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- **Beghi, Maurizio**
36015 Schio (VI) (IT)
- **Masiero, Simone**
35024 Boloventa (PD) (IT)
- **Calore, Stefano**
35142 Padova (IT)

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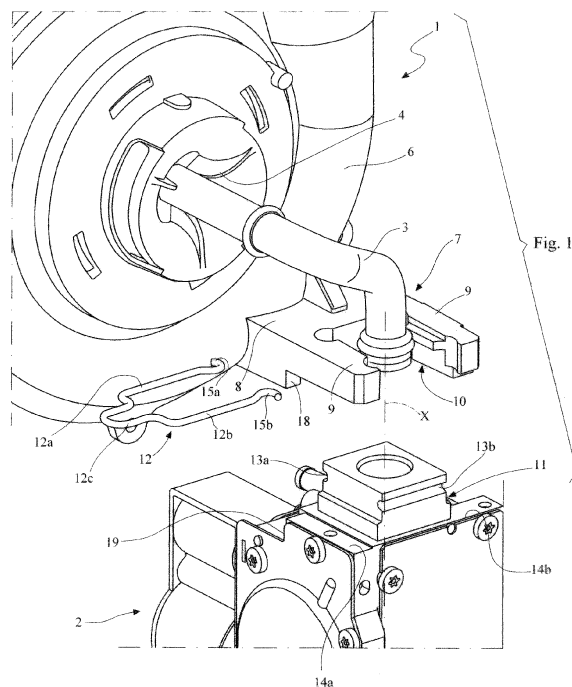
(71) Applicant: **Sit La Precisa S.p.A. con socio unico**
35129 Padova (IT)

(72) Inventors:
• **Zulian, Lorenzo**
30030 Fosso¹ (VE) (IT)

(74) Representative: **Fabris, Stefano**
Cantaluppi & Partners S.r.l.
Piazzetta Cappellato Pedrocchi, 18
35122 Padova (IT)

(54) **A system for connecting a valve unit to a fan structure of an air-gas mixing device for supplying burners of boilers and similar equipment**

(57) What is described is a system for connecting a valve unit (2) to a fan structure (5) of an air-gas mixing device (1) for supplying burners of boilers and similar equipment, in which a gas feed section of the valve unit (2) can be connected sealingly to a tubular gas supply section of the mixing device (1) in an axial direction (X) of coupling between the aforesaid sections. The system comprises coupling means and counter-means, provided on the mixing device (1) and on the valve unit (2) respectively, which can be engaged with each other coaxially from and towards an operating position in which said sections are connected sealingly to each other, and axial retaining means between said coupling means and counter-means for retaining the valve unit (2) with respect to the mixing device (1) in the direction of axial interconnection. The coupling means and counter-means comprise at least one support appendage (7) formed in one piece with a manifold portion (6) of a fan (5) of the mixing device (1), and at least one end portion (11) of the feed section of the valve unit (2) which can be housed in a seat (10) provided in the appendage (7), the axial retaining means comprising at least one retaining element (12), which can be engaged removably in at least one groove (13a, 13b) provided transversely with respect to the axial direction (X) in the end portion (11) of the valve unit (2) when the end (11) is received in the seat (10), so as to lock the valve unit (2) and the mixing device (1) together axially.



Description

[0001] The present invention relates to a system for connecting a valve unit to a fan structure of an air-gas mixing device, having the features stated in the preamble of the principal claim (Claim 1).

[0002] In the specific technical field of the present invention, and particularly in boilers and similar equipment principally for domestic use comprising systems for premixing the combustible air-gas mixture to be supplied to the burners, there is a known way of fixing the valve unit for controlling the gas feed either to a supporting structure of the boiler or to a structural part of the mixing device. The connection between the parts is typically made with screw fastenings, or with flanged connectors with appropriate securing screws. There is also a known way of fixing the valve body rigidly to the casing of the Venturi tube provided in the mixing device and integrated into the body of the fan, as described in European patent application no. 1 959 194.

[0003] Although the aforesaid known solutions provide mutual fixing, they make the assembly (and disassembly) of the valve unit and the mixing device rather complicated; in particular, the aforesaid connection systems are not particularly fast or flexible as regards their assembly by the installers. They also require the provision of flanges and/or flanged connectors with corresponding fixing screws. The fundamental problem of the invention is that of providing a connection system whose structural and functional design is such that the limitations of the aforementioned prior art can be overcome.

