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APPARATUS FOR BURNING OIL.

APPLICATION FILED JAN. 24, 1912. RENEWED NOV. 13, 1919.

1,344,029. **Patented June 22, 1920.**

Fig. 1.

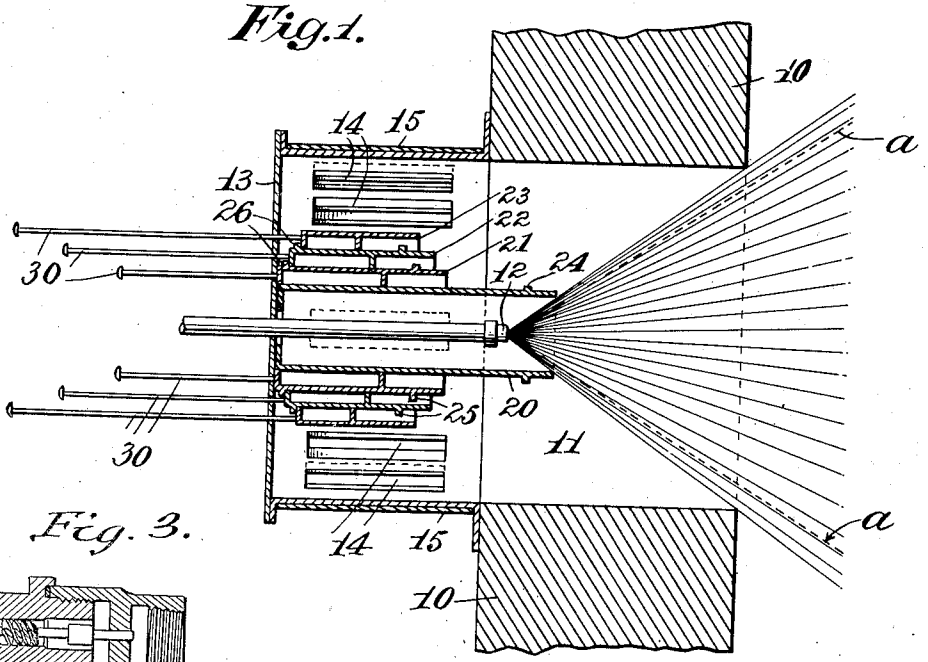


Fig. 3.

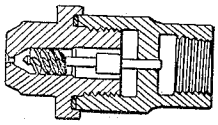
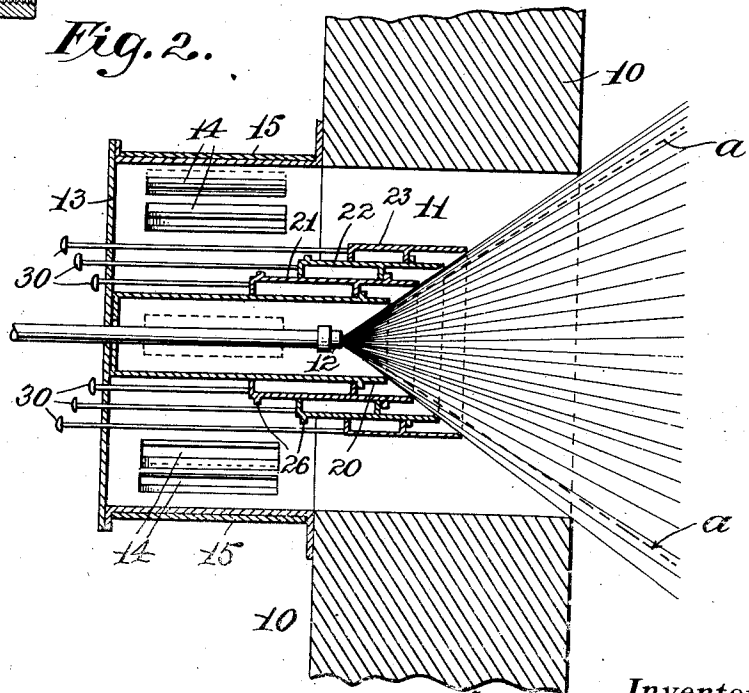


Fig. 2.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR BURNING OIL.

1,344,029. Specification of Letters Patent. Patented June 22, 1920.

Application filed January 24, 1912, Serial No. 673,237. Renewed November 13, 1919. Serial No. 337,887.

To all whom it may concern:

Be it known that I, ADALBERT FISCHER, a subject of the German Emperor, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Burning Oil, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to an apparatus for burning oil which is sprayed or atomized by being discharged from a spray nozzle or other spraying device, and more particularly to apparatus of this kind having a spray nozzle by which the oil is discharged in the form of a hollow cone. It is of great importance in oil firing that the air which is supplied for supporting combustion of the oil should mix with the sprayed oil as completely and intimately as possible. The object of the present invention is to secure the best possible mixing of the air with the sprayed oil, and also to utilize the available draft, especially in natural draft furnaces, to the fullest extent.

