US 20100294275A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2010/0294275 A1**

(43) **Pub. Date: Nov. 25, 2010**

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(54) **COUPLING ARRANGEMENT**

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(21) Appl. No.: **12/772,807**

(22) Filed: **May 3, 2010**

Related U.S. Application Data

(63) Continuation of application No. 10/240,885, filed on Oct. 4, 2002, now Pat. No. 7,721,738, filed as application No. PCT/DK01/00231 on Apr. 5, 2001.

(30) **Foreign Application Priority Data**

Apr. 6, 2000 (DK) ..... PA 2000 00580

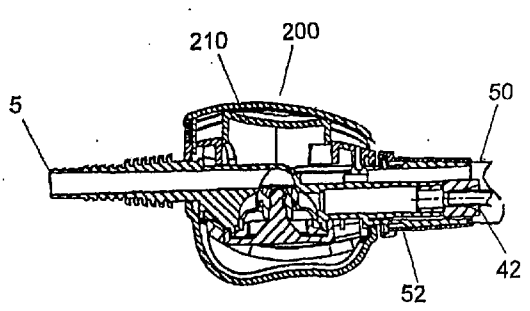
Publication Classification

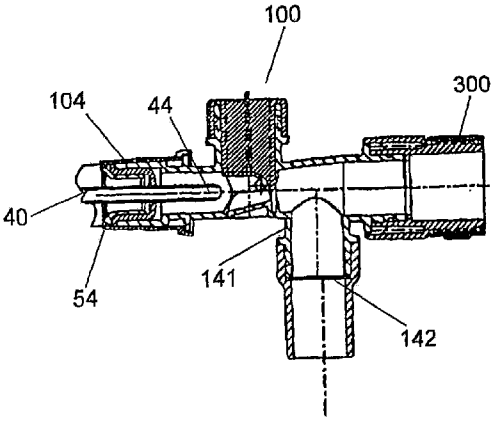
(51) **Int. Cl.**
A62B 9/04 (2006.01)

(52) **U.S. Cl.** **128/202.27**

(57) **ABSTRACT**

The present invention relates to a coupling arrangement for a system for endotracheal ventilation of a patient, which system comprises an endotracheal tube and a manifold (**100**) configured for allowing ventilation of the patient via said endotracheal tube, which manifold (**100**) has a first coupling means (**300**) with an axial extent (**400**) and with engagement means (**330**); and which endotracheal tube has a second coupling means (**400**) with an axial extent and with engagement means (**420**); wherein the coupling arrangement is configured to produce, when the first (**300**) and the second (**400**) coupling means are moved together in the axial **360** direction, a locking engagement between the engagement means (**33**, **420**). The invention is characterised in that the first coupling means (**300**), in the axial direction, comprises an exterior screw thread (**320**); and that the second coupling means (**400**) comprises an exterior abutment face (**430**); that the coupling arrangement also comprises a disengagement means (**350**) configured for cooperating with said screw thread (**320**); and that the disengagement means (**350**) and the screw thread (**320**) are configured for allowing an axial movement of the disengagement means (**350**) from a first position, in which said engagement means (**330**, **420**) are in locking engagement, to a second position in which the disengagement means (**350**) can influence the abutment face (**430**) by an axial force for releasing the locking engagement.





