

F. METCALF & J. E. CARSON.

WINCH.

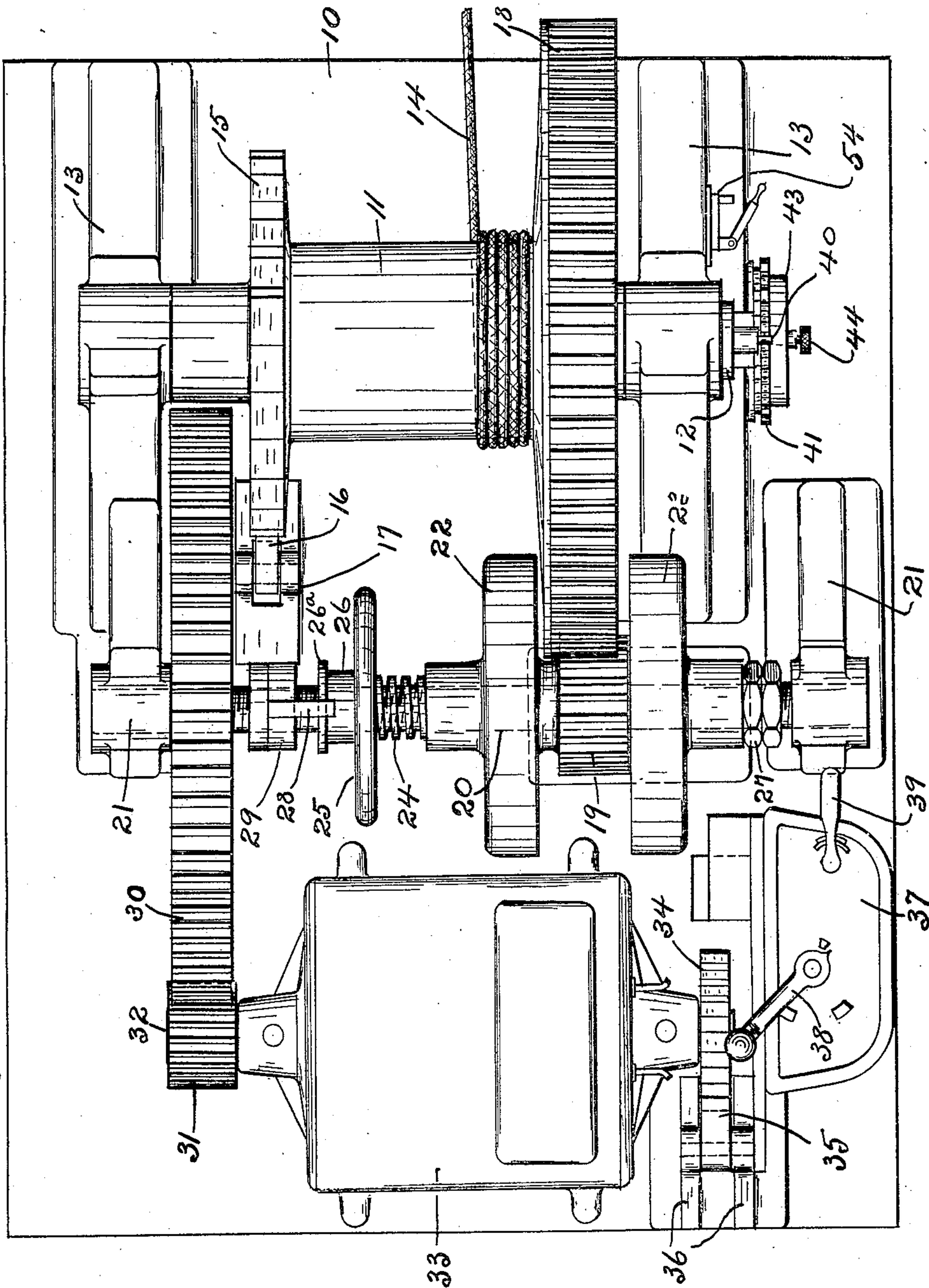
APPLICATION FILED AUG. 28, 1909.

