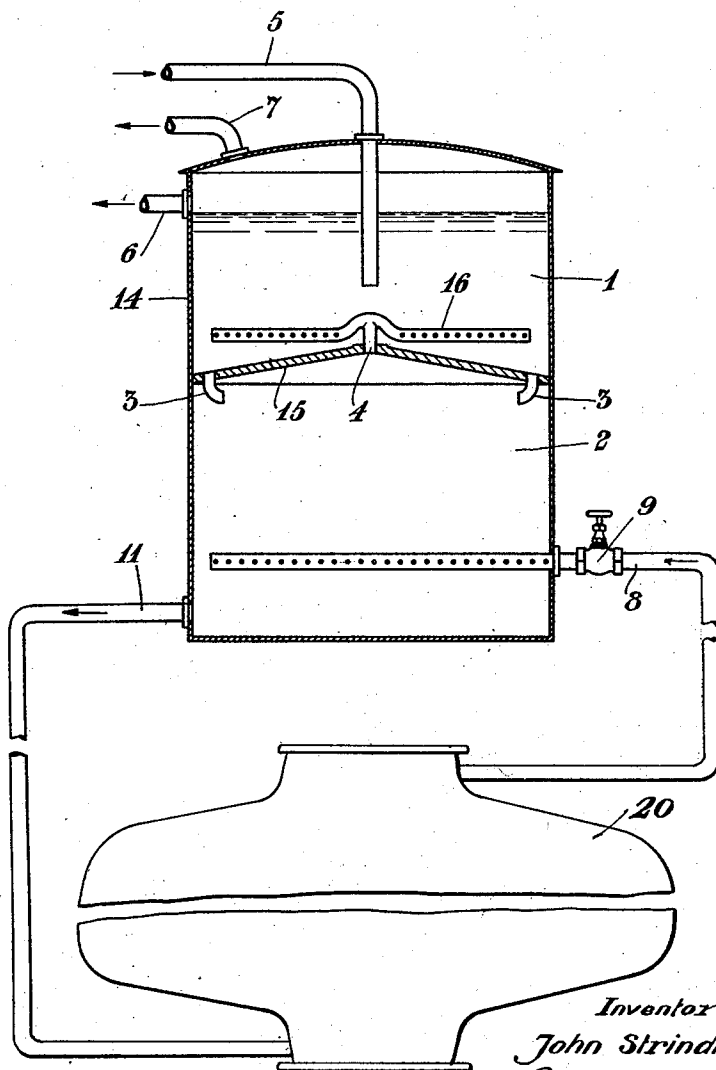


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APPARATUS FOR RECOVERING ACID AND HEAT UNITS THEREOF
FROM DIGESTERS AND FOR PREPARING DIGESTER LIQUOR
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UNITED STATES PATENT OFFICE

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APPARATUS FOR RECOVERING ACID AND HEAT UNITS THEREOF FROM DIGESTERS AND FOR PREPARING DIGESTER LIQUOR

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An apparatus for recovering acid and the heat units thereof from digesters and preparing and storing strong and hot boiling acid or digester liquor in the sulphite cellulose manufacture is previously known in the art, such apparatus comprising a receptacle containing acid into which gas and liquor from the digester when blown off are conducted directly and without being cooled, for the purpose of concentrating the acid. Said prior apparatus is principally characterized in that the said receptacle is not closed, but is in open communication with one or more other, higher located receptacles in such manner that when drawing off concentrated liquor from the lower receptacle, this lower receptacle is again automatically filled with acid from the higher located receptacle, which latter is in open communication with the atmosphere and is provided with an overflow drain so that the acid in said latter receptacle is always maintained at a constant level, and a practically constant excess pressure corresponding to the difference in height between the receptacles is maintained in the lower receptacle. In the apparatus above referred to, two separate receptacles are used one of which is located at a certain height above the other, and which receptacles are connected with each other by means of two separate pipes.

Now, my present invention relates to a simplification of the apparatus above referred to, and has for its purpose to make the apparatus cheaper to construct, and particularly to simplify the alteration of such old installations for the purpose in question which are provided with a single receptacle, into the present apparatus for preparing digester liquor. For this purpose my present invention consists principally in that the two receptacles, or all receptacles, above referred to, consist of two or more compartments of a single receptacle which is divided by means of one or more partitions into two or more compartments located one above the other, and which are in open communication with one another through suitable openings in the partition or partitions in the same way as that above described in respect of the earlier

apparatus. For the purpose of altering an old installation having a single receptacle into my present improved apparatus it is thus only required to insert in such receptacle a partition having suitable openings. The cost of such change will therefore be very inconsiderable.

