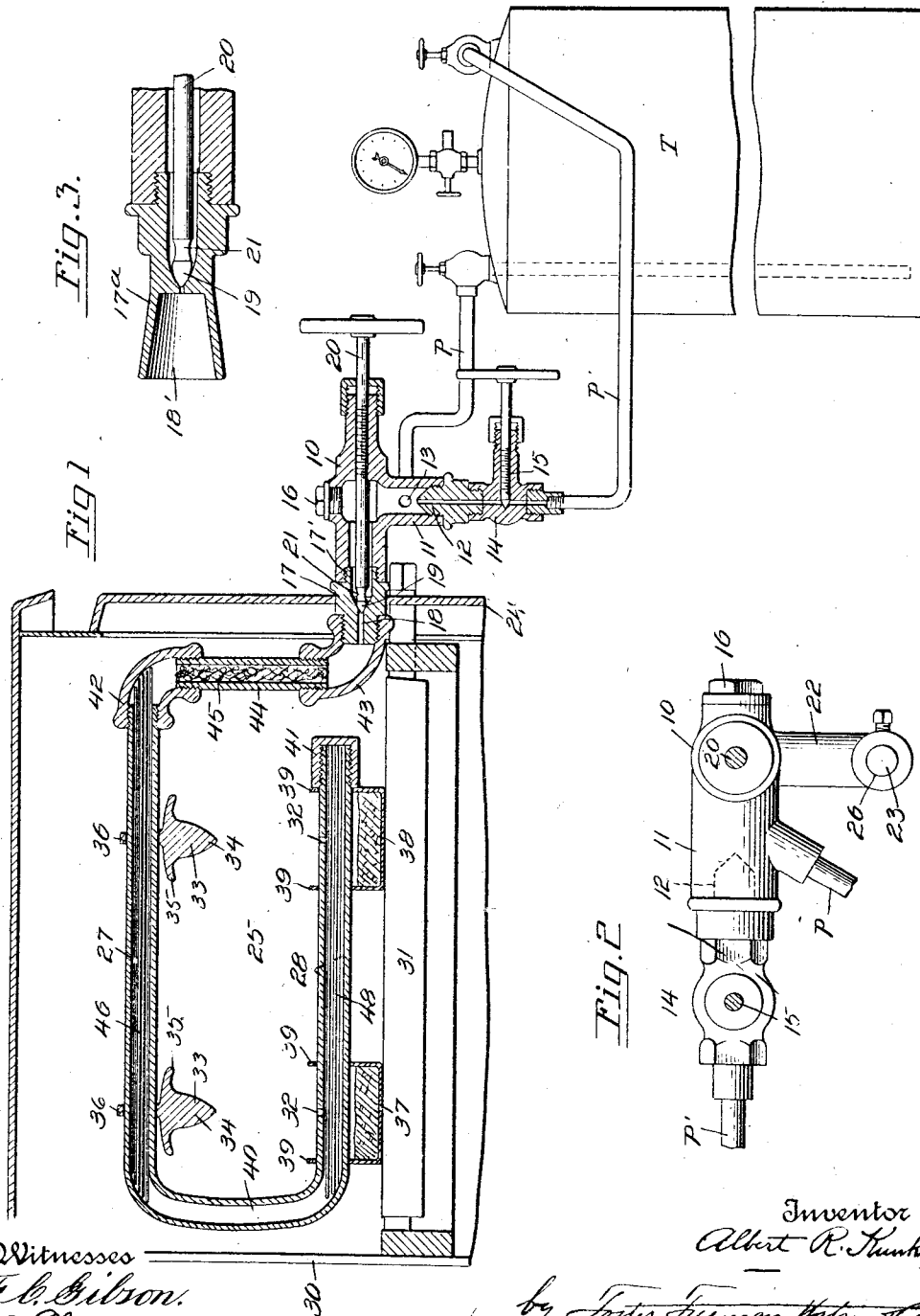


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 APPARATUS FOR BURNING FUEL OIL.
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Witnesses
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UNITED STATES PATENT OFFICE.

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APPARATUS FOR BURNING FUEL-OIL.

1,039,297.

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To all whom it may concern:

Be it known that I, ALBERT R. KUNKEL, a citizen of the United States, residing at Palestine, in the county of Anderson and State of Texas, have invented certain new and useful Improvements in Apparatus for Burning Fuel-Oil, of which the following is a specification.

This invention relates to an apparatus for utilizing fuel oil, crude oil or any similar combustible product as a fuel in stoves and furnaces and some of its objects are to more thoroughly mix the oil with air before vaporizing the mixture, to provide means for uniformly heating the mixture, and to generally improve and simplify the construction of such devices to make the same more economical in operation.

