

No. 681,586.

Patented Aug. 27, 1901.

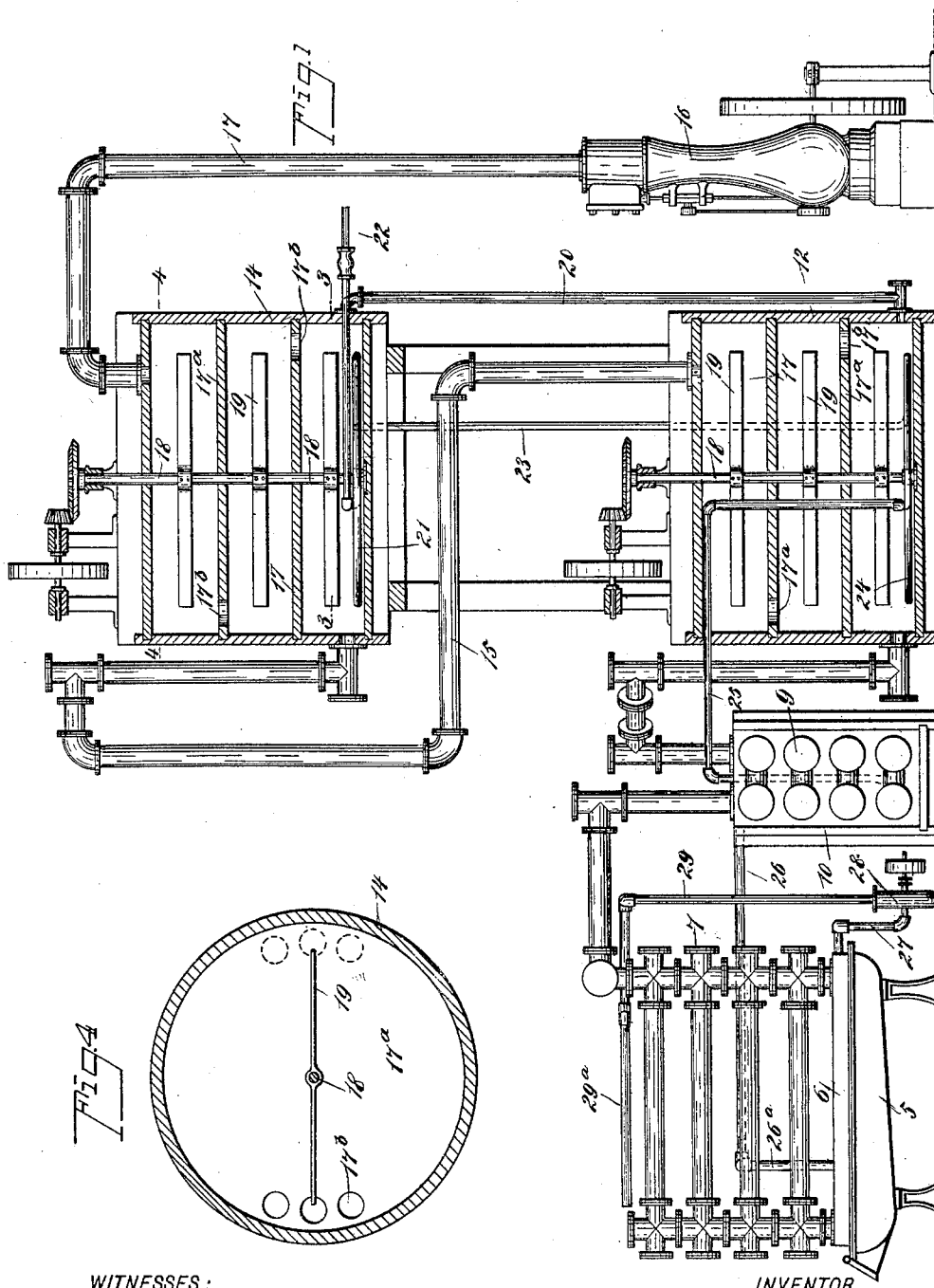
G. A. STEBBINS.

APPARATUS FOR PRODUCING BISULFITE LIQUOR.

