Nov. 12, 1929. W. G. JOHNSTON 1,735,463

OIL BURNING APPARATUS

Filed July 8, 1927 2 Sheets-Sheet 1

FIG. 1.

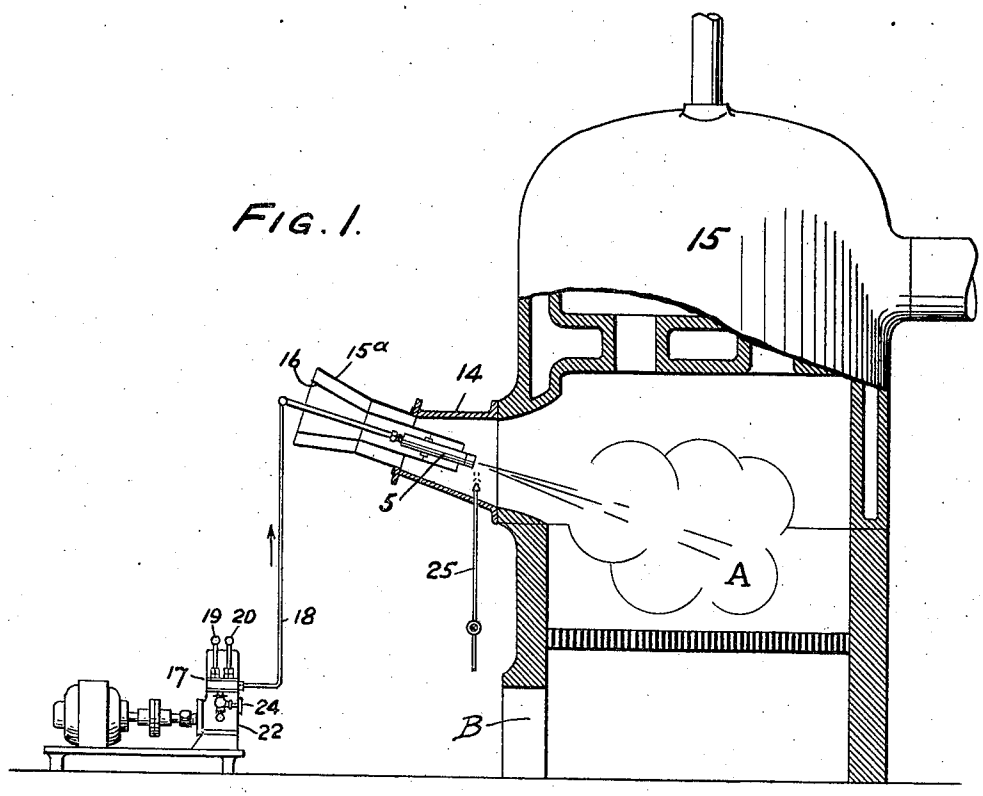
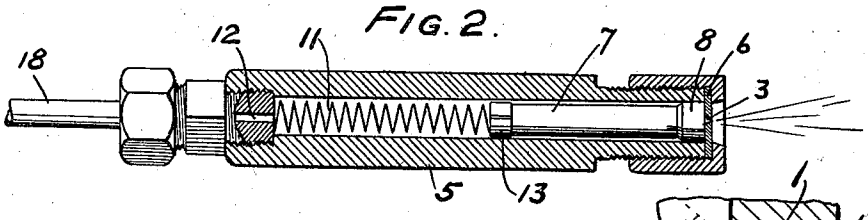


FIG. 2.



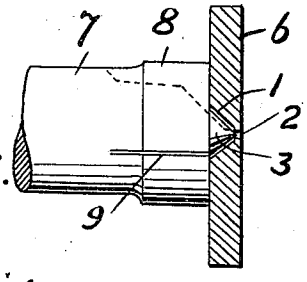


FIG. 3.

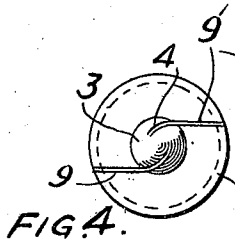


FIG. 4.

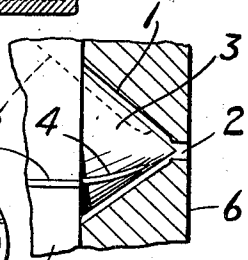


FIG. 5.

WITNESS:

