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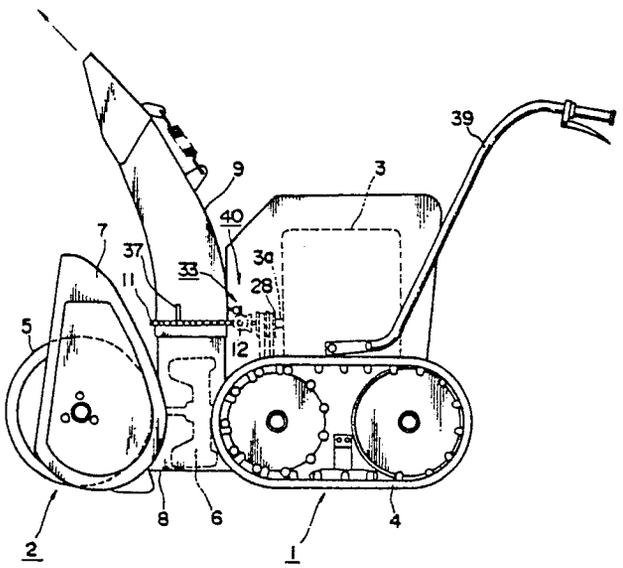
(54) Guideshooter swiveling controller for snowplow.

(57) In a snowplow which has a propelling body (1) with an engine (3) and a snow removing machine (2) with an auger (5) and a blower (6), a guideshooter swiveling controller has a swiveling mechanism (40) for swiveling a guideshooter (9) by the output of the engine. The guideshooter swiveling mechanism (40) has a clutch which consists of a bevel member and a contact rotating member with a pair of engagement taper surfaces. The guideshooter (9) is provided with a projections (37) which defines the swiveling range of the guideshooter. The clutch is connected with a rod which, when the guideshooter swivels in excess of the swiveling range, engages with the projection (37) and thereby returns the clutch to the neutral state.

FIG. 1



EP 0 372 150 A1

GUIDESHOOTER SWIVELING CONTROLLER FOR SNOWPLOW

This invention relates to a guideshooter swiveling controller for a snowplow.

Various types of snowplows have been developed for removing snow lying on roads and throwing it onto sideways. Snowplows for home use, as disclosed in the Japanese Patent Application Laid-Open No. 194307/1987, comprises a propelling body with a crawler and a snow removing machine mounted at the front of the body. The snow removing machine has an auger for crushing and gathering snow by a screw action, a blower for throwing the gathered snow, and a guideshooter for guiding the snow discharged from the blower onto sideways.

The guideshooter consists of a vertical cylinder section rising up from the blower and a curved cylinder section formed at the upper end of the vertical cylinder section, so that the snow discharged from the blower can be led to a high position before being thrown onto roadsides. To change the snow discharging direction, it is necessary to swivel the guideshooter with respect to the snowplow body. In the above snowplow, the guideshooter is swiveled by manually rotating a crank handle located at an operating section of the snowplow.

In this known example, however, the reduction ratio of a power transmission mechanism must be set large so that the guideshooter can be turned manually and will not rotate of itself while the snowplow is in operation. This in turn results in a corresponding increase in the number of revolutions that the crank handle must be operated. The conventional snowplow has another disadvantage of a bad operability. That is, during the snow clearing work, an operator must perform complicated operations, i.e., rotate a crank handle while at the same time steering the snowplow.

OBJECTS OF THE INVENTION

The object of the invention is to provide a snowplow that can control swiveling of a guideshooter with a simple operation.

Another object of the invention is to provide a snowplow in which the guideshooter is prevented from swiveling in excess of an allowed range.

DETAILED DESCRIPTION OF THE INVENTION

In the attached drawings;

Figure 1 is an overall side view of a snowplow of this invention;

Figure 2 is an enlarged plan view of a guideshooter drive mechanism;

Figure 3 is a lateral cross-sectional view of a clutch mechanism;

Figure 4a is a front view of a lever; and

Figure 4b is a side view of the lever.

One embodiment of the invention will be explained in the following. A snowplow according to this invention consists of a propelling body 1 and a snow removing machine 2. The snowplow travels on snow by driving a pair of right and left crawlers 4 by an engine 3.