975,558.

Patented Nov. 15, 1910.

2 SHEETS-SHEET 1.

Fig. 1.



Witnesses:  
H. J. Gittins  
B. C. Brown.

Inventors  
Frederick Metcalf  
and John E. Carson  
by Lynch & Dorer  
their Attorneys

F. METCALF & J. E. CARSON.

WINCH.

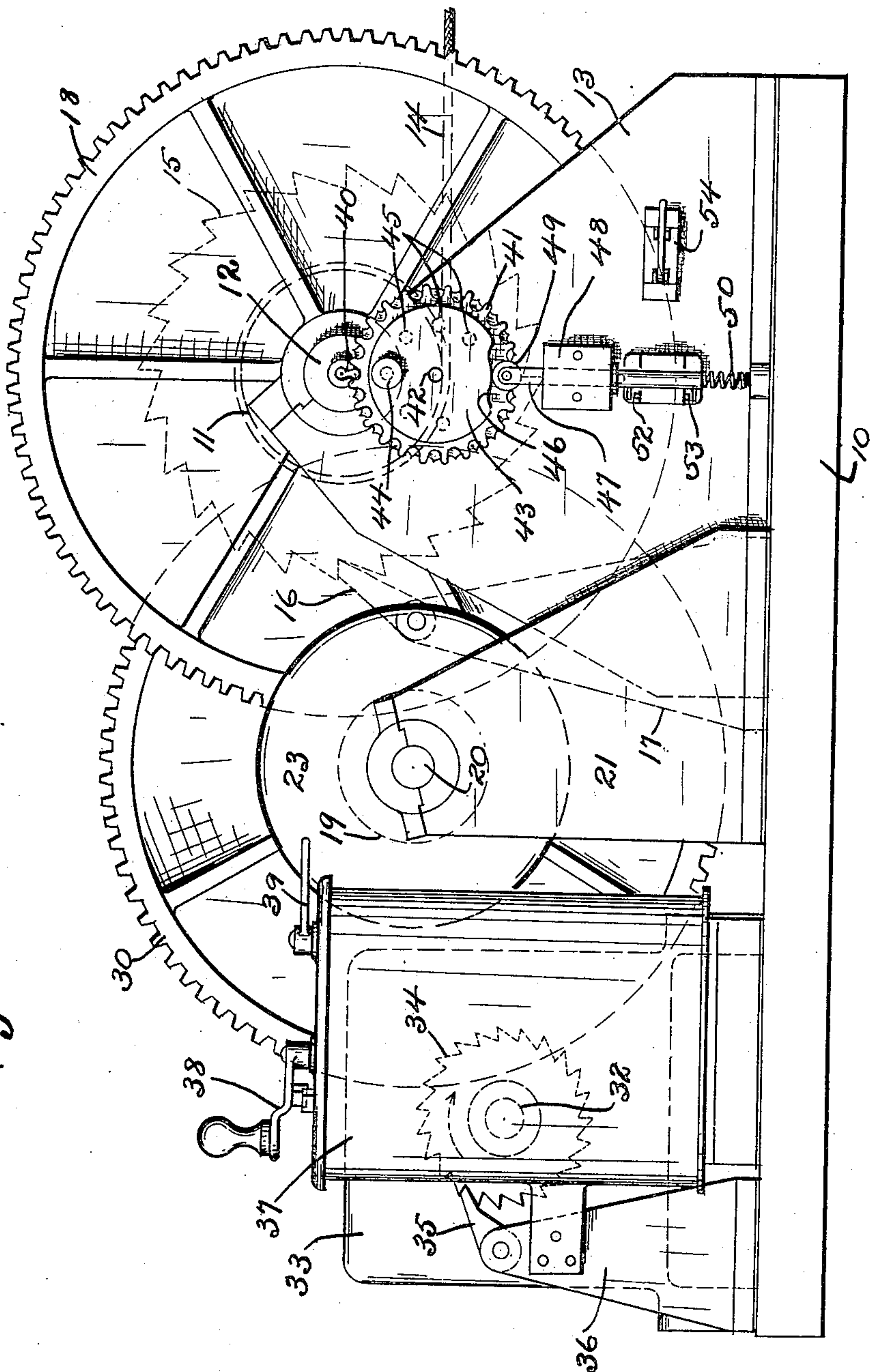
APPLICATION FILED AUG. 28, 1909.

