

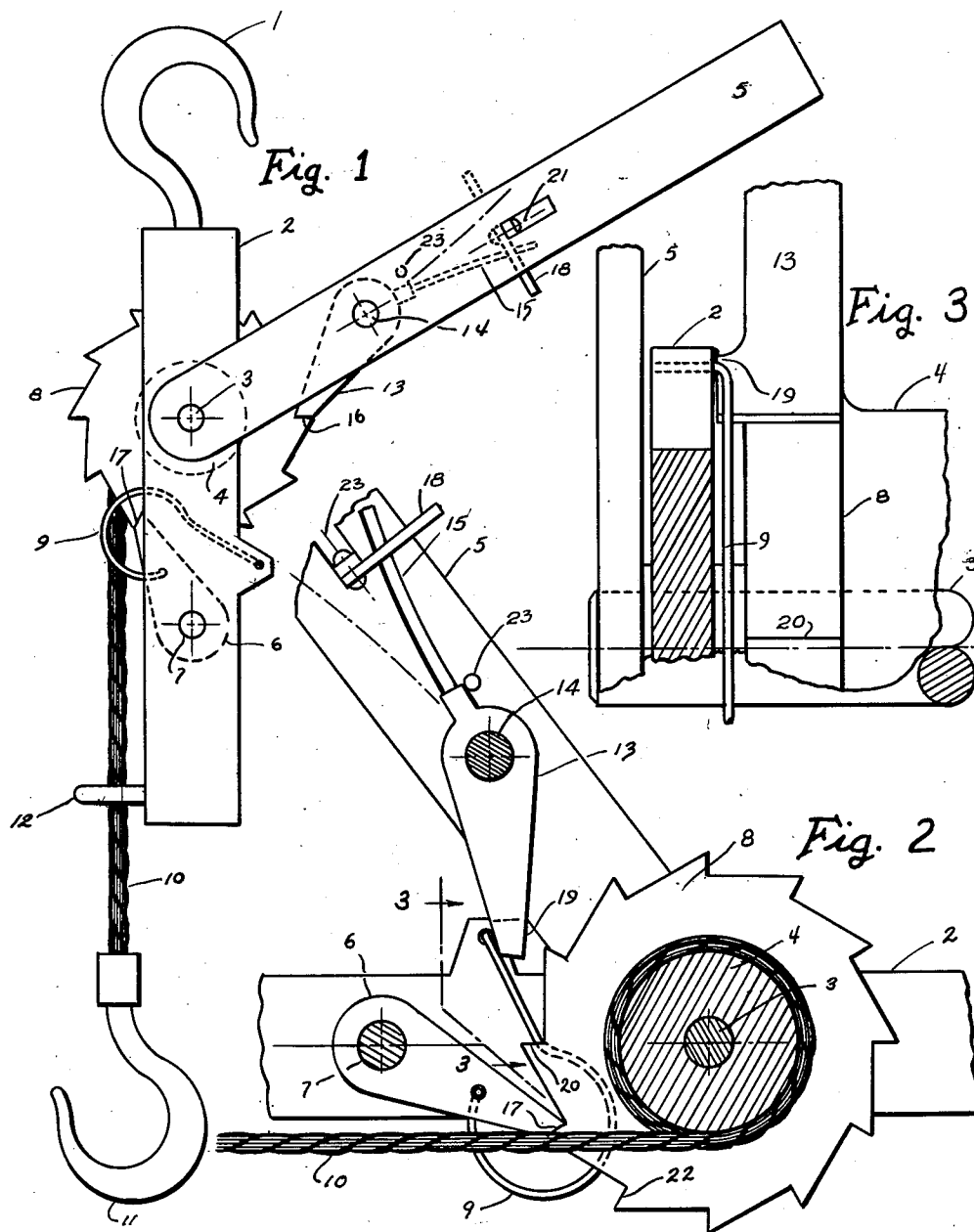
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WINCH

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WINCH

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3 Claims. (Cl. 254—164)

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My invention relates to winches or hoists and more particularly to a method for unwinding rope, cable or chain from a drum, under load with full control.

