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(54) **Scraper blade and scraper**

(57) A blade (3) of a scraper (1) and a scraper (1). The blade (3) of the scraper (1) comprises a curved por-

tion (4) and a fastening structure (8) for fastening the scraper blade (3) and a scraper shaft (2) together.

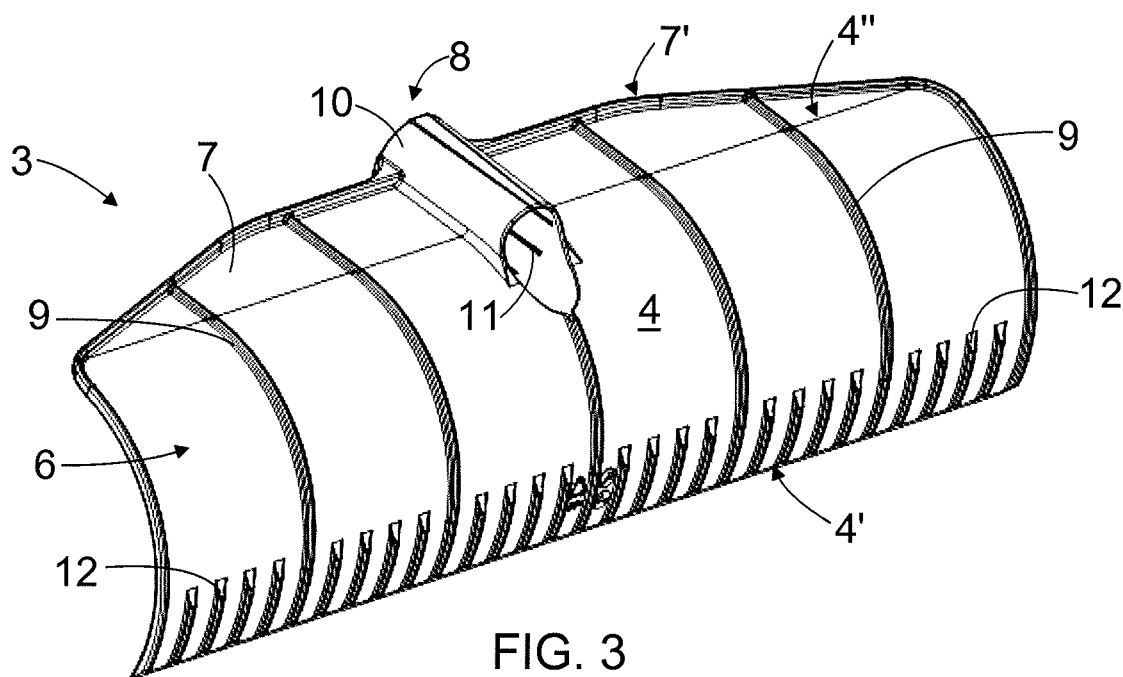


FIG. 3

Description

Background of the invention

[0001] The invention relates to scrapers and, in particular, to a scraper blade.

[0002] Scrapers may be used for example for cleaning different surfaces or areas. A scraper typically comprises a scraper shaft or a shaft portion and a scraper blade fastened thereto.

Brief description of the invention

[0003] An object of the invention is to provide a novel scraper blade and a scraper.

[0004] The scraper blade of the invention is characterized in that the scrape blade comprises a curved portion and a fastening structure for fastening the scraper blade and the scraper shaft together.

[0005] The scraper and the scraper blade of the invention may be used e.g. as a snow tool, for example for removing relatively thin layers of snow from passages, such as pedestrian passages and stairs. The scraper and scraper blade may also be used as a tool in gardening or earthworks for levelling soil for lawn groundwork or the bedding sand for paving, for example. The scraper and scraper blade of the invention are light to use because the curved portion of the scraper blade guides the amount of snow or soil the scraper blade scrapes so that it is moved or thrown in the direction to which the scraper shaft points, instead of being piled up as a single thick drift or heap right in front of the scraper blade.

[0006] The scraper of the invention which comprises a scraper shaft and a scraper blade to be fastened to the shaft is characterized in that the scraper blade is a scraper blade as claimed in any one claims 1 to 10.

