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GRID CLEANER.

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DE-B- 2 847 314
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NL-A- 8 701 939
US-A- 4 404 986

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Description

This invention relates to a grid cleaner comprising at least one carriage that is movable along a rail, said carriage mounting at least one drivable drum on which a hoisting rope, to which a grapple is connected, can be moved up and down, said carriage mounting at least one second drum for winding a fluid supply hose and a fluid exhaust hose for the hydraulic operation of the grapple.

Such an apparatus is known from applicant's NL patent application 8701939. A disadvantage of that known apparatus is the fact that owing to a difference in the stretch of the hoisting rope and the fluid hose, the latter is stretched considerably more than the former, which gives rise to improper winding of the rope and the hose, there being a real chance of the fluid hose ending up under the hoisting rope, so that the fluid hose will be seriously damaged, with all its consequences.

It is an object of this invention to overcome that disadvantage.

To that effect, a grid cleaner of the type described in the preamble is characterized in that the first drum is fixedly mounted on a driving shaft and the second drum is rotatably mounted on the driving shaft, said driving shaft being connected to said second drum by means of a clockwork spring or helical spring. Thus, any differences in length between the fluid hose and the hoisting rope are automatically compensated by the fluid hose being held taut during lifting and lowering.

Means may be provided which prevent rotation of the drivable drum when the grapple abuts an obstacle. Indeed, in such an event, too, twisting of the fluid hose and the hoisting rope may occur.

To prevent further rotation of the drivable drum when the grapple abuts an obstacle, the hoisting rope may extend from the drum over a rope-slack pulley. This rope-slack pulley may be rotatably mounted on a lever whose other end is rotatably mounted on the carriage.

The rope-slack pulley may be provided with a stop rod adapted to cooperate with a stop connected to the carriage.

The stop rod may be under the influence of a tension spring.

Further, the lever can cooperate with a rope-slack switch arranged in the electric circuit of the motor operating the drum.

Another arrangement for preventing rotation of the drivable drum when the grapple butts an obstacle may comprise a tubular monorail from which the carriage is suspended, but the carriage's longitudinal axis extends parallel to the centreline of the monorail and the centres of gravity of the carriage and the grapple are not located vertically below the monorail, so that when the grapple abuts an obstacle, the car-

riage tilts and operates an inclination switch arranged in the electric circuit of the motor.

It is observed that a grid cleaner in which a tubular monorail is used is known per se from applicant's NL patent application 86.03276.

Some embodiments of the grid cleaner will now be further explained and illustrated with reference to the accompanying drawings, in which:

Fig. 1 is a schematic sectional side view of a first embodiment of a grid cleaner;

Fig. 2 is a schematic bottom view of the apparatus according to Fig. 1;

Fig. 3 is a view similar to Fig. 1 of a second embodiment of the grid cleaner according to the invention;

Fig. 4 is a front view of the apparatus according to Fig. 1 during operation; and

Fig. 5 shows a view similar to Fig. 4, but after the grapple has abutted an obstacle.

According to the drawings a grid cleaner comprises a carriage 1 which is suspended from wheels 2 for moving the carriage along a rail 3. The drive of the wheels 2 is omitted for clarity's sake, but can be effected in a known manner: reference is made, for instance, to NL patent application 87.01939 and NL patent application 86.03279, both in applicant's name.

Provided in the carriage is a reduction or driving gearbox 4 to which a motor 5 is connected. Connected further to the driving gearbox are two projecting shafts 6 and 7 each mounting two sheaves 8 and 9 arranged side by side. Wound on the sheave 8 is a hoisting rope 10, while a fluid hose 11 is wound on the sheave 9. The cable 10 and the hose 11 extend over rope-slack pulleys 12 and 13, respectively. From the pulleys 12, 13 the hoisting rope 10 and the fluid hose 11, respectively, extend downwardly to a grapple 14. The known per se elements are not described in any further detail here, since they are described extensively in applicant's NL patent applications mentioned above.

As schematically shown in Fig. 1, on each shaft 6, 7 a helical clockwork spring 15 is mounted, which at one end is fixedly connected with the shaft 6, 7 and at the other end with the sheave 9 for the fluid hose. The sheave 9 is further adapted to rotate freely on the shafts 6, 7, while the sheaves 8 are fixedly connected to the shafts 6, 7. In this way the respective sheaves 8 and 9 can rotate relatively to each other, so that any differences in length between the fluid hose and the hoisting rope are automatically compensated.

