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(54) Support device for a snowplough blade

(57) The support device (1) for a snowplough blade (3) comprises a body (5) produced in one piece and defining: a reservoir (6), pumping means (7) and support means (8, 17) for the blade (3), the pumping means (7) being fed by the reservoir (6) and operating the support means (8, 17) for the blade (3).

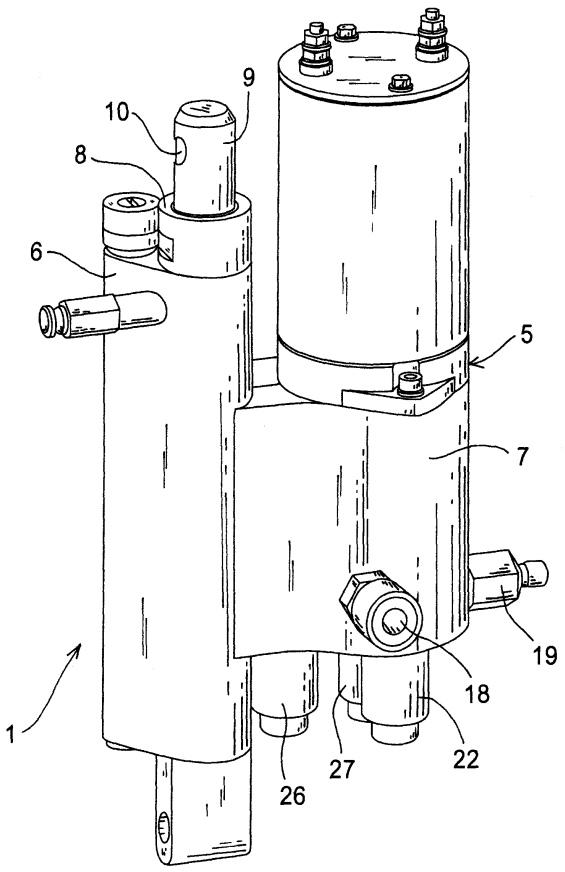

FIG. 1

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Description

[0001] The present invention relates to a support device for a snowplough blade.

[0002] Snowplough blades are currently mounted on and manipulated by suitable vehicles provided with support devices which are very heavy and bulky.

[0003] For example, a blade support system typically presents a plurality of hydraulic cylinders for supporting and swivelling the blade and a plurality of valves and control and safety systems connected together, which make the device extremely heavy and bulky.

[0004] Because of the considerable weight and large dimensions of traditional devices a snowplough blade cannot be mounted on "generic" vehicles even if these are of very large dimensions and engine power, such as SUVs.

[0005] The technical aim of the present invention is therefore to provide a support device for a snowplough blade which enables the stated technical drawbacks of the known art to be eliminated.

[0006] Within the scope of this technical aim an object of the invention is to provide a device of small dimensions and weight such that it can also be mounted on a vehicle of generic type (i.e. not specifically designed therefore) without the risk of this overturning because of the weight.

[0007] Another object of the invention is to provide an economical device.

[0008] The technical aim together with these and further objects are attained according to the present invention by a support device for a snowplough blade in accordance with claim 1.

[0009] Other characteristics of the present invention are defined in the subsequent claims.

[0010] Further characteristics and advantages of the invention will be more apparent from the description of a preferred but non-exclusive embodiment of the device of the invention, illustrated by way of nonlimiting example in the accompanying drawings, in which:

Figure 1 is a perspective view of a device of the invention;

Figure 2 is a circuit diagram of the device of the invention (including a second swivel cylinder for the snowplough blade);

Figure 3 is a schematic perspective view of a snowplough blade mounted on a vehicle; and

Figure 4 is a schematic side elevation (partly sectioned) of a vehicle carrying a snowplough blade.

[0011] With reference to said figures, these show a snowplough blade support device indicated overall by the reference numeral 1.

[0012] Figure 3 shows a "generic" motor vehicle (such as a SUV) on which a device of the invention is mounted to support a snowplough blade 3.

