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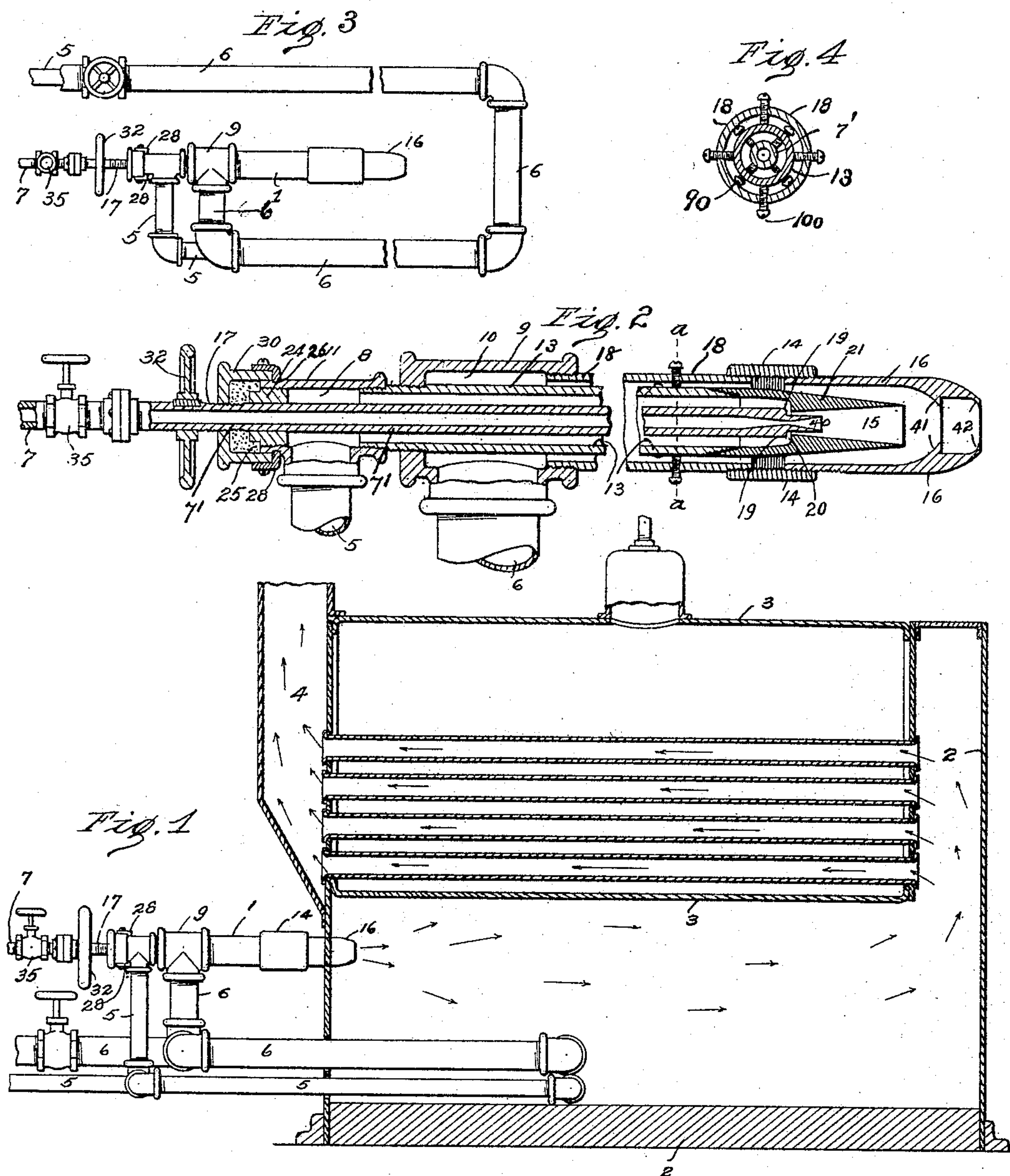
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I. CARL.

