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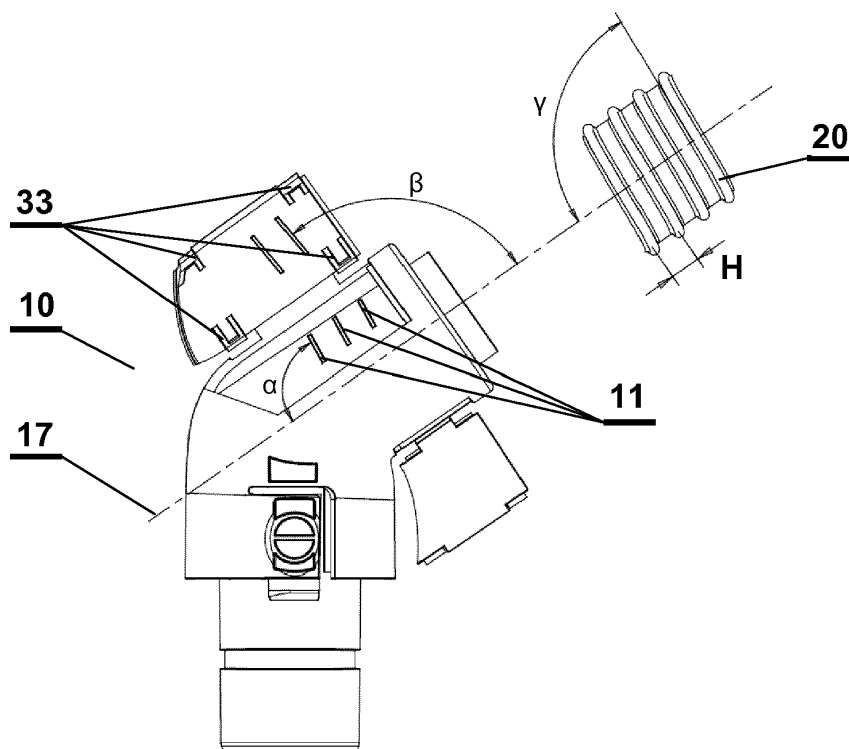
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(54) **HOSE COUPLING FOR A VACUUM CLEANER**

(57) A coupling device (10) for coupling a helical hose (20) of a cleaning device comprising: a hose recess (16) for a helical hose (20), an inner wall (12) and an outer wall (13), wherein the inner wall (12) is equipped with one or more projections (11) for fastening the helical hose (20) and wherein the outer wall (13) comprising at least one coupling element (15), which is connected with the outer wall (13) after assembling.

The present invention enables a hose coupling for coupling a helical hose where only two parts; hose and coupling device are connected together. The coupling device is easy to produce and it's also possible to create a secure and airtight connection between the hose and the coupling device. Additionally the production and mounting costs of such coupling device are reduced.

Fig. 1



Description

FIELD OF THE INVENTION

[0001] The invention relates to a hose coupling which enables connecting a hose with an electrical vacuum cleaner comprising: a hose recess for a helical hose, an inner and an outer wall, wherein the inner wall is equipped with one or more projections for fastening the helical hose onto the inner wall.

STATE OF THE ART

[0002] The patent application WO 2005/ 009 194 A1 discloses a hose coupling which enables fastening hoses in electrical vacuum cleaners with elements such as handles, pipes or suction nozzles, which enables fastening the hose without the need to use an adhesive substance or additional parts and which prevents the deformation and the disengagement of the hose during usage. This presented solution does not provide good tightness of the connection. Manipulation of the hose during usage causes leakage of the air which leads to decreasing vacuuming efficiency.

[0003] The Polish patent PL 174 307 B1 discloses a hose connector containing suction hose with helical wall which is connected with outer helical thread of the two-stage connector which is snapped on the hose end wherein between successive threads of the outer surface of the lower stage of the two-stage connector are formed parallel to the helical thread, preferably two short vertical fin-shape resistance projections mounted in the fitting through-holes of the side wall of the suction hose and higher stage of the connector has mounted lip seal on its surface.

