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PRESSURE BURNER.

APPLICATION FILED OCT. 12, 1905.

915,714. Patented Mar. 16, 1909.

Fig. 1.

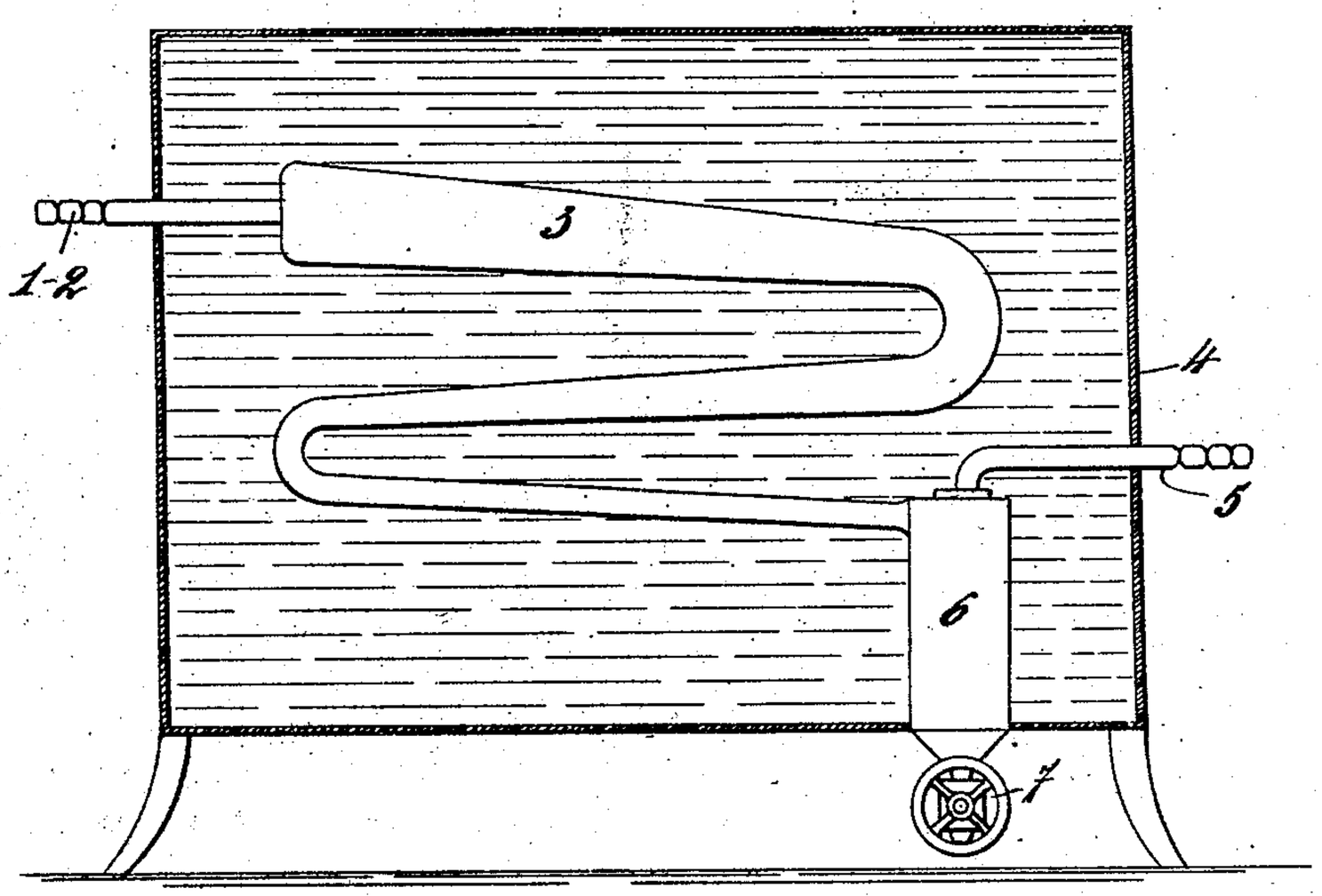
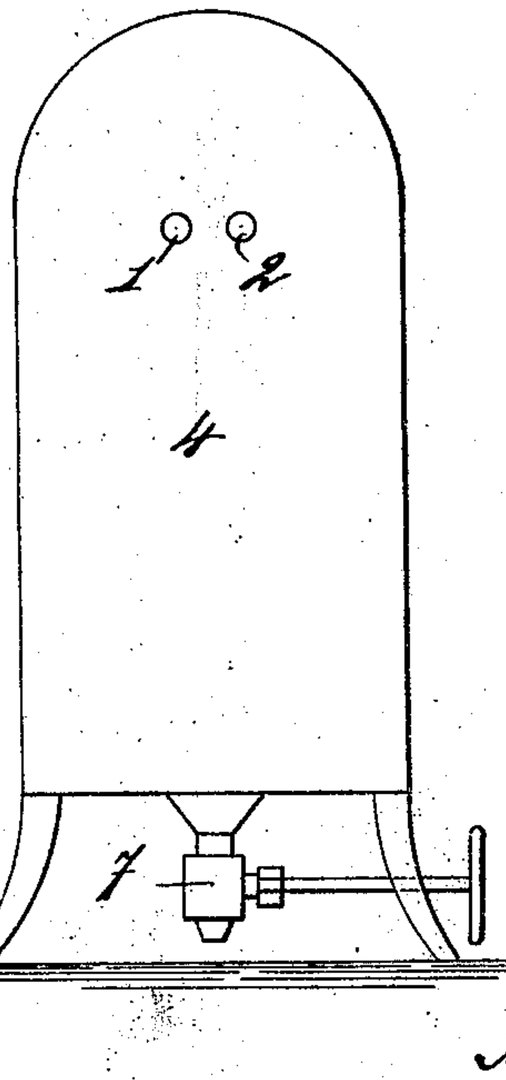


