May 15, 1951 R. H. BENSON ET AL 2,553,031

SCAFFOLD WINCH

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Fig. 1.

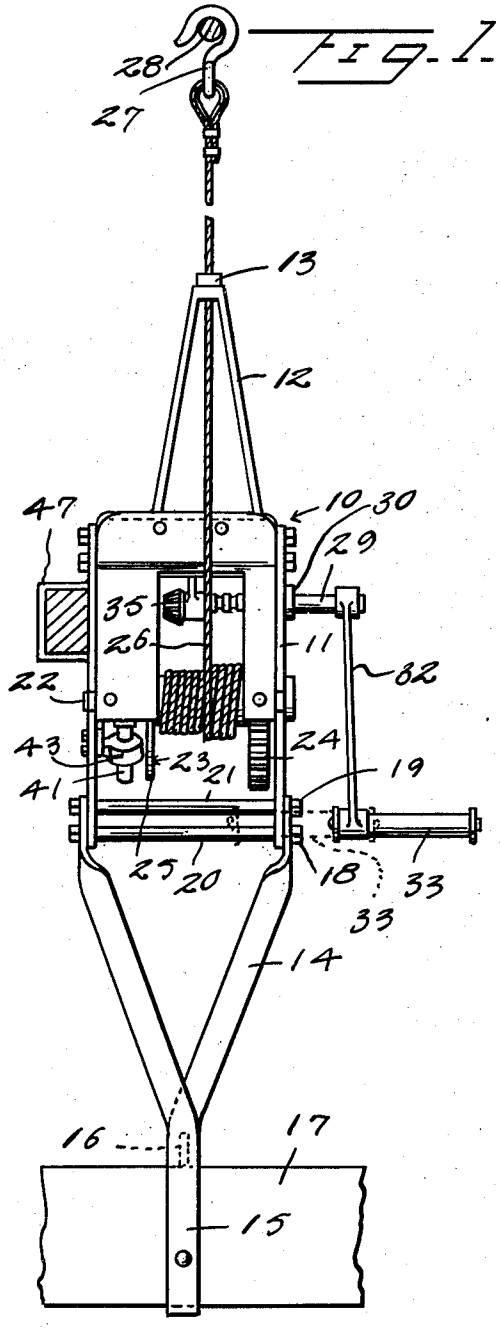
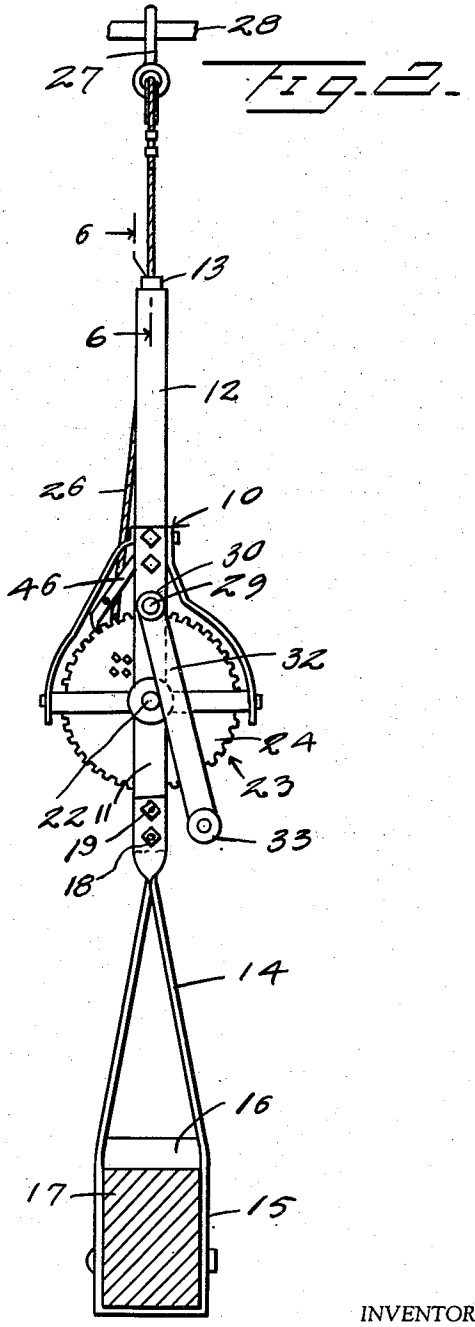


Fig. 2.



