April 25, 1944. R. LARAQUE 2,347,569

WINCH PROVIDED WITH AN AUTOMATIC RELEASE AT THE END OF THE LIFTING OPERATION

Filed Oct. 17, 1939 3 Sheets-Sheet 1

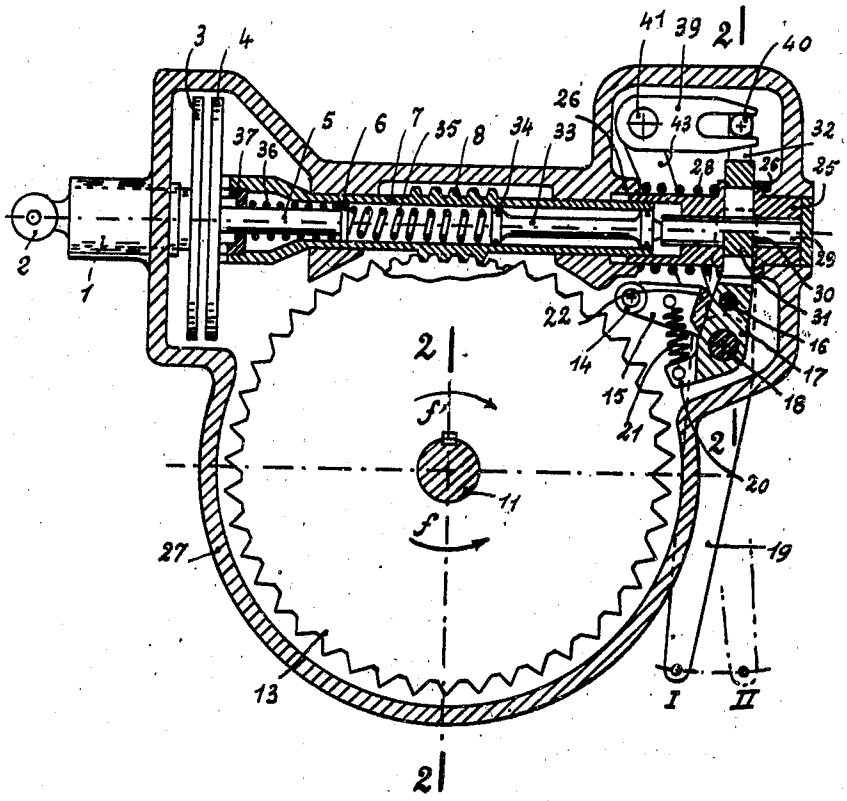


Fig. 1

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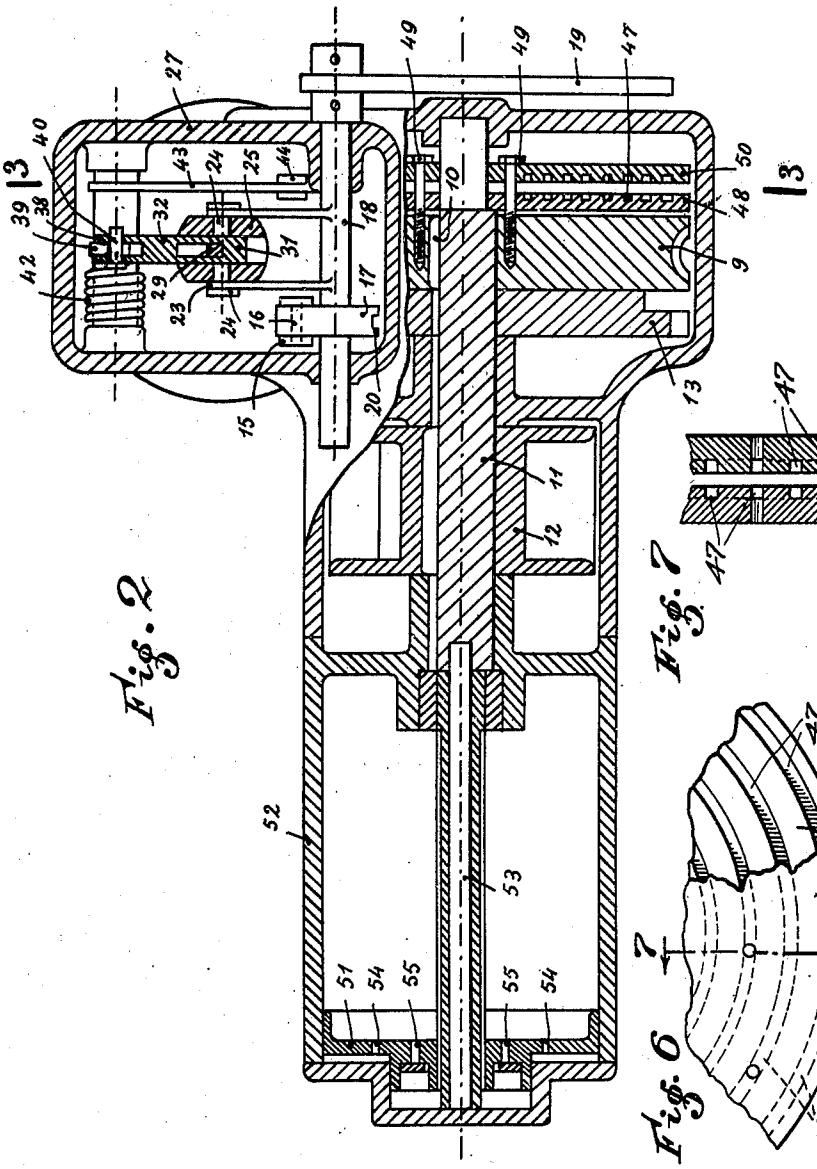


