Oct. 6, 1953 J. J. VODA 2,654,570

MILK CAN HOIST WITH FRICTION BRAKE

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Fig. 1.

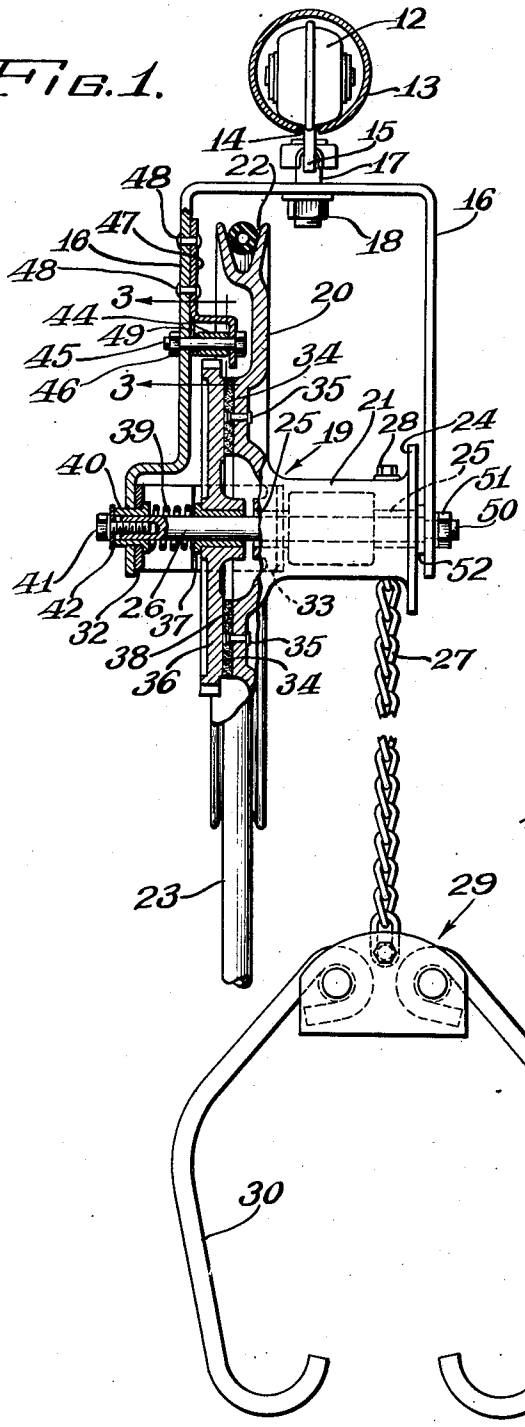


Fig. 4.

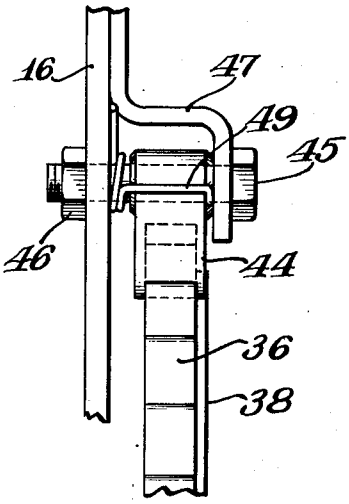
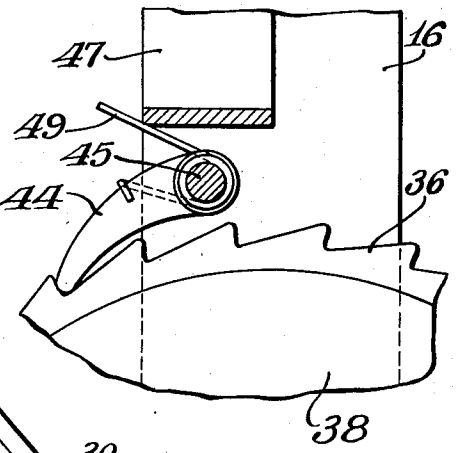


Fig. 3.