(Application filed Sept. 5, 1900.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

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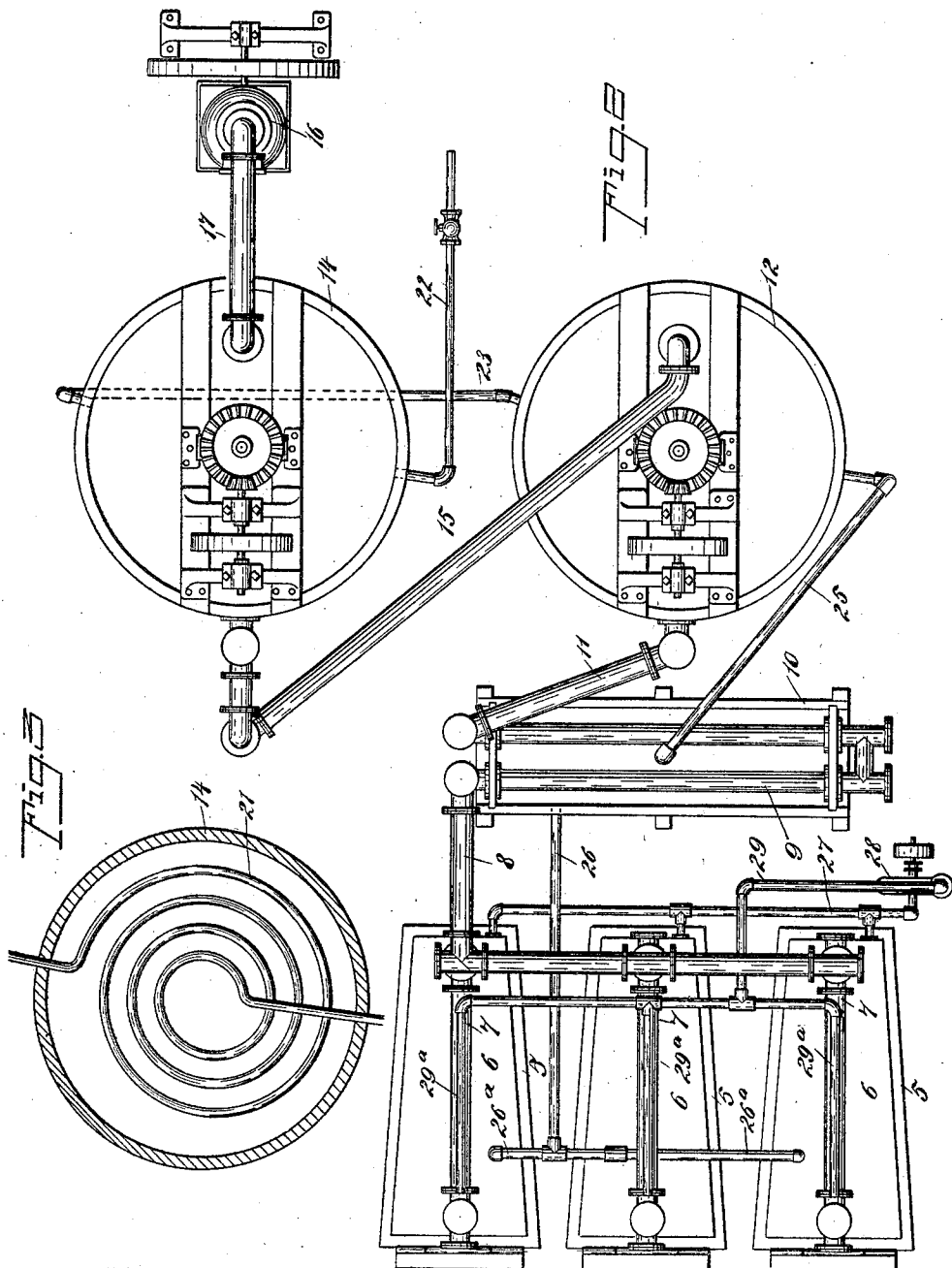
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UNITED STATES PATENT OFFICE.

GEORGE A. STEBBINS, OF WATERTOWN, NEW YORK.

APPARATUS FOR PRODUCING BISULFITE LIQUOR.

SPECIFICATION forming part of Letters Patent No. 681,586, dated August 27, 1901.

Application filed September 5, 1900. Serial No. 29,058. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. STEBBINS, a citizen of the United States, and a resident of Watertown, in the county of Jefferson and State of New York, have invented a new and Improved Apparatus for Producing Bisulfite Liquor, of which the following is a full, clear, and exact description.

