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FLAME SUPERVISION INSTRUMENTATION

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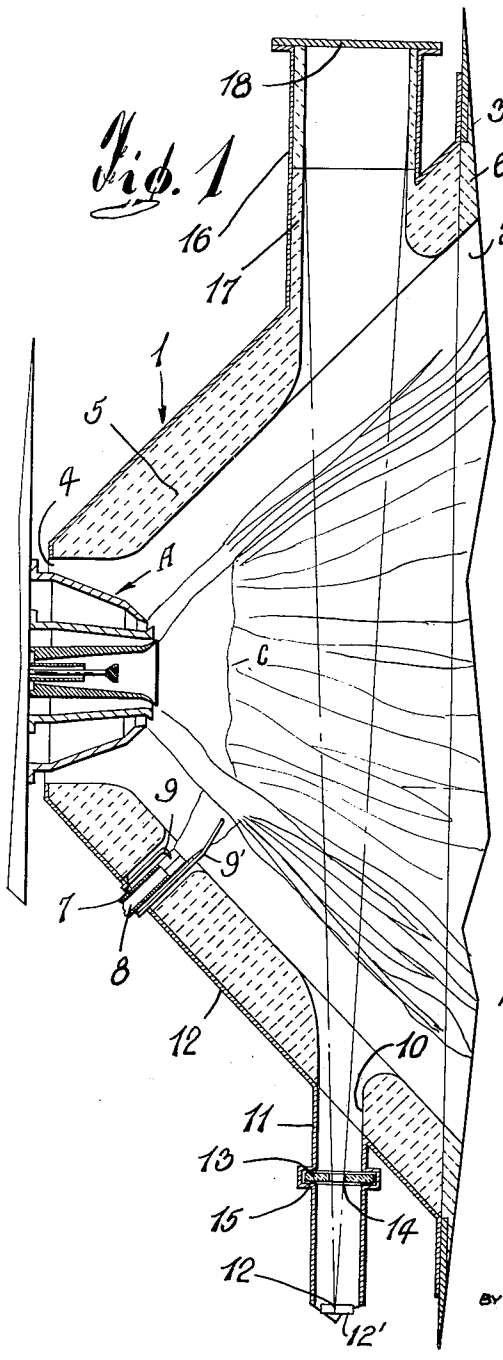


Fig. 1

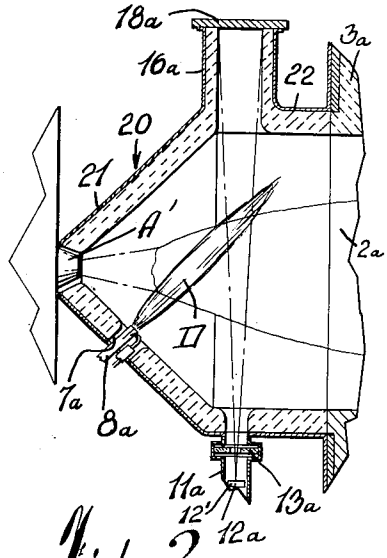


Fig. 2

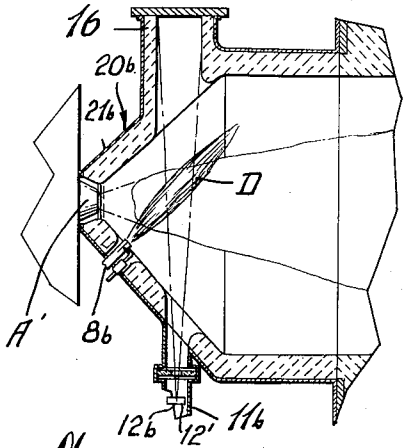


Fig. 3

INVENTOR
OSKAR KATORSKY

BY

ATTORNEYS

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FLAME SUPERVISION INSTRUMENTATION

Oskar Katorsky, 4269 Dorchester St. W., Montreal, Quebec, Canada

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The present invention relates to flame supervision instrumentation and, more particularly, to a new manner of mounting the flame supervision instrument in a furnace.

Gas and oil fired furnaces are usually provided with a flame supervision instrument which is mounted near the firing unit and arranged to "see" an internal wall portion of the furnace and to have its line of sight through the area normally occupied by the flame produced by the firing unit. The flame supervision instrument operates means for stopping the firing unit as soon as a flame failure takes place due to causes foreign to the normal operation of the burner. However, the flame of an oil or gas firing unit heats the refractory lining of a furnace to light emitting temperature whereby it frequently happens that, even when the flame becomes accidentally extinguished, the hot lining of the furnace wall portion seen by the instrument continues to emit sufficient light to energize the instrument, whereby the flame supervision instrumentation fails to stop immediately the fuel admission into the furnace; this can result in explosions due to the fuel striking the hot lining.

