

WINCH.

Patented Nov. 15, 1910.

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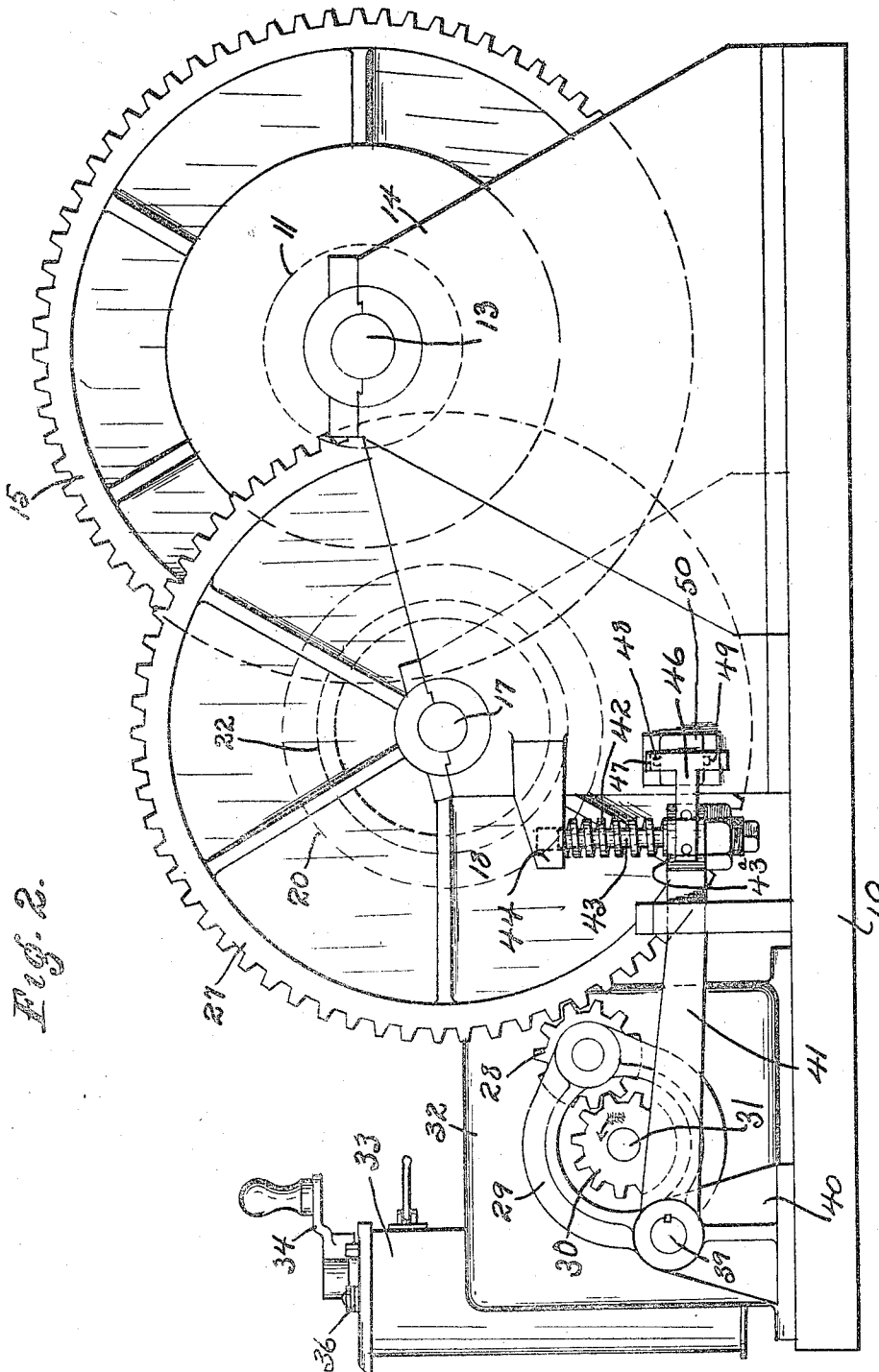
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2 SHEETS-SHEET 2.



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UNITED STATES PATENT OFFICE.

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WINCH.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, FREDERICK METCALF and JOHN E. CARSON, citizens of the United States of America, and residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Winches; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

This invention relates to improvements in winches and particularly in mooring winches.

