May 27, 1941. J. M. BENSON 2,243,789

WINCH

Filed March 25, 1940 3 Sheets-Sheet 1

Fig. 1.

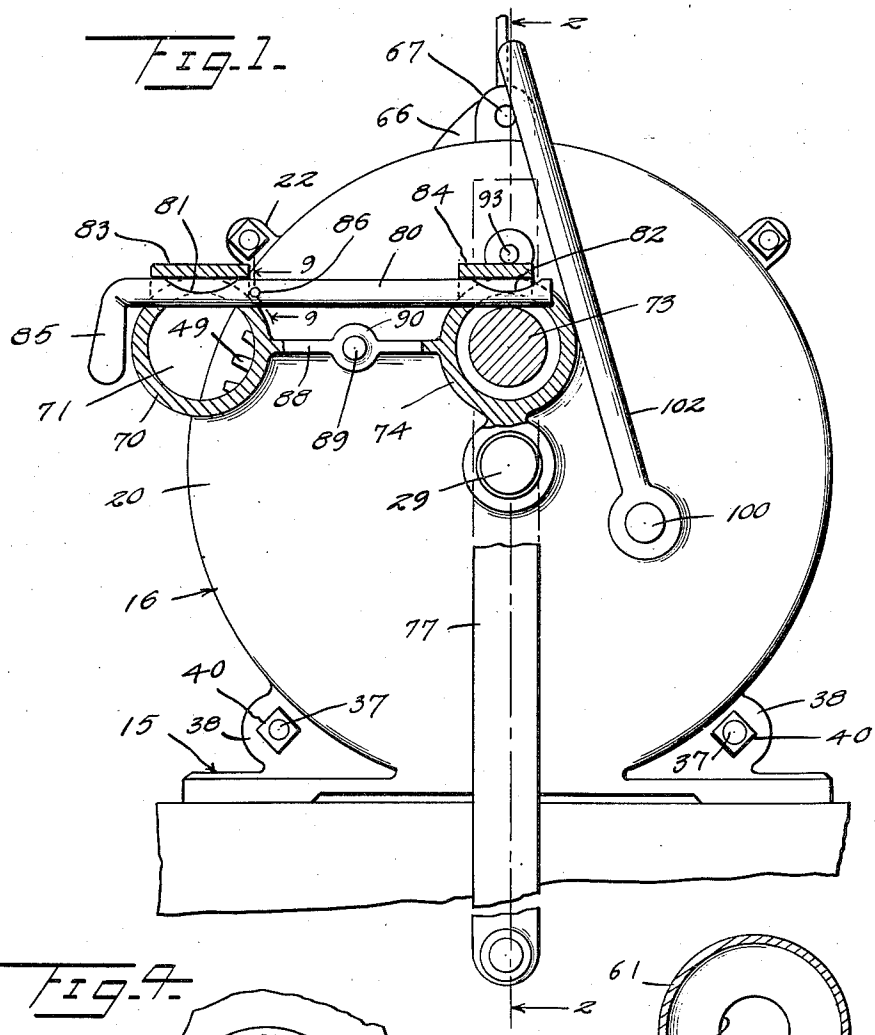
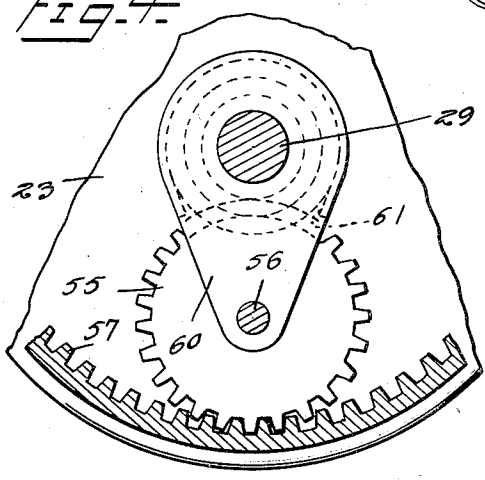


Fig. 4.