[0013] The blade 3 is used to shift snow while the vehicle 2 is travelling; its position can be adjusted vertically (as indicated by the arrow F1) or horizontally (as indicated by the arrow F2).

[0014] Specifically, the device 1 comprises a body 5 produced in one piece by casting; the body 5 defines a reservoir 6, pumping means 7 (consisting of a gear pump connected to a preferably electric motor powered by the vehicle battery) and support means 8 for the blade 3; the pumping means 7 are fed by the reservoir 6 and operate the blade support means 8.

[0015] The support means 8 comprise a first hydraulic cylinder for raising the blade; as shown in Figure 1 this first cylinder 8 is defined by the body 5 and within it there moves a piston rod 9 the end of which carries a through holed seat 10 for connection to the blade 3.

[0016] The first hydraulic cylinder 8 is single acting (only one of its chambers is fed by the fluid from the pump 7) and operates against the action of a spring, consisting of an air spring formed in the first hydraulic cylinder 8 at the opposite end to that comprising the inlet and outlet for the operating fluid originating from the pump 7.

[0017] The first cylinder 8 is also connected to a unidirectional valve 13 enabling air to enter its interior at that chamber 12 of the first cylinder 8 which defines the spring, only when the cylinder piston rod re-enters the cylinder.

[0018] Alternatively the chamber 12 can be pressurized and can contain pressurized fluid (gas) to increase the elastic thrust.

[0019] For regulating the (maximum) pressure of the first cylinder 8, the device 1 comprises a regulating valve 14 connected in parallel with the valve 13.

[0020] The device also comprises a second hydraulic cylinder 17 for defining the lateral orientation (or swivelling) of the blade 3.

[0021] Preferably the second cylinder 17 is external to the body 5, which (body 5) presents two connectors 18, 19 for connection to the second cylinder 17.

[0022] The second cylinder 17 is a double acting cylinder (for this reason two feed/discharge connectors are required), consequently the body 5 presents two connectors 18, 19 for feeding the second cylinder 17.

[0023] As shown in Figure 2, the device comprises only one second cylinder 17 connected to one side of the blade 3; the blade 3 also presents a hinge 20 (for example of ball type to enable it to be vertically adjusted and swivelled) for its hinging to a frame of the vehicle 2 on its transverse axis of symmetry.

[0024] The body defines a plurality of conduits defining the feed circuit of the first and second cylinder.

[0025] The body 5 also presents, for feeding the connectors 18, 19, a feed circuit comprising at least one control valve 22, a bypass valve 23 and a non-return valve 24.

[0026] The feed circuit for the connectors 18, 19 comprises a recirculation valve 25 for the operating liquid leaving one of the chambers of the second cylinder 17, to feed it into the other chamber of the second cylinder 17.

[0027] The device also comprises a control valve 26 for deviating the flow of operating liquid delivered by the pump 7 from the first cylinder 8 to the second cylinder 17

and vice versa, to enable both the first cylinder 8 and the second cylinder 17 to be operated by a single pump 7.

[0028] A further unidirectional valve 27 is positioned in the line between the reservoir 6 and the first cylinder 8, to enable or prevent fluid passage through said line, and hence connect or not connect the reservoir to the first cylinder 8.

[0029] The operation of the device according to the invention is apparent from that described and illustrated, and is substantially the following.

[0030] The first cylinder 8 is operated by connecting it to the pump 7 via the valve 26; the pump 7 feeds liquid which enters the cylinder 8 by compressing the air contained in the chamber 12 (which is unable to leave via the unidirectional valve 13); if a safety pressure is exceeded the valve 14 would automatically open to discharge air to the outside.

[0031] When the blade 3 has been brought into the required (vertical) position (adjustment in the direction of the arrow F1), the cylinder 8 is isolated by setting the valve 26 and valve 27 in the configuration shown in Figure 2; in this manner the piston rod of the cylinder 8 is unable to reenter the cylinder because the liquid (incompressible oil) is unable to leave the isolated cylinder 8, and at the same time a force exists which urges the piston rod towards the interior of the cylinder 8 (as indicated by the arrow F), which ensures that the position of the piston rod and hence of the blade 3 is maintained.