Accordingly, the general object of the present invention is the provision of a new manner of mounting the flame supervision instrument to obviate the above noted disadvantages.

A more specific object of the invention is the provision of means whereby the flame supervision instrument will always see a dark surface as soon and so long as there is no flame in the furnace.

The foregoing and other important objects of the present invention will become more apparent during the following disclosure and by referring to the drawings in which:

Figure 1 is a section of an adapter and of the nozzle of the firing unit and showing the manner of mounting the flame supervision instrument;

Figure 2 is a section similar to that of Figure 1, showing a modified form of adapter;

Figure 3 is a section showing still another modified form of adapter.

Referring now more particularly to the drawings in which like reference characters indicate like elements throughout, reference numeral 1 generally indicates an adapter which is fitted over the mouth 2 of a furnace 3, only part of which is shown in Figure 1. The adapter 1 is of conical shape and has an opening 4 at its apex for receiving the nozzle of a fuel or gas burner, such as the nozzle A of a rotary cup oil burner, for instance, the rotary cup oil burner described in co-pending patent application Ser. No. 707,884, filed on January 9, 1958, by the same applicant, now Patent No. 2,933,131, granted April 19, 1960.

The adapter 1 is internally lined with firebrick or the like refractory lining 5. Similarly, the furnace 3 has a refractory lining 6.

The adapter 1 is provided with a through hole 7 adjacent the central aperture 4 for the insertion of a conventional igniter 8. In the embodiment illustrated in Figure 1, the igniter 8 is of the gas-fired type and is provided with an arcing electrode 9 and a flame rectifier rod 9'. With this type of igniter, the firing unit will not operate until the control panel of the burner has received from the flame rectifier rod 9' a signal that the igniter 8 is on, and its flame is large enough to ignite the main flame.

The root C of the flame produced by the burner normally lies at a short distance from the nozzle tip, for instance, two to four inches.

The adapter 1 is provided with a second through bore 10 which communicates with a tubular extension 11 secured to the outside metal wall 12 of the adapter 1. The extension 11 houses a flame supervision instrument of standard construction consisting of a light sensitive element, such as a photoelectric cell 12' located at point 12. A masking plate 13 (also conventional) provided with a central opening 14 is disposed in an annular recess 15 of the tubular extension 11 so that the masking plate 13 is properly located at a predetermined distance in front of the flame supervision instrument.

The instrument of Figure 1 is of a type which is sensitive only to the light of the main flame, and cannot be excited by the gas flame of the igniter. Such instruments are obtainable on the market as standard units comprising the tube 11, plate 13 and the light sensitive element.

The axis of the tubular extension 11 and through hole 10 is preferably perpendicular to and intersects the main axis of the conical adapter 1. Furthermore, as the tubular extension 11 is disposed adjacent the base of the conical adapter 1, the line of sight of the light sensitive element located at 12 is sufficiently beyond the normal location of the root C of the flame so that the element will see the flame produced by the burner. The portion of the adapter 1 disposed exactly opposite the field of vision of the light sensitive element forms an external tubular extension 16 which is disposed in axial alignment with the tubular extension 11. Extension 16 is internally lined with refractory lining 17 forming a continuation of the lining 5, and is closed at its outer end by a metal closure plate 18. The extension 16 has a diameter considerably greater than the diameter of the tubular extension 11, and is of such length that its metal plate 18 will remain at a low enough temperature, so that it will not become light emitting under the heat radiated by the flame produced by the burner.

Thus the extension 16 and plate 18 forms a dark well, the plate 18, which appears black, being seen by the instrument located at 12, the diameter of the plate 18 being large enough to cover the field of vision of the flame supervision instrument, limited by plate 13.

Upon accidental extinguishing of the flame, only the dark face of the plate 18 and no part of the light emitting lining of the adapter or of the furnace will be seen by the instrument located at 12; thus the fire supervision instrument will always positively stop the operation of the burner.

It will be noted that the arrangement of the present invention will also operate when the flame is not extinguished, but its root C becomes unduly separated from the nozzle A due to faulty adjustment of the proportion and/or delivery pressure of the fuel and air. Thus the flame supervision instrument enables the detection not only of accidental extinguishing of the flame but also of faulty operation of the burner.

