E. WATKINS.

HYDROCARBON BURNER.

APPLICATION FILED MAY 16, 1918.

1,324,863.

Patented Dec. 16, 1919.

2 SHEETS—SHEET 1.

Fig. 2.

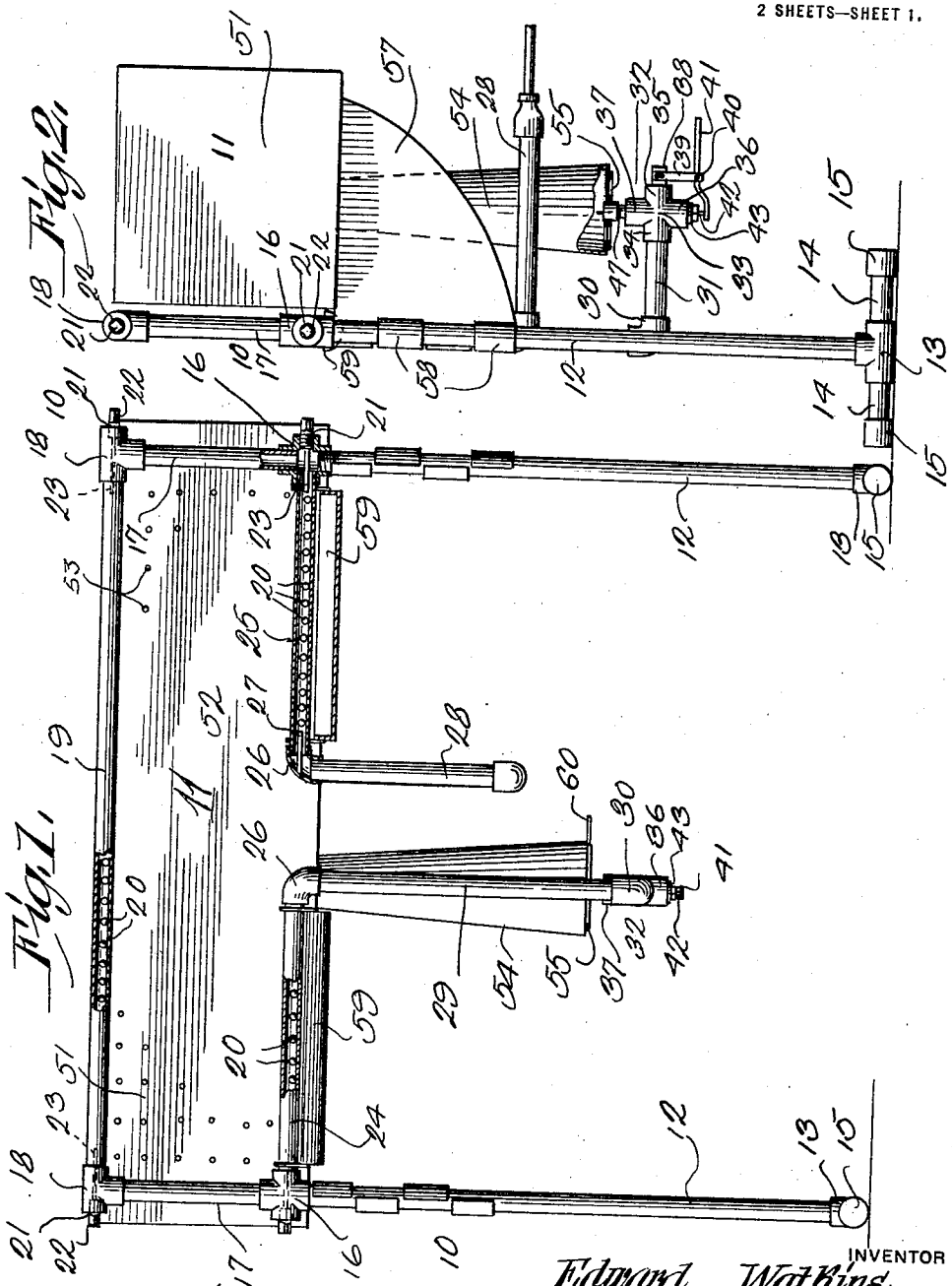


Fig. 1.

WITNESSES

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2 SHEETS—SHEET 2.

Fig. 3.

