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G. BLUEMEL

1,511,019

BURNER

Filed July 24, 1922

Fig. 2

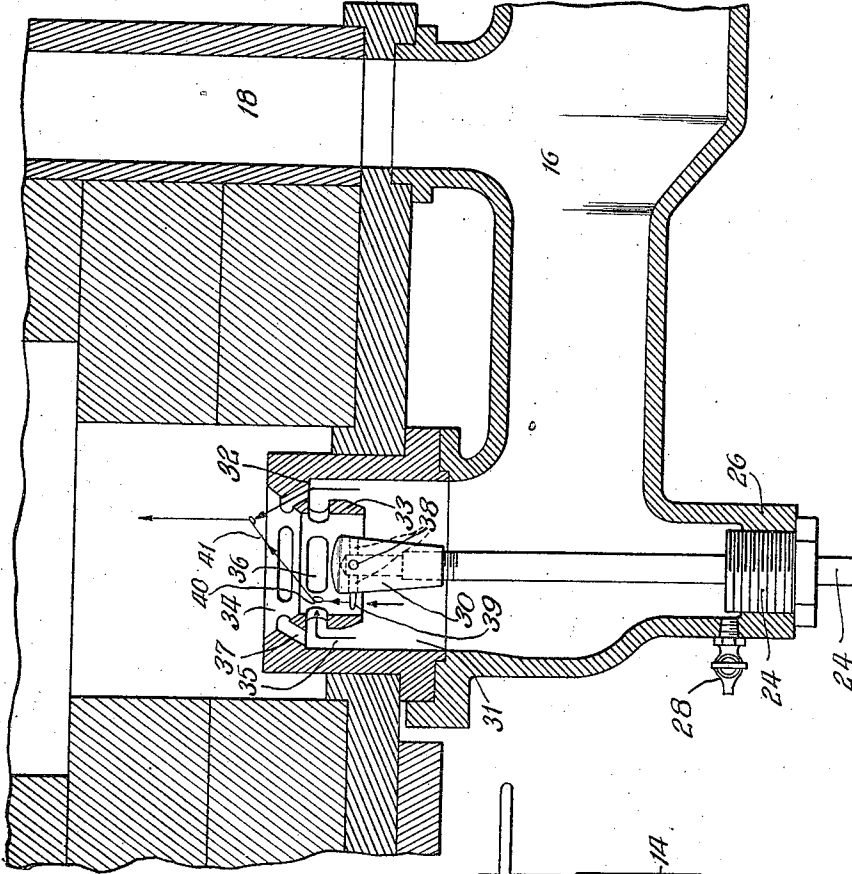
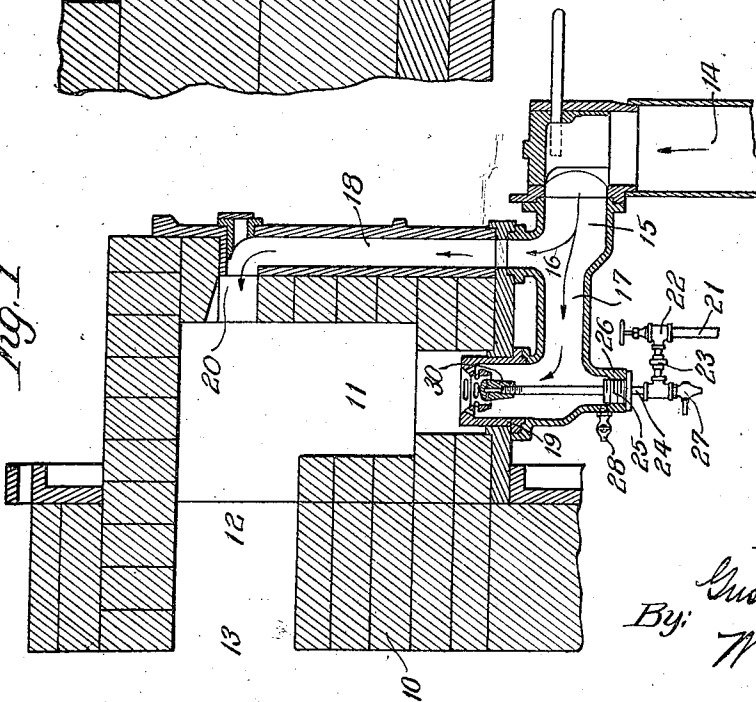


Fig. 1



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UNITED STATES PATENT OFFICE.