Fig. 2

Fig. 7

Fig. 6

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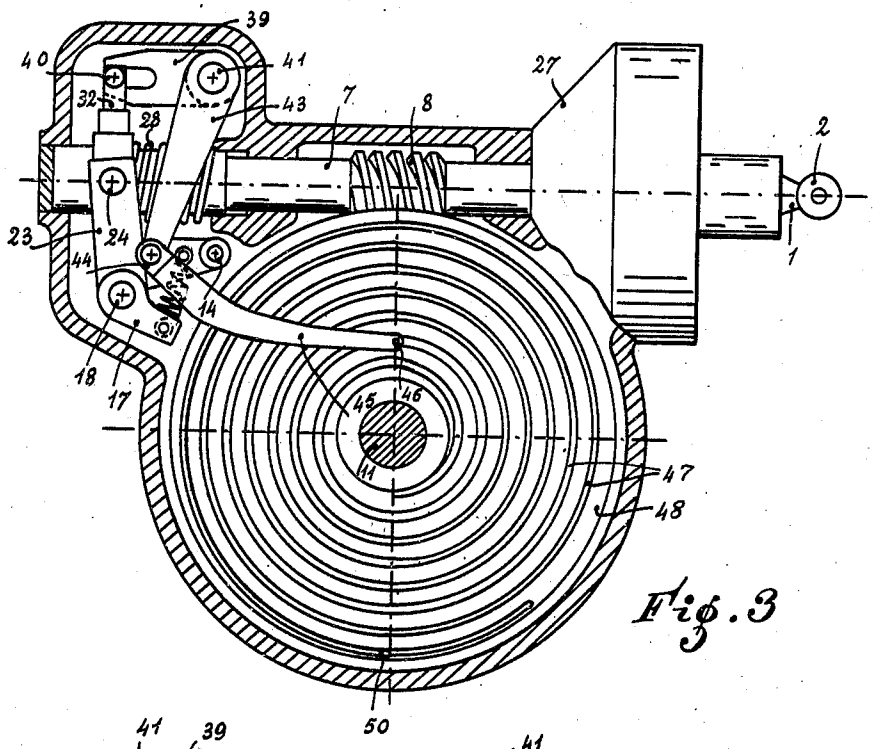


