W. MAYNARD.

APPARATUS FOR THE GENERATION AND HYDRATION OF SULPHUROUS ACID GAS.

No. 183,185. Patented Oct. 10, 1876.

Fig. 1.

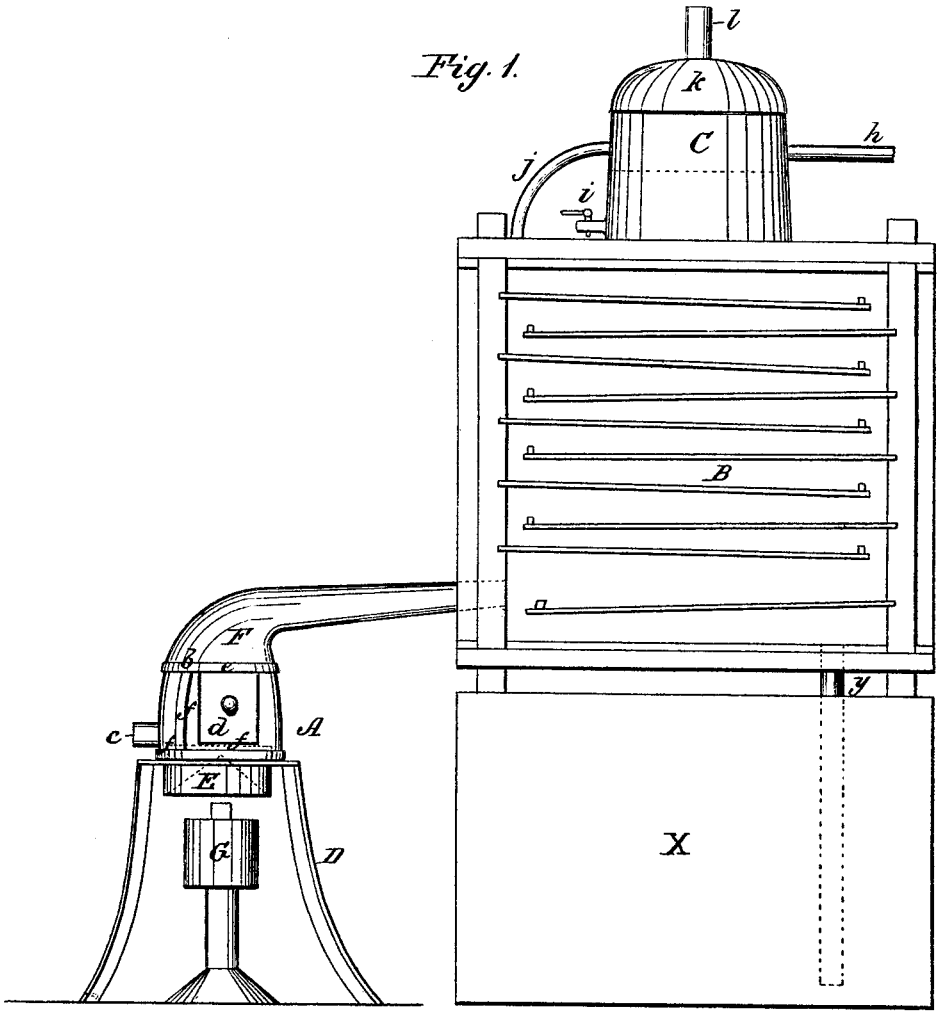
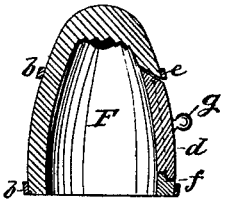


Fig. 2.

Fig. 3.



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IMPROVEMENT IN APPARATUS FOR THE GENERATION AND HYDRATION OF SULPHUROUS-ACID GAS.

Specification forming part of Letters Patent No. **183,185**, dated October 10, 1876; application filed July 20, 1876.

