

Oct. 23, 1923.

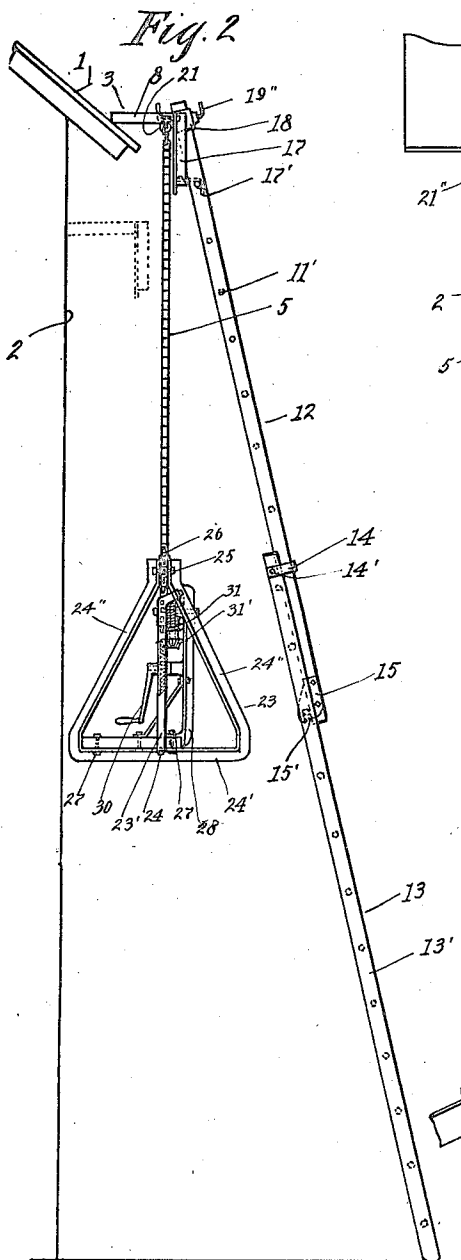
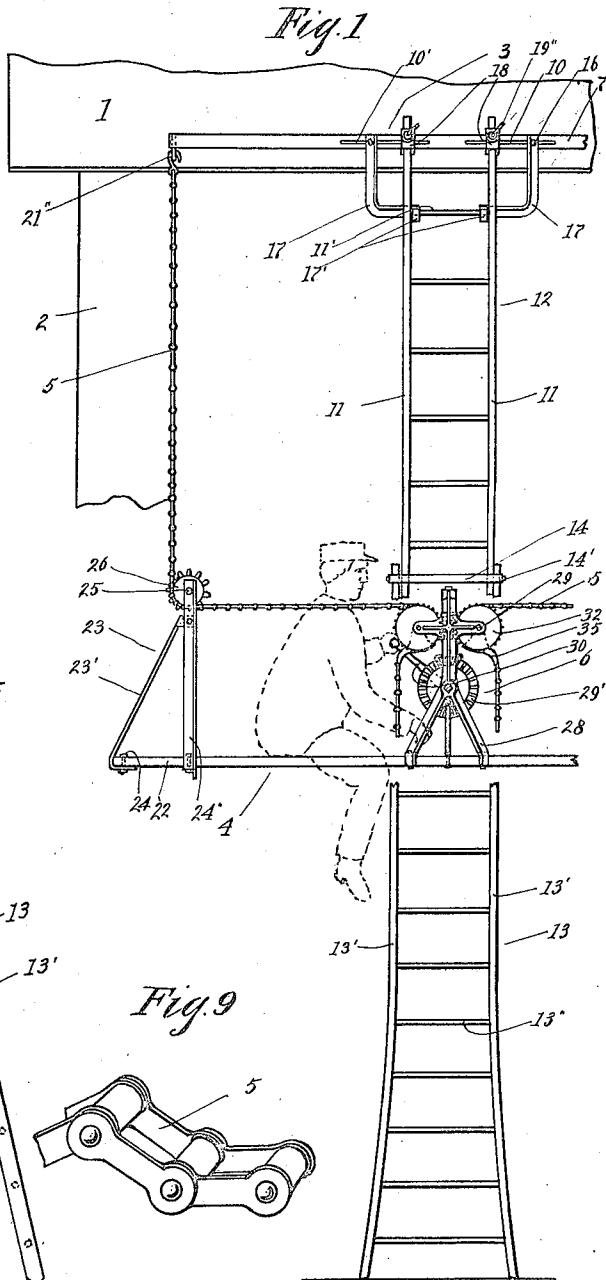
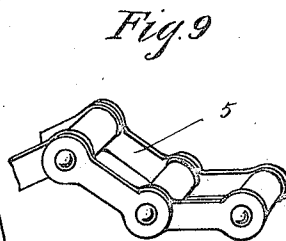
S. W. JOHNSON

