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2,054,162

HEATING APPARATUS.

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Fig. 1.

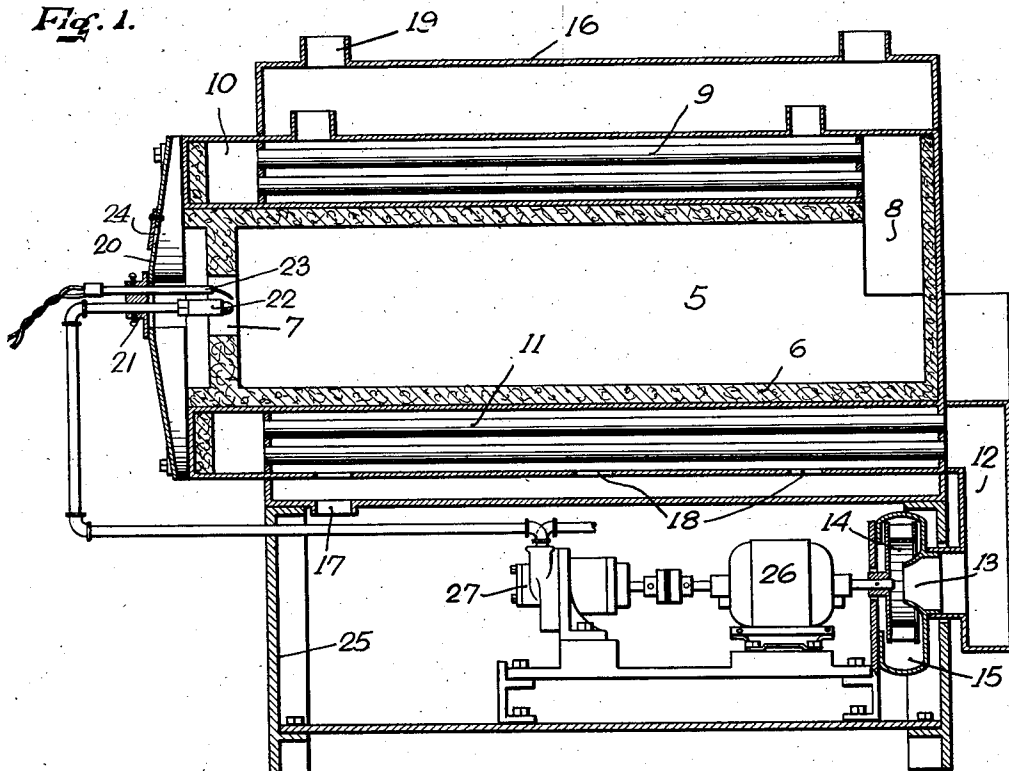


Fig. 2.

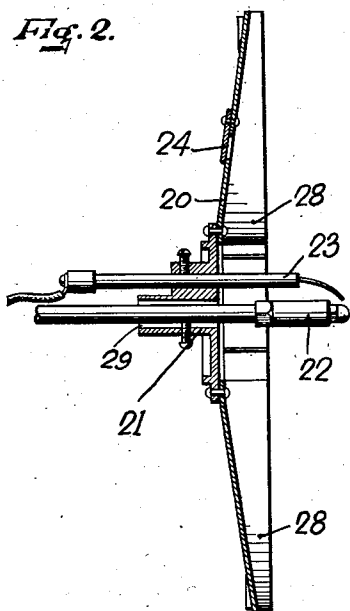
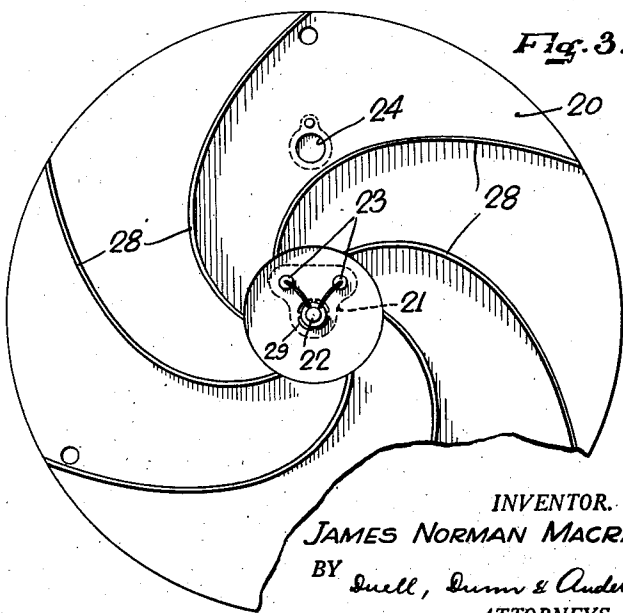


Fig. 3.



