Feb. 27, 1934. W. P. SCHENCK ET AL 1,949,260

OIL BURNING APPARATUS

Filed Dec. 15, 1931 2 Sheets-Sheet 1

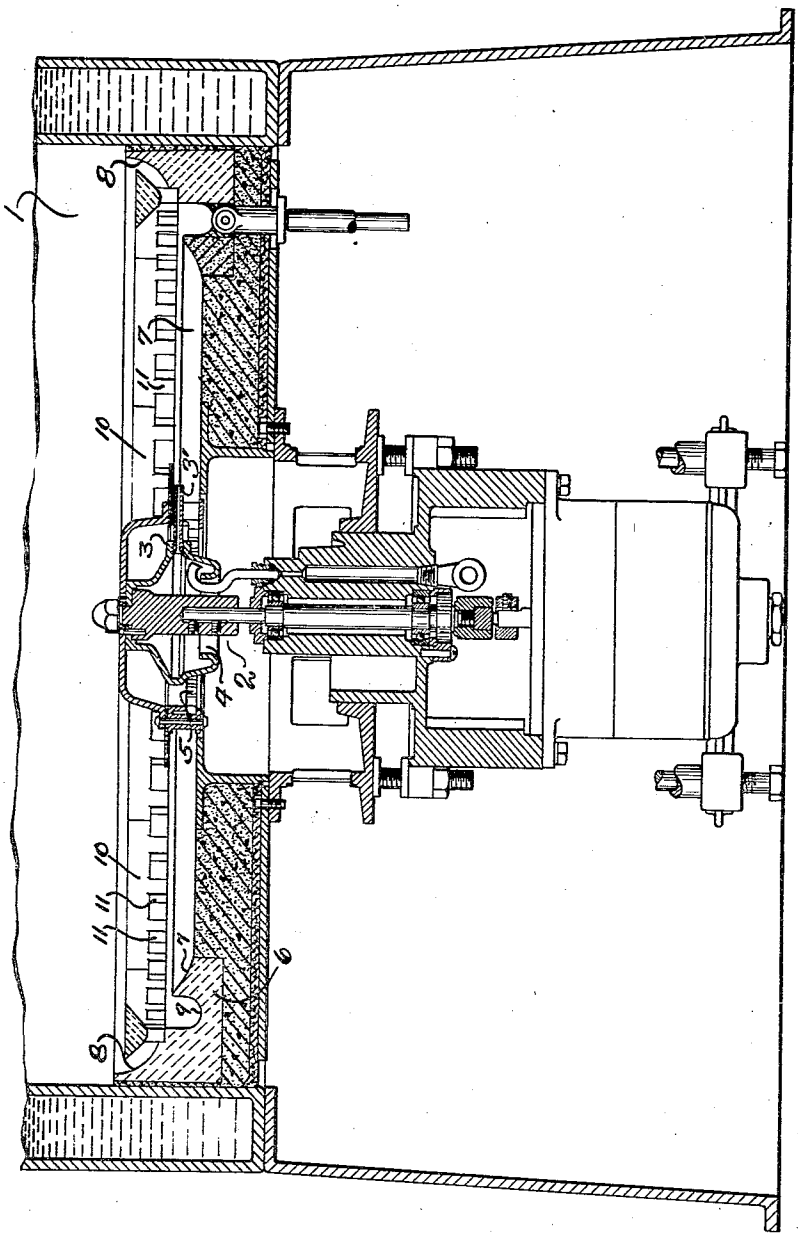


Fig. 1.

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Fig. 2.