1,471,848

PORTABLE SCAFFOLD

Filed Oct. 20, 1922

2 Sheets-Sheet 1



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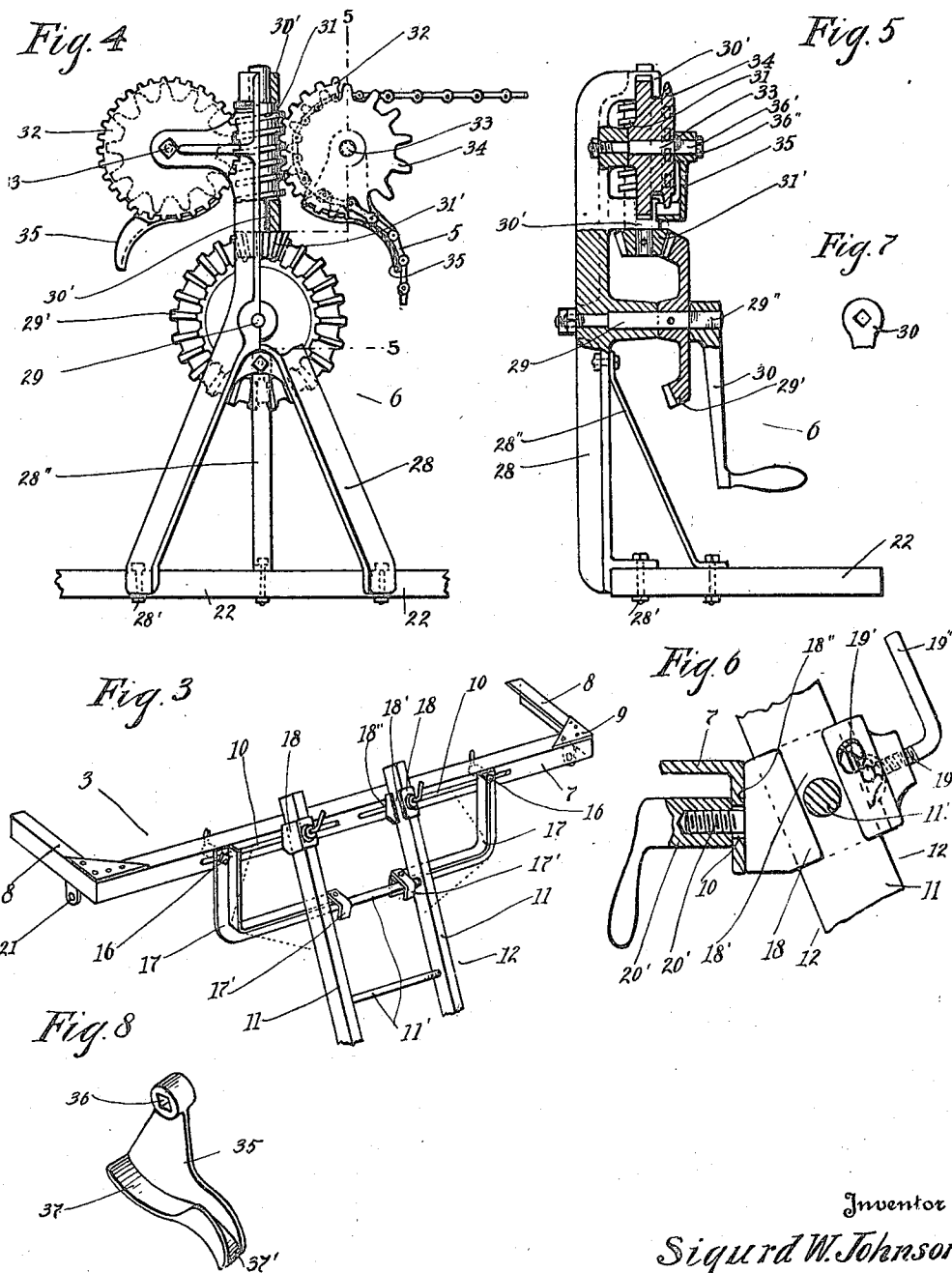
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

