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(54) **Fixing device, particularly for fixing a tubular element inside the muffle of a food cooking oven**

(57) A fixing device, particularly for fixing a tubular element inside the muffle of a food cooking oven, adapted to connect the tubular element to a support, and being constituted by at least one self-tapping screw (11), which passes through a first hole (12) which is provided in the support and is adapted to engage a facing second through hole (13) provided in the tubular element, the second hole (13) having a smaller diameter than the first hole (12) and being such as to allow the mechanical seal of the self-tapping screw (11) engaged therein.

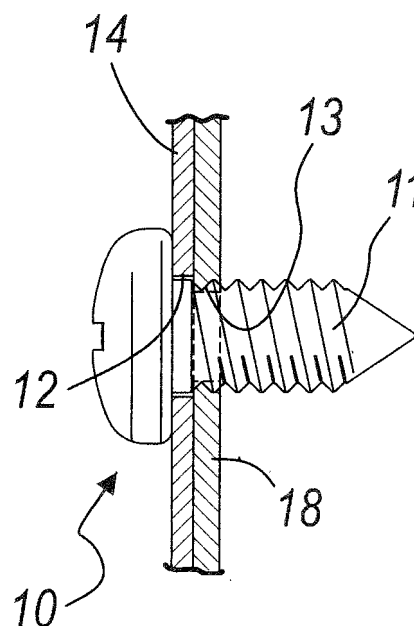


Fig. 3

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Description

[0001] The present invention relates to a fixing device, particularly for fixing a tubular element inside the muffle of a food cooking oven.

[0002] Currently known food cooking ovens with forced air circulation generally comprise, in the rear part of the muffle and connected thereto, a heating and air ventilation chamber.

[0003] Such heating and ventilation chamber is formed by the back of the muffle and by a protective wall for the heating means and for the fans, which are accommodated between the back and the wall.

[0004] When the door of the oven is opened, the wall is visible.

[0005] Such ovens with forced air circulation are generally provided with one or more tubes for introducing water in the heating chamber, so that the heating and ventilation means atomize it, blowing water vapor onto the food in the cooking chamber.

[0006] Known tubes are constituted by a connecting hose, which the water reaches from the hydraulic connection and from the electric flow control valve.

[0007] The hose carries the water toward a tubular element, which is shaped so as to convey the water from the upper partition of the muffle, at which the hose is connected to the tubular element, to a region which surrounds the rotation shaft of the served fan.

[0008] Such tubular element runs along the wall outside the face thereof that is visible from the inside of the oven and is clearly visible when the oven is open.

[0009] Proximate to the region that surrounds the fan rotation shaft, the tubular element is shaped so as to pass through the wall in a dedicated hole and discharge the water substantially in the center of the fan.

[0010] Such tubular element is fixed to the wall with at least one U-bolt, which is adapted to be fixed to the housing by means of a rivet or screw, or other equivalent locking element, for each of the two lateral wings of the U-bolt.

[0011] In order to avoid its vertical sliding or rotation tilting away from the fan to be served, the tubular element in turn is fixed to at least one U-bolt by means of at least one spot weld.

[0012] The number of metallic U-bolts depends on the length of the tubular element, which in turn depends on the height at which the fan served by the tubular element is arranged.

[0013] This connection by means of U-bolts and spot welds, although being effective, has some aspects which can be perfected.

[0014] The use of U-bolts, connecting elements such as rivets or screws or any other equivalent means, and the application of spot welds entails, in addition to the costs in terms of materials, a plurality of assembly operations and devices (including the riveting gun and the welding machine), which are numerous and are also relatively expensive.

[0015] Further, the visual impact of such U-bolts when

the oven is opened might not be pleasant, especially in relation to the smooth and polished surfaces typical of a cooking chamber.

[0016] The aim of the present invention is to provide a fixing device, particularly for fixing a tubular element inside the muffle of a food cooking oven, which is capable of obviating the drawbacks of known fixing devices.