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HEATING APPARATUS

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Application April 22, 1932, Serial No. 606,811

4 Claims. (Cl. 158—1.5)

This invention relates to a structurally and functionally improved form of heating apparatus capable of use in numerous different associations, but primarily intended for employment in connection with boilers, furnaces and similar mechanism of a commercial or domestic nature.

It is an object of the invention to provide an apparatus of this character which will be of primary utility when correlated—at the time of manufacture—with a boiler or furnace but which may, if desired, be adapted and applied to an already existing installation. Whether initially or subsequently provided, however, an extremely efficient combustion cycle will occur and by means of which in any given installation low stack temperatures will result, although the flame will be of maximum intensity.

Another object of the invention is that of constructing a heating apparatus which may readily be set in operation and in which the installation and manufacturing costs of the apparatus will be relatively low.

Another object is to furnish an apparatus of this type which will render efficient service for long periods of time with freedom from difficulties and in which, when adjustments, renewals or corrections are required, they may be achieved with minimum effort and expense.

With these and other objects in mind, reference is had to the attached sheet of drawing illustrating one practical embodiment of the invention and in which:

Fig. 1 is a sectional side view of a heating apparatus embodying the present invention;

Fig. 2 is an enlarged sectional side view of the intake head and

Fig. 3 is a face view of said head.

Referring primarily to Fig. 1, it will be seen that a boiler has been illustrated which is the subject matter of a copending application for Letters Patent, Serial No. 567,548, filed October 8, 1931. This boiler includes a combustion chamber 5, lined, for example, with suitable refractory material 6, and having an inlet opening 7 and an outlet opening, or passage, 8. The opening 8 communicates with the rear ends of an upper bank of tubes 9 and secondary combustion may occur within these tubes. The products of combustion pass into a head 10 at the forward end of the boiler and flow downwardly into the forward ends of a lower bank of tubes 11 similar to tubes 9. Thence the products of combustion escape into the conduit 12 and flow thence through the intake end 13 of an exhaust fan 14,

the latter discharging through an opening 15 into a stack (not shown).

The boiler is preferably jacketed as at 16 and this jacket may have a drain opening 17, it being noted that, as described in my said copending application, communication is provided between the jacket and interior of the boiler by means of a series of openings 18. In this manner feed water (from a source not shown) can be established at a proper level in the jacket and will be preheated, the water being capable of readily flowing into the boiler with a view to replenishing the supply therein as it becomes exhausted. Also, as moisture condenses and returns through the openings 19, it will pass into the jacket, and not into the body of highly heated water within the boiler body proper.

Secured to the forward end of the boiler is a plate 20 which is formed with a central opening normally closed by a cap 21. Mounted by the latter is a nozzle 22 adjacent which electrodes 23 extend. The plate is preferably formed with an observation opening 24, this opening being so disposed that all or a portion of the interior of the combustion chamber 5 may be observed. It will be appreciated that the rear refractory wall might also be pierced in line with this opening so that ready observation will be practicable.

The boiler is preferably supported upon a frame 25, which also mounts a motor 26 driving a pump 27, as well as an exhaust blower or fan 14. The motor may be connected to a switch (not shown) of the relay or hand type, to which are also connected the electrodes 23. Thus, by means of the usual layout of control apparatus, the motor is set to operating and a spark gap or source of primary ignition is provided adjacent the outlet end of the nozzle. With the motor operating it will be apparent that fuel oil will be ejected from the nozzle and that air will be drawn past the latter through the various passages provided for this purpose. The electrodes will function to ignite the resultant fuel mixture and the flame will move in contact with the refractory 6 and the products of combustion will flow through the passage 8, tubes 9, passage 10, tubes 11, passages 12 and 13, through the pump 14 and thence be discharged through the stack.

With a view to assuring combustion of maximum efficiency, it is desirable that the air flowing past the nozzle be given a vortex action. The plate 20 is, for example, spaced from the forward end of the boiler to an extent adequate to permit of a sufficient flow of air at this point. Addi-

tionally, however, the inner face of the plate is provided with a series of spiral inwardly extending fins or ribs 28 so that as the air enters it will be given a twisting action. This will obviously result in a rapid rotation of the air column as it flows through the opening 7, thus achieving the desired results.

