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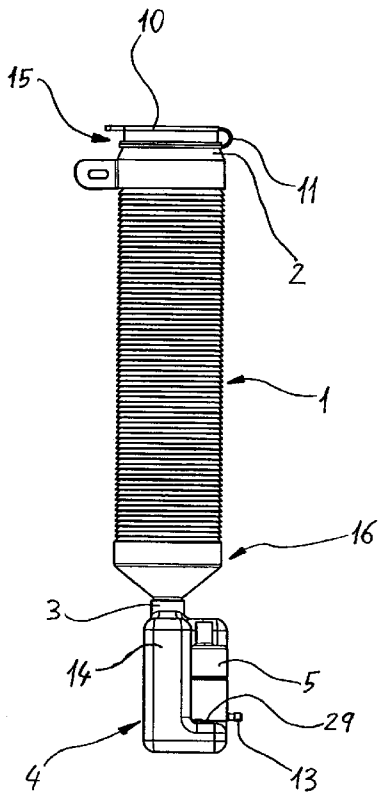
(54) **Title:** CONTAINER ASSEMBLY FOR WINDSHIELD AND HEADLIGHT WASHING FLUID IN A VEHICLE



(57) **Abstract:** A container assembly for windshield or headlight washing fluid in a vehicle. It comprises in combination: an elongated hollow structure (1) demarcated by a wall with a plurality of asymmetric accordion folds that can be arranged in a stable retracted position and in a flexible extended position, in which it is suitable for being installed in a useful space of an engine compartment in said vehicle, the hollow structure (1) in said extended position containing an operational amount of windshield or headlight washing fluid; a filling opening (2) located at an inlet end portion (15) of the hollow structure (1); at least one pump (5) associated to said hollow structure (1) for transferring contained fluid to a service point; and securing means for securing said inlet end portion (15) and one or more sections of the hollow structure (1) to said engine compartment in an installation area.

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CONTAINER ASSEMBLY FOR WINDSHIELD AND HEADLIGHT WASHING FLUID IN A VEHICLE

Field of the Art

The present invention relates to a container assembly for windshield or headlight washing fluid in a vehicle, including an extensible tank associated to a motor-driven pump and securing means for fixing the container assembly to the engine compartment of a vehicle for example.

When reference is made herein to a container for headlight washing fluid, it will be implicitly understood that the container must supply both a windshield and a headlight washing device.

Background of the Invention

Patent document JP-A-2004291838 describes a tank for windshield washing fluid formed from a tubular portion with accordion folds closed at its ends by a front wall and a rear wall, such that it can contract in the front-rear direction without breaking when it receives an impact. The solution described in this patent imposes an arrangement for assembling the tank in the engine compartment, or a very specific application and it does not describe or suggest that the tubular portion with accordion folds can adopt a compact, stable retracted position that is suitable for saving space during storage or transport, for example.

Patent document EP-A-1571047 describes a tank for windshield washing fluid constructed from a first rigid main tank portion, in which there is arranged a pump for driving the fluid, extended by a second expandable auxiliary tank portion provided with accordion folds. The two rigid and expandable tank portions are supported on a rack with a suitable extensible part for adapting the expansion or retraction of the auxiliary tank portion in relation to the main tank portion, providing a tank with a variable volume. The proposed solution again imposes a very specific and/or limited location area or arrangement in the engine compartment and does not describe or suggest that the accordion folds allow the auxiliary tank portion to adopt a compact, stable retracted position, and does not provide or suggest a flexible structure which can adapt to reduced non-linear spaces.

Patent document JP-A-62286863 describes a rigid tank for detergent fluid in a vehicle. The rigid tank is provided with a filling tube with a wall formed by a plurality of accordion folds providing it with flexibility. The flexible filling tube does not act as a tank rather it only has the function of leading the fluid from the filling opening to the rigid tank during a filling operation.

The structure of a tube with folds in the form of an accordion is known, although in other fields of the art, patent documents US-A-4846510 and US-A-4927191 being among them. The mentioned patents describe several applications, for example, such as a flexible connecting tube, a trap drain, a retractable neck for a container (in a manner similar to the aforementioned JP patent document), and even a body of a folding container with a small height; However, these patent documents do not describe or suggest such an adjustable structure in association to a pump

for the construction of a suitable flexible elongated tank for containing windshield or headlight washing fluid in a vehicle.

Patent document DE-A-19811019 relates to a conduit for windshield washing fluid comprising a manifold with several corrugated portions separated by several smooth sections and with leak-tight coupling means associated to both ends. Like other background documents, it always describes the fluid guiding or circulating functionality through the mentioned conduit and by no means does it describe its possible use for fluid storage and its possible association to a pump.

The present invention provides a new structure concept for a windshield or headlight washing fluid tank or container that is especially favorable as regards manufacturing, logistics and assembly in a vehicle engine compartment.

Description of the Invention

The present invention provides a container assembly for windshield or headlight washing fluid in a vehicle, comprising an elongated hollow structure with a plurality of asymmetric accordion folds formed therein, thanks to which said hollow structure can be arranged in a stable retracted position and in a flexible extended position. When the hollow structure is in the mentioned flexible extended position, it is suitable for being installed inside an engine compartment in said vehicle. The hollow structure in said extended position is sized to be able to contain an operational amount of windshield or headlight washing fluid and given its flexibility and elongation, it can be located in very small or unaligned spaces. The container assembly comprises a filling opening located in an inlet end portion of the hollow structure and generally (although other variants are contemplated) an outlet port located in an outlet end portion of the hollow structure.

In a preferred implementation, the container assembly further includes a pump support joined to said outlet end portion and adapted to support a motor-driven pump such that a suction inlet of said motor-driven pump is communicated with the outlet port. Securing means are arranged to secure said inlet end portion and said pump support to the engine compartment with the filling opening at a higher lever than the outlet port, and a plurality of securing devices have been provided adapted to secure several portions of the hollow structure located between the filling opening and the outlet port to the engine compartment, such that stability of the container is ensured when the vehicle is moving and is subjected to speed variations (accelerations and braking).

The container assembly proposed by the present invention has several advantages. Firstly, when the container assembly is not installed in the vehicle, it can be arranged in a substantially compact and stable retracted position, requiring much less space for storage and transport tasks compared to rigid tubes and tank assemblies. Furthermore, when the extendible tank of the container assembly of the present invention is in an extended configuration, it is extraordinarily flexible and can be easily adapted to the available spaces in the engine compartment of each vehicle, which allows making use of relatively narrow spaces which are not necessarily aligned with one another and which otherwise would not be used. For this same

reason, reserving space for the windshield or headlight washing fluid tank can virtually be forgotten in the vehicle design stage, and a single model of the container assembly of the present invention can easily be adapted to different vehicle models. In addition, the container assembly of the present invention, except for the securing devices, can be integrated in a single part designed for the purpose of being obtained by extruding and/or blowing a plastic material, which is an additional advantage as regards the simplification of the manufacture, storage, transport, installation and maintenance or replacement.

