A. H. LIGHT.

OIL BURNER.

APPLICATION FILED APR. 22, 1909.

959,364. **Patented May 24, 1910.**

3 SHEETS—SHEET 1.

Fig. 1.

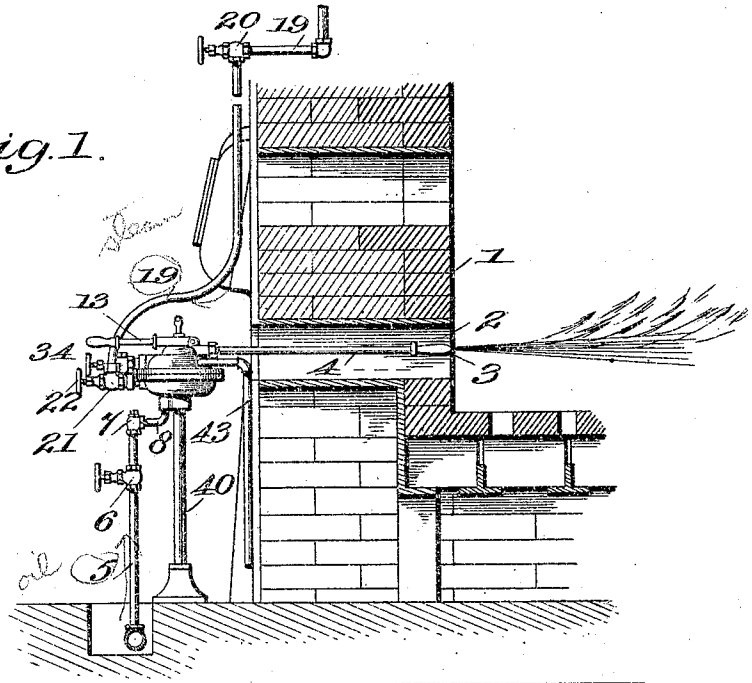
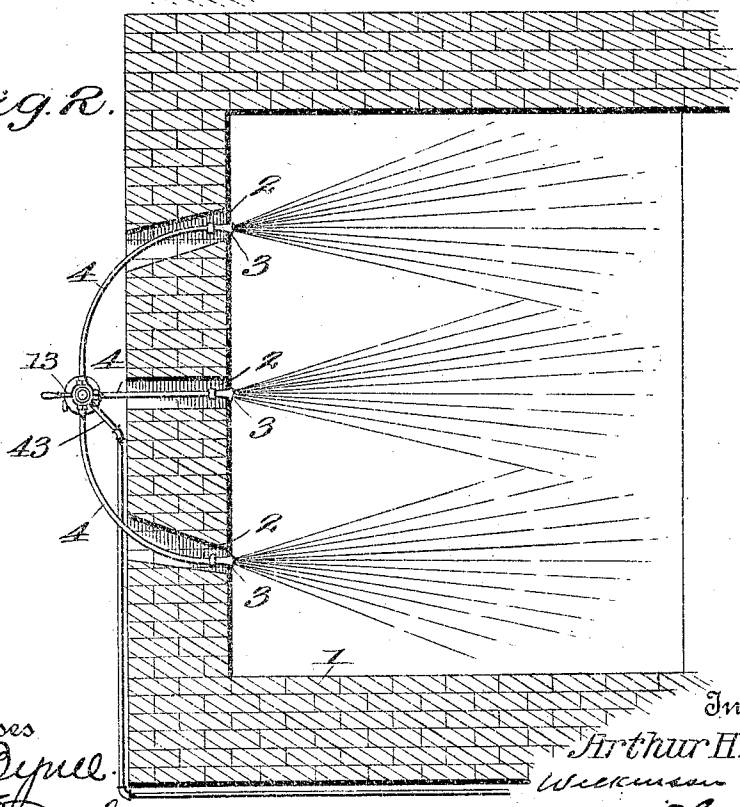


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 3.