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OIL BURNING APPARATUS

Filed July 8, 1927 2 Sheets-Sheet 2

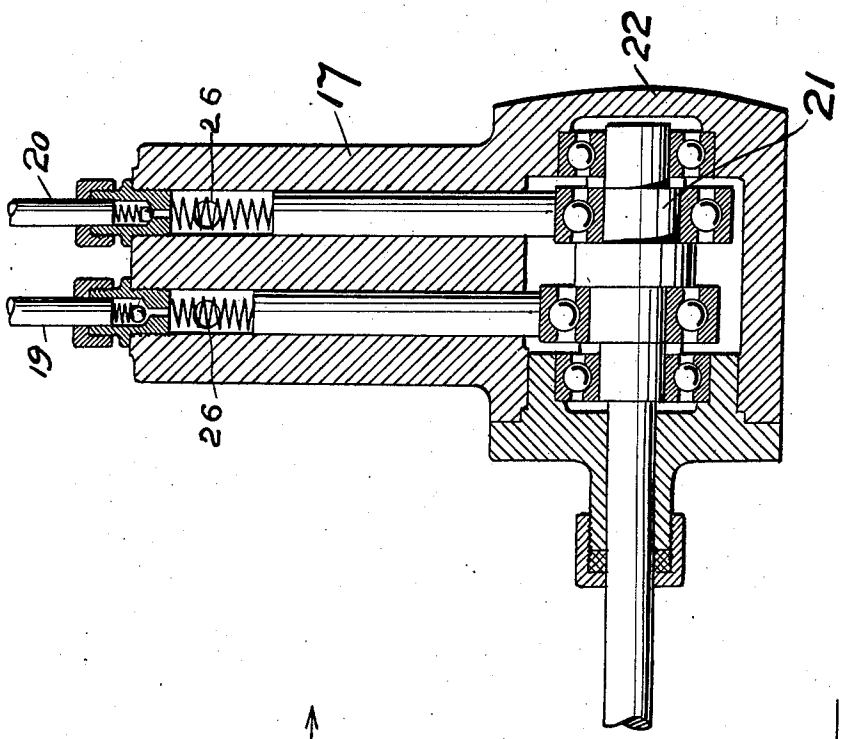


FIG. 7.

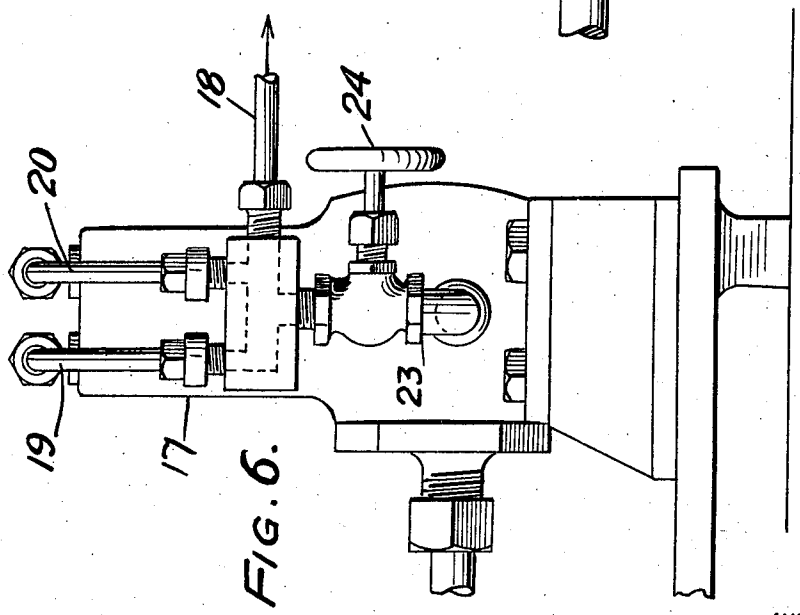


FIG. 6.

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UNITED STATES PATENT OFFICE

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OIL-BURNING APPARATUS

Application filed July 8, 1927. Serial No. 204,177.

The principal object of the present invention is to provide oil burning apparatus, including a mechanical atomizer, and adapted without replacement of any of its parts to operate successfully and satisfactorily for different hourly capacities by the simple operation of adjusting the oil feed. Another object of the invention is to afford convenience in changing from oil to solid fuel. Another object of the invention is to prevent dripping or leakage of oil when the burner is extinguished.

Other objects of the invention will appear from the following description and it may be said that the invention comprises a number of specially constructed elements cooperating for the production of the results above indicated.

The invention also comprises the improvements to be presently described and finally claimed.

In the drawings

Figure 1 is a view partly in section and partly in elevation illustrating oil burning apparatus embodying features of the invention in application to the combustion chamber of one form of heater or furnace selected from others for the sake of illustration.

Fig. 2 is a longitudinal central section of the mechanical atomizer shown in Fig. 1 but drawn to an enlarged scale.

Fig. 3 is an enlarged sectional view of the headed stem shown in Fig. 2 and of the plate with which it cooperates.

Fig. 4 is an end view of the head of the stem showing spiral cuts on the conical projection.

Fig. 5 is an exaggerated view similar to Fig. 3.

Fig. 6 is an enlarged end view of the pump shown in Fig. 1 and illustrating a bleeder connection for the oil line, and

Fig. 7 is a sectional view of the pump shown in Fig. 5.

The mechanical atomizer is provided with a cavity 1, Fig. 3, of conical frustum form, and the cavity is provided through its smaller base with an orifice 2. Arranged in the cavity is a conic projection 3 provided near its base with spiral cuts 4. The apex of the projection 3 is arranged in the orifice 2, clear of the wall thereof, whilst the body of the conical projection is spaced ever so little from the conical wall of the cavity. In this way and by this means drip from the atomizer is prevented as will be hereinafter described and the spiral cuts 4 carry a swirl of the oil right up to the orifice 2.

