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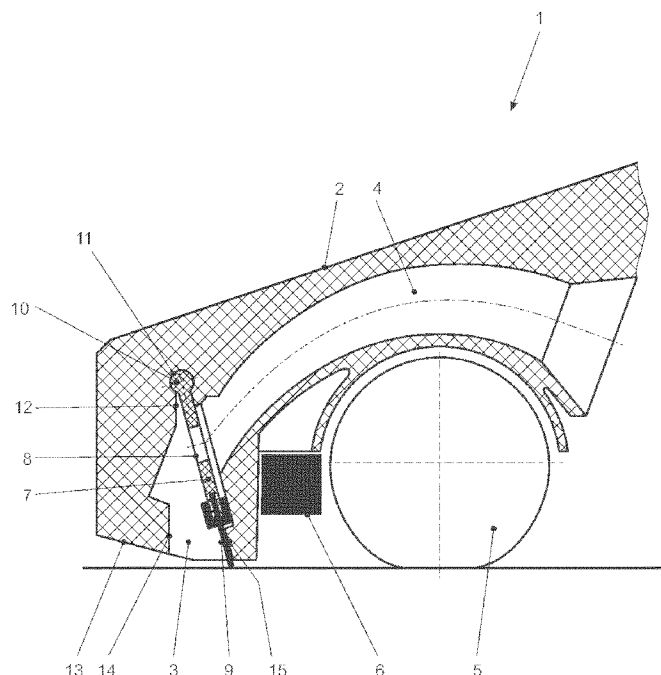
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(54) Titre : APPAREIL DE NETTOYAGE  
(54) Title: CLEANING APPARATUS

Fig. 1



(57) **Abbrégé/Abstract:**

A cleaning device (1) comprising a main body (2), a suction means having a suction opening (3) and a suction duct (4), and a brush assembly having a rotatable roller brush (5), wherein the suction opening (3) and the roller brush (5) are arranged in the main body (2) in such a manner as to face the floor to be cleaned, wherein the suction opening (3) has a first wall (14) facing the front edge (13) of the main body (2) and a second wall (15) facing the roller brush (5), the roller brush (5) being designed to loosen dirt from the floor to be cleaned, wherein additionally a means (6) is provided to wet the floor to be cleaned with liquid and is associated with the roller brush (5), characterized in that a lip (7) is pivotally associated with the suction opening (3), which lip optionally bears against the first wall (14) or the second wall (15).

## Abstract:

A cleaning device (1) comprising a main body (2), a suction means having a suction opening (3) and a suction duct (4),  
5 and a brush assembly having a rotatable roller brush (5),  
wherein the suction opening (3) and the roller brush (5) are  
arranged in the main body (2) in such a manner as to face  
the floor to be cleaned, wherein the suction opening (3) has  
a first wall (14) facing the front edge (13) of the main  
10 body (2) and a second wall (15) facing the roller brush (5),  
the roller brush (5) being designed to loosen dirt from the  
floor to be cleaned, wherein additionally a means (6) is  
provided to wet the floor to be cleaned with liquid and  
is associated with the roller brush (5), characterized in  
15 that a lip (7) is pivotably associated with the suction  
opening (3), which lip optionally bears against the first  
wall (14) or the second wall (15).

## CLEANING APPARATUS

5 The invention relates to a cleaning apparatus, comprising a  
main body, a suction device with a suction opening and a  
suction channel, and a brush arrangement with a rotatable  
brush roller, wherein the suction opening and the brush  
roller are arranged in the main body such that they are  
facing the floor to be cleaned, wherein the suction opening  
10 has a first wall, facing the front edge of the main body,  
and a second wall, facing the brush roller, wherein the  
brush roller is designed to detach dirt from the floor to  
be cleaned, wherein a device intended for wetting the floor  
to be cleaned with liquid and assigned to the brush roller  
15 is also provided.

Such a cleaning apparatus is known from CN 205126117 U. The  
cleaning apparatus enables combined dry and wet cleaning.

20 When the cleaning apparatus is being moved in one  
direction, first of all the suction opening comes into  
contact with the dirt resting on the floor to be cleaned.  
Here, particulate and dust-like dirt are conveyed through  
the suction opening and the suction channel into a dirt  
25 container. At the same time, the floor to be cleaned is  
wetted with a cleaning liquid, which detaches dirt adhering  
to the floor, by means of the device. This dirt is then  
removed from the floor to be cleaned by the brush roller.

30 The suction opening is delimited along the longitudinal  
edge by two lips, which protrude in the direction of the  
floor to be cleaned. The lips are required to maintain the  
necessary suction pressure for sucking in particulate and  
liquid dirt. In the case of this configuration, it is  
35 disadvantageous that the cross-sectional width of the  
suction opening is limited, and as a result relatively

large particles cannot be received by the suction opening. The sealing lip assigned to the front side also pushes some of the particulate dirt along during the forward movement like a blade of a snowplow, with the result that said dirt  
5 does not enter the suction channel. Furthermore, the sealing lip assigned to the brush roller can push along some of the liquid to be received, with the result that said liquid likewise cannot enter the suction channel during the backward movement.

10

The invention is based on the object of providing a cleaning apparatus which enables improved receiving of particulate and wet dirt.

