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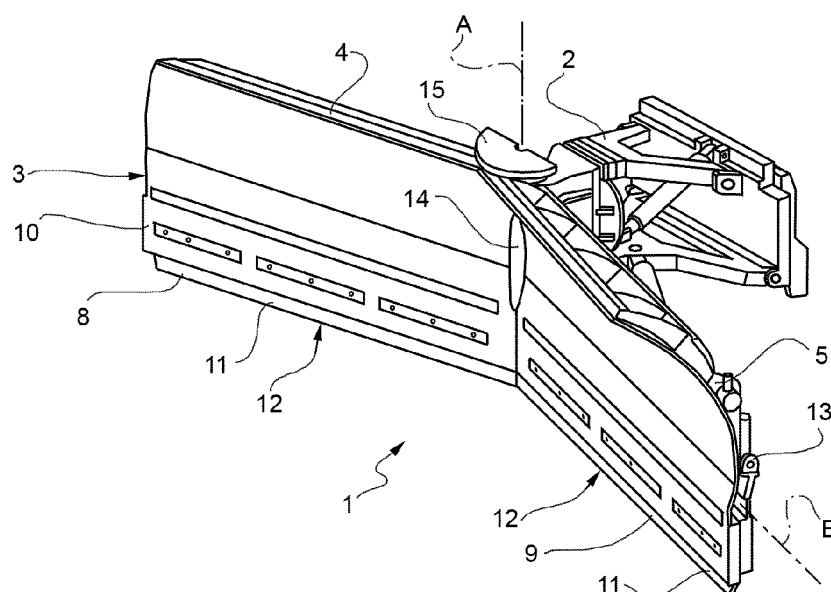
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(54) Improved snowplow for plowing snow

(57) A snowplow (1) comprises a structure (2) adapted to be connected to a vehicle and defining an axis (A), a first and a second rotating element (4, 5) hinged about the axis (A) and actuators (16) interposed between the structure (2) and the respective first and second rotating elements (4, 5) to move the latter, wherein the first and second rotating elements (4, 5) comprise a frame (17,

18) and a wall (16) of a polymeric material mounted on the frame (16, 17). The snowplow further comprises a first deformable blade (10) and a second blade (11) mobile between an extracted position wherein the first blade (10) is interposed between a lower edge (12) of the second blade (11) and the relative rotating element (4, 5) and a retracted position.

FIG. 3a



Description

[0001] The present invention relates to an improved snowplow preferably for plowing snow at high speed.

[0002] A snowplow is normally made entirely of steel and has a first and a second rotating elements mobile between each other around a vertical axis. The blades can be configured in discrete positions by the action of hydraulic cylinders.

[0003] A steel snowplow is normally used when the snow on a road forms a layer of considerable thickness, such as in high mountain passes. The structure being particularly sturdy and durable is designed to move large quantities of snow at a reduced speed, i.e. 5-10 km/h.

[0004] The purpose of the present invention is to provide a snowplow being lighter and suitable for versatile use at higher speeds.

[0005] The purpose of the present invention is achieved by way of a snowplow according to claim 1.

[0006] For a better understanding of the present invention a preferred embodiment is now described, purely by way of non limiting example, with reference to the accompanying drawings wherein:

- Figures 1a, b, c are respective front views of a snowplow according to the present invention in different working positions;
- Figures 2a, b, c are respective plan views of Figures 1a, b, c; and
- Figures 3a, b, c are respective perspective views of Figures 1a, b, c.

[0007] Figure 3a shows, as a whole, a snowplow comprising a shock-absorbing structure 2 adapted to be secured on the front axle of a vehicle and a cutter assembly 3 carried by said shock-absorbing structure for plowing snow from a road.

[0008] The cutter assembly 3 comprises a first and a second rotating element 4, 5 dimensionally equal to one another and hinged to the structure by way of a hinge pin to rotate with respect to one another and with respect to the structure 2 about a hinge vertical axis A and lying in a symmetry plane of the shock-absorbing structure 2. The cutter assembly also comprises a pair of cylinders 6, 7 mounted between the shock-absorbing structure 2 and the respective rotating elements 4, 5 and blade assemblies 8, 9 mounted on the respective rotating elements 4, 5 and in use next to the road.

