G. F. BEACH.

HYDROCARBON BURNER.

APPLICATION FILED NOV. 25, 1912.

1,161,183.

Patented Nov. 23, 1915.

3 SHEETS—SHEET 1.

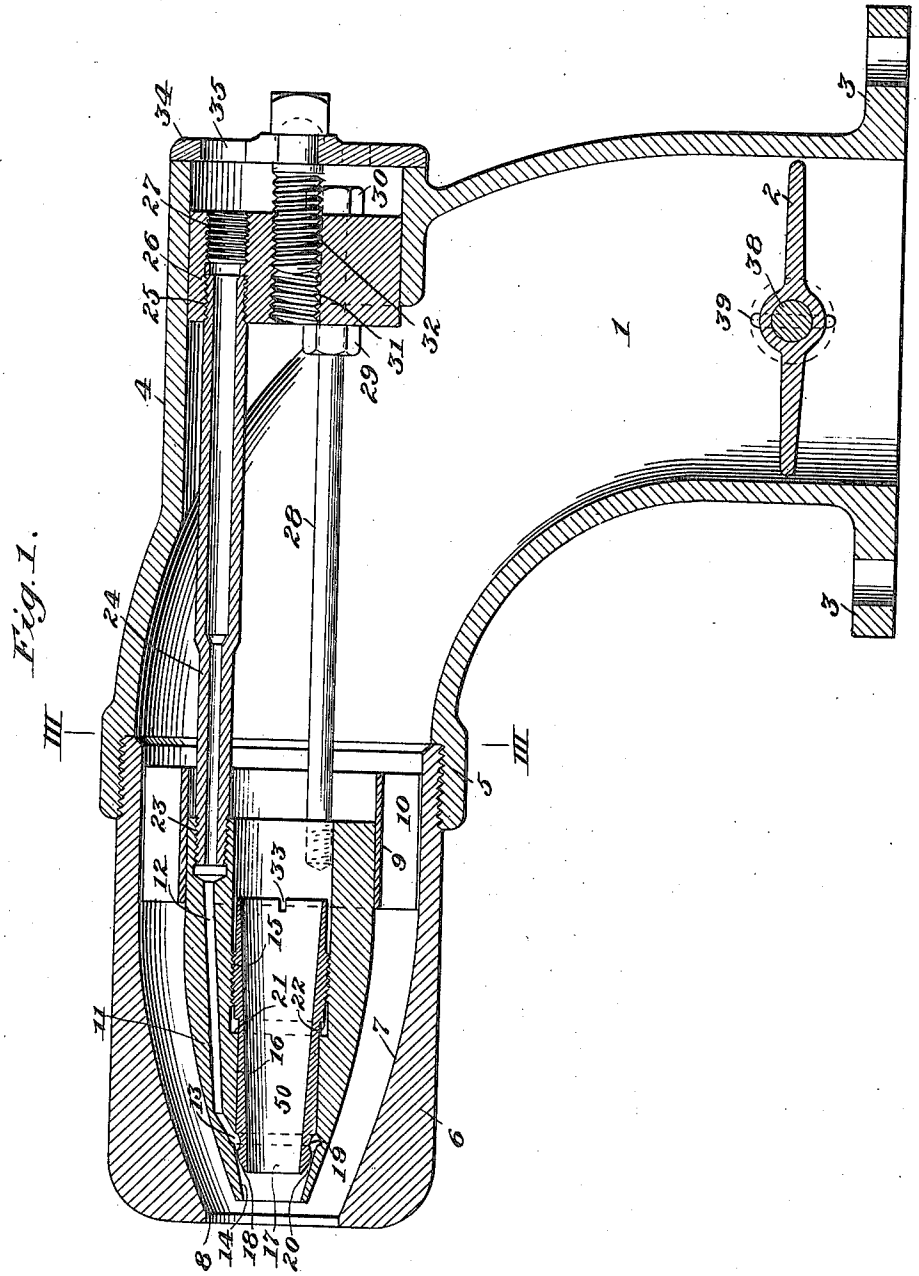


Fig. 1.

