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(54) **LANCE INJECTOR FOR INJECTING FUEL OIL INTO A GAS TURBINE COMBUSTION CHAMBER**

LANZENINJEKTOR ZUM EINSPRITZEN VON KRAFTSTOFFÖL IN EINE
GASTURBINENBRENNKAMMER

INJECTEUR DE TYPE LANCE POUR L'INJECTION DE MAZOUT DANS UNE CHAMBRE DE
COMBUSTION DE TURBINE À GAZ

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(56) References cited:
**EP-A1- 2 439 448 US-A- 2 369 046
US-A- 2 578 934 US-A- 2 715 546
US-A- 3 464 630**

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Description

TECHNICAL FIELD

[0001] The present invention relates to a lance injector for injecting fuel oil into a gas turbine combustion chamber.

BACKGROUND ART

[0002] As known, gas turbines, especially if used in plants for the production of electric energy, may be supplied with various types of fuel. In particular, it is known to run gas turbines on gaseous fuels of various nature and features (natural gas, syngas) or on fuel oils, such as diesel. For this reason, the gas turbines are provided with burner assemblies which comprise injectors, normally of the lance type, specifically designed to supply a controlled flow rate of fuel oil.

[0003] The lance injectors generally comprise a plurality of coaxial tubular bodies, on the end of which a terminal provided with a nozzle is mounted. The tubular bodies define, between one another, at least one delivery line between an inlet and the nozzle and a return line, which allows to recover the fuel in excess supplied to the nozzle. Possibly, a water supply line may be present.

[0004] A problem often present in lance injectors is due to the different thermal expansion of the components in use, with particular reference to the tubular bodies. The thermal stresses are considerable as a result of the very high temperatures in the combustion chamber (i.e. near the terminal and the nozzle). The consequent thermal expansions are not only remarkable, but also differ greatly from one component to the other, by effect of the differences of geometry and of exposure to the high temperatures of the combustion chamber and to the cooling air conveyed from the outside or to the process fluid.

[0005] In turn, the different expansions produce intense mechanical stresses and may cause damage to the components, loss of fitting and malfunctioning in general. A fault which may often occur is the partial or total obstruction of the fuel oil fluid passages between the outlet of the delivery line, the nozzle and the inlet of the return line. In these cases, it is not possible to supply the required fuel oil supply correctly, with negative repercussions, for example on machine efficiency and on polluting emissions. In extreme cases, it may be necessary to stop the plant to replace the faulty injectors.

US 2 578 934 A discloses a lance injector that comprises coaxial outer and inner tubular bodies, which define a first fluid line in a gap therebetween and a second fluid line in the inner tubular body. A nozzle is connected fluidically to the fluid lines at respective first ends of the outer and the inner tubular bodies. The tubular bodies are constrained to each other so that relative axial slide between the outer tubular body and the inner tubular body is prevented in a locking region at the first ends, and is permitted on account of expansion, between the locking

region and respective second ends of the outer tubular body and the inner tubular body.

[0006] Another example of a known lance injector is disclosed in EP 2 439 448 A1.

DISCLOSURE OF INVENTION

[0007] Thus, it is the object of the present invention to provide a lance injector for injecting fuel oil into a gas turbine combustion chamber which allows to overcome the described limitations.

[0008] According to the present invention, a lance injector for injecting fuel oil into a gas turbine combustion chamber is provided as defined in claim 1.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The present invention will now be described with reference to the accompanying drawings, which illustrate some non-limitative embodiments thereof, in which:

- figure 1 is a side section view, taken along an axial longitudinal plane and with parts removed for clarity, of a burner of a gas turbine incorporating a lance injector according to an embodiment of the present invention;
- figure 2 is a first enlarged detail of the lance injector in figure 1;
- figure 3 is a variant of the detail in figure 2, according to a different embodiment of the present invention;
- figure 4 is a second enlarged detail of the lance injector in figure 1.

BEST MODE FOR CARRYING OUT THE INVENTION

[0010] In figure 1, reference numeral 1 indicates as a whole a burner assembly for supplying fuel, in particular a gas, into a gas turbine combustion chamber 2, shown only partially here. The burner assembly 1 extends along an axis A and comprises a peripheral gas main burner 3, a central gas pilot burner 4, and a lance injector 5 for injecting fuel oil into the combustion chamber 2.

[0011] The main burner 3 is of the pre-mixer type, is arranged about the pilot burner 4 and is provided with a diagonal swirler 7, which comprises a plurality of vanes 10, mutually defining respective flow channels to convey a flow of combustion supporting air and fuel gas towards the combustion chamber 2 obliquely with respect to axis A. In an embodiment, the fuel gas is supplied through nozzles 11 placed on the vanes 10.

[0012] The pilot burner 4 is arranged coaxial to the main burner 3 and is provided with an axial swirler 8, which comprises a plurality of vanes 12, mutually defining respective flow channels to convey a further flow of combustion supporting air towards the combustion chamber 2, substantially along axis A.

[0013] The lance injector 5 extends along axis A and

has an end inserted within the pilot burner 4.

[0014] The lance injector 5 comprises an outer tubular body 15, an inner tubular body 16, an end member 17 and a nozzle 18. Furthermore, the lance injector 5 is provided with flanges 20, 21.

