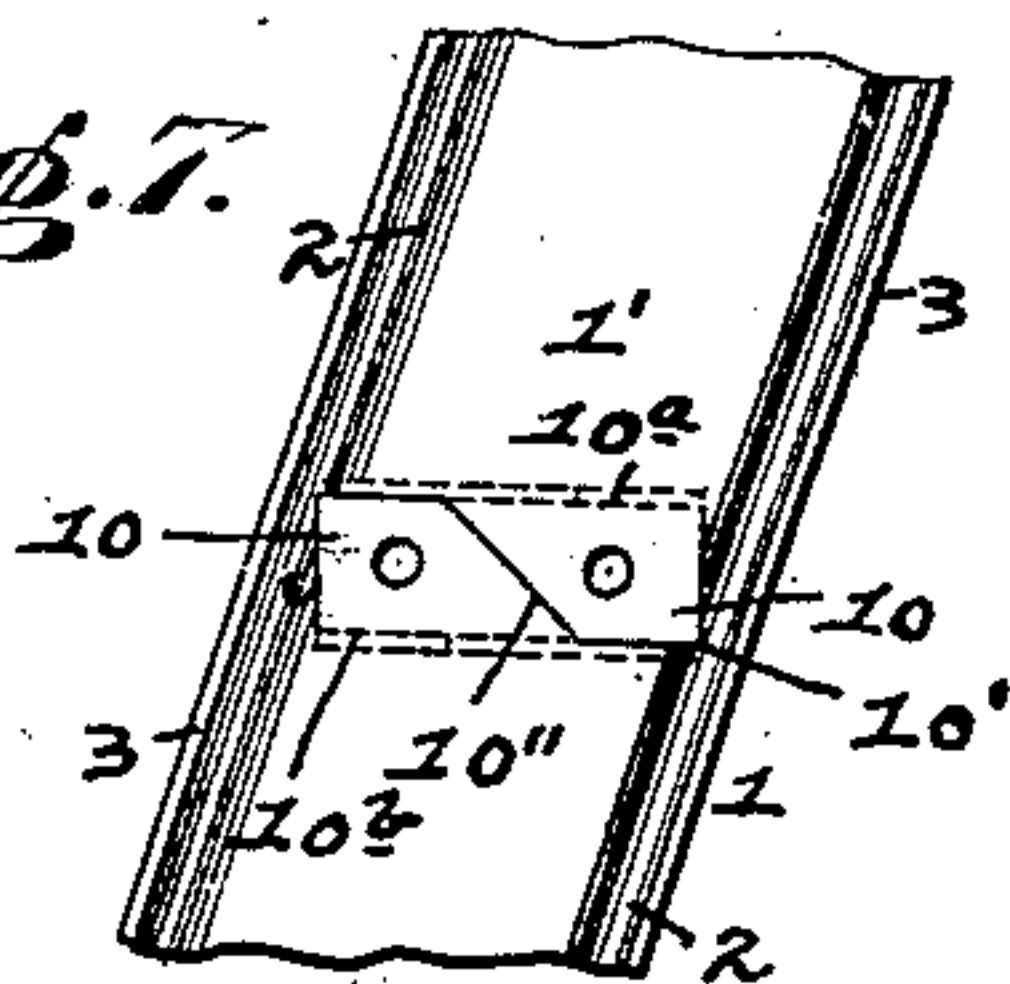


Fig. 9.

