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APPARATUS FOR NEUTRALIZING ACID LYES.

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1,098,562. Patented June 2, 1914.

Fig. 1.

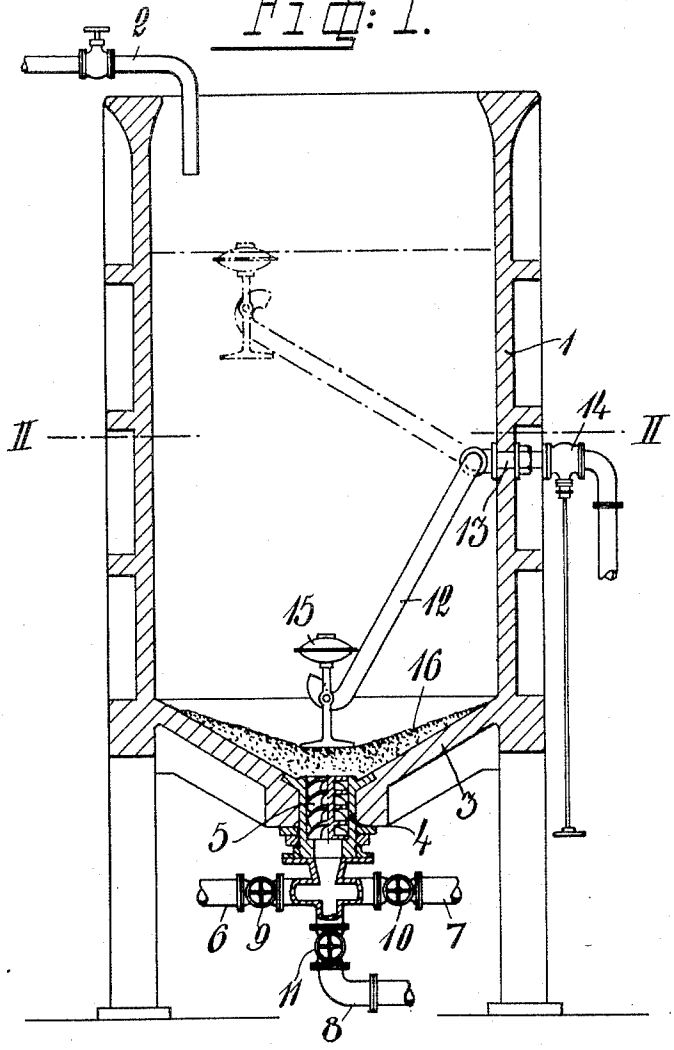
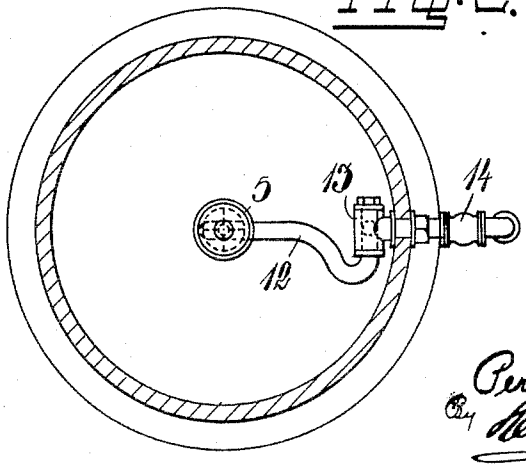


Fig. 2.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR NEUTRALIZING ACID LYES.

1,098,562. Specification of Letters Patent. Patented June 2, 1914.

Application filed February 24, 1912. Serial No 679,793.

To all whom it may concern:

Be it known that I, PER GÖSTA EKSTRÖM, a citizen of the Kingdom of Sweden, residing at Harnäs, Sweden, have invented a new and useful Improved Apparatus for Neutralizing Acid Lyes, of which the following is a specification.

This invention relates to an improved apparatus for neutralizing acid lyes obtained in boiling cellulose matters with acid liquids, as for instance the sulfite liquor from the sulfite pulp process, and is convenient for carrying out the process described in my application Serial No. 679,792, filed February 24, 1912.

As is well known the sulfite liquor contains a small percentage of saccharin matters which may be converted into alcohol by usual fermentation. Before such fermentation can be carried out it is necessary to neutralize the liquor by binding its acid constituents to a base, such as lime, limestone or the like.

The chief object of the present invention is to provide an apparatus in which large quantities of liquid may be neutralized in each charge in an effective and economical manner while using as neutralizing agents chemical compounds which are *per se* insoluble or give rise to insoluble compounds in the lye.

The apparatus consists, chiefly, of a reservoir having means for admitting the liquid to be treated, means for blowing air under pressure from below through the liquid and means for drawing off the neutralized liquid from the surface according as the liquid is cleared in the surface layer by that the solid matters contained in the liquid sink downward.

A further feature of the invention consists in means for removing the sediment from the bottom of the reservoir after the completion of one or more neutralizing processes as will be more fully described in the following description of the invention.

In the accompanying drawing I have shown one constructional form of my invention which is especially adapted for neutralizing the sulfite liquor from the sulfite pulp process.

Figure 1 shows a vertical central section of the apparatus, and Fig. 2 shows a horizontal section thereof on line II—II of Fig. 1.