To all whom it may concern:

Be it known that I, WILLIAM MAYNARD, of the city, county, and State of New York, have invented a new and Improved Apparatus for the Generation and Hydration of Sulphurous-Acid Gas; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming part of this specification, in which—

Figure 1 is a side elevation of my improved apparatus, with the front plate of the condenser removed; Fig. 2, a sectional detail view of the sulphur-pan; Fig. 3, a sectional detail view of the furnace-cupola.

My invention relates to certain improvements in apparatus for generating and hydrating sulphurous-acid gas.

It consists, mainly, in the construction of the furnace for burning the sulphur, which is provided with a door of peculiar construction, and a sulphur-pan having a conical bottom tapering upwardly to an apex, which form of pan enables me to conserve a larger amount of heat, and, by rapidly heating the sulphur, to ignite the same before it commences to sublime.

The invention also further consists in the construction and arrangement of a tank or reservoir located upon the top of the condenser, which reservoir holds the water that is fed to the apparatus, and, while preventing the bad effects of the pulsations from the pump, also serves, by reason of a pipe connecting with the condenser, as a secondary condenser for the sulphurous-acid gas which passes through the condenser proper, and also as a receiver for the azotized air, as hereinafter more fully described.

In the accompanying drawing, A represents the furnace; B, the condenser, and C the reservoir, located upon the top of the condenser. Referring to the furnace, D is a stand or tripod, in the circular or other shaped rim of which, at the top, is located the sulphur-pan E. This pan may be made either a fixture with the stand or be detachable therefrom, and upon its upper projecting edge fits the cupola F. The bottom *a* of the sulphur-pan is made conical in shape, and tapers upwardly, so as to leave a funnel-shaped bottom on the outside, and a projecting apex, forming an annular trough upon the inside.

This form of sulphur-pan secures important advantages, first, because there is a larger amount of heated surface, and the sulphur is therefore melted more quickly; secondly, because the funnel-shaped bottom permits of the conservation of a larger amount of heat; and, thirdly, because the heat being concentrated at the apex of the cone, the sulphur at this point quickly ignites and prevents the subliming of the same. To obviate this subliming of the sulphur is a special desideratum, for the reason that the subliming of the sulphur leaves in the narrow conduit of the cupola leading to the condenser deposits of sulphur which obstruct the passage of the heavy gas which, when forcing apparatus is not employed, as in this case, will only pass freely under the most favorable circumstances. The construction of the sulphur-pan then obviates the necessity of a forcing apparatus by preventing the deposits of sublimed sulphur.

G is a lamp, located beneath the sulphur-pan, for the purpose of burning the same, which lamp may be of any suitable construction and heating-capacity. The cupola F is made, preferably, of pot-clay, braced with strengthening-bands *b*, and tapers upwardly and to one side, in the form of a pipe or conduit, that enters the lower portion of the condenser. The said cupola is provided at one side with an inlet-connection, *c*, for the air which supports the combustion of the sulphur, and forms, by the oxidation of the same, sulphurous-acid gas. With this inlet *c* a pipe leading to the outer air may be connected, which will be brought into requisition whenever the air in the room is deficient in oxygen.

By reason of the peculiar circumstances attending the generation of the gas, the cupola is provided with a door, *d*, of peculiar construction. The gas being insidious and penetrating in its character, it is desirable that the door should fit tightly, and the cupola being made of clay, and subjected to a high temperature, buttons or ordinary fastenings could not be employed, for the reason that the unequal rate of expansion would crack the cupola, and, being hot, the manipulation of the same would be inconvenient. Furthermore,

fastenings of the ordinary kind could not be employed, for the reason that, if they tightly fastened the door, they would not automatically open to operate as a relief-valve in the event of an explosion.

To provide a door meeting all of the requirements, I under-cut the upper edge *e* of the opening, and rabbet the other three sides *f*. The door is then made of the same material as the cupola, to correspond to this conformation of edges, and is provided with a non-conducting handle or knob, *g*. The door is inserted by adjusting the upper edge first, and then pressing it in below, in which position it will be tightly held against the gas without other fastening, and in such a manner as to be readily removed and replaced.

