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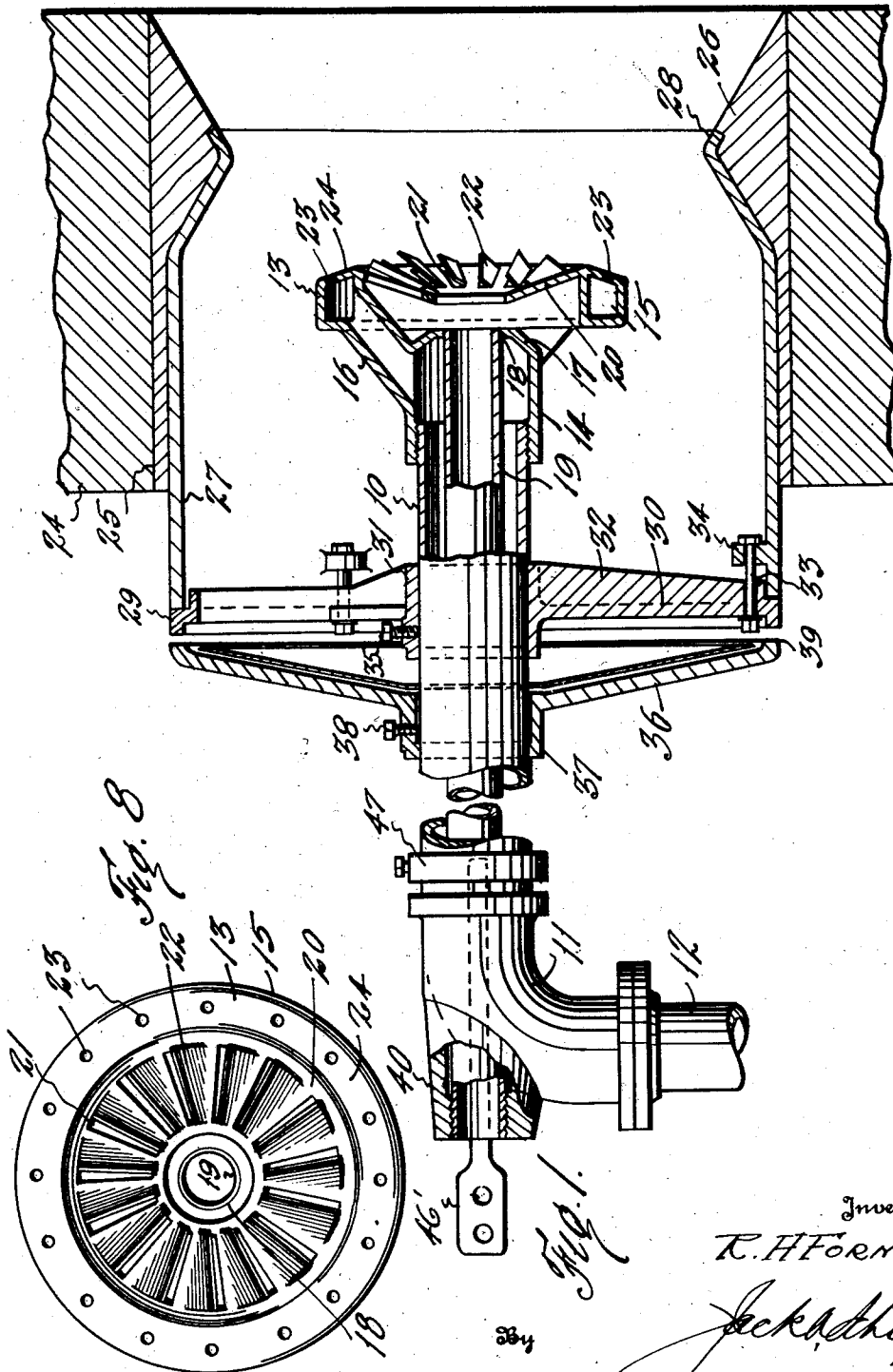
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COMBINATION GAS AND OIL BURNER