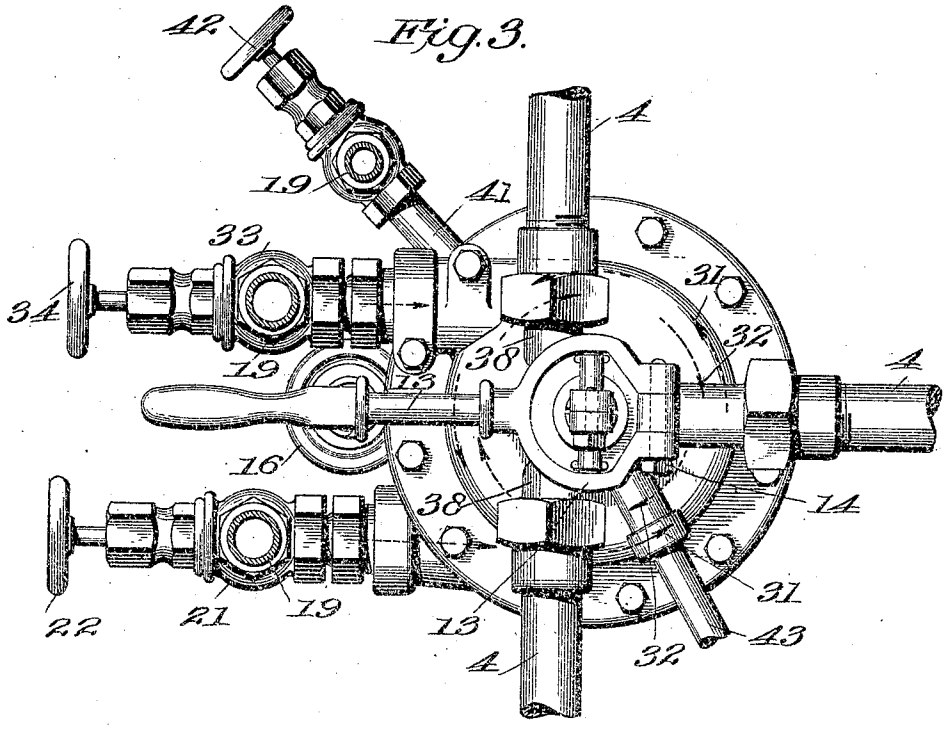
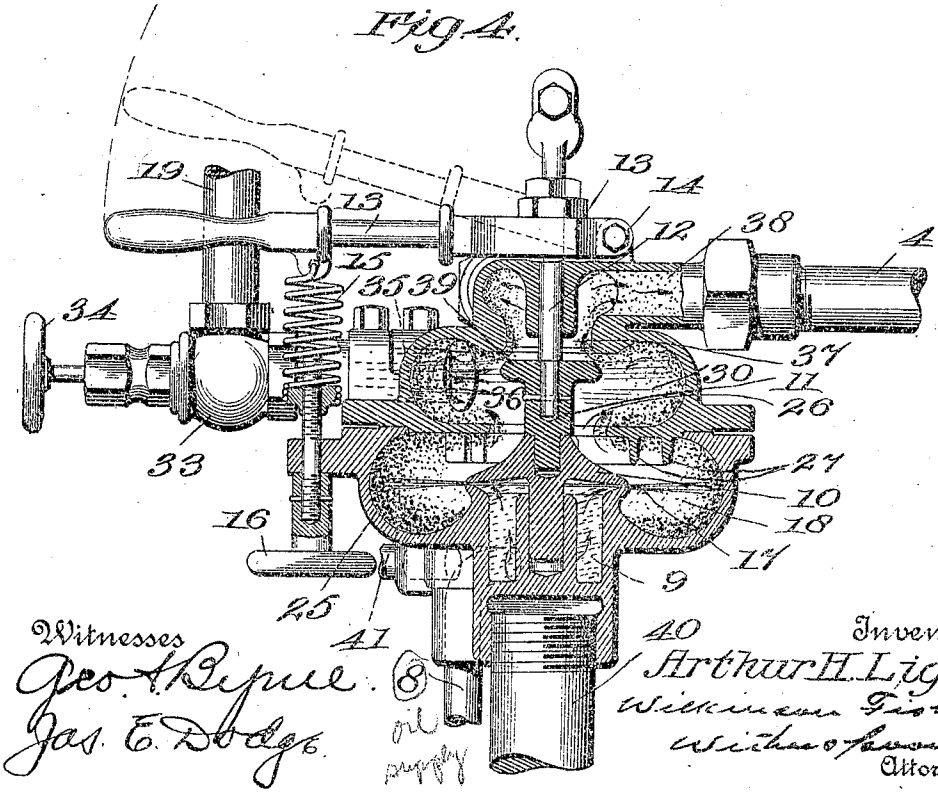


