Oct. 2, 1923. 1,469,645

W. H. KOBBÉ

SULPHUR BURNER

Filed Feb. 21, 1923

Fig. 1.

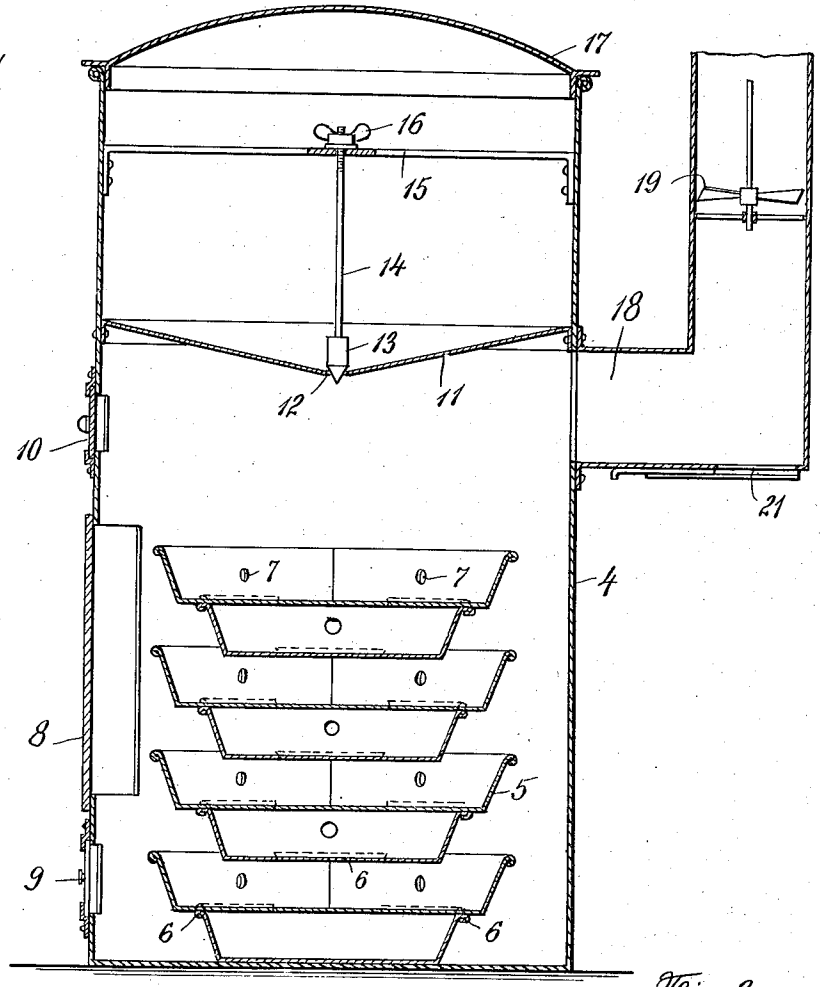


Fig. 2.

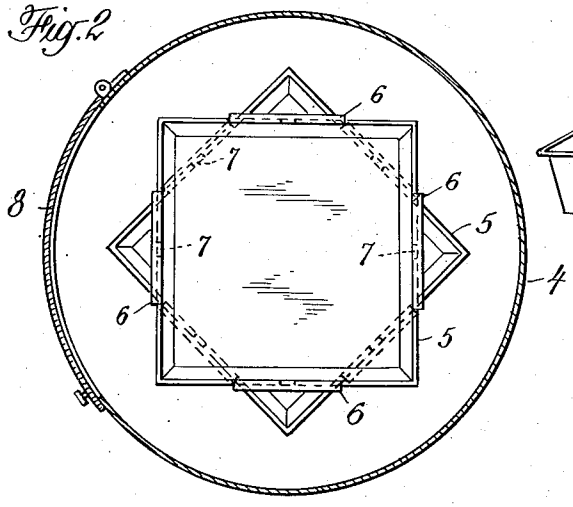
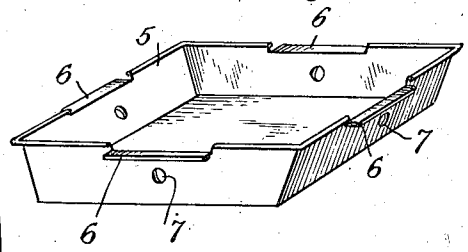


Fig. 3.



INVENTOR

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UNITED STATES PATENT OFFICE.

WILLIAM HOFFMAN KOBBÉ, OF NEW YORK, N. Y., ASSIGNOR TO TEXAS GULF SULPHUR COMPANY, OF BAY CITY, TEXAS, A CORPORATION OF TEXAS.

SULPHUR BURNER.