[0017] Within this aim, an object of the present invention is to provide a fixing device which improves the visual impact of the cooking chamber of the oven in which it is used.

[0018] Another object of the present invention is to provide a fixing device which can be assembled easily even by an operator who lacks particular prior training.

[0019] Another object of the present invention is to provide a fixing device whose effectiveness and durability is at least equal to that of known types of device.

[0020] Another object of the present invention is to provide a fixing device which can be adopted for tubular elements of any length and transverse dimensions.

[0021] A further object of the present invention is to provide a fixing device which does not compromise the functionality of the tubular element to which it is applied.

[0022] A still further object of the present invention is to provide a fixing device particularly for fixing a tubular element inside the muffle of a food cooking oven which can be manufactured with known systems and technologies.

[0023] This aim and these and other objects, which will become better apparent hereinafter, are achieved by a fixing device, particularly for fixing a tubular element inside the muffle of a food cooking oven, which is adapted to connect said tubular element to a support, characterized in that it is constituted by at least one self-tapping screw, which passes through a first hole which is open in said support and is adapted to engage a facing second through hole provided in said tubular element, said second hole having a smaller diameter than said first hole and being such as to allow the mechanical seal of the self-tapping screw engaged therein.

[0024] Further characteristics and advantages of the invention will become better apparent from the following detailed description of a preferred but not exclusive embodiment thereof, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a front view of a food cooking oven;

Figure 2 is a sectional view of a device according to the invention, applied to a food cooking oven;

Figure 3 is a view of a detail of the device according to the invention.

[0025] With reference to the figures, a fixing device, particularly for fixing a tubular element inside the muffle of a food cooking oven, according to the invention, is generally designated by the reference numeral 10.

[0026] The device 10 is adapted for connecting a tubular element to a support.

[0027] The device 10 comprises, in the embodiment shown in the figures, two self-tapping screws 11.

[0028] Each of the screws 11 passes through a first hole 12, which is provided in the support and is adapted to engage a facing second through hole 13 provided in the tubular element.

[0029] The second hole 13 has a smaller diameter than the first hole 12, so as to ensure the mechanical seal of the self-tapping screw 11 engaged therein.

[0030] The first hole 12 and the second hole 13 are each obtained by means of a laser cutting operation.

[0031] Laser cutting allows to obtain the holes 12 and 13 so that they are perfectly cylindrical, a shape which allows to optimize the screwing of the screw 11 into the second hole 13 and the consequent coaxiality of the screw 11 with respect to the second hole 13.

[0032] Once the screw 11 has been tightened, the tubular element is pressed against the support and the coaxiality of the first hole 12 with the second hole 13 is also ensured.

[0033] In the example of application of the device 10 according to the invention described herein, the support is constituted by a protective wall 14 for the heating means and for the ventilation means which are accommodated between the back 16 and the wall 14 of a food cooking oven 17.

[0034] The tubular element is constituted by a tube 18, which is adapted to be fixed to the face of the wall 14 which is directed toward the inside of the cooking chamber 19 of the oven 17, as shown in Figure 1.

[0035] In Figure 1, the oven 17 is shown in a configuration in which a door 19a is open.

[0036] The tube 18 is adapted to convey the water that arrives from a hose 20 connected thereto at an upper partition 21 of a muffle 22 which forms the cooking chamber 19 to a central region of a fan 15 of the heating and ventilation means with which the oven 17 is provided.

[0037] The use of the device 10 allows correct fixing of the tube 18, eliminating the use of omega-shaped U-bolts, rivets and welding operations, with considerable advantages both in terms of costs and in terms of assembly time.

[0038] Moreover, the device 10 according to the invention is not visible inside the cooking chamber of an oven, enhancing the visual impact of said cooking chamber.

[0039] Further, the device 10 does not compromise the tightness of the tube 18, although using the second hole 13 which is open into the tube 18.

