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Applicant: DUHOVNIK, Jozef
1215 Medvode (SI)

(72)

Inventor: DUHOVNIK, Jozef
1215 Medvode (SI)

(74)

Representative: Sveticic, Andrej
Patentna pisarna d.o.o.
Copova 14
1000 Ljubljana (SI)

(30)

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SCRAPER WINCH

(57)

The invention relates to a scraper winch for use in a mine. The technical problem is how to provide a winch that is of simple construction, single-drive, small in size, energy-efficient and easy to control. The winch (1) of the invention comprises an electric motor (2), a reduction gear (3) with an output shaft (4), a first free-wheel clutch (5), fixedly mounted on the reduction gear output shaft (4), so as to allow torque to be transmitted in the first direction, while it rotates freely in the second direction, a second freewheel clutch (6), fixedly mounted on the reduction gear output shaft (4), so as to allow torque to be transmitted from the output shaft (4) in the second direction, while it rotates freely in the first direction, a first drum (7) fixedly mounted on the first freewheel clutch (5), a second drum (8) fixedly mounted on the second freewheel clutch (6), a control unit, and an operating unit.

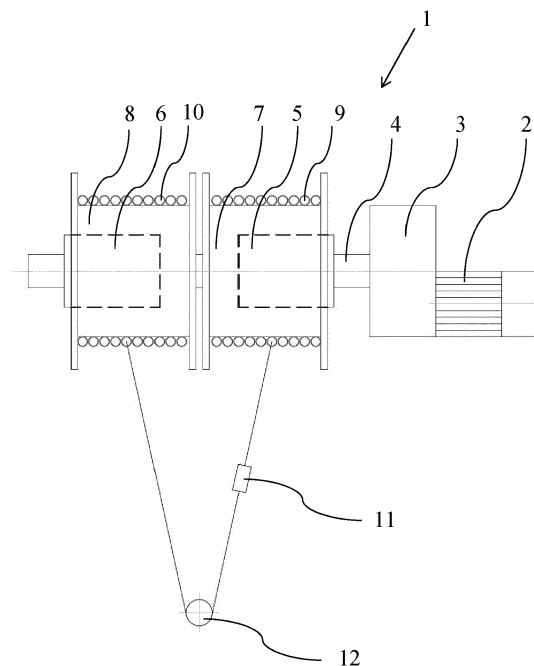


Fig. 1

Description

Field of Invention

[0001] The invention relates to a scraper winch for use in mines, open cast mines, construction or agriculture to scrape various materials, crushed stones or ore on the ground.

Prior art

[0002] A scraper winch is known from prior art, which has a shaft that is driven by an electric motor via a reduction gear and on which two drums for rope winding are rotatably mounted. Each of the drums is connected to planetary gears that mesh with a sun gear of the planetary drive which is fixedly coupled to the shaft. The gear with internal teeth meshes with the planetary gears and has a brake fitted on the outside. The gear with internal teeth rotates freely around the shaft. Actuation of the brake of either drum causes the rotary motion to be transmitted from the shaft to either drum, thereby achieving the winding of the rope on either drum. The construction of the winch is very complex. The brake may be either a band brake or a multiple-disc brake. The brake can be operated manually. Manual operation is physically tiring, as the winch operator must exert force at all times to pull the rope in one direction or the other. In addition to an effective force of 40 to 80 N, the winch operator must also exert a force to overcome the brake mechanism clearance. A further disadvantage of the winch is that the operator of the device must be near the winch, which does not allow him to have good control of the scraper as it slides over the material as it is moved towards the winch.

[0003] There are also winches where the brake is not actuated manually, but by means of various controllable actuators or hydraulic devices. These winches therefore do not require physically strenuous work and allow a better view of the scraper, but the construction of such a winch is even more complex. A plurality of mechanisms not only makes the winch more expensive, but also increases the number of breakdowns and consequent downtime. A large number of components also has a negative impact on the winch dimensions. Understandably, in mining conditions, it is desirable to keep the winch dimensions as small as possible.

[0004] In all these solutions, the electric motor is switched on in advance to keep it in steady drive. The reduction gear and the planetary gears of both drums are idling and consuming energy during this time. The winch becomes effective only after one or other of the brakes has been actuated.

[0005] WO 2017/216731 A1 discloses a winch having two drums rotatably mounted in the housing. Each drum has its own variable speed drive. The electric motors are fully or partially disposed within the drums. The winch may be controlled remotely, thus giving the operator a

good overview of the scraper. A disadvantage of the winch is that it requires two separate drives and consequently more complex winch control.

5 Technical problem

[0006] The technical problem is how to provide a scraper winch that is of simple construction, single-drive, small in size, energy-efficient and easy to control.