15

This object is achieved by the features of claim 1. The dependent claims refer to advantageous configurations.

20

To achieve the object, a lip, which bears alternately against the first wall or the second wall of the suction opening, is assigned pivotably to the suction opening. Here, the lip preferably bears alternately against the first wall or the second wall, depending on the direction of movement of the cleaning apparatus. When the cleaning apparatus is moved in one direction, for example forward,  
25 the lip bears against the second wall facing the brush roller, with the result that a gap, through which dirt, in particular particulate dirt, enters the suction channel via the suction opening, opens along the front edge in the region of the first wall. In the case of movement in the opposite direction, for example backward, the lip bears  
30 against the first wall, with the result that a gap, through which the dirt detached by the brush roller and the liquid applied by the device enter the suction channel, opens in the region of the second wall. In the case of this  
35 configuration, it is advantageous that the arrangement requires only a single lip. In particular, it is not

necessary to delimit both longitudinal edges of the suction opening separately by a lip in each case. By virtue of the fact that the lip is arranged pivotably in the main body, on the one hand a larger cross section for the suction opening can be provided in the region of the front edge. As  
5 a result, said suction opening can receive larger particles. On the other hand, in the other direction of movement the lip functions as a take-up lip and pushes the liquid along, so that it is received by the suction  
10 opening.

The lip preferably rests on the floor to be cleaned. As a result, it is ensured that the lip can pivot depending on the direction of movement of the cleaning apparatus.  
15 Furthermore, in particular the suction power of the suction opening is improved.

The lip can be formed as a tilting lever and be fixed pivotably in the main body. In this configuration, along a  
20 longitudinal edge the lip can have a thickening, which is arranged in a congruent recess of the main body.

A V-shaped slit, through which the lip protrudes, can be assigned to the recess. As a result, an undercut is formed,  
25 which fixes the lip in the main body. The V-shaped slit results in the pivotability of the lip.

According to an advantageous configuration, the lip is slanted when the lip bears against the second wall and is  
30 perpendicular to the floor to be cleaned when the lip bears against the first wall. As a result, the lip rests with pretensioning on the floor to be cleaned when the lip bears against the first wall. As a result, the cleaning power with respect to liquids is increased. When the lip bears  
35 against the second wall, there is less pretensioning, so that maneuvering of the cleaning apparatus is simplified.

The lip can be provided with at least one aperture. As a result, the lip can be arranged in the suction channel such that it is arranged between the suction channel and the suction opening. When the lip bears against the second wall, the flow-conducting connection between the floor to be cleaned and the suction channel is produced via the at least one aperture. The aperture can be formed in the form of a slit or in the form of a plurality of round or angular apertures. When the lip bears against the first wall, no air flow through the at least one aperture takes place.

The lip can have an elastic portion. The elastic portion is preferably assigned to the floor to be cleaned. The lip preferably comprises a rigid portion and an elastic portion.

Here, the second gap delimited by the second wall and the floor to be cleaned preferably has, on account of the smaller gap dimension, a smaller cross section than the second gap delimited by the first wall and the floor to be cleaned. By virtue of the resultant narrowing of the flow cross section in the region of the second gap, the suction pressure is increased, which improves the receiving of wet dirt, which usually has a higher density.

The first gap delimited by the first wall and the floor to be cleaned correspondingly has a larger gap dimension. Particulate dirt, in particular relatively large particles, can be better received as a result of the larger gap dimension.

The lip can be produced from injection-moldable plastic, wherein the rigid and the elastic portion are produced by two-component injection molding and the elastic portion consists of thermoplastic elastomer. The rigid portion

consists of a dimensionally stable plastic and enables a defined function of the lip.

5 The lip can have at least one, preferably a plurality of spacers along the edge assigned to the floor to be cleaned. Here, the spacers are designed and arranged on the lip such that, when the cleaning apparatus is being moved forward, they come into contact with the floor to be cleaned and bring about the effect that a narrow gap, on which the  
10 suction pressure acts, is produced between that edge of the lip which is assigned to the floor to be cleaned and the floor to be cleaned. As a result, cleaning liquid from the region of the device can be received at least partially also during the forward movement.

15 The device for wetting the floor to be cleaned with liquid can be designed as a drip-feed device. In an alternative configuration, the device can be in the form of a spraying device. Here, the device is designed to apply cleaning  
20 liquid to the floor to be cleaned in a dripping manner or, in the case of the spraying device, as a spray mist. The cleaning liquid detaches firmly adhering dirt.

25 The device can be arranged between the brush roller and the suction opening. As a result, the cleaning liquid is applied to the floor to be cleaned in the immediate vicinity of the brush roller and the suction channel.

30 The brush roller can have a soft fibrous web, for example of microfibers, on the circumference. As an alternative, soft or hard bristles can also be used.

35 The suction channel can be operatively connected to an extractor fan. The extractor fan is preferably operatively connected to an electric motor. Said electric motor can be supplied with electrical current via a grid power

connection or via a battery.

A dirt container can be arranged between the suction  
channel and the extractor fan. The dirt container is  
5 preferably removably arranged in the main body.

