

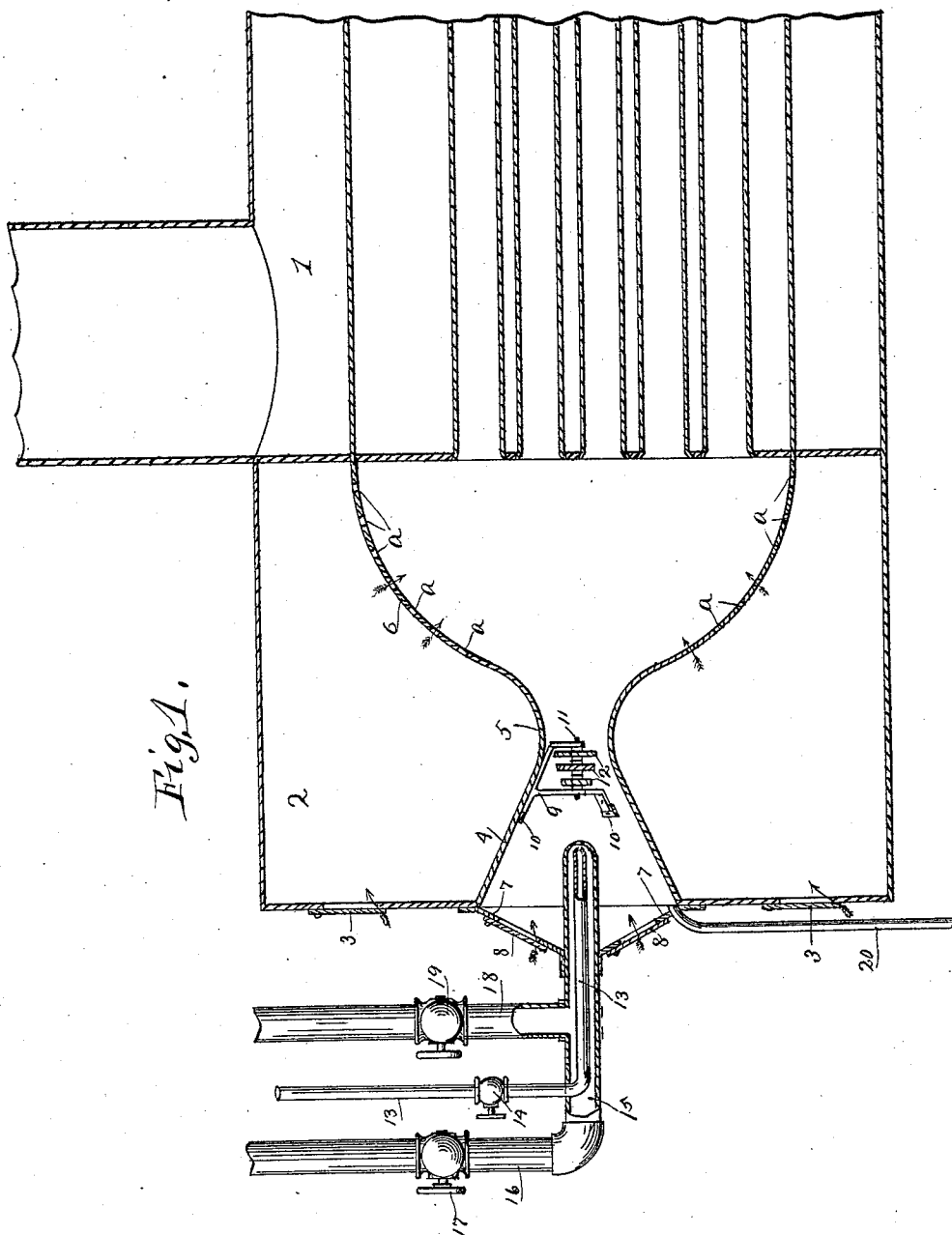
(No Model.)

2 Sheets—Sheet 1.

L. S. BUFFINGTON.
APPARATUS FOR BURNING FLUID FUEL.

No. 579,637.

Patented Mar. 30, 1897.



Witnesses.

Wright Beamon
Attorney

By his Attorney

John Williamson

Inventor
Leroy S. Buffington

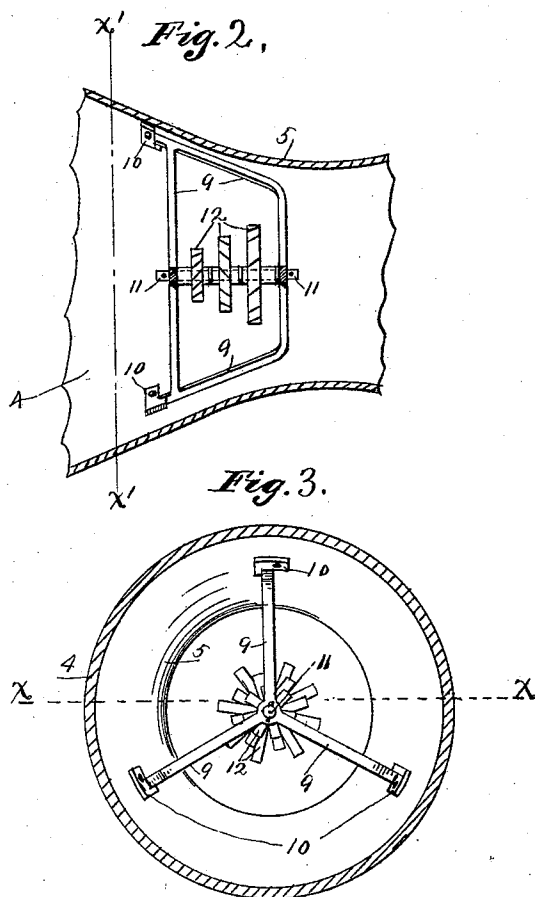
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George H. Paison
R. D. Merchant