[0004] This problem is resolved by the invention using a connection system made in accordance with the following claims.

[0005] Other features and advantages of the invention will become clear from the following detailed description of a preferred example of embodiment thereof, illustrated, for guidance only and in a non-limiting way, in the attached drawings, in which:

- Figure 1 is a partial perspective view of a connection system according to the invention, between a mixing device and a valve unit, shown in a condition of disassembly from each other,
- Figure 2 is a further partial perspective view of the connection system of Figure 1,
- Figure 3 is a partial perspective view of the connection system according to the invention, wherein the mixing device and the valve unit are shown fixed to each other by means of the aforesaid system,
- Figure 4 is a further partial perspective view of the connection system in the configuration of Figure 3.

[0006] With reference to the aforementioned drawings, the number 1 indicates the whole of an air-gas mixing device, shown only in part, designed for connection to a valve unit 2, which is also shown only in part, using a connection system made according to the present inven-

tion. The invention is particularly, but not exclusively, applicable to the connection of air-gas mixers provided with electric fans to valve units in gas appliances, such as boilers with gas burners for domestic use. In the mixing device 1, the gas supplied by the valve unit 2 is conveyed by means of a conduit 3, shown only schematically, to the constriction of a Venturi tube 4 positioned in the intake section of a fan 5, this fan comprising a manifold 6, also known in the relevant technical field as a "scroll", in which the air-gas mixture is formed and is sent to the delivery section of the fan.

[0007] The connection system includes a support appendage 7 which is made in one piece with the manifold 6, being made, for example, integrally with one of the two half-shells typically forming the manifold of the fan.

[0008] The support appendage 7 comprises a fixing base 8 from which a pair of branches, both indicated by 9, project in the same direction, these branches being parallel to and spaced apart from each other. Between said branches 9 there is formed a seat 10 which can receive an end portion 11 of the supply section of the valve unit 2. Said end portion 11 has a quadrilateral configuration in cross section, such that two opposite sides thereof are adjacent to the corresponding profiles of the opposing branches when the portion 11 is received in the seat 10.

[0009] In order to retain the valve unit 2 relative to the support appendage 7 (with respect to the direction X), the connection system according to the invention comprises a retaining element 12, preferably in the form of a spring clip, such as a metal wire clip, which has two opposing arms 12a and 12b, connected at one end by means of a cross-piece 12c. The opposing arms 12a and 12b of the spring clip are designed to engage removably with corresponding grooves 13a and 13b formed on opposite sides of the end portion 11 when said end 11 is received in the seat 10, as can be clearly seen in Figure 1. Conveniently, the grooves 13a, 13b are parallel to and spaced apart from each other and are located on diametrically opposite sides of the direction X, and the arms of the spring clip can be spread apart in an elastic way to engage the corresponding grooves, in such a way that the branches 9 of the appendage are retained axially between corresponding counter-surfaces 14a, 14b of the end 11 of the valve and the portions of said clip which extend beyond the portions engaged in the aforesaid grooves, as shown in the assembled state in Figure 3. Bent portions 15a, 15b of the free ends of both arms of the clip enable the clip to be retained in the position shown in Figure 2, from which position the clip can be quickly disengaged from the slots by spreading the arms apart, thus enabling the valve unit to be disconnected rapidly from the manifold of the mixing device. The valve can be rapidly attached to the manifold and supported thereon by a similar but reversed relative movement.

[0010] The number 16 denotes a projection from one of the branches 9 which can engage, substantially by means of a positive connection, a corresponding recess

17 provided in the body of the valve unit 2, during the relative movement of the end 11 towards the receiving seat 10. The provision of the projection has the main purpose of providing a unique and correct connection between the valve unit and the manifold, such that this operation can be performed without any possibility of error by the installer when the valve is connected to the mixer. It is also possible to provide a recess 18 on the other branch 9 of the appendage 7, which can be coupled substantially by a positive connection to a projection 19 provided on the valve body, which, in addition to the connection between the projection 16 and the recess 17, ensures that the positioning is unique when the valve unit is centred and mounted on the fan manifold. Additionally, if the end portion 11 of the valve has a cylindrical tubular configuration, which is a possible alternative to the configuration described and illustrated above, and if the seat 10 has a corresponding similar circular configuration, the pairs of surfaces 16-17 and 18-19 can impede the rotation of the connected parts relative to each other, and thus act as rotation prevention means in the connection of the valve unit to the mixer manifold.

