

(19)



(11)

EP 4 187 016 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
31.05.2023 Bulletin 2023/22

(51) International Patent Classification (IPC):
E01H 4/00 (2006.01)

(21) Application number: **22000252.1**

(52) Cooperative Patent Classification (CPC):
E01H 4/00

(22) Date of filing: **22.11.2022**

(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 ME MK MT NL
NO PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(71) Applicant: **Florek, Ryszard**
33-336 Labowa (PL)

(72) Inventor: **Florek, Ryszard**
33-336 Labowa (PL)

(30) Priority: **30.11.2021 PL 43971621**

(54) **MOTOR VEHICLE WITH A DEVICE FOR LEVELLING SLED RUNS**

(57) Motor vehicle (1) with a device levelling sled runs comprising chassis (2) with a device attached to it constructed out of a truss, at least two screw conveyors (6) attached symmetrically to the device truss, and shielded from the side of the motor vehicle by open chute (7), wherein each screw conveyor (6) features a shaft with internal end (61) connected to the drivetrain and external

end (62) attached to the truss, and each screw conveyor (6) performs a rotation around its axis of rotation so that the accumulated snow is moved towards internal end (61) of screw conveyors (6), and features compacting plate (10), attached to motor vehicle (1) chassis (2) behind open chute (7) of screw conveyors (6).

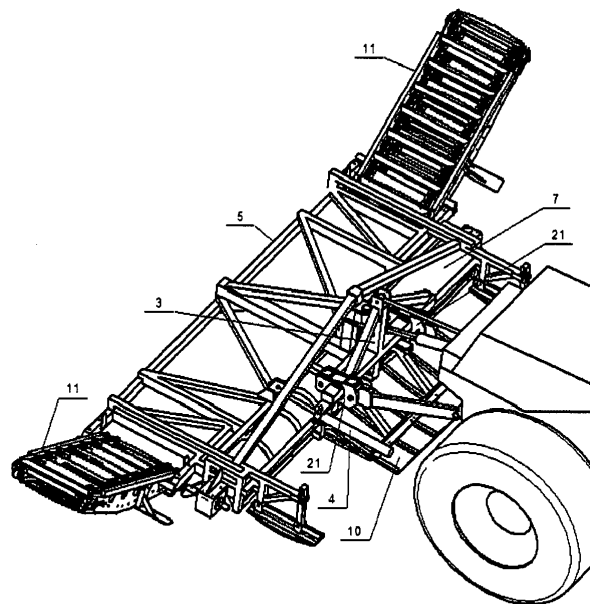


Fig. 4

EP 4 187 016 A1

Description

[0001] The subject-matter of the invention comprises a motor vehicle, and in particular a tractor with a device for levelling sled runs.

[0002] A tractor with a device which contains a screw conveyor to move accumulated snow towards a longitudinal transport chute was disclosed in CN111472314. To that end, it features an opening at one end of the device through which snow accumulated by the screw conveyor is discharged and at the same time fed into the transport chute. Then the snow is moved along the aforementioned transport chute to a second screw conveyor which moves the accumulated snow to the side. The screw conveyors and the transport chute are powered by the tractor's powertrain.

[0003] However, the disclosed invention does not groom the sledding surface by filling and levelling ruts made by the passage of numerous sleds. The indicated problem was solved by a motor vehicle with a device according to claim 1.

[0004] The essence of the invention comprises a motor vehicle comprising a chassis with a truss attached to it with a device for levelling sled runs. Chassis arms feature brackets for the main beam of the truss. The device also features an actuator connecting the main beam of the truss with its functional part, so that when turning, the functional part tilts relative to the main beam to a position where it is practically at a right angle to the sled run sides and once the vehicle completes the turn it returns to its starting position. The truss comprising at least two symmetrically mounted screw conveyors shielded from the side of the motor vehicle by an open chute. The shaft of each screw conveyor has two ends: internal and external. The internal end is connected to the motor vehicle drivetrain whereas the external end is attached in a floating manner within the truss. The motor vehicle drivetrain comprises the vehicle's drive shaft connected to a telescopic universal joint shaft, bevel gear, and a gear system which holds the internal shaft ends of both screw conveyors. A significant property of the invention is that the screw conveyors move accumulated snow towards the internal ends of their shafts, then the snow is compacted by a compacting plate mounted to the chassis of the vehicle behind the open chute of the device.