[0015] The outer tubular body 15 and the inner tubular body 16 extend concentrically along axis A and define fluid delivery line 22 and a fluid return line 23. More in detail, the fluid delivery line 22 is defined by a gap between the outer tubular body 15 and the inner tubular body 16 and allows to convey a fuel oil flow to the nozzle 18. The fluid return line 23 is instead defined in the inner tubular body 16 and allows to recover the fuel oil supplied in excess to the nozzle 18 and to re-introduce it into a manifold (not shown). An axial pin 24 is housed in the inner tubular body 16, facing the nozzle 18, and is configured so as to adjust the return flow of the fuel oil.

[0016] With reference to figure 2, the nozzle 18 is fluidly coupled to the fluid delivery line 22 and to the fluid return line 23 at respective ends 15a, 16a of the outer tubular body 15 and the inner tubular body 16. In particular, the nozzle 18 is mounted on the end 16a of the inner tubular body 16 by threaded coupling or hot-fitted and comprises a lateral wall 26 delimiting a chamber 25 and having a supply outlet 25a facing outwards (in use, towards the combustion chamber 2) and a recovery outlet, 25b, axially opposite to the supply outlet 25a and coupled to the fluid return line 23.

[0017] The end member 17 is fitted onto the end 15a of the outer tubular body 15 and coupled thereto by threaded coupling or possibly hot-fitted. The nozzle 18 and the end member 17 are connected interferentially and the nozzle 18 projects axially outwards with respect to the end member 17.

[0018] The end member 17 defines internally a fluid passage 29 between the fluid delivery line 22 and the nozzle 18, the lateral wall 26 of which has inlet openings 25c for accessing the chamber 25.

[0019] The outer tubular body 15 and the inner tubular body 16 are constrained to each other at respective ends 15a, 16a so that the relative slide following thermal expansion is prevented in a locking region. The relative slide between the outer tubular body 15 and of the inner tubular body 16 is free between the locking region and the opposite ends 15b, 16b, instead.

[0020] The connection in the locking region is made by means of constraint members, which, in one embodiment, comprise the end member 17 and a lock pin 27.

[0021] The lock pin 27 crosses the inner tubular body 16 and the axial pin 24 crosswise to axis A, for example perpendicularly. In one embodiment, the lock pin 27 is inserted with slight interference or welded in diametrically opposite seats of the inner tubular body 16 and is thus perpendicular to the axis A. In one embodiment, the lock pin 27 projects in opposite directions from the inner tubular body 16 and is arranged in front of an axial margin of the end 15a of the tubular body 15. Furthermore, the length of the lock pin 27 is greater than the inner diameter

and is substantially either equal to, or slightly greater than the outer diameter of the outer tubular body 15.

[0022] The end member 17 is configured so as to axially lock the lock pin 27 against the outer tubular body 15. In detail, the end member 17 internally has an abutment seat 28, defined by an annular shoulder, of diameter smaller than the length of the lock pin 27. The end member 17 is screwed onto the end 15a of the outer tubular body 15 so as to fit the ends of the lock pin 27 tightly between the axial margin of the end 15a of the outer tubular body 15 and the abutment seat 28. The lock pin 27, tightly fitted by the end member 17, thus prevents the relative axial slide between the outer tubular body 15, the inner tubular body 16 and the axial pin 24 in the locking region.

[0023] In a different embodiment, shown in figure 3, the lock pin, indicated hereinafter by reference numeral 27', extends through the outer tubular body 15, the inner tubular body 16 and the axial pin 24, thus preventing the relative axial slide in the locking region.

[0024] Furthermore, the constraint members comprise a lock ring 30, which is tightly fitted onto the outer tubular body 15 and is coupled to the end member 17 so as to prevent respective relative rotations between the outer tubular body 15 and the end member 17, thus preventing the release of the threaded coupling. For example, the lock ring 30 is provided with axial teeth which engage respective seats of the end member 17.

[0025] The flange 20 extends along axis A and has a through axial cavity 31 and a radial fluid passage 32, communicating with the axial cavity 31, for supplying fuel oil to the fluid delivery line 22. The axial cavity 31 ends with a neck 20a against which the end 15b of the outer tubular body 15 is arranged. The neck 20a and the end 15b of the outer tubular body 15 may be welded to each other. The end 16b of the inner tubular body 16 extends in the axial cavity 31 beyond the outer tubular body 15 and is inserted in a guide bushing 33, which belongs to the constraint members between the outer tubular body 15 and the inner tubular body 16. The guide bushing 33 supports the inner tubular body 16 in centered position on axis A and allows the axial slide thereof, in particular following the thermal expansion of the portion closest to the combustion chamber 2. Furthermore, the guide bushing 33 ensures fluid-tightness against the lateral wall of the inner tubular body 15, thus preventing leakage of fuel oil.

[0026] The flange 21 is coupled to the flange 20 and has a through axial cavity 35, communicating with the end 16b of the inner tubular body 16 through the guide bushing 33 to recover the fuel oil in excess coming from the fluid return line 23. The guide bushing 33 and the axial cavity 35 of the flange 21 define an expansion chamber which allow the free axial slide of the end 16b of the inner tubular body 16, which is free from axial constraints.

