

(19)



(11)

EP 3 974 583 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent:

11.06.2025 Bulletin 2025/24

(51) International Patent Classification (IPC):

E02F 3/815 ^(2006.01)

(21) Application number: **21197319.3**

(52) Cooperative Patent Classification (CPC):

E02F 3/8155; E02F 3/844; E02F 9/0841

(22) Date of filing: **17.09.2021**

(54) **BULLDOZER**

PLANIERRAUPE

BULLDOZER

(84) Designated Contracting States:

**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

(30) Priority: **24.09.2020 FI 20200099 U**

(43) Date of publication of application:

30.03.2022 Bulletin 2022/13

(73) Proprietor: **Katu-Karhu Oy**

04330 Lehela (FI)

(72) Inventor: **Tölli, Veli**

04330 Lahela (FI)

(74) Representative: **Papula Oy**

P.O. Box 981

00101 Helsinki (FI)

(56) References cited:

CA-A1- 2 527 888

CN-U- 205 617 458

US-A1- 2005 229 437

US-A1- 2013 263 480

US-B1- 6 470 606

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] This invention relates to a bulldozer that is intended for spreading and levelling road surface material over which an asphalt layer is further intended to be applied, which bulldozer is formed of a frame that is articulated in the middle and of bearing chain track wheels and a front bulldozer blade.

[0002] Devices that are known per se for levelling roads are so-called road graders having a long frame, front wheels and rear wheels, and wherein the grader blade is located behind the front wheels. The frame is not articulated. This road grader works if the road is long and straight with no bends. The wheels of the road grader easily break a levelled and graded road surface. No evenly bearing track wheels are provided.

[0003] Known bulldozer is shown for example in document CA 2527888 A1 and documents US 2013/263480 A1 and US 2005/229437 A1 show some blade structure of a snow plow.

Summary of the invention

[0004] The object of this invention is to remedy the defects described above. The bulldozer according to the invention is characterized by the features of the appended claim 1.

[0005] One embodiment of the invention is characterized in that the side blades are foldable by hydraulic cylinders that are known per se.

[0006] Another embodiment of the invention is characterized in that the bulldozer blade has two troughs in cross-section, wherein the troughs are longitudinally one on top of the other.

[0007] Advantages of the bulldozer according to the invention compared with the known road graders are: Speed, precision, ease of use, the frame jack-knives, i.e. easy to turn and nimble, surface pressure is low, does not break the levelled surface.

[0008] The invention will now be described by way of example with reference to the accompanying drawing, in which

List of the figures

[0009]

Fig. 1 illustrates a bulldozer as a side view,

Fig. 2 illustrates a bulldozer blade as viewed from above,

Fig. 3 is the same as Fig. 2, but with side blades folded forward, and

Fig. 4 illustrates a bulldozer blade according to another embodiment as a side view.

Detailed description of the invention

[0010] The bulldozer is intended for spreading and levelling road surface material. An asphalt layer is further intended to be applied over the levelled surface. The bulldozer is formed of a frame 1, 2 that is articulated in the middle and of bearing chain track wheels 3 and a front bulldozer blade 4a, 4b. The bulldozer blade has three parts, a body blade 5 and side blades 6 folding forward substantially to an angle of 90° on both sides, whereby a U-shaped trough 7 is formed in front of the bulldozer. The side blades 6 are foldable by hydraulic cylinders that are known per se. Not illustrated in the drawing.

[0011] In Fig. 4, the bulldozer blade 4b has two troughs in cross-section, wherein the troughs 8, 9 are longitudinally one on top of the other.

[0012] The frame of the bulldozer is divided into two parts, a front part 1 and a rear part 2, attached to each other in an articulated manner. The articulation is arranged in the vertical direction, whereby the front part and the rear part may pivot relative to each other in the horizontal plane. This enables nimbler operation of the device because due to the articulation, the device can be turned even in a narrow place. At the same time, the precision of work is improved and the device may also be easily used at winding and narrow work sites.

[0013] The device comprises bearing chain track wheels 3 by means of which the weight of the device can be distributed over a larger area than by using traditional wheels, whereby the device leaves less marks on the working surface, or does not leave any marks at all. Two of the chain track wheels may be arranged in the front part on opposite sides thereof and two may be arranged in the rear part on opposite sides thereof. The device may also comprise more of the chain track wheels in the front part and/or the rear part on different sides thereof. The chain track wheel may have a triangular design, when the chain track wheel is viewed from the side. Thus, the chain track wheel comprises three track wheels that are arranged so that two of the track wheels are arranged so to speak facing the ground, and one is arranged over these two track wheels in the middle, as is illustrated in Fig. 1. The track of the track wheel is arranged to run around the track wheels.