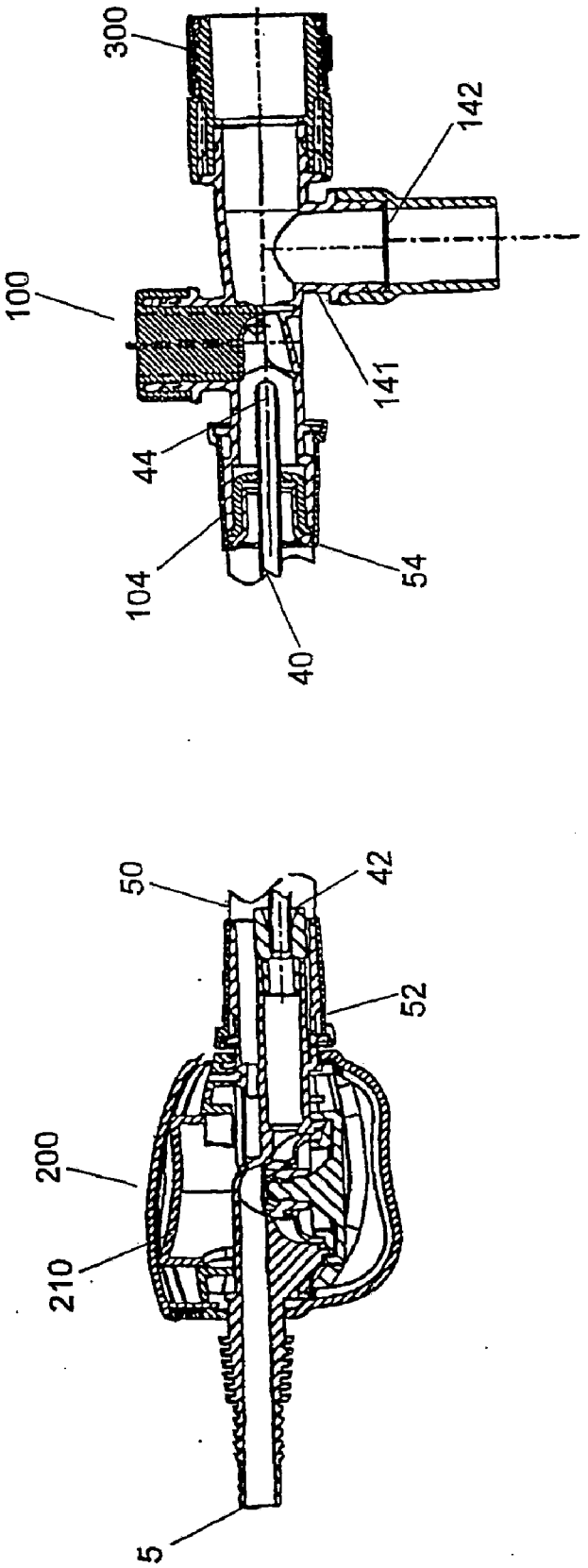
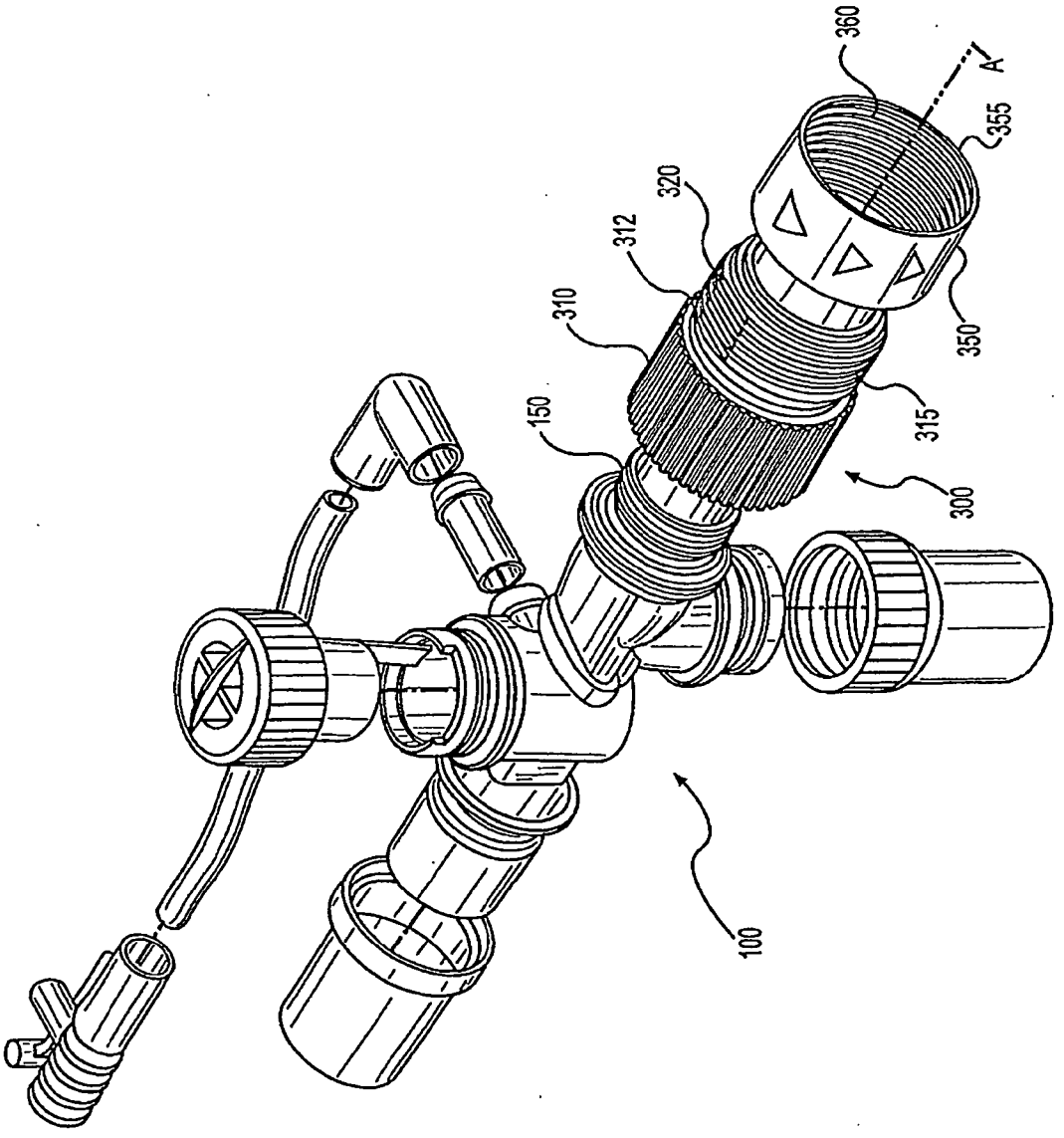


