Feb. 8, 1944. C. K. BOYER 2,340,925

STRAINER FOR PULP DIGESTERS

Filed May 25, 1940 2 Sheets-Sheet 1

Fig. 1.

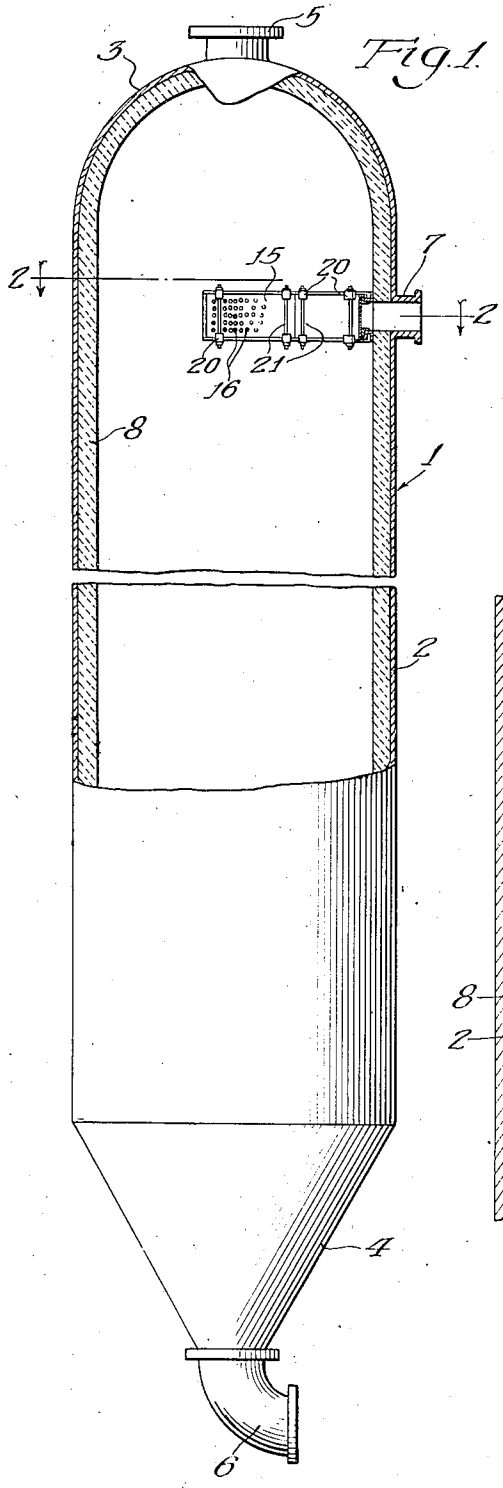


Fig. 2.

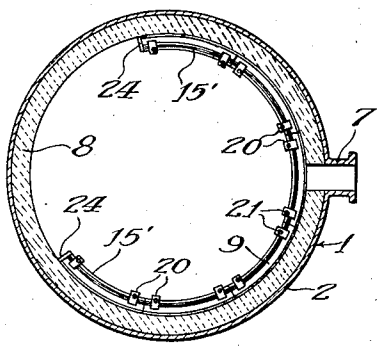
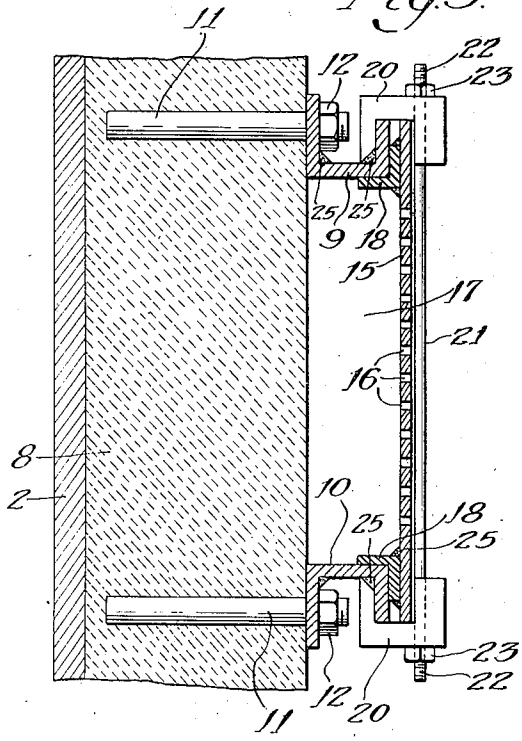


Fig. 3.