[0014] The bulldozer blade of the device is fixedly attached to the front part of the frame, such that the position of the bulldozer blade may be changed. The bulldozer blade may be tilted as desired forward and backward, or it may be turned in the horizontal plane, whereby the material being worked may be guided to the side with the bulldozer blade. The bulldozer blade may be attached to the front part of the frame for example with hydraulic cylinders by means of which the position of the bulldozer blade may be changed. The front part of the bulldozer may comprise a cab in which the control devices of the device are arranged. The control devices may comprise means required to control the device, such as a steering wheel and control means for moving the device

forward and backward. In addition, the cab may comprise bulldozer blade control means for changing its position. The bulldozer blade must be fixedly attached, because the material being levelled, such as stones, gravel etc., is very heavy and the bulldozer blade must withstand the forces exerted by the material without the bulldozer blade starting to move by the effect of the forces applied thereto. By fixed attachment it is meant that the bulldozer blade is rigidly attached to the front part of the bulldozer, whereby the bulldozer blade is supported by the whole weight of the device. The bulldozer blade 4a, 4b may be attached to the front part 1 fully or partly hydraulically, e.g. by hydraulic cylinders, whereby the position of the bulldozer blade may be changed hydraulically.

[0015] The bulldozer blade comprises a body blade 5 and side blades 6 arranged at both ends of the body blade 5. The angle of the side blades 6 in relation to the body blade 5 may be adjusted in the horizontal plane between 90-180 degrees. In Fig. 2 the side blades 6 are at an angle of 180 degrees relative to the body blade 5 and in Fig. 3 the side blades are at an angle of 90 degrees relative to the body blade 5. The angle of each side blade 6 may be adjusted independently, irrespective of the angle of the other side blade, or the angle of the side blades may be adjusted synchronously.

[0016] A bar that is fitted with a camera for imaging the road surface or other material being moved may be attached to the upper part of the body blade of the bulldozer blade. The cab of the device may comprise a display to which the signal of the camera may be transmitted and the driver or user of the device sees in real time what is happening in front of the bulldozer blade. Thus the driver is able to react quickly if something appears in front of the bulldozer blade that should not be there, or is able to control the device in places that require precision.

[0017] The upper part of the body blade 5 may also comprise two transmitters by means of which the position of the bulldozer blade may be determined. The transmitters are arranged at the ends of the upper part of the body blade so that one transmitter is close to a first side part and another transmitter is close to a second side part. Thus the exact position of the blade can be detected. The detection of the position may be based on GPS (Global Positioning System). The device may also comprise more transmitters. Two masts may be attached to the body blade 5 such that the masts are attached to the upper edge of the body blade close to the point of attachment of the side parts, whereby they extend vertically upwards from the surface being worked. The transmitters can be attached to these masts.

[0018] The body blade 5 and the side blades 6 each comprise a cutting edge part that is arranged to the lower edge of the blades, extending vertically towards the surface being levelled, i.e. during work the cutting edge is oriented at an angle of approximately 90 degrees relative to the surface being worked. This has the advantage that the bulldozer blade is not lifting, i.e. it does not peel material off the surface being worked, but only levels it

to a desired level. The cutting edge part may be manufactured from a different material than the other parts of the bulldozer blade. The cutting edge part may be removably attached to the blades, whereby the cutting edge parts may be replaced as they wear down.

[0019] The bulldozer blade may have two troughs in cross-section, i.e. cross-section as viewed from the side, wherein the troughs 8, 9 are longitudinally, i.e. in the vertical direction, one on top of the other above the cutting edge part. By means of these troughs the material being levelled/moved does not uncontrollably accumulate in front of the bulldozer blade, but can be spread evenly along the whole width of the bulldozer blade. This way the material being levelled can also be better compacted.

