Feb. 14, 1956 H. S. CAMPBELL 2,734,717

HAND OPERATED HOIST CONSTRUCTION

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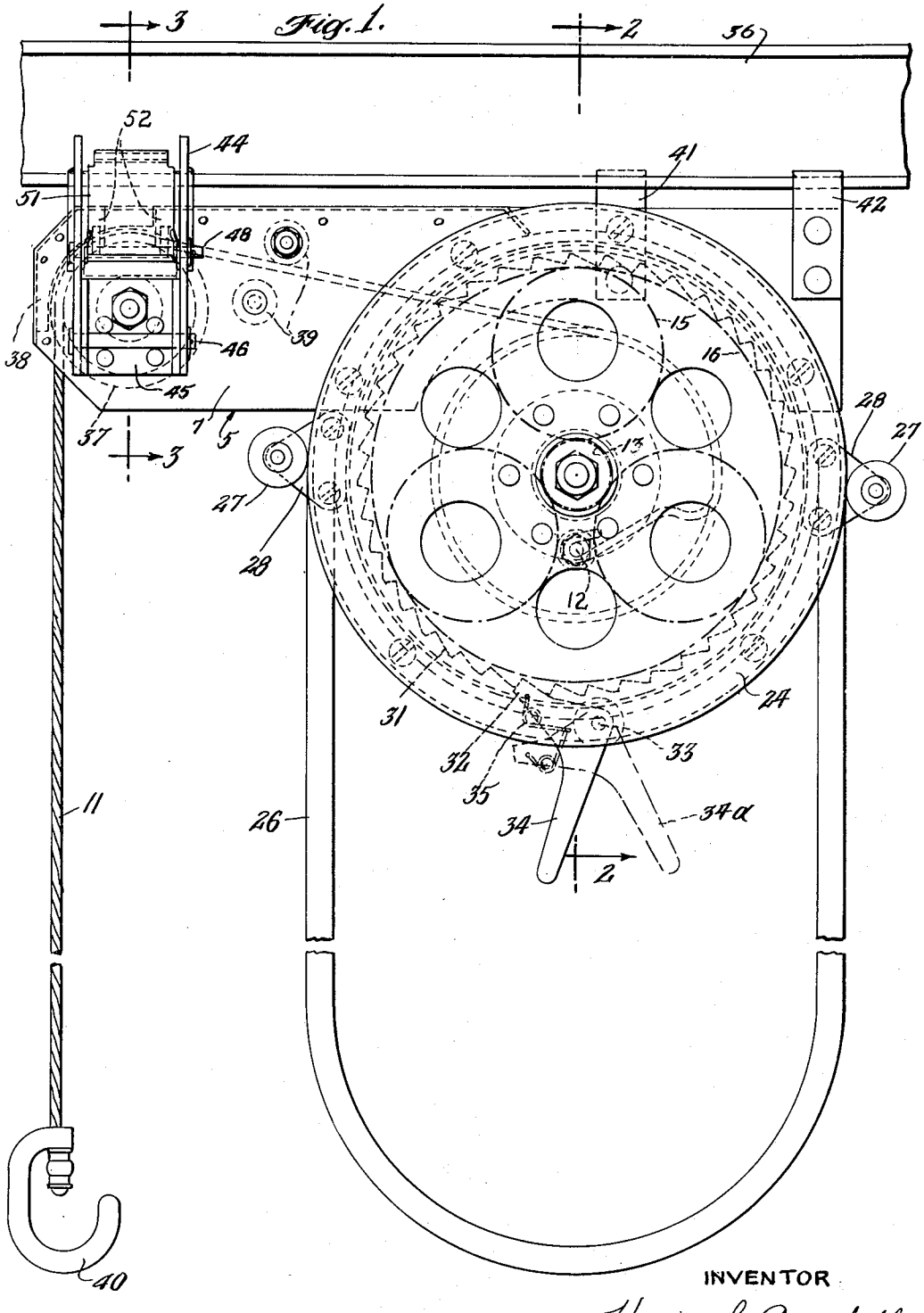
Fig. 1.



INVENTOR

Harris S. Campbell

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Fig. 2.

