J. H. BECKER.

CENTRIFUGAL BURNER.

APPLICATION FILED MAY 19, 1913.

1,101,779. Patented June 30, 1914.

Fig. 1.

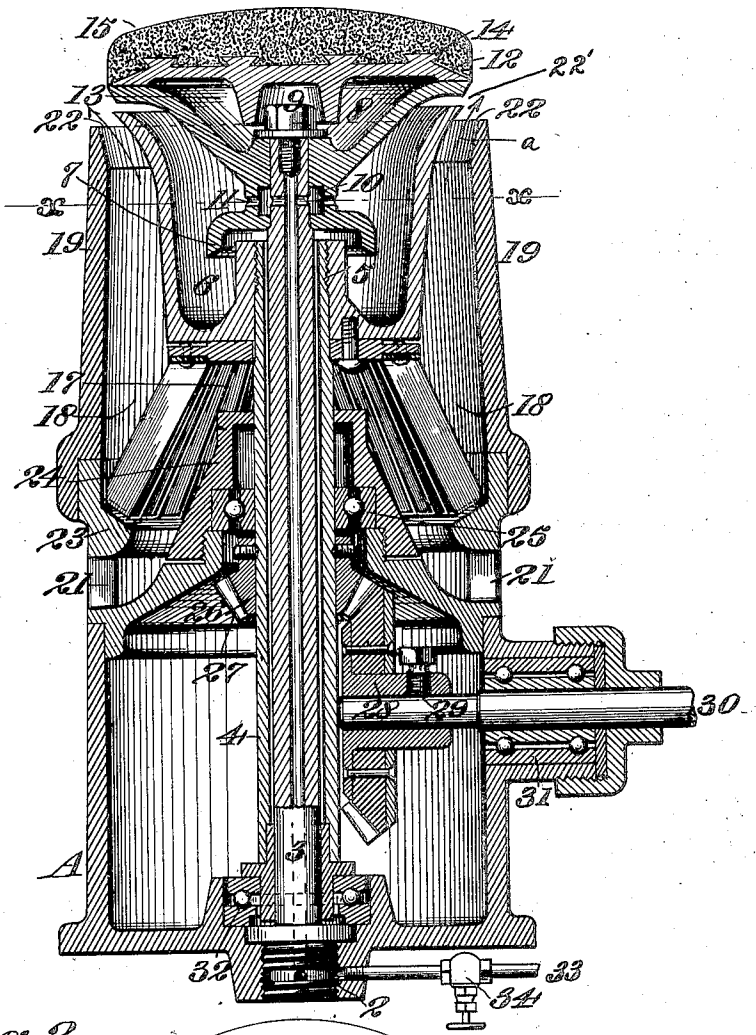
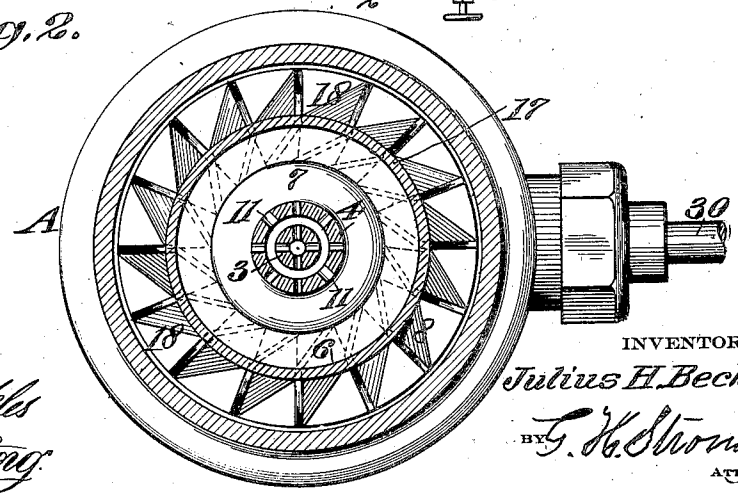


Fig. 2.