In the accompanying drawing an apparatus according to my present invention for concentrating the raw digester liquor is illustrated in vertical section.

In the construction illustrated in the drawing a single receptacle 14 is used, which is divided by means of a partition 15 inserted therein into two compartments, namely an upper compartment 1 and a lower compartment 2. The partition 15 has a slightly conical or in other manner slightly convex shape so that its middle portion is located somewhat higher than its outer portions at the walls of the receptacle 14. In the middle and higher portion of the partition an opening is provided in which a short tube 4 is inserted which serves to conduct gas from the lower compartment to the upper compartment, and which for this purpose is in communication with a gas distributing tube 16 having fine orifices provided in the last mentioned compartment. In the outer and lower portions of the partition two openings are provided in which short tubes 3 are inserted which are bent at an angle in the instance illustrated, and which serve to conduct liquor from one compartment to the other. A pipe 5 opens into the upper compartment 1 which pipe serves to admit the raw acid or liquor into said compartment. Said compartment 1 is also provided with an overflow drain pipe 6 through which a possible excess of acid is drained off to a storage receptacle, so that the acid in the receptacle 1 will be maintained at a constant level, and with a gas exhaust pipe 7 which communicates with the gas pipes in the acid preparation plant. Through said last mentioned pipe the upper compartment 1 is thus in communication with the atmosphere, so that the pressure in said compartment is always practically equal to the atmospheric pressure. A pipe 8 opens into the lower compartment 2 and serves to

lead gas and liquor from the digester, which is not illustrated in the drawing, into said compartment, and is for this purpose provided with a control valve 9. The lower compartment 2 is also provided with a drain pipe 11 which serves to conduct the concentrated digester liquor to the digester.

The apparatus described operates in the following manner: The cold raw acid from the acid preparation plant is admitted through the pipe 5 into the upper compartment 1 and flows from said compartment through the tubes 3 into the lower compartment 2 which will thus be entirely filled with raw acid, while the upper compartment 1 will only be partly filled, namely up to the overflow drain pipe 6. The liquid in the lower compartment 2 will thus be under a certain pressure which is dependent upon the level of the liquid in the upper compartment 1. When the digester is blown off the hot gas and liquor from the digester are led directly and without being cooled through the pipe 8 into the lower compartment 2. The sulphurous acid introduced in this manner into the said compartment is absorbed by the raw acid which is thereby heated. If more sulphurous acid is introduced into the compartment 2 than the acid in said compartment can absorb at the prevailing pressure and temperature, the excess gas passes through the tubes 4 and 16 to the upper compartment 1 and is absorbed by the cooler acid in said compartment. Owing to the volume increasing when the gas and liquor are admitted into the lower compartment 2 and heat the acid in the same, a quantity of the acid or liquor in the compartment 2 flows back to the upper compartment 1 through the tubes 3. The excess of acid in the compartment 1 possibly caused hereby flows off through the pipe 6, so that the level in the compartment 1 is still maintained constant. In this manner hot and strong digester liquor, that is to say, liquor concentrated as much as possible, is thus obtained in the lower compartment 2, while the compartment 1 contains cooler acid which is only enriched with sulphurous acid to a less extent.

When the digester is to be charged for a new operation, hot concentrated digester liquor is drawn from the lower compartment 2 through the pipe 11 and is introduced into the digester in the ordinary manner. According as digester liquor is drawn in this manner from the compartment 2, fresh and colder acid flows from the upper compartment 1 through the tubes 3 so that the compartment 2 is always maintained filled. With the apparatus described a digester liquor can thus be obtained which has the highest and most uniform concentration possible.

In certain cases it may be suitable to divide the receptacle 14 by means of several partitions 15 into more than two compartments

which are placed in open communication with one another through suitable openings.

I claim:

1. Apparatus for recovering acid and the heat units thereof from digesters and for preparing digester liquor, comprising a receptacle divided by partition means into superposed compartments, means for admitting cold acid liquor into the uppermost compartment, means for maintaining a constant level of acid liquor in said compartment, means for admitting hot acid gas and liquid into the lowermost compartment, means for drawing off hot acid liquor to be fed to a digester from said last mentioned compartment, the partition means having a substantially convex shape, with its middle portion located higher than its outer portions and being provided with an opening in its middle portion and with at least one opening in its outer portion, and a gas distributing tube located in the uppermost compartment and communicating with said opening in the middle portion of said partition.

