May 17, 1949. J. A. ROSMAIT 2,470,267

PAPER PULP AGITATOR

Filed March 10, 1945 2 Sheets-Sheet 1

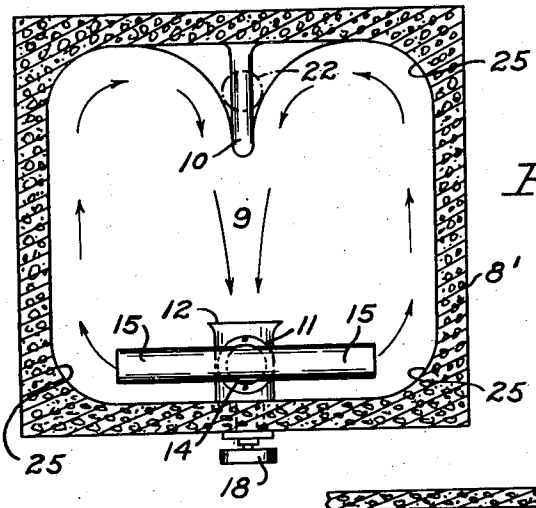


FIG. 3.

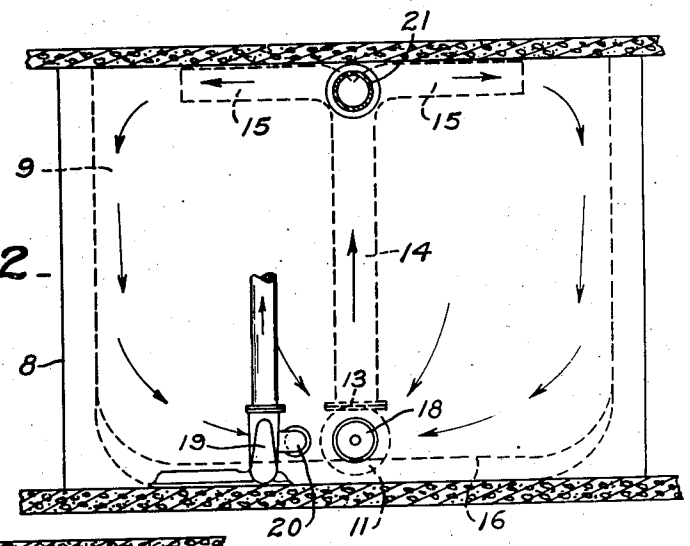


FIG. 2.

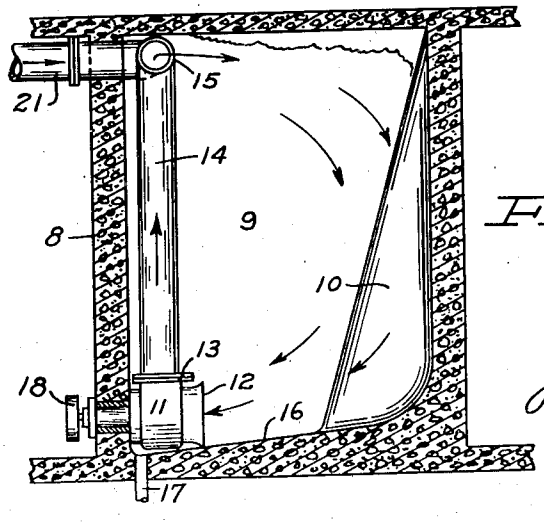


FIG. 1.

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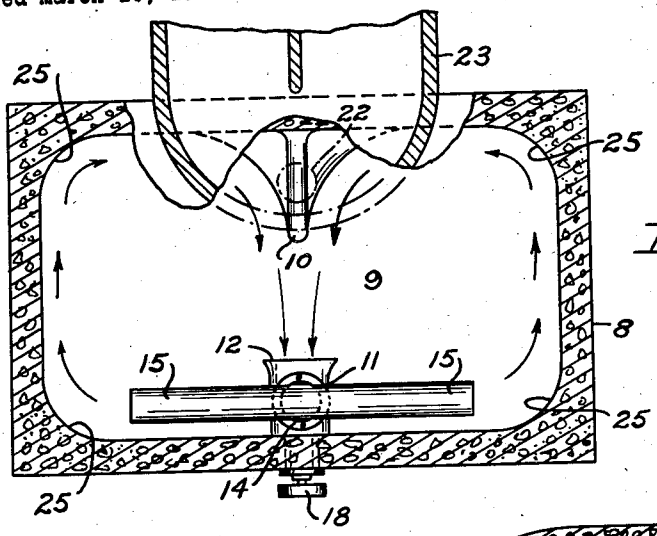


FIG. 4.

