

Nov. 29, 1932.

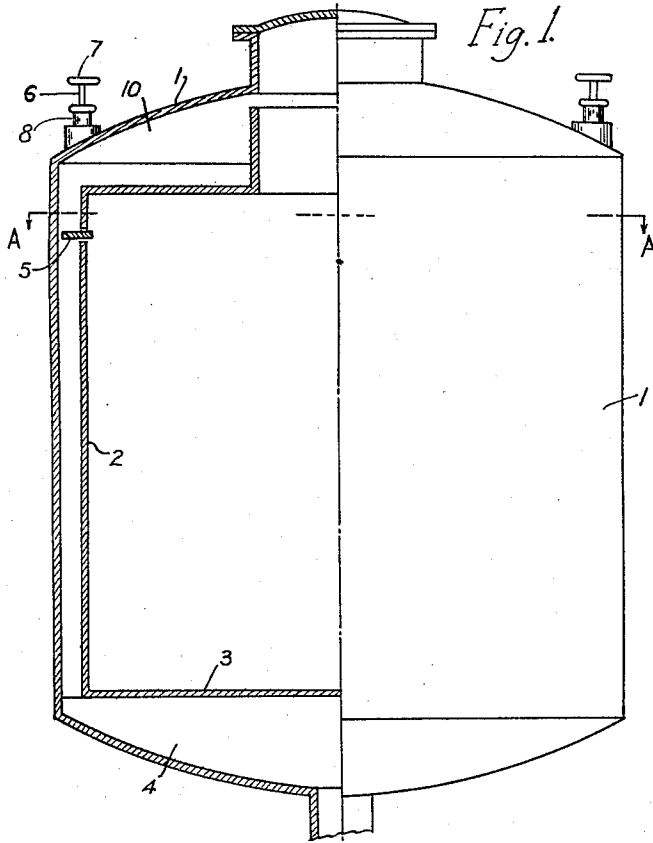
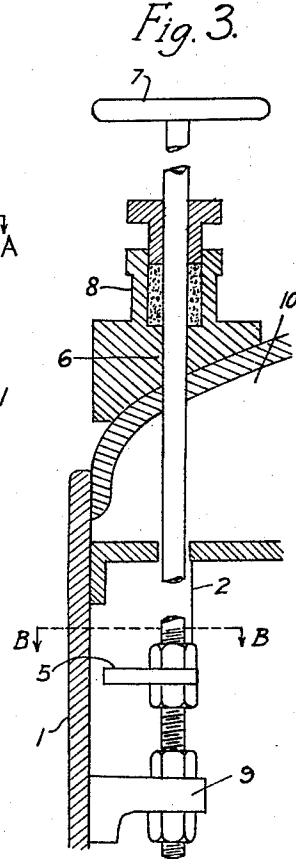
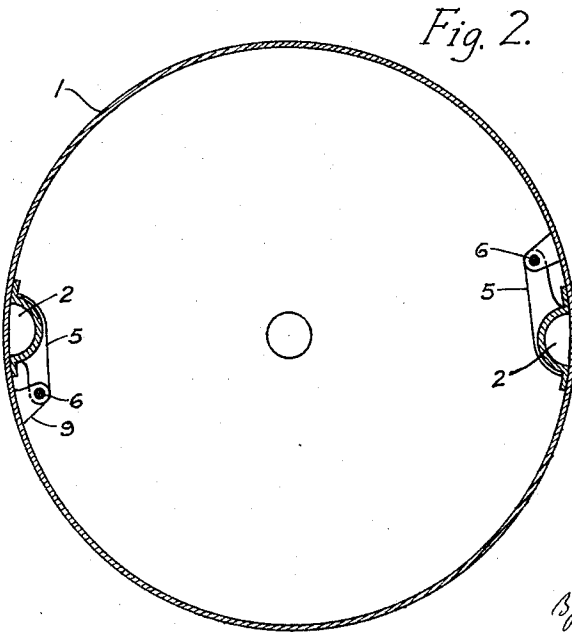
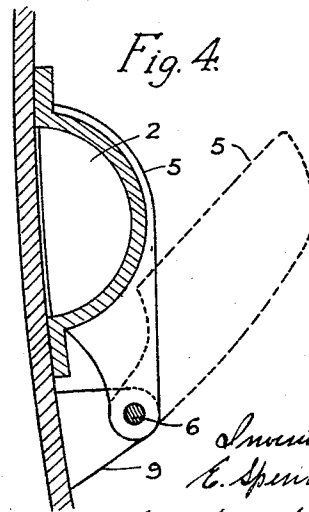
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1,889,158

