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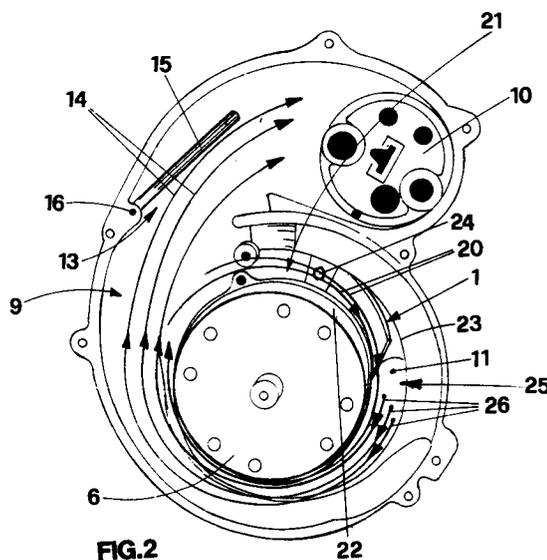
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54 **Device for the optimization of the performance of a fan supplying air to a burner.**

57 The invention discloses a device for the reduction of the load losses in a fan (2) supplying air to the combustion chamber (10) of a forced-air burner. Said fan (2) comprises an impeller (4) fitted within the body (3) of the fan, wherein a supply spiral-shaped channel (9) and a return channel (21) are obtained, the latter re-conveying the excess air (20) present in the area of the delivery opening (13) to the area (25) of the suction opening (11). Within the return channel (21) is arranged the device according to the invention consisting of at least one baffle plate (1) fit to guide the re-conveyed air (20) to the area (25) where it converges with the sucked-in flow (26), the ensuing motion being essentially non-turbulent.



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The invention concerns a device for the optimization of the performance of a fan supplying combustion air into the combustion head of a forced-air burner.

It is a known fact that the combustion air for burners is sent into the combustion head by means of a centrifugal fan.

The centrifugal fans belonging to the known technique, which are fitted into burners, consist essentially of an impeller positioned inside the body of the fan, within which a spiral-shaped channel is obtained, the latter consisting essentially of a supply channel conveying the combustion air to a delivery opening communicating with the combustion head, after it has been sucked in through a suction opening communicating with the outside environment.

In order to reduce the overall axial dimensions, fans have been developed wherein the motor driving the impeller is lodged partially in a dome-shaped recess within the body of the fan and partially within the impeller.

In correspondence with the delivery opening of the combustion chamber there is also an adjustable air lock, through which the amount of air delivered into the combustion head is varied, so as to maintain constant the volume of the air supplied.

If the quantity of air sent into the combustion head through the delivery opening is varied by partially closing the air lock, the excess air is re-conveyed in correspondence with the area of the suction opening through a return channel, obtained between the fan body and the inner dome, said channel extending from the area in correspondence with the delivery opening to the area in correspondence with the suction opening.

One inconvenience presented by the fans of the described type consists in that, when the air conveyed through the return channel converges with the air flow coming in through the suction opening, there occurs in the contact area a considerable turbulence which causes a reduction in the performance of the fan.

It is in order to overcome this inconvenience that the device according to the present invention is disclosed, with the purpose of reducing the load losses in the fan supplying the combustion head of a forced-air burner.

The proposed purpose is fulfilled by the realization of a device for the reduction of the load losses in the fan supplying the combustion head of a forced-air burner, wherein said fan comprises an impeller fitted within the body of the fan within which a supply spiral-shaped channel is obtained for the conveyance of the combustion air from the suction opening to the delivery opening communicating with the combustion head and a return channel for the re-conveyance of the excess air

present in the area of the delivery opening to the area of the suction opening, said device being characterized in that it comprises at least one baffle plate arranged within the return channel and fit to guide the re-conveyed air creating an essentially non-turbulent movement in the area wherein said re-conveyed flow meets the flow sucked in through the suction opening.

Advantageously the device according to the invention optimizes the characteristic curve (delivery/delivery head) with the purpose of improving the starting capacity in a forced-air burner.

The device according to the invention will be now described in detail with reference to the enclosed tables of drawing, wherein;

- Fig. 1 is an axonometric rear view of the fan/motor unit of the burner to which the device according to the invention is applied;
- Fig. 2 represents a front view of the inside of the fan body within which the device according to the invention is applied.