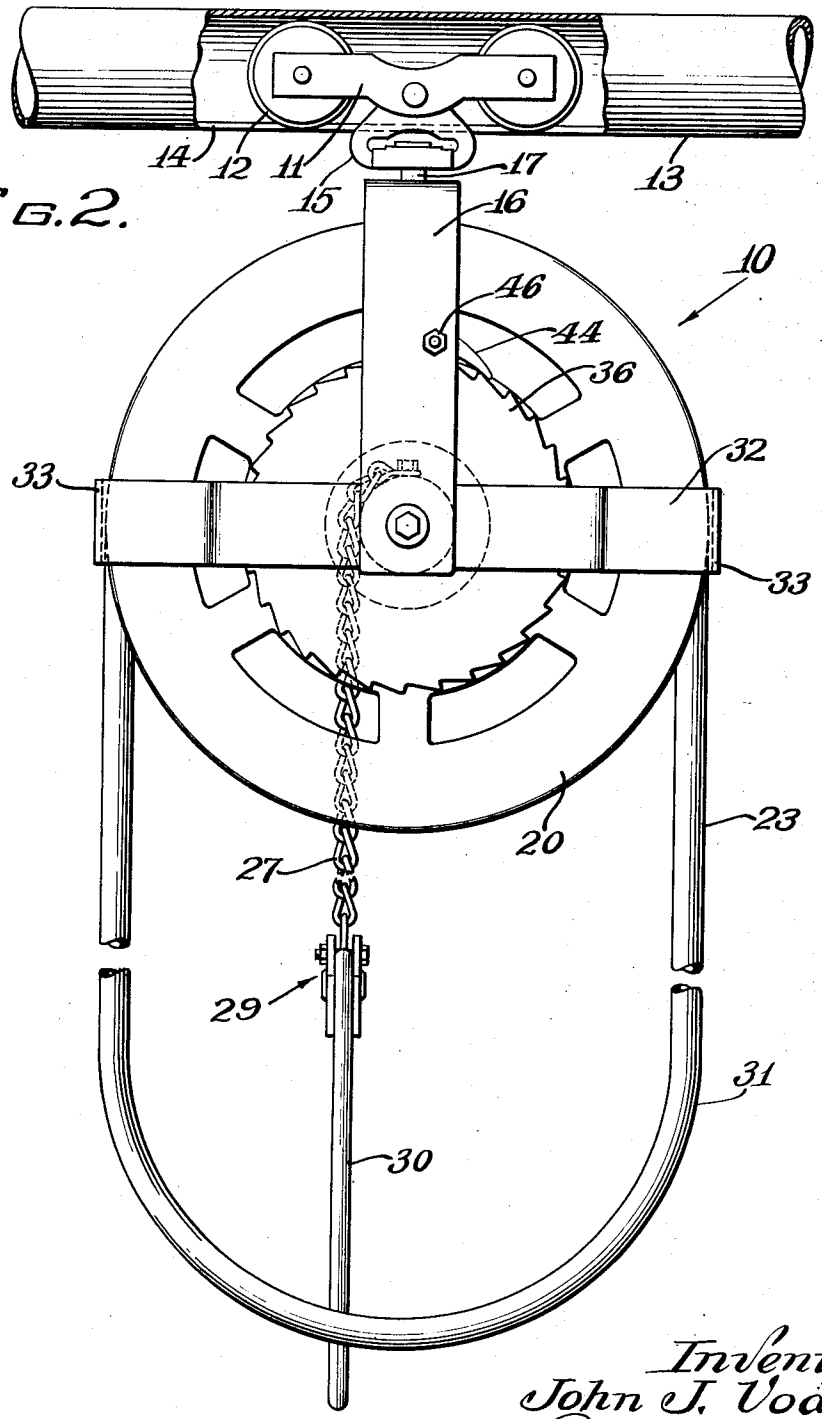
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FIG. 2.



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MILK CAN HOIST WITH FRICTION BRAKE

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6 Claims. (Cl. 254—169)

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This invention relates to hoisting devices but is more particularly directed to a hand-operated hoist which is suitable for lifting or otherwise raising such articles as milk cans and like equipment generally utilized around a dairy farm.

