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Winch with a casing

Description:

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The invention relates to a winch having a casing according to the preambles of claims 1 and 14.

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It is generally known to provide winches with a casing. Thus, WO 93/15705 shows a ceiling-mounted lifter in which a harness for a patient is hooked into a central hook on the underside of the lifter. Provided on the top of the lifter is an opening, through which a pulling means is guided which can be connected to a chassis which can be moved along a ceiling-mounted rail. Accommodated in the lifter casing are an electric motor and its power supply, together with a gear box, the motor shaft being permanently connected to the gearbox input shaft. A pulling-means roller for winding and unwinding the pulling means is seated on the gearbox output shaft. In operation, the lifter lifts itself upward, and hence also lifts the person to be transported upward.

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The disadvantage with this lifter is that it is suitable only for a specific use, that is to say it cannot be used universally. In addition, this lifter cannot readily be transported by one person over a relatively great distance without further aids; the weight and the shape of the lifter are such that it cannot readily be re-hung by one person.

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Furthermore, a portable hoist is disclosed by US 4,434,973. This hoist uses a high step-up ratio in order to hold the load safely, even without a brake, when the motor is at a standstill. The disadvantage of this solution is: this hoist cannot be used universally and cannot be transported easily, inter alia because it does not have a balanced center of gravity. Furthermore, the casing does not completely protect the hoist. Moreover, it is complicated and expensive, so that for these reasons it is not suitable for the domestic sector either.

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The object of the invention is to provide a cost-effective, universally usable winch, especially for the domestic sector, which can be transported relatively comfortably by one person without further aids.

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This object is achieved by the features specified in claim 1 and 14. The winch is respectively further refined in an advantageous way by the characterizing features of subclaims 2 to 13 and 15 and 16.

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The solution provides for the box-like casing, whose shape and size are designed like a suitcase, to have a suspension means on one of the two flat outer sides and, on the opposite outer side, an opening to lead the pulling means through, and can be transported by one person in the manner of a portable winch, and for the electric

motor, the gearbox and the pulling-means roller to lie in a common plane, preferably a horizontal plane.

Low wear on the pulling means results if the suspension means and the opening lie on a straight line going through the center of mass.

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The utility of the winch may be improved if the suspension means of the flat casing are arranged centrally on one of the two flat sides, and the opening is arranged centrally on the opposite flat side.

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The casing is expediently formed from two casing halves detachably connected to each other.

In order to simplify the transport, the casing has a carrying handle on one long side.

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The field of use is enlarged if a control unit for controlling the winding and unwinding movements is accommodated in the housing.

In order to simplify the operation, the control unit should be capable of being operated remotely via a receiver unit arranged in the housing.

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Operation independently of the mains may be achieved if a power supply comprising at least one storage battery accommodated in the casing is provided.

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In order to be able to cover many applications, it is proposed that a power cable for the supply of power can be connected to the casing.

The storage battery can expediently be charged via the power cable.

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In order to accommodate the power cable, the latter, when not in use, can be wound up manually on at least one winding element arranged on the casing.

The action of winding up the power cable may be configured in a straightforward way if a number of winding elements for the power cable are provided on the same transverse side.

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A box-like, that is to say flat, winch is obtained cost-effectively with a low technical outlay if the electric motor is designed as a universal motor and the gearbox is designed as a self-locking worm drive, and if, furthermore, the universal motor is connected to the worm drive via a belt drive. The belt drive used here together with the worm drive is made for a flat construction. A belt drive is normally not used in hoists for reasons of safety; here, the use of the winch, which can be used universally, as a hoist is nevertheless ensured.

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An exemplary embodiment of the invention is shown in the drawing and will be described in more detail below. In the drawing:

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- Fig. 1 shows a perspective illustration of a winch,
Fig. 2 shows the winch according to Fig.1 without a casing,

- Fig. 3 shows a winch according to Fig.2 without the controller and the power supply,
 Fig. 4a shows a schematic illustration of the winch according to Fig.1,
 Fig. 4b shows a schematic illustration according to Fig.1 with two fastening hooks,
 Fig. 5 shows the winch according to Fig.1 with the casing opened,
 Fig. 6 shows the winch according to Fig.1 with a power cable winding means,
 Fig. 7 shows the winch according to Fig.6, viewed from another side, and
 Fig. 8 shows a further version of a winch in a schematic illustration.

Fig. 1 shows a schematic three-dimensional illustration of the winch having a casing 1, which consists of two casing halves 1a, 1b. The box-like flat casing 1 resembles a suitcase in size and shape. A suspension means in the form of a hook 2a which can be folded out is arranged on the flat side (the upper side in Fig. 1) (outer side 3a). Formed in the opposite lower flat side (outer side 3b) is an opening 3c (cf. Fig. 5), through which a pulling means 4 in the form of a cable 4a is led, having a means 5 (hook 5a) for picking up a load fastened at the end of the pulling means 4. The two detachable casing halves 1a, 1b are firmly connected to each other when in the operating state.

