Jan. 7, 1936. J. W. CANNON 2,026,609

OIL BURNER

Filed June 18, 1932 4 Sheets-Sheet 1

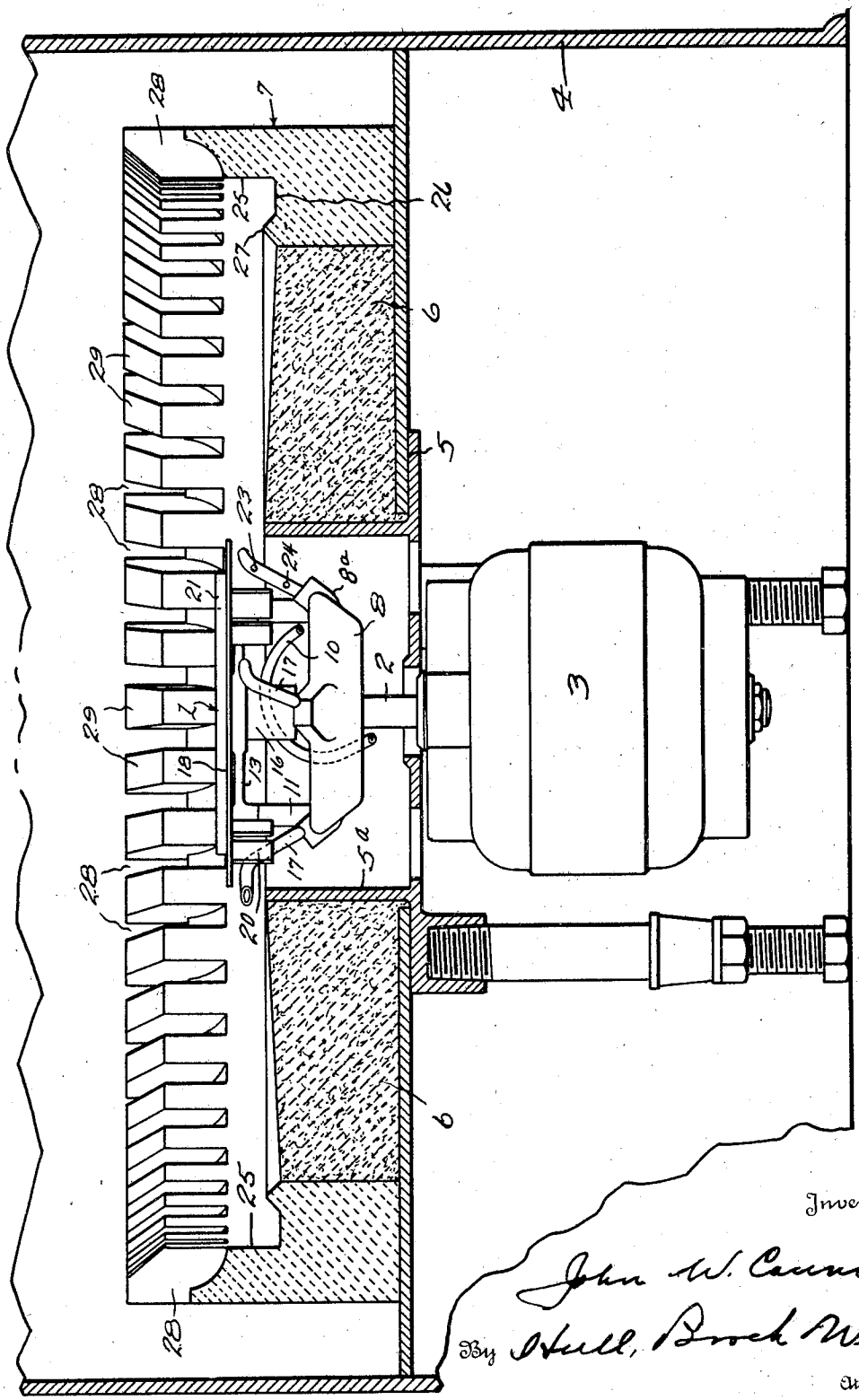


Fig. 1