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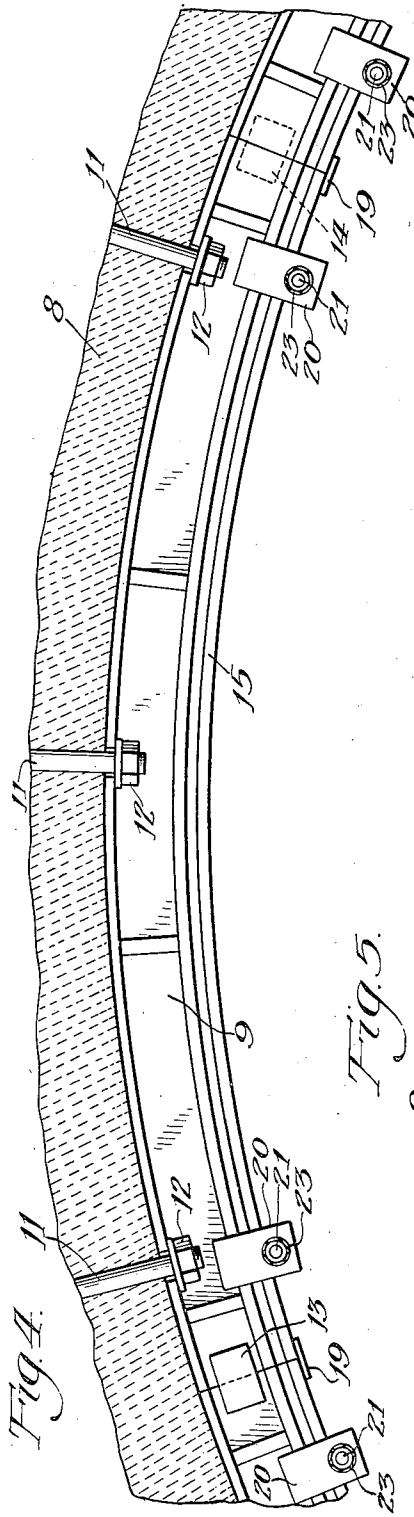


Fig. 4.