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

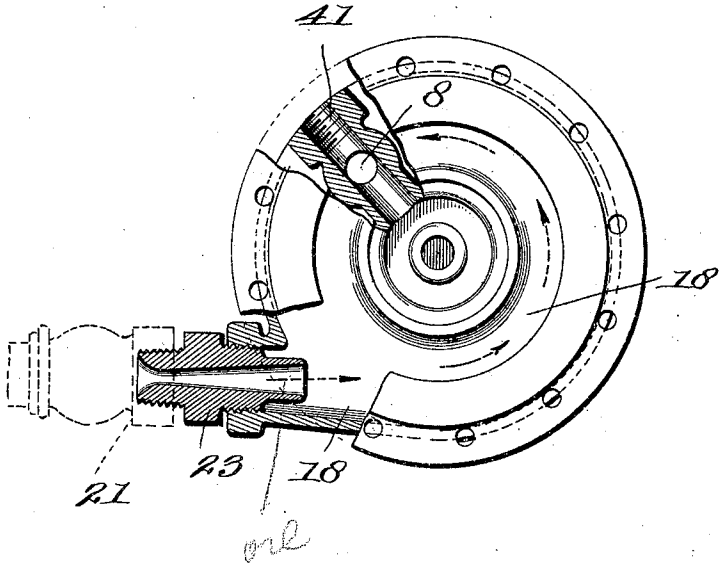
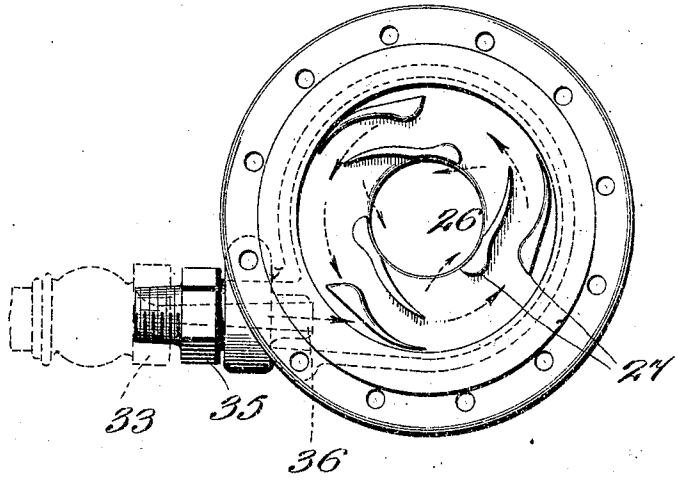


Fig. 6.



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UNITED STATES PATENT OFFICE.

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OIL-BURNER.

959,364. Specification of Letters Patent. Patented May 24, 1910.

Application filed April 22, 1909. Serial No. 491,556.

To all whom it may concern:

Be it known that I, ARTHUR H. LIGHT, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Oil-Burners; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to oil burners, and has for its object the production of a mixing device for the oil and steam which will be simple and certain in operation, inexpensive to construct, and one that will also afford an efficient means for regulating the fire under the boiler.

