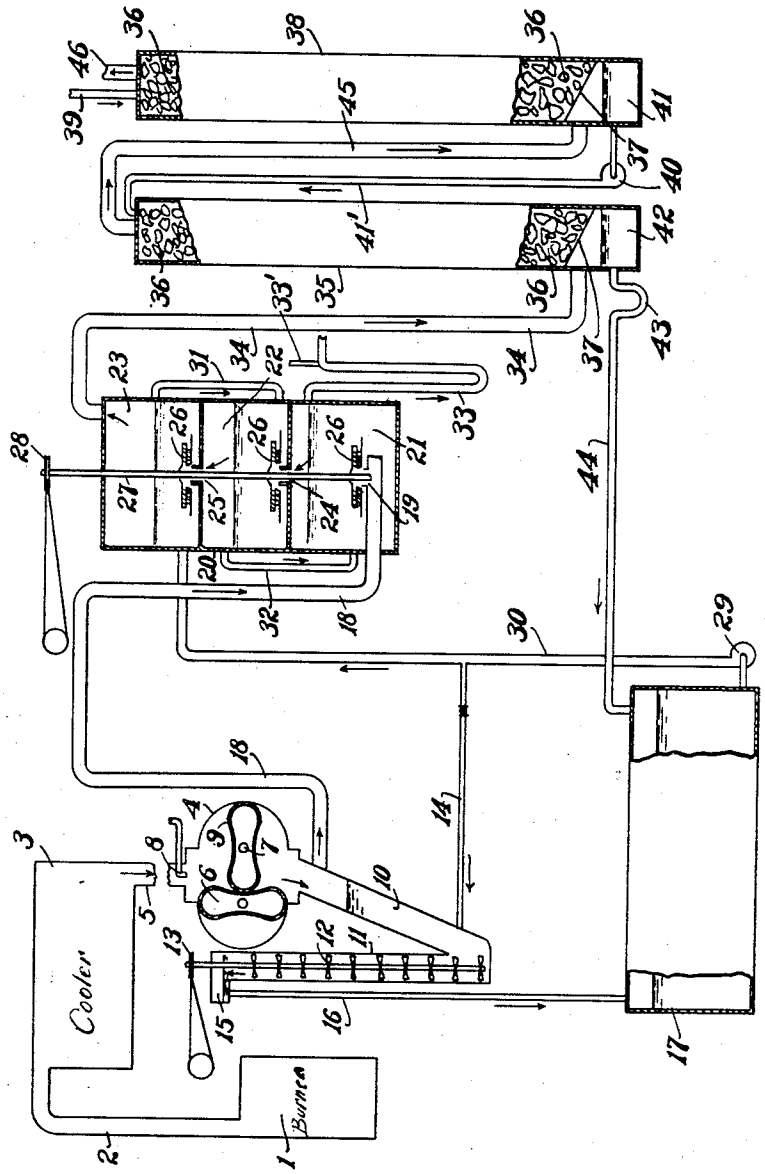
R. B. WOLF.

APPARATUS FOR MAKING SULFITE LIQUOR.

APPLICATION FILED JULY 13, 1911.

1,097,785. Patented May 26, 1914.



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APPARATUS FOR MAKING SULFITE LIQUOR.

1,097,785. Specification of Letters Patent. Patented May 26, 1914.

Application filed July 13, 1911. Serial No. 638,380.

To all whom it may concern:

Be it known that I, ROBERT B. WOLF, a citizen of the United States, residing at Berlin, New Hampshire, have invented certain new and useful Improvements in Apparatus for Making Sulfite Liquor, of which the following is a specification.

This invention relates to the manufacture of sulfite liquor for a paper process and particularly to the utilization of the excess gas of a system using gas under pressure for the purpose of rendering the same available for the advance of preliminary changes in the basic liquor.

In my co-pending applications, Serial Nos. 528,443 and 528,444, I have discussed the general method and apparatus for making a liquid in a system using the gas under pressure. In my present application, I shall deal more particularly with that portion of the system which deals with the treatment of the excess of gas escaping from the absorption system and the utilization of this in the formation of basic liquor in which certain desired reactions are advanced.

In order to make my present application clear I will show and describe the complete apparatus substantially as set forth in my prior applications which may be taken as illustrative of a satisfactory embodiment of my invention.

Throughout specification and drawings like reference numerals are employed to indicate corresponding parts and in the drawings I have shown a diagrammatic plan of the said system.

Referring to the system as a whole, I have indicated at 1 a burner in which the sulfur dioxid is formed. From the burner 1 gas is led by a pipe 2 into a cooler 3. The pipe 5 leads from the cooler 3 to a blower 4. Within the blower casing are a pair of impellers 6 mounted on shafts 7. Above the impellers 6 is located a jet 8 from which lime water is sprayed into the blower casing. This lime water combines with the SO_2 gas and forms on the impellers and on the interior of the gas blower a coating 9 of calcium monosulfite which protects the metal parts of the blower from the attack of the acid of the gas. Below the blower 4 is set an inclined foot with a vertical pipe 11. Within the pipe 11 is an agitator 12, turned by a pulley 13. The agitator 12 prevents the settling of the matter in suspension in the liquor so that it will be carried up from the pipe 11 and off through the spillway 15 from which it runs through the pipe 16 to the basic liquor tank 17. From this tank 17 a pump lifts the basic liquor through a pipe 30 a part of which is carried through the pipe 14 into the catch pipe 10 over this bent foot to increase the circulation and the flushing out of the foot between the pipes 10 and 11.

At one side of the delivery end of the blower 4 a gas pipe 18 enters the pipe 10 so that the gas may separate from the falling liquid and pass off through this pipe 18. It is then conducted to the base of the absorption system 20 which it enters near the bottom discharging centrally thereof from a capped nozzle 19.

