Nov. 21, 1944. E. B. MOORE 2,363,138

REVERSIBLE HAND OPERATED WINDLASS

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Fig. 1

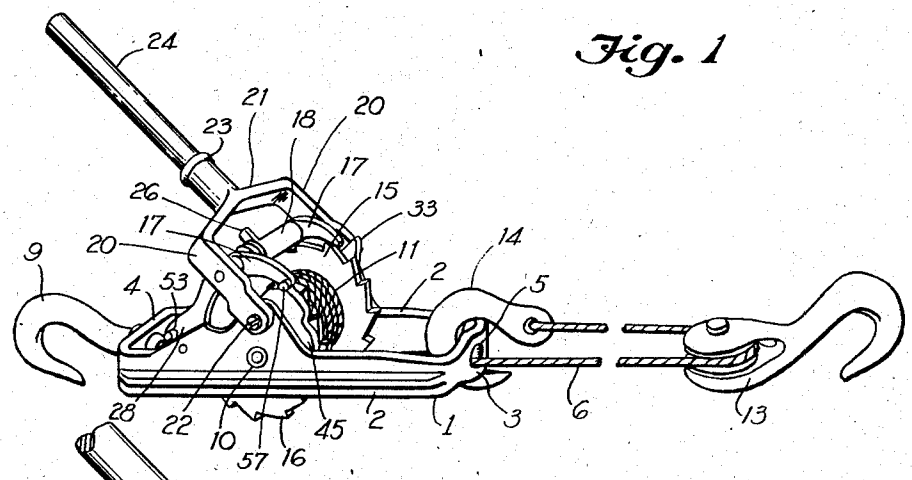


Fig. 2

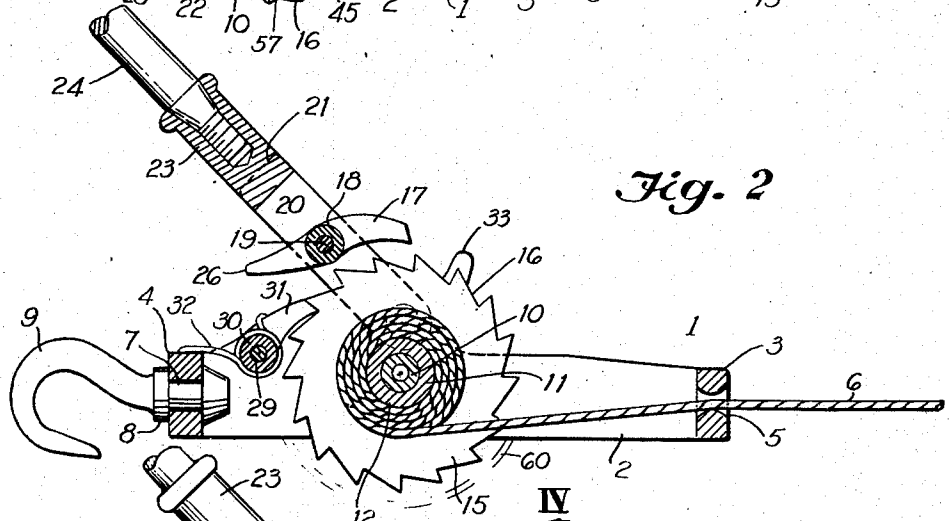
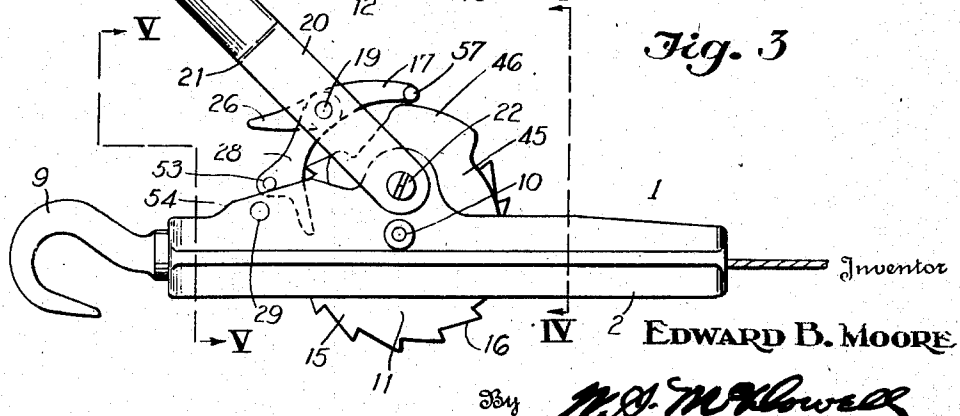


