Nov. 1, 1927.

1,647,956

A. BUTCHER

OIL BURNER

Filed Jan. 16, 1926

2 Sheets-Sheet 1

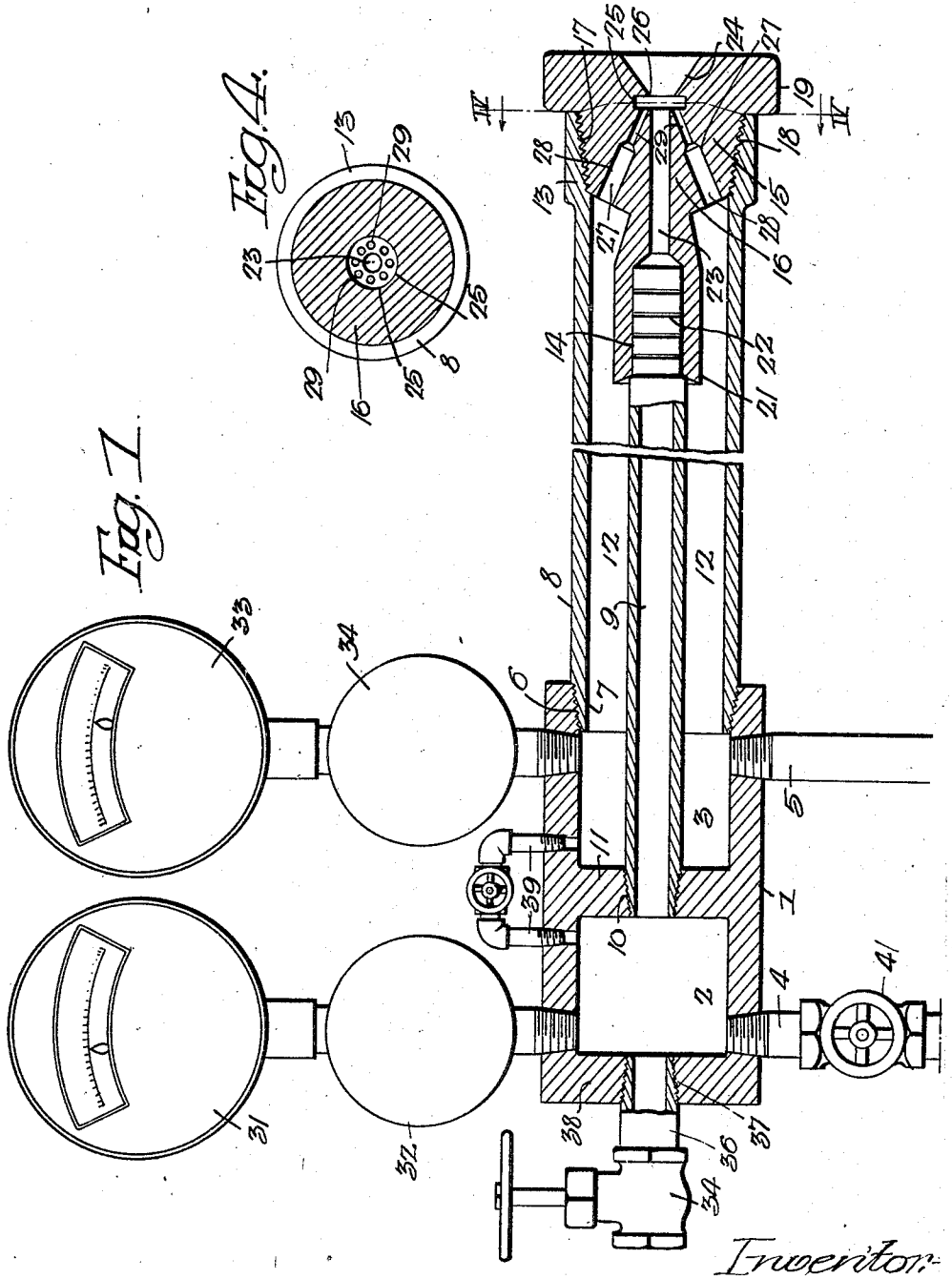


Fig. 1

Fig. 4.

Inventor:
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Fig. 5.

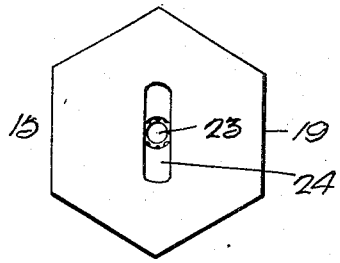


Fig. 2.

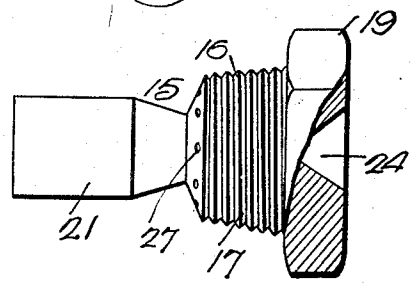


Fig. 3.

