A. H. LIGHT.

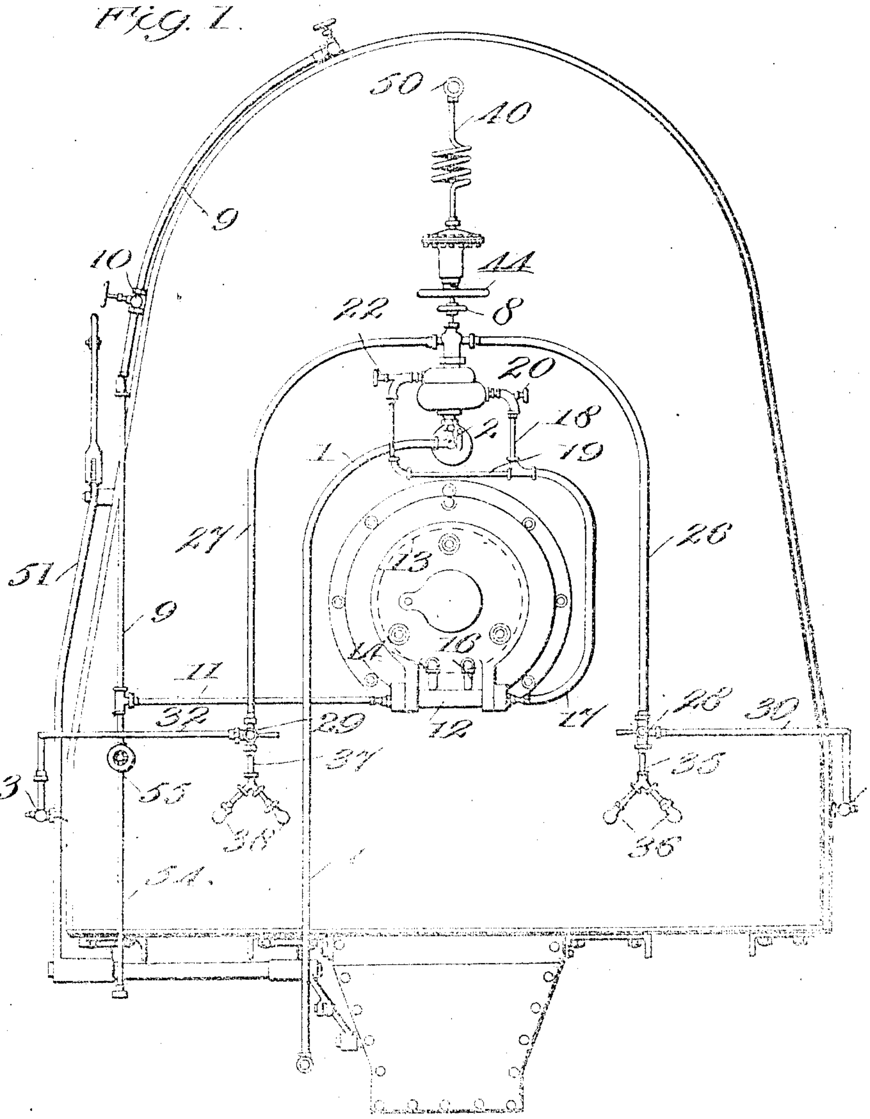
OIL BURNER.

APPLICATION FILED AUG. 23, 1909.

965,719. Patented July 26, 1910.

3 SHEETS—SHEET 1.

Fig. 1.



