May 30, 1967 E. A. SMITH 3,322,398

PORTABLE POWER-DRIVEN WINCH DEVICE

Filed Dec. 30, 1965 2 Sheets-Sheet 1

Fig. 1

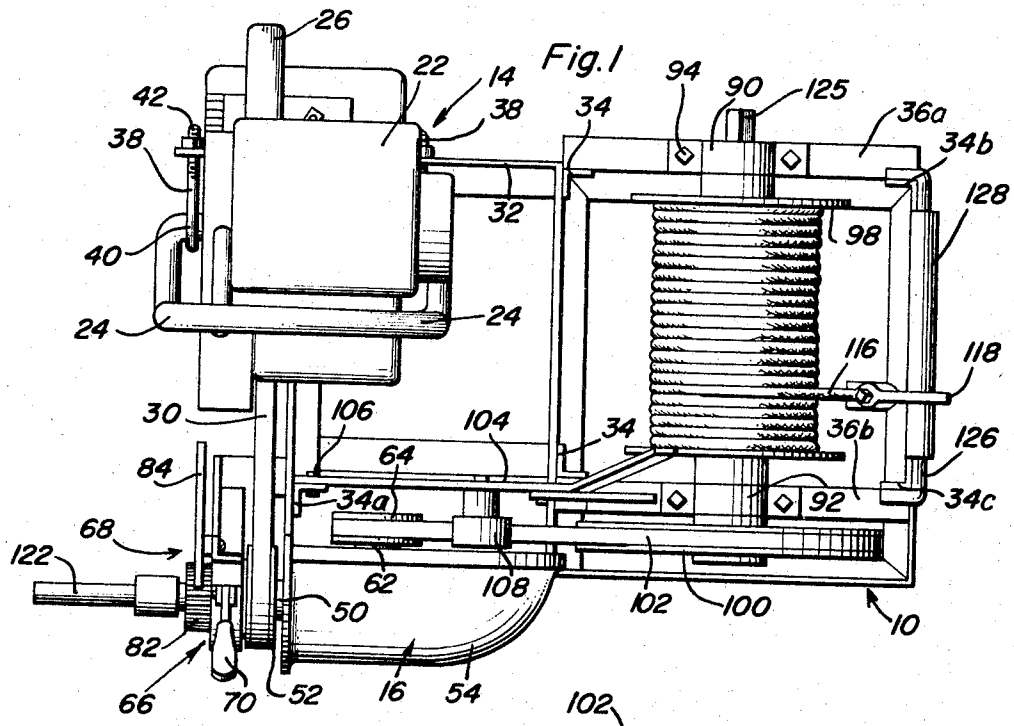
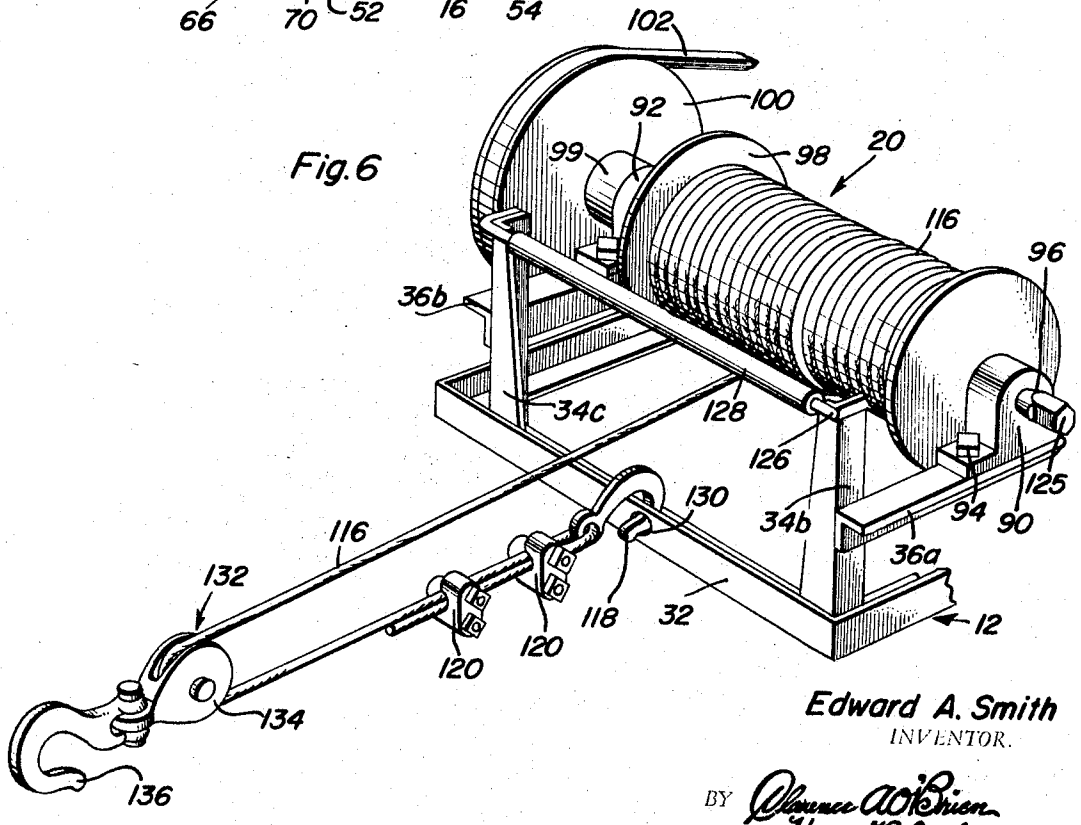