Referring now to the drawing, 1 is a reservoir suitably made of concrete and having at the top a supply pipe 2 for supplying the liquid to be treated which is herebelow referred to as being the sulfite liquor of the sulfite pulp process. The bottom 3 of the reservoir has suitably a concave shape or the shape of an inverse cone or is in other manner bent downward.

In the center of the bottom 3 a nozzle 4 is provided having a number of helical partitions 5 which impart to a fluid supplied through the nozzle a rotary motion. Outside the reservoir three pipes 6, 7 and 8 are connected to the nozzle. The said pipes are provided with valves or the like 9, 10 and 11 respectively so that each of them may be put in operative connection with the nozzle while the two others are cut off therefrom. The pipe 6 serves to supply air under pressure to the nozzle for which purpose it is connected to a suitable reservoir for air under pressure or to an air compressor (not shown in the drawing). The pipe 7 is a supply pipe for water under pressure and the pipe 8 is drawing off pipe through which the sediment may be removed from the reservoir as will be further described herebelow.

12 is a siphon pipe pivotally connected to a pipe 13 which latter passes through the wall of the reservoir and outside the latter has a valve or the like 14. A float 15 is connected to the free end of the siphon pipe 12 and serves to keep the said end near to the surface of the liquid in the reservoir 1.

The operation of the above described apparatus when used for neutralizing the sulfite liquor from the sulfite pulp process is as follows: The liquor to be treated is supplied through the pipe 2 and at the same time the neutralizing agent, as for instance powdered lime-stone, is filled into the reservoir from above. During this period the valves 9, 10, 11 and 14 remain closed. I prefer to treat the liquor immediately after it has been drawn off from the boilers *i. e.* while its temperature still is about 90–95° C.

When the reservoir has been filled, the valve 9 is opened so that a current or air under pressure is admitted through the nozzle 4 into the reservoir. An air pressure of 2 to 3 atmospheres is preferred. On account of the shape of the partitions 5 of the nozzle the air admitted flows into the reservoir in a whirling motion thereby causing a violent agitation of the liquid and the neutralizing

agent so that the latter will be kept suspended in the liquid and thoroughly mixed therewith as long as the blowing is continued. During this operation the sulfurous acid contained in the liquor partly reacts with lime so as to form insoluble calcium monosulfite partly is oxidized by the oxygen of the air blown through the liquor into sulfuric acid which combines with the lime into calcium sulfate. At the same time certain organic compounds contained in the liquor the structure of which are unknown but which I have found to be injurious to the yeast when fermenting the liquor, are oxidized and thereby made uninjurious for the fermentation process. The neutralizing reaction is accomplished after about three to four hours when treating a charge of 100–200 cu. m. and then the valve 8 is closed. The insoluble matters contained in the liquor now begin to sink, and as soon as the surface layer of the liquid has become cleared, I open the valve 14 for drawing off the neutralized liquid from the reservoir 1 through the siphon pipe 12 and the drawing off pipe 13. The siphon pipe 12 is supported by the float so that its mouth always is kept close to the surface of the liquid, as indicated by dotted lines in Fig. 1, and the drawing off is then regulated in such manner that the liquor is drawn off according as it is cleared. When the drawing off of the liquid is ended, the insoluble matters of the liquor form a layer covering the bottom of the reservoir, as is indicated at 16 in Fig. 1.

For removing the said sediment, I flush the bottom by water by opening the valve 10 of the pipe 7. The pressure of the water in the pipe 7 may suitably be about 3 to 5 kg. per sq. cm. so as to obtain a great power of the water jets flowing in through the nozzle 4. These water jets described on account of the construction of the nozzle a whirling motion and whirl up the sediment from the bottom of the reservoir. When the sediment in this manner has been completely whirled up by the water admitted into the reservoir through the pipe 7 and the nozzle 4, I close the valve 10 and then the water together with the sediment contained therein is immediately drawn off from the reservoir by opening the valve 11. The removal of the sediment may take place after each neutralizing operation or after a number of such processes when a large quantity of mud has accumulated in the reservoir.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. Apparatus for neutralizing by means of solid reagents, acid liquors obtained in boiling cellulose matters with acid liquids; consisting of a reservoir for receiving the liquor to be treated and the neutralizing agent, means for blowing a spiral jet of air under pressure from below in a whirling motion through the liquor with sufficient pressure to carry the solid reagent with the air through the body of liquor, means for drawing off the neutralized liquid, means for flushing the bottom of the reservoir from below with water supplied under pressure, and means for drawing off the flush water, substantially as and for the purpose set forth.

2. Apparatus for neutralizing by means of solid reagents acid liquors obtained in boiling cellulose matters with acid liquids; consisting of a reservoir for receiving the liquor to be treated and the neutralizing agent, a float-supported siphon pipe for drawing off the neutralized liquid from the surface layer according as the solid matters contained therein sink downward, a nozzle in the bottom of said reservoir having helical passages therein, a pipe for supplying air under pressure to said nozzle whereby a spiral jet of air entraining the reagent is forced through the body of liquor, a pipe for supplying water under pressure to said nozzle, a drawing off pipe in axial alinement with the nozzle, and means for bringing either of said pipes into operative connection with the nozzle, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

PER GÖSTA EKSTRÖM.

Witnesses:
ARVID DELMAR,
JOHN DELMAR.