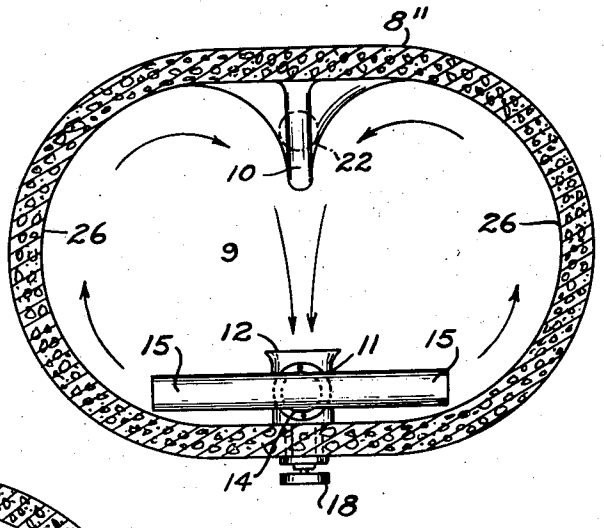


FIG. 5.

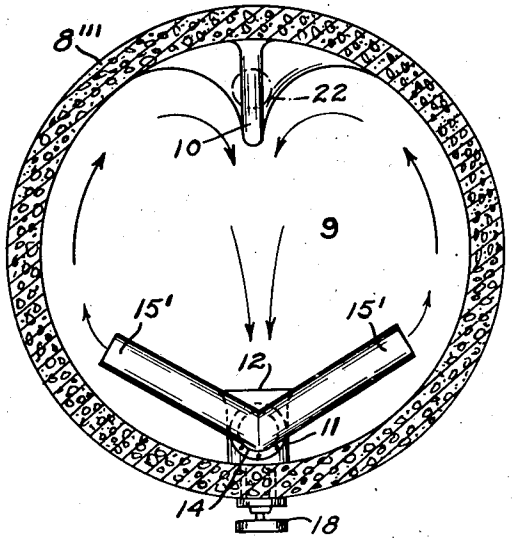


FIG. 6.

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UNITED STATES PATENT OFFICE

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PAPER PULP AGITATOR

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Application March 10, 1945, Serial No. 582,069

1 Claim. (Cl. 92—37)

1

The present invention relates generally to improvements in the art of paper making, and relates more particularly to improvements in the construction and operation of equipment for storing and agitating fibrous pulp stock preparatory to converting the same into paper.

Te primary object of my present invention is to provide an improved fibrous pulp storage and agitating system especially adapted for use in the production of paper, and which is simple in construction and highly efficient in operation.

It is customary in the paper making industry, to store considerable quantities of fibrous pulp stock comprising an abundance of water having the tiny pulp fibres suspended therein, in large vats or chests; and unless the minute fibres are constantly and thoroughly agitated while the pulp is thus stored, they will either sink or float thereby destroying the uniformity of the entire mixture. While various types of fibrous pulp storage and agitating methods and apparatus have heretofore been proposed and used commercially, all of these prior systems have proven objectionable either because they did not operate to maintain proper uniformity in the pulp mixture, or because they were relatively complicated and therefore difficult to manipulate and to maintain clean and free from undesirable fibre accumulation, or because they necessarily had to function as batch systems and could not be maintained in continuous operation. In the more successful of these prior pulp agitators, the pump for maintaining desired circulation of the mixture, was disposed outside of the storage space and special flow directing elements were obstructively mounted within the circulating chamber, thus complicating the agitating equipment and making it relatively costly to install and difficult to maintain in clean condition.