Fig. 6



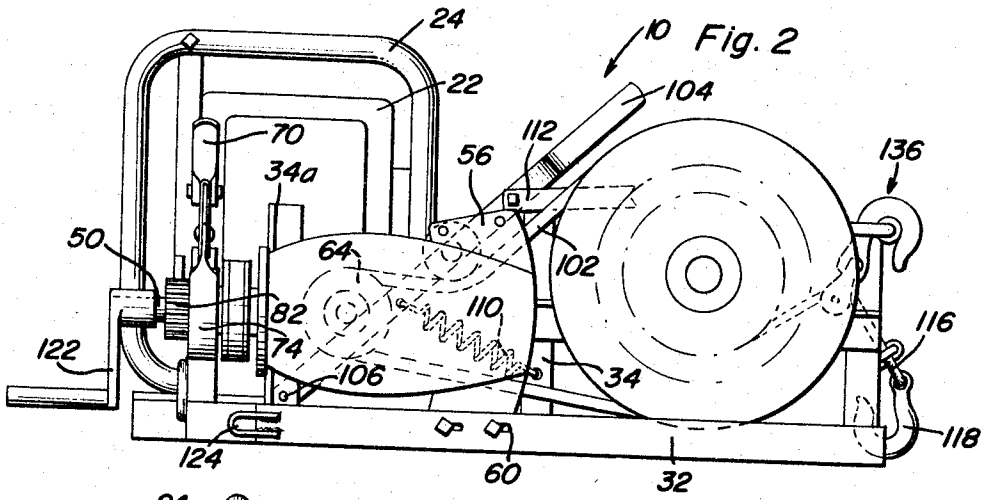
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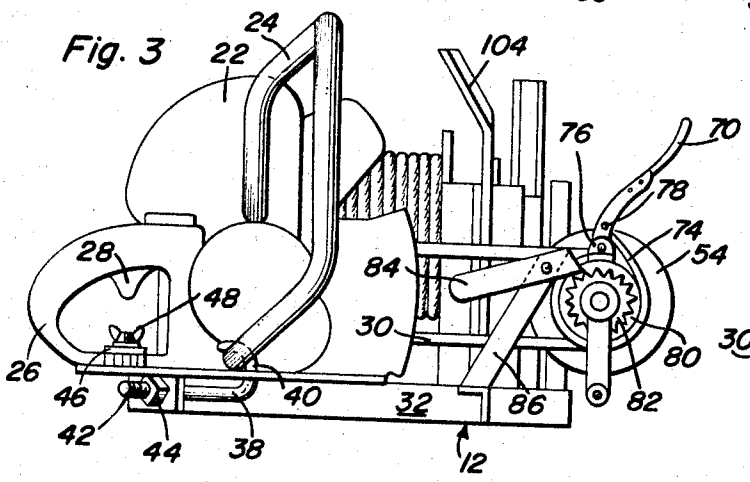
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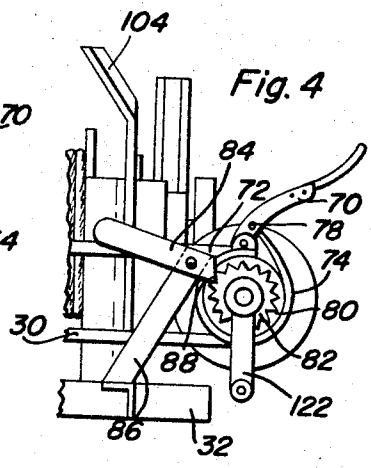
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PORTABLE POWER-DRIVEN WINCH DEVICE

