Aug. 14, 1962 D. D. BEEBE 3,049,338

RATCHET HOIST

Filed April 25, 1960

FIG. 1

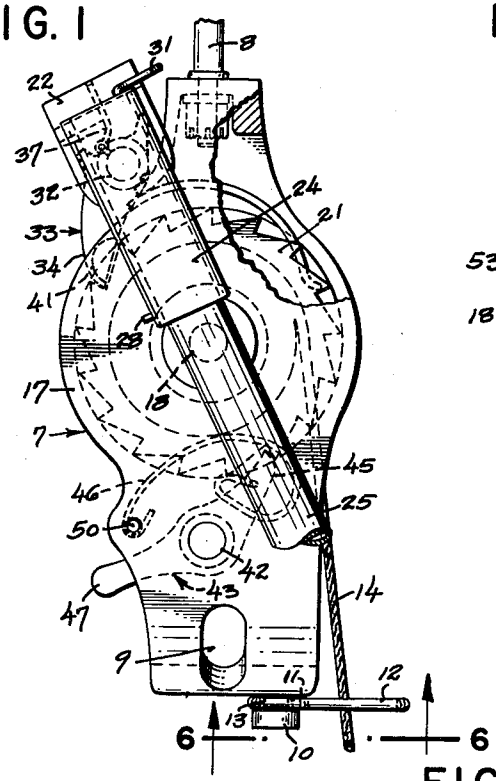


FIG. 2

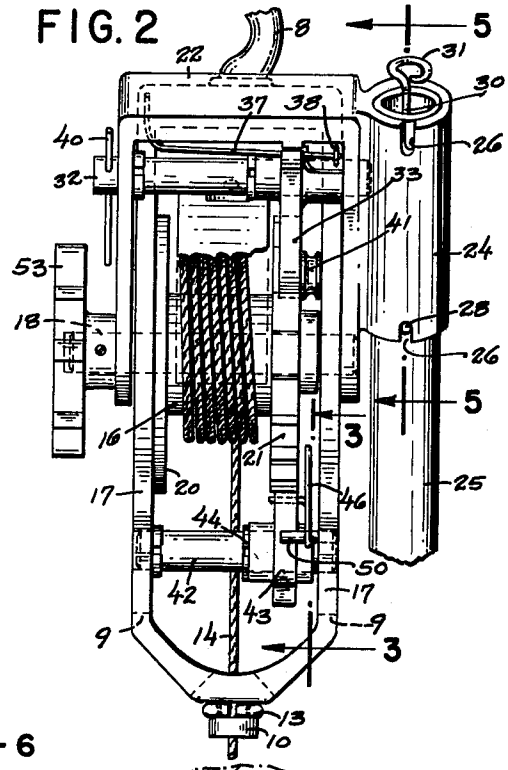


FIG. 4

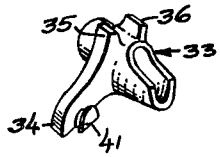


FIG. 3

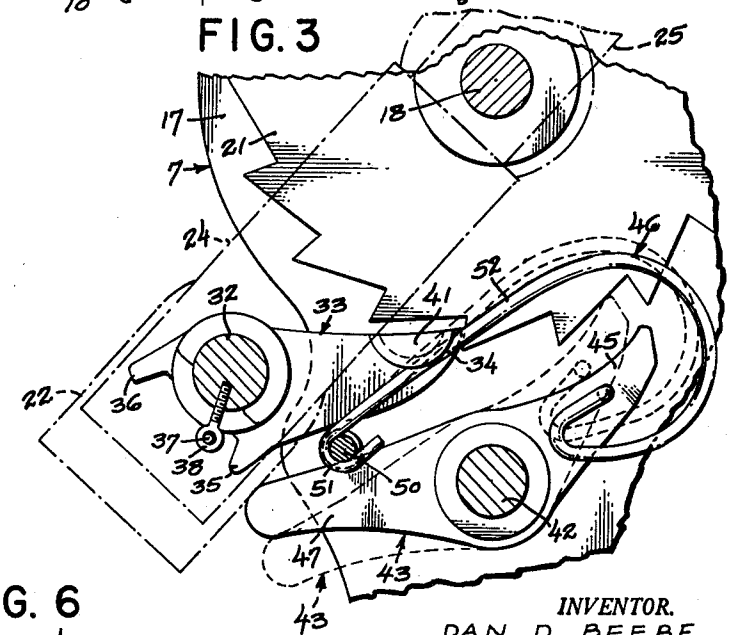


FIG. 5

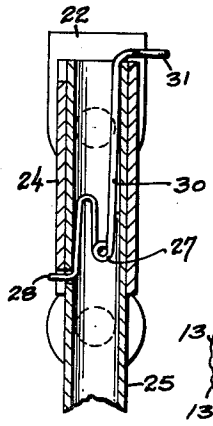
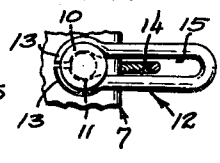


FIG. 6



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RATCHET HOIST

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8 Claims. (Cl. 254—167)

This invention relates to a ratchet hoist, and for its general object aims to provide a sturdy hoist comparatively light in weight, of simple and inexpensive construction, and which is especially efficient in winding and unwinding cable under load pressure. The present application is a continuation-in-part of application filed January 25, 1960, Ser. No. 4,503, now abandoned.

With these objects in view and otherwise looking to the provision of a ratchet hoist incorporating structural refinements over existing hoist designed to function in a generally similar manner, the invention consists in the novel construction and in the adaptation and combination of parts hereinafter described and claimed.

In the accompanying drawing:

FIGURE 1 is a fragmentary end elevational view with parts in section, illustrating a ratchet hoist constructed to embody preferred teachings of the present invention.

FIG. 2 is a fragmentary side elevational view thereof.

FIG. 3 is a fragmentary transverse vertical sectional view drawn to an enlarged scale on line 3—3 of and showing the ratcheting mechanism of the hoist in the position when the cable is being let out while sustaining a load.

FIG. 4 is a perspective view of the feed pawl used in the present hoist.

FIG. 5 is a fragmentary transverse vertical sectional view on line 5—5 of FIG. 2; and

FIG. 6 is a fragmentary underside view from the vantage point indicated at 6—6 in FIG. 1.