It is an object of this invention to accomplish the above mentioned purpose in a semiautomatic manner, without the use of a brake, and with a minimum of parts.

The above and other objects and advantages of the invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming a part of this specification, of which Figs. 1, 2 and 3 show the simplest embodiment.

Fig. 1 shows a typical portable winch incorporating the invention. Fig. 2 is an enlarged view of the winch shown in Fig. 1, but excluding the extreme ends of the frame and lever arm, and is viewed from the opposite side with interfering parts removed for a better view of pawl and spring action. Fig. 3 is a fragmentary sectional view taken at line 3—3 of Fig. 2, to more clearly show the manner in which spring and pawl operate together.

Referring to Fig. 1, I have shown the invention embodied in a winch comprising an anchoring hook 1, attached to a frame 2. Frame 2 supports a shaft 3 upon which a drum 4 and a lever arm 5 are mounted, and about which they freely turn, though with limited lateral movement parallel to the axis of shaft 3. Frame 2 also supports a shaft 7 upon which pawl 6 is mounted, free to rotate on this shaft 7, but with limited movement parallel to the axis of shaft 7. Lever arm 5 also carries pawl 13 on shaft 14, which pawl together with pawl 6 engage ratchet wheel 8 of drum 4 and are in a plane common with ratchet wheel 8, with shafts 3, 7, and 14 at right angles to this plane. The two pawls are normally held in positive engagement with ratchet wheel 8 by springs 9 and 15, as shown in Fig. 1.

Viewing Fig. 1, a clockwise moment is produced at 16, due to a clockwise force on lever arm 5. When this moment exceeds the countermoment produced by the load at hook 11, and carried by cable 10 to drum 4, ratchet wheel 8 will be rotated clockwise. With cable 10 properly anchored to drum 4, the load at hook 11 will now be lifted. Reducing or releasing clockwise pressure on lever arm 5 will allow drum 4 to rotate counterclockwise slightly, until stopped by contact between ratchet wheel 8 and pawl 6 at point 17. The cycle can be repeated until the load at hook 11 has been pulled the required distance. Guide 12 serves as a stabilizing

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and aligning member for both hoist and cable, and also acts to promote level winding on drum 4.

The cycle can be reversed under any load conditions within the capacity of the hoist (winch), as a study of Figs. 2 and 3 will show. It is this feature and means for accomplishment upon which the patent is based. To reverse the cycle, first throw lever 18, which is pivoted about axis 21 from the position shown in Fig. 1 to that shown in Fig. 2. This involves a rotation of lever 18 of approximately 180 degrees, thereby displacing spring 15 to such an extent that it now acts to lift pawl 13 clear of ratchet wheel 8, and will do so when pressure is released between pawl 13 and ratchet wheel 8. The pawl 13 now comes in contact with a suitable stop 23, at a point clear of contact with ratchet wheel 8, but in a position to contact spring 9 as shown in Fig. 2. Further counterclockwise rotation of lever arm 5, in Fig. 2, brings the shoulder 19 on the pawl 13 into firm contact with spring 9, with further rotation of lever arm 5 forcing pawl 13 against ratchet wheel 8 and finally into contact with ratchet tooth 20. Fig. 3 better shows the manner of contact between spring 9 and shoulder 19, together with the relative position of this spring between ratchet wheel 8 and frame 2. As the pawl 13 moves toward ratchet tooth 20, Fig. 2, it also displaces spring 9 toward pawl 6. By the time spring 9 displacement is adequate it will force pawl 6 clear of ratchet wheel 8, and will do so when pressure between pawl 6 and the tooth of the ratchet with which it is engaged is relieved or released.

As stated, under load, pawl 6 cannot swing free since the angle of contact between either pawl and any tooth of ratchet wheel 8 produces a powerful component of force toward the axis of drum 4 which is in excess of the reverse force exerted by spring 9 when displaced as described in the previous paragraph. In addition to transferring the load from pawl 6 to pawl 13, it is also normally necessary to rotate drum 4 a few degrees counterclockwise, as seen in Fig. 2, before pawl 6 can swing clear of the ratchet wheel 8. This accomplished, the load has now been entirely transferred to pawl 13, and now this pawl is securely engaged to ratchet wheel 8, with a powerful force component toward the hub of drum 4, well in excess of the reverse force exerted by spring 15. This locking of pawl to ratchet wheel in excess of the unlocking spring action is necessary and a key part of the successful function of my invention.