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Solution to the technical problem

[0007] The technical problem is solved with a winch for a scraper, comprising:

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- an electric motor,
- a reduction gear connected to the electric motor and having an output shaft,
- a first freewheel clutch, fixedly mounted on the reduction gear output shaft, so as to allow torque to be transmitted from the output shaft in the first direction, while it rotates freely in the second direction, opposite to the first direction,
- a second freewheel clutch, fixedly mounted on the reduction gear output shaft, so as to allow torque to be transmitted from the output shaft in the second direction, while it rotates freely in the first direction,
- a first drum fixedly mounted on the first freewheel clutch,
- a second drum fixedly mounted on the second freewheel clutch,
- a control unit, and
- an operating unit.

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[0008] An advantage of the winch according to the invention is that it has a small number of structural parts and only one drive. Control is easy. The winch is operated remotely, giving the operator a good overview of the scraper. A further advantage of the winch is that it uses energy only when the rope is actively being pulled (no idling). The structure of the winch according to the invention provides for safe and reliable operation and prevents incorrect rope kinematics.

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Figure 1: Schematic view of a scraper winch

[0009] The invention is described in more detail hereinbelow.

[0010] The technical problem is solved with a winch 1 for a scraper 11, comprising:

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- an electric motor 2,
- a reduction gear 3 connected to the electric motor 2 and having an output shaft 4,
- a first freewheel clutch 5, fixedly mounted on the reduction gear output shaft 4, so as to allow torque to be transmitted from the output shaft 4 in the first direction, while it rotates freely in the second direction,

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opposite to the first direction,

- a second freewheel clutch 6, fixedly mounted on the reduction gear output shaft 4, so as to allow torque to be transmitted from the output shaft 4 in the second direction, while it rotates freely in the first direction,
- a first drum 7 fixedly mounted on the first freewheel clutch 5,
- a second drum 8 fixedly mounted on the second freewheel clutch 6,
- a control unit, and
- an operating unit.

[0011] In technical vocabulary, the term 'overrunning clutch' is sometimes also used instead of the freewheel clutch.

[0012] The control unit is adapted in a way to enable the electric motor 2 to be switched on for rotation in the first direction and the electric motor 2 to be switched on for rotation in the second direction which is opposite to the first direction. When the electric motor is switched on for rotation in the first direction, one drum rotates together with the output shaft, allowing the rope to be wound on the drum, while in this case the other drum rotates freely on the output shaft, allowing the rope to be unwound from the second drum. When the electric motor is switched on to rotate in the opposite direction, the situation is, of course, reversed. When the electric motor is switched on, the direction of movement of the scraper which can be connected to the two drums by means of a rope is therefore uniquely determined. The control is simple and, thanks to the system's good responsiveness, extremely efficient. When the electric motor is switched off, both drums are free to rotate, allowing the rope to be unwound from both drums.

[0013] The invention also relates to the winch 1 further comprising:

- a first rope 9 connected to the first drum 7 by its first end and wound on it in a third direction,
- a second rope 10 connected to the second drum 8 by its first end and wound on it in a fourth direction which is opposite to the third direction.

[0014] The invention also relates to the winch 1 further comprising:

- a scraper 11 connected at one end to the second end of the first rope 9 and connected at the other end to the second end of the second rope 10.

[0015] When the winch is used in a mine, one of the ropes is passed around a pulley 12 which is fixed e.g. in the mine wall.

[0016] The drums may be provided with casings sealed against the output shaft. In this way, the spaces inside the drums receiving the freewheel clutches can be filled

with oil to ensure lubrication of the freewheel clutches and thus trouble-free operation.

[0017] The drums 7, 8 may be arranged side by side on one side of the reduction gear 3. Alternatively, the reduction gear may be arranged centrally between the drums.

[0018] The operating unit can be connected to the control unit via a wire. Alternatively, the operating unit can be connected wirelessly to the control unit.

Claims

1. A winch (1) of a scraper (11), comprising:

- an electric motor (2),
- a reduction gear (3) connected to the electric motor (2) and having an output shaft (4),
- a first freewheel clutch (5), fixedly mounted on the reducing gear output shaft (4), so as to allow torque to be transmitted from the output shaft (4) in the first direction, while it rotates freely in the second direction, opposite to the first direction,
- a second freewheel clutch (6), fixedly mounted on the reducing gear output shaft (4), so as to allow torque to be transmitted from the output shaft (4) in the second direction, while it rotates freely in the first direction,
- a first drum (7) fixedly mounted on the first freewheel clutch (5),
- a second drum (8) fixedly mounted on the second freewheel clutch (6),
- a control unit, and
- an operating unit.

2. The winch according to claim 1, **characterized in that** the control unit is adapted in a way to enable the electric motor (2) to be switched on for rotation in the first direction and the electric motor (2) to be switched on for rotation in the second direction which is opposite to the first direction.

3. The winch according to any of preceding claims, **characterized by** further comprising:

- a first rope (9) connected to the first drum (7) by its first end and wound on it in a third direction,
- a second rope (10) connected to the second drum (8) by its first end and wound on it in a fourth direction which is opposite to the third direction.

