E. E. MURPHY.

METHOD AND MEANS FOR BURNING CARBONACEOUS FUEL AND WATER.

APPLICATION FILED NOV. 23, 1918.

1,430,832. Patented Oct. 3, 1922.

2 SHEETS—SHEET 1.

Fig. 2.

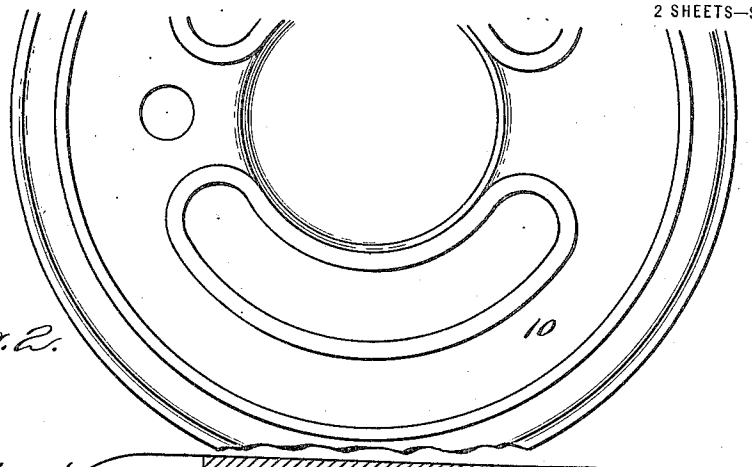
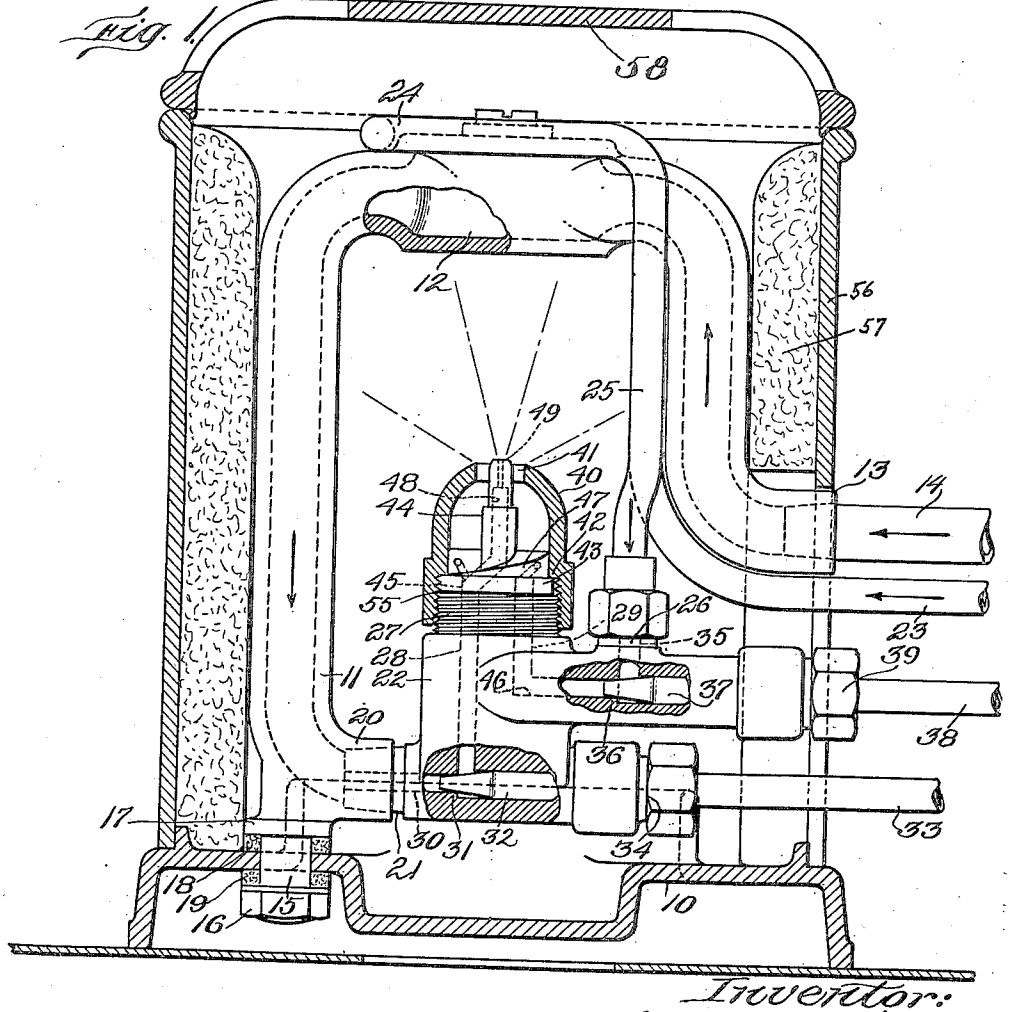


