

March 26, 1935.

K. MURAKI

1,995,861

OIL BURNING APPARATUS

Filed May 27, 1931

2 Sheets-Sheet 1

Filed
Fig. 1

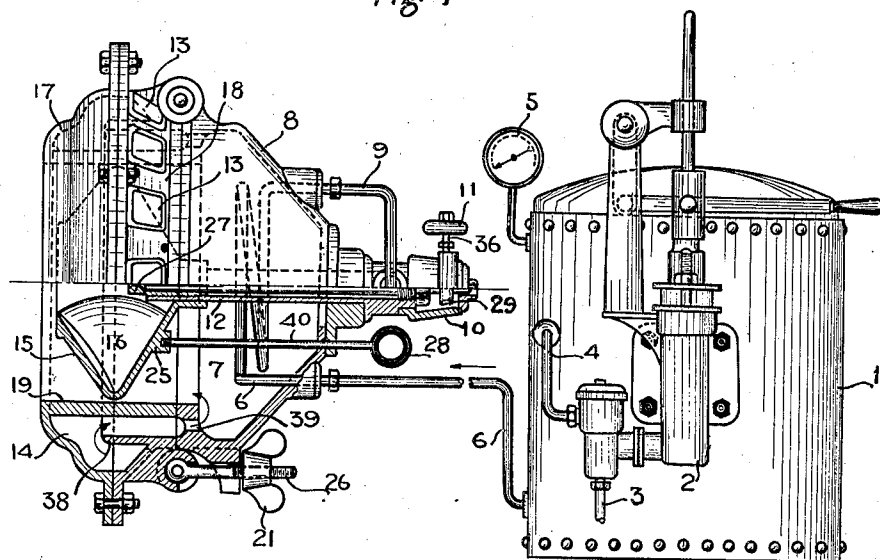


Fig. 5

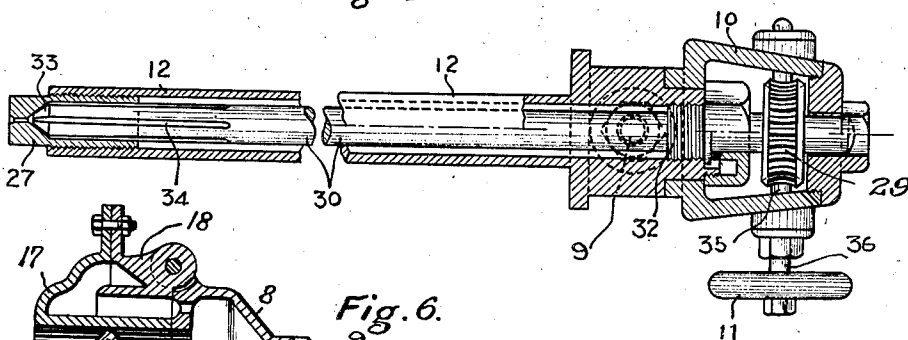
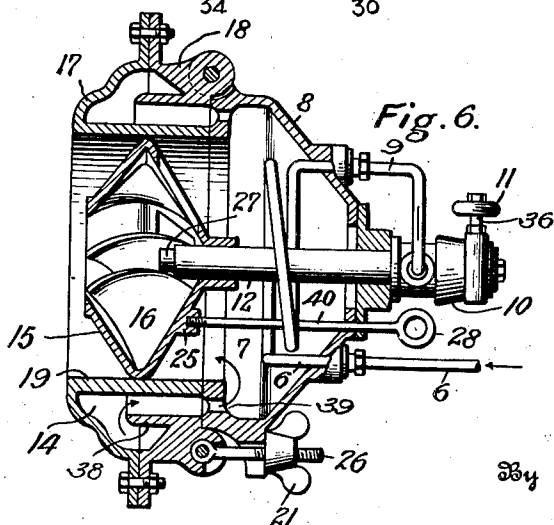


Fig. 6.