THE AIM OF THE INVENTION

[0004] It is the object of the present invention to provide a further development with an advantage over the state of the art.

[0005] A further object of the invention is to avoid air leakage and reduce vacuuming efficiency. Another object of this invention is to enable fastening helical hose to the hose coupling without using adhesive substance and to provide firmly connection at the same time. Another object of this invention is to mount the hose with reduced screwing force and to provide a reliable connection for the helical hose with a coupling device. Another object of this invention is to reduce the production and mounting costs of a coupling device. Another object of this invention is to create a coupling device in which the correct mounting position can be easily checked after assembling.

SUMMARY OF THE INVENTION

[0006] This object is solved by a coupling device for

coupling a helical hose of a cleaning device whereby the outer wall comprising at least one coupling element, which is connected with the outer wall in a working position.

5 A coupling device of a cleaning device is on the first side connected with an air guide device, normally a flexible hose. The hose is connected with a grip, so that the user can guide a connected nozzle with the hose to clean a floor. The second side of a coupling device is in a working position releasable connected to the lid of a cleaning device. A cleaning device comprises an electrical motor with a fan, which sucks the dirt from the nozzle over the hose into a dust compartment. The dust compartment can be a bag or a so called bagless container.

10 The helical hose is flexible air guide element designed to conduct air with dust from the floor to the cleaning device and has a helical threaded structure which is identified with an inclination angle which inclines freely to the right and to the left and pitch, comprising a threaded inner surface and a threaded outer surface.

20 The outer wall of the coupling element protects the flexible hose at the connection to the coupling device. The coupling element is designed for fixing the flexible hose in a working position. The coupling element could be separated from the outer wall.

25 A working position means that the helical hose is screwed on the inner wall of the coupling device up to the end position of the hose recess and the coupling element fixes the hose airtight.

30 **[0007]** In the working position the coupling element is flush-mounted to the outer wall so it can be easily checked if the coupling element is mounted correctly. In a wrong mounted position the coupling element protrudes over the surface of the outer wall. So it can be easily controlled that it is in a wrong position.

35 The coupling element could be separated from the outer wall.

PREFERRED EMBODIMENT OF THE INVENTION

40 **[0008]** In the preferred embodiment of the invention the coupling element comprises an opening and a flap wherein the flap closes the opening after assembling. The opening is designed for mounting a flap to the outer wall of the coupling device. The opening is needed to form one-piece projections with an injection tool on the inner wall of the coupling device. Another advantage is that through the opening it is easy to check if the hose is well mounted up to the end position. The hose is well mounted when it is fixed up to the ground of the bottom of the recess. The flap fits tightly to the opening and in a working position creates one surface with the outer wall of the coupling device. In other words: if the flap is not well mounted this can easily be seen because the flap protrudes over the surface.

55 **[0009]** In another embodiment of the invention the flap is connected to the outer wall by a hinge. The hinge is the movable connection between the flap and the outer

wall whereby the flap is pivotally arranged to the outer wall of the coupling device. The hinge provides movable attachment of the flap to the outer wall of the coupling device. In a preferred solution the hinge is undetachable connected with the outer wall. The positive effect of the undetachable hinge is that it is possible to reduce mounting time and it isn't needed to use additional parts, only hose and coupling device. In a preferred solution the hinge is designed as a film hinge and therefore can be produced in one production process.

[0010] In the preferred embodiment of the invention the coupling element comprises at least one rib on the side of the flap which is directed to the inner wall. The ribs are placed on the flap to provide the possibility of a firmly connection of the helical hose to the coupling device. The aim of the rib in a working position is to press the hose to the inner wall to provide more friction force against demounting of the hose from the coupling device. The rib is in such a dimension that it fills or fits a groove of the helical hose to a quarter or up to the maximum.

