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Degassing tube and ejection cone for a turbine engine, as well as tool for assembly thereof

Abstract

An aircraft turbine engine module, including a degassing tube and an ejection cone. The tube and the cone are engageable together by structures which cause them to be centered when engaged together. Also provided is a locating and adjusting tool for assembling the module.

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Background/Summary

TECHNICAL FIELD

(1) The present invention notably relates to a degassing tube and ejection cone for a turbine engine, in particular, for an aircraft. It also relates to a unit comprising these two systems, as well as a tool and a method for assembly of this unit.

PRIOR ART

(2) The prior art notably comprises the documents WO-A2-2014/072643, WO-A2-2014/072626 and FR-A-1 103 224.

(3) A turbine engine, such as a turbofan engine, typically comprises an air inlet comprising a blower whose outgoing airflow divides into an airflow which penetrates the motor and forms a hot flow or primary flow and an airflow which flows around the motor and which forms a cold flow or secondary flow.

(4) The motor typically comprises, from upstream to downstream, in the direction of the gas flow, at least one compressor, a combustion chamber, at least one turbine, and an ejection nozzle in which the combustion gases exiting the turbine and forming the primary flow are mixed with the secondary flow.

(5) At the downstream end, the turbine engine comprises an ejection cone of the primary flow or even of the mixed primary-secondary flow. This cone has an extended form of which the upstream end of larger diameter is fixed to an element of the turbine engine, like a casing.

(6) In typical fashion, a degassing tube longitudinally traverses the ejection cone. The function of this tube is to extract and to channel the air discharged from the oil by the oil separators of the turbine engine and to eject it into the atmosphere by the downstream end of the tube, substantially situated at the point of the downstream end of the ejection cone.

(7) The document WO-A1-2011/117560 describes a turbine engine degassing tube.

(8) The degassing tube has an extended form and can comprise, at a longitudinal end, means of fixing to an element of the turbine engine. The degassing tube is, in this case, cantilevered on this element, which is not satisfactory for retention reasons during dynamic stresses.

(9) Furthermore, while the ejection cone has a non-axisymmetric form and has, for example, upstream and downstream ends which are not aligned, the assembly unit comprising the tube and the cone is complex. The tube is mounted on the turbine engine beforehand and once the cone is mounted on the turbine engine, the tube is no longer accessible. In addition to the difficulties linked to the form of the cone, the relative position of the tube with regard to the cone can vary by a few millimetres due to manufacturing tolerances of the parts.

(10) The present invention proposes a solution to solve at least one part of the problems mentioned above, in a simple, efficient and cost-saving manner.

DESCRIPTION OF THE INVENTION

(11) The invention proposes a degassing tube for a turbine engine of an aircraft, this tube having an extended form and comprising at a longitudinal end means of fixing to an element of the turbine engine, the tube also comprising at its outer periphery and at a distance from said end first centring means configured to co-operate with second centring means of an ejection cone of the turbine engine designed to be traversed by said tube characterised in that said first centring means are formed by an allowance of said tube and have a polygonal peripheral form in cross section and comprise a annular row of external support surfaces.

(12) The invention also ensures the centring and the support of the tube inside the cone.

(13) The tube according to the invention can comprise one or several of the following features, either in isolation from each other or in combination with each other: said external support surfaces are flat, said first centring means have a hexagonal peripheral form in cross section.

(14) The invention also relates to an ejection cone for a turbine engine of an aircraft, this cone having an extended form and comprising at the longitudinal end means of fixing to an element of the turbine engine, the cone also comprising at its inner periphery and at distance from said end

second centring means configured to co-operate with first centring means of a degassing tube of the turbine engine designed to traverse said cone, the cone comprising at least one annular stiffener at its inner periphery, said second centring means being fixed in a detachable manner to said stiffener, characterised in that said second centring means comprise an annular row of tabs configured to be radially supported on said first centring means.

