

March 6, 1934.

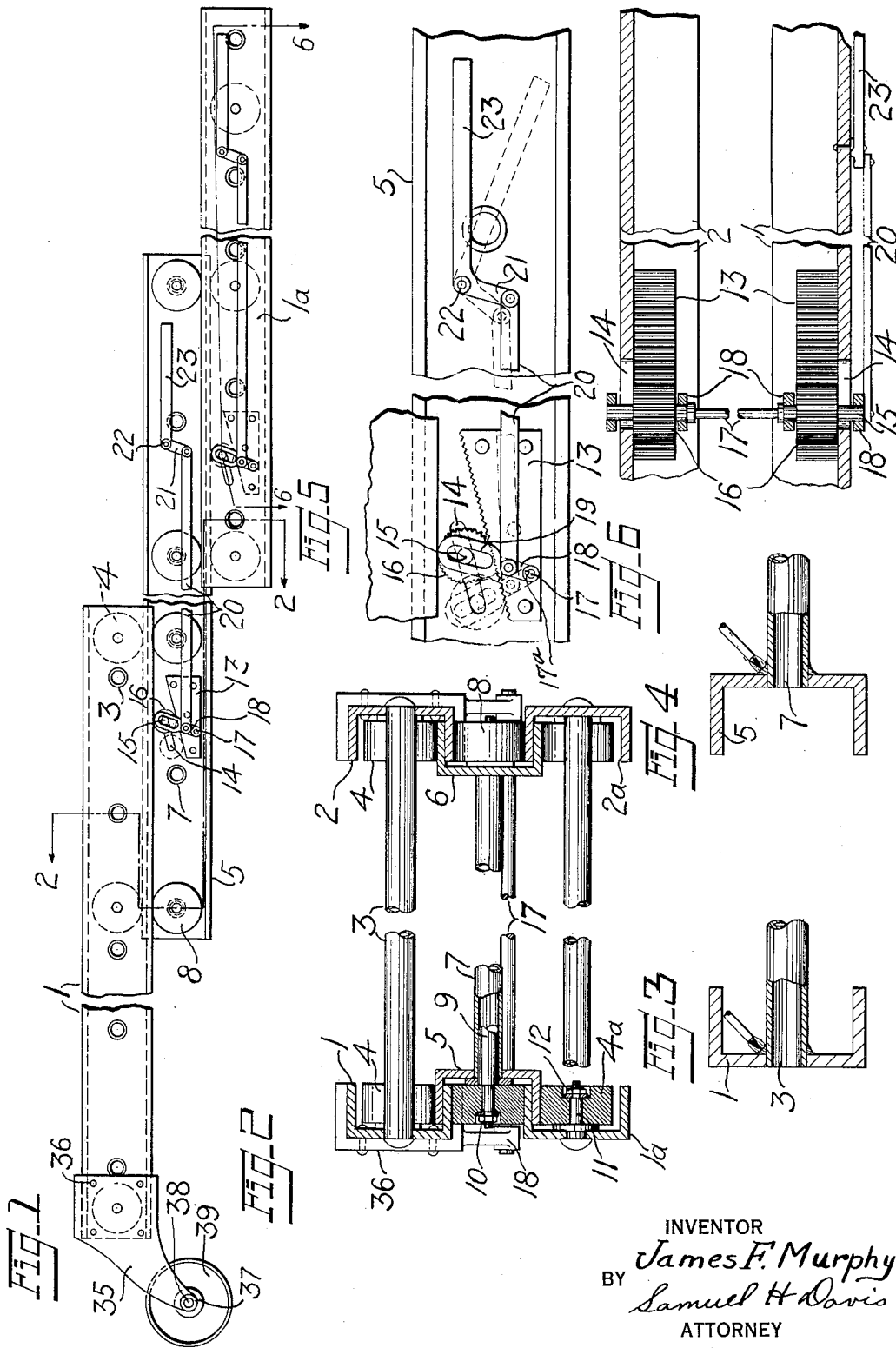
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EXTENSION LADDER AND SECTION LOCK