Fig. 3



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Fig. 4

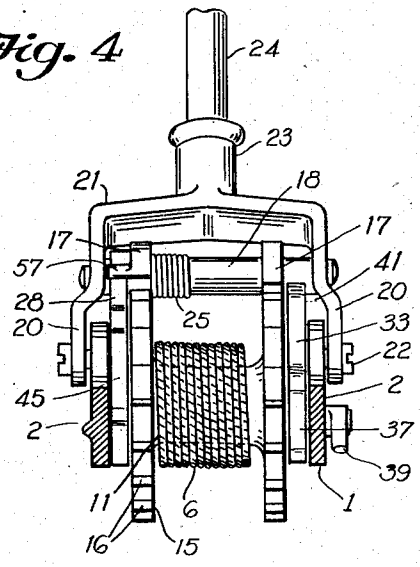


Fig. 5

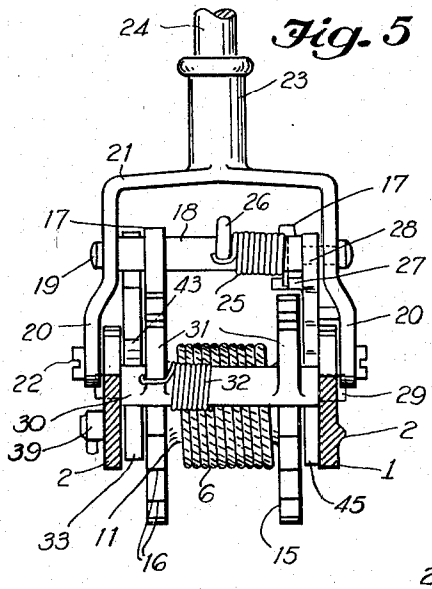


Fig. 6

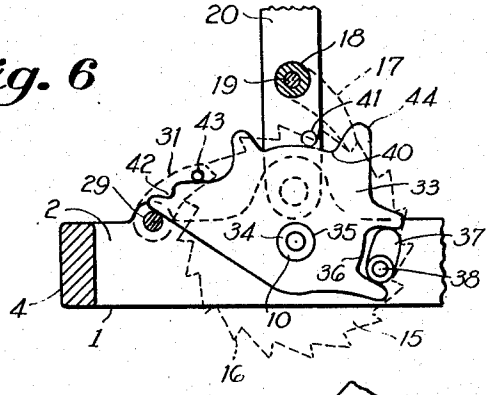


Fig. 7

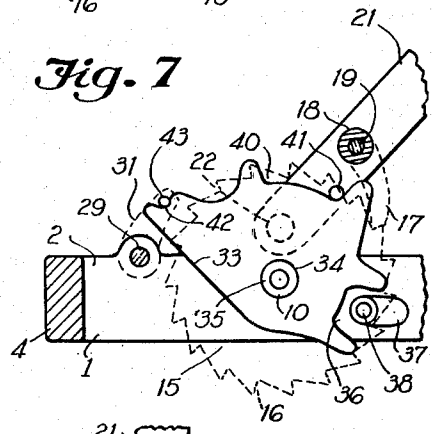


Fig. 8

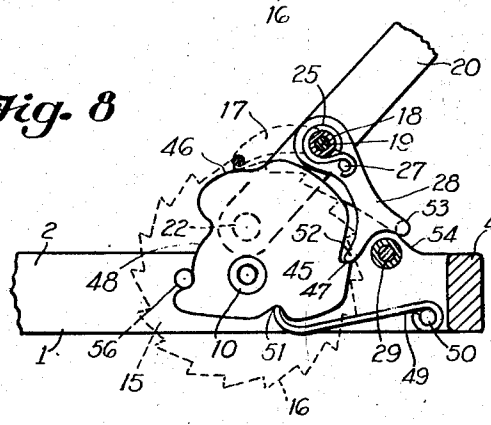
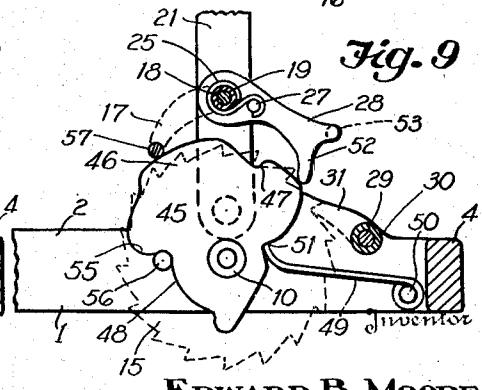