One of the most fatiguing tasks of the dairy farmer involves the lifting and movement from place to place of the filled transport-type cans so generally used for transporting milk. Heretofore, many devices have been provided to facilitate the operations incident to the loading and movement of such cans, but such conventional devices as have been proposed were generally too heavy, unwieldly and were not otherwise highly suitable for general farm use. It is the principal object of this invention, therefore, to provide a relatively light weight, hand-operated hoist which is comparatively inexpensive to manufacture and simple to operate. It is a further important object to provide a hoist equipped with a slip-clutch-type release mechanism which is operable by the operator for lowering the load as desired. Another object includes the provision of a friction engaging mechanism disposed between an integrally fashioned winding reel and hand sheave assembly and a ratchet gear held thereagainst by axially disposed resilient means.

Other objects and advantages will be understood and will become more apparent from the following description when read in conjunction with the accompanying drawings in which:

Fig. 1 is a front elevation, partially in section, of an improved hand hoist depicted as being suspended from an overhead track.

Fig. 2 is a side elevational view of the improved hoist.

Fig. 3 is a partial section, in enlarged dimension, taken on line 3—3 of Fig. 1 and shows the pawl and ratchet engaging feature of the device.

Fig. 4 is a front elevation of the pawl and ratchet gear portion of the device shown in partial section in Fig. 3.

Referring now to the drawings, particularly Figs. 1 and 2 thereof, it will be noted a hoist has been designated generally by the reference character 10. Said hoist may be suspended from a wheeled carriage 11 having horizontally spaced wheels or rollers 12 thereon and adapted for longitudinal movement within a tube-like track 13, in turn, supported from a building structure in any suitable manner. The tube-like track 13 is provided with a longitudinally extending slot 14 which provides clearance for a hook or stirrup 15, in turn, securely connected

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to the carriage 11. A bail-shaped bracket-like strap or support 16 is connected by means of a swivel bolt 17 and holding nut 18 to the stirrup or hook 15 and is thereby rotatably suspended therefrom.

The bracket 16 is adapted to support a unitary sheave and winding reel or drum indicated generally by the numeral 19. This assembly which, preferably, is integrally fashioned includes a sheave 20 and a winding reel or drum 21 extending laterally from one face thereof. The outer peripherial rim of the sheave is fashioned to provide a V-shaped groove or track 22 adapted to receive a flexible endless member such as the belt 23. The drum or winding reel 21 is generally cylindrical in shape and is provided with a flange 24 on the outboard or free end thereof. The sheave and drum assembly 19 has a transversely extending opening through the center thereof which is arranged to receive a flanged sleeve bearing member 25 that is rotatably supported on a shaft 26, in turn, supported at its opposite ends in the spaced apart arms of the bracket 16 so that said assembly will be free to rotate in a horizontal axis about said shaft.

A flexible element 27, which may be in the form of a chain, wire cable, or rope, has one end thereof connected, by some suitable means such as the stud bolt 28, to the winding drum or reel 21, while the opposite end of said element is connected to a grapple or hook 29 having arms 30 which may be hooked underneath the outwardly projecting handles of the transport-type milk can or other article to be lifted.

The sheave and drum assembly 19 may be rotated to wind the flexible cable member 27 on the drum 21 by means of manual pressure applied to the endless belt 23. Said belt is fashioned, preferably, with a tubular cross section utilizing a plastic tubing or extruded rubber hose and may be provided with a loop portion 31 which extends within easy reach of an operator. As best shown in Figs. 1 and 2 it will be noted said endless belt has a portion thereof that is continually in functional engagement within the V-shaped groove 22; hence any downward pull on the flexible belt 23 will cause rotation of the sheave 20 and its associated drum 21.

A horizontally extending strap-like belt guard 32, which may be affixed by any suitable means to the supporting bracket 16, is arranged to extend forwardly and rearwardly from said bracket while the forward and rearward edges of said strap are inwardly turned, as shown at 33, and adapted to provide guides or guards for the belt

23 and thus facilitate retaining said belt in the V-groove 22 of the sheave.