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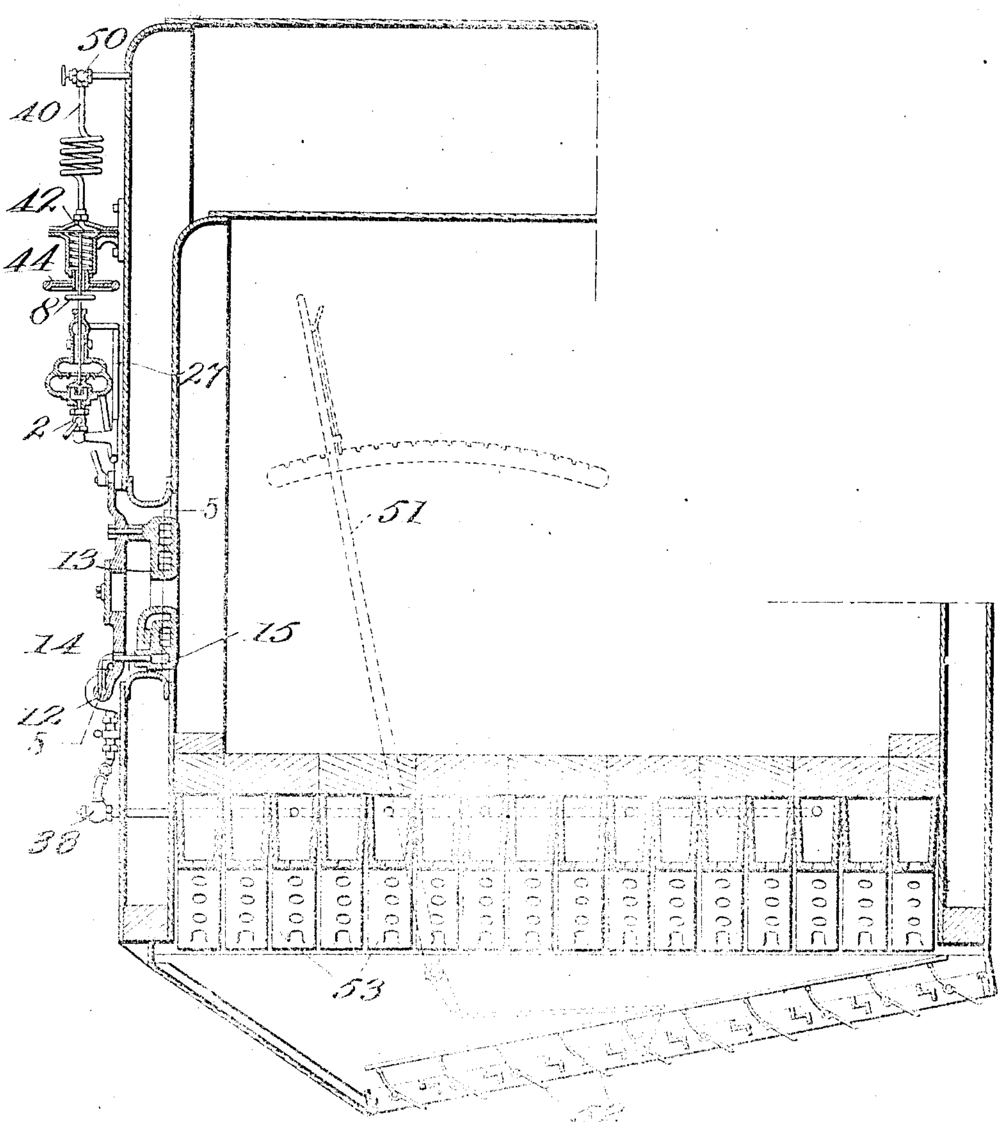
3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

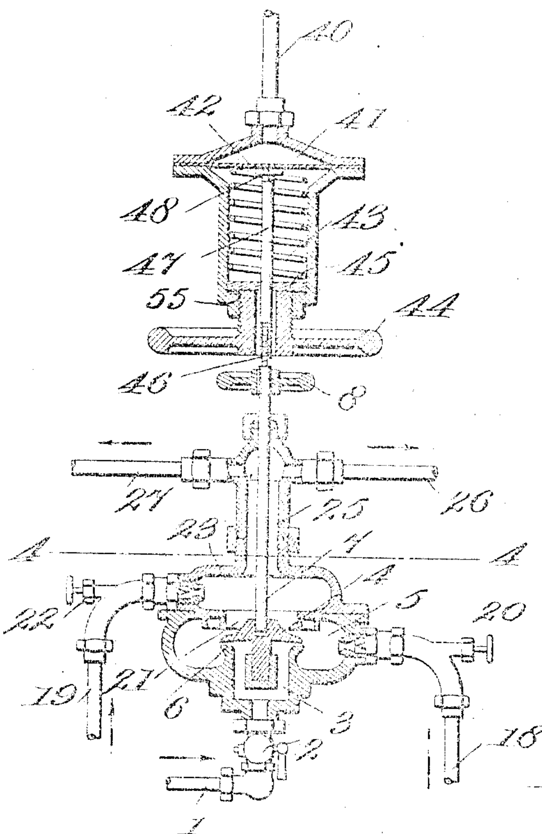


Fig. 5.

