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(54) Method of forming tracks in snow, in particular a cross-country ski track, and relative track-forming device

(57) A method of forming tracks (4) in snow, to form a classic style cross-country ski track, includes separating at least two continuous elongated portions (27) of snow cover from the rest of the snow cover, the two continuous elongated portions (27) extending in a given direction (D1); and pressing the two continuous elongated portions (27) against the rest of the snow cover to form a track (4) along each continuous elongated portion (27).

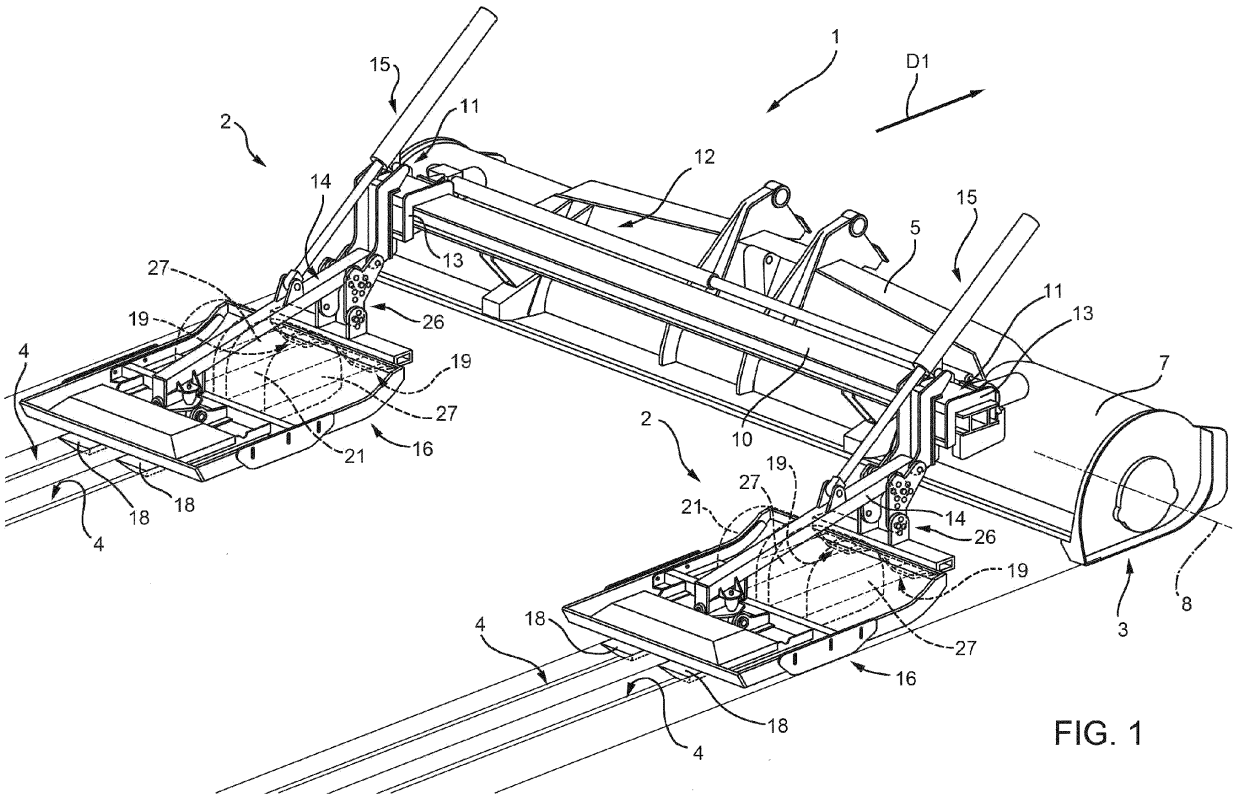

FIG. 1

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Description

[0001] The present invention relates to a method of forming tracks in snow, in particular a classic style cross-country ski track.

[0002] Known methods of forming classic style cross-country ski tracks comprise forming at least two continuous, parallel tracks in the snow cover.

[0003] A cross-country ski track is normally a furrow with a flat bottom face and two flared lateral faces, is designed to guide a ski, and is formed by pressing a runner on the snow and simultaneously moving the runner along a given path. In other words, the snow is compacted and deformed locally along each track by the runner.