Fig. 1.



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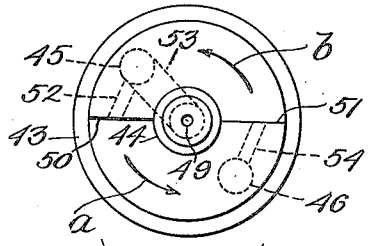
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2 SHEETS—SHEET 2.

Fig. 4.



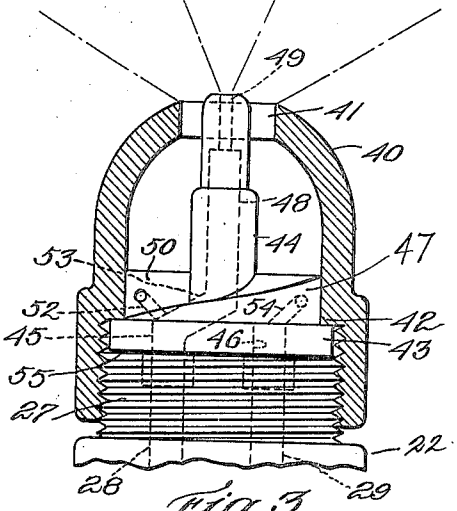


Fig. 3.

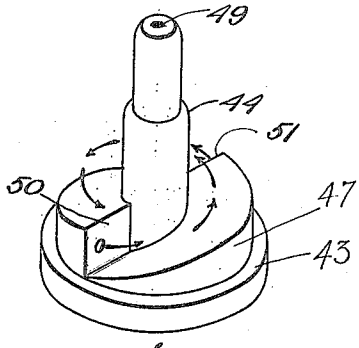


Fig. 5.

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UNITED STATES PATENT OFFICE.

EDWARD E. MURPHY, OF WINCHESTER, MASSACHUSETTS.

METHOD AND MEANS FOR BURNING CARBONACEOUS FUEL AND WATER.

Application filed November 23, 1918. Serial No. 263,924.

To all whom it may concern:

Be it known that I, EDWARD E. MURPHY, a citizen of the United States, residing at Winchester, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Methods and Means for Burning Carbonaceous Fuel and Water, of which the following is a specification.

The present invention has for its main object to make available for producing applied heat the potential heat units contained in water. Water, being a compound of hydrogen, which is combustible, and oxygen, which is the active agent which supports combustion, contains in its elements great potential heat value, which, however, is not instantly available for generation of heat. My invention, therefore, is concerned with a mode of, and a means for decomposing water and recombining its elements with carbonaceous fuel to form combustible gases, and therefrom burning such gases. Another object of the invention is to develop heat by the combustion of oil fuel, with economy in the consumption of oil by combining water therewith. A further object is to provide a burner adapted to bring a mixture of water vapor and carbonaceous fuel vapor into a region of such high temperature adjacent to a flame that chemical reaction occurs between the vapors, producing combustible gases which add fuel to the flame. All of these objects are accomplished by the use of a burner having the characteristics described in detail in the following specification; and the invention consists in part in such burner, the principles underlying the same, and equivalents thereof, and in part in the method or procedure practiced and carried on with the aid of burner containing essentially such principles.