Filed Aug. 26, 1931

3 Sheets-Sheet 1



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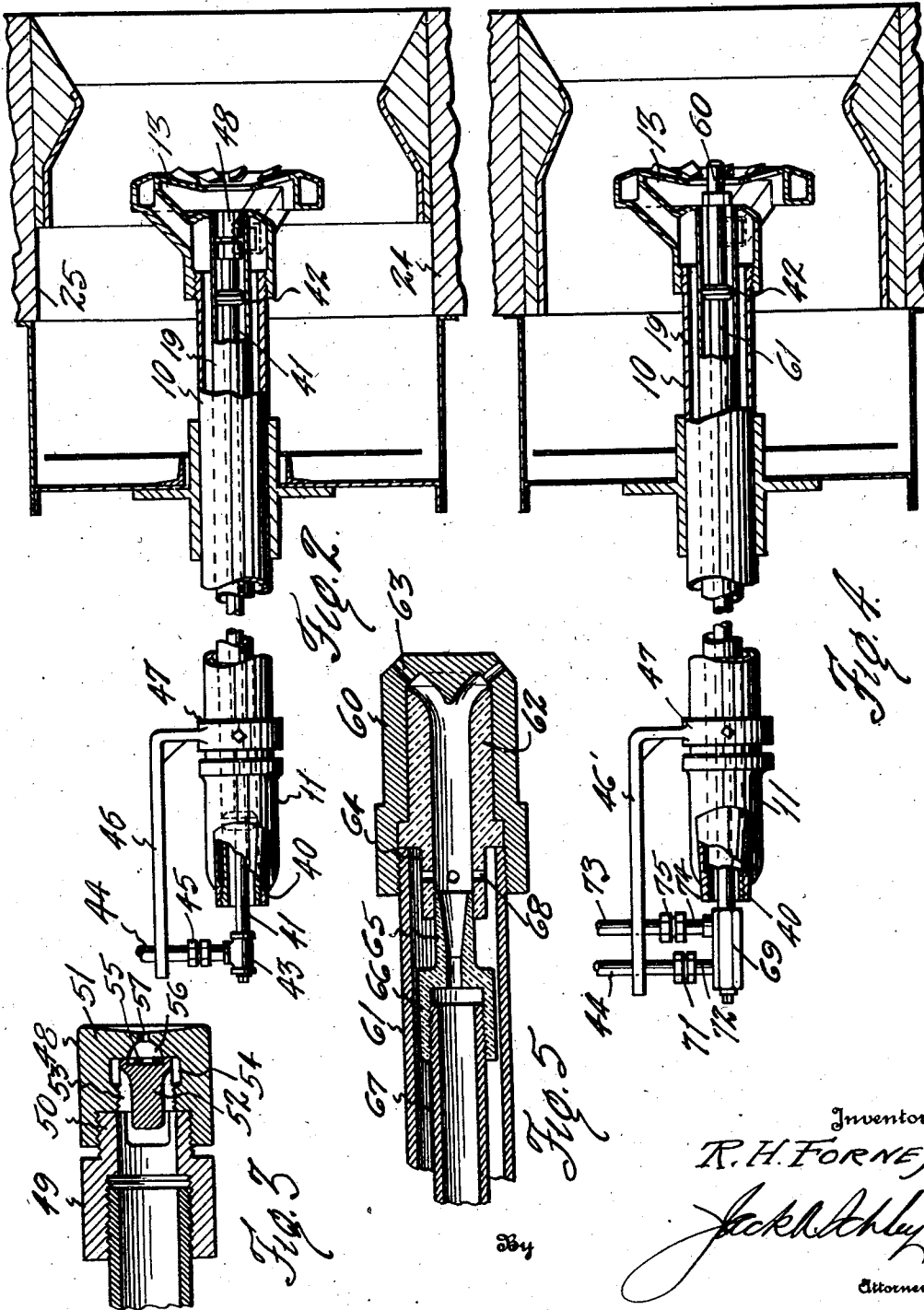