975,558.

Patented Nov. 15, 1910.

2 SHEETS—SHEET 2.

Fig. 2.



Witnesses:  
H. J. Gittins  
B. C. Brown.

Inventors  
Frederick Metcalf  
and John E. Carson  
By Lynch & Rorer  
Attorneys.



# UNITED STATES PATENT OFFICE.

FREDERICK METCALF AND JOHN E. CARSON, OF CLEVELAND, OHIO, ASSIGNORS TO  
THE CHASE MACHINE COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

## WINCH.

975,558.

Specification of Letters Patent. Patented Nov. 15, 1910.

Application filed August 28, 1909. Serial No. 514,982.

*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 new and useful improvements in winches, and particularly to winches employed as towing machines and as anchor windlasses.

At the present time automatic steam towing machines are in common use, the primary object of the machines being to prevent the breaking of the line or hawser under overload by permitting the machine to pay out the line against resistance until the overload falls off, and then return the line paid out to its previously set position. Double cylinder steam engines are usually employed in these towing machines, a steam pressure being constantly maintained in the cylinders so as to balance the normal load, and means being provided for regulating the steam pressure as the load varies so as to resist the paying out of the line on the occurrence of an overload and then again wind in the line so paid out. In another form of towing machine the steam pressure is assisted in holding the load by a friction brake, the load turning the drum and engine under the brake when an overload occurs and the engine returning the line to the drum against the brake friction when the overload falls off. In all these machines of which we are aware, steam pressure is always present in the cylinders and there is considerable consumption of steam due to the condensation and cylinder leakage.

Steam and hand power windlasses are now in common use, in which power is applied to pull the vessel to a position such that the anchor chain leads nearly directly upward from the anchor to the hawser pipe of the vessel, the lift of the vessel on the waves or the surging by the propeller screw being utilized to assist in breaking out the anchor. In these machines the windlass is usually held from reversal under overload by the friction of worm gearing or by any other

suitable means such as pawls and ratchets, no provision being made for paying out the line as the load increases. There have been built a few windlasses called "riding windlasses" used chiefly, if not entirely, on light ships, and in these windlasses the engines are designed, as in towing machines, to be reversed against the steam pressure to pay out the chain under overload and to automatically return the chain to its previously set length when the overload falls off.

One of the objects of the present invention is the provision of a winch which is more efficient than those which have been heretofore employed and which may be used as a towing machine and as a windlass either to hold the chain gained by surging and to quickly take up the slack chain when the anchor is being broken out and raised, or as a riding windlass to permit the chain to pay out under an overload and to be again wound in when the machine is relieved of the overload.

A further object of this invention is the provision of a winch wherein other sources of power or other forms of motive devices than steam engines may be effectually employed, such, for example, as electric motors.

In carrying out our invention we provide a winch wherein no power or energy is consumed under normal conditions but only when the winch is in actual use either paying out of winding in the line or chain, and for this purpose we provide between the drum and motive device or source of power a friction clutch which permits the drum to pay out the line on overload and provide suitable means operated by the movement of the drum in paying out the line, for automatically starting the rotation of the clutch shaft and for again stopping the rotation of the clutch shaft after the overload has fallen off and the exact amount of line has again been wound upon the drum.