[0004] To form tracks more easily, the snow cover is first tilled and/or harrowed. Significant examples of methods and/or equipment for forming cross-country ski tracks are described in EP 450, 138, EP 57, 743, EP 461, 303, EP 216,753, EP 1,754,832 and US 4,523,398, in which some methods provide for tilling a surface layer of the snow cover before forming the tracks, and others, such as the one described in EP 216, 753, for harrowing a surface layer of the snow cover.

[0005] The snow cover varies widely, depending on environmental conditions, such as temperature, humidity and temperature range. For example, it may be soft or compact or relatively soft beneath a hard surface crust. These varying characteristics seriously affect formation and the structure of the tracks, with the result that known methods and equipment fail to ensure good quality cross-country ski tracks and fast operating speed.

[0006] It is an object of the present invention to provide a method of forming cross-country ski tracks, designed to eliminate the drawbacks of the known art.

[0007] Another object of the present invention is to provide tracks that are well defined and highly resistant to in-service stress.

[0008] According to the present invention, there is provided a method of forming tracks in snow, in particular a classic style cross-country ski track, the method comprising the steps of separating at least two continuous elongated portions of snow cover from the rest of the snow cover, the two continuous elongated portions extending in a given direction; and pressing the two continuous elongated portions against the rest of the snow cover to form a track along each continuous elongated portion.

[0009] Using the method according to the present invention, the tracks can be formed along two continuous elongated portions of snow cover distinctly separate from the rest of the snow cover. This separation makes the tracks easier to form, regardless of the characteristics of the snow cover. More specifically, as it is separated, each continuous elongated portion is also broken up, thus simplifying compression later, and so improving finish of the tracks and increasing track formation speed.

[0010] Each continuous elongated portion of snow cover preferably has a trapezium-shaped, in particular, an isosceles-trapezium-shaped, cross section, in which the major wall of the isosceles trapezium substantially coincides with the free face of the snow cover.

[0011] In the preferred embodiment of the present invention, the cross section of each continuous elongated portion is slightly larger than the cross section of the track.

[0012] The present invention also relates to a track-forming device designed to eliminate the drawbacks of the known art.

[0013] According to the present invention, there is provided a track-forming device for forming tracks in snow, in particular a classic style cross-country ski track, the track-forming device comprising blades for separating at least two continuous elongated portions of snow cover from the rest of the snow cover, the two continuous elongated portions extending in a given direction; and at least two runners for pressing the two continuous elongated portions against the rest of the snow cover to form a track along each continuous elongated portion.

[0014] In a preferred embodiment of the present invention, the track-forming device comprises a supporting structure; the blade being connected to the supporting structure by an adjusting mechanism for adjusting the depth of the blade and/or the angle of the blade with respect to the runner.

[0015] This provides for adjusting the difference in size between the cross section of the continuous elongated portion and the cross section of the track, and for adjusting the blade angle to achieve a greater or lesser break-up effect.

[0016] In another preferred embodiment of the present invention, the track-forming device comprises a supporting structure comprising a slide connected slidably to a guide crosswise to the given direction; and at least one actuator for selectively adjusting the position of the track-forming device in a direction crosswise to said given direction.

[0017] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which :

Figure 1 shows a view in perspective, with parts removed for clarity, of a device for forming cross-country ski tracks and implementing the method according to the present invention;
Figure 2 shows a side view, with parts removed for clarity, of the Figure 1 device;
Figure 3 shows a view in perspective, with parts removed for clarity, of a detail of the Figure 1 device;
Figure 4 shows a larger-scale cross section, with parts removed for clarity, of a track being formed;
Figure 5 shows a larger-scale plan view, with parts removed for clarity, of a track being formed;
Figure 6 shows a larger-scale plan view, with parts removed for clarity, of a finished track.

[0018] Number 1 in Figure 1 indicates as a whole a machine for forming a cross-country ski track. In the Fig-

ure 1 example, machine 1 comprises a tiller 3; and two track-forming devices 2, each for forming two tracks 4 parallel to a direction D1 corresponding to the travelling direction of machine 1. The choice of two track-forming devices is purely indicative, and the present invention relates to the single track-forming device or to a machine equipped with more than two track-forming devices.