To ensure that the driving motor will stop immediately when the grapple abuts an obstacle, each rope-slack pulley 12, 13 is connected to one end of a lever 16, whose other end is rotatably connected to the carriage 1. Further mounted in the carriage, in the path of movement of the lever 16, is a switch 17 which is arranged in the electric circuit of the motor 5.

Further, a so-called stop rod 18 is connected to the rope-slack pulley 12, 13, the rod being fixedly connected to the lever 16, the other end of the rod being suspended from the carriage 1 by means of a spring 19. As will appear from the drawing, the carriage 1 is provided with a stop 20 for supporting the stop rod 18 in the neutral service position.

However, as soon as the grapple 14 abuts an obstacle, the rope-slack pulley 12, 13 will be pulled upwards by the spring 19 and thus operate the switch 17, so that the driving motor stops immediately.

As will appear from Fig. 2, the carriage can be arranged in a rotated position relative to the gearbox 4 and the sheaves 8, 9 such that the respective vertical portions of the hoisting rope are approximately in the longitudinal median plane of the carriage, which ensures a proper balancing of the forces involved.

In the embodiment shown in Figs. 3-5 like parts are indicated by like reference numerals. The main difference between this embodiment and the embodiment of Figs. 1-2 is that instead of the rail 3 a round tube 20 is used which cooperates with wheels 21 provided with a concave profile.

The sheaves 8, 9 and the motor 5 and the gearbox 4 may be similar to those described with reference to Figs. 1-2. The same holds for the clockwork spring 15.

Under the influence of the weight of the various parts and the proper choice of the points of suspension, in operation the parts will be positioned relatively to each other as shown in Fig. 4. However, when the grapple abuts an obstacle 24 (see Fig. 5), the weight of the grapple drops out, so that the whole tilts about the round rail 20, thus operating an inclination switch 22 mounted on a driving motor 23 of one of the rollers 21. The inclination switch 22 is included in the electric circuit (not shown) of the driving motor 5 of the reduction gearbox 4, so that when the grapple 14 abuts an obstacle (24), as shown in Fig. 5, the rope sheave 8 and the hose sheave 9 will tilt, thus operating the inclination switch 22 and hence the motor 5, so that the rope sheave 8 and the hose sheave 9 will stop immediately.

It will be clear that a great number of modifications are conceivable without departing from the scope of the invention, as defined by the appended claims.

Claims

1. A grid cleaner comprising at least one carriage (1) that is movable along a rail (3), said carriage (1) mounting at least one first drivable drum (8) on which a hoisting rope (10) to which a grapple (14) is connected can be moved up and down, said carriage (1) mounting at least one second drum (9) for winding a fluid supply and fluid exhaust hose (11) for the hydraulic operation of the grapple (14), characterized in that said first drum (8) is fixedly mounted on a driving shaft (6, 7) and said second drum (9) is rotatably mounted on said driving shaft (6, 7), said driving shaft (6, 7) being connected to said second drum (9) by means of a clockwork spring or helical spring (15).

2. A grid cleaner according to claim 1, characterized in that means (17) are provided which prevent rotation of the drivable drum (8) as soon as the grapple (14) abuts an obstacle (17).
3. A grid cleaner according to claim 2, characterized in that the hoisting rope (10) extends from the drum over a rope-slack pulley (13).
4. A grid cleaner according to claim 3, characterized in that the rope-slack pulley (13) is rotatably mounted on a lever (16) whose other end is rotatably mounted on the carriage.
5. A grid cleaner according to claim 4, characterized in that the rope-slack pulley (13) is provided with a stop rod (18) adapted to cooperate with a stop (20) mounted on the carriage.
6. A grid cleaner according to claim 5, characterized in that the stop rod (18) is under the influence of a tension spring (19).
7. A grid cleaner according to claim 4, 5, or 6, characterized in that the lever (16) can cooperate with a rope-slack switch (17) included in an electric circuit of the motor (5) operating the drum.
8. A grid cleaner according to claim 1 or 2, characterized in that the carriage is suspended from a tubular monorail (20), in such a way that the carriage's longitudinal axis is parallel to the centreline of the monorail (20), the centres of gravity of the carriage and the grapple (14) not being located vertically under the monorail (20), so that upon abutting an obstacle (24), the carriage will tilt and operate an inclination switch included in the electric circuit of the motor (5).