Inventor.
Leroy S. Buffington.

By his Attorney.

Jas. F. Williamson

UNITED STATES PATENT OFFICE.

LEROY S. BUFFINGTON, OF MINNEAPOLIS, MINNESOTA.

APPARATUS FOR BURNING FLUID FUEL.

SPECIFICATION forming part of Letters Patent No. 579,637, dated March 30, 1897.

Application filed November 18, 1895. Serial No. 569,256. (No model.)

To all whom it may concern:

Be it known that I, LEROY S. BUFFINGTON, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Apparatus for Burning Fluid Fuel; 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.

My invention has for its object to provide an improved apparatus for producing and burning fluid fuel.

To these ends my invention consists of the novel features hereinafter described, and defined in the claims.

This apparatus is illustrated in the accompanying drawings, wherein, like figures and letters referring to like parts throughout—

Figure 1 is a vertical longitudinal section through my improved apparatus as it might be applied to a steam-boiler. Fig. 2 is a central horizontal section through the spraying or primary commingling chamber on the line xx of Fig. 3, and Fig. 3 is a vertical cross-section on the line $x'x'$ of Fig. 2.

The numeral 1 represents a steam-boiler of any suitable construction. 2 represents a box or casing, shown as projecting from the front end of the boiler 1 and as provided with air-inlets covered or controlled by dampers or doors 3 for affording a supply of free or atmospheric air to the interior of the box or chamber 2.

Directly in front of the flues is supported in any suitable way a hollow casting or body 4, 5, and 6 in the form, preferably, of two cone-frustums united at the point 5 to form a common connecting throat or passage between the outer and smaller cone 4 and the inner or larger cone 6. The larger cone 6 terminates flush with the outer wall of the furnace, so as to embrace the ends of the boiler-flue, and is provided with a series of inlets a for the supply of free air thereto from the air chamber or box 2. The outer or smaller cone 4 projects through a suitable opening in the face of the box 2 and is closed by a removable cap or outer end 7, having air-passages there-through controlled by suitable doors or dampers 8.

A suitable spider-like frame 9 of conical form is removably secured within the outer or small cone 4 by means of catch-lugs 10, with which the spider-legs may be made to engage by giving the spider a partial turn after placing the same approximately in position within the cone 4. In the said spider 9 is journaled a shaft 11, on which are loosely mounted one or more wind-wheels 12. As shown, the said shaft 11 carries three of the said wheels 12, which are graduated in size with the smallest member thereof located at the outer end and the largest member at the inner end of the series. As shown, the outer and inner wheels have their blades set for rotation in a common direction, while the intermediate wheel has its blades set with an opposite pitch or for rotation in a direction opposite to that of the end wheel. When the said spider is in its proper working position, the said wheels 12 will be in the position shown best in Figs. 1 and 2 of the drawings.

A nozzle-ended pipe 13 is in communication with a supply of oil under pressure and is provided with a valve 14 for controlling the supply of the same. The nozzle end of the oil-supply pipe 13 is supported in any suitable way, with its nozzle or delivery end within the outer cone 4, or in position to deliver a jet of oil onto the blades of the wheels 12.

The delivery-section of the oil-supply pipe 13 is embraced by a larger pipe-section 15, having its open inner end or delivery-nozzle approximately in line with the nozzle or delivery end of the oil-pipe 13. The pipe 15 is tapped by a pipe 16, which is in communication with a supply of air under pressure and is provided with a hand-valve 17 for controlling the supply of the same. The pipe 15 is also tapped by a pipe 18, which is in communication with the source of steam, such as the steam-dome of the boiler, and is provided with a hand or throttle valve 19 for controlling the supply of the same. With this arrangement of the parts noted it must be obvious that the jet of oil can be delivered alone, under pressure, onto the blades of the wheels 12, or can be delivered thereto accompanied by a column of air under pressure, or a column of steam under pressure, or a column of commingled air and steam under pressure. Hence the jet of oil alone may be relied upon