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Fig. 3

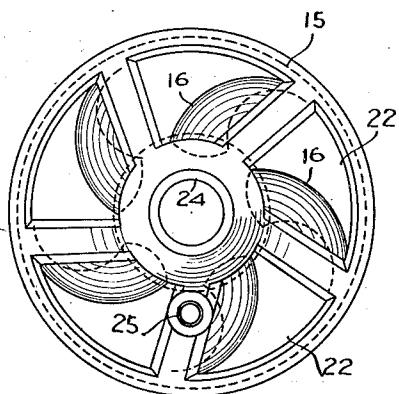


Fig. 2

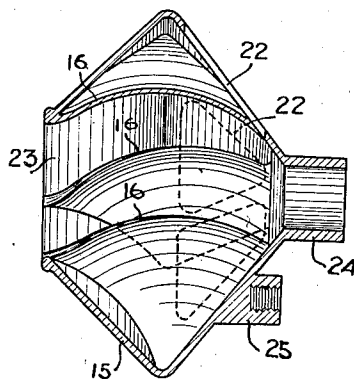
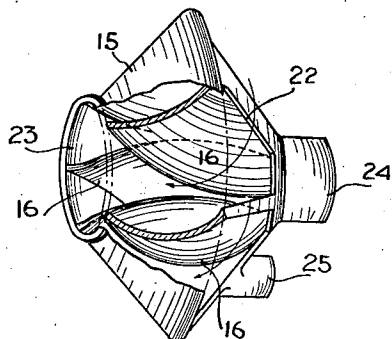


Fig. 4



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OIL BURNING APPARATUS

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Application May 27, 1931, Serial No. 540,315

2 Claims. (Cl. 158—76)

This invention relates to an oil burning apparatus which may be used in many types of industrial furnaces.

One feature of the invention consists in the provision of an oil burning apparatus comprising an annulus enclosing an oil injection nozzle and having walls which are inclined from the middle towards the ends, one end of the annulus having a contracted open mouth, while a number of air admission ports are provided at the opposite inclined wall thereof. A plurality of spiral vanes or partition walls are used to form spiral passages between the air admission ports and the contracted open mouth to enable the admitted air to swirl rapidly and to break up the oil particles projected from the oil injection nozzle as a fine spray.

Due to this arrangement the fuel oil is very thoroughly mixed with the admission air so that complete combustion can take place, and a very large and strong flame can be provided at the contracted open mouth. This flame can be made still larger by the provision of a partition wall and the formation of vacuum in a space between said wall and an inclined wall of the annulus.

The length of the flame may be adjusted by varying the amount of oil passing through the oil injection nozzle and by changing the distance between the mouth of the oil injection nozzle and the contracted open mouth of the annulus.

Another feature of this invention is the preliminary heating of air flowing toward the admission ports of the annulus. The fuel oil is also heated on its way to the oil injection nozzle.

An embodiment of the present invention is illustrated in the annexed drawings, in which:

Figure 1 is an elevation, partly in section, of the apparatus connected with the fuel oil tank.

Figure 2 shows in section the flame blowing annulus provided with walls converging from the middle towards the ends thereof.

Figure 3 is an end view of the annulus.

Figure 4 shows the annulus in perspective with parts cut away.

Figure 5 is a section through the oil injection nozzle.

Figure 6 shows the nozzle in elevation and the annulus and the casing in vertical section.

The device illustrated in the drawings comprises a pressure tank 1 containing the fuel oil and a feed pump 2 which is connected by a pipe 3 with an oil reservoir not shown in the drawings. The pump 2 feeds the fuel oil into the pressure tank 1 through the pipe 4. A pressure gauge 5 and a feed pipe 6 are connected to the

tank 1. A portion of the pipe 6 forms coils surrounding an oil injection nozzle 12 which is situated in the middle of a chamber 7 formed by the walls of a hollow casing 8. Another chamber 14 is formed by the walls of a cover 17 and a hollow casing 18. The air is introduced into the chamber 14 through openings 13 formed on the periphery of the casing 18.

The pipe 6 is connected with a pipe 9 which conducts fuel oil into the oil injection nozzle 12.

A box 10 serves as a cover for an adjusting device which actuates a regulating spindle 30 (Fig. 5). The spindle 30 passes through a packing 32 which is mounted adjacent to the rear end of the oil injection nozzle 12. The adjusting device comprises a worm wheel 29 which is keyed on the spindle 30 and which is geared with a worm 35 on a spindle 36 actuated by a handle 11. The regulating spindle 30 is moved longitudinally by the revolution of the worm wheel 29.

A conical end 33 of the spindle 30 fits in a conical bore of a member 27 screwed into the forward end of the oil injection nozzle 12 and provided with an opening for the passage of the oil. The spindle 30 has a plurality of grooves 34 provided along a suitable length thereof, beginning from its conical end 33. The grooves 34 serve for the passage of oil to the mouth of the nozzle.