Patentansprüche

1. Gitterreiniger mit wenigstens einem Wagen (1), der längs einer Schiene (3) beweglich ist und wenigstens eine erste antreibbare Trommel (8) trägt, auf der ein Zugseil (10) auf und nieder bewegt werden kann, an dem ein Greifer (14) angebracht ist, wobei der Wagen (1) wenigstens eine zweite Trommel (9) zum Aufwickeln eines Fluidförder- und Fluidabgabeschlauchs (11) für die hydraulische Betätigung des Greifers (14) trägt,

dadurch gekennzeichnet,

daß die erste Trommel (8) auf einer Antriebswelle (6, 7) fest angebracht ist und die zweite Trommel (9) auf dieser Antriebswelle (6, 7) verdrehbar ist, wobei die Antriebswelle (6, 7) mit der zweiten Trommel (9) mittels einer Uhrwerkfeder oder einer Spiral- bzw. Schraubenfeder (15) verbunden ist.

2. Gitterreiniger nach Anspruch 1, dadurch gekennzeichnet, daß eine Einrichtung 117 vorgesehen ist, die eine Verdrehung der antreibbaren Trommel (8) verhindert, sobald der Greifer (14) an einem Hindernis (24) zum Anliegen kommt. 15
3. Gitterreiniger nach Anspruch 2, dadurch gekennzeichnet, daß das Zugseil (10) sich von der Trommel über eine Seilspannrolle (13) erstreckt. 20
4. Gitterreiniger nach Anspruch 3, dadurch gekennzeichnet, daß die Seilspannrolle (13) drehbar an einem Hebel (16) angebracht ist, dessen anderes Ende verschwenkbar am Wagen angebracht ist. 25
5. Gitterreiniger nach Anspruch 4, dadurch gekennzeichnet, daß die Seilspannrolle (13) mit einer Stoppstange (18) versehen ist, die mit einem Anschlag (20) an dem Wagen zusammenwirkt. 30
6. Gitterreiniger nach Anspruch 5, dadurch gekennzeichnet, daß die Stoppstange (18) unter dem Einfluß einer Spannfeder (19) steht. 35
7. Gitterreiniger nach Anspruch 4, 5 oder 6, dadurch gekennzeichnet, daß der Hebel (16) mit einem Schlaffseilschalter (17) zusammenwirkt, der in einem elektrischen Schaltkreis des Motors (5) für den Antrieb der Trommel angeordnet ist. 40
8. Gitterreiniger nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß der Wagen auf einer rohrförmigen Monoschiene (20) derart aufgehängt ist, daß die Längsachse des Wagens parallel zur Mittellinie der Monoschiene (20) verläuft, wobei die Schwerpunkte des Wagens und des Greifers (14) nicht senkrecht unter der Monoschiene (20) liegen, so daß beim Auftreffen auf ein Hindernis (24) der Wagen kippt und einen Neigungsschalter betätigt, der in dem elektrischen Schaltkreis des Motors (5) angeordnet ist. 45 50 55

Revendications

1. Dispositif de nettoyage à grille comprenant au moins un chariot (1) pouvant se déplacer sur un rail (3), ledit chariot (1) portant au moins un premier tambour entraînable (8) sur lequel un câble de levage (10) auquel est relié un grappin (14) peut être relevé ou abaissé, ledit chariot (1) portant au moins un second tambour (9) servant à enrouler un flexible (11) d'alimentation et de retour du fluide assurant le fonctionnement hydraulique du grappin (14), caractérisé en ce que ledit premier tambour (8) est solidaire d'un arbre d'entraînement (6, 7) et en ce que ledit second tambour (8) est solidaire dudit arbre d'entraînement (6, 7), ledit arbre d'entraînement (6, 7), ledit arbre d'entraînement (6, 7) étant relié audit second tambour (9) par l'intermédiaire d'un ressort spiralé ou hélicoïdal (15).
2. Dispositif de nettoyage à grille selon la revendication 1, caractérisé en ce que des moyens (17) sont prévus pour interrompre la rotation du tambour entraînable (8) dès que le grappin (14) rencontre un obstacle.
3. Dispositif de nettoyage à grille selon la revendication 2, caractérisé en ce que le câble de levage (10) quitte le tambour via une poulie tendeuse (13).
4. Dispositif de nettoyage à grille selon la revendication 3, caractérisé en ce que la poulie tendeuse (3) est montée à rotation sur un levier (16) dont l'autre extrémité est montée à rotation sur le chariot.
5. Dispositif de nettoyage à grille selon la revendication 4, caractérisé en ce que la poulie tendeuse (13) est dotée d'un barreau d'arrêt (18) adapté pour coopérer avec un arrêt monté sur le chariot.
6. Dispositif de nettoyage à grille selon la revendication 5, caractérisé en ce que le barreau d'arrêt (18) est soumis à l'action d'un ressort de tension (19).
7. Dispositif de nettoyage à grille selon la revendication 4, 5 ou 6, caractérisé en ce que le levier (16) peut coopérer avec un contacteur (17) de tension de câble inclus dans un circuit électrique du moteur (5) entraînant le tambour.
8. Dispositif de nettoyage à grille selon la revendication 1 ou 2, caractérisé en ce que le chariot est suspendu sur un monorail tubulaire (20) de telle sorte que l'axe longitudinal du chariot soit parallèle à l'axe du monorail (20), les centres de gra-