Witnesses:

N. P. Leonard.

E. C. Tate.

Inventor:

George F. Beach

by Byrnes, Townsend & Brickenstein,

Att'ys.

G. F. BEACH.

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3 SHEETS—SHEET 2.

Fig. 2.

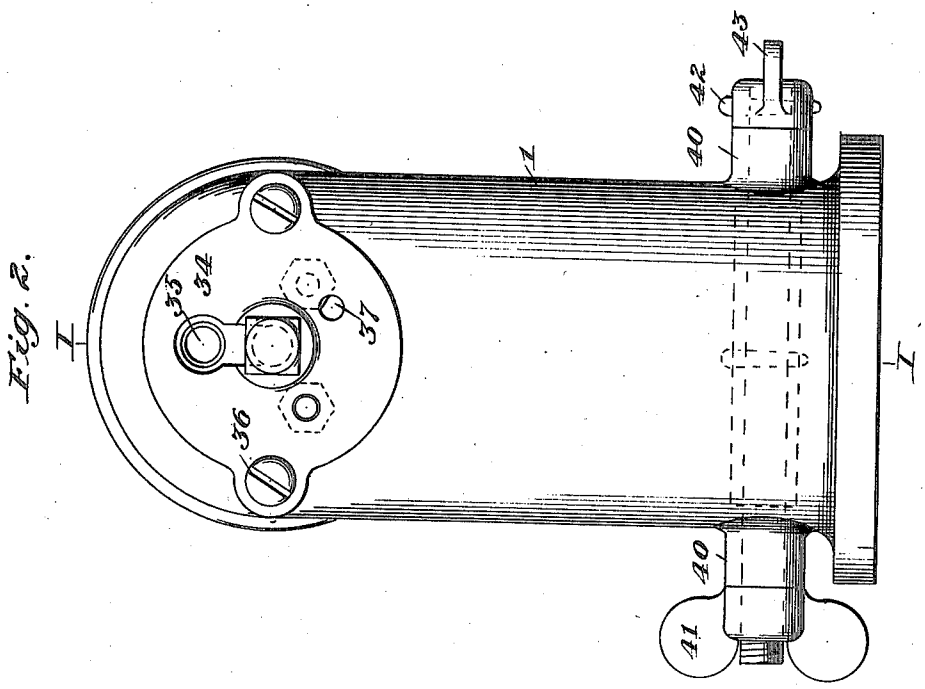
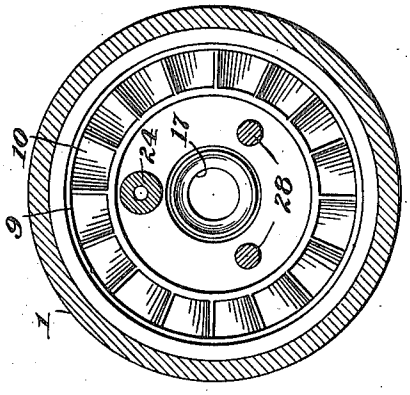


Fig. 3.



Witnesses:

N. P. Leonard.

C. C. Tate.

Inventor:

George F. Beach,

by Byrnes, Townsend & Brickenstein,

Atty's

G. F. BEACH.

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3 SHEETS—SHEET 3.

Fig. 4.