Fig. 9



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UNITED STATES PATENT OFFICE

2,363,138

REVERSIBLE HAND-OPERATED WINDLASS

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Application July 15, 1943, Serial No. 494,876

6 Claims. (Cl. 254—164)

The present invention relates to improvements in power-applying windlasses having particular reference to a portable windlass in which rotary motion is imparted to a cable-spooling drum through pawl and ratchet mechanism, the latter being operated by a manually oscillatory lever. Such windlasses, known commercially as power pullers, are used advantageously in capacities requiring moving or lifting of heavy equipment or objects of many different kinds, such as machine tools, in the loading and unloading of freight on or from transportation vehicles, in oil field operations, in applying tension-producing forces to fencing, telephone lines, and in various other capacities in which powerful mechanical forces are needed by manual operators to perform useful work.

In prior devices of this character, considerable difficulty has been encountered, particularly in stretching or tension-producing operations, in controllably releasing the tensioning forces developed by such a windlass. Usually this release has been effected by manually lifting the stop pawls from engagement with the ratchet teeth of the cable drum. Such an operation permits, in many instances, of a too sudden and uncontrolled release of the tensioning energy in the power-imparting cable of the windlass and objects or bodies joined therewith, frequently causing various types of damage or producing other undesired operating conditions.

It is, therefore, an object of the present invention to provide a windlass, or power puller, of the character set forth wherein the rotation of the cable drum is rendered reversible by normal operations of the oscillating lever, so that after the drum cable has been tensioned to a predetermined degree, the strain thereon may be relieved or removed by the actuation of lever operated pawl-controlling elements, the latter functioning to release cable tension in a controlled and regulable manner.

Other objects of the invention reside in a windlass or power puller of a sturdy, compact and efficient construction and one composed of few and simple parts which are not likely to break, become out of order or to require unusual care in their maintenance.

For a further understanding of the invention, reference is to be had to the following description and the accompanying drawings, wherein:

Fig. 1 is a perspective view of a power puller or windlass formed in accordance with the present invention;

Fig. 2 is a vertical longitudinal sectional view taken through the windlass;

Fig. 3 is a side elevational view thereof;

Fig. 4 is a vertical transverse sectional view taken on the plane indicated by the line IV—IV of Fig. 3;

Fig. 5 is a similar view, taken on the plane indicated by the line V—V of Fig. 3;

Fig. 6 is a detail vertical sectional view disclosing the drum-reversing latch, the latter being disclosed in its working position enabling the drum of the windlass to wind its associated cable thereon;

Fig. 7 is a similar view, disclosing the latch in its second working position permitting the unwinding of the cable from the drum;

Fig. 8 is a detail vertical sectional view disclosing the shiftable spring-pressed cam used in controlling the operation of the lever-actuated feed pawls, the cam being shown in its retracted position permitting the feed pawls to engage the ratchet teeth of the cable drum;

Fig. 9 is a similar view disclosing the cam in its advanced position in which the feed pawls are maintained out of engagement with the drum ratchet teeth.

Referring more particularly to the drawings, the windlass comprising the present invention is formed to include a substantially rectangular frame 1, embodying spaced side bars 2 which terminate at their forward ends in a transverse front bar 3 and at their rear ends in a transverse rear bar 4, the front bar being provided with an aperture 5 through which is passed a cable 6. The rear bar 4 is formed with an opening 7 in which the shank 8 of a mounting hook 9 is swiveled. In the use of the windlass, this hook may be attached to any suitable support so that the windlass may be maintained substantially stationary during its operation.