Inventor

John W. Cannon

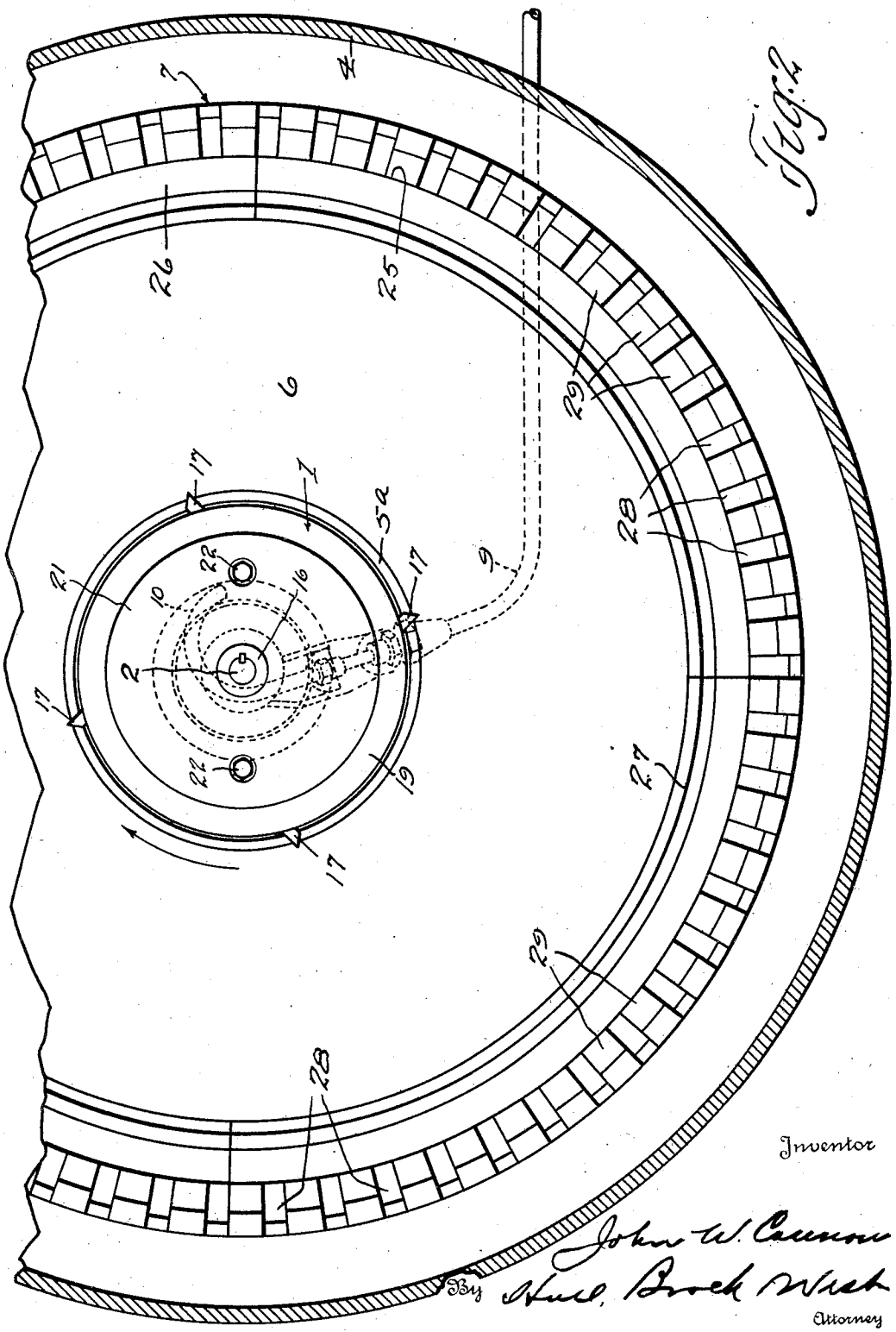
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OIL BURNER