(15) The cone according to the invention can comprise one or several of the following features, either in isolation from each other or in combination with each other: the cone comprises at least one annular stiffener at its inner periphery, said second centring means being fixed in a detachable manner to said stiffener, said tabs are carried by a first disc which is fixed to a second disc, a third disc being inserted and squeezed between said first and second discs and being fixed to said stiffener, said first, second and third discs extending around the longitudinal axis of the cone, said first and second discs are fixed together by screws which traverse first holes or slots of said third disc, and said third disc is fixed to said stiffener by screws which traverse second holes or slots of said second disc inserted between said third disc and said stiffener, said first and second holes or slots being configured as having the larger transversal dimensions than said corresponding screws in order to allow for relative displacements in a radial direction between said first and second discs, on the one hand, and said third disc and stiffener, on the other hand.

(16) The present invention also relates to a unit of a turbine engine of an aircraft, comprising a tube and a cone as described above.

(17) The present invention also relates to a turbine engine, of an aircraft in particular, characterised in that it comprises this unit.

(18) The present invention also relates to a locating and adjusting tool for the assembly of a unit as described above, in that it comprises: a first ring configured to be applied and fixed to an element of the turbine engine and to also be, in a sequenced manner (in other words, it is capable of being fixed to two pieces but when it is fixed to one piece, it is not fixed to the other piece), applied and fixed to an end with a larger diameter than said cone, said first ring being configured to be traversed by said tube, a second ring configured to be traversed by said tube and to be accommodated in said cone, ring connecting struts, which extend between the rings and are fixed to the latter, these struts being configured to be accommodated in said cone, and a third ring configured to be traversed by said tube and to carry, in a detachable and sequenced manner, a tubular finger comprising first centring means substantially identical to the first centring means of said tube, said third ring being fixed to said second ring by means which allow for adjustment of the misalignment of the axes of said second and third rings.

(19) Advantageously, said third ring comprises an inner cylindrical centring surface which is configured to co-operate with an external cylindrical surface of said finger and, in a sequenced manner, with an external cylindrical surface of a tubular sleeve, this sleeve, preferably divided into sectors, comprising an inner cylindrical surface in polygonal, preferably hexagonal, form, in cross section, which is complementary to that of said first centring means of said tube.

(20) Lastly, the present invention relates to an assembly method of a unit of the type described above, using the tool described above, which includes the steps of: a) fixing said tube to a first element of the turbine engine and fixing said first ring of the tool to a second element of the turbine engine, so that said second and third rings are traversed by said tube, said fixing means between said second and third rings not being tightened. b) mounting said sleeve around said tube and inside said third ring, then tightening said fixing means between said second and third rings which themselves are not tightened, c) releasing the tool from said first element of the turbine engine, fixing said finger to said third ring, and inserting the tool into said cone, so that said finger co-operates with said second centring means, which are mounted idly in a radial direction facing said cone, then fixing said first ring to said cone, d) rigidly fixing said centring means facing said cone, and e) mounting said cone around said tube, so that said first and second centring means co-operate together, then fixing said cone to said first element of the turbine engine.

Description

DESCRIPTION OF THE FIGURES

(1) The invention will be better understood and other details, features and advantages of the invention will become apparent on reading the following description by way of a non-limiting example and referring to the appended drawings in which:

(2) FIG. **1** is a schematic view in axial section of a unit of a turbine engine, comprising a degassing tube and an ejection cone,

(3) FIG. **2** is a half-schematic view in axial section of a unit of a turbine engine as in FIG. **1**,

(4) FIG. **3** is a perspective view of a unit according to the invention,

(5) FIGS. **4** to **6** are perspective views of the centring means of the tube and the cone of the unit in FIG. **3**,

(6) FIGS. **7** to **10** are schematic views in axial section, and certain ones are perspective views, of the centring means of the tube and the cone of the unit in FIG. **3**,

(7) FIGS. **11** to **18** are perspective views of an assembly tool of the unit according to the invention, and represent the steps of an assembly method,

(8) FIGS. **19** to **22** are schematic views in axial section, and certain ones are perspective views, of the means of adjustment of the tool in FIGS. **11** to **18**, inserted into the ejection cone, and

(9) FIG. **23** is a perspective view of a downstream end of a turbine engine.

