

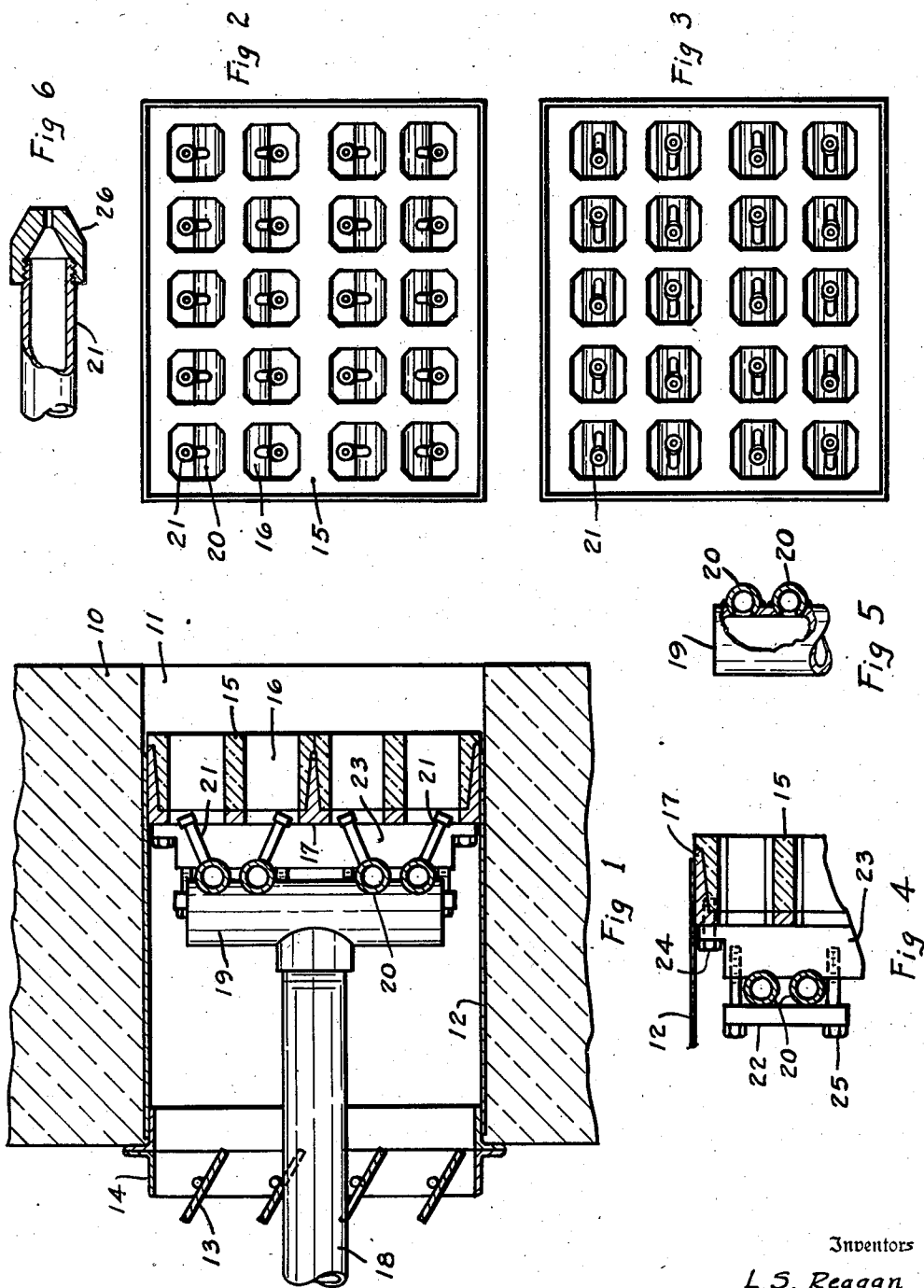
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COMBUSTION APPARATUS

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COMBUSTION APPARATUS

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3 Claims. (Cl. 158—7)

The present invention relates to gas burners of the type embodying a multi-ported burner block in a draft duct. Burners of this type have special utility in connection with steam boiler furnaces but as heretofore designed have been subject to the drawback that flame pulsations readily occur in the furnace firebox. The object of the present invention is to provide an improved burner of the type indicated which shall not be subject to the difficulty mentioned.

For a consideration of what is believed to be novel and our invention, attention is directed to the following specification and the claims appended thereto.

In the accompanying drawing wherein the preferred form of the invention is shown,

Fig. 1 shows the improved burner in partial side elevation and vertical section and as positioned in a horizontal draft passage in the vertical wall of a combustion chamber.