The requirements of a mooring winch are that it not only bring the vessel to the dock, but also when the vessel is alongside the dock that it hold it tightly in place, and if there is any relative movement between the vessel and the dock due to the loading or unloading of a cargo, the action of tides, waves or passing vessels, or if for any other reasons the vessel rises or falls, it is essential that the winch be able to automatically pay out the line when the load or drag increases beyond a certain amount to avoid the breakage of the line or of the winch, and that it again wind in the line when it becomes slack, and thereby preserve a uniform tension on the line. Steam winches having double cylinder steam engines are most commonly employed for the above purpose, inasmuch as the engines can be overhauled or reversed when the load or drag on the lines becomes excessive and can again wind in the lines quickly when they become slack, the steam being supplied to the cylinders continuously as long as the winches are in use.

One of the objects of the present invention is the provision of an efficient winch which answers all the requirements and wherein other motive devices than a steam engine may be employed, such, for example, as an electric motor.

Another object is to improve generally the construction of winches and to provide a winch which is more efficient and economical than those which have been employed heretofore.

In carrying out our invention we provide a winch having between the drum and the motor or motive device a friction clutch which permits the drum to turn independ-

ently of the motive device when the load increases beyond a certain amount, and provide means controlled by the load for automatically starting or stopping the motor so that when the line is slack or the load falls off, the motor will be started and will cause the drum to wind in the line, and when the load increases to a predetermined amount, the motor will be stopped and will be held against movement in the reverse direction.

Although our invention is designed particularly for use in connection with an electric motor, in some of its broadest aspects, however, it is not limited to this type of motive device alone.

The invention may be further briefly summarized as consisting in certain novel details of construction and combinations and arrangements of parts which will be described in the specification and set forth in the appended claims.

For an understanding of our invention reference is had to the accompanying sheets of drawings in which—

Figure 1 is a plan view of a mooring winch constructed along the preferred lines of our invention. Fig. 2 is a side elevation of the same.

Referring now to the figures of the drawings 10 represents the frame or bed of the winch upon which all the operating parts are mounted.

At 11 is shown a winding drum which is adapted to receive the line or cable 12, and which is secured to a horizontal shaft 13 mounted in suitable frames or housings 14 carried by the bed 10. The shaft 13 has secured thereto a large gear wheel 15 which meshes with the pinion 16 loosely mounted on a counter-shaft 17 which is also supported from the bed 10 by suitable frames or housings 18. The shaft 17 is provided with a friction clutch consisting in this case of two sections 19 and 20 which rotate with the shaft but may move axially thereof and which may be forced against flanges (not shown) of the pinion 16 by a coil spring 21 which also surrounds the shaft 17. The tension of the spring 21 may be regulated by a hand wheel 22 having a threaded hub 23 which engages a threaded portion of the shaft, the spring 21 being in this case between the hand wheel and the section 20 of the clutch.

For the purpose of keeping the pinion 16

in alinement with the gear 15 and for the further purpose of regulating the tension of the spring 21, an adjustable nut 24 is provided on the shaft, and this nut engages and normally holds against endwise movement the section 19 of the clutch. In order that the spring may not be compressed or set too tightly we provide means which may be given a predetermined adjustment for limiting the axial movement of the hand wheel, and this means consists in this case of an arm 25 which is carried by an adjustable nut or ring 26 mounted on the threaded section of the shaft, the arm 25 having a portion which overhangs a flange 23^a on the hub 23 of the hand wheel. Thus it will be seen that by turning the nut 24 and by setting the arm 25 so as to stop the hand wheel at any desired position and with a spring of the proper size, the hand wheel when moved to the predetermined position will cause any desired power to be transmitted between the pinion and the clutch and when this power is exceeded by the load on the drum, the clutch will slip and permit the drum to rotate independently of or relative to the clutch, counter-shaft and other parts to be mentioned presently. By shifting the hand wheel away from the clutch the spring tension may be withdrawn from the clutch permitting the pinion 16 to become loose on the counter-shaft and free the drum from the control of the motor or motive device to be referred to, so that the line can be unwound or removed from the drum by hand.