Referring to said drawing, the numeral 7 designates a cast cheek-frame having integral cross-bars at each of the two ends. An anchoring hook 8 is journaled in one of said cross-bars for swivel movement about the longitudinal axis of the frame. The other cross-bar has two closely spaced elongated openings 9 located in substantially the median longitudinal vertical plane of the frame one at one side and the other at the other side of the median transverse vertical plane of the frame. Spaced to one side of said longitudinal vertical plane substantially on said transverse vertical plane the casting presents an integral downwardly projecting button 10 attached to the bottom cross-bar by a reduced shank 11. A fairleader fitting 12 produced from a length of heavy-gauge wire bent upon itself and formed so as to provide a key-hole opening (see FIG. 6) is attached to the button by springing the terminal ends 13 of the fitting over the shank. More particularly, said fitting has its free ends 13 bent so as to produce opposing hooks which act in complement to form a circular opening arranged to catch over the shank. The running end of a cable 14 which is wrapped about the winding drum of the present hoist is threaded through the eye which the exposed long slot 15 of said fitting produces. Such running end carries a terminal hook (not shown) which may be attached directly to a load or such hook may, for reduction purposes, be dead-ended through said openings 9 of the frame, in such case looping the running end and attaching the load to a sheave received in the bight of said loop.

The referred-to winding drum is denoted by 16 and occupies a position between the two cheeks 17 of the frame proximal to that end of the latter which carries the anchoring hook 8. The drum is fixed upon a rotary cross-shaft 18 which is journaled in said frame cheeks with each of the two ends protruding well beyond the external face of the concerned cheek. The winding surface of the drum

is made integral with and lies between an annular flange 20 and a ratchet wheel 21.