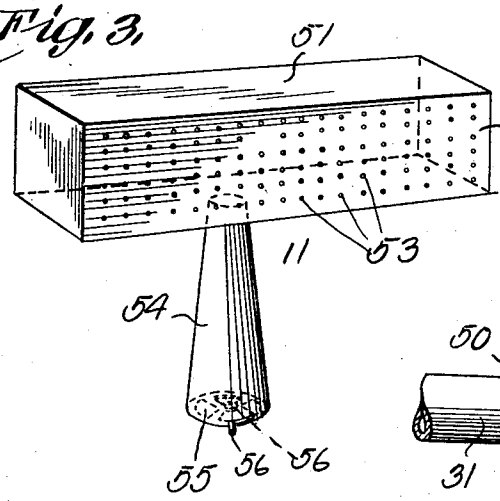


Fig. 4.

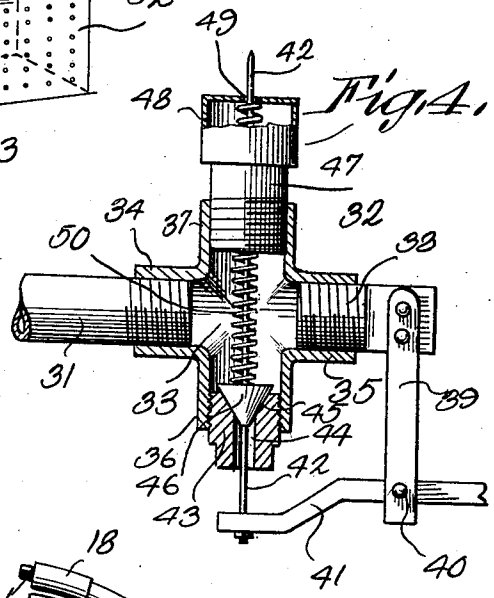


Fig. 5.

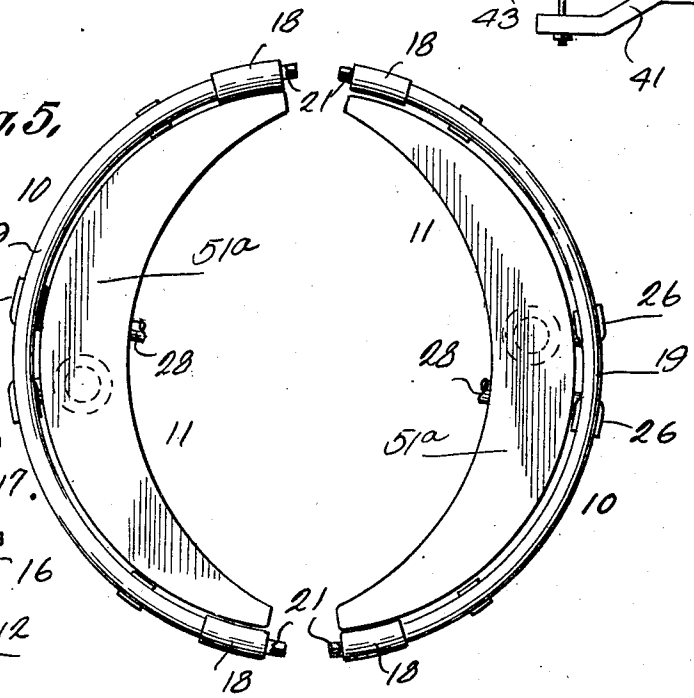
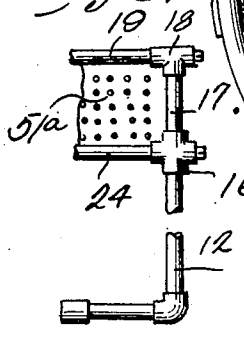


Fig. 6.



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UNITED STATES PATENT OFFICE.

EDWARD WATKINS, OF BAYSIDE, NEW YORK.

HYDROCARBON-BURNER.

1,324,863. Specification of Letters Patent. **Patented Dec. 16, 1919.**

Application filed May 16, 1918. Serial No. 234,877.

To all whom it may concern:

Be it known that I, EDWARD WATKINS, a citizen of the United States, residing at Bayside, Long Island, in the county of Queens and State of New York, have invented certain new and useful Improvements in Hydrocarbon-Burners, of which the following is a specification.

This invention relates to oil burners for producing heat in convenient, efficient and economical form for domestic and commercial purposes.