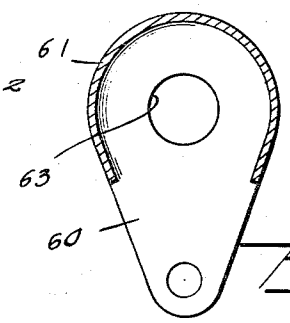


Fig. 5.

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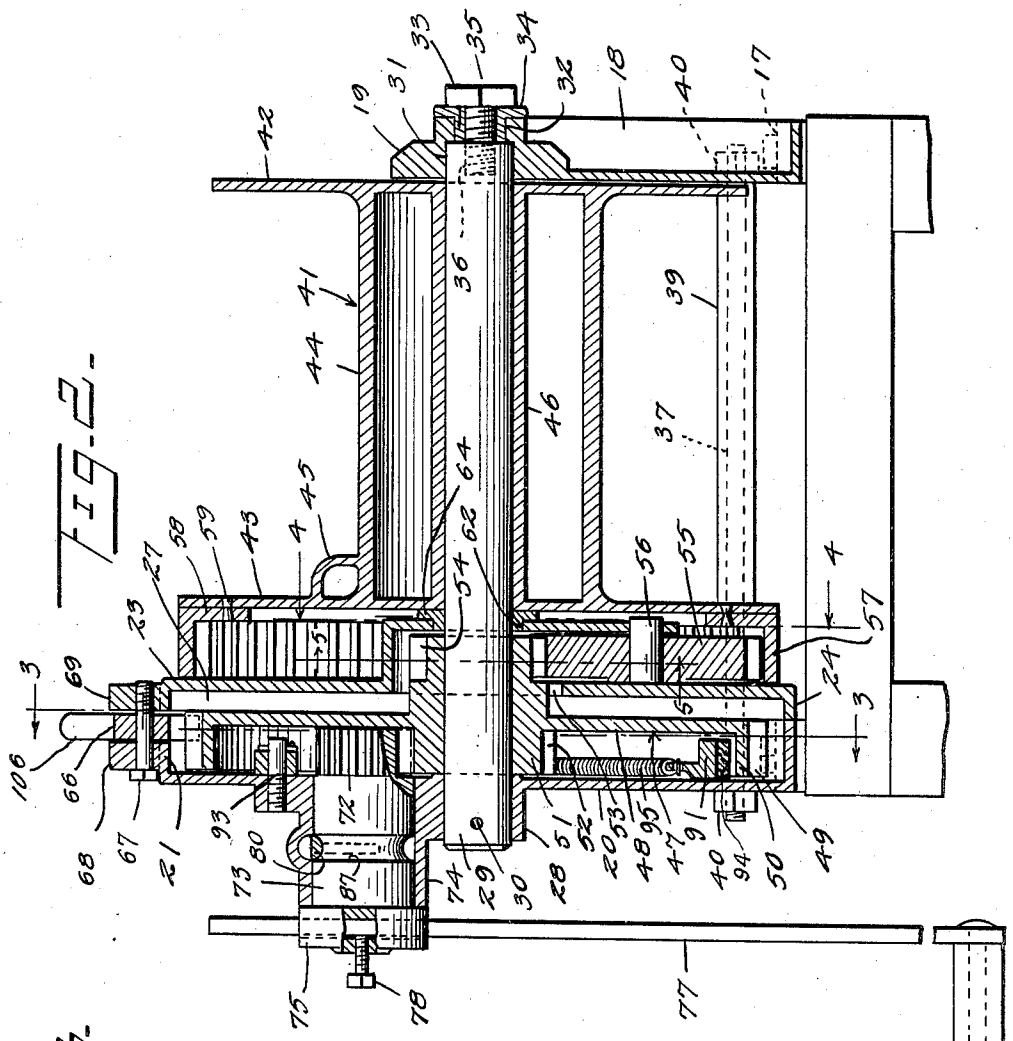


FIG. 2.