HYDROCARBON BURNER FOR BOILERS OR OTHER PURPOSES.

APPLICATION FILED JAN. 5, 1903.

NO MODEL.



Witnesses
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UNITED STATES PATENT OFFICE.

IRVING CARL, OF LOS ANGELES, CALIFORNIA.

HYDROCARBON-BURNER FOR BOILERS OR OTHER PURPOSES.

SPECIFICATION forming part of Letters Patent No. 764,708, dated July 12, 1904.

Application filed January 5, 1903. Serial No. 137,967. (No model.)

To all whom it may concern:

Be it known that I, IRVING CARL, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles, State of California, have invented and discovered a new and useful Improvement in Hydrocarbon-Burners for Boilers or other Purposes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in hydrocarbon-burners for boilers and other purposes; and the objects of my invention are, first, to construct a burner that will consume all the combustible constituents of highly-heated crude petroleum containing a large per cent. of asphalt with the aid of highly-heated air and steam; second, to provide means for separately raising in the furnace the temperature of crude oil and air to a high temperature before being admitted to the burner; third, to afford facilities for heating all the combustible constituents of crude petroleum to the "burning-point" and the air to the same temperature before being mixed together in the burner; fourth, to improvise devices for intimately mixing within the burner volatilized crude hydrocarbons and air at the same temperature before being introduced into the burner, and, fifth, to construct devices that will thoroughly commingle crude oil raised to the burning-point and air at the same temperature and steam and to ignite the combustible constituents of these substances at the nozzle end of the burner. I attain these objects by the construction illustrated in the accompanying drawings, in which—

Figure 1 is a view in elevation of the burner, portions of the oil, air, and steam pipes and their connections with the burner shown in elevation, the furnace, smoke-box, stack, and boiler illustrated in section. Fig. 2 is a longitudinal sectional view of the burner with portions thereof broken away and a part of the steam-pipe and valve shown in elevation. Fig. 3 is a view in elevation of the burner, the oil, air, and steam pipe partly broken away, shown in elevation removed from the furnace; and

Fig. 4 is a vertical sectional view of the burner on the line *a a* of Fig. 2 of the drawings.

Similar reference numerals and letters refer to similar parts throughout the several views.

The reference-numeral 1 refers to the burner, a portion of which is shown projected into the furnace 2, and 3 is the boiler with the tubes therein which communicate between and connect the furnace 2 with the smoke-box 4.

5 is the oil-pipe, 6 the air-pipe, and 7 the steam-pipe, for conveying the oil, air, and steam, respectively, to the burner.

The oil is conveyed from a tank or reservoir (not shown) through the pipe 5 into the furnace 2. This pipe 5 enters the front of the furnace, preferably at one point, is bent twice upon itself, forming angles within the furnace, and makes its exit at a point distant from the point of entrance, and is connected with the oil-sleeve *T*, surrounding a portion of the burner.

The air-pipe 6 enters the front of the furnace 2 at one point and is bent twice upon itself, forming angles within the furnace, and emerges from the furnace at the point thereof, desirably at a point distant from the point of entrance, following the course of the oil-pipe 5 within the furnace 2, and it (pipe 6) is connected with the air-sleeve *T*, which surrounds a portion of the burner 1.