To these ends the invention consists in the novel details of construction and combinations of parts more fully hereinafter disclosed and particularly pointed out in the claims.

Referring to the accompanying drawings forming a part of this specification in which like numerals refer to like parts in all the views: Figure 1, is a sectional elevational view showing my invention applied to a furnace. Fig. 2, a sectional plan view, showing a plurality of burner tips fed from a single mixer. Fig. 3, a plan view of the mixer proper. Fig. 4, a sectional view of the same showing a plurality of cyclone mixing chambers. Fig. 5, a plan view of the lower mixing chamber, after the upper chamber has been removed, and Fig. 6, a view of the bottom of the upper chamber which forms a partial cover for the lower, as seen looking from below upwardly.

1 represents any suitable furnace to which heat is to be applied, 2 any suitable entrance therein, 3 any suitable burner nozzles and 4 a plurality of connections between the same and one or more mixing chambers.

5 represents an oil supply, controlled by the valve 6, and provided preferably with a check valve 7.

8 represents a connection leading into the oil chamber 9, provided with the controlling valve 10, on which is suitably mounted the piece 11, carrying the vertically movable rod 12, suitably controlled by the lever or other device 13, which may be conveniently pivoted as at 14, and is connected at a suitable point with a spring 15, the tension of which may be conveniently adjusted as by the hand wheel 16, as will be readily understood. The oil from the chamber 9 issues into the cyclone mixing chamber 18 in a thin film 17, and the thickness of this film may be readily controlled by adjusting the valve 10 through the lever 13 and its connections as will be understood from the drawings.

19 represents steam or other supply pipes for fluid under pressure, all of which are controlled by a valve 20, and one of the branches of which leads to a connection 21, controlled by a valve 22 and provided with a readily removable and properly designed nozzle 23, delivering into said mixing chamber 18. The steam entering said chamber through said nozzle rotates around the same many hundreds of times a second, and carrying the oil from the film 17 around with it, the latter of course is soon reduced to an exceedingly fine state of subdivision; although, as is well known, the heavier or more solid portions of said oil is not so easily finely divided as is the lighter or more volatile portions. These heavier portions 25 of oil are thrown out to the sides of the chamber 18 as indicated, and have a tendency to pass upwardly and out of the passage 26, from said chamber. In order to further break up or atomize these heavier particles 25 of oil, I provide the ribs or baffles 27, best shown in Figs. 4 and 6, which are so disposed as to cause numerous cross currents to be formed in the mixture of steam and oil, and therefore to effectually cause the breaking up of any larger particles 25 that may be caught in said currents.

As the rapidly rotating atomized steam and oil emerges from the chamber 18, through the opening 26, into the chamber 30, it meets a current of steam rotating around said chamber 30, also at a speed of many hundreds of revolutions per second, and

preferably in a direction opposite to that in which said mixture was rotated in the chamber 18. That is to say if when looking down on the mixing chambers the steam and oil is continuously rotated counter clockwise as indicated by the arrows 31 in Fig. 3, then upon entering the chamber 30, this rapidly rotating mixture is suddenly subjected to the action of a jet of steam rotating at a high speed in a clockwise direction as indicated by the arrows 32 in Fig. 3. This second rotating jet of steam is fed through another branch of the steam supply 19 to the connection 33, controlled by the valve 34, and through the properly designed and readily removable nozzle 35, whose tip 36 enters the said chamber 30 in a tangential direction as shown in Figs. 4 and 6. After receiving the action of this second and reversely rotating steam jet, any heavy particles 25 of oil that may have escaped the dividing action of the baffles 27, are effectually broken up, and the mixture of steam and lighter particles of oil is reduced to a physical state closely resembling that of vaporization. If the oil be of such a nature, however, that all its particles are not sufficiently finely divided by this second rotating steam jet, a third chamber and jet may be arranged above the chamber 30, and if desired a fourth one or as many as are necessary may be arranged above that. The mixed steam and oil next passes through the port 37, into one or more passages 38, and pipes 4 to the place of ignition. Of course, any number of passages 38 and pipes 4 may be provided. The port 37 is preferably controlled by a valve 39, operated by the lever 13, as will be readily understood.