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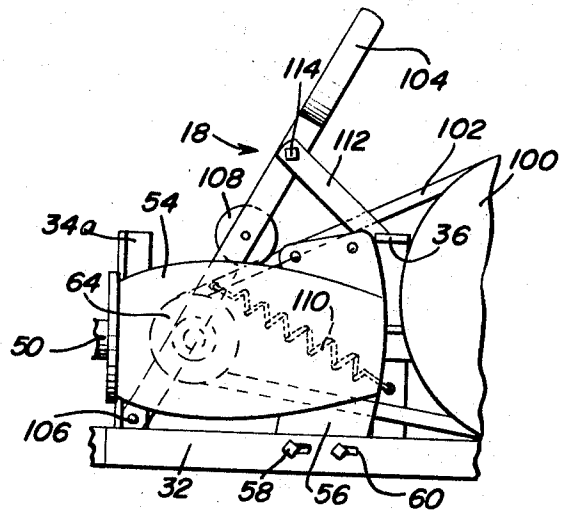


Fig. 5

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PORTABLE POWER-DRIVEN WINCH DEVICE

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6 Claims. (Cl. 254—186)

This invention relates generally to winch devices, and more particularly to a power operated portable winch device adapted to be easily carried to the situs of intended use and then suitably attached to the ground, a tree or the like for stability and rigidity.

It is well known that there is a great need for a really portable winch device embodying power operation whereby tree surgeons, loggers, hunters and the like may carry such winch device with them into generally inaccessible locations where truck-mounted winches cannot be taken. Accordingly, this invention provides such a winch device, including as well as power operation and ability to be hand carried to a desired location, various other desirable features usually found only on larger, heavier non-portable winches.

It is an object of the present invention to provide a power-operated, portable winch device which is relatively light of weight, extremely sturdy of construction and efficient in operation.

It is another object of the present invention to provide a power-operated multi-purpose portable winch device.

It is a further object of the present invention to provide a winch device which is light of weight and portable, including means for allowing the device to be readily moved about while also being able to be quickly and efficiently fastened down for pulling or lifting loads many times heavier than the device is itself.

It is a further object of the present invention to provide a portable winch device of the character described which has the operating components thereof arranged so as to be extremely compact and to have a low profile and hence a low center of gravity.

It is a still further object of the present invention to provide a portable power-operated winch device of the character described including means for clutching or declutching the power drive means to the output cable drum, and means for varying the output power available at the cable drum.

It is another object of the present invention to provide a winch device of the character described which includes means for enabling the device to be used as a high output-torque power takeoff.