Affixed to the inner face of the sheave 20 is a layer of friction facing material 34. Said material may be affixed thereto by any suitable means, but as illustrated conventional countersunk rivets 35 are used for the purpose. Any of the well known clutch facing materials presently on the market may be employed for the facing proposed herein.

A ratchet gear 36 is positioned on the shaft 26 by means of a flanged bearing sleeve member 37. Said sleeve is tightly fitted into a transverse opening in said gear and thereafter rotatably disposed on said shaft so that said gear is free to rotate about the horizontal axis of the shaft in much the same manner as that of the sheave and drum assembly 19. One vertical face of said gear is finished, as by machining or the like, to provide a smooth plane surface 38 that is normal to the axis of the shaft 26 and this surface is arranged to frictionally engage the friction facing 34, on the sheave 20, for braking purposes as will presently be explained. Positioned in abutting relationship against the outer surface of the flange of said sleeve bearing 37 is a resilient member which, as illustrated, may be in the form of a coil spring 39 the opposite end of which abuts a flanged end of a sleeve bearing member 40 rotatably and slidably disposed in one arm of the supporting bracket 16. A spring washer may, if desired, be used in place of said coil spring 39. A stud bolt 41, having a retaining washer or spacer 42 therearound that abuts one end of the sleeve bearing 40, is adapted to be threadably received in one end of the shaft 26 so as to provide a simple means for increasing and decreasing the reactive force component of said coil spring 39. By varying the pressure of this spring it will be appreciated that the frictional engaging resistance between the smooth surface 38, of gear 36, and the facing material 34, of the sheave 20, may be modified or varied as desired.

The ratchet gear 36 is also arranged so that the teeth disposed around the periphery thereof engage a pawl 44 that is loosely positioned, by means of a bolt 45 and nut 46, between a bracket arm 47 and one leg of the support 16. Said bracket arm 47 is supported, in turn, by suitable means such as the rivets 48 on one leg of said supporting bracket 16. A spring member 49 wraps around the bolt 45 and over the top of the pawl 44 and, as so arranged, serves to constantly urge or maintain said pawl into engaging relation with at least one of the teeth of the ratchet gear 36, as best illustrated in Figs. 3 and 4.

The opposite end of shaft 26 is provided with a threaded and reduced end section 50 over which a nut 51 may be threaded to fixedly position said shaft in one arm of the support bracket 16. A flange 52 on end end of the sleeve bearing 25 may function as a space washer to provide clearance between the flanged end 24 of said drum and the proximate arm of the support bracket 16.

Normally the spring 49 urges the pawl 44 into locking relation with the teeth of ratchet gear 36, hence the device is usually locked or stabilized in the position last assumed by the drum and said associated gear member.

To operate the device the arms 30, of the grapple hook 29, are placed in position underneath the handles of a transport-type milk can, or similar article to be lifted, and then a downward force or pull is exerted on the right hand side,

as viewed in Fig. 2, of the endless belt 23. Such force will effect rotation of the sheave and drum assembly 19 and cause the chain 27 to wind around the drum 21 thus lifting the grapple hook 29 and any article fastened thereto. Since the axially disposed coil spring 39 constantly urges the smooth face 38, of ratchet gear 36, into frictional engagement with the friction facing material 34, on the sheave 20, it will be appreciated that said gear and sheave will then rotate as a unit in a clockwise direction, as viewed in Fig. 2. As the ratchet gear 36 rotates the pawl 44 overrides the teeth thereof, but as soon as the applied force is removed from the belt 23 the weight of the load will tend to rotate the drum in the opposite direction, whereupon the pawl 44 urged by the spring 49 falls into abutting relation with the radial portion of one of the teeth in said gear and locks the device against rotation of the drum in the opposite or counterclockwise direction. The device as thus locked will remain indefinitely in such position and the hoist may then be moved about from place to place by means of the wheeled carriage 11 and track 13.