The shape of the adapter shown in Figure 1 is suitable for a wide angle fire, while the embodiments of the adapter and flame supervision arrangement of Figures 2 and 3 are for foxtail or elongated flames.

The adapter 20 of Figure 2 has a conical portion 21 and at the base of the latter a cylindrical portion 22 which is fixed at its outer end to the furnace 3a and which sur-

rounds the furnace mouth 2*a*. The igniter 8*a* is disposed in a through hole 7*a* positioned adjacent the nozzle A' of the firing unit. The tubular extension 11*a* containing the flame supervision instrument with the masking plate 13*a* is positioned on the cylindrical portion 22 of the adapter 20 adjacent the base of the conical portion 21. Similarly, the tubular extension 16*a* for the dark well is disposed on the cylindrical portion 22 of the adapter and is diametrically opposite the tubular extension 16*a*. As in Figure 1, only the plate 18*a*, which forms a dark surface in the interior of the adapter, is seen by the light sensitive element disposed at point 12*a*.

In Figure 3, the same type of adapter is used as in Figure 2 but the tubular extensions 11*b* and 16*b* are disposed on the conical part 21*b* of the adapter 20*b* so that the line of sight of the instrument is closer to the root C of the flame. In the embodiments of Figures 2 and 3 the instrument is of a type sensitive to the igniter flame as well as the main flame, and as shown in these figures the igniter flame D is positioned to intersect the line of sight of the instrument disposed at 12*a* or 12*b*. Thereby, as soon as the flame supervision instrument is actuated by the igniter flame, it starts operating the burner. For this reason the igniter 8*a* or 8*b* does not require a flame rectifier rod such as 9' (Figure 1).

From the foregoing it will be evident that the manner of mounting the flame supervision instrument in accordance with the present invention is very flexible and may be suited to various shapes of adapters. Said adapter shapes depend in turn on the shape of the flame produced by the particular firing unit.

Although in the embodiments illustrated, the dark well is directly mounted on the adapter, it should be understood that said dark well could in some cases be mounted in any area of the walls of the furnace provided it is positioned within the field of vision of the light sensitive element, and that the field of vision intersects the flame produced by the firing unit. For instance, it is possible to mount the flame supervision instrument in the conventional manner, that is, on the adapter 1 at a slight angle with respect to the firing nozzle A such that the photoelectric cell will see a portion of the back wall of the furnace through the furnace mouth 2. In this case the dark well would be positioned in said portion of the back wall of the furnace and would provide an external tubular extension of sufficient length to prevent

radiant heat from heating the cover 18 to a light emitting temperature.

In carrying the invention into practice, however, it is preferable to build the adapter with the flame supervision instrument and the igniter as a standard or custom made unit, because of the precision required in aligning the instrument with the dark well. It is evident that better results will be obtained by working at the factory, rather than at the installation site.

It should be noted that the invention is particularly adapted for floor mounted burners.

While preferred embodiments in accordance with the present invention have been illustrated and described, it is understood that various modifications may be resorted to without departing from the spirit and scope of the appended claims.

I claim:

1. In a furnace having a mouth, and a burner having a nozzle spaced from said mouth, said nozzle being outside the furnace; an at least partly conical enclosed adapter fastened to the mouth and having a portion surrounding the nozzle of said burner, said adapter having two diametrically opposite tubular extensions with a common axis perpendicular to the axis of said adapter and spaced from the nozzle, a light sensitive flame supervision instrument mounted in one extension, with a limited field of vision coaxial with said common axis, said other extension comprising an outer closure plate covering all the field of vision of said instrument and spaced from the wall of the adapter at such a distance that it is not heated by the flame of the burner to light emitting temperature.

2. In a furnace having an adapter as claimed in claim 1, said adapter comprising a cylindrical portion adjacent the mouth of the furnace, said tubular extensions being provided in the conical portion of said adapter.

3. In a furnace having an adapter as claimed in claim 1, said adapter comprising a cylindrical portion adjacent the mouth of the furnace, said tubular extensions being provided in said cylindrical portion of said adapter.

References Cited in the file of this patent

UNITED STATES PATENTS

2,360,166	Schumann et al.	Oct. 10, 1944
2,404,903	Cohen	July 30, 1946
2,598,808	Ledin	June 3, 1952