In order that the winch may be used as an ordinary anchor windlass suitable means is provided for preventing, when desired, the reverse movement of the drum so as to prevent the length of line gained from paying out an overload. This means, which is preferably in the form of a suitable ratchet mechanism, may be thrown out of action when the winch is to be used as a towing machine or as a riding windlass to maintain



the proper length of line or chain between the winch drum and the vessel being towed or between the drum and anchor.

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 a better understanding of our invention reference is had to the accompanying sheets of drawings, in which—

Figure 1 is a plan view of a winch constructed in accordance with our invention showing in this case a drum having an ordinary line or cable partially wound thereon. Fig. 2 is a side elevation of the same.

Referring now to the figures of the drawings 10 represents a bed upon which the operating parts are mounted, and 11 represents a drum which is secured to a horizontal shaft 12 mounted in suitable bearing frames or housings 13 on the bed 10. The drum, as stated before, is shown as having partially wound thereon a line 14, although, of course it may receive an anchor chain and may be varied in construction in accordance with requirements. At one end of the drum is a ratchet wheel 15 which is adapted to be engaged by a ratchet pawl or finger 16 supported from the bed by a suitable pedestal or standard 17, and this ratchet mechanism, as will be explained presently, is designed to be employed when the winch is used as an ordinary anchor windlass for the purpose of breaking out the anchor and for raising the same. At the opposite end of the drum is a large gear wheel 18, and this gear wheel meshes with a pinion 19 loosely mounted on a counter shaft or clutch 20 supported in bearing frames or housings 21. A friction clutch consisting of two sections 22 and 23 is mounted on the shaft, and these clutch sections are adapted to engage flanges (not shown) on the pinion 19, and are adapted to be forced with predetermined pressure against the pinion by a coil spring 24 also surrounding the shaft. These clutch sections, of course, rotate with the shaft 20 but may move longitudinally thereof. The tension of the spring 24 is designed to be regulated by a hand wheel 25 having a hub 26 which engages a threaded portion of the shaft 20.

For the purpose of keeping the pinion 19 in alinement with the gear 18, and for the further regulation of the tension of the spring 24, a nut 27 is provided on the shaft, and this nut is engaged by the section 23 of the clutch. The spring 24 may be prevented from being set too tightly or firmly by means of an arm or projection 28 which is carried by an adjustable nut or ring 29 and which has a portion 28 which over-

hangs or engages a flange 26<sup>a</sup> on the hub 26 of the hand wheel so that when this nut or ring 29 is set in any predetermined position, the arm or projection 28 will limit the movement of the hand wheel away from the nut or ring 29 and will limit the compression of the spring 24.

It will be seen that by turning the nut 27 on the shaft 20 and by setting the nut or ring 29 to stop the hand wheel at any desired position and with a spring of the proper size, the hand wheel, when fully set up or moved to a predetermined position, will cause any desired power to be transmitted between the clutch sections and the pinion, the clutch slipping when this power is exceeded by the load on the drum. By shifting the hand wheel away from the clutch the spring tension may be lessened or withdrawn allowing the pinion 19 to become loose on the shaft 20 so that the line can be unwound from the drum by hand or by any other suitable means. Of course, if the motive device employed is reversible the line can be run off or unwound from the drum by power.

Secured to the counter shaft or clutch shaft 20 is a large gear wheel 30, and this gear wheel meshes with a pinion 31 which is secured to the shaft 32 of the motive device or source of power 33 which in this case is an electric motor preferably of the ordinary series type. To prevent reversal of the motor when it is desired that it operate in a forward direction only, the motor shaft is provided with a ratchet wheel 34 which is engaged by a ratchet pawl or finger 35 carried by a suitable frame or standard 36 on the bed 10. This ratchet mechanism may, of course be thrown out of action when it is desired to reverse the motor. For manual control of the motor an ordinary controller 37 is provided, this controller having the usual operating handle 38 and reversing switch handle 39.

