E. GROSSENBACHER.

OIL BURNER.

APPLICATION FILED JUNE 22, 1921.

1,425,196. Patented Aug. 8, 1922.

2 SHEETS—SHEET 1.

Fig. 1.

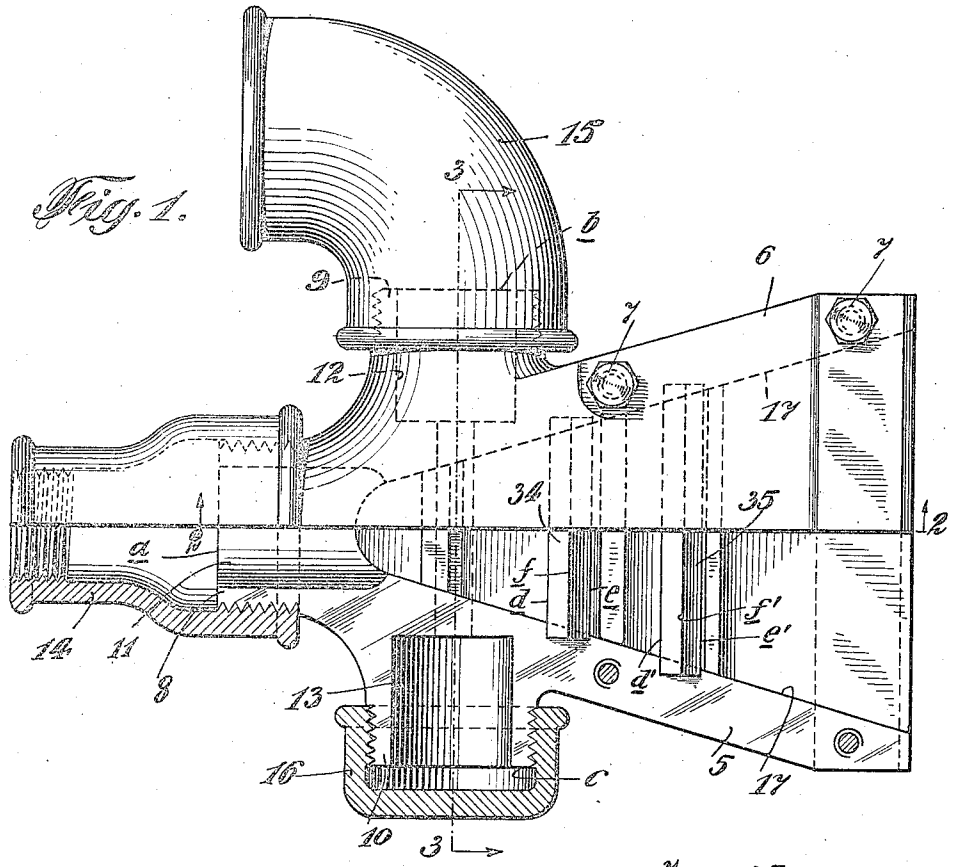
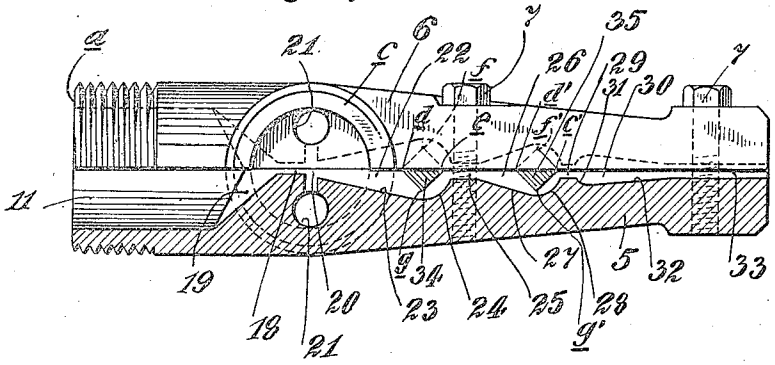


Fig. 2.



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2 SHEETS—SHEET 2.