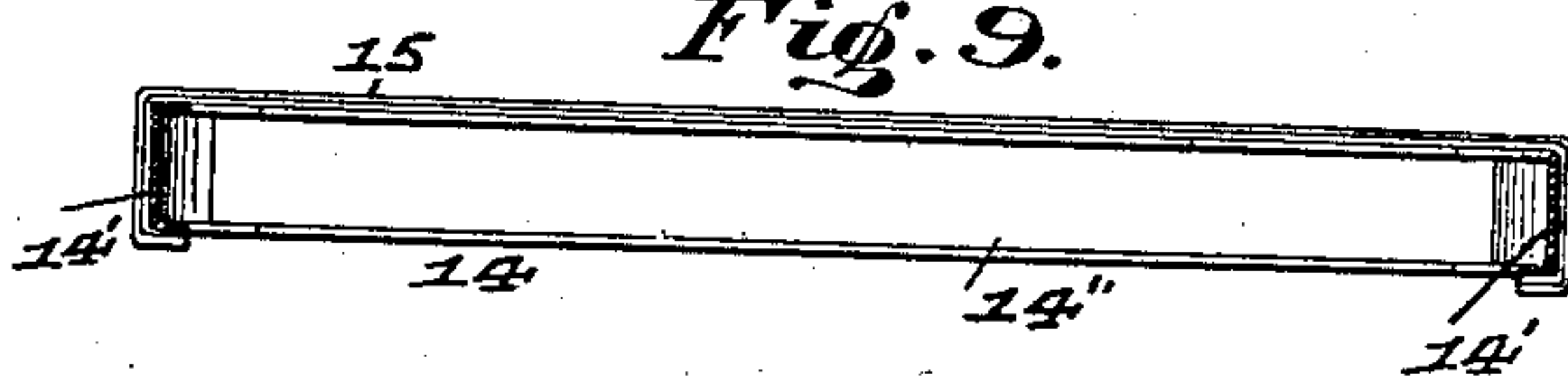


Fig. 13.

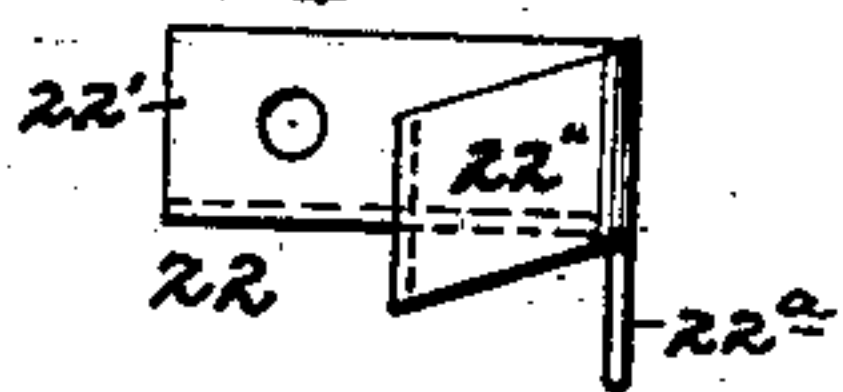


Fig. 12.

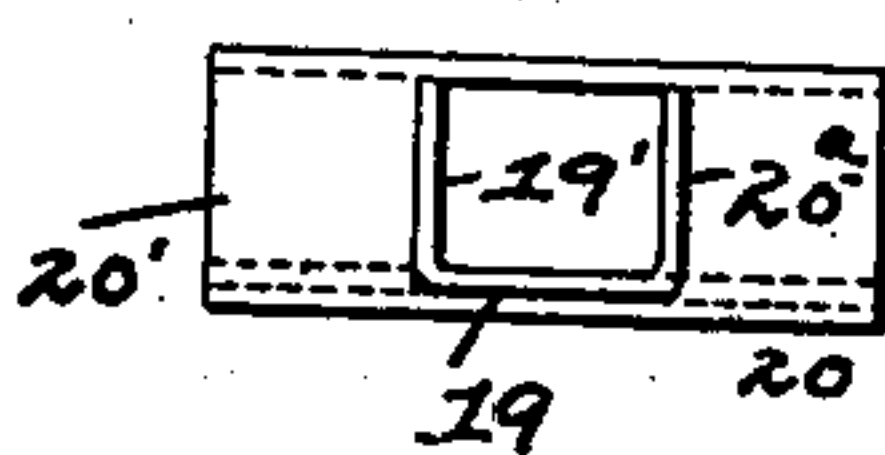


Fig. 11.

