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SPRAY BURNER.

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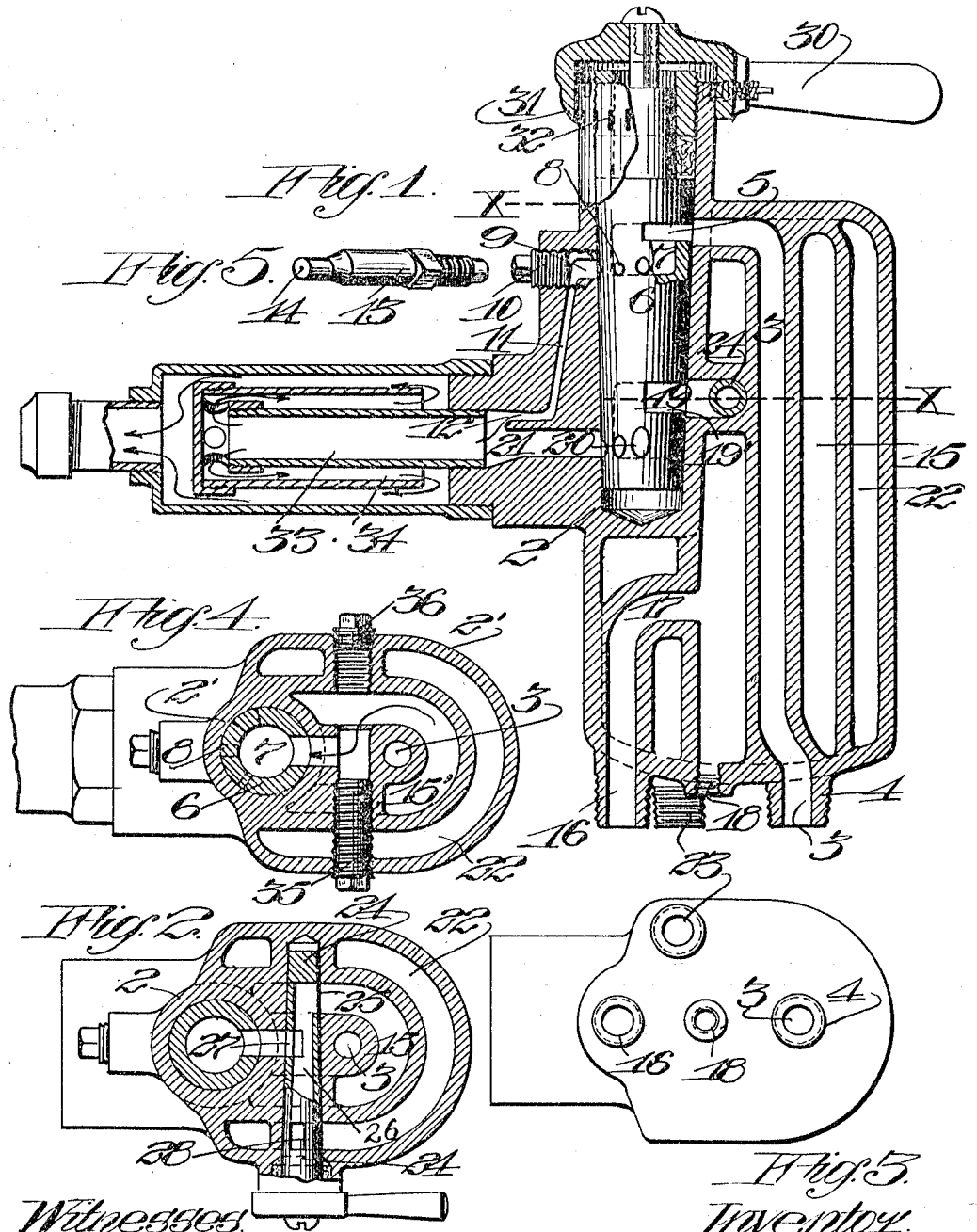
1,051,831. Patented Jan. 28, 1913.



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UNITED STATES PATENT OFFICE.

EMANUEL W. DUNN, OF SAN FRANCISCO, CALIFORNIA.

SPRAY-BURNER.

1,051,831. Specification of Letters Patent. Patented Jan. 28, 1913.

Application filed December 11, 1911. Serial No. 665,056.

To all whom it may concern:

Be it known that I, EMANUEL W. DUNN, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Spray-Burners, of which the following is a specification.

This invention relates to an apparatus having means whereby oil is atomized or finely divided by steam or air, and the mixture injected into a combustion chamber.

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

Figure 1 is a vertical sectional view through the device. Fig. 2 is a cross section on line X—X Fig. 1. Fig. 3 is a bottom plan view of the apparatus. Fig. 4 shows a modification of the mixture controlling means. Fig. 5 is a perspective of a spraying nozzle.

In certain oil burning systems of my construction and invention, I admit oil and a spraying medium to a proportioning device, such as indicated in the present instance as comprising a casing or body portion 2; the oil and spraying medium both being under given pressures automatically controlled by devices utilized in the system.