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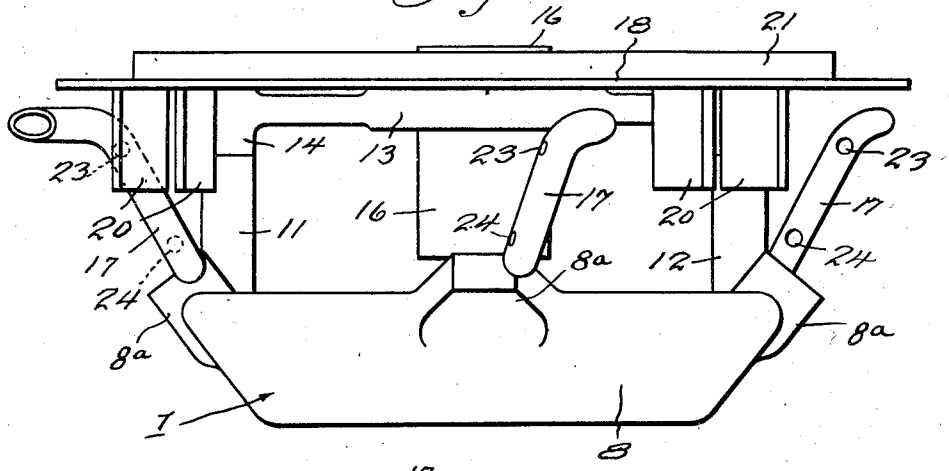
Attorney