Claims

1. A bulldozer that is intended for spreading and leveling road surface material over which an asphalt layer is further intended to be applied, which bulldozer is formed of a frame (1, 2) that is articulated in the middle and of bearing chain track wheels (3) and a front bulldozer blade (4a, 4b), **characterized in that** the bulldozer blade (4a, 4b) has three parts, a body blade (5) and side blades (6) folding forward to an angle of 90° on both sides, whereby a U-shaped trough (7) is formed in front of the bulldozer, wherein the body blade (5) and the side blades (6) each comprise a cutting edge part that is arranged to lower edges of the blades, and in operation, the cutting edge is extending vertically towards the surface being levelled at an angle of 90 degrees relative to the surface being worked.
2. The bulldozer according to claim 1, **characterized in that** the side blades (6) are foldable by hydraulic cylinders that are known per se.
3. The bulldozer according to claim 1 or 2, **characterized in that** the bulldozer blade (4b) has two troughs in cross-section, wherein the troughs (8, 9) are longitudinally and one on top of the other.
4. The bulldozer according to claim 1, wherein the frame (1,2) comprises a front part and a rear part attached to each other in an articulated manner.
5. The bulldozer according to claim 4, wherein the front part of the frame comprises two chain track wheels arranged on opposite sides of the front part, and the rear part of the frame comprises two chain track wheels arranged on opposite sides of the rear part.
6. The bulldozer according to claim 4 or 5, wherein the bulldozer blade (4. 4a) is fixedly attached to the front part of the frame, so that the position of the bulldozer blade may be changed from the cab.

7. The bulldozer according to any of claims 1-6, wherein the angle of the side blades in relation to the body blade may be adjusted between 90-180 degrees.
8. The bulldozer according to any of claims 1-7, wherein the angle of each side blade may be adjusted independently, irrespective of the angle of the other side blade.
9. The bulldozer according to any of claims 1-8, wherein a bar that is fitted with a camera for imaging the road surface material is attached to the upper part of the body blade (5).
10. The bulldozer according to any of claims 1-9, wherein the upper part of the body blade (5) comprises two transmitters by means of which the position of the bulldozer blade may be determined and of which one transmitter is positioned close to the point of attachment of a first side blade and another transmitter is positioned close to the point of attachment of a second side blade.
11. The bulldozer according to any of claims 1-10, wherein the body blade (5) and the side blades (6) each comprise a cutting edge part that is arranged to the lower edge of the blades, extending vertically towards the surface being levelled.
12. The bulldozer according to any of claims 1-11, wherein that the bulldozer blade (4b) has two troughs in cross-section, wherein the troughs (8, 9) are in the vertical direction one on top of the other above the cutting edge part.

Patentansprüche

1. Planierraupe zum Verteilen und Nivellieren von Straßenoberflächenmaterial, auf das ferner eine Asphaltschicht aufgebracht werden soll, wobei die Planierraupe aus einem Rahmen (1, 2), der in der Mitte gelenkig ist, und aus tragenden Ketten-Spurrädern (3) und einem vorderen Planierraupenschild (4a, 4b) gebildet ist, **dadurch gekennzeichnet, dass** der Planierraupenschild (4a, 4b) drei Teile aufweist, einen Körperschild (5) und Seitenschilde (6), die an beiden Seiten um einen Winkel von 90° nach vorne klappbar sind, wodurch eine U-förmige Mulde (7) vor der Planierraupe gebildet wird, wobei der Körperschild (5) und die Seitenschilde (6) jeweils einen Schneidkantenteil umfassen, der an unteren Kanten der Schilde eingerichtet ist, und im Betrieb die Schneidkante sich vertikal in Richtung der zu nivellierenden Oberfläche in einem Winkel von 90 Grad relativ zur bearbeiteten Oberfläche erstreckt.
2. Planierraupe gemäß Anspruch 1, **dadurch gekenn-**

zeichnet, dass die Seitenschilde (6) durch per se bekannte Hydraulikzylinder klappbar sind.