DETAILED DESCRIPTION

(10) FIGS. **1** and **2** are referred to first, which represent an ejection or downstream unit **10** of a turbine engine, comprising an ejection cone **12** extending around a degassing tube **14**.

(11) The cone **12** has an extended form of axis A, of which the upstream end of larger diameter is fixed to an intermediate element of the ejection unit, itself fixed to a casing of the turbine engine, for example by means of an annular flange **16**.

(12) The degassing tube **14** extends along the axis A and thus also has an extended form. It comprises fixing means, such as a flange **18**, at its upstream longitudinal end, to an element of the turbine engine.

(13) This type of technology has some drawbacks and the present invention aims to solve this, at least in part, particularly due to the centring means and the support of the downstream end of the tube inside the cone.

(14) The following figures illustrate an embodiment of the invention.

(15) FIG. **3** represents a unit **110** as a whole, comprising an ejection cone **112** and a degassing tube **114** longitudinally traversing the cone and comprising a fixing flange **116** at its upstream end.

(16) The cone **112** comprises a substantially conical or frusto-conical wall which is here reinforced by a series of inner annular stiffeners **118** longitudinally spaced apart from each other. In the example shown, there are four of these.

(17) One of the stiffeners **118**, situated next to the downstream end of the cone, is situated next to the downstream end of smaller diameter of the cone and carries the centring means **120** designed to co-operate with the complementary centring means **130** of tube **114**.

(18) The centring means **130** of the tube, better illustrated in FIGS. **4** to **10**, comprise an annular row of, preferably flat, external support surfaces **132**. In the example shown, the centring means **130** are formed by an allowance of the tube and have a polygonal, preferably hexagonal, peripheral form in cross section. It is conceivable that each side of the hexagon defines one of the aforementioned support surfaces, here six in number evenly distributed around the axis A. The centring means **130** are then integrally formed with the tube **114** in the example shown.

(19) The stiffener **118** of the cone, which carries the centring means **120**, comprises a flat annular wall extending substantially radially with respect to the axis A. This wall has a larger internal diameter than the external diameter of the tube **114**. The stiffener **118** comprises an annular row of

axial screw holes **122**.

(20) The centring means **120** comprise three discs **124**, **126**, **128** in the example shown.

(21) Each disc **124**, **126**, **128** is designed to be traversed by the tube **114**, and has a larger internal diameter than the external diameter of the tube **114**.

(22) The disc **124**, known as upstream disc or first disc, carries an annular row of radial support tabs **134** on the faces **132** of the centring means **130** of the tube **114**. The number of tabs **134** is preferably equal to the number of faces **132**, and thus there are six in the present case.

(23) The tabs **134**, as well as the discs **124**, **126**, **128** are preferably formed out of metal. Each tab **134** comprises, for example, an element of sheet metal folded in order to substantially form a V. An arm radially external of the V is applied and fixed, for example by welding, to a face, here upstream, of the disc **124**, and the other arm radially inside of the V is folded back downstream to extend substantially parallel to a face **132** and to be capable of entering into co-operation with it by support plane.

(24) As shown in the drawings, the disc **124** comprises an annular row of through slots **136** in axial direction at its external periphery.

(25) The disc **124** also comprises an annular row of holes **138** for screws **140** fixing the disc **124** to the disc **128**. The holes **138** are here formed in the arms radially external of the tabs **134**.

(26) The disc **128**, known as downstream disc or second disc, has an annular row of screw **140** holes, as well as plate nuts or rivet bushes **142** for screwing these screws.

(27) The disc **128** also comprises an annular row of through slots **144** in axial direction at its external periphery.