40 represents any suitable support for the apparatus; 41 a by pass between another branch of the steam supply 19 and the oil chamber 9, which is controlled by the valve 42.

43 represents a connection leading steam and oil under pressure to any suitable damper operating apparatus not shown.

The operation of my burner is as follows: Oil is fed through the supply 5, and valve 6, to the chamber 9, and from there in a thin film 17, it goes into the mixing chamber 18. The pressure of the oil in chamber 9 naturally keeps the valve 10 lifted, and the thickness of this film is regulated by pressing down on this valve by means of the lever 13 as will readily be understood. The oil in the chamber 18 is subjected to the atomizing action of a rapidly rotating jet of steam entering through the tangential nozzle 23, and the heavier particles 25 thereof, are further broken up through the agency of the baffles 27, when the atomized oil and steam enters through the opening 26 the second atomizing or mixed chamber 30, there to be subjected to the atomizing action of a second tangential jet of steam entering through the nozzle 35 and rapidly rotating in a direction preferably opposite to that of the first jet. It is evident that the oil and steam may enter as many chambers and be subjected to as many jets as may be desired that may be placed the one above the other, and that the individual jets may alternately rotate in opposite directions, or that they may all rotate in the same direction. From the topmost jet the atomized or vaporized oil and steam passes through the port 37, and passage 38, to the various burner tips. The said port may be controlled by the valve 39, through the agency of the lever 13, and the spring 15. The lower end of the stem of valve 39 loosely fits in a socket in the top of valve 10, as clearly shown in Fig. 4, and therefore the valve 39 may be closed independently of the valve 10, while forcing downwardly the valve 39 to open the same wide will cause the valve 10 to close.

As is well known, it is a common practice for firemen, when a sudden decrease in the load occurs, to run along in front of the boilers and shut off the oil supplies and thereby extinguish the fires; but as the steam supply has been regulated, and it is some trouble to do it, the said firemen do not wish to disturb it, so they let the steam blow continuously. It often happens that after a load has suddenly decreased and the boilers cut out, that it is not over fifteen or twenty minutes before the load is increased and the boilers must be cut in again. In such cases, a single fireman usually has so many boilers to attend to, that it would not be possible for him to cut in the oil and also to regulate the steam supply, had it also been cut off, so under the present conditions it is not practical to obviate the continuous blowing of the steam after the oil is cut off. By my invention, however, the atomizing chamber supplies as many burners as desired, and when once the proper regulations of the oil and steam has been secured for any given load, no further adjustment will be required, and when the fire is to be reduced, all that is necessary is to lift the lever 13, and cut off the supplies of said oil and steam to the furnace. Upon dropping the lever, all the fires are immediately restored. It is also evident that the energy of the steam will be utilized to the fullest extent in the atomizing action, and owing to the simple method of control, a further considerable saving in the amount of steam used is effected. When my burner is used for locomotive boilers, the intensity of the fire is easily controlled by the throttle valve 39; for a par-

tial closure thereof results in less steam to the fire box, and also less oil, owing to the increasing pressure in the chamber 18 causing the valve to close down and to therefore admit less oil to said chamber. Of course, if the throttle valve 39 is opened a reverse action takes place.

When it is desired to blow steam through all the parts for cleaning purposes, the same may be accomplished by opening the valve 42, and when it is desired to automatically operate dampers from the pressure in the chambers 18 and 30, that may be accomplished by connecting said dampers with the pipe 43 leading from the port 37.

It is evident that changes may be made in my burner by those skilled in the art without departing from the spirit of the invention, and therefore I do not wish to be limited to the details of construction and arrangement of parts disclosed except as may be required by the claims.