Fig. 2 is an end elevation of the burner viewed from the right in Fig. 1.

Fig. 3 is a view similar to Fig. 2 but showing the fuel nozzles arranged in a somewhat different pattern as regards their angularity with respect to each other.

Figs. 4, 5 and 6 are fragmentary detail views of certain details of construction.

In the drawing, 10 indicates an upright side wall of a combustion chamber of a steam boiler furnace. In this wall 10, there is a horizontal passage 11 wherein the burner of the present invention is positioned to fire into the combustion space or chamber at the right of the wall 10 as viewed in Fig. 1.

The improved burner comprises an air duct or casing 12 adapted to be positioned in the passage 11. Louvres 13 in a frame 14 at the outer end of the duct control the entry of air into the duct and a multi-ported burner block 15 at the inner end of the duct divides the main air stream into a plurality of separate streams, the ports or apertures in the block being indicated at 16 and being shown as of the square type and as being arranged in vertical and horizontal rows, this being the preferred arrangement. The burner block is made of refractory material supported in a dished frame 17 fixedly secured to the walls of the casing 12 in any preferred way as by spot welding.

The fuel supply pipe is indicated at 18 and extends into the casing 12 to a transversely extending header 19 closed at both ends. In gas connection with this header is a plurality of gas distributing tubes 20, one tube for each horizontal

row of air ports 16. As shown in Fig. 5 the tubes 20 are preferably welded to the header 19.

Each tube 20 has a row of elongated gas nozzles 21 extending therefrom, one nozzle for each adjacent air port 16. It is important that the nozzles be maintained in predetermined fixed position with respect to the burner block 15. A simple expedient for this purpose comprises (see Fig. 4) clamp bars 22 for clamping the ends of the distributing tubes 20 to vertical spacing bars 23 secured to the back of the frame 17 as by screws 24. Clamping screws for the bars 22 are indicated at 25. As best shown in Fig. 6, each nozzle 21 comprises a removable tip or spud 26 to facilitate changing of the discharge area of the nozzle as the special conditions of each burner application may require as, for example, the particular kind of gas that is available, etc.

In the present invention, each gas nozzle 21 is so arranged with respect to the adjacent air port 16 that the gas will be fed into said port one side only of the air stream passing through the port, the nozzle for this purpose having its discharge end in relatively close proximity to a spot on the inner surface of the air port and being arranged to discharge towards said spot at a relatively small angle of incidence, the preferred angle being about 23°. This manner of adding the fuel to the air effectively prevents flame pulsations from occurring in the furnace combustion chamber and may be said to constitute the distinguishing feature of the present invention. Also by thus causing the fuel to flow in contact with the inner surface of the air port, intermixing of the fuel layer next to said surface is sufficiently delayed to provide in close proximity to the discharge end of said surface a pilot flame which tends to hug said end and which, therefore, cannot be blown off regardless of how much the rate of flow of air through the air port may vary due to varying draft conditions.

It will readily be appreciated that because the air and fuel flow side by side in the respective air ports the combustion flame tends to be relatively long. However, in accordance with the present invention, the length of flame can be varied by varying the angular pattern of the nozzles with respect to each other. Thus, in Fig. 2, all of the nozzles in any one horizontal row are shown as parallel to each other but in adjacent rows they point alternately up and down. This particular angularity of nozzles between adjacent rows produces a flame pattern that is shorter than would be the case if the nozzles in adjacent rows all pointed in the same general direction as, for ex-

ample, upwardly or downwardly or sideways. A still shorter flame pattern will result if the nozzles of each horizontal row point alternately in converging and diverging directions. A typical arrangement is shown in Fig. 3, it being noted that in this figure the nozzles point alternately in converging and diverging directions in horizontal planes. However, the planes might just as well be vertical.

From the foregoing description it should be clear that the present invention provides a unique type of burner well adapted for its intended purpose.

What is claimed as new is:

1. In a burner for supplying air and fuel gas to a furnace chamber, the combination of a burner block having a multiplicity of ports

through which the combustion air flows to said chamber, and a gas discharge nozzle for each port, the discharge end of the nozzle being positioned so close to one wall of the port that the air gap therebetween is negligible and the angle of incidence of the gas jet on said wall being so small that the gas jet tends to maintain its stream integrity for a substantial distance along said wall, whereby intermixing of the air and gas proceeds relatively slowly in the port.

2. In the combination specified in claim 1, the said angle of incidence being about 23° .

3. In the combination specified in claim 1, the said gas discharge nozzles pointing in various directions with respect to each other.

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