(28) The disc **126**, known as intermediate disc or third disc, has a first annular row of screw **140** holes **146** and a second annular row of holes **148** for screws **150** fixing the disc **126** to the aforementioned stiffener **118**, which traverses the holes **122**.

(29) The holes **146** are situated on a first centred circumference C**1** on the axis of the disc **126**, and the holes **148** are situated on a second centred circumference C**2** of that axis, C**2** being larger than C**1**.

(30) The diameter of the holes **146** is larger than the diameter of the screws **140** so that, in the absence of screw tightening, the disc **126** can be moved in its plane, which is a plane substantially radial with regard to the axis of the tube. This degree of freedom or idle assembly allows the position of the disc **126**, and thus of the cone **112**, with regard to the tube **114**, to be adjusted.

(31) The slots **136**, **114** have a similar function to the holes **146** in how they are dimensioned and positioned to allow the screws **150** to pass through and to allow relative displacements in the aforementioned radial plane between the discs **124**, **128**, on the one hand, and the disc **126** and the stiffener **118**, on the other hand.

(32) The heads of the screws **140** can be applied on the upstream face of the disc **124**. The heads of the screws **150** can be applied on the upstream face of the disc **126** and can be screwed into the nuts **152** supported on the downstream face of the stiffener **124** or in the plate nuts or rivet bushes mounted in the holes **122** of the stiffener.

(33) It is understood that the discs **124** and **128** are secured together by the screws **140**. The disc **126** is inserted between the discs **124**, **128** and secured to the stiffener **124** and thus the cone **112** by the screws **150**.

(34) Even in the case where the cone **112** has a non-axisymmetric form, the tube **114** is centred and supported in an optimal manner inside the cone by co-operation of the tabs **134** with the faces **132** of the tube. A misalignment of the axis of the tube with regard to the downstream end of the cone is allowed by the centring means **120** which, before the tightening of the screws **140**, **150**, can be positioned in the radial plane so that all the tabs **134** are supported on the faces **132**. The tightening of the screws **140**, **150** then allows the relative positions of the cone and the tube to be fixed in place.

(35) FIGS. **11** to **22** show a tool for assembly of the unit on a turbine engine, as well as the steps of