Some configurations of the cleaning apparatus according to  
the invention are explained in more detail below with  
reference to the figures. In the figures, in each case  
10 schematically:

Figure 1 shows the cleaning apparatus in section, wherein  
the lip bears against the second wall;  
Figure 2 shows the cleaning apparatus in section, wherein  
15 the lip bears against the first wall;  
Figure 3 shows in detail the lip in a front view;  
Figure 4 shows the cleaning apparatus according to figure  
1 with an alternatively configured lip;  
Figure 5 shows the cleaning apparatus according to figure  
20 2 with an alternatively configured lip;  
Figure 6 shows in detail the alternatively configured lip  
in a front view.

The figures show a cleaning apparatus 1 with a main body 2.  
25 Arranged in the main body 2 is a suction device with a  
suction opening 3 and a suction channel 4, and a brush  
arrangement with a rotatable brush roller 5. Here, the  
suction opening 3 and the brush roller 5 are arranged in  
the main body 2 such that they are facing the floor to be  
30 cleaned.

The suction opening 3 has a first wall 14, facing the front  
edge 13 of the main body 2, and a second wall 15, facing  
the brush roller 5. A first gap is produced between that  
35 edge of the first wall 14 which faces the floor to be  
cleaned and the floor to be cleaned. A second gap is



produced between that edge of the second wall 15 which faces the floor to be cleaned and the floor to be cleaned. The gap dimension, the clear height between the edge and the floor, is larger in the case of the first gap than in  
5 the case of the second gap. The first wall 14 and the second wall 15 extend transversely over the main body 2 and delimit the substantially rectangular suction opening 3.

The brush roller 5 is designed to detach dirt from the  
10 floor to be cleaned. In the present configuration, the brush roller 5 has a soft fibrous web of microfibers. A device 6 for wetting the floor to be cleaned with liquid is also assigned to the main body 2. The device 6 is arranged between the brush roller 5 and the suction opening 3.  
15 During the cleaning process, a cleaning liquid, which detaches firmly adhering dirt, drips out of the device 6 onto the floor to be cleaned. Finally, the detached dirt is removed by the brush roller 5 from the floor to be cleaned and finally enters the suction channel 4. In this respect,  
20 the device 6 is assigned to the brush roller 5.

A lip 7, which bears alternately against the first wall 14 or the second wall 15, is assigned pivotably to the suction opening 3.  
25

The lip 7 rests on the floor to be cleaned, is in the form of a tilting lever and is fixed pivotably in the main body 2. For this purpose, along a longitudinal edge the lip 7 has a circular thickening 10, which is arranged in a  
30 congruently formed recess 11 of the main body 2. The recess 11 ends in a V-shaped slit 12, through which the lip 7 protrudes. The V-shaped slit 12 predefines the rotational mobility of the lip 7.

35 The lip 7 is substantially rectangular and has an elastic portion 9, which is assigned to the floor to be cleaned.

When the lip 7 bears against the first wall 14, the lip is aligned perpendicular to the floor to be cleaned and bears with elastic pretensioning against the floor to be cleaned. When the lip 7 bears against the second wall 15, the lip is aligned in a slanted manner with respect to the floor to be cleaned, with the result that the pretensioning against the floor to be cleaned is low. The lip 7 is also provided with a substantially rectangular aperture 8.

The suction channel 4 is operatively connected to an extractor fan. In turn, the extractor fan is driven by an electric motor. The electric motor can be supplied with electrical energy by a battery or by a grid power connection. A dirt container, which is removably provided in the main body 2, is arranged between the suction channel 4 and the extractor fan.

Figure 1 shows the cleaning apparatus 1, which is guided over the floor to be cleaned in the direction of the front edge 13. This direction of movement can be understood to be a forward movement. Here, the lip 7 tilts and thus bears against the second wall 15 of the main body 2. In this position, the suction opening 3 and the suction channel 4 are connected in a flow-conducting manner through the aperture 8 of the lip 7. The cleaning liquid, which is applied by the device 6 to the floor to be cleaned during this movement, comes into contact with the brush roller 5 after a short acting time. The brush roller 5 then detaches firmly adhering dirt. At the same time, the suction opening 3 receives particulate dirt and conveys it through the suction channel 4 into the dirt container.

Figure 2 shows the cleaning apparatus 1 in a direction of movement in the direction of the brush roller 5. This direction of movement can be understood to be a backward movement. Here, the lip 7 tilts against the first wall 14

of the main body 2. Here, the lip blocks the first gap between the first wall 14 and the floor to be cleaned. Furthermore, during the backward movement the lip 7 pushes dirt, which has been detached by the brush roller 5, and liquid along, with the result that said dirt and liquid enter the suction channel 4. The small gap dimension of the second gap between the second wall 15 and the floor to be cleaned and the first gap shut off by the lip 7 results in the development of a very high suction pressure, which is suitable for receiving the cleaning liquid applied to the floor to be cleaned along with dirt detached by the brush roller 5.

A handle for guiding the cleaning apparatus 1 can be assigned to the main body 2. In all alternative configurations, the cleaning apparatus 1 is designed as a cleaning robot.

Figure 3 shows the lip 7 in a front view. The aperture 8, which is incorporated in the lip 7, can be seen.