A stationary drum axle 10 has its end portions received in transversely aligned openings provided intermediately of the length of the frame side bars 2. Mounted for rotation on the axle 10 is a cable-spooling drum 11, to which the inner end of the cable 6 is securely attached as at 12. The cable is adapted to be wound or unwound on or from the drum 11, and extends through the aperture 5 to a suitable object or body to which a pulling force is to be applied. In Fig. 1 of the drawings, the cable has been shown as extending around the pulley of a sheave block 13, having its outer end secured to a hook 14 removably engaged with the front bar 3. Such an application is, of course, by way of illus-

tration and the cable may be otherwise connected or arranged to perform particular tasks.

In a preferred form of the invention, the side-forming walls 15 of the drum have their outer peripheral portions formed with ratchet teeth 16. Engageable with these teeth are the outer ends of a pair of feed pawls 17. These pawls may be integrally formed at the ends of a tube 18, the latter being rockably mounted on a journalling rod 19, which has its ends positioned in the side arms 20 of a lever yoke 21. The lower ends of the arms 20 are pivotally united as at 22 to the side bars 2 of the frame 1 at positions immediately above the drum axle 10. The upper end of the yoke terminates in a socketed extension 23 and the handle 24 of the operating lever has removable threaded engagement with the extension 23. A coiled spring 25 surrounds the tube 18, and one end of the spring engages with a finger extension 26 formed with said tube midway of its length while the other end of said spring is engaged with a pin 27 extending inwardly and laterally from a detent 28, the latter being pivotally supported by one end of the tube 18 and its function will be described hereinafter. The spring 25 by being thus mounted serves to maintain positively the feed pawls in contact with the ratchet teeth 16 of the drum, or to urge the pawls toward such engagement when actual engagement is prevented.

Extending transversely of the frame 1 to the rear of the axle 10 is a rod 29, the latter having its ends supported in openings provided in the side bars 2 of the frame 1. Mounted on the rod 29 is a tube 30, the latter being formed at its ends with integral forwardly extending stop pawls 31. These pawls have their outer ends normally engaged with the ratchet teeth 16 of the cable drum, in order to prevent reverse rotation of said drum when the cable 6 is being wound thereabout. Such engagement may be positively maintained, although the force of gravity may be used, by providing the tube 30 with a coiled wire spring 32, one end of said spring engaging with one of the stop pawls, while the other end of the spring is connected to the rear bar 4 of the frame 1.

The construction thus far described is that which is employed commonly in power windlasses of the manually operated type. For example, reference may be had to my former Patent No. 1,206,019, issued November 28, 1916. Such a windlass will apply the necessary force to its cable so that one man may perform the work usually required of several men. It will be seen that upon the forward oscillation of the lever, the feed pawls will engage with the ratchet teeth of the cable drum to rotate the latter in a direction winding the inner portions of the cable about the drum. The stop pawls function to hold the drum against reverse rotation when the operating lever is being rocked rearwardly on its idle stroke. If a cable of such an ordinary windlass is under tension, difficulty is frequently encountered in releasing or reducing such tension. Heretofore, this has been done by manually rocking the feed or stop pawls to hold the same out of engagement with the ratchet teeth of the cable drum.

It will be seen, however, that with this mode of operation, if the cable is under any considerable degree of tension, the release of the pawls from engagement with the ratchet teeth will cause the drum to rotate rapidly, unwinding the cable therefrom. This rapid release of the cable is often undesirable and is apt to result in injury to objects or bodies connected therewith. As previously stated, it is one of the purposes of the present invention to provide improved means for effecting a controlled release of the cable while it is under tension, either at the conclusion of a given operation, or if an excess amount of tension has been applied to the cable, to reduce such tension to a desired degree.