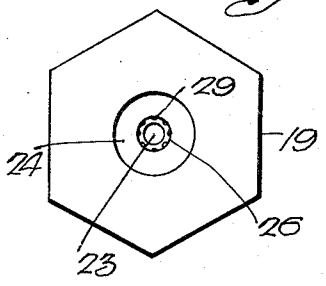


Fig. 6.

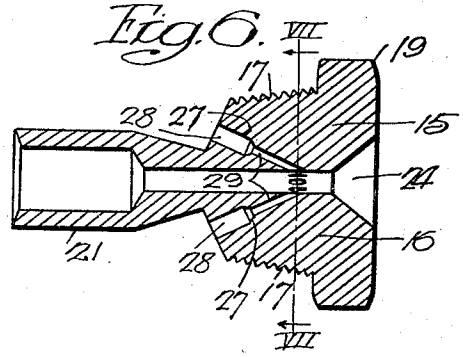
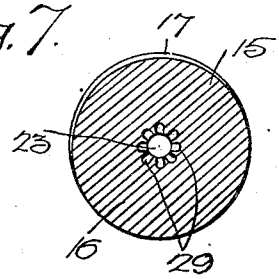


Fig. 7.



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Patented Nov. 1, 1927. 1,647,956

UNITED STATES PATENT OFFICE.

ALFRED BUTCHER, OF ROSELLE PARK, NEW JERSEY.

OIL BURNER.

Application filed January 16, 1926. Serial No. 81,793.

My invention relates to oil burners, and it has for one object the provision of a burner of simple, compact and rugged design which lends itself to inexpensive quantity production methods of manufacture, the several parts of which may be made on existing automatic machinery and may be assembled with a minimum expenditure of time and of money.

Another object of my invention is to provide a burner that shall be characterized by the fact that a cleaning rod may be passed completely through the same and into the furnace without the necessity for removing any pipe sections or in any way taking the burner apart. This feature is very desirable when using a colloidal fuel, inasmuch as such fuel causes a frequent choking of the fuel pipe and the consequent necessity for cleaning.

A further object of my invention is to provide a burner, wherein the streams of oil and atomizing fluid meet at such point that the atomizing fluid may thereafter expand in the burner to form a relatively short flame. As a result of such expansion, back pressure on the oil pipe of the burner is decreased to such extent that said burner may be used on gravity-feed systems. Moreover, the vaporized oil is prevented from being reciprocated into heavy globules.

A still further object of my invention is to provide an oil burner that shall not only have a relatively low pressure at the burner tip but also a low velocity of mixed vapors and consequent short flame making the burner especially applicable to short furnaces.

A still further object of my invention is to provide gauges for the steam and oil chambers of the burner, whereby the operator may know at all times the amount of the fuel and atomizing fluid supplied to the burner. Such information is necessary for efficient operation, inasmuch as an excess of steam is not only costly but also injurious to the furnace, having a tendency to damage the boiler tubes and brickwork. An excess of steam also causes a long flame, which is inefficient in short furnaces.

Other objects and applications of my invention, as well as details of construction and operation, whereby my invention may be practiced, will be apparent more fully hereinafter, when taken in connection with the accompanying drawings, wherein—

Fig. 1 is a view, partially in longitudinal section and partially in elevation, of an oil burner and associated apparatus embodying my invention;

Fig. 2 is a detail side elevational view, partially in section, of the atomizer of Fig. 1;

Fig. 3 is a front elevational view of the atomizer of Fig. 2;

Fig. 4 is a transverse sectional view taken on the line IV—IV of Fig. 1;

Fig. 5 is a view similar to Fig. 3 but showing another form of expansion chamber operating to form a flat flame rather than a round flame as in Figs. 1 to 3, inclusive;

Fig. 6 is a detail longitudinal sectional view of a modified form of atomizer embodying my invention; and

Fig. 7 is a transverse sectional view taken on the line VII—VII of Fig. 6.

In the illustrated embodiment of my invention shown in the drawing, a casing 1 is provided with a pair of chambers 2 and 3 which are respectively connected by pipes 4 and 5 to oil and steam sources not shown. Since other forms of liquid fuel than oil may be used in my burner and other atomizing fluids than steam, my invention is not necessarily limited to such substances.

Access to the steam chamber 3 may be had through a threaded opening 6, the latter receiving one end 7 of an outer steam tube 8. An inner fuel tube 9, which is positioned in the longitudinal axis of the outer tube 8, extends through the opening 6 and the chamber 3 and is removably secured in threaded engagement with an opening 10 in a wall 11 separating the oil and steam chambers 2 and 3. An annular chamber 12, which is formed between the inner and outer tubes 9 and 8, may be closed adjacent to outer ends 13 and 14 of said tubes by means of an atomizer 15. The atomizer 15 may comprise a body 16 having an intermediate threaded portion 17 for engagement with an internally threaded portion 18 of the outer end 13 of the steam tube 8, whereby said atomizer may be removably secured in position. An outer portion 19 of the body 16 may be in the form of a hexagonal nut, so that said body may be readily gripped when it is desired to turn the same.