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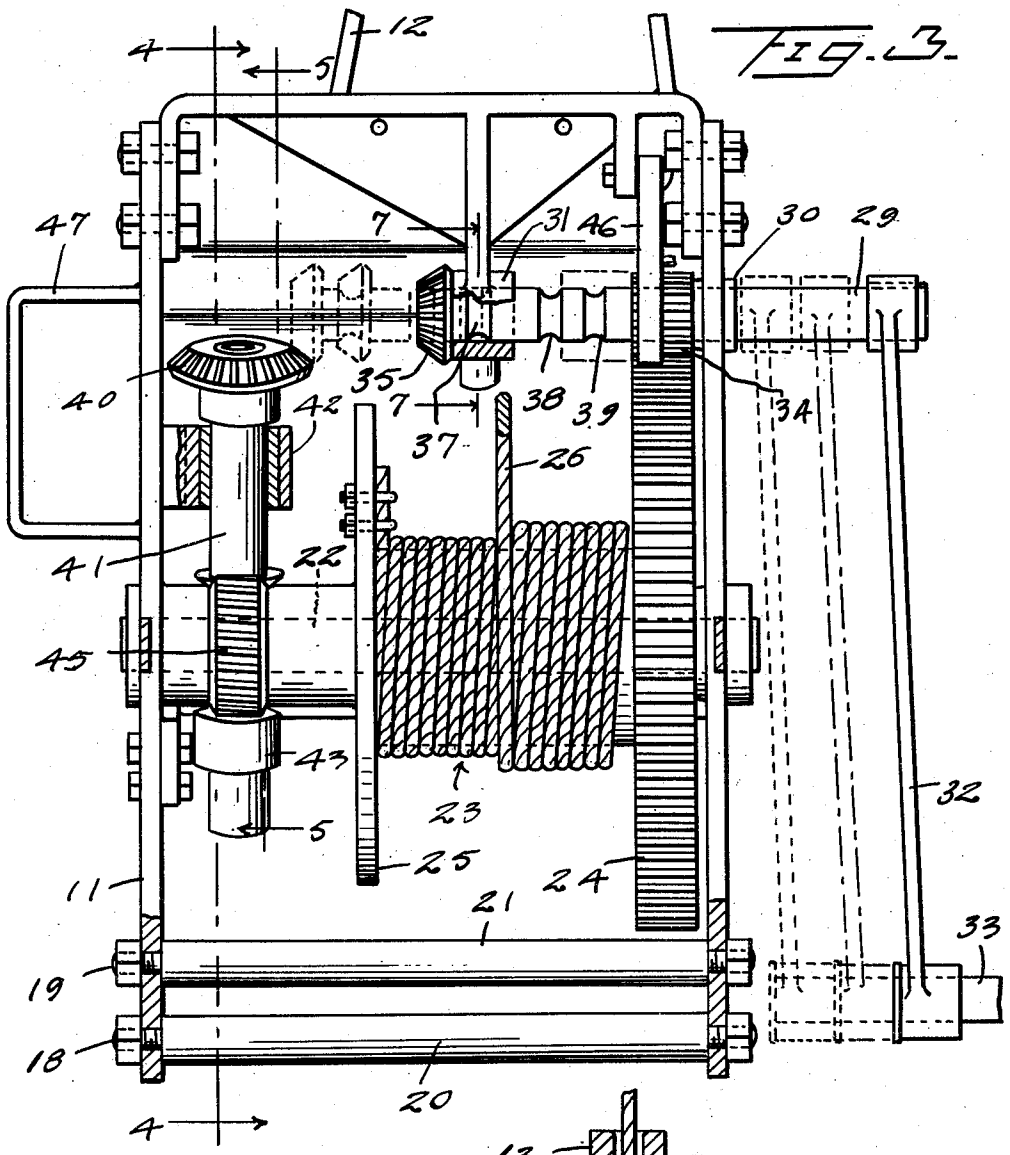


Fig. 3.

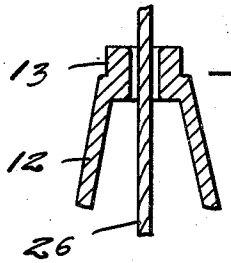


Fig. 6.

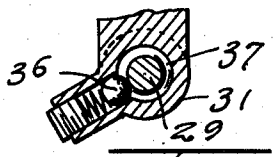


Fig. 7.

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Fig. 4.