SIGURD W. JOHNSON, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR OF ONE-HALF TO
EDWIN O. TURNQUIST, OF MINNEAPOLIS, MINNESOTA.

PORTABLE SCAFFOLD.

Application filed October 20, 1922. Serial No. 595,848.

To all whom it may concern:

Be it known that I, SIGURD W. JOHNSON, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Portable Scaffolds, of which the following is a specification.

My invention relates to improvements in portable scaffolding for gaining convenient access to the sides of houses and the like, as for painting and cleaning same, and has for one of its objects, the provision of improved apparatus for use in connection with ordinary or extension ladders, which may vary in width and which may be readily and quickly attached to same without in any manner mutilating the ladder or attaching special parts thereof, thus rendering the invention applicable at all times to all makes of standard ladders, thereby extending its usefulness, and owing to its extreme simplicity, rendering it light in weight and cheap of manufacture.

A further object of the invention is the provision of a scaffold of the class described which may be supported on a single ladder of ordinary make, and which embodies certain new and novel features of construction, whereby safe access may be had to a vertical strip of wall space equal in width to four or five times the width of the ladder, novel hoisting mechanism being provided on the scaffold whereby one man on the scaffold is enabled to safely raise or lower the ladder in a continuous movement without relying upon the hitching ropes customarily employed at each end of the scaffold, and which requires to be carefully tied to keep the platform suspended at the desired level, it usually requiring two men (one at each end) to manipulate the ropes.

A still further object of the invention is to provide a device of the class described which may be constructed of light angle bars, and which is designed in parts capable of being readily disassembled and handled by one man.

Other advantages of the invention will be pointed out as this specification progresses, the invention consisting in the construction, combination, and arrangement of parts hereinafter to be described and claimed, and illustrated in the accompany-

ing drawings forming part of this specification, in which:

Figure 1, is a front elevation of a suspended scaffold embodying my invention.

Figure 2, is a side elevation of same.

Figure 3, is a perspective view of the supporting cross beam, showing it secured to the top of the ladder.

Figure 4, is a front elevation, drawn to an enlarged scale, of the raising and lowering mechanism, showing it partly broken away.

Figure 5, is a side elevation of same, partly in section, on line 5—5 of Figure 4.

Figure 6, represents a side view of the sliding clamping sleeves employed for adjustably joining the cross beam to the ladder up-rights, shown partly in section and partly broken away.

Figure 7, is a fragmentary front view of the operating handle for the hoisting mechanism.

Figure 8, is an enlarged perspective view of one of the chain guides forming part of the hoisting mechanism; and

Figure 9, is a side view of a fragment of sprocket chain, drawn to an enlarged scale, used as a substitute for cable or rope, ordinarily employed.