Filed July 15, 1931

2 Sheets-Sheet 1



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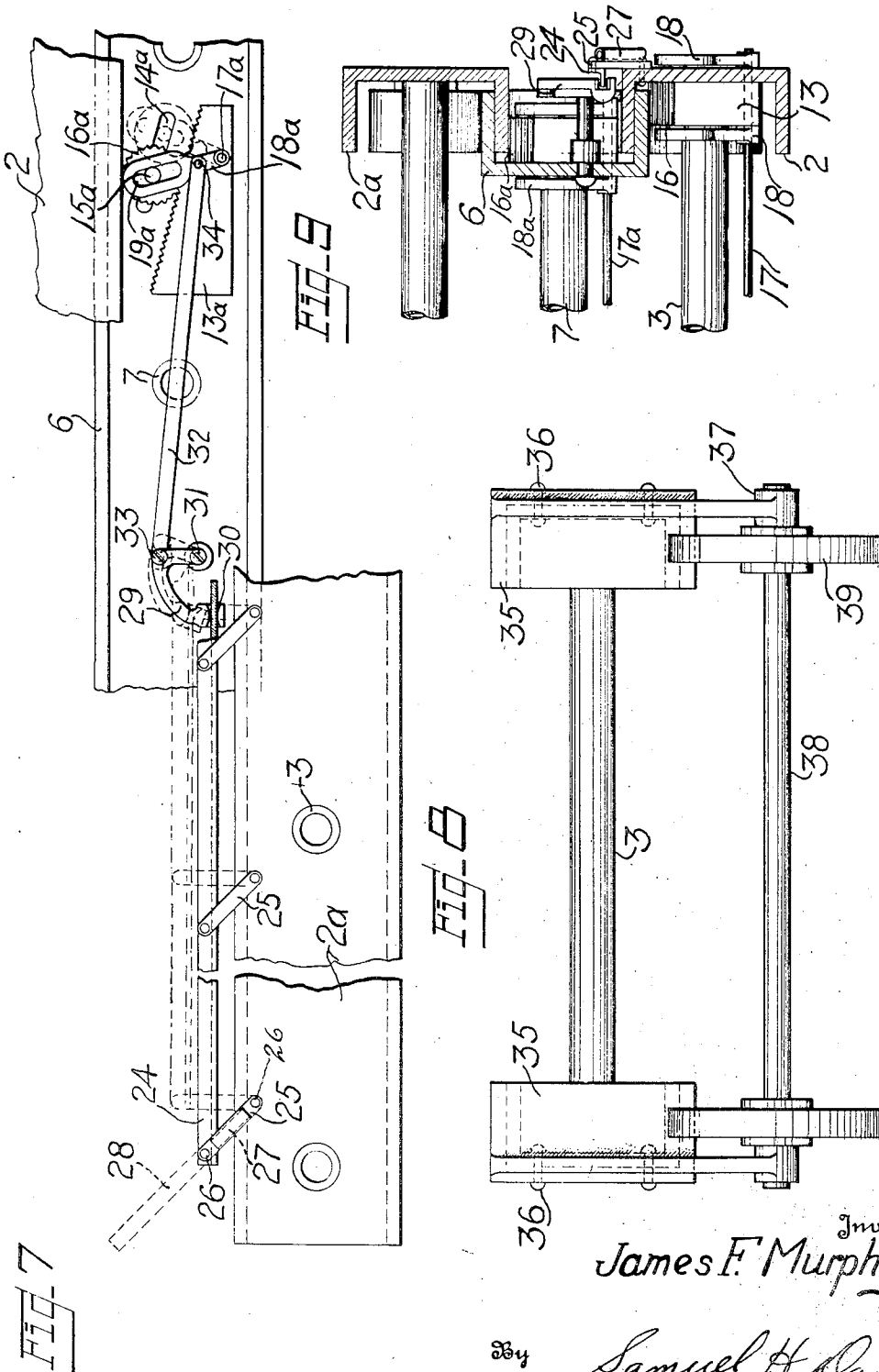
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EXTENSION LADDER AND SECTION LOCK

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8 Claims. (Cl. 228—18)

This invention relates to extension ladders and section locking or clamping devices for securing the sections together in adjusted positions.

The object of this invention is to provide a ladder that may be lengthened or shortened as desired, and which will be of the simplest mechanical construction and of the greatest strength and least weight as a whole consistent with safety and durability.

It is also an object of this invention to produce a ladder of the character stated comprising sections of channel iron or steel with the flanges of the sections in movable contact, and to include devices of special formation and disposition for clamping the flanges of the sections together after any adjustment necessary in using the ladder.