[0011] In another embodiment of the invention the flap is snapped into the opening by at least one latch arranged on the flap or on the opening. At least one latch provides a firmly connection of the flaps to the outer wall of the coupling device and the latch is arranged on the flap or on the opening. With a latch it is possible to reduce mounting force and achieve a quick fixing and secure connection. In a preferred solution on each corner of the flap there is a latch arranged for a secure and strong connection which is impossible to demount.

[0012] Advantageously the coupling device is equipped with two openings on the opposite sides of the coupling device and each opening has a flap. The positive effect is that two flaps can be closed with two fingers of one hand in one step without need of the additional equipment for mounting. It is easy to produce such coupling device.

[0013] Advantageously the ribs are formed in an angle α between 80° to 100° to the central axis of inner wall of the coupling device in a working position. In a specialized form the angle α is between 85° to 95° . In a preferred embodiment the angle α is the same as the angle γ . The positive effect of the angled rib is in combination with different pitch is that it is more difficult to disassembling the hose from the coupling device. The angled ribs works than as an additional blocking element.

[0014] In a favourable embodiment at least one rib in a working position is formed in a right angle ($\alpha = 90^\circ$) to the central axis of the inner wall. With a right angle and with a variation of the lengths of the ribs it's easy to adjust the torque moment for secure fixing of the hose.

[0015] In a favourable embodiment at least two ribs are almost parallel to each other. The positive effect is that the connection can be designed firmly. The distance between the ribs is adjusted to the pitch of the hose.

[0016] Advantageously at least one rib is arranged between two projections when the closing flaps are in a working position. Then the ribs and the projections works

like a gearing and they fix the hose very effectively.

[0017] Advantageously at least one rib is in the middle between the projections when the flaps are in a working position. The effect is that the rib is then exactly between two top points of the waveform of the hose and thereby the hose will not be stretched and is also in the working position air tight.

[0018] In the preferred embodiment of the invention the projections are formed in an angle β between 85° to 95° degrees to the central axis. Advantageously at least two projections are almost parallel to each other. In a preferred embodiment the angle α and the angle β are the same. Advantageously at least one projection is formed in a right angle ($\beta = 90^\circ$) to the central axis. The favourable effect is that the helical hose is easy to screw on the inner wall and an additional effect is to protect the hose from demounting. The projections are positioned in such a way that there are gaps which enable the helical threaded structure of the hose to jump from one projection to the other between the projection groups made up of projections which are parallel to each other and which are placed on the inner wall of the coupling device preferable in a right angle to the central axis of the inner wall and parallel to each other.

[0019] The present invention enables a hose coupling for coupling a helical hose where only two parts; hose and coupling device are connected together. The coupling device is easy to produce and it's also possible to create a secure and airtight connection between the hose and the coupling device. Additionally the production and mounting costs of such coupling device are reduced.

BRIEF DESCRIPTION OF THE FIGURES

[0020] The construction of the invention, however, together with additional objects and corresponding advantages will be best understood from the following description of specific embodiments and in connection with the accompanying drawings.

[0021] Further benefits and advantages of the present invention will become apparent after a careful reading of the detailed description with appropriate reference to the accompanying drawings.

[0022] In the drawings:

- Fig. 1 shows a coupling device and a hose in a starting position before mounting.
- Fig. 2 shows the coupling device with the hose which is screwed onto the inner wall of the coupling device to the end position of the hose recess.
- Fig. 3 shows the coupling device like Fig. 2 with closed flaps in a working position.
- Fig. 4 shows the coupling device without the hose in top view.
- Fig. 5 shows the coupling device with the hose in top view.
- Fig. 6 shows a sectional view of Fig. 5

DETAIL DESCRIPTION OF THE INVENTION

[0023] In cooperation with attached drawings, the technical contents and detailed description of the present invention are described thereafter according to a preferable embodiment, being not used to limit its executing scope. Any equivalent variation and modification made according to appended claims is all covered by the claims claimed by the present invention.