4. The winch according to any of preceding claims, **characterized by** further comprising:

- a scraper (11) connected at one end to the second end of the first rope (9) and connected

at the other end to the second end of the second rope (10).

5. The winch according to any of preceding claims, **characterized in that** the drums (7, 8) are provided with casings sealed against the output shaft, such that they may be filled with oil. 5
6. The winch according to any of preceding claims, **characterized in that** the operating unit is connected to the control unit with a wire. 10
7. The winch according to any of claims 1 to 5, **characterized in that** the operating unit is connected to the control unit wirelessly. 15
8. The winch according to any of preceding claims, **characterized in that** the drums (7, 8) are arranged side by side on one side of the reduction gear (3). 20
9. The winch according to any of claims 1 to 7, **characterized in that** the reduction gear is arranged centrally between the two drums. 25

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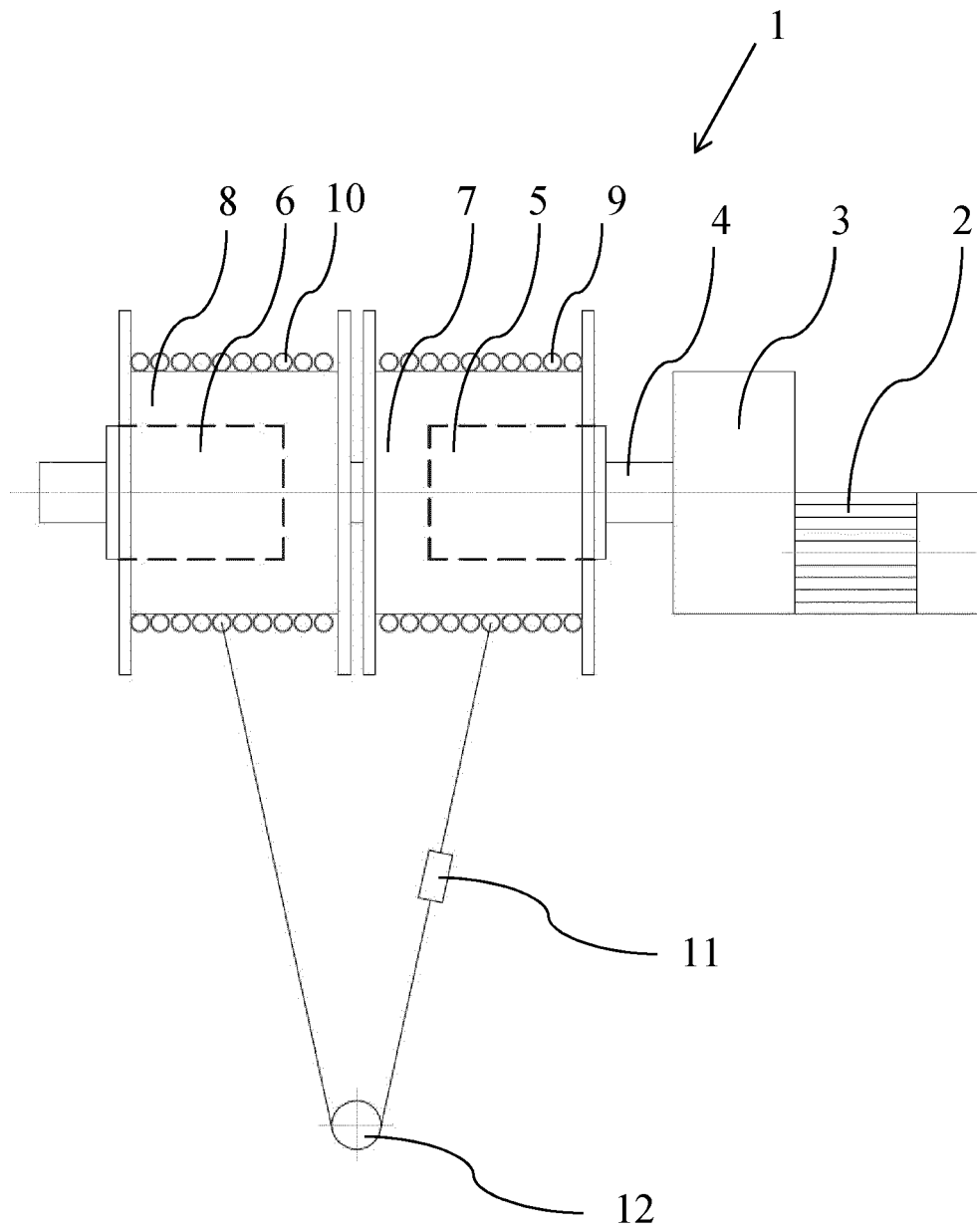


Fig. 1



EUROPEAN SEARCH REPORT

Application Number

EP 23 18 7218

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 8 December 2023	Examiner Güzel, Ahmet
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

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