

No. 783,898.

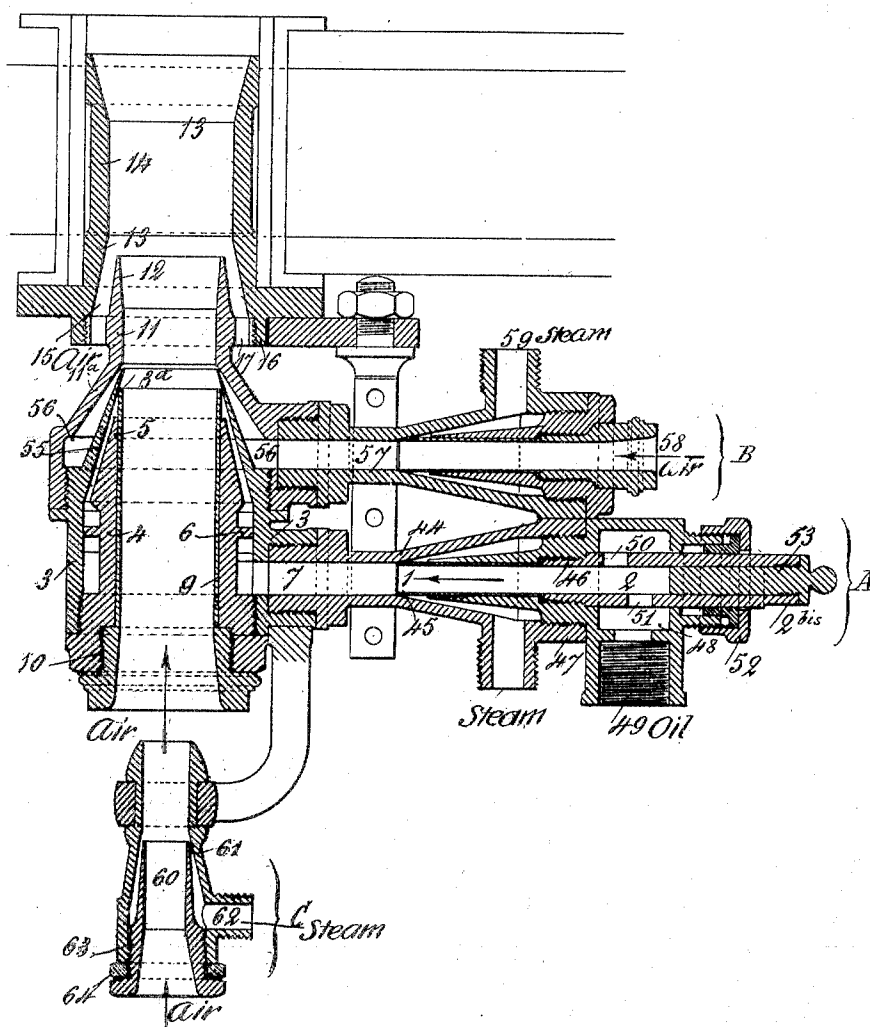
PATENTED FEB. 28, 1905.

A. R. SCHERDING,
HEATING DEVICE FOR USE WITH LIQUID FUEL.

APPLICATION FILED JULY 30, 1901.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:
P. A. Wright
A. C. Connor

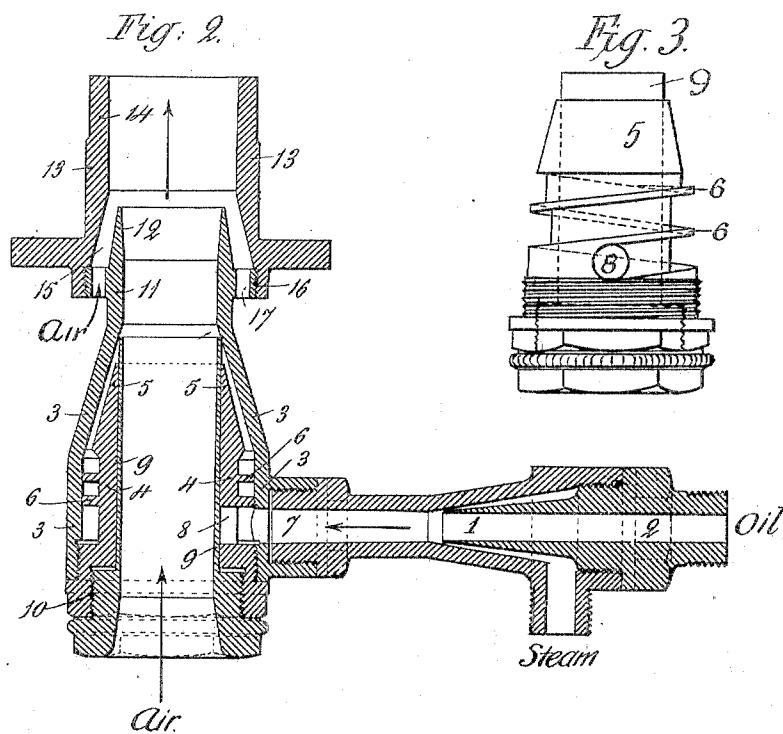
INVENTOR
AUGUSTE ROBERT SCHERDING
BY
Howden and Howden
HIS ATTORNEYS.