To attain the above and other objects, which will appear from the description, I have devised the apparatus illustrated in the accompanying drawing, in which,

Figure 1 is a vertical sectional view, parts being in elevation, showing my apparatus in operative position; Fig. 2 is another view of the primary mixing device; Fig. 3 is a view showing a modified form of nozzle for the mixing device especially adapted for use on the latter when the same is utilized as the burner.

Referring to the drawings, the primary mixing device comprises a casing 10, preferably cast in one piece and having the four radiating passage-ways, as shown. The tubular part 11, containing one of these passage-ways, has screwed into its end the nozzle 12 for projecting a jet of air into the passage ways which constitute the mixing chamber. An oil inlet 13 is in advance of the air inlet nozzle 12 whereby the oil will be drawn up by the jet of air and thoroughly mixed therewith. A valve casing 14 is secured to the air nozzle and is provided with the control valve 15. The end of the mixing chamber opposite the air inlet nozzle is closed by a screw plug 16. The said plug may be removed so as to give access to the interior of the chamber. The nozzle 17 has a threaded portion 17' whereby the same may be screwed into the casing 10. The nozzle 17 is provided with a small outlet 18 having a valve seat immediately back of it. A tapering valve 19 fits against this seat and has a stem 20 extending out through the opposite side of the casing so that it may be controlled by hand. Immediately back of

the valve the stem is cut away at 21 so as to leave a surrounding groove or chamber and I have found that this arrangement gives a better and more effective mixture of the air and oil as it is discharged from the nozzle. The tapering valve fitting into the tapering valve seat will automatically maintain the fluid tight connection since the valve will grind against the valve seat, making a close fit.

In Fig. 3 I have shown a slightly modified form of nozzle which replaces the nozzle 17 when the device is utilized as a burner. In the modification the nozzle 17' is in most respects similar in construction to the nozzle 17 but instead of the long, narrow opening 18 the same may be somewhat shorter and extending forwardly therefrom there is a flaring mixing chamber 18' which serves to more effectively mix the air and oil and which will prevent any unvaporized oil from dropping down from the nozzle. The oil will be taken up in this extension and carried forward by the blast.

In order to supply the air and oil under pressure to the mixing chamber 10 I make use of a tank T and pipe connections P and P', leading therefrom to the oil and air inlets respectively. The arrangement of the tank and pipes is fully described in my Patent No. 976,268, of November 22, 1910.

The oil vaporizing and gas generating device and burner is set into the stove or furnace, as shown, and receives the mixture of oil and air under pressure from the primary mixing chamber. The casing 10 is provided with an integral extension 22 and a bracket 23 secured to the door or front of the combustion chamber or fire-box of a furnace or stove engages in a hole 24 in the said extension 22 whereby the mixing chamber may be rigidly connected to the stove.

The vaporizing device or retort comprises a length of pipe bent to form a U-shaped vaporizer, the parallel members 27 and 28 of the vaporizer in operative position are disposed vertically one above the other. The lower member of the vaporizer is provided with two or more small jet holes 32 in its upper wall by means of which the fluid issuing therefrom is directed toward the upper member 27. The fluid jet issuing from the lower member impinges against flame distributors 33. The flame distributors 33 are provided with depending por-

tions 34 and enlarged heads 35. Each also has cast integral therewith a supporting ring 36, by means of which the flame distributors or deflectors may be supported from the upper pipe 27. Said rings preferably fit the pipe tightly so that they may be both longitudinally and circumferentially adjustable thereon. The lower pipe 28 has mounted thereon two small pans 37 and 38, each disposed beneath one of the openings 32. The pans have a bail 39 secured at each end by means of which they may be held securely against the pipe 28. The pans are filled with asbestos and may rest on the grate 31, thereby supporting the gas generating pipe and burner on the grate.

The parallel members 27 and 28 are connected at one end by the unobstructed passage-way 40 which constitutes a gas chamber. Said arms 27, 28 are each open at their other end. The lower pipe 28 is closed at its open end by a cap 41. The open end of the upper pipe 27 is connected to the nozzle 17 by means of elbows 42 and 43 and the nipple 44, the outer end of the nozzle 17 having external threads thereon to accommodate the elbow 43 and the end of the pipe 27 being similarly threaded to receive the elbow 42. The nipple 44 is filled with fine wire gauze, mineral wool or incombustible porous material 45. The oil and gas passing through this material will be more thoroughly mixed and moisture will be removed therefrom. The upper pipe 27 is partially filled with light wires 46 to more uniformly distribute the heat and prevent the flame from overheating the pipe at any point. This wire also provides a larger area for the accommodation of the residue or non-combustible material resulting from the decomposition of the oil. The lower pipe 28 is partially filled with large or heavy wire 48 for further mixing of the gas and even distribution of the same. When it is desired to clean the arms of the pipes the said wires may easily be removed through the open ends of the pipes by unscrewing the elbows 42 and 43, and cap 41.