[0007] According to an embodiment, the fastening structure for fastening the blade and the scraper shaft together joins the top edge of the curved portion.

[0008] According to an embodiment, the scraper blade comprises a straight portion joining the top edge of the curved portion, the straight portion comprising a fastening structure for fastening the scraper blade and the scraper shaft together.

[0009] According to an embodiment, the fastening structure for fastening the blade to the shaft comprises a tubular portion, which is made as a single uniform structure with the scraper blade and into which the scraper shaft is insertable for fastening the scraper blade to the scraper shaft.

[0010] According to an embodiment, the concave side of the curved portion forms a front surface of the scraper blade and the convex side of the curved portion forms a rear surface of the scrape blade, the rear surface comprising stiffening elements for stiffening the scraper blade.

[0011] According to an embodiment, the rear surface of the scraper blade comprises stiffening ribs extending

upwards from the bottom edge of the scraper blade for stiffening the lower part of the scraper blade.

[0012] According to an embodiment, the curved portion of the scraper blade is arranged to be in the shape of a circular arch having a radius of curvature of R50 to 150.

[0013] According to an embodiment, the curved portion of the scraper blade has a sector angle of 70 to 150 degrees in relation to the centre point of the radius of curvature.

[0014] According to an embodiment, the scraper blade is a single uniform injection moulded piece made of a plastic material.

[0015] According to an embodiment, the scraper blade is made of polypropylene or polyethylene.

Brief description of the figures

[0016] The invention is now described in closer detail in connection with preferred embodiments, with reference to the accompanying drawings, in which:

Figure 1 is a schematic front view of a scraper blade; Figure 2 is a schematic front diagonal view of the scraper blade of Figure 1;

Figure 3 is a schematic rear diagonal view of the scraper blade of Figure 1;

Figure 4 is a schematic end view of the scraper blade of Figure 1; and

Figure 5 is a schematic view of a scraper with a scraper blade of Figures 1 to 4 fastened to a shaft of the scraper.

Detailed description of the invention

[0017] Figure 1 is a schematic front view of a scraper blade 3, Figure 2 is a front diagonal view of the scraper blade 3 of Figure 1, Figure 3 is a rear diagonal view of the scraper blade 3 of Figure 1, Figure 4 is a schematic end or side view of the scraper blade 3 of Figure 1 and Figure 5 is a schematic view of a scraper 1 with a scraper blade 3 according to Figures 1 to 4 attached to a shaft 2 of the scraper 1.

[0018] The scraper blade 3 comprises a curved portion 4 having a bottom edge 4' and a top edge 4". The curved portion 4 has a concave side 5 or a concave surface 5 that forms a front surface 5 of the scraper blade 3 and a convex side 6 or a convex surface 6 that forms a rear surface 6 of the scraper blade 3. The scraper blade 3 further comprises a straight portion 7 that joins the top edge 4" of the curved portion 4. The straight portion 7 of the scraper blade 3 that joins the top edge 4" of the curved portion 4 extends in a direction indicated by the concave side 5 of the curved portion 4. The straight portion 7 of the scraper blade 3 ends at an end edge 7' of the straight portion, the end edge 7' being thus oriented away from the concave portion 5 of the scraper blade 3. The end edge 7' of the straight portion 7 forms the top edge 7' of the scraper blade 3 and the bottom edge 4' of the curved

portion 4 forms the bottom edge 4' of the scraper blade 3. The scraper blade 3 further comprises a fastening structure 8 arranged in connection with the straight portion 7, the shaft 2 of the scraper 1 being attachable in connection with the structure for fastening the scraper blade 3 to the shaft 2 such that the scraper shaft 2 points in the direction to which the concave side 5 of the scraper blade 3 faces. The scraper shaft 2, in turn, provides a holding point for using the scraper 1. The rear surface 6 of the scraper blade 3 further comprises first stiffening elements 9 extending from the bottom edge 4' to the top edge 7' for stiffening the structure of the scraper blade 3. In the case of Figure 3, said first stiffening elements 9 are stiffening ribs extending from the bottom edge 4' of the blade 3 to the top edge thereof. Said first stiffening elements 9 could also extend only to a portion between the bottom edge 4' and the top edge 7' of the blade on the rear surface 6 of the blade 3. It is also possible that said first stiffening elements 9 are provided on the front surface 5 of the scraper blade 3. Further still, the first stiffening elements 9 may have a shape different from a rib-like shape.