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WITNESSES:

G. W. Wright
S. C. Connor

INVENTOR

AUGUSTE ROBERTSCHERDING

By *Howden and Howden*
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UNITED STATES PATENT OFFICE.

AUGUSTE ROBERT SCHERDING, OF PARIS, FRANCE.

HEATING DEVICE FOR USE WITH LIQUID FUEL.

SPECIFICATION forming part of Letters Patent No. 783,898, dated February 28, 1905.

Application filed July 30, 1901. Serial No. 70,247.

To all whom it may concern:

Be it known that I, AUGUSTE ROBERT SCHERDING, engineer, of 42 Rue du Louvre, Paris, in the French Republic, have invented a certain new and useful Heating Device for Use with Liquid Fuel, of which the following is a full, clear, and exact description.

This invention relates to a device for heating by means of combustible liquids for use in connection with the heating and rapid obtaining of pressure in steam-generators, furnaces, fire-grates, and the like.

This device effects the mingling and intimate mixture of a combustible liquid with the amount of air necessary for complete combustion and enables the admission of the mixture to be varied, so as to vary the intensity of the heating.

In the drawings, Figure 1 is a section of the device forming the essential part and which I term the "adjustable mixing-jet." Fig. 2 shows in section a simplified arrangement of this apparatus. Fig. 3 is a side elevation illustrating the helicoidal nozzle.

The essential part of the device, which I designate the "adjustable mixing-jet," is shown in longitudinal section in Fig. 1. It comprises a jet worked by steam or compressed air which effects the admission into a helicoidal passage of the liquid fuel supplied from a reservoir. The mixture of liquid and of steam or air is directed into a nozzle or "twyer," where, with the assistance of a second jet, it receives a supplementary addition of air, and it is further mixed with a column of air proceeding from a third jet. The helicoidal channel, into which the mixture of liquid fuel and of steam or air is sent by a jet A sucking into or fed from a reservoir containing the combustible, is constructed as follows: A tubular portion formed of a cylindrical part 3, joined to a truncated cone 3^a, serves as a jacket for a shell 4, composed of a tube of which the inner wall is cylindrical and the outer wall is truncated toward the end 5. Upon the external cylindrical portion are circular ribs 6, making contact with the interior cylindrical wall of the jacket 3, forming a series of circular channels, which communicate by means of openings formed in these ribs, so that a chan-

nel having a direction of a helicoidal nature is obtained. These ribs 6 might be replaced by a single rib of exactly helicoidal shape, as will be evident. This channel communicates at its lower portion with the pipe 7 forming the end of the jet A, through which the liquid fuel is admitted.

The external truncated surface of the part 5 is arranged at a slight distance from the internal truncated surface of the part 3^a. Within the shell 4 is provided, in contact with its cylindrical wall, a tube or liner 9, which extends somewhat beyond the end of 5 and ends slightly below the truncated wall 3^a. The annular space or throat so formed can be varied as desired by adjusting liner 9. For this purpose the latter is at its lower part screwed at 10 to the shell 4, so that its position as regards height can be varied. Its extremity at this end is open to the air. Beyond the other extremity of the liner 9 the truncated portion 3^a finishes near the internal truncated surface in a casing 11^a, which is continued as a cylinder 11, ending at 12 in a portion slightly widened outwardly. The nozzle so formed delivers into a pipe 13, consisting of two truncated portions 14 and 15, connected at their smaller bases. The part 14, which is only slightly widened out, is above the tube 11/12, so that this latter enters into the portion 15 and affords an annular space between these two portions. The part 14 15 is screwed at 16 to the upper extremity of the jacket 3, the screw-thread being formed upon a collar integral with this latter and in which are formed openings 17, which enable the aforesaid annular space to communicate with the outer air.