Brief Description of the Drawings

The previous and other features and advantages will be more fully understood from the following detailed description of several embodiments with reference to the attached drawings, in which:

Figure 1 shows an elevational view of a container assembly for windshield or headlight washing fluid in a vehicle according to an embodiment of the present invention in a stable retracted position, for storage or transport for example;

Figure 2 shows a side elevational view of the container assembly of Figure 1 in a flexible extended position;

Figure 3 shows an elevational view of a container assembly for windshield or headlight washing fluid in a vehicle according to another embodiment of the present invention in a stable retracted position;

Figure 4 shows a side elevational view of the container assembly of Figure 3 in a flexible extended position;

Figure 5 shows a schematic view showing an example of the installation of the container assembly of Figure 1 in the engine compartment of a vehicle;

Figure 6 shows a perspective view of a securing device forming part of the container assembly of Figure 1;

Figure 7 shows a partial sectioned view schematically showing the coupling of the securing device of Figure 6 to the hollow body of the container assembly of Figure 1;

Figure 8 shows a partial sectioned view schematically showing the coupling of another variant of the securing device to the hollow body;

Figure 9 shows a partial sectioned view schematically showing the coupling of another variant of the securing device to the hollow body for an embodiment thereof including several smooth intermediate sections;

Figure 10 shows a side elevational view with a partial section of an implementation variant which is only distinguished by the arrangement of the pump inside the structure next to its filling opening;

Figure 11 is equivalent to the previous view and shows another implementation example in which the pump is arranged immersed inside the structure next to the distal end of the filling opening of the container;

Figure 12 also shows an elevational view of the hollow structure proposed with a third alternative example of assembling the pump directly connected to an outlet port in a distal end of

the filling opening; and

Figures 13 and 13a show elevational and detailed views respectively of the features of the wall with an asymmetric accordion structured applied in the hollow structure of the invention.

Detailed Description of Several Embodiments

With reference first to Figures 1 and 2, they show a container assembly for windshield or headlight washing fluid according to an embodiment of the present invention, which basically comprises a flexible and extensible hollow structure 1, a pump support 4 joined to an end of said tubular structure and several securing devices 6, said contained being provided to be incorporated to a windshield or headlight washing system of a vehicle. The mentioned hollow structure 1 comprises a plurality of asymmetric accordion folds formed therein, thanks to which the hollow structure 1 can be arranged in a retracted position shown in Figure 1 or in an extended position shown in Figure 2. When the hollow structure 1 is in the retracted position, it adopts a compact reduced configuration suitable for storage and transport. When the hollow structure 1 is in the extended position, it becomes significantly flexible and is suitable for being installed inside an engine compartment in said vehicle (Figure 5). The hollow structure 1 in said extended position has sufficient capacity to house an operational amount of windshield or headlight washing fluid. "Operational amount" is understood as the amount that manufacturers usually foresee for windshield or headlight washing fluid tanks. For example, when the hollow structure 1 is adapted for a headlight washing system, it can have, in the extended position, a capacity comprised between 2.5 and 5 liters of fluid. If the hollow structure 1 is intended for a windshield washing system, it can have, in the extended position, a capacity comprised between 2.5 and 3 liters of fluid.

In the embodiment shown in Figures 1 to 4, the hollow structure 1 has a filling opening 2 located in inlet end portion 15 of the hollow structure 1 and an outlet port 3 located in outlet end portion 16 of the hollow structure 1. The mentioned pump support 4 is joined to said outlet end portion 16 of the hollow structure 1. The pump support 4 is adapted to support a motor-driven pump 5 such that a suction inlet 12 of said motor-driven pump 5 is communicated with the outlet port 3. In the embodiments shown, the pump support includes a receptacle 14 in which the outlet port 3 of the hollow body 1 ends up, and the suction inlet 12 of the motor-driven pump 5 is connected to an outlet of said receptacle 14. The motor-driven pump 5 has a drive outlet 13 connected to a conduit device of the windshield or headlight washing system. The pump support 4 preferably comprises elastic configurations 29 adapted to receive and hold the motor-driven pump 5, for example by snap fitting with optional elastic deformation, and the outlet of the receptacle 14 is adapted to receive the coupling of said suction inlet 12 of the motor-driven pump 5 by pressure coupling with a sealing gasket.

The inlet end portion 15 and generally the pump support 4 include securing means to secure the container assembly to the engine compartment of the vehicle with the filling opening 2 at a higher level than the outlet port 3. The container assembly further includes a plurality of securing devices 6 adapted to secure several portions of the hollow structure 1 located between the filling opening 2 and the outlet port 3 to the engine compartment. The number of such

securing devices 6 can vary depending on the length and configuration of the hollow structure 1, and in any case, it will be a number that is enough to secure the hollow structure 1 in place, suitably locking it and minimizing stress (due to fluid pressure) on the wall of the container when the container assembly is full of liquid and subjected to the characteristic accelerations of a moving vehicle.

According to an embodiment, the hollow structure 1, the inlet end portion 15, the outlet end portion 16 and the pump support 4 including the receptacle 14 are integrated in a single part, which can be designed for the purpose of being obtained by extruding and/or blowing a plastic material. However, according to another embodiment (not shown), the hollow structure 1, the inlet end portion 15 and the outlet end portion 16 are integrated in one part and the pump support 4 including the receptacle 14 is another separate part. The hollow structure 1, the inlet end portion 15, the outlet end portion 16 and the pump support 4 including the receptacle 14 can alternatively be separate parts. The inlet end portion 15 is adapted to receive a lid 10 connected to the inlet end portion 15 of the hollow structure 1 by a connecting bead 11. This lid 10 and its connecting bead 11 can also be advantageously integrated in the single part forming the container assembly or, if such were the case, in the single part integrating the hollow structure 1, the inlet end portion 15, and the outlet end portion 16, or simply in the inlet end portion 15.

As shown in Figures 6 and 7, each of said securing devices 6 comprises a flange which can at last partly encircle a section of the hollow structure 1 and a base 8 adapted to be fixed to the engine compartment. The flange of the securing device 6 comprises a pair of elastic arms 7 adapted to receive and secure by snap fitting with elastic deformation a section of the hollow structure 1 in which said asymmetric accordion folds are formed. The mentioned asymmetric accordion folds of the hollow structure 1 comprise valleys 17 and peaks 18. The arms 7 are configured with inner ribs 9 adapted to at least partly be inserted in one or more of said valleys 17, thereby preventing the possible sliding of the arms 7 over the peaks of the folds. Alternatively, as shown in Figure 8, the arms 7 have a smooth inner surface 19 adapted to be supported on the mentioned peaks 18 of the folds of the hollow structure 1. Optionally, in an embodiment shown in Figure 9, the hollow structure 1 can comprise smooth sections 1b arranged between sections with asymmetric accordion folds 1a, the smooth sections 1b having smaller transverse dimension than the maximum transverse dimension in the sections with folds 1a, and the elastic arms 7 of the flanges of the securing devices 6 are adapted to be coupled to the smooth sections 1b of the hollow structure 1 by snap fitting with elastic deformation.

Alternatively, according to an embodiment not shown, the container can comprise a single securing device 6 including a base adapted to be fixed to the engine compartment and several spaced flanges which can at least partly encircle several sections of the hollow structure. Another variant of said only securing device 6 could include one or more wedge-shaped configurations joined to the base, which can at least partly encircle several sections of the hollow structure 1.

In the embodiment shown in Figures 1 and 2, the hollow body has a profile of circular cross section. However, the hollow body 1 of the present invention can be configured differently,

for example, with an oval or polygonal cross section.