METHOD OF CONTROLLING THE TREATMENT OF VEGETABLE MATTER TO OBTAIN
CELLULOSE THEREFROM BY MANIPULATION OF THE VOMIT PIPES

Filed March 20, 1929

2 Sheets-Sheet 1



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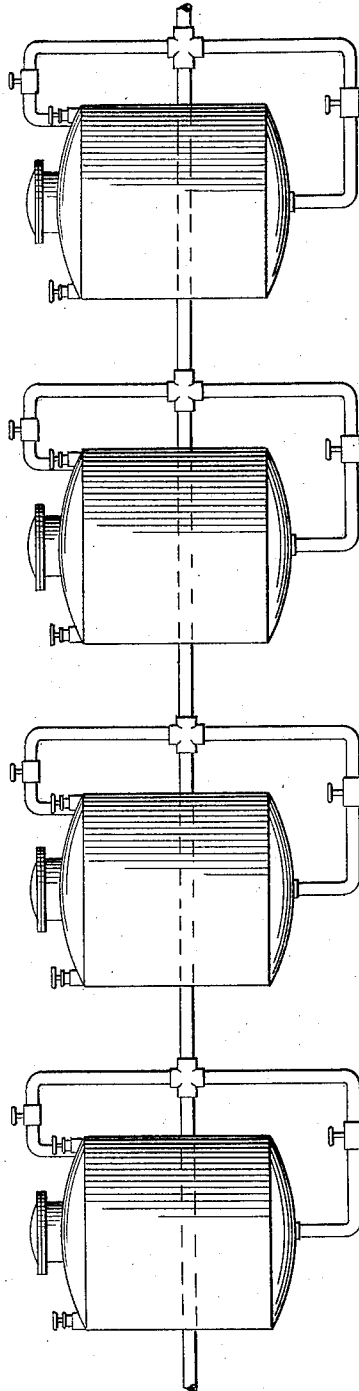
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2 Sheets-Sheet 2

Fig. 5.



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UNITED STATES PATENT OFFICE

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METHOD OF CONTROLLING THE TREATMENT OF VEGETABLE MATTER TO OBTAIN
CELLULOSE THEREFROM BY MANIPULATION OF THE VOMIT PIPES

Application filed March 20, 1929, Serial No. 348,577, and in British India May 18, 1928.

This invention relates to improvements in the manner of digesting vegetable matter to recover the cellulose contained therein and to improvements in the apparatus to enable the said improved treatment to be carried out.

liquor when the liquor was blown off with the vomit valves open. With the vomit valves closed the amount of liquor contained in the grass after blowing over as much as possible using the pressure in the digester was only 500 gallons.

The second advantage of these vomit pipe valves is that by closing them periodically during the digest a better circulation may be effected by forcing the liquor up through the fibre at intervals when such valves are closed.

Another advantage which is connected with the blowing over of the liquor from one digester to another is that the liquor may be forced up by the pressure through the fibre with the valves closed and so ensure a thorough circulation of the liquor within the fibre.

In the digestion of vegetable matter to recover cellulose therefrom carried out in digesters having therein internal vomit pipes, the invention consists widely in a manner of increasing the efficiency of certain parts or steps in the treatment whereby better circulation of liquor in or transfer of liquor from one vessel to another may be effected by the closing off or opening out of the said vomit pipes as may be desired in order to force the liquor to take a desired path, or to circulate in a desired direction under better control.

The invention thus comprises in the digestion of vegetable matter for the purpose of recovering the cellulose contained therein (or for paper making or like purposes) in which a digester with internal vomit pipes is used, an improved manner of treatment which consists, when the digestion or the stage or step in the digestion (if such digestion is carried out in stages or steps) is complete, in closing said vomit pipes when the liquor in the digester is to be blown over to waste or into another digester, and in utilizing the steam or vapour pressure above the liquor in said first digester to assist in forcing the liquor through the cellulose or fibre under treatment thus actively forcing out a greater proportion of the liquor contained therein than is otherwise possible from digesters with open vomit pipes.

The invention relates to digestion processes which are carried out in digesters fitted with internal vomit pipes, and more particularly to processes employing cascade digestion methods, or analogous or similar methods, in which the digestion is carried out in stages or steps in a step down pressure—free caustic or digesting liquor concentration gradation. The processes or treatment to be described is indeed of considerable value in digestion processes as described in the specifications of U. S. A. patents applications Serial Nos. 253,309, 253,310 or 253,311, filed February 10, 1928, although it is to be understood that its use is not necessarily restricted to application to such process alone.

The invention concerns the provision of valves in the internal vomit pipes used in the digesters, which valves may be closed off or opened when desired, thus permitting certain advantages and improvements to be realized in the treatment.