In the drawings forming a part of this application,

Figure 1 is a longitudinal section of parts of the burner and associated elements. Figure 2 is a partial plan view of the base. Figure 3 is a view, enlarged, partly in section and partly in elevation, of the jet forming parts of the burner. Figure 4 is a plan view, and Figure 5 is a perspective view, of that part of the burner which I call the nozzle.

In the drawings 10 represents a base on which there is supported a conduit 11, the latter having a rising portion, to which the numeral 11 is directly applied, a substantially horizontal portion having an enlarged chamber 12, and an entrance part 13 to which there is joined an inlet or supply pipe 14 adapted to conduct oil thereto. The rising part of the conduit is connected to the base by a stud 15, preferably formed integral with the conduit, which passes through the top plate of the base, and is threaded at its end to hold a nut 16. There is also a flange 17 on the stud above the said top wall. Washers 18 and 19 are provided between said wall and the flange on one side and said wall and the nut on the other side, such washers being of heat-insulating material to prevent conduction of heat from the base to the conduit. Evidently the flange and nut clamp the base between them and so hold the conduit firmly in its upright position.

The end 20 of the rising part of the conduit is curved and is connected to a threaded nipple 21 of a valve casing 22.

23 represents a pipe or conduit adapted to contain water which enters beside the inlet end of the conduit, and is connected to one end of a coil 24 arranged close to and around the chamber 12 previously mentioned. The other end of said coil is connected to a pipe section 25 which is joined by a coupling to a nipple 26 on a second branch of the valve casing 22. The valve casing has a third branch terminating in a threaded nipple 27, in which there are two passages, 28 and 29 terminating in orifices at the end of nipple 27. The passage 28 joins a passage 30 in the branch or nipple 21, and between such passages is a valve seat 31, wherewith cooperates a valve 32 of the needle valve type, having a stem 33 which passes through a stuffing box 34 and is equipped with an operating handle or any other sort of means (not shown) suitable for moving it. The passage 29 turns a corner and joins a passage 35 in the branch 26, there being between the passages 29 and 35, a valve seat or shoulder 36 with which cooperates a valve 37 of the needle valve type having a stem 38 which passes through a stuffing box 39 and may be equipped with a hand wheel (not shown) or any other suitable operating means. It may be assumed that the stems of both valves, 32 and 37, are screw threaded into the casing in a well understood manner to permit regulation by rotation.

A dome or head 40 is screwed upon the threaded nipple 27. It is provided at its crown with a central opening 41, and near its base with an internal shoulder 42 which bears upon a flange 43 the base of a mixing nozzle 44, which rests on the nipple 27 and is clamped thereto by the shoulder 42. This mixing nozzle has two openings 45, 46 which register with the orifices of the passages 28 and 29, respectively. It has also a large base 47, whereon the flange 43 is formed, and a centrally arranged standpipe which may, and preferably does project somewhat through the opening 41 of the dome, substantially in the center of such opening. Such standpipe has a longitudinal passage 48 terminating in a discharge orifice 49. The base 47 is cut away or beveled at opposite sides of a diameter and at opposite sides of the standpipe, in such manner as to provide two abrupt faces or walls 50 and 51, and two substantially helicoidal upper surfaces extending respectively from the bottom of the wall 50 to the top of the wall 51 in the direction of the arrow *a* shown in Figure 4, and from the bottom of the wall 51 to the top of wall 50 in the direction of the second arrow, *b*, shown on the same figure. From the inlet opening 45 of this nozzle there is a passage 52 having a discharge orifice in the wall 50; and there is a second passage 53 from the same inlet which connects with the longitudinal passage 48 of the nozzle standpipe. Another passage 54 leads from the inlet opening 46 and has its discharge orifice in the wall 51. Preferably a heat insulating washer 55, of asbestos or other suitable material, is interposed between the nipple 27 and the nozzle base 47, and has holes in register with the passages previously described.