[0019] Figure 5 is a schematic view of a scraper 1 having a scraper blade 3 of Figures 1 to 4 attached to the shaft 2 of the scraper 1, the scraper shaft 2 being oriented to the direction pointed by the concave side 5 of the scraper blade 3. The scraper 1 shown in Figure 5 may be used e.g. as a snow tool, for example for removing a layer of snow of some centimetres from pathways, such as pedestrian passages and stairs. The scraper 1 may also be used as a tool in gardening or earthworks for levelling soil for lawn groundwork or the bedding sand for paving, for example.

[0020] When the scraper 1 is being used, the bottom edge 4' of the scraper 3 is directed downwards and held against the surface to be cleared of snow, for example, or to the layer of soil being levelled. Next, the scraper 1 is drawn so that the concave side 5 of the scraper blade 3 moves forward to the direction pointed by the shaft 2 towards the user of the scraper 1 and, when desired, past the user. When the scraper 1 moves towards the user of the scraper 1, a portion above the bottom edge 4' of the scraper blade 3 scrapes snow or soil from the ground. Guided by the concave surface 5 and the straight portion 7 of the scraper blade 3', the portion of snow or soil scraped by the scraper blade 3 moves or is thrown forward in the direction to which the shaft 2 of the scraper 1 points, the scraper blade 3 leaving behind a ground from which snow is cleared or roughness levelled. When the scraper is being used and depending on the dimensioning the scraper blade 3, snow to be removed may be thrown by the scraper blade 3 over edgings forming the borders of a pathway as a result of the drawing motion without the scraper having to be lifted at the side of the edgings over the edgings for removing the snow from the pathway area entirely. Moreover, when the scraper is being used for removing snow, one draw with the scraper allows the surface to be cleared to be made cleaner than

by using a street broom.

[0021] In the embodiment of the scraper blade 3 depicted in Figures 1 to 5, the fastening structure 8 for fastening the blade 3 to the shaft 2 extends from the direction of the top edge 7' of the blade 3 towards the curved portion 4, extending partly also into the area of the curved portion 4 and comprising a tubular portion 10 of a solid cross-section into which the shaft 2 is inserted for fastening the blade 3 to the shaft 2. Said tubular portion 10 comprises rib-shaped protrusions 11 extending to the inside thereof parallel with the tubular portion 10, the protrusions restricting the cross-sectional area inside the tubular portion 10 and thus increase a force effect acting in a press fit formed between the fastening structure 8 and the scraper shaft 2, the press fit keeping the tubular portion 10 and the scraper shaft 2 attached to one another. If desired, the fastening of the blade 3 to the shaft 2 may be further ensured for example by a screw to be screwed to the scraper shaft 2 through the wall of the tubular portion 10 or by gluing the tubular portion 10 and the shaft 2 together.

[0022] Although in the embodiment of Figures 1 to 5, the tubular portion 10 has a substantially constant cross-section in the longitudinal direction thereof, the tubular portion 10 could also have a cross-section that narrows evenly from the top edge 7' of the blade 3 towards the curved portion 4. It is also possible to provide a fastening structure 8 in which a form-locking is provided between the blade 3 and the shaft 2.

[0023] Alternatively, the fastening structure for fastening the scraper blade 3 to the scraper shaft 2 could be for example a shaped structure made to the scraper blade 3 to provide a shape supporting the scraper shaft 2. Alternatively, the fastening structure for fastening the scraper blade 3 to the scraper shaft 2 may comprise, either alone or in combination with the above fastening structures, one or more holes made through the scraper blade 3 or one or more thinned portions made to the scraper blade 3, through which a fastening screw or bolt or a similar fastening member extending to the scraper shaft 2 or even through it is arranged for fastening the scraper blade 3 to the scraper shaft 2.