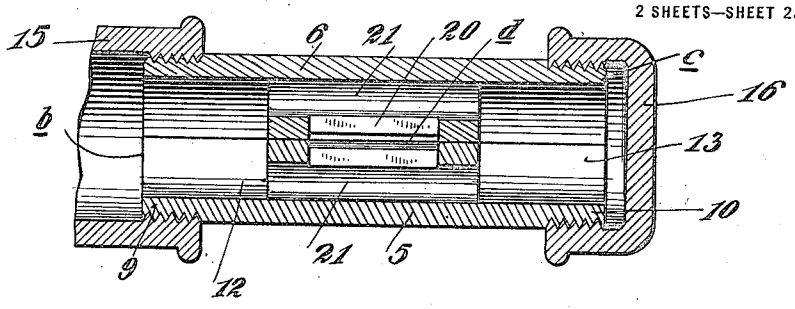


Fig. 3.

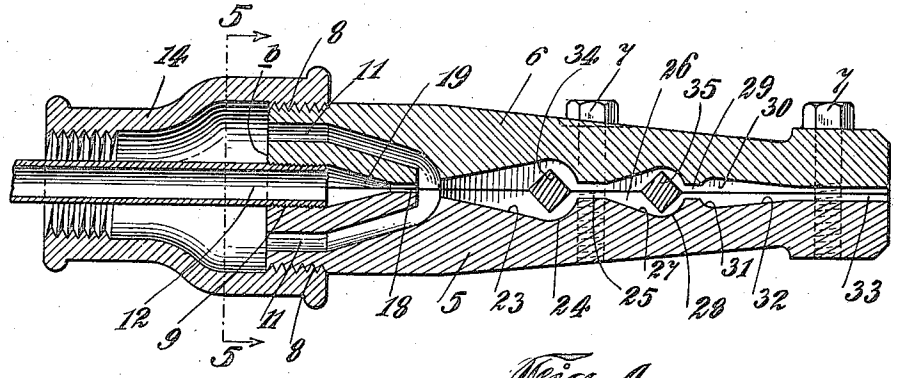


Fig. 4.

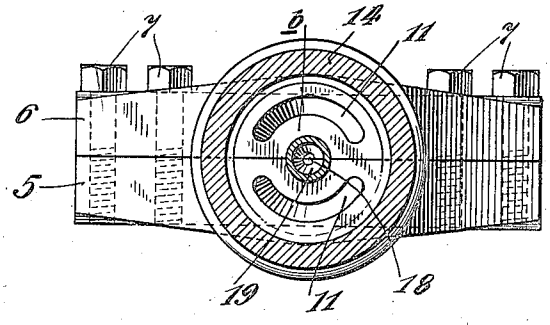


Fig. 5.

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UNITED STATES PATENT OFFICE.

ERNEST GROSSENBACHER, OF FAJARDO, PORTO RICO.

OIL BURNER.

1,425,196. Specification of Letters Patent. Patented Aug. 8, 1922.

Application filed June 22, 1921. Serial No. 479,457.

To all whom it may concern:

Be it known that I, ERNEST GROSSENBACHER, a citizen of the United States, and resident of Fajardo, Porto Rico, have invented certain new and useful Improvements in Oil Burners, of which the following is a specification.

My invention relates to oil burners and has for its object to provide an improved and simplified construction in which maximum atomization of the oil is secured in a novel and efficient manner and in which the resulting flame is of great intensity and comparatively short in length, thus avoiding any contact with and injury to the lining of the furnace in which the burner is incorporated. Another object of my invention is to provide a burner constructed in a novel manner so as to be particularly adapted to the use of tar and heavy grades of fuel oil. Other objects of my invention will appear from the description hereinafter and the features of novelty will be pointed out in the appended claims.

In the accompanying drawings, which illustrate an example of my invention without defining its limits, Figure 1 is an elevation, partly in section, of the burner; Fig. 2 is a longitudinal section on the line 2—2 of Fig. 1; Fig. 3 is a cross-section on the line 3—3 of Fig. 2; Fig. 4 is a view similar to Fig. 2 showing another form of burner, and Fig. 5 is an end view thereof.