3. Planierraupe gemäß Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** der Planierraupenschild (4b) im Querschnitt zwei Mulden aufweist, wobei die Mulden (8, 9) in Längsrichtung und eine über der anderen angeordnet sind.
4. Planierraupe gemäß Anspruch 1, wobei der Rahmen (1, 2) einen vorderen Teil und einen hinteren Teil umfasst, die in einer gelenkigen Weise aneinander angebracht sind.
5. Planierraupe gemäß Anspruch 4, wobei der vordere Teil des Rahmens zwei Ketten-Spurräder umfasst, die an gegenüberliegenden Seiten des vorderen Teils eingerichtet sind, und der hintere Teil des Rahmens zwei Ketten-Spurräder umfasst, die an gegenüberliegenden Seiten des hinteren Teils eingerichtet sind.
6. Planierraupe gemäß Anspruch 4 oder 5, wobei der Planierraupenschild (4, 4a) an dem vorderen Teil des Rahmens fest angebracht ist, so dass die Position des Planierraupenschildes von dem Führerhaus aus verändert werden kann.
7. Planierraupe gemäß einem der Ansprüche 1-6, wobei der Winkel der Seitenschilde in Bezug auf den Körperschild zwischen 90 und 180 Grad verstellt werden kann.
8. Planierraupe gemäß einem der Ansprüche 1-7, wobei der Winkel jedes Seitenschildes unabhängig verstellt werden kann, ungeachtet des Winkels des anderen Seitenschildes.
9. Planierraupe gemäß einem der Ansprüche 1-8, wobei eine Stange, die mit einer Kamera zum Abbilden des Straßenoberflächenmaterials ausgestattet ist, am oberen Teil des Körperschildes (5) angebracht ist.
10. Planierraupe gemäß einem der Ansprüche 1-9, wobei der obere Teil des Körperschildes (5) zwei Sender umfasst, mit denen die Position des Planierraupenschildes bestimmt werden kann und von denen ein Sender nahe dem Anbringungspunkt eines ersten Seitenschildes und ein anderer Sender nahe dem Anbringungspunkt eines zweiten Seitenschildes positioniert ist.
11. Planierraupe gemäß einem der Ansprüche 1-10, wobei der Körperschild (5) und die Seitenschilde (6) jeweils einen Schneidkantenteil umfassen, der an der unteren Kante der Schilde eingerichtet ist und sich vertikal in Richtung der zu nivellierenden Ober-

fläche erstreckt.

12. Planierdraupe gemäß einem der Ansprüche 1-11, wobei der Planierdraupenschild (4b) im Querschnitt zwei Mulden aufweist, wobei die Mulden (8, 9) in vertikaler Richtung eine über der anderen über dem Schneidkantenteil angeordnet sind.

Revendications

1. Bulldozer qui est destiné à étaler et niveler un matériau de surface de route sur lequel une couche d'asphalte est ensuite destinée à être appliquée, lequel bulldozer est formé d'un châssis (1, 2) qui est articulé au milieu et de roues porteuses sur chenilles (3) et d'une lame de bulldozer avant (4a, 4b), **caractérisé en ce que** la lame de bulldozer (4a, 4b) présente trois parties, une lame de corps (5) et des lames latérales (6) se repliant vers l'avant jusqu'à un angle de 90° des deux côtés, moyennant quoi une auge en forme de U (7) est formée à l'avant du bulldozer, dans lequel la lame de corps (5) et les lames latérales (6) comprennent chacune une partie de bord de coupe qui est agencée sur des bords inférieurs des lames et, en fonctionnement, le bord de coupe s'étend verticalement vers la surface qui est nivelée à un angle de 90 degrés par rapport à la surface qui est travaillée.
2. Bulldozer selon la revendication 1, **caractérisé en ce que** les lames latérales (6) peuvent être repliées par des vérins hydrauliques connus en soi.
3. Bulldozer selon la revendication 1 ou la revendication 2, **caractérisé en ce que** la lame de bulldozer (4b) présente deux auges en section transversale, dans lequel les auges (8, 9) sont longitudinalement et l'une sur l'autre.
4. Bulldozer selon la revendication 1, dans lequel le châssis (1, 2) comprend une partie avant et une partie arrière fixées l'une à l'autre de manière articulée.
5. Bulldozer selon la revendication 4, dans lequel la partie avant du châssis comprend deux roues sur chenilles agencées sur des côtés opposés de la partie avant, et la partie arrière du châssis comprend deux roues sur chenilles agencées sur des côtés opposés de la partie arrière.
6. Bulldozer selon la revendication 4 ou la revendication 5, dans lequel la lame de bulldozer (4, 4a) est attachée de manière fixe à la partie avant du châssis, de sorte que la position de la lame de bulldozer peut être changée à partir de la cabine.