In the drawings, 1 designates the inclined roof of a building, and 2 the side wall thereof. The invention comprises, in combination with an ordinary ladder, a skeleton roof or wall engaging structure, designated by the numeral 3, which structure constitutes a supporting cross beam slidable on the side rails of the ladder, and functions as a support for the depending platform, designated as a whole by the numeral 4, said platform being suspended by means of the sprocket chains 5, which chains have operative connection with the hoisting mechanism, designated as a whole by the numeral 6. The supporting structure 3 comprises a cross beam 7, here shown formed of angle iron, having one flange thereof extending downward and the other inward, away from the ladder, and being bent inwardly, preferably at right angles, at its ends to form arm members 8, the corner joints between the beam and arms being preferably reinforced by the gussets 9. The vertical angle of the beam 7 is perforated between its ends by two long, nar-

row slots 10, located symmetrically between the arm members, which slots extend an appreciable distance outward beyond the side rails 11 of the top section 12 of the extension ladder, said rails spacedly supporting the usual rungs 11'. The extension ladder comprises further a lower section 13, having side rails 13', spaced to slidably receive the upper ladder section between them, as indicated in Figures 1 and 2, said upper section slidably engaging with the rungs 13'' of the lower section. The upper section is held in slidable position on the lower section by the bail 14, which loosely embraces the upper section, and is secured to the lower section by means of the bolts 14'.

For the purpose of holding the upper ladder member against a downward sliding movement, the lower end of each side rail thereof is provided with a locking plate 15, formed with downwardly opening notch 15', said notch adapted to receive any one of the rungs of the lower ladder, whereby the two ladder members are firmly held, both against a sliding and bending movement. Obviously, the upper ladder section may be slid on the lower section to bring the notches 15' into engagement with any chosen rung to secure the length of ladder desired.

Secured to the cross beam 7 by means of bolts 16 which latter extend through the slot 10, as to be adjustable longitudinally of the beam, are the oppositely disposed angle braces 17, said braces extending downwardly and inwardly toward each other and, respectively, behind and beyond the side rails 11, and being formed at their respective free ends with hook members 17', said hook members formed to extend outwardly toward the ladder and between said side rails thereof in a manner to engage with a chosen rung 11', as indicated in Figure 3. It will be noted that the jaws of the hooks are directed downward, so that by relaxing the bolts 16, the angle members 17 may be swung upwardly to disengage the rung, so that the ladder may be removed.

Slidable longitudinally on the side rails 11 are the sleeves 18, one for each rail, the inner wall of said sleeve being cut away to form a slot 18' sufficiently wide to permit the rungs of the ladder to freely pass therethrough when the sleeve is slid. The sleeve is held positioned on the side rails by means of a suitable set screw 19, preferably provided with a swivel washer 19' at its inner extremity within the sleeve to engage with the ladder rail to be firmly pressed thereagainst when the set screw is set. The set screw is preferably formed with a suitable handle 19'', whereby it may be conveniently operated.

The sleeve is further formed on the side facing the building, when the ladder is in

inclined operative position, with a vertical, flat face 18'', disposed at an angle to the axis of the hollow of the sleeve, from which face extends at right angles the threaded stud 20, upon which is threaded the hand nut 20', said stud extending through the slot 10 of the cross beam, whereby the sleeve may be firmly adjustably secured to the cross beam at any desired lateral position within the range of the slots 10.

The cross beam structure 3 is thus adjustable longitudinally of the ladder, so that it may be secured at any selected rung to accommodate buildings of varying heights, the arms 8 being adapted to rest against a flat side wall or against an inclined roof, as indicated in Figure 2. By making the angle members 17 adjustable laterally in the slots 10, the device is available for ladders of varying widths, while at the same time it is not essential that the rung of the ladder occupy any particular level with reference to the cross beam 7, inasmuch as the angle members may be swung to the right or left, as the case may be, (dotted lines Figure 3) upon the bolts 16 to bring the hook 17' into engagement with the rung, regardless of its exact position. By this construction I secure the advantage of being enabled to fasten the cross beam at a greater number of levels.

The bolts 16 are provided with hand nuts 20', similar to that indicated in Figure 6, so that they may be readily manipulated to effect a quick change of position of the beam structure. Near each of its outer corners the cross beam structure is preferably provided with a drop hanger having an opening 21, adapted to loosely receive, preferably a chain hook 21', which latter is suitably connected to the chains 5.