[0032] The blade is raised by operating the valve 27 so that it closes the circuit into which it is connected, in order to enable the liquid contained in the cylinder 8 to discharge into the reservoir 6.

[0033] The cylinder 17 is operated by suitably controlling the valves 22, 25.

[0034] Specifically, to cause the piston rod of the cylinder 17 to emerge from the cylinder (as indicated by the arrow F4) the valve 22 is kept open (as shown in Figure 2) while the valve 25 is closed (enabling liquid to pass through it); in this manner the liquid pumped by the pump 7 passes through the valve 24 and the valve 25, passes through the connector 18 and enters the chamber 17a of the cylinder 17; at the same time the fluid leaving the chamber 17b passes through the connector 19 and through the valve 25 to also enter the chamber 17a.

[0035] The cylinder is operated in the direction of the arrow F5 by leaving the valve 25 open and closing the valve 22 (so that this can be traversed by the fluid); in this case the fluid pumped by the pump 7 passes through the valve 24 and the connector 19 to penetrate into the chamber 17b of the cylinder 17.

[0036] The fluid leaving the chamber 17a of the cylinder 17 passes through the valve 22 to reach the intake side of the pump 7.

[0037] The bypass valve 23 enables the blade 3 to swing if it is struck laterally.

[0038] It has been found in practice that the device of the invention is particularly advantageous as it is very economical and light in weight, and can be easily mounted on generic vehicles.

[0039] The device conceived in this manner is susceptible to numerous modifications and variants, all falling within the scope of the inventive concept; moreover all details can be replaced by technically equivalent elements.

[0040] In practice the materials used and the dimensions can be chosen at will according to requirements and to the state of the art.

Claims

1. A support device (1) for a snowplough blade (3), **characterised by** comprising a body (5) produced in one piece and defining: a reservoir (6), pumping means (7) and support means (8, 17) for the blade (3), wherein the pumping means (7) are fed by the reservoir (6) and operate the support means (8, 17) for the blade (3).

2. A device (1) as claimed in claim 1, **characterised in that** the support means (8, 17) comprise a first hydraulic cylinder (8) for raising the blade (3), said first cylinder (8) being defined by said body (5).

3. A device (1) as claimed in one or more of the preceding claims, **characterised in that** said first hydraulic cylinder (8) is single acting and operates against the action of a spring.

4. A device (1) as claimed in one or more of the preceding claims, **characterised in that** said spring is an air spring formed in said first hydraulic cylinder (8) at the opposite end to that comprising the inlet and outlet for the operating fluid.

5. A device (1) as claimed in one or more of the preceding claims, **characterised in that** said first hydraulic cylinder (8) is connected to a unidirectional valve (13) enabling air to enter its interior at that end of the first cylinder (8) which defines the spring, only when the cylinder piston rod re-enters said cylinder.

6. A device (1) as claimed in one or more of the preceding claims, **characterised by** comprising a regulating valve (14) for regulating the pressure of said first cylinder (8).

7. A device (1) as claimed in one or more of the preceding claims, **characterised in that** said support means comprise a second hydraulic cylinder (17) for defining the lateral orientation of said blade (3).

8. A device (1) as claimed in one or more of the preceding claims, **characterised in that** said second cylinder (17) is external to said body (5), said body (5) presenting at least one connector (18, 19) for

connection to said second cylinder (17).

9. A device (1) as claimed in one or more of the preceding claims, **characterised in that** said second cylinder (17) is a double acting cylinder, said body (5) presenting two connectors for feeding the second cylinder (17).

10. A device (1) as claimed in one or more of the preceding claims, **characterised by** comprising only one second cylinder (17) connectable to one side of said blade (3), said blade (3) presenting a hinge (20) for its hinging to a frame on its transverse axis of symmetry.