The cheek-frame is straddled by a yoke 22 having its arms pivoted to said protruding ends of the cross-shaft 18 for reciprocal motion through an approximate quarter-circle swing. A hollow cylinder 24 open at both ends is formed integral with the yoke upon the exposed face of one of the arms. This cylinder is disposed so that its axis lies radial to the axis of the cross-shaft, and functions as a socket for an operating lever 25. Said cylinder, or socket-piece as it will be hereinafter termed, has its two ends each notched, as at 26, at diametrically opposite sides. The operating lever is a substantial pipe section, and within the hollow center carries a wire sear spring which functions as a ready-release catch between the lever and the socket-piece. Such wire spring (see FIG. 5) has a center coil 27. From the coil one branch is bent upon itself and thence projects by an end 28 radially of the lever through a hole which is spaced from the root extremity of the lever a distance moderately less than the length of the socket-piece. The other branch is given a substantial L-shape with one leg 30 extending from the coil longitudinally of the lever to the root-end opening thereof, from whence the other leg 31 extends transversely and by the spring action of the coil is yieldingly urged in an outward direction to overhang the end. The leg 31 has a length equal to or less than the diameter of the lever, consequently permitting such end to be pressed inwardly against the spring thrust of the coil in a degree sufficient to clear the outer wall. It will be thus seen that the lever can be introduced to the socket from either end of the latter, the pin-forming end 28 of the sear spring engaging in a related one of the notches 26 to hold the lever both against rotation and displacement in one endwise direction while the out-turned leg 31 holds the lever against endwise displacement in the other direction.

The yoke has a shaft 32 extending between the yoke-arms, and a feed pawl 33 is freely pivoted on this shaft in the substantial plane of the ratchet wheel so that a dogging end 34 of such pawl engages the teeth of the ratchet wheel. The feed pawl has two horns 35 and 36 projecting from the end thereof opposite the dogging end. These horns are spaced apart circumferentially of the pawl. A wire spring 37 traverses the space therebetween with one end anchored to the yoke and the other end caught in the eye of a bolt 38 threaded in the shaft 32. An end of the shaft is exposed beyond the yoke at the side of the latter opposite the cylindrical socket-piece 24. A cross-pin 40 is secured to this end, enabling the shaft to be turned at will so as to flip the wire spring against either the horn 35 or the horn 36, selectively. The function of the wire spring is to bias the pawl either in or out of engagement with the teeth of the ratchet wheel, depending upon which of the two horns is pressed by the spring. For a purpose later to be described, the feed pawl 33 has an ear 41 jutting laterally from the outer face, such ear having an arcuate bottom profile with the underside grooved concave in cross-section.

Between said ratchet wheel and the lower end of the cheek-frame there is provided a pivot shaft 42 traversing the two cheeks. A holding pawl 43 for the ratchet wheel is pivoted intermediate its ends to this shaft, the pawl being properly positioned by a snap-ring 44. One arm 45 of the pawl provides a buttress tip urged by a bowed wire spring 46 into dogging engagement with the ratchet wheel. Such dogging tip may be disengaged from the ratchet teeth, against the yielding opposition of the spring 46, either by manually lifting the other arm 47 or, in a manner to be described, by action of the feed pawl 33. Lift travel of said arm 47 is limited by a stud 50 which is rooted in the proximal cheek of the frame and projects into the travel path of said arm 47. This stud has a

circumferential groove engaging a terminal loop **51** of the wire spring **46** for anchoring one end of the spring. Such spring, which has its other end lodged in a side socket provided by the arm **45** of the holding pawl, has its bowed back section **52** overlying the pivot shaft **42** in the transverse vertical plane occupied by the saddling ear **41** of the feed pawl and in a position to be engaged by the latter as said feed pawl approaches the locking pawl. The load characteristic of the spring **46** acts to hold the loop **51** upon the anchoring stud **50** as well as urging the dogging arm against the ratchet wheel.