tivité du chariot et du grappin (14) n'étant pas situés sous le monorail dans le plan vertical passant par l'axe du monorail (20), de sorte qu'en cas de rencontre avec un obstacle (24) le chariot s'incline et actionne un contacteur d'inclinaison inclus dans le circuit électrique du moteur (5).

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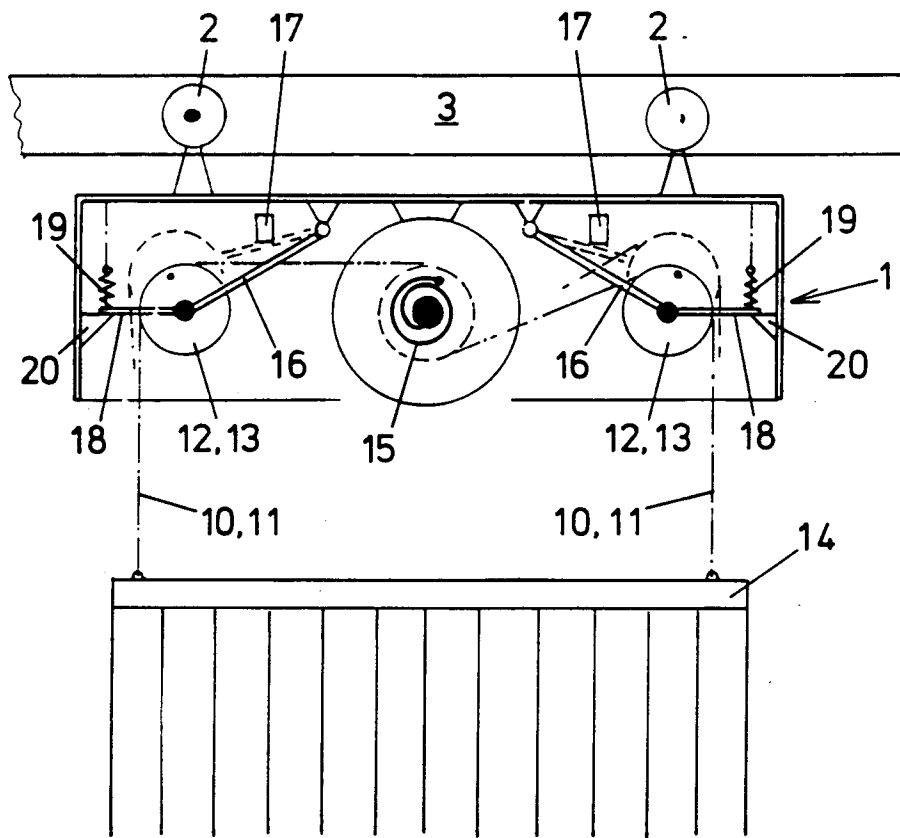