[0040] The self-tapping screw 11 in fact applies to the second hole 13, owing to its inherent characteristics, a sealing force which is sufficient with respect to the flow-rate and operating pressure of the tube 18.

[0041] Further, the device 10 also meets the strictest standards (such as for example the United States standards) in terms of hygiene of food oven cooking chambers.

[0042] For example, the use of rivets is banned by United States standards, since the head of a rivet can become a recess where dirt can settle.

[0043] Eliminating the rivets therefore entails also improving the hygiene of the cooking chamber.

[0044] In practice it has been found that the invention thus described solves the intended aim and objects.

[0045] In particular, the present invention provides a fixing device, particularly for fixing a tubular element inside the muffle of a food cooking oven, which improves the visual impact of the cooking chamber of the oven in which it is used.

[0046] Moreover, the present invention provides a fixing device which can be assembled easily even by an operator who lacks particular prior training.

[0047] Further, the present invention provides a fixing device whose effectiveness and durability is at least equal to that of known types of device.

[0048] Moreover, the present invention provides a fixing device which can be adopted for tubular elements having any length and transverse dimensions.

[0049] Further, the present invention provides a fixing device which does not compromise the functionality of the tubular element to which it is applied.

[0050] Moreover, the present invention provides a fixing device, particularly for fixing a tubular element inside the muffle of a food cooking oven, which can be manufactured cheaply with known systems and technologies.

[0051] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims; all the details may further be replaced with other technically equivalent elements.

[0052] In practice, the materials employed, so long as they are compatible with the specific use, as well as the dimensions, may be any according to requirements and to the state of the art.

[0053] The disclosures in Italian Patent Application No. PD2005A000159 from which this application claims priority are incorporated herein by reference.

[0054] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A fixing device, particularly for fixing a tubular element inside the muffle of a food cooking oven, which is adapted to connect said tubular element to a support, **characterized in that** it is constituted by at least one self-tapping screw (11), which passes through a first hole (12) which is open in said support and is adapted to engage a facing second through hole (13) provided in said tubular element, said second hole (13) having a smaller diameter than said first hole (12) and being such as to allow the me-

chanical seal of the self-tapping screw (11) engaged therein.

2. The fixing device according to claim 1, **characterized in that** at least said second hole (13) on the tubular element is cylindrical and is obtained by means of a laser cutting operation. 5
3. The fixing device according to one or more of the preceding claims, **characterized in that** said support is constituted by a wall (14) for protecting the heating means and the ventilation means accommodated between the back (16) and said wall (14) of a food cooking oven (17). 10
4. The fixing device according to one or more of the preceding claims, **characterized in that** said tubular element is constituted by a tube (18) which is adapted to be fixed to the face of said wall (14) that is directed toward the inside of the cooking chamber (19) of an oven (17), said tube (18) being adapted to convey the water that arrives from a hose (20) connected thereto at the upper partition (21) of the muffle (22) that forms the cooking chamber (19) to a central region of a fan (15) of the heating and ventilation means with which the oven (17) is provided. 15 20 25
5. The fixing device according to one or more of the preceding claims, **characterized in that** at least two self-tapping screws (11) for a corresponding number of pairs of facing holes (12, 13) are used to fix said tube (18) to said wall (14). 30