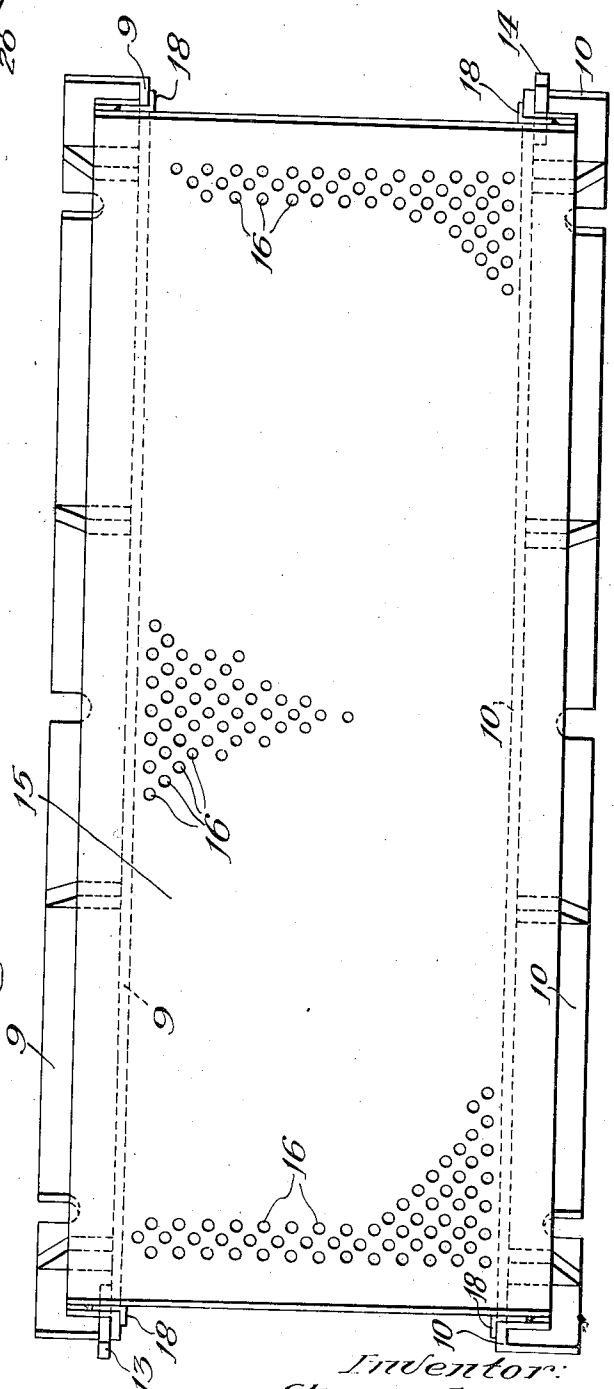


Fig. 5.

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Patented Feb. 8, 1944 2,340,925

UNITED STATES PATENT OFFICE

2,340,925

STRAINER FOR PULP DIGESTERS

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Application May 25, 1940, Serial No. 337,174

5 Claims. (Cl. 92—7)

This invention relates to improvements in chemical pulp digesters particularly adaptable for the manufacture of chemical pulp employed in the making of paper, and refers specifically to a strainer construction utilized in conjunction with a chemical pulp digester.

It is the usual practice in the cooking of chemical pulp to relieve or withdraw from the pulp digester a portion of the gases or liquors from the digester for recovery of said gases or liquors or for the purpose of re-heating the same outside the digester and returning them to the digester. Such practice requires the use of a device commonly known to the art as a strainer which permits the gases and liquors to flow from the digester, but strains out and retains in the digester the wood chips and pulp already formed. The usual strainer comprises supports, fastened to the inner surface of the digester at some convenient point, said supports being adapted to carry a perforated plate whereby a channel is formed between the plate and the wall of the digester through which gases and liquors from the digester may pass to the gas or liquor outlet.

Many different types of strainers have heretofore been used. However, due to the chemical reactions within the digester, heavy scale deposits frequently form on the strainer plates causing the perforations therein to be clogged. This necessitates frequent periodic cleaning. Also, due to the wide variations in temperature within the digester, the contraction and expansion of the common rigidly built and fastened strainers have caused costly damages to the same.

In my present invention, I employ a strainer construction that permits the use of convenient sized strainer plates which may be removed quickly and easily for efficient cleaning. Also, the construction is such that the various elements of the assembled strainer can move freely with respect to each other thus eliminating the difficulties resulting from temperature stresses and strains.

Other objects and advantages of my invention will be apparent from the accompanying drawings and following detailed description.

In the drawings, Fig. 1 is a vertical elevational view of a digester, parts being broken away and parts being shown in section.

Fig. 2 is a horizontal sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is an enlarged transverse sectional view illustrating a portion of my strainer construction.

Fig. 4 is an enlarged detailed horizontal section showing various details of my strainer construction.

Fig. 5 is a detailed elevational view of a portion of the strainer construction.

Referring in detail to the drawings, 1 indicates a chemical pulp digester which comprises a metal shell 2 which is usually dome-shaped at its upper portion as indicated at 3, and tapered conically at its lower portion as indicated at 4. A manhole 5 is provided adjacent the upper end of the digester whereby wood chips and liquors utilized for the pulping of the chips may be introduced. An outlet 6 is carried at the lower portion of the conical tapered end 4 for the removal of the pulp. An outlet 7 is provided in the lateral wall of the digester 1 whereby gases and liquor may be removed from the digester. The shell 2 of the digester is lined with an acid or corrosion resisting lining 8, preferably a refractory material.