Figures 3 and 4 show a container assembly according to the present invention which is completely similar to the one described above in relation to Figures 1 and 2, except in that the cross section profile of the hollow body 1 is rectangular rather than circular. Accordingly, the inlet end portion 15, the lid 10 and the outlet end portion 16 have a rectangular configuration to match. The flanges of the securing devices are adapted to such rectangular configuration. The pump support 4 and the receptacle 14 are similar to those described above.

Figures 10, 11 and 12 show alternative assembly variants for the pump 5 connected to the tubular structure 1, maintaining the basic features of the proposed invention.

In Figure 10 said pump 5 is fixed, inside said hollow structure (1), next to the mentioned inlet opening 2, a suction tube 20 connected a said suction intake 12 deriving from the pump 5, said tube 20 extending to the distal end, or bottom of the container.

In Figure 11 the pump 5 is installed inside the hollow structure 1 and is a pump which operates immersed, fixed next to the distal end of the structure or bottom of the container. The figure shows the suction inlet 12 of the pump 5 in the bottom of the container and a manifold 21 (extending throughout the container and exiting through its filling opening), connected to the discharge outlet 13 of said pump 5.

In Figure 12, the pump 5 is attached to said hollow structure 1, a suction intake 12 of the pump 5 being directly connected to an outlet port 3 defined at the distal end of the structure.

The detail of Figure 13a shows the shape and different inclination of each the walls forming the accordion wall of the hollow structure 1, in this example the angles α have been identified with a value of about 47 degrees and β with a value of about 33 degrees.

A person skilled in the art can introduce variations and modifications in the embodiments shown and described without departing from the scope of the present invention as it is defined in the attached claims.

CLAIMS

1.- A container assembly for windshield or headlight washing fluid in a vehicle, comprising in combination:

an elongated hollow structure (1) demarcated by a wall with a plurality of asymmetric accordion folds, thanks to which said hollow structure (1) can be arranged in a stable retracted position and in a flexible extended position, in which it is suitable for being installed in the useful space of an engine compartment in said vehicle, the hollow structure (1) in said extended position being able to contain an operational amount of windshield or headlight washing fluid;

a filling opening (2) located at an inlet end portion (15) of the hollow structure (1); and

at least one pump (5) associated to said hollow structure and suitable for transferring contained fluid to a service point.

2.- An assembly according to claim 1, characterized in that it further comprises securing means for securing said inlet end portion (15) and at least one section of the hollow structure (1) located between said filling opening (2) and a distal end to said engine compartment in an installation area.

3.- An assembly according to claim 2, characterized in that said hollow structure (1) further comprises an outlet port (3) located at a distal outlet end portion (16) of the hollow structure (1) of said filling opening (2).

4.- An assembly according to claim 3, characterized in that it includes coupling and securing means for coupling and securing said pump (5) to said hollow structure (1), a suction intake of the pump (5) being directly coupled to said outlet port (3).

5.- An assembly according to claim 3, characterized in that it includes a pump support (4) joined to said outlet end portion (16) and adapted to support a motor-driven pump (5) such that a suction inlet of said motor-driven pump (5) is communicated with said outlet port (3).

6.- An assembly according to claim 2, wherein said pump (5) is fixed, inside said hollow structure (1), next to the mentioned inlet opening (2), a suction tube (20) extending to the distal end or bottom of the container deriving from the pump (5).

7.- An assembly according to claim 2 wherein said pump (5) is installed inside the hollow structure (1) and is a pump which operates when immersed, fixed next to the distal end of the structure or bottom of the container.

8.- An assembly according to any one of claims 1 to 7, characterized in that said inlet end portion (15) is adapted to receive a lid (10) for the filling opening (2).

9.- An assembly according to any one of claims 1 to 7, characterized in that said inlet end portion (15) is adapted to receive a lid (10) for the filling opening (2) and in that said lid (10) is connected to the hollow structure (1) or to the filling opening (2) by a connecting bead (11).

10.- An assembly according to claim 5, characterized in that it includes securing means to fix said inlet end portion (15) and said pump support (4) to the engine compartment in an installation area with the filling opening (2) at a higher level than the outlet port (3).

11.- An assembly according to claim 5, characterized in that the mentioned pump support (4) comprises a cavity or receptacle (14) in which the outlet port (3) of the hollow structure (1)

ends, said suction inlet of the motor-driven pump (5) being connected to an outlet of said receptacle (14).

12.- An assembly according to claim 11, characterized in that the pump support (4) comprises a recessed area defined in a side wall of said receptacle (14).

13.- An assembly according to claim 11, characterized in that said outlet of the receptacle (14) is adapted to receive said suction inlet of the motor-driven pump (5) through a pressure coupling with a sealing gasket.

14.- An assembly according to claim 2, characterized in that said securing means comprise several securing devices (6), each of which includes a flange means that can at least partly encircle a section of the hollow structure (1) and a base (8) adapted to be fixed to the engine compartment.

15.- An assembly according to claim 14, characterized in that said flange means of the securing device (6) comprises a pair of elastic arms (7) adapted to receive and secure by snap fitting with elastic deformation a section of the hollow structure (1) in which said asymmetric accordion folds are formed.

16.- An assembly according to claim 15, characterized in that said pair of elastic arms (7) of the flange of the securing device (6) integrate at least one projecting rib (9) configured to be at least partly inserted in one or more valleys formed by said asymmetric accordion folds of the wall of the hollow structure (1).

17.- An assembly according to claim 14, characterized in that the hollow structure (1) comprises smooth sections (1b), each of which is formed between two sections provided with said asymmetric accordion folds (1a), said smooth sections (1b) having a smaller transverse dimension than the maximum transverse dimension in the sections with folds (1a), and in that said flange of the securing device (6) comprises a pair of elastic arms (7) adapted to receive and secure by snap fitting with elastic deformation one of the smooth sections (1b).

18.- An assembly according to claim 2, characterized in that said securing means include several spaced flanges which can at least partly encircle several sections of the hollow structure (1) and a base adapted to be fixed to the engine compartment.

19.- An assembly according to claim 2, characterized in that said securing means include at least one wedge configuration that can at least partly encircle several sections of the hollow structure (1) and a base adapted to be fixed to the engine compartment.

20.- An assembly according to any one of claims 1 to 9, characterized in that the hollow structure (1) has a polygonal cross section.

21.- An assembly according to any one of claims 1 to 9, characterized in that the hollow structure (1) has a substantially quadrangular cross section.

22.- An assembly according to any one of claims 1 to 9, characterized in that the hollow structure (1) has a rectangular section.

23.- An assembly according to any one of claims 1 to 9, characterized in that the hollow structure (1) has a substantially circular or oval cross section.

24.- An assembly according to any one of claims 1 to 9, characterized in that the hollow

structure (1) is adapted to a windshield and headlight washing system, having in the extended position a capacity comprised between 2.5 and 6.5 liters.

25.- An assembly according to any one of claims 1 to 9, characterized in that the hollow structure (1) is adapted to a windshield washing system, having in the extended position a capacity comprised between 2.5 and 3 liters.

26.- An assembly according to claim 5, characterized in that the hollow structure (1), the inlet end portion (15), the outlet end portion (16) and the pump support (4) are integrated in one part.