Such a controlled release of cable tension is obtained by the provision of a reversing latch indicated at 33. This latch may be formed from a flat metallic plate, which is provided with a circular opening 34, enabling the latch to be journaled on the hub extension 35 of the cable drum 11, so that the latch may rock about the longitudinal axis of said drum. The latch is positioned between one end of the drum and one of the side bars 2 of the frame 1, as shown more particularly in Figs. 4 to 7, inclusive, of the drawings. The outer or peripheral edge of the latch is provided with a slot shown at 36. This slot is shaped to receive a turnable crank element 37, the latter being fixed to or formed with the inner end of a journalling stud 38 carried by one of the frame side bars 2. The outer end of the stud is formed with an operating arm 39, which may be manually operated to rock the element 37 and thereby permit of the shifting of the latch between active and inactive positions, as shown in Figs. 6 and 7. Further, the periphery of the latch includes an elongated pin-receiving recess 40. This recess is shaped to receive a pin 41 which projects inwardly and laterally from one of the side arms 20 of the lever yoke 21. Further, the upper edge of the latch is formed at one end with an indentation or socket 42 which, when the latch is actively positioned, as shown in Fig. 7, is adapted to receive a pin 43 projecting laterally from one of the stop pawls 31, in order that the latch will serve to hold the stop pawls out of engagement with the ratchet teeth of the drum to permit of the rotation of said drum in a cable unwinding direction.

When the latch is inactively positioned, as illustrated in Fig. 6, and the drum 11 is rotated to wind the cable thereabout, the crank element 37 prevents oscillation of the latch when the lever is oscillated forwardly on its active stroke through the contacting of the pin 41 with the finger 44 of the latch. By so limiting movement of the latch, the latter cannot rock about the axis of the drum 11 to cause engagement between the pin 43 of the stop pawl and the indentation or socket 42 of the latch. Therefore, the stop pawls will be maintained in normal engagement with the ratchet teeth of the drum, preventing reverse rotation of the latter to unwind the cable. However, when it is desired to release or reduce cable tension, the crank element 37 is rocked so that it will assume the position disclosed in Fig. 7. When in this position, a longer forward stroke may be imparted to the lever, permitting the pin 41 to engage the finger 44 of the latch and rock the latter downwardly beyond its position as illustrated in Fig. 6. This enables the rear portion of the latch to be moved upwardly so that the socket or indentation 42 engages with the pin 43 of the stop pawl, thereby rocking the stop pawl assembly and removing the same from engagement with the ratchet teeth of the drum, as in Fig. 7.

During this reversing operation, it is also necessary to maintain the feeder pawls 17 out of engagement with the drum ratchet teeth upon forward oscillation of the operating lever, and

yet to permit the feed pawls to engage with said ratchet teeth when the lever is rocked rearwardly, so that the drum may turn in unison with the rearward movement of the lever. This is done by means of a cam 45. The latter may be formed from a flat plate of metal shaped so that its periphery provides a lift section 46, a shoulder shown at 47 and a pin-receiving recess 48. Centrally, the body of the cam is formed with a circular opening in which is received one end of the drum hub, the cam being disposed on the opposite side of said drum as regards the latch 33. The cam is urged to rotate in an anti-clockwise direction, as it is viewed in Figs. 8 and 9, by means of a wire spring 49. One end of this spring is anchored to a stud 50, carried by the frame 1, while the outer or free end of the spring has contact with an indentation 51 provided in the outer margin of the cam. A finger 52, formed at the outer end of the detent 28, is adapted for engagement with the shoulder 47 of the cam when the lever is rocked toward the rear of the frame, such rearward movement of the lever causing the detent to press downwardly on the shoulder of the cam, revolving the latter so that it will assume the position disclosed in Fig. 8 of the drawings when the lever reaches substantially the end of its rearward inactive or return stroke. In this position, the feed pawls have normal engagement with the ratchet teeth of the drum, so that when the lever is rocked forwardly on its active or advance stroke, the drum may be rotated to wind the cable thereabout. In this manner, the cam does not interfere with normal operations in which the drum is rotated to wind the cable thereabout. When it is desired to release the cable, or reduce the tension thereon, and following the adjustment of the crank element 37, the operating lever is rocked to the extreme limit of its rearward or return stroke. When this occurs, the finger 52 of the detent 28 is released from engagement with the shoulder 47 of the cam through an automatic operation caused by the riding of a lateral pin 53, projecting from the foot of the detent, on an inclined surface 54 provided on the upper edge and at the rear of one of the side bars 2, see Fig. 3. The wiping engagement between the pin 53 and the surface 54, causes the detent to swing on its pivot rod against the resistance of the spring 25, releasing the finger 52 from engagement with the shoulder 47 of the cam 45 and allowing the latter to respond to the influence of its spring 49, so that the cam moves to its active position as shown in Fig. 9, turning movement of the cam in response to the action of the spring 49 being limited by the engagement of the shoulder 55 of the cam with a stationary stop pin 56, the latter projecting inwardly and laterally from the adjoining frame side bar. When in the position shown in Fig. 9, unwinding of the cable is prevented by the stop pawls 31. Upon forward swinging movement of the lever, the feed pawls 17 are kept out of engagement with the ratchet teeth by providing one of said feed pawls at its outer end with a laterally directed stud 57. This stud rides over the lift section 46 of the cam, thereby spacing the feed pawls from the ratchet teeth of the cable drum. Before the operating lever reaches the end of its forward stroke, the latch 33, as previously explained, is oscillated by the lever to lift the stop pawls out of engagement with said ratchet teeth, as in Fig. 7.