The object of the invention is to provide an improved burner and its support which shall be simple, practical and readily inserted within a stove or furnace for burning mineral oil, either crude or refined in the form of kerosene or gasolene, the oil being first vaporized and then mixed with air in sufficient quantity to burn with a blue, transparent, odorless and smokeless flame and with little liability for the deposition of carbon or other foreign matter at the jet opening. In connection with the burner there is provided means for cleaning the jet opening should any carbon or other foreign matter collect therein.

Another object of the invention is to provide in the burner proper, a large mixing chamber, for oil vapor and air, having a perforated side for the escape of the mixed gas which, when lighted, will burn with maximum intensity within the furnace so as to be utilized to the best advantage by directing all the flame against the surface to be heated.

A further object of the invention is directed to the supporting frame for the burner proper which is made wholly or in part of pipes and fittings connecting them through which the oil is forced under pressure and vaporized by the heat of the burner and then, after passing through a super-heater also forming a part of the frame, the gaseous vapor is permitted to escape from the frame into the burner to be mixed with air in proper proportions for consumption.

With these objects in view, together with others which will appear as the description proceeds, the invention resides in the novel formation, combination and arrangement of parts, all as will be described more fully hereinafter, particularly pointed out in the claims and illustrated in the accompanying drawings, in which:

Figure 1 is a side elevation of the oil burner complete, portions being shown in section.

Fig. 2 is an end view of the oil burner.

Fig. 3 is a perspective view of the mixing chamber and oil burner proper.

Fig. 4 is a sectional view of the jet nozzle.

Fig. 5 is a plan view of a modified form of the burner, designed to be used within a circular firebox, and

Fig. 6 is an elevation of a portion of the modified form of burner.

The improved oil burner of the present invention is made in two separable parts, the frame 10 and the burner proper 11 designed to be supported by the frame. The frame 10 is made of sections of pipe, pipe and rods and pipe fittings, the whole being connected together to form a conduit for oil and oil vapor and a suitable rack and support for the burner proper to which the oil vapor is led from the tubular frame 10, forced thereinto under pressure.

The frame 10 includes two upright standards 12 which may be sections of pipe or rods as desired. The lower ends of the standards are screwed into T-couplings 13 which join two short alined, horizontal pipe or rod sections 14 fitted with terminal caps 15, these fittings forming the feet of the standards 12. The height of the standards is regulated by the height of the fire box of the stove or furnace into which the burner is to be placed, their upper ends being screwed each into the lower branch of four-way coupling 16, while in the upper branch of each coupling is screwed a short pipe section 17 that extends vertically in line with the standard and carries at its upper end a three way fitting 18. Screwed into a lateral branch of each of these two fittings 18 are the opposite ends of a horizontal pipe 19 within which are placed a number of metal balls 20 of less diameter than the bore of the pipe and lying relatively close together. Screwed into the opposite lateral branch of each fitting 18 is a plug 21 squared on its outer end at 22 for a wrench and having a pin 23 projecting from its inner end into the adjacent end of pipe 19, these pins serving to hold the balls 20 in position in pipe 19 and prevent them falling through the fittings 18 into the pipe sections 17.

Short sections of pipe 24 and 25 are screwed into the inwardly projecting branches of the four-way couplings 16 in

line with each other and parallel to the pipe 19, their inner ends being spaced a short distance apart and each fitted with a downwardly turned right angled coupling 26. Within the pipes 24 and 25 are balls 20 similar to the balls in the pipe 19, these balls being retained in place in said pipes by pins 23 on the inner end of screw plugs 21 threaded in the outer branches of the four-way couplings 16, and by fixed pins 27 projecting inwardly from the walls of the right angled couplings 26 into the pipes 24 and 25. Connected to the fitting 26 of pipe 25 is an oil feed pipe 28 through which oil, under pressure, is forced into the tubular sections of the frame 10 and there vaporized. A depending pipe 29 is connected to the coupling 26 of pipe section 24 and at a suitable distance below said coupling it is fitted with a right angled coupling 30, to which is connected a short horizontal section of pipe 31 on the outer end of which is screwed the jet nozzle 32, shown in enlarged detail view in Fig. 4.

