Oct. 2, 1928. 1,685,967

W. J. SULLIVAN

BURNER

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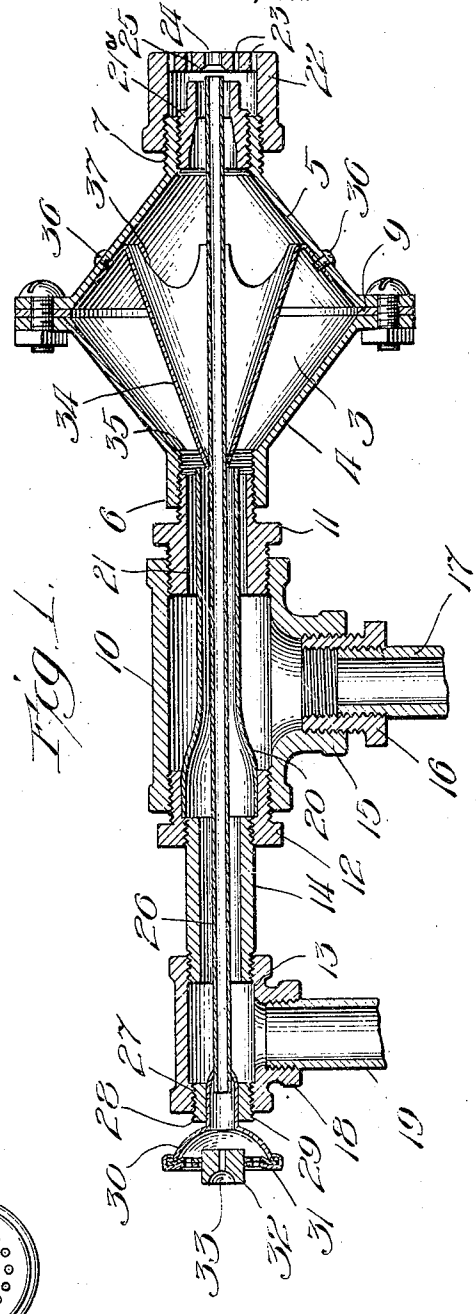


Fig. 1.

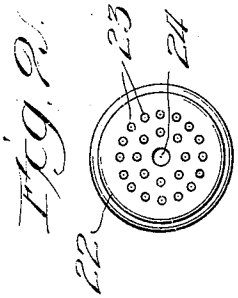


Fig. 2.

Inventor
William J. Sullivan,
by Rector, Hibben, Davis & Macauley
His Attys

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UNITED STATES PATENT OFFICE.

WILLIAM J. SULLIVAN, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO C. P. MERTENS, OF CHICAGO, ILLINOIS.

BURNER.

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My invention relates more particularly to burners for utilizing heavy oil, such as crude oil, as fuel, and is designed to thoroughly atomize and vaporize the fuel oil and intimately mix it with steam and air prior to its delivery to the flame.

In the accompanying drawing, Figure 1 is a longitudinal axial section through a burner embodying my invention; and Fig. 2 a front view of the nozzle or outlet end thereof.

Referring to the drawing, it will be seen that the specific construction of my invention chosen for illustration thereof comprises a doubly conical housing 3 formed of two conical members 4, 5, bolted together at their flanged bases and respectively provided at their reduced ends with an interiorly threaded nipple 6 and an exteriorly threaded nipple 7. A washer 9 is interposed between the flanges to secure a tight joint. A T 10 is connected to the interiorly threaded nipple 6 by a reducing union 11. The opposite end of the T 10 from that which receives the reducing union receives a reducer 12 which is connected to a second smaller T 13 by a pipe section 14. The side nipple 15 of the larger T 10 receives a reducer 16 to which is connected a pipe 17 for supplying fuel oil to the T. The side nipple 18 of the smaller T 13 is connected to a pipe 19 for supplying steam under pressure.

A tapering pipe or nozzle 20 is secured at one end within the reducer 12 and extends through the T 10 and opens into the housing 3 so that steam entering the pipe 19 will discharge into the housing. The external diameter of the tapered nozzle 20 is such that an annular passage 21 surrounds it within the reducer 11 so that the fuel oil entering at pipe 17 may pass around the nozzle 20 and into the housing 3.

The outlet nipple 7 of the housing is interiorly and exteriorly threaded, the interior thread receiving a nozzle 21ª, the bore of which is tapered as shown and which projects beyond the end of the casting 5. The outer thread of the nipple 7 receives a cap 22 which is perforated at 23 by a number of small jet holes (see Figs. 1 and 2). A larger hole 24 is formed at the center of the cap and is flared or tapered at its inlet end as at 25.