[0019] With reference to Figures 4 and 6, each track 4 is substantially defined by a furrow having a substantially isosceles-trapezium-shaped cross section, a flat bottom face 4A, and two flared lateral faces 4B.

[0020] With reference to Figure 2, tiller 3 is towed by a vehicle, and comprises a frame 5, a shaft 6, and a housing 7 enclosing shaft 6. Shaft 6 has teeth 9 and is mounted to rotate about an axis 8; and frame 5 comprises a guide 10 substantially parallel to axis 8 and along which track-forming devices 2 slide.

[0021] With reference to Figure 1, each track-forming device 2 comprises a supporting structure 11 connected to guide 10. Supporting structures 11 are connected to an actuator 12 for moving them along guide 10 and adjusting the distance between track-forming devices 2 in a direction crosswise to direction D1. Each supporting structure 11 comprises a slide 13 fitted to guide 10; and an elongated portion 14 hinged to slide 13. And each track-forming device 2 comprises an actuator 15 located between slide 13 and elongated portion 14 to selectively position elongated portion 14 in a lowered work position (Figures 1 and 2) and a raised rest position (Figure 3).

[0022] Each track-forming device 2 comprises a slide 16 connected to supporting structure 11 and defined by a plate having a flat bottom surface 17 curving slightly upwards at the front edge; two runners 18 connected to slide 16, projecting downwards from the bottom surface of slide 16, and located at the rear edge of slide 16; and a cutting implement 19 connected to supporting structure 11. In the embodiment shown, each track-forming device 2 comprises an additional tiller 20 (shown by the dash line) fitted to slide 16, enclosed in a housing 21, and extending through an opening 22 in slide 16. An alternative embodiment (not shown) of the present invention has no additional tiller 20.

[0023] Cutting implement 19 comprises two blades 23, each of which has a central portion 24, and two inclined lateral portions 25 flaring with respect to central portion 24, and is the same shape as the cross sections of track 4 and runner 18.

[0024] Both blades 23 are connected to supporting structure 11 by an adjusting mechanism 26 for adjusting the angle and/or depth of blades 23 independently of slide 16, and which comprises two selectively adjustable articulated arms.

[0025] Blades 23 are located between tiller 3 and runners 18, and, in the example shown, are each aligned with a respective runner 18.

[0026] With reference to Figure 4, blade 23 is slightly larger than runners 18, and separates a continuous elongated portion 27 of snow cover from the rest of the snow cover. In Figure 4, dash line 28 indicates the work depth of tiller 3 (Figure 2), and dash line 29 the work depth of tiller 20 (Figure 2), if provided. In other words, tiller 3 (Figure 2) works a wide, shallow strip of snow cover, and any additional tillers 20 work narrower, deeper strips. As it is separated (Figure 5), continuous elongated portion 27 is also broken up, which assists formation of track 4 (Figure 6) .

[0027] With reference to Figure 4, each runner 18 is drawn along a continuous elongated portion 27, and compresses the snow along portion 27 by virtue of the pressure exerted by actuator 15. When working on icy, firmly compacted snow cover with no additional tiller 20, runner 18 effectively compresses continuous elongated portion 27 (broken up by blade 23) onto a relatively solid support defined by the rest of the snow cover shaped beforehand by blades 23. Otherwise, runners 18 also exert pressure on the snow cover adjacent to continuous elongated portions 27.

[0028] Track-forming device 2 normally comprises substantially three members for actively working the snow cover : blades 23 for separating continuous elongated portions 27 from the rest of the snow cover; runners 18 for forming tracks 4 along continuous elongated portions 27; and slide 16 for compacting the snow cover adjacent to tracks 4. In some cases, tilling by additional tiller 20 is recommended.

[0029] The advantages of the present invention substantially lie in the quality of the finished tracks, their resistance to prolonged use, and faster track-forming speed.

[0030] In a variation not shown in the drawings, break-up of the continuous elongated portions allows track-forming device 2 to form tracks 4 even when not connected to tiller 3.