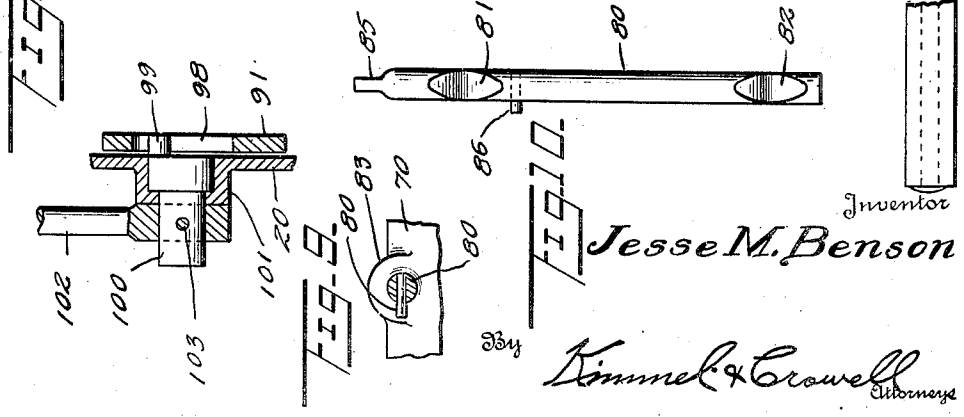


FIG. 4.

FIG. 5.

FIG. 10.

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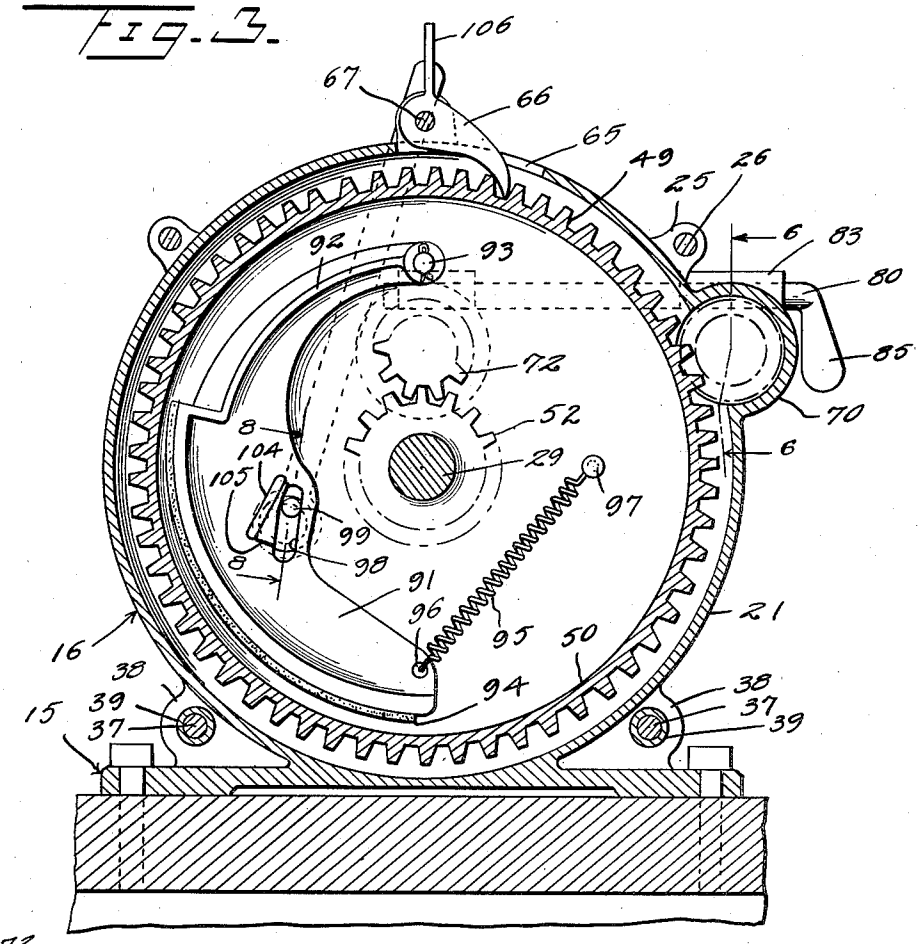
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WINCH

Filed March 25, 1940 3 Sheets-Sheet 3

Fig. 3.