In the accompanying drawings are illustrated the special construction and combinations of the parts of this invention, and Fig. 1 represents a side view of three top sections made in accordance with this invention and showing all parts assembled. Fig. 2 is a sectional view taken upon the indirect broken line 2—2 of Fig. 1. Fig. 3 and Fig. 4 are sectional views by which are illustrated the method of joining the rungs to the sides of the ladder by welding.

Fig. 5 is a side view of a portion of two adjoining sections, showing the construction and arrangement, slightly enlarged, of the locking or clamping devices. Fig. 6 is a top view of the inclined block and clamping roller engaged therewith.

Fig. 7 is a side view somewhat enlarged showing portions of three sections, and illustrating the connections by which two adjoining sections may be clamped together from a third section and at a distance from the clamping devices.

Fig. 8 is an end view of the top section, and Fig. 9 is a fragmentary cross section of the three sections shown in Fig. 7 at the point where the connections carried by the third section engage the clamping devices carried by the second or intermediate section.

Throughout the drawings and description the same number is used to refer to the same part.

Considering the drawings, the channel iron sides 1 and 2 have rungs 3 welded thereto, and rollers 4 in the channels, as best illustrated in Fig. 2. The second or intermediate ladder section has the channel sides 5 and 6, and the third section has the sides 1a and 2a. It will be noted that the openings of the channels of adjoining sides or irons are in opposite directions. That is to say, in Fig. 3 the openings of the channels

of the first and third ladder sections open inwardly and the channel openings of the middle section open outwardly, and that the flanges of the channels rest one against another as shown. Within the channels 5 and 6 and between the flanges of the other sections and having the same axis as rung 7 are the rollers 8, and the rung 7 carries the round rod 9 at the ends of which are the journals for the rollers 8, the rollers being secured by nuts 10. The rollers 4a, Fig. 2, are the same as the rollers 4, and they are revoluble upon spindles 11 and secured by nuts 12.

In Fig. 5 is shown a block or member 13 having an inclined or toothed side, and the block is represented as secured upon the inside of the channel iron 5, although that particular arrangement is not obligatory. The channel 5 has formed through it an inclined slot 14 which has substantially the same slant as the inclined side of the block 13. Within and traveling in slot 14 is an axis 15 of a geared roller 16 which engages the teeth of the inclined side of the block 13, and is capable of being moved up and down upon the inclined side. Passing transversely through block 13 and across the section of the ladder is a shaft 17 at the ends of which are secured arms 18 by means of keys 17a. Arms 18 are provided with longitudinal slots 19, and it will be observed that the axes 15 of the rollers 16 movably engage the slots 19. Arms 18 are worked back or forth by the connecting bar 20, that is pivotally joined to the end 21 of a lever having the fulcrum 22. The handle of the lever is marked 23. It is thought to be clear that if the handle of the lever is moved the roller 16 may be correspondingly moved up or down upon the inclined side of the member 13. It is not necessary that the block or blocks 13 be applied to the section sides 5 and 6, since the blocks and connections may be attached in the same manner for like purpose and operation to the section sides 1 and 2 the flanges of which project towards each other as set forth in Fig. 6.

In the construction of this invention it is found most advantageous and desirable with the view of maximum strength and lightness to weld the rungs 3 and 7 to the sides 1 and 5 as set forth in Figs. 3 and 4.

Considering Fig. 7 there will be noted the connecting rod 24 coupled to the section side 2a by short links 25 having pivotal junctions 26 formed between rod 24 and side 2a. Rod 24 may be moved lengthwise back and forth by inserting in the tubular socket 27 which is welded on the out-

side of link 25 so that the hole in the tube runs lengthwise of the link 25, the end of a hand lever 28. The rod 24 passes through the end of a bell crank lever 29 provided with the opening 30 for the end of the rod to slide in. The end of lever 29 has a pivot 31 on the side of the ladder section and a pivotal connection with a connecting bar 32 at the point 33. The bar 32 has a pivotal junction 34 with the arm 18a which is in all respects like the arm 18 of the clamping devices previously mentioned.

As shown in Figs. 1 and 8, it is customary to equip the top section of the ladder with brackets 35, secured by rivets 36 and having bearings 37 for the ends of the revoluble shaft 38 carrying the rollers 39 near its ends for contact with a wall or other surface when the ladder is erected.