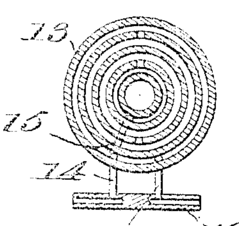
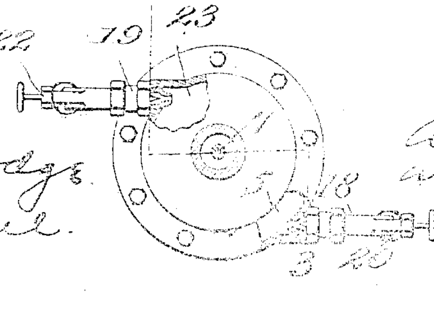


Fig. 4.



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UNITED STATES PATENT OFFICE.

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OIL-BURNER.

965,719. Specification of Letters Patent. Patented July 26, 1910.

Application filed August 23, 1909. Serial No. 514,2[illegible].

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 to produce a fuel mixture of a high efficiency as well as a burner that will automatically control the supply of fuel to the fire box while permitting a minimum amount of unconsumed carbon to pass through the furnace.

With these and other objects in view 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 an end elevational view showing the invention applied to a locomotive furnace; Fig. 2, is a sectional side elevational view of a portion of a locomotive fire box, with the invention applied thereto; Fig. 3, is a sectional elevational view of the mixing chambers and their co-acting parts, taken on the line 3—3 of Fig. 4. Fig. 4, is a sectional view, taken on the line 4—4 of Fig. 3; and, Fig. 5, is a sectional view showing the detailed construction of the superheater.

1 represents any suitable oil supply, as for example, a pipe leading to a tank carried by the tender of the locomotive and having a constant pressure maintained therein. 2 represents a suitable valve controlling said pipe, 3 an oil chamber, and 4 a valve controlling the admission of oil into the mixing chamber 5, and adapted to deliver the oil into said chamber in a thin film through the annular passage 6, as will be readily understood. This valve is provided with a recess in its top in which loosely fits the stem 7, controlled by a hand wheel 8, as will be more fully hereinafter disclosed.

9 represents any suitable steam supply controlled by a valve 10 and connected to the pipe 11 leading to the hinge 12 of the superheater 13. Said hinge is hollow, as shown, and is provided with a connection 14 leading into one end of the coils 15 of the superheater, and which coils are exposed to the heat of the interior of the furnace. The other end of the coils of said superheater is joined by a short connection 16 and through another portion of the hollow hinge 12 to the supply pipe 17 provided with the branches 18 and 19. The branch 18 tangentially enters the mixing chamber 5, as indicated in Fig. 4, and is controlled by the valve 20. Above the mixing chamber 5 is a second mixing chamber 23 connected with said chamber 5 by a passage 21, and the branch 19 tangentially enters this chamber 23, as also indicated in Fig. 4. Said branch 19 is likewise controlled by a suitable valve 22. A passage 25 connects the chamber 23 with the pipes 26 and 27 controlled by the valves 28 and 29 respectively. From the valve 28 leads the pipe 30 to the burners 31 entering the side of the furnace; and from the valve 29 leads the pipe 32 to the burners 33, entering the furnace on the side opposite from that of the burners 31. From the valve 28 also leads the pipe 35 to the pilot burners 36. From the valve 29 likewise leads the pipe 37 to the pilot burners 38.

40 represents any suitable connection with the live steam in the boiler, and it leads to the chamber 41 provided with the diaphragm 42 controlled by the spring 43. The tension of said spring 43 is, in turn, controlled by the larger hand wheel 44 through the medium of the disk 45, which slides up and down in the cylinder containing the spring, when the hand wheel 44 is turned, by means of the screw thread 55, as shown.