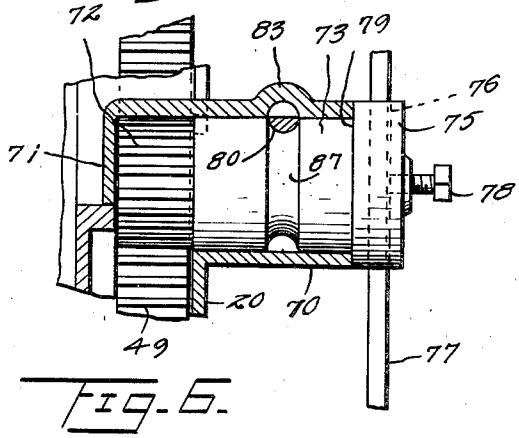
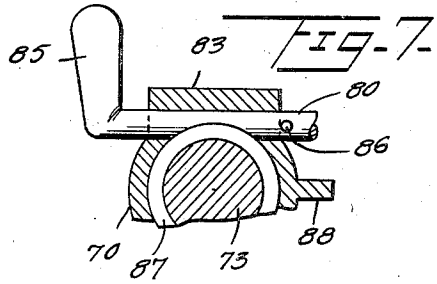


Fig. 6.

Fig. 7.



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Patented May 27, 1941

2,243,789

UNITED STATES PATENT OFFICE

2,243,789

WINCH

Jesse M. Benson, Concord, Tenn.

Application March 25, 1940, Serial No. 325,905

4 Claims. (Cl. 254—186)

This invention relates to winches designed for loading or unloading purposes and is an improvement over the winch structure embodied in my prior Patent No. 2,083,489.

An object of this invention is to provide a winch which is so constructed that the winding drum may be operated at a selected one of at least two speeds and wherein the operating mechanism for rotating the drum is positioned at one end of the device.

Another object of this invention is to provide an improved winch of this character embodying the use of a single locking mechanism for locking the driving element on the device in a selected position to obtain the desired speed of rotation of the winding drum.

A further object of this invention is to provide a winch of this character wherein the winding drum is rotatably mounted on a stationary shaft which is supported between a pair of housing or end members and wherein the braking means for holding the drum against rotation engages in an annular gear carried by the stationary shaft.

A still further object of this invention is to provide a simplified winch structure which can be made in exceedingly compact form and which is preferably manually operable.

A further object of this invention is to provide a winch of this kind which can be manufactured and produced at a relatively small cost and which, while designed for relatively heavy work, is constructed out of relatively light material so that it can be readily transported from one place to another.

To the foregoing objects and to others which may hereinafter appear, the invention consists of the novel construction, combination and arrangement of parts as will be more specifically referred to and illustrated in the accompanying drawings wherein are shown embodiments of the invention, but it is to be understood that changes, variations and modifications may be resorted to which fall within the scope of the invention as claimed.

In the drawings:

Figure 1 is a detail end elevation partly in vertical section of a winch constructed according to an embodiment of this invention.

Figure 2 is a sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a sectional view taken on the line 3—3 of Figure 2.

Figure 4 is a fragmentary sectional view taken on the line 4—4 of Figure 2.

Figure 5 is a sectional view taken on the line 5—5 of Figure 2, the bearing and shaft being removed.

Figure 6 is a fragmentary vertical section taken on the line 6—6 of Figure 3.