[0024] In the examples shown in the figures the fastening structure for fastening the scraper blade 3 to the scraper shaft 2 is arranged in the centre of the scraper blade in the width direction thereof, although the position of the fastening structure may also differ from that shown in the figures. Hence the fastening structure is not necessarily in the centre of the blade. Another possibility is to implement the fastening structure so that the shaft sets into an inclined position with regard to an imaginary centre line that runs from the bottom edge 4' to the top edge 7' of the blade 3. The shaft 2 may be arranged to the blade 3 also by articulation or the fastening structure itself may comprise an articulated structure that allows the position of the scraper shaft 2 in relation to the scraper blade 3 to be adjusted.

[0025] In the embodiment of the scraper blade 3 shown

in Figures 1 to 5, the rear surface 6 of the scraper blade 3 comprises second stiffening elements 12 implemented as stiffening ribs directed from the bottom edge 4' of the scraper blade 3 towards the top edge 7' and extending at least on some distance to the curved portion 4 of the blade 3, without necessarily reaching, however, the straight portion 7 of the blade 3. Alternatively, the second stiffening elements 12 may begin at a distance from the bottom edge 4' of the blade 3 and extend towards the top edge 7' of the blade 3. The second stiffening elements 12 are arranged to stiffen the lower portion of the blade 3 structure particularly in the vicinity of its bottom edge 4' that is set against the ground. The second stiffening elements 12 could also be formed of some other than a rib-like structure. Moreover, said second stiffening elements may be placed on the front surface 5 of the blade 3 and their shape may differ from a rib-like shape.

[0026] In the embodiment of the scraper blade 3 shown in Figures 1 to 5 the bottom edge 4' of the blade 3 comprises a straight portion 13 extending from the front surface 5 of the blade towards the rear surface 6. Said straight portion 13 forms a support surface that allows the blade 3 of the scraper 1 to be firmly held against the ground when the scraper 1 is being used. At the same time, an acute angle 14 is formed at the bottom edge between the straight portion 13 and the front surface 5 of the blade, the angle providing the blade 3 with a sharp edge 14 that efficiently separates the portion of snow to be removed or the soil to be moved from the ground surface, snow or soil remaining underneath the bottom edge 4' of the blade 3. Although the bottom edge 4' of the blade 3 wears when the blade 3 is drawn on the ground surface, the blade 3 still maintains the acute angle and thus sharpens itself when the scraper 1 is being used.

[0027] The curved portion 4 of the blade 3 may be symmetrically curved, i.e. a portion curved in the shape of a circular arc and comprising a curved portion corresponding to only one radius of curvature of a circle. The curved portion 4 of the blade 3 may also be asymmetrically curved, i.e. the curved portion may comprise a plural number of successive curved portions, the radii of curvature of a circle corresponding to which differing from one another. However, the curved portion 4 of the blade 3 is preferably formed of a curved portion corresponding to only one radius of curvature of a circle. In that case the curved portion 4 of the front surface 5 of the blade 3 may have a radius of curvature R of a circle which may be R50 to 150, for example. The radius of curvature R corresponding to the curved portion 4 of the blade 3 and the centre point CP of the radius of curvature are schematically shown in Figure 4.

[0028] The angle of the shaft 2 of the scraper 1 to the ground surface is important for convenient and efficient use of the scraper. Since the straight portion 7 of the scraper blade 3 joins the top edge 4" of the curved portion 4 parallel to the tangent of the top edge, the angle of use of the shaft 2 of the scraper 1 is determined by the joint effect of the radius of curvature R of the curved portion

4 on the scraper blade 3 and a sector angle SA covering the curved portion 4. Depending on the radius of curvature R applied on the curved portion 4, the sector angle SA, whose centre point is the centre point CP of the radius of curvature of the circle, may be 70 to 150 degrees, for example, preferably 90 to 120 degrees. In that case the sector angle SA of the radius of curvature R70, for example, may be e.g. about 100 degrees.

[0029] The scraper blade 3 together with all of its features presented above is preferably a single uniform piece. The scraper blade may be made as a single uniform piece of metal or a plastic material, for example. A scraper blade made of a plastic material may be manufactured as a single uniform piece by injection moulding, for example. When the scraper blade 3 is being made of a plastic material, the material to be used may be e.g. polypropylene PP or polyethylene PE, such as a high-density polyethylene HDPE, or some other plastic grade that sustains well impacts even at cold temperatures or sub-zero temperatures.