The purpose of this invention is to provide means for producing bisulfite liquor used in paper manufacture by which the product will be obtained more economically and effectively than heretofore. This end I accomplish by insuring the intimate contact of the sulfurous gases with the basic solution and also by a system of gradual cooling for the sulfurous gases, all of which will be fully described hereinafter.

This specification is the disclosure of one form of the invention, while the claims define the actual scope thereof.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a view showing the apparatus involved in my invention, such view being partly in vertical section. Fig. 2 is a plan view of the apparatus. Fig. 3 is a section on the line 3 3 of Fig. 1, and Fig. 4 is a section on the line 4 4 of Fig. 1.

5 represents the sulfur-burners, which are here shown to be three in number, and each of which has at its top a pan 6, used for heating the water which is employed in the cooling system.

7 represents a number of return-bends which are provided, respectively, for the sulfur-burners 5 and serve to carry off the gaseous products thereof. These bends 7 are all in communication with a pipe 8, which passes to manifold pipes 9, placed in a tank 10, and through which manifolds the gases are conducted. From the manifolds 9 the gases pass by a pipe 11 to the lower absorption-tank 12, which is hermetically sealed. Mounted over the absorption-tank 12 is an upper absorption-tank 14, which tanks 12 and 14 are the only absorption-tanks involved in the

apparatus. From the tank 12 the gases pass to the tank 14 by way of a pipe 15, and a vacuum-pump 16 through the medium of a pipe 17 serves to draw off the waste gases from the absorption-tank 14. It will thus be seen that a continuous circulation of the gases is induced through the entire apparatus from the sulfur-burners 5 to the exhaust of the waste gases at the pump 16.

The absorption-tanks 12 and 14 are hermetically sealed, and each tank is provided with a number (preferably two) of partitions 17^a. These partitions, as best shown in Fig. 4, are formed with orifices 17^b therein, which permit the gases to pass from one side of the partition to the other; but these orifices are out of alinement, so that the gases are forced to take a circuitous passage through the absorption-tanks, and are thus held in association with the basic solution in the absorption-tanks longer than they would be were the gases permitted to pass directly through the absorption-tanks. For the purpose of agitating the solution within the absorption-tank and breaking up the globules of sulfurous gases I provide each tank with an agitator, comprising a suitably-driven rotating shaft 18, standing vertically in the tank and provided with blades 19, which are located between respective partitions 17^a and by means of which the contents of the absorption-tanks are violently agitated and the thorough admixture of the gas with the solution is insured. The gases pass first to the lower absorption-tank 12, and the gases not absorbed there pass to the upper absorption-tank. In the practical operation of the system when the solution in the lower absorption-tank has been properly impregnated with the gases this solution is drawn off by any suitable means, (not shown,) and the solution from the tank 14 is then transferred by way of the pipe 20 to the lower absorption-tank 12, where it is again subjected to the action of the fresh gases coming from the burners 5, the upper tank 14 being meanwhile filled with a fresh supply of the solution. The gases drawn by way of the pipe 17 from the upper tank 14 are waste gases, forming the residu-

um of the process. The basic solution is that usually employed—namely, a solution of milk of lime.