GUSTAVE BLUEMEL, OF TOLEDO, OHIO, ASSIGNOR TO FERGUSON FURNACE COMPANY,
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BURNER.

Application filed July 24, 1922. Serial No. 576,954.

To all whom it may concern:

Be it known that I, GUSTAVE BLUEMEL, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Burners, of which the following is a specification.

This invention relates to improvements in furnaces of the class in which crude petroleum or fuel oil is used for fuel and its object is to promote the efficiency of these furnaces by accelerating and perfecting the combustion of the fuel. This result is produced by breaking the oil up into extremely fine globules or particles and thoroughly incorporating them with a sufficient quantity of air to make an extremely rapid burning mixture.

The breaking up or atomizing of the fuel oil is preferably accomplished by subjecting the oil to a plurality of air blasts erected crosswise to the movement of the oil and acting upon it successively.

The particular embodiment of the invention disclosed in this application includes a burner provided with a series of air passages arranged at angles to each other and adapted to direct successive blasts of air against oil supplied through a suitable nozzle. The first air passage is arranged substantially at right angles to the openings in the nozzle; the second passage is arranged substantially at right angles to the first, and the third is substantially at 45° to the first and the second.

In the drawings I have illustrated a selected embodiment of the invention, and in which—

Fig. 1 is a sectional view through a furnace equipped with a burner made according to the invention; and

Fig. 2 is a similar section enlarged to better show the details of the burner.

Referring to these drawings, 10 indicates a furnace having a primary combustion chamber 11 and a secondary combustion chamber 12 which communicates at 13 with a suitable heating chamber or other compartment. Compressed air is supplied to the furnace from any suitable source through a pipe 14 which is connected with a tube 15 divided at 16 to form the primary air blast 17 and the secondary air blast 18. The primary air blast communicates with a tubular casing 19 which opens into the primary combustion chamber at the bottom and a sec-

ondary air blast communicates with the passage 20 leading into the secondary combustion chamber at the end opposite the outlet 13.

Fuel oil is supplied to the burner through a pipe 21 which is controlled by a valve 22. The valve is connected by a suitable fitting 23 with the upright stem 24 which is suitably supported in the plug 25 screwed into the tubular catch pocket 26 at the bottom of the burner. Pet cocks 27 and 28 permit excess oil to be drawn off after the valve 22 has been closed. Oil is supplied under suitable pressure as by a pump and as it escapes from the nozzle 30 carried by the stem it is taken up by the primary air blast, atomized and carried into the primary combustion chamber.

Experiments have shown that the finer the oil can be broken up or atomized the quicker and more perfect will be the resultant combustion, and this is particularly true when the breaking up or atomizing is accomplished by air which thereby becomes thoroughly mixed and incorporated with the finely divided oil. Considerable difficulty is met, however, in attempting to break up a comparatively large amount of oil with a single application of air or within a short time. I therefore prefer to divide the initial air blast into three sections or small blasts arranged so as to successively strike the oil as it passes from the nozzle 30 to the chamber 11. In doing this I take advantage of the fact that drops or globules of any liquid moving through space become elongated in the direction of their movement and therefore present a relatively large surface and an easily broken section to an air blast moving transversely to the path of movement.