[0031] In another variation not shown, the track-forming device runners and blades are movable crosswise to direction D1 to adjust the track gauge. In which case, the runners and blades are mounted on respective guides and connected to actuators enabling remote adjustment to the runner and blade gauges, and therefore to the track gauge. EP 450,138, for example, describes a runner gauge adjusting device. The track gauge around bends, in fact, must be wider than along the straight to accommodate the natural movement of the skier into a more stable position when cornering.

[0032] Clearly, changes may be made to the method and track-forming device as described herein without, however, departing from the scope of the accompanying Claims.

Claims

1. A method of forming tracks in snow, in particular a classic style cross-country ski track, the method comprising the steps of separating at least two continuous elongated portions (27) of snow cover from

the rest of the snow cover, the two continuous elongated portions (27) extending in a given direction (D1); and pressing the two continuous elongated portions (27) against the rest of the snow cover to form a track (4) along each continuous elongated portion (27).

2. A method as claimed in Claim 1, wherein each continuous elongated portion (27) of snow cover has a substantially trapezium-shaped, in particular, an isosceles-trapezium-shaped, cross section.

3. A method as claimed in either one of the foregoing Claims, wherein the cross section of each continuous elongated portion (27) is slightly larger than the cross section of the track (4).

4. A method as claimed in any one of the foregoing Claims, and comprising the step of tilling a top layer of snow cover before separating the continuous elongated portions (27); the depth of the top layer of snow cover being less than the depth of the tracks (4).

5. A method as claimed in any one of the foregoing Claims, and comprising the step of tilling a top layer of snow cover after separating the continuous elongated portions (27) and before forming the tracks (4); the depth of the top layer of snow cover being less than the depth of the tracks (4).

6. A method as claimed in any one of the foregoing Claims, and comprising the step of forming two pairs of tracks (4) using two respective side by side track-forming devices (2) fitted to a frame (5) and slidable crosswise to said given direction (D1).

7. A method as claimed in Claim 6, and comprising the step of selectively adjusting the distance between the two track-forming devices (2).

8. A track-forming device for forming tracks in snow, in particular a classic style cross-country ski track, the track-forming device (2) comprising blades (23) for separating at least two continuous elongated portions (27) of snow cover from the rest of the snow cover, the two continuous elongated portions (27) extending in a given direction (D1); and at least two runners (18) for pressing the two continuous elongated portions (27) against the rest of the snow cover to form a track (4) along each continuous elongated portion (27).

9. A track-forming device as claimed in Claim 8, wherein each blade (23) is shaped to impart to the continuous elongated portion (27) of snow cover a substantially trapezium-shaped, in particular, an isosceles-trapezium-shaped, cross section, in which the major wall of the isosceles trapezium substantially coincides with the free face of the snow cover.

10. A track-forming device as claimed in Claim 8 or 9, and comprising a tiller (20) between the blade (23) and the runner (18).

11. A track-forming device as claimed in any one of Claims from 8 to 10, and comprising a supporting structure (11); the blade (23) being connected to the supporting structure (11) by an adjusting mechanism (26) for adjusting the depth of the blade (23) and/or the angle of the blade (23) with respect to the runner (18).

12. A track-forming device as claimed in any one of Claims 8 to 11, and comprising a supporting structure (11) comprising a slide (13) connected slidably to a guide (10) crosswise to said given direction (D1); and at least one actuator (12) for selectively adjusting the position of the track-forming device (2) in a direction crosswise to said given direction (D1).

13. A track-forming device as claimed in any one of Claims 8 to 12, and comprising a supporting structure (11) comprising an elongated portion (14) for supporting the runners (18) and the blades (23) and movable between a rest position and a work position; and a further actuator (15) connectable to the elongated portion (14) to move the elongated portion (14), the runners (18), and the blades (23) between the rest position and the work position, and to press the runners (18) onto the snow cover.

