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G. GORDEJEFF.

APPARATUS FOR THE PRODUCTION OF HEAT BY BURNING LIQUID FUEL.

APPLICATION FILED JULY 2, 1903.

NO MODEL.

Fig. 1.

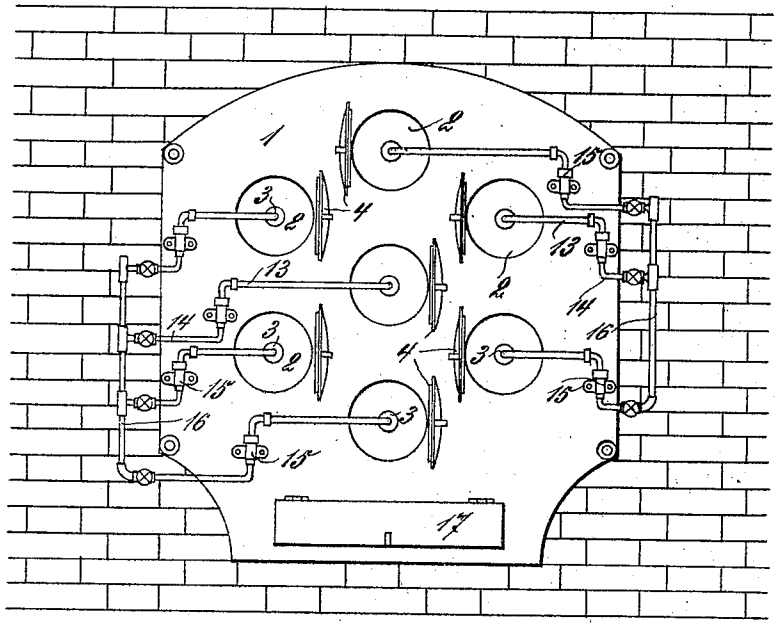
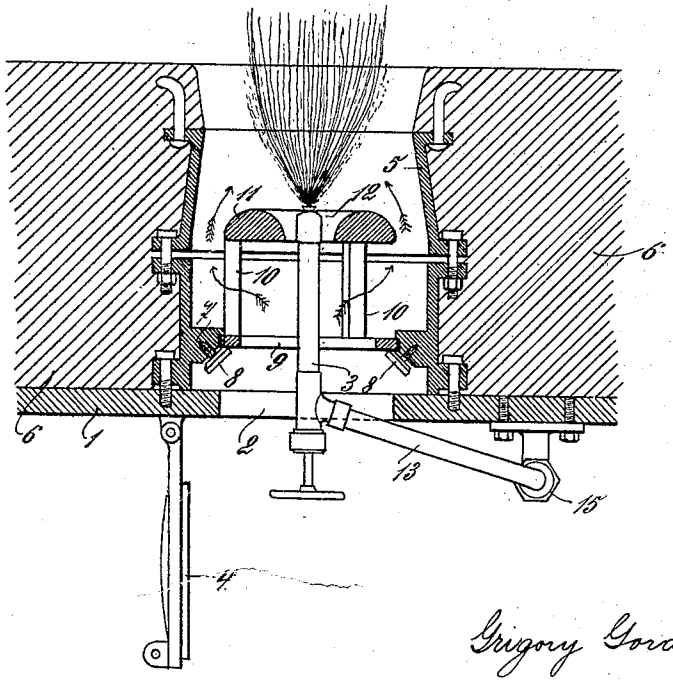


Fig. 2.



Witnesses:
B. Ober.
B. L. Sommers

Inventor.
Grigory Gordejeff.
by Munn & Co
Attys.

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UNITED STATES PATENT OFFICE.

GRIGORY GORDEJEFF, OF ST. PETERSBURG, RUSSIA.

APPARATUS FOR THE PRODUCTION OF HEAT BY BURNING LIQUID FUEL.

SPECIFICATION forming part of Letters Patent No. 764,718, dated July 12, 1904.

Application filed July 2, 1903. Serial No. 164,039. (No model.)

To all whom it may concern:

Be it known that I, GRIGORY GORDEJEFF, a citizen of the Russian Empire, residing at St. Petersburg, in the Russian Empire, have invented certain new and useful Improvements in Apparatus for the Production of Heat by Burning Liquid 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, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

This invention relates to apparatus for the production of heat by burning liquid fuel.

According to this invention, which is applicable for heating steam-boilers and other apparatus by burning sprayed or pulverized liquid fuel—such, for instance, as naphtha, naphtha residues, petroleum, &c.—instead of a single spraying apparatus a number of correspondingly smaller spraying devices arranged in one or more groups are employed, each separate spraying device being provided with an independent annular air-indrawing duct, and each spraying device can be set in operation at any desired moment and also be placed out of operation at any desired moment, the corresponding air duct or ducts being capable of being closed immediately afterward, in the latter case for the purpose of enabling the intensity of the fire to be regulated, by shutting off a number of the spraying devices without disturbing the conditions which are requisite for the complete smokeless-combustion action of the devices remaining in operation.

For the purpose of explaining the nature of the invention reference is made to the accompanying drawings, which illustrate a constructional example of apparatus according to the present invention.

Figure 1 is a front elevation of a furnace having seven spraying devices shown in operation; and Fig. 2 is a plan, partly in section, of a single spraying device with appurtenant parts and air-duct.