At this time, the feed pawls will have cleared the lift section 46 of the cam 45, so that reengagement between the outer ends of the feed pawls and the ratchet teeth takes place. Then, when the operating lever is swung rearwardly, reverse rotation of the drum is effected through the tension on the cable 6.

It will be noted, however, that such reverse rotation is controlled or regulated by the operation of the lever, the drum rotating in exact unison with the swinging of the lever on its rearward stroke. When the cable tension is being released or reduced, it is necessary to rock the lever rearwardly to its extreme limit so that the detent may be released from engagement with the shoulder 47 of the cam 45 through the action of the pins 53 and the inclined frame surface 54. This is done in order that the cam will be released from engagement with the detent and will turn forwardly under the action of its spring 49, to raise the feed pawls prior to initiation of forward swinging movement on the part of the operating lever. When the windlass is being used to wind or wrap the cable about the drum, the lever is not swung back quite as far on its inactive stroke as is done when the cable is to be unwound from the drum, since in the winding operation, the feed pawls are maintained at all times in contact with the ratchet teeth of the drum, and the cam merely rocks to a sufficient extent about its journal support to move in unison, both forwardly and backwardly, with the operating lever.

In releasing tension or load on the cable 6, the operation may be summarized as follows: The adjustable stop or crank element 37, through manipulation of the arm 39, is rocked to assume the position disclosed in Fig. 7, so that when the handle 24 of the operating lever 21 is swung fully forwardly in a clockwise direction, as viewed in Fig. 7, the pin 41 engages the latch finger 44 and slightly rocks the latch about its fulcrum mounting 10. This rocking movement of the latch is sufficient to bring the indentation 42, on the upper marginal edge of the latch, into registration with the pin 43 of the stop pawls 31. This action results in elevating the outer ends of the stop pawls, so that they are removed from engagement with the teeth 16 of the cable drum, thereby admitting of turning movement of the drum in an anti-clockwise direction, as viewed in Fig. 2, to release or reduce tension or load on the cable 6.

Following adjustment of the crank element 37 to provide for the operations described in the immediately preceding paragraph, and before forward movement of the handle, the latter is first moved to its extreme rearward limit of movement in an anti-clockwise direction, as viewed in Figs. 1 to 3, so that the pin 53 will engage the sharply inclined surface 54 of the frame 1. This causes the finger 52 of the detent 28 to be removed from engagement with the shoulder 47 of the cam 45, with the result that said cam turns forwardly, independently of the operating lever, in an anti-clockwise direction, as viewed in Fig. 8, under the action of the spring 49, this independent movement of the cam being limited by the engagement of the shoulder 55 with the frame carried stop pin 56. When, thereafter, the lever 21 is rocked forwardly in an anti-clockwise direction, as viewed in Fig. 9, the lift region 46 of the cam is located so that it is engaged by the pin 57 of the feeding pawl 17, maintaining the latter substantially throughout the full extent of such forward movement, removed from contact with the ratchet teeth 16 of the cable drum thereby preventing the drum from rotating in a direction winding the cable thereabout.