An air supply pipe or jet 26 extends substantially through the entire burner, terminating just short of and in axial alignment, with the hole 24 in the cap. At its opposite end the air pipe 26 extends through the end of the T 13. Preferably it is formed with or connected to an enlargement 28 which extends through a plug 29 screwed into the T 13 and said enlargement terminates in a chamber 30 having means for regulating the supply of air thereto. For this purpose I have illustrated an ordinary Bunsen burner air control with the usual rotary regulating means 31, a plug 32 with a permanently open hole 33 being inserted in the center of the regulating air admission plate. Other means for regulating the supply of air may be employed.

Within the chamber 3 formed by the conical castings 4, 5, is mounted a deflecting cone 34 the inner or small end 35 of which closely surrounds and may be attached to the air pipe at a point adjacent the end of the steam nozzle 20. The outer or larger end of the cone 34 is secured at 36 to the conical member 5. Passageways for the steam and air between the cones 34 and 5 are provided by means of cutout portions 37 in the edge of cone 34, so that the mixture of vapors entering the chamber 3 may pass to the chamber formed by the cones 34 and 5.

Steam entering the pipe 19 preheats the air in the pipe 26 and also the oil entering the T 10. At the end of the nozzle 20 the stream is discharged into the annular chamber in the housing 3, where it impinges upon the cone 34, highly heating the same and mixes with the oil entering said chamber from the T 10. The oil, which has been somewhat preheated as above described, is drawn into the chamber of the housing 3 and mixes with the steam therein and impinges upon the cone 34. It is highly heated and vaporized thereby and the mixture of steam and oil vapors formed passes onward and enters the chamber formed by the cones 5, 34. The mixture of steam and oil vapor as it enters about the base of cone 34 is given a whirling and eddying motion so that more complete mixing takes place in said chamber and the mixture under pressure passes out through the annular space between the nozzle 21 and the air pipe 26 into the distributing cap 22. The rapidly moving mixture of steam and oil vapor entrains or aspirates air through the pipe 26, the amount of which is controlled by the means heretofore described. The mixture of steam, oil, vapor and air not only escapes through the opening

24 but through the surrounding smaller perforations whereby it is thoroughly mixed with the additional air necessary to support combustion.

Obviously the perforated cap 22 may be omitted or other forms of burner terminals submitted therefor. Many other changes, particularly in the means for supplying oil and steam will suggest themselves to those skilled in this art.

I claim:—

1. In a burner of the class described, a mixing chamber, a partition dividing the mixing chamber into chambers communicating about the periphery of said diaphragm, a nozzle connected with one of said chambers, means for supplying oil and steam to the other of said chambers and directing the steam and oil against said partition and an air supply pipe extending through said partition and into said nozzle.

2. In a device of the class described, a housing having an outlet nozzle at one end and an inlet opening at the other, an air supply pipe extending through the housing and into the outlet nozzle, a conical partition in the housing surrounding the air pipe, the smaller end of the partition being directed toward the inlet of the housing and passages being provided between the periphery of the larger end of the partition and the wall of the housing, a steam supply in the nozzle for supplying steam about the air inlet pipe and directing it upon the conical partition, and an oil inlet pipe surrounding the steam supply.

3. In a device of the class described, a housing having an outlet nozzle at one end and an inlet opening at the other, an air supply pipe extending through the housing into the nozzle, a perforated cap secured over the nozzle, a conical partition mounted in the housing and having its smaller end adjacent the inlet of the housing and its larger end secured to the wall of the housing, there being vapor passages about the skirt of the partition, a steam nozzle extending into the inlet opening of the housing, a pipe for admitting steam to said nozzle, and an oil supply pipe surrounding but spaced from said nozzle whereby steam and oil may be directed against the outer face of the conical partition thereby heating and vaporizing the oil.

4. In a device of the class described, a housing formed of oppositely directed frusto conical members and having at one end an outlet nozzle and at the other an inlet opening, a conical partition in the housing the larger end of which is secured to the wall of the housing with spaces whereby the inlet and outlet chambers of the housing are in communication, the smaller end of the partition being directed toward the inlet end of the housing, a T connected to the inlet end of the housing and having a lateral oil supply pipe, a steam nozzle mounted in the end of the T remote from the housing and extending into the inlet opening of the latter, a pipe connected to said nozzle for supplying steam thereto, an air supply pipe extending through the steam supply pipe and nozzle and through the housing to the outlet nozzle thereof, and means for regulating the supply of air to said pipe.

5. In a burner of the class described, a housing having an outlet nozzle at one end thereof, the other end constituting the inlet, a hollow conical partition in the housing dividing it into inlet and outlet chambers, the smaller end of the conical partition being located adjacent the inlet end of the housing, piping connected with the inlet end of the housing for supplying oil thereto, a nozzle of smaller diameter extending through said piping to a point adjacent to the small end of the conical partition to convey steam to the latter, and an air supply pipe extending through the last named nozzle and through the partition to the outlet nozzle of the burner.

WILLIAM J. SULLIVAN.