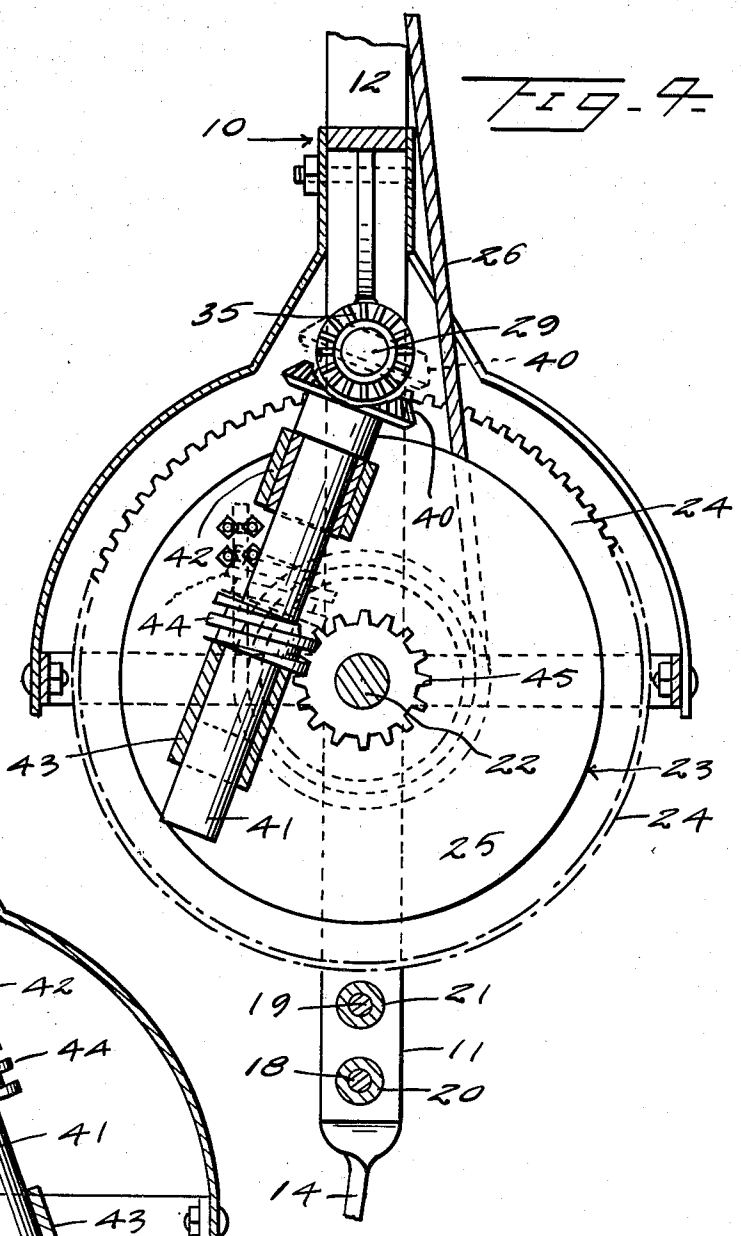
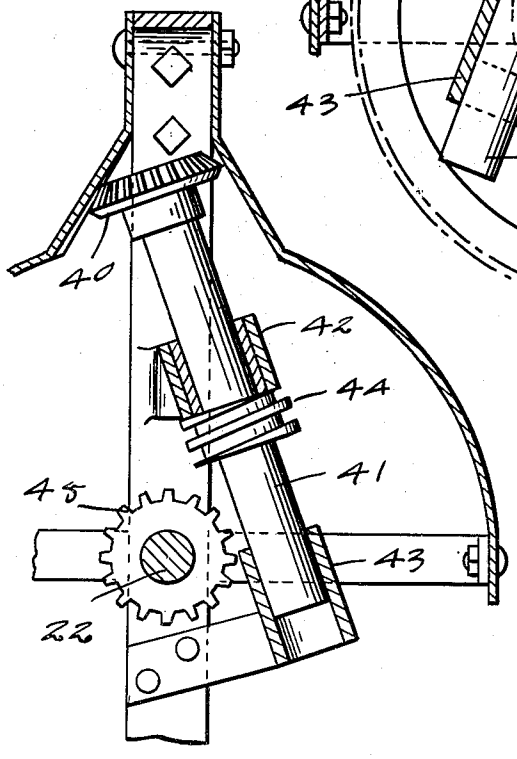


Fig. 5.



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SCAFFOLD WINCH

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Application March 8, 1950, Serial No. 148,489

1 Claim. (Cl. 254—187)

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This invention relates to winches or hoists.