As was before stated, we have provided means operated by the movement of the drum for automatically starting rotation of the clutch shaft as the line pays out on the occurrence of an overload, and for automatically stopping the rotation of the same after the machine is relieved of the overload and the exact amount of line has been rewound on the drum, and this means will now be explained. Upon one end of the drum shaft 12 is a single gear tooth 40 cooperating with a suitable gear wheel 41 and forming with the same the familiar Geneva stop mechanism and in this case serving to close and open the motor circuit. The gear wheel 41 is mounted on a pin 42 carried by the frame of the machine, said pin also carrying a cam plate 43 which is adapted to be driven from the gear wheel 41 by a spring lock pin 44 which may engage in any one of



a number of holes 45 in the gear wheel 41, these holes in the gear wheel being shown by dotted lines in Fig. 2. The cam plate 43 is provided with a depression 46, and a longitudinally movable rod 47 which is below the cam plate and is mounted for longitudinal movement in a member 48 on the frame of the machine, is provided at its upper end with a roller 49 which is held yieldingly against the face or edge of the cam plate by means of a spring 50. This rod 47 is provided at its lower end with projections which, when the rod moves longitudinally press against and operate two electric switch buttons 52 and 53 respectively, the button 52 being operated when the rod moves downwardly, and the button 53 being operated when the rod moves upwardly.

The operation of the machine is as follows:—The spring lock 44 being disengaged from the gear wheel 41 so that the cam plate 43 is inoperative, the roller 49 being in the depression 46 and the ratchet pawls being thrown out of action, the machine may be operated as an electric winch to set the line at its desired length. The adjustment of the clutch on the clutch or counter shaft 20 may be made once for all, the tension in the spring 24 being such that the clutch will be capable of transmitting the normal towing power of the vessel if the winch is used as a towing machine, or to sustain the normal drag on the anchor chain if the winch is used as a riding windlass. The clutch may be set sufficiently in excess of the power to be transmitted, but should not be set too tightly in order that it may slip before the line is strained beyond its elastic limit. The line being set at the desired length, the motor is stopped, the ratchet pawl 35 is thrown into action so as to prevent the reversal of the motor and the spring lock pin 44 is entered into the nearest hole 45 in the gear wheel 41, the roller 49 being still in the depression 46 which is of sufficient length to permit the cam plate to be rotated through a small arc if necessary in order that the spring lock pin may enter one of the holes 45. A suitable switch 54 on the frame of the machine is then closed connecting the automatic circuit with the main line, but with the rod in the position stated above it has operated button 53 and no current is therefore supplied to the motor. Under normal conditions the strain on the line is sustained by the ratchet wheel 34 and pawl 35. If now the line is subjected to an exceptionally heavy pull, causing the friction clutch to slip and pay out the line, the rotation of the drum 11 will turn the tooth 40 and the gear wheel 41 causing the cam plate 43 to move with it. The depression 46 in the cam plate will then move away from the roller 49 on the end of the rod 47, shifting

the rod downward and operating push button 52 so as to close the circuit to the motor to start the same in operation opposing the movement of the drum or in a direction such as to wind in the line. As long as the load on the line exceeds the power of the clutch, the drum will continue to pay out the line, each revolution of the drum causing the gear wheel to be moved through the space of one tooth, but as soon as the pull on the line falls below the power of the clutch, the line will be again wound on the drum and when the exact amount of line has been rewound on the drum, the cam plate will be in its original position, the rod 48 will be lifted again, operating push button 53, thus automatically shutting off the current to the motor.

If the winch is to be used as an ordinary windlass for breaking out and raising an anchor, all that is necessary is to throw out of action the automatic mechanism by removing the spring lock pin 44 from the hole 45 which it occupies and placing the ratchet pawl 16 into action, after which the motor can be controlled by the controller 37 in the usual manner. The pawl 16 and ratchet wheel 15 will prevent the paying out of any line or chain regardless of the pull on the drum. The drum thus being held from movement when the pull on the drum exceeds the power of the motor and the motor causing the drum to rapidly wind in the line or chain when the latter becomes slack, the anchor can be broken out and then raised.