[0027] The described lance injector has many advantages. Firstly, one advantage derives from the fact that the relative axial slide constraint is closer to the hottest

region of the injector in use, which is critical for the thermal and mechanical stresses and because the even partial obstruction of the fluid delivery and return lines must be avoided. The presence of the axial slide constraint causes the residual relative slide of the outer and inner tubular bodies and of the nozzle to be entirely negligible even following major differences of temperature. The opening of the fluid passages is thus ensured.

[0028] Furthermore, the outer and inner tubular bodies, which for their axial dimensions are subjected to higher expansions, are constrained to each other and to the end member without fitting, by inserting the lock pin and the threaded coupling between end member and outer tubular body. Consequently, there is no risk of damage or malfunctioning deriving from loss of interference between components.

[0029] Thus, with respect to the known injectors, the described lance injector is much less affected by the effects of the major thermal expansions caused by the high temperatures in the combustion chamber. The considerable robustness of the lance injector according to the invention allows, in turn, to reduce significantly the cooling air flow rate for correct operation during operation with gas supplied by the main burner and/or the pilot burner. The general efficiency general of the gas turbine is thus increased.

[0030] The correct positioning of the components may be maintained both in use (i.e. in presence of high temperatures and major temperature differences between the opposite ends of the outer and inner tubular bodies) and in rest conditions, without needing to resort to contrast elements tending to promote the restoring of a given configuration (for example, packs of Belleville washers operating against the ends of one or both the tubular bodies). Thus, on one hand, the mechanical stresses and risks of failures are further reduced; on the other hand, the manufacturing of the lance injector is simplified.

[0031] Another advantage is given by the freedom of the outer and inner tubular bodies to expand in opposite direction with respect to the nozzle, where, by virtue of the chamber formed by the guide bushing and by the axial cavity, there are wide tolerances to allow relative axial slides without the risk of obstruction of passages and contact between various components. This aspect also contributes to reducing the risk of damage and malfunctions.

[0032] Finally, it is apparent that changes and variations may be made to the lance for injecting for fuel oil into a gas turbine combustion chamber without departing from the scope of protection of the present invention, as defined in the appended claims.

Claims

1. A lance injector for injecting fuel oil into a gas turbine combustion chamber (2), the lance injector comprising:

an outer tubular body (15) and an inner tubular body (16), which extend along a common axis (A) and define a first fluid line (22) in a gap between the outer tubular body (15) and the inner tubular body (16), and a second fluid line (23) in the inner tubular body (16); and

a nozzle (18) connected fluidically to the first fluid line (22) and to the second fluid line (23), at respective first ends (15a, 16a) of the outer tubular body (15) and the inner tubular body (16); wherein the outer tubular body (15) and the inner tubular body (16) are constrained to each other by constraint members (17, 27, 27', 30, 33) so that the relative axial slide between the outer tubular body (15) and the inner tubular body (16) is prevented in a locking region at the respective first ends (15a, 16a), and is permitted on account of expansion, between the locking region and respective second ends (15b, 16b) opposite to the first ends (15a, 16a), of the outer tubular body (15) and the inner tubular body (16);

characterized in that the constraint members (17, 27, 27', 30, 33) comprise a lock pin (27; 27') extending through the inner tubular body (16), crosswise to the axis (A), and projecting from the inner tubular body (16), the lock pin (27; 27') being connected to the inner tubular body (16) and to the outer tubular body (15) so as to prevent the relative axial slide between the outer tubular body (15) and the inner tubular body (16) in the locking region.

2. An injector as claimed in Claim 1, wherein the lock pin (27; 27') is perpendicular to the axis (A).
3. An injector as claimed in Claim 1 or 2, wherein the constraint members (17, 27, 27', 30, 33) comprise an end member (17) fitted onto the first end (15a) of the outer tubular body (15) and configured to lock the lock pin (27; 27') axially with respect to the outer tubular body (15).
4. An injector as claimed in Claim 3, wherein the end member (17) comprises an abutment seat (28), and is fitted to the first end (15a) of the outer tubular body (15) so as to clamp ends of the lock pin (27; 27') between an axial margin of the first end (15a) of the outer tubular body (15) and the abutment seat (28).
5. An injector as claimed in Claim 4, wherein the end member (17) and the first end (15a) of the outer tubular body (15) are connected by a threaded coupling.
6. An injector as claimed in Claim 5, wherein the constraint members (17, 27, 27', 30, 33) comprise a lock ring (30) tightly fitted to the outer tubular body (15) and coupled to the end member (17) so as to prevent

rotation of the end member (17) about the outer tubular body (15) and release of the threaded coupling.