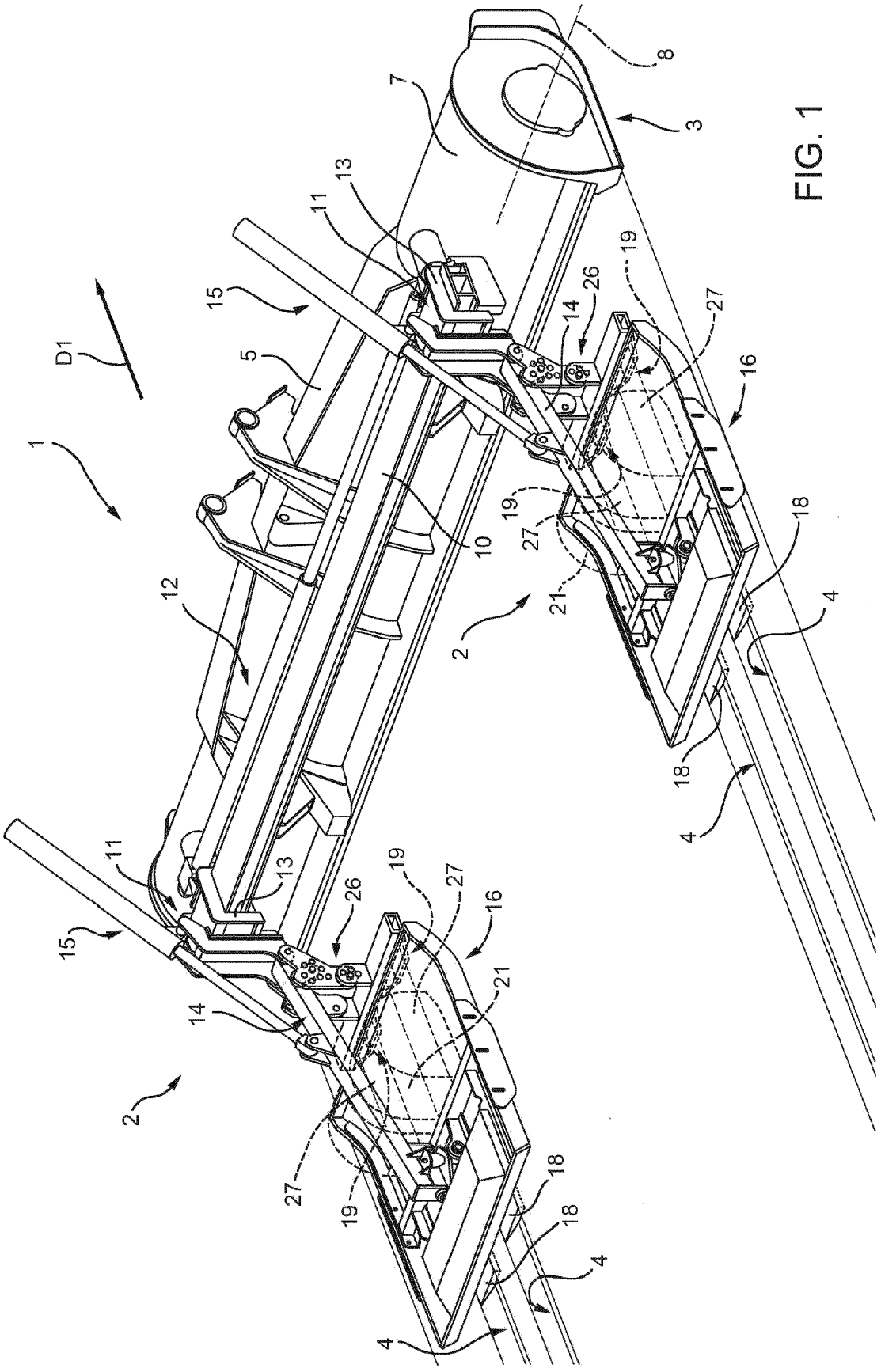

FIG. 1

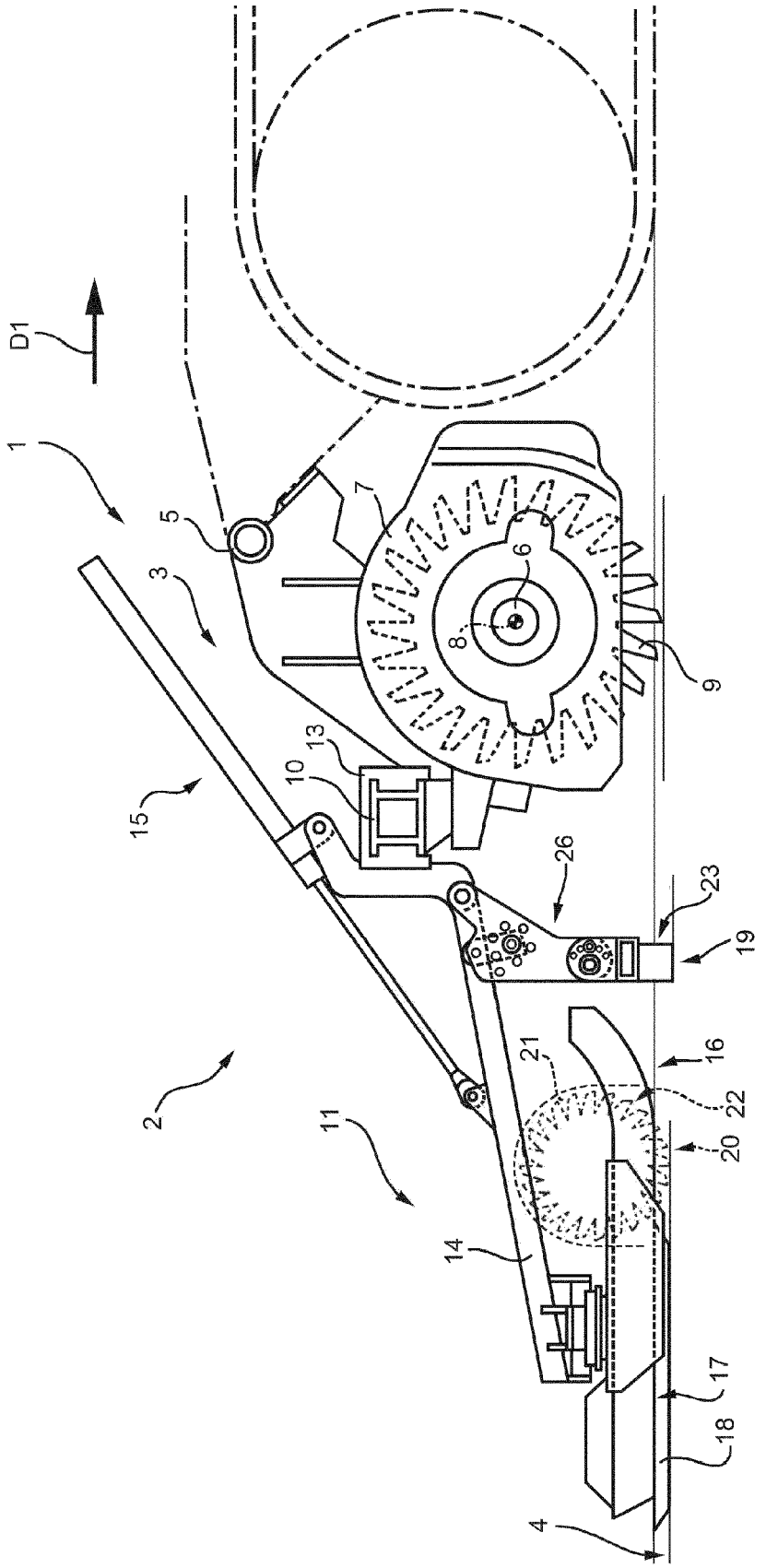

FIG. 2

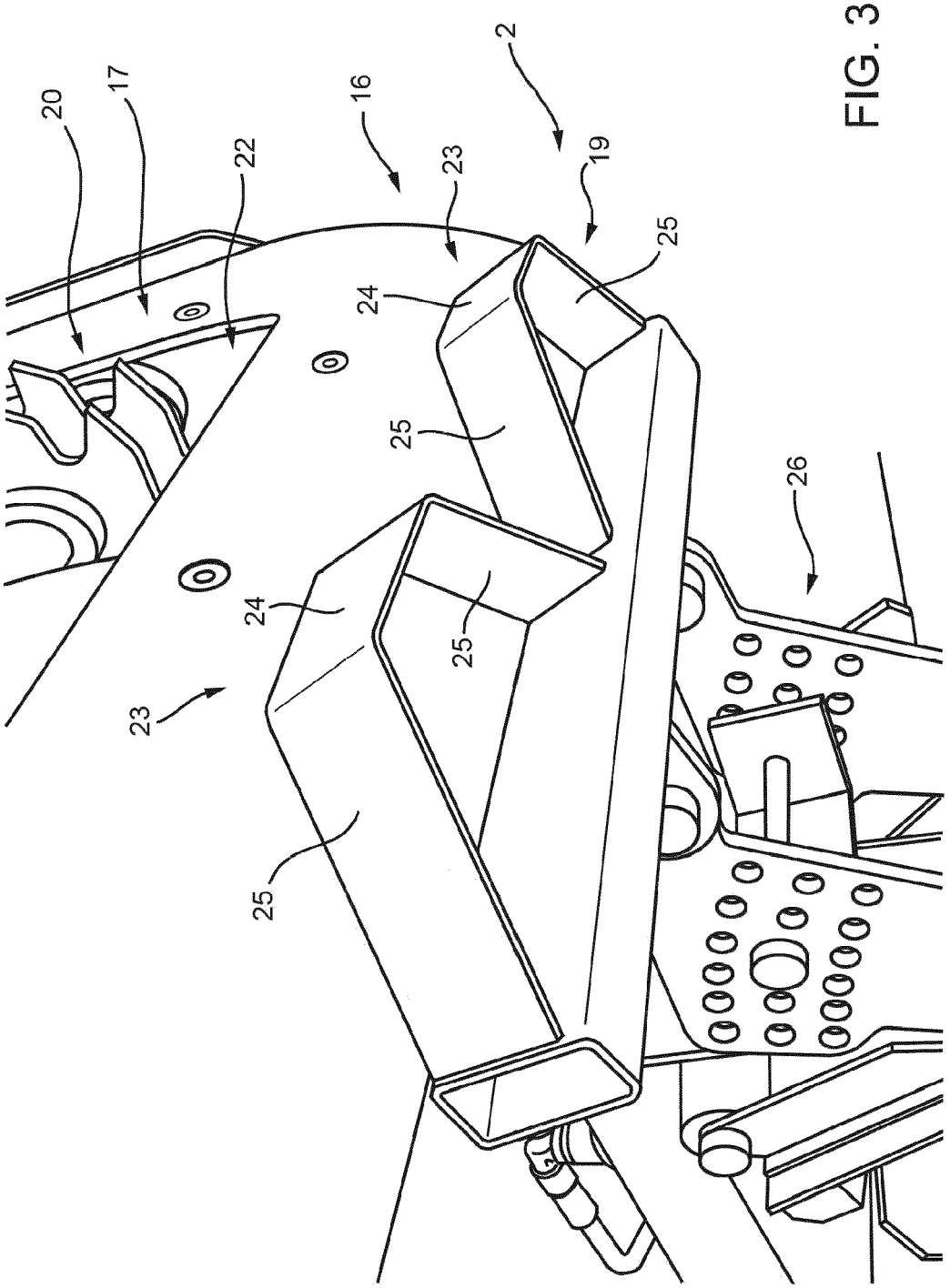

FIG. 3