[0005] The external ends of each screw conveyor shaft in one embodiment are held in bearings, whilst another embodiment has them in a side bevel gear powered by a screw conveyor shaft. The side bevel gear transmits power to a side shaft of a side snow scoop, used to pile snow on the sides of the sled run for example. The side scoop comprises a belt conveyor, with its side shaft held in bearings mounted to the device truss. The side shaft sets in motion a belt conveyor chain which has combs arranged along its length scooping and transporting snow from the bottom towards the top. A significant property of the invention is that the screw conveyors move accumulated snow towards the internal ends of their shafts,

then the snow is compacted by a compacting plate mounted to the chassis of the vehicle behind the open chute of the device.

[0006] The snow moved by the screw conveyors and compacted by the compacting plate fills ruts in the sled run establishing a hard, ready to use sled run surface.

[0007] The illustration depicts the invention, with given figures showing the following:

Fig. 1 top view of the motor vehicle with device as per the invention,

Fig. 2 front view of the motor vehicle with device as per the invention,

Fig. 3 spatial view of the motor vehicle with device as per the invention,

Fig. 4 sled run levelling device mounted on a motor vehicle,

Fig. 5 front view of the sled run levelling device,

Fig. 6 bottom view of the sled run levelling device side snow scoop.

[0008] Motor vehicle 1 comprising a device for levelling sled runs. The device comprises a truss attached to chassis 2 of the motor vehicle. To that end chassis 2 has brackets 21 for main beam 3 of the truss. The truss performs a swinging motion relative to chassis 2 of the vehicle using actuator 4 connecting main beam 3 of the truss with its functional part 5. The truss features at least two symmetrically mounted screw conveyors 6 shielded from the side of the motor vehicle by open chute 7. The shaft of each screw conveyor 6 has two ends: internal end 61 and external end 62. Internal end 61 is connected to the drivetrain which comprises gear system 81, bevel gear 82, telescopic universal joint shaft 83 and vehicle drive shaft 84. Conveyor shaft internal ends 61 are held directly in gear system 81 connected to other drivetrain elements. External ends 62 of each screw conveyor shaft are held in side bevel gear 9 powered by screw conveyor 6 shaft. Screw conveyors 6 move accumulated snow towards internal ends 61 of their shafts, then the snow is compacted by compacting plate 10 mounted to chassis 2 of the vehicle behind open chute 7. The device also features snow scoop 11. Aforementioned side bevel gear 9 transmits power to side shaft 12 of side snow scoop 11. Side shaft 12 of side snow scoop 11 is held in bearings 13 attached to the device truss. Side shaft 12 sets in motion chain 14 of the snow scoop which has combs 15 arranged along its length scooping and transporting snow from the bottom towards the top.

Claims

1. Motor vehicle (1) with a device levelling sled runs comprising a chassis (2) with a device attached to it constructed out of a truss, at least two screw conveyors (6) attached to the device truss, and shielded from the side of a motor vehicle by an open chute (7), wherein each screw conveyor (6) features a shaft with an internal end (61) connected to a drivetrain and external end (62) attached to the truss, **characterized in that** each screw conveyor (6) is arranged to perform a rotation around its axis of rotation so that the accumulated snow is moved towards internal end (61) of screw conveyors (6), and comprising an compacting plate (10), attached to the motor vehicle (1) chassis (2) behind open chute (7) of the screw conveyors (6). 5 10 15

2. The motor vehicle according to claim 1 **characterized in that** it comprising at least one side snow scoop (11) in the form of a belt conveyor mounted on the device truss. 20

3. The motor vehicle according to claim 1 or 2 **characterized in that** the side snow scoop (11) comprising a chain (14) with a combs (15), set in motion by side shaft (12) held in side bevel gear (9) powered by the screw conveyor (6) shaft. 25

4. The motor vehicle according to claim 1 or 2 **characterized in that** it comprises at least one actuator (4) connecting a functional part (5) of the truss with its main beam (3) facilitating swinging motion of the functional part (5) of the truss relative to main beam (3) . 30 35