[0009] Each blade assembly 8, 9 comprises a fixed blade 10 proximal to its rotating element 4, 5 and a mobile blade 11 proximal to the road in use. According to a variant the fixed blades are firmly butt-jointed together and, conveniently form part of a body made in one piece, conveniently a monolithic body of elastomeric material. An intermediate portion of the body made in one piece arranged at the level of the axis A defines a virtual hinge connecting the side portions of the body itself. Alternatively, the intermediate portion is replaced by a conven-

tional hinge. The hinges have axes substantially parallel to the axis A.

[0010] In particular, the mobile blade 11 is mobile between an extracted position wherein the fixed blade 10 is interposed between a lower edge 12 of the mobile blade 11 and the relative rotating element 4, 5 along a vertical direction, and a retracted position, wherein the fixed blade 10 is facing directly on the road and the relative mobile blade 11 is facing backward.

[0011] The snowplow 1 also comprises hydraulic actuators 13 mounted between the rotating elements 4, 5 and the related mobile blades 11 for controlling the movement of the latter between the extracted and the retracted position.

[0012] Preferably, each mobile blade 11 is hinged to the relative rotating element 4, 5 to rotate about a respective rectilinear transversal axis B, preferably perpendicular, to the axis A and fixed with respect to the relative rotating element 4, 5. Each of the axes B is arranged in the proximity of an upper terminal edge of the fixed blades 10 and in a position so as to allow a free movement of the blades 11 around the axes B whatever the relative position of the rotating element 4, 5 around the axis A would be and the approaching or a partial overlap of the same at least in the extreme positions of the stroke end. Even more preferably, each blade 10 is made of a flexible material comprising a polymeric or elastomeric material and the lower edge 12 is defined by a rigid material, e.g. metallic material.

[0013] The snowplow 1 also comprises a first and a second profiled portion 14, 15 interposed in the horizontal direction between the rotating elements 4, 5 and the shock-absorbing structure 2 and arranged to join together the rotating elements 4, 5. Each profiled portion 14, 15 is fixed with respect to the shock-absorbing structure 2 and defines a portion of a rotation surface with respect to the axis A. For example, the profiled portion 14 defines a portion of a cylindrical surface and the profiled portion 15, arranged on the opposite side of the blades 10 11 with respect to the profiled portion 14, defines a surface such that each section along a plane containing the axis A defines a curved line whose points have a decreasing distance with respect to the axis A moving towards the profiled portion 14.

[0014] According to a preferred embodiment, each rotating element 4, 5 comprises a frame and a thrust front wall 16 made of a polymeric material or other equivalent lightweight metallic or non metallic material. According to a variant the wall 16 has a metal structure. The frame can be made of metal and comprise a plurality of cross members 17 and ribs 18 which intersect each other to define a strong and lightweight structure. Each frame supports the relative wall 16 so that the latter defines a concave surface to collect and/or evacuate the snow depending on the relative angular position of the rotating elements 4, 5 with respect to axis A.

[0015] In particular, the blades 4, 5 can be moved relative to one another to define any relative angular position

both symmetric and asymmetric with respect to a central plane passing through the axis A. For example, for obtaining such high and flexible configurability, the cylinders 6, 7 are controlled by way of independent and proportional valves, i.e. resulting in a continuous or considerable adjustment according to the flow rate of hydraulic fluid which drives the cylinders 6, 7.

[0016] At each position, the profiled portions 14, 15 join to one another the walls 16 so that, in use, only a minimum quantity of snow escapes between the two rotating elements 4, 5 towards the shock-absorbing structure 2 without being deflected laterally by the latter.

[0017] In particular, the walls 16 are mounted protruding from the relative frame so as to exert an elastic pressure on the profiled portions 14, 15 and further increasing the seal against the snow.

[0018] The advantages of the snowplow according to the present invention are the following.