Figure 7 is a fragmentary sectional view showing the locking means for the driving element in released position.

Figure 8 is a sectional view taken on the line 8—8 of Figure 3.

Figure 9 is a fragmentary sectional view taken on the line 9—9 of Figure 1.

Figure 10 is a plan view of the locking means removed from the housing.

Referring to the drawings, the numeral 15 designates a base member at one end of the winch structure which has secured thereto an upwardly extending gear housing generally designated as 16. A base member 17 is disposed at the opposite end of the winch structure and has formed therewith a standard or supporting member 18 and a bearing 19 is carried by the upper end of the standard 18.

The housing 16 comprises an outer end wall 20 formed with an annular flange 21 which is provided with a plurality of ears 22. An inner end wall 23 having an annular flange 24 and ears 25 is adapted to be secured to the outer housing part comprising the outer wall 20 and the flange 21 by fastening devices 26 in the form of bolts. The flange 24 carried by the inner wall 23 is adapted to confront and abut the flange 21 and forms therewith a gear chamber 27. The outer wall 20 is provided with a bushing or boss 28 and a stationary shaft 29 is mounted in the bushing or boss 28 being fixedly secured therein by means of a pin 30. The shaft 29 at the opposite end thereof engages in the bearing 19 and preferably the bearing 19 is formed with an opening 31 in which the shaft 29 is received and the bearing 19 is also formed with a reduced opening 32 in which a bushing 33 removably engages. The bushing 33 is provided with an annular flange 34, and a bolt 35 engages through the bushing 33 and is threaded into an opening 36 which is formed axially of the stationary shaft 29.

A pair of elongated rods 37 extend through web portions 38 which are formed in the housing 16 and also extend through the standard 18. A tubular spacing member 39 engages about the bolt or rod 37 between the web 38 and the standard 18, and nuts 40 are threaded onto the opposite ends of the rods 37, and through the use of the spacing members 39, the standard 18 and the housing 16 are held in the desired spaced apart relation.

A winding drum generally designated as 41 is rotatably mounted on the stationary shaft 29 and comprises end plates 42 and 43 which are secured to a cylindrical hub 44. A cable holding loop 45 is secured to the hub 44 and also the end wall 43 so that one end of the cable may be anchored to the drum 41. A cylindrical bearing 46 is secured between the end walls 42 and 43 and rotatably engages the stationary shaft 29.

In order to provide a means whereby the drum 41 may be selectively rotated at different speeds, I have provided a gear means including a driven gear generally designated as 47 which is mounted in the chamber 27. The gear member 47 includes a plate of disc form 48 which is formed on the periphery thereof with gear teeth 49 which extend laterally of one side of the plate 48. The gear teeth 49 are carried by a cylindrical member 50, the inner surface of which is smooth and forms a brake drum. The disc 48 is provided on one side thereof with a hub 51 formed with gear teeth 52 and in the operation of the drum 41 either the gear teeth 49 or the gear teeth 52 may be engaged by a driving element for rotating the drum 41 at different speeds.

The hub 51 also extends laterally of the opposite side of the disc 48 and loosely engages in an opening 53 which is formed in the inner wall 23. A gear member 54 is formed on the inner end of the hub 53 and meshes with an intermediate gear 55 rotatably carried by a stub shaft 56. The stub shaft 56 is fixed at one end to the inner end wall 23 and the gear 55 is rotatably carried by the shaft 56. The gear 55 meshes with the gear 54 and also meshes with a ring gear 57 having an annular flange 58 at one end thereof which is fixed to the end wall 43 of the drum 41 by fastening devices 59 in the form of rivets, welding or the like. A supporting arm 60 engages on the inner side of the gear 55 and is provided with a flange 61 which engages about the gear 54. The flange 61 is integral with and offset rearwardly relative to the end wall 23.