The rod 7 is preferably made in two parts, as shown, and the turning of the hand wheel 8 has the effect of increasing or decreasing the total length of said rod. In Fig. 3 there is conventionally shown a screw threaded joint 46 for accomplishing this purpose, while the upper end 47 of said rod 7 rests in a washer or disk 48, against which the diaphragm is adapted to rest, as shown.

It is evident if live steam be admitted through the pipe 40, that the movement of the diaphragm downward, under the action of the pressure of the live steam, may be regulated by screwing up on the hand wheel 44, and, thereby, opposing the pressure of the spring 43 to the pressure of said dia-

phragm 42. It is also evident, if the total length of the rod 7 is sufficient, that the movement of the diaphragm downward may close the valve 4; while if the total length of the rod 7 is not sufficient, the movement of the diaphragm downward will have no effect upon said valve 4. In other words by lengthening or shortening the rod 7 through turning the hand wheel 8, the valve 4 may be subjected to the action of the said diaphragm, or by cutting off steam in the pipe 40, by means of the valve 50, said valve 4 may be controlled by hand.

51 represents a suitable lever for controlling the dampers 52 admitting air to the furnace grates 53, but as said mechanism is not specifically claimed in this application, a further description thereof is dispensed with.

54 represents a pipe connected to the steam supply 9 controlled by a valve 55, which is adapted to receive steam from the outside when the engine is in the round house and before steam has been generated in its own boilers.

In operation: Supposing the locomotive to be in the round house and ready to start, the pipe 54 is connected to any suitable steam supply, oil is turned on through the pipe 1, and the valves 20 and 22 are suitably adjusted. Oil will then be forced up through the pipe 1 into the chamber 3 in the form of a thin film through the annular orifice 6 into the mixing chamber 5. At the same time steam will pass from the round house supply through the connection 11, the superheater 13, and connections 17, 18 and 19 to the mixing chambers 5 and 23. The steam being tangentially delivered into each of the mixing chambers 5 and 23 the oil in the first chamber will be rotated around the interior of the same many hundreds of times a second, and, as it becomes highly subdivided, the mixed oil and steam will pass through the passage 21 into the chamber 23, where it will be again subjected to a like rotation and further subdivided. The finely attenuated oil and steam will then pass out through the pipes 26 and 27 to the side burners 31 and 33 where it may be lighted under the locomotive boiler. The fuel mixture will continue to burn until sufficient steam is generated within the locomotive boiler, when the pipe 54 may be disconnected from the round house supply, the valve 55 closed, and the steam supply turned on through the pipe 9 from the locomotive boiler, when, of course, the atomizing action in the chambers 5 and 23 will continue as before.

It is well known that firemen on locomotives, under present conditions, are compelled to give practically all their attention to the oil supply and the furnace, and this permits them to give very little attention to the control of the air supply or to other matters. The live steam, however, admitted through pipe 40, acting upon the diaphragm 42, causes the rod 7 to close the valve 4 and to thereby shut off the supply of oil when the pressure in the boiler becomes too great; and likewise the spring 43 raises said diaphragm and permits the oil to force the valve 4 open, and thereby increase its supply when the pressure in the boiler becomes too low. In this manner the supply of oil and therefore the pressure of the steam, is automatically regulated. If the parts are set to maintain any particular pressure, they may be changed for any other pressure, by simply adjusting the larger hand wheel 44, and thereby the tension of the spring 43. Since the steam passes through the superheater before it enters the atomizing or mixing chambers, it is raised to a high temperature, and, therefore, it acts to more completely atomize or vaporize the oil than would be the case were it not passed through the superheater. The engineer, of course, by suitably manipulating the lever 51 may readily control the draft, and therefore, the combustion which takes place inside the fire box. When the engine comes to a stop, the fuel supply may be cut off at the valves 28 and 29 except for the pilot lights; and when it is desired to start again the pilot lights may be utilized to relight the main fires.

The loose connection between the valve 4 and the stem 7, enables the valve to operate to a limited extent independently of said stem; and the adjustment of the length of the stem enables the operator at will to control the extent of this limited operation, or in other words, to control the maximum thickness of the film of oil delivered to the chamber 5.

