(No Model.)

T. R. BROWNE.

OIL BURNER.

No. 588,691. Patented Aug. 24, 1897.

Fig. 1.

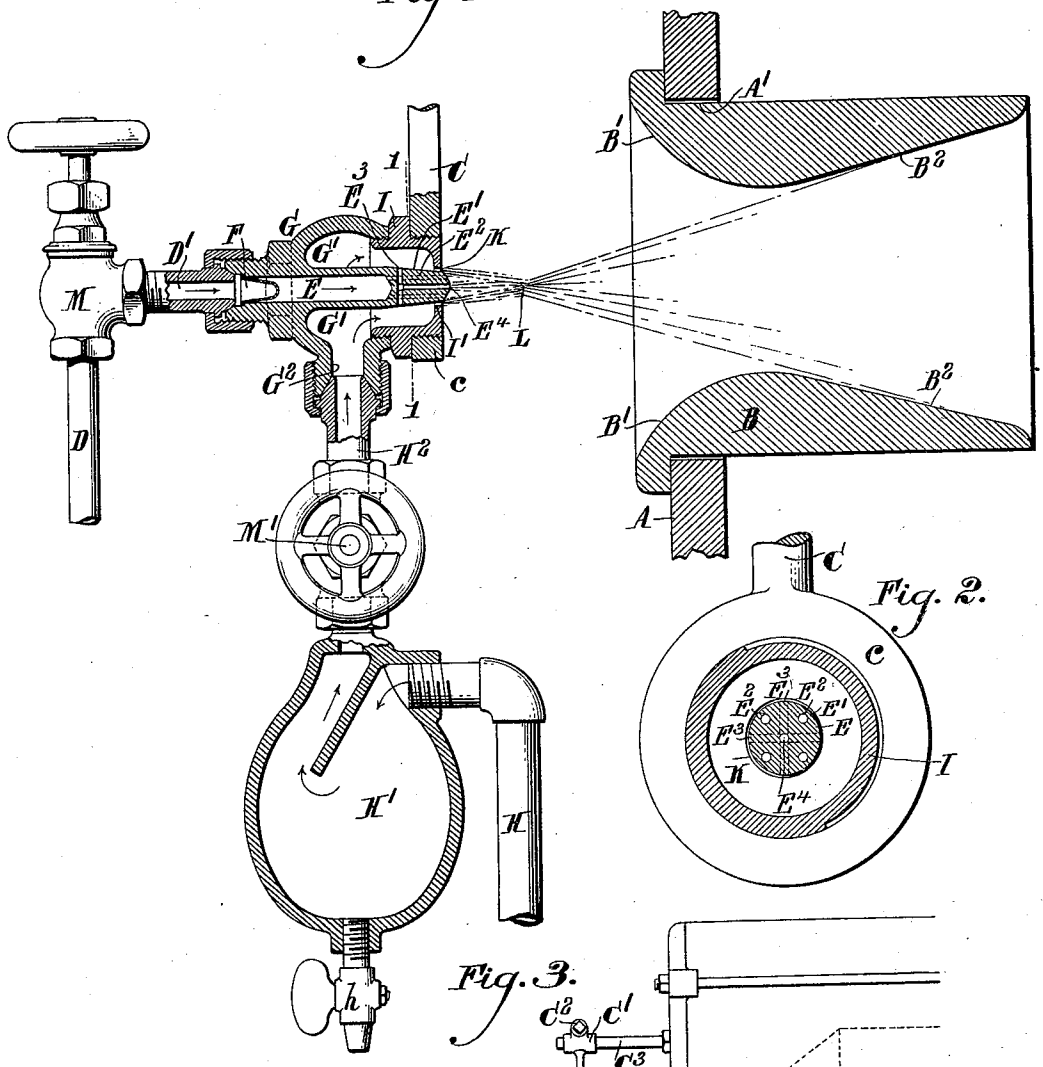
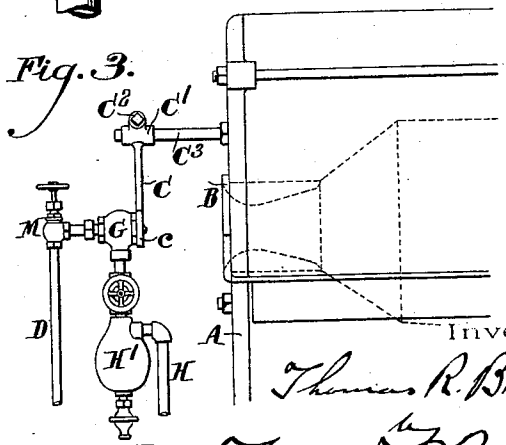


Fig. 2.

