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GAS GENERATOR

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4 Claims. (Cl. 48-62)

This invention relates to gas generators and has for an object the provision of an efficient apparatus for generating industrial gases. More particularly the invention contemplates the provision of an improved apparatus for generating reducing gases for use in metallurgical and similar industries. The invention further contemplates the provision of improved apparatus for generating and utilizing gases.

The heretofore customary type of gas generator is relatively complicated in construction and requires considerable space for its installation. In view of this fact, it is frequently necessary to generate industrial gases at points remote from the points at which they are to be used. The gases are usually stored under slight pressure at some point between the generator and the point of use, and when the operations being conducted require the introduction of the gas under considerable pressure it is necessary to provide an additional compressor or blower. While industrial gases are usually produced at high temperatures, their heat content is dissipated while they are in storage or while they are being conducted from the storage receptacle to the place at which they are to be used. Consequently, not only is considerable heat wasted, but in some types of operations, such, for example, as those involving the introduction of reducing gases into a molten mineral bath, heavy deposition of carbon takes place in the tuyères interfering with the proper operation of the apparatus.

The present invention contemplates the provision of gas generating apparatus which is highly efficient and of relatively simple construction and which may be conveniently disposed immediately adjacent a receptacle or other type of apparatus in which the gas is to be used. The invention further contemplates the provision of improved apparatus for subjecting materials to the action of gases at high temperatures in which gas may be introduced directly from a generator into a receptacle containing the material to be subjected to the action of the gas.

Gas generators constructed in accordance with the present invention are adapted to be utilized in effecting partial combustion of carbonaceous materials and are provided with means for preheating the oxidizing gas. In the preferred form of construction the gas generators are provided with combustion chambers which are surrounded by gas chambers so arranged that the oxidizing gas may be passed around the combustion chamber and be heated by the heat radiated therefrom during its passage into the combustion chamber. The combustion chamber is preferably cylindrical, and it is preferably so mounted that its axis extends horizontally. An outer casing surrounds the cylindrical combustion chamber and is spaced therefrom to provide a gas chamber for the in-

roduction and preheating of the oxidizing gas. A tube may extend axially through the combustion chamber to provide means for igniting the combustible mixture in the first instance, and for providing an additional hot surface for the continuous ignition of the combustible mixture introduced into the combustion chamber.

The combustion chamber may be provided with one or more burners for injecting a mixture of carbonaceous material and oxidizing gas. Burners capable of injecting a mixture of any desired carbonaceous material and any desired oxidizing gas may be provided. Thus, burners capable of injecting a mixture of air and any suitable oil, or burners capable of injecting a mixture of air and powdered coal may be employed.

The gas generator is preferably provided with observation tubes having sealed end portions extending into the interior of the combustion chamber and open end portions projecting outwardly beyond the outer casing. Such tubes permit the operator to determine the temperature within the combustion chamber by inserting a pyrometer or by observing the color of the heated sealed ends.

The arrangement of gas chamber, combustion chamber, and burners is such that the air supply to all burners may be controlled by a single valve and the supply of oil or other carbonaceous material may be controlled independently at each burner.

In the complete apparatus of the invention the gas generator is mounted on or closely adjacent to a receptacle which is adapted to contain the material to be subjected to the action of the gas. The gas generator is preferably mounted on a wall of the receptacle in such a manner that relatively short conduits or tuyères may be used for providing means of communication between the combustion chamber and the interior of the receptacle. The receptacle may be stationary or it may be mounted for rotary movement through any desired arc, and when the receptacle is mounted for rotary movement the generator is preferably movable therewith. The portions of the tuyères or conduits which are disposed between the gas generator and the outer shell of the receptacle may be covered with insulating material to prevent heat losses, or the gas generator may be so mounted that the exposed portions of the tuyères or conduits are sufficiently short that the heat losses are negligible. This arrangement of gas generator and receptacle permits the introduction of gases into the interior of the receptacle at temperatures and pressures substantially equal to those at which the gases are generated.

In one of the preferred forms of the invention, the apparatus consists of a receptacle adapted to hold a molten mineral bath and mounted for movement about a horizontal axis, a reducing gas