The snow removing machine 2 consists of an auger 5 for crushing and gathering snow and a blower 6 for blowing and scattering the collected snow. The auger 5 has its shaft rotatably arranged perpendicular to the direction of snowplow travel and rotated by the engine 3. The auger 5 as it is being driven collects and draws snow lying in front of the snow removing machine 2 toward the blower 6. An auger cover 7 is provided around the auger 5. The rotating shaft of the blower 6 is arranged parallel to the direction of snowplow travel and rotated by the engine 3. A cylindrical blower cover 8 is provided enclosing the blower 6. A snow discharge port is formed in the blower cover 8 above the blower 6.

To the snow discharge port of the blower cover 8, the lower part of a vertically extending guideshooter 9 is rotatably joined.

By referring to Figure 2 and 3, a swiveling mechanism 40 of the guideshooter 9 is explained. The guideshooter 9 has a ring flange 10 formed around the lower part thereof. The flange 10 is formed with teeth 11 on its outer circumference at least over the swiveling range A of the guideshooter 9. The teeth 11 is engaged with a worm gear 12. A rotating shaft 14 of the worm gear 12 has a contact rotating member 15 mounted thereon, which is coupled to the rotating shaft 14 by a key 16 so that it is only axially slidable. As the contact rotating member 15 rotates, it drives the worm gear 12 through the rotating shaft 14.

The contact rotating member 15 has an annular recess 17 formed on its outer circumference, with tapered engagement surfaces 17a, 17b formed on each side of the recess 17. A boss 38 is formed integral with an extends from one side of the contact rotating member 15. The boss 38 is attached with a collar 19 with a bearing 18 interposed therebetween. The collar 19 is rotatable relative to the contact rotating member 15, and moves along with it when the contact rotating member 15 moves axially along the rotating shaft 14. On the outer circumference of the collar 19 near one end is

formed an annular groove 20, with which pins 23 of a junction lever 22 shown in Figures 4a, 4b are engaged.

At each side of its center shaft 21, the junction lever 22 is fixedly attached with wires 24, 25, which are connected to operation levers on each side (not shown) located near steering handles 39 of the propelling body 1. When the right-hand operation lever is operated, the wire 24 is pulled, rotating the junction lever 22 in a direction of arrow D, which in turn causes the collar 19 and the contact rotating member 15 to be slid in a direction of arrow F. When the left-hand operation lever is operated, the wire 25 is pulled, rotating the junction lever 22 in a direction of arrow E. This in turn causes the collar 19 and the contact rotating member 15 to be slid in a direction of arrow G.

On each side of the contact rotating member 15 are installed compression springs 26, 27 which are so set that the contact rotating member 15 is at rest at a central neutral position.

An output pulley 28 for the crawler 4 and the auger 5 is secured to the output shaft 3a of the engine 3 by a bolt 29 and a nut 30. A bevel member 32 is secured to the front end of the bolt 29 and is placed close to the annular recess 17. A taper surface 31 of the bevel member 32 and taper surfaces 17a, 17b of the annular recess 17 are out of contact when the contact rotating member 15 is at the neutral position. They contact each other when the contact rotating member 15 moves along the rotating shaft 14 in either direction. When the taper surface 31 and the taper surface 17a or 17b are engaged. The rotation of the bevel member 32 is transmitted through the contact rotating member 15 to the worm gear 12, which in turn causes the guideshooter 9 to rotate. In this way, the contact rotating member 15 and the bevel member 32 combine to work as a clutch 13 of the swiveling mechanism 40.

An automatic release mechanism 33 is provided to the swiveling mechanism 40. The collar 19 has an arm 35 erected therefrom whose end is rigidly attached with a rod 34 extending parallelly with the shaft 14. The rod 34 is supported in such a way as to be axially movable along the shaft 14. Secured to the rod 34 is an arm 36 extending above the flange 10 of the guideshooter 9. The flange is provided with two projections 37a, 37b that define the swiveling limits of the guideshooter 9. When the guideshooter 9 swivels in excess of these limits, the projection 37a or 37b engages with the arm 36, moving the rod 34 axially along the shaft 14, forcibly bringing the bevel member 32 out of engagement with the contact rotating member 15.