The platform structure 4 comprises a long plank 22, and end hangers 23, each end hanger comprising a triangular frame through which the end of said plank extends, and a brace member 23' secured to said triangular frame near the top thereof, and extending downwardly and outwardly and being secured to the end of the plank as by means of the bolt 24, whereby said frame is rigidly held in perpendicular position relative to the plank. The triangular frame is formed with a horizontal supporting member 24' and oppositely disposed inwardly inclined side members 24'', the upper extremities of said side members being parallel and spaced from one another and supporting the spindle 25, extending horizontally through said side members and at right angles to the long axis of the plank. Rotatable on said spindle is the sprocket gear 26, which meshes with the sprocket chain 5 and serves as an idler or anti-friction roller around which the chain passes in meshed relation.

The frame is suitably secured as by the bolts 27 to the plank.

While I have shown only one end of the platform in Figure 1, it is to be understood that the hangers 23 at both ends of same are substantially similar, the ladder sections in this Figure being broken away to show an unobstructed view of the hoisting mechanism 6. This hoisting mechanism comprises a housing 28, which latter is firmly bolted as by means of the bolts 28' to the plank 22, and includes an inclined brace member 28'' to impart stiffness to the structure. The housing extends vertically from the outer edge of the plank and supports rotatably intermediate its ends, the shaft 29, which latter extends horizontally at right angles to the edge of the plank and parallel with the spindles 33, and upon which is rigidly mounted the bevel gear 29'. The inner end 29'' of the shaft is preferably square in cross section, and removably fits the socket of the handle 30 (see Figure 7), so that said gear may be manually rotated, at will.

Rotatably mounted in the vertically aligned bearings 30' carried by the housing, to rotate in a horizontal plane and axially in vertical alinement with the shaft 29, is the worm 31, the lower extremity of said worm rigidly carrying the bevel pinion 31', which latter meshes with the gear 29', so that a rotation of the latter will communicate rotary motion to the worm.

Rotatably mounted in the housing, one on either side of said worm and meshing therewith, are the worm gears 32, of equal diameter, the mounting of each of said gears comprising a spindle 33, arranged in parallelism with the shaft 29. Preferably integral with the gears 32, and located to rotate in a plane spaced inwardly from the plane of the latter, are the sprocket wheels 34, in mesh, respectively, with the chains 35, which latter run respectively over the top and around the inner sides thereof, and are held in mesh therewith by the guide members 35. These guide members are each formed with a squared socket 36, adapted to receive the squared portion 36' of the spindle 33, said squared portion being formed with a head 36'', whereby the guide member is held firmly positioned. As best shown in Figures 4 and 8, the guide members are formed with a flange portion 37, which is concentric with the spindle 33, and approximately of a radius equal to the radius of the circumference of the worm gears, whereby the sprocket chains are controlled to be held in mesh with their respective sprocket wheels, the flange 37 merging into a downwardly curved lip 37', which has side flanges, whereby the slack portion of the chain may be held suspended.

As shown in Figure 1, the horizontal por-

tion of the chains leading from the gears 26 to the gears 34, respectively, serve as a guard rail for the occupant of the platform, since these chains are stretched quite taut under the load carried. It is to be further noted, that the chain runs on the outer and under sides of the sprocket 26, thus requiring a sprocket chain of the type shown in Figure 9 of the drawings, wherein the links are so constructed as to render the chain bendable in either direction. In operation, responsive to a turning movement of the handle, as hereinbefore stated, the worm 31 will be rotated, which in turn will actuate the worm gears 32 and cause them to rotate in opposite directions, thereby simultaneously winding up or paying out chain in accordance with the direction in which the handle is rotated. Thus, the operator may raise or lower himself as desired, the worm obviating the use of the customary pawl and ratchet used in hoisting apparatus. It will also be noted that the gear 29' is appreciably larger in diameter than the pinion 31', the proportions shown being approximately three to one, whereby the speed of the worm is materially increased, and the raising and lowering movement therefore, proportionately accelerated. This feature, together with the use of sprocket chain, is essential to render the invention practicable, inasmuch as cables in place of chains could not be as economically employed nor manipulated over small diameter wheels, and worm mechanism without accelerating gears, would be too slow to render the use of the device profitable.