27.- An assembly according to claim 5, characterized in that the hollow structure (1), the inlet end portion (15), the outlet end portion (16) and the pump support (4) are integrated in one part designed for the purpose of being obtained by extruding and/or blowing a plastic material.

28.- An assembly according to claim 3, characterized in that the hollow structure (1), the inlet end portion (15) and the outlet end portion (16) are integrated in one part and the pump support (4) is another separate part.

29.- An assembly according to claim 3, characterized in that the hollow structure (1), the inlet end portion (15), the outlet end portion (16) and the pump support (4) are separate parts.

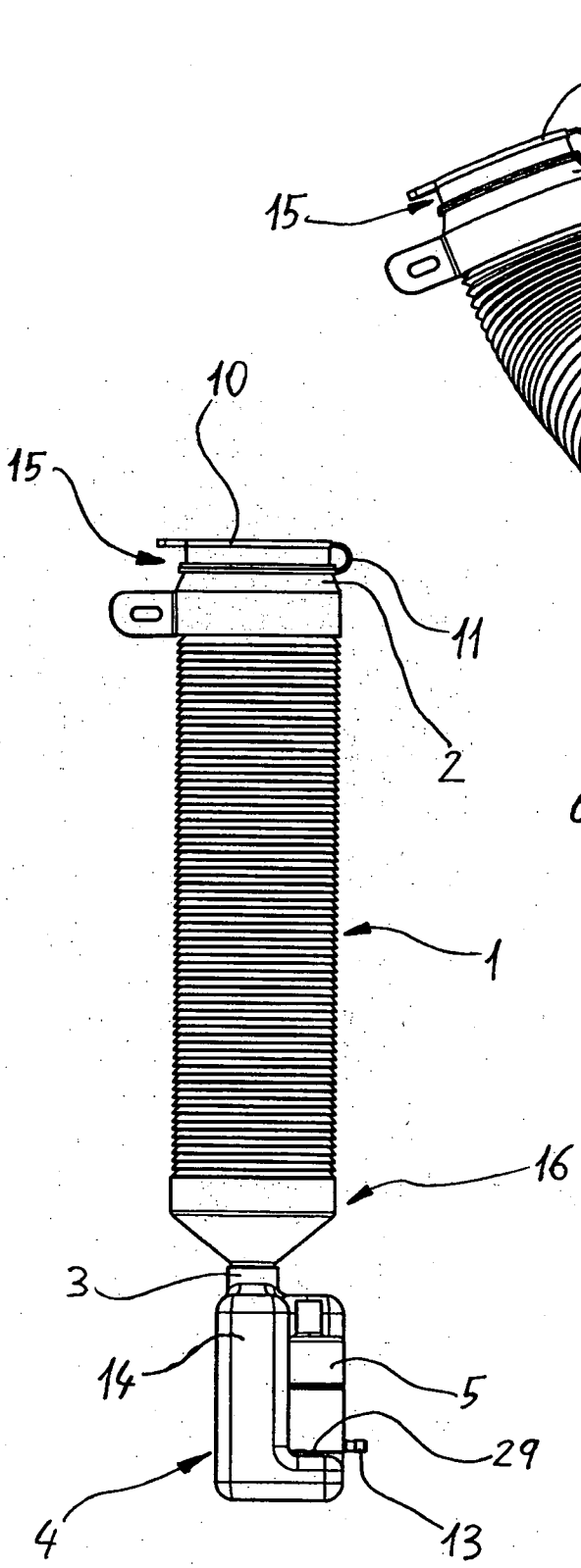

Fig. 1

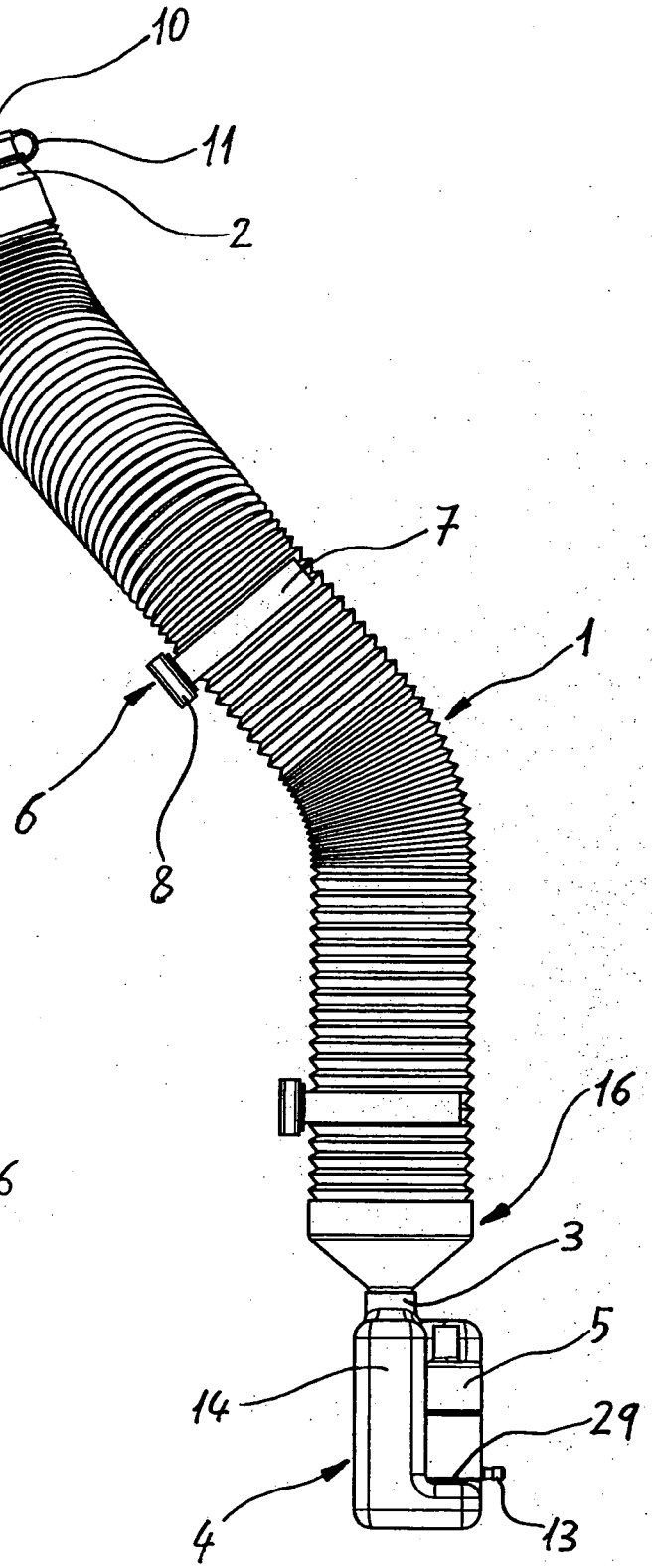

Fig.2

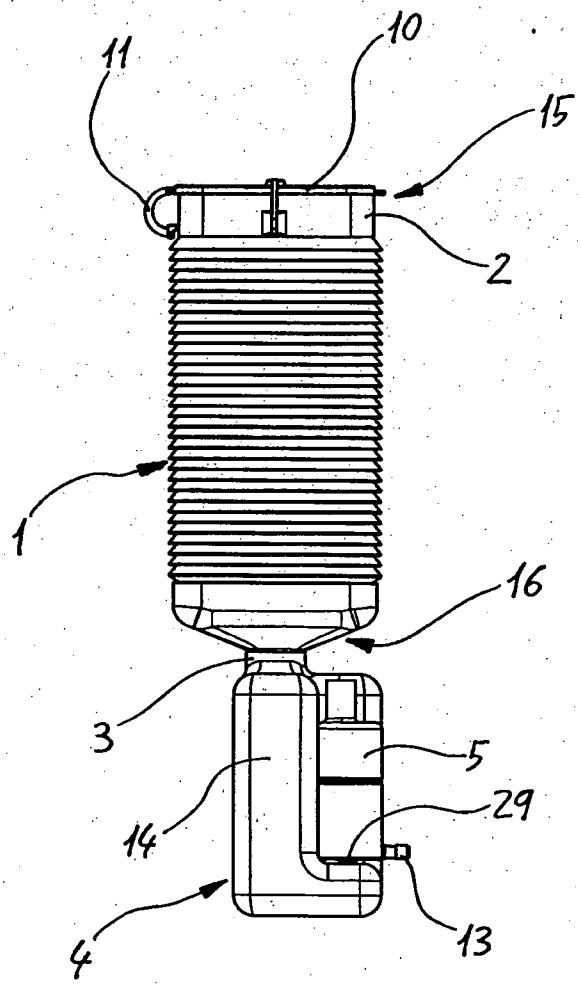

