June 12, 1923. 1,458,378

C. P. ASTROM

OIL BURNER

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Fig. 1.

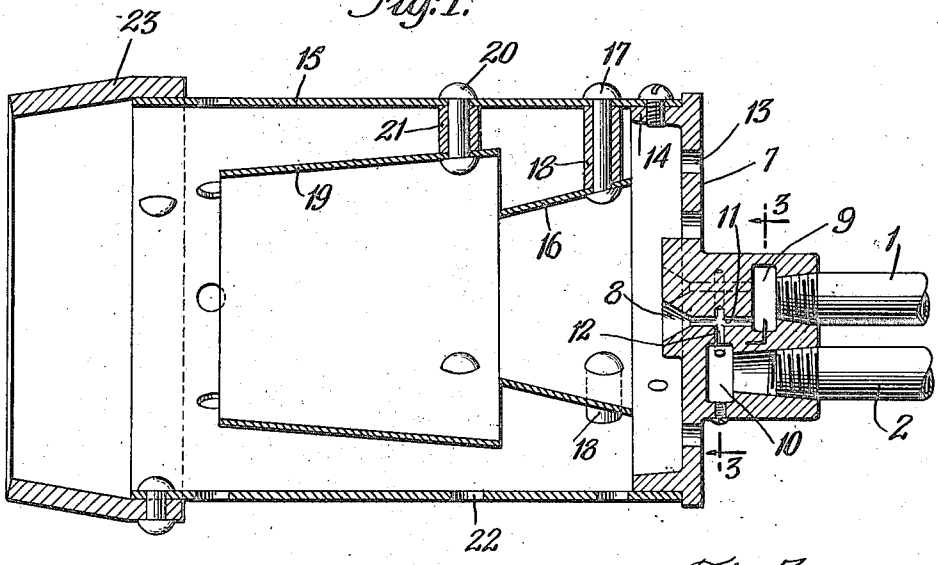


Fig. 3.

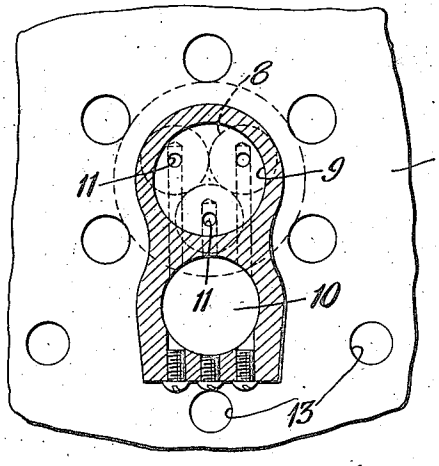
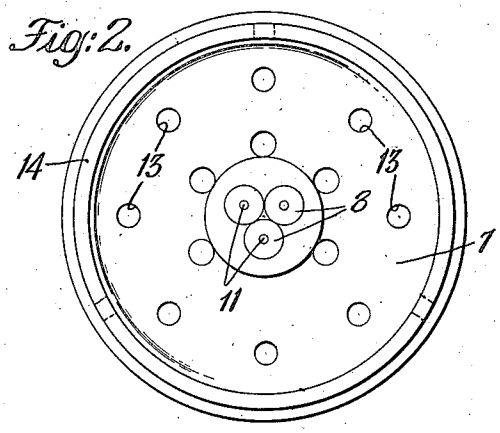


Fig. 2.



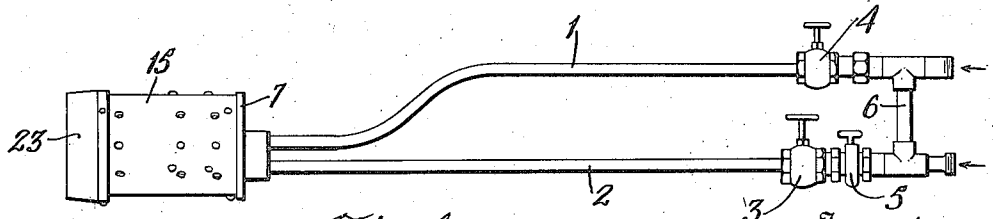


Fig. 4.

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Fig: 5.