A bushing 62 engages about the stationary shaft 29 and within an opening 63 formed in the supporting arm 60 and the bushing 62 is also formed with an annular flange 64 engaging between the outer face of the supporting arm 60 and the adjacent or outer face of the end wall 43 of the drum 41.

The annular flange 21 is formed with a cut-out or slot 65 within which a pawl 66 loosely engages. The pawl 66 is rockably carried by a bolt or threaded shaft 67 which is mounted in a pair of ears 68 and 69 carried by the flanges 21 and 24, and the pawl 66 is adapted to engage the gear 47 so as to hold the gear 47 against rotation in one direction. The end wall 20 of the housing 16 is provided with a cylindrical boss or bearing 70 having an inner end wall 71. A driving element comprising a gear 72 which is carried by a stub shaft 73 is adapted to removably engage in the bearing 70 and the gear 72 is adapted to engage the gear 47 when the drum 41 is to be rotated at low speed.

A second cylindrical bearing 74 is carried by the end wall 20 and this bearing 74 is disposed in a position whereby the shaft 73 and the gear 72 may be extended into the bearing 74 so that the gear 72 may engage the gear teeth 52 carried by the hub 51 when it is desired to rotate the drum 41 at a higher speed. The stub shaft 73 is provided at its outer end with an enlarged head 75 having an opening 76 formed therethrough, and a handle 77 engages in the opening 76 and is adjustably secured in the head 75 by a set screw or locking member 78. The head 75 is substantially larger in diameter than the stub shaft 73 and forms a shoulder 79 which engages against the outer end of the bearing or boss 70 or the outer end of the bearing or boss 74. When the driving member including the driving gear 72 and the stub shaft 73 are mounted in the bearing 70, the inner end of the gear 72 is adapted to engage against the inner end wall 71 carried by the bearing 70.

In order to provide a means whereby the driving element may be releasably locked in a selected bearing, I have provided a lock shaft 80 which is formed with a pair of concave recesses 81 and 82. The shaft 80 rockably engages in bosses 83 and 84 which are carried by the bearings 70 and 74, respectively, and the recess 81 is provided so that the stub shaft 73 may be extended into the bearing 70 when the shaft 80 is turned so that the recess 81 is lowermost. The recess 82 is provided so that the stub shaft 73 may be extended into the bearing 74 when the recess 82 is lowermost and preferably the two recesses 81 and 82 are on one side of the shaft 80 so that both of these recesses will be disposed in a lowermost position at the same time in order to permit the stub shaft 73 to be disposed in a selected bearing.

A handle 85 is carried by one end of the shaft 80 and is adapted to gravitatingly hold the shaft 80 in a locked position with the recesses 81 and 82 uppermost. The shaft 80 is held against endwise movement by means of a pin or locking member 86 which in the present instance is adapted to engage the inner end of the boss 83. The stub shaft 73 is provided with a peripheral groove 87 in which the locking shaft 80 is adapted to engage so that when the shaft 80 is in a locking position with the handle 85 in a dependent position, the shaft 80 will engage in the groove 87 and lock the stub shaft 73 against endwise movement while permitting free rotation thereof.

A bracing web 88 extends between the two bearing or bosses 70 and 74, and an outwardly projecting pin 89 is carried by a boss 90 formed with the web 88. A braking attachment similar to that embodied in my copending application filed March 25, 1940, Serial No. 325,906, is adapted to engage the pin 89.

A brake shoe 91 is disposed in the gear chamber 27 and an arcuate supporting arm 92 is carried by the shoe 91 and engages a supporting pin 93 carried by the outer wall 20 of the housing 16. The brake shoe 91 is provided with a brake lining 94 which is adapted to engage the drum 50 so as to hold the drum 50 against rotation. The brake shoe 91 is constantly urged to a released position by means of a contracting spring 95 which at one end engages in an opening 96 formed in the shoe 91 and the opposite end of the spring 95 engages a pin 97 which is carried by the outer wall 20. The shoe 91 is formed with an elongated slot 98 in which a shoe operating pin 99 loosely engages. The pin 99 is eccentrically carried by a brake operating shaft 100 which is journalled in a bushing 101 carried by the end wall 20.