Application filed February 21, 1923. Serial No. 620,344.

To all whom it may concern:

Be it known that I, WILLIAM HOFFMAN KOBBÉ, a citizen of the United States, residing at New York city, in the county of New York, State of New York, have invented certain new and useful Improvements in Sulphur Burners; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to sulphur burners, and particularly to burners in which crude or unrefined sulphur may be burned successfully to produce sulphur dioxide, the latter gas being made available thereby for various uses to which it is applied in the arts.

In my copending application, Serial No. 580,419, I have described a method of burning sulphur which contains traces of petroleum oils and similar organic impurities. The presence of oil in sulphur, particularly sulphur derived from deep wells, retards the burning of the sulphur if it is merely ignited in open pans or receptacles without provision for maintaining the sulphur in a heated state. Under such conditions the oil combines with the sulphur to form a film which quickly spreads over the surface of the sulphur and eventually extinguishes the flame. Accordingly it is impossible to burn sulphur containing oil in open pans with any degree of efficiency, the flame being extinguished after approximately 24% of the sulphur has been consumed. By the application of my prior invention it is possible to arrange the receptacles for the sulphur so that heat is transmitted from one to the other. The effect of the heat is to prevent the oil from interfering with the burning quality of the sulphur. In other words, no film is formed and the sulphur will continue to burn so long as the necessary oxygen is supplied in the form of air.

It is the object of the present invention to provide an improved burner for the sulphur which presents certain advantages over the type of burner described in my copending application, particularly in respect to the compact arrangement of the sulphur containers, the feeding and distribution of sulphur thereto and the concentration and withdrawal of the sulphur dioxide.

Further objects and advantages of the invention will be apparent as it is better understood by reference to the following specification and accompanying drawing, in which

Fig. 1 is a vertical section through a sulphur burner embodying the invention;

Fig. 2 is a section on the line 2—2 of Fig. 1; and

Fig. 3 is a view in perspective of one of the pans.

Further investigation since the date of my application above referred to has indicated that the prefered form of container for the sulphur is a square pan which may be constructed of iron, aluminum or other suitable metal. Such a pan may be from eight to eleven inches square, although obviously the size may vary depending upon the desired capacity of the apparatus. In order that the pans may be compactly arranged, I prefer to stack them one upon the other, and to prevent slipping the edges of each pan are preferably provided with notches which permit the overlying pan to rest therein in a diagonal position. This arrangement permits access of sufficient air to the sulphur within the pans and avoids the necessity of providing loops or other supports between the successive pans. In a stack of pans so arranged the sulphur may be ignited. In the lowermost pan the sulphur burns as in an open pan and quickly develops a film which would eventually extinguish the flame. Meanwhile the overlying pans have been subjected to heat developed by the burning of sulphur beneath them and this heat causes a change in the sulphur which avoids the characteristic formation of the film to which reference has been made. Within a short time all of the pans will be quite hot and the sulphur therein substantially melted, a portion of it being heated to the boiling point. The transfer of heat downwardly from the upper pans eventually brings the lowermost pan to substantially the same temperature, and the effect of the film on the surface of the sulphur therein is quickly dissipated so that the sulphur burns freely as in the overlying pans. As a result the sulphur in all of the pans will continue to burn until entirely consumed, thus ensuring efficient production of sulphur dioxide.

In the preferred form of the invention arrangement is made for the progressive

descent of molten sulphur through the stack. This may be accomplished by providing openings in the sides of the pans, such openings being about one-half inch in diameter and spaced from the bottom of each pan a distance equal to the desired depth of sulphur to be maintained therein. When the sulphur in the uppermost pan has become molten, it will flow through the openings in the sides thereof into the next lower pan and thence through the pans of the stack, a constant level of sulphur in each pan being maintained by the overflow of surplus sulphur therefrom. The sulphur is finally consumed in the lowermost pan which is not provided with openings in its sides. A further development of this idea, permitting substantially continuous operation of the sulphur burner without attention, involves the provision of a melting receptacle above the stack of trays in which a quantity of sulphur may be disposed. This receptacle is closed to prevent access of air and is provided with a valved outlet in its bottom directly over the uppermost pan of the stack. By regulating the position of the valve the amount of sulphur which is fed to the uppermost pan may be controlled so that a constant level of molten sulphur is maintained in each pan, the amount of sulphur reaching the lowermost pan being sufficient only to maintain the required quantity therein.

To conserve the heating effect of the molten sulphur and to ensure concentration of the sulphur dioxide produced, it is preferable to surround the stack of trays with a casing which may have suitable dampers for the admission of air and side openings through which the action of the burner may be observed. The casing serves as a support for the receptacle in which the sulphur is melted and is provided with an outlet near the base of this receptacle through which the sulphur dioxide may be withdrawn. A fan or other suitable means may be disposed in the outlet to cause a forced draft and to convey the sulphur dioxide to the point where it is utilized.

