

12 **EUROPEAN PATENT APPLICATION**

21 Application number: **81103593.0**

51 Int. Cl.³: **F 23 M 9/06, F 23 D 11/40**

22 Date of filing: **11.05.81**

30 Priority: **23.05.80 IT 8556580**

71 Applicant: **Sossella, Evio, Via Pozzetto 10, I-36020 Albettona Province of Vicenza (IT)**

43 Date of publication of application: **02.12.81**
Bulletin 81/48

72 Inventor: **Sossella, Evio, Via Pozzetto 10, I-36020 Albettona Province of Vicenza (IT)**

84 Designated Contracting States: **AT BE CH DE FR GB LI LU NL SE**

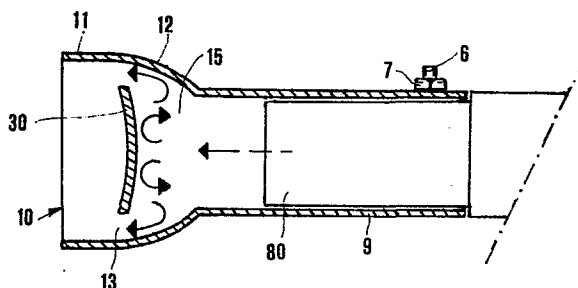
74 Representative: **Modiano, Guido et al, MODIANO & ASSOCIATI S.A.S. Via Meravigli, 16, I-20123 Milan (IT)**

54 **Flame trap apparatus for use on gas or oil burners.**

57 The invention relates to a flame trap apparatus for use on gas or oil burners. The device comprises a preferably cylindrical tubular body (10) adapted to form, in use, an extension of the flame emitting head (80) of a burner, and an intercepting element (30) located inside the tubular body (10) and defining a narrow peripheral passage (13) therewith. The flame trap device limits a chamber (15) close to the head (80).

Within the chamber (15), the flame generated by the burner hits the intercepting element (30).

The combustion gases are thus deflected from their path and compelled to thoroughly mix, partly strike the inner wall of the tubular body (10), and then flow toward the passage (13).



This invention relates to a flame trap apparatus for use on gas or oil burners.

It is known that most white flame gas burners, and especially white flame oil burners, provide a flame wherein the combustion gases are only rarely allowed to burn in a complete manner. This is confirmed by the formation of sooty deposits, frequently of considerable depth, which grow on the inner walls of the boiler and flue, and adversely affect the thermal efficiency of the boiler. Consequently, the latter requires intensive maintenance operations, often to be carried out at frequent intervals, and in all cases at a fairly high cost.

It is an object of this invention to provide a flame trap apparatus for application to the head of most gas or oil operated burners, or burners operating on some other comparable fluid fuel, the apparatus being suitable to ensure substantially complete combustion of the flue gases leaving the burner on which the said device is installed prior to their reaching the boiler proper and flue or stack.

Another object of this invention is to provide a flame trap apparatus which enables the temperature of the burned gases flowing toward the flue or stack to be controlled in an optimum manner.

Another important object of the invention is to provide a flame trap apparatus which is extremely simple to manufacture and install, and of low production cost.

These and other objects, such as will be apparent hereinafter, are achieved by a flame trap apparatus, according to the invention, for use on gas or oil burners, which comprises a tubular body adapted to
5 form an extension of the flame emitting head of a burner, and an intercepting element positioned inside said tubular body and limiting a narrow peripheral passage therewith, such as to intercept, in use the flame generated by the burner and cause the
10 combustion gases to be deflected from their straight path and flow toward said peripheral passage.

Advantageously, said tubular body, intercepting element, and burner head delimit, in use, a chamber wherein the combustion process of the flue gases is
15 carried to completion.

Further aspects and advantages of the invention will be more clearly apparent from the following detailed description of two embodiments of the inventive flame trap apparatus, with reference to the
20 accompanying drawing, in which:

Figure 1 is a diagrammatic elevational view of a burner incorporating a flame trap apparatus;

Figure 2 is an elevational view of a flame trap apparatus having its portion for connection to the burner
25 made longer than that of the flame trap apparatus of Figure 1;

Figure 3 is a longitudinal section view of the apparatus of Figure 2, as mounted on the head of a burner; and

Figure 4 is a front view from the left of the flame trap apparatus of Figure 3.

With reference to the figures in the drawing, wherein identical or similar components are designated with the same reference numerals, there is indicated at 5 10 a flame trap apparatus having a cylindrical tubular body formed in three sections. The first of such sections, indicated at 9, is a connection end which can be inserted onto and secured to the flame emitting 10 head 80 of an oil burner 81. The connection end 11 may be fastened to the head 80, for instance, by means of a set screw 6 which can be threaded into a nut 7 made rigid, as by welding, with the section 9 of the flame trap apparatus (Figure 3). Of course, fastening 15 means, like the one exemplified by the screw 6 and nut 7, are provided for the application of the inventive apparatus to already installed burners, it being understood that the flame trap apparatus 10 may be implemented as an integral part of the head 80 of a 20 burner 81.