In employing a digester such as digester 1, wood chips are introduced into the digester and a liquor, frequently a dilute acid is also introduced into the digester, the liquor being adapted to react with the chips to produce what is known to the art as chemical pulp. In most digester constructions the liquor is introduced into the digester and withdrawn therefrom as a continuous operation.

In view of the fact that the digester is usually filled to capacity, to withdraw the liquor contemplates that some means be provided for withdrawing the liquor and gases without removing the chips or pulp. Consequently, the outlet for said liquor and gases is provided with a strainer which prevents such removal. A strainer construction for this purpose comprises the specific concept of my invention.

In my strainer construction channel members 9 and 10 are mounted upon the inner wall 8 of the digester. The channel members 9 and 10 are spaced vertically from each other above and below, respectively, the center line of the outlet 7. The channel members, of course, are curved to conform with the curved surface of the inner wall of the digester. To secure the channel members 9 and 10 to the inner wall of the digester, bolts 11 may be embedded and firmly grouted in the body of the lining 8, or said bolts, if desired, may extend entirely through the lining 8 and shell 2 and may be secured externally by means of nuts. This latter construction is not illustrated but is believed to be clear to any one skilled in the art. The inner ends of the

bolts 11 are threaded to receive nuts 12 whereby the channel members 9 and 10 are securely mounted upon the inner wall of the digester.

In mounting the channel members 9 and 10 upon the digester wall, the same may be positioned thereon in sections. It is contemplated that the members 9 and 10 may extend entirely around the circumference of the digester or may traverse any desired portion of the circumference. Therefore, the channel members 9 and 10 will be formed as arcuate sections which are disposed end to end to traverse a desired portion of the circumference of the digester. At one end of each channel member 9 a plate 13 (Figs. 4 and 5) may be welded to the upper surface of the channel member, a portion of said plate extending beyond the end of the channel member whereby the same is adapted to slidingly overlap the end of an adjacent channel member. Similarly a plate 14 is carried adjacent one end of the channel member 10 and extends beyond the end thereof to overlap an adjacent channel member 10.

It can readily be seen that there is no rigid connection between the ends of adjacent channel members and that said channel members are free to expand or contract individually, excess contraction of the channel members leaving a large gap between adjacent channel members is compensated for by the provision of the plates 13 and 14 which tends to close the gap sufficiently to prevent the passage of chips or pulp between the ends of the channel members.

Plain, arcuate plates 15 are adapted to be mounted upon channel members 9 and 10, said plates being provided with relatively small apertures 16 which permit communication between the interior of the digester and annular space 17 provided between the inner wall of the digester and said plates. The outlet 7 communicates with this annular space to remove the liquors and gases which pass through the apertures 16 in the plates 15. Upon the inner faces of the plates 15 adjacent the upper and lower edges thereof, angle irons 18 are mounted, said angle irons being adapted to register with the channel members 9 and 10 in an internesting fashion as shown best in Fig. 3. A plurality of plates 15 are utilized, said plates being curved to conform with the curvature of the channel members 9 and 10.

Adjacent plates 15 abut at their transverse edges and adjacent one transverse edge of each plate, a lapping plate 19 is carried, said lapping plate being welded or otherwise secured to the plate 15. The lapping plate 19 extends beyond one transverse edge of each plate 15 and is adapted to slidingly overlap the transverse edge of an adjacent plate whereby excess contraction of adjacent plates resulting in a large gap between the transverse edges of said adjacent plates is compensated by the plate 19 covering said gap to the extent necessary to prevent removal of chips and pulp into the annular opening 17.

To mount the plates 15 upon the channel members 9 and 10, substantially U-shaped clamping elements 20 and 21 are hooked over or engage the outer edges of the channel members 9 and 10 and the upper and lower edges of the plate 15 respectively.

An opposite pair of clamping members 20 are secured together by a tie-rod 21 which is threaded as indicated at 22 at each of its ends for the reception of nuts 23, the arrangement being such that clamping members may be drawn into contact with the channel members 9 and 10, securely holding the plates 15 in position. As clearly shown in Figs. 1, 2 and 4, a plurality of pairs of clamping members may be employed, one pair of clamping members being disposed adjacent each end of a plate 15.