[0030] In practise the design and dimensioning of the scraper blade 3 may vary in many different ways. The width of the blade 3, i.e. the blade's dimension in a direction substantially transversal to the direction between the bottom edge 4' and the top edge 7' of the blade may vary from 200 to 700mm, for example, preferably from 350 to 600mm. The height of the blade 3, i.e. the shortest distance between the bottom edge 4' and the top edge 7' of the blade, in turn, may vary from 50 to 350mm. Hence a scraper blade 3 may comprise a curved portion 4 corresponding to a circular arc having a radius of curvature R72, for example, with a sector angle of about 110 degrees, the width of the blade being, at the same time, about 450mm and the blade's height about 150mm, for example.

[0031] It will be apparent to a person skilled in the art that as technology advances, the basic idea of the invention may be implemented in many different ways. The invention and its embodiments are thus not restricted to the examples described above but may vary within the scope of the claims. Hence the scraper blade 3 could also be implemented without the straight portion 7, the fastening structure 8 being in that case entirely on the curved portion 4 of the scraper blade 3.

Claims

1. A blade (3) of a scraper (1), **characterized in that** the scraper blade (3) comprises a curved portion (4) and a fastening structure (8) for fastening the scraper blade (3) and a scraper shaft (2) together.
2. A scraper blade as claimed in claim 1, **characterized in that** the fastening structure (8) for fastening the scraper blade (3) in connection with the scraper shaft (2) joins a top edge (4') of the curved portion (4).

3. A scraper blade as claimed in claim 1 or 2, **characterized in that** the scraper blade (3) comprises a straight portion (7) joining the top edge (4') of the curved portion (4), the straight portion (7) comprising the fastening structure (8) for fastening the scraper blade (3) and the scraper shaft (2) together. 5

4. A scraper blade as claimed in any one of the preceding claims, **characterized in that** the fastening structure (8) comprises a tubular portion (10) formed as a single uniform structure with the scraper blade (3) and into which the scraper shaft (2) is insertable for fastening the scraper blade (3) to the scraper shaft (2). 10
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5. A scraper blade as claimed in any one of the preceding claims, **characterized in that** the curved portion (4) has a concave side (5) forming a front surface (5) of the scraper blade (3) and the curved portion (4) has a convex side (6) forming a rear surface (6) of the scraper blade (3), the rear surface (6) comprising stiffening elements (9, 12) for stiffening the scraper blade (3). 20