As shown in Figs. 1, 2 and 3 of the illustrated examples, the burner comprises two duplicate and complemental sections 5 and 6 which constitute the body of the burner and are primarily secured together by means of screws or the like 7. Each section 5 and 6 is formed with exteriorly screw-threaded extensions 8, 9 and 10 which, when fitted together, comprise externally screw-threaded bosses *a*, *b* and *c* provided with passages 11, 12 and 13 respectively. These bosses are adapted to accommodate a pipe bushing 14, an elbow 15 and a pipe cap 16, the illustrated example showing the pipe bushing 14 connected with the boss *a*, the elbow 15 with the boss *b* and the pipe cap 16 with the boss *c*; it will be understood that these fittings may be changed at will with respect to said bosses, only two of them being in active use at a time and the third being sealed by the cap 16. In addition to their other functions, these elements 14, 15 and 16 serve also to assist in fastening the sections 5 and 6 together.

As shown in Fig. 1 of the drawings the interior of the burner converges from the passage 11 toward the exit end of said burner along the lines 17 which constitute, in part, the interior walls thereof. The sections 5 and 6 are so constructed that, when fitted together, a flat nozzle is formed at 18 which is connected with the passage 11 by means of a passage 19 which, when viewed as in Fig. 2, converges from the passage 11 to the nozzle 18; the latter communicates with relatively narrow slots 20 which, in turn, are connected with the passages 12 and 13 by means of ducts 21 extending transversely to the burner. From the slots 20 a passage 22 diverges throughout a major portion of its length along lines 23 and then converges, preferably along curved lines 24, toward a second nozzle 25 which is also of flat shape, as shown in Fig. 2, the passage 22, in part at least, comprising a mixing chamber in which the oil and steam or other atomizing agent are caused to become mixed. From the nozzle 25 a passage 26 diverges also throughout a major portion of its length along lines 27 and then converges, preferably also along curved lines 28, toward a third nozzle 29 which may be similar in character to the preceding nozzles 18 and 25; as illustrated in Fig. 2 the passage 26 is somewhat shorter in axial length than the passage 22. Beyond the third nozzle 29 a passage 30 diverges, preferably along curved lines 31, and then converges along lines 32 toward the exit or fuel nozzle 33, which constitutes the previously mentioned exit end of the burner. The latter further includes rods 34 and 35 of rectangular cross-section and extending transversely of the burner, as shown in Fig. 1; these rods 34 and 35 are located respectively in the largest portions of the passages 22 and 26 in close proximity to the nozzles 25 and 29 and with the corner edges *d* and *e* of the rod 34 facing the nozzles 18 and 25 respectively, and the corner edges *f* and *g* thereof spaced from the walls of the passage 22 at approximately the points where the lines 23 and 24 join each other. In the same way the corner edges *d'* and *e'* of the rod 35 are presented respectively toward the nozzles 25 and 29, while the corner edges *f'* and *g'* of said rod are spaced from the walls of the passage 26 at approximately

the points where the lines 27 and 28 join each other. The rods 34 and 35 which, in effect, comprise baffles or baffle-rods of lozenge-shape in cross-section, may be secured in position in any suitable manner as, for instance, by having their ends fitted into suitable recesses formed at the proper points in the walls 23 of the sections 5 and 6, as shown in Fig. 1.

In the form shown in Figs. 4 and 5, the screw-threaded extensions 9 and 10 are omitted and the burner sections 5^a and 6^a are provided with members g which, when fitted together, constitute a nozzle 18^a located concentrically within the extension 11^a and internally screw-threaded for the accommodation of a pipe 14^a with a source of steam or other atomizing agent. In this form the oil pipe 15^a is connected with the extension 11^a and conducts oil to the ducts 21^a, which are formed about the nozzle 18^a and converge toward a point in front thereof, as shown in Fig. 5, and communicate with the passage 22, which corresponds to the similarly indicated passage of Fig. 2. In all other respects the form of burner shown in Figs. 4 and 5 may correspond to the form shown in Figs. 1, 2 and 3, the only difference being that the inlet for the atomizing agent is located within the inlet for the fuel oil.