[0024] In the following description of the preferred embodiments of the present invention, similar identical reference numbers designate identical or comparable components

[0025] The electrical vacuum cleaner comprises a nozzle for sucking up dust from the floor or surface, a pipe which is connected to the handle, a flexible hose wherein the dust is guided to the vacuum cleaner. Inside the vacuum cleaner there is a motor and the fan for creating air stream and filter system for collecting dust. The hose is connected by a removable coupling device to the lid. On one side the coupling device can be assembled with the lid of a vacuum cleaner and on the other side the coupling device is air tight connected to the hose.

[0026] Fig. 1 shows a coupling device (10), central axis (17) and a flexible hose (20). The coupling device (10) is shown in a side view in the mounting position when it is ready to be joined with the hose (20). The coupling device (10) has two coupling elements (15) placed on the opposite sides of the outer wall (13) of the coupling device (10). Each said coupling element (15) consists of opening arranged on the outer wall (13) of the coupling device (10) and the snapping flap (30) which is integrally formed on the film hinge (31). The flaps (30) have almost rectangular arched shape and are provided with two ribs (32) and four latches (33) placed on its concave side which is directed to the inner wall (12). The ribs (32) have longitudinal shape. The ribs (32) are inclined to the central axis (17) of the coupling device (10) and have almost the same pitch as the pitch of the hose. Four latches (33) are integrally formed on the flap (30) and they are placed in each corner of the flap (30). The latches (30) are U-shaped. The laying outside convex surface of the flap (30) is laminar. The coupling device (10) as shown in the Fig. 1 consists of a tubular inner wall (12) and a tubular outer wall (13) which are concentrically arranged to the central axis (17). The distance between the two walls is slightly bigger than thickness of the wall of the hose (20). The inner wall (12) is provided with three projections (11) with the longitudinal shape. The projections (11) are inclined to the central axis (17) of the coupling device (10) and have almost the same pitch as the pitch of the hose (20). The hose (20) as shown of the Fig. 1 is flexible and has a helical threaded structure which is defined by an inclination angle γ and the pitch (H). In a typical vacuum cleaner the angle γ is about 92 - 93°. The hose (20) comprises a threaded inner surface and a threaded outer surface.

[0027] Fig. 2 shows the coupling device (10) with open

flaps (30) and the helical hose (20) after it is easily screwed on the inner wall (12) to the end position of the hose recess (16). The hose is a first time fixed against demounting with barbed hooks which are located on the upper surface of the projections (11).

[0028] Fig. 3 shows now the coupling device (10) in the final working position with the assembled helical hose (20). The snapping flaps (30) are in a closed position which are connected with the outer wall (13) of the coupling device (10) by four latches placed on the flap (30). In this position it is impossible to open the snapping flaps (30) without damage the coupling device (10). When the flaps (30) are closed it is impossible to disassemble the helical hose (20) which is placed between the inner wall (12) and the outer wall (13) of the coupling device (10). Furthermore, disassemble of the helical hose (20) is prevented by projections (11) and ribs (32) which protrude into a wave trough of the hose.

[0029] Fig. 4 shows the coupling device (10) without the hose (20) in a top view directed into the movement direction of the hose (20). The recess (16) is determined by the gap between the inner wall (12) and the outer wall (13) of the coupling device (10). The inner diameter of the outer wall (13) correlate with the outer diameter of the hose (20) and the outer diameter of the inner wall (12) correlate with the inner diameter of the hose (20).

[0030] Fig. 5 shows the coupling device (10) with the hose (20) screwed on the inner wall (12) in a top view and a cut line which is shown in Fig. 6.

[0031] Fig. 6 shows a sectional view of the coupling device (10) as shown in the Fig. 5. In this figure the cooperation of the projections (11) and ribs (32) with the hose (20) can be explained. The inner wall (12) is provided with the projections (11) which have an external extension and have the same distance as the pitch of the hose (20). The ribs (32) of the flap (30) are directed to the inner wall (12) and are placed in the middle between projections (11). Between the external surface of the ribs (32) and the inner wall (12) is the material thickness of the hose (20). Or in other words: the ribs (32) presses the hose (20) against the inner wall so that the hose (20) is hermetic closed from out or inside. The flaps (30) are in closed position in a plain surface with the outer wall (13) of the coupling device (10). So in this working position the flaps (30) and the outer wall (13) forms a cylindrical surface.