6. A scraper blade as claimed in claim 5, **characterized in that** the rear surface (6) of the scraper blade (3) comprises stiffening ribs (12) extending upward from the bottom edge (4') of the scraper blade (3) for stiffening the lower part of the scraper blade (3). 25
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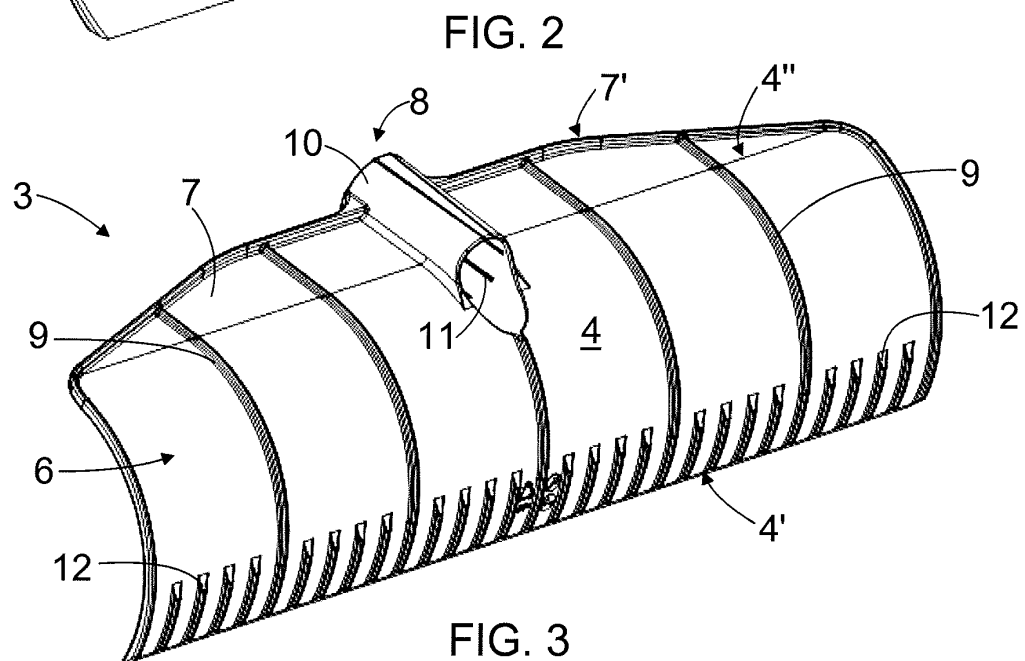
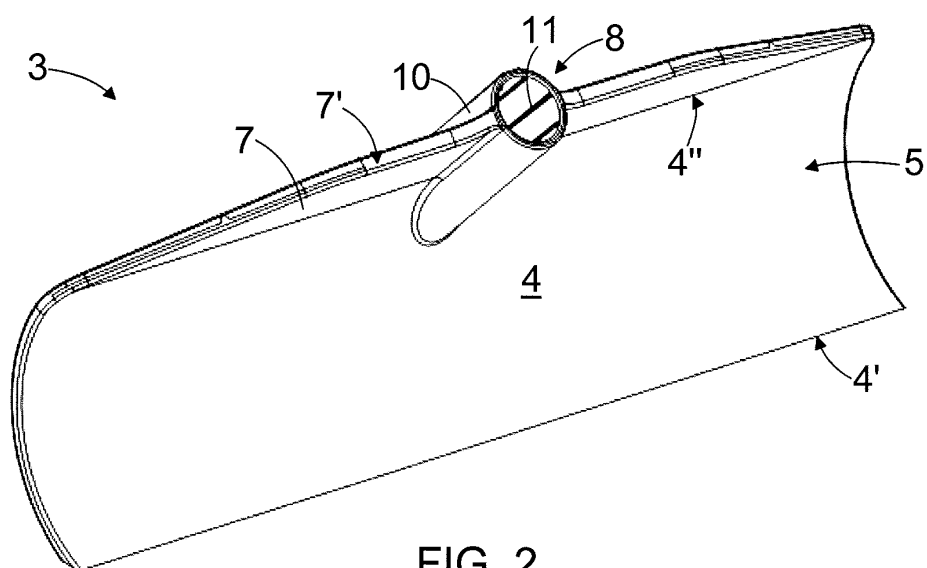
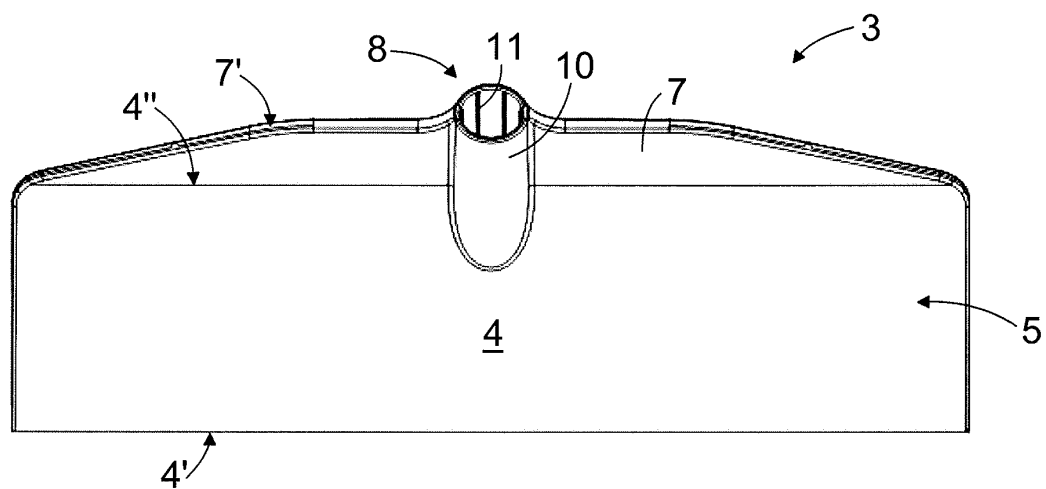
7. A scraper blade as claimed in any one of the preceding claims, **characterized in that** the curved portion (4) of the scraper blade (3) is arranged to be in the shape of a circular arc having a radius of curvature (R) of R50 to 150. 35