Figure 4 shows the cleaning apparatus 1 according to figure 1. In the case of the present configuration, the lip 7 is of an alternative configuration and has a plurality of spacers 16 along the edge assigned to the floor to be cleaned. When the cleaning apparatus 1 is being moved forward, the spacers 16 come into contact with the floor to be cleaned and bring about the effect that a narrow gap, on which the suction pressure acts, is produced between that edge of the lip 7 which is assigned to the floor to be cleaned and the floor to be cleaned. As a result, cleaning liquid can be received at least partially also during the forward movement.

Figure 5 shows the cleaning apparatus 1, with a lip 7 of an alternative configuration, during the backward movement

analogous to figure 2. In the case of this direction of movement, that edge of the lip 7 which is assigned to the floor to be cleaned rests linearly on the floor to be cleaned. By contrast, the spacers 16 are not in contact  
5 with the floor to be cleaned.

Figure 6 shows the lip 7 of an alternative configuration in a front view. The aperture 8, which is incorporated in the lip 7, can be seen. Furthermore, the spacers 16, which are  
10 arranged along that edge of the lip 7 which is assigned to the floor to be cleaned, can be seen. The spacers 16 are made of one and the same material and designed in one piece with the lip 7 and are designed as elevations.

15

## Claims:

1. A cleaning apparatus (1), comprising a main body (2), a suction device with a suction opening (3) and a suction channel (4), and a brush arrangement with a rotatable brush roller (5), wherein the suction opening (3) and the brush roller (5) are arranged in the main body (2) such that they are facing the floor to be cleaned, wherein the suction opening (3) has a first wall (14), facing the front edge (13) of the main body (2), and a second wall (15), facing the brush roller (5), wherein the brush roller (5) is designed to detach dirt from the floor to be cleaned, wherein a device (6) intended for wetting the floor to be cleaned and assigned to the brush roller (5) is also provided, characterized in that a lip (7), which bears alternately against the first wall (14) or the second wall (15), is assigned pivotably to the suction opening (3).
2. The cleaning apparatus as claimed in claim 1, characterized in that the lip (7) rests on the floor to be cleaned.
3. The cleaning apparatus as claimed in claim 1 or 2, characterized in that the lip (7) is provided with at least one aperture (8).
4. The cleaning apparatus as claimed in one of claims 1 to 3, characterized in that the lip (7) has an elastic portion (9).
5. The cleaning apparatus as claimed in claim 1 to 4, characterized in that the lip (7) is formed as a tilting lever and is fixed pivotably in the main body (2).
6. The cleaning apparatus as claimed in claim 5, characterized in that the lip (7) rests with

pretensioning on the floor to be cleaned when the lip (7) bears against the first wall (14).

- 5        7. The cleaning apparatus as claimed in one of claims 1 to 6, characterized in that the lip (7) has at least one spacer (16) along the edge assigned to the floor to be cleaned.
- 10       8. The cleaning apparatus as claimed in one of claims 1 to 7, characterized in that a gap is respectively formed between the first wall (14) and the floor to be cleaned and between the second wall (15) and the floor to be cleaned.
- 15       9. The cleaning apparatus as claimed in claim 8, characterized in that the gap between the first wall (14) and the floor to be cleaned has a larger gap dimension than the gap between the second wall (15) and the floor to be cleaned.
- 20       10. The cleaning apparatus as claimed in one of claims 1 to 9, characterized in that the device (6) is arranged between the brush roller (5) and the suction opening (3).
- 25       11. The cleaning apparatus as claimed in one of claims 1 to 10, characterized in that the suction channel (4) is operatively connected to an extractor fan.
- 30       12. The cleaning apparatus as claimed in claim 11, characterized in that a dirt container is arranged between the suction channel (4) and the extractor fan.