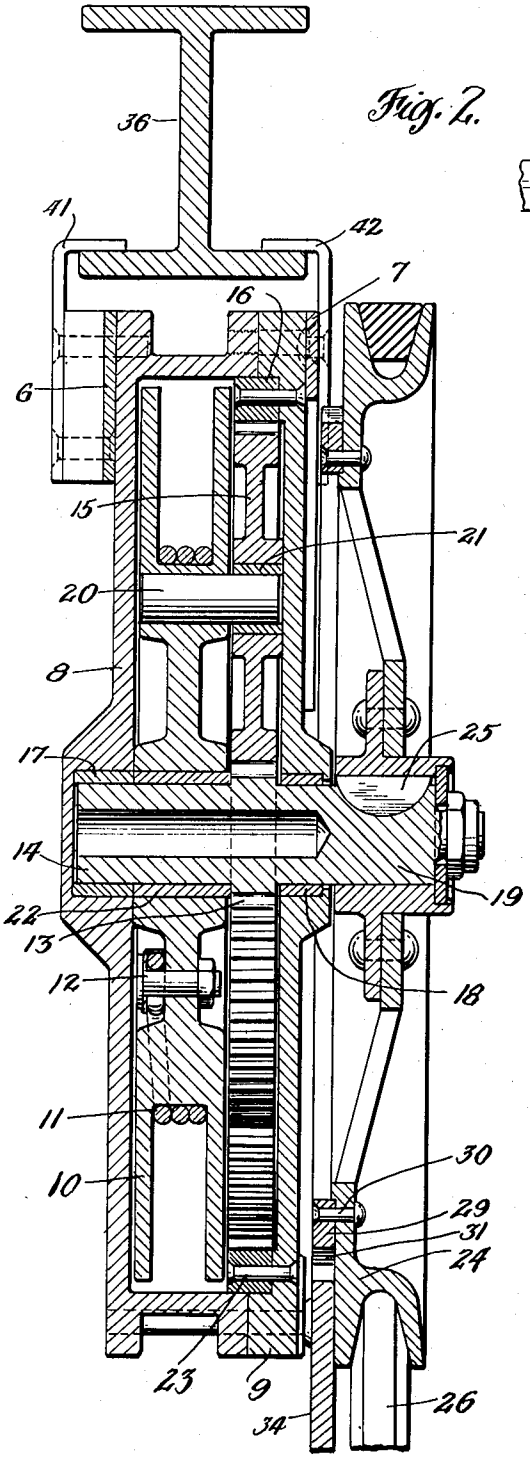


Fig. 4.

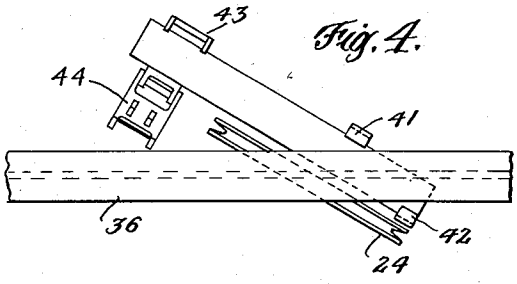
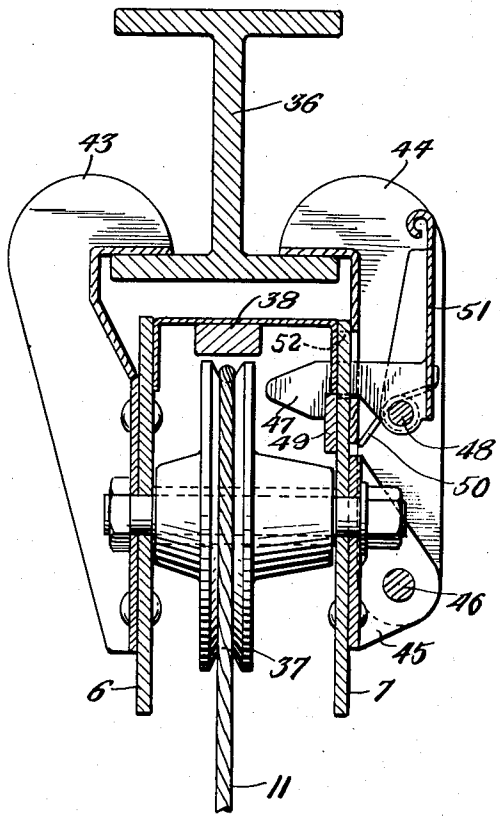


Fig. 3



INVENTOR

Harris S. Campbell

United States Patent Office 2,734,717 Patented Feb. 14, 1956

2,734,717

HAND OPERATED HOIST CONSTRUCTION

Harris S. Campbell, Bryn Athyn, Pa., assignor to Eastern Rotorcraft Corporation, Neshaminy, Pa., a corporation of Pennsylvania

Application March 8, 1952, Serial No. 275,488

2 Claims. (Cl. 254—169)

This invention relates to improvements in the construction of low capacity manually operated mechanical hoists.