[0032] The present invention enables a hose coupling for coupling a helical hose where only two parts; hose and coupling device are connected together. The coupling device is easy to produce and it's also possible to create a secure and airtight connection between the hose and the coupling device. Additionally the production and mounting costs of such coupling device are reduced.

LIST OF REFERENCE SIGNS

[0033] The figures have been each numbered corresponding the following:

10	Coupling device	
11	Projection	
12	Inner wall	
13	Outer wall	
14	Opening	5
15	Coupling element	
16	Hose recess	
17	Central axis	
20	Helical hose	10
30	Flap	
31	Hinge	
32	Rib	
33	Latch	15
α	angle between central axis (17) and the rib (32)	
β	angle between central axis (17) and the projections (11)	
γ	angle between central axis (17) and the helical thread of the hose (20)	20
H	pitch of the hose (20)	

Claims

1. A coupling device (10) for coupling a helical hose (20) of a cleaning device comprising: a hose recess (16) for a helical hose (20), an inner wall (12) and an outer wall (13), wherein the inner wall (12) is equipped with one or more projections (11) for fastening the helical hose (20) **characterized in that** the outer wall (13) comprising at least one coupling element (15), which is connected with the outer wall (13) in a working position. 30
2. A coupling device (10) according to claim 1, **characterized in that** the coupling element (15) comprising an opening (14) and a flap (30) wherein the flap (30) closes the opening (14) in a working position. 40
3. A coupling device (10) according to claim 2, **characterized in that** the flap (30) is connected to the outer wall (13) by a hinge (31). 45
4. A coupling device (10) according to claim 1 to 3, **characterized in that** the coupling element (15) comprises at least one rib (32) on the side of the flap which is directed to the inner wall (12). 50
5. A coupling device (10) according to any one of the preceding claims 2 to 4, **characterized in that** the flap (30) is snapped into the opening (14) by at least one latch (33) arranged on the flap (30) or on the opening (14). 55
6. A coupling device (10) according to any one of the

preceding claims 2 to 5, **characterized in that** two openings (14) are arranged on opposite sides of the outer wall (13) and each opening (14) comprises a flap (30).

7. A coupling device (10) according to any one of the preceding claims, **characterized in that** the ribs (32) are formed in an angle α between 80° to 100° degrees to the central axis (17) in a working position.
8. A coupling device (10) according to claim 7, **characterized in that** at least one rib (32) is formed in a right angle to the central axis (17) in a working position.
9. A coupling device (10) according to any one of the preceding claims, **characterized in that** at least two ribs (32) are almost parallel to each other.
10. A coupling device (10) according to any one of the preceding claims 4 to 9, **characterized in that** at least one rib (32) is arranged between two projections (11) when the flaps (30) are in working position.

11. A coupling device (10) according to any one of the preceding claims 4 to 10, **characterized in that** at least one rib (32) is in the middle between the projections (11) when the flaps (30) are in a working position. 25
12. A coupling device (10) according to any one of the preceding claims, **characterized in that** the projections (11) are formed in an angle β between 85° to 95° degrees to the central axis of inner wall (12). 30
13. A coupling device (10) according to claim 12, **characterized in that** at least one projection (11) is formed in a right angle to the central axis of the inner wall (12). 35
14. A coupling device (10) according to any one of the preceding claims, **characterized in that** at least two projections (11) are almost parallel to each other. 40