Fig. 1

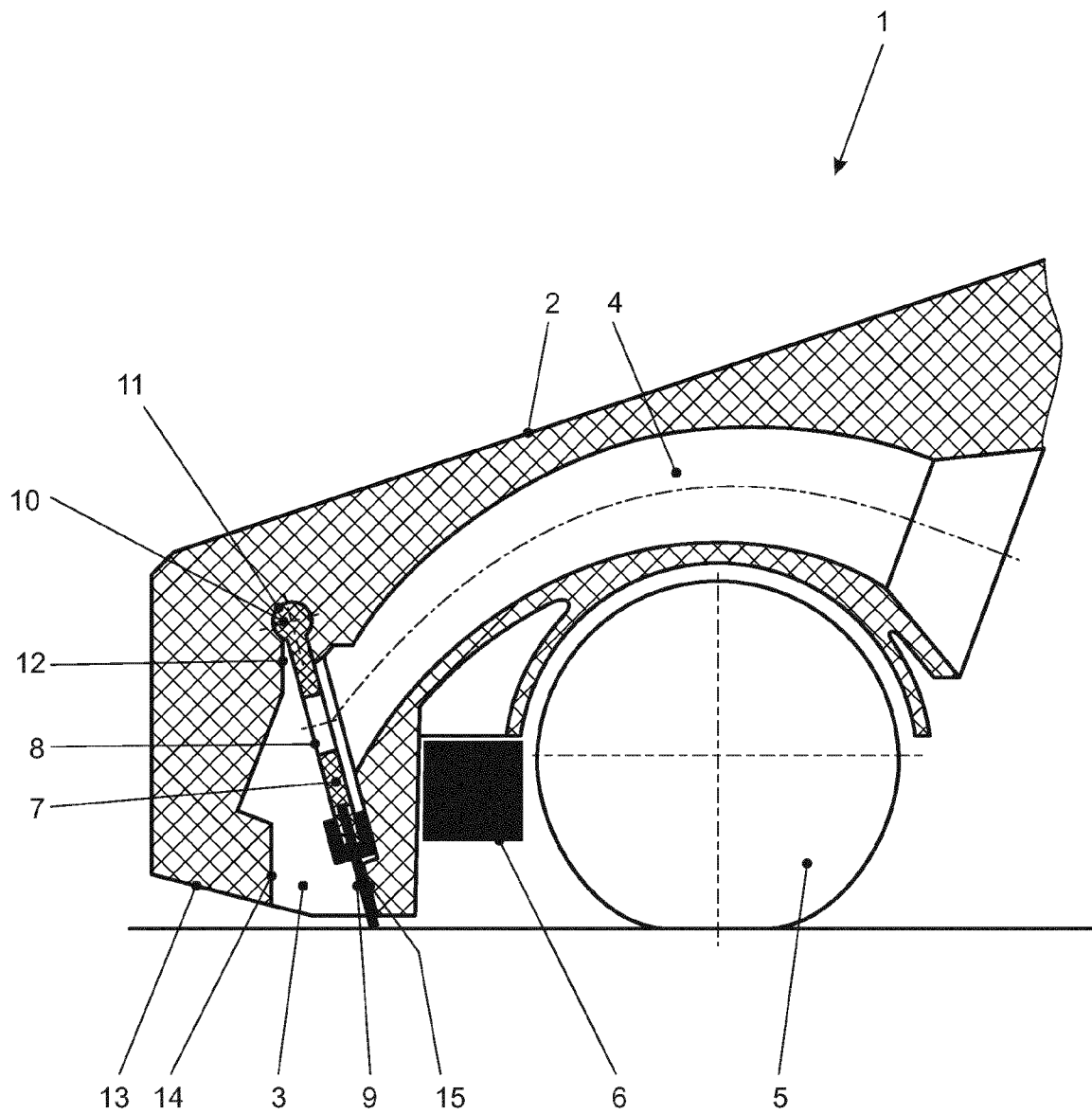


Fig. 2

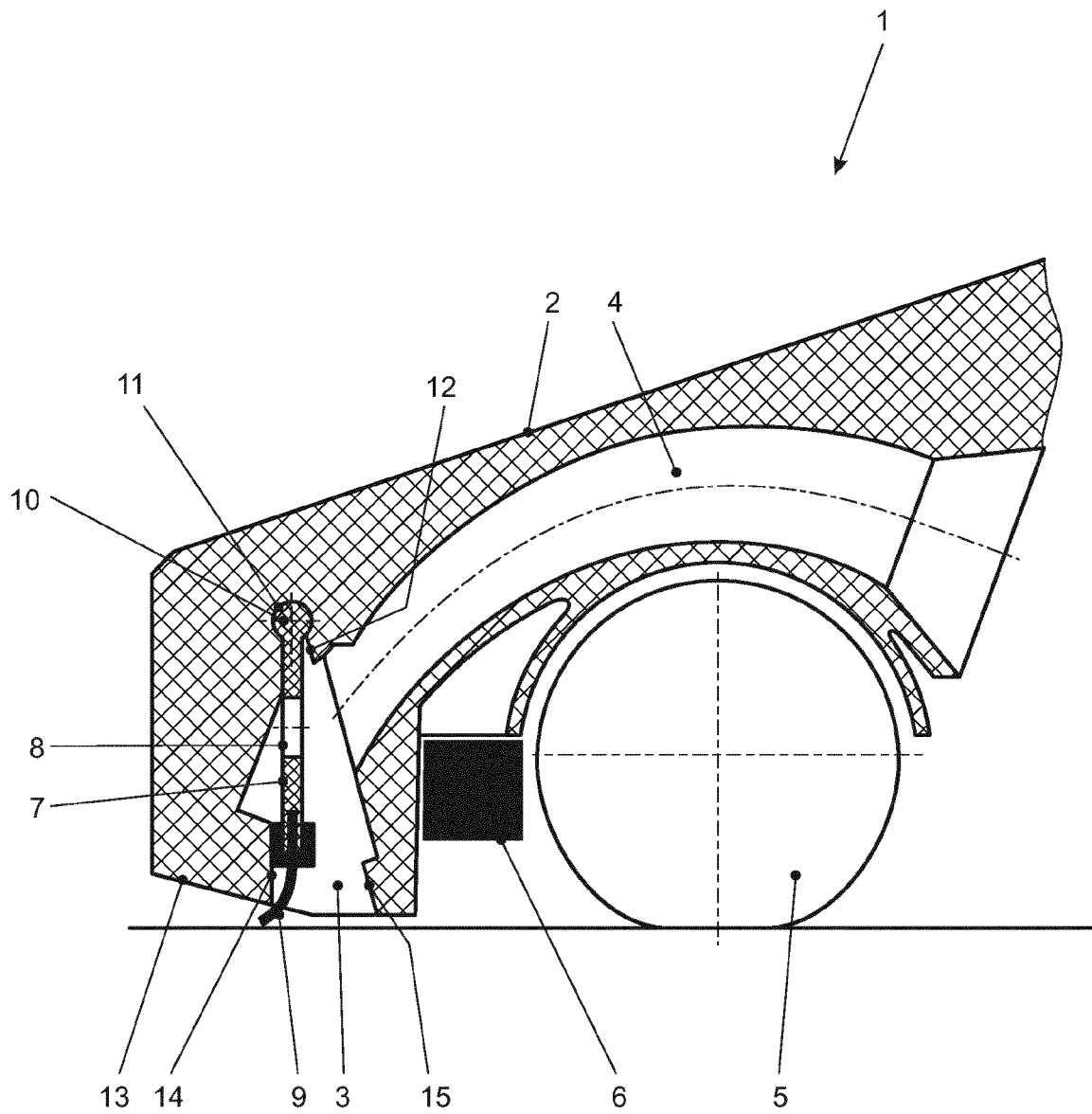