OPERATION

In Figure 2, the output shaft 3a rotates in the direction of arrow C. Because the bevel member 32 and the contact rotating member 15 are out of contact with each other, the guideshooter 9 is not rotated. When the guideshooter 9 is to be swiveled clockwise in Figure 2, the right-hand operation lever located near the steering handle 39 is operated to pull the wire 24. Then, the lever 22 is turned in the direction of arrow D (Figure 4a), causing through the pins 23 the collar 19 and the contact rotating member 15 to be slid in the direction of arrow F against the force of the compression spring 27. As the contact rotating member 15 moves in the direction of arrow F, the taper surface 17a comes into line contact with the taper surface 31 of the bevel member 32, with the result that the contact rotating member 15 starts to rotate in the direction of arrow H. The rotation of the contact rotating member 15 is transmitted through the shaft 14 to the worm gear 12 which is rotated in the same direction of arrow H, causing the guideshooter 9 to turn clockwise.

When the guideshooter 9 has rotated to a desired extent, the right-hand operation lever is released allowing the contact rotating member 15 to return to the neutral position by the force of the compression spring 27. As a result the contact rotating member 15 parts from the bevel member 32 stopping the rotation of the guideshooter 9.

In Figure 2, when the guideshooter 9 is to be turned counterclockwise, the left-hand operation lever located near the steering handle 39 is operated to pull the wire 25. Then, the lever 22 is rotated in the direction of arrow E (Figure 4b), causing through the pins 23 the collar 19 and the contact rotating member 15 to slide in the direction of arrow G against the force of the compression spring 26. As the contact rotating member 15 moves in the direction of arrow G, the taper surface 17b comes into a line contact with the taper surface 31 of the bevel member 32. As a result, the contact rotating member 15 rotates in the direction of the tail of the arrow H, opposite to the direction of the above case, and its rotation is transmitted through the shaft 14 to the worm gear 12 which is rotated in the direction of the tail of the arrow H, swiveling the guideshooter 9 counterclockwise.

When the guideshooter 9 has turned to a desired extent, the left-hand operation lever is released allowing the contact rotating member 15 to return to the neutral position. As a result, the contact rotating member 15 parts from the bevel member 32 bringing the swiveling guideshooter 9 to a halt.

Therefore, the swiveling operation of the guideshooter 9 can very easily be done while

steering or other operations are being performed simultaneously.

In general snowplows, inadvertent operation of the guideshooter 9 in excess of the swiveling limits may lead to an unexpected accident. With this invention, however, when the guideshooter 9 reaches a swivelling limit, it is automatically stopped. This is detailed below.

In Figure 2, when the guideshooter 9 is further rotated counterclockwise and reaches the swiveling limit, the projection 37b at the swiveling limit point engages the front end of the arm 36. At this time, the guideshooter 9 is rotating counterclockwise, i.e. the contact rotating member 15 has moved in the direction of arrow G and its taper surface 17b and the bevel member 32 are in contact with each other.

As the arm 36 is pushed by the projection 37b in the direction of arrow F, the arm 35 is also moved by the rod 34 in the same direction, causing the collar 19 to move in the direction of arrow F against the operating force of the left-hand operation lever. As a result, the taper surface 17b of the contact rotating member 15 and the taper surface 31 of the bevel member 32 are separated from each other immediately stopping the rotation of the guideshooter 9.

While in the above description, the taper surface 17a and the taper surface 17b are formed on a single member, they may be formed on separate members, in which case the bevel member 32 is made to engage with the taper surface 17b by the wire 24 and with the taper surface 17a by the wire 25.

Claims

(1) In a snowplow having a propelling body with an engine and a snow removing machine with an auger and a blower, a guideshooter swiveling controller comprising:
a swiveling mechanism for swiveling a guideshooter by the output of the engine;
a clutch provided in the swiveling mechanism, the clutch having three states, a first state for rotating the guideshooter in a forward direction by the output of the engine, a second state for rotating the guideshooter in a backward direction by the output of the engine, and a third state or neutral state for preventing the transmission of the output of the engine to the guideshooter; and
one or two operating levers for switching the clutch to the forward rotating state and the backward rotating state.

(2) A guideshooter swiveling controller as set forth in claim 1, wherein the clutch has a bevel member with a taper surface and a contact rotating member with a pair of engagement taper surfaces.

