(No Model.)

J. BURNS.

APPARATUS FOR EFFECTING THE ADMIXTURE OF OIL, AIR, AND STEAM, AND FOR INJECTING THE SAME INTO FURNACES OR RETORTS.

No. 456,111. Patented July 14, 1891.

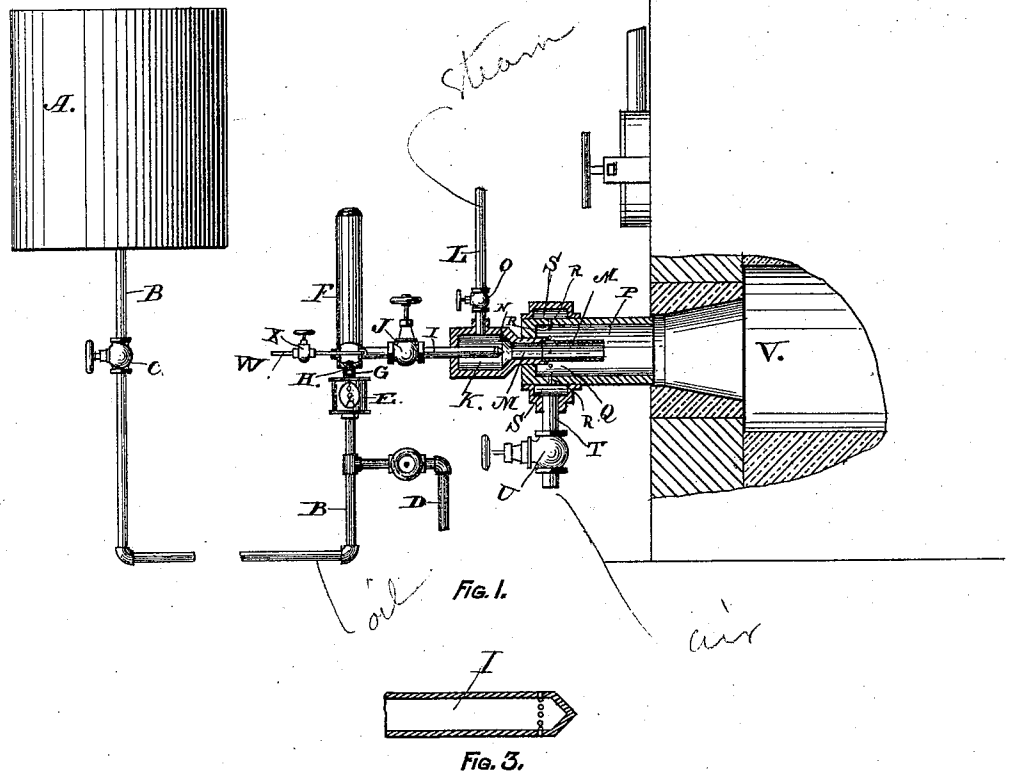

Fig. 1.

Fig. 3.

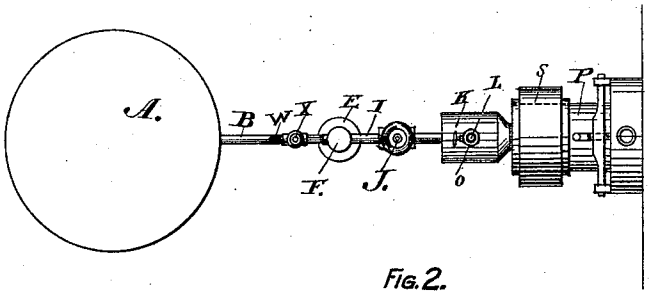

Fig. 2.

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APPARATUS FOR EFFECTING THE ADMIXTURE OF OIL, AIR, AND STEAM AND FOR INJECTING THE SAME INTO FURNACES OR RETORTS.

SPECIFICATION forming part of Letters Patent No. 456,111, dated July 14, 1891.

Application filed August 5, 1890. Serial No. 361,104. (No model.)

To all whom it may concern:

Be it known that I, JOHN BURNS, of Rochester, in the county of Monroe and State of New York, have invented a new and useful Apparatus for Effecting the Admixture of Oil, Steam, and Air and for Injecting the Same into Furnaces or Retorts, of which the following is a specification.

My invention relates to an apparatus whereby oil, steam, and air in suitable proportions can be thoroughly mixed together and injected into a furnace when the mixture is to be utilized as a fuel, or into a retort when illuminating-gas is to be generated therefrom; and the object of my invention is to provide facilities for mixing oil, steam, and air exteriorly to the chamber wherein the mixture is to be used and immediately injecting said mixture by the same apparatus into the chamber wherein it will be utilized. This object I attain by the means illustrated in the accompanying drawings, which are herein referred to and form part of this specification, and in which—

Figure 1 is a longitudinal section of my apparatus, with parts of the same shown in side elevation. Fig. 2 is a plan view of my apparatus, and Fig. 3 is an enlarged longitudinal section of the delivery end of the oil-spraying pipe.