It will of course be understood that the motor 26 is preferably connected to a relay which is in turn controlled from a thermostat. By means of the present invention it is apparent that a boiler is provided which will be capable of working entirely without a stack, although it will of course be understood that such stack will ordinarily be provided. More especially, in the case of a gun-blower type of oil burner, as heretofore developed, it has been almost necessary that a stack having a natural draft of a certain minimum factor be available. Otherwise, improper combustion would occur and the products of combustion would not traverse the flue passages and escape through the stack. By means of the present invention, however, and having in mind that the blower is connected to the exhaust end of the boiler or furnace, it is obvious that when the motor 26 is set in operation, the exhaust fan will primarily begin to operate, thus establishing the necessary flow of air into the combustion chamber past the nozzle. Immediately subsequently thereto the flame will be developed within the combustion chamber and as the apparatus functions the combustion air will flow over the plate 20 and be preheated. Of course, as shown, air may also flow through an internally ribbed tube 29 which is mounted, for example, upon the hub 21, and in turn mounts the nozzle 22. When the motor 26 ceases to operate it is apparent that there will be no danger of a "puff back" for the reason that the products of combustion will be substantially completely exhausted through the combustion chamber with no probability of a reversal of flow and regardless of the existence or non-existence of a stack.

With regard to the motor, it will be understood that the operation of this member and the blower are governed by any or all of the usual controls, which include, for example, relay operating clocks, thermostats, pressure-stats, vapor-stats, air-stats, combustion control devices, aqua-stats and low water control.

From the foregoing it will be appreciated that among others, the several objects as specifically aforementioned, are achieved. Obviously, numerous changes in construction and rearrangements of the parts may be resorted to without departing from the spirit of the invention as defined by the claims.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. An oil burning apparatus including a casing providing a passage for the flow of combustion products and having an opening in one end thereof for introduction of oil and air, a plate removably associated with said end of said casing and placed over said opening, fins secured to the inner face of said plate and in contact with said end, such fins providing between them passages for the flow of air, the air being preheated by contact with said end of said casing, a fuel

supplying tube extending through the plate, and a fuel nozzle connected to said tube and projecting into said opening for the discharge of oil into said casing.

2. An oil burning apparatus including a casing providing a passage for the flow of combustion products and having an opening in one end thereof for introduction of oil and air, a plate removably associated with said end of said casing and placed over said opening, fins secured to the inner face of said plate and in contact with said end, such fins providing between them passages for the flow of air, the air being preheated by contact with said end of said casing, said plate being formed with an opening in line with said casing opening, a cap mounted on said plate and closing said plate opening, said cap being formed with a transversely extending bore, a fuel supplying tube having a diameter less than said bore, a fuel nozzle coupled to the inner end of such tube, and means for adjustably supporting said tube with respect to said cap and within said bore whereby said tube may be longitudinally shifted, the space between said tube and the surface of the cap bore providing a passage for the flow of air.

3. An oil burning apparatus including a casing providing a passage for the flow of combustion products and having an opening in one end thereof for introduction of oil and air, a plate removably associated with said end of said casing and placed over said casing opening, means whereby the inner face of said plate is maintained in spaced relationship with respect to the end of the casing whereby air may flow between said plate and casing towards the opening of the latter, said plate being also formed with an opening in line with the casing opening, a cap mounted on said plate and covering such plate opening, said cap having transversely extending bores, a fuel supplying tube extending through one of said bores and longitudinally shiftable with respect to said cap, a fuel nozzle mounted on the inner end of such tube, and an igniting element extending through another of said bores and longitudinally shiftable with respect to said cap and said tube.

4. An oil burning apparatus including a casing providing a passage for the flow of combustion products and having an opening in one end thereof for introduction of oil and air, a plate removably associated with said end of said casing and placed over said opening, fins secured to the inner face of said plate and in contact with said end, such fins extending from the periphery of the plate towards its center and providing between them passages for the flow of air, the air being preheated by contact with said end of said casing, said plate being formed with an opening substantially in line with said casing opening, a cap mounted on said plate and closing the plate opening, said cap being formed with a transversely extending bore, a fuel supplying tube of a diameter less than that of such bore and extending through the same, a fuel nozzle mounted on the inner end of such tube, and means for securing said tube within said bore whereby the same may be axially shifted.

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