(3) A guideshooter swiveling controller as set forth in claim 2, wherein a rotating shaft of the bevel member and a rotating shaft of the contact rotating member are disposed perpendicular to each other, and the contact rotating member is made movable only axially along the rotating shaft, so that in the neutral state the taper surface of the bevel member is out of contact with both the engagement taper surfaces of the contact rotating member, in the forward rotating state it is in contact with either of the engagement taper surfaces, and in the backward rotating state it is in contact with the other engagement taper surface.

(4) A guideshooter swiveling controller as set forth in claim 3, wherein the rotating shaft of the contact rotating member is provided with springs to hold or return the contact rotating member to the neutral state position.

(5) A guideshooter swiveling controller as set forth in claim 2 through claim 4, wherein the engagement taper surfaces of the contact rotating member are formed on separate members.

(6) A guideshooter swiveling controller as set forth in claim 2 through claim 5, wherein a projection is provided at least at one location on a guideshooter swiveling limit and the contact rotating member is connected with a rod which, when the guideshooter has rotated in excess of the allowed swiveling range, engages with the projection and thereby returns the contact rotating member to the neutral state position.

(7) A guideshooter swiveling controller as set forth in claim 6, wherein the contact rotating member is sleeved with a rotatable collar which is connected with the rod.

FIG. 1

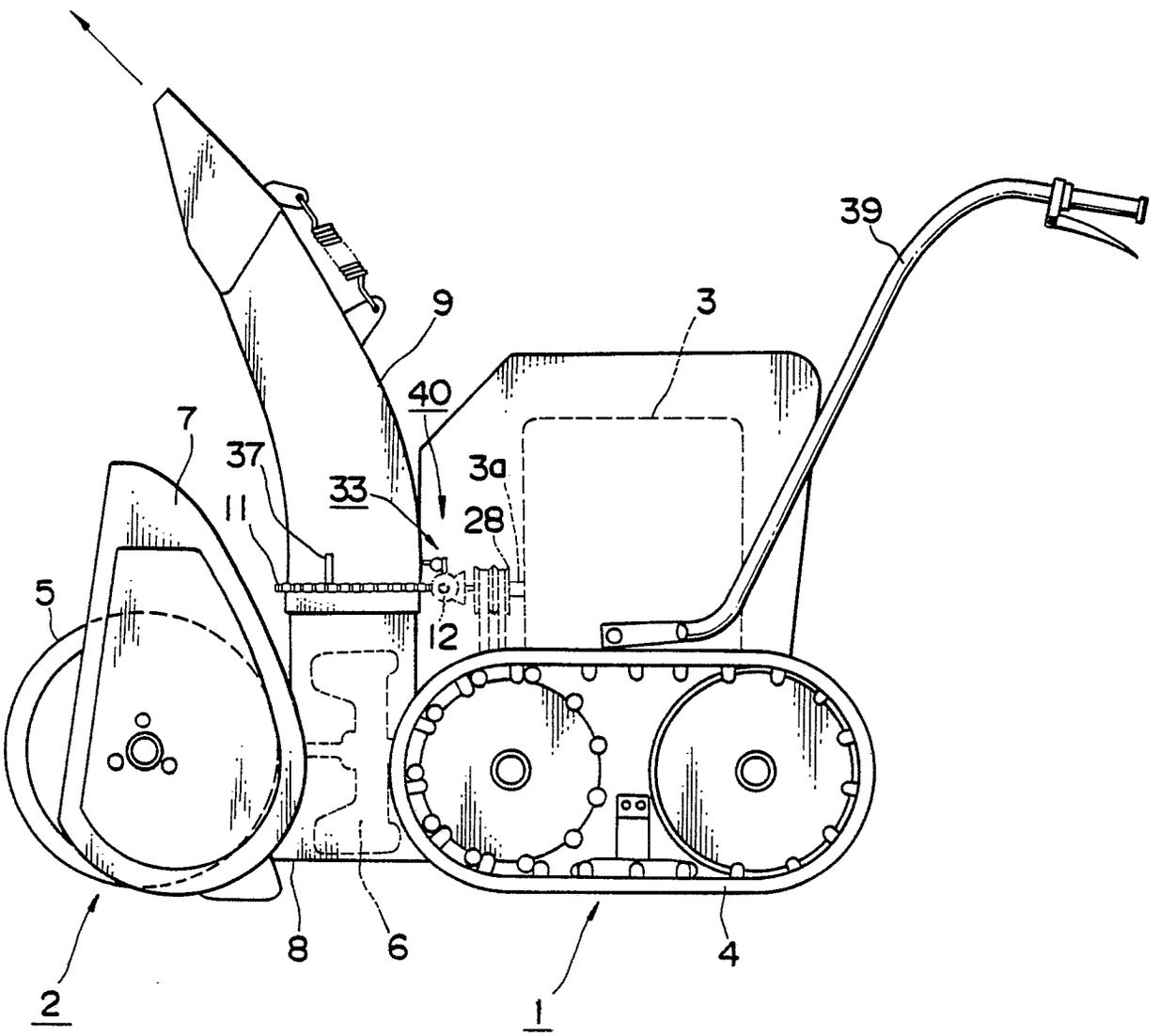
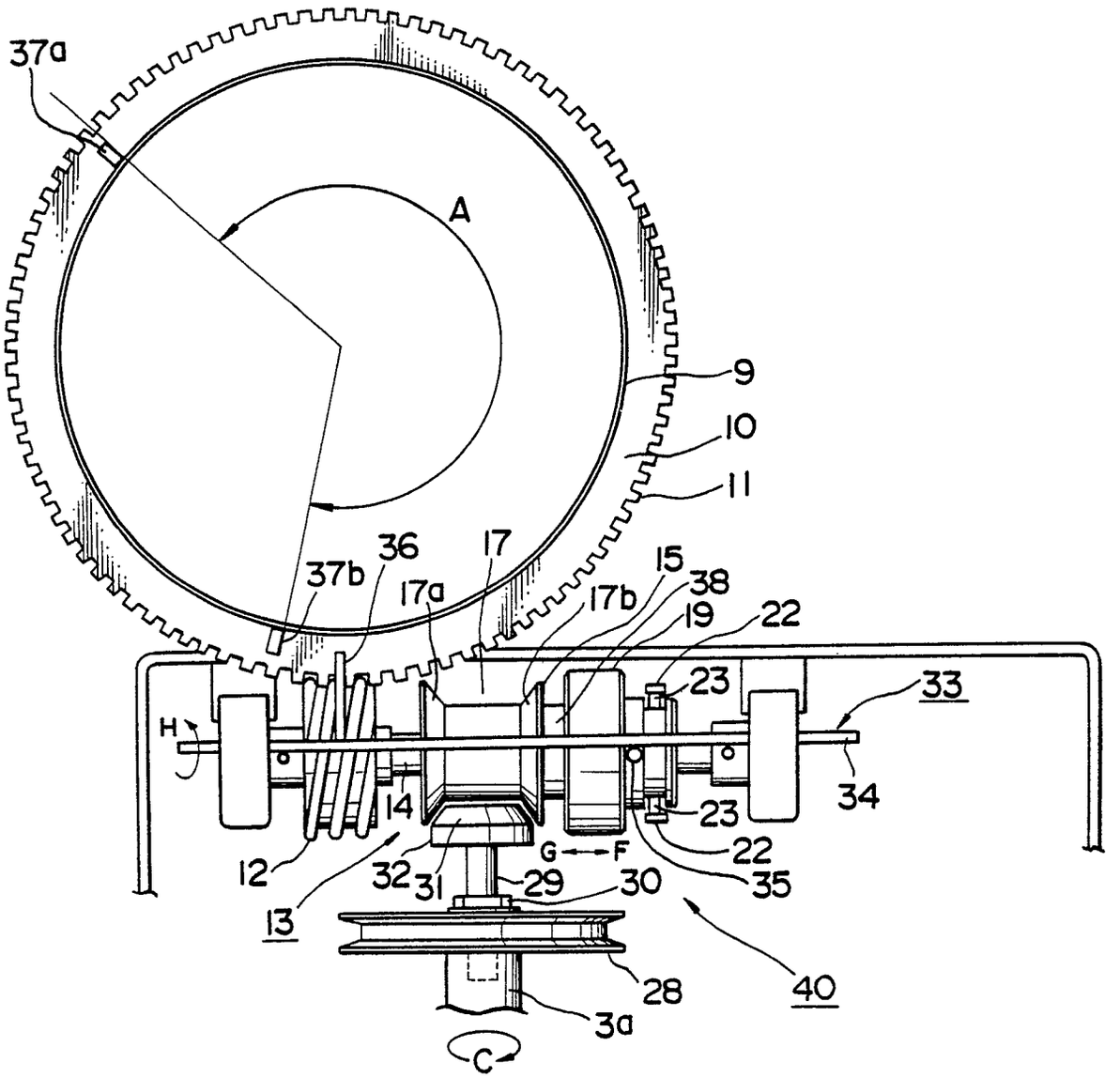