Fig. 3

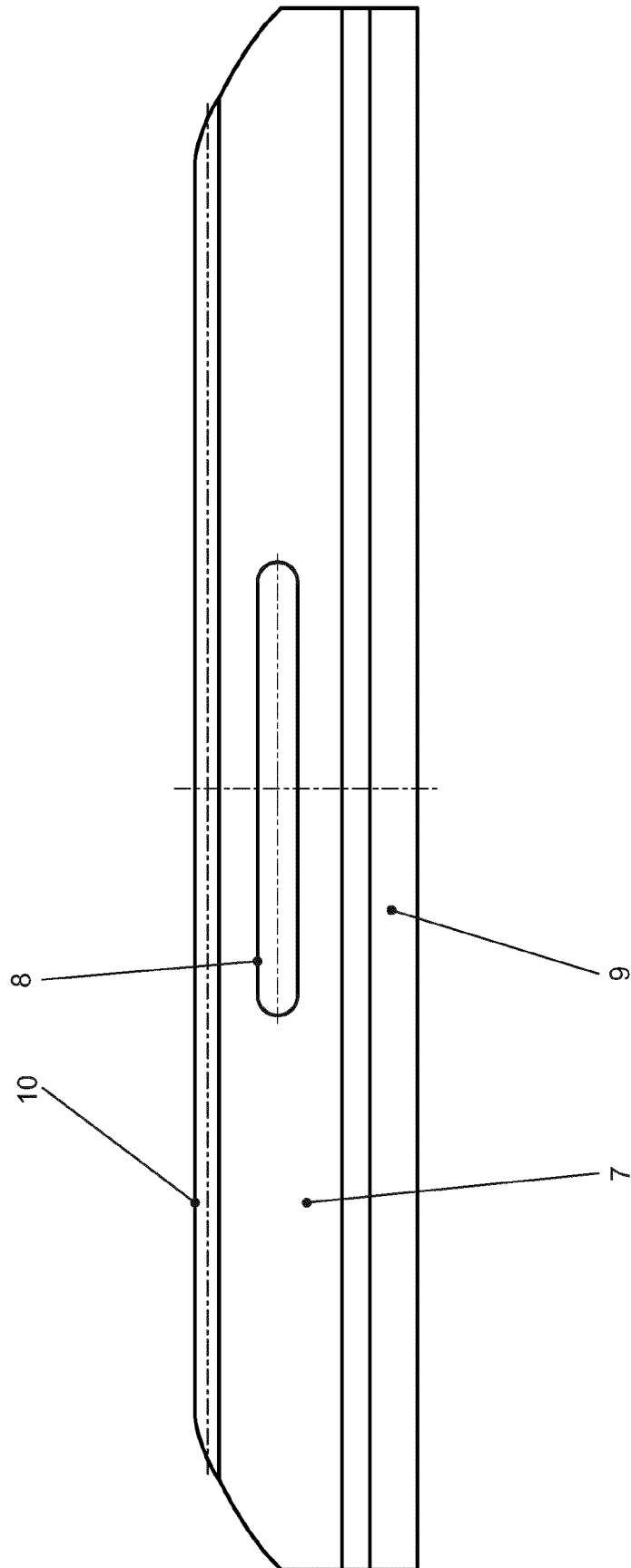


Fig. 4