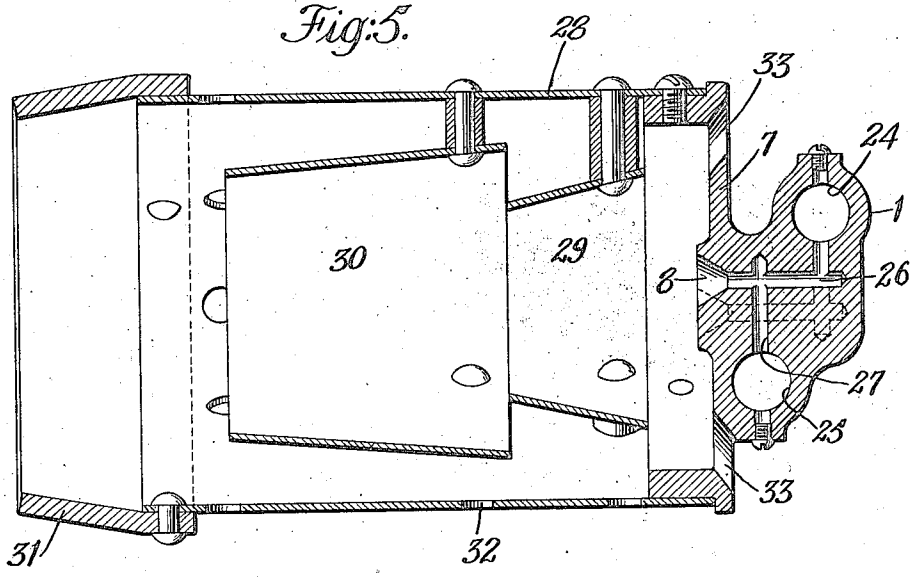
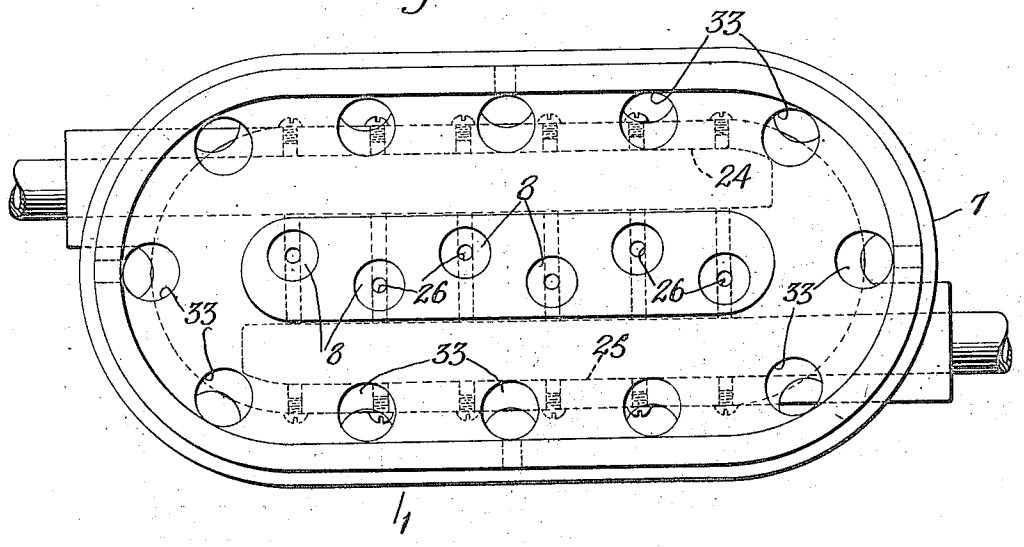


Fig: 6.



Inventor

Carl P. Astrom

By his Attorney J. Wootten

Patented June 12, 1923. 1,458,378

UNITED STATES PATENT OFFICE.

CARL P. ASTROM, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO McKNEAT MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

OIL BURNER.

Application filed January 21, 1921. Serial No. 438,815.

To all whom it may concern:

Be it known that I, CARL P. ASTROM, a citizen of the United States, and resident of East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Oil Burners, of which the following is a specification.