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OIL BURNER

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Fig. 3



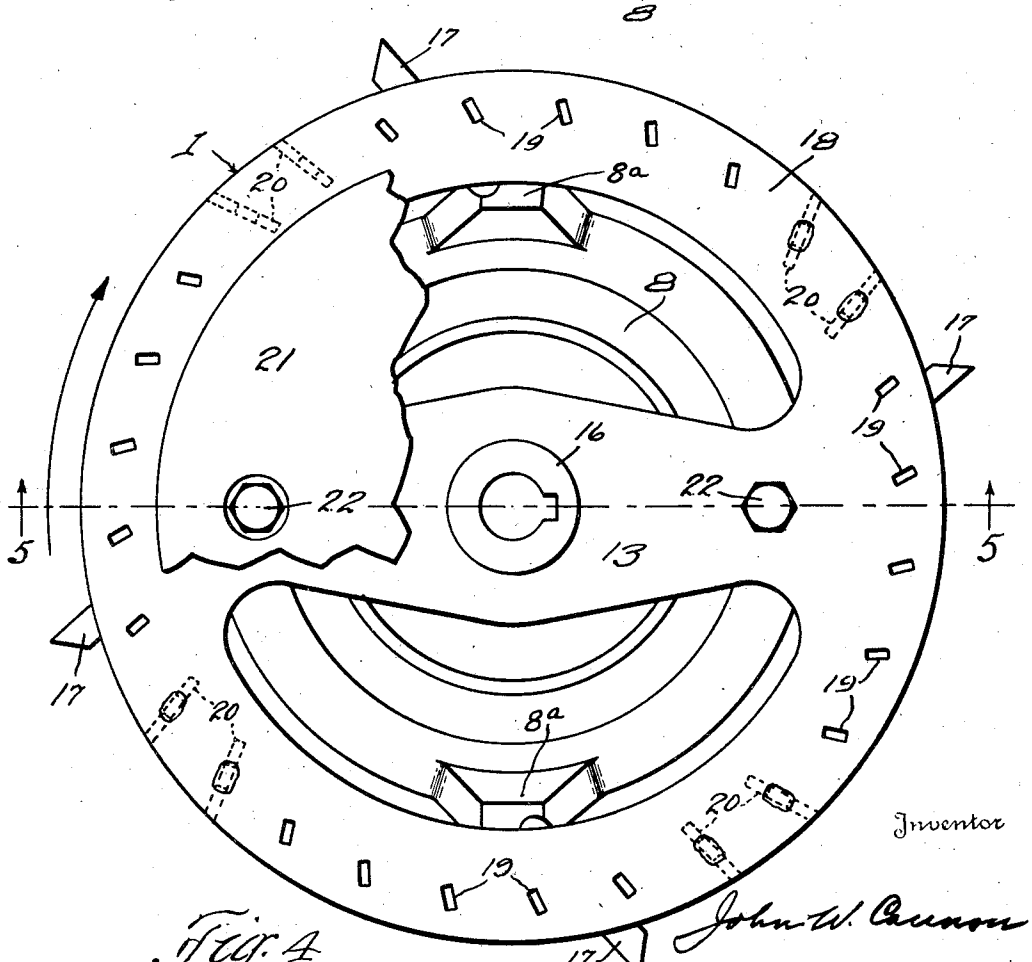


Fig. 4

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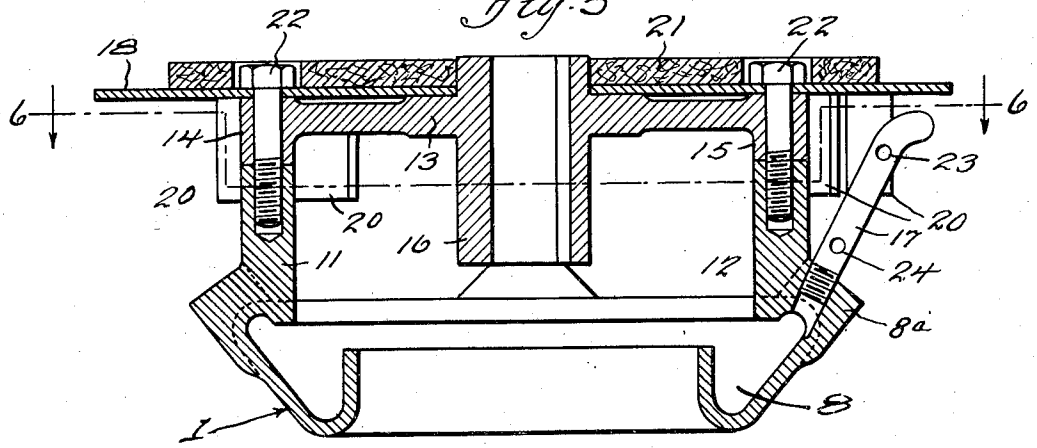
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OIL BURNER