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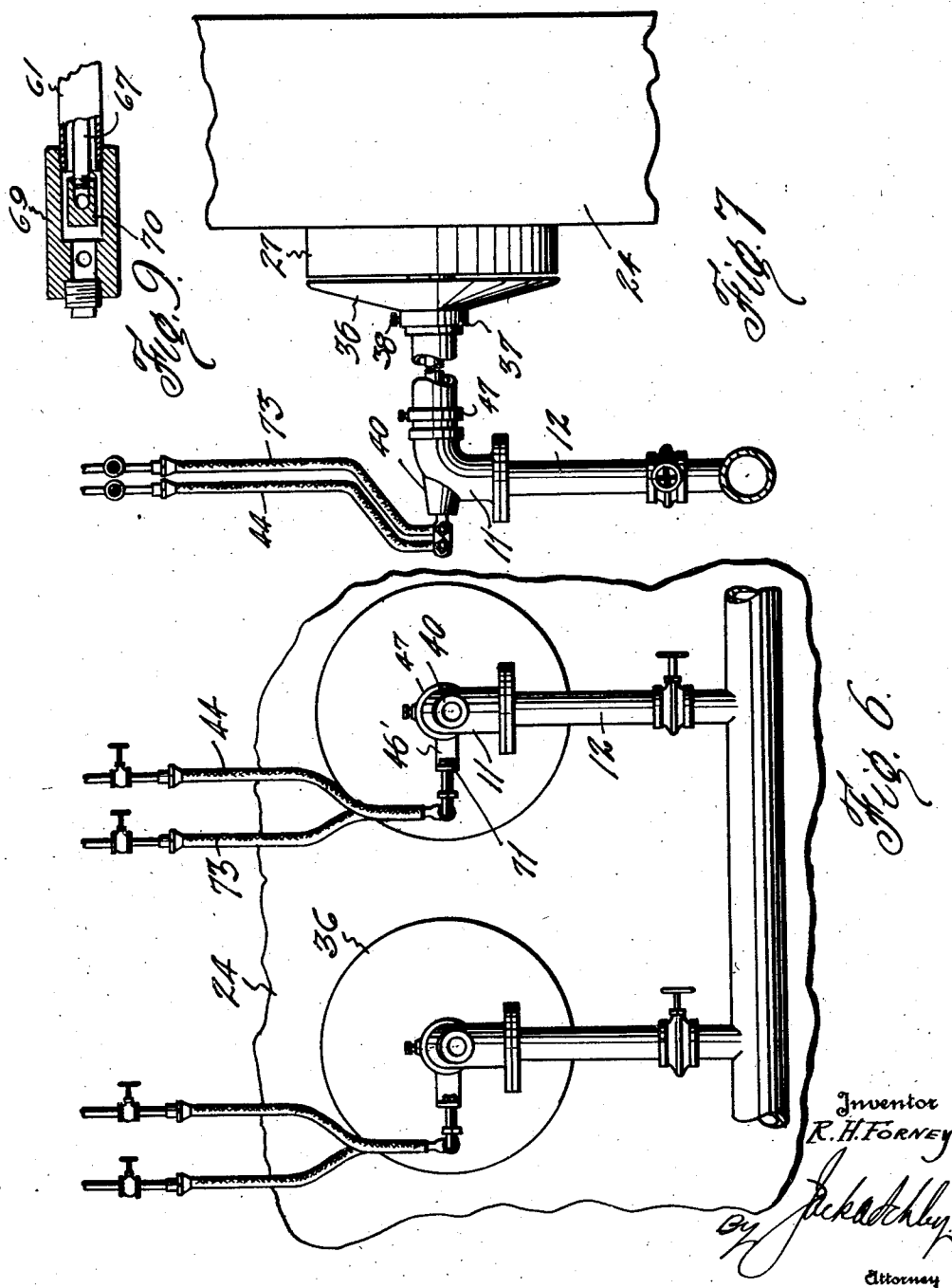
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UNITED STATES PATENT OFFICE