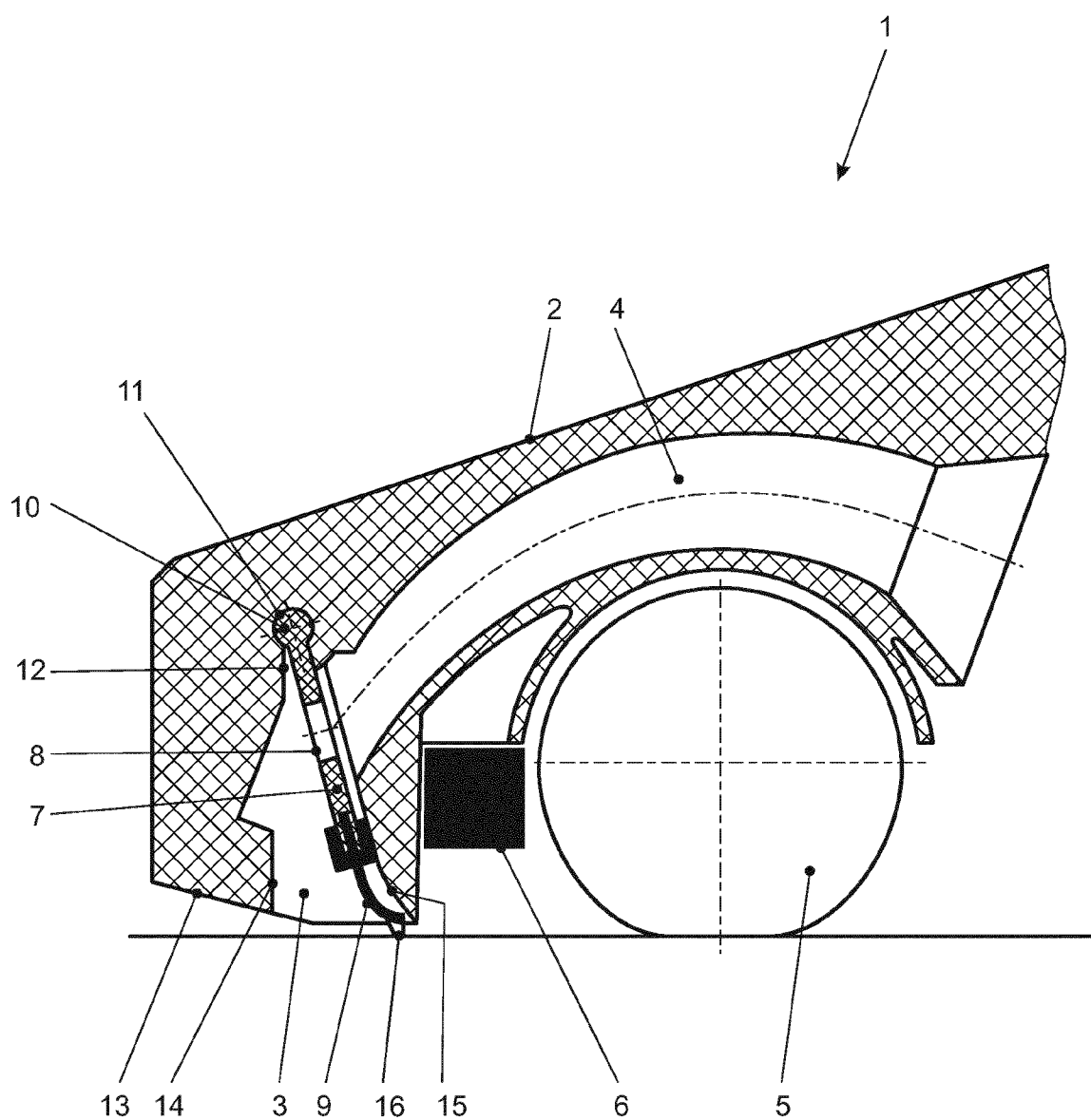
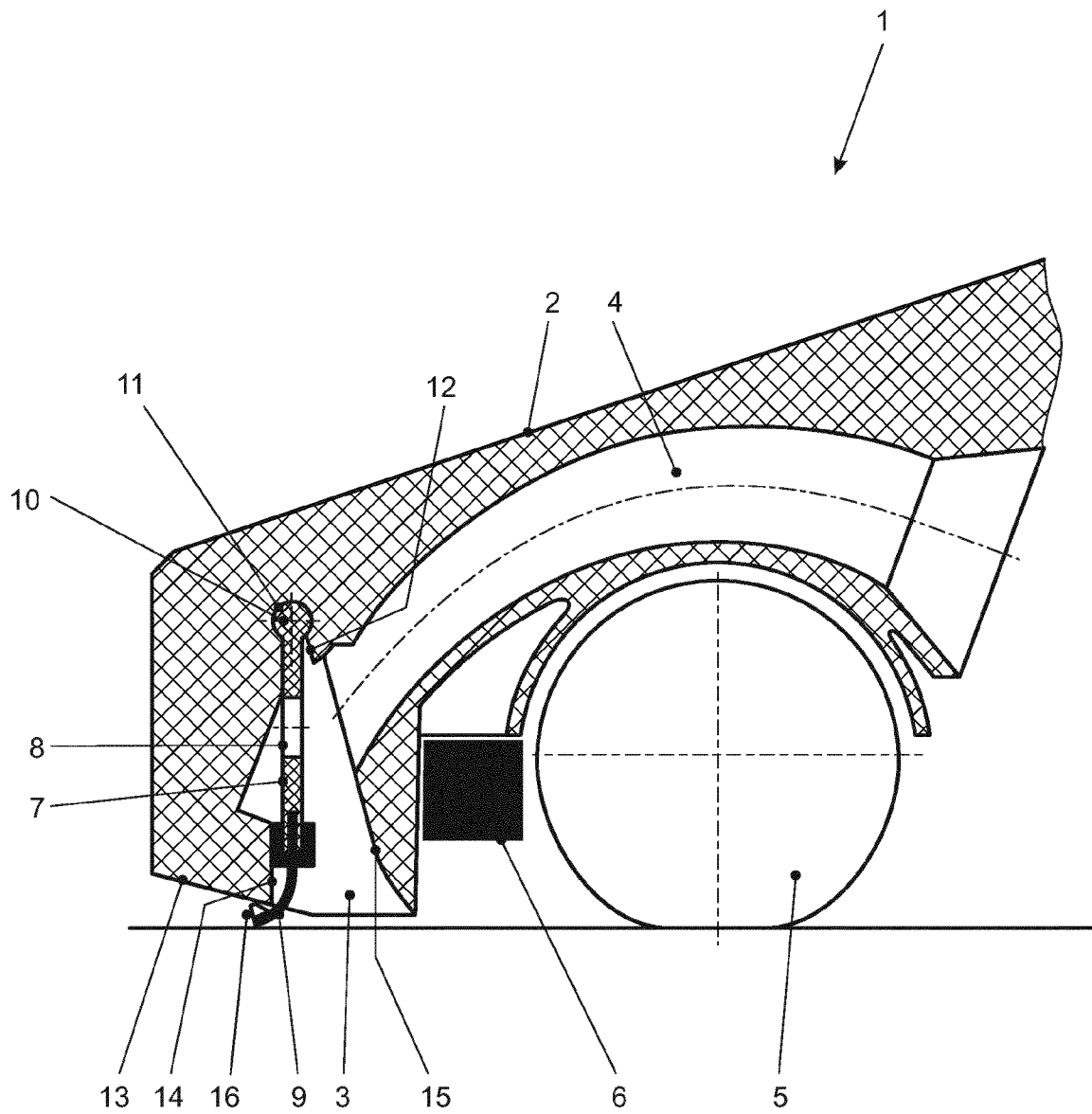