8. A scraper blade as claimed in any one of the preceding claims, **characterized in that** the curved portion (4) of the scraper blade (3) has a sector angle (SA) of 70 to 150 degrees in relation to a centre point (CP) of the radius of curvature (R) of the curved portion (4). 40

9. A scraper blade as claimed in any one of the preceding claims, **characterized in that** the scraper blade (3) is a single uniform piece made of a plastic material by injection moulding. 45

10. A scraper blade as claimed in any one of the preceding claims, **characterized in that** the scraper blade (3) is made of polypropylene or polyethylene. 50

11. A scraper (1) comprising a shaft (2) of the scraper (1) and a blade (3) of the scraper (1) to be fastened to the shaft, **characterized in that** the scraper blade (3) is a scraper blade (3) as claimed in any one of claims 1 to 10. 55



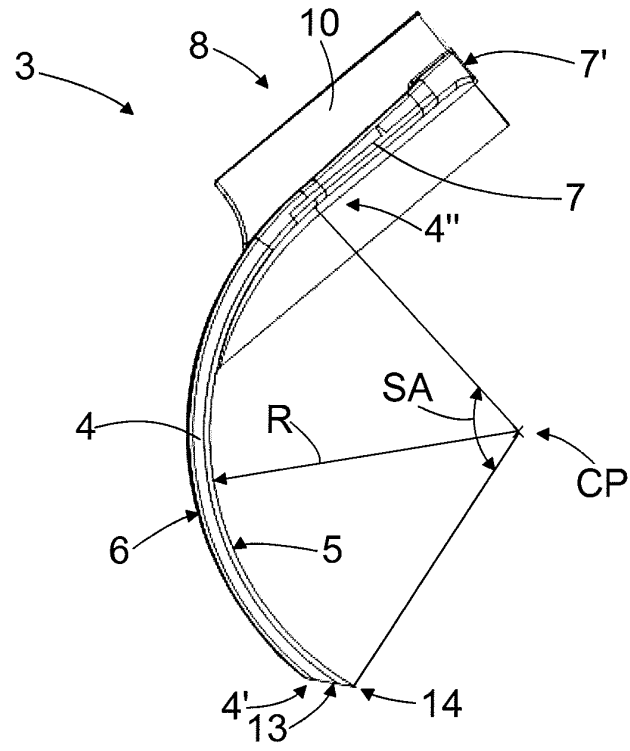


FIG. 4

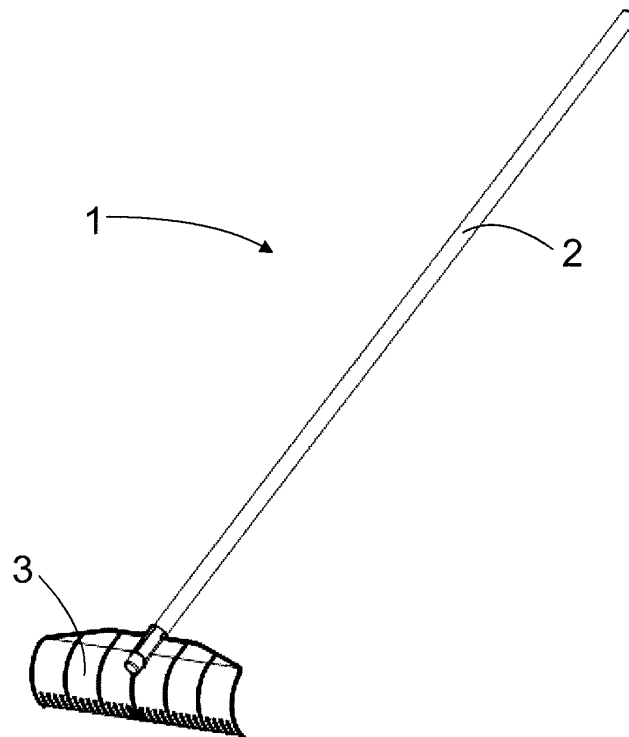


FIG. 5