The density of the oil spray being greatest close to the nozzle and decreasing as the spray gets farther from the nozzle, the combustion supporting air can penetrate more easily and mingle more completely and intimately with the oil in that portion of the spray farther from the nozzle and which is more rarefied and has the oil particles more widely separated, than it can in the denser portions near the nozzle. Also, the inner zones of the spray cone or the portion nearest the nozzle, because of the greater density, present much greater resistance to the air than the outer zones where the spray is less dense. It is found that where the air is allowed to strike the inner zones as well as the outer zones of the spray cone, not only does a less perfect combustion result, due to imperfect mixture of the air with the oil, than where the air is directed only to the outer zones of the spray cone, but also that there is more or less interference with the draft. This is probably due to the deflection of the air currents which strike the inner zones of the spray cone. It is especially important in furnaces operating with a natural draft to utilize to the best advantage the draft which is not consumed in friction through the furnace, boiler flues, up-take and chimney, both by avoiding, so far as possible, interference with the draft, and by causing the available draft to be used to the best advantage for securing the desired mixture of the air with the oil.

The desired results are secured in accordance with the present invention by providing means for directing the combustion supporting air to the outer zones of the spray cone and for preventing access of the air to the inner, denser zones; and to provide for varying conditions of the spray and the draft, such means are best made adjustable. In carrying the invention into practice, I preferably provide a plurality of shields arranged about the nozzle or other spraying device, one or more of which are adjustable and which are adapted to cut off successive zones of the spray cone from access of the combustion supporting air.

A full understanding of the invention can best be given by a detailed description of a simple form of apparatus embodying the various features of the invention in a preferred form, and such a description will now be given in connection with the accompanying drawings showing such an apparatus.

In said drawings:

Figure 1 is a central sectional view of the apparatus,

Fig. 2 is a similar view showing the movable shields in operative position.

Fig. 3 is an enlarged sectional view of a suitable form of spray nozzle.

Referring to the drawings: 10 represents a masonry or other fire wall of a furnace provided with a spray opening 11 to receive the spray from a spray nozzle 12 of suitable form, but which is preferably a centrifugal or other spray nozzle adapted to discharge the spray in the form of a hollow cone as indicated in Fig. 1 by the dotted lines *a*, as for example, a nozzle such as the nozzle of well known form shown in Fig. 3. A casing 13 mounted in position to register with the spray opening 11 is provided with air inlet openings 14, which are controlled to regulate the air admission by means of a controlling slide or register 15. Surrounding the nozzle is a cylindrical shield 20 which extends forward of the nozzle sufficiently so that its front edge will stand close to or near the surface of the spray when the apparatus is in operation. This shield will thus serve to

prevent access of the air to an inner zone of the spray cone where the spray is of the greatest density. Mounted to slide on the cylindrical shield 20 and on each other are a series of three concentrically arranged shields 21, 22 and 23, the shield 21 being mounted to slide on the shield 20, the shield 22 to slide on the shield 21, and shield 23 to slide on the shield 22. These sliding shields may be drawn back to the position shown in Fig. 1, or may be pushed forward to the positions shown in Fig. 2, in which positions each of the shields 21, 22 and 23 cuts off from air access an additional zone of the spray cone. Instead of all three of these sliding shields being in operative position, the inner shield 21 alone may be in operative position, while the shields 22 and 23 are drawn back away from the spray cone; or the shield 22 may also be in operative position with the outer shield 23 only withdrawn. A stop 24 on the stationary shield 20 limits the forward movement of the shield 21, and the forward movement of the shield 22 relatively to the shield 21 and of the shield 23 relatively to the shield 22 is limited by similar stops 25. Stops 26 are also provided for limiting the rearward movement of the shield 23 relatively to the shield 22 and of the shield 23 relatively to the shield 21. The sliding shields may be operated by means of handles 30 extending from the outer shield 23, or other suitable operating means for moving the outer shield, so that all three sliding shields may be moved forward into operating position through the movement given to the outer shield, and then the outer one or two may be drawn back if desired; or separate handles 30 or other operating means may be provided for moving each sliding shield independently of the others within the limits of its independent movement as permitted by the movement limiting stops.

In the apparatus shown, in which the inner shield 20 is stationary, the inner zone or densest portion of the spray cone will be always cut off from access of the air, and one or more of the sliding shields will be set in the operative position shown in Fig. 2 according to the extent of the portion of the spray cone from which it is desired to cut off the air. In general, other conditions being equal, the greater the quantity of the oil being sprayed, the greater will be the zone corresponding to a given density of the spray, and from which the air should be cut off by the shields. So also with variations in the draft, the lighter the draft available for carrying the air through the oil the greater the extent of the zone of the spray cone which should be covered by the shields; this for the purpose of directing the air to the less dense portions of the spray which are the more readily penetrated, and also for reducing the opening through which the air strikes the spray and thereby increasing the velocity of the air.

It will be understood that while the invention finds its greatest utility as applied to oil firing apparatus having a spray nozzle by which the spray is discharged in the form of a hollow cone, yet the invention may be applied to apparatus having other nozzles or other means for spraying the oil whether the oil is combined with steam or air or other fluid or not, and is useful in connection with the burning of oils of practically any character. It will be understood also that the invention is not to be limited to the exact construction shown and to which the foregoing description has been mainly confined, but that it includes changes and modifications thereof within the claims.