A brake operating lever 102 is fixed to the shaft 100 by means of a pin or fastening device 103. When the brake shoe 91 is in a released position, the lever or brake operator 102 is yieldably held against the bushing or bearing 74 as shown in Figure 1. The brake shoe 91 has formed integral therewith a laterally project-

ing lug 104 to which a wear element 105 is attached, and the wear element 105 is adapted to have one face thereof projecting slightly into one side of the slot 98 for engagement with the eccentric pin 99.

In the use and operation of this winch structure assuming that the driving element comprising the stub shaft 73 and the driving gear 72 is inserted in the bearing 70 and locked therein by the locking member 80, in order to insert the stub shaft 73 and the driving gear 72 in the bearing 70, the handle 85 of the lock shaft 80 is raised to a substantially upright position so that the recess or cut-out 81 will be disposed innermost of the bearing 70. The gear 72 will engage the outer or large gear 47 and the lock shaft 80 is then rotated by means of the handle 85 so that the shaft 80 is in the position shown in Figure 6. The crank 77 may then be rotated so as to rotate the gears 72 and 47. Rotation of the gear 47 will rotate the gear 54 and the gear 55 which will also rotate the ring gear 57 and the winding drum 41. At this time, the pawl 66 is riding over the teeth of the gear 47. In the event it is desired to lock the drum 41 against rotation, the crank 77 may be held against rotation so that the pawl 66 will engage between selected teeth of the gear 47. The pawl 66 gravitatingly engages the teeth of the gear 47. In the event it is desired to release the drum 41 from the pawl 66, the pawl 66 may be rocked outwardly of the cut-out 65 by means of a handle 106. The handle 106 is so secured to the pawl 66 that when the handle or operator 106 is rocked downwardly, the pawl 66 will be raised and held in its raised position. At this time the brake lever 102 may be rocked to the righ as viewed in Figure 1 so as to swing the brake shoe 91 against the brake drum 50.

The pull on the cable which is wound about the drum 41 will effect reversed rotation of the drum 41 and the speed of this reversed rotation may be regulated by pressure applied to the brake drum 50 by means of the brake shoe 91. In the event it is desired to rotate the drum 41 at a higher speed, the operating element comprising the shaft 73 and the gear 72 may be inserted in the bearing or bushing 74. In this position the gear 72 will engage the gear teeth 52 and as the gear 52 is of a smaller diameter than the gear 47, engagement of the gear 72 with the gear 52 will effect a more rapid rotation of the drum 41. The winch hereinbefore described forms an exceedingly compact structure wherein the operating gears are housed in a relative narrow housing structure and the gears are so arranged that the winding drum 41 will not be subjected to undue torsional strain during either the winding or unwinding of the cable thereon. This winch structure is constructed for the purpose of providing a compact portable winch which may be manually operated and which is safe in operation so that the crank 77 will not be pulled out of the hands of the operator when the drum 41 is under load. This winch has been placed in actual operation and has been found more efficient that winches at present available for the purpose for which the winch has been designed.

I claim:

1. In a winch, a winding drum, a stationary shaft having a portion thereof rotatably supporting said drum, an upstanding stationary gear housing fixed to one end of said shaft and having outer and inner end walls, a relatively large low speed driving gear in said housing, a hub carried by said gear rotatable on another portion of said shaft and having one end extended laterally from said gear through the inner end wall of the housing, a high speed driving gear within the housing carried by the other end of said hub, a second gear carried by the said projecting end of said hub, an intermediate gear meshing with the gear on the projecting end of said hub and arranged exteriorly of said inner end wall, means on the inner end wall of the housing for rotatably supporting said intermediate gear, below said second gear, an internally threaded gear fixed to the inner end of said drum and meshing with said intermediate gear, a pair of bushings connected to the outer end wall of and opening into said housing, an operating member engageable in a selected bushing for engagement with a selected driving gear for rotating said drum at a selected speed, spacing means about said shaft between the inner end of the drum and said intermediate gear supporting means, and means for supporting the other end of said shaft and for maintaining the drum on the latter.