At or about the longitudinal center of the burner 1 and surrounding the same is the air-sleeve *T* 9, to which the air-pipe 6 is connected, the said pipe serving to convey air from the outside of the furnace 2 into the furnace, through the said furnace, and therefrom in a highly-heated condition into and within the air-sleeve chamber 10 of the air-sleeve *T* 9. From the said air-sleeve chamber 10 the said intensely-heated air passes into the adjustable air-tube 18, externally screw-threaded at each end, forming adjustable connections with the air-sleeve *T* 9 at one end thereof and with the internally-screw-threaded coupling 14 at the opposite end. From the said adjustable air-tube 18, forming a part of the burner 1, the heated air passes through the said coupling 14 into the nozzle 16, which forms a part of the burner 1, where all the combustible ele-

ments of the air, oil, and steam, intensely heated, are assembled. The oil raised far above its burning-point, with the air and steam, pass to the outer end of the nozzle, where the mixture is burned. The said oil-pipe 5 is connected with the oil-sleeve T 11, which surrounds a portion of the burner 1, near the opposite end thereof from that on which the nozzle 16 is affixed. Under the boiler 3, within the furnace 2, the said oil-pipe lies underneath the air-pipe 6 and follows the course, as above described, in entering and leaving the furnace 2. This oil-pipe 5 conveys the crude petroleum under pressure from a tank or reservoir (not shown) adjacent to the furnace 2 into, through, and from said furnace into the oil-chamber 8 within the oil-sleeve T 11. From thence the intensely-heated oil in a state to be vaporized is carried by the adjustable oil-tube 13, forming a part of the burner 1, into the oil-receptacle 15, forming a part of the oil-burner 1.

Under the boiler 3, within the furnace 2, the oil and air are heated to very high degrees of temperature by the furnace-heat, and both these substances are in attenuated conditions, which facilitate their tendencies to commingle thoroughly and intimately mix when brought together at the end of the air-nozzle and within the air-nozzle at the end of the burner.

The steam enters the burner 1 through the end thereof opposite to that on which the nozzle 16 is attached by means of the steam-tube 7', forming a continuation of the steam-pipe 7, which is screw-threaded at 17 near the end projecting from the end of the burner and is adjustable therein. The said steam-tube 7' has secured thereon the hand-wheel 32 for adjusting the said tube 7' within the burner, thereby bringing the offset 19, near the nozzle end thereof, in contact with the shoulder 20 upon the inner face of the oil-nozzle 21, secured within the coupling 14 upon the free end of the adjustable oil-tube 13. Thus it will readily appear that by turning the said hand-wheel 32 in one direction the said offset 19 will abut against the shoulder 20, and by revolving the hand-wheel in the opposite direction the said offset 19 will be further removed from the said shoulder 20, thereby making the opening for the outflow of oil larger or smaller, as may be required.

The oil-sleeve T 11 is internally screw-threaded at each end thereof. In one end thereof the external screw-threaded oil-tube 13 is adjustably secured, and in the opposite end the externally-screw-threaded centrally-perforated plug 24 is inserted, and through the said perforated plug the adjustable steam-tube 7' passes into the burner after having been first passed through the centrally-perforated screw-threaded cup 30, which is securely fastened to the end of the oil-sleeve T 11. I

provide a recess 26 near the end of the sleeve T 11, in which the retainer 28 is inserted, thereby firmly fastening the said cup 30 to the oil-sleeve T. The cup 30 I fill with packing 25 to prevent the heated oil within the oil-chamber 8 of the oil-sleeve T 11 from escaping from the said chamber.

The nozzle end of the steam-tube 7' is provided with an outwardly-flaring receptacle 40 with a sharp cutting edge, into which receptacle the steam is expanded as it issues from the narrow opening near the end of the tube 7'. The removable oil-nozzle 21, connected with the adjustable oil-tube 13, is also provided with a similar outwardly-flaring oil-receptacle 15 with a sharp cutting edge, into which receptacle the highly-heated vapors of oil and steam expand and are thoroughly mixed together.

The nozzle 16 is adjustable within one end of the coupling 14, the opposite end of said coupling being adjustable upon one end of the air-tube 18, forming a part of the burner 1.

The detachable air-nozzle 16, connected with the coupling 14, attached to the adjustable air-tube 18 of the burner 1, has two inwardly-extending curved projections 41 and 42, against which the heated air, oil, and steam are precipitated as they issue from their respective pipes and nozzles, forming eddies in passing out from the air-nozzle 16.

