



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
21.10.2015 Bulletin 2015/43

(51) Int Cl.:
E01H 5/06 (2006.01) E02F 3/815 (2006.01)

(21) Application number: **15163432.6**

(22) Date of filing: **13.04.2015**

(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
Designated Extension States:
BA ME
Designated Validation States:
MA

(71) Applicant: **Meiren Engineering OÜ**
11216 Tallinn (EE)

(72) Inventor: **Renser, Raoul**
11216 Tallinn (EE)

(74) Representative: **Nelsas, Tõnu**
AAA Patendibüroo OÜ
Tartu mnt, 16
10117 Tallinn (EE)

(30) Priority: **14.04.2014 EE 201400010**

(54) **BLADE OF A SNOW PLOUGH**

(57) Invention is related to design of a blade of a snow plough. Wear element of the blade of the plough is placed into elastic encasement, which is attached between metal plates, that are attached to the plough, wherein there are openings in the metal plate for cooling, abutments of

the wear elements protruding partly from said openings. These protruding parts are in direct contact with the surrounding environment to cool the blade, that heats up because of the friction when the blade and road surface are in contact.

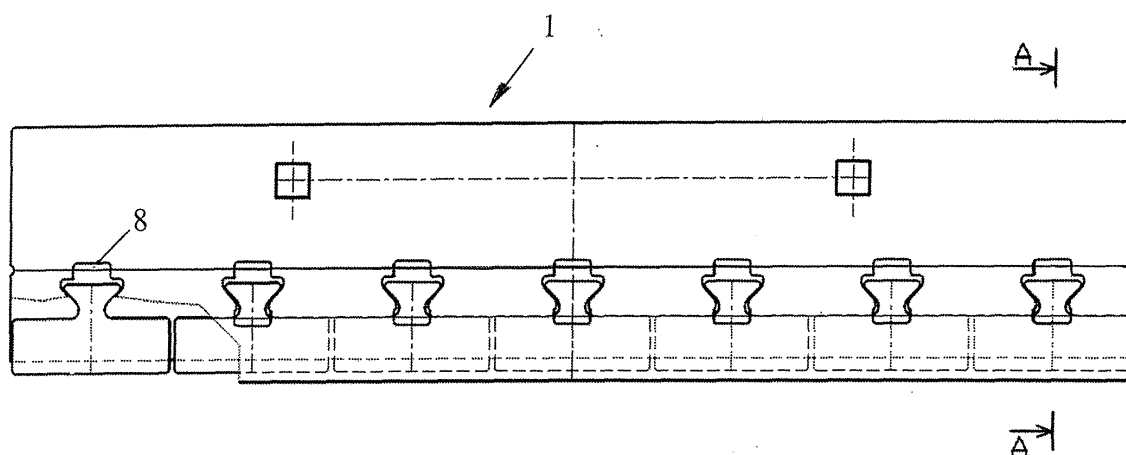


FIG 1

Description

Field of the invention

[0001] The invention is related to the field of engineering and relates to the design of maintenance equipment for roads, streets and similar large areas, more specifically, the design of a road maintenance plough or snow plough blade. An element of the plough blade, made of wear resistant material, is mounted in a flexible case, which is attached between metal plates, the blade having cooling means for cooling the blade that is heated up due to the friction between the blade and road surface.

State of the art

[0002] Similar solutions are known in the state of the art, related to a plough blade with means for cooling the blade.

[0003] DE 102005040705 discloses a plough blade with a rubber or plastic body and wear casing, which is incorporated in the wearing area of the body and consists partially or fully of hard highly wear resistant material. The blade body includes cooling means for the blade.

[0004] Hard alloy blades without separate cooling means are also known in the state of the art.

[0005] In the hard alloy blades known as the state of the art, the proportion of hard alloy is generally small and thus a large amount of material is wasted when the hard alloy part wears out (steel is scrapped, rubber or other flexible parts are discarded). In traditional hard alloy blades, the hard alloy pieces are rigidly attached to the blade body and thus cause excessive damage to the road surface and surface markings, and are not able to withstand impacts from uneven road surface. In the blades disclosed in DE 102005040705, the hard alloy part is flexibly installed in a steel jacket (vulcanized with rubber or enclosed in plastic), but in the preferred embodiment, the wear resistant element itself is mounted inside a larger steel piece and the wear resistant element is rather small. The friction between the blade and the road surface produces heat which must be dissipated to avoid excessive heating of the blade. Otherwise the blade will wear rapidly. In addition to the wear of the blade, excessive heat also damages the flexible material surrounding the wear resistant element, which may melt or become fragile. As a result, the wear resistant element of the blade may fall out from the flexible material during operation. To solve this, DE 102005040705 has provided cooling openings for blades, which are not very large and efficient. Cooling openings may clog during operation and decrease cooling efficiency. At the same time, a wide blade vulcanized in rubber does not heat up as much as a traditional hard alloy blade, but it also does not remove hardened and cold snow as efficiently.