What I claim is:—

1. In an oil burner the combination of an oil supply; a supply for fluid under pressure; an atomizing chamber in which said oil and fluid are mixed; means for causing said oil and fluid to rotate around said chamber; a valve governing the admission of oil into said chamber said valve being controlled by the pressure of said oil and fluid; and baffle plates adapted to cause the further subdivision of the coarser particles of said oil while the same is being rotated by said fluid, substantially as described.

2. In an oil burner the combination of an oil supply; a steam supply; an atomizing chamber into which said steam is tangentially delivered and in which said oil and steam is subjected to a rapid rotation; a valve controlling the admission of oil to said chamber and adapted to be operated by the pressure therein; a second atomizing chamber in which said mixture of oil and steam is further subjected to a rapid rotation; and a valve controlling the exit of oil and steam out of said second chamber, substantially as described.

3. In an oil burner the combination of an oil supply; a steam supply; an atomizing chamber in which said oil and steam is subjected to a rapid rotation; a valve controlling the admission of oil to said chamber and itself controlled by the pressure of said mixture; baffle plates to which said mixture is subjected; a second atomizing chamber in which said mixture of oil and steam is further subjected to a rapid rotation; and a valve in the same controlling the exit of oil and steam out of said second chamber, substantially as described.

4. In an oil burner the combination of an oil supply; a steam supply; a plurality of burner tips; an atomizing chamber in which said oil and steam is subjected to a rapid rotation; a valve controlling the admission of oil to said chamber; a second atomizing chamber in which said mixture of oil and steam is further subjected to a rapid rotation; a plurality of connections between said second chamber and said tips; and a valve controlling the exit of oil and steam out of said second chamber, substantially as described.

5. In an oil burner the combination of supplies of oil and steam; a plurality of atomizing chambers in which said oil and steam is subjected to successive rapid rotations; a valve governing the admission of oil to and controlled by the pressure of the oil and steam in the first of said chambers; a second valve governing the exit of oil and steam from the last of said chambers; and means for operating said second valve independently of said first valve, substantially as described.

6. In an oil burner the combination of supplies of oil and steam; a plurality of atomizing chambers connected together in which said oil and steam is subjected to successive rapid rotations an independent steam supply for each chamber; and a burner tip connected to said chambers, substantially as described.

7. In an oil burner the combination of supplies of oil and steam; a plurality of atomizing chambers connected together in which said oil and steam is subjected to successive rapid rotations; a fluid pressure operated valve governing the admission of oil to said first chamber; a hand operated valve governing the exit of oil from the last of said chambers; and a plurality of burner tips connected to said chambers, substantially as described.

8. In an oil burner the combination of a plurality of atomizing chambers connected together, means for supplying oil to one of said chambers; and means comprising independent steam supplies for successively subjecting oil and steam to rapid rotations in said chambers, substantially as described.

9. In an oil burner the combination of a plurality of atomizing chambers connected together, means for supplying oil to one of said chambers; and means comprising tangential steam supplies for successively subjecting oil and steam to alternately opposite rapid rotations in said chambers, substantially as described.

10. In an oil burner the combination of a plurality of atomizing chambers connected together means for supplying oil to one of said chambers; means comprising independent tangential steam supplies for successively subjecting oil and steam to rapid rotations

in said chambers; and means for blowing steam through the parts for cleaning purposes, substantially as described.

11. In an oil burner the combination of a plurality of atomizing chambers connected together, means for supplying oil to one of said chambers; means for successively subjecting oil and steam to rapid rotations in said chambers comprising independent steam supplies; and means for blowing steam through the parts for cleaning purposes, substantially as described.

In testimony whereof, I affix my signature, in presence of two witnesses.

ARTHUR H. LIGHT.

Witnesses:

ROGER S. BENNETT,

JUSTINE OTTOFY.