The admission-jet A comprises an arrangement enabling the width or bore of the annular passage 44 around the pipe 1 in front of the passage 7 to be altered according to the pressure of the steam or air. This adjustment is effected by means of a spindle 2^{bis}, which is a cylindrical portion having a conical end 45. Being screw-threaded at 46, this cylinder can be advanced or withdrawn in the manner of a needle-valve, and consequently the bore of the annular passage 44 is decreased or increased. I may also screw it so that it is

blocked at 47 in order to cut off the admission of steam.

The spindle 2nd passes through a chamber 48, into which the liquid fuel enters through a side inlet 49. By means of two openings 50 and 51 the central portion of the handle 2nd communicates with this chamber. A stuffing-box 52 prevents leakage from the fuel-chamber. The spindle 2nd ends in a square portion 53, which is acted upon for the manipulation of this part. The construction is made in such a manner that, for example, each turn corresponds with a variation of one-tenth of a millimeter in the section of the annular passage, which thus enables this to be estimated.

When the heating device is working, the mixture of gaseous fluid and of liquid fuel furnished by the jet A enters the channel formed by the ribs 6, traverses it, and passes out by the annular space or throat between the end of the truncated portion 3^a and the internal truncated portion of the casing 11^a. This space is adjusted as desired by the movement of the liner 9. At this point the speed of the mixture is increased by the jet B. This draws in and delivers air from the atmosphere through the central channel of a pipe 58, by means of which the annular bore of this jet is regulated. The steam or compressed air feeding this jet enters at 59. The mixture of air and steam under pressure furnished by this jet passes through the channel 57, enters the chamber 56, formed by the casing 11^a and cone 3^a, and passes out through the annular passage existing between the end of the truncated wall 3^a and the casing 11^a, so that it affords an increase in speed to the combustible mixture, which, as has been seen, is delivered a little beneath. This arrangement enables me materially to increase the output of combustible, while procuring a supplementary supply of air, which becomes intimately mixed with the combustible mixture. The latter enters the pipe 14, and by reason of its speed air is drawn in through the openings 17. The supply is further increased and the value of the combustible mixture is improved by the arrangement of a jet C, injecting into the central passage or pipe and axially thereof a column of air drawn in by an annular jet of steam. This jet consists of a nozzle 60, placed in the axis of the passage or pipe of the mixing-jet. Steam is delivered at 61 into this passage 60 annularly, such steam being admitted at 62. The annular jet of steam escaping at 61, and which may besides be very weak, carries along a quantity of air through the passage 60 and imparts to

it a fair speed. This auxiliary mixture of air and of steam enters into the nozzle or central passage of the principal jet and increases the quantity of air drawn in by such jet. This gives rise to a considerable rush of air favorable to the composition of the mixture and allows the combustion of a large proportion of the liquid fuel to take place. I can regulate this jet by manipulating the screw-threaded spindle or valve 63, by means of which the admission of air is modified as may be desired.

The apparatus which I have just described can be used for a perfect regulation of the elements of the combustible mixture and allows liquid fuels of very different qualities to be employed; but in certain cases I may employ a simplified form of the apparatus, such as is shown in Fig. 2. This apparatus is fitted with only one admission-jet A. The parts corresponding to those of the apparatus above described bear the same reference-figures.

In my claims where I use the term "a supporter of combustion" I wish to be understood as including, broadly, either air or steam.

I claim as my invention—

1. A nozzle for mixing and ejecting liquid fuel, comprising means for forcing said fuel in a tubular stream, means for mixing a supporter of combustion under pressure with the fuel, means for forcing said mixture in a tubular stream, means for supplying a supporter of combustion to the center of said fuel stream and means for supplying a tubular stream of a supporter of combustion to the outer wall of the fuel stream, all substantially as described.

2. A nozzle, comprising a tubular liner, and a jacket, two chambers within the jacket, atmospheric openings at both ends of the jacket, a nozzle at the rear of the liner, consisting of a pressure connection 62, and an atmospheric opening, a fuel-feed to one of the chambers, consisting of a fuel connection 49 and a pressure connection, a supporter of combustion-feed to the other chamber, consisting of a pressure connection and an atmospheric connection, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

AUGUSTE ROBERT SCHERDING.

Witnesses:

GUSTAVE DUMONT,
EDWARD P. MACLEAN.