Fig. 3

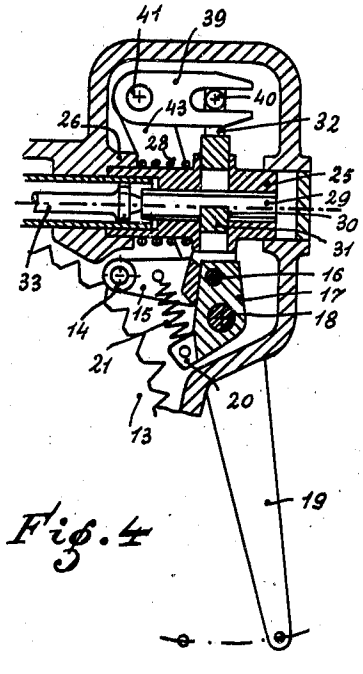


Fig. 4

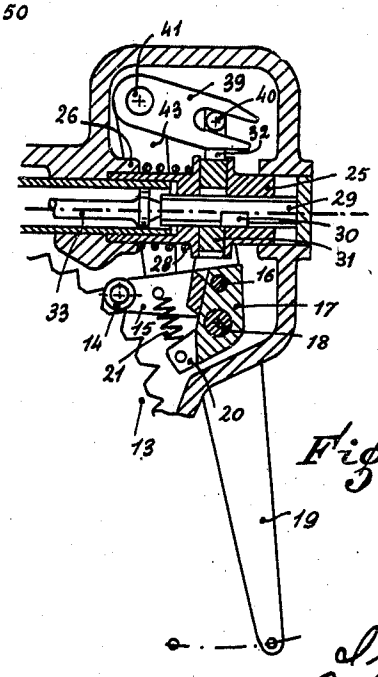


Fig. 5

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UNITED STATES PATENT OFFICE

2,347,569

WINCH PROVIDED WITH AN AUTOMATIC RELEASE AT THE END OF THE LIFTING OPERATION

Roland Laraque, Paris, France; vested in the Alien Property Custodian

Application October 17, 1939, Serial No. 299,877
In Luxemburg October 28, 1938

4 Claims. (Cl. 254—173)

The present invention has for its object a winch provided with automatic release at the end of the lifting operation which is applicable to the retraction of aeroplane undercarriages for example.

The various features of said invention will be made apparent in the ensuing description and with reference to the accompanying drawings wherein:

Fig. 1 shows the winch in transverse section;

Fig. 2 shows a section along the line 2—2 passing through two different planes of Fig. 1;

Fig. 3 shows a section along the line 3—3 of Fig. 2;

Figs. 4 and 5 are two fragmentary views showing the operation of the control device;

Fig. 6 is a fragmentary view of part of the control device, a portion being broken away;

Fig. 7 is a vertical section on the line 7—7 of Fig. 6.

In one embodiment of the object of the invention, which is given simply by way of example, the winch is formed in the following manner.

On a shaft 1 (Fig. 1) which is driven by an electric or other motor through a Cardan joint 2, is fixed a first clutch plate 3 with which a second plate 4 is adapted to come into contact.

This plate is provided with a stem 5 which is terminated by a collar 6 and which slides in a hollow shaft 7 provided with a worm 8. Said worm drives in a reversible manner a helical gear 9 fixed at 10 (Fig. 2) on a shaft 11 which carries the drum 12 of the winch. On said shaft 11 is also fixed at 10 a ratchet wheel 13, the teeth of which are adapted to receive a pawl 14 which is controlled as follows.

Said pawl is preferably formed by a roller carried by a fork 15 which swings about a pin 16 on a crank 17. Said crank is fixed on a shaft 18 actuated by an operating lever 19 which may be directly controlled by hand or by means of any suitable remote transmission device.

The crank 17 is provided with a nose 20 on which is hooked a spring 21 acting on the fork 15, and the stay 22 which abuts against the crank so as to limit the return travel of the pawl and increases the resistance of same to the thrust of the teeth of the ratchet after the load has been lifted.

On the shaft 18 are provided two arms 23 (Fig. 2) which, by means of projections 24, can act on a hollow pusher 25 and make it slide in bearings 26 (Fig. 1) of the case 27 which houses the whole mechanism. Said pusher is retracted to a rear position by a spring 28.

In the pusher can slide a catch 29 provided with a slot 30 into which can be inserted the bolt 31 of a lock 32 which passes through the pusher perpendicular to its axis.