Summary of the invention

[0006] The objective of this invention is to improve the design of a plough blade and its wear resistant hard material element, to ensure that both the blade and its wear resistant hard material elements can be cooled more efficiently and the wear resistant hard material element of the blade would remain in its position during the entire service life of the blade. In order to achieve this objective, the wear resistant hard material element of the blade has a heel connected to the part of element in contact with the road surface with a neck, while openings with the shape of the heel of the element are provided in the metal plate surrounding the wear resistant hard material element, ensuring that the heels partially protrudes from the heel-shaped openings. This ensures the efficient and direct contact of the hard material blade with the external environment, including snow, water, ice and air. The efficient cooling of the element is ensured as a result of the direct contact of the wear resistant hard material element with the external environment. The lough blade element of the invention has been made of a wear resistant hard material or is covered with a layer of wear resistant hard material on one or several sides, in order to ensure the high wear resistance of the blade and longer service life. The wear resistant hard material element of the blade is mounted in a casing made of a flexible material, such as an elastomer, surrounding the plough blade element and in turn located between two metal plates or steel plates in the preferred embodiment. The steel plates include attachment means, in the preferred embodiment in the form of openings for the connection of the blade to the plough.

List of figures

[0007] A better understanding of the present invention is obtained by reference to the detailed description of an exemplary embodiment of the invention set out below, together with the accompanying figures, where:

FIG 1 is a front view of the blade of the invention;

FIG 2 is a view of the section A-A in figure FIG 1;

FIG 3 is an alternative blade of the invention;

FIG 4 is a view of the section B-B of figure FIG 3;

FIG 5 shows a wear resistant hard material element of the blade with a trapezoidal heel;

FIG 6 shows a wear resistant hard material element of the blade with a round heel.

Exemplary embodiment of the invention

[0008] The snow plough blade 1 (see FIG 1 and 2) has

a front plate 2 and a rear plate 3. The plate 2 faces the direction of travel and its surface is bent in the whole width of the blade in the part facing the road surface, so that a groove or slot is formed in the part facing the road surface between the front and rear plates in the whole width of the blade where the hard material element of the blade 4 is installed. The element is fixed inside the groove either by being cast in rubber, adhesion using flexible polymers, or using other flexible binders 5 (polyurethane, silicone or similar). This also ensures the resiliency of the blade element 4 on an uneven road surface. The hard material blade element 4 has a heel 6, having a round or trapezoidal shape in a preferred embodiment. The heel 6 is connected to the part of blade element in contact with the road surface by a neck 7, the minimum width of which is smaller than the maximum width of the heel. A substantially heel-shaped opening 8 is made in the front plate 2 of the blade in the area of the heel 6 of the blade. A part of heel 6 of element 4 of the blade partially protrudes from the heel-shaped opening 8 made in the blade frame. Such interaction of the heel of the blade element and the heel-shaped opening has 2 main objectives:

1. As the hard material blade element is worn, the flexible material casing surrounding the blade element and front and rear plates will also wear. Thus, as the blade element wears off, the area of the surface keeping the blade element in position also decreases, creating the risk that in the final stage of wear, the blade element will fall out of the groove. Due to the interaction of the heel and the heel-shaped opening of the front plate, the detachment of the blade element is prevented, as the neck area of the heel of the blade element will come into contact with the lower part of the heel-shaped opening in the front plate.

2. This protruding part of the heel of the blade element is in direct contact with snow, ice, water, and air, thus helping to dissipate the heat caused by the friction between the blade and the road surface.

[0009] The heel of the hard material element may have various shapes, such as a triangular, round, trapezoidal, or any other shape (FIG 5, 6), ensuring the cooling as well as the safe installation of the element in the flexible material casing in the groove between the front and rear plates.

[0010] Cooling conduits 9 may be provided in the front plate 2 of the blade for additional cooling of the blades (see FIG 3), providing the blade elements additional contact with the external environment, facilitating the cooling conduits to ensure better overall cooling of the elements.

Claims

1. A snow plough blade comprising a wear resistant

element in a flexible casing and a means for connecting the blade to the plough, **characterized in that** the wear resistant element has a heel, the means for connecting the blade to the plough has a substantially heel-shaped opening, whereas the element heel protrudes partially from the heel-shaped opening.

2. The snow plough blade of claim 1, **characterized in that** the dimensions of the substantially heel-shaped opening are adapted to receive the heel of the blade element.