It is a final object of the present invention to provide a portbale power-driven winch device with a provision for hand-cranking of the cable drum for reversing the normal rotation of the cable drum, in order to play out cable when desired.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a top plan view of the portable winch device of the present invention;

FIGURE 2 is a front elevational view corresponding to the illustration of FIGURE 1;

FIGURE 3 is a side elevational view corresponding to the illustratioin of FIGURES 1 and 2;

FIGURE 4 is a partial elevational view of a portion of the device as illustrated in FIGURE 3;

FIGURE 5 is a partial elevational view of a portion of the device as illustrated in FIGURE 2; and

FIGURE 6 is an enlarged partial perspective view of a portion of the device illustrated in FIGURES 1–5.

Referring now more specifically to the drawings, reference numeral **10** generally denotes the portable power-driven winch device comprising the present invention. The winch device **10** includes a base generally denoted by reference numeral **12**, on which base **12** there are mounted the various operating components of the winch device including a motor generally denoted by reference numeral **14**, a reducing gear box generally denoted by reference numeral **16**, a belt tensioning member generally denoted by the reference numeral **18** and a cable carrying assembly generally denoted by reference numeral **20**.

Referring first to FIGURES 1 and 3 in particular, the motor **14** is illustrated as a conventional chain saw type motor **22** with the usual guard or carrying handle **24**, operating handle **26** and trigger **28**. Further, as is well known, the chain saw motor **22** includes a centrifugal clutch therein which will declutch as the motor is slowed when no load is applied thereto but will remain clutched even when slowed down if the motor is loaded. Further, the motor **22** includes the usual power output shaft having an output pulley thereon (not illustrated) whereby a friction type belt such as the belt **30** may be mounted on the pulley for drivingly engaging a second pulley.

Referring again to FIGURES 1 and 3, as well as the various other figures of the drawings, it will be observed that the base **12** includes a bottom, generally rectangular frame **32** of suitable angle iron or the like, as well as various upstanding frame elements **34** and various cross frame elements **36** as required for purposes of mounting the various components of the invention on the frame. The motor **22** is mounted on the frame **32** by means of two hook bolts **38** having hooked head portions **40** for hooking and engaging the guard **24**, and threaded foot portions **42** which extend through the base frame **32**. Bolts **38** are connected to the frame by the nuts **44**. Thus, it will be observed that the motor **22** may be mounted or demounted on the frame **32** very quickly by means of the hook bolts **38**, and further, the exact position of the motor **22** on the base may be adjusted by threading the nuts **44** onto the threaded portions **42** of the bolts **38** thereby moving the motor **22** transversely of the base frame **32**. This adjustable feature will, of course, allow the friction belt **30**, which will normally be coupled between the motor **22** and a remotely placed pulley, to be tightened or loosened as desired. Referring again to FIGURE 3, it will be observed that a strap **46** with wing nut **48** thereon is wrapped about the handle **26** for further rigidly mounting the motor **22** on the base frame **32**, and of course, the strap **46** must be loosened prior to adjusting the position of the motor **22** on the base frame **32** as described above.

The reducing gear box generally denoted by reference numeral **16** comprises a generally conventional right angle reducing gear box having a five-to-one (5:1), or other desired gear reduction, which gear box includes an input shaft **50** extending generally parallel to the power output shaft of the motor **22** and having an input pulley **52** thereon which is generally parallel and in the same plane as the motor pulley, the friction belt **30** extending about the input pulley **52**. Thus, it will be apparent that the tension on the friction belt **30** may be adjusted between the motor pulley and the input pulley **52** as described above. The reducing gear box **16** includes a casing **54** in which the conventional gear train is positioned, the casing **14** being mounted on the upstanding frame member **34** and an upstanding plate **56**. The plate **56** is connected to the frame **32** at its lower end by bolts **58** extending through the slot **50** whereby the position of the plate **56** may be adjusted. The reducing gear box **16** includes an output shaft **62**

extending at right angles to the input shaft 50 and at right angles to the power output shaft of the motor 22. The output shaft 62 has an output pulley 64 mounted thereon for rotation therewith. Thus, it will be apparent that when the motor 22 is in operation, the belt 30 will be driven and hence the input pulley 52 and shaft 60 will be rotated, thereby causing the output shaft 62 and output pulley 64 to be rotated at a five-to-one speed reduction and concomitant increase in torque.