[0019] The combination of the frame structure of the rotating elements 4, 5, of the blade 10 and the mobile blade 11 make the frame lighter and suitable for high speeds also for high speed applications, for example exceeding 30 km/h on roads where the snow cover thickness is various tens of centimeters. At high speed, in fact, the mobile blade 11 is in the retracted position so that any obstacles on the road are compensated at least partially by the deformability of the blade 10.

[0020] The pressure applied by the walls 16 on the profiled portions 14, 15 defines an effective seal so that the rotating elements 4, 5 are configurable in a continuous way in an extremely versatile and always effective way.

[0021] It is finally clear that to the snowplow described and illustrated herein modifications or variations can be made without thereby departing from the scope of protection as defined by the appended claims.

[0022] In particular, the walls 16 are flexible to exert pressure directly on the profiled portions 14, 15 by way of an elastic action or comprise specialized assemblies which press on the profiled portions.

[0023] It is also possible to provide a snowplow according to the pre-characterizing part of claim 1 and as set forth in claim 2. In other words, it is possible that the snowplow comprises at least a profiled portion 14, 15, wherein at least the wall 16 is configured so as to exert a pressure on the profiled portion 14, 15 without the blades 10, 11 being present. Even the frame 17, 18 may or may not be combined with the wall 16 which compresses the portions 14, 15.

and the respective first and second rotating elements (4, 5) to move said rotating elements, **characterized in that** the first and the second rotating elements (4, 5) comprise a respective frame (17, 18), a respective thrust frontal wall (16) mounted on said frame (16, 17), a respective first blade (10) made of flexible material and a respective second blade (11) mobile between an extracted position in which said first blade (10) is interposed between a lower edge (12) of said second blade (11) and the relative rotating element (4, 5) and a retracted position; hinge means being interposed between said first blades (10).

2. The snowplow according to claim 1, **characterized in that** it comprises at least one profiled portion (14, 15) and **in that** at least one wall (16) protrudes from said frame and is configured so as to exert a pressure on said profiled portion (14, 15).

3. The snowplow according to claim 2, **characterized in that** said profiled portion (14, 15) defines a rotation surface about said axis (A) on which the pressure of said wall (16) is exerted.

4. The snowplow according to any of the preceding claims, **characterized in that** it comprises control means to control said actuators (6, 7) and **in that** said control means are proportional.

5. The snowplow according to any preceding claims, **characterized in that** said second blade (11) is hinged to rotate about a second axis (B) transversal with respect to said axis (A).

6. The snowplow according to any of the preceding claims, **characterized in that** said first blades are part of a body formed in one piece; said hinge means being defined by an intermediate portion of said body.

7. The snowplow according to claim 6, **characterized in that** said body is a monolithic body made of elastomeric material.

Claims

1. A snowplow (1) comprising a structure (2) adapted to be connected to a vehicle, a first and a second rotating element (4, 5) hinged to said structure to rotate about a vertical hinge axis (A) and actuator means (16) interposed between said structure (2)