1,991,894

COMBINATION GAS AND OIL BURNER

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Application August 26, 1931, Serial No. 559,577

6 Claims. (Cl. 158—11)

This invention relates to new and useful improvements in combination gas and oil burners.

One object of the invention is to provide a burner of the type set forth particularly adapted and arranged for efficient burning of gas at low pressure; together with means whereby a maximum mixing of air and gas is obtained thus resulting in high combustion efficiency, without pulsation or back-firing.

A further object of the invention is to produce a combination burner which may be readily adjusted and which will be of simple construction, thus making for easy removal for cleaning and repairing.

Another object of the invention is to provide a burner particularly adapted to burn either oil or gas and including improved means whereby oil is atomized by steam and mixed therewith prior to discharge to form a combustible mixture, while the other fuel is discharged under its natural low pressure, and also whereby the fuels, oil and gas, may be burned separately or simultaneously.

A construction designed to carry out the invention will be hereinafter described together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings in which an example of the invention is shown, and wherein:

Figure 1 is a vertical sectional view of a burner constructed in accordance with the invention and adjusted to burn gas at a low pressure,

Figure 2 is a reduced vertical sectional view of the burner arranged to burn oil, or gas and oil,

Figure 3 is a longitudinal sectional view of the oil burner shown in Figure 2,

Figure 4 is a similar view showing a steam connection,

Figure 5 is a longitudinal sectional view of the oil and steam burner shown in Figure 4,

Figure 6 is an elevation showing a dual burner connection,

Figure 7 is a side elevation of the same,

Figure 8 is a front view of the gas burner head, and

Figure 9 is a sectional view of the steam atomizing head.

In the drawings, the numeral 10 designates an elongated metal sleeve having its rear end secured to the upper end of an elbow 11. The elbow has connection with a gas supply pipe 12.

A circular burner head 13 is mounted on the

front end of the sleeve. The burner head comprises a hollow cylindrical shank 14 and a hollow burner ring 15 made integral with the shank by means of diverging tubular arms 16. The shank is screwed onto the front end of the sleeve and is formed with a cap 17 having a central opening 18. A tube 19 mounted axially and extending longitudinally within the sleeve has its front end fastened in the opening 18, whereby the shank is sealed.

The burner head is provided with an inwardly inclined deflector flange 20 within the ring and relatively surrounding the tube 19. This flange is provided with ports 21 and upset wings 22 overhanging the ports. Air passing along the sleeve 10 and between the arms 16 is directed through the ports 21 and deflected by the wings 22. Gas passing through the sleeve 10 is conducted through the arms 16 into the ring 15 and discharged through ports 23. The ports are formed in an annular face 24 which is inclined oppositely from the flange 20. This arrangement causes the gas to escape in jets and in flaring relation. The air discharged from the ports 21 is given a tendency to whirl by the wings and mingles with the gas jets together with counter currents flowing around the burner head, whereby a highly combustible mixture is provided.

In the wall 24 (Figure 1) of the furnace, is formed a port 25 having a lining 26 of fire clay 30 or other suitable material. A cylindrical metal barrel 27 is secured in the lining. The forward end of the barrel is contracted into a frusto-conical shape and provided with a flared lip 28. The gas jets and the air currents are collected by the front end of the barrel and spread by the lip and liner into a frusto-conical flame within the fire box (not shown) of the furnace.

In the rear end of the barrel, which protrudes from the port 25, is fitted the annular flange 29 of a circular head 30. The head includes an axial collar 31 and spiders 32. Bolts 33 passing through the spiders engage lugs 34 in the barrel.