By employing this means of attachment or securement of plates 15 upon the channel members 9 and 10, it can readily be seen that said plates will be firmly held in position, but that longitudinal movement of said plates with respect to the channel members 9 and 10 will be permitted since there is no positive connection between the plates 15 and the channel members 9 and 10. In addition, plates 15 can be readily removed for cleaning or replacement.

If the annular space 17 is to be defined around the entire circumference of the vessel, then ordinary plates 15 may be employed. If, however, the space 17 is to traverse only a portion of the circumference of the vessel, special plates 15', Fig. 2, having inwardly extending ends 24, may be employed, the ends being adapted to close the opposite ends of the space 17. If desired, all of the plates defining the space 17 may be perforated as in the case of plates 15, or alternate plates may be provided with perforations interposed between imperforate plates. Both types of plates are contemplated in my invention.

The channel members 9 and 10 may be formed with integral web and flanges or the same may be formed by separate strips welded at the corners as indicated at 25 in Fig. 3. Similarly the angles 18 may be formed integral with the plates 15 and 15' or said angles may be welded to the inner faces of said plates. In view of the fact that the chemicals introduced into the vessel 1 normally have a corrosive effect upon metal, all of the metal parts contemplated in the construction of the strainer are of a non-corrosive type of metal.

I claim as my invention:

1. Chemical pulp digesting apparatus, comprising: a substantially cylindrical digester; a pair of supporting members positioned in vertically spaced relation upon the inner wall of said digester, said supporting members each carrying a flange along its inner edge, the flange of the upper supporting member extending upwardly and the flange of the lower supporting member extending downwardly; a perforated, plain, arcuate strainer plate bridging the space between said pair of spaced supporting members at their innermost flanged surfaces to provide a substantially concentric space between the inner wall of said digester and said plate; and clamping means frictionally holding said strainer plate in position relative to said flanges of said supporting members to thereby permit movement of said plate with respect to said supporting members, said digester being provided with an outlet opening communicating with said space, whereby fluid from said digester passing through the perforations in said plate may be discharged through said outlet opening.

2. Chemical pulp digesting apparatus, comprising: a substantially cylindrical digester; a pair of arcuate channel members secured in vertically spaced relation upon the inner wall of said digester with the backs of said channel members opposing each other; a perforated, plain, arcuate strainer plate bridging said channel members at their innermost flanged surfaces to provide a substantially concentric space between the inner wall of the digester and said plate; and clamping means frictionally holding said strainer plate in position relative to the inner flange of said channel members to thereby permit movement of said

plate with respect to said channel members, said digester being provided with an outlet opening communicating with said space, whereby fluid from said digester passing through the perforations in said plate may be discharged through said outlet opening.

3. Chemical pulp digesting apparatus, comprising: a substantially cylindrical digester; a pair of supporting members positioned in spaced relationship upon the inner wall of said digester; a perforated, plain, arcuate strainer plate bridging the space between said pair of spaced supporting members to provide a substantially concentric space between the inner wall of the digester and said plate which is substantially rectangular in cross-section; and means for holding said plate in position upon said supporting members including a pair of clamping elements engageable with said spaced supporting members and the opposite edges of said strainer plate and means for drawing said clamping elements toward each other to frictionally hold said plate upon said spaced supporting members while permitting relative sliding movement of said plate with respect to said spaced supporting members, said digester being provided with an outlet opening communicating with said space, whereby fluid from said digester passing through the perforations in said plate may be discharged through said outlet opening.

4. Chemical pulp digesting apparatus as defined in claim 3, in which the supporting members include an upright flange at their innermost portions, the flange of the upper supporting member extending upwardly and the flange of the lower member extending downwardly, and in which the clamping elements are substantially U-shaped and embrace the flanges of said supporting members and the adjacent edges of said strainer plate.

5. Chemical pulp digesting apparatus as defined in claim 3, in which the strainer plate is provided with means extending outwardly therefrom arranged to engage at least the lower one of said supporting members to support the weight of said plate, whereby to relieve the clamping means of the burden of supporting the weight of said plate.

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