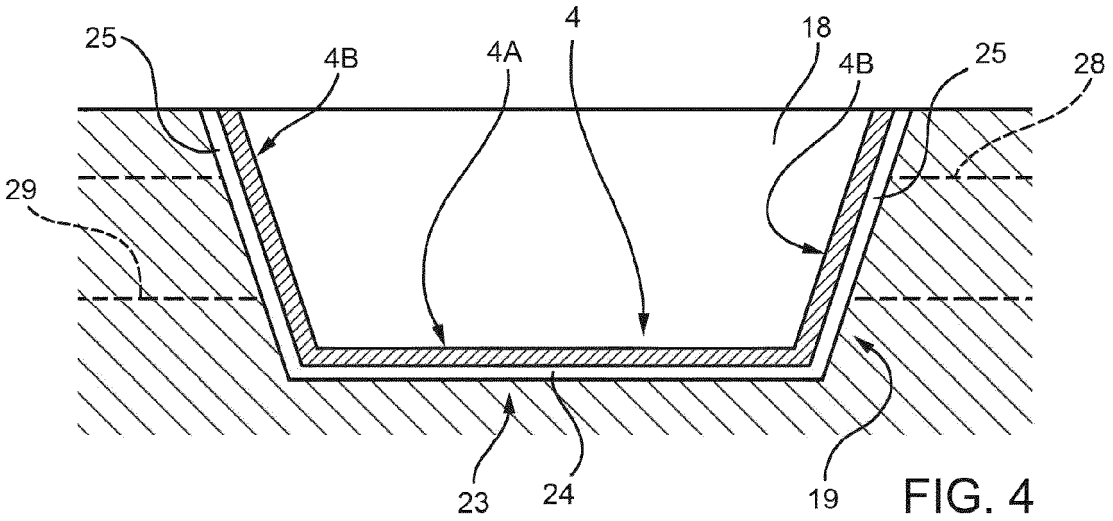

FIG. 4

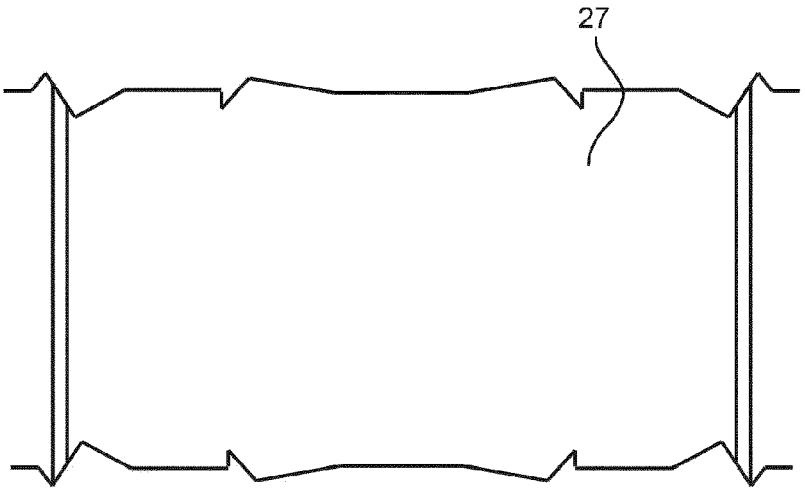

FIG. 5

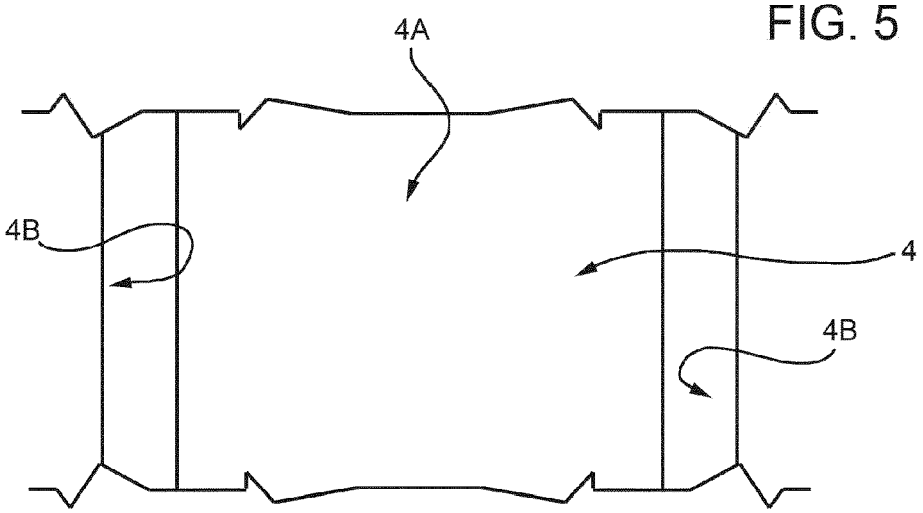

FIG. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 11 19 5049

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TECHNICAL FIELDS SEARCHED (IPC)

E01H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	14 March 2012	Fernandez, Eva

CATEGORY OF CITED DOCUMENTS

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

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