Aug. 21, 1934. P. J. M. T. ALLARD 1,971,126

WINCH FOR THE OPERATION OF GRABS, BUCKETS, AND THE LIKE

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Fig.1

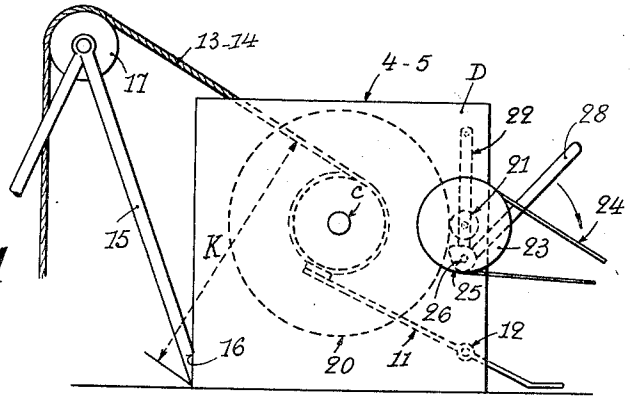


Fig.2

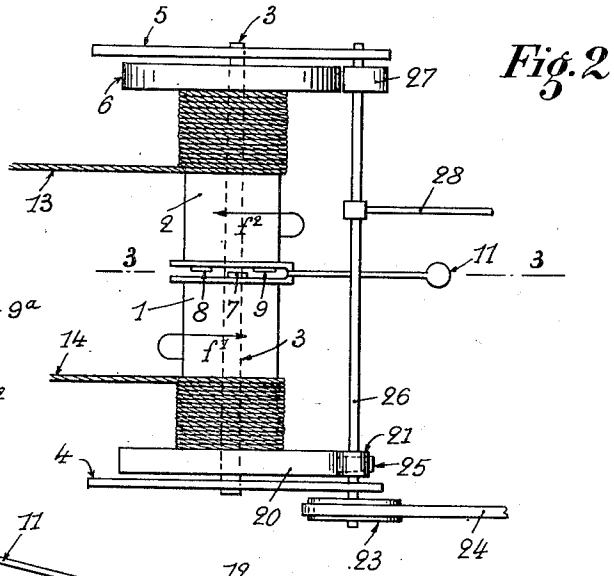


Fig.3

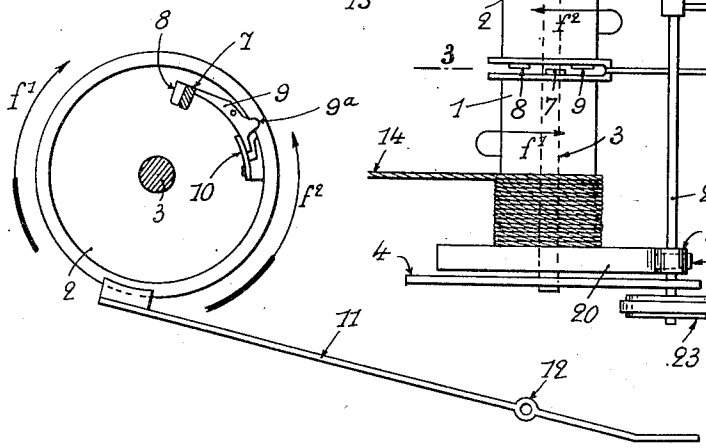


Fig.4

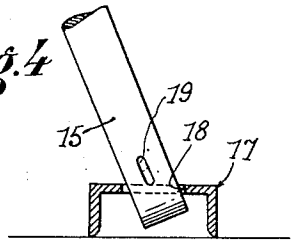
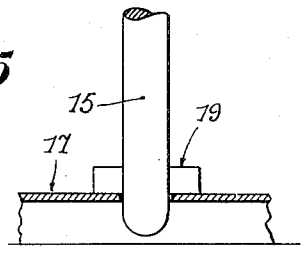


Fig.5



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WINCH FOR THE OPERATION OF GRABS, BUCKETS, AND THE LIKE

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5 Claims. (Cl. 254—173)

The present invention has for its object a winch comprising two drums, for the operation of all classes of automatic buckets or grabs, and chiefly for grabs adapted for excavation works for shafts or wells. The said winch is chiefly characterized by the fact that it comprises two opening and closing drums the perimeter of which is equal to the developed length of the cable necessary for closing or opening the grab, and a device for mechanical connection between the two drums, this device being adapted to limit the relative movement of rotation of the two drums to one revolution.

According to one form of execution, the said connecting device comprises, in combination:

A tappet mounted on one of the lateral faces of the drum adapted to close and lift the grab.

Another tappet mounted on the adjacent lateral face of the drum adapted to open the grab, this tappet being mounted so as to make contact with the tappet of the closing drum.

A pivoted pawl which may be withdrawn by a controlling device, said pawl being so arranged as to hold the tappet of the closing drum against the opening drum when, at the end of the opening movement of the grab, the first-mentioned tappet makes contact with the opening drum.