7. An injector as claimed in any one of Claims 3 to 6, wherein the end member (17) internally defines a fluid passage (29) between the first fluid line (22) and the nozzle (18). 5
8. An injector as claimed in Claim 7, wherein the nozzle (18) comprises a lateral wall (26) defining a chamber (25) and having inlet openings for fluidly coupling the chamber (25) and the first fluid line (22). 10
9. An injector as claimed in Claim 7 or 8, wherein the nozzle (18) and the end member (17) are connected interferentially, and the nozzle (18) projects axially outwards with respect to the end member (17). 15
10. An injector as claimed in any one of the preceding Claims, comprising an axial pin (24), arranged in the inner tubular body (16) along the axis (A), facing the nozzle (18), and fitted through with the lock pin (27; 27'). 20
11. An injector as claimed in any one of the foregoing Claims, wherein the nozzle (18) has a supply outlet (25a) towards outside and a recovery outlet (25b) axially opposite the supply outlet (25a) and connected to the second fluid line (23). 25
12. An injector as claimed in any one of the foregoing Claims, comprising an expansion chamber (35) configured to permit free axial slide of the second end (16b) of the inner tubular body (16) as a result of expansion. 30
13. An injector as claimed in any one of the foregoing Claims, wherein the constraint members (17, 27, 27', 30, 33) comprise a guide bushing (33) between the outer tubular body (15) and the inner tubular body (16), the guide bushing (33) being configured to permit axial slide of the inner tubular body (16) with respect to the outer tubular body (15) as a result of expansion. 35
14. A gas turbine burner comprising a lance injector (5) as claimed in any one of the foregoing Claims. 40

Patentansprüche

1. Lanzeninjektor zum Einspritzen von Heizöl in eine Gasturbinenbrennkammer (2), wobei der Lanzeninjektor umfasst:

einen äußeren Rohrkörper (15) und einen inneren Rohrkörper (16), die sich entlang einer gemeinsamen Achse (A) erstrecken und eine erste

Fluidleitung (22) in einem Spalt zwischen dem äußeren Rohrkörper (15) und dem inneren Rohrkörper (16), sowie eine zweite Fluidleitung (23) in dem inneren Rohrkörper (16) definieren; und

eine Düse (18), die mit der ersten Fluidleitung (22) und der zweiten Fluidleitung (23) an jeweiligen ersten Enden (15a, 16a) des äußeren Rohrkörpers (15) und des inneren Rohrkörpers (16) fluidisch verbunden ist; wobei der äußere Rohrkörper (15) und der innere Rohrkörper (16) durch Zwangselemente (17, 27, 27', 30, 33) so aneinander gebunden sind, dass das relative axiale Gleiten zwischen dem äußeren Rohrkörper (15) und dem inneren Rohrkörper (16) in einem Verriegelungsbereich an den jeweiligen ersten Enden (15a, 16a) verhindert wird und wegen der Ausdehnung des äußeren Rohrkörpers (15) und des inneren Rohrkörpers (16) zwischen dem Verriegelungsbereich und den jeweiligen zweiten Enden (15b, 16b), die den ersten Enden (15a, 16a) gegenüber liegen, zugelassen wird;

dadurch gekennzeichnet, dass die Zwangselemente (17, 27, 27', 30, 33) einen Verriegelungsbolzen (27; 27') umfassen, der sich quer zur Achse (A) durch den inneren Rohrkörper (16) erstreckt und aus dem inneren Rohrkörper (16) hervorsteht, wobei der Verriegelungsbolzen (27; 27') mit dem inneren Rohrkörper (16) und dem äußeren Rohrkörper (15) so verbunden ist, dass das relative axiale Gleiten zwischen dem äußeren Rohrkörper (15) und dem inneren Rohrkörper (16) im Verriegelungsbereich verhindert wird.

2. Injektor nach Anspruch 1, wobei sich der Verriegelungsbolzen (27; 27') senkrecht zur Achse (A) erstreckt.
3. Injektor nach Anspruch 1 oder 2, wobei die Zwangselemente (17, 27, 27', 30, 33) ein Endelement (17) umfassen, das auf das erste Ende (15a) des äußeren Rohrkörpers (15) aufgesetzt ist und dafür konfiguriert ist, den Verriegelungsbolzen (27; 27') bezüglich des äußeren Rohrkörpers (15) axial zu verriegeln.
4. Injektor nach Anspruch 3, wobei das Endelement (17) einen Anschlagsitz (28) umfasst und am ersten Ende (15a) des äußeren Rohrkörpers (15) so angeordnet ist, dass es die Enden des Verriegelungsbolzens (27; 27') zwischen einem axialen Rand des ersten Endes (15a) des äußeren Rohrkörpers (15) und dem Anschlagsitz (28) festklemmt.
5. Injektor nach Anspruch 4, wobei das Endelement (17) und das erste Ende (15a) des äußeren Rohr-

körpers (15) mittels einer Gewindekupplung verbunden sind.