It is a primary object of this invention to provide construction for hoists of this nature which will simplify the manufacture and reduce the weight and cost. Hoists of this nature are often used in aircraft to provide for lifting heavy bundles from the floor of the aircraft to an overhead rail or for loading articles from the ground into the aircraft. It is essential, therefore, that the weight of such hoists be kept at a minimum.

A specific object of the invention is the provision of simplified and improved hand engaging mechanism for the operation of the hoist. The present invention provides for the adaptation of a continuous V-belt member to operate the hoist in place of the commonly used heavy metallic chain member. For small size hoists of this nature, the minimum practical size chain member is not only relatively heavy and awkward but provides a less desirable hand engaging member than the fabric and rubber V-belt construction. The use of a V-belt further has the additional advantage of eliminating the possibility of damage which might be caused by the hand member striking or moving across frail packages or objects.

A further object is the provision of simplified mechanism for connecting the hoist to a supporting rail.

A still further object is the provision of a simple and accessible control mechanism for preventing inadvertent release of the load when the hand is removed from the actuating mechanism.

How these and other objects and advantages of the invention are attained will be clear from the following description of the drawings in which—

Figure 1 is a side elevational view of a hoist constructed in accordance with the present invention.

Figure 2 is a sectional view to an enlarged scale of the hoist taken in the direction of arrows 2—2, Figure 1.

Figure 3 is another sectional view through the extension of the hoist taken in the direction of arrows 3—3, Figure 1.

Figure 4 is a plan view to a reduced scale showing the manner in which the hoist is mounted in position on a rail.

Referring to Figures 1, 2 and 3 it will be seen that hoist of the present invention incorporates a frame 5 which is composed of side plates 6 and 7. The gear housing 8 and cover 9 are supported on the frame 5. The housing encloses a cable pulley, or drum 10, upon which the hoist cable 11 may be reeled. It will be noted that one end of the hoist cable 11 is anchored to the web of the drum 10 by means of an anchor bolt 12. To operate the drum 10, planetary gears composed of the sun pinion 13 which is attached to shaft 14, planet gears 15 and ring gear 16 are provided. The shaft 14 is supported in bearings 17 and 18 which are mounted in the housing 8 and the cover 9 respectively. One end 19 of the shaft 14 projects through the cover 9 to provide the axle by means of which the gear train is operated. The planet gears 15 are mounted

on shafts 20 which are anchored to the cable drum 10 and project therefrom to support a bearing 21 on which the planet gears 15 may rotate. The pulley 10 is also mounted upon a bearing 22 which is supported by the pinion shaft 14. The ring gear 16 is anchored to the cover member 9 by means of rivets 23.

To actuate the gearing an external pulley 24 is mounted on the projecting shaft 19 by means of a key member 25. Pulley 24 incorporates an annular groove in which V-belt 26 fits. Endless belt 26 provides the hand member by which manual operation of the hoist in either direction is accomplished. Roller guards 27 which are mounted at each side of the operating pulley 24 by means of brackets 28 maintain the V-belt in the proper position in the pulley groove and apply a slight pressure to the belt to improve the load transfer characteristics and thus prevent the slippage of the belt even when the tension load is applied to only one side of the belt.

In order to retain the hoist in any position of adjustment when supporting a load, a ratchet member 29 is attached to the inside face of the belt pulley 24 by means of rivets 30. Ratchet 29 incorporates angular teeth 31 which are proportioned to engage a pawl device 32, anchored to the housing by means of pivot 33. The pawl is shaped with an external portion to form a handle 34 by means of which it can be moved into or out of operative position. A spring device 35 which reacts between the pawl 32 and the cover 9 holds the pawl in an engaged position as indicated by the full line position in Figure 1. The reaction points of spring 35 are selected in such a manner that when the pawl is moved to disengaged position such as indicated by dotted outline 34*a*, the spring reaction passes over dead center with respect to pivot member 33 and thus retains the pawl in disengaged position. In this fashion the pawl may be retained either in closed or open position. When in closed position the pulley drum 24 may be rotated only in the direction to raise the load. Thus at any time the manual force is withdrawn from the belt 26 the load is held in position by the reaction through the pawl. To permit the load to lower the pawl is moved to release position and then the load is lowered under control of the operator.