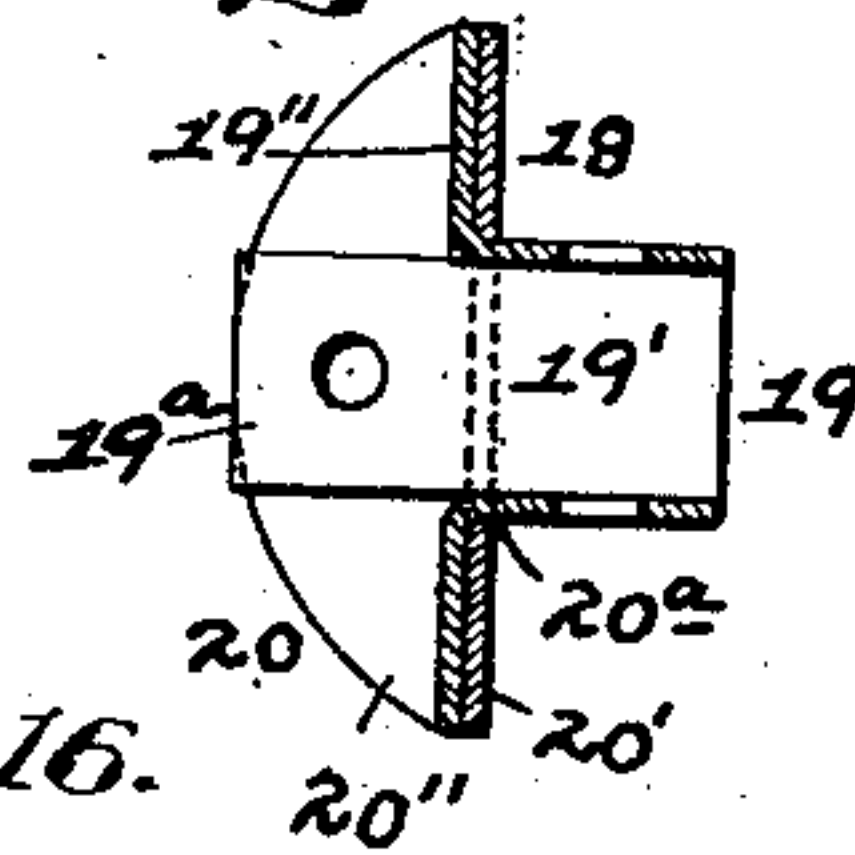


Fig. 15.