FIG.1

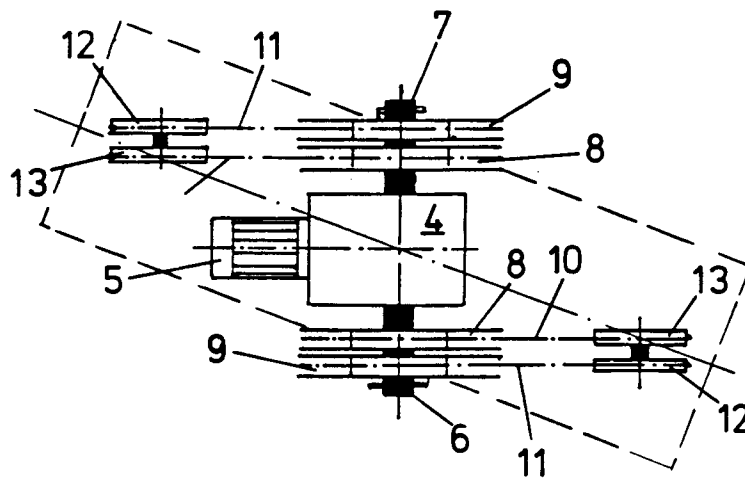


FIG.2

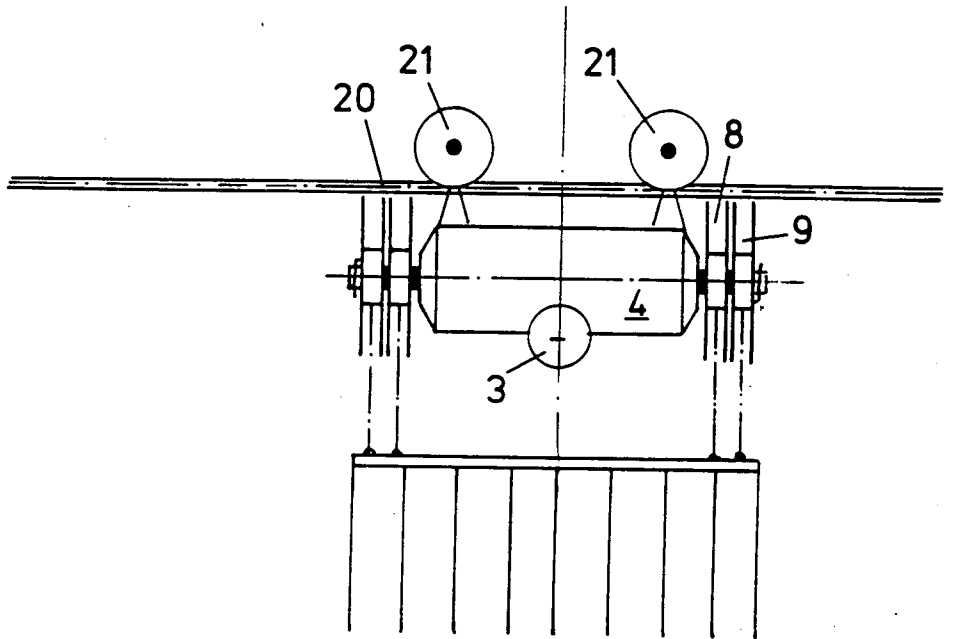


FIG. 3

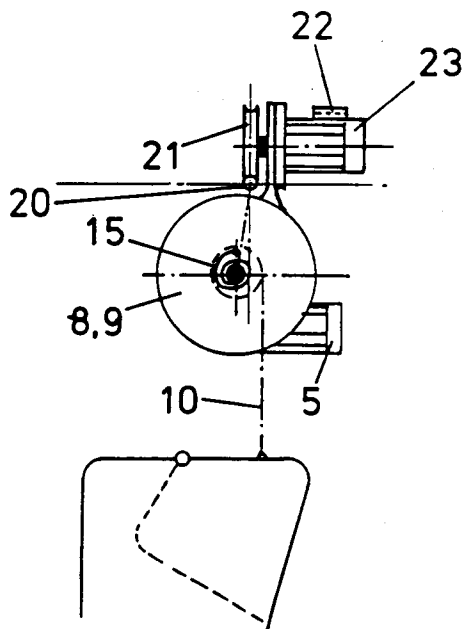


FIG. 4

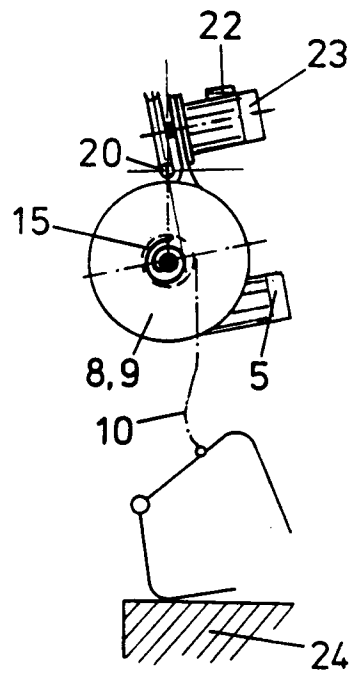


FIG. 5