3. The snow plough blade of claim 1, **characterized in that** the means for connecting the blade to the plough includes a front plate and a rear plate, whereas the front plate faces the direction of travel and the part of the front plate facing the road surface is bent in the whole width of the blade.

4. The snow plough blade of claim 1, **characterized in that** the heel of the blade element is connected to the part of the blade element contacting the road surface with a neck.

5. The snow plough blade of claim 1, **characterized in that** the interaction of the heel, the neck, and the heel-shaped opening of the front plate prevents the blade element from being released downwards from the flexible casing.

6. The snow plough blade of claim 1, **characterized in that** the heel of the element is substantially of a shape selected from: a round shape, a reverse trapezoidal shape with round or sharp corners, a polygonal shape with round or sharp corners.

7. The snow plough blade of claim 1, **characterized in that** the flexible casing is selected from: polymer, elastomer, rubber, silicone, plastic or similar, or a combination thereof.

8. The snow plough blade of claim 1, **characterized in that** slots transverse to the lower edge are located in the lower edge of the front plate of the means for connecting the blade to the plough.

9. The snow plough blade of claim 8, **characterized in that** the slots extend substantially to the heel.

10. The snow plough blade of claim 1, **characterized in that** the wear resistant element is made of cermet.

11. The snow plough blade of claim 1, **characterized in that** the wear resistant element is covered with recycled cermet powder.

12. The snow plough blade of claim 1, **characterized in**

that the wear resistant element is made of thermally processed wear resistant steel, such as HARDOX®.