Fig. 2.



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UNITED STATES PATENT OFFICE.

FELIX JOTTRAND, OF UCCLE, NEAR BRUSSELS, BELGIUM; JULIA RENARD JOTTRAND, WIDOW OF SAID FELIX JOTTRAND, DECEASED, AND AUGUSTE JOTTRAND, ASSOCIATE GUARDIAN OF THE HEIRS-AT-LAW, ASSIGNORS TO SOCIÉTÉ ANONYME L'OXHYDRIQUE INTERNATIONALE, A CORPORATION OF BELGIUM.

PRESSURE-BURNER.

No. 915,714. Specification of Letters Patent. Patented March 16, 1909.

Application filed October 12, 1905. Serial No. 282,460.

To all whom it may concern:

Be it known that I, FELIX JOTTRAND, a subject of Belgium, residing at Uccle, near Brussels, Rue de l'Orangerie, in the Kingdom of Belgium, have invented new and useful Improvements in Pressure-Burners, of which the following is a specification.

This invention relates to new or improved apparatus for mixing a combustible gas and a gas adapted to support combustion.

When it is desired to effect the soldering or fusion of metal by means of a blow-pipe in which two gases are mixed, one gas being combustible, such as hydrogen, coal-gas, acetylene, or vaporized hydro-carbon, and the other a gas adapted to support combustion, such as oxygen or atmospheric air, the danger always exists that the flame produced at the end of the blow-pipe may propagate itself and flash back into the said tube. To produce this effect it is sufficient if the velocity of the gas decreases, since as soon as this velocity becomes less than the velocity of propagation of the flame the latter flashes back into the pipe. Inside the latter the gas then continues to burn, since the pipe contains all the elements necessary to feed a flame, namely a combustible gas and a gas adapted to support combustion. When combustion does take place within the pipe it is necessary to immediately cut off the supply of gas, since otherwise the pipe will rapidly melt under the action of the internal flame. Blow-pipes are frequently rendered useless by the occurrence of combustion within them, more particularly if provided with an aspirator or other device for preventing the propagation of the flame to the reservoirs from which the gases are supplied.

Reduction of the velocity of the gas, liable to produce internal combustion, may accidentally occur through numerous causes. In many cases it is due to the fact that the operator places the end of the blow-pipe too near the article which he is soldering, so that small scoriæ or particles of iron are projected toward the orifice of the pipe. Another cause liable to produce the same effect is that the india-rubber tube through which gas is supplied is accidentally trodden on, or that the regulators fail to act properly, or the like. Small accidents of this nature, which are of comparatively frequent occurrence, more particularly if powerful gas-currents are used, greatly impede the working, alarm the operator, involve delay and injury to the work, and in many cases destroy the blow-pipe.

The object of the present invention is to render the back firing of the flame entirely harmless.

The invention is based on the following principles. It is known that when a tube is filled with an explosive gas-mixture at rest, the flame due to the combustion of the said gas is propagated from one end of the tube to the other with a certain definite velocity. It is also known that if the explosive mixture is traveling with a certain velocity in the direction of the axis of the tube, the said flame will not be propagated in the opposite direction unless its normal velocity of propagation is greater than the velocity at which the gas is traveling. It is also known that a flame becomes extinguished when the quantity of heat generated by the combustion is insufficient to raise the gases produced by the flame, or in contact with the latter, to a temperature which exceeds the temperature of ignition of the gaseous mixture. If the temperature of the flame falls below the temperature of ignition the flame becomes extinguished. For extinguishing a flame it is, therefore, sufficient to cool the said flame. In order to effect this, the flame is, according to the present invention placed in a medium which rapidly absorbs the heat generated and thus lowers the temperature to below the temperature of ignition.