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Fig. 5



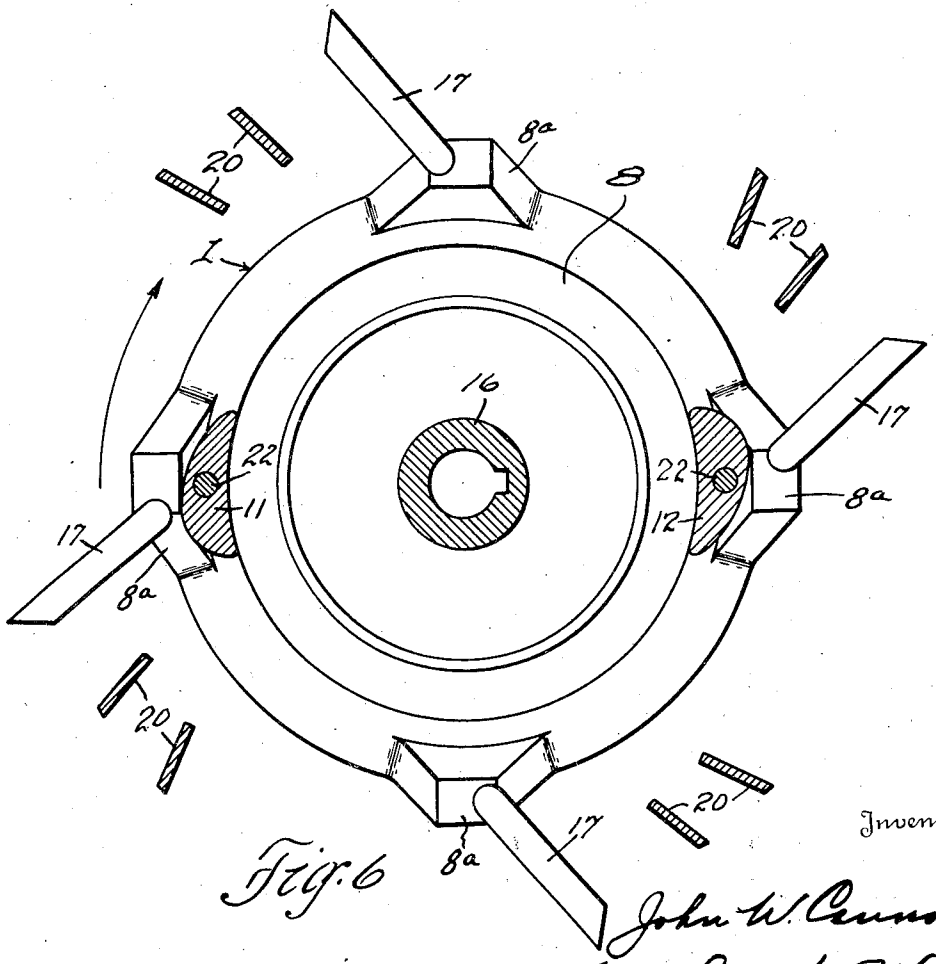


Fig. 6

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Patented Jan. 7, 1936

2,026,609

UNITED STATES PATENT OFFICE

2,026,609

OIL BURNER

John W. Cannon, Plainfield, N. J.

Application June 18, 1932, Serial No. 618,003

14 Claims. (Cl. 158—77)

This invention relates generally to automatic heat generators and more particularly to oil burning units which are designed for use in connection with household furnaces.

One of the main objects of the invention is to provide a rotary oil distributing head which is simple in construction, safe and dependable in operation, together with a new and improved fire ring which is so designed and so positioned with respect to the oil distributing head as to produce a very hot flame near the base of the combustion ring and spaced from the rotary head.

Another object of the invention is to provide a new and improved oil distributing head and fire ring for furnaces of the character described in which the liquid fuel is converted into a gas at the base of the fire ring in such a manner that most of the combustion is completed before the flame and gases leave the projections or fingers on the combustion ring.

Another object of the invention is to provide an oil distributing head and fire ring for furnaces of the character described which will produce a large amount of surface combustion and greatly increase the rate of combustion.

A further object of the invention is to provide an oil distributing head and fire ring for furnaces of the character described in which rapid and efficient combustion is obtained at and near the base of the fire ring in the form of a circle of flame similar to a large gas burner and which is directed outwardly and upwardly.

A still further object of the invention is to provide a rotary fuel distributing head and fire ring which is so constructed and positioned with respect to the furnace that the distributing head will withstand the destructive action of the fire and at the same time produce a very hot and efficient flame.

Another object of the invention is to provide a rotary distributing head of the character described which includes an oil receptacle and a plurality of tubes leading therefrom, the tubes being provided with means for emitting liquid fuel therefrom should the ends of the tubes become obstructed and which is also provided with means for reducing the temperature of the tubes and for increasing the velocity of the liquid fuel as it leaves the tips of the tubes.

Another object of the invention is to provide a rotary distributing head for furnaces of the character described which includes a bowl or receptacle which is disposed a considerable distance below the hearth and which is also provided with a fan member having a plurality of blades which are readily attached or detached therefrom.

Further and more limited objects of the invention will appear as the description proceeds and by reference to the accompanying drawings in which Fig. 1 is a central vertical sectional view of my device showing it positioned in a furnace; Fig. 2 is a sectional plan view of the device as shown in Fig. 1; Fig. 3 is a side elevation of the oil distributing head; Fig. 4 is a plan view of the oil distributing head, the cover plate being partially broken away; Fig. 5 is a vertical sectional view on the line 5—5 of Fig. 4 and Fig. 6 is a horizontal sectional view taken substantially on the line 6—6 of Fig. 5.