Fig. 5



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Fig. 6

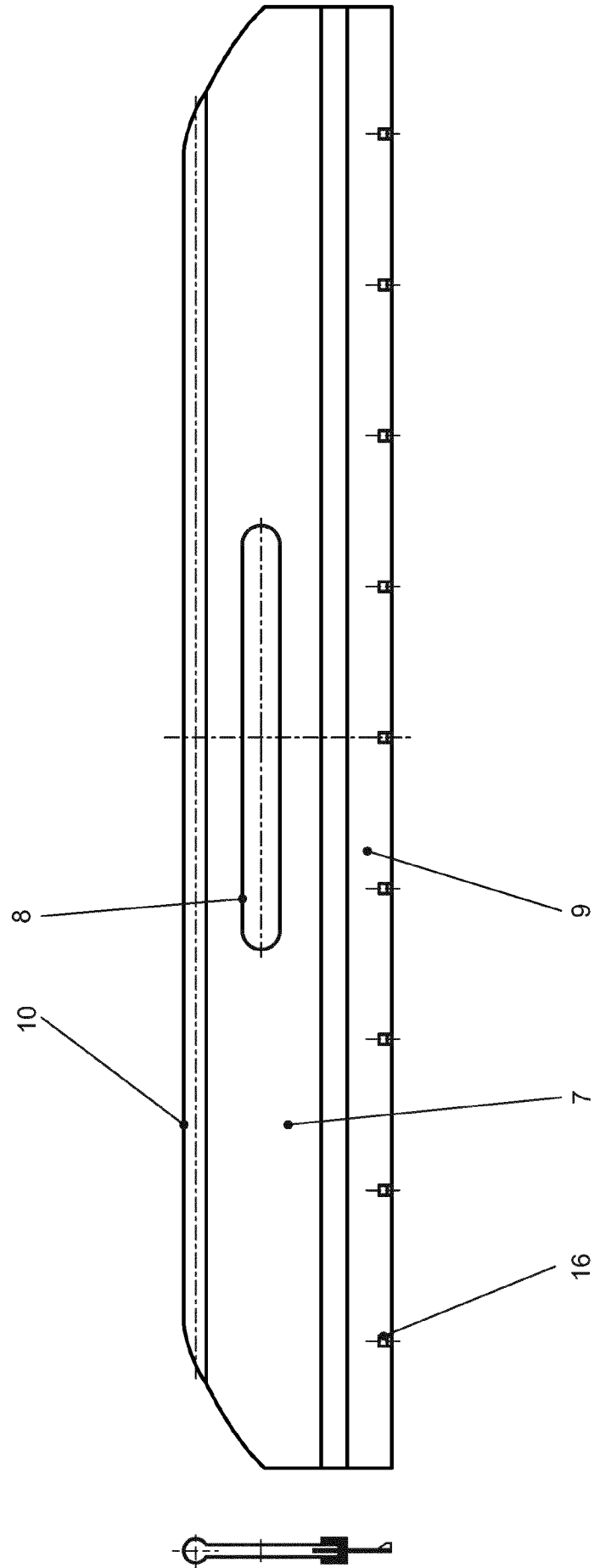


Fig. 1