FIG. 1

FIG. 2



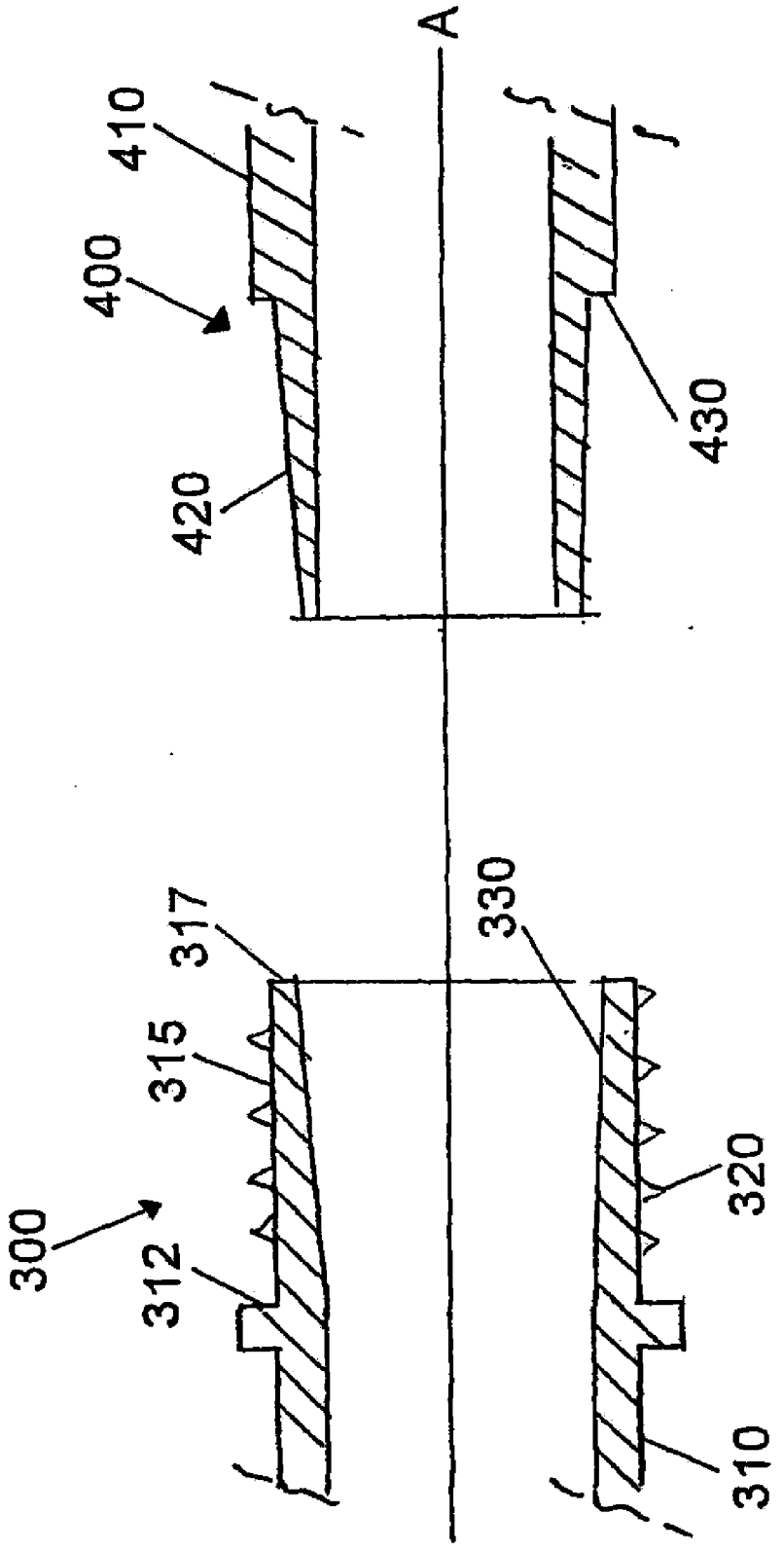


Fig. 3

COUPLING ARRANGEMENT

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a coupling arrangement of the kind described in the preamble to claims **1** and **2**. The coupling arrangement can be used for connecting a manifold of the kind described in eg WO98133536 and U.S. Pat. No. 5,487,381 to an endotracheal tube.

BRIEF SUMMARY OF THE INVENTION

[0002] It is commonly known to configure the end of an endotracheal tube with a conically tapering male coupling means that is introduced into a complementarily configured female coupling means on the manifold for establishing a sealing frictional connection. In order to separate the parts from each other it is necessary to produce an axial separation force. This force is typically produced by means of a disengagement means in the farm of a wedge-shaped manifold that is wedged between two protruding flanges located at the end of the female and the male coupling means, respectively. However, it has been found that by use of said manifold in practice, it is difficult for the hospital staff to avoid laterally oriented power influences on the coupling means and thus on the endotracheal tube that has been inserted into the patient with ensuing traumatic consequences for the patient. Besides, the prior art solutions involve a risk that the manifold disappears. In given situations, the latter has entailed that the hospital staff have attempted to separate the coupling means manually, which has, to an even wider extent, traumatically influenced the patient due to laterally oriented power influences.

[0003] It is the object of the invention to solve the above-mentioned problems by the prior art. As featured in the characterising portions of claims **1** and **2** this is obtained by arranging a thread for a disengagement means on either the manifold or in connection with the endotracheal tube. By the solution thus provided it is ensured that, at any time, the separation force is oriented essentially in the axial direction, and that no power influences occur transversally to the coupling means. Additionally, it becomes possible to avoid that the disengagement means is lost.