In the operation, if the sections of the ladder are extended as illustrated in Fig. 1, and the levers 23 are suitably actuated, the rollers 16 will move up on the inclined toothed sides of the blocks 13, and press the flanges of the sides 1 and 5 strongly together. Assume that the ladder has been placed against a wall in an inclined position. Now, if the top section tends to descend by its weight, it will be seen that the rollers 16 are more strongly forced up upon the inclines of the blocks and the flanges of the sides pressed more strongly one upon the other. The greater the weight upon the rungs of the top section, the more force is exerted to clamp the section flanges together. In Fig. 7 let it be assumed that 2a is the side of the lowest ladder section, 6 the side of an intermediate or second section, and 2 the side of a top section. To lower the top or upper sections with respect to the lowest section, the lever 28 is operated. Thus, the clamping effect of two given sections may be controlled from a third section and at a distance. It is held to be within the purview of this invention to use other and equivalent clamping devices in place of those herein shown and explained.

Having now described this invention, I claim:—

1. An extension ladder having in combination a channel iron section, and adjoining sections having flanges arranged against the flanges of the said channel section, and devices carried by the channel section for clamping the flanges of the said section and an adjoining section together.

2. An extension ladder comprised of a plurality of sections co-operatively nested together, the side members of each of said sections being flanged, the flanges of said sections being arranged one against the other, means for clamping the flanges of one section firmly against the co-operating flanges of the succeeding section, one part of said clamping means comprising a member secured to one of the said sections and being in the form of an inclined slide, the other part of said clamping means being in the form of a roller movable along the surface of said inclined slide and being located between said slide and the flange of the preceding ladder section, means for forcing the said roller into locking contact between the said flange of the preceding section and the inclined slide thereby locking the said sections in any desired position, said means being also adapted for moving the said roller along said incline to bring said roller out of locking contact with the flanges of the preceding section so that the said section may

be moved at will in the flange side member to which the said incline is secured and is parallel with, and one of said side members having an inclined slot.

3. An extension ladder comprising a plurality of sections, the side members of each section being channel irons spaced at a predetermined distance from each other, tubular metal rungs connecting the said side members, the said sections being arranged with the openings of the channels of adjoining sections in opposite directions and the flanges together, and devices carried by one section for clamping the flange of said section against the flange of the next section to hold the sections together, the said devices being operable at a point on the section carrying said devices at a distance from the point of application of the clamping force.

4. An extension ladder comprising a plurality of sections, the side members of each section being channel irons spaced at a predetermined distance from each other, tubular metal rungs connecting the said side members, the said sections being arranged with the openings of adjoining sections in opposite directions and the flanges of the said irons together, devices carried by one section for locking the same to the next section, and means carried by a third section for operating the said locking means from a distance.

5. An extension ladder comprising a plurality of sections, the side members of each section being channel irons spaced at a predetermined distance from each other, tubular metal rungs connecting the said side members, the said sections being arranged with the openings of the channels of adjoining sections in opposite directions and the flanges of the said irons together, and devices carried by one section constructed to act thereon and upon the adjoining section to clamp the flanges of said sections together.

6. An extension ladder comprising a plurality of sections, the side members of each section being channel irons spaced at a predetermined distance from each other, tubular metal rungs connecting the said side members, the said sections being arranged with the openings of the channels of adjoining sections in opposite directions and the flanges of the said irons together, devices carried by one section constructed to act thereon and upon the adjoining section to clamp the flanges of said sections together, and means carried by a third section for operating the said clamping means from a distance.

7. An extension ladder comprising a plurality of sections, the side members of each section being channeled metal beams spaced at a predetermined distance from each other, tubular metal rungs connecting the said side members, the said sections being arranged with the openings of the channels in opposite directions and the flanges of the irons together, devices for clamping said flanges together comprising a block attached to one of said irons and having an inclined toothed side, a toothed roller engaging the said inclined side of the block and capable of being pressed against the flange of the adjoining iron, and means for forcing the toothed roller up said inclined side of the block.

8. An extension ladder comprising a plurality of sections, the side members of each section being channeled metal beams spaced at a predetermined distance from each other, tubular metal rungs connecting the said side members, the said sections being arranged with the openings of the channels of adjoining sections in opposite di-

reactions and the flanges of the said irons together, and devices for clamping said irons together comprising a block attached to one of said sections and having an inclined toothed side, a toothed roller engaging the said inclined side and capable of being moved into contact with the flange of an adjoining iron, a lever having a ful-

crum upon one of said sections, and a connecting bar pivotally connected with the said roller whereby the roller may be forced up the said inclined side to clamp the flanges of adjoining sections together.

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