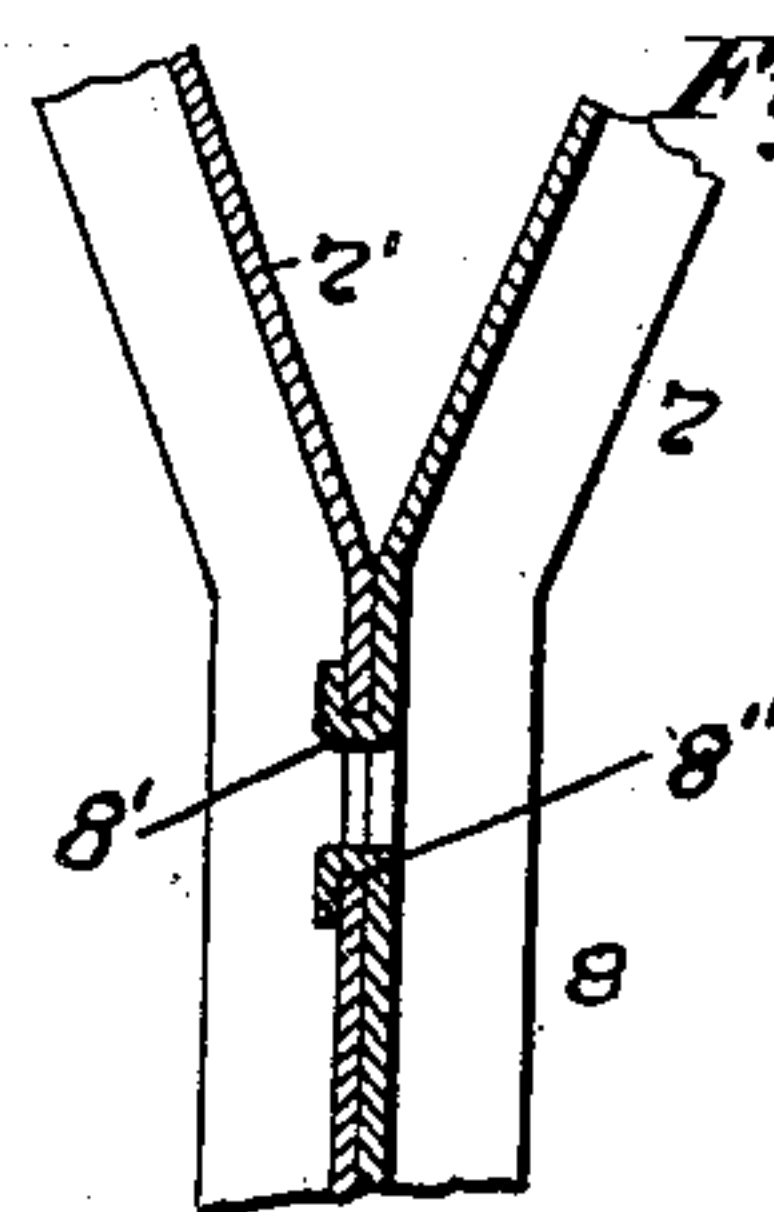


Fig. 14.

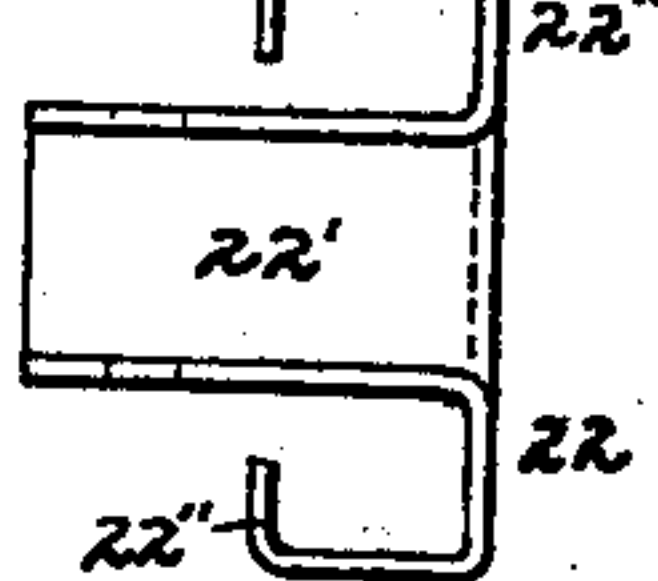
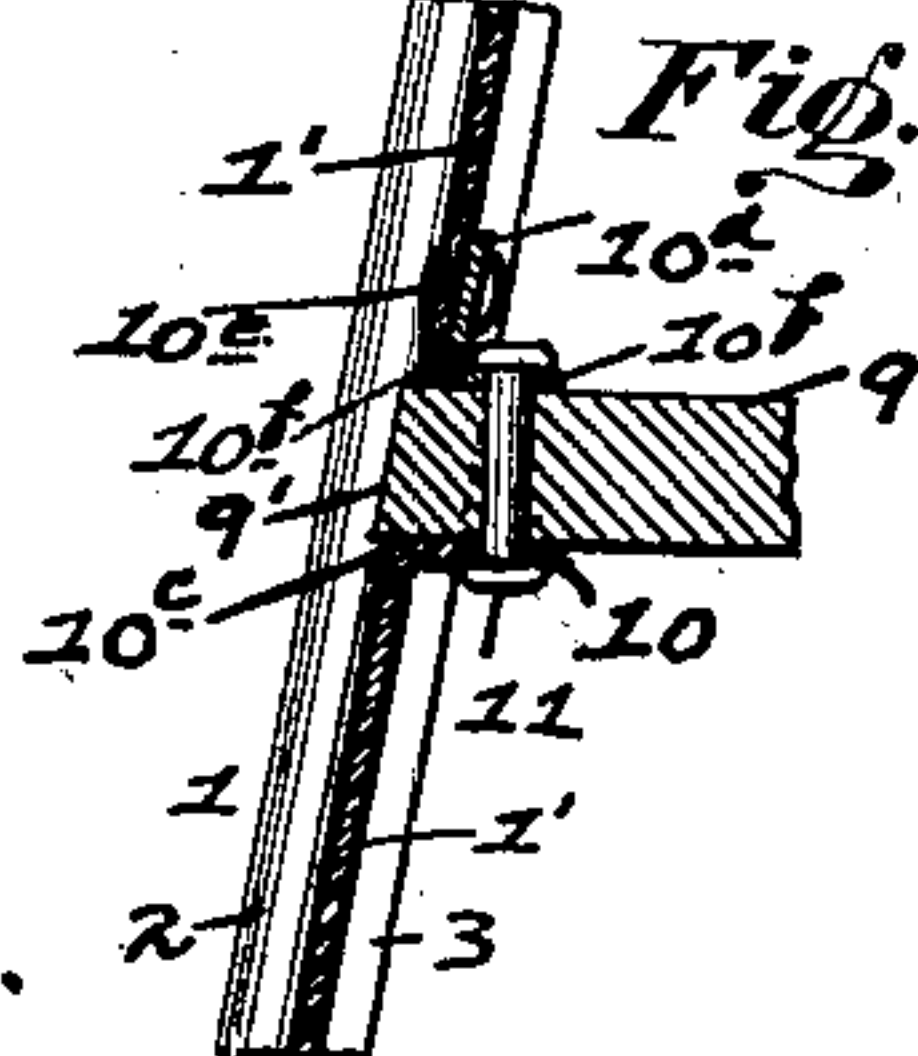


