

UNITED STATES PATENT OFFICE

2,310,173

METHOD AND APPARATUS FOR PROVIDING A CONTROLLED SUPPLY OF SULPHUR COMBUSTION GASES

John B. Chatelain and Gordon A. Cain, Freeport, Tex., assignors to Freeport Sulphur Company, New York, N. Y., a corporation of Delaware

Application June 7, 1939, Serial No. 277,908

6 Claims. (Cl. 23—278)

This invention relates to new and improved apparatuses and methods for providing a controlled supply of sulphur combustion gases, more particularly, sulphur dioxide in comparatively small quantities.

In the burning of sulphur for the commercial production of sulphur dioxide, we have observed that the quantity and the consistency of the combustion gases are affected by a number of variables. These variables are primarily: (1) the physical state and temperature of the sulphur; (2) the depth of the sulphur in the combustion chamber; (3) the cross-sectional area of the burning surface; (4) the rate of heat radiation from the combustion chamber, and (5) the amount of combustion supporting gases supplied. The relative importance of each of these variables becomes greater as the quantity of combustion gases required becomes less, the range within which they must be controlled becomes narrower, and the demand for consistency in them becomes higher.

Many sulphur burners and methods of burning sulphur have heretofore been described that will operate satisfactorily if the rate at which sulphur is to be burned is comparatively high and variable amounts of combustion products of high consistency are not demanded. However, the operation of conventional burners at rates wherein sulphur is burned in comparatively small portions within narrow limits, is attended with great difficulty of control, requiring constant supervision to maintain the burning rates within such limits. Furthermore, it is generally recognized that the operation of various conventional types of sulphur burners at very low burning rates is accomplished by the likelihood of cessation of combustion and interruption of continuous operation.

Although sulphur dioxide gases and particularly its solutions in water have applications in industrial processes, its use in many of these processes requiring only very small, continuous but variable and accurately controlled amounts of sulphur dioxide has been limited due to the cost of providing compressed, or liquid sulphur dioxide, or cost of supplying the necessary additional equipment to control accurately the feeding thereof. The cost of such equipment and the supervision required to produce sulphur dioxide by burning sulphur at accurately controlled and easily varied rates has heretofore proven prohibitive. The latter is peculiarly true in operations which require the use of sulphur dioxide under pressure. For instance, according to past practices, it has often proven impractical to use

5 sulphur dioxide in many flocculation, reduction, bleaching and acid imparting and alkalinity reducing processes because of the cost of the raw materials and equipment necessary.

10 It is an object of the present invention to provide processes and apparatuses for supplying a controlled supply of sulphur combustion gases at rates which will make the use of said combustion gases commercially feasible in processes heretofore found unprofitable. A further purpose of this invention is to provide a method and an apparatus for burning sulphur at variable rates to produce sulphur dioxide of high consistency in easily controllable quantities.

15 More particularly the object of this invention is to provide a method and apparatus for burning sulphur continuously at relatively low rates under complete control to produce sulphur dioxide in variable amounts exactly in the quantities desired.

20 In obtaining these objectives, the number of variable factors affecting the rate of the burning of sulphur, are in accordance with the present invention, reduced to a minimum such that the amount and consistency of the combustion gases produced are easily controlled by regulation of the remaining variable quantities. Constancy is obtained primarily by providing a supply of liquid sulphur in such relation to the combustion chamber and with such connections that the sulphur is caused to flow into the combustion chamber at a point below the surface of the burning sulphur without agitating this surface and in accordance with a control system which is automatically responsive to the level of the sulphur in the combustion chamber. With the arrangement of apparatus hereinafter described, the amount of sulphur combustion gases produced under ordinary circumstances will vary in direct proportion to the amount of combustion supporting gases introduced into the combustion chamber. When the amount of combustion gases to be produced is extremely small and the refinements more exacting, the quantity and the consistency of the combustion gases can be further modified by controlling the rate of heat loss from the combustion chamber as will hereinafter be more fully described.

25 The preferred construction and features of our invention will be made apparent by the following detailed descriptions of several illustrative embodiments of the invention when considered in conjunction with the accompanying drawings.

30 In the drawings, Fig. 1 is a view in vertical section of a typical embodiment of the invention. 55