the assembly method.
(36) The tool **160** mainly comprises: a first ring **162** configured to be applied and fixed to an intermediate element of the ejection unit, itself fixed to a casing of the turbine engine, and also, in a sequenced manner, to be applied and fixed to the end of larger diameter of the cone, this first ring being configured to be traversed by the tube, a second ring **164** configured to be traversed by the tube and to be accommodated in the cone, struts **166** connecting the discs, which extended between the discs and are fixed to the latter, these struts being configured to be accommodated in the cone, and a third ring **168** configured to be traversed by the tube and to carry, in a detachable and sequenced manner, a tubular finger **170** comprising centring means **130′** substantially identical to the centring means **130** of the tube, this third ring being fixed to the second ring by means allowing an adjustment of the misalignment of the axes of the second and third rings.
(37) The first ring **162** is here formed by a flat wall, substantially radial. It comprises an annular row of holes **172** for screws fixing to the intermediate element of the ejection module, or at the downstream end of the cone, for example at its annular flange. It also comprises holes for fixing screws for struts **166**.
(38) The struts **166** are formed by bars here in a U-shape in cross section, of which the longitudinal ends are respectively fixed to the rings **162**, **164**. The struts **166** are evenly distributed around the axis A and are six in number in the example shown. They are inscribed into a frusto-conical surface and are capable of being engaged, with the rings **164**, **168** in the cone **112**.
(39) The ring **164** comprises a first annular row of orifices **174**, here in oblong form. These orifices are situated in the longitudinal extension of the bars at the point of the opening of the U of their section.
(40) The ring **164** also comprises an annular row of through slots **176** in axial direction, situated at the external periphery of the ring.
(41) The ring **164** also comprises a second annular row of holes for screws **178** carried by the third ring **168**. These holes have a larger diameter than that of the screws **178** so that the ring **168** can, before tightening of the screws **178**, be moved in a radial plane with regard to the ring **164**, as described above.
(42) This ring **168** comprises an inner cylindrical centring surface **180** which is configured to co-operate with an external cylindrical surface **182** of the finger **170** (FIG. **15**) and, in a sequenced manner, with an external cylindrical surface **184** of a tubular casing **186** (FIGS. **12** to **14**).
(43) As described above, the finger **170** is tubular and comprises a longitudinal portion, here upstream, carrying the face **182**, and a longitudinal portion, here downstream, carrying the centring means **130′** at the external hexagonal peripheral section. The finger **170** comprises, at its downstream end, an annular screw **188** retaining flange in the ring **128**. It is also understood that the finger **170** is secured to the ring **128** by the screws **188**, and that its radial position with regard to the ring **126** is adjustable by means of the screws **178**.
(44) The casing **186** is here sectioned and comprises two half-shells, of which the joint plane contains the longitudinal axis of the casing. The casing **186** comprises the external cylindrical surface **184** at its external peripheral and, at its inner peripheral, a face of polygonal, preferably hexagonal, form in cross section, which is complementary to that of the centring means **130**, **130′**. The casing also comprises an annular collar **190** at its downstream end.
(45) The tool can also comprise a supporting frame **192** of the cone upon insertion of the arrangement formed by the rings **162**, **164**, **168** and the struts **166** in the cone, as ca be seen in FIGS. **16** to **18**.
(46) This frame **192** comprises four substantially vertical supports **194** supporting two or three substantially horizontal rings **196** designed to support and maintain the cone by supporting means like the pads **198**. As can be seen in the drawings, the cone is mounted in the frame **192** so that its longitudinal axis extends substantially vertical. The pads are supported on the external frusto-conical surface of the cone.

(47) The usage of the tool **160** and the assembly of the unit **110** of FIG. **23** will now be described with reference to FIGS. **11** to **22**.
(48) The arrangement formed by the rings **162**, **164**, and **168** and the struts **166** is pre-assembled, the fixing screws **178** of the rings **164**, **168** not being tightened.
(49) The tube **114** is fixed to the element of the turbine engine by its downstream flange then the ring **162** of the tool is fixed to the intermediate element of the turbine engine (FIG. **11**). The tube then traverses the rings **164**, **168** of the tool.
(50) As can be seen in FIGS. **11** to **13**, the casing **186** is inserted between the tube and the ring **168**, and more exactly between the centring means **130** of the tube and the inner cylindrical surface **180** of the ring **168**.
(51) This operation allows the ring **168** to be correctly positioned with regard to the tube, meaning that the ring **168** is centred in the tube. The fixing screws **178** of the rings **164**, **168** are then tightened to fix them into this relative position.
(52) The casing **186** is then removed (FIG. **14**). The tool **160** can then be detached from the turbine engine. It was used to locate the relative position of the centring means **130**′ with regard to the intermediate element of the ejection module of the turbine engine on which the cone must be fixed. The finger **170** is fixed to the ring **168**, as shown in FIG. **15**.
(53) The cone **112** is arranged in the frame **192**, as shown in FIG. **16**, then the adjusted tool **160** is accommodated in the cone until the finger **170** co-operates with the tabs **134** of the centring means **120** and the ring **162** is supported on the downstream end or the flange of the cone (FIGS. **17** and **18**). The tool can also be fixed to the cone.
(54) The co-operation of the finger **170** with the tabs **134** allows precise and relative positions corresponding to the optimal centring positions of the tube to be charged onto the tabs. It is therefore easily understandable that the tool serves as a means of locating but also adjusting the relative positions between the two systems.
(55) The fixing screws **140**, **150** of the discs can then be tightened as described above, to fix the relative positions of the discs, and thus the centring tabs **134** with regard to the cone, in place. For that, an operator can have access to the heads of the screws **140**, **150** by the orifices **174** and slots **176** of the tool **160**.
(56) The tool **160** is thus detached and removed from the cone, which can be fixed to the turbine engine. The cone is mounted around the tube, so that the centring means **120**, **130** co-operate together, then the cone is fixed by its upstream flange to the intermediate element of the ejection unit of the turbine engine (FIG. **23**).