Referring to the drawing, 5 indicates the pans arranged in the form of a stack. Each pan is provided with a plurality of notches 6 in its upper edges to receive the corners of the overlying pan. Openings 7 are arranged in the side walls of the pans to permit the overflow of sulphur as previously described. If the pans are to be used without permitting the sulphur to overflow, the openings may be omitted.

The stack of pans is disposed within a suitable casing 7 of metal or other material adapted to withstand the action of sulphur dioxide. The casing is preferably circular in cross-section and slightly larger in diameter than the diagonal of the stack of pans. The casing may take any form desired, however. It is provided with a closure 8 permitting access to the interior so that the pans may be examined or replaced, and with a damper 9 whereby the amount of air supplied to the burner is regulated to procure the most efficient operation. A sight opening 10 in the side of the casing is closed by a sight glass which permits observation of the interior of the burner.

Suspended in the upper part of the casing 7 is a receptacle 11, the bottom of which is preferably conical, sloping toward an outlet 12 which is closed by a valve 13. The latter is controlled by a rod 14 extending through the brace 15 of the receptacle. The valve 13 may be raised or lowered by means of a nut 16 threadedly mounted on the end of the seam or by other suitable and manually controllable valve mechanism. The casing 7 is closed by a cover 17 which prevents access of air to the sulphur within the receptacle. The sulphur dioxide produced is withdrawn through an outlet 18 and a fan 19 or other suitable means may be disposed in the outlet for the purpose of creating a draft. The fan is driven through a shaft 20 extending through the wall of the outlet pipe. An inlet 21 permits air to enter for the purpose of ensuring complete combustion.

In the operation of the burner as described, a supply of sulphur is disposed in each of the pans and the sulphur is ignited. Meanwhile the receptacle 11 has been filled with the required amount of sulphur to maintain the production of sulphur dioxide for the desired period. As the sulphur burns, sufficient heat is generated to eliminate the effect of any oil which may be present in the sulphur which burns freely under regulation of the draft 9. If a surplus of sulphur has been disposed in the uppermost pan, as soon as it has melted it will flow through the openings 7 in the sides of the pan into the next lower pan, and thence downwardly through the series of pans to the lowermost pan. When sufficient heat has been generated to melt or partially melt the sulphur in the receptacle 11, the valve 13 may be regulated to introduce sufficient molten sulphur into the combustion chamber to ensure continued operation. After the flow of sulphur has been thus regulated the burner will continue to function substantially without attention until the sulphur in the receptacle 11 has been exhausted.

Although the invention is preferably used in connection with the casing 7, since the heat is thereby conserved and maximum concentration of the sulphur dioxide is assured, it should be understood that the pans described herein may be employed advantageously without the casing. When so

used these pans have the advantage of the burner described in my copending application above identified and the additional advantage that they are simpler in construction and may be more compactly arranged.

The sulphur burner herein described has numerous advantages, among which are continuity of operation without substantial attention, purity of product which is relatively undiluted except for the nitrogen which necessarily enters with the combustion air, and efficiency owing to the complete combustion of all of the sulphur which enters the combustion chamber. These and other advantages particularly adapt the invention to use in the manufacturing of sulphur dioxide for various purposes, such as the curing of hops in vitaculture, in bleaching broom corn and cloth, and for the preparation of dried fruits.

Various changes may be made in the details of the form and arrangement of the burner without departing from the invention or sacrificing any of the advantages therein set forth.

I claim:—

1. In a sulphur burner, a pan having slots in its sides to receive the corners of the overlying pan when the pans are stacked.

2. In a sulphur burner, a pan having openings in its sides spaced from the bottom to permit molten sulphur to flow from pan to pan when the pans are stacked.

3. In a sulphur burner, a pan having openings in its sides spaced from the bottom to permit molten sulphur to flow from pan to pan when the pans are stacked, the pans being formed to remain in fixed relatively diagonal positions.

4. In a sulphur burner, a stack of pans arranged so that the corners of each pan project beyond the sides of the overlying pan, the pans being formed to interlock.

5. In a sulphur burner, a stack of pans, and a casing surrounding the stack and having regulating means for the admission of air, an outlet for combustion products, and means for delivering a regulated supply of sulphur to the stack the pans having openings in their sides and being arranged with the corners of each pan projecting beyond the sides of the overlying pan to permit the sulphur to descend through the pans successively.

In testimony whereof I affix my signature.

WILLIAM HOFFMAN KOBBÉ.