to rotate the wheels, or the air and steam may be either separately or jointly added thereto for action on the said wheels. Inasmuch as the said wheels are graduated or vary in size, increasing from the outermost to the innermost member, it is obvious that whatever portions of the jet of fluid or fluids passes the outermost wheel will operate on the succeeding members of the series in regular order. It is also obvious that under this rotation of the said wheels the oil will be completely sprayed into a finely-divided condition, and will be at the same time thoroughly commingled with the body of air and steam together, or either alone, as supplied under pressure from the pipes 17 and 18, respectively. The said wheels 12 will of course be driven at high speed, especially when the jet of oil is reinforced by the column of commingled air and steam, or even by the air or steam alone, and the commingled elements will move forward from the wheels into the inner or large cone 6. The wheels 12 and the contracted throat 5 serve as the burner or point at which the combustion of the commingled elements begins. The chamber 6 is therefore the combustion-chamber, with gradually-expanding walls for accommodating the increasing volume of gases, and under the forced and natural draft on the said combustion-chamber an additional supply of free or atmospheric air will be drawn in through the inlets *a* to the interior of the combustion-chamber. The suction produced by the combustion and the moving columns of oil, air, and steam, or one or more thereof, when acting on the spraying-wheels, will cooperate to produce a strong suction, which will induce a considerable of free or atmospheric air through the openings 8 in the head 7 of the outer or commingling cone 4. Hence the oil will be sprayed and commingled with any desired quantity of air alone or commingled air and steam under pressure, and will burn with a reinforcing supply of free or atmospheric air, which may be regulated in quantity, so as to afford any amount thereof desired. The combustion will therefore be complete, affording a most efficient and smokeless fuel. The action on the boiler is of course obvious, as the flames or burning gases will pass through the flues in the ordinary way.

The removable cap or end piece 7 may be secured in position by any suitable means (not shown,) and may be slid outward on the end of the nozzle-section 15, so as to give an increased amount of free-air opening. As preferably constructed, the free-air passages are of such size and of such number that the sum of their area exceeds that of the cross-section of the contracted neck portion 5.

It will be noted that in the construction above described the spraying-wheels are mounted in a funnel-shaped neck portion formed by the section 4, the converging or small end of which unites, by means of the contracted portion 5, with the combustion-

chamber 6 and the diverging or large end of which is positioned outward. In virtue of this construction the draft of air in passing through the converging neck portion 4 will be constantly intensified as it approaches the spraying-wheels and will be delivered onto said wheels at the point of its greatest intensity.

With the construction above described the spraying-wheels can be run at a sufficient speed to thoroughly spray the oil by the natural draft of the combustion-compartments. Hence for many uses it will only be necessary to provide, in connection with the parts just set forth, some suitable means of supplying the liquid fuel to the spraying wheel or wheels. It is also important to note the importance of the free-air passages *a* in the diverging walls of the combustion-chamber 6. These free-air passages *a* permit the free inflow of fresh air and hence relieve what might otherwise be a partial vacuum created by the draft of the flues on the large end of this combustion-chamber.

It should be noted that one or more of the spraying-wheels 12 may be employed and that they may be constructed either to turn in a common direction or in different directions on their supporting-shaft, and if constructed to turn in a common direction they might all be rigid with the shaft, so as to render the action of the oil, air, and steam, or any one or more thereof, cumulative in effect on the shaft. The spraying action, however, is the thing desired, and for this purpose it is thought that the action will be better when the wheels are constructed and mounted to rotate in different directions.

It will of course be understood that minor details of the construction might be changed without departing from the spirit of my invention.

A waste or drip pipe 20 is shown as applied to the outer cone or commingling-chamber 4 for leading off any oil or condensed steam which may collect therein.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. The combination with a combustion-chamber, of a funnel-shaped neck portion leading thereto with its large or flaring end positioned outward and open to the atmosphere, one or more spraying-wheels mounted in the contracted section of said neck portion, and means for supplying liquid fuel to said wheel or wheels; whereby the intensity of the draft is increased as it approaches said spraying wheel or wheels, substantially as described.

2. The combination with a combustion-chamber formed with inwardly-diverging walls, of a converging or funnel-shaped neck portion uniting at its contracted portion with the contracted portion of said combustion-chamber, and having its large or flaring end turned outward and open to the atmosphere, one or more spraying-wheels mounted in said

converging neck portion, and means for delivering liquid fuel onto said spraying wheel or wheels, substantially as described.

3. The combination with a combustion-chamber, of a series of spraying-wheels of increasing size mounted in the draft-passage to said combustion-chamber, on a pivot that is disposed longitudinally of said draft-passage, and means for supplying liquid fuel to said spraying-wheels, substantially as described.

4. The combination with the combustion-chamber, of a series of spraying-wheels of increasing size mounted in the draft-passage to said combustion-chamber the alternate wheels being arranged to run in different directions, and means for supplying liquid fuel to said spraying-wheels, substantially as described.

5. The combination with a combustion-chamber, formed with inwardly-diverging walls provided with air-passages leading from the atmosphere, of a converging or funnel-shaped neck portion uniting at its contracted portion with the contracted portion of said combustion-chamber and having its large or flaring end turned outward and open to the atmosphere, one or more spraying-wheels mounted in said converging neck portion, and means for delivering liquid fuel onto said spraying wheel or wheels, substantially as described.

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

LEROY S. BUFFINGTON.

Witnesses:

JAS. F. WILLIAMSON,
C. WRIGHT DAVISON.