The particular construction here illustrated for accomplishing this result is shown enlarged in Fig. 2. The casing 19 has a substantially cylindrical bore 31 extending to within a short distance of its upper end where an internal shoulder 32 is provided, from the inner edge of which depends a tube 33. The opening in the tube 33 is substantially cylindrical and communicates at its upper end with the preferable conical discharge 34. The annular space 35 between the tube 33 and the inner wall of the casing 19 is connected with the bore of the tube 33 by a plurality of passages 36 arranged to

direct air passing therethrough substantially at right angles to the axis of the tube. It is also connected with the discharge 34 by a plurality of passages 37 cut through the shoulder 32 and arranged substantially at 45° to the axis of the tube. The oil escapes from the nozzle 30 through a plurality of ports 38 in the form of streams 39 moving substantially horizontally or at right angles to the axis of the tube 33. That portion of the primary air blast passing through the tube is therefore moving at right angles to these streams and in consequence breaks them up into drops or globules which are driven through the tube at high speed and elongated substantially as indicated at 40. When these elongated globules reach points opposite the passages 36 the second section of the primary air blasts strikes them at right angles to their longest axis breaking them into smaller globules which are driven along lines corresponding to the resultant of the first and second air blast and illustrated by the line 41 in Fig. 2. These globules are also elongated in the direction of their travel and when they reach points opposite to the passages 37 the third section of the primary air blasts strikes them transversely to their length and breaks them into very fine particles or atoms which pass into the primary combustion chamber along lines substantially parallel to the axis of the tube 33. The result of this successive breaking up by air blasts is a mixture of thoroughly and completely atomized or nebulized oil and air which burns very quickly and thoroughly.

The passages 36 and 37 may be in any suitable number but I prefer to make them correspond as closely as possible to complete circles. The opening in the tube 33 and the passages 36 and 37 may be arranged at a variety of angles but I prefer that shown because it gives a sufficient number of successive blasts directed at right angles to the movement of the oil so that it is repeatedly broken up and divided until it enters the primary combustion chamber in the form of a mist mixed with air.

The particles of oil in this mixture are so very minute and are so intimately mixed with air that they will burn with great rapidity and be completely consumed.

I am aware that changes may be made in the form, construction and arrangement of the invention, as set forth in the selected embodiment herein, without departing from the scope or sacrificing any of its material advantages, and I therefore preserve the right to make all such changes as fairly fall within the scope of the following claims.

I claim:

1. In a burner, the combination of a tubular casing having a shoulder at one end, a

tubular flange depending from said shoulder and having a longitudinal passage therethrough terminating in a flame orifice, transverse passages connecting the interior of said tubular flange with the interior of said casing, and other passages connecting the interior of said casing with the exterior adjacent to the end of said longitudinal passage and an oil nozzle located within said tubular flange and having a plurality of ports opening transversely to the axis of the casing.

2. In a burner, the combination of a tubular casing having an annular shoulder at one end, a tubular flange projecting inwardly from the shoulder, the outer end of the tubular member terminating in a flame orifice, transverse passages extending through the tubular flange adjacent the shoulder, diagonal passages connecting the interior of the casing with the flame orifice, a nozzle disposed in the inner end of the tubular flange and spaced from the inner surface thereof, the nozzle having a plurality of ports opening transversely to the axis of the tubular flange, and means for supplying air under pressure to the casing.

3. In a burner, the combination of a tubular casing having an annular shoulder at one end, a tubular flange projecting inwardly from the shoulder, the outer end of the tubular member terminating in a flaring flame orifice, transverse passages extending through the tubular flange, diagonal passages connecting the interior of the casing with the flaring flame orifice, a nozzle disposed in the inner end of the tubular flange and spaced from the inner surface thereof, the nozzle having a plurality of ports opening transversely to the axis of the tubular flange, and means for supplying air under pressure to the casing.

4. The combination with a combustion chamber, of a burner comprising a tubular casing having an annular shoulder at one end, a tubular flange projecting inwardly from the shoulder, the outer end of the tubular member terminating in a flame orifice in the combustion chamber, transverse passages extending through the tubular flange adjacent the shoulder, diagonal passages connecting the interior of the casing with the flame orifice, a nozzle disposed in the inner end of the tubular flange and spaced from the inner surface thereof, the nozzle having a plurality of ports opening transversely to the axis of the tubular flange, and means for supplying air under pressure to the casing, together with a bypass communicating with said last mentioned means for supplying air under pressure to the combustion chamber at a point remote from the flame orifice.

GUSTAVE BLUEMEL.