6. Injektor nach Anspruch 5, wobei die Zwangselemente (17, 27, 27', 30, 33) einen Verriegelungsring (30) umfassen, der fest auf den äußeren Rohrkörper (15) aufgesetzt und mit dem Endelement (17) gekoppelt ist, so dass er eine Drehung des Endelements (17) um den äußeren Rohrkörper (15) und ein Lösen der Gewindekupplung verhindert. 5 10
7. Injektor nach einem der Ansprüche 3 bis 6, wobei das Endelement (17) im Inneren einen Fluiddurchlass (29) zwischen der ersten Fluidleitung (22) und der Düse (18) definiert. 15
8. Injektor nach Anspruch 7, wobei die Düse (18) eine Seitenwand (26) umfasst, die eine Kammer (25) definiert und Einlassöffnungen zum fluidischen Kopplern der Kammer (25) und der ersten Fluidleitung (22) aufweist. 20
9. Injektor nach Anspruch 7 oder 8, wobei die Düse (18) und das Endelement (17) mittels Presspassung verbunden sind und die Düse (18) bezüglich des Endelements (17) axial nach außen hervorsteht. 25
10. Injektor nach einem der vorangehenden Ansprüche, einen axialen Bolzen (24) umfassend, der im inneren Rohrkörper (16) entlang der Achse (A) angeordnet ist, der Düse (18) zugewandt ist, und durch den der Verriegelungsbolzen (27; 27') eingesetzt ist. 30
11. Injektor nach einem der vorangehenden Ansprüche, wobei die Düse (18) einen Zuführungsauslass (25a) nach außen aufweist, sowie einen Rückgewinnungsauslass (25b), der dem Zuführungsauslass (25a) axial gegenüberliegt und mit der zweiten Fluidleitung (23) verbunden ist. 35 40
12. Injektor nach einem der vorangehenden Ansprüche, eine Expansionskammer (35) umfassend, die dafür konfiguriert ist, ein freies axiales Gleiten des zweiten Endes (16b) des inneren Rohrkörpers (16) infolge einer Expansion zu ermöglichen. 45
13. Injektor nach einem der vorangehenden Ansprüche, wobei die Zwangselemente (17, 27, 27', 30, 33) eine Führungshülse (33) zwischen dem äußeren Rohrkörper (15) und dem inneren Rohrkörper (16) umfassen, wobei die Führungshülse (33) dafür konfiguriert ist, ein axiales Gleiten des inneren Rohrkörpers (16) bezüglich des äußeren Rohrkörpers (15) infolge einer Expansion zu ermöglichen. 50
14. Gasturbinenbrenner, der einen Lanzeninjektor (5) nach einem der vorangehenden Ansprüche umfasst. 55

Revendications

1. Injekteur à lance destiné à injecter du fioul dans une chambre de combustion d'une turbine à gaz (2), l'injekteur à lance comprenant :

un corps tubulaire extérieur (15) et un corps tubulaire intérieur (16), qui s'étendent le long d'un axe commun (A), et qui définissent une première canalisation de fluide (22) dans un espace entre le corps tubulaire extérieur (15) et le corps tubulaire intérieur (16), et une seconde canalisation de fluide (23) dans le corps tubulaire intérieur (16) ; et

une buse (18) connectée de manière fluïdique à la première canalisation de fluide (22) et à la seconde canalisation de fluide (23), au niveau de premières extrémités respectives (15a, 16a) du corps tubulaire extérieur (15) et du corps tubulaire intérieur (16) ;

où le corps tubulaire extérieur (15) et le corps tubulaire intérieur (16) sont contraints entre eux par des éléments de contrainte (17, 27, 27', 30, 33) de façon à empêcher un coulisement axial relatif entre le corps tubulaire extérieur (15) et le corps tubulaire intérieur (16), dans une région de verrouillage au niveau des premières extrémités respectives (15a, 16a), et à l'autoriser en raison d'une dilatation, entre la région de verrouillage et des secondes extrémités respectives (15b, 16b) opposées aux premières extrémités (15a, 16a) du corps tubulaire extérieur (15) et du corps tubulaire intérieur (16) ;

caractérisé en ce que les éléments de contrainte (17, 27, 27', 30, 33) comprennent une broche de verrouillage (27 ; 27') s'étendant à travers le corps tubulaire intérieur (16), en travers de l'axe (A), et faisant saillie à partir du corps tubulaire intérieur (16), la broche de verrouillage (27 ; 27') étant connectée au corps tubulaire intérieur (16) et au corps tubulaire extérieur (15) afin d'empêcher un coulisement axial relatif entre le corps tubulaire extérieur (15) et le corps tubulaire intérieur (16) dans la région de verrouillage.

2. Injekteur selon la revendication 1, où la broche de verrouillage (27 ; 27') est perpendiculaire à l'axe (A).
3. Injekteur selon la revendication 1 ou 2, où les éléments de contrainte (17, 27, 27', 30, 33) comprennent un élément d'extrémité (17) ajusté sur la première extrémité (15a) du corps tubulaire extérieur (15), et configuré pour verrouiller la broche de verrouillage (27 ; 27') axialement par rapport au corps tubulaire extérieur (15).
4. Injekteur selon la revendication 3, où l'élément d'extrémité (17) comprend un siège de butée (28), et est