The functioning relationship between the feed pawl and the holding pawl can be explained as follows:

Upon reciprocally moving the yoke in a counterclockwise direction, considered from the vantage point of FIG. 1, the feed pawl lodges behind a tooth of the ratchet wheel and causes the drum to responsively turn in a cable-winding direction, the holding pawl **43** simply ratcheting over successive teeth as spring **46** performs its normal function of biasing the dogging arm **45** against the wheel. In the clock-wise return motion the holding pawl lodges against a tooth of the wheel while the feed pawl ratchets over the then stationary teeth. Should it be desired to let out the cable while under load the action is performed by short-stroke reciprocal motion of the yoke at the low end of its permitted travel. Backing off one tooth at a time, the ear **41** of the feed pawl in this case acts during the counterclockwise stroke to press downwardly against the bowed back section **52** of spring **46**. This responsively retracts the dogging end of pawl **43** from the ratchet wheel and as the yoke is then swung backwardly (clockwise) a distance of one tooth or more the ratchet wheel responsively backs off in unison a single tooth before the ear releases the spring **46** and permits the latter to again perform its normal function of pressing the holding pawl against the ratchet wheel.

The cross-shaft **18** protrudes beyond the yoke **22** at the end of the latter opposite the socket-piece **24**. A notched hand-wheel **53** is fixed to this protruding end, its purpose being to either take up slack before picking up a load, without ratcheting the drum, or to pay out cable. In turning the drum by means of said hand-wheel, the feed pawl is disengaged from the ratchet wheel by causing the spring **37** to press against the horn **36**, this action being performed by manually twisting the shaft **32** an approximate quarter-turn.

The invention and the manner of its operation should be clear from the foregoing. Minor changes in the details of construction can be resorted to without departing from the spirit of the invention, wherefor it is my intention that no limitations be implied and that the hereto annexed claims be given the broadest interpretation to which the employed language fairly admits.

What I claim is:

1. A ratchet hoist comprising a cheek-frame, a winding drum journaled for rotation between the cheeks of the frame and having a ratchet wheel turning in unison therewith, a yoke journaled from the frame for reciprocating forward and return swing motion about an axis coinciding with the rotary axis of the drum, a shaft extending between the arms of said yoke, a feed pawl on said shaft biased into ratcheting engagement with the ratchet wheel, a shaft extending between the cheeks of the frame, a holding pawl carried by the last-named shaft for pivot movement into and out of ratcheting engagement with the ratchet wheel, a wire spring anchored by one end to the frame and attached by its other end to the holding pawl and by its spring action normally urging the holding pawl into said ratcheting engagement, said spring having an arched back so disposed as to be engaged directly by the feed pawl as the latter nears the end limit of its forward travel and by such engagement pressing the holding pawl out of said ratcheting engagement with the ratchet wheel for the working interval necessary to back off said ratchet wheel a single tooth as the yoke initially swings in its return stroke of reciprocation, the holding pawl having a width appreciably less than the span between the cheeks of the frame and admitting to slide movement along said shaft from a normal operating position closely adjacent one cheek to a spring-assembling position providing a space of substantial width therebetween, means being provided for releasably holding said pawl in said operating position, said spring having its said anchored end bent back upon itself to produce a parallel-sided slot arranged to be slipped over a grooved pin constituting the frame anchor and by such slip fit providing a quick-release mounting for the spring, the other end of the spring presenting a terminal portion bent outwardly normal to the plane occuplied by the spring and being arranged in use to be removably lodged in a mating pocket bored in the working arm of the holding pawl, the spring, during operation of the hoist, occupying a protected position in the narrow space provided between the holding pawl and said cheek to which the holding pawl is closely adjacent.

2. The hoist recited in claim 1 in which means are provided upon one end of the frame for localizing the frame, the frame having an integral button projecting beyond the other end and attached to the frame by a reduced shank of circular cross-section, and a fitting journaled for swing movement on said shank and presenting an eye receiving the working end of a cable wound on the drum so that the fitting functions as a fairleader for the cable.