Fig.3

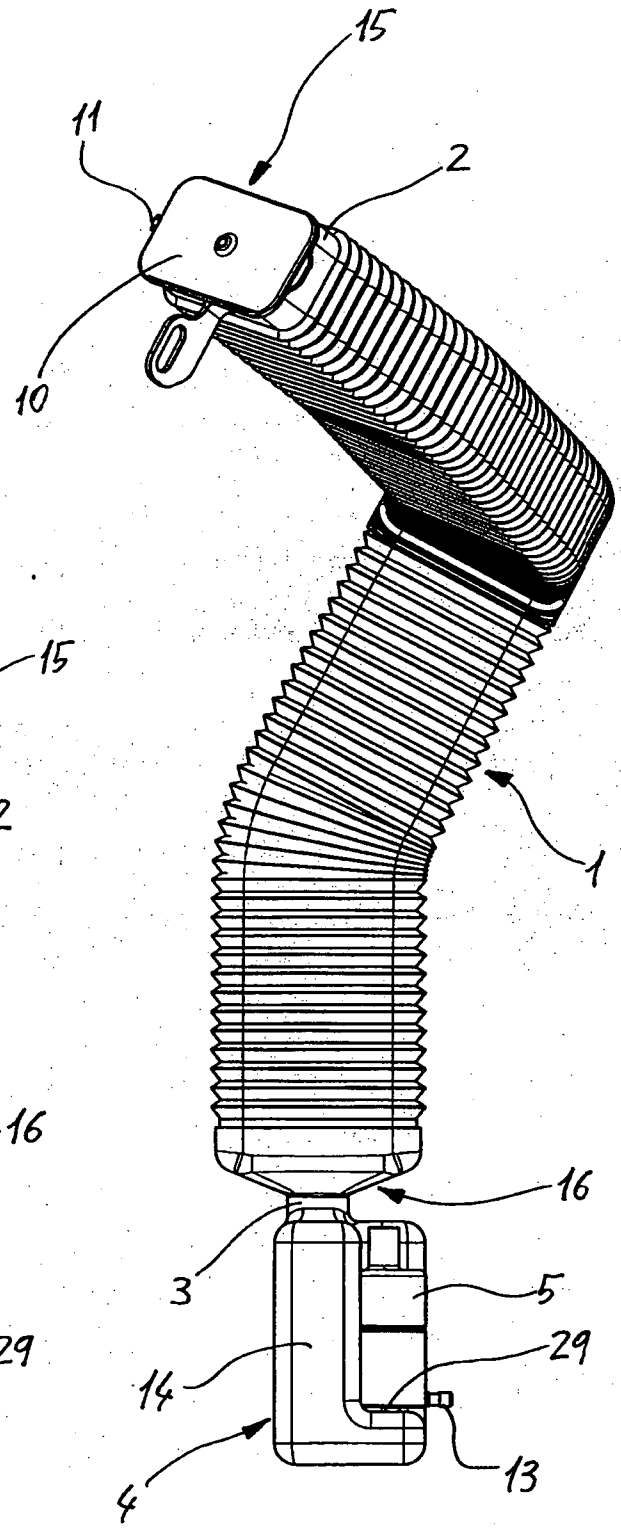

Fig.4

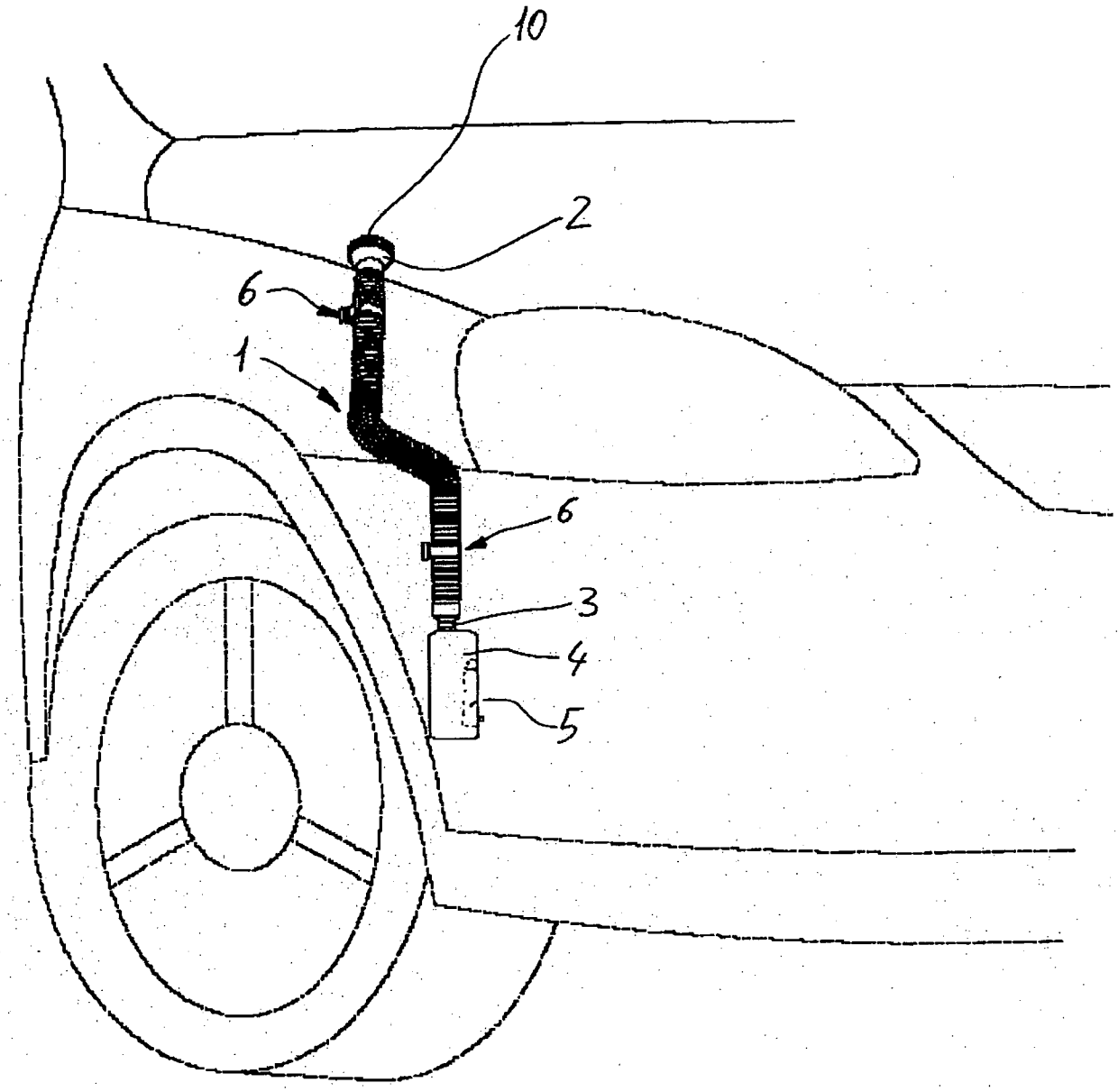

Fig.5

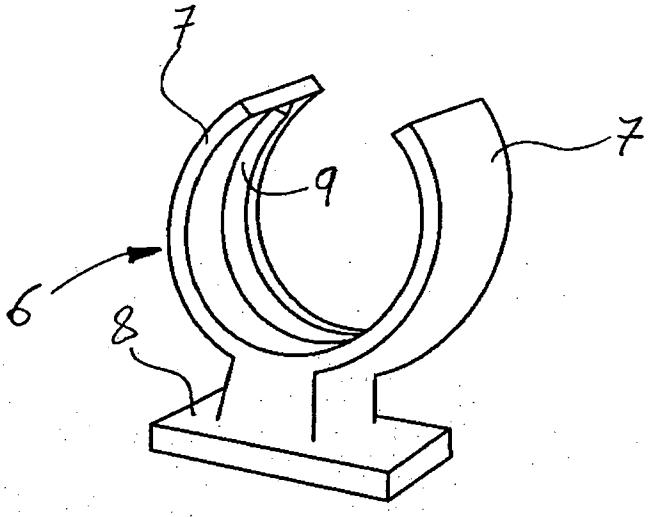

Fig.6

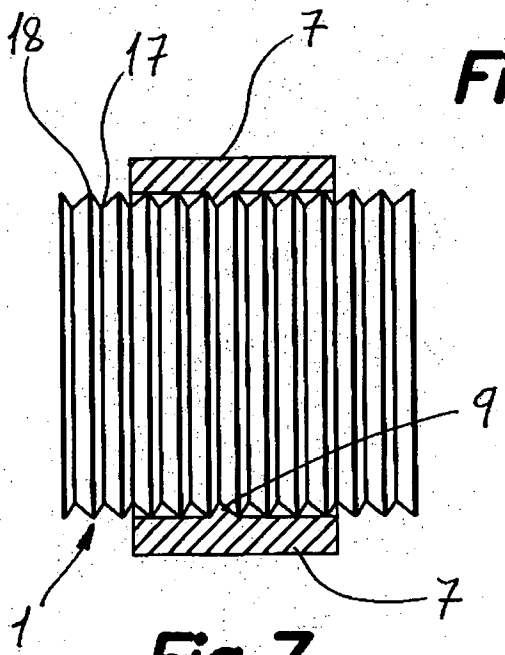

Fig.7

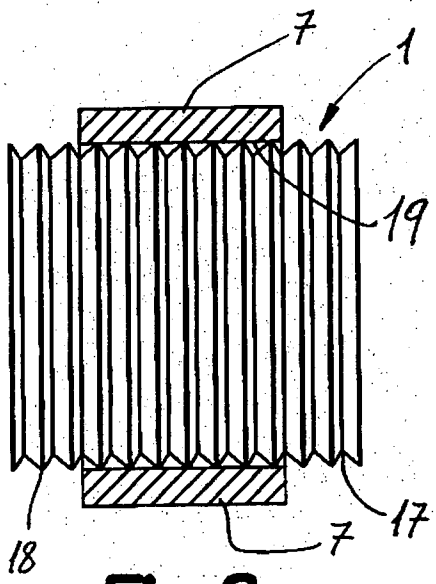

Fig.8

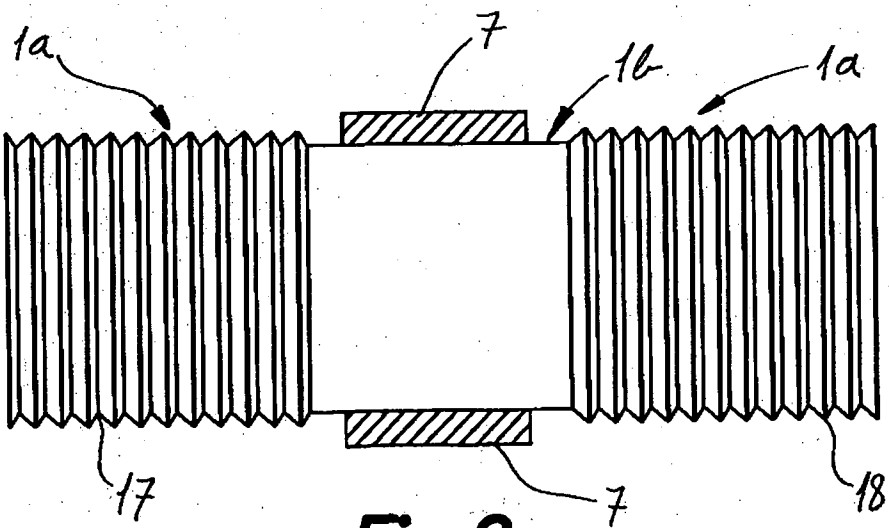