- ajusté sur la première extrémité (15a) du corps tubulaire extérieur (15), afin de serrer les extrémités de la broche de verrouillage (27 ; 27') entre un bord axial de la première extrémité (15a) du corps tubulaire extérieur (15) et le siège de butée (28). 5
5. Injecteur selon la revendication 4, où l'élément d'extrémité (17) et la première extrémité (15a) du corps tubulaire extérieur (15), sont connectés par un accouplement fileté. 10
6. Injecteur selon la revendication 5, où les éléments de contrainte (17, 27, 27', 30, 33) comprennent un anneau de verrouillage (30) ajusté serré sur le corps tubulaire extérieur (15), et accouplé à l'élément d'extrémité (17) afin d'empêcher une rotation de l'élément d'extrémité (17) autour du corps tubulaire extérieur (15), et une libération de l'accouplement fileté. 15
7. Injecteur selon l'une quelconque des revendications 3 à 6, où l'élément d'extrémité (17) définit intérieurement un passage de fluide (29) entre la première canalisation de fluide (22) et la buse (18). 20
8. Injecteur selon la revendication 7, où la buse (18) comprend une paroi latérale (26) définissant une chambre (25), et présentant des ouvertures d'entrée pour coupler de manière fluïdique la chambre (25) et la première canalisation de fluide (22). 25
9. Injecteur selon la revendication 7 ou 8, où la buse (18) et l'élément d'extrémité (17) sont connectés de manière interférentielle, et la buse (18) fait saillie axialement vers l'extérieur par rapport à l'élément d'extrémité (17). 30
10. Injecteur selon l'une quelconque des revendications précédentes, comprenant une broche axiale (24), agencée dans le corps tubulaire intérieur (16) le long de l'axe (A), faisant face à la buse (18), et ajustée à travers la broche de verrouillage (27 ; 27'). 35
11. Injecteur selon l'une quelconque des revendications précédentes, où la buse (18) présente une sortie d'alimentation (25a) vers l'extérieur, et une sortie de récupération (25b) opposée axialement à la sortie d'alimentation (25a), et connectée à la seconde canalisation de fluide (23). 40
12. Injecteur selon l'une quelconque des revendications précédentes, comprenant une chambre d'expansion (35) configurée pour permettre un coulisement axial libre de la seconde extrémité (16b) du corps tubulaire intérieur (16) en raison d'une dilatation. 45
13. Injecteur selon l'une quelconque des revendications précédentes, où les éléments de contrainte (17, 27, 27', 30, 33) comprennent une bague de guidage (33) entre le corps tubulaire extérieur (15) et le corps tubulaire intérieur (16), la bague de guidage (33) étant configurée pour permettre un coulisement axial du corps tubulaire intérieur (16) par rapport au corps tubulaire extérieur (15) en raison d'une dilatation. 50
14. Brûleur de turbine à gaz comprenant un injecteur à lance (5) selon l'une quelconque des revendications précédentes. 55