2. Apparatus for recovering acid and the heat units thereof and for preparing cooking liquor, comprising a single closed receptacle, a partition in the receptacle dividing the same into superposed compartments, a pipe leading into the uppermost compartment for discharging fresh cold acid liquor into that compartment, a pipe connected to the lower portion of the receptacle for passing fluid into the lowermost compartment of the receptacle, an outlet pipe connected to the lowermost compartment of the receptacle, a first passageway in the partition for leading gas from the upper portion of the lowermost compartment into the lower portion of the uppermost compartment, and a second passageway in the partition for leading liquor from the lower portion of the uppermost compartment into the upper portion of the lowermost compartment, said passageways being so arranged that acid liquor introduced into the uppermost compartment can completely fill the lowermost compartment and at least partially fill the uppermost compartment, whereby a relatively tall column of liquor is provided.

3. Apparatus for recovering acid and the heat units thereof and for preparing cooking liquor, comprising a single closed receptacle, a partition in the receptacle dividing the same into superposed compartments, a pipe leading into the uppermost compartment for discharging fresh cold acid liquor into that compartment, a pipe connected to the lower portion of the receptacle for passing fluid into the lowermost compartment of the receptacle, an outlet pipe connected to the lower portion of the receptacle for passing liquor from the lowermost compartment of the receptacle, a first passageway in the partition for leading gas from the upper portion of

the lowermost compartment into the lower portion of the uppermost compartment, a second passageway in the partition for leading liquor from the lower portion of the uppermost compartment into the upper portion of the lowermost compartment, said passageways being so arranged that acid liquor introduced into the uppermost compartment can completely fill the lowermost compartment and at least partially fill the uppermost compartment, whereby a relatively tall column of liquor is provided, and a pipe arranged at the upper portion of the uppermost compartment for maintaining a constant level of liquor in the uppermost compartment.

4. Apparatus for recovering acid and the heat units thereof and for preparing cooking liquor, comprising a single closed receptacle, a partition in the receptacle dividing the same into superposed compartments, a pipe leading into the uppermost compartment for discharging fresh cold acid liquor into that compartment, a pipe connected to the lower portion of the receptacle for passing fluid into the lowermost compartment of the receptacle, an outlet pipe connected to the lower portion of the receptacle for passing liquor from the lowermost compartment of the receptacle, a first passageway in the partition for leading gas from the upper portion of the lowermost compartment into the lower portion of the uppermost compartment, a second passageway in the partition for leading liquor from the lower portion of the uppermost compartment into the upper portion of the lowermost compartment, said passageways being so arranged that acid liquor introduced into the uppermost compartment can completely fill the lowermost compartment and at least partially fill the uppermost compartment, whereby a relatively tall column of liquor is provided, and a pipe connected to the top of the receptacle for discharging gas from the upper portion of the uppermost compartment.

5. Apparatus for recovering acid and the heat units thereof and for preparing cooking liquor, comprising a single closed receptacle, a partition in the receptacle dividing the same into superposed compartments, a pipe leading into the uppermost compartment for discharging fresh cold acid liquor into that compartment, a pipe connected to the lower portion of the receptacle for passing fluid into the lowermost compartment of the receptacle, an outlet pipe connected to the lower portion of the receptacle for passing liquor from the lowermost compartment of the receptacle, a first passageway in the partition for leading gas from the upper portion of the lowermost compartment into the lower portion of the uppermost compartment, a second passageway in the partition for leading liquor from the lower portion of the up-

permost compartment into the upper portion of the lowermost compartment, said passageways being so arranged that acid liquor introduced into the uppermost compartment can completely fill the lowermost compartment and at least partially fill the uppermost compartment, whereby a relatively tall column of liquor is provided, and a perforated gas distributing tube connected to the partition and communicating with the first passageway for distributing gas rising from the lowermost compartment into the acid liquor contained in the uppermost compartment.

6. Apparatus for recovering acid and the heat units thereof and for preparing cooking liquor, comprising a single closed receptacle, a partition in the receptacle dividing the same into superposed compartments, a pipe leading into the uppermost compartment for discharging fresh cold acid liquor into that compartment, a pipe connected to the lower portion of the receptacle for passing fluid into the lower most compartment of the receptacle, a pipe connected to the lower portion of the receptacle for passing liquor from the lowermost compartment of the receptacle, a first passageway in the partition for leading gas from the upper portion of the lowermost compartment into the lower portion of the uppermost compartment, and a second passageway in the partition for leading liquor from the lower portion of the uppermost compartment into the upper portion of the lowermost compartment, said passageways being so arranged that acid liquor introduced into the uppermost compartment can completely fill the lowermost compartment and at least partially fill the uppermost compartment, whereby a relatively tall column of liquor is provided, the first passageway being arranged at the central portion of the partition, and the second passageway being arranged near the edge of said partition.

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