J. GROW.

HYDROCARBON FURNACE.

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911,587. Patented Feb. 9, 1909.

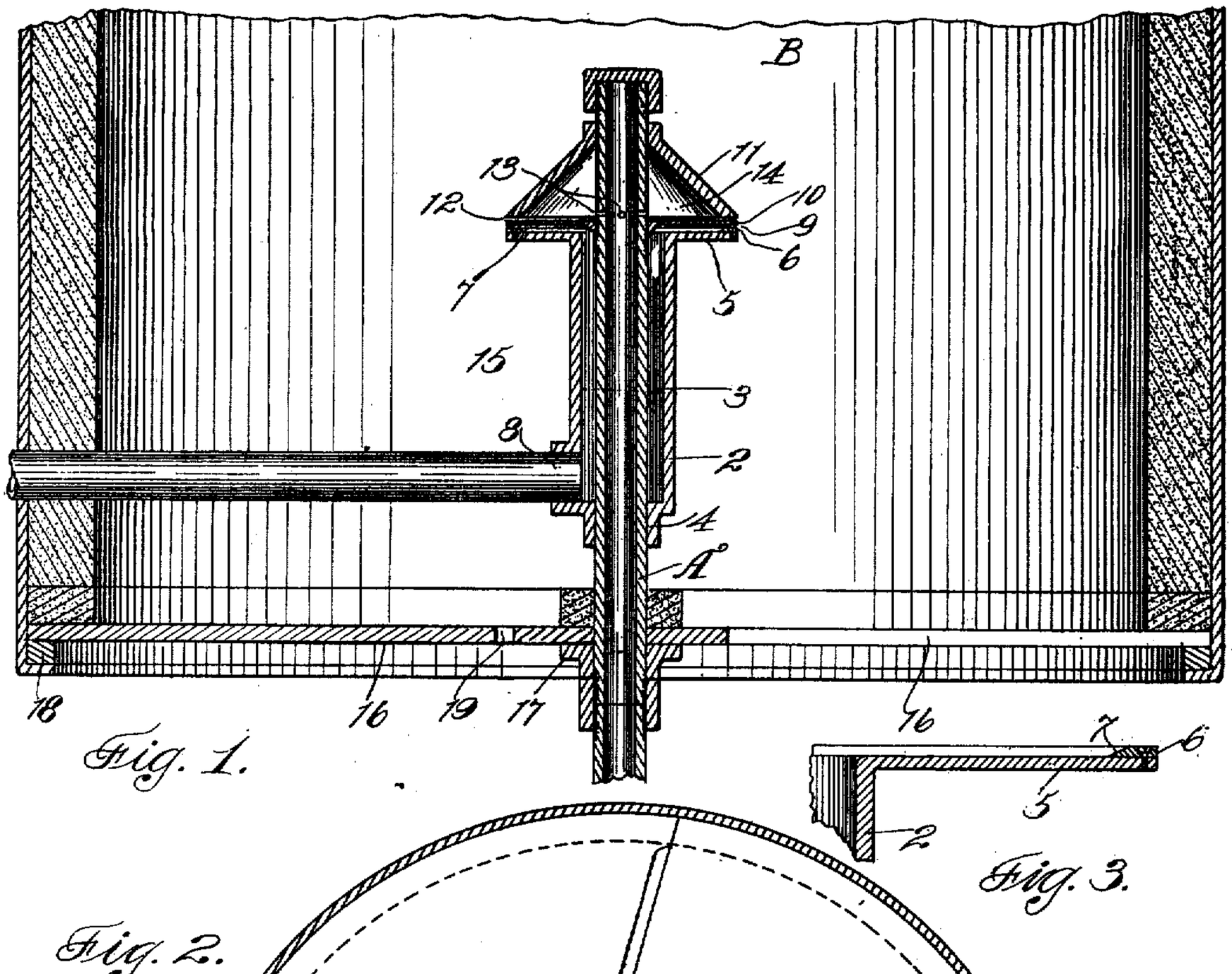

Fig. 1.

Fig. 3.

Fig. 2.

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HYDROCARBON-FURNACE.

No. 911,587. Specification of Letters Patent. Patented Feb. 9, 1909.

Application filed April 9, 1907. Serial No. 367,244.

To all whom it may concern:

Be it known that I, JOSEPH GROW, a citizen of the United States, residing at Alameda, in the county of Alameda and State of California, have invented new and useful Improvements in Hydrocarbon-Furnaces, of which the following is a specification.