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

What I claim is:

1. In an oil burner the combination of an oil supply; a steam supply; an atomizing chamber in which said steam is tangentially delivered and in which said oil is delivered in a thin film; a second atomizing chamber; a second steam supply for said second chamber; a connection between said chambers; a pipe leading from said second chamber to the furnace; and automatic means for controlling the amount of oil delivered to said first mentioned chamber by the pressure of the steam generated by said furnace; substantially as described.

2. In an oil burner the combination of an oil supply; a steam supply; a superheater for the steam; an atomizing chamber in

which said steam is tangentially delivered and in which said oil is delivered in a thin film; a second atomizing chamber; a second steam supply for said chamber; a connection between said chambers; a pipe leading from said second chamber to the furnace; and automatic means comprising a diaphragm for controlling the amount of oil delivered to said first mentioned chamber by the pressure of the steam generated by said furnace; substantially as described.

3. In an oil burner, the combination of an oil supply; a steam supply; an atomizing chamber in which said steam is tangentially delivered and in which said oil is delivered in a thin film; a second atomizing chamber; a second steam supply for said chamber; a connection between said chambers; a pipe leading from said second chamber to the furnace; and automatic means comprising a diaphragm; a spring for controlling the same; and a connection between said valve and diaphragm for controlling the amount of oil delivered to said first mentioned chamber by the pressure of the steam generated by said furnace; substantially as described.

4. In an oil burner the combination of oil and steam supplies; a plurality of atomizing chambers; means for tangentially delivering steam to said chambers; a connection between said chambers and a furnace; and means for automatically controlling the oil by the steam generated by said furnace, comprising a diaphragm, a live steam supply on one side of the same, a spring on the other side of said diaphragm, a valve and a connection between said valve and diaphragm, substantially as described.

5. In an oil burner the combination of oil and steam supplies; a plurality of atomizing chambers; means for tangentially delivering steam to said chambers; a connection between said chambers and a furnace; and means for automatically controlling the oil by the steam generated by said furnace, comprising a diaphragm, a live steam supply on one side of said diaphragm, a spring on the other side of said diaphragm, means to adjust the tension of said spring, a connection between said valve and diaphragm, and means to adjust the length of said connection, substantially as described.

6. In an oil burner the combination of oil and steam supplies; a plurality of atomizing chambers; means for tangentially admitting steam to said chambers; a connection between said chambers and a furnace; and means for controlling the supply of mixed oil and steam, comprising a valve; a diaphragm, adapted to control said valve, a connection between said valve and diaphragm, and means for eliminating the action of said diaphragm on said valve; substantially as described.

7. In an oil burner the combination of oil and steam supplies; a plurality of atomizing chambers; means for tangentially admitting steam to said chambers; a valve controlling the admission of oil to one of said chambers; a diaphragm adapted to control said valve; a connection between said valve and diaphragm; means to adjust the length of said connection; and an adjustable spring for controlling said diaphragm; substantially as described.

8. In an oil burner, the combination of oil and steam supplies; an atomizing chamber; means for delivering the steam into said chamber in a tangential direction; means for superheating said steam before it enters said chamber; a valve controlling the admission of oil to said chamber; a diaphragm adapted to control said valve; a live steam connection on one side of said diaphragm; a connection between said valve and diaphragm; means to adjust the length of said connection; and an adjustable spring for controlling said diaphragm; substantially as described.

9. In an oil burner for locomotive furnaces, the combination of an oil supply; an atomizing chamber connected to said supply; a pipe adapted to deliver steam to said chamber from the boiler of said locomotive; a pipe also adapted to deliver steam from an outside source to said chamber; a second chamber in which the mixed oil and steam is further finely divided; and means for automatically controlling the supply of fuel to said furnace; substantially as described.

10. In an oil burner for locomotives the combination of an atomizing chamber; a superheater; means to pass steam through said superheater and then to said chamber; means to tangentially admit steam to said chamber; and automatic means for regulating the supply of oil admitted to said chamber in accordance with the pressure of said steam; substantially as described.

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

ARTHUR H. LIGHT.

Witnesses:
L. C. POTTER,
M. E. RUHE.