[0011] Consequently, the connection system described here operates in such a way that the valve unit can be fixed more rapidly and accurately than by using the conventional solutions. Starting from a disconnected configuration, the valve unit is moved axially (along the axis X) towards the manifold to house the end 11 in the corresponding seat 10, with the centring and unique positioning as described above. When it is received in the seat, thus forming a sealed connection between the conduit 3 and the feed section of the valve, the end 11 of the valve is fastened to the support appendage by the engagement of the spring clip in the corresponding grooves, completing the fixing of the valve unit to the fan manifold. For disassembly, the operations described above are carried out in reverse order, starting by disengaging the clip by spreading its branches apart elastically to disengage them from the corresponding grooves.

[0012] The connection system according to the invention therefore achieves the proposed objects by overcoming the limitations noted with reference to the prior art and achieving the advantages claimed above with respect to the known solutions.

Claims

1. A system for connecting a valve unit (2) to a fan structure (5) of an air-gas mixing device (1) for supplying burners of boilers and similar equipment, in which a gas feed section of said valve unit (2) can be connected sealingly to a tubular gas supply section of the mixing device (1) in an axial direction (X) of coupling between said sections, the system comprising:

- coupling means and counter-means, provided on the mixing device (1) and on the valve unit

(2) respectively, which can be engaged with each other coaxially from and towards an operating position in which said sections are connected sealingly to each other;

- axial retaining means between said coupling means and counter-means for retaining the valve unit (2) with respect to the mixing device (1) in said direction (X) of axial interconnection, **characterized in that** said coupling means and counter-means comprise:

at least one support appendage (7) formed in one piece with a manifold (6) portion of a fan (5) of said mixing device, and at least one end portion (11) of the feed section of the valve unit (2) adapted to be housed in a seat (10) provided in said appendage (7), and **in that** said axial retaining means comprise at least one retaining element (12), which can be engaged removably in at least one groove (13a,13b) provided transversely with respect to the axial direction (X) in said end portion (11) of the valve unit (2) when said end (11) is housed in said seat (10), so as to lock the valve unit (2) and the mixing device (1) together axially.

2. A system according to Claim 1, wherein a pair of parallel grooves (13a,13b) is provided, these grooves being spaced apart from each other and being formed on diametrically opposite sides with respect to said axial direction (X), and said retaining element (12) is made in the form of a resilient clip with a pair of resiliently deformable opposing branches (12a,12b) which can engage said corresponding grooves (13a,13b) when the end portion (11) of the valve unit is housed in the seat (10) of said support appendage (7), in such a way that said support appendage and said end portion of the valve unit are fastened together, said appendage (7) being axially retained between at least one bearing surface (14a, 14b) of the valve unit and corresponding portions of the branches of said clip which extend beyond said grooves (13a,13b) when the clip is engaged in the grooves.
3. A system according to Claim 2, wherein at least one projection (16) is provided, this projection extending from said support appendage (7) and being capable of engaging, substantially by means of a positive connection, a corresponding recess (17) provided in said valve unit, when the end (11) of said valve unit is housed in the seat (10) of said appendage (7), so as to provide a single position for the coupling between the valve unit (2) and the mixing device (1).
4. A system according to any one of the preceding claims, wherein said support appendage (7) com-

prises a pair of parallel branches (9), spaced apart from each other and extending in the same direction from a base (8) for fastening to the mixing device (1), the seat (10) in said support appendage (7) being jointly delimited by said branches (9).