Claims

1. Locating and adjusting tool for the assembly of a unit of a turbine engine of an aircraft, the unit comprising a degassing tube and an ejection cone, the degassing tube having an extended form and comprising first fixing means configured to fix to a first element of the turbine engine at a first longitudinal end, the degassing tube also comprising first centering means which are located at an external periphery of the degassing tube and at a distance from said first longitudinal end, said first centering means being configured to co-operate with second centering means of the ejection cone which is designed to be traversed by said degassing tube, said first centering means having a polygonal cross-sectional profile and being formed by external flat surfaces of the degassing tube that extend annularly around an outside of the degassing tube, the ejection cone having an extended form and comprising second fixing means configured to fix to a second element of the turbine engine at a second longitudinal end, the ejection cone also comprising the second centering means which are located at an inner periphery of the ejection cone and at a distance from said second longitudinal end, said second centering means being configured to co-operate with said first centering means of the degassing tube which is designed to traverse said ejection cone, the ejection

cone comprising at least one annular stiffener at the inner periphery, said second centering means being fixed in a detachable manner to said at least one annular stiffener, said second centering means comprising an annular row of tabs configured to be supported radially on said first centering means, wherein the locating and adjusting tool comprises: a first ring configured to be applied and fixed to said second element of the turbine engine and to also be, in a sequence manner, applied and fixed to the second longitudinal end of larger diameter of said ejection cone, said first ring being configured to be traversed by said degassing tube, a second ring configured to be traversed by said degassing tube and to be accommodated in said ejection cone, ring connecting struts, which extend between the first and second rings and are fixed to the first and second rings, these ring connecting struts being configured to be accommodated in said ejection cone, and a third ring configured to be traversed by said degassing tube and to carry, in a detachable and sequenced manner, a tubular finger of the locating and adjusting tool, said tubular finger comprising third centering means substantially identical to said first centering means of said degassing tube, said third centering means having a polygonal cross-sectional profile and being formed by external flat surfaces of the tubular finger that extend annularly around an outside of the tubular finger, said third ring being directly fixed on said second ring by fourth means allowing an adjustment of a radial misalignment of axes of said second and third rings, said fourth means comprising an annular row of first screws, the first screws being carried by the third ring.
2. Tool according to the claim 1, wherein said third ring comprises an inner cylindrical centering surface which is configured to co-operate with an external cylindrical surface of said tubular finger and, in a sequenced manner, with an external cylindrical surface of a tubular casing of the locating and adjusting tool, said tubular casing comprising an inner surface of polygonal form in cross section, which is complementary to that of said first centering means of said degassing tube.
3. Tool according to claim 2, wherein the tubular casing is sectioned and comprises several sectors.
4. Tool according to claim 2, wherein the inner surface of the tubular casing is hexagonal form in cross section.
5. Assembly method of a unit of a turbine engine of an aircraft, by means of a locating and adjusting tool according to claim 2, the unit comprising a degassing tube and an ejection cone, the degassing tube having an extended form and comprising first fixing means configured to fix to a first element of the turbine engine at a first longitudinal end, the degassing tube also comprising first centering means which are located at an external periphery of the degassing tube and at a distance from said first longitudinal end, said first centering means being configured to co-operate with second centering means of the ejection cone which is designed to be traversed by said degassing tube, said first centering means having a polygonal cross-sectional profile and being formed by external flat surfaces of the degassing tube that extend annularly around an outside of the degassing tube, the ejection cone having an extended form and comprising second fixing means configured to fix to a second element of the turbine engine at a second longitudinal end, the ejection cone also comprising the second centering means which are located at an inner periphery of the ejection cone and at a distance from said second longitudinal end, said second centering means being configured to co-operate with said first centering means of the degassing tube which is designed to traverse said ejection cone, the ejection cone comprising at least one annular stiffener at the inner periphery, said second centering means being fixed in a detachable manner to said at least one annular stiffener, said second centering means comprising an annular row of tabs configured to be supported radially on said first centering means, wherein the assembly method includes the steps of: a) fixing said degassing tube to the first element of the turbine engine and fixing said first ring of said locating and adjusting tool to the second element of the turbine engine, so that said second and third rings are traversed by said degassing tube, said fourth means between said second and third rings not being tightened, b) mounting said tubular casing around said degassing tube and inside said third ring, said fourth means between said second and third rings not being tightened, c) detaching said locating and adjusting tool from said second element of the