The entire structure composed of the conduits and valves thus described is surrounded by a wall 56 which rises from the base to a height preferably as great as that of the coil 24. It shields the conduit and valve passages from the cooling effect of the outer air, and is lined with a substantial mass 57 of heat-insulating material, such as asbestos fiber in any suitable form, or other material. It also prevents access to the flame of any air except that which is admitted to support combustion through flues provided for the purpose in the base within the circuit of the wall. A cover 58 rests on the top of the wall 56 and is provided with openings of any desired form in any desired locations to permit egress of the flame in whatever direction or directions may be desired, while being formed with an impervious central part which overlies the vaporizing chamber 12 and shields the same from down draft of cool air which might flow toward it, and reflects heat upon this chamber and the coil or chamber 24. Before reaching the cover the flame is spread by the under side of the chamber 12, which I have called an "impact disk", and which is made of considerable width and area, to afford a large surface conducting heat to the gas within the chamber, and preferably of regular outline in order to spread the flame symmetrically.

The burner is so arranged that the chamber 12, the adjacent parts of the conduit, and the coil 24 are directly over the flame and receive the impingement of the jet of burning gas emitted from the nozzle.

When the burner is in operation, oil is admitted to the entrance end 13 of the conduit, and flows through the chamber 12 toward the valve. The large volume of such chamber causes retardation of flow, and allows the oil to remain for an extended time subject to the intense heat of the flame, whereby it is first vaporized and then superheated to a greater or less degree, being thus brought into a condition more or less closely approximating that of a perfect gas. Passing on through the conduit, this gas is delivered, in a quantity governed by regulation of the valve 32, to the passage 28 and thence partly to the nozzle orifice 49, whence it issues as an unmixed oil vapor jet to feed the flame, and in part through the passage 52 into the interior of the dome 40. Water flowing in through the supply pipe 23 passes to the coil 24, and is there subjected to the heat of the flame, whereby it is vaporized and superheated. The superheated water vapor passes through the connection 25 and past the valve 37 in regulated quantity to the passages 29 and 54, from the latter of which it emerges into the interior of dome 40. The passages 52 and 54 are tangentially arranged with respect to the dome, that is, they are not radial to the dome, but are substantially perpendicular to certain radii thereof. The stream of oil vapor emitted from one of these passages, and the stream of water vapor emitted from the other, under pressure, whirl about the interior of the dome in spiral paths converging toward the outlet 41, and become thoroughly mingled.

Then the mixed vapors issue from the annular space between the nozzle standpipe 44 and the boundary of the opening 41 in what may be called, for the purpose of this description, a funnel-shaped jet, which is given a wide spread by centrifugal force and so occupies an area entirely surrounding and underlying the jet of oil vapor issuing from the standpipe. As the latter jet is burning and is supplied with air from beneath, the enveloping layer of mixed vapors is carried by the draft up to the flame, where it is brought to the temperature at which reaction between the elements of the vapors takes place. The result of the reaction so occurring is the formation of water gas, a

mixture of carbon monoxide and hydrogen (CO+H), which is at once ignited and burned, there being enough air admitted for this purpose, and in so burning it generates intense heat additional to that generated by combustion of oil vapor from the nozzle orifice 49. The total heat thus generated, less the small quantity abstracted to vaporize oil and water in the chambers 12 and 24, is available to be applied for any purpose.

Thus it will be seen that the burner delivers a combustible jet by which a flame is initiated, and delivers carbonaceous fuel and water, in the vaporous state, in such close proximity to the flame that reaction occurs with transformation of water into a combustible gas; and that such combustible gas is forthwith burned. Thereby the potential heat value of water is released and developed into useful heat. The control valves enable the different vapors to be accurately regulated to such amounts and proportions as will most efficiently and economically produce this result; and also in such manner as will produce more or less heat, that is, make a larger or smaller, or a hotter or less hot flame.

What I claim and desire to secure by Letters Patent is:

1. A burner comprising a nozzle from which a flame jet is emitted, conduits adapted to conduct oil and water extending to said nozzle and having portions exposed to said flame for vaporizing the liquids respectively admitted thereto, said nozzle having an outlet from which oil vapor is separately emitted, and another outlet from which a mixture of the vapors of oil and water is emitted in close proximity to the flame.