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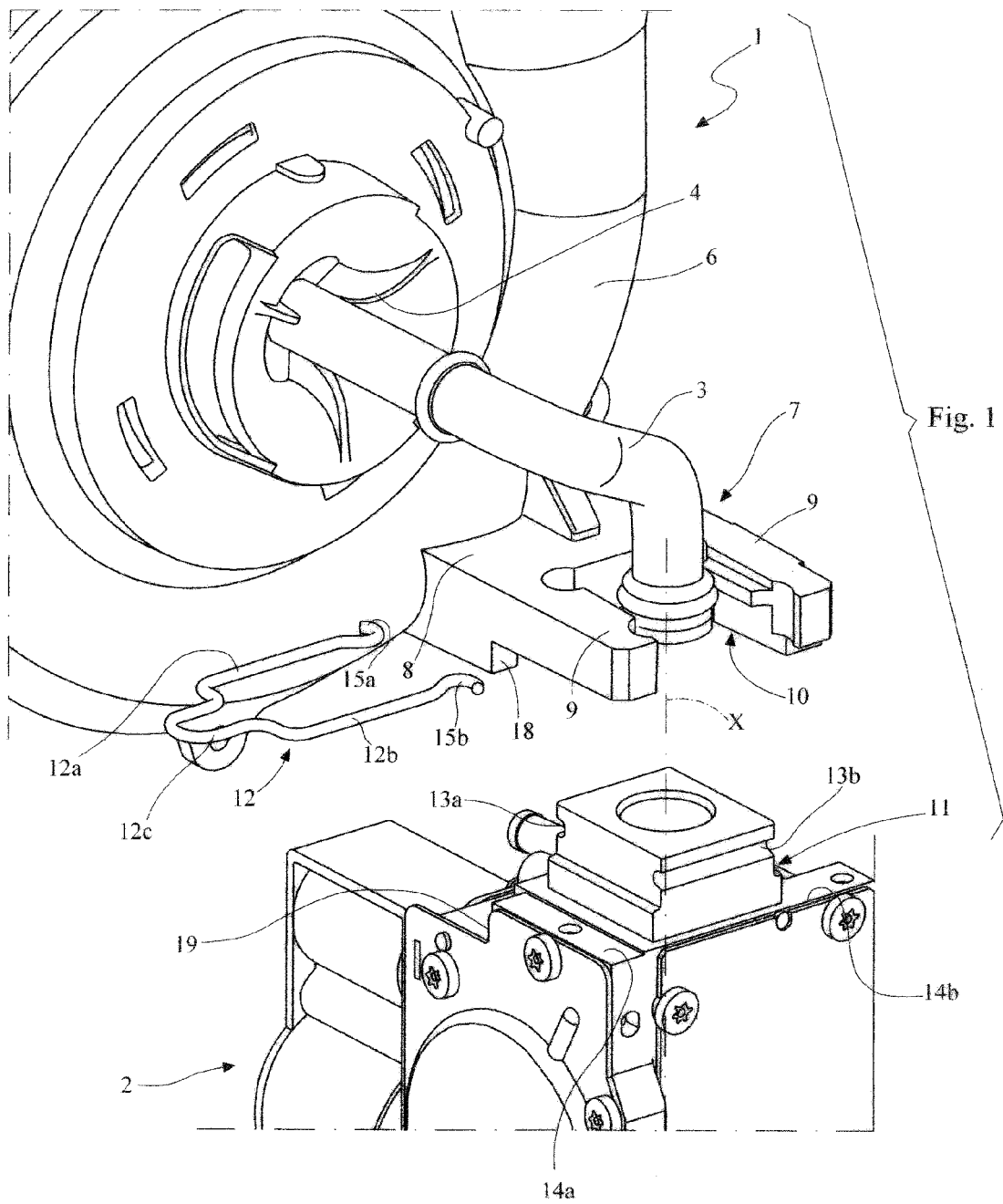
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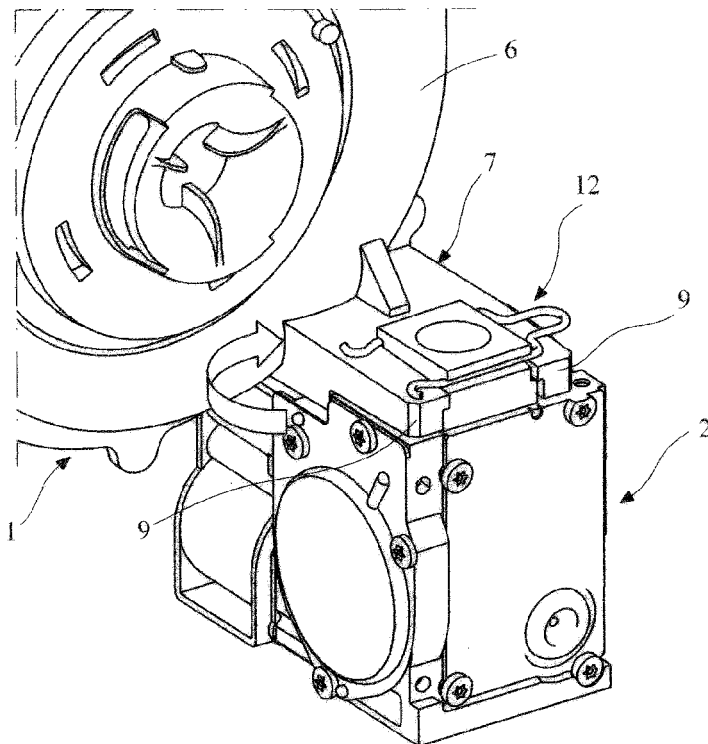