Referring now to FIGURES 1 through 4, it will be observed that the input shaft 50 is provided with a brake generally denoted by reference numeral 66, and a positive stop generally denoted by reference numeral 68. The brake 66 includes a brake handle 70 rotatably mounted on the cross frame element 72, and having the brake band 74 fixed at one end to the brake handle bracket 76, which bracket is mounted on the cross frame element 72, and at the other end to the handle 70 as indicated at 78. Thus, by referring to FIGURES 3 and 4 in particular, it will be observed that the brake band 74 is in wrapping engagement with a brake shoe 80, the brake shoe 80 being fixedly mounted on an extension of the input shaft 50, and thus, when the brake handle is moved from the position illustrated in FIGURE 4 to the position illustrated in FIGURE 3, the brake band which wrappingly engages the shoe 80 will be tightened down on the shoe and will thereby slow down or stop the shaft 50 depending upon the pressure applied to the handle. In this manner, the brake 66 provides a means for regulating the input speed to the reducing gear box 16 and hence the output speed of the shaft 62.

Referring further to FIGURES 3 and 4, it will be observed that a ratchet wheel 82 is also mounted on the input shaft outwardly of the brake shoe 80. Thus, the positive stop lock 68 comprises a stop member or arm 84 rotatably mounted on the frame member 86 at a point intermediate the ends thereof, the stop member 84 having a nose portion 88 which may be swung into engagement with the ratchet wheel 82 in order to positively stop rotation of the input shaft 50. Thus, it will be apparent that while the positive stop lock 68 provides a means for immediately and completely stopping the rotation of input shaft 50, the brake assembly 66 provides means for regulating the speed of the input shaft 50 by slowing or stopping it if so desired.

Referring now to FIGURES 1, 2 and 6 in particular, it will be observed that the cross frame elements 36*a* and 36*b* have a pair of pillow mounting blocks 90 and 92 mounted thereon by means of suitable mounting means 94, and a cable drum shaft 96 is rotatably mounted therebetween parallel to the base frame 32 and the output shaft 62 and perpendicular to the pulley 64 and motor power output shaft. A cable drum 98 is mounted between the pillow blocks 90 and 92 on the shaft 96 and is rotatable with the shaft 96. Mounted on one end of the shaft 96 and spaced by the spacer 98 so as to be in alignment with the pulley 64, is a cable pulley 100, which cable pulley 100 is approximately three to four times larger than the output pulley 64. A friction belt 102 is wrappingly engaged about the pulleys 100 and 64, the belt 102 normally being of such length as to provide slack therein, and hence due to such slack, rotation of the output pulley 64 will normally not cause the cable pulley 100 to be rotated by the belt 102, the belt merely slipping thereon. However, the belt tensioning member 18 is provided in order to clutch and declutch the pulley 100 to the pulley 64 in order to selectively drive the cable drum 98 at a reduced speed due to the size differential between pulleys 100 and 62. The belt tensioning member 18 includes a belt tensioning bar 104 rotatably connected at 106 to the upstanding frame element 34*a*. The belt tensioning bar 104 carries a tensioning roller 108 intermediate the upper and lower ends thereof, the roller 108 being rotatably mounted on the bar 104 and free to rotate thereon. Referring to FIGURES 2 and 5, it will be observed that a coil spring 110 is connected between the bar 104 and an upstanding frame element 34, the spring 110 normally biasing the bar 104 to the position illustrated in FIGURE 2 whereby the roller 108 will be in engagement with the friction belt 102 in order to take up the slack therein and hence bias the belt 102 into frictional engagement between the pulleys 64 and 100. Thus, rotation of the pulley 64 will cause the pulley 100 to be rotated hence rotating the cable drum 98 therewith. A tension bar locking leg 112 is pivotally connected as at 114 to the bar 104, the locking leg 112 being swung upwardly out of the way as illustrated in FIGURE 2 when the spring 110 biases the bar 104 to this clutched or driving position. However, it will be seen that the bar 104 may be manually moved upwardly to the position illustrated in FIGURE 5 at which time the locking leg 112 may be swung downwardly into engagement with the cross frame element 36*c* in order to retain the bar 104 in the position illustrated in FIGURE 5. At this time, there will be no tension on the belt 102 due to the slack therein, and hence the pulley 100 will not be driven.