FIG. 2


37a
A
9
10
11
37b
36
17
17a
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3a
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FIG. 3

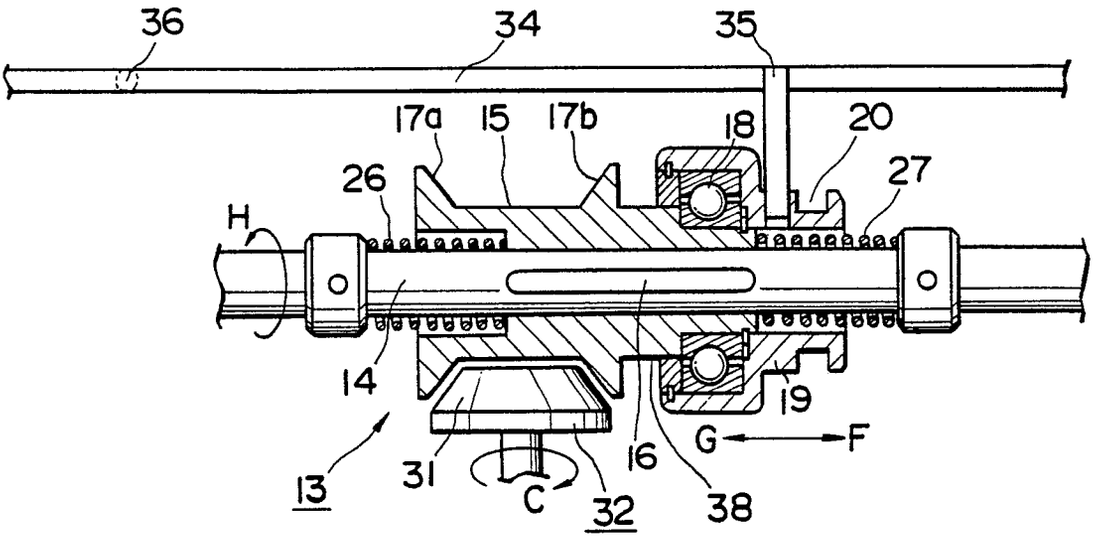


FIG. 4 (a)

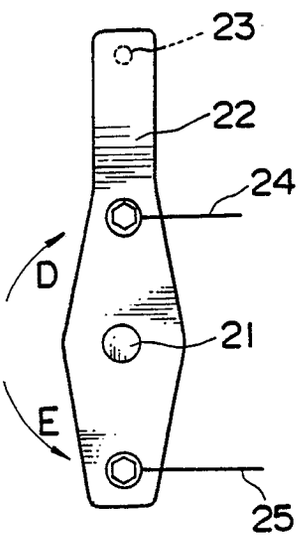
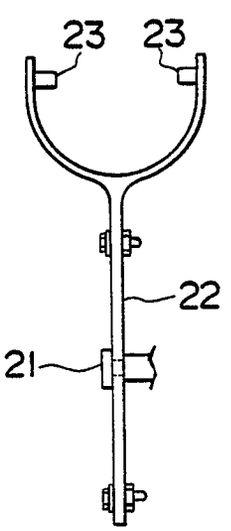


FIG. 4 (b)



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EUROPEAN SEARCH REPORT

Application Number

EP 89 10 5718

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-2 916 330 (F.J. DUMANOWSKI) * Column 1, lines 50-60; column 2, lines 25-64; figures 1-4 *	1,4	E 01 H 5/09
A	US-A-4 549 365 (D.L. JOHNSON) * Column 4, lines 42-64; figures 5,8,9 *	1	
A	DE-A-1 507 192 (DEERE)		
A	CA-A-1 130 324 (CANADIANA GARDEN PROD.)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

E 01 H
A 01 D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	01-03-1990	VERVEER D.

CATEGORY OF CITED DOCUMENTS

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