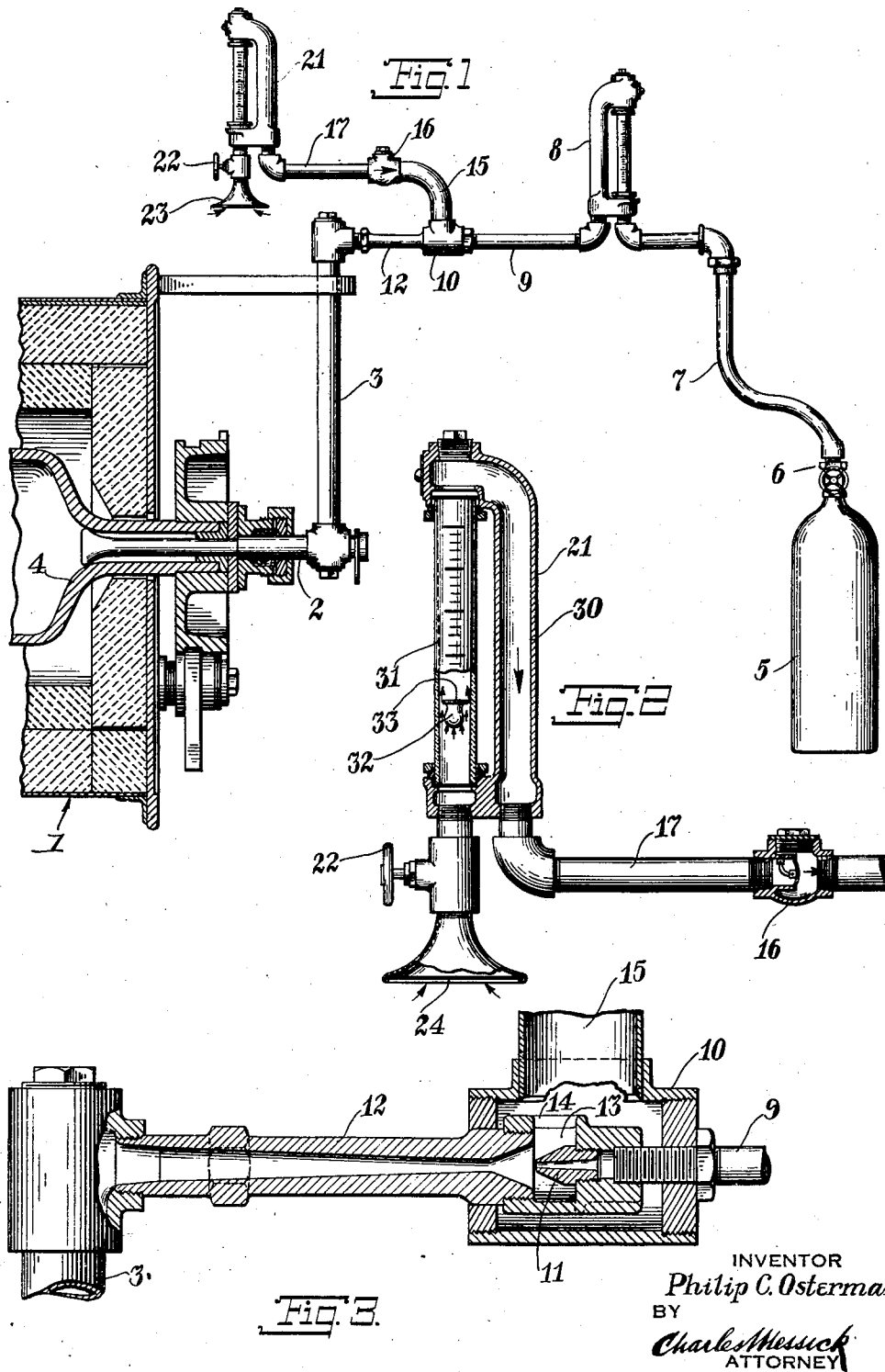


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METHOD OF CARBURIZING

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METHOD OF CARBURIZING

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1 Claim. (Cl. 148—17)

My invention pertains particularly to the method of using available instrumentalities in an improved arrangement, to accurately proportion the quantities of carburizing gas and air or other diluent which are to be forced into the retort of a case hardening or carburizing furnace against the resistance of the waste gases which ordinarily is as much as one inch of water or more. Heretofore such injectors have only been required to work against the resistance of the contents of combustion chambers, perhaps amounting to from one to fourteen one-hundredths of an inch of water. I use an injector for the purpose of effecting the carburizing of the work.