Referring again to FIGURES 1 and 6, it will be observed that the cable drum 98 has a length of cable 116 wound thereon, the cable 116 having a conventional hook 118 clamped to one end thereof by the fastening means 120. Further, as will be observed in FIGURE 2 for example, an anchor member 124 is connected to the base frame 32 as for example by being welded thereon, whereby the winch 10 may be suitably secured to the ground or to a tree stump or the like by means of suitable chains, cable elements or the like. Thus, after the winch 10 has been carried to a desired location, it can be suitably fixed to the ground at which time a required length of the cable 116 may be unwound from the drum 98 and hooked to an object desired to be pulled or lifted by the winch device. It will be appreciated that the cable 116 may be readily unwound from the drum by loosening the belt tensioning bar and removing the belt 102 from the pulley 100. However, inasmuch as this is time consuming, this invention contemplates another method of unwinding the cable, or reversing the normal rotation of the cable drum 98. Thus, referring to FIGURES 1 and 2, it will be observed that the input shaft 52 of the reducing gear box 16 extends outwardly past the ratchet wheel 82, and, as illustrated in FIGURES 1 and 2, a handle 122 is mounted on the end of shaft 50. Of course, it will be appreciated that the output end of the shaft 50 is suitably polygonally shaped whereby the handle 122 may be fixed thereon for rotating the shaft 50. Further, it will be appreciated that the handle 122 is removably mounted on the outboard end of the shaft 50 and will normally not be in place thereon as illustrated in FIGURES 1 and 2 when the winch 10 is being used in its normally intended manner. Thus, by use of the handle 122, the shaft 50 can be reversely rotated, that is, rotated in the opposite direction as the normal rotation imparted thereto by the friction belt 30, and hence the output shaft 62 will be reversely rotated as will the cable drum 98. It will also be appreciated that, inasmuch as a great deal of friction or drag occurs in the reducing gear box 16, it will be quite difficult to pull out the cable 116; that is, it will be difficult to rotate the drum 98 in a reverse manner by pulling out the cable 116. Thus, the handle 122 provides means for easily and readily unwinding the cable 116 when so desired.

Referring now to FIGURES 1 and 6, it will be observed that the shaft 96 includes a power take-off end section 124 thereon of hexagonal shape, whereby when so desired, the winch device 10 may be used to provide rotational power for driving any type of machine. Thus, it will be seen that the power take-off section extends laterally outwardly of the drum 98, and will be appreciated that the cable 116 will normally be entirely removed from the drum 98 when it is desired to utilize the device as a power take-off. With proper attachments, this power

take-off section enables the instant device to be used as a post hole digger, well digger, hoist or log and pulp loader.