Further, the structure shown is designed with a view to rendering the device safe of operation by the operator when on the platform, in that the handle 30 may be conveniently and advantageously turned by the operator when sitting astride the plank, as indicated in Figure 1, in which position an effective purchase may be had without swaying the platform, which would not be the case if the operating handle were rotatable in a horizontal or transverse plane with respect to the plank. As I have designed the mechanism to rotate the handle in a vertical plane, parallel with the longitudinal axis of the plank, the forces involved in a raising and lowering movement of the platform, all operate in a plane parallel with and slightly spaced from the plane of the chains, worm gears, and the sprocket wheels, thus effectively avoiding the creation of a swaying action in the platform, which is always a dangerous feature in suspended scaffolds of the class described.

The chains may be termed flexible suspending members, while the angle members 17 constitute braces which bear against the under sides of the side rails of the ladder, and thereby prevent the frame (formed by

the beam and the arms 8) from rotating about the long axis of the beam when the weight of the platform is brought to bear down on the frame at the hangers 21. Further, the hooks 17' prevent the frame rotating upward about the beam axis, as when the arms 8 rest upon a roof.

I claim:

1. In a hoisting mechanism for scaffolds, the combination with an elongated platform, of a sprocket wheel mounted for rotation at each end of the platform, a sprocket chain adapted to be connected to a support for suspending the platform, there being one for each of said sprocket wheels, said chain extending downward and around the under side of its respective sprocket wheel and longitudinally of the platform towards the center thereof, horizontally alined sprocket wheels adjacently mounted on the platform in a manner to mesh respectively with said sprocket chains to pull the latter toward each other responsive to a rotary movement of the alined wheels in opposite directions, and manually operated worm actuated actuating mechanism for simultaneously rotating said sprocket wheels at will in opposite directions, for the purpose set forth.
2. In a scaffold of the class described, the combination with an elongated platform, of a sprocket wheel mounted at each end of the platform, a sprocket chain for suspending said platform, one for each end of the latter, said chains being adapted to extend around the under side of said sprocket wheels and longitudinally of the platform toward the center of the latter, horizontally alined sprocket wheels adjacently mounted on the platform in a manner to mesh respectively with said sprocket chains to pull the latter toward each other responsive to a rotary movement of the alined sprocket wheels in opposite directions, and manually operated means for simultaneously rotating

said sprocket wheels in opposite directions, said means including a pair of worm gears, one operatively connected with each of said alined sprocket wheels to rotate therewith when the sprocket wheels are actuated, a worm in mesh with opposite sides of said gears, and a gear train including a hand lever adapted to be rotated for actuating same, operatively connected to said worm for rotating the latter, said gear train including gears so proportioned as to cause the worm to rotate faster than said lever is rotated.

3. In a device of the class described, the combination with an elongated platform, a sprocket wheel mounted for rotation at each end of the platform, a sprocket chain for suspending said platform, one for each of said sprockets, said chains extending respectively around said sprocket wheels and longitudinally of the platform toward the center of the latter, horizontally alined wheels adjacently mounted on the platform in a manner to mesh respectively with said sprocket chains to pull the latter toward each other responsive to a rotary movement of the alined sprocket wheels in opposite directions, and manual means for simultaneously rotating said sprocket wheels in opposite directions, said means including worm gears, one operatively connected to each of said sprocket wheels, a worm in mesh with said worm gears for rotating them in opposite directions when the worm is rotated, and manually actuated means operatively connected to the worm for actuating the latter, said actuating means including a rotatable actuating handle, rotatable in a vertical plane disposed longitudinally of the platform, for the purpose set forth.

In testimony whereof I affix my signature.

SIGURD W. JOHNSON.