In order to insure the rapid and thorough
5 absorption of the sulfurous gases by the solution in the absorption-tanks, it is necessary to cool the sulfurous gases and the solution. The lower the temperature of these elements the more effective will be the absorption.
10 The gases must not, however, be cooled so rapidly that condensation or other effects incident to rapid cooling will take place. In doing this I provide a system of gradually cooling the gases by the use of water. In
15 the upper absorption-tank 14 is placed a coil of pipe 21, communicating with a water-supply pipe 22. This coil 21 discharges into a pipe 23, passing downward to a similar coil 24 in the bottom of the lower absorption-tank
20 12. From this coil 24 the water passes by a pipe 25 into the tank 10, and overflowing therefrom the water passes by a pipe 26 and its several branches 26^a into the heating-tanks 6 of the sulfur-burners 5. The water is
25 heated in these tanks and overflows therefrom into a pipe 27, which leads to a suitably-driven centrifugal or other pump 28 and by which the heated water is forced through a pipe 29 and its various branches 29^a up to
30 the top of the bends 7 and sprayed thereover. Now it will be observed that the cold water enters the upper absorption-tank 14 and cools the same, it passing therefrom into the lower absorption-tank, the water having gained a
35 slight increase in temperature, and from the lower absorption-tank the water passes to the tank 10, where it is further increased in temperature, and then it passes to the heating-pan 6, where it is heated and then spread over the
40 bends 7. This provides for the gradual cooling of the sulfurous gases generated in the burners 5, and by this gradual cooling I bring the gases at a low temperature to the tanks, the solution of which is also at a low temperature,
45 and thus I effect a maximum degree of absorption without incurring the condensation of the sulfurous gases and other detrimental effects incident to rapidly lowering the temperature thereof, and I also avoid the danger of choking
50 up the pipes of the apparatus. The water in the pan 6 is heated to a temperature slightly lower than that of the sulfurous gases, and then as the gases pass into the manifolds 9 they are subjected to the action of the water in the tank 10, which water while warm is nevertheless cooler than the gases in the manifolds. The same is so throughout the
55 entire operation, at each stage of which the gases are subjected to the action of water, which is used at a temperature slightly lower than that of the gases, and thus the gases, as well as the solution in the absorption-tanks, are effectually cooled without involving the detrimental effects above mentioned.

65 Having thus described my invention, I

claim as new and desire to secure by Letters Patent—

1. An apparatus for producing bisulfite liquor, having a sulfurous generator with a pan formed thereon, an absorption-tank, a gas-
70 pipe passing from the generator to the absorption-tank, means for conducting a cooling liquid into contact with the absorption-tank and then into the tank on the sulfur-burner, and a second means for conducting the water
75 from the pan on the burner to the gas-pipe.

2. An apparatus for producing bisulfite liquor, having a sulfur-burner, with a pan thereon, a gas-pipe passing from the sulfur-burner, and means for conducting the water from the
80 pan to the exterior of the gas-pipe.

3. An apparatus for making bisulfite liquor, having a sulfur-burner, a gas-pipe leading therefrom, an absorption-tank to which the
85 gas-pipe extends, means for enforcing the circulation of the gas through the gas-pipe and absorption-tank and means for conducting a cooling medium, said means extending continuously from the absorption-tank to various
90 points along the length of the gas-pipe and serving to permit the passage of the cooling medium from the absorption-tank along the gas-pipe to the end thereof adjacent to the
95 sulfur-burner, whereby to gradually cool the gas as it passes from the sulfur-burner to the absorption-tank.

4. An apparatus for producing bisulfite liquor, comprising a sulfur-burner, a gas-pipe passing therefrom, an absorption-tank to which the gas-pipe leads, means for enforcing
100 the circulation of the gas through the pipe and absorption-tank, a cooling-tank through which a part of the gas-pipe passes, and means for carrying a cooling medium, such means extending through and from the absorp-
105 tion-tank to the cooling-tank, to conduct the cooling medium from the absorption-tank to the cooling-tank, whereby gradually to cool the gas and the solution in the absorption-tank.

5. An apparatus for producing bisulfite liquor, comprising a gas-burner with a water-
110 pan arranged to be heated thereby, a gas-pipe passing from the burner, a part of the pipe being located over the pan, an absorption-tank to which the gas-pipe leads, means for
115 enforcing the circulation of the gas in the pipe and tank, a pipe passing into the absorption-tank and out of the same to conduct water from the absorption-tank to the water-pan
120 on the burner, and means for forcing the water in the pan upward into contact with the part of the gas-pipe which lies over the pan.

6. An apparatus for producing bisulfite liquor, comprising a sulfur-burner with a water-
125 pan thereon, a gas-pipe passing from the burner, a part of the pipe lying over the pan, an absorption-tank to which the gas-pipe passes, means for creating a circulation of gas in the pipe and absorption-tank, a cool-
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ing-tank into which part of the gas-pipe projects a pipe for conducting water the pipe passing through the absorption-tank to the cooling-tank, a second pipe passing from the
5 cooling-tank to the pan on the burner, and means for forcing the water from the pan upward into contact with the part of the gas-pipe which lies over the pan.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE A. STEBBINS.

Witnesses:

AUGUST F. RICHTER,
MAY M. BRENNAN.