The charging-opening, which in coal-fired furnaces is adapted to be closed by means of a door or doors, is closed in apparatus according to this invention by means of a cast-iron plate 1, in which are formed the requisite or desired number of suitably-distributed (preferably circular) apertures 2 for the insertion or introduction of the spraying devices 3 into the apparatus, said apertures being adapted to be closed by means of doors 4 when the spraying devices have been removed. Castings 5, Fig. 2, are provided at the rear or inner side of the plate 1 and are arranged in line with the apertures 2. These castings form the air-indrawing ducts and also serve as supports for a brick lining or backing 6 of the cast-iron plate 1. The castings 5 have each an inner flange 7, to which is fixed, by means of clamping-screws 8 or by any other means, a ring 9, on which is mounted, by means of supports 10, an annular deflector 11, having a small central inwardly-flaring aperture 12. This aperture 12 is just large enough to allow of the head or nozzle of the spraying device to be passed through it with a small amount of play, and the deflector 11 serves to deflect the axially-entering current of air toward the periphery. The effect of this arrangement is to cause the air necessary for combustion to come into contact with the completely-sprayed liquid and become intimately mixed therewith, and thus to produce a compact sheaf or jet of flame of a not too great length, filling the entire duct. This result is due to the construction of the casting 5, which, as shown, is made to taper inwardly from a point slightly in front of the deflector 11 to a point some distance in rear thereof, thus causing the deflected body of air to converge toward the axis of the spraying-nozzle of the injector 3 and thoroughly mix with the sprayed fuel some distance in rear of the nozzle, while the opening in the furnace-lining in rear of said casting 5 is made flaring inwardly, causing the flame to spread. A further effect due to the location of the deflector 11 in close proximity to the outlet of the spraying device is to cause the liquid fuel to become ignited only at some distance beyond the spraying device, so that the latter is not

heated to an excessive degree, but only to a moderate extent, which is very important for the permanently-efficient operation of the apparatus.

The spraying devices may be of any desired kind—that is to say, the liquid fuel may be sprayed either by means of steam or gas or of air under pressure or preferably, also, by purely mechanical means. Heavy or viscid fuels are with advantage heated before entering the spraying device in order that they may acquire the necessary consistency, and thus prevent stoppage or choking of the latter, and so secure a perfect spraying effect.

The spraying devices are preferably connected in a pivotal manner to the supply-pipes 16 by any suitable means, such as by means of pipe lengths 13 14 and hollow cocks 15, as is clearly indicated in Fig. 1. An aperture provided below the aforesaid apertures, which is adapted to be wholly or partly closed by means of a door 17, serves to supply air to the flame from below. Instead of only one aperture a number of such apertures located side by side may be provided and adapted to be closed by a single door common to all the apertures, or each aperture may be arranged to be controlled by means of its own door; but so long as the operation is properly regulated there is no need to provide a supplementary air-supply by means of an aperture or apertures. The advantages due to this arrangement of the spraying devices in groups in wide ducts which are made preferably contracting somewhat behind the annular disk 11 are the following: First, each spraying device operates independently and is self-contained, so that it can be placed out of operation immediately at any moment; second, after a spraying device has been removed from the air-supply duct the latter can be closed immediately; third, the air for combustion is deflected sidewise by the disk and is then guided by the walls of the duct in such a manner as to be compelled to cross the direction of movement of the finely-pulverized liquid fuel, whereby it is compelled to become mixed intimately with said fuel. By this means the compact flame issuing from the spraying devices may be regulated according to requirement in the simplest manner by shutting off one or more of the spraying devices, while maintaining the quantity of air which is requisite to effect the complete combustion of the diminished flame, because each spraying device operates independently, and when it is shut off the corresponding air-supply duct may be immediately closed. The spraying device removed or set out of operation may be cleaned or repaired without having to be taken down, and it can then be placed again into operation immediately.

What I claim is—

1. The combination with a fuel-injector and an air-supply duct encompassing the same and extending beyond the injector-nozzle; of means at the nozzle to deflect the air in rear thereof and direct it to meet the jet of fuel in front of and at a distance from said nozzle, for the purpose set forth.

2. The combination with a fuel-injector and an air-supply duct encompassing the same and extending beyond the injector-nozzle, said duct of gradually decreasing diameter from a point in rear of the nozzle to or substantially to the inner end of the duct; of an annular deflector encompassing the ejector-nozzle and constructed to deflect the bulk of air in rear of said nozzle and direct the deflected air to meet the jet of fuel in front of and at a distance from the nozzle, for the purpose set forth.

3. The combination with a fuel-injector and a tapering air-supply duct encompassing the same and projecting beyond the nozzle thereof, said duct widening out from its narrower end; of an annular deflector having a flaring axial aperture into the narrower part of which the injector-nozzle projects, for the purpose set forth.

4. The combination with a plurality of fuel-injectors, a normally open air-supply duct encompassing each of said injectors and a door for each of said air-ducts; of a feed-pipe common to all the injectors and means organized to adapt the injectors to be swung into and out of their respective air-ducts independently of each other, for the purposes set forth.

5. In an apparatus for the production of heat, the combination with a furnace wall or lining having a feed-opening formed therein; of a plate for closing said opening provided with a plurality of apertures, doors for closing said apertures, an air-duct concentrically mounted behind each aperture, a flange near the mouth of said duct, concentric supports mounted on said flange and projecting into the duct, a perforated disk mounted on said supports, a supply-pipe, a spraying device pivotally connected to the supply-pipe and adapted to be projected into the duct and through the disk, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

GRIGORY GORDEJEFF.

Witnesses:
W. STEININGER,
F. A. LOVINGUIRE.