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To continue the cycle, allow lever arm 5 to rotate clockwise, in Fig. 2. Pawl 6 will be held clear of ratchet wheel 8 for a few degrees of rotation, by the displaced spring 9. However, with the retreat of pawl 13 from tooth 20, spring 9 will return to its normal position, drawing pawl 6 again into contact with ratchet wheel 8, but not until point 17 has rotated clockwise far enough to be clear of reseating pawl 6. In Fig. 2, clockwise rotation can continue until tooth 22 firmly engages pawl 6, at which time the load is exchanged from pawl 13 to pawl 6. Also at this time, pawl 13 will be swung clear of ratchet wheel 8 by spring 15 and the cycle ready to repeat. In practice this cycle can take place rapidly, i. e., in the order of one second.

What is claimed is:

1. A winch comprising a supporting frame, a cable drum, a ratchet wheel rotatable with the drum, an operating lever pivoted on the axis of the drum, a pawl on the lever pivoted thereon at a point outside the path of travel of the ratchet teeth, a spring for biasing said pawl in a chosen direction, means for changing the direction of said bias, a pawl on the frame, and a spring normally biasing said frame pawl toward the ratchet, said frame pawl spring, the teeth on the ratchet and the free end of the lever pawl being arranged in alignment with said free end positioned to be interposed between the frame pawl spring and the teeth of the ratchet and being of sufficient length to contact the frame pawl spring when the lever is rotated in the direction which moves its pawl toward engagement with the ratchet teeth whereby the frame pawl spring will be acted upon by the lever pawl to bias the frame pawl away from the teeth of the ratchet, said lever pawl at the same time being moved by the frame pawl spring into its ratchet engaging position even against the opposing bias exerted by the lever pawl spring.

2. A winch comprising a supporting frame, a cable drum, a ratchet wheel rotatable with the drum, an operating lever pivoted on the axis of the drum, a pawl on the lever pivoted thereon at a point outside the path of travel of the ratchet teeth, spring means associated with said pawl and adapted to bias the pawl in a chosen direction, means for changing the direction of said bias, a pawl on the frame, and other spring means associated with said frame pawl and adapted to bias the same toward the ratchet, ratchet engaging end of said lever pawl being of sufficient length and so arranged with respect to the ratchet engaging end of the frame pawl and the teeth on the ratchet as to project

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therebetween and one of said spring means being positioned so as to be interposed between the ratchet engaging end of the lever pawl and the ratchet engaging end of the frame pawl when the lever is rotated in the direction which moves its pawl toward engagement with the ratchet teeth, said spring means when so interposed being adapted to move the frame pawl away from the teeth and, at the same time, to move the lever pawl into its ratchet engaging position even against the opposing bias exerted by the lever pawl spring.

3. A winch comprising a supporting frame, a cable drum, a ratchet wheel rotatable with the drum, an operating lever pivoted on the axis of the drum, a pawl on the lever, pivoted thereon at a point outside the path of travel of the ratchet teeth, a spring for biasing said pawl in a chosen direction, means for changing the direction of said bias, a pawl on the frame, and resiliently yielding means permanently associated with and connected to said frame pawl and constructed and arranged to bias the frame pawl toward the ratchet, the ratchet engaging end of said lever pawl being of sufficient length and so arranged with respect to the ratchet engaging end of the frame pawl and the teeth on the ratchet as to project therebetween, said resiliently yielding means being positioned so as to be interposed between the ratchet engaging end of the lever pawl and the ratchet engaging end of the frame pawl when the lever is rotated in the direction which moves its pawl toward engagement with the ratchet teeth, and said resiliently yielding means when so interposed being adapted to move the frame pawl away from the teeth and, at the same time, to move the lever pawl into its ratchet engaging position even against the opposing bias exerted by the lever pawl spring.

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