The jet nozzle 32 in its simplest form is of cruciform shape as shown, the body 33 of which is hollow and from which four tubular arms or branches 34, 35, 36 and 37 project. The arm 34 is threaded on the end of the pipe section 31. The arm 35 on the opposite side of the body has a plug 38 screwed therein from which an arm 39 extends downwardly a short distance and pivotally supports at 40 a lever 41 having an outwardly projecting end to be tapped with a poker for operating the same and a pin 42 connected to its inner end and extending upwardly through the jet nozzle for a purpose to be described later. The depending tubular branch 36 of the nozzle has a plug 43 screwed therein through which is formed a bore 44 terminating at the top of the plug in a valve seat for a conical valve 46 fixed on the pin 42. The upstanding tubular arm 37 of the nozzle forms a support for a tubular nipple 47 closed at its upper end by a cap 48 through the center of which is a small opening 49 for the escape of vaporized oil into the burner. The pin 42 is of such length as to extend above the valve 46, through the nipple 47 and out through the opening 49, said pin being smaller than the opening so as not to prevent the escape of vapor, but of sufficient size to clear this opening of carbon and other foreign accumulations whenever the valve 46 is closed and opened. The valve is normally maintained closed on its seat 45 by a coil spring 50 surrounding the pin 42 above the valve 46, one end of the spring bearing upon the valve and the other against the inner side of the cap 48.

The burner proper 11 is in the form of an elongated box like casing 51 preferably made of sheet metal with a vertical outer side 52 through which a number of small perforations 53 are formed for the escape of the gasified oil in jets which jets are lighted and burn close to the side 52 to generate heat. Depending from the under side of the casing 51 is a sleeve 54, preferably of conical form, as shown, but which may be cylindrical. The base of this conical sleeve is of greater diameter than the upper end, which latter opens into the casing 51. The base is provided with a damper or air inlet 55 of any approved type which will regulate the entrance of air to the demands of the burner. In the center of the damper 55 is a circular opening 56 sufficiently large to permit the cap 48 on the jet nozzle 32 to pass into the lower end of the sleeve 54.

The burner proper 11 is supported on the frame 10 in working position with its sleeve 54 over the jet nozzle and its perforated side 52 against the pipes 19, 24 and 25, by a pair of bracket arms 57 attached to the standards 12 immediately below the four-way couplings 16, these bracket arms being shown in the present instance as made of sheet metal, each having a horizontal edge upon which the burner proper rests and a vertical edge provided with claws or fingers 58 which are bent around the standards and serve to firmly hold the brackets in place on the standards. It is to be noted that the pipe 19, the vertical pipe sections 17 and the horizontal pipe sections 24 and 25 lie close to and aline with the top, ends and bottom of the burner casing 51, forming a frame around the wall 52 and the perforations 53 therein, so that when the gas passing out through the perforations is lighted, the jets serve to heat the pipes 25 and 19 for vaporizing the oil and also the pipe 24 which forms a super-heater for the oil gas before it passes through the pipe 29 to the jet nozzle 32.

For the purpose of furnishing heat to vaporize the oil when the burner is first lighted, troughs 59 are suspended from the pipes 24 and 25 below the same for their entire length in which alcohol or other suitable inflammable substance may be placed and ignited for primarily heating these pipes and the pipe 19 to generate sufficient gas to start the burner.

In use, the frame 10 of suitable size and shape, is placed within the fire box of the stove or furnace to be heated, with the feet of the standard 12 resting upon the grate. This raises the burner 11 to the proper height for efficient service. The pipe 28 is connected to a suitable source of oil supply which forces the oil into the tubular members of the frame 10. The oil, passing through pipe 25, pipe 17 connected thereto and the pipe 19 is vaporized, at first by the burning substance in the troughs 59 and afterward by the heat of the burner which

raises the temperature of these pipes and the balls 20 in the pipes 19 and 25 to such a degree that the oil is volatilized and passes down the pipe 17 at the opposite side of the frame into the super-heater pipe 24 and then by pipes 29 and 31 to the jet nozzle 32. From the jet nozzle the oil vapor passes into the sleeve 54 and up said sleeve, drawing air through the damper 55. The air and gas together, pass up the sleeve and into the mixing chamber 51 where they become thoroughly mixed and thence flow out through the perforations 53 in the front wall of the burner. By inserting a number of balls 20 in the pipes 19 and 25, additional heating surfaces are provided for vaporizing the oil, and as these balls are of less diameter than the bore of the pipes and rest on the bottom of the pipes, they form a slight obstruction to the flow of oil through the pipes which is therefore caused to circulate around the heated balls and come in contact with the entire surface of all of them and so insure and hasten vaporization. The gas produced by the heat of the pipes 12 and 25, and the balls 20 rises to the top of the pipes and flows through the pipe over the balls and unimpeded by them, to the super-heater, where any portion of the gas not thoroughly vaporized comes in contact with the pipe 24 and the balls 20 therein and so completes the formation of a fixed, or substantially fixed gas, which when burned in connection with the proper amount of air, produces a transparent, blue flame. The damper 55 is provided with a finger piece 60 for operating the same to increase or decrease the openings through the bottom of the sleeve and so admit more or less air to the burner.