Fig. 16.



WITNESSES

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UNITED STATES PATENT OFFICE.

HENRY ADLER, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO H. ADLER COMPANY, OF CARNEGIE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

LADDER.

No. 884,120.

Specification of Letters Patent.

Patented April 7, 1908.

Application filed August 12, 1905. Serial No. 273,872.

To all whom it may concern:

Be it known that I, HENRY ADLER, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Ladders; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to ladders and has special reference to that class commonly known as step-ladders.

The object of my invention is to form a ladder almost entirely from sheet metal which will make the same, light, strong and durable and will greatly cheapen the cost of manufacture of the same, while at the same time rendering the same less liable of injuring a person by breakage of the parts or their becoming loose, and also rendering the same capable of easy handling and in folding when out of operation as in the ordinary step-ladders.

My invention consists, generally stated, in the novel arrangement, construction and combination of parts, as hereinafter more specifically set forth and described and particularly pointed out in the claims.

To enable others skilled in the art to which my invention appertains to construct and use my improved ladder, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a side view of my improved ladder showing the same open and ready for use. Fig. 2 is a front view of the ladder. Fig. 3 is a rear view of the same. Fig. 4 is an enlarged cross-section of the ladder on the line 4—4 Fig. 1 and looking toward the bottom of the platform. Fig. 5 is a cross-section of such platform on the line 5—5 Fig. 2. Fig. 6 is an enlarged detail section showing the connection between the standard and step on the line 6—6 Fig. 2. Fig. 7 is an enlarged side view of a portion of one of the standards showing the manner of forming the step-supports. Fig. 8 is a plan view of the shelf for the ladder. Fig. 9 is an enlarged cross-section of the same on the line 9—9 Fig. 8. Figs. 10, 11 and 12 are detail sectional views of the connection for the leg-support on one of the steps. Figs. 13 and 14 are detail views of the leg-support connection for use on the legs. Fig. 15 is a detail section of the bracing-bars. Fig. 16 is a view showing another manner of supporting the step on the standards.

Like symbols of reference herein indicate

like parts in each of the figures of the drawings.