In the accompanying drawing, which is given by way of example:

Fig. 1 is a diagrammatic side view of a winch in conformity with the invention.

Fig. 2 is a corresponding plan view.

Fig. 3 is a diagrammatic view of the mechanism for connection between the two drums.

Figs. 4 and 5 show, on a larger scale, the details of the mounting, at the lower part of the winch frame, of the parts of the derrick carrying the transmission pulleys.

According to the represented example of execution, the winch consists of two drums, a drum 1, used for the cable which closes and lifts the bucket, and a drum 2 which serves to wind the cable used to open and to retain the bucket. The said winch has been constructed in order to perform the very rapid operations which are necessary for this class of installations.

The drums 1 and 2 are loose upon a shaft 3 which is mounted in two end-plates 4 and 5. The drum 1 is actuated by known means (friction gearing, electric or petrol motor, or the like).

The diameters of the drums 1 and 2 are alike. The drum 2 used for the opening and the retaining of the grab carries a brake-ring 6. The diameter of the drum used for the closing and the lifting of the grab is such that one revolution of this drum is sufficient to assure the complete closing or opening of the bucket.

A mechanical device assures the connection between the two drums 1 and 2 when the grab is open, and provides for the operation of the opening drum 2 when the grab has been raised in the closed position. This arrangement can be obtained in the following manner (Fig. 3):

The drum 1 for the closing and lifting of the grab carries an actuating tappet 7. The drum 2 for the opening carries a similar tappet 8. On the other hand, this drum 2 is also provided with a pawl 9 controlled by a spring 10, which is so arranged as to hold the tappet 7 of the drum 1 and to connect the drums 1 and 2 together at will.

A pedal control device 11, pivoted at 12, or a like device, which may be mounted as shown in Fig. 3, acts upon pawl 9, by means of a boss 9^a provided on the said pawl, and thus releases the tappet 7 and renders the two drums 1 and 2 independent.

A further characteristic of the said winch is that it does not comprise a brake on the drum 1 used for closing the grab, this drum simply carrying the device for the control of the lifting.

The winch may be actuated by friction or by any other well known means. By way of example, Figs. 1 and 2 show a friction driving. Drum 1 is provided with a friction ring 20 actuated by means of a roller 21 mounted on an oscillating element 22 also carrying a pulley 23 connected by a belt 24 with a motor, not shown. Oscillating element 22 cooperates with a cam 25 and this latter is adapted to impart to this element an oscillating motion in order to bring roller 21 in and out of engagement with ring 20.

Cam 25 is mounted on a shaft 26 also carrying another cam 27 adapted to come into frictional engagement with the brake 6. Shaft 26 may be actuated by a lever 28.

Thus, when it is desired to rotate drum 1, lever 28 is lifted or lowered, bringing roller 21 into engagement with ring 20 and cam 27 out of engagement with brake 6. If it is desired to brake drum 2, lever 28 is actuated in the contrary direction and brings cam 27 into engagement with brake 6 and liberates drum 1.

The operation of the two drums is as follows: When the grab is to be raised in the closed position, the drum 1 is actuated by the motor in the direction of the arrow f^1 (Figs. 2 and 3). As the tappet 7 is in contact with the left-hand face of the tappet 8 of the drum 2, this drum 2, which is not braked, will thus be driven at the same

speed and in the same direction f^1 as the drum 1; it winds up the opening cable 13 (Fig. 2) at the same speed as the drum 1 winds up the lifting cable 14 which at this time supports the weight of the grab.

When the grab reaches the upper part of its course, the drum 2 is braked and the drum 1 is released by means of lever 28. At once, for instance by the action of a heavy central piston slidably contained in the grab, this latter opens, giving to the drum 1 a movement contrary to that shown by the arrow f^1, that is, in the direction of the arrow f^2 (Fig. 3).

When the drum 1 has made one revolution, the grab is entirely open, and the tappet 7 again makes contact with tappet 8, but this time with the right-hand face (Fig. 3) thereof. When passing, the tappet 7 has raised the pawl 9, which is brought back by the spring and comes to the rear of said tappet 7 and holds it fast. The two drums 1 and 2 are thus connected together.

The grab being open and empty, the operator slightly acts upon lever 28 releasing brake 6 of the opening drum, but still holding roller 21 far away from ring 20. Drum 2, under the action of the cable 13, is rotated in the direction of the arrow f^2. Closing drum 1, connected with drum 2, is also rotated, and cable 14 is thus unwound from the drum, while avoiding the necessity of exercising a traction upon this drum; the grab can thus be very rapidly lowered when open, and almost by a free dropping, if necessary.

As cable 14 is unwound from drum 1 while avoiding the necessity of exercising a traction upon this drum, it will thus be impossible that the grab should close during its descent, as the slidable piston above referred to which is urged by gravity and is only required to draw the slack part of the cable, that is, with an insignificant force, cannot rise, and hence the grab will not close up again, which is a most interesting feature permitting very rapid operations.