5 is the body of the mechanical atomizer. 6 is a plate in which the cavity and orifice are provided and it may well be of hardened steel. 7 is a headed stem and it carries the projection 3. The head 8 of the stem is provided with axial oil slots 9 which extend generally tangent to the base of the conical projection and are aligned with the cuts 4. The stem is acted upon by a spring 11 and oil is supplied by the inlet 12 and finds its way past the head 13 through the provision of suitable openings or clearance. The end of stem 7 rests upon the face of the plate 6.

The fit between the wall of the conic projection 3 and the wall of the orifice 2 and cavity 1 is such that there is provided a film of oil sufficient to prevent drip when there is no pressure on the oil in the body 5 of the atomizer but when pressure is applied to the oil in the body of the atomizer the increase in pressure on the film is sufficient to expel it in the form of vapor. The philosophy of the action of the spring 11 is not quite clear. It is known that if the spring be replaced by a threaded spindle and the parts be adjusted in the manner described the operation is satisfactory for several hours only. It is reasonable to suppose that the spring operates under variations of pressure or clogging of a temporary nature in the space provided between the wall of the cavity 1 and the wall of the conic projection 3 where the film of oil is provided to maintain the described moving or flowing film. Inasmuch as the structure 7 is balanced under pressure the spring appears to operate in connection with the provision of a film so thin that its surface tension prevents dripping when the oil in the body 5 is not under pump pressure and yet said film is adapted to escape when the oil in the body 5 is under pump pressure.

For the proper operation of the described

mechanical atomizer other elements are required and they will be referred to. 14 is an atomizer chamber in which the atomizer is arranged, and this chamber is applicable to the doorway of a combustion chamber A having an air intake B as a means for supplying air for combustion in the combustion chamber. As shown the chamber 14 is applied to the entrance of the doorway of a heater 15. This has an advantage in that the chamber structure 14 can be removed and replaced by the door of the furnace which can then be fired with solid fuel. Another of the elements referred to is means for permitting indrafts of air around the atomizer and into the atomizer chamber 14 and thence out though the offtake of the heater. As shown these means comprise nested open ended tubes 15^a and 16 of which the tube 16 extends well toward the end of the atomizer, and of which the tube 15^a is shorter and terminates at the entrance of the chamber 14. The described parts insure proper combustion of the vaporized oil in the combustion space of the furnace 15 without contacting with the walls bounding that space, and furthermore the described elements of the atomizer are not overheated and remain clean and operative. Another one of the elements referred to is a pressure oil supply of which the capacity may be variously set, and it is a feature of the invention that within wide limits the apparatus without any alteration whatever will properly atomize and burn oil supplied in different quantities per hour, so that the apparatus as a whole and by merely adjusting the amount of oil supplied per hour can be successfully used with a variety of combustion apparatus of which the furnace 15 is an example. The motor driven oil pump 17 includes a pressure delivery pipe 18, to the delivery pipes 19 and 20 of the pump cylinders and pistons which are operated alternately through very short strokes by the mechanism 21 contained in the crank case 22. There is a valved bleeder connection 23 from the pipe 18 to the crank case so that by operating the valve 24 the quantity of oil supplied per hour to the atomizer can be adjusted with regard to the size of the heating apparatus represented by the furnace 15. The crank case is of course connected back to the oil supply and the oil supply is properly cleaned or filtered all of which is well understood by those skilled in the art. 25 is a lighter. 26 is the oil intake connection for the pump.

From the foregoing description it is evident that there is provided a very thin film of oil close up to and at the end of the atomizer which confronts the combustion chamber. Oil or fluid fuel in such a thin film is readily cracked with deposition of carbon by exposure to its containing walls to high heat and of course deposition of carbon interferes with and puts the atomizer out of commission. The provision of the chamber 14 or atomizing chamber permits of the spacing of the atomizer at a considerable distance from the combustion chamber A, so that the film of oil may be considerably removed from the heat of the combustion chamber but heat is radiated from the walls of the chamber 14 and air entering through the tube 16 and flowing onto the end of the atomizer protects the film of oil therein from heat radiated from the walls 14 as well as from heat emanating from the combustion in the chamber A. Air entering the tube 16 might be said to heat insulate the tube 16 from the walls 14, thus additionally insuring the film in the atomizer against overheating. The air for supporting combustion of the fog or mist delivered into the combustion chamber A is supplied through B and up through the grate of the heater.

It will be obvious to those skilled in the art to which the invention relates that modifications may be made in details of construction and arrangement and in matters of mere form without departing from the spirit of the invention which is not limited to such matters or otherwise than the prior art and the appended claim may require.

I claim:

Oil burning apparatus comprising a combustion chamber having an intake for air for combustion, a mechanical atomizer including a plate having an orifice provided with a conical throat and a spring pressed slotted head abutting on the plate and provided with a conical projection, there being at all times space provided between the walls of the orifice and of the throat and the wall of the projection, a chamber communicating with the combustion chamber and in which the atomizer is housed in spaced relation to the combustion chamber, and a tubular casing surrounding the atomizer and arranged for the introduction of air for cooling the discharge end thereof.

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