The catch 29 is in contact, at one of its ends, with a spacing-bar 33 provided with a collar 34 against which bears a spring 35 that bears, at its other end, against the collar 6 of the stem of the clutch plate 4. A spring 36, which bears against the other face of said collar 6, is kept inside the hollow shaft 7 by a nut 37 screwed in the latter and exerts an opposing action to the spring 35, but weaker than that of the spring 35.

The length of the spring 35 is such that its action on the stem 5 is nil or almost nil when the catch 29 is at the end of its rearward travel. The spring 36 then predominates and acts on the stem 5 to separate the plate 4 from the plate 3.

Now, the position of the catch 29 depends on the relative positions of the pusher 25 and of the lock 32.

The lock 32 terminates in a jaw 38 in which a fork 39 can act on it through a pin 40. Said fork is secured to a shaft 41 that a spring 42 tends to rotate to lift the lock 32. On said shaft is fixed a lever 43, at the end of which is pivoted, by means of a jaw 44, a lever 45 (Fig. 3) of which the end is provided with a projection 46. Said projection engages in a spiral groove 47 provided in a plate 48 secured to the gear 9.

In the embodiment shown and considered preferable, the projection 46 is double and engages, on either side of the lever 45, in two spiral grooves 47 which are opposite each other and are formed in two identical plates 48.

Said plates are secured to the gear 9 by screws 49 which enable the plates to be given a suitable direction relatively to the gear.

In each groove 47 can be fixed an adjustably positioned abutment 50 against which the projection 46 is adapted to abut after having travelled in the groove a distance which depends on a predetermined number of revolutions effected by the plates 48 with the gear 9 and the drum 12.

The operation of the apparatus is as follows:

When the winch is inoperative, it is released and the load is at its low point. The mechanism is then placed in the position shown in Fig. 1. The lock 32 is lifted and secures the catch 29 to the pusher 25 which is in its extreme rearward position under the action of its spring 28. The plates 3 and 4 are kept apart by the spring 36.

The operating lever 19 is placed in the position I and the pawl 14 is raised. As regards the projection 46 of the lever 45, it is in its extreme

position in the grooves 47 towards the centre of the plates 48.

As soon as the operating lever 19 is acted on and brought into the raising position II (Fig. 4), the arms 23 (Fig. 2) actuate the pusher 25 and compress the spring 28. The pusher is in this case accompanied by the catch 29 which is secured thereto by the bolt 31 of the lock 32. The catch then acts on the spacing bar 33 which compresses the spring 35 which in turn overcomes the resistance of the spring 36 and brings the plate 4 into contact with the plate 3 that is actuated by the motor.

The clutch is thus engaged and the worm 8 drives the drum 12 by means of the gear 9 and of the shaft 11.

While the load is being raised, the plates 48 rotate with the gear 9 and the projection 46 follows the grooves 47 of these latter until it abuts against the abutment 50. This instant must correspond to that at which the load occupies its highest position and this coincidence is obtained by suitably positioning the abutment 50.

When said abutment comes into contact with the projection 46, the plates continue to rotate and thus move said projection along a certain length of an arc. By so doing, they act on the lever 45 which causes the lever 43 to pivot with its shaft 41. The fork 39 is then lowered with the lock 32, the bolt 31 of which leaves the slot 30 of the catch 29. From this instant onwards, the spring 35 can push back the spacing bar 33 which returns the catch to its inoperative position.

The spring 35 is then relaxed and the spring 36 acts on the stem 5 of the plate 4 and separates same from the plate 3. The winch is thus released and its various elements occupy the positions shown in Fig. 5.

During its operation, the ratchet 13 was rotating in the direction of the arrow *f*, and lifted with each of its teeth the pawl 14. As soon as the winch is released, the load exerts its pull on the drum and rotates the ratchet 13 in the direction of the arrow *f'* so that one of the teeth abuts against the pawl, the stay 22 of which is resting on the crank 17. Any rotation of the drum in this direction is thus made impossible and the load is locked at its highest point.

In order to lower the load, the operating lever 19 is brought into the position I. The pusher 25 is then brought backwards and the pawl 14 is lifted as in Fig. 1. The ratchet is released and the load can then move downwards, rotating the drum 13.