The present apparatus is designed to receive the oil and spraying medium at their given definite and automatically controlled pressures; means being provided in the body 2 whereby certain definite ratios as to volume of the oil and spraying medium may be obtained.

Oil under fixed and controlled pressure is admitted to a central channel 3 at a suitable connection 4; the oil channel 3 extending upwardly within the body and being registered at its upper end with a port 5, having a wide mouth, in a plug 6 movably fitted in the body 2. The port 5 opens into a distributing or pressure equalizing pocket 7 from which there radiate a number of graduated or differently sized delivery ports 8, which may range from a very small opening to one of much greater area; as many of the ports 8 being provided radially in the valve plug 6 as may be desired to produce or feed certain definite proportions or quantities of oil. The graduated ports 8 are adapted to be turned to discharge into a recess 9, in front of which may be inserted a blind plug 10, which, when in place, directs the oil downwardly into a channel 11 which is directed forwardly at its lower end, as at 12.

By providing a wide mouth for port 5 the oil may freely flow into the pocket 7 in which the oil will accumulate at a pressure substantially equal to that in the channel 3. The variously sized discharge openings or radial ports 8 may, one at a time, be turned into register with the outlet 9 and the oil in each port 8 is constantly subjected to a uniform pressure with that in the channel 3 which may be such as desired.

It is important in order to insure a uniform supply that the oil flow evenly and readily through the valve, and to that end I find it expedient to form the pocket 7 in which an ample supply of oil may collect at full or balanced pressure and to arrange and form the graduated ports 8 in the most direct fashion; this being readily accomplished by drilling radially through the wall of the plug into the chamber 7, the egress 8 being shown on a lower plane than the wide port 5. By this structure the oil flows in a straight path of uniform area from the chamber 7 into aperture 9.

Under certain conditions and requirements, it may be desired to remove the plug 10 and insert a form of discharge nozzle or tip 13, Fig. 5, which is perforated from end to end with an orifice of suitable diameter or area, and when the plug or tip 13 is screwed into the valve body 2, it is designed to cut off the flow of oil into the passageway 11 so that the oil admitted to the duct or channel 3 when passing through the valve port 5 and one of the selected graduated radial ports 8 will be forced to discharge through the tip 13. In this instance the atomization is produced by the sudden release of the oil under high pressure and temperature without the aid of a spraying medium in the apparatus.

I have found it extremely expedient and efficacious to increase the temperature of the oil as it flows through the channel 3, and in order to produce this increase in temperature I have formed within the body 2 a chamber 15, of suitable proportions and area, which surrounds the walls of the oil channel 3; steam being admitted to the heating chamber 15 through an inlet connection

16 at the lower end of the body 2, the steam inlet passageway 17 being carried upwardly somewhat above the bottom of the jacket or body 2 so that moisture of the steam may be precipitated to the bottom of the chamber 15 from which condensed material may be drained through an opening 18. By reason of the provision of the heating jacket or chamber 15, the oil, before issuing from the proportioning device, may be raised to the desired temperature and its viscosity nicely determined and held steady, thereby rendering the issue of oil more free, steady and reliable, prepared for quick and perfect atomization.

Certain establishments being provided with steam plants, the present apparatus is designed to utilize the steam for the dual function of increasing the temperature of the oil passing through the channel 3 and as the means for spraying the oil issuing from the proportioning device, and for that purpose I introduce in the body 2 suitable means whereby the steam from the chamber 15 may be admitted to a port having a wide mouth 19 and a pocket or chamber 19′ in the valve plug 6. The port 19 communicates with a series of variously sized radial ports 20 which are so arranged, relative to the oil ports 8, that the ports 8 and 20 are adapted to be turned into registration with the discharge channel 9 for the oil and a channel 21 for the steam; that is to say, the smallest port 8 and the smallest port 20 are in line longitudinally of the plug 6, the next larger sizes of the ports 8 and 20 are alined and so on until the largest of the ports 8 and the largest of the ports 20 are alined. Thus it will be seen that by so arranging the oil ports and the steam ports that any alined set or two of them will produce a given definite, proportionate volume of oil and steam or air for certain positions of the valve 6.

It is one of the purposes of this invention to provide means whereby air may be used as the spraying medium in lieu of steam, if desired, thus the apparatus is capable of use with either air or steam as the means for finely dividing the fuel used, and to that end the body 2 of the device is provided with an air chamber 22, of suitable proportions, which is shown in the present instance as substantially surrounding the steam jacket 15, which in turn surrounds the oil channel 3.

In order to enable the operator to select at his desire either steam or air as a spraying medium to be admitted into the port 19 of the valve 6, there is mounted in the casing 2 a valve 24, Fig. 2, extending transversely and having a radial port 25 which may be turned to register with the interior of the steam jacket 15; the part 25 communicating with a central duct 26 in the valve 24; and the duct being provided with an opening 27 leading to the port 19 of the valve 6.