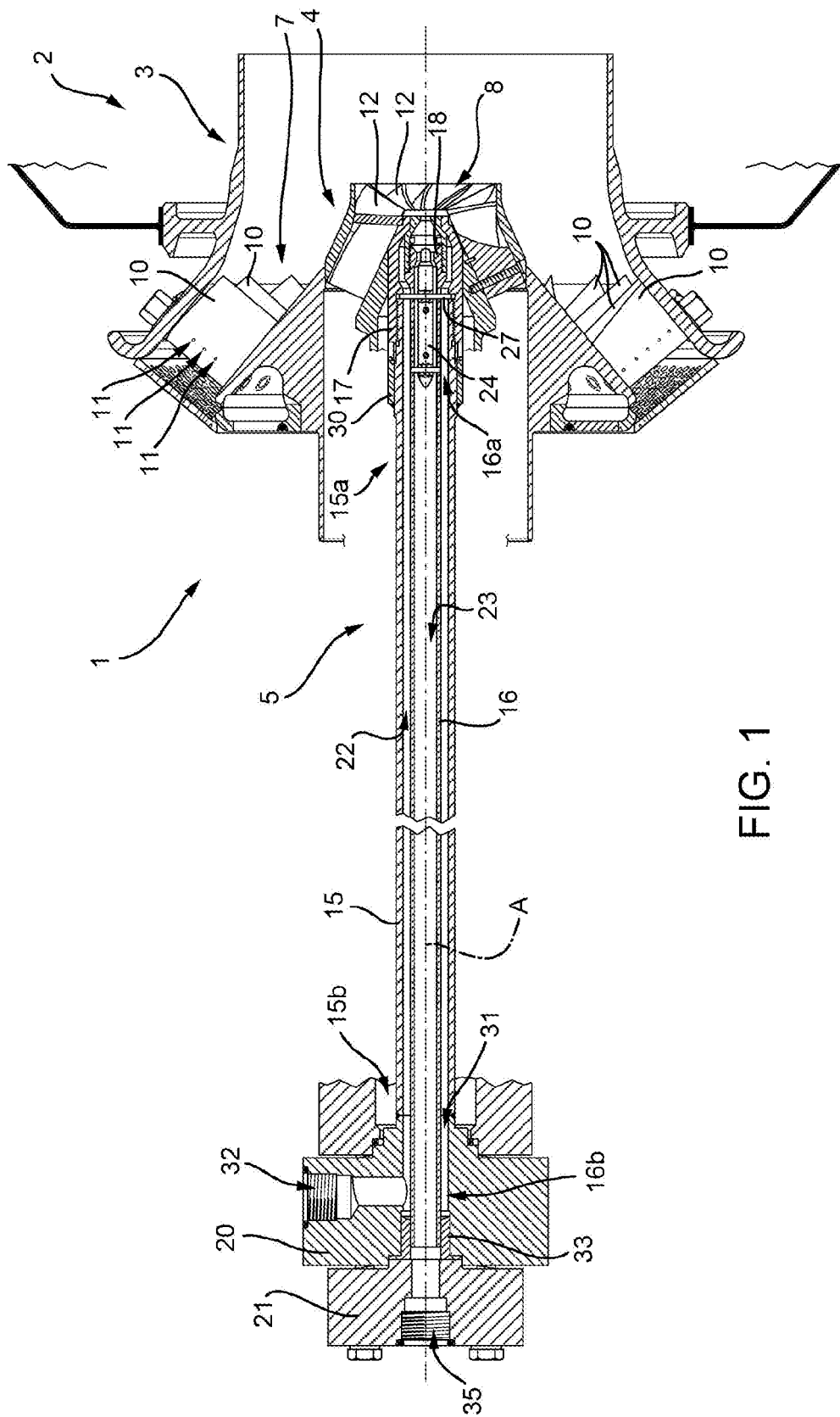
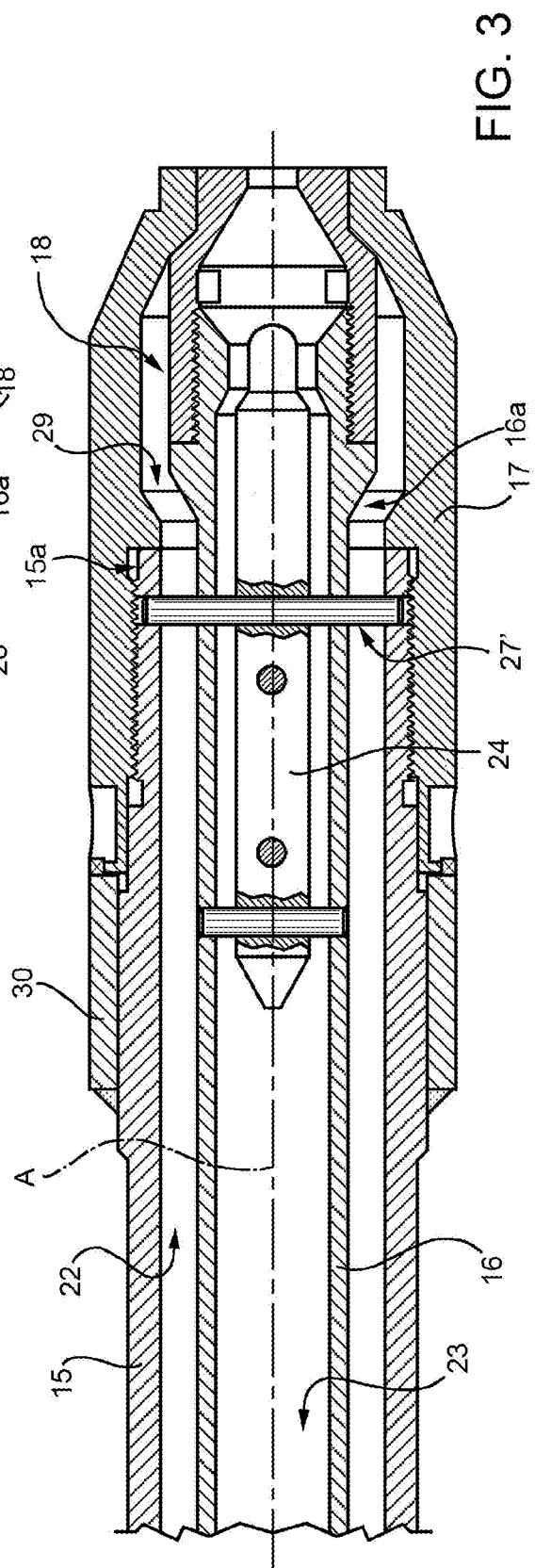
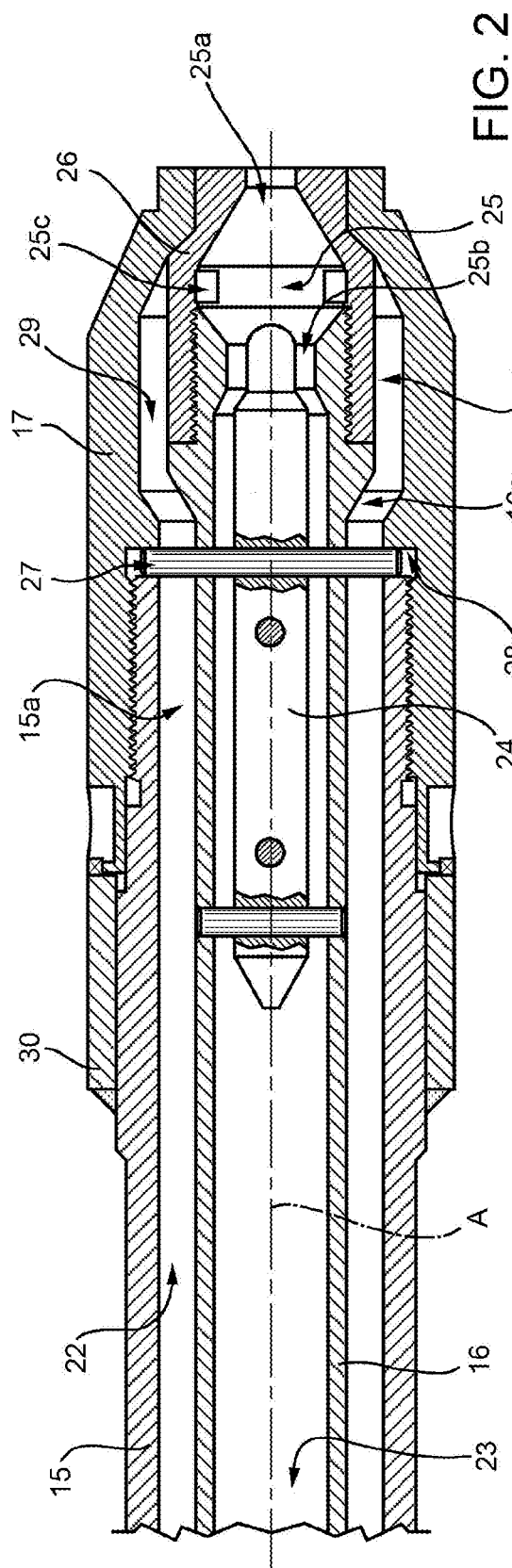