[0004] It is also preferred that the coupling means are configured as male and female parts, respectively, as featured in claims **3** and **4**. Preferably the coupling means are configured with engagement means in the form of complementary conical faces whereby it is possible to provide a frictional coupling in conventional manner as such. However, nothing prevents the engagement means from being configured in another manner, eg so as to provide a releasable joining by clipping together the engagement parts while profiting from the resilience of the constituent materials.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] The invention will now be described in further detail with reference to the embodiments shown in the drawing. In the drawing:

[0006] FIG. **1** illustrates a part of a system for endotracheal ventilation of a patient;

[0007] FIG. **2** illustrates a manifold in a perspective view and featuring a part of the coupling arrangement according to the invention; and

[0008] FIG. **3** is a cross sectional view through the coupling arrangement according to the invention, without the disengagement means.

DETAILED DESCRIPTION

[0009] In principle, the functionality of the system shown in FIG. **1** corresponds to the functionality of eg the system described in DK patent application No **32195**. The system shown is thus suitable for performing ventilation as well as aspiration of a patient and is thus conventionally designated a 'closed' system. A flexible shrouding or pipe coupling **50** is thus, at its first end **52**, connected to the valve device **200** and it is, at its opposite end **54**, connected to a manifold **100**. The valve housing **200** is configured for being, via a coupling **5**, connected to a not shown suction device for generating a sub-atmospheric pressure in the system.

[0010] The manifold **100**, which is preferably transparent, is also configured to be connected—via a coupling arrangement—to a tubular element or "tube" for endotracheal ventilation of a patient, ie a tube configured for being introduced into the respiratory tracts of the patient with a view to maintaining artificial ventilation of the patient. To this end, the manifold **100** has a coupling device, designated in the drawing by the reference numeral **300** and to be described in further detail below. An opening **142** in a ventilation stub **141** allows ventilation of the patient by means of a not shown conventional apparatus. To this end the ventilation stub **141** is preferably configured with a screw thread for connection with the ventilation apparatus.