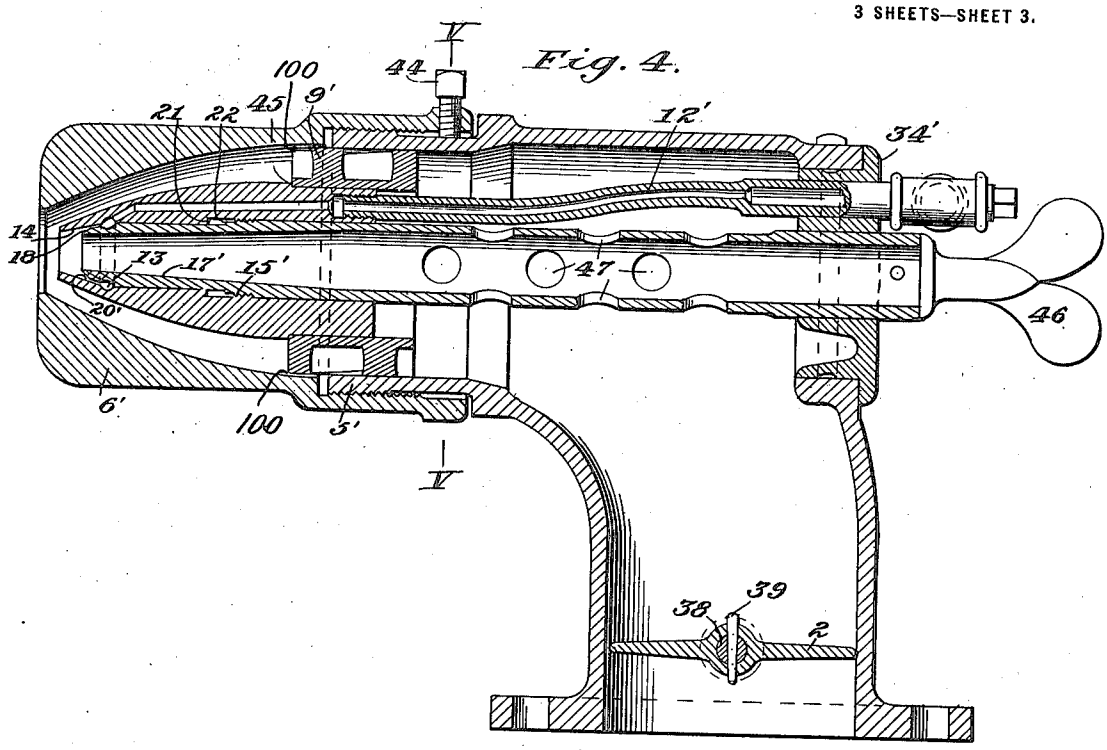


Fig. 6.

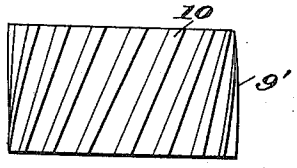
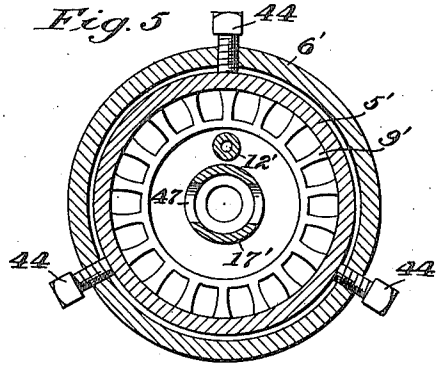


Fig. 5



Witnesses:

N. P. Leonard.

E. C. Tate.

Inventor:

George F. Beach,

by Byrnes, Townsend & Brickenstein.

Atty's.

UNITED STATES PATENT OFFICE

GEORGE F. BEACH, OF NORFOLK, VIRGINIA, ASSIGNOR TO MIRCS FUEL-OIL EQUIPMENT COMPANY, INCORPORATED, OF NORFOLK, VIRGINIA, A CORPORATION OF VIRGINIA.

HYDROCARBON-BURNER.

1,161,183. Specification of Letters Patent. Patented Nov. 23, 1915.

Application filed November 25, 1912. Serial No. 733,445.

To all whom it may concern:

Be it known that I, GEORGE F. BEACH, a citizen of the United States, residing at Norfolk, in the county of Norfolk and State of Virginia, have invented certain new and useful Improvements in Hydrocarbon-Burners, of which the following is a specification.