As can be observed in the Figs. 1 and 2, the device according to the invention, indicated as a whole with 1, is applied on a fan, indicated as a whole with 2, wherein the following components are visible: the body 3, the impeller 4 and the electric motor 5 which drives impeller 4.

It will be observed more in detail in Fig. 2 that dome 6 of motor 5 is an indentation within impeller 4 and body 3, so that in the axial direction 7 there is a reduction of the overall dimensions of the electric motor 5, of fan 2 and of the pump supplying fuel 8 and connected with the electric motor 5.

It will also be observed in Fig. 2 that within body 3 of the fan a spiral-shaped channel is obtained for the supply of the combustion air to the combustion head 10, which conveys the combustion air from the suction opening 11, communicating with the outside environment, to the delivery opening 13. More specifically, the air-flow 14, flowing through the delivery opening 13 is regulated through an adjustable air lock 15, which has its fulcrum at a spot 16 of the fan body 3.

The excess air is re-conveyed following direction 20 into a return channel 21, which is defined between the circular crown 22 of dome 6 and the inner surface 23 of the fan body.

Said return channel 21 extends from the area of the delivery opening 13 to the area of the suction opening 11 and in its interior is arranged the device according to the invention which, as can be observed, consists of the baffle plate 1 attached to the fan body 3 through a fastening element, for instance a screw 24.

It will be observed that the baffle plate 1 presents a surface with a curved profile 27 guiding the re-conveyed flow 20 through channel 21 and

leads it in correspondence with the area 25, near the suction opening 11.

Since it is guided by the baffle plate 1 in correspondence with area 25, said re-conveyed flow 20 converges with the incoming flow 26 without generating any turbulence, contrary to what happens in the fans belonging to the known technique. As a consequence, the characteristic curve (delivery/delivery head) is optimized and so is the starting capacity in any average forced-air burner.

It is obvious that, during the manufacturing stage, the device according to the present invention may comprise several variously positioned and variously shaped baffle plates rather than one.

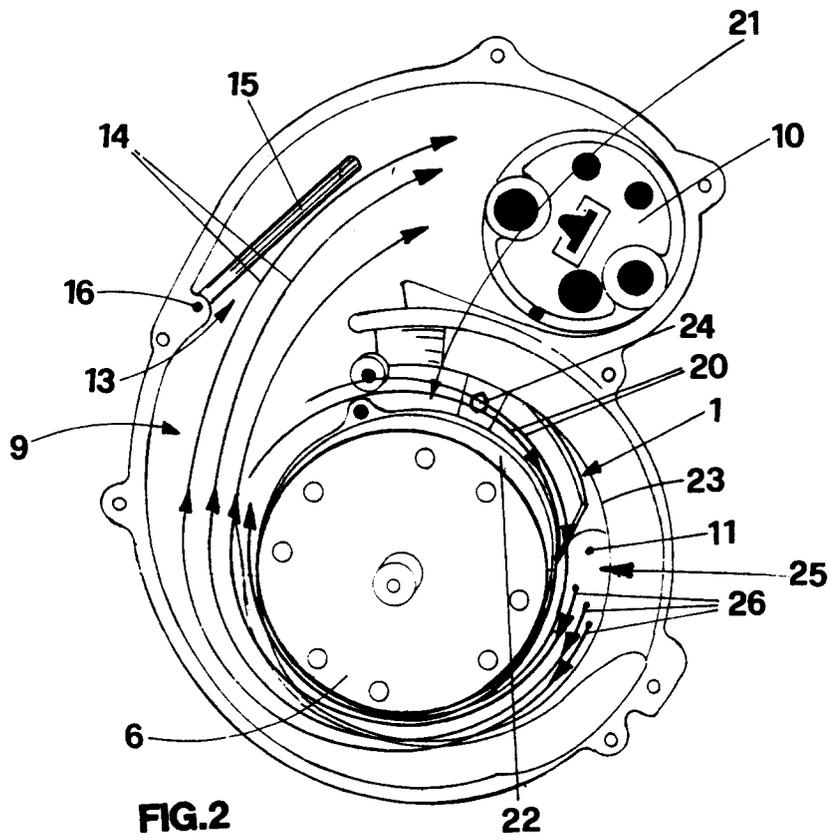
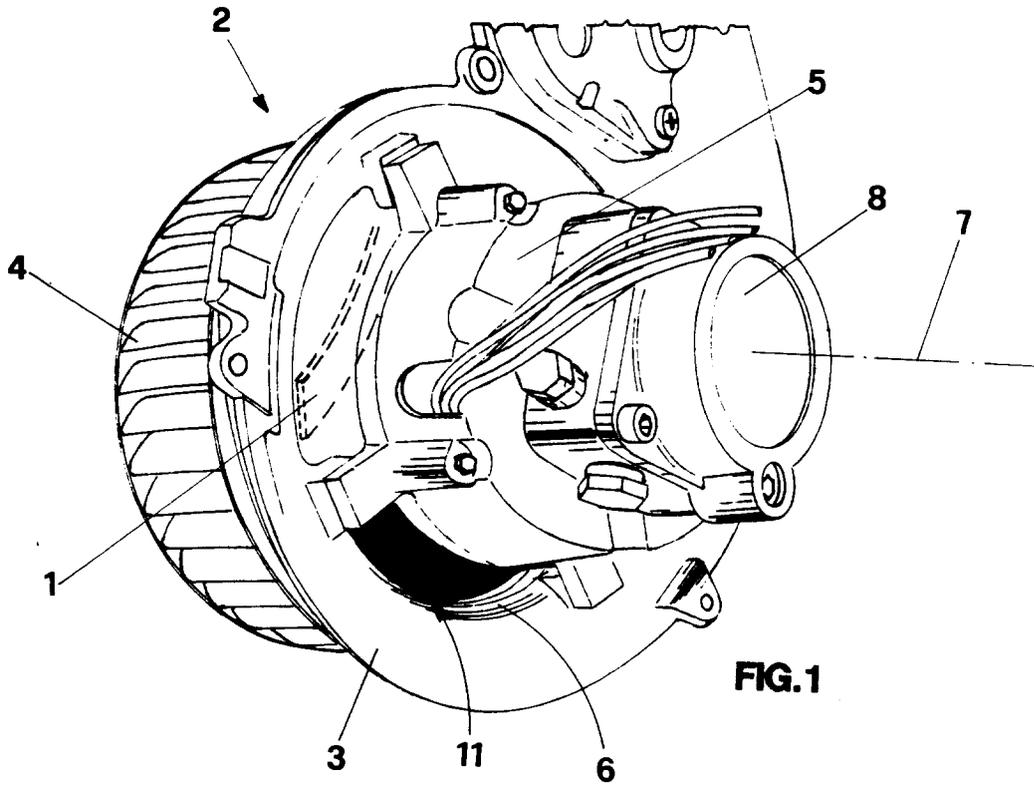
It is, however, understood that the realization of a fan with one or more baffle plates, although shaped differently in comparison with the described embodiment, will still fall within the scope protected by the present invention.