turbine engine, fixing said tubular finger to said third ring, and inserting said locating and adjusting tool in said ejection cone, so that said tubular finger co-operates with said second centering means, which are freely mounted in a radial direction with regard to said ejection cone, then fixing said first ring to said ejection cone, d) rigidly fixing said second centering means with regard to said ejection cone, and e) mounting said ejection cone around said degassing tube, so that said first and second centering means co-operate together, then fixing said ejection cone to said second element of the turbine engine.

6. A set comprising a locating and adjusting tool according to claim 1 and a unit of a turbine engine of an aircraft, the unit comprising a degassing tube and an ejection cone, the degassing tube having an extended form and comprising first fixing means to a first element of the turbine engine at a first longitudinal end, the degassing tube also comprising at an external periphery of the degassing tube and at a distance from said first longitudinal end first centering means configured to co-operate with second centering means of the ejection cone which is designed to be traversed by said degassing tube, said first centering means having a polygonal cross-sectional profile and being formed by external flat surfaces of the degassing tube that extend annularly around an outside of the degassing tube, the ejection cone having an extended form and comprising second fixing means to a second element of the turbine engine at a second longitudinal end, the ejection cone also comprising the second centering means which are located at an inner periphery of the ejection cone and at a distance from said second longitudinal end, said second centering means being configured to co- operate with said first centering means of the degassing tube which is designed to traverse said ejection cone, the ejection cone comprising at least one annular stiffener at the inner periphery, said second centering means being fixed in a detachable manner to said at least one annular stiffener, said second centering means comprising an annular row of tabs configured to be supported radially on said first centering means.

7. Tool according to claim 1, wherein each of said first screws passes through a corresponding hole of the second ring, each of said first screws having a respective diameter which is smaller than a diameter of the corresponding hole, so that the third ring is able to be moved in a radial plane relative to the second ring when said first screws are not tightened.

8. Tool according to claim 1, wherein each ring connecting strut is fixed to the first ring and to a first annular face of the second ring, the third ring being directly fixed on a second annular face of the second ring by said fourth means, the second annular face of the second ring being opposite to the first annular face of the second ring.

9. Tool according to claim 1, wherein each ring connecting strut is fixed to the first ring and to a first annular face of the second ring, the third ring comprising a collar, the collar of the third ring being directly fixed on a second annular face of the second ring by said fourth means, the second annular face of the second ring being opposite to the first annular face of the second ring.

10. Tool according to claim 1, wherein said tubular finger is fixed to the third ring by an annular row of second screws when the tubular finger is carried by the third ring.

11. Tool according to claim 1, wherein said third ring comprises an unthreaded inner cylindrical centering surface which is configured to co-operate with an unthreaded external cylindrical surface of said tubular finger and, in a sequenced manner, with an unthreaded external cylindrical surface of a tubular casing of the locating and adjusting tool, said tubular casing comprising an inner surface of polygonal form in cross section, which is complementary to that of said first centering means of said degassing tube.