Fig.9

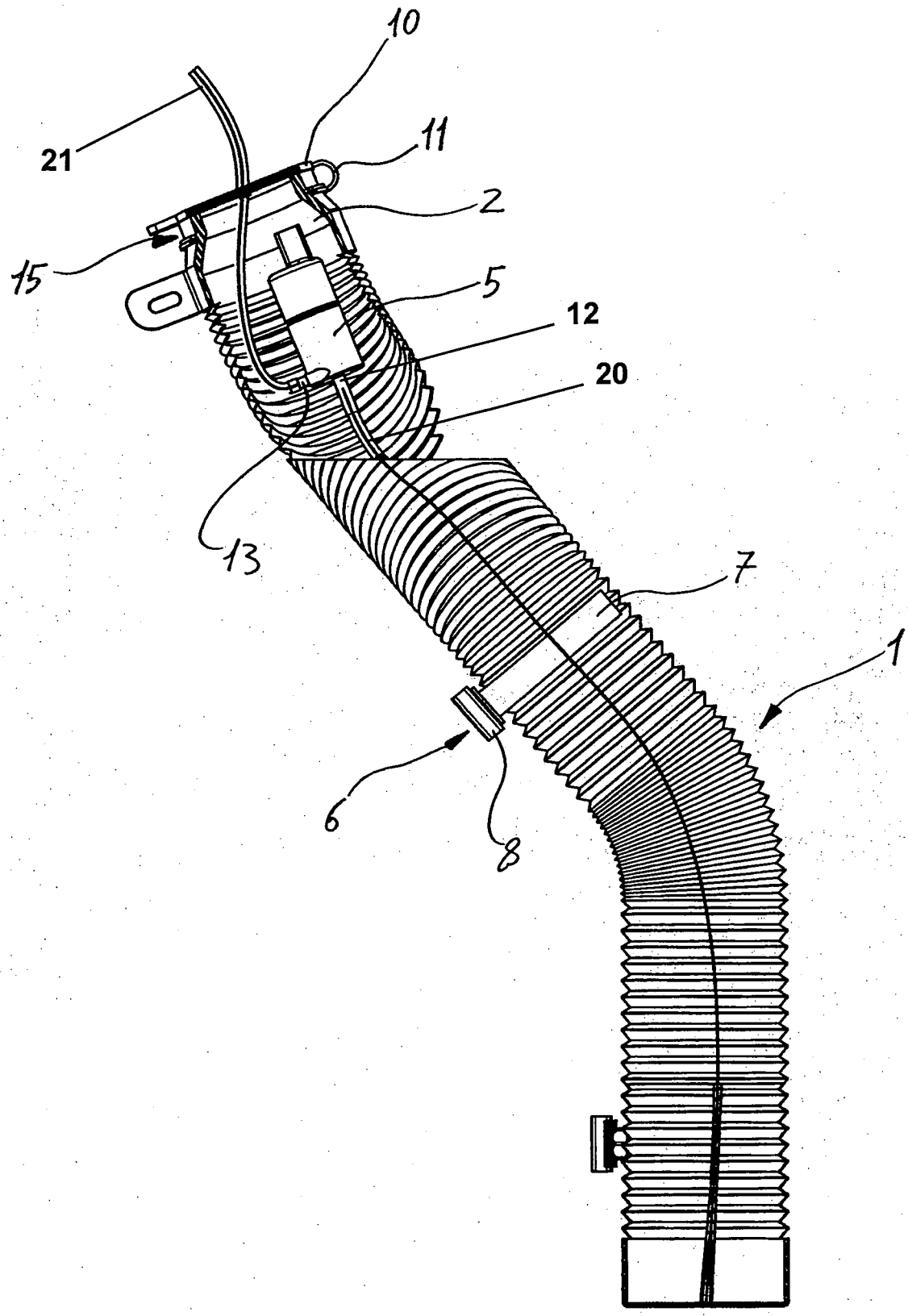

Fig. 10

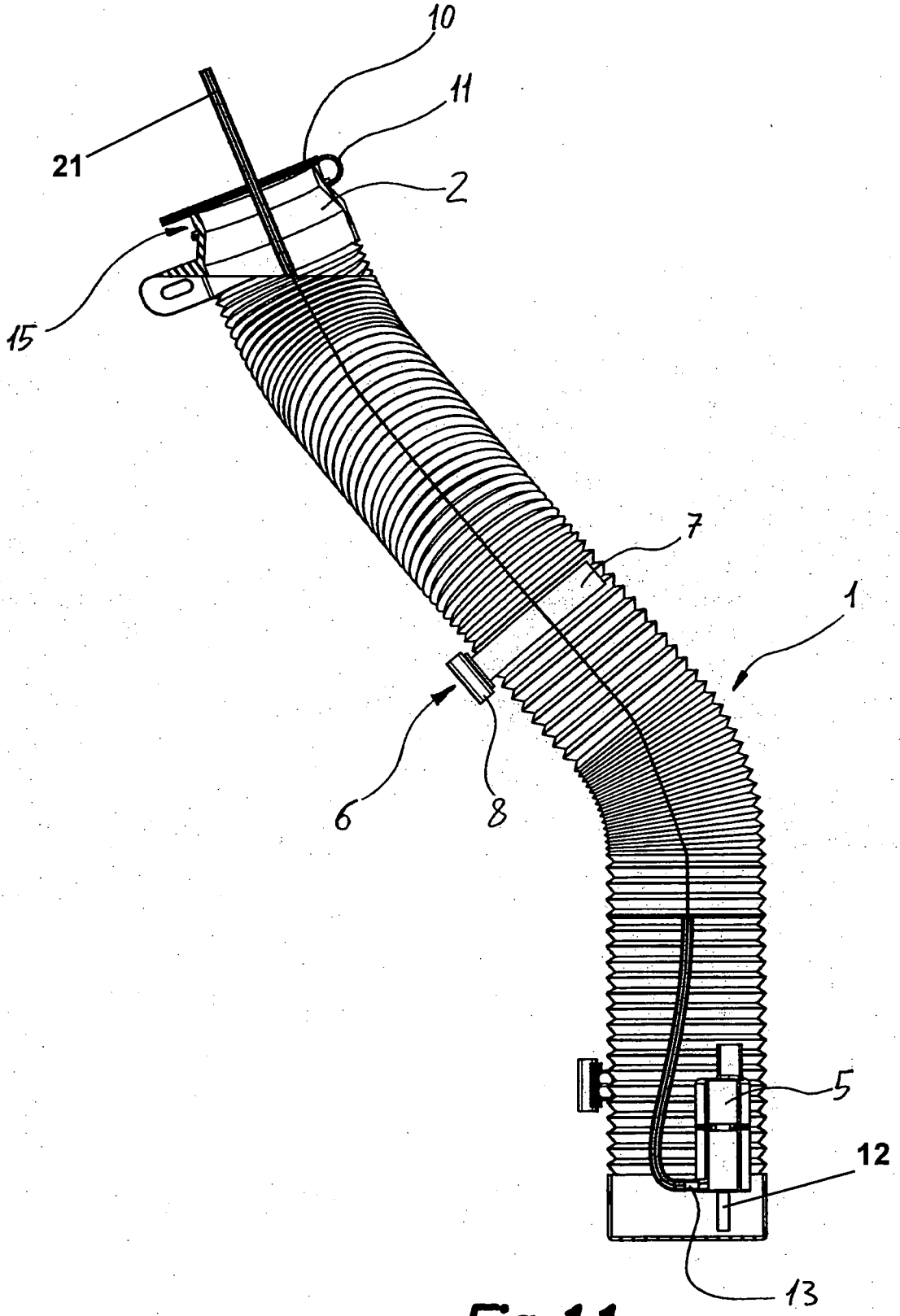

Fig. 11

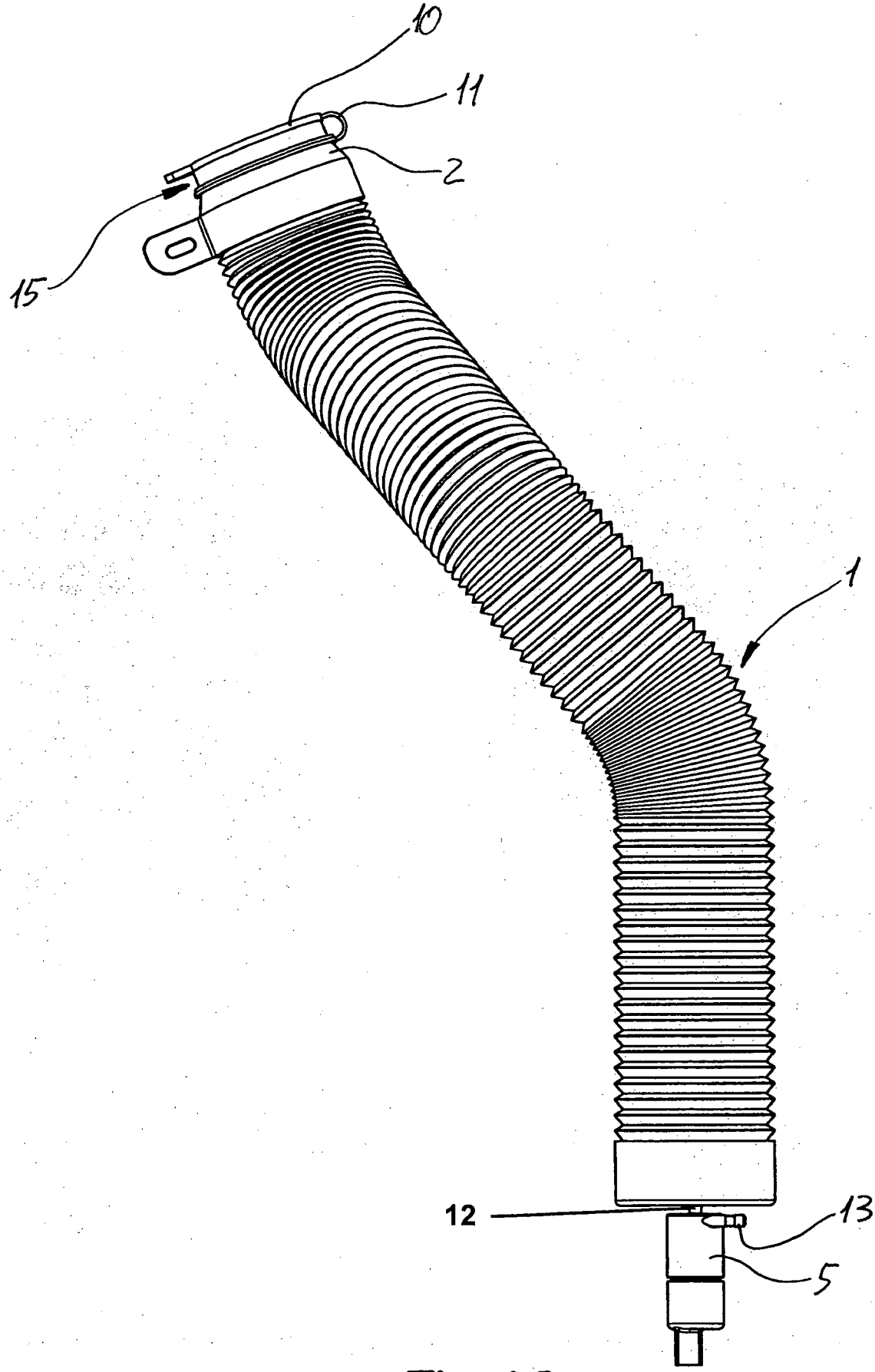

Fig. 12

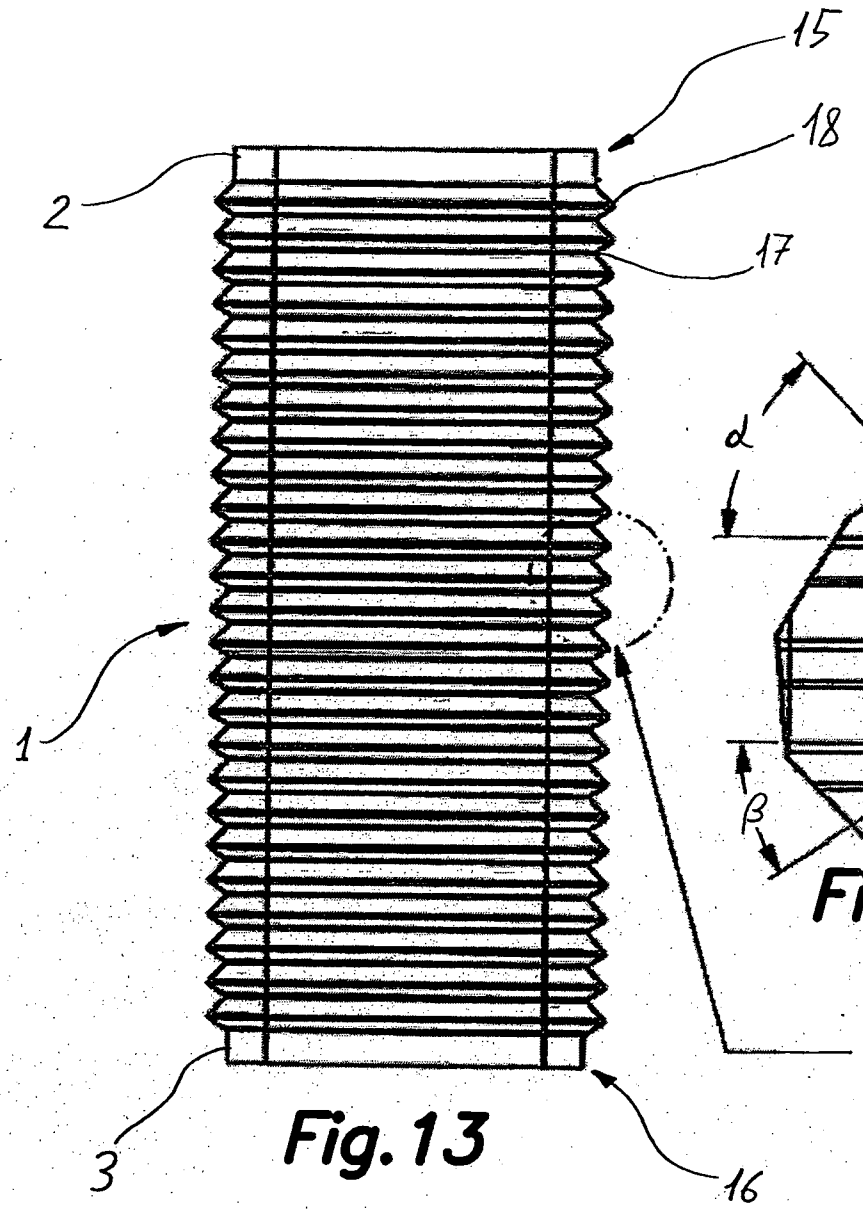

Fig. 13

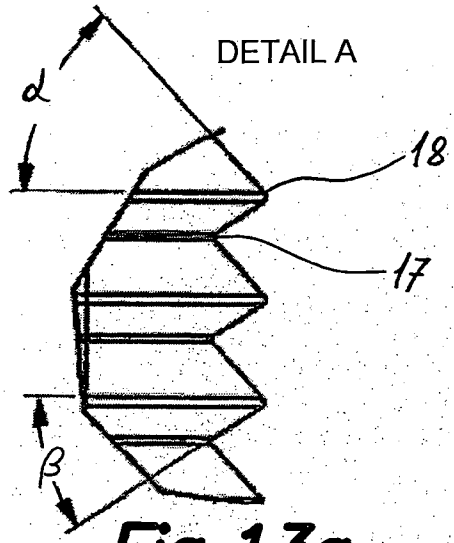

Fig. 13a