2. In a winch, a winding drum, a stationary shaft having a portion thereof rotatably supporting said drum, an upstanding stationary gear housing fixed to one end of said shaft and having outer and inner end walls, a relatively large low speed driving gear in said housing, a hub carried by said gear rotatable on another portion of said shaft and having one end extended laterally from said gear through the inner end wall of the housing, a high speed driving gear within the housing carried by the other end of said hub, a second gear carried by the said projecting end of said hub, an intermediate gear meshing with the gear on the projecting end of said hub and arranged exteriorly of said inner end wall, means on the inner end wall of the housing for rotatably supporting said intermediate gear, below said second gear, an internally threaded gear fixed to the inner end of said drum and meshing with said intermediate gear, a pair of bushings connected to the outer end wall of and opening into said housing, an operating member engageable in a selected bushing for engagement with a selected driving gear for rotating said drum at a selected speed, spacing means about said shaft between the inner end of the drum and said intermediate gear supporting means, means for supporting the other end of said shaft and for maintaining the drum on the latter, and a rockable locking member mounted in said bushings for selectively locking said operating member in a bushing.

3. In a winch, a winding drum, a stationary shaft having a portion thereof rotatably supporting said drum, an upstanding stationary gear housing fixed to one end of said shaft and having outer and inner end walls, a relatively large low speed driving gear in said housing, a hub carried by said gear rotatable on another portion of said shaft and having one end extended laterally from said gear through the inner end wall of the housing, a high speed driving gear within the housing carried by the other end of said hub, a second gear carried by the said projecting end of said hub, an intermediate gear meshing with the gear on the projecting end of said hub and arranged exteriorly of said inner end wall, means on the inner end wall of the housing for rotatably supporting said intermediate gear, below said second gear, an internally threaded gear fixed to the inner end of said drum and meshing with said intermediate gear, a pair of bushings con-

nected to the outer end wall of and opening into said housing, an operating member engageable in a selected bushing for engagement with a selected driving gear for rotating said drum at a selected speed, spacing means about said shaft between the inner end of the drum and said intermediate gear supporting means, means for supporting the other end of said shaft and for maintaining the drum on the latter, a pair of hollow aligned bosses carried by said bushings, and a rockable locking member mounted in said bosses for releasably locking said operating member in a selected bushing.

4. In a winch, a winding drum, a stationary shaft having a portion thereof rotatably supporting said drum, an upstanding stationary gear housing fixed to one end of said shaft and having outer and inner end walls, a relatively large low speed driving gear in said housing, a hub carried by said gear rotatable on another portion of said shaft and having one end extended laterally from said gear through the inner end wall of the housing, a high speed driving gear within the housing carried by the other end of said hub, a second gear carried by the said projecting end of said hub, an intermediate gear meshing with the gear on the projecting end of said hub and arranged exteriorly of said inner end wall, means on the inner end wall of the housing for rotatably supporting said intermediate gear, below said second gear, an internally threaded gear fixed to the inner end of said drum and meshing with said intermediate gear, a pair of bushings connected to the outer end wall of and opening into said housing, an operating member engageable in a selected bushing for engagement with a selected driving gear for rotating said drum at a selected speed, spacing means about said shaft between the inner end of the drum and said intermediate gear supporting means, means for supporting the other end of said shaft and for maintaining the drum on the latter, a pair of hollow aligned bosses carried by said bushings, and a rockable locking member mounted in said bosses for releasably locking said operating member in a selected bushing, said locking member including an angularly disposed operator for gravitatingly maintaining said locking member in locking position relative to said operating member.

JESSE M. BENSON.