7. Bulldozer selon l'une quelconque des revendications 1 à 6, dans lequel l'angle des lames latérales par rapport à la lame de corps peut être réglé entre 90 et 180 degrés.
8. Bulldozer selon l'une quelconque des revendications 1 à 7, dans lequel l'angle de chaque lame latérale peut être réglé de manière indépendante, sans tenir compte de l'angle de l'autre lame latérale.
9. Bulldozer selon l'une quelconque des revendications 1 à 8, dans lequel une barre qui est montée avec une caméra pour imager le matériau de surface de route est fixée à la partie supérieure de la lame de corps (5).
10. Bulldozer selon l'une quelconque des revendications 1 à 9, dans lequel la partie supérieure de la lame de corps (5) comprend deux émetteurs à l'aide desquels la position de la lame de bulldozer peut être déterminée et parmi lesquels un émetteur est positionné à proximité du point de fixation d'une première lame latérale et un autre émetteur est positionné à proximité du point de fixation d'une seconde lame latérale.
11. Bulldozer selon l'une quelconque des revendications 1 à 10, dans lequel la lame de corps (5) et les lames latérales (6) comprennent chacune une partie de bord de coupe qui est agencée au niveau du bord inférieur des lames, s'étendant verticalement vers la surface à niveler.
12. Bulldozer selon l'une quelconque des revendications 1 à 11, dans lequel la lame de bulldozer (4b) présente deux auges en section transversale, dans lequel les auges (8, 9) sont dans la direction verticale l'une sur l'autre au-dessus de la partie de bord de coupe.

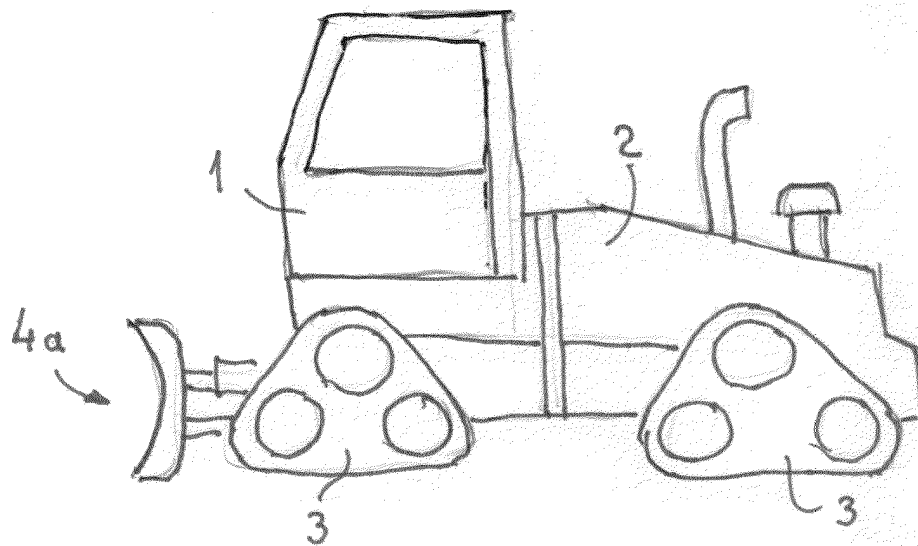


Fig. 1

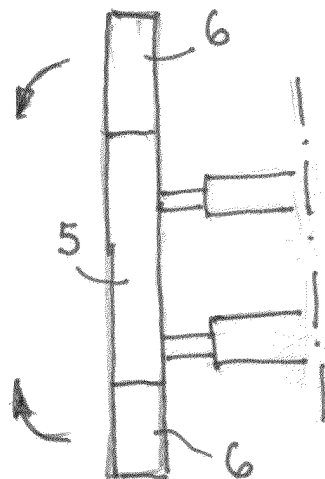


Fig. 2

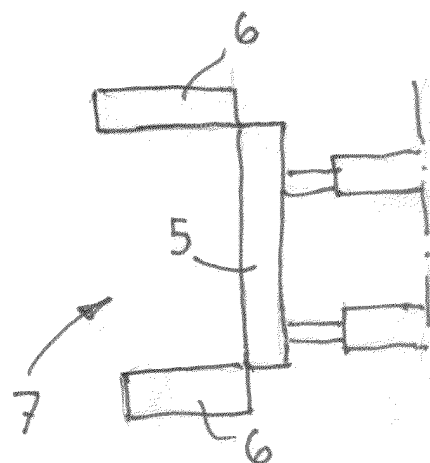


Fig. 3

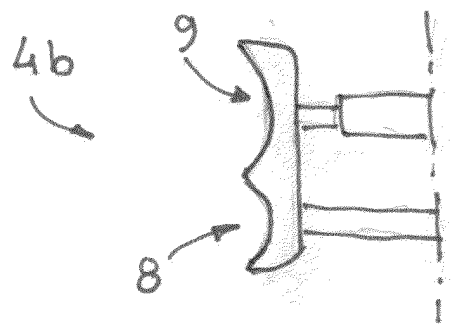


Fig. 4

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- CA 2527888 A1 [0003]
- US 2013263480 A1 [0003]
- US 2005229437 A1 [0003]