WITNESSES:

Charles Pickles

Thos. Eastberg.

INVENTOR

Julius H. Becker,

BY G. H. Strong,

ATTORNEY

UNITED STATES PATENT OFFICE.

JULIUS H. BECKER, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO AMERICAN HEAT & POWER CO., OF SAN FRANCISCO, CALIFORNIA, A CORPORATION OF CALIFORNIA.

CENTRIFUGAL BURNER.

1,101,779. Specification of Letters Patent. Patented June 30, 1914.

Application filed May 19, 1913. Serial No. 768,463.

To all whom it may concern:

Be it known that I, JULIUS H. BECKER, a citizen of the United States, residing at the city and county of San Francisco and State of California, have invented new and useful Improvements in Centrifugal Burners, of which the following is a specification.

This invention relates to a hydrocarbon burning apparatus.

The object of this invention is to provide a cheaply-manufactured, simple, substantial, and highly efficient oil burner of the centrifugal atomizing type, which is particularly adapted to handle crude and heavy oils.

Another object of the invention is to assist centrifugal atomization by bringing the projected oil into contact with an upwardly directed air current, thus further breaking up the oil and mixing the oil with the air.

Further objects will appear hereinafter.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a vertical section of the burner. Fig. 2 is a cross section on the line X—X.

Referring to Fig. 1 of the drawings: A indicates a cylindrical-shaped base casting, in the bottom portion of which is secured, as at 2, an upwardly extending hollow shaft or standard 3, about which is revolubly mounted a sleeve 4, having secured, as at 5, on its upper end an oil discharging centrifugal atomizer 6, to which oil is delivered through the hollow stationary standard 3 and a stationary distributer cap 7, formed on the lower end of a hollow burner head 8, which in turn is secured to the upper end of the stationary standard 3 by any suitable means, or as here shown by the cap screw 9. The burner head is provided with an annular chamber 10, and radially disposed openings 11, through which the oil discharges from the hollow standard 3, being delivered to the stationary distributer cap 7, thus permitting an even flow and distribution into the centrifugal atomizer 6.

Secured on the upper flange of the hollow burner head 8 is a plate 12, which is so positioned as to form an air-tight compartment 13 between the plate 12 and the head 8, and formed on the upper face of the plate is a series of dove-tailed tongues 14, provided for the purpose of forming an anchorage for a high-grade refractory material, as at 15. The stationary head 8 is thus absolutely protected and insulated from heat radiation within the fire box; being first protected by the layer of refractory material, second by the plate 12, and third by the air-tight chamber 13.

17 is a fan which is suitably secured to the under portion of the centrifugal atomizer 6 and consists of a circumferential series of outwardly and downwardly extending blades operating in an annular air duct 18, which latter is formed between the outer cylindrical casing section 19 and the centrifugal atomizer. The upper casing section 19 is rigid with the base A, and is connected thereto by an intermediate casing section 23, which has a circumferential series of air inlets 21 below the fan, so that when the fan is driven, an air current is drawn through the openings 21, and driven upwardly through the air conduit 18, to be discharged through the annular outlet 22 and across the path of the oil discharged from the atomizer 6. The intermediate casing section 23 has a cap 24 which incloses an anti-friction ball bearing 25. This ball bearing and cap 24 loosely surround and form a guide bearing for the rotary sleeve 4. Suitably secured on the sleeve 4, as at 26, is a beveled pinion 27, through which power is transmitted to rotate the sleeve, with connected atomizer and fan, by a beveled gear 28, suitably secured as at 29 upon a shaft 30, which in turn is journaled in an anti-friction bearing 31, secured in the base; power being transmitted to the shaft 30 from any suitable means, as an electric motor, not here shown. The end-thrust, transmitted to the sleeve 4 by the weight of the centrifugal atomizer 6 and fan 17, may be considerably reduced or taken up by an anti-friction thrust-bearing 32, secured in the lower portion of the base A.