For carrying out the invention in practice the apparatus illustrated in the annexed drawing is used, Figure 1 being a longitudinal section and Fig. 2 an end-view thereof.

The two gases, one combustible and the other adapted to support combustion, are

supplied through separate tubes 1 and 2 to a mixing chamber 3 formed by a coiled tube. The capacity of the mixing chamber is such that the velocity of the gases passing through is small, and the said capacity is so calculated, with reference to the quantity of gas which passes through the apparatus, that the complete combustion of the gas can take place during the travel of the latter from the entrance to the exit of the coil. The latter is placed in a box or casing filled with water or other liquid adapted to rapidly absorb heat.

The mixing tube 3 consists of thin copper or iron, which rapidly transmits the heat.

The coil terminates in a tube 5 to which is joined a flexible tube adapted to conduct the gas-mixture to the burner or blow-pipe. Between the tube 5 and the coil 3 there is inserted a separator 6 provided with a discharge cock 7 which allows of drawing off the water formed in the mixing tube 3.

If the flame flashes back to the mixing-tube, its propagation ceases at the latter, since the gases do not mingle with each other until they reach the said tube. The combustible gas is thus burned within the coil at the same rate as it enters the latter. The flame is not propagated beyond the coil since the capacity of the latter is such that gas entering from the tubes 1 and 2 is completely burned by the time it arrives at 5. It will be observed that the present invention does not purport to absolutely prevent the flame striking back. On the contrary, the flame is expected to strike back unavoidably at times, and the peculiar function of the apparatus is to prevent such striking back from doing any harm. The function of the chamber 3 is, therefore, not analogous to capillary tubes, etc., which have hitherto been proposed to prevent the flame from striking back. The present mixing chamber 3 really serves two entirely separate functions. The initial part of the chamber where it joins the inlet pipes 1 and 2 may be termed a flame zone, and the subsequent part of the chamber terminating in the outlet pipe 5 may be termed a cooling zone. The idea is to have the length, diameter and form of the chamber such that if the flame strikes back at all, it will strike back to the beginning of the chamber into the part which may be termed the flame zone. At this point it is designed to have the gases burn for a small fraction of a second until the cooling walls have had time to reduce the temperature below the combustion point. But during this minute interval, the intensely heated products of combustion must be taken care of so as not to burn up the rubber hose connected at 5, and heat the blow pipe. This cooling is accomplished by the cooling zone of the flame chamber which is the portion which extends toward the outlet end. The india-rubber tube and burner will, therefore, only contain cooled products of combustion and whatever combustible gas or oxygen was present in excess. The flame thus localized in the coil generates a certain quantity of heat. Owing, however, to the large surface-area of the tube-walls and to the slight thickness of the latter, and also the presence of a volume of water at a comparatively low temperature, this heat is rapidly absorbed, so that the temperature of the flame falls below the temperature of ignition, and the flame becomes extinguished. The extinction of the flame is, in fact, practically instantaneous.

If, during the use of the blow-pipe, the flame strikes back into the latter, a slight explosion takes place, the flame reaches the mixing tube and immediately becomes extinguished in the latter. The combustible gas and air or oxygen, which continue to flow to the mixing tube, drive out of the latter the products of combustion and then pass through the burner, so that they come into contact with the hot solder or the like, and are by this means re-ignited. The blow-pipe thus continues to act normally, and less than a second elapses between the striking back of the flame, and the re-ignition of the gas-mixture. The striking back of the flame is, under these conditions, not an incident of any importance or inconvenience, and it remains practically unnoticed, except that a slight explosion may be heard. If this incident is repeated several times in rapid succession, and if the water surrounding the mixing-tube does not circulate, the said water may become heated to such an extent that it is incapable of reducing the temperature of the flame to the degree required for extinguishing the latter. The flame then continues to burn but the combustion within the mixing tube does not cause any damage whatever and merely evaporates the water in the cooling-chamber. The blow-pipe in that case, however, ceases to act, since only burned gases are supplied to the burner. The operator must, therefore, temporarily cut off the supply of gas, and then re-start the supply as soon as the flame has become extinguished, whereupon the mixture can be reignited and the blow-pipe will again act normally.

The improved apparatus thus has the advantage that it entirely removes the inconvenience and danger arising from internal combustion within the apparatus. The overheating of the latter, the deterioration of the parts, the burning of the india-rubber tubing, and the interruption of work, are thus entirely prevented.

Having thus described my invention, what I claim is:

In a device of the class described, a box containing cooling-liquid, separate gas and

air inlets, a chamber with thin metal walls wholly included within said box and having a transverse sectional area which diminishes continuously from end to end, said chamber being joined to said inlets at its large end, and a single outlet passage extending from the small end of said chamber and issuing from the box.

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

FELIX JOTTRAND.

Witnesses:
GEO. W. ROOSEVELT,
GREGORY PHELAN.