Referring again to FIGURES 1, 2 and 6, it will be observed that the device includes a guide bar **126** extending between the upstanding frame elements **34***b* and **34***c* adjacent the cable drum **98**, and a rotatable guide member **128** mounted on the guide bar **126** whereby when the hook **118** is used for lifting or hoisting or the like the cable **116** will engage the rotatable guide member **128** for easy movement thereover. However, as will be appreciated by viewing FIGURES 2 and 6 in particular, the cap **118** may be hooked into an aperture **130** in the base frame **32** and a block generally denoted by reference numeral **132** may be mounted on the cable **116**. The block **132** includes a pulley portion **134** and a hook portion **136** whereby the cable **116** will be movable through the cable portion **134** and, when the hook **118** is hooked into aperture **130** and the hook **136** attached to an object to be pulled, the output power of the device as applied to the attached object will be effectively doubled. Thus, when the cable **116** is used in the manner illustrated in FIGURE 6, the effective force applied to the hook **136** will be twice as great as the force applied to the hook **118** when it is hooked to an object, without requiring any additional output of the motor **22** for changing of the reducing gear box gear ratio. Further, as illustrated in FIGURES 1 and 2, either or both of the hooks **130** and **136** may be hung over the guide bar **126** when the device is being transported, in order to maintain the hooks in a relatively stationary and out-of-the-way position.

In view of the above description of the device **10**, it will be appreciated that the particular manner of mounting the motor **22** on the base frame **32** will allow the friction belt **30** to be tightened. Also, the positioning of the various operating elements, that is, the motor **22**, the reducing gear box **16**, and the cable drum **98** on the base **12** in generally U-shaped configuration, provides an extremely compact while equally efficient portable winch device. Thus, if the above elements were to be positioned in a straight line, the device would be much longer and unwieldly. Further, if the above elements were to be positioned in vertically spaced relation to each other, the center of gravity of the device would not be relatively low as it is in this configuration, and thus its utility as a winch would be impaired. Accordingly, it will be appreciated that the device **10** may be readily carried to an area which would normally be inaccessible to other similar winch devices, such as those mounted on trucks and the like, and may be used by a tree surgeon, a logger, etc. in order to effectively lift or pull heavy objects such as tree limbs, stumps or the like.

What is claimed as new is as follows:

1. A portable power-operated winch comprising a base including opposite end portions and opposite sides, a chain saw motor including a rearwardly disposed handle and a forwardly disposed drive shaft journaled for rotation about an axis extending transversely of said motor, means removably securing said motor to one end portion of said base at one side thereof with said axis extending longitudinally of said base, said handle disposed adjacent one side of said base, and said shaft spaced from said handle toward the other side of said base, a right-angle reducing gear box secured to said one end portion of said base adjacent the other side thereof and including an input shaft extending longitudinally of said base adjacent said one side thereof having an exposed end portion adjacent said one end portion of said base on which a first driven wheel is mounted, said drive shaft including a first drive wheel aligned with said driven wheel, an endless drive member entrained about said drive and driven wheels, said gear box including an output shaft journaled for rotation about an axis extending transversely of said base and spaced toward the other end thereof from said drive member, said output shaft having a second drive wheel mounted thereon, a winding member journaled on said other end portion of said base for rotation about an axis extending transversely of said base and including a second driven wheel aligned with said second drive wheel, and an endless drive member entrained about said second drive and driven wheels.

2. The combination of claim **13** including brake means supported from said base and operable to selectively brake said input shaft.

3. The combination of claim **2** wherein said portable power-operated winch includes selectively operable clutch means interposed in the power transmission path thereof between said output shaft and said winding member and operable to selectively declutch said winding member from said output shaft.

4. The combination of claim **3** including second brake means carried by said frame and operative to selectively positively lock said input shaft against rotation relative to said base, the first-mentioned brake means being of the friction drag-type and operable to apply selected amounts of drag on said input shaft.

5. The combination of claim **1** wherein said motor is supported from said base for adjustable positioning longitudinally of the latter and the first-mentioned endless drive member comprises a friction drive belt, the adjustable positioning of said motor longitudinally of said base serving to vary the tension of said belt.

6. The combination of claim **1** wherein the end of said input shaft adjacent said one end of said base includes a non-circular portion adapted to have a crank handle mounted thereon for manual rotation of said input shaft, said motor including a centrifugal clutch driving said drive shaft and operable to declutch the motor from the drive shaft when the motor is slowed and no load is applied to the drive shaft and remain clutched to the drive shaft even when the motor is slowed if the drive shaft has a load applied thereto.

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