This invention relates to improvements in hydrocarbon burners, for oil or gas, for use in heating furnaces, forges, etc.

An object of my invention is to produce a burner which permits a perfect alinement of the several parts, the independent adjustment of the several parts, and affords means to obtain a more perfect atomization of the oil and its mixture with the air than is common with burners of this type.

In the accompanying drawings, Figure 1 represents a vertical longitudinal section of the burner on the line I—I of Fig. 2; Fig. 2 is a rear-end elevation of the burner showing the plate covering opening through which the interior parts are inserted; Fig. 3 is a view of the inclined air channels and the adjustment rods, on the line III—III of Fig. 1; Fig. 4 is a vertical longitudinal section of a modified burner, in which the sprayer tube extends through to the back of the burner, whereby it can be more readily adjusted; Fig. 5 is a vertical section at right angles to that of Fig. 4, on the line V—V thereof, showing the adjusting cap-screws and air channels; and Fig. 6 is a top view showing the air channels as used in Fig. 4.

Similar reference characters refer to similar parts.

In Fig. 1, a casing 1, containing a rotatable damper 2, and having perforated lugs 3, 3, a tubular extension 4, and a threaded end 5, serves as the air pipe and the body of the burner. Into the threaded end 5 is screwed a tubular nose 6, having a preferably converging, curved, or parabolically-shaped passage 7, opening through the end 8. Fitting within the passage 7 and concentric therewith, is an annular channel-member 9, having blades 10 set at an angle to its axis so as to give the stream of air passing therethrough a whirling motion; the channel-member may be either separate, or integral with the nose 6. Slidably supported within the channel-member and concentric therewith, is a preferably parabolically-shaped atomizer, comprising an oil-nozzle 11, containing a fuel passage 12, which opens into an annular groove 13; the nozzle has a conical orifice 14, through which the fuel passes; within the bore of the nozzle is a threaded portion 15, and a cylindrical portion 16, which support, concentrically, an adjustable sprayer-tube 17, having threaded and cylindrical portions on its exterior coöperating with the corresponding portions on the interior of the oil-nozzle, and a central, preferably conical bore 50. The outer end 18 of the spraying-tube is conical and beveled at a more obtuse angle than the conical orifice of the oil-nozzle, providing an annular opening of adjustable dimensions for the exit of greater or less quantities of fuel. On the exterior of the sprayer-tube, and opposite the annular groove 13 in the oil-nozzle is an annular groove 19, coöperating with the groove 13 to form a reservoir for the distribution of oil or other fuel, from which reservoir the oil issues in an annular jet through the passage 20 between the conical opening 14 of the oil-nozzle and the end 18 of the sprayer-tube. In order to prevent the end 18 of the sprayer-tube from becoming jammed in the orifice 14 of the oil-nozzle, the nozzle is provided with a shoulder 21 against which abuts the shoulder 22 on the sprayer-tube, when the latter is screwed forward its full extent.

The fuel-passage 12 communicates with a threaded socket 23 into which is screwed the pipe 24, secured at its other end by a threaded joint 25 in the slidable support or plug 26, and communicating with the threaded socket 27 for the fuel-supply pipe, not shown. The oil-nozzle is further connected to the slidable support 26 by adjusting-rods 28, 28, one of which is shown in Fig. 1, on which are nuts 29 and 30; the three connecting pieces, pipe 24, and rods 28, 28, being independently adjustable, permit the perfect co-axial alinement of the oil-nozzle with the nose 6, thereby insuring true concentric tubular masses of air and fuel. The support 26 is further longitudinally adjustable in the tubular extension 4 of the casing by means of its threaded central bore 31 and coöperating screw-plug 32, the turning of which advances or withdraws the support or plug 26, and with it the oil-nozzle 11. The sprayer-tube 17 has a slot 33 at its inner end which permits its independent adjustment in the oil-nozzle. Other means for effecting these adjustments may be used without de-

parting from the spirit of this invention. The end of the tubular extension of the casing is closed by the cap 34 secured by screws 36 and through which is an opening 35 admitting a suitable pipe to connect with the threaded socket 27 to supply fuel. The cap also has an air-vent hole 37.