An object of this invention is to provide a winch which as an example may be used for scaffolds and which includes an improved safety means to prevent unwinding of the drum or reel when the crank is released.

Another object of this invention is to provide in a winch a combined ratchet and low speed operator for the reel, the combined ratchet and operator being in the form of a floating worm engageable with a worm gear which is fixed relative to the reel.

A further object of this invention is to provide a safety means of this kind wherein the ratcheting worm may be manually shifted endwise to disengaged position with respect to the worm gear so that the reel may be freely rotated to unwind the cable therefrom.

A further object of this invention is to provide a relatively large reel gear of the spur type with a worm gear fixed to the reel and a shiftable crankshaft having a pair of gears thereon. One of the pair of gears is adapted to mesh with the large spur gear in one position of the crankshaft, and the other gear is adapted to mesh with a gear on a worm shaft when the crankshaft is shifted endwise so that the reel can be rotated in either direction with the worm inherently locking the reel. In the neutral position of the crankshaft the worm will automatically lock the reel against unwinding when a load is imposed on the winch frame, but when the worm is manually disengaged from the worm gear the reel may be freely rotated in either direction. The winch herein disclosed is particularly adapted for use in supporting scaffolding used by bricklayers wherein heavy loads are placed on the scaffolding and wheelbarrows are moved over the scaffolding.

In the drawings:

Figure 1 is a detailed front elevation of a winch or hoist constructed according to an embodiment of this invention.

Figure 2 is a detailed side elevation of the device.

Figure 3 is a fragmentary vertical section of the device.

Figure 4 is a fragmentary sectional view taken on the line 4—4 of Figure 3.

Figure 5 is a fragmentary sectional view taken on the line 5—5 of Figure 3 showing the worm gear in released position.

Figure 6 is a fragmentary sectional view taken on the line 6—6 of Figure 2.

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Figure 7 is a fragmentary sectional view taken on the line 7—7 of Figure 3.

Referring to the drawing, the numeral 10 designates generally a frame structure which includes an inverted U-shaped frame member 11 which has extending upwardly therefrom a pair of upwardly convergent bars 12 to the upper ends of which is secured a guide ring 13. The frame structure 10 also includes a pair of downwardly extending scaffold supporting bars 14 which, as shown in Figure 1, converge downwardly and are then bent in vertical position to form a U-shaped cross piece cradle 15. A connecting brace 16 is secured between the lower ends of the bars 14 to hold these bars and the legs of the U-shaped member in spaced relation.

A timber or cross piece 17 is adapted to engage through the U-shaped member 15 and is adapted to have longitudinal platfrom timbers disposed on the upper side thereof. The upper divergent ends of the bars 14 are secured to the lower ends of the legs of the U-shaped member 11 by means of a pair of bolts 18 and 19, and spacer members 20 and 21 engage about the bolts 18 and 19, respectively, and between the legs of the U-shaped member 11.

A reel shaft 22 is journalled between the legs of the U-shaped member 11 and has fixed thereon a reel or drum 23. One side of the reel or drum 23 is formed by a relatively large spur gear 24, and the other side of the reel or drum 23 is formed by a plate 25.

A cable 26 is adapted to be wound about the reel or drum 23 and is then extended upwardly through the ring or eye 13. A hook 27 is secured to the end of the cable 26 and is adapted to engage a suitable supporting means 28.

A crankshaft 29 is rotatably carried by bearings 30 and 31, and the shaft 29 has fixed thereto a crank 32 which is formed with a slidable and rotatable handle 33. The shaft 29 has fixed thereon a relatively small spur gear 34 and has fixed to the inner end thereof a bevel gear 35. The shaft 29 is releasably held against endwise movement by means of a spring pressed ball 36 which engages in a selected one of the annular grooves 37, 38, and 39 which are formed in the shaft 29. When the ball 36 is engaged in the groove 37, gear 34 will be in mesh with spur gear 24 so that reel or drum 33 will be rotated from gear 34. When ball 36 is engaged in groove 38, gear 34 will be disengaged from gear 24, and shaft 29 will be in the neutral position. When ball 36 is engaged in groove 39, shaft 29 will be in its innermost position, and bevel gear 35 will be in

mesh with a second bevel gear 40 which is fixed on a worm shaft 41. The worm shaft 41 is journalled in bearings 42 and 43 which are fixed to the U-shaped frame 11, and the shaft 41 has fixed thereon a worm 44.