As illustrated in said drawings 1 designates the sides or standards which are formed or stamped from a piece of thin sheet metal and have each of their side and bottom edges bent outwardly from the body 1' of said standards to form the rounded or semi-circular portions 2 and the side and bottom flanges 3 and 3' respectively, and such bottom portions 2 and bottom flanges 3' being rounded as at 2' and 2'' where they join with the side portions 2 and flanges 3. The upper edge of the body 1' of said standards 1 is bent outwardly and at right angles to said body to form the flanges 1'' on which is supported the upper step or platform 4 which is preferably formed of wood and is secured to said flanges 1'' by the rivets 4' which pass through holes formed in said flanges and platform and are clenched at their ends against the same. U shaped clamping-pieces 5, formed or stamped from a piece of thin sheet metal are secured at each end of the platform 4 by means of rivets 5'' which pass through holes formed in said platform and through holes formed in flanges 5' extending out on each side of the upper edges of said clamping-pieces and are clenched at their ends against the same, while the innermost rivets 5'' also pass through holes formed in the flanges 1'' on the standards 1 and held between said platform and the ends of said flanges 5'. Pivoted to the sides of each of the clamping-pieces 5 by means of rivet 6' are the rear supporting standards or legs 6 which are formed or stamped from a piece of thin sheet metal into a channel shape like the standards 1 and such rivet passes through holes formed in the sides of said legs and through holes formed in the sides of said clamping-pieces and is clenched at its ends against each side of the same.

Extending diagonally inwardly as at 7' from the upper and lower portions of the legs 6, are the bracing-bars 7 which are formed or stamped from a piece of thin sheet metal into a channel shape and are connected at their ends to the inner side of the said legs by means of the rivets 7'' passing through holes formed therein and clenched at their ends against the same, while their middle portions are formed in a vertical plane as at 8 and are connected together by flanges 8' on one passing through holes 8'' in the other and clenched at their ends against the same.

The edges of the bars 7 fit at their ends within the grooves on sides of the legs 6 and are thus secured by said rivets 7". The steps 9 extend between the standards 1 and are preferably formed of wood, such steps being supported by and secured to said standards through the medium of flanges 10 which are cut or stamped out of the body 1' of said standards and bent inwardly at right angles to said body. These flanges 10 are formed of the shape shown in Figs. 6 and 7 and each standard 1 is preferably provided with two of such flanges, each being formed by severing the metal of the body 1' of said standards on each side by a right angle cut, as shown at 10' and by a diagonal center cut 10" which connects with the ends of said right angle cuts. After this is done the metal is then bent inwardly on the lines 10^a and 10^b to form the upper and lower flanges 10 respectively as well as the opening 10^c in the body 1' of said standards which is formed in said body by the bending out of said flanges. Between these flanges 10 the ends of the steps 9 are inserted, so that rivets 11 can be secured through holes formed in said flanges and steps and clenched at their ends against the same. The projecting end portions 9' on said steps will fit within the openings 10^c in the standards 1 and will bear directly on and be supported by the standard body 1'. Braces 12 formed from a piece of thin sheet metal into channel shape to brace the lower ends of the standards 1 are connected to the body 1' of said standards and to the lower face of the bottom step 9 by means of rivets 12' which pass through holes formed in said braces and through holes formed in said steps and body, respectively, and are clenched at their ends against the same.

The shelf 13 for holding a bucket or other article or articles is formed or stamped from two pieces of thin sheet metal and consists of the frame 14 which is of channel shape in cross-section and bent to form its sides 14' tapering in both directions and ends 14". The shelf is pivoted to the legs 6 at the apex or joining point of said tapering sides 14' by a rivet 13' which passes through holes formed in said legs and sides and is clenched at its ends against the same. The outer end 14" is provided with the corrugated cover-plate 15 which is bent around the outer end and sides 14' of the frame 14 for holding the bucket or other article or articles thereon and the inner end 14" is adapted to engage with the under face of one of steps 9 for holding the shelf 13 in position.

Extending across and between the legs 6 and one of the steps 9 is the leg-support 16 which is composed of the two bars 16' and 16" formed from a piece of thin sheet metal in channel shape and their inner ends are pivoted together by means of a rivet 17