In operation it is common practice to install a burner of this type in such position that the upper portion of the atomizing appliance projects into the center of the furnace a suitable distance above the fire-brick-covered grate-bars of the furnace or burner, not here shown. When it is desired to start a fire within the furnace, it is first accomplished by starting the motor, or other means connected on the shaft 30, to revolve the sleeve with connected centrifugal atom-

izer and fan member until the desired speed is obtained. Fuel oil is then admitted through a pipe 33, which connects with the lower end of the hollow standard 3; the fuel oil rising through the hollow standard is then admitted to the centrifugal atomizer by discharging through the radial openings 11 and over the circular stationary distributer cap 7, in such manner as to be evenly distributed to all portions of the lower part of the atomizer, which, when revolving at a high speed causes the oil to pass rapidly up the wall of the atomizing device in the form of a thin film, which is immediately projected at right angles when discharging from the upper edge of the device. The upwardly-directed air current, supplied through the openings 21 in the casing section 23 and forced with sufficient pressure by the fan 17, is discharged through the annular opening 22 and the discharge outlet 22′ formed between the head 8 and the upper edge of the shell 19 in the direction of the arrow. The upwardly-discharging air current will thus deflect the horizontally discharging atomized fuel, and will tend to further atomize and break up the oil, and at the same time cause a perfect mixture of the air and fuel as they pass out through the annular outlet 22′. The fuel being discharged from the atomizing device in a horizontal direction is deflected in an upward direction by the air under pressure from the rapidly revolving fan, thus preventing any liquid fuel from being thrown against the walls of the furnace in a state of incomplete combustion, which might have a tendency to accumulate in the form of a carbon on the walls of the furnace. Furthermore, the upward direction of the fuel is very necessary inasmuch as combustion does not take place at the point where the atomized fuel leaves the atomizing device. Experiments have shown that combustion takes place at a point from four to six inches from the point of discharge. By directing the air current in the upward direction here described, it has been found that the apparatus may be successfully operated in a fire-box of a very small radius, as the flame area is considerably reduced or deflected by the air current. By constructing the burner as here shown, and by providing the protective heavy cast-iron shell or housing and refractory cover, it can easily be seen that the rotating parts are entirely inclosed, thus preventing any of the parts from being injured or thrown out of alinement by careless operators when cleaning the interior of the furnace. The revolving parts thus inclosed are also protected from damage due to warping, and on account of excessive heat. Another advantage gained by this construction is this: There is no possibility of any liquid fuel accumulating in such a position that it can carbonize by radiation of heat from the hot fire box when the burner is stopped, which would tend to bind the moving and stationary parts together, causing the motor to burn out when the apparatus is again started. It can easily be seen that all fuel fed into the burner must be discharged into the furnace, as it is impossible for any fuel to find its way out of the lower portion of the atomizing device, as this is constructed in the form of a container, secured on the rotary sleeve. It is thus impossible for the oil to overflow and find its way into the ash pit where combustible gases may be formed, which upon ignition might destroy the apparatus, and even cause serious fires. The base portion A, constructed as here shown, may be partly filled with oil, which will be projected by the revolving gear 28 a sufficient distance to lubricate the various bearings and revolving parts. Any suitable form of valve, as at 34, may be provided for the purpose of regulating the volume of oil fed to the atomizer, thus providing a suitable means for increasing and decreasing the flame area within the furnace.

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

1. In a centrifugal hydrocarbon burning apparatus, the combination of an outer casing, an oil-delivering hollow standard centrally disposed and secured within the casing, a sleeve revolubly mounted on said standard, a centrifugal atomizer mounted on the sleeve, said atomizer and casing inclosing an air conduit, a burner head secured on the standard, and means for forcing an air current upward through the conduit, to deflect the fuel discharge from the centrifugal atomizer in an upward direction and to further atomize the fuel.