This invention relates to oil burners, and particularly to large capacity oil burners where a long hot flame is desired. Hitherto the capacity of such burners has been increased by enlarging the passages leading to the atomizing nozzles, or by increasing the pressure of the compressed air used for ejecting the oil. It was soon found, however, that the atomizing nozzles would not function properly after a certain size of passage had been exceeded, or after the air pressure had been raised beyond a certain point, but would eject the oil in a solid column, or only partially atomized. The only way in which a greater quantity of fuel could be consumed, beyond the limits thus established, was by utilizing a plurality of independent burners. In this way a greater quantity of material could be heated, but it should be observed that the temperature developed by a plurality of burners is no greater than that of a single burner; nor could the problem of attaining a long flame, desirable for many purposes, thus be solved.

I have devised a form of burner suitable for such uses as heating tires for locomotives preparatory to shrinking them on the wheels, and for heating large castings, and for a great variety of similar purposes in foundries, forge shops, railroad yards, ship yards, and plants of like character. In my invention, a plurality of atomizing nozzles, all connected with a common source of fuel and compressed air supply, are located adjacent one another. In the path of discharge of the nozzles is a converging baffle, and beyond this another converging baffle. A casing, perforated to permit additional air to enter, surrounds both baffles, and at its end, beyond the second baffle, is the burner nozzle, of somewhat more contracted transverse area than the casing itself.

I have found that the efficient size for the oil passages leading to the individual atomizing nozzles is determined by the density of the fuel employed. Accordingly, I make these atomizers in three standard sizes to accommodate various grades of oil from ordinary fuel oil to kerosene, the smaller sizes being for lighter oils. The capacity of the burner is determined by the number of atomizing nozzles used, and I have found that in general burners with either three or six atomizing nozzles give the most satisfactory service.

As the compressed air and atomized fuel issue from the atomizing nozzles, the separate jets unite to form a single stream of large volume, giving a flame of considerably greater length than could be obtained by the use of a single atomizing nozzle. As such a flame is more compact than an equivalent number of smaller flames and there is less radiation loss, the temperature developed will be considerably higher than in the case of a single atomizing nozzle. The powerful draft set up within the casing draws in a large amount of additional air and thoroughly mixes it with the atomized oil to form a perfect combustible mixture. The baffles are heated to a very high temperature by direct radiation of the flame, and also by conduction from the burner nozzle and parts adjacent the flame, thus serving to preheat the mixture passing therethrough. Such a large capacity burner is more convenient in operation and more economical to manufacture than an equivalent number of smaller capacity burners, and presents other advantages as will appear in the following description of an apparatus embodying my invention and illustrated in the accompanying drawing.

An advantageous feature of the present invention resides in the provision of a casting having chambers for compressed air and for oil. From the air chamber a passageway is drilled to each atomizing nozzle and from the oil chamber separate passageways are led to each of the first mentioned passageways at an angle preferably a right angle. With the atomizing nozzles arranged close together in this manner, the flames from the several jets unite to form a long, uniform and homogeneous flame.

Fig. 1 is a longitudinal cross-section of the improved burner;

Fig. 2 is an end view of the atomizing nozzle portion with the casing removed;

Fig. 3 is a cross-section on the line 3—3 of Fig. 1;

Figure 4 is a general assembly of the device showing the supply pipes attached.

Fig. 5 is a longitudinal section of a modified form of the invention; and

Fig. 6 is an end view of the atomizing nozzle member shown in Fig. 5.

1 designates a compressed air supply pipe; 2 an oil pipe. 3 is a needle valve controlling the oil supply; 4 is a valve controlling the air supply, and 5 an oil strainer. The pipes 1 and 2 are rigidly connected by a bracing, such as 6, at one end and the other end is threaded into the atomizing nozzle casting 7. The casting 7 consists of a hub, having three atomizing or spray nozzles 8 which are conical in form and have an angle of about 60 degrees. The three nozzles 8 are arranged preferably in the form of an equilateral triangle. The casting 7 is cored as at 9 to provide for a compressed air chamber and is also cored, as at 10, to provide for an oil chamber. Connecting the vertices of each of the atomizing nozzles 8 with air chamber 9 is a passage 11 and intersecting each of the passages 11 and leading from oil chamber 10 is a passage 12. Hub member 7 is provided with air ports 13 and has a flange 14 upon which is secured, by bolts, rivets or other suitable means, a casing 15, into which the nozzles 8 open. Within the casing 15 and in the path of discharge of the nozzles 8 is a converging baffle 16 in the form of a frustum of a cone open at both ends and which is secured by means of bolts or rivets 17 and spacing members 18 to casing 15. Beyond baffle 16 and in alignment with the same is another baffle 19, similar in form, preferably somewhat longer, and also open at both ends, the wide end of baffle 19 being substantially wider than the narrow end of baffle 16. Baffle 19 is similarly secured to casing 15 by means of bolts or rivets 20 in spacing members 21. Casing 15 is perforated at a plurality of points to provide air-ports 22. Bolted or riveted upon the outer end of casing 15 is a converging member 23, which constitues the burning nozzle.