The flame trap apparatus 10 also comprises a terminating section 11 having a larger diameter than the section 9 to which it is connected through an intermediate transition section 12 which widens out 25 to a bell-like shape from the section 9 to the section 11.

At the transition or the terminating section, there is provided, inside the body 10, an intercepting element 30 which comprises a slightly crowned disk secured to the

walls of the tubular body by means of a plurality of welded fins or tabs 4.

The intercepting element 30 delimits together with the inner wall of the tubular body 10 and front
5 end of the head 80, a chamber 15 which communicates with the outside of the tubular body 10 through a peripheral passage 13 between the free edge of the intercepting element 30 and inner wall of the tubular body 10.

10 As may be seen in particular in Figure 3, the burner 81, which is preferably pressure operated, will emit from its head 80, when in operation, a flame which is intercepted by the element 30, and thus the combustion gases are compelled to deflect, inter-
15 mix, and at least in part strike the inner wall of the tubular body 10 prior to flowing to the passage 13. Thus, there occurs within the chamber 15 the combined effect of an expansion and
20 thorough mixing of the combustion gases which are forced to strike and sweep past the intercepting element 30 and/or the inner wall of the tubular body, thereby ensuring a virtually complete combustion of all the fuel particles contained in the
25 flame, also in view of both the intercepting element 30 and entire tubular body 10 being, in operation, at a very high temperature, approximating the red hot level. Thus, thanks to its own thermal capacity, the flame trap apparatus 10 also acts as a heat stabilizer
30 effective to ensure a more uniform combustion within the chamber 15, which serves in turn to accommodate

any incidental variations resulting from irregularities in the jet of fuel-air mixture created by the burner. All this results in an increase of the overall thermal efficiency of the burner.

- 5 Actual tests have shown that with the flame trap apparatus according to this invention, the flue gases are practically completely free of carbon monoxide, no soot build-up is produced inside the boiler and flue or stack or has been detected in any substantial
- 10 amount even after months of operation of the burner. Moreover, in some cases, and with the same set of conditions, it has become possible to considerably shorten the length of the boiler associated with the burner.
- 15 Understandably, the absence of sooty formations inside the boiler, in addition to maintaining the boiler performance constant, has brought about a drastic reduction of the maintenance operations required to ensure proper operation of the boiler-
- 20 burner assembly.

In the course of actual tests, particularly satisfactory results have been obtained with flame trap apparatus having an 80 mm diameter at the section or connecting end 9, a 135 mm diameter at the section

25 11, and an 85 mm distance from the front of the head 80 of the burner to the intercepting element 30. In another embodiment, the diameter of the section 9 was equal to 93 mm, the diameter of the section 11 equal to 135 mm, and the distance between the intercepting

30 element 30 and front of the head 80 was equal to 95 mm.

With flame trap apparatus having the above dimensions substantial improvement in the efficiency of 20,000 to 75,000 Kcal/h burners has been obtained.

With more powerful burners, a diameter of, for
5. example, 136 mm is suitable for the section 9, a diameter of 394 mm for the section 11, and a nozzle-to-disk distance of 120 mm.

The invention is susceptible to modifications and variations. Thus, for example, the flame trap
10 apparatus, instead of being fastened to the head 80 of a burner, may be fastened to a wall of the boiler whereon the burner is installed.

CLAIMS

1 1. A flame trap apparatus, particularly for use
2 on gas or oil burners, which comprises a tubular
3 body (10) adapted to form an extension of the flame
4 emitting head (80) of a burner (81), and an inter-
5 cepting element (30) positioned inside said tubular
6 body (10) and delimiting a narrow peripheral passage
7 (13) therewith, such as to intercept, in use, the
8 flame generated by said burner (81) and cause the
9 combustion gases to be deflected from their straight
10 path and flow toward said peripheral passage (13).

1 2. An apparatus according to Claim 1, character-
2 ized in that said tubular body (10), intercepting
3 element (30), and burner head (80) delimit, in use,
4 chamber (15) serving as a chamber for the comple-
5 tion of the combustion process.

1 3. An apparatus according to Claim 2, character-
2 ized in that the said tubular body (10) comprises
3 a terminating portion (11) designed to constitute, in
4 use, the distal from said burner (81), and having an
5 internal opening larger in size than the remaining
6 portion of the tubular body (10), thereby promoting
7 an expansion of the combustion gases flowing toward
8 said peripheral passage.

1 4. An apparatus according to Claim 3, character-
2 ized in that said intercepting element (30) is posi-
3 tioned inside the terminating portion (11) of larger
4 internal opening size of said tubular body (10).

1 5. An apparatus according to Claim 4, character-
2 ized in that said intercepting element (30) is

3 mounted stationary within said tubular body (10).

1 6. An apparatus according to Claim 5, character-
2 ized in that said tubular body (10) can be inserted
3 into and secured to said burner head (80).