The sleeve 10 is supported in the collar 31 and adjustably held by a set screw 35. The head provides relatively large air admitting openings. For controlling the draft currents and air supply, a frusto-conical damper 36 is slidably mounted on the sleeve 10. The damper has an axial collar 37 snugly surrounding the sleeve and carrying a set screw 38 engaging said sleeve to fasten the damper in adjusted positions. The damper has a circular lip 39 of such diameter as to register with and engage the flange 29, when the damper is slid up to the head. Ordinarily

the damper is spaced from the head as is shown in Figure 1.

On the elbow 11 is formed a nipple 40 which is internally screw-threaded and the rear end of the tube 19 is screwed into the nipple. The tube 5 extending through the sleeve and engaging in the nipple at one end and the cap 17 at the other end, seals the sleeve against the admission of air and is itself sealed against the admission of 10 gas, and so far as the burning of gas alone is concerned the tube could be omitted.

In Figures 2 and 3, I have shown an oil burning addition to the gas burner. A pipe 41 is supported axially in the sleeve by spiders 42. The rear end of the pipe extends from the nipple and carries a T-connection 43. An oil supply conductor 44 is connected to the T by a coupling 45. The conductor is supported in a bracket 46 extending from a collar 47 fastened on the sleeve.

On the front end of the pipe 41 is mounted a burner tip 48 which includes an adapter 49 screwed onto the pipe. The adapter has a reduced screw-threaded nipple 50 which is screwed into the screw-threaded end of a cap 51. A plug 52 is screwed into the cap and this plug has opposite longitudinal oil ducts 53. These ducts are dished at their forward ends so as to divert the oil into an annular chamber 54 at the front end of the cap. The head of the plug fits against the front wall of the cap and has ports 55 admitting oil from the chamber to a sump 56 in the cap, from which it is ejected through a small orifice 57 in the form of an atomized spray.

As is shown in Figure 2, the burner tip 48 is located within the front end of the tube 19 so that the spray is given a full opportunity to mix with the air passing through the ports 21 of the burner head 13. The oil burner may be used with or without gas.

In Figures 4 and 5 is illustrated a steam atomizing form of burner. A burner tip 60 is screwed onto the outer end of a pipe 61 which is supplied with oil. A mixing sleeve or liner 62 is telescoped into the tip. Ports 63 are provided in the outer end of the tip. The mixing sleeve has a reduced shank 64 receiving the reduced nozzle 65 of a nipple 66 screwed onto the end of a steam pipe 67 within the oil pipe 61. The shank 64 has ports 68 admitting oil from the pipe 61 into the path of the steam sprayed into the liner from the nozzle. The oil and steam being thoroughly mixed produce an atomized mixture which is ejected through the ports 63.

The oil pipe 61 is screwed into the forward end of a head 69, while the steam pipe 67 is screwed into a web 70 in said head. The oil supply conductor 44 is connected by a coupling 71 with a nipple 72, whereby oil is discharged into the head and the pipe 61. A steam conductor 73 is connected with a nipple 74 by a coupling 75. The nipple discharges the steam into the web and the pipe 67. The conductors are supported in a bracket 46' extending from a collar 47 fastened on the sleeve 10.

It will be seen that several types of fuel may be used. In Figure 1, the burner is shown for use with gas only, whereas in Figure 2, both gas and oil are used, however, it would be possible to cut off either one of these fuels and use only one. In Figure 4, an equipment for burning oil and gas and using steam atomization is shown, and likewise in this form one of the fuels could be cut off. The burner head 13 is a very important feature, and is particularly efficient for 75 burning gas at a low pressure. The arrange-

ment of the head provides for a maximum mixing of gas and air, particularly at low pressure. The general arrangement produces high combustion efficiency, and pulsation or back-firing is eliminated. The parts are simple and may be readily taken apart for cleaning and repairing. It is pointed out that while gas is being burned under a low pressure oil may be atomized under a high pressure at a high temperature.