A broad object of my invention is to provide an improved apparatus and an improved method of using same, capable of highly efficient and accurate control of the proportions and the mixture of the gas and diluent and to accomplish this efficiently with apparatus of low first cost and inexpensive in operation.

Another object of my invention is to provide an improved apparatus and method for this work which is particularly designed to operate effectively in conjunction with a heavy, rich, carburizing gas, such for instance as propane. Propane is usually shipped to a carburizing plant under pressure in liquid form, stored in steel bottles or tanks, and I utilize this pressure by first allowing the liquid to expand to gas, under a lower pressure. This gas pressure I use to entrain the desired amount of diluent, for propane if used alone, is such a rich hydrocarbon gas that it tends to deposit soot on the work.

Other objects of my invention will appear from the detailed description of a preferred construction which follows, and be pointed out in the appended claim.

Referring to the accompanying drawing:

Fig. 1 is a side elevation, partly in section, of a typical apparatus in which my method may be practiced.

Fig. 2 is an enlargement, partly in section, of the flow meter and check valve of Fig. 1, and

Fig. 3 is an enlargement, partly in section, of the Venturi mixing valve of Fig. 1.

The numeral 1 indicates a fragment of the right hand end of a conventional rotary carburizing or case hardening furnace provided with an inlet pipe 2 and a connecting pipe 3 of conventional form through which the carburizing fluid is to be flowed into the retort 4 of the furnace 1.

Referring to the right of Fig. 1; a conventional steel bottle or tank 5 containing liquid propane is shown and a valve 6 is provided at its upper portion. Propane in gaseous form emanates from the liquid propane in tank 5, and is controlled by valve 6 and conducted by the hose 7 to the flow meter 8, which is similar to flow meter 21 to be fully described hereafter.

After passing through flow meter 8 which shows the rate of flow of the propane gas, the gas flows through pipe 9 and into the Venturi mixing valve 10 and jets out from the nozzle 11 thereof into the Venturi tube 12 and thence flows into the pipe 3 previously described. The nozzle chamber 13 surrounding nozzle 11 is provided with a port 14 which communicates with the pipe 15 which is provided with a conventional check valve 16, pipe 17 and flow meter 21 which in turn is open to free air through valve 22 and intake 23 which is provided with a screen 24 to prevent the entrance of foreign matter.

Arrows at check valve 16 and intake 23 indicate the direction of the flow of atmospheric air for entrainment and mixture with the propane gas as the gas jets from nozzle 11 into Venturi tube 12. Other well known diluent gases may, if desired, be substituted for air.

The flow meters 8 and 21 are designed to indicate the rate of flow respectively of gas and air. The valve 6 controls the rate of flow of the gas and the valve 22 throttles the flow of the entrained air if required; however, the valve 22 is not absolutely essential if the Venturi mixing valve 10 is so proportioned as to entrain the correct amount of air for diluting a particular kind of gas. Thus also the flow meters 8 and 21 may be dispensed with but are a convenience and desirable refinement.

Flow meter 21 consists of a hollow frame casting 30 through which the air is drawn downward in the direction of the arrow. Casting 30 also supports a graduated transparent tube 31 of bakelite or glass which is tapered gradually to a larger bore at the upper end than at the lower end. The graduations on tube 31 are usually in cubic feet per hour of fluid which is flowing upward through the flow meter tube 31 into the hollow frame casting 30.

Tube 31 is provided with a hollow float 32 of thin sheet aluminum or bakelite which rises or falls in tube 31 as the flow varies and as the upper portion 33 of float 32 moves to a particular graduation on the transparent tube 31 the rate of flow is indicated by the adjacent graduation.

I claim:—

The method of making a mixture of carbonaceous gas under pressure and a diluent, such as air, suitable for the most effective results in carburizing ferrous metal, which consists of entraining the diluent, such as air, by means of the gas and thereby forming the mixture, providing meters whereby the quantities of gas and diluent, such as air, may be predetermined, regulating the quantities of gas and diluent, such as air, flowing at any substantially simultaneous reading of the meters and carburizing ferrous metal with said mixture.

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