Fig. 2

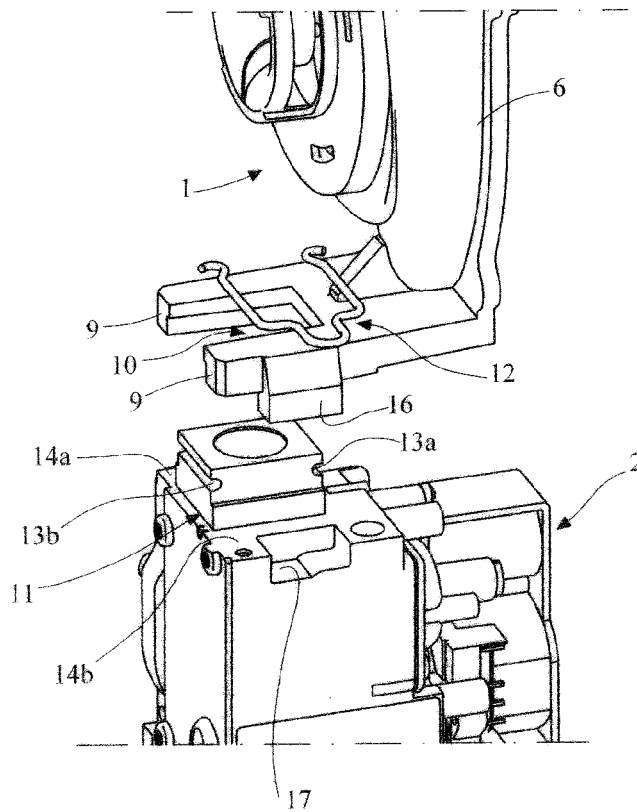


Fig. 3

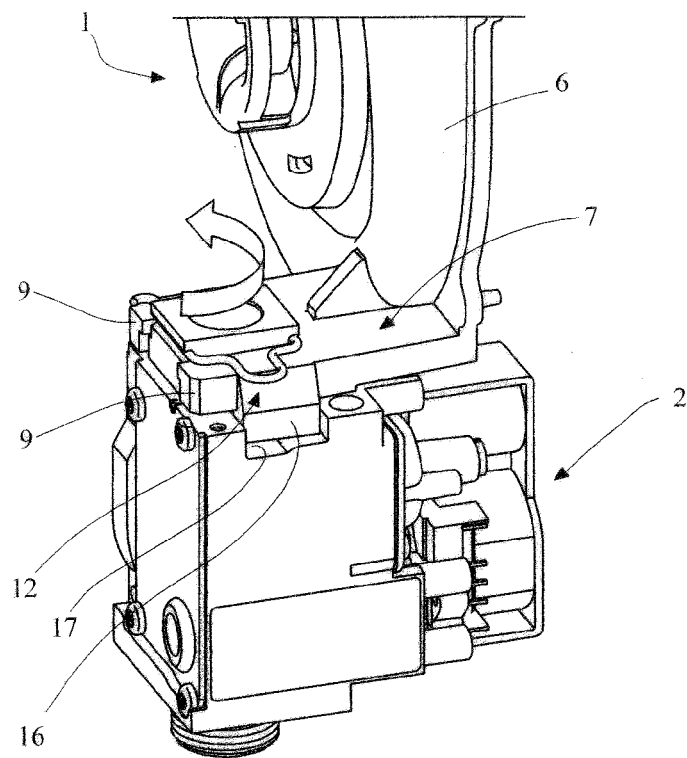


Fig. 4



EUROPEAN SEARCH REPORT

Application Number
EP 10 19 1729

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	EP 1 959 194 A1 (VIESSMANN WERKE KG [DE]) 20 August 2008 (2008-08-20) * paragraph [0012] - paragraph [0019]; figure 1 *	1	INV. F23D14/36 F23K5/00
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A	US 2006/214420 A1 (MORI HIROYOSHI [JP] ET AL) 28 September 2006 (2006-09-28) * figures 1-4 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 12 April 2011	Examiner Theis, Gilbert
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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</p>			

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EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 10 19 1729

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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REFERENCES CITED IN THE DESCRIPTION

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