Referring now to the drawings, the reference character 1 designates a rotary oil distributing head which is supported upon a shaft 2 of an electric motor 3 which is supported in any suitable manner. The reference character 4 designates a wall of the boiler or furnace. The bottom of the furnace is closed by means of a wall 5 having an inwardly directed circular flanged portion 5a thereon. Disposed adjacent the bottom wall 5 is a hearth 6 formed of suitable insulating material and about which is disposed my improved fire ring 7 the details of construction of which will be described hereinafter. The shaft 2 of the motor projects through the opening provided in the bottom wall of the fire box and the rotary distributing head is non-rotatably secured thereto. The rotary distributing head consists essentially of a fuel receiving receptacle 8 to which fuel is supplied through a supply pipe 9 having an overhanging head portion 10 removably secured thereto. Preferably cast integral with the receptacle 8 are a pair of upstanding lugs or bosses 11 and 12 and fitting thereover is a spider 13 having downwardly extending bosses 14 and 15. Cast integral with the spider is a hub 16 which fits over the shaft of the motor. Preferably formed integral with the oil receiving receptacle 8 are a plurality of bosses 8a having threaded bores therein. Secured within the bores in the bosses 8a respectively are a plurality of tubes 17 which are disposed at an angle to the receptacle as shown most clearly in Figs. 3 and 4. The fuel delivery tubes are disposed so as to be inclined rearwardly with respect to the direction of rotation of the receptacle. Disposed over the spider 13 is an annular fan member of the sirocco type having a top portion 18 the periphery of which is provided with a plurality of angularly disposed slots 19 in which are detachably secured fan blades 20. Fitting

over the top of the unit is a cover member 21 formed of suitable heat insulating material which protects the fuel receptacle from the head of combustion. The spider 13 is secured to the bosses 11 and 12 by means of bolts or screws 22 which extend through openings provided in the bosses 14 and 15 and threadedly engage with the bosses 11 and 12. The lugs or bosses 11 and 12 are shaped in section as shown most clearly in Fig. 6 so as to tend to pump air through the centrally disposed opening in the receptacle or at least to reduce the resistance offered to the flow of air through said opening when the device is in operation.

The fuel oil receptacle or chamber 8 is somewhat annular in shape and provided with an inwardly directed overhanging ledge portion which forms a peripherally extending groove or chamber from which lead the tubes 17. The tubes 17 project outwardly a slight distance beyond the ends of the fan blades 20. The shape of the receptacle 8 permits a draft of air to be drawn upwardly through the receptacle and about the motor shaft which tends to reduce the temperature of these parts. The rotary distributing head is rotated in a direction indicated by the arrow in Fig. 2 and each of the tubes 17 is provided on the advance side thereof with openings 23 and 24 arranged as shown most clearly in Fig. 3. The openings 23 and 24 constitute means for emitting liquid fuel from the tubes should the ends of the tubes become clogged or filled with carbon. The delivery ends of the tubes are also cut on an oblique angle as shown whereby to increase the velocity of the fuel as it leaves the ends of the tubes and also reduces the danger of backfiring to the tip of the tubes. Should the ends of the tubes become obstructed or filled up as a result of carbonizing, a small amount of oil will be delivered through the openings 23 and 24 so that the oil will not overflow from the oil receptacle but will delay the starting operation of the unit sufficiently to enable the automatic ignition control to cut off the supply of oil to the oil receptacle. The fan blades 20 are adapted to be quickly and readily detached from or secured to the periphery of the fan so that they may be removed or replaced on the job if desired. The oil receiving recepacle 8 is disposed a considerable distance below the plane of discharge of fuel and the discharge tubes having their delivery ends disposed below that portion of the upper surface of the hearth which is adjacent the distributing head so that the fuel oil receptacle is not subjected to such an intense heat, which is another safety feature. From an inspection of Figs. 5 and 6 it will be seen that the fuel receptacle is provided with a plurality of bosses 8^a which extend upwardly and outwardly therefrom and to which the tubes 17 are secured.