At the end of this forwardly advanced stroke of the lever 20, the back pawls 31 are lifted from engagement with the ratchet teeth 16 by the movement of the latch 33 to the position shown in Fig. 7. Concurrently therewith, the pin 57 is removed from engagement with the lift region 46 of the cam 45, and the outer ends of the feeding pawls 17, by the action of the spring 25, are reengaged with the ratchet teeth of the cable drum. The tension or load forces on the cable are then operative to rotate the cable drum in a direction to reduce or release cable tension. However, such forces are resisted or regulated by the operator manipulating the handle 24, who permits the handle to be gradually rocked in a rearward direction, clockwise as viewed in Fig. 9. Before the rearward movement of the handle or yoke lever is initiated, the finger 52 of the detent 28 will have established reengagement with the shoulder 47, so that as the handle is permitted to swing rearwardly, the cam 45 will move in unison therewith until its movement is finally arrested by the lowermost of the shoulders 55 contacting the stop pin 56. If further release of cable tension is desired, this cycle of operations is repeated until a desired state of tension in the cable has been reached or until all tension has been removed therefrom.

To rewind the cable on the drum, the crank element 37 is turned to assume its operating position shown in Fig. 6. When so positioned, the crank element 37 prevents movement of the latch 33, thus holding the back pawls 31 in contact with the ratchet teeth of the drum. Also, when applying tension to the cable 26, by winding the latter about the drum, it will be understood that the rearward oscillating stroke of the lever 20 is not as long as the same stroke when employed to release cable tension. The short stroke prevents the finger 52 of the detent 28 from being disengaged from the shoulder 47 of the cam 45, thereby causing the cam to swing on its axis 10 in unison with the forward and rearward swinging movement of the operating lever.

It will be evident that the present invention provides an improved hand-operated cable windlass in which controlled rotation of the cable drum is effected in both cable winding and unwinding directions. To change over from one operation to the other, it is merely necessary for the operator to turn the crank element 37 so that the latter will occupy one or the other of its two operating positions. Otherwise, the operation of the windlass is effected through the manual oscillation of the lever. Such reversal in the operation of the cable drum is obviously highly desirable in portable manually operated windlasses of this category, the reversible feature adding materially to the usefulness of such tools.

The bottom of the ratchet wheel 16 may be covered by an arcuate guard 60, shown in dotted lines in Fig. 2. This guard is adapted to be carried by the frame 1 and is used to prevent dirt or other foreign matter from collecting in the teeth of the ratchet wheels when the windlass is dragged over or rests on the ground.

While I have described and illustrated a preferred form of my improved windlass, nevertheless, it will be understood that the same is subject to considerable variation in its structural design, and I therefore desire to include within the scope of the invention all such variations or modifications falling within the scope of the appended claims.

I claim:

1. A windlass comprising a frame, a cable-carrying drum rotatably mounted in said frame, said drum being provided with peripheral ratchet teeth, an oscillating lever pivoted at one end to said frame, a feed pawl movably carried by said lever for engagement with said ratchet teeth and operable upon the oscillation of said lever through its active stroke to rotate said drum in a cable winding and tensioning direction, a stop pawl movably carried by said frame and cooperative with said ratchet teeth to hold said drum against rotation during oscillation of said lever through its inactive stroke, a manually adjustable latch actuated by said lever and operable when actively positioned for maintaining said stop pawl out of engagement with said ratchet teeth during movement of said lever through its return stroke, and cooperative cam-controlled means for maintaining said feed pawl out of engagement with said ratchet teeth when said lever is oscillated on its forward stroke, said cam means being such as to reestablish engagement between said feed pawl and said ratchet teeth at the end of the forward stroke of said lever.

2. A windlass comprising a frame, a cable-carrying drum rotatably mounted in said frame, said drum being provided with peripheral ratchet teeth, an oscillating lever pivoted at one end to said frame, a feed pawl movably carried by said lever for engagement with said ratchet teeth, a stop pawl movably carried by said frame for cooperating with said ratchet teeth, a reversing latch movably supported in said frame adjacent to said stop pawl, manually adjustable means for positioning said latch so that in its active position of operation said latch contacts with the stop pawl to withhold the latter from engagement with said ratchet teeth, a detent pivotally carried by said lever, a cam turnable about the axis of said drum, spring means tending to rotate said cam in one direction, said cam being rotated against the action of said spring on the return stroke of said lever through the engagement of said detent therewith, and means operable upon oscillating movement of said lever on its return stroke to move said detent out of engagement with said cam, whereby to cause the latter to rotate under the influence of said spring means to a position lifting said feed pawl from engagement with the ratchet teeth of the cable drum upon forward movement of said lever.