Fig. 1

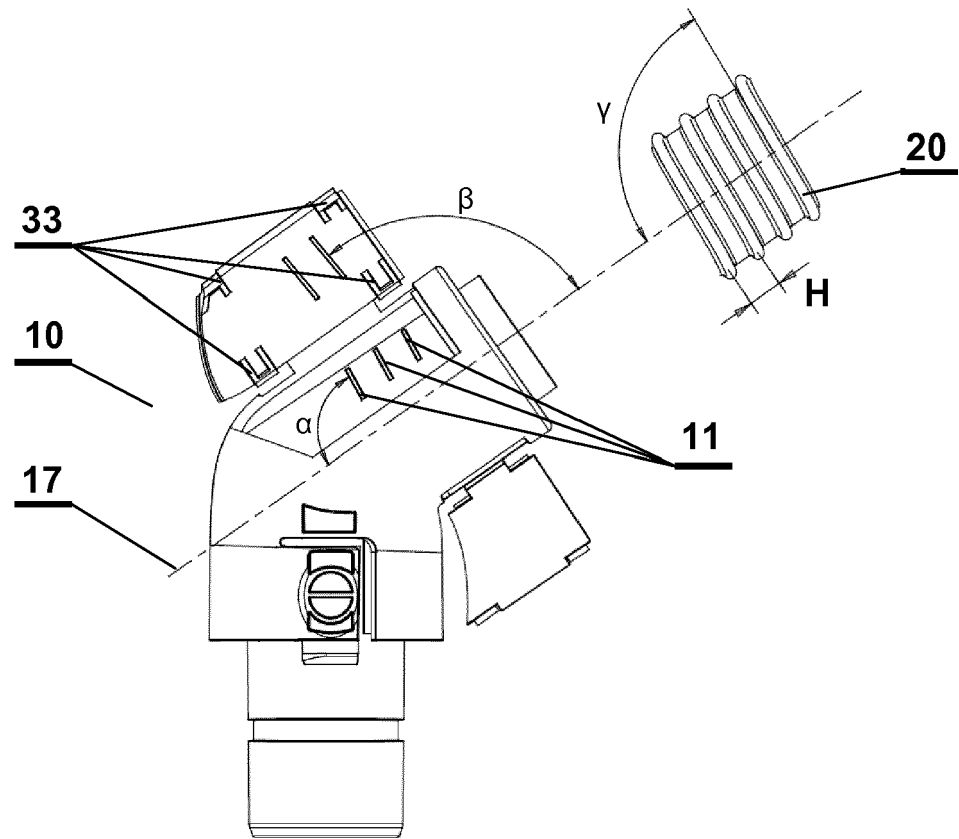


Fig. 2

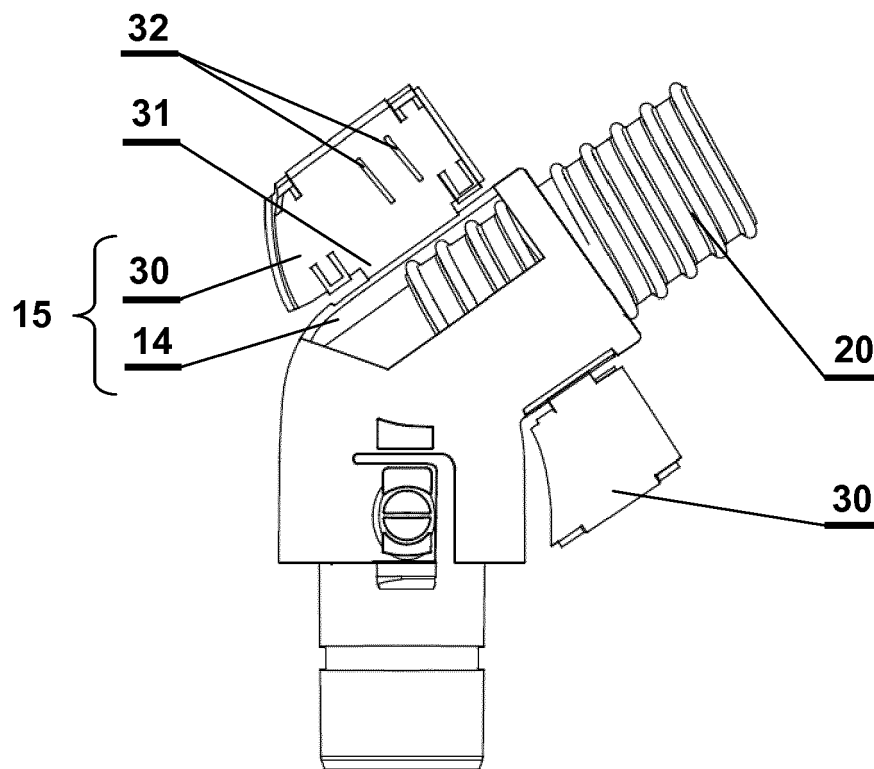


Fig. 3

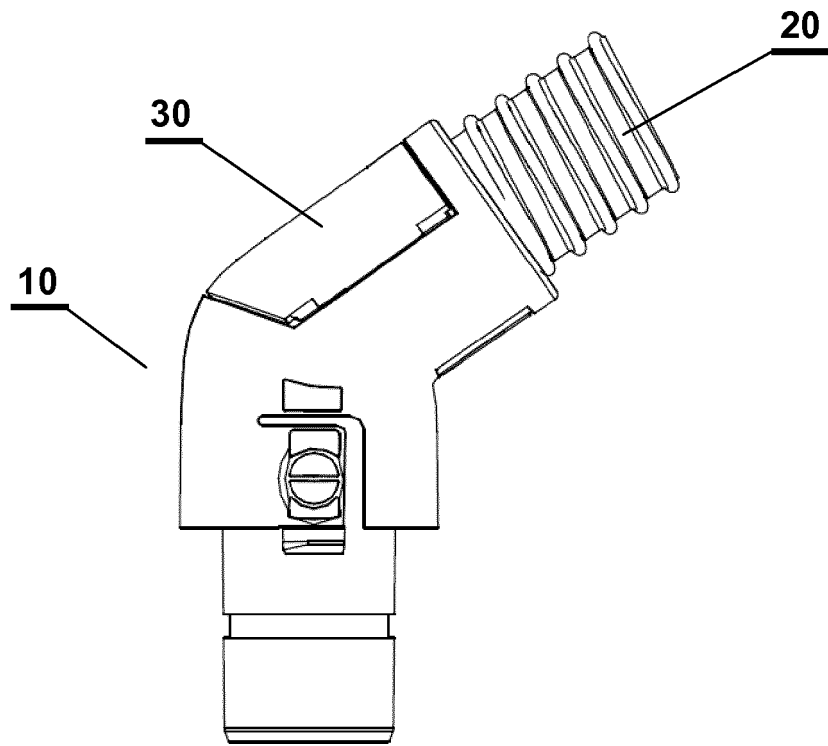


Fig. 4

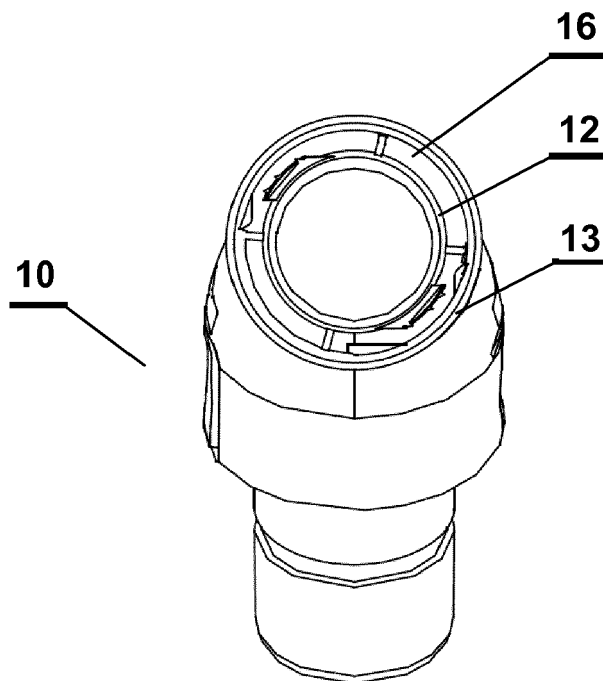


Fig. 5

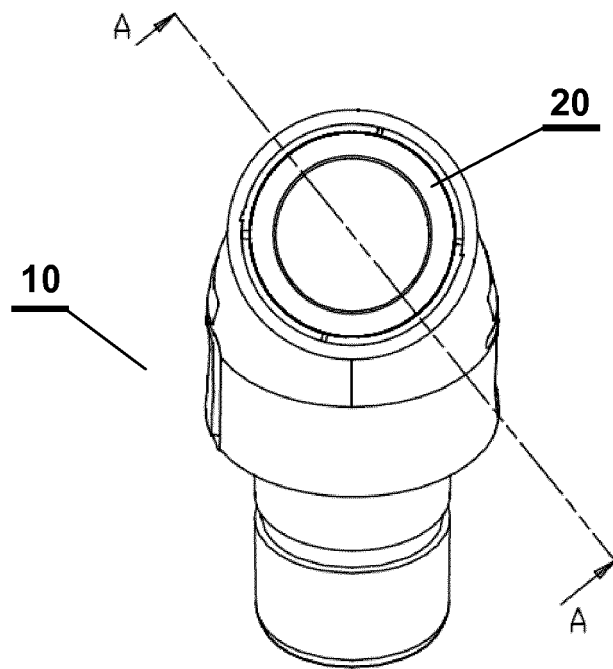