When it is desired to lower the milk can, or any other article secured to grapple hook 29, the sheave 20 is rotated counterclockwise, as viewed in Fig. 2, by exerting a downward pull on the left hand side of the endless belt 23. Since the pawl 44 prevents the ratchet gear 36 from rotating in a counterclockwise direction there will be no rotation of the sheave until the force exerted on the belt is sufficient to overcome the frictional engaging resistance established between the surface 38 of said gear and the friction facing material 34 of said sheave. When this force is adequate there will be sufficient slippage of the braking device to permit the drum to unwind and lower the load. As soon as such external force is removed from the belt, however, the rotation of the drum ceases and the vertical position of the load will remain stationary until such force is again applied.

The coil spring 39 may be pre-stressed, as desired, either to compensate for wear of the facing material 34 or to permit different loads to be handled by the device, by merely turning the adjusting bolt 41 so as to increase or decrease the compressive force of said spring.

From the foregoing it will be appreciated that a highly effective and greatly simplified hand hoist has been provided. The proposed device is inexpensive to fabricate and will require a minimum of maintenance. Furthermore, the device as so arranged always provides positive control by the operator over the lifting and lowering of articles being handled and there is no so-called free or uncontrolled travel of the load.

Although only a preferred form of the invention has been illustrated and described it will be apparent to those skilled in the art that various modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

What is claimed is:

1. A hand hoist comprising, in combination: a support; a shaft mounted within said support; a sheave mounted on said shaft for rotation within said support; said sheave being fashioned with a central vertical web member having opposite faces thereon, and a peripherally extending rim therearound providing a track; a winding drum extending laterally from one face of said sheave web; a flexible hoist element connected to said drum and adapted for winding about said drum

during rotation of said sheave: said hoisting element extending outwardly from said drum for connection to an article to be hoisted; a friction disc mounted on the face of said web opposite that from which said drum extends; pawl and ratchet gear means mounted adjacent said sheave; said gear being adapted for rotation about said shaft, and for axial movement therealong; said ratchet gear being further arranged so that one vertical face thereof engages said friction disc; resilient means for urging the face of said gear into engagement with said disc; and means for rotating said sheave including a flexible endless belt having a portion in continual frictional engagement with said track and a portion extending below said sheave within reach of an operator.

2. The structure described in claim 1, wherein the resilient means includes an axially arranged coil spring disposed between the ratchet gear and one arm of the support.

3. The structure described in claim 2, further characterized by having said resilient means axially adjustable.

4. A hand hoist comprising, in combination: a support having a pair of spaced arms; a shaft having opposite ends thereof mounted in the arms of said support; a sheave mounted on said shaft for rotation within said support; said sheave having a vertical web member with opposite faces thereon, and a peripherally extending rim thereabout providing a substantially V-shaped groove; a winding drum extending laterally from one face of said sheave web; a flexible hoist element connected to said drum and adapted for winding about said drum during rotation of said sheave; said hoisting element extending outwardly from said drum for connection to an article to be hoisted; a friction disc affixed to the face of said sheave web opposite that from which said drum extends; a ratchet gear rotatably mounted on said shaft and disposed adjacent said friction disc; pawl retaining means mounted on said support, and including a first resilient member

for urging said pawl into engagement with said ratchet gear for restricting rotation of said gear to only one direction about said shaft; said ratchet gear being further disposed for axial movement along said shaft, and arranged so that a vertical face thereof frictionally engages said friction disc; means for axially urging said ratchet gear along said shaft including a second resilient member that is concentrically disposed with respect to said shaft, and an abutting member for receiving in abutting relation one end of said second resilient member; said abutting member being slidably positioned over one end of said shaft and additionally slidably disposed within one arm of said support; and means for rotating said sheave including a flexible endless belt having a portion in continual frictional engagement with said V-shaped groove and a portion extending below said sheave within reach of an operator.

5. The structure described in claim 8, further characterized by having means cooperative with one end of the shaft for axially moving the abutting member therealong.

6. The structure described in claim 9, wherein the cooperative means includes an axially disposed member threadably mounted in a threaded recess in the center of the shaft, and having an enlarged head extending beyond the end of the shaft for engaging one end of the abutting member.

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