5

10

15

20

25

30

35

40

45

50

55

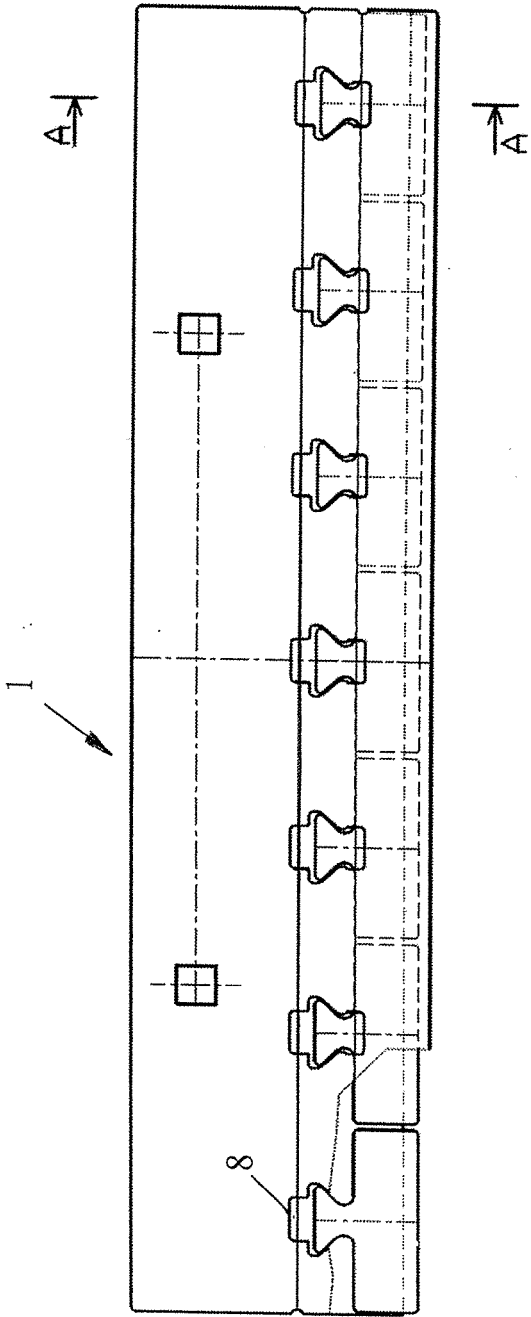


FIG 1

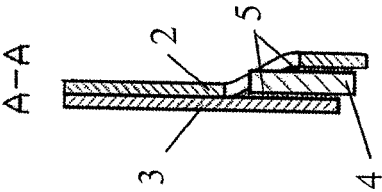


FIG 2

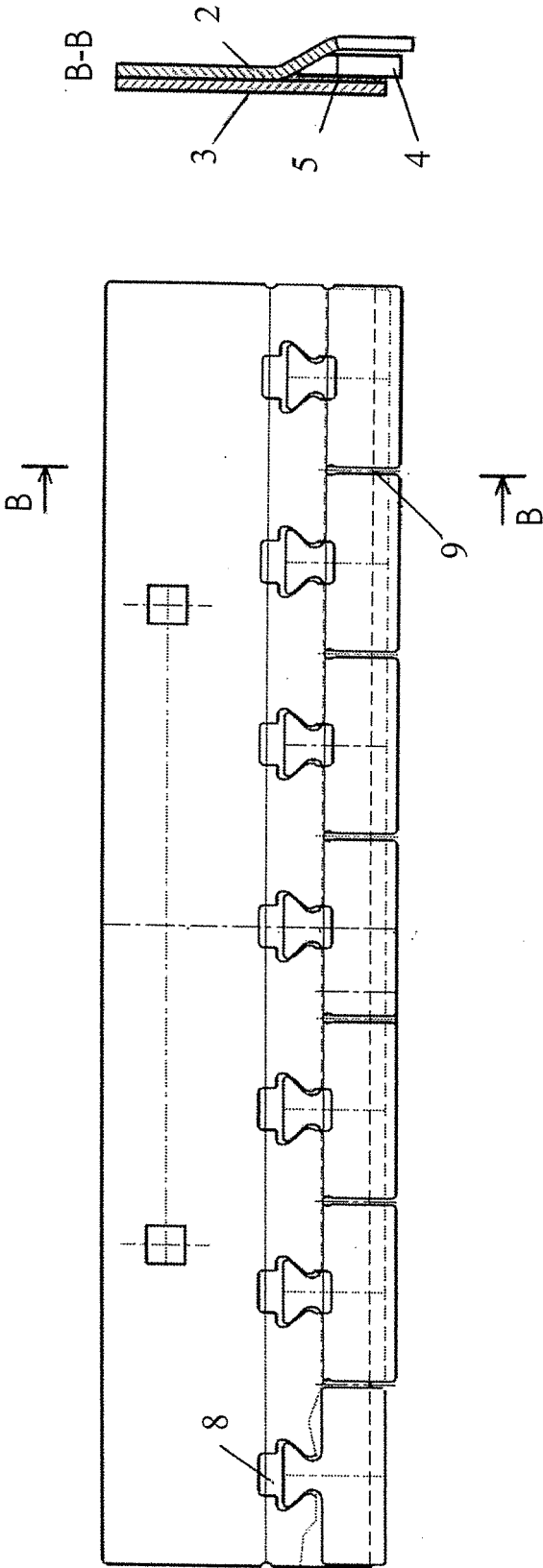


FIG 3

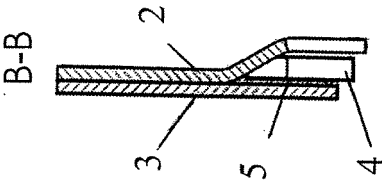


FIG 4

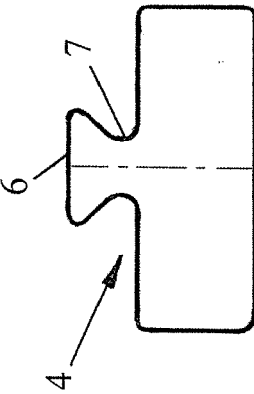


FIG 5

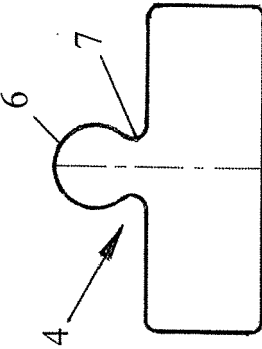


FIG 6



EUROPEAN SEARCH REPORT

Application Number
EP 15 16 3432

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)
A,D	DE 10 2005 040705 A1 (KUEPER GUMMI [DE]) 1 March 2007 (2007-03-01) * figures 1,2 *	1-12	INV. E01H5/06 E02F3/815
A	US 2009/223090 A1 (HUNT BRAD [CA]) 10 September 2009 (2009-09-10) * figure 2 *	1-12	
A	FR 2 775 703 A1 (TECTA SA [FR]) 10 September 1999 (1999-09-10) * figure 2 *	1-12	
			TECHNICAL FIELDS SEARCHED (IPC)
			E01H E02F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 10 September 2015	Examiner Saretta, Guido
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			

EPO FORM 1503 03.82 (P04C01)

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

EP 15 16 3432

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.

10-09-2015

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 102005040705 A1	01-03-2007	NONE	

US 2009223090 A1	10-09-2009	CA 2717986 A1	17-09-2009
		EP 2271807 A1	12-01-2011
		US 2009223090 A1	10-09-2009
		WO 2009111863 A1	17-09-2009

FR 2775703 A1	10-09-1999	NONE	

15

20

25

30

35

40

45

50

55

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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

- DE 102005040705 [0003] [0005]