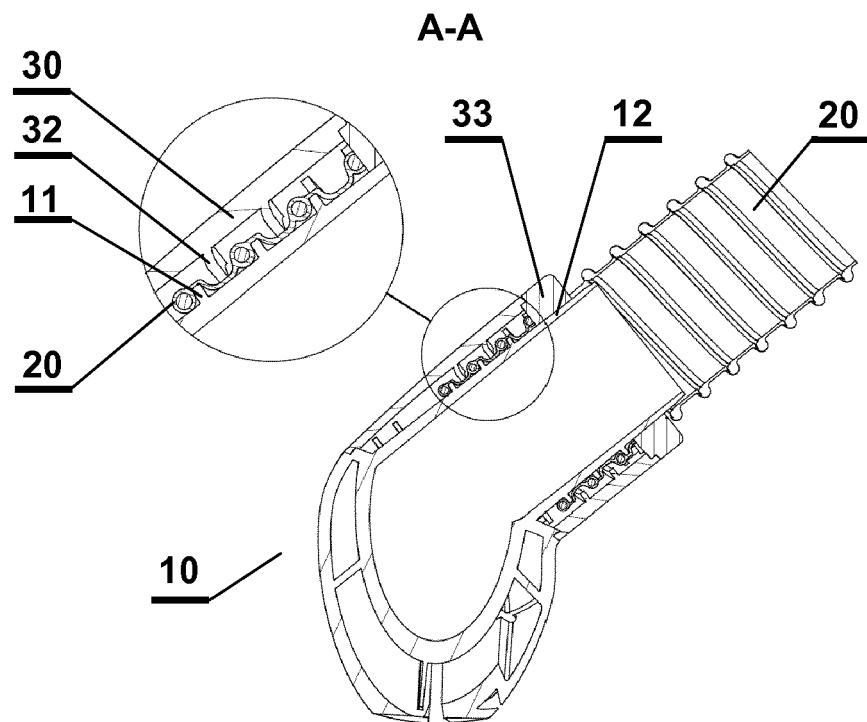


Fig. 6





EUROPEAN SEARCH REPORT

 Application Number
 EP 17 17 2803

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
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Place of search		Date of completion of the search	Examiner
Munich		9 October 2017	Eckenschwiller, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 17 2803

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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