Fig. 2 shows the winch according to Fig. 1 without the two casing halves 1a, 1b. The winch comprises an electric motor 6, which can be operated with DC and/or AC, with a gearbox 7 connected downstream and a pulling-means roller 8 for winding and unwinding the pulling means 4. The motor shaft of the electric motor 6 is firmly connected so as to rotate with the input shaft of the gearbox 7 on whose gearbox output shaft the pulling-means roller 8 is in turn seated. The pulling means 4 is led downward over a further roller 9. In addition, Fig.2 shows the power supply 10 arranged in the casing 1, in the exemplary embodiment in the form of storage batteries 10a. (Of course, the term power supply 10 here also includes a connection to a power supply (mains network)).

Also accommodated in the casing in the exemplary embodiment is a charger 11. In order to be able to operate the winch remotely, there is also in the casing 1 a control unit 12 which has an infrared receiver unit 13 (cf. Fig. 7) whose input is accessible from outside. The control unit 12 is used to control the movement of the electric motor 6.

If a cable is used as the pulling means 4, the pulling-means roller 8 is a cable drum (and if a chain is used, it is a sprocket).

As Fig. 2 shows, the electric motor 6, the power supply 10, the gearbox 7 and the pulling-means roller 8 lie in a common plane. In addition, the suspension means 2 and the opening 3c lie on a straight line going through the center of the mass of the winch (this can be seen better in Fig. 4a). The suspension means of the flat casing 1 is arranged centrally on one of the two flat sides (outer sides 3a), and the opening 3c is arranged centrally on the opposite flat side (outer side 3b). When the suspended winch is in operation, the result is essentially a horizontal position.

Fig. 3 corresponds to Fig. 2, but without the storage batteries 10a or the charger 11, nor the control unit 12.

5 Fig. 4a and Fig. 4b show a schematic illustration of the winch with one and with two hooks 2a as the suspension means 2.

Fig. 5 shows the winch with the casing 1 folded open.

10 In Fig. 6 the winch can be seen as a "suitcase" ready for transport, there being a carrying handle 14 on the upper long side of the casing 1. Because of its shape and its weight, the winch can be carried relatively comfortably by one person in the manner of a portable appliance. Furthermore, winding elements 15, onto which a power cable 16 can be wound up, are arranged on the left hand end of the casing 1. The power cable 16 is led through a casing opening 17 and is connected to the controller 12 and to the
15 charger 11. The winch itself can also be supplied with electrical power via the power cable 12.

Fig. 7 shows the casing 1 of the winch according to Fig. 6 viewed from the other side, so that the infrared receiver unit 13 can be seen.

20 Further provided in the interior of the casing 1 is an accessory compartment (not shown), which is accessible from outside and in which, for example, the hook together with the cable can be accommodated. The setting up of an accessory compartment is obvious, since the interior always has free space which can still be used.

25 Fig. 8 shows, in a schematic illustration viewed from above, a preferred further solution for a winch of flat design having a box-like casing 101, which can be used in particular as an extremely small hoist. Arranged in the casing 101 are, as an electric motor, a universal motor 102 which can be operated with DC and AC, a brake 103 having the
30 schematically illustrated elements 103a and, as a gearbox, a worm drive 104, as well as, as the pulling-means drive (pulling-means roller or pulling-means drum 105), a cable drive, all located in a common plane. (Alternatively, a chain drive and the like can also be provided as the pulling-means drive.) It is also usual to move the brake into the electric motor or to operate the electric motor in such a way that the latter is effective
35 as a brake in a specific mode of operation.

As Fig. 8 shows, the motor shaft 108 extends parallel to the rotary shaft 109 of the worm drive 104. The motor shaft 108 is connected to the rotary shaft 109 via a belt drive 110, whose belt 110a is led over a drive pulley 111 designed as a belt pulley,
40 which is seated on the output side on the motor shaft 108. A pulley 112 driven by the belt 110a is fastened to the rotary shaft 109 of the worm drive 104. The pulling-means roller 105, which is driven directly by the worm drive 104, is located within a carrying frame 106, physically between the universal motor 102 and the worm drive 104. Fig. 8 shows that the rotary shaft of the pulling-means roller 105 extends at right angles to the rotary shaft of the worm gear 104. The pulling means 113 is led to the outside
45 through a casing opening (not shown).

In addition, an inlet opening 114 and an outlet opening 115 for cooling air (see arrows in Fig. 8) can be seen in Fig. 8. In the interior of the casing, that region of the casing through which the cooling air flows is separated by an intermediate wall 116 from the adjacent region, in which the worm drive 104 and the pulling-means roller 105 are located. Only a small opening for the passage of the belt 110a is provided in the intermediate wall 116. The fan wheel 118, which is seated on the end of the motor shaft 108 opposite the output side, draws cooling air through the inlet opening 114 and forces this air through the cooled area of the casing in the direction in which the motor shaft extends. Consequently, the cooling air cools the universal motor 102 and the brake 103 during the operation of the motor.