Fig. 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

THOMAS R. BROWNE, OF ALTOONA, PENNSYLVANIA.

OIL-BURNER.

SPECIFICATION forming part of Letters Patent No. 588,691, dated August 24, 1897.

Application filed May 5, 1896. Serial No. 590,371. (No model.)

To all whom it may concern:

Be it known that I, THOMAS R. BROWNE, a citizen of the United States, residing in Altoona, in the county of Blair, in the State of Pennsylvania, have invented a certain new and useful Improvement in Oil-Burners, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to the construction of oil-burners and atomizers, and has for its object to provide a burner or atomizer of simple and efficient construction particularly adapted for use outside of a furnace and to be preferably connected to the furnace by a properly-arranged adjustable arm or other suitable support for the purpose of adjusting it to and away from the furnace or, rather, to and from a properly-shaped orifice or flared tube inserted in the furnace, the adjustment being regulated in proportion to the amount of oil to be burned and the cubic contents of the furnace in which the oil is consumed.

The leading feature of my invention consists in providing one or more channels through which the oil can flow or be forced and in surrounding the nozzle in which these orifices are formed with an annular converging nozzle with its inside wall preferably set at some slight distance behind or back of the end of the nozzle containing the oil channel or channels and through which an impelling-jet of fluid, preferably air, though steam may be used, is caused to flow.

Another preferred feature of my construction, and one which has given superior results, is the provision of a central channel for the impelling-jet of air or steam in the nozzle in which the oil-channels are formed, so that the oil is subjected at the same time to the action of surrounding and central jets of the impelling fluid, producing a slight vacuum in front of the nozzle containing the oil-channels, assisting the flow of oil and at the same time atomizing it.

The nature of my improvements will be best understood as described in connection with the drawings, in which they are illustrated, and in which—

Figure 1 is a sectional elevation of a burner constructed in accordance with my invention and arranged in the proper way in connection with the furnace-wall or nozzle or proper-shaped opening in said wall. Fig. 2 is a cross-section on the line 1 1 of Fig. 1, and Fig. 3 is a view showing how the burner is adjusted to and from the furnace.

A represents the furnace-wall, having an opening A′, in which is inserted a flared receiving-tube B, the inner diverging walls B^2 of which should correspond closely with the form of the jet forced between them, while the outer diverging walls B′ are so formed in order to insure the drawing in of a proper supply of air to properly support the combustion of the oil-spray forming the jet when it has reached the inside of the furnace.

C indicates an adjustable supporting-arm, which, as shown, is provided with a clamp C′, adjustable along a stud C^3, secured to the furnace-wall C^2, being a bolt by which the clamp is secured and to which arm, in the plan shown, the burner is secured.

D is an oil-supply pipe connecting through the valve M with pipe D′ and through pipe D′ to the central oil-supplying tube E, having an end or nozzle E′, formed with converging sides, and through which extend one or more oil-escape passages or channels E^2. In the design shown four such passages pass through the nozzle E′ and are symmetrically arranged around and parallel with the center thereof. In my preferred construction I also provide lateral passages E^3, communicating at their center with a longitudinal passage E^4, which opens in the center of the nozzle E′.

F indicates a strainer by which impurities are prevented from entering the pipe E.

G indicates the body of the burner or atomizing device, and is so shaped as to form a chamber G′, surrounding the pipe E, and communicating through passage G^2 with the pipe H^2, which forms part of a conduit for compressed air or steam, of which also the trap (indicated at H′) and the pipe H, leading to it, form a part, M′ being a valve by which the pipe H can be closed at will.

I is a cap-piece screwing into the body G of the burner, as indicated, and having an orifice or opening I′, through which the nozzle E′ projects, a small space (indicated at K) being left between the walls of the opening I′ and the

nozzle E′, through which the compressed air or other fluid in the chamber G′ can issue. The nozzle E′ should project a slight distance beyond the inside wall of the cap-piece I and the orifice I′, and the walls of the opening I′ should preferably be given a converging shape corresponding with the converging walls of the nozzle E′, though the desired result of a converging jet issuing from the cap-piece I will be secured even if the walls of the opening I′ do not converge, but are made thin, the convergence of the nozzle E′ being alone sufficent to secure this result.