3. A windlass comprising a frame, a cable drum rotatably mounted in said frame, said drum being provided with peripheral ratchet teeth, an operating lever pivoted at one end to said frame, a feed pawl movably carried by said lever and adapted for engagement with said ratchet teeth, a stop pawl movably carried by said frame and adapted for engagement with said ratchet teeth, a latch device pivotally supported in said frame for turning movement about the axis of said drum, a manually operated crank element movably carried by said frame cooperative with said latch device for actively and inactively positioning the same, means carried by said lever for moving said latch device to a position in which it retains said stop pawl out of engagement with said ratchet teeth, and means operated by said lever for maintaining said feed pawl out of engagement with said ratchet teeth upon the forward stroke of said lever when said latch device is actively positioned.

4. A portable ratchet operated windlass, comprising a frame, a cable-carrying drum rotatably mounted in said frame, said drum being formed

with peripheral ratchet teeth, an oscillatory operating lever pivoted at one of its ends to said frame in offset relation to the longitudinal axis of the drum, a feed pawl pivotally mounted on said lever, said pawl having its outer end movable into and out of engagement with said ratchet teeth, a laterally projecting element provided at the outer end of said pawl, a stop pawl pivotally carried by said frame and cooperative with said ratchet teeth, a cam pivotally mounted within said frame for turning movement about the axis of said drum, said cam being formed peripherally with a lift section, a detent pivotally carried by said lever having its free end engaged with said cam to cause rotation of the latter when said lever is oscillated in one direction, spring means opposing rotation of said cam by said detent and lever, and means operative upon the lever reaching the end of its cam-turning stroke to release the cam from engagement with said detent, whereby to cause the cam to return to its normal position and during such return to bring its lift section into contact with the laterally projecting element of said feed pawl in order to hold the latter out of engagement with said ratchet teeth during the next succeeding stroke of said lever.

5. A windlass comprising a frame, a cable-carrying drum rotatably mounted in said frame, said drum being provided with peripherally disposed ratchet teeth, an oscillating lever pivoted at one end to said frame, a feed pawl movably carried by said lever for engagement with said ratchet teeth, a stop pawl movably carried by said frame and cooperative with said ratchet teeth, the outer end of said stop pawl being provided with a lateral extension, a latch arranged between one end of said drum and said frame for limited oscillatory movement about the axis of said drum, one end of said latch being formed with a socket for the reception of the lateral extension formed on said stop pawl, a frame carried manually turnable crank element disposed in a slot provided in said latch and operable to shift said latch between stop pawl actuating and releasing positions, said latch being further provided with a pin receiving recess, and a pin projecting laterally from said lever for movement in said recess, whereby when said latch occupies its pawl-operating position through adjustment of said crank element, the movement of said lever at the end of its active stroke will cause said pin to engage one of the end walls of said recess to rock said latch to a position causing the socket of said latch to receive the lateral extension of said stop pawl, thereby removing the latter from and holding the same out from engagement with said ratchet teeth.

6. A windlass comprising a frame, a cable-carrying drum rotatably mounted in said frame, said drum being provided with peripherally disposed ratchet teeth, an oscillating lever pivoted at one end to said frame, a feed pawl movably carried by said lever for engagement with said ratchet teeth, a stop pawl movably carried by said frame and cooperative with said ratchet teeth, the outer end of said stop pawl being provided with a lateral extension, a latch arranged between one end of said drum and said frame for limited oscillatory movement about the axis of said drum, one end of said latch being formed with a socket for the reception of the lateral extension formed on said stop pawl, a frame carried manually turnable crank element disposed in a slot provided in said latch and operable to shift said latch between stop pawl actuating and releasing positions, said latch being further provided with a pin-receiving recess, a pin projecting laterally from said lever for movement in said recess, whereby when said latch occupies its pawl-operating position through adjustment of said crank element, the movement of said lever at the end of its active stroke will cause said pin to engage one of the end walls of said recess to rock said latch to a position causing the socket of said latch to receive the lateral extension of said stop pawl, thereby removing the latter from and holding the same out from engagement with said ratchet teeth, and cam means arranged between the other end of said drum and frame, said cam means being mounted for limited oscillatory movement about the axis of said drum and operable automatically to maintain said feeding pawl out of engagement with said ratchet teeth upon movement of said lever in one direction when said lever is actuated to turn said drum in a direction releasing cable tension.

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