Another advantage of this device is the following. When the grab is opened, drum 1 acquires, under the traction of the cable due to the piston of the grab, a certain kinetic energy which would cause an improper unwinding of cable 14. However, with the aforesaid arrangement, such unwinding is not to be feared, for as soon as the grab is entirely opened, the movement of drum 1 is stopped by the contact between tappet 7 and tappet 8. When the grab has reached the working place, brake 6 of drum 2 is entirely released, and the motor is set in operation in the direction for the closing. At the same time, the operator presses down pedal 11, thus withdrawing pawl 9. Drum 1, which is now free, makes one complete revolution, thus permitting the grab to close. When the grab is entirely closed, tappet 7 again makes contact with the left-hand of tappet 8, and thus actuates drum 2.

Thus there will be no traction on cable 13 during the closing of the grab, which would offer prejudice to the proper sinking of the grab into the material, neither is it to be feared that opening drum 2 will start with a certain delay behind closing drum 1, which would give slack to cable 13 and act against its proper winding on the drum.

By carefully regulating the bearing parts of the tappets, it may be assured that the basket will also be lifted by cable 13, this being most advantageous due to the fact that both cables thus divide between them the power employed, which may be considerable, at the time when the grab is first lifted, it being observed that the lifting speed of a winch of this class must be very rapid, and also that there is no danger that the grab will twist about, as it is now held at two different points.

Another advantage found in the said winch when it is employed with grabs for the excavation of shafts, resides in that in the case of a very hard ground it will lift the open grab and let it drop several times upon the same place in order to break up the ground. In this case, it is simply necessary not to act upon device 11 which releases pawl 9.

When the motor is started, drum 1, by means of pawl 9, actuates drum 2, and the grab is raised by cable 13. When the operation of breaking up the ground has been performed for the required number of times, by actuating the control of pawl 9, this latter releases drum 1. The grab thus closes, and rises as above described, while removing the earth.

As above stated, the said winch, which is especially arranged for use with grabs for the excavation of shafts or for earthwork, should be as light as possible, in order to facilitate its handling, its transport and its operation.

On the other hand, it has to withstand the force which is necessary to raise the grab. As it is difficult to anchor the winch, a derrick 15 (Fig. 1) made up of three or four uprights, which consist for example of tubes, has two of its uprights fixed in any manner at 16 (Fig. 1) upon the front part of the frame of the winch. For instance, if the members of the frame consist of U iron bars 17 (Figs. 4 and 5), each member will comprise holes of oval shape 18 in which are mounted tubes 15 forming uprights; tappets or bolts 19 maintain the tubes on the U iron bars. As the derrick carries at its upper part two pulleys 17 which are necessary for supporting the closing cable 14 and the opening cable 13, the traction produced by these cables between the drums 1 and 2 of the winch and the pulleys 17 is annulled due to the arrangement of the members 15 of the derrick, and thus the winch cannot rise.

This arrangement further offers the advantage of allowing a certain elasticity to the whole apparatus. The weight of the winch acts upon the derrick 15 according to the lever arm K (Fig. 1) with reference to the point 16 at which the tubes of the derrick are secured to the frame of the winch. When the work is normal, the weight of the winch acting according to the lever arm K is sufficient to hold the winch securely on the ground. However, if due to an improper handling by the operator, there is an abnormal stress on the cables, the winch will pivot about the point of contact between the U iron bars which are placed on the ground and the tappets 19 of the members mounted on said U iron bars, the winch forming a counterweight due to its own weight.

This arrangement will greatly deaden the shocks and will prevent breakage of cables, or other accidents.

Obviously, the invention is not limited to the method of execution represented and described, which has been chosen only by way of example.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A winch of the type referred to comprising two drums of equal permieters, drawing means on these drums adapted to operate respectively

the closing and the opening of the grab, tappets mounted on the lateral faces of both of said drums and adapted to make contact, means for holding said tappets together during the rotation of said drums and further means for bringing said tappets out of contact after one revolution of these drums.

2. A winch according to claim 1, further comprising a braking device mounted on the drum serving to open the grab.

3. A winch according to claim 1, wherein said holding means consist of a pivotally mounted pawl.

4. A winch according to claim 1, wherein said holding means consist of a pivotally mounted pawl and further means for bringing said tappets out of contact consist of an oscillating member acting upon said pawl.

5. A winch of the type referred to comprising a frame, a main shaft on said frame, two drums loosely mounted on said shaft, drawing means for opening and closing the grab and disposed on said drums, the perimeter of both of said drums being equal to the development of the drawing means necessary for opening and closing the grab, driving means for one of said drums, braking means for the other drum, stop members on the lateral adjacent surfaces of said drums, said stop members being adapted to make contact and to connect the drums as to rotation, a movable fingerlike member adapted to maintain said stop members in contact and controlling means for said fingerlike member and adapted to release the drums.

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