which passes through holes formed in said ends and clenched at its ends against the same, while the inner ends of the bar 16" fit within the inner end of the bar 16' in order to allow this pivoted joint to be raised and lowered in the closing and opening of the ladder. The bar 16' is secured to the step 9 by means of the clamping connection 18 which is composed of two pieces 19 and 20, formed from pieces of thin sheet metal, the piece 19 being bent to form the U-shaped body portion 19' having the flanges 19" extending out at right angles from the sides of the same and the extension 19^a projecting out from the end of said body portion and adjacent to said flanges. The piece 20 is of U-shape and is provided with an opening 20^a in its end 20' for fitting around the body 19' of the piece 19 and such end is adapted to fit against the flanges 19" on said piece 19, while the lower side 20" of the piece 20 fits under the extension 19^a on said piece 19. The outer end of the bar 16' is pivoted to the sides of the U-shaped body 19' on the clamping-piece 19 by means of the rivet 21 which passes through holes in the sides of said bar and body and its ends are clenched against the same, and such clamping connection 18 is secured to the step 19 by placing the side edge of said step between the sides 20" of the piece 20 and on top of the extension 19^a on the piece 19, and then a rivet 20^a is passed through holes in the extension 19^a of the piece 19 and sides 20" of the piece 20 and is clenched at its ends against the same. The bar 16" is secured to the legs 6 by means of the clamping-piece 22 which is formed of a single piece of thin sheet metal and is bent to form the U-shaped body portion 22' the flange 22" extending out from the sides of the same and the downwardly projecting flange 22^a. The outer end of the bar 16" is pivoted to the sides of the U-shaped body 22' by means of the rivet 23 which passes through holes in said sides and in the sides of said bar and its ends are clenched against the same, while such clamping-piece 22 fits between the upper diagonal portions 7' of the bracing-bars 7 so that the flanges 22' can be bent around the same to form U-shaped flanges and the projecting flange 22^a will fit against the vertical portions 8 of said bars to hold said piece in place.

If desired, in the case of large sized ladders where the spread of the legs 6 is greater than in the smaller sizes, bracing-rods 24 can be used between the said legs and bracing-bars 7 and these rods are formed from a single piece of thin sheet metal to channel form and have their ends bent at right angles, as at 24', so that they can be attached to said legs and bars respectively by the rivets 24" which pass through holes formed therein and are clenched at their ends against the same.

In Fig. 16 is shown another manner of sup-

porting the steps 9 on the standards 1, which consists in cutting and bending inwardly from the body 1' a single lower flange 10 for fitting under the steps 9 and then forming a
 5 separate angular flanged piece 10^d from a single piece of thin sheet metal which is bent to shape, so that it can be secured to the inner face of body 1' by rivets 10^e passing through holes in one of the sides 10^b of said
 10 piece and body, and having their ends clenched against the same. In this case the projecting end 9' on the steps 9 is inserted between the flange 10 and the side 10^b of said piece 10^d and within the opening 10^c in said
 15 body formed by cutting and bending out said flange 10, so that the rivets 11 can be secured to and through the step 9, flange 10 and side 10^b as before described. In both these constructions for supporting the steps 9 on the
 20 standards 1 the inner side edge of said steps will contact against the rear side flanges 3 on the rounded or semi-circular portions 2 of said standards which flanges are extended on such side and assist in supporting and hold-
 25 ing said steps in place.

The rivets used in attaching the ladder parts together are preferably hollow-rivets and are formed from thin sheet metal and bent to shape ready for use, thereby lessening greatly the weight of the ladder and enabling the same to be clenched more easily and with less force against the hollow parts so that they will hold the parts securely in place and not be liable to become loose.

35 If desired the steps and their supporting flanges can be braced or clamped by any suitable means to prevent any swaying of the ladder when a person is walking on or using the same, and various other modifications and changes in the design and construction of my improved ladder may be resorted to without departing from the spirit of the invention or sacrificing any of its advantages.

It will thus be evident that my improved
 45 ladder is of a cheap and simple construction and will be very efficient for its purposes and uses. It can be formed from black thin sheet metal and then its parts galvanized, so that all the spaces between the engaging faces of the parts can be filled up, thereby rendering
 50 the ladder steady and finished in appearance, while it will also be evident that corrugated sheet metal can be used for some or all of the parts in order to make said parts stronger
 55 and novel to the eye.

What I claim as my invention and desire to secure by Letters Patent is—

1. A ladder comprising sides or standards formed of sheet metal, steps, and means integral with and extending out from the body of
 60 said standards for supporting said steps by fitting over the same at their ends.

2. A ladder comprising sides or standards formed of sheet metal, steps, and flanges integral with and extending out from the body of
 65

said standards for supporting said steps by fitting over the same at their ends.