2. In a centrifugal hydrocarbon burning apparatus, the combination of an outer casing open at its upper end, a standard centrally disposed and secured within the casing, a burner head secured on the standard which is so positioned with relation to the upper open end of the casing as to form an annular discharge opening between the casing and head, an atomizer revolubly mounted within the casing adapted to centrifugally discharge oil through said opening in a horizontal direction, means for forcing an air current upward between the atomizer and the casing to deflect the fuel discharged from the atomizer in an upward direction and to further atomize the fuel, and means for evenly distributing and delivering oil to said atomizer.

3. In a centrifugal hydrocarbon burning apparatus, the combination of a casing open at its upper end, a standard centrally disposed and secured within the casing, a

burner head secured on the standard which is so positioned with relation to the upper open end of the casing as to form an annular discharge opening between the casing and head, an atomizer revolubly mounted within the casing adapted to centrifugally discharge oil through said opening in a horizontal direction, means for forcing an air current upward between the atomizer and the casing to deflect the fuel discharged from the atomizer in an upward direction and to further atomize the fuel, means for evenly distributing and delivering oil to said atomizer, and means for regulating the fuel supply to the atomizer.

4. In a centrifugal hydrocarbon burning apparatus, the combination of a cylindrical-shaped hollow casing open at its upper end, a standard centrally disposed and secured within the casing, a hollow burner head secured on the standard above the open end of the cylindrical casing in such position as to form an annular discharge opening between the casing and head, a sleeve mounted on the standard, means for revolving the sleeve, an atomizing device secured on the sleeve, an oil passage formed in the standard, means for evenly distributing and delivering the oil into the atomizing device, and means for forcing an air current upward between the atomizing device and the casing to deflect the centrifugally projected fuel and to further atomize the fuel.

5. In a centrifugal hydrocarbon burning apparatus, the combination of a cylindrical-shaped hollow casing open at its upper end, a standard centrally disposed and secured within the casing, a hollow burner head secured on the standard above the open end of the cylindrical casing in such position as to form an annular discharge opening between the casing and head, a plate secured on the burner head, a refractory material secured on said plate, a sleeve mounted on the standard, means for revolving the sleeve, an atomizing device secured on the sleeve, an oil passage formed in the standard, means for evenly distributing and delivering the oil into the atomizing device, and means for forcing an air current upward between the atomizing device and the casing to deflect the centrifugally projected fuel and to further atomize the fuel.

6. In a centrifugal hydrocarbon burning apparatus, the combination of a cylindrical-shaped hollow casing open at its upper end, a standard centrally disposed and secured within the casing, a hollow burner head secured on the standard above the open end of the cylindrical casing in such position as to form an annular discharge opening between the casing and head, a plate secured on the burner head, a refractory material secured on said plate, a sleeve mounted on the standard, means for revolving the sleeve, an atomizing device secured on the sleeve, an oil passage formed in the standard, means for evenly distributing and delivering the oil into the atomizing device, and a blower fan secured on the sleeve for forcing an air current upward between the atomizing device and the casing to deflect the centrifugally projected fuel and to further atomize the fuel.

7. In a centrifugal oil burner, the combination of a cylindrical casing, a stationary insulated deflecting burner head centrally disposed over and spaced from the casing, the space between the burner head and the adjacent end of the casing forming an annular discharge outlet, a rotary oil distributer within the casing and below the burner head and constructed and arranged to discharge an annular jet of oil through said discharge outlet, said casing and oil distributer forming an annular air passage way which discharges at an angle outwardly below and across the said annular oil jet, a series of fan blades in the passage way and below and rotatable with the oil distributer, and said casing having an annular series of air inlets into said passage way on the side of the fan opposite the discharge outlet.

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

JULIUS H. BECKER.

Witnesses:
JOHN H. HERRING,
W. W. HEALEY.