[0011] Besides, the system conventionally comprises a catheter **40** that extends within the interior of the shrouding **50** and that can be introduced into the patient's respiratory tracts to draw out secretion. At its first end **42**, the catheter **40** is securely connected to the valve device **200** and, at its opposite end **44**, it is dispiaceably received in the manifold **100**, the catheter being—via a packing **104**—sealed relative to the shrouding **50** so as to prevent fluid from penetrating into the shrouding. Also, the packing **104** causes secretion to be scraped off the outside of the catheter **40** during withdrawal of the catheter from the patient. it will be understood that the opposite end **44** of the catheter forms a suction point that can, while the shrouding **50** is simultaneously folded, be displaced through the manifold interior and into the not shown tube for ventilation of the patient. By this movement, the end **44** of the catheter is thus conveyed to the right in FIG. **1**. Hereby it is possible to perform regular suction of secretion from the patient's respiratory tracts, as the operator connects the system to the suction device by operating an actuator button **210** arranged in the valve housing **200**.

[0012] As mentioned above, the manifold **100** has a coupling device that constitutes a first coupling means **300** of a coupling arrangement **300**, **330**, **400**. This first coupling means is shown more clearly in FIG. **2**, from where it will also appear that the manifold **100** defines a through-going axis A. In the embodiment shown the coupling means **300** is constituted by a separate pipe coupling that is configured for being able to be fastened in extension of the manifold **100** via an engagement area **150** on the outside of the manifold **100** and that extends along the axis A. However, the coupling means **300** may very well be formed integrally with the manifold **100**. The coupling means **300** has an interiorly extending, through-going passage for ventilation and aspiration of the patient, and it has at its one end a first cylindrical area **310** that

continues—via an annular plateau **312** that extends perpendicular to the axis A—into a cylindrical area **315** provided with an exterior thread **320**.

[0013] In FIG. **3**, the coupling arrangement is shown in further detail. To the left in the drawing the coupling means **300** thus shown that has, to the extreme right, an annular end edge **317**. The passage in the cylindrical area **315** has, as will appear, an evenly increasing interior diameter in a direction away from the manifold **100**, whereby it is possible to provide a frictional joint between the first coupling means **300** and a second coupling means **400**, which is shown to the right in FIG. **3**, and comprising an area **420** that is complementary with the area **315**.

[0014] The second coupling means **400** is, as shown, configured as a cylindrical body with a through-going passage that extends along the axis A like the passage in the first coupling means **300**. A tapering area **420** of the second coupling means **400** has an increasing, exterior diameter that has been adjusted in accordance with the change in the interior diameter of the passage within the area **315** in the first coupling means **300**. Thereby it is possible to provide a sealing frictional coupling by introduction of the second coupling means **400** into the first coupling means **300**. When the manifold **100** is to be connected to an endotracheal tube, said joining of the two coupling means is performed for establishing a very sealing frictional connection. The tapering of the passage within the area **315** and the area **420** can be comprised within the preferred ratio of about I to 40.

[0015] The second coupling means **400** also comprises a plateau **430** that extends perpendicular to the axis A, which plateau forms a transition between the tapering area **420** and a head portion **410** of the coupling means **400**. The head portion **410** can either be solidly connected to the end of an endotracheal tube, or it can be configured for being solidly connected to the end of an endotracheal tube immediately preceding the introduction into the patient of the endotracheal tube. It will be understood that the first coupling means **300** will, in the relevant case, form a female coupling means, whereas the second coupling means **400** forms a male coupling means.

[0016] Additionally the coupling arrangement comprises the disengagement means **350** shown in FIG. **2** that has an internal thread **360** configured for cooperating with the thread **320**. The plateau **312** forms a first end position for the disengagement means **350**, since preferably the extent of the disengagement means **350** along the axis A corresponds maximally to the extent of the thread **320** along the axis A.

[0017] When the second coupling means **400** has been introduced into the coupling means **300**, the end edge **317** is preferably in abutment on the plateau **430**. In this state, there will preferably be a certain distance between the plateau **430** and the disengagement means **350** that has been screwed onto the area **315**. In order to be able, in this state, to perform a separation of the two coupling means, the disengagement means **350** is turned a suitable number of times, whereby the means **350** is displaced and caused to abut on the plateau **430**. By carrying out a further manual turning of the disengagement means **350**, an axial power influence is generated towards the second coupling means **400**. The power influence is oriented in accordance with the axis A and will entail that the second coupling means **400** is released. The pitch of the threads **320**, **360** can be selected in accordance with the forces involved, including the ease with which the user must be able to turn the disengagement means **350** in order to achieve the intended separation.