It is of course evident that the compressed air or steam or other fluid under pressure filling the chamber G will not only issue through the orifice I′, but will also pass through the lateral opening E^3 into the central passage E^4 in the center of the outward end of the oil-pipe E and central with reference to the oil-passages E^2. The oil burner or atomizer should be set at some distance from the outer end of the feeding-tube B. This distance I have found in practice may conveniently be four or five inches, but should be regulated by the nature of the jet formed and the smallest diameter of the feeding tube or nozzle B or a corresponding opening provided in the furnace-wall, the provision for such adjustment being secured by proper connection of the arm C to the horizontal stud connected to the furnace-wall or other suitable support.

In operation the converging jet of impelling fluid, as well as the central jet, converge and meet at a point L at some distance in front of the burner, the oil from the channels E^2, being practically carried inside of the converging impelling-jet, in which there is a slight vacuum, is not permitted to drop or fall before reaching the point L, and at this point it is subjected to such intense and violent action by the impact of the central jet of impelling fluid and the converging jet of impelling fluid that it is broken into an exceedingly fine spray, the finely-divided oil and air by impact then forming a diverging jet of uniform shape, which is impelled with great force into and through the receiving or feeding tube B or a correspondingly and properly shaped opening in the furnace-wall, and with the result of drawing into the said tube an ample supply of air to support the proper combustion of the oil contained in the finely-divided jet. While I preferably use compressed air as the means of spraying and impelling the oil into the furnace, it is upon the air drawn into the receiving-tube by the action of the jet that I depend to support proper combustion, and therefore I may, if desired, use steam as the impelling-jet, or I may, in connection with the atomizing of the oil in the burner separated from the furnace, provide a sufficient amount of air to support combustion by means of artificial blast supplied from a blower or other mechanical means.

In my construction of burner the oil is not ignited at or close to the orifice or orifices through which it issues, and ignition does not take place until it enters the furnace itself. Therefore the burner or spraying device is not subjected to the action of an injurious degree of heat or the danger of explosion, it being practically impossible to draw the flame back and produce combustion at the point of discharge of the impelling-jet containing the oil and air or steam. This obviates the necessity of frequent cleaning of the burner due to the oil caking or baking hard at such times as the burner may be shut off, and in fact further provision may be made against this possibility by interposing between the furnace and the burner when not in use a small iron plate or ring, which may hang from the stud C^3.

I have found it highly desirable in all cases to carry the nozzle E′ a slight distance beyond the inside wall of the cap I and the orifice I′, as by this means the oil does not enter the converging air-jet until the jet is fully formed and it is impossible for the oil and air to become mixed or in any way unite at any other point than outside of the burner; nor can the jet be properly formed and the oil thoroughly atomized to the degree of combustion until the oil and impelling-jets of air or steam have reached the point L in front of the burner and above referred to.

While I prefer to use in connection with the annular converging jet issuing from the orifice I′ the central impelling-jet from the passage E^4, I have obtained excellent results with the annular converging and diverging jet alone.

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

1. In an oil-burner apparatus an oil-spraying nozzle having a central and an annular outer air-channel and oil-channels situated between said air-channels, said nozzle being adapted, as described, to throw a jet of air and oil which first converges toward and then diverges from a point in front of the nozzle in combination with a receiving-nozzle B situated in front of the spraying-nozzle and having its inner walls B^2 proportioned and flared to conform to the size and form of the mixed oil and air jet.

2. In an oil-burner apparatus an oil-spraying nozzle having a central and an annular outer air-channel and oil-channels situated between said air-channels, said nozzle being adapted, as described, to throw a jet of air and oil which first converges toward and then diverges from a point in front of the nozzle in combination with a receiving-nozzle B situated in front of the spraying-nozzle and having its inner walls B^2 proportioned and flared to conform to the size and form of the mixed oil and air jet and its outer wall B′ abruptly flared outward.

3. In an oil-burner, an oil-pipe as E, and a solid terminal nozzle E′, said nozzle having

perforations as E^2 running from pipe E to its outer end to serve as oil-channels, a central perforation E^4 not connecting with the oil-pipe and one or more lateral perforations or channels E^3 running through the side walls of the nozzle to the central perforation or channel E^4, in combination with an outer casing adapted to serve as an air or a steam chamber and forming with the walls of the nozzle E^2 an annular air-escape channel K.

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