Various changes in the size and shape of the different parts, as well as modifications and alterations, may be made within the scope of the appended claims.

What I claim, is:

1. A burner comprising, a cylindrical hollow shank, tubular arms extending radially from said shank, an annular hollow head carried by said arms and communicating therewith, said head having an annular outwardly inclined face provided with orifices for directing fuel streams in an outwardly flaring frustum, and an annular inclined deflector flange within the head having air openings and deflector wings overhanging said openings, whereby the air passing through said openings is deflected annularly of the head and into the fuel streams and mixed therewith.

2. A burner comprising, a cylindrical hollow shank, tubular arms extending radially from said shank, an annular hollow head carried by said arms and communicating therewith, said head having an annular outwardly inclined face provided with orifices for directing fuel streams in an outwardly flaring frustum, and an annular inclined deflector flange within the head having air openings and deflector wings overhanging said openings, the wings of the deflector flange being inclined and arranged to set up a turbulence of the air currents within the head, whereby said currents are directed outwardly into the jets of fuel escaping from the orifices of the head.

3. A fuel burner comprising, an outer gas supply tube, a cylindrical hollow shank on one end of said tube and having a reduced opening, an inner tube of less diameter extending axially through the gas tube and sealed off therefrom and also having its discharge end fitting tightly in the opening of the shank, imperforate tubular arms extending from the shank, an annular head carried by said arms at their outer ends and in direct communication therewith, said head having orifices arranged to direct streams of gas divergently and outwardly from the center of said head, and an air deflector within the head having air deflecting wings for deflecting air currents into the streams of gas discharged from said head.

4. A fuel burner comprising, an outer gas supply tube, a cylindrical hollow shank on one end of said tube and having a reduced opening, an inner tube of less diameter extending axially through the gas tube and sealed off therefrom and also having its discharge end fitting tightly in the opening of the shank, imperforate tubular arms extending from the shank, an annular head carried by said arms at their outer ends and in direct communication therewith said head having orifices arranged to direct streams of gas divergently and outwardly from the center of said head, an oil supply tube extending through the inner tube, a nozzle on the forward end of the oil tube at the forward end of the inner tube for spraying oil, and an air deflector within the gas head surrounding the nozzle and having air deflecting wings for deflecting air currents into

the streams of gas discharged from the gas head and also for whirling the air currents flowing in the zone of the oil spray.

5 5. A fuel burner comprising, an outer gas supply tube, a cylindrical hollow shank on one end of said tube having a reduced opening, an inner tube of less diameter extending axially through the gas tube and sealed off therefrom and also having its discharge end fitting tightly in the opening of the shank, imperforate tubular arms extending from the shank, an annular head carried by said arms at their outer ends and in direct communication therewith said head having orifices arranged to direct streams of gas divergently and outwardly from the center of said head, an oil supply tube extending through the inner tube, a nozzle on the forward end of the oil tube at the forward end of the inner tube for spraying oil, an air deflector within the gas head surrounding the nozzle and having air deflecting wings for deflecting air currents into the streams of gas discharged from the gas head and also

for whirling the air currents flowing in the zone of the oil spray, and a steam supply tube within the oil tube within the inner tube and communicating with the nozzle.

6. A fuel burner comprising, an elongated sleeve, means for supplying gas to said sleeve, an annular head surrounding and spaced from said sleeve, imperforate tubular arms extending from the sleeve to the head for conducting gas from said sleeve to said head, said head having orifices arranged to direct streams of gas divergently and outwardly, and an annular deflector flange mounted within the area surrounded by the head and having openings extending from its inner marginal portion to its outer marginal portion and provided with wings overhanging and restricting said openings so as to deflect air currents passing through said openings outwardly into the streams of gas discharged from said head.

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