An annulus 15 surrounds the mouth of the oil injection nozzle 12 and is provided with walls which are inclined from the middle of the annulus toward the ends thereof. A contracted open mouth 23 is formed at the forward end of the annulus while a number of air admission ports 22 are provided at the rear wall of the annulus. The neck 24 of the annulus 15 is loosely fitted on the member 27, so that the annulus 15 may be moved slightly with respect to the oil injection nozzle 12 to adjust the length of the flame; for that purpose, the annulus 15 is provided with a projection 25 formed on the rear wall of the annulus and connected with a rod 40 which is provided with an operating handle 28.

A number of spiral vanes or partitions 16 are provided within the annulus 15 and are arranged in the form of spiral passages leading from the air admission ports 22 to the mouth 23, so that suction is exerted on the air passing through these spiral passages.

The annulus 15 is surrounded by a cover 17 and a casing 18. The casing 18 is hinged to a flange of the casing 8 and is tightened by a pivotal bolt 26 and a nut 21.

The cover 17 and the casing 18 are detachably connected at their flanges. The cover 17 is curved

for the purpose of enlarging the flame. Air admission ports 13 provided in the casing 18 lead to the chamber 14, formed by the outer walls of the casing 18 and the cover 17, and by inner partition walls 19 and 38, forming parts of the cover 17 and the casing 18, respectively. Openings or perforations 39 connect the chamber 14 with the chamber 7.

The oil burning apparatus is used in the following manner:

The pump 2 is worked first and the fuel oil is fed into the oil injection nozzle 12 through the pipes 6 and 9 from the tank 1. As soon as the oil spray is injected, the oil and air mixture is ignited, and the air coming through the air admission ports 13 of the casing 18 passes through the spiral passages of the annulus 15.

It is to be observed from the description and drawings, that the spiral passages not only cause suction, but also produce a centrifugal force acting upon the flame, so that the length of the flame may be made very great. A vacuum is developed between the front inclined wall of the annulus 15 and the partition wall 19 of the cover 17 due to the withdrawal of air, the flame being outwardly enlarged along the surface of the cover 17.

The length of the flame may be adjusted at will by regulating the quantity of the fuel oil passing through the member 27 carried by the oil injection nozzle 12, by means of the regulating spindle 30 which may be moved by the worm wheel 29 and the worm 35 operated by the handle 11, and also by adjusting the distance between the member 27 and the open mouth 23 of the annulus 15 by moving said annulus by means of the handle 28.

Furthermore, by means of this invention it is possible to mix thoroughly the atomized oil with a stream of hot air and to obtain complete combustion, because oil projected against the spiral vanes 16 is broken up into minute particles which are caught by the air stream.

The air entering the chamber 14 through the ports 13 is heated while it passes around the partition wall 38 and is also heated in the chamber 7 into which it penetrates through the openings 39, so that hot air is introduced into the

annulus 15. The fuel oil passing through the coils of the pipe 6 within the chamber 7 is also heated. Due to this arrangement the process of atomizing the oil is improved to a considerable extent.

What I claim and desire to secure by Letters Patent is:

1. An oil burning apparatus, comprising an oil injection nozzle, means connected with said oil injection nozzle for feeding oil to said nozzle, a casing surrounding and carrying said oil injection nozzle, an annulus mounted on said oil injection nozzle and comprising a wall converging toward both ends of said annulus, said annulus having air admission openings formed close to said oil injection nozzle, spiral partitions within said annulus forming spiral passages for air and oil mixture, another casing surrounding said annulus and connected with the first-mentioned casing, and an inner partition wall situated within the second-mentioned casing and connected therewith, the second-mentioned casing having openings, whereby air is admitted to the space between said partition wall and the second-mentioned casing and is discharged into the first-mentioned casing.

2. An oil burning apparatus, comprising an oil injection nozzle, means connected with said oil injection nozzle for feeding oil to said nozzle and for regulating the amount of oil flowing through said nozzle, a casing surrounding and carrying said oil injection nozzle, an annulus mounted on said oil injection nozzle and comprising a wall converging toward both ends of said annulus, said annulus having air admission openings formed close to said oil injection nozzle, spiral partitions within said annulus forming spiral passages for air and oil mixture, another casing surrounding said annulus and connected with the first-mentioned casing, an inner partition wall situated within the second-mentioned casing and connected therewith, the second-mentioned casing having openings, whereby air is admitted to the space between said partition wall and the second-mentioned casing and is discharged into the first-mentioned casing and means connected with said annulus for moving the same relatively to said oil injection nozzle.

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