3. Structure according to claim 2, said fairleader being comprised of a length of heavy-gauge wire bent upon itself with the two branches which are thereby produced extending in spaced parallelism to one another for a substantial portion of their length and at the free ends being each formed with a terminal hook which acts, one said hook in conjunction with the other hook, to produce a circular opening of a diameter approximating that of the shank, said terminal hooks being sprung onto said shank.

4. The ratchet hoist recited in claim 1 having a hollow cylindrical member open at both ends and integrally secured upon an exposed face of one of the side arms of the yoke in a position placing its axis radial to the swing axis of the yoke, and a lever for activating said yoke socketed in said hollow center of the cylindrical member from either end of the latter selectively, means being provided for releasably securing the lever in said socketed position.

5. A ratchet hoist according to claim 4, the means last recited comprising a sear spring carried by the lever with one end holding the lever against displacement from the socket in one endwise direction and the other end holding the lever against displacement in the other endwise direction.

6. In a ratchet hoist, the combination of a cheek-frame having a winding drum journaled for rotation between the cheeks thereof, a hollow cylindrical arm member open at both ends and journal-mounted from the frame exteriorly of one cheek thereof for reciprocating forward and return motion about an axis coinciding with the rotary axis of the drum, the axial line of said cylindrical member lying radial to said rotary axis, a ratchet connection between said arm member and the drum causing the drum to turn in response to said reciprocating motion of the arm member, a lever for activating said arm member socketed in the hollow center of the latter from either end thereof selectively and itself provided with a hollow center, and means for releasably securing the lever in said socketed positions comprising a sear spring received in the hollow center of the lever with one end holding the lever against displacement from the socket in one endwise direction and the other end holding the lever against displacement in the other endwise direction.

7. A ratchet hoist comprising a cheek-frame, a winding drum journaled for rotation between the cheeks of the

frame and having a ratchet wheel turning in unison therewith, a yoke journaled from the frame for reciprocating forward and return swing motion about an axis coinciding with the rotary axis of the drum, a shaft extending between the arms of said yoke, a feed pawl on said shaft biased into ratcheting engagement with the ratchet wheel, a shaft extending between the cheeks of the frame, a holding pawl carried by the last-named shaft for pivot movement into and out of ratcheting engagement with the ratchet wheel, a wire spring anchored by one end to the frame and attached by its other end to the holding pawl and by its spring action normally urging the holding pawl into said ratcheting engagement, said spring having a portion thereof so disposed as to be engaged directly by the feed pawl as the latter nears the end limit of its forward travel and by such engagement pressing the holding pawl out of said ratcheting engagement with the ratchet wheel for the working interval necessary to back off said ratchet wheel a single tooth as the yoke initially swings in its return stroke of reciprocation, the holding pawl having a width appreciably less than the span between the cheeks of the frame and admitting to slide movement along said shaft from a normal operating position closely adjacent one cheek to a spring-assembling position providing a space of substantial width therebetween, means being provided for releasably holding said pawl in said operating position, the end of the spring which is attached to the holding pawl presenting a terminal portion bent outwardly normal to the plane occupied by the spring and being arranged in use to be removably lodged in a mating pocket bored in the working arm of the holding pawl, the spring, during operation of the hoist, occupying a protected position in the narrow space provided between the holding pawl and said cheek to which the holding pawl is closely adjacent, the engagement between the feed pawl and the spring being afforded by an ear which juts laterally from the feed pawl on the dogging end thereof and has a groove into which the engaged portion of the spring fits and holds said engaged portion against displacement in a direction lateral to the feed pawl.

8. The hoist recited in claim 7 in which means are provided upon one end of the frame for localizing the frame, the frame having an integral button projecting beyond the other end and attached to the frame by a reduced shank of circular cross-section, and a fitting journaled for swing movement on said shank and presenting an eye receiving the working end of a cable wound on the drum so that the fitting functions as a fairleader for the cable.

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