Secured to the counter-shaft 17 is a large gear 27 which meshes with a pinion 28 carried by a swinging or oscillatory frame 29, the pinion 28 being engaged by a pinion 30 which in this case is secured to the shaft 31 of a motor or motive device 32. The motor 32 may be of any desired type, as far as certain features of our invention are concerned, but in this case we have shown an electric motor which we prefer to employ, and this motor is preferably of the ordinary series type. For the purpose of manually controlling the motor, we have shown an ordinary controller 33 having a main operating handle 34 and a reversing switch handle 36. In order to normally prevent reversal of the motor shaft and to give holding power to the winch when the power is thrown off, we employ a ratchet wheel 37 on the motor shaft 31 and ratchet finger 38 which permits the motor shaft 31 to turn freely in one direction but prevents it from turning in the opposite direction. This ratchet finger 38 may be manually disengaged from the ratchet wheel 37 when the motor is reversed to unwind the cable from the drum.

The swinging or oscillatory frame 29 which carries the pinion 28 is mounted on a stud 39 carried by a suitable standard 40

on the bed 10, and this stud has secured to the end thereof an arm 41 which operates suitable switch mechanism to open and close the motor circuit which will be explained.

When the line is being wound on the drum, the motor rotates in the direction indicated by the arrow in Fig. 2, or in a counter clockwise direction and the action of the pinion 30 when turning in this direction tends to cause the pinion 28 to ride upward on the gear 27. This upward movement of the pinion 28 is normally resisted by a coil spring 42 mounted on an adjustable stud 43 carried by the arm 41 and which has a shoulder 43^a on which the lower end of the spring rests. The upper end of the spring 42 abuts against a stationary projection 44 and therefore by adjusting the stud 43 up or down the tension on the spring 42 can be increased or decreased as desired. Secured to the end of the arm 41 is a switch arm 46 which, as shown, is somewhat T-shaped, this switch arm having at its end a vertical portion provided with inwardly extending ends 47, one of which is shown in Fig. 1 and which coöperates with a pair of push buttons 48 and 49 carried by a suitable block or other support 50 on the frame of the machine. These parts are so arranged that when the pull on the line is below a predetermined amount, the spring 42 will force the arm 41 downward against the push button 48 shifting the same a sufficient amount to close the circuit through the electric motor so as to start the motor in operation. As soon as the operation of the motor has caused the pull on the line to reach another and higher predetermined limit or if for any other reason the load is increased a certain amount, the pinion 28 will be moved upwardly raising the arm 41 and causing the button 49 to be shifted an amount sufficient to break the circuit of the motor so as to stop its operation. Under ordinary circumstances when the load or pull on the line is normal, the motor is stationary and the load will be sustained by the friction clutch and ratchet mechanism. The upward movement of the pinion and consequently of the arm 41 is a very slight one as is indicated by the construction of the switch mechanism. It will be seen that no power or energy is consumed under normal conditions or even when the slipping between the parts of the clutch permits the line to pay out when the pull on the line exceeds the predetermined limit, and the winch is, therefore, very economical in operation.

What we claim is,—

1. In a winch, a drum adapted to receive a line, an electric motor for operating the drum, means including a friction clutch for operatively connecting the drum and motor, means normally preventing the reversal of the motor and for holding the same against

movement in one direction, and means controlled by the pull on the line for automatically opening and closing the motor circuit.

2. In a winch, a drum adapted to receive
5 a line, a motive device, means operatively
connecting the drum and motive device comprising a friction clutch and a plurality of
gears one of said gears having a movable
support and having a position depending
10 upon the pull on the line, and means operated by the movement of said gear due to
the variations in the pull on the line for
automatically starting and stopping the motive device.

15 3. In a winch, a drum adapted to receive
a line, a motor for operating the drum,
means operatively connecting the motor and
drum comprising a friction clutch and gearing
including an idler gear, a swinging
20 frame for said idler gear adapted to be
shifted by variations in the pull on the line,
yieldable means resisting the movement of
said frame, and means operated by the movement
of said frame for automatically starting
25 ing and stopping the motive device.

4. In a winch, a drum adapted to receive
a line, a counter-shaft geared to said drum
and provided with an adjustable friction
clutch, an electric motor, gearing connecting
said motor and counter shaft, said gearing
30 including an idler pinion, an oscillatory
or swinging frame carrying said pinion and
adapted to be shifted by variations in the
load on the drum, yieldable means normally
resisting the movement of said frame, means
35 for normally preventing the movement of
the motor in one direction, an arm movable
with said swinging frame, and switch mechanism
operated by movements of said arm
for automatically opening and closing the
40 motor circuit.

In testimony whereof, we sign the foregoing specification, in the presence of two witnesses.

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