The damper 2 is secured upon a spindle 38 by the pin 39; the spindle is rotatably supported in the bearings 40, and secured at one end by the wing-nut 41 and at the other by the pin 42, which also secures the wing-nut 43.

In the modification shown in Fig. 4, the nose 6′ is screwed on the outside instead of the inside of the threaded end 5′ of the casing, and is provided with three adjusting set-screws 44, which permit a perfect alinement of the axis of the nose with that of the atomizer; the nose is longitudinally adjusted relatively to the atomizer by screwing it on or off the casing. Within the nose is the atomizer, the nozzle of which is held in a fixed position by the fuel-supply pipe 12′, which latter is secured to the support or cap 34′ removably fastened in the tubular extension of the casing. The air-channel-member 9′ is forced tightly over the inner end of the nozzle to the abutment 45, and fits closely within the casing, but permits the adjustment with screws 44 as above described at 100, shown exaggerated for purposes of illustration. The sprayer-tube 17′ is prolonged to extend through the support 34′ where it terminates in a suitable wing-handle 46, the turning of which advances or withdraws the sprayer-tube by means of the threaded portion 15′ within the nozzle, thereby adjusting the thickness of the oil-stream, and regulating the quantity of oil that will pass through the annular passage 20′ of the atomizer. Openings 47, in the sprayer-tube, provide for the admission of air to the center of the flame. The fuel-supply pipe 12′ terminates in a suitable coupling for connection to an oil- or other fuel-supply, as shown. The operation of this burner is otherwise the same as that shown in Fig. 1.

In operation, the incoming air-stream is controlled by the damper 2; the air then passes into the nose of the burner where it divides into two concentric streams, the inner stream passing through the sprayer tube 17, and the outer one through the channel-member 9, the angular blades 10 giving the air a whirling motion. The oil passing out through the annular opening 20 is in the form of a tubular spray which is caught between the inner and outer air-streams, the combined effect of which is completely to atomize and thoroughly mix the adjacent layers of air in the air streams with the oil. This arrangement of the combustible elements gives a more perfect combustion than is generally obtained, and avoids the deposition of carbon so common with oil burners.

The relative positions of the inner sprayer tube and the nozzle of the atomizer are adjusted so that a film or spray of oil in proper quantity is delivered. This adjustment, when once determined for a burner of given size operating under given conditions of oil and air pressure, need not be changed, any further adjustments needed to fix the character of flame desired being obtained by screwing the nose in or out. If the nose be screwed inward, the flame is brought closer to the end of the burner; if the nose is screwed outward the point of ignition is at a greater distance.

By means of the arrangements above described, the oil is completely burnt, and the deposition of carbon particles resulting from the carbonization of unburnt oil particles, is entirely obviated.

When supplies of both oil and gas are available for use as fuel, the burner shown in Fig. 4 may be readily adapted for gas by removing the sprayer-tube 17′ and inserting a similar tube without the air-openings 47, and also having a suitable pipe connection and gas-cock in place of the wing-handle 46. This change can be made in a few minutes without otherwise dismantling the burner, and when so used the supply of oil is shut off unless it is desired to enrich the gas, in which case a suitable supply of oil is admitted. Otherwise, the operation is the same as above described for oil.

I claim:

1. A hydrocarbon burner, comprising an atomizer having a central air passage, a nose surrounding said atomizer and spaced therefrom to provide an annular air passage, means for centering the atomizer with respect to said nose, and means for imparting a whirling motion to air passing through said annular air passage.