2. A means for decomposition and combustion of water which comprises a burner having means from which carbonaceous vapor is ejected and burned, said burner having other means for mixing water vapor and carbonaceous fuel vapor and emitting such mixture in close proximity to the flame of said carbonaceous vapor.

3. A means for decomposition and combustion of water which comprises a burner from which carbonaceous vapor is ejected and burned, said burner having means for mixing carbonaceous vapor and water vapor together and emitting such mixture in close proximity to the burning carbonaceous vapor.

4. A burner having separate passages, to one of which water vapor is admitted, and to the other of which the vapor of carbonaceous fuel is admitted, said burner having an outlet joined to that one of said passages to which such carbonaceous vapor is separately admitted, and having also a mixing chamber to which the outlets of both passages deliver and in which a mixture of the vapors is produced; the said chamber having an emission orifice adjacent to the aforesaid outlet.

5. An oil water burner comprising a body having separate passages, means for conducting the vapor of oil to one of such passages, means for separately conducting the vapor of water to the other of said passages, a nozzle having a base provided with inlets in register with said passages respectively, and each of said inlets having a separate discharge orifice, said nozzle extending above the base and having a passage and terminal orifice in connection with that inlet which registers with said oil vapor passage, and a dome surrounding said nozzle and the before named outlets, providing a mixing chamber into which said outlets discharge and having itself an anuular orifice surrounding the terminal part of the nozzle.

6. A burner comprising a valve body having separate passages, conduits opening into said passages coupled to said valve body, a separately adjustable controlling valve in each of said passages, a nozzle having a base detachably mounted on said body and having a centrally arranged standpipe of smaller diameter than said base, and a dome surrounding said nozzle and attached to the valve body, said dome having an inner chamber and an end opening through which the standpipe part of said nozzle passes; the nozzle having separate passages opening into the interior space of said dome and communicating separately with the passages in the valve body, and having a third passage extending through the standpipe and in branch connection with one of the first two passages.

7. A burner comprising a valve body having separate passages, conduits opening into said passages coupled to said valve body, a separately adjustable controlling valve in each of said passages, a nozzle having a base detachably mounted on said body and having a centrally arranged standpipe of smaller diameter than said base, and a dome surrounding said nozzle and attached to the valve body, said dome having an inner chamber and an end opening through which the standpipe part of said nozzle passes; the nozzle having separate passages opening into the interior space of said dome and communicating separately with the passages in the valve body, and having a third passage extending through the standpipe and in branch connection with one of the first two passages, said first two passages being arranged to discharge tangentially into the interior of the dome, whereby to cause mixture of the vapor separately emitted from each.

8. A burner comprising a mixing chamber into which oil vapor and water vapor separately are admitted and in which they

are mixed, said chamber having an outlet, and a nozzle passing through the middle part of said outlet having a discharge orifice and a passage adapted to conduct and emit oil vapor.

9. The combination with a burner as set forth in claim 8 of conduits for oil and water respectively extending to said burner and communicating separately with the aforesaid passages therein, said conduits having chambers exposed to the heat of the flame projected from the burner, in which chambers oil and water respectively are transformed into vapor.

10. The combination as set forth in claim 9 and including further a shield surrounding said burner and conduit and constructed to exclude therefrom the external cool air, whereby to prevent condensation of the vapors produced as set forth prior to their emergence from the burner.

11. A burner comprising a nozzle having a terminal outlet from which combustible carbonaceous vapor is emitted and burned, and having a base below said terminal outlet with tangentially arranged outlets from which carbonaceous vapor and water vapor are separately emitted, and a dome surrounding said nozzle to provide a mixing chamber in which the vapors emitted from the last named outlets are received and mixed, said dome having an outlet surrounding the nozzle terminal from which the mixture of vapors is delivered in a layer surrounding and beneath the jet of burning vapor emitted from said terminal outlet, whereby said mixture is maintained in such close proximity to the heat of the flame that reaction takes place between the vapors, with production of water gas, which is burned by combination with such air.

In testimony whereof I have affixed my signature.

EDWARD E. MURPHY.