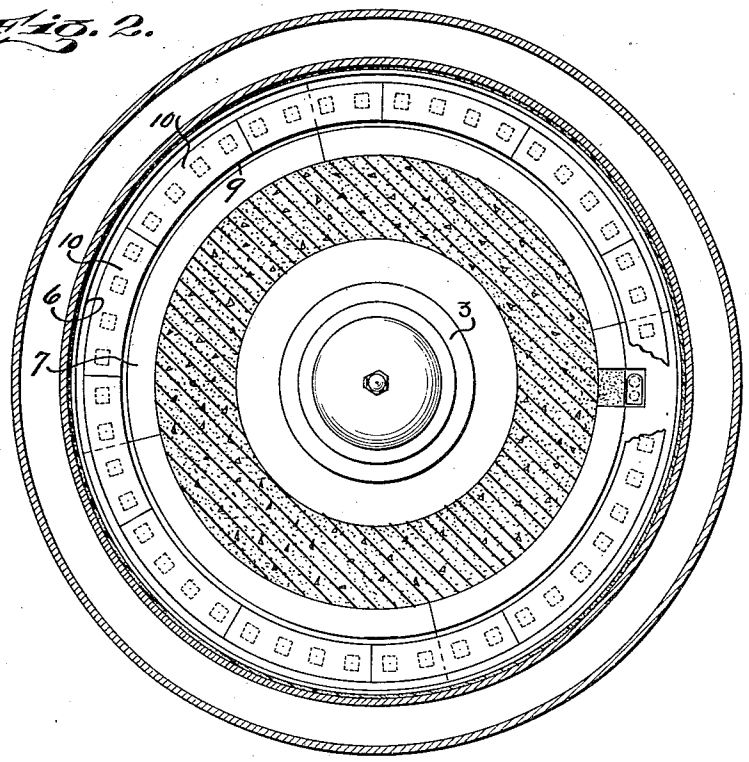
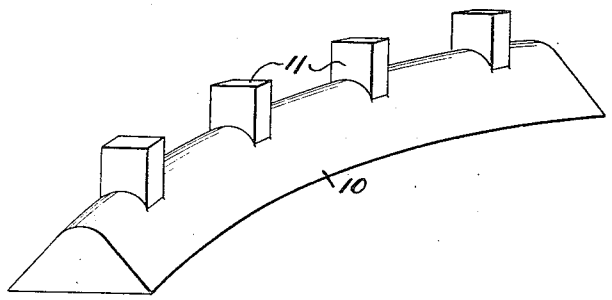


Fig. 3.



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OIL BURNING APPARATUS

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Application December 15, 1931
Serial No. 581,106

11 Claims. (Cl. 158—4)

This invention relates to an improvement in oil burning apparatus and is particularly directed to the provision of an improved combustion chamber for liquid fuel burners of the vertical rotating type, that is, burners of the type employing a rotatable head rotating in a horizontal plane, the head projecting into the combustion chamber and projecting a combustible mixture continuously outwardly by centrifugal force toward or against the refractory surface of the combustion chamber.

One of the objects of our invention is the provision of a combustion chamber which is so constructed and arranged that the speed or rate of combustion is retarded and the formation of soot and smoke by reason of partial combustion substantially eliminated.

More specifically our invention provides a construction in which the action of the burner is improved by so constructing the walls of the combustion chamber that a portion of the gases of combustion is deflected upwardly and inwardly toward the fuel mixture being thrown outwardly by the burner head, these gases being picked up by this fuel mixture and as these gases of combustion are to a large extent inert gases they have the effect of reducing the ease with which the combustible constituents of the fuel unite with the oxygen of the air supply, thereby reducing the speed or rate of combustion and producing a flame which is blue in color and in which combustion noises are considerably lessened.

Such a construction imparts a further advantage to liquid fuel burning apparatus in that formation of soot or carbon in the flame or their deposit on the refractory are practically eliminated.

Attempts have been made prior to our invention to improve the operation of liquid fuel burners by throttling the drafts on the boiler or furnace so that the rising wall of combustion gases is held in the fire chamber or combustion chamber long enough to enable the centrifugal action of the rotating head to pick up a portion of these gases and project the same outward towards the refractory surfaces along with the fuel and air mixture. Such furnaces, however, are extremely sensitive to the slightest change in draft conditions, a change in draft sometimes promoting the introduction of such an increased quantity of gases into the fuel and air mixture that the flame can not longer be propagated and combustion ceases.