2. A hydrocarbon burner, comprising an atomizer having a central air passage, a nose surrounding said atomizer and spaced therefrom to provide an annular air passage, means for centering the atomizer, means for longitudinally adjusting the atomizer to vary the relation between it and the nose, and means for imparting a whirling motion to air passing through said annular air passage.

3. In a hydrocarbon burner, a nose having a substantially converging curved-shaped passage therethrough, an atomizer within said nose having a substantially converging curved-shaped exterior, and having an annular oil reservoir with a cone-shaped outlet, and means to relatively adjust the nose and atomizer.

4. In a hydrocarbon burner, the combination of a casing, a detachable nose therefor, means to give air a whirling motion within

said nose. an atomizer comprising an oil nozzle and a sprayer-tube, means to prevent the jamming of the sprayer tube within the nozzle, said sprayer tube having its interior passage communicating with said casing, said air-whirling means and atomizer coaxial with the nose, and means for longitudinally adjusting the atomizer to vary the relation between it and the nose.

5. In a hydrocarbon burner, a nose having a substantially converging curved-shaped passage therethrough, an atomizer within and coaxial therewith having a substantially converging curved-shaped exterior and having an annular oil reservoir with a cone-shaped outlet, and means for longitudinally adjusting the nose to vary the relation between it and the atomizer.

6. In a hydrocarbon burner, a casing arranged to be connected to a supply of air, means for dividing said air-supply into two streams of air, one an outer annular envelop and the other as an interior core, means to supply a fuel-stream between said outer envelop of air and said core, means to give one of said air streams a whirling motion before it mixes with the fuel, whereby said fuel-stream is intimately mixed with the adjacent layers of air in the outer and inner air streams.

7. In a hydrocarbon burner, an atomizer comprising a nozzle having a bore and a sprayer-tube in said bore, said nozzle having a fuel passage, a fuel reservoir communicating with said fuel passage, said sprayer-tube coöperating with the nozzle to form a flaring annular fuel outlet, and means to vary the size of the annular fuel outlet.

8. In a hydrocarbon burner, an atomizer comprising a nozzle having a bore and a sprayer-tube within said bore, the nozzle and sprayer-tube being relatively adjustable, a fuel-supply passage communicating with said nozzle, an oil-reservoir communicating with said fuel passage and located between the inner wall of the nozzle and outer wall of the sprayer-tube and adapted to supply fuel in an annular jet, said nozzle projecting beyond said sprayer-tube and coöperating therewith to provide a flaring outlet for fuel, and means to supply a straight jet of air on the inside of said fuel-annulus, and a whirling jet of air on the outside of said fuel-annulus.

9. A hydrocarbon burner comprising an atomizer having a central air passage and means for delivering into said central passage a forwardly directed tubular film of oil, a nose surrounding said atomizer and spaced therefrom to provide an annular air passage, and means for imparting a whirling motion to air passing through said annular air passage.

10. A hydrocarbon burner comprising an atomizer having a central air passage and means for delivering into said central passage a forwardly directed tubular film of oil, a nose surrounding said atomizer and spaced therefrom to provide an annular air passage, means for imparting a whirling motion to air passing through said annular air passage, and means for varying the relation between the nose and atomizer.

11. A hydrocarbon burner comprising an atomizer having a central air passage and means for delivering into said central passage, but back of the forward end of said air passage, a forwardly directed tubular film of oil, a nose surrounding said atomizer, extending beyond the end of said atomizer and spaced therefrom to provide an annular air passage, and means for imparting a whirling motion to air passing through said annular air passage.

12. A hydrocarbon burner comprising an atomizer having a central air passage and means for delivering into said central passage, but back of the forward end of said air passage, a forwardly directed tubular film of oil, a nose surrounding said atomizer, extending beyond the end of said atomizer and spaced therefrom to provide an annular air passage, means for imparting a whirling motion to air passing through said annular air passage, and means for varying the relation between the nose and atomizer.

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

GEORGE F. BEACH.

Witnesses:
BLANCHE M. MILLS,
ELVIN G. SHOND.