3. A ladder comprising sides or standards formed of sheet metal, steps, and means integral with and extending out from the body of
 70 said standards for fitting on the upper and lower faces of said steps for supporting the same.

4. A ladder comprising steps, sides or standards formed of sheet metal and having
 75 openings therein for the reception of the ends of said steps, and means integral with and extending out from the body of said standards for forming said openings and for supporting
 80 said steps.

5. A ladder comprising steps, sides or standards formed of sheet metal and having
 85 openings therein for the reception of the ends of said steps, and means integral with and extending out from the body of said standards for fitting on the upper and lower faces of said
 90 steps and for forming said openings to support said steps.

6. A ladder comprising steps, sides or standards formed of sheet metal and having
 95 openings therein for the reception of the ends of said steps, and flanges integral with and extending out from the body of said standards for forming said openings and for fitting on the upper and lower faces of said steps to
 100 support the same.

7. A ladder comprising standards, steps, supporting legs formed in channel shape, and
 105 bracing-bars fitting within and connected to said legs, said bracing-bars being formed of sheet metal in channel shape and connected together at their center portions through their
 110 bodies fitting against each other by flanges on one bar engaging with the other bar through openings therein.

8. A ladder comprising steps, supporting-
 115 legs, bracing-bars, leg-supports formed of sheet metal into channel form and pivoted together at one end and to said steps, and a clamping-connection fitting around said bars
 120 formed of sheet metal for the pivoting of the other end of the leg-supports thereto.

9. A ladder comprising steps, supporting
 125 legs, bracing-bars, leg-supports formed of sheet metal into channel form and pivoted together and at one end and to said steps, and a U-shaped clamping-piece on said bars and connected thereto for the pivoting of the
 130 other end of said leg-supports thereto.

10. A ladder comprising steps, supporting
 135 legs, bracing-bars, leg-supports formed of sheet metal into channel form and pivoted together and at one end and to said steps, and a U-shaped clamping-piece on said bars for the pivoting of the other end of said leg-
 140 supports thereto and having flanges thereon for being bent around said bars to hold the same in place.

11. A ladder comprising steps, supporting
 145 legs, bracing-bars, leg-supports formed of

sheet metal into channel form and pivoted together at one end and to said steps, and a U-shaped clamping-piece on said bars for the pivoting of the other end of said leg-supports thereto and having flanges thereon for being bent around said bars and for fitting against the same to hold said piece in place.

12. A ladder comprising steps, supporting-legs, bracing-bars, leg-supports formed of sheet metal into channel form and pivoted together and at one end to said bars, and a clamping-connection fitting over said steps and formed of two pieces of sheet metal for the pivoting of the other end of the leg-supports thereto and for being connected to said steps.

13. A ladder comprising steps, supporting-legs, bracing-bars, leg-supports formed of sheet metal into channel form and pivoted together and at one end to said bars, a clamping-connection formed of two pieces of sheet metal, and being connected to said steps, and one of said connections being formed of a U-shaped piece for the pivoting of the other end of the leg supports thereto.

14. A ladder comprising steps, supporting-legs, bracing-bars, leg-supports formed of sheet metal into channel form and pivoted together and at one end to said bars, a clamping-connection formed of two pieces of sheet

metal and one of said connecting pieces having flanges, an extension and U-shaped body to which the other end of the leg-supports is pivoted and the other connecting piece being formed of an angular shape for fitting against said flanges under said extension and connected to said steps.

15. A ladder standard formed of sheet metal and having a tongue cut from the standard, bent out from and across the body thereof and forming an opening in said standard.

16. A ladder standard formed of sheet metal and having tongues cut from the standard, bent out from and across the body into oppositely disposed flanges and forming an opening in said standard.

17. A ladder comprising sides or standards formed of sheet metal, steps, and flanges integral with and extending out from the body of said standards for fitting over the upper and lower faces of said steps to support the same.

In testimony whereof, I the said HENRY ADLER have hereunto set my hand.

HENRY ADLER.

Witnesses:

J. N. COOKE,
WALTER FARNARISS.