[0018] Although the invention herein has been described with reference to particular embodiments, it is to be understood that these embodiments are merely illustrative of the principles and applications of the present invention. It is therefore to be understood that numerous modifications may be made to the illustrative embodiments and that other arrangements may be devised without departing from the spirit and scope of the present invention as defined by the appended claims.

1-5. (canceled)

6. A coupling arrangement for a system for endotracheal ventilation of a patient, which system comprises an endotracheal tube and a manifold (**100**) configured for allowing ventilation of the patient via said endotracheal tube,

which manifold (**100**) has a first coupling means (**300**) with an axial extent and with engagement means (**330**); and

which endotracheal tube has a second coupling means (**400**) with an axial extent and with engagement means (**420**);

wherein the coupling arrangement is configured to produce, when the first (**300**) and the second (**400**) coupling means are moved together in the axial direction, a locking engagement between the engagement means (**330**, **420**),

characterised in

that the first coupling means (**300**), in the axial direction (A), comprises an exterior screw thread (**320**); and

that the second coupling means (**400**) comprises an exterior abutment face (**430**);

that the coupling arrangement also comprises a disengagement means (**350**) configured for cooperating with said screw thread (**320**); and

that the disengagement means (**350**) and the screw thread (**320**) are configured for allowing an .axial movement of the disengagement means (**350**) from a first position, in which said engagement means (**330**, **420**) are in locking engagement, to a second position in which the disengagement means (**350**) can influence the abutment face (**430**) by an axial force for releasing the locking engagement, and

that the first coupling means (**300**) are released from the second coupling means (**400**) together with the disengagement means (**350**).

7. A coupling arrangement for a system for endotracheal ventilation of a patient, which system comprises an endotracheal tube and a manifold (**100**) configured for allowing ventilation of the patient via said endotracheal tube,

which manifold (**100**) has a first coupling means (**300**) with an axial extent and having engagement means (**330**); and

which endotracheal tube has a second coupling means (**400**) with an axial extent and engagement means (**420**);

wherein the coupling arrangement is configured for generating, when the first (**300**) and the second (**400**) coupling means are moved together in the axial direction, a locking engagement between the engagement means (**330**, **420**),

characterised in

that the first coupling means (**300**) comprises an external abutment face (**430**), and that the second coupling means (**400**) comprises, in the axial direction (A), an external screw thread (**320**);

that the coupling arrangement also comprises a disengagement means (**350**) configured for cooperating with said screw thread (**320**); and

that the disengagement means (**350**) and the screw thread (**320**) are configured for allowing an axial movement of the disengagement means (**350**) from a first position in which said engagement means (**330**, **420**) are in locking engagement to a second position in which the disengagement means (**350**) can influence the abutment face (**430**) by an axial force for releasing the locking engagement, and

that the second coupling means (**400**) are released from the first coupling means (**300**) together with the disengagement means (**350**).

wherein the coupling arrangement is configured for generating, when the first (**300**) and the second (**400**) coupling means are moved together in the axial direction, a locking engagement between the engagement means (**330**, **420**),

characterised in

that the first coupling means (**300**) comprises an external abutment face (**430**), and that the second coupling means (**400**) comprises, in the axial direction (A), an external screw thread (**320**);

that the coupling arrangement also comprises a disengagement means (**350**) configured for cooperating with said screw thread (**320**); and

- that the disengagement means (**350**) and the screw thread (**320**) are configured for allowing an axial movement of the disengagement means (**350**) from a first position in which said engagement means (**330**, **420**) are in locking engagement to a second position in which the disengagement means (**350**) can influence the abutment face (**430**) by an axial force for releasing the locking engagement.

8. A coupling arrangement according to claim **1** or **2**, characterised in

that the first coupling means (**300**) is configured as a male coupling means;

that the second coupling means (**400**) is configured as a female coupling means.

9. A coupling arrangement according to claim 'f or **2**, characterised in

that the first coupling means (**300**) is configured as a female coupling means (**330**); and

that the second coupling means (**400**) is configured as a male coupling means (**420**).

10. A coupling arrangement according to any one of the preceding claim **3** or **4**, characterised in

that the male coupling means is configured with a frusto-conical surface (**420**); and

that the female coupling means is configured with a surface (**330**) that is complementary to said frusto-conical surface.

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