It will be observed that the form of door described not only insures a secure fastening, but, in the event of an explosion, automatically opens to permit the escape of the gas without injury to the other parts of the apparatus. By under-cutting the upper edge, also, further and important advantages are secured, in that the unhealthy, insidious fumes are not so liable to escape, and if the door be blown out the under-cut at the top operates as a pivot, and compels the door to open first at the bottom, and thus direct the blast of heavy heated sulphurous-acid fumes downwardly instead of upwardly into the face of the attendant.

The condenser B is constructed of glass, earthenware, or other analogous material, and consists of a rectangular case containing two series of alternating inclined, imperforate shelves, provided with ledges at their lower ends, and forming tapering lateral chambers, through which the gas passes in its ascent, while the water drops from one shelf to the other in its descent through the apparatus, and passes through the water-sealing pipe *y* into the reservoir *x*. This particular construction of condenser, and the advantages arising out of the same, need not be herein fully described, as the same is described at length, and also claimed in another pending application. The reservoir C is provided with an inlet-pipe, *h*, for the water coming from the pump, and a stop-cock, *i*, for the delivery of its water to the condenser. It is also connected, through a pipe, *j*, at a point above the level of the water, with the condenser, and has a removable cover, *k*, with a pipe-connection, *l*. The function of this reservoir is twofold. In the first place, it is necessary to have such a reservoir in order to make the feeding-stream for the condenser uniform, as the pulsation directly from the pump would force out the gas in such a manner as to make it inconvenient and even injurious to the operator by reason of the inhalation of escaping gas. It is also necessary to have an escape-vent and receiver at the top of the absorber for the unabsorbed gas and azotized air, in order to insure the transmission of the gas through the condenser and prevent its backlash into the generating-furnace. This reservoir serves both these purposes, and in such a manner as to prevent the escape of any considerable quantity of the sulphurous gas, for that which passes out through pipe *j* is absorbed by the water contained in the reservoir, while the azotized air passes out through the pipe *l*, which may be connected with the chimney or carried out of doors. The cover *k* of the reservoir is made removable to admit the inspection of the interior, and also for the purpose of introducing lime and other alkalies when the apparatus is used for the purpose of producing a solution of the sulphite of lime, or other salt of sulphurous acid.

Referring to the construction of my sulphur-pan, I would state that I am aware that a double-walled cone-shaped retort has been employed for volatilizing gasoline in the manufacture of illuminating-gas, the object of which construction was the rapid volatilization of the gasoline by a diminution of volume and increase of surface in proportion to the heat. This construction would be useless, however, for my purpose, as for my use a free access of air to the top of the burning sulphur is absolutely essential, to secure which the sulphur-pan must be open at the top. I therefore disclaim the idea referred to, and confine this feature of my invention to the construction shown, in which the sulphur-pan is made with a conical upwardly-tapering bottom, and straight outer wall forming an open annular trough.

Having thus described my invention, what I claim as new is—

1. The sulphur-pan having a conical upwardly-tapering bottom and straight outer wall, forming an open annular trough, substantially as and for the purpose described.

2. The cupola F, made of clay, with bands *b*, and having inlet-connection *c*, and a door, *d*, in combination with the sulphur-pan E, having a conical bottom, and the stand D, substantially as and for the purpose described.

3. The sulphur-combustion chamber having an opening with an under-cut edge, *e*, at the top and rabbeted edges *f* upon the sides and bottom, in combination with the door *d*, having edges corresponding to the edges of the opening, and provided with a handle, substantially as and for the purpose described.

4. The combination, with the condenser B, of the reservoir C, having an inlet, *h*, and outlet-cock *i* for conveying the water to the condenser, together with a pipe, *j*, for the mixed sulphurous acid and azotized air, connecting the condenser with the reservoir above the level of the water, and a removable cover, *k*, having an outlet, *l*, for the azotized air, substantially as and for the purpose described.

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