11. A device (1) as claimed in one or more of the preceding claims, **characterised in that** said body (5) presents, for feeding said connectors (18, 19), a circuit comprising at least one control valve (22), a bypass valve (23) and a non-return valve (24).

12. A device (1) as claimed in one or more of the preceding claims, **characterised in that** said circuit feeding said connectors (18, 19) comprises at least one valve (25) for recirculating the operating liquid leaving a chamber of the second cylinder (17), to feed it into the other chamber of said second cylinder (17).

13. A device (1) as claimed in one or more of the preceding claims, **characterised by** comprising a control valve (26) for deviating the flow of operating liquid delivered by the pumping means (7) from the first cylinder (8) to the second cylinder (17) or vice versa, to enable said first cylinder (8) and said second cylinder (17) to be operated by a single pumping means (7).

14. A device (1) as claimed in one or more of the preceding claims, **characterised in that** a unidirectional valve (27) is positioned in the line between the reservoir (6) and the first cylinder (8).

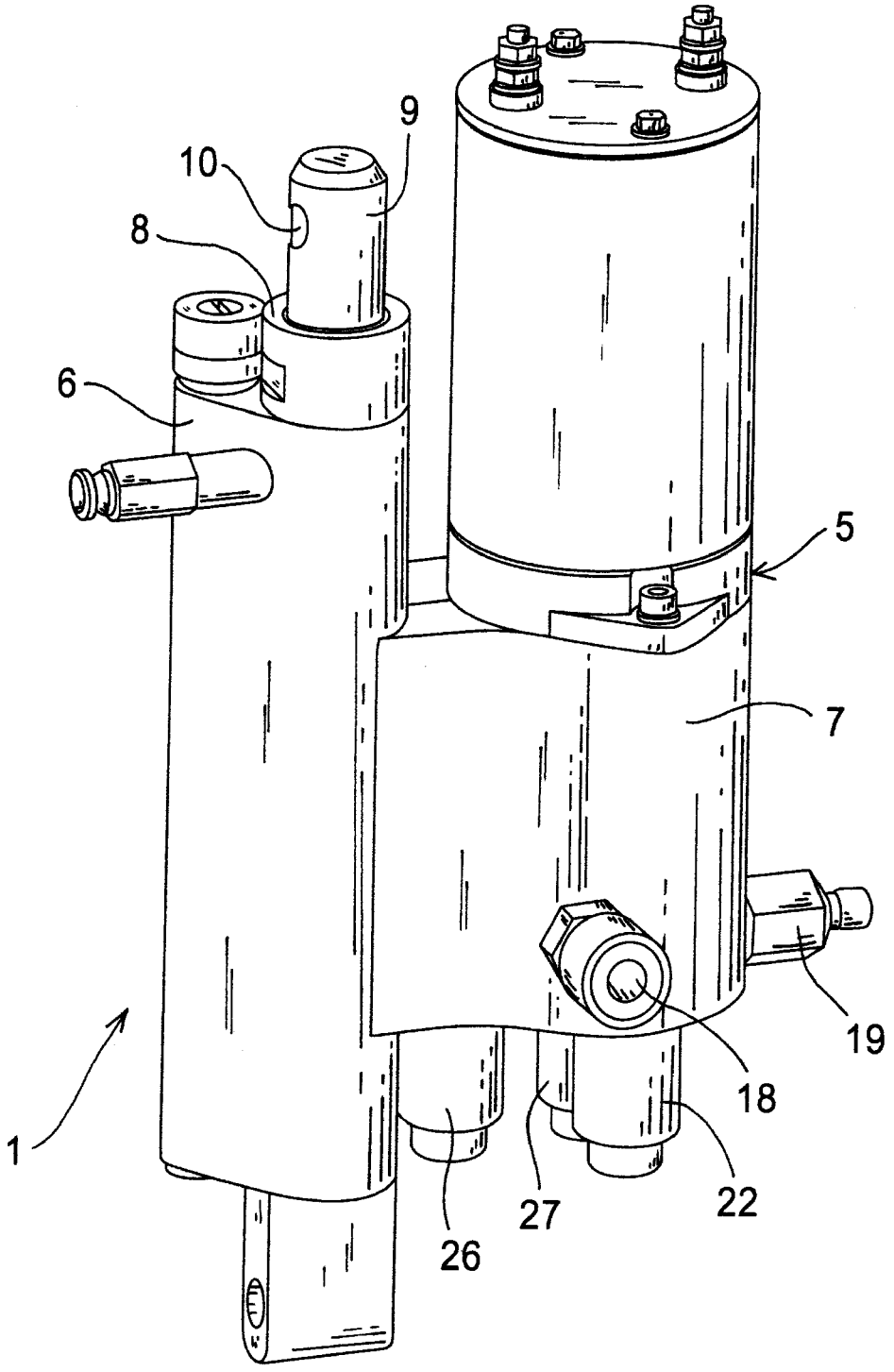

FIG. 1

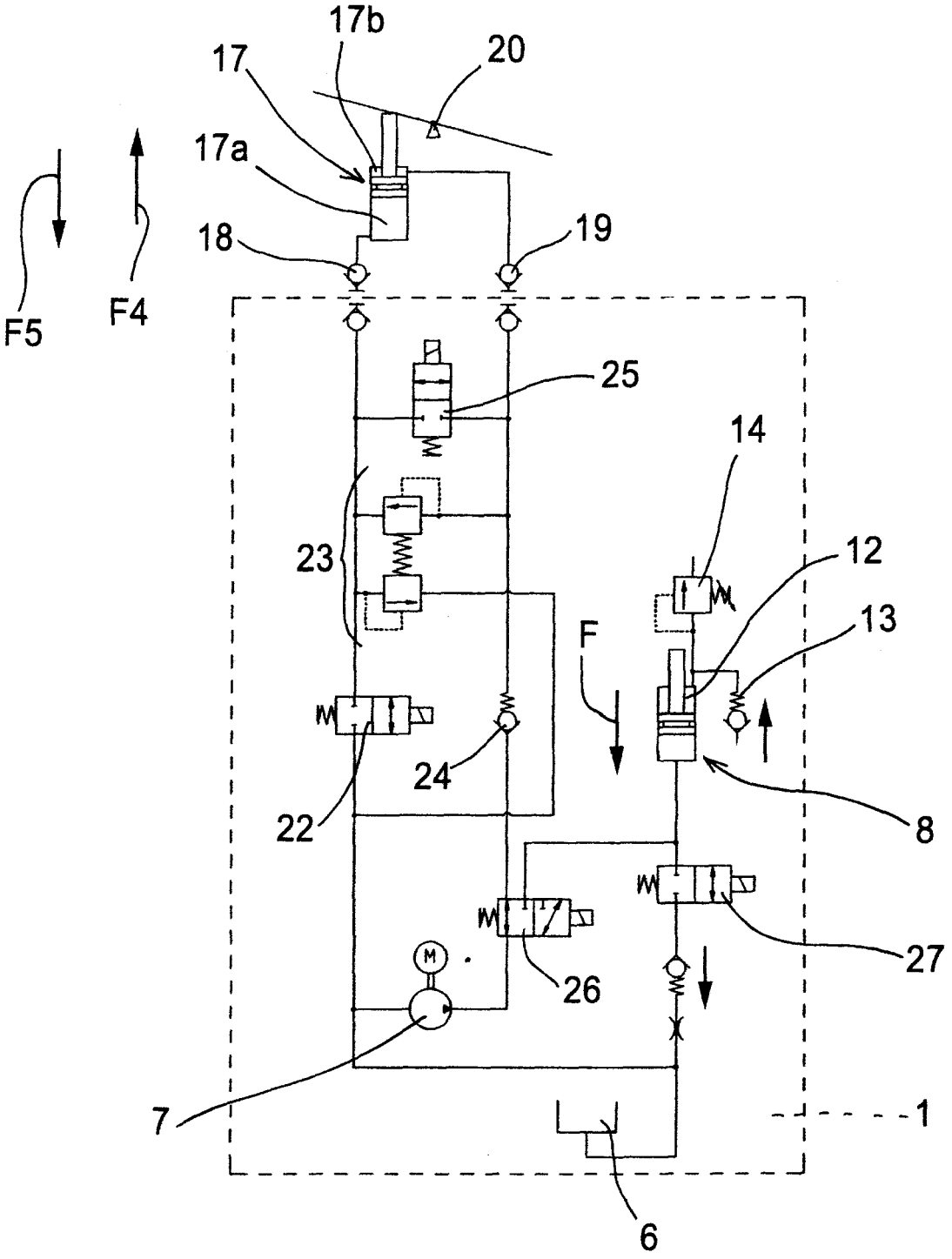

FIG. 2

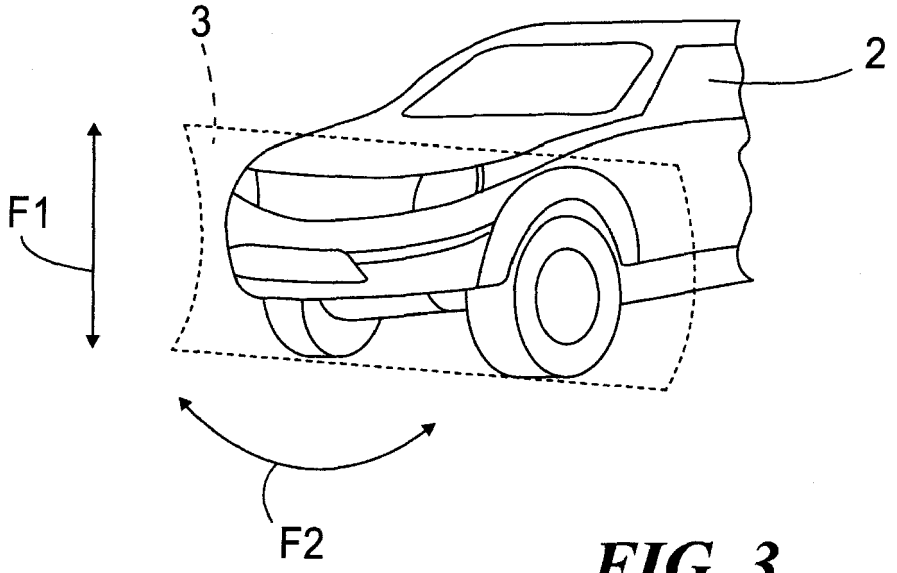

FIG. 3

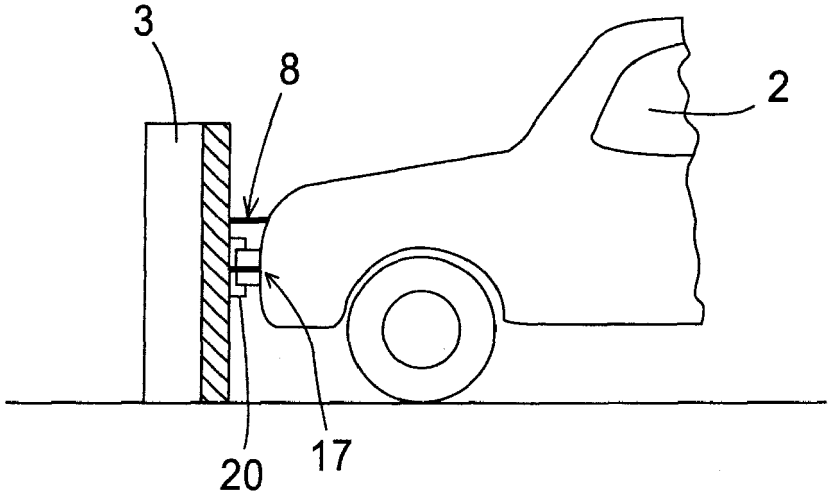

FIG. 4