As represented in the drawings, A designates an oil-supply tank, which may be made of any preferred form and suitable capacity. Said tank is of necessity located at a sufficient height above the point of delivery to insure the required pressure for delivering the oil into my mixing apparatus. A pipe B, provided with a regulating-valve C, leads from said tank to convey a supply of oil to the mixing apparatus, and a water-supply pipe D connects with the pipe B for the purpose of supplying the latter with water to a level corresponding to the upper part of a sight-feed cup E, whereby the quantity of oil passing into the mixing apparatus can be observed and determined. The water contained in the pipe B will form a water seal, whereby the flame from a furnace to which my apparatus may be connected will be prevented from passing through said pipe to endanger the oil contained in the supply-tank A.

The sight-feed cup E is connected to the lower end of an oil-receiver F by means of a passage G, provided with a check-valve H, fitted to automatically close the opening through said passage when occasion requires. The oil-receiver F is fixed below the level of the tank A, so that the oil from the latter will flow under pressure into said receiver, and said oil will flow intermittently drop by drop through the water in the pipe and enter the receiver F with sufficient pressure to compress the air remaining in the latter, whereby a resilient cushion will be produced to effect a constant and uniform flow of the oil from said receiver. An oil-spraying pipe I forms a communication from the lower part of the oil-receiver F with the interior of the primary mixing-chamber K for the purpose of conveying oil from said receiver into said chamber, and said pipe is provided with a valve J for the purpose of regulating the flow of oil through the pipe I. The latter projects into said mixing-chamber nearly to the forward end of the discharge-opening of the same. A steam-pipe L is fitted to discharge a current of steam into the primary mixing-chamber intermediately between the closed outer end of the latter and the discharging end of the spraying-pipe I. A circumferential row or rows of minute perforations are made at said discharging end, so as to deliver a spray of oil therefrom intermediately between the steam-pipe L and the discharge-nozzle M of said mixing-chamber. Preferably the inner end of the oil-spraying pipe I is made coniform, so as to accord with an angular end N of said chamber, whereto the discharge-nozzle M is attached. The perforations in the oil-spraying pipe I will cause the oil passing therethrough to assume the form of diminutive streams or spray when entering the primary mixing-chamber, and the steam from the pipe L will instantly commingle with said spray to form a vapor charged with hydrocarbon.

The steam-pipe L connects the primary mixing-chamber K with a steam-generator

(not shown in the drawings) to supply said chamber with a required quantity of steam for mixing with the spray of oil, and said pipe is provided with a valve O, whereby the flow of steam through said pipe can be regulated as occasion requires.

P is a secondary mixing-chamber, into which the nozzle M of the primary mixing-chamber K intrudes to form an annular passage Q between the perimeter of said pipe and the bore of the secondary mixing-chamber. The latter near its outer end is provided with a series of circumferentially-arranged perforations R for admitting air into said chamber. Preferably a channel-piece is attached to the casing of the secondary mixing-chamber, so as to form an annular passage S, which communicates with said perforations, and an air-pipe T, provided with a regulating-valve U, is fitted to admit air into the perforations R. The air which enters the secondary mixing-chamber P will instantly thoroughly commingle with the vapor entering from the primary mixing-chamber, and thereby a new mixture is formed suitable for immediate ignition in a furnace.

For the purpose of clearing the perforations of the oil-spraying pipe I from any obstructions, a small steam-pipe W is fitted to discharge a current of steam into said spraying-pipe, and said steam-pipe is provided with a stop-valve X for admitting steam to pass through said pipe when it is required.

The operation of my apparatus is as follows: The oil from the tank A is conveyed through the water in the pipe B and sight-feed cup E into the oil-receiver F, the water causing the oil to feed intermittently through said pipe, and the quantity of oil will be observable in said sight-feed. From said receiver the oil is conveyed through the pipe I and delivered in the form of spray into the primary mixing-chamber K, wherein it is met by a current of steam from the pipe L. The steam commingles with the oil-spray and forms a vapor highly charged with hydrocarbon. This vapor, impelled by the steam, passes through the nozzle M and enters the secondary mixing-chamber P. By the forcible injection of said vapor into said mixing-chamber air is drawn thereinto through the perforations R, and the entering air will instantly commingle with the vapor from the primary mixing-chamber to form a vapor composed of oil, steam, and air, which is in condition for immediate ignition or for transformation into illuminating-gas by being heated.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In apparatus of the character herein described, the combination of an oil-feed whereby oil is intermittently fed into an oil-receiver, a water seal interposed between the oil-supply and said oil-receiver, a sight-feed cup fixed in the oil-feed pipe, and an oil-receiver which forms a chamber for containing an upper stratum of compressed air, whereby a constant flow of oil is ejected from said oil-receiver into the mixing-chamber of said apparatus, as and for the purpose herein specified.

2. The combination of a secondary mixing-chamber having inlet air-openings, means for regulating the admission of air into said openings, a primary mixing-chamber provided with a discharge-nozzle which is centrally intruded into said secondary chamber, a steam-pipe leading into said primary chamber, an oil-spraying pipe centrally intruded in said primary chamber and projecting thereinto beyond the opening of said steam-pipe, and an oil-receiver from which said spraying-pipe leads into said primary mixing-chamber, as and for the purpose specified.

JOHN BURNS.

Witnesses:
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