40

45

50

55

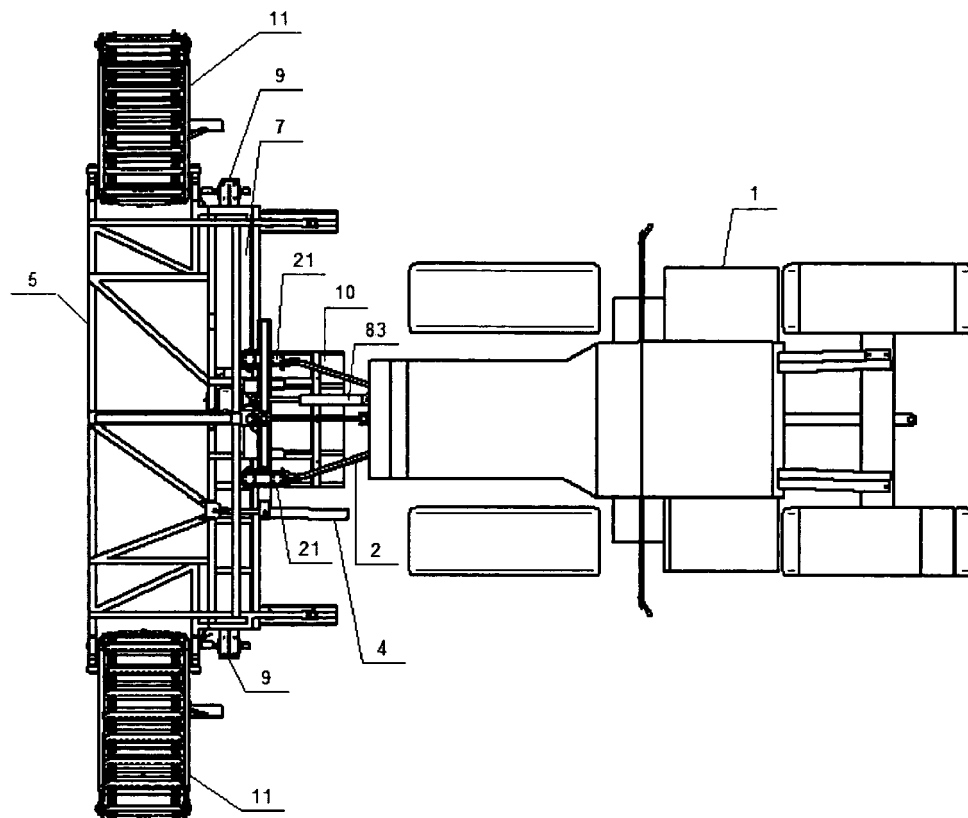


Fig. 1

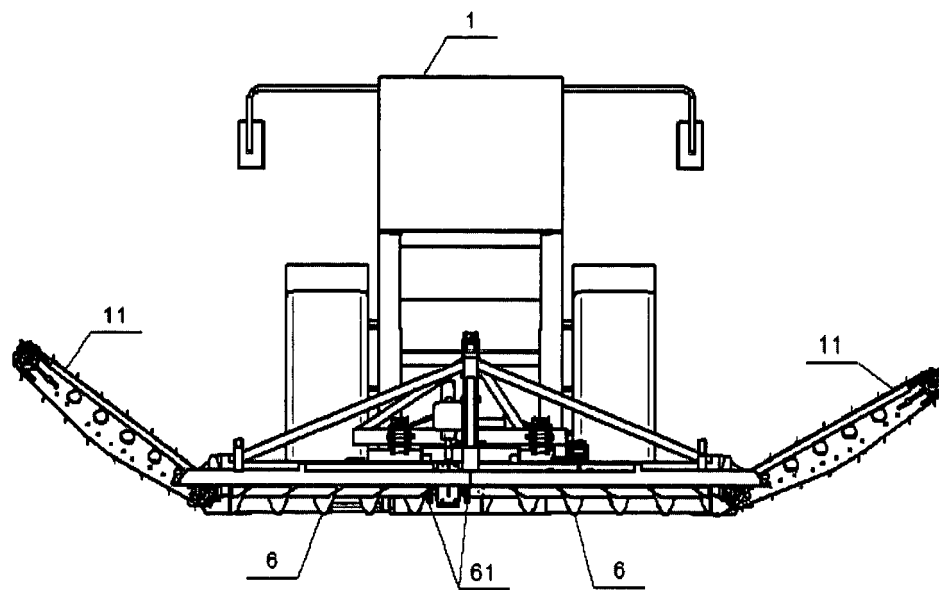


Fig. 2

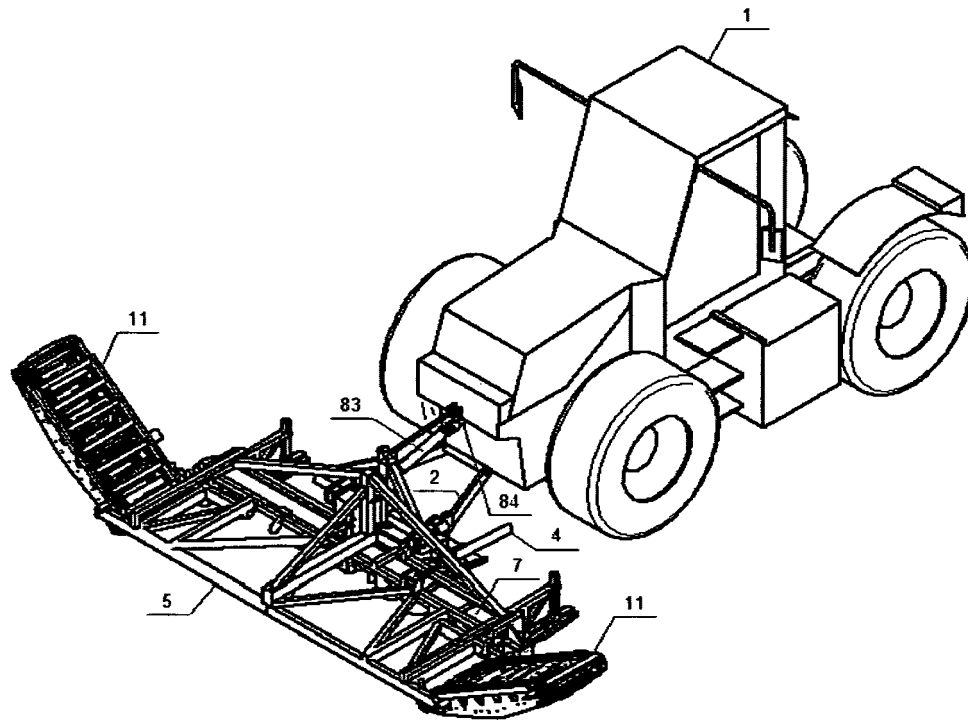


Fig. 3

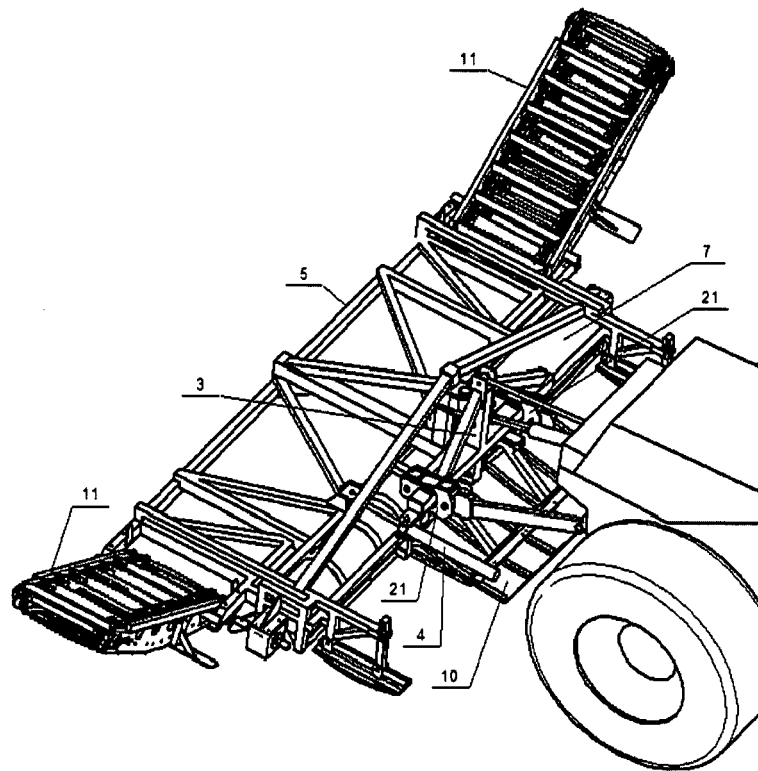


Fig. 4

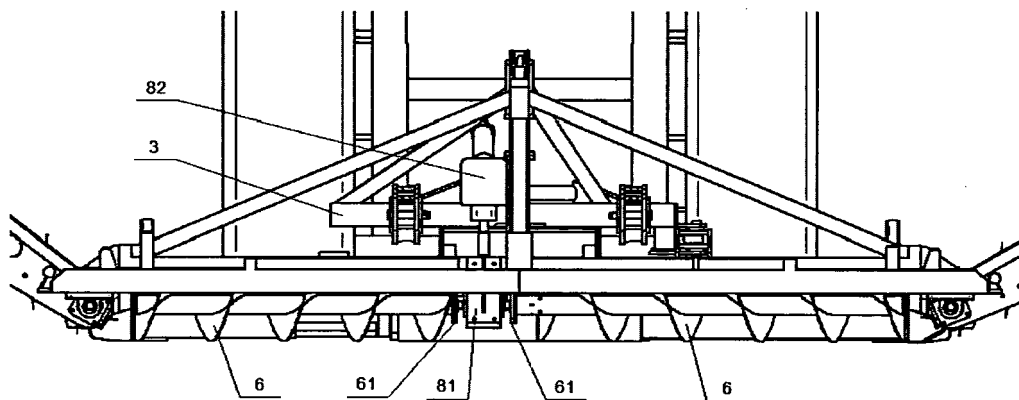


Fig. 5

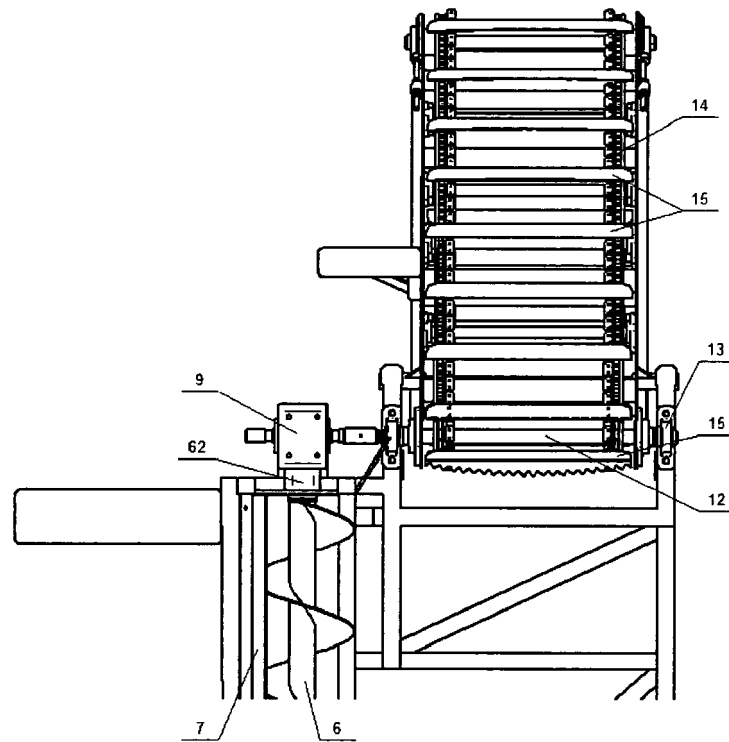


Fig. 6



EUROPEAN SEARCH REPORT

Application Number

EP 22 00 0252

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 2 171 633 Y (ZHANG JIXIAN [CN]) 13 July 1994 (1994-07-13)	1, 4	INV. E01H4/00
Y	* figures 1,2 *	2, 3	