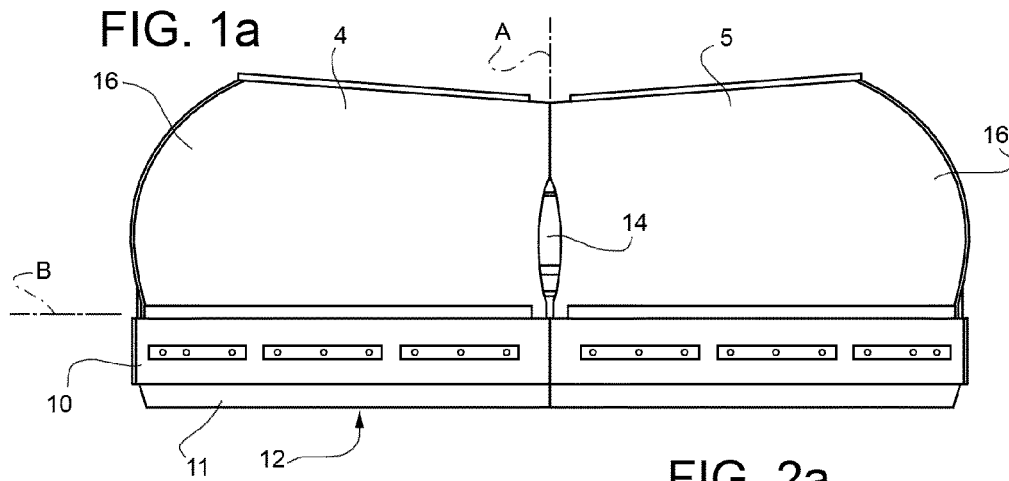


FIG. 2a

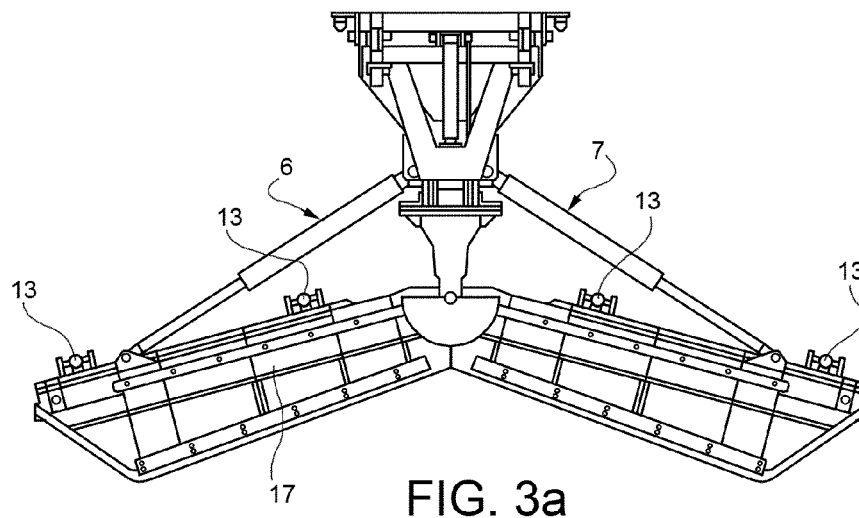


FIG. 3a

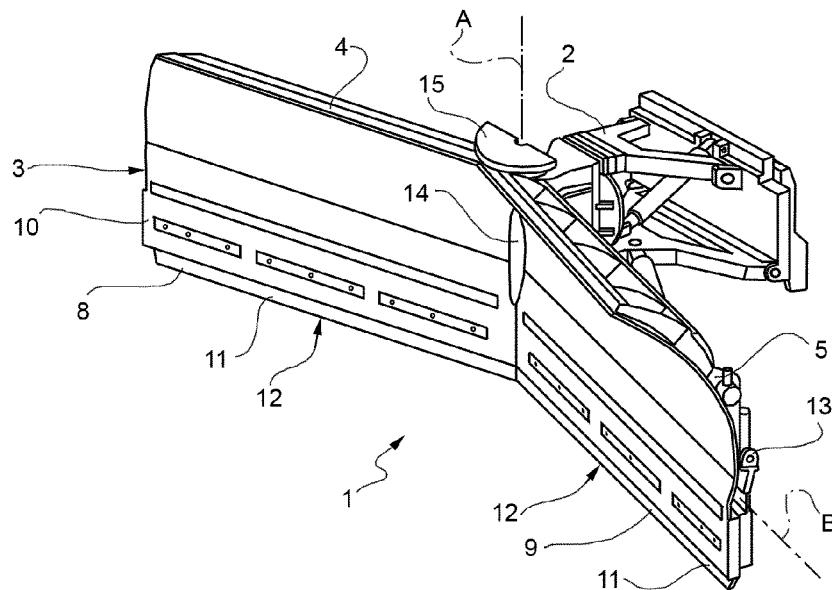


FIG. 1b

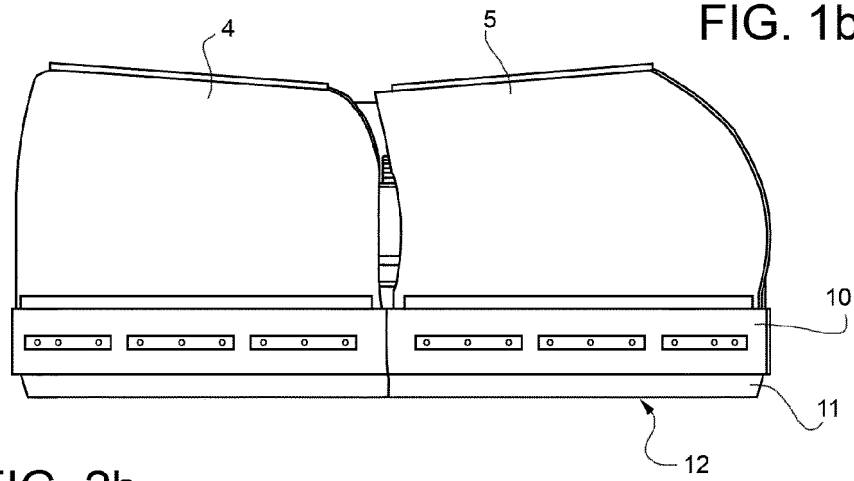


FIG. 2b

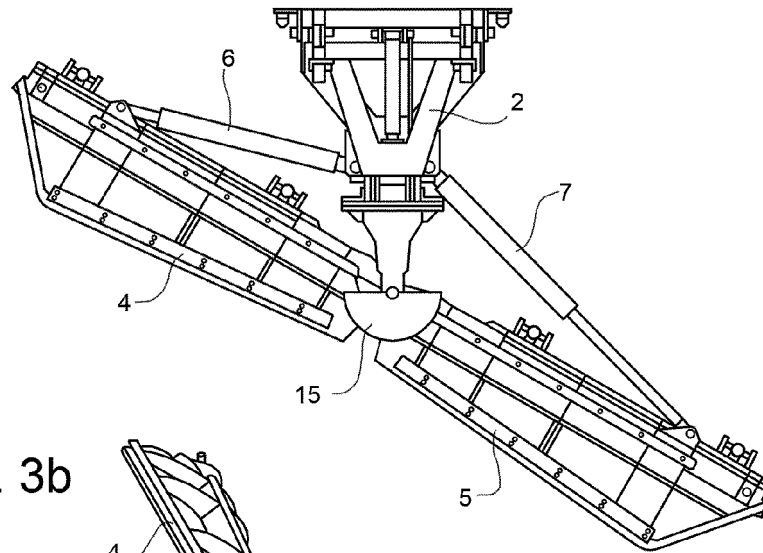


FIG. 3b

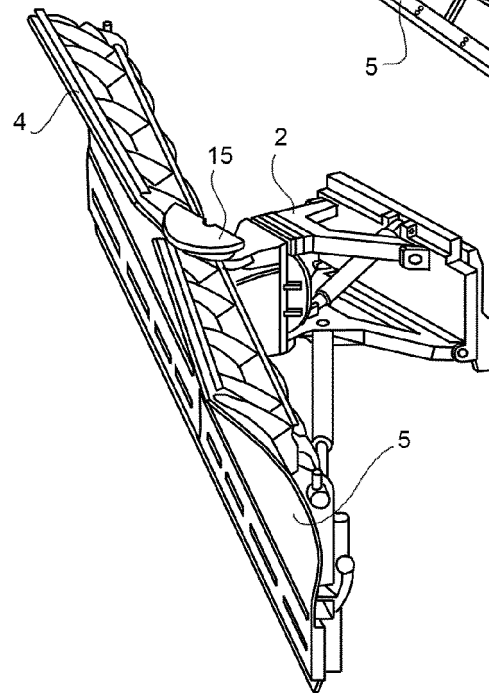


FIG. 1c

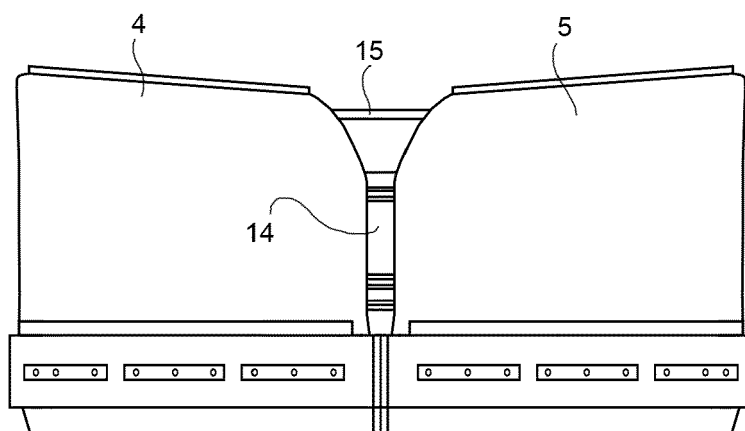


FIG. 2c

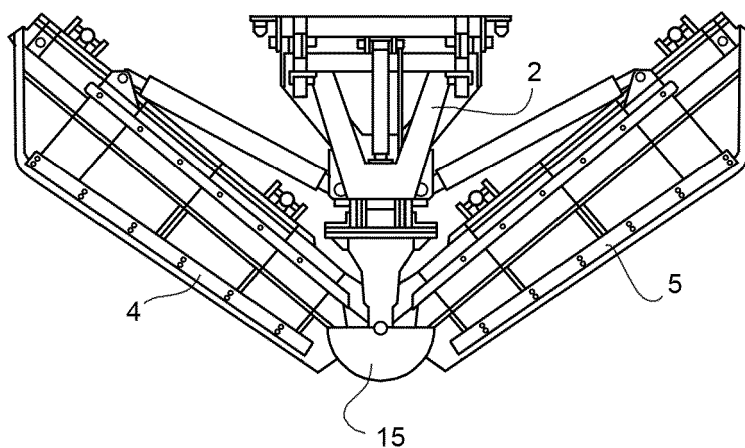
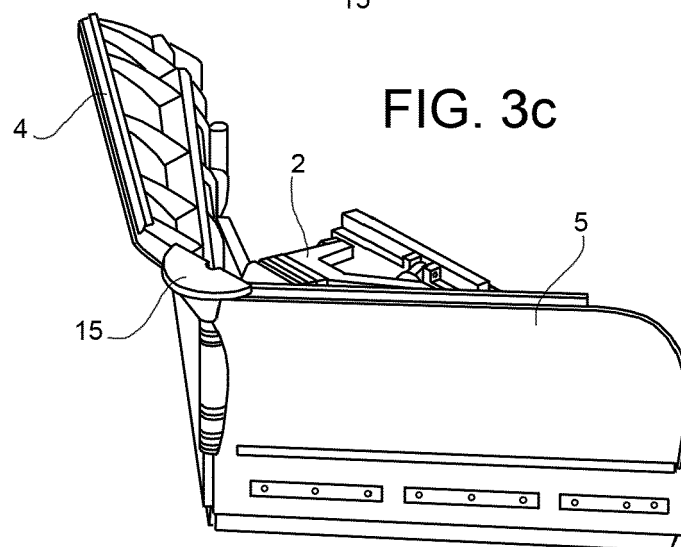


FIG. 3c





EUROPEAN SEARCH REPORT

Application Number
EP 12 16 7582

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	US 4 658 519 A (QUENZI PHILIP J [US]) 21 April 1987 (1987-04-21) * figures 1,6-8 * * column 2, line 54 - column 3, line 23 * -----	1-5	INV. E01H5/06
Y	US 5 088 215 A (CIULA JAMES C [US]) 18 February 1992 (1992-02-18) * column 1, lines 51-56 * * column 2, lines 13-19 * * column 7, lines 39-45 * * figures 2,6,22 * -----	1	
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A	US 4 074 448 A (NIEMELA W WALLY) 21 February 1978 (1978-02-21) * figures 1,6,7,8 * -----	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			E01H
2 Place of search The Hague Date of completion of the search 13 August 2012 Examiner Tran, Kim Lien			

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

EP 12 16 7582

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
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