My improved fire ring is disposed outwardly of the distributing head and is shaped in section as shown most clearly in Fig. 1. The fire ring is shaped to provide an annular vertical peripheral wall 25 against which fuel is discharged and an inwardly disposed grooved portion 26 which is disposed below the plane of discharge of fuel. Disposed inwardly of the grooved portion 26 is a deflector 27 shaped as shown which projects upwardly to or slightly above the plane of discharge of fuel. The upper portion of the peripheral wall of the fire ring is provided with a plurality of spaced slots 28 which provide fingers or projections 29, the lower ends of the slots being disposed slightly above the plane of discharge of the fuel. That portion of the peripheral wall of the fire ring between said fingers is curved outwardly toward the top edge of the fire ring as shown most clearly in Fig. 1. The centrifugal action caused by the high rotation of the rotary head throws the fuel in a spray from the discharge tubes toward the fire ring. The greater portion of liquid fuel passes over the top edge of the deflector 27 and strikes the combustion ring just below the base of the slots 28. The bottoms of the slots 28 are curved so as to direct the products of combustion away from the rotary head. The deflector 27 tends to deflect the air upwardly permitting only a small amount of air to strike the fire ring adjacent the base thereof and directs the air through the slots near the top of the ring. The fingers 29 are heated to a very high temperature and the products of combustion coming in contact with the surface of the highly heated fingers greatly increase the rate of combustion. The construction and arrangement of the rotary distributing head and the position and shape of the fire ring produces a very hot and efficient flame which does not whirl off of the fire ring or above the fire ring. The combustion ring is made of a material of high thermal conductivity such as fused alumina or silicon carbide. The high thermal conductivity of the ring tends to produce more uniform temperature which is evenly distributed and tends to eliminate hot spots within the furnace and also to prevent cracking of the fire ring due to uneven heat distribution. The fingers or projections 29 tend to hold the flame down and to prevent it from whirling. The material of which the fire ring is made has a thermal conductivity greater than 0.006 cal/cm³/°C./sec. Such a material is fused alumina bonded with a material which reduces the tendency to spalling such as titania. Silicon carbide has a still higher thermal conductivity which may reach as high a value as nine times that of fire clay. It is very strong mechanically at high temperatures and withstands thermal shocks well on account of its low coefficient of expansion. The high conductivity of this material tends to keep the combustion ring and its upwardly extending projections at a uniform temperature. This is important in the matter of obtaining complete combustion of the fuel. The higher rate of combustion in combination with the high thermal conductivity of the fire ring cooperate to increase the rate of combustion and to produce an unusually great amount of radiant energy.

The fire ring has great density and is formed of material that is impervious to oil. The oil spray from the rotary head will remain on the surface, which will give quicker ignition on a cold start and increases the skin temperature of the fire ring after it becomes hot.

It will now be clear that I have provided an oil distributing unit and fire ring therefor which will accomplish the objects of the invention hereinbefore stated. It is of course to be understood that the embodiment of the invention herein disclosed is merely illustrative and is not to be considered in a limiting sense as various changes may be made in the details of construction as well as in the size, shape and arrangement of parts without departing from the spirit of my invention as the invention is limited only in accordance with the scope of the appended claims.

Having thus described my invention, what I claim is:

1. A rotary fuel oil distributing head for use with furnaces of the character described including

an oil receiving receptacle and a fan, a plurality of delivery tubes leading from said receptacle, each of said tubes having one or more openings therein disposed intermediate the ends thereof for reducing the danger of backfiring to the delivery ends of the tubes.

2. A rotary oil distributing head for furnaces of the character described including an oil receiving receptacle, a conduit for delivering fuel oil to said receptacle, a plurality of delivery tubes leading from said receptacle, a spider secured to said receptacle and carrying a hub adapted for attachment to a drive shaft, and a cover secured over said spider and removable to provide access to the delivery end of said conduit.

3. A rotary fuel oil distributing head for furnaces of the character described including an oil receiving receptacle, a conduit for delivering fuel oil to said receptacle, a plurality of delivery tubes leading from said receptacle, a spider secured to said receptacle and carrying a hub adapted for attachment to a drive shaft, means spacing said receptacle a considerable distance below said hub, and a cover secured over said spider and removable to provide access to said conduit.

4. A rotary oil distributing head for furnaces of the character described comprising a rotatable oil receiving receptacle, a plurality of delivery tubes leading from said receptacle, a spider secured to said receptacle and carrying a hub adapted for attachment to a drive shaft and spaced a considerable distance above said receptacle, a cover for said head and a fan disposed below said cover, said receptacle having an unobstructed central opening therein through which air is drawn by said fan.