By the use of such valves it is possible to arrange that the head of pressure in a digester is effectively used to force the liquid from the fibre contained in the digester when transferring the liquor from said digester without the pressure releasing itself down the side vomit pipes. If these vomit pipes are left open, owing to the pressure releasing down these vomit pipes in preference to passing through the packed fibrous mass below, the discharge of the liquor from the digester is mainly accomplished by the ordinary gravitational flow of the liquor from the fibre, and it is very difficult to obtain complete removal of the liquor owing to capillary attraction. With the vomit pipes closed the pressure head is maintained in the top of the digester and it forces the liquor down through the fibre more completely. As an example a digester, fitted with these new valves in its vomit pipes and containing one ton of cooked fibre retained 1000 gallons of

In the digestion of vegetable matter for recovering cellulose therefrom in which for efficiency in loading, drenching down and circulating liquor in the digesters vomit pipes are used inside the digesters, and more particularly in digestion processes of the cascade type such as are disclosed in U. S. A. patent Serial Nos. 253,309, 253,310 or 253,311 in which digesters such vomit pipes are used, the invention includes a manner of improving the blowing off or blowing over efficiency in transferring the liquid contents from one digester to another or from one digester to waste or to other desired destination using for that purpose the residual pressure in the digester to be blown off or over, which consists in closing off the vomit pipes and thus preventing release of steam or vapour pressure by way of said pipes from above the liquid surface of the contents of the digester when the valve at the bottom of the digester is opened thus ensuring that said steam or vapour pressure shall follow up and drive before it the liquor in the fibre being digested, whereby a much larger percentage of contained liquor may be discharged from the digester under the pressure contained therein than can be done with the vomit pipes open.

The invention also includes, in the digestion of vegetable matter for recovering cellulose therefrom in digesters fitted with internal vomit pipes, a manner of improving the circulation during loading or digestion which consists in closing the said vomit pipes periodically to cause the direction of circulation of the liquor and steam to reverse at each such closing so as to force said liquor up through the charge of fibre containing material every time the vomit pipes are closed instead of such liquor tending to flow as normally, when the vomit pipes are in use, in the opposite direction.

The invention also includes in digesters as above indicated an improved manner of blowing over from one digester to another of the digesting liquor, which consists in closing, preferably periodically or intermittently, the vomit pipes in the digester into which the liquor is being forced for the purpose of forcing the incoming liquor up through the fibre contents of the said digester each time the said vomit pipes are closed.

It further includes a process of digestion of vegetable matter to isolate or extract the fibre or cellulose therefrom according to any of the methods disclosed in U. S. A. patent Specifications Serial Nos. 253,309, 253,310 or 253,311 in which internal vomit pipes are used in the digesters and the efficiency is increased of the blowing, forcing or pumping over from or blowing, forcing or pumping liquor into a digester by periodically, intermittently or when desired closing off the vomit pipes for the purposes explained.

Finally, the invention includes apparatus for the digestion of vegetable matter to recover the cellulose therefrom, comprising one or more digesters with internal vomit pipes, characterized by having valves or other closing means whereby the said vomit pipes may be closed or opened when desired.

The invention will now be described with reference to the accompanying drawings, in which:—

Fig. 1 is a half elevation and half section of a Sinclair type of digester;

Fig. 2 is a cross section on line A A of Fig. 1;

Figs. 3 and 4 are a vertical section and a plan on line B B of a valve.

Fig. 5 is an elevation, showing a plurality of the digesters, arranged in series relation.

In these figures which are only for illustration purposes the digester 1 has two semi-circular vomit pipes 2, 2 leading from the space 4 below the grating 3 in the bottom of the digester to the space 10.

In each vomit pipe a valve or cut-off 5 is fitted which may be worked by the spindle 6.

This valve 5 works in a slot through the vomit pipe and may close the same or leave it unobstructed. The hand wheel 7 operates the spindle 6 which passes through a suitable gland 8 and has a bearing in the bracket 9.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A process of digestion of vegetable matter in which a container is employed in which the load is inserted and expelled from the top, together with internal vomit pipes extending substantially the entire length of the drum, and an opening for the digesting liquid in the bottom, comprising inserting the digesting liquid from the bottom and normally passing it through the vomit pipes to the top of the drum, and then showering the digesting liquid through the load, and cutting off the flow of liquid through the vomit pipes when discharging the liquid, whereby the internal pressure in the drum substantially rids the load of its content by discharge through the said opening.

2. A process of digestion of vegetable matter employing a drum into which the load is inserted and expelled from the top and having internal vomit pipes, comprising inserting the digesting liquid from the bottom of the drum and passing it upwardly through the vomit pipes to the top portion of the drum, and then showering the liquid through the load, and periodically reversing the flow of the liquid through the drum and vomit pipes, for ensuring intimate contact between the liquid and the load.

3. A process of digestion of vegetable matter employing a battery of digesters arranged in cascade, each digester comprising a drum

having internal vomit pipes and into which the load is inserted and expelled from the top, comprising normally passing the digesting liquid in each drum from the bottom thereof through the vomit pipes to the top portion of the drum, and then showering the liquid through the load, and cutting off the flow of liquid through the vomit pipe in one of the digesters when the liquid from another digester is being passed therein, whereby the liquid is forced directly through the load to ensure intimate contact between the liquid and the load.

In testimony whereof I hereto affix my signature, this 8th day of October, 1928.

EDMONDSON SPENCER.

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