A	WO 2014/122360 A1 (SOTHER OY [FI]) 14 August 2014 (2014-08-14) * the whole document *	1-4	

A	CA 352 708 A (WANDSCHEER DANIEL) 27 August 1935 (1935-08-27) * the whole document *	1-4	

A	JP 2007 291842 A (NIPPO CORP KK) 8 November 2007 (2007-11-08) * the whole document *	1-4	

A	RU 191 994 U1 (BORINOSERVICE) 29 August 2019 (2019-08-29) * the whole document *	1-4	

Y	CN 111 472 314 A (MEN DAZHI) 31 July 2020 (2020-07-31)	2, 3	TECHNICAL FIELDS SEARCHED (IPC)
A	* figures 1,2,19-21 *	1	E01H

The present search report has been drawn up for all claims			

2

EPO FORM 1503 03:82 (P04C01)

Place of search	Date of completion of the search	Examiner
Munich	20 March 2023	Lorandi, Lorenzo
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.**

EP 22 00 0252

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

20-03-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 2171633	Y	13-07-1994	NONE
WO 2014122360	A1	14-08-2014	NONE
CA 352708	A	27-08-1935	NONE
JP 2007291842	A	08-11-2007	JP 4372802 B2 25-11-2009 JP 2007291842 A 08-11-2007
RU 191994	U1	29-08-2019	NONE
CN 111472314	A	31-07-2020	NONE

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

- CN 111472314 [0002]