In order to reduce the downward speed to a suitable value, the shaft 11 is provided with a governor formed by a piston 51 that moves in a cylinder 52 along a screw 53 driven by said shaft.

The cylinder is filled with oil and the piston 51 is provided with openings 54. Flap valves 55 are furthermore arranged in said piston.

When the shaft 11 is driven by the motor, the oil can pass through the piston by way of the openings 54 and the valves 55 and thus offers no resistance to the forward movement of the piston along the screw 53.

On the contrary, when the shaft 11 is driven by the load, the oil only passes through the openings 54 and offers a fairly large resistance to the movement of the piston which thus brakes the rotation of the screw 53.

This speed damper may moreover be replaced by any similar device and the apparatus described above may be subjected to any modifications of shape and of detail without for that reason departing from the spirit of the invention.

It is obvious that this winch may be used for manipulating any load and in particular whenever the lowering of such load is to be ensured in any case.

What I claim is:

1. In a winch, the combination of a drum; a gear for actuating said drum; driving means for said gear; a clutch for said driving means; slidable means for engaging and disengaging said clutch; manually actuated means to slide said slidable means in one direction to engage said clutch; resilient means to slide said slidable means in the opposite direction to disengage said clutch, said resilient means being energized by said manually actuated means; and locking means to prevent the operation of said resilient means, said locking means being released by the operation of the drum, to cause said resilient means to disengage the clutch according to the determined degree of hoist of the load by the winch.

2. In a winch, the combination of a drum; a gear for actuating said drum; driving means for said gear; a clutch for said driving means; slidable means for engaging and disengaging said clutch; manually actuated means to slide said slidable means in one direction to engage said clutch; resilient means to slide said slidable means in the opposite direction to disengage said clutch, said resilient means being energized by said manually actuated means; locking means to prevent the operation of said resilient means, said locking means being released by the operation of the drum, to cause said resilient means to disengage the clutch according to the determined degree of hoist of the load by the winch; and means operated by said manually actuated engaging means, to control the rotation of the drum when the clutch is disengaged.

3. In a winch, the combination of a drum; a gear for actuating said drum; driving means for said gear; a clutch for said driving means comprising co-acting members, one of which is slidably mounted and provided with a stem; a spring associated with said stem and adapted to move said slidable clutch member into disengaged position; a casing; a cylinder slidably mounted in said casing; manual means for sliding said cylinder; a bolt slidably mounted in said cylinder; a latch reciprocably mounted on said cylinder for detachably connecting said bolt with said cylinder; connecting means between said bolt and said stem adapted to move said slidable clutch member into engaged position, and to compress said spring when said bolt is connected with said cylinder and said cylinder is moved by said manual means; and operating means mounted in said casing for moving said latch to disconnect said bolt from said cylinder and permit expansion of the spring to disengage the clutch members, said last mentioned means being actuated by said drum so that the clutch is disengaged according to the determined degree of hoist of the load by the winch.

4. In a winch, the combination of a drum; a gear for actuating said drum; driving means for said gear; a clutch for said driving means comprising co-acting members, one of which is slidably mounted and provided with a stem; a spring associated with said stem and adapted to move said slidable clutch member into dis-

engaged position; a casing; a cylinder slidably mounted in said casing; manual means for sliding said cylinder; a bolt slidably mounted in said cylinder; a latch reciprocably mounted on said cylinder for detachably connecting said bolt with said cylinder; connecting means between said bolt and said stem adapted to move said slidable clutch member into engaged position, and to compress said spring when said bolt is connected with said cylinder and said cylinder is moved by said manual means; operating means mounted in said casing for moving said latch to disconnect said bolt from said cylinder and permit expansion of the spring to disengage the clutch members, said last mentioned means being actuated by said drum so that the clutch is disengaged according to the determined degree of hoist of the load by the winch; a ratchet on said drum; and a pawl adapted to be moved into and out of engagement with said ratchet by said manually actuated cylinder sliding means, the parts being so related that, when the pawl engages the ratchet, the drum can rotate to raise the load and is prevented from reverse rotation to lower the load, and, when the pawl is disengaged from the ratchet, the drum can rotate to lower the load.

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