For the purpose of describing the operation of the burner in both of its illustrated forms, it will be assumed that the burner is connected with sources of fuel oil and atomizing agent in the usual manner, the latter, for descriptive purposes, being indicated as steam, although it will be understood that any other suitable atomizing agent may be substituted if desired; under the suggested conditions the elbow 15 of Figs. 1, 2 and 3 and the pipe 15^a of Figs. 4 and 5 may therefore comprise the oil inlet while the pipe bushing 14 and pipe 14^a respectively represent the steam inlet. In practice, the burner is started in the customary manner by first opening the steam connection (not shown) whereby steam is caused to pass through the bushing 14 and passages 11 and 19 to the first nozzle 18, or through the pipe 14^a and nozzle 18^a, through either of which it passes at high velocity, because of the dimensions and shape of said nozzle, into the passage 22 and rushes against the rod 34. The edge d of the latter cuts the stream of steam in two and deflects the two sub-streams against the curved walls 24 which divert said sub-streams toward each other with great velocity and cause them to become united at such high velocity in registry with the second nozzle 25. Through the latter the steam in a united stream passes at high velocity into contact with the rod 35, the edge d' of which again cuts said stream of steam into two parts and deflects the sub-streams thus formed into contact with the curved walls 28. These cause said sub-streams to be again diverted toward each other at high speed and to become again united in registry with the third nozzle 29, through which the united stream of steam passes at high velocity into the passage 30 and through the fuel nozzle 33 into the furnace.

Coincidentally with the above, the oil enters through the elbow 15 and passage 12 into the ducts 21, from which it issues through the slots 20 in streams which meet in front of the steam nozzle 18 of Figs. 1, 2 and 3 or through the pipe 15^a and ducts 21^a to a point in front of the nozzle 18^a of Figs. 4 and 5. The stream of steam rushing out of either of these nozzles carries with it a part of the oil, the remainder of which follows the interior walls of the burner to the point d, where the sub-streams of steam previously mentioned cut the oil into a fine mist. The two streams of the mixture of steam and oil follow the curved walls 24 in opposite directions of flow and meet with force at the entrance to the second nozzle 25 through which the united sub-streams of mixed oil and steam pass into the passage 26 and against the rod 35. At this point the stream of mixture is again cut in two and deflected and the two sub-streams brought into a head-on collision at the entrance to the third nozzle 29 through which the again united stream passes into the passage 30 and out through the burner-nozzle 33. It will be understood that the individual description of the passage of the steam which precedes the description of the passage of the mixture of oil and steam is included for the sake of clearness and not because it is necessary to first cause steam or other atomizing agent to pass alone through the burner.

Due to the divergent walls 17 whereby the burner becomes relatively narrow or small at the steam inlet end 11 and wider or larger at the nozzle end 33, the velocity of the steam or other atomizing agent and with it the fuel oil which it carries, although remaining high enough to efficiently perform its functions as an atomizing agent, decreases sufficiently so that the flame at the fuel nozzle 33 exerts no blow-torch action against the wall of the furnace opposite the burner. In other words, a comparatively short, wide flame of great intensity is provided which is very desirable in that it provides an even and uniform heat in the furnace without coming into contact with any of the walls thereof, which are thus protected against injury from this source.

With the present burner the steam or other atomizing agent and the oil are brought into such a complete state of admixture, that is, the oil is so thoroughly

atomized to a fine, easily ignitable mist by the action of the rods 34 and 35, that the most perfect combustion and most efficient heat results are obtained while at the same time the oil consumption is reduced to a minimum, thus making the burner most economical in operation. Because of the manner in which the atomization is accomplished, the burner may be efficiently utilized for burning tar and heavy grades of fuel oil.

Various changes in the specific form shown and described may be made within the scope of the claims without departing from the spirit of my invention.

I claim:

1. An oil burner comprising a casing having inlets for the atomizing agent and oil respectively, and provided with an exit nozzle, said casing further having an interior passage including a mixing chamber in which the atomizing agent and oil are mixed, said passage diverging toward said exit nozzle in one plane and alternately diverging and converging in directions transverse to said plane, and means in said interior passage whereby the stream of mixed agent and oil is divided into sub-streams and for bringing them together again at high velocity, said mixture being coincidentally spread in approximately fan-shape toward said exit nozzle.

2. An oil burner comprising a casing having inlets for the atomizing agent and oil respectively, and provided with an exit nozzle, said casing further having an interior passage including a mixing chamber in which the atomizing agent and oil are mixed, said passage diverging toward said exit nozzle in one plane and alternately diverging and converging in successive steps in directions transverse to said plane, and a plurality of means at spaced intervals in said passage in close proximity to the converging portions thereof whereby the stream of mixed agent and oil is alternately divided into sub-streams and brought together again in a single stream, said mixture being coincidentally spread in approximately fan-shape toward said exit nozzle.