Another disadvantage of using throttled drafts is that with a burner igniting automatically the flame often snuffs out when the burner is started with the refractory and boiler surfaces cold.

The present invention, as above noted, provides a specially constructed combustion chamber which functions in such a manner that the desired results are obtained without draft throttling.

In the drawings:

Fig. 1 is a sectional elevational view through the combustion chamber and burner of an embodiment of our invention;

Fig. 2 is a plan view of Fig. 1; and

Fig. 3 is a view in perspective of a part of the refractory shown in Figs. 1 and 2.

Referring to the drawings in detail, the combustion chamber embodying our invention is designated 1, while 2 designates a burner of the vertical type, that is, a burner of the type employing a rotatable cup 3 rotated in a horizontal plane, the liquid fuel (oil and air) supplied to this cup being thrown outwardly therefrom by centrifugal force toward the walls of the combustion chamber 1.

It is customary in such burners to provide for supplying air to the interior of the rotating cup and to the exterior of the cup as well; the cup of our burner is open at the bottom as shown at 4 to admit air to the interior of the cup while about the lower part of the cup are louvers 5 for introduction of air into the liquid fuel which is thrown outwardly by the cup 3, the air and liquid fuel, as will be understood, providing a combustible mixture.

6 designates arc-shaped sections of refractory laid end to end and providing a lining along the bottom and for a short distance up at the sides of the combustion chamber. The inner face of each of these sections, that is, the face nearest the burner is slightly concaved and inclined outwardly and upwardly as shown at 7 to provide an annular deflecting surface in the path of the air entering the combustion chamber through the louvers 4. The refractories 6 are also provided with a slightly concaved outwardly and upwardly inclined deflecting surface 8 adjacent the wall of the combustion chamber, this surface lying slightly above the plane of the fuel thrown outwardly by the cup 3. Intermediate the deflecting surfaces 7 and 8 the refractories 6 are provided with a gutter or groove 9.

10 designates a series of arc-shaped refractory sections laid end to end to provide a circular flame spreading and gas re-circulating baffle. Each of these refractories is supported by the

refractories 6 on legs 11. One of these refractory sections is shown in Fig. 3 in inverted position.

Each of the refractories 10 is substantially flat on top with curved undersides and the structure is slightly raised by the legs 11 above the refractories 6 and is positioned in front of and in spaced relation to the deflecting surface 8 of the refractories 6.

As will be understood the initial combustible mixture of atomized liquid fuel and air is projected by the tubes 3' carried by the rotating head 3 in a horizontally circular plane outwardly from the head. The upper plane of the atomized fuel just clears the top of the deflecting surface 7, a portion of the fuel striking the outer wall of the groove or gutter 9 which is slightly higher than the inner wall of this groove and flowing to the bottom of the groove, while the remainder of the fuel passes on to strike the curved underside of the baffle 10 and between the legs 11 thereof to the upwardly inclined deflecting surface 8 of the refractories 6. The lower plane of air passing into the combustion chamber through the louvers 5 will strike the upwardly and outwardly inclined deflecting surface 7 of the refractories 6 to be deflected upwardly to strike the refractory baffle 10.

Combustion of a portion of the fuel takes place in the gutter 9 and the gases of this combustion rise to mix with the combustible mixture about the baffle 10 and adjacent the deflecting surface 8. The baffle 10 as will be apparent is so constructed and so disposed in the combustion chamber as to effect, in cooperation with the deflecting surface 8, an inward deflection of a portion of the gases of combustion to bring these practically inert gases into the path of the fuel mixture being projected outwardly from the head 3 to reduce the speed or rate of combustion desired.

It will be seen, therefore, from the foregoing that we have provided liquid fuel combustion apparatus in which the combustion chamber is so constructed and arranged as to effect introduction of the gases of combustion into the combustible fuel mixture being projected outwardly toward the rotating burner head, thereby eliminating the difficulties above enumerated in connection with prior attempts, by throttling the drafts on the boiler, to retain the combustion gases in the combustion chamber long enough for them to be picked up by the rotating burner head.