The universal motor 102 has series-connected motor windings and is therefore also designated a series-wound commutator motor. It can be operated only as a motor (so-called 2-quadrant operation), that is to say it produces no generator torque and can therefore not be braked by the generator torque either.

The two motor windings of the universal motor 102 comprise a rotor winding and one or more stator windings. For example, two stator windings arranged parallel to each other are provided on either side of the rotor winding. During motor operation, all three motor windings are connected in series.

The worm drive 104 is of self-locking design. The self locking is set such that even the greatest load is held by the worm drive 104 when the universal motor 102 is at a standstill. When the worm is at a standstill, the self-locking is at a maximum; it decreases with increasing rotational speed of the worm, that is to say a load torque which depends on the rotational speed is applied to the universal motor 102. Consequently, the self-locking worm drive 104 acts as a continuously acting brake during both raising and lowering operations.



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Patent Claims:

1. A winch having a casing,
in which an electric motor, a gearbox and a pulling-means roller are arranged,
5 the pulling-means roller being seated on the gearbox output shaft so as to rotate
therewith to wind and unwind a pulling means connected to a means for picking
up a load, and
the motor shaft being connected to the gearbox input shaft,
wherein
10 the box-like casing (1), whose shape and size are designed like a suitcase, has a
suspension means (2) on one of the two flat outer sides (3a) and, on the
opposite outer side (3b), has an opening (3c) to lead the pulling means (4)
through, and can be transported by one person by means of a carrying element
15 in the manner of a carrying handle, and
wherein the electric motor (6), the gearbox (7) and the pulling-means roller (8) lie
in a common plane.
2. The winch as claimed in claim 1, wherein the suspension means (2) and the
20 opening (3c) lie on a straight line through the center of mass.
- 2a. The winch as claimed in either of claims 1 and 2, wherein the suspension means
(2) of the flat casing (1) is arranged centrally on one of the two flat sides (outer
sides 3a), and the opening (3c) is arranged centrally on the opposite flat side
(outer side 3b).
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3. The winch as claimed in one of claims 1 – 2a, wherein the casing (1) is formed
from two casing halves (1a, 1b) detachably connected to each other.
4. The winch as claimed in one claims 1 – 3, wherein the carrying handle (14) is
30 arranged on one long side of the casing (1).
5. The winch as claimed in one of claims 1 – 4, wherein a control unit (12) is
accommodated in the casing (1).
- 35 6. The winch as claimed in one of claims 1 – 5,
wherein the control unit (12) can be operated remotely via a receiver unit (13)
accommodated in the casing (1).
7. The winch as claimed in one of claims 1 – 6, wherein a power supply (10), which
40 comprises at least one storage battery (10a), is arranged in the casing (1).
8. The winch as claimed in one of claims 1 – 7, wherein a power cable (16) for the
supply of power (10) can be connected to the casing (1).
- 45 9. The winch as claimed in claim 8, wherein the storage battery (10a) can be
charged via the power cable (16).

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10. The winch as claimed in either of claims 8 and 9, wherein the power cable (16), when not in use, can be wound up manually on at least one winding element (15) arranged on the casing (1).
- 5 11. The winch as claimed in one of claims 1 – 10, wherein a number of winding elements (15) for the power cable (16) are provided on the same transverse side.
12. The winch as claimed in one of claims 1 – 11, wherein the electric motor (6) is designed as a universal motor and the gearbox (7) is designed as a self-locking worm drive, whose self-locking acts as a brake.
- 10 13. The winch as claimed in claim 12, wherein the universal motor is connected to the worm drive via a belt drive.
- 15 14. A winch having a casing, in which an electric motor, a gearbox and a pulling-means roller are arranged, the pulling-means roller being seated on the gearbox output shaft so as to rotate therewith to wind and unwind a pulling means connected to a means for picking up a load, and
- 20 the motor shaft being connected to the gearbox input shaft, wherein the electric motor (101) is designed as a universal motor, and the gearbox (104) is designed as a self-locking worm drive, whose self-locking acts as a brake, the universal motor being connected to the worm drive (104) via a belt drive (110).
- 25 15. The winch as claimed in claim 14, wherein the box-like casing (110), whose shape and size are designed like a suitcase, has a suspension means on one of the two flat outer sides and, on the opposite outer side, an opening to lead the pulling means (113) through, and can be transported by one person by means of a carrying element in the manner of a carrying handle.
- 30 16. The winch as claimed in either of claims 14 and 15, wherein the electric motor (102), the gearbox (104) and the pulling-means roller (105) lie in a common plane.