The atomizer body 16 is also provided

with a projecting portion 21 of reduced diameter and is recessed to receive the outer end 14 of the oil tube 9. The end 14 may be provided with one or more annular grooves 22 so as to minimize leakage of the atomizing agent from the annular chamber 12 into the oil pipe 9. However, should such leak develop, the operation of my burner would not be interrupted. The atomizer body 16 is further provided with a central passage 23 constituting a continuation of the inner oil tube 9, said passage having a flared frusto-conical outlet 24 in the outer end of the body 16. An annular recess 25 may be formed at an inner end 26 of the flared outlet 24, as shown in Fig. 1.

In accordance with my invention, a plurality of steam passages 27 are formed in the nozzle body 16 and extend from the annular steam chamber 12 to the recess 25 at the base of the frusto-conical outlet 24. These passages may have an enlarged portion 28 adjacent to the chamber 12 and a restricted discharge portion 29 to the recess 25. The inclination of the steam passages 27 with respect to the recess 25 and the frusto-conical outlet 24 is such that the mixing point of the streams of oil and steam is immediately adjacent to the base portion 26 of said flared outlet 24. The steam is thus permitted to expand in the conical outlet 24, so as to form a relatively short flame of desired shape. Should the outlet be as shown in Fig. 3, then a circular flame is formed, but if the outlet is as illustrated in Fig. 5, then a flat flame will be formed. A further advantage of causing the steam to expand in the outlet 24 is that the delivery pressure at the outer end of the atomizer is extremely low. The burner, therefore, is particularly applicable to gravity feed systems.

My invention further contemplates means for indicating to an operator the amount of oil and steam supplied to the atomizer 15. The advantage of knowing at all times the amount of steam supplied to the burner is that an excess is injurious to the furnace and, moreover, represents a considerable heat loss. Furthermore, a longer flame is produced which may cause a serious erosion of the brickwork and damage to the boiler tubes.

The indicating means comprises an oil gauge 31, which is connected to the oil chamber 2 through a condenser 32, and also a steam gauge 33 which is connected through a condenser 34 to the steam chamber 3. The oil gauge 31 may be calibrated in pounds per square inch, or gallons or pounds per hour. The steam gauge 33 may be calibrated in pounds per square inch, or pounds flowing per hour. In one practical installation, less than nine one-hundredths pounds of steam were used per pound of fuel atomized.

In order to facilitate the cleaning of the central oil tube 9, a clean-out valve 34 is mounted on a pipe 36 extending from an aperture 37 in one wall 38 of the oil chamber 2. The passage defined by the pipe 36 is preferably in direct alignment with that in the oil tube 9, so that a cleaning rod (not shown) may be inserted into the atomizer 15 through the central passage 23 and passed completely through the apparatus. Furthermore, provision is made for the cleaning of the oil tube 9 by means of a valve controlled by-pass 39, where steam may be supplied from the chamber 3 to the chamber 2 and connected oil pipe 9. At such time, a valve 41 in the pipe 4, should be closed.

Under conditions of operation, oil is supplied through the pipe 4, the chamber 2 and the central oil tube 9 to the passage 23 of the atomizer 15. At the same time, steam is supplied through the pipe 5, the chamber 3, the annular chamber 12 and the passages 27 to the recess 25 and outlet 24. As above noted, the mixing point is preferably adjacent to the base 26 of the outlet 24 so that the steam may further expand and form the shape of the flame by the time it leaves the outlet 24. The expansion of the steam in the outlet 24 further causes the back pressure at the outer end of the atomizer 15 to be a minimum, so that the burner is particularly applicable to gravity-feed oil systems as above noted. A further advantage, as above indicated is that the flame issuing from the nozzle 15 is relatively short, permitting the burner to be used in short furnaces.

Figs. 6 and 7 illustrate a modification of my invention, wherein the steam passages 27 open into the wall of the straight portion of the central oil passage 23 rather than immediately at the base 26 of the flared outlet 24, as in the preceding figures.

When I have shown only two forms of embodiment of my invention, for the purpose of describing the same and illustrating its principles of construction and operation, it is apparent that various changes may be made therein without departing from the spirit of my invention, and I desire, therefore, that only such limitations shall be imposed thereon as are indicated in the appended claims or as are demanded by the prior art.

I claim:

1. An oil burner provided with a fuel passage terminating in a flaring outlet and also having an enlarged recess at the small end of said outlet, said burner also having a plurality of fluid passages opening into said recess in such manner that the meeting point of the fuel and fluid is immediately adjacent to the smaller end of said outlet, so that said fluid may further expand before leaving said burner to provide a relatively short flame of desired form.

2. An atomizer comprising two concentrically disposed tubes having a space therebe-

tween, a nozzle having a threaded engagement with one tube and a sliding engagement with the other, said nozzle having a fuel passage terminating in a frusto-conical outlet and also a recess at the base of said conical outlet, said nozzle also having a plurality of fluid passages so opening into said recess that the mixing point of said fuel and fluid is immediately adjacent to the base of said conical outlet, whereby said fluid may be further expanded in said outlet to a low pressure at the end thereof.

ALFRED BUTCHER.