What we claim is:—

1. Combustion chamber construction for liquid fuel burners comprising in combination a plurality of arc-shaped refractories laid end to end to provide a circular structure, said refractories being provided on their inner faces with outer and inner outwardly and upwardly curved deflecting surfaces and with an intermediate groove or gutter, and a plurality of other arc-shaped refractories laid end to end supported by the first mentioned refractories in spaced relation thereto, the last mentioned refractories being curved on their underside and disposed adjacent to but spaced from the outer deflecting surface of the first mentioned refractories.

2. Liquid fuel burning apparatus comprising in combination a combustion chamber, a burner having a head rotatable in a horizontal plane and extending into said chamber through the bottom thereof for supplying a fuel and air mixture to the combustion chamber, means for introducing air into the combustion chamber adjacent the lower portion of the burner head, a refractory structure about the bottom and side wall of the combustion chamber, said structure being provided with an upwardly and outwardly curved deflecting surface in the path of the air introduced into the combustion chamber adjacent the lower portion of the burner head, and with an upwardly and outwardly curved deflecting surface above and outwardly of the combustion chamber with respect to the first-mentioned deflecting surface, and with an annular groove or gutter intermediate said deflecting surfaces, and refractories disposed in superimposed spaced relation to said last-mentioned deflecting surface, said refractories being provided on their underside with a curved surface cooperating with said deflecting surfaces.

3. Liquid fuel burning apparatus comprising in combination a combustion chamber, a burner having a head rotatable in a horizontal plane and extending into said chamber for supplying a fuel and air mixture to the combustion chamber, said chamber being provided with an outwardly and upwardly extending annular face or surface in the path of the lower plane of the fuel thrown outwardly by said rotatable head, and with a cooperating outwardly and upwardly extending annular face or surface disposed outwardly of the first mentioned surface, and refractories curved on their underside disposed in superimposed spaced relation to the last mentioned surface.

4. Apparatus for use in the combustion chamber of liquid fuel burners, said apparatus comprising in combination a refractory ring or annulus adapted to lie adjacent the wall of the combustion chamber, the upper face of said refractory ring or annulus being depressed to provide a groove or gutter, the upper face of said ring outwardly of said gutter being provided with an upwardly and outwardly extending curved deflecting surface and inwardly of said groove with an outwardly and upwardly curved deflecting surface, a refractory annulus or ring supported by the first mentioned refractory in superimposed spaced relation thereto intermediate the gutter and the first mentioned deflecting surface, the last mentioned refractory being curved on its underside and partially overlying said groove or gutter.

5. Apparatus for use in the combustion chamber of liquid fuel burners, said apparatus comprising in combination a refractory ring or annulus adapted to lie adjacent the wall of the combustion chamber, the upper face of said refractory ring or annulus being depressed to provide a groove or gutter, the upper face of said ring or annulus outwardly of said gutter being provided with an upwardly and outwardly extending curved deflecting surface, and inwardly of said groove with an outwardly and upwardly curved deflecting surface, the plane of the outer edge of the inner deflecting surface being below the inner edge of the outer deflecting surface, a refractory annulus or ring supported by the first mentioned annulus in superimposed spaced relation thereto intermediate the gutter and the first mentioned deflecting surface, the underside of the superimposed annulus or ring being convex and spaced above the first mentioned deflecting surface.

6. Liquid fuel burning apparatus comprising in combination a combustion chamber, a burner having a head rotatable in a horizontal plane extending into said chamber for supplying a fuel

and air mixture to the combustion chamber, horizontal slinger tubes carried by said head and rotatable therewith, a refractory annulus surrounding said head and spaced outwardly therefrom, said annulus having outwardly and upwardly extending deflecting surfaces spaced from each other by a groove or gutter in the refractory, the outer of said deflecting surfaces being above the plane of said tubes, and a refractory annulus mounted on and spaced above said first mentioned refractory annulus intermediate said deflecting surfaces and outwardly of said groove or gutter, the underside of the last mentioned refractory annulus being convex.