In Figs. 5 and 6 is shown a modified form of the device in which six atomizing nozzles are employed instead of three nozzles. In this form of the invention hub member 7 is not circular but is elongated or elliptical. The atomizing nozzles 8 are arranged in two staggered rows of three each. Hub member 7 is cored as at 24 to provide an elongated compressed air chamber 24 extending parallel to the rows of nozzles 8, and is also cored as at 25 to provide an elongated oil chamber, which also extends parallel to the atomizing nozzles. Connecting the vertices of each of the nozzles 8 with chamber 24 is an air passage 26, and intersecting air passage 26 and leading to oil chamber 25 is an oil passage 27. In this form of the device a casing 28 is secured to hub 7 and converging baffles 29 and 30 are placed in the path of discharge of nozzles 8 and on the end of casing 28 is a burning nozzle 31. Casing 28 is perforated at various points 32 to provide air-ports, and hub member 7 is likewise perforated at various points 33 to provide air-ports. Casing member 28, baffles 29 and 30, and burning nozzle 31 are similar in all respects to the corresponding members described in the preferred form of the invention except that they will be elongated or elliptical in section to conform to the arrangement of the atomizing nozzles 8. The air and oil chambers 24 and 25 are respectively supplied by air pipe 1 and oil pipe 2 previously described.

The burner above described effects a thorough mixing of the oil with the compressed air and the additional atmospheric air drawn in through ports 13 and 22. A solid flame of 8 to 10 feet in length and of uniform and extremely high temperature is produced. The conicity of baffles 16 and 19 and of baffles 29 and 30, and the velocity of the fuel mixture passing therethrough, prevents the flame from flashing back. The baffles are disposed annularly of the combined path of discharge of the nozzles and in no way tend to retard or disperse the current of fuel and air issuing therefrom. Gases may be used for fuels with equally satisfactory results.

What I claim is:

1. An oil burner having a plurality of atomizing nozzles adapted to form a long and uniform flame, means for supplying oil to the same, a converging baffle with both ends open located beyond said nozzles and in the path of their discharge, a second converging baffle located beyond said first baffle and in the path of discharge, the inner end of said second baffle being wider than the outer end of said first baffle.

2. In combination with a plurality of substantially parallel and adjacent atomizing nozzles having an imperforate wall between them and adapted to form a uniform flame, means for supplying oil to the same, and a plurality of converging baffles disposed annularly of the combined path of said nozzles.

3. An oil burner comprising a plurality of substantially parallel atomizing nozzles adjacent one another and adapted to form a long homogeneous flame, means for supplying oil to the same, a plurality of baffles in succession disposed annularly of the combined path of said nozzles and beyond the same, and a burner nozzle beyond the outer baffle.

4. An oil burner comprising a plurality of atomizing nozzles, a chamber for compressed air, a chamber for oil, individual conduits between each of said nozzles and said air chamber, a separate conduit from the oil chamber joining each of the first mentioned conduits at one side thereof and at an

angle whereby the air is adapted to atomize the oil and means for supplying oil and compressed air to the respective chambers.

5. An oil burner adapted to produce a long and homogeneous flame which comprises a base member casting, air and fuel chambers in said casting, a plurality of outwardly flaring atomizing nozzles arranged with each one adjacent another and adapted to produce a uniformly blended flame, a separate passageway from the air chamber to each nozzle, individual passageways from the fuel chamber and connected at an angle to each of the first mentioned passageways, a casing and a plurality of tapered baffles surrounding the atomizing nozzles and removably secured to said casting and means for introducing additional air into the large end of each tapered baffle.

Signed at New York city, in the county of New York and State of New York, this 20th day of January, A. D. 1921.

CARL P. ASTROM.