What we claim is,—

1. In a winch, a drum, an electric motor for driving said drum, power transmitting mechanism forming an operative connection between said drum and said electric motor, a friction clutch arranged in said power transmitting mechanism and adapted to carry a load less than the carrying power of the said electric motor and means controlled by the movement of the drum for starting the operation of the motive device when the load on the drum exceeds the power of the clutch and the line is paid out by the rotation of the drum and for stopping the operation of the motive device when the drum is relieved of the overload and the line so paid out rewound on the drum.

2. In a winch, a winding drum, an electric motor for operating the drum, means operatively connecting the motor and drum comprising suitable gearing and a friction clutch, means for preventing the reversal of the motor when the load becomes excessive, and switching mechanism operated by the movement of the drum when the load becomes excessive and the clutch slips so that the line is paid out, for automatically closing the motor circuit so as to supply current thereto, and for automatically opening the motor circuit so as to shut off the current



supply after the overload falls off and all the line paid out has been rewound on the drum.

3. In a winch, a winding drum, a motive device adapted to operate the drum, a friction clutch between the drum and motive device, means normally preventing the reversal of the motive device, and means for automatically starting the motive device in operation when the load on the drum exceeds the power of the clutch and the line pays out and for automatically stopping the operation of the motive device when all the line paid out has been rewound on the drum and the overload has fallen off.

4. In a winch, a winding drum, an electric motor for operating the drum in one direction, a friction clutch between the drum and motor, means normally preventing the reversal of the motor when the load on the drum exceeds the power of the clutch, and means operated by the movement of the drum when the line pays out on the occurrence of an overload for starting the operation of the motor and for again stopping the operation of the motor when the overload falls off and the line has been rewound on the drum.

5. In a winch, a winding drum, an electric motor for operating the drum, means operatively connecting the motor and drum comprising suitable gearing and a friction clutch, means for holding the motor stationary when the load is normal and for preventing its reversal when the load becomes excessive, and switching mechanism operated by the movement of the drum when the load becomes excessive and the clutch slips so that the line is paid out, for automatically closing the motor circuit so as to supply current thereto, and for automatically opening the motor circuit so as to shut off the current supply after the overload falls off and all the line paid out has been rewound on the drum.

6. In a winch, a drum, a source of power adapted to be connected to the drum, a clutch and clutch shaft between the drum and source of power, means operated by the movement of the drum on the occurrence of

an overload for automatically starting the rotation of the clutch shaft and for automatically stopping the rotation of the same when the overload falls off and when the proper amount of line has been rewound on the drum, and means which may be thrown into action at will for preventing the rotation of the drum to pay out the line.

7. In a winch, a winding drum and shaft, a ratchet wheel carried thereby, a motive device, a friction clutch between the drum and motive device, means controlled by the movement of the drum for automatically starting the operation of the motive device when the load on the drum exceeds the power of the clutch and the line is paid out by the rotation of the drum and for automatically stopping the operation of the motive device when the drum is relieved of the overload and the line so paid out rewound on the drum, and a ratchet pawl adapted to be thrown into operation at will to cooperate with said ratchet wheel so as to prevent the rotation of the drum in the direction to pay out the line.

8. In a winch, a drum, an electric motor for driving said drum, power transmitting mechanism forming an operative connection between said drum and said electric motor, a friction clutch arranged in said power transmitting mechanism and adapted to carry a load less than the carrying power of the said electric motor, a toothed wheel secured on the drum shaft, a toothed wheel arranged to mesh with said first-mentioned wheel, a cam plate rotatably mounted in proximity to said last-mentioned toothed wheel, means for locking said cam plate to said last-mentioned wheel and a switch arranged in the motor circuit and having its movable member in contact with said cam plate so as to be actuated thereby.

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

FREDERICK METCALF.

JOHN E. CARSON.

Witnesses:

VICTOR C. LYNCH,  
N. L. McDONNELL.