These burners may be made with a flat perforated wall 52 of elongated or square form as shown in Fig. 1 for stoves, ranges and furnaces having elongated fire boxes, or of circular form as shown in Fig. 5 for furnaces of that shape. Furthermore, these burners may be used singly as in Fig. 1 or in sets of two or more, each independent of the other as in Fig. 5, where the mixing chambers 51^a are shown of a semi-lunar form placed within or against the concave side of a substantially semi-circular frame 10. The perforations for the escape of gas are of course formed in the convex walls of the mixing chambers.

Even with the best care, continued use of the burner will result in the accumulation and deposition of carbon, dust and other foreign matters in the various passages through which the oil and gas pass, and to permit withdrawal of these substances, the plugs 21 are made removable so that the tubes 19, 24 and 25 can be cleaned with very little trouble, while any collection of carbon or dust within the jet nozzle is quickly removed by depressing the lever 41 and raising the valve 46 so that the gas passing to the burner will blow out through the bore 44 at the bottom of the jet nozzle, all loose substances deposited therein from the gas. At the same time the pin 42 sliding through the gas outlet opening 49 serves to scrape away any deposits left there by the outflowing gas.

The foregoing description and the drawings have reference to what may be considered the preferred, or approved form of my invention. It is to be understood that I may make such changes in construction and arrangement and combination of parts, materials, dimensions, et cetera, as may prove expedient and fall within the scope of the appended claims.

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

1. In a hydrocarbon burner, vertical and horizontal tubular members forming a conduit, a jet nozzle connected with the conduit, balls loose in the horizontal member, and a pin extending across the vertical member and projecting into the horizontal member to retain the balls therein and prevent their passing therefrom into the vertical member.

2. A hydrocarbon burner, comprising upper, lower and end tubular members, the lower tubular member being divided to form branches, a fuel pipe connected with one of the branches, a jet nozzle connected with the other branch, a mixing chamber having a perforation in approximately the plane of the tubular members, balls loose in the upper and lower tubular members and pins extending from the end members and projecting into the upper and lower members to retain the balls therein.

3. In a hydrocarbon burner, a heating coil for the hydrocarbon, comprising a substantially rectangular tubular frame through which the hydrocarbon passes, said coil comprising an upper horizontal member and a lower horizontal member composed of two short alined sections; an inlet, for liquid hydrocarbon, connected to one of said short sections; an outlet from the other short section for the gaseous hydrocarbon, said latter short section forming a super-heater; a plurality of spherical metal members of less diameter than the interior of the coil, loosely mounted within the horizontal portions thereof to provide additional heating surfaces for volatilizing the hydrocarbon, and pins projecting inwardly into the ends of the horizontal portions of the coil to retain the spherical members in place, one or more of said pins being longitudinally adjustable.

4. A hydrocarbon burner comprising a mixing chamber having a perforated wall for the escape of gas to be burned, a tubular coil encircling said wall in position to

be heated by the burning gas and forming a conduit for hydrocarbon; an inlet into said coil for liquid hydrocarbon; an outlet from said coil for gaseous hydrocarbon; a jet nozzle on the end of said outlet having a perforation for the escape of the gaseous hydrocarbon to be conveyed to the mixing chamber and an opening on the opposite side of the jet nozzle, formed with a valve seat; a spring actuated valve closing said opening; a pin upon which said valve is mounted extending through the jet nozzle and out of the perforation, and means for moving said pin longitudinally to raise the valve and permit foreign substances to be blown from the jet nozzle through the opening and also to clean said perforation by the movement of the pin therein.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD WATKINS.

Witnesses:
IDA WOLFF,
JOHN E. BURCH.