Referring to Fig. 4 of the drawings, the screws 100, which pass through the air-tube 18 of the burner 1, fix the oil-tube 13 and the oil-nozzle 21 centrally within the air-tube 18 and the air-nozzle 16, connected thereto. The screws 90, which pass through the oil-tube 13 of the burner 1, locate and securely hold the steam-tube 7' centrally within the oil-tube 13 and the oil-nozzle 21 of the burner 1.

It will readily appear from the foregoing description, when read in connection with the drawings hereto appended and made a part of the specification and claims, what is the operation of my invention, and further description of the manner of operating my improvement is deemed unnecessary.

It is obvious that many variations and changes in the details of construction and arrangement of my invention would readily suggest themselves to persons skilled in the art and still be within the spirit and scope of my invention.

I do not desire to confine this invention to the specific construction and combination and arrangement of parts herein shown and described, and the right is reserved to make all changes in and modifications of the same as come within the spirit of this invention; but I do desire to secure as my invention all features of construction and equivalents thereof that come within the scope of my improvements as herein shown and described, and illustrated upon the drawings appended hereto.

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

1. A hydrocarbon-burner, and air-sleeve **T** internally screw-threaded at each end thereof having a pipe for conducting air thereto, an adjustable air-tube screw-threaded at each end thereof and provided with a screw-threaded coupling upon one end, an air-nozzle adjustably connected to the coupling at one end thereof and the opposite end of said tube adjustably secured within the air-sleeve **T**, the said tube, coupling and nozzle adapted to conduct heated air through the burner, an oil-sleeve **T** provided with a pipe for conducting heated oil thereto, an oil-tube, an oil-nozzle provided with an inner projecting shoulder thereon connected with said oil-tube, the said oil tube and nozzle adapted to convey heated oil through the burner, a steam-tube having an outwardly-projecting offset thereon and centrally located within the oil-tube and oil-nozzle and means for longitudinally adjusting the steam-tube relatively to the air and oil tubes.

2. In a burner, an internally-screw-threaded air-sleeve **T**, means for conveying heated air thereto, a longitudinal adjustable air-tube forming a part of the burner externally screw-threaded at each end thereof and provided with an internally-screw-threaded coupling upon one end, an air-nozzle adjustably connected to one end of said coupling, the opposite end of said tube longitudinally adjustable within the air-sleeve **T**, the said tube, coupling and nozzle adapted to conduct heated air through the burner, an oil-sleeve **T** internally screw-threaded at each end thereof having a connection for conveying heated oil

thereto, an oil-tube externally screw-threaded at each end thereof, an oil-nozzle removably secured to one end of the oil-tube and provided with a shoulder thereon, the opposite end of said tube adjustably secured within the oil-sleeve **T**, the said oil-tube and oil-nozzle adapted to convey oil through the burner, a steam-tube having an offset adapted to engage the shoulder on the oil-nozzle, said steam-tube located within the oil-tube and oil-nozzle and screws for centrally adjusting the air and oil tubes relatively to each other within the burner.

3. An oil-burner comprising an air-sleeve **T**, and oil-sleeve **T**, means for conveying heated air and oil respectively to said air and oil sleeve **T**'s, an air-tube adjustable in said air-sleeve at one end having on the opposite end thereof an adjustable screw-threaded nozzle provided with an interior curved projection, an oil-tube connecting with said oil-sleeve **T** at one end and provided at its other end with an internally-screw-threaded nozzle, said nozzle provided with an internal shoulder upon the inner face thereof, a steam-tube centrally located within the oil-tube and oil-nozzle and having an external offset upon the end from which the steam makes its exit into the oil-nozzle and means for longitudinally adjusting the said steam-tube to increase or diminish the flow of oil through the burner.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

IRVING CARL.

Witnesses:

G. M. GIFFEN,
B. W. PIERCE.