On the opposite side of the valve 24 from the port 25 is provided a port 28 communicating with the central duct 26; the port 28 being arranged in the plug 24 so that it may be turned to register and communicate with the interior of the air chamber 22, at which time the port 25 will have been reversed so as to cut out communication with the steam chamber 15. Thus the operator has the privilege of selecting air under suitable pressure from the chamber 22 to be admitted to the port 19 of the valve 6, thence discharging through one of the openings 20 into the ejector port or channel 21.

When oil alone is to be discharged by the valve 6, the operator turns the valve 24 to such a position that both the ports 25 and 28 are arranged in neutral, inoperative position so that no communication is had with the steam chamber 15 or the air chamber 22, in which case no air or steam will be admitted to the port 19 of the valve 6.

Assuming that a certain quantity of oil (at a given pressure which is automatically controlled at all times to be proportionate to a given pressure of steam in the chamber 15 or air in the chamber 22) be wanted, it is necessary that the operator have some index by which he may determine which of the proportioning sets of ports 8—20 are in registration with their respective channels 9—21, and therefore the plug 6 is shown as provided with a suitable operating handle 30, having an index finger or other suitable indicator 31 which is adapted to register with certain gradations 32 on the exterior of the upper portion or side of the body 2. The gradations 32 will be so marked that the operator will have means of knowing which of the variously sized ports 8—20 are at any given time registering with their respective outlets 9—21.

From the foregoing it will be seen that with oil and steam or air admitted to the proportioning apparatus at given, automatically, controlled pressures, preferably that of the oil being the higher, the operator may select any one of the sets of ports 8—20, to produce a mixture of oil and steam or air in fixed definite proportions for the production of a flame of desired size. Since the ports 8—20 are arranged in sets determined by their relative areas, which areas are designed to produce a mixture of a given quantity of oil and steam or air, this proportion will always remain constant irrespective of the particular set of calibrated ports 8—20 that may be selected to discharge different quantities of the mixture.

The oil pressure being always held at a greater pressure than the steam or air assures a constant flame. Inasmuch as the proportioning device or apparatus heretofore described

is mainly for the purpose of accurately proportioning a hydrocarbon and a spraying medium, it is desirable to provide in the apparatus means for the thorough commingling of the oil and spraying medium after the latter pass from the discharge channels 12—21, and for this mixing there is provided a suitable device as a chamber 33 having a tortuous passageway 34 through which the two may pass and be thoroughly mixed before issuing from the chamber 33.

In Fig. 4 there is shown a modification of the means for controlling the admission of steam or air to the mixing valve 6. In this instance I employ a long plug 35 adapted to reach sufficiently far into the casing 2′ to cut off the inlet of air, and there is provided a short plug 36, which, when inserted in the casing 2′, leaves the steam port from the steam jacket 15′ open so that steam may be admitted. The interchange of these plugs 35—36 will correspondingly change the fluid used as the spraying medium.

The oil ports 8—20 are respectively arranged to mix oil and a spraying medium in such proportions as to produce as perfect an atomization as possible.

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

1. A device of the character described, comprising a casing, having a mixing chamber and having a channel for oil, a chamber for air, and a steam jacket inclosing the oil channel; and a turning plug mounted in the casing between said chamber and the mixing chamber and having ports adapted to communicate with said oil channel and steam jacket or air chamber, said ports being graduated in size and adapted to admit to the mixing chamber fixed proportions of oil and an atomizing fluid.

2. In a device of the character described, a casing having an oil channel, a steam jacket surrounding the same, and an air chamber, an outlet from the oil channel, a second outlet adjacent the same, means for placing either the steam jacket or the air chamber in communication with said second outlet, and means for regulating the flow of fluid through both said outlets.

3. In a device of the character described, a casing having an oil channel, a steam jacket surrounding the same, and an air chamber, an outlet from the oil channel, a second outlet adjacent the same, means for placing either the steam jacket or the air chamber in communication with said second outlet, and means for regulating the flow of fluid through both said outlets, said last-named means comprising a valve having series of graduated ports for the passage of various quantities of said fluids in definite proportions.

4. In a device of the character described, a casing having an oil channel, a steam jacket surrounding the same, and an air chamber, an outlet from the oil channel, a second outlet adjacent the same, means for placing either the steam jacket or the air chamber in communication with said second outlet, and means for regulating the flow of fluid through both said outlets, said means including a valve having fluid passages with pressure equalizing chambers arranged therein and said valve having radial ports of various areas extending from said chambers.

5. In a device of the character described, a casing having an oil channel, a steam jacket surrounding the same, and an air chamber, an outlet from the oil channel, a second outlet adjacent the same, and means for regulating the flow of fluid through both said outlets, said means comprising a valve having series of graduated ports for the passage of various quantities of said fluids in definite proportions, means for cutting off both the steam and air or admitting either to the valve, and means for indicating the position of any of the graduated ports.

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

EMANUEL W. DUNN.

Witnesses:
CHARLES EDELMAN,
C. J. SWENSON.