5. In an oil burning unit, the combination of a rotary fuel distributing head comprising an oil receiving receptacle, delivery tubes leading from said receptacle, a hub connected with said receptacle and spaced a considerable distance thereabove, a fan carried by said head for cooling said receptacle, a cover for said head, said receptacle having an unobstructed central opening therein through which air is drawn by said fan, said receptacle being spaced a considerable distance below said fan so as to permit the flow of air about and over said receptacle, and means for rotating said receptacle and fan.

6. A rotary fuel oil distributing head for burners of the character described including an oil receiving receptacle, a plurality of delivery tubes leading from said receptacle, a fan spaced above said oil receiving receptacle, said oil receiving receptacle having an unobstructed central opening therein so as to permit air to be drawn through said receptacle and between the fan and receptacle, a shaft supporting said fan and oil receiving receptacle and means for rotating said shaft.

7. A fuel oil distributing head for use with furnaces of the character described including a rotary oil receiving receptacle and a fan for cooling said receptacle, and a plurality of delivery tubes leading from said receptacle, the delivery ends of said tubes being cut on an angle oblique to the longitudinal axis thereof.

8. A rotary fuel oil distributing head for burners of the character described including an oil receiving receptacle, a plurality of delivery tubes leading from said receptacle, a fan, said oil receiving receptacle having an unobstructed central opening therein so as to permit air to be delivered through said receptacle, a cover member disposed above and spaced from said receptacle and extending beyond the peripheral edge thereof so as to cause the air delivered by the fan to pass through the receptacle and thence outwardly toward the delivery ends of said tubes, a shaft supporting said fan and oil receiving receptacle and means for rotating said shaft.

9. A rotary fuel oil distributing head of the character described including an oil receiving receptacle having a centrally disposed opening therein, a plurality of lugs projecting upwardly from said receptacle, a plurality of oil delivery tubes leading from said receptacle, a fan and a cover member supported by said lugs, said lugs being so shaped as to offer slight resistance to the flow of air through the opening in said receptacle when the receptacle and fan are rotated.

10. A rotary fuel oil distributing head of the character described including an oil receiving receptacle having a centrally disposed opening therein, a plurality of lugs projecting upwardly from said receptacle, a plurality of oil delivery tubes leading from said receptacle, a fan and a cover member connected with said lugs, said lugs being so shaped as to tend to pump air through said receptacle when the receptacle and fan are rotated.

11. A rotary fuel oil distributing head of the character described including an oil receiving receptacle having a centrally disposed opening therein, a fan for causing air to pass through said opening, means for rotating said receptacle, a plurality of bosses formed on said receptacle having bores therein, a plurality of upwardly extending outwardly directed oil delivery tubes secured in said bores respectively, said tubes having straight delivery end portions disposed in a horizontal plane whereby to increase the nozzle velocity of the fuel oil.

12. A rotary fuel oil distributing head for use with furnaces of the character described including an oil receiving receptacle and a fan, a plurality of fuel oil delivery tubes leading from said receptacle each having a fuel delivery orifice at the end spaced from said receptacle, each tube having an opening for discharging liquid fuel therefrom should the delivery ends of said tubes become obstructed.

13. A rotary fuel oil distributing head for use with furnaces of the character described including an oil receiving receptacle and a fan, a plurality of fuel oil delivery tubes leading from said receptacle each having a fuel delivery orifice at the end spaced from said receptacle, each tube having an opening disposed intermediate the ends thereof for admitting air to said tubes whereby to reduce the temperature of said tubes.

14. A rotary fuel oil distributing head of the character described including an oil receiving receptacle, a fan for causing air to pass over said receptacle, means for rotating said receptacle, a plurality of fuel oil delivery tubes extending upwardly and outwardly from said receptacle and having straight delivery end portions disposed in a horizontal plane and extending rearwardly with respect to the direction of rotation of said receptacle.

JOHN W. CANNON.