My invention relates to improvements in hydrocarbon furnaces and burners therefor. Its object is first to provide a burner which will be capable of producing a flat disk-like flame and which burner is particularly applicable for use under vertical boilers or whenever a circular flame or a broad flat-flame of even intensity is desired; and secondly to improve the furnace construction so as to get the best results with my burner.

The invention consists of the parts and the combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a section on line *a*—*a* of Fig. 2, which is a plan view of the grate members. Fig. 3 is a detail sectional view of the flange and ring members.

A represents a vertically disposed oil pipe; 2 is an outer steam pipe or shell surrounding and spaced from the oil pipe to provide the annular steam space 3. A tight connection as at 4 with the oil pipe A is provided at the lower end of the casing, and the top of the casing is provided with a flat annular flange or plate 5 which constitutes what I term the lower steam-jet plate. A ring 6 is secured to the outside edge of the top of plate 5 and has its inner edges beveled as shown at 7. Steam enters the passage-way 3 at 8 and passes out all around the burner in a thin annular sheet through the jet opening 9 between the ring 6 and the upper steam jet plate 10. This latter plate is suitably supported on the central oil pipe A and suitably spaced from the lower steam jet plate 5 and ring 6 to provide the proper steam jet opening.

11 is a conical hood or petticoat secured to the upper end of the oil pipe and extending down to within a short distance of the upper steam jet plate to provide the necessary annular oil outlet 12.

The upper end of the pipe A is closed except for suitable perforations 13 formed underneath the hood or petticoat 11, through which openings the oil is allowed to escape into the generator chamber 14 formed between the upper steam jet plate and the hood. The oil in liquid form on passing out through the opening 12 beneath the hood meets the steam issuing at high velocity through the steam jet opening 9, and becomes volatilized and mixed and spread in all directions radially of the pipe A. This inflammable vapor when ignited forms a broad round flame of uniform intensity. The ring 6 with its beveled edge 7 is important in causing a proper jet effect of the steam at every point in the circumference of the plate 5.

As the burner is circular it is manifest that when placed in the center of the firebox of a vertical or other boiler, a sheet of flame will spread over the entire area of the grate and the full heating surface of the boiler will be equally acted on, which is not the case with "straight shot" and other burners in common use. Moreover with this burner a better opportunity is given for the air to meet and mix with the hydrocarbon particles and so effect perfect combustion.

In order to get the best results with this burner it requires a grate of special construction, and I have here shown a grate especially designed for use in conjunction with my burner and forming part of the present invention.

B represents a furnace having the firebox 15 in which are disposed the grate bars or plates 16. These grate bars have their inner narrow ends supported on a central column or post 17 and their outer wider ends supported on a ring or annular ledge 18 on the inside of the firebox; said plates or grate-bars being slightly separated from one another to provide the narrow slits or draft openings 19. The walls of the firebox and the top of the grate-bars are suitably lined with fire brick.

The oil pipe A comes up through the central column or post 17.

The openings 19 between the grate-bars are arranged at inclinations to one another so that the outer end of one slit overlaps the inner end of a next adjacent slit in such fashion that if a radial line is drawn from the center of the support 17 it will invariably cross one slit at least. When it is remembered that my burner is arranged in the center of the firebox and is adapted to discharge its inflammable gases radially in every direction it will be manifest that every part of the flame will get an equal supply of oxygen, which would not be the

case with a grate which has its openings either radial of the firebox or parallel with one another.

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

1. In a furnace having a circular fire-box, the combination with a circular flame burner arranged centrally within the fire-box, of a grate for the fire-box, said grate having slots arranged at inclinations to one another so that the outer end of one slot overlaps the inner end of a next adjacent slot whereby a line drawn radially of the fire-box and through the inner end of one of the slots will intersect a succeeding slot.

2. In a hydrocarbon furnace having a circular fire-box, the combination with a circular flame burner arranged centrally within the firebox, of grate-bars comprising plates having their outer ends supported adjacent to the wall of the firebox and having their inner ends supported adjacent to the burner, and said plates spaced from each other to provide air slots, said air slots being arranged at inclinations to one another so that the outer end of one slot overlaps the inner end of a next adjacent slot whereby a line drawn radially of the firebox and through the inner end of one of said slots will intersect a succeeding slot.

3. The combination with a grate having slots arranged at inclinations to one another so that the outer end of one slot overlaps the inner end of a next adjacent slot, whereby a line drawn radially of the firebox and through the inner end of one of the slots will intersect a succeeding slot, of an oil burner having separate oil and steam passages, said steam passage having an annular outlet, said oil passage having an annular outlet, and said outlets arranged in juxtaposition to each other whereby a flat annular flame is provided.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOSEPH GROW.

Witnesses:
FRED A. GROW,
JOHN F. AKERLAND.