FIG. 1



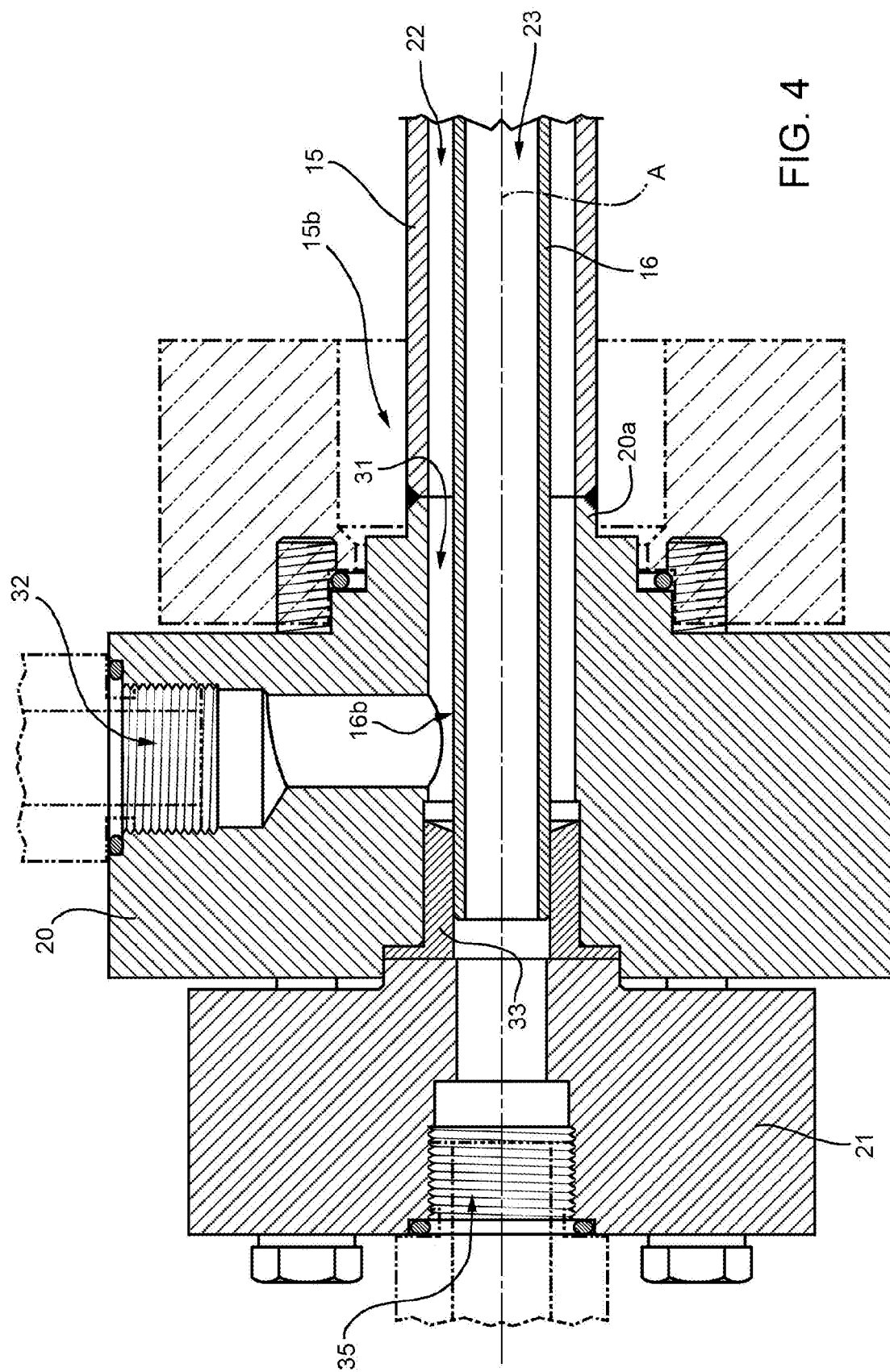


FIG. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2578934 A [0005]
- EP 2439448 A1 [0006]