Claims

1. A device for the reduction of the load losses in the fan (2) supplying the combustion head (10) of a forced-air burner, wherein said fan (2) comprises an impeller (4) fitted within the body (3) of the fan within which a supply spiral-shaped channel (9) is obtained for the conveyance of the combustion air from the suction opening (11) to the delivery opening (13) communicating with the combustion head (10) and a return channel (21) for the re-conveyance of the excess air (20) present in the area of the delivery opening (13) to the area (25) of the suction opening (11), said device being characterized in that it comprises at least one baffle plate (1) arranged within the return channel (21) and fit to guide the re-conveyed air (20) creating an substantially non-turbulent movement in the area (25) wherein said re-conveyed flow (20) converges with the flow (26) sucked in through the suction opening (11).
2. A device according to claim 1, characterized in that the return channel (21) is inside the body (3) of the fan (2), between the peripheral surface (23) of body (3) of the fan (2) and the lateral surface (22) of a dome (6) indented toward the interior of the body (3) of the fan and of the impeller (4), said return channel extending from the area of the delivery opening (13) to the converging area (25), of the re-conveyed flow (20) and of the flow (26) sucked through the suction opening (11).
3. A device according to claim 1, characterized in that the baffle plate (1) presents a curved profile (27) arranged in a position substantially

tangential to the direction (20) of the flow re-conveyed inside the return channel (21).

4. Device according to claim 3, characterized in that the baffle plate is attached to the fan body (3) through at least one blocking screw (24).





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EUROPEAN SEARCH REPORT

Application Number

EP 93 10 1910

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	WO-A-9 116 544 (ABB FLÄKT AB) * the whole document * ----	1,2	F23D11/00 F04D27/02
Y	US-A-4 680 006 (FISHER) * the whole document * -----	1,2	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			F23D F04D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15 APRIL 1993	Examiner KOOIJMAN F.G.M.
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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