The absorption system 20 preferably consists of a plurality of superimposed tanks although as far as the present application goes it might be but a single tank. The triple tank which I prefer is that employed in the well known Burgess three tank system. These tanks have central openings between them as shown at 24 and 25 from which the gas may progress into the succeeding compartments. Hollow stirring arms 26 are provided on a shaft 27 from which the gas passes. Shaft 27 is rotated by a pulley 28 so as to agitate the liquid and distribute the gas. The liquid is lifted from the tank 17 by a pump 29 through the pipe 30 to the bottom of the upper tank 23. From this tank it overflows from the pipe 31 to the bottom of the tank 22. In this tank the liquid will rise to the level of the pipe 32 which conducts it to the bottom of the tank 21 from which it is drawn by a pipe 33 which is bent to form a trap against the gas pressure. This delivers the finished acid.

On account of using the gas under pressure in the absorption system 20 the excess gas will escape at the top of said system.

For this purpose I provide a pipe 34 which I conduct to the bottom of the tower 35 filled with lime stone, as indicated at 36 supported by a grating 37. 38 is a similar tower filled with lime stone supported in the same manner. A single tower might be used but in the particular system described two towers are used in the manner shown.

The water supply enters the top of the tower 38 from the sprinkler 39 and a pump 40 lifts it from the tank 41 at the bottom of the tower 38 through the pipe 41′ to the top of the tower 35 where it is showered into the tank 42. From the tank 42 it is carried through a pipe 44 to the basic liquor tank 17. From the top of the tower 35 a gas pipe 45 leads below the grate of the tower 38.

46 is a vent on the top of the tower 38 for the escape of any such gases as might pass through the final treatment in the tower 38.

The gas containing SO_2 is drawn from the burners 1 by the blower 4 through the cooler 3. A burning is therefore secured under a pressure slightly less than atmospheric or at least not greater than atmospheric. It is then drawn into the blower 4 then mixed with a fine spray of milk of lime. This forms in the blower calcium monosulfite and also some calcium sulfate owing to a small percentage of SO_3 in the gas. A part of this deposits as a fine coating on the impellers and casing and protects them from the acid attack which would otherwise quickly destroy them. The remainder of the monosulfite then drops into the pipe 10 and is carried farther by the agitated flow from the spray 8 and the branch pipe 14 from the main feed 30. It finally passes off through the spill 15 and down through the pipe 16 into the tank 17 which is fed with milk of lime.

The gas separating from the shower of water and calcium monosulfite is forced through the pipe 18 into the absorption system 20 where it meets the basic liquor from the tank 17 in the counter current principle emerging as a finished acid from the pipe 33.

The particular advantages of this part of my system are set forth in my prior applications above referred to. My present application as stated above deals more particularly with the utilization of the excess gas for the securing of an advance in the reaction in the basic liquor. As the gas escapes from the pipe 34 it is carried through the lime stone towers 35 and 38. Here the gas forms with the water in the presence of the lime stone monosulfite which is deposited on the surface of the stone. This monosulfite is then raised to bisulfite and ultimately washed down and carried together with sulfurous acid into the tanks at the bottom of the towers from which it is pumped into the basic liquor tank 17 where a further reaction is secured on the calcium hydrate with an increased amount of monosulfite. This basic liquor is then ready to be used in the absorption system with a corresponding increase in the rapidity of completion of the combined base. It will then be seen that by utilizing the excess gas which is necessary in the employment of pressure in the absorption system I not only conserve the gas which would otherwise be wasted and add it to the total production but I actually increase the ultimate strength of the acid by furnishing to my basic liquor those elements needed so that the action of the absorption system is advanced and so that I am able to present the liquor having no uncombined calcium hydrate in it when it reaches that point at which the gas is strongest.

Various modifications may, obviously, be made in the several parts of the system and in the construction and arrangement of the apparatus which is to utilize the excess gases all without departing from the spirit of my invention if within the limits of the appended claims.

What I therefore claim and desire to secure by Letters Patent is:

1. An apparatus for making sulfite liquor comprising means for producing a gas containing sulfur dioxid, a cooler for said gas, an absorption system, a tank for basic liquor, means for supplying liquor from said basic liquor tank to said absorption system, means located between the gas producer and the absorption system for forcing an excess of gas under pressure through said system, a tower having a carbonated basic filling, means for introducing a liquid capable of absorbing sulfur dioxid at the top of said tower, means for transferring the excess of gas from the absorption system to the bottom of said tower and means for delivering the liquor from the bottom of said tower to said basic liquor tank.

2. An apparatus for making sulfite liquor comprising means for producing a gas containing sulfur dioxid, a cooler for said gas, an absorption system comprising a plurality of absorbing tanks, a tank for basic liquor, means for suppying liquor from said basic liquor tank to said absorption system, means for transferring the liquor from one tank to another, means located between the gas producer and the absorption system for forcing an excess of gas under pressure through said system, a tower having a carbonated basic filling, means for introducing a liquid capable of absorbing sulfur dioxid at the top of said tower, means for transferring the excess of gas from the absorption system to the bottom of said tower and means for delivering the liquor from the bottom of said tower to said basic liquor tank.

3. An apparatus for making sulfite liquor comprising an absorption system for supply-

ing an excess of gas containing sulfur dioxid to said system under pressure, a tank for basic liquor, means for supplying liquor from said basic liquor tank to said absorption system, means for treating the excess of gas from said absorption system with a solvent in the presence of a carbonated base and means for delivering the liquor produced by said last mentioned treatment to said basic liquor tank.

In testimony whereof I affix my signature in presence of two witnesses.

ROBERT B. WOLF.

Witnesses:

EDMUND SULLIVAN,

HOLMAN A. DREW.