3. An oil burner comprising a casing having inlets for the atomizing agent and oil respectively and provided with a mixing chamber in which the atomizing agent and oil are mixed, said chamber having a burner nozzle at its exit end and an interior passage diverging toward the same, a plurality of interior nozzles located at spaced intervals in said passage and means in said passage in advance of said interior nozzles whereby the stream of mixed agent and oil is divided into sub-streams and brought together again in a single stream prior to its passage through each of said nozzles.

4. An oil burner comprising a casing having inlets for the atomizing agent and oil respectively and provided with a mixing chamber in which the atomizing agent and oil are mixed, a plurality of interior nozzles located at spaced intervals within said casing, and means within said casing in advance of said interior nozzles whereby the stream of mixed air and oil is divided into sub-streams and brought together again in a single stream prior to its passage through each of said nozzles.

5. An oil burner comprising a casing having inlets for the atomizing agent and oil respectively and provided with a mixing chamber in which the atomizing agent and oil are mixed, an interior nozzle within said casing connected with said mixing chamber, and means within said casing in advance of said interior nozzles whereby the stream of mixed agent and oil is divided into sub-streams and brought together again in a single stream prior to its passage through said interior nozzle.

6. An oil burner comprising a casing having an inlet nozzle for an atomizing agent and an inlet for fuel oil leading thereto whereby the oil is conducted into contact with a stream of said agent travelling at high velocity, an interior nozzle spaced from said inlet nozzle, a baffle of lozenge-shape in cross-section located in said casing between said inlet and interior nozzles whereby the stream of mixed agent and oil is divided into sub-streams and means co-operating with said baffle to unite said sub-streams into a single stream prior to their passage through said interior nozzle.

7. An oil burner comprising a casing having an inlet nozzle for an atomizing agent and an inlet for fuel oil leading thereto whereby the oil is conducted into contact with a stream of said agent travelling at high velocity, an interior nozzle spaced from said inlet nozzle, a passage leading from said inlet nozzle to said interior nozzle and diverging from said inlet nozzle and converging toward said interior nozzle and a rectangular bar located in said passage in advance of said interior nozzle whereby the stream of mixed agent and oil is divided into substreams, the converging portion of said passage uniting said sub-streams in one stream prior to the passage through said interior nozzle.

8. An oil burner comprising a casing having a steam inlet and a steam nozzle connected therewith and provided with an oil inlet leading to said steam nozzle and having a fuel exit nozzle, an interior passage in said casing leading from said steam nozzle to said exit nozzle and consisting of spaced interior nozzles connected by passage sections which converge toward said interior nozzles, and rods of rectangular cross-section projecting across said passage

sections and having two angular edges located in alignment with said interior nozzles and the other two angular edges spaced from the walls of said passage sections.

9. An oil burner comprising a casing consisting of complemental sections secured together in face to face relation and having inlets for an atomizing agent and oil respectively, said sections being provided with complemental interior conformations forming a mixing chamber in which the atomizing agent and oil are mixed, a longitudinal passage and an exit nozzle, and means in said casing in registry with the dividing line between said sections for dividing the atomizing agent and oil into sub-streams and for bringing them together again prior to the passage thereoef through said exit nozzle.

10. An oil burner comprising a casing consisting of complemental sections having externally screw-threaded extensions fitting together, fastening devices for fastening said sections together, a pipe fitting fitted upon one pair of extensions to provide a steam inlet, an elbow fitted upon the other pair of extensions to provide an oil inlet, said pipe fitting and elbow serving further to fix said casing sections against separation, said casing being provided further with an exit nozzle, a plurality of spaced interior nozzles within said casing connected with each other and communicating with said inlets and with said exit nozzle and baffle-bars within said casing in advance of said interior nozzles.

11. An oil burner comprising a casing consisting of complemental sections, fastening means for fastening said sections together, said casing having a fuel inlet and an inlet for an atomizing agent located one within the other and further having an exit nozzle, a plurality of spaced interior nozzles within said casing connected with each other and communicating with said inlets and with said exit nozzle and baffle-bars within said casing in advance of said interior nozzles.

In testimony whereof I have hereunto set my hand.

ERNEST GROSSENBACHER.