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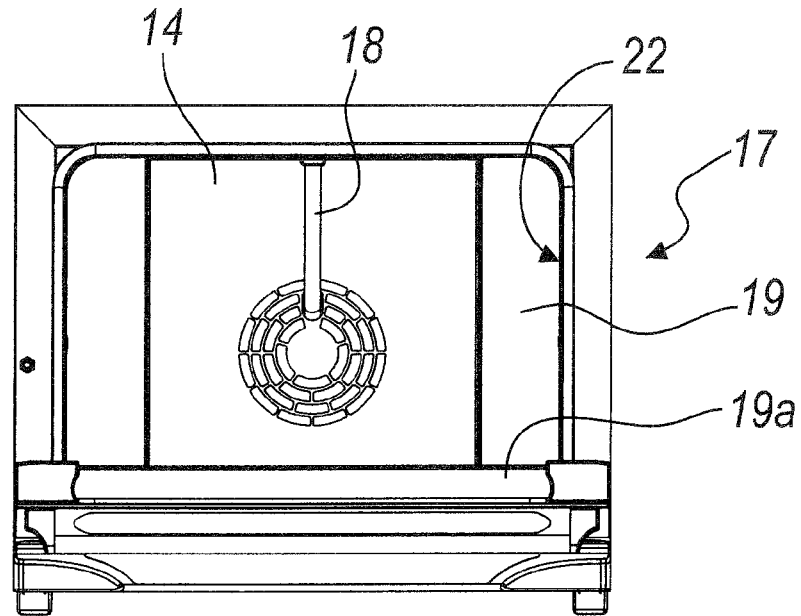


Fig. 1

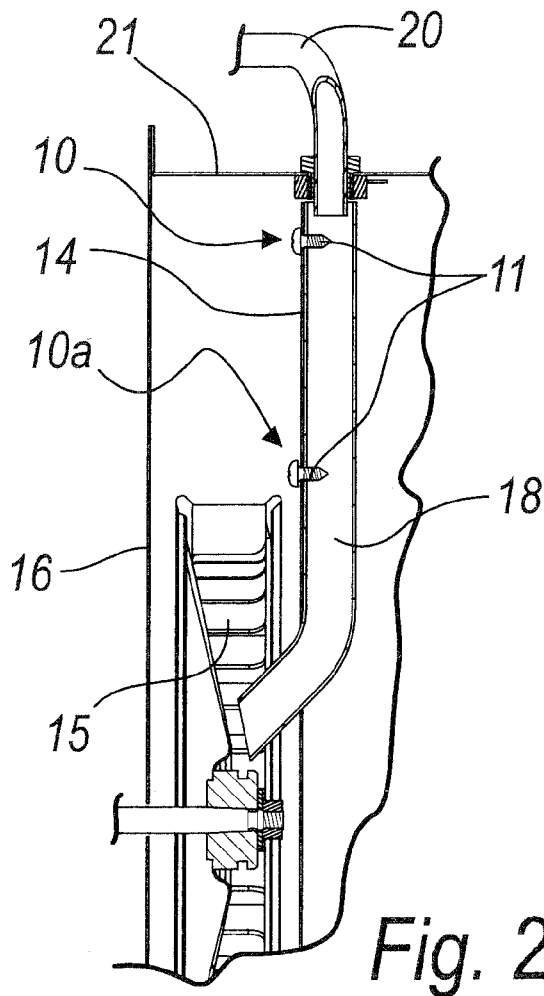


Fig. 2

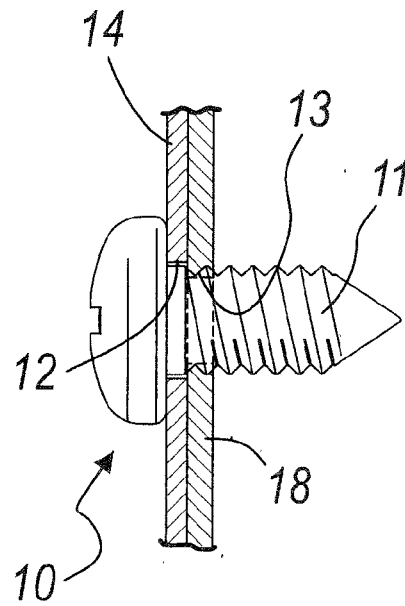


Fig. 3



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EUROPEAN SEARCH REPORT

Application Number
EP 06 11 3582

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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Place of search Munich		Date of completion of the search 7 September 2006	Examiner Merkt, Andreas
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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