The reel shaft 22 has fixed thereon a worm gear 45 which is adapted to be engaged by the worm 44. The shaft 41 is freely movable in an upward direction so that when the drum or reel 23 is being rotated through gears 34 and 24, shaft 41 with worm 45 will be raised upwardly and will ratchet on the teeth of worm gear 45. When gear 34 is released by release of crank 32 so that the load on cable 26 will tend to unwind from the reel or drum 23, the clockwise rotation of worm gear 45 will pull worm 44 and worm shaft 41 downwardly to a fully engaged position as shown in Figure 4. In this position of the worm 44, reel or drum 23 is positively locked against unwinding.

As a further safety means for holding reel or drum 23 against unwinding a pivoted pawl 46 is carried by the frame 11 and engages large spur gear 24. The frame 11 includes a loop or U-shaped member 47 which is fixed to one side of the frame and is disposed at right angles to the U-shaped member 15 for supporting a hand rail parallel to the boards or beams which are mounted on the cross piece 17.

In the use and operation of this winch the scaffold which, as an example, is a scaffold for use by bricklayers, will be disposed close to the ground. In order to provide a means whereby the cable 26 may be unwound so that the hook 27 may be secured to the frame of the building at an elevated point, the crankshaft 29 is shifted endwise to the intermediate or neutral position with the ball 36 engaging in groove 38. In this position of the crankshaft 29, gears 34 and 35 will be disengaged from their associated gears 24 and 40, respectively. At this time dog or pawl 46 will be raised from spur gear 24, and shaft 41 is manually moved upwardly so that worm 44 will be disengaged from worm gear 45. The disengagement of worm 44 from worm 45 may be readily effected by partially rotating reel 23 in a winding direction to raise worm 44 and shaft 41 upwardly to the ratchet position. With worm 44 manually held upwardly to a position as shown in Figure 5, cable 26 may be pulled through the ring or guide eye 13 until the cable is substantially unwound from reel 23.

If desired, the winch including the frame may be laid flat on the ground with the worm shaft 41 uppermost so that this shaft will gravitatingly move downwardly to released position with respect to the worm gear 45. The cable 26 may then be freely pulled from the reel 23.

With the winch structure in a vertical position and the upper end of cable 26 secured to a suitable support, the scaffold may be raised by turning crank 32. At this time crankshaft 29 will be disposed in the full lined position shown in Figure 3 with ball 36 engaging in groove 37. Gear

34 will be in mesh with large reel gear 24. Rotation of shaft 29 in a clockwise direction will effect rotation of gear 24 in a counterclockwise direction so that worm gear 45 will be constantly moving worm 44 and shaft 41 upwardly. The worm 44 will be constantly dropping downwardly by gravity to engage the teeth of gear 45 so that in the event crank 32 is released at any time worm 44 will instantly lock worm gear 45 against rotation. The locking position of worm gear 45 is shown in Figure 4.

As an added safety factor, handle 33 is slidable through the end of crank 32 and may be shifted inwardly to the dotted line position shown in Figure 1 wherein the handle 33 will be in contact with one side of the frame 11.

With spur gear 34 in mesh with spur gear 24 reel 23 can only be rotated to wind cable 26 thereon. In the event it is desired to unwind cable 26 from reel 23 with a load on the cable 26, crankshaft 29 is shifted inwardly until the ball 36 engages in groove 39. At this time bevel gear 35 will be engaged with bevel gear 40 of wormshaft 41. Rotation of crankshaft 29 will thereupon effect rotation of worm gear 45 and reel 23 in either a winding or unwinding direction. The worm and worm gear structure herein disclosed provides an irreversible lock for the reel shaft 22 so that this shaft will be automatically locked against rotation in an unwinding direction when worm 44 is engaged with worm gear 45.

What is claimed is:

A winch comprising a frame, a reel rotatably carried by said frame, a spur gear fixed relative to said reel, a worm gear fixed relative to said reel, a crankshaft, means carried by said frame supporting said crankshaft for rotary movement and for endwise adjustment, means releasably locking said crankshaft in selected endwise adjusted position, a spur gear fixed to said crankshaft and adapted in one position of the latter to engage said first named gear, a worm shaft, means carried by said frame rotatably mounting said worm shaft in substantially upright position, a worm on said worm shaft engageable with said worm gear, a bevel gear on said worm shaft, and a bevel gear on said crankshaft engageable with said first named bevel gear in another position of said crankshaft for rotating said reel in either direction through said worm and worm gear, rotation of said reel in a winding direction through said spur gears effecting endwise movement of said worm shaft whereby said worm will ratchet on said worm gear.

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