What is claimed is:—

1. In an apparatus for burning oil, the combination with a spray nozzle for spraying the oil in the form of a hollow cone, and means for supplying air to the oil spray, of a shield mounted to extend about and to be closely adjacent to the spray cone at its forward edge to prevent access of air to the inner zones of the spray cone and to direct the air to an outer zone of the spray cone which is beyond the end of the shield, said shield being of sufficient extent to prevent access of air to the inner portion of the spray cone where the spray is of such density as to deflect the air current and substantially prevent the air from entering the spray, whereby the air will be caused to strike the portions of the spray cone which offer less resistance to the air.

2. In an apparatus for burning oil, the combination of an air chamber having a spray opening through one wall thereof, means for supplying air to said chamber, a spray nozzle for spraying the oil in the form of a hollow cone mounted to discharge the same into said air chamber and outward through said spray opening, and a shield mounted to extend into the air chamber about the spray cone to prevent access of air to the inner zones of the spray cone and to direct the air to an outer zone of the spray cone between the end of the shield and said spray opening, said shield being of sufficient extent to prevent access of air to the inner portion of the spray cone where the spray is of such density as to deflect the air current and substantially prevent the air from entering the spray, whereby the air will be caused to strike the portions of the spray cone which offer less resistance to the air.

3. In an apparatus for burning oil, the combination of an air chamber having a spray opening through one wall thereof, means for supplying air to said chamber, a spray nozzle for spraying the oil in the

form of a hollow cone mounted to discharge the same into said air chamber and outward through said spray opening, and a shield mounted to extend about the spray cone to prevent access of air to the inner zones of the spray cone and to direct the air to an outer zone of the spray cone between the end of the shield and said spray opening, said shield being of sufficient extent to prevent access of air to the inner portion of the spray cone where the spray is of such density as to deflect the air current and substantially prevent the air from entering the spray, whereby the air will be caused to strike the portions of the spray cone which offer less resistance to the air, and means for adjusting said shield to vary the extent of the inner portion or zone of the spray from which the air is cut off.

4. In an apparatus for burning oil, the combination with a spraying device for spraying the oil, and means for supplying air to the oil spray, of means for directing the air to the outer zones of the spray and for preventing access of the air to the inner, denser zones of the spray, whereby the air will be caused to strike the portions of the spray which offer less resistance to the air and where a better mixture of the air and oil will take place, said means being adjustable to vary the extent of the inner portion or zone of the spray from which the air is cut off.

5. In an apparatus for burning oil, the combination with a spray nozzle for spraying the oil, and means for supplying air to the oil spray, of means to direct the air to the outer portion of the spray and to prevent access of the air to the inner portion of the spray where the spray is of such density as to deflect the air current and substantially prevent the air from entering the spray, said means comprising a shield formed to deflect the air to a portion of the spray beyond the shield and adjustable to vary the extent of the inner portion or zone of the spray from which the air is cut off.

6. In an apparatus for burning oil, the combination with a spray nozzle for spraying the oil in the form of a hollow cone, and means for supplying air to the oil spray, of means for preventing access of the air to an inner zone of the spray and for directing the air to an outer zone of the spray including a shield which is adjustable into and out of operating position to vary the extent of the inner portion or zone of the spray from which the air is cut off.

7. In an apparatus for burning oil, the combination with a spray nozzle for spraying the oil in the form of a hollow cone, and means for supplying air to the oil spray, of a shield extending about and beyond the nozzle to prevent access of the air to the inner, denser portion of the spray, and a movable shield extending about the first said shield and formed to deflect the air to a portion of the spray beyond it when in operative position and movable forward and backward to increase or decrease the extent of the inner zone of the spray from which the air is cut off.

8. In an apparatus for burning oil, the combination with a spray nozzle for spraying the oil, and means for supplying air to the oil spray, of a plurality of concentric shields arranged about the nozzle and adjustable to cover more or less of the inner, denser portion of the spray against access of the air.

9. In an apparatus for burning oil, the combination with a spray nozzle for spraying the oil in the form of a hollow cone, and means for supplying air to the oil spray, of a plurality of shields arranged about the nozzle and adjustable to cover more or less of the inner denser portion of the spray cone against access of the air.

10. In an apparatus for burning oil, the combination with a spray nozzle for spraying the oil, and means for supplying air to the oil spray, of a plurality of concentric shields arranged about the nozzle and successively one outside of another and each movable independently of another into and out of position in which its forward edge is adjacent to the outer surface of the spray.

11. In an apparatus for burning oil, the combination with a spray nozzle for spraying the oil in the form of a hollow cone, and means for supplying air to the oil spray, of adjustable means for controlling the air supply, and means for directing such air to the outer portion of the spray and for preventing access of the air to the inner denser portion or zone of the spray where the spray is of such density as to deflect the air current, said last said means being independently adjustable to vary the extent of the inner portion or zone of the spray from which the air is cut off.

In testimony whereof, I have hereunto set my hand, in the presence of two subscribing witnesses.

ADALBERT FISCHER.

Witnesses:
THOMAS W. MURPHY,
SIMON W. SNYDER.