The operation of the burner will be clear from the foregoing description. The oil and air is discharged under pressure into the primary mixing chamber 10 from tank T. It is thoroughly mixed in this chamber and then passes into the vaporizing device through the mixing and cleaning pipe 44. The jet issuing from the openings 32 is ignited. The flame from the burning oil will heat the pipe 27, vaporizing the mixture of oil and air therein, whereupon combustible gas instead of oil will issue from the jet openings 32. The flame distributors 33 will afford an equal distribution of the flame on to the pipe 27 and the light wire 46 therein, will provide further distribution of the heat. The mixture passing through the fine

gauze 45 will be more thoroughly mixed before it is heated and vaporized. Any excess oil escaping from the perforations in the burner will overflow into the pans 37, 38 and be soaked up by the asbestos wick therein to be consumed when ignited.

By thoroughly mixing the oil and air under pressure before vaporizing the same in the retort I am able to obtain more heat from a given quantity of oil and a brighter and clearer flame, doing away with smoke and the like. The U-shaped vaporizer and burner is more readily kept free from non-combustible material and from overheating.

It will be seen that I have provided a simple and efficient device for the purpose described and as changes within the scope of the claims may be made without departing from the spirit of the invention, I do not wish to limit myself to the exact details as shown and described.

Having thus described my invention, what I claim is:

1. In a device of the class described, the combination with a mixing chamber for oil and air, of a gas mixing and generating pipe communicating with said chamber; a portion of said pipe having fuel jet openings therein adapted to direct the jet of fluid toward the imperforate portion of the pipe, and means within the perforate and imperforate portions of said pipe to further mix the oil and air.

2. In a device of the class described, the combination with a mixing chamber for oil and air under pressure, of a gas mixing and generating pipe communicating with said chamber and having a perforate portion to provide an opening for the escape of fuel under pressure, an imperforate portion disposed above said perforate portion, means on the imperforate portion adapted to distribute the heat and flame caused by the ignited jet of fuel issuing from the said opening, and loose metal strips in both the imperforate and perforate portions of said pipe to further mix the oil and air and intercept incombustible matter.

3. In a device of the class described, the combination with a mixing chamber for oil and air adapted to be supported outside the firebox of a heating device, of a continuous gas mixing and generating pipe and burner disposed within the firebox and communicating with the said chamber, a portion of said pipe having openings therein adapted to direct jets of the fluid toward the imperforate portion of the pipe, means in the imperforate portion for mixing and cleaning the mixture of air and oil delivered from the mixing chamber on the outside of the heating device, and means in the perforate portion for further mixing the gas.

4. In a device of the class described, the

combination with a combustion chamber the wall of which is provided with an opening, of a mixing chamber for oil and air supported on said wall outside the combustion chamber, a nozzle communicating with said mixing chamber and projecting and discharging through said opening, a gas generating pipe disposed within the combustion chamber having a discharge opening therein, a pipe connecting the generating pipe with the end of said nozzle projecting through said opening in the combustion chamber wall, and a perforate non-combustible material in said connecting pipe to further mix the air and oil and clean the same.

5. In a device of the class described, the combination with a mixing chamber for oil and air, of a continuous U-shaped pipe constituting a retort, one of the arms of which pipe is provided with perforations facing the other arm to direct the fluid escaping therefrom toward the latter, a pipe connecting the imperforate portion of the retort with the mixing chamber, and means in said pipe to further mix and clean the mixture of air and oil.

6. In a device of the class described, the combination with a mixing chamber for oil and air, of a vertically disposed one-piece U-shaped retort, one of the arms being perforate and the other imperforate, the perforations adapted to direct the fluid escaping therefrom toward said imperforate arm, a pipe connecting the end of the imperforate arm with the mixing chamber, said pipe having wire gauze therein to further mix and clean the air and oil, a plurality of

wires in the imperforate arm and a plurality of wires in the perforate portion, the portion of the retort corresponding to the bend of the U being unobstructed.

7. In a device of the class described, the combination with a combustion chamber, the wall of which is provided with an opening, of a mixing chamber for oil and air supported on said wall, a nozzle communicating with said chamber and discharging through said opening, an oil and air mixing and gas generating retort arranged in the combustion chamber to receive fluid discharged from said nozzle, a tapering valve for said nozzle having a circumferential groove immediately back of the tip curved in longitudinal section, and a tapering seat for said valve.

8. In a device of the class described, the combination with a combustion chamber the wall of which is provided with an opening, of a mixing chamber for oil and air supported on the wall outside the combustion chamber, a nozzle communicating with said mixing chamber and discharging through said opening, a gas generating pipe disposed within the combustion chamber and arranged to receive fluid discharged from said nozzle, said pipe having perforate and imperforate portions, and loose metallic material in said portions to mix the oil and air and intercept incombustible matter.

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

ALBERT R. KUNKEL.

Witnesses:

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