7. Liquid fuel burning apparatus comprising in combination a combustion chamber, a burner having a head rotatable in a horizontal plane extending into said chamber for supplying a fuel and air mixture to the combustion chamber, said head comprising horizontally disposed slinger tubes carried thereby and rotatable therewith, means for introducing air into the combustion chamber below the plane of said tubes, a refractory annulus surrounding said head and spaced outwardly therefrom, said annulus having outwardly and upwardly extending deflecting surfaces spaced from each other by a groove or gutter in the refractory, the outer of said deflecting surfaces being above the plane of said tubes, the inner of said deflecting surfaces lying in the path of the air admitted to the combustion chamber below said tubes, and a refractory annulus mounted on and spaced above said first mentioned refractory annulus intermediate said deflecting surfaces and outwardly of said groove or gutter.

8. Liquid fuel burning apparatus comprising in combination a combustion chamber, a burner having a head rotatable in a horizontal plane extending into said chamber for supplying a fuel and air mixture to the combustion chamber, said head comprising horizontally disposed slinger tubes carried thereby and rotatable therewith, means for introducing air into the combustion chamber below the plane of said tubes, a refractory annulus surrounding said head and spaced outwardly therefrom, said annulus having outwardly and upwardly extending deflecting surfaces spaced from each other by a groove or gutter in the refractory, the outer of said deflecting surfaces being above the plane of said tubes, the inner of said deflecting surfaces lying in the path of the air admitted to the combustion chamber below said tubes, and a refractory annulus mounted on and spaced above said first mentioned refractory annulus intermediate said deflecting surfaces, the underside of said last mentioned refractory annulus being convex.

9. Liquid fuel burning apparatus comprising in combination a combustion chamber, a burner having a head rotatable in a horizontal plane extending into said chamber for supplying a fuel and air mixture to the combustion chamber, horizontal slinger tubes carried by said head and rotatable therewith, a refractory annulus surrounding said head and spaced outwardly therefrom, said annulus having outwardly and upwardly extending deflecting surfaces spaced from each other by a groove or gutter in the refractory, the outer of said deflecting surfaces being above the plane of said tubes, and a refractory annulus mounted on and spaced above said first mentioned refractory annulus intermediate said deflecting surfaces and outwardly of said groove or gutter.

10. Liquid fuel burning apparatus comprising in combination a combustion chamber, a burner head rotatable in a horizontal plane extending into said chamber through the bottom thereof for supplying a fuel and air mixture to the combustion chamber, means for introducing air into the combustion chamber adjacent the lower portion of the burner head, a hearth, refractories on the hearth providing, outwardly of the burner, an outwardly and upwardly extending deflecting surface in the path of the fuel and air mixture thrown off from the burner head to assist in effecting an inward deflection of gases of combustion into the path of the fuel and air mixture being thrown outwardly by the burner head, other refractories on the hearth providing another outwardly and upwardly extending deflecting surface intermediate the burner head and the first-mentioned deflecting surface, disposed below the level of the first-mentioned deflecting surface so as to be in the path of the air introduced into the combustion chamber adjacent the lower portion of the burner head and to deflect the same into the path of the fuel and air mixture adjacent the periphery of the combustion chamber, an annular groove or gutter intermediate said deflecting surfaces, and refractories disposed in spaced relation to the first mentioned deflecting surface, and provided on their underside with a convex face overlying but spaced from the first mentioned deflecting surface.

11. Combustion chamber construction for liquid fuel burners comprising in combination a hearth, a plurality of refractories laid end to end upon said hearth adjacent the periphery thereof, said refractories being provided on their upper faces with an outwardly and upwardly curved deflecting surface and with another outwardly and upwardly curved deflecting surface disposed outwardly of the combustion chamber with respect to the first mentioned deflecting surface and with a groove or gutter intermediate said deflecting surfaces, and a plurality of other refractories laid end to end and supported by the first mentioned refractories in spaced relation thereto, the last mentioned refractories being curved on their underside and disposed adjacent to but spaced from the outer of the said deflecting surfaces of the first mentioned refractories.

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