With a hoist of the particular type shown, the hoist unit is supported on an overhead I-beam 36 as illustrated. In order to provide for raising the load to a point as close to the I-beam as possible, the extension frame 5 is provided. Extension 5 supports at its outer end the grooved pulley 37 (see Figures 1 and 3). Cable 11 passes from the drum 10 over the pulley 37 and is retained against dislodgment by a guard 38 which is supported on frame 5. Roller guide members 39 are supported also on frame 5 to guide the cable 11 as it passes from the drum 10 to the extension pulley 37 and these guide pulleys 39 serve to prevent tangling or jamming of the cable. A hook member 40 is connected to the lower end of cable 11 for the purpose of supporting the load to be lifted by the hoist.

In order to provide for attachment of the hoist unit to the supporting I-beam, stationary brackets 41 and 42 (see Figures 1 and 2) are attached to one end of frame 5 and additional brackets 43 and 44 are attached to the other end of frame 5 in the region of the extension pulley 37 (see Figures 1 and 3). Brackets 41, 42 and 43 are rigidly connected to the side plates 6 and 7 by means of rivets. Bracket 44 however is movably mounted on the side frame 7 by means of bracket 45 to which it is pivoted by pin 46. In order to retain the bracket 44 in closed position, a latch member 47 is pivotally mounted in the bracket 44 by means of pivot 48. Latch 47 extends through the frame plate 7 to engage bearing plate 49 to retain the bracket 44 in closed position. A spring 50 urges the latch 47 into an engaged position as illustrated. The forward end of latch 47 is shaped to permit it to

readily enter the openings 52 in the side plate 7. A handle part 51 is attached to the latch 47 to permit the operator to disengage latch 47. This in turn allows supporting bracket 44 to pivot about pin 46 and swing away from beam 36.

In Figure 4 the manner in which the hoist unit may be attached or removed from the overhead supporting beam is clearly illustrated. Here it will be seen that the brackets 41 and 42 are spaced at alternate longitudinal positions along the frame 5. This will also be observed in Figure 1. With the movable bracket member 44 swung down out of the way, the hoist may be brought up to the bottom of rail 36 in an angular position as illustrated in Figure 4, the position being selected to permit the flanges of the beam to pass between the brackets 41 and 42. In this position the hoist may then be swung around until it is parallel to the beam in which position the brackets 41 and 42 engage the upper surface of the flanges of beam 36 and also the bracket 43 engages the flange. The movable bracket 44 is then swung up into position so that it also engages the beam 36 and the latch 47 snaps into position to hold the bracket 44 securely in locked position. The hoist unit may be quickly removed from the beam by the reverse process merely by releasing latch 47 by handle 51 which permits twisting the hoist to release it from the beam. With this construction only one of the four supporting brackets need be movable.

From the foregoing description it will be evident that I have provided a simple and efficient light weight hoist unit which is particularly well adapted for use in handling loads in cargo aircraft. Because of its light weight and quick acting mounting structure it can be easily placed in position for operation or removed for storage purposes. By the use of the extension structure the load may be hoisted close to the bottom of the rail where it may be readily transferred to trolley or other supporting structure as desired. The use of the V-belt hand operating member provides an extremely desirable method of operating a hoist of this light weight construction inasmuch as the weight of the operating member is much less than that of a chain for this purpose and in addition it provides a member which is easily gripped by the operator's hand since the rubber and fabric construction does not tend to slip. The use of the particular belt guard roller devices causes the belt to remain in its operating groove and further provides suitable frictional action to permit operation without slippage in the groove. The simple latch mechanism construction shown provides for an effective load retention device which permits rapid attachment to or removal from the support.

I claim:

1. A manually operated hoist having a housing, reduction mechanism and a cable drum mounted in said housing, a pulley member supported by said housing, an endless belt member contacting said pulley member for hand engagement to operate said hoist, and an extension arm having a cable pulley mounted thereon, four supporting brackets for attaching said hoist to a rail, two of said brackets being fixed in staggered relationship at opposite sides of said hoist, two of said brackets being located in directly opposite relationship close to said cable pulley, one of the said last two brackets being fixed to said hoist and the other being pivotally mounted to swing down below the plane of the rail to provide for removal and attachment to the rail.

2. A hoist device having supporting structure connected thereto for attachment to a rail, said structure including four supporting brackets extending therefrom, two of said brackets being fixed in staggered relationship at opposite sides of said structure and two of said brackets being located in longitudinal spaced relationship with respect to said two fixed brackets, one of said longitudinally spaced brackets having a pivotal connection to the supporting structure to allow removal and attachment of the hoist by swinging said pivoted bracket below the plane of the rail.

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