It is therefore a more specific object of my invention to provide an improved paper pulp storing and agitation assemblage which obviates all of the above-mentioned difficulties and objections, and which is simplified by virtue of the fact that the circulating pump is confined directly within the pulp storage space wherein obstructive flow circulating structure is also reduced to an absolute minimum.

Another specific object of this invention is to provide a pulp confining and agitating chest

2

capable of being built in diverse shapes and sizes, and wherein undesirable deposition and accumulation of fibres is eliminated while most effective agitation is produced, by proper formation of the chest walls and surfaces which bound the storage space.

Still another specific object of the present invention is to provide a pulp stock storage and agitating vat to which fresh stock may be constantly admitted and from which thoroughly agitated and uniformly treated stock may likewise be withdrawn, in an efficient and convenient manner.

A further specific object of the invention is to provide improved pulp mixture agitating equipment which may be readily installed at moderate cost, and which is operable with minimum power consumption to produce pulp stock of extreme uniformity and of proper consistency.

An additional specific object of my invention is to provide an improved custom built pulp stock treating system, which may be readily constructed to meet any requirements, and which will occupy minimum space considering the actual capacity thereof.

These and other specific objects and advantages of my present invention will be apparent from the following detailed description.

A clear conception of several typical embodiments of the invention, and of the mode of operating paper pulp stock agitating systems built in accordance with the improvement, may be had by referring to the drawings accompanying and forming a part of this specification, wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a vertical section taken transversely through a typical pulp storage and agitating chest embodying my present invention, and having a preferred type of fresh pulp stock inlet and a transverse horizontal cross-section of any desired formation;

Fig. 2 is an elevation looking toward the front wall of a rectangular storage and agitating chest of the type shown in Fig. 1, also having a fresh stock inlet of the same type but additionally illustrating a typical pulp stock discharge pump;

Fig. 3 is a horizontal section taken transversely through the upper end of a square storage and agitating chest built according to the invention,

and showing in dot-and-dash lines a modified location of the fresh pulp stock inlet;

Fig. 4 is also a horizontal section taken transversely through the upper end of a rectangular chest such as shown in Figs. 1 and 2, and also illustrating the modified arrangement of the fresh pulp inlet;

Fig. 5 is another horizontal section taken transversely through the upper end of an oval vat or chest having a vertical section and an elevation such as shown in Figs. 1 and 2, but with the stock inlet the same as in Figs. 3 and 4; and

Fig. 6 is still another horizontal section taken transversely through the upper end of a circular vat having the modified location of fresh pulp stock inlet.

While the invention has been disclosed herein as being especially advantageously applicable to storage and agitating tanks, vats, or chests of definite shapes and adapted primarily for use in handling paper stock pulp, it is not my desire or intent to thereby unnecessarily restrict the scope or the utility of the novel features for analogous purposes.

Referring to the drawings, my present improved paper pulp stock storing and agitating equipment, comprises in general a normally enclosed receptacle or chest 8 forming a pulp confining and circulating chamber 9 which is preferably disposed symmetrical with respect to a central vertical plane and is provided with a rear wedge 10 located centrally of this plane; a low head liquid circulating pump 11 confined directly within the lowermost central front portion of the chamber 9 and having a flaring approximately horizontal inlet 12 directed toward the wedge 10, and an upwardly directed outlet 13; and an upright circulating pipe 14 disposed concentric with the central plane of the chest and having its lower end in open communication with the pump outlet 13, while its upper extremity is provided with laterally directed pulp delivery branches 15 extending away from said central plane near the top of the chamber 9.

The chests 8 may be constructed of re-enforced concrete, masonry, or other suitable material, and of any desired height and transverse cross-sectional area, in order to provide the desired capacity, and the interiors of these chests 8 should be devoid of sharp fibre collecting corners and should preferably be provided with a smooth and hard surface or lining such as glazed tile, wherever the surfaces are contacted by the fluent stock. While the central rear flow directing wedge 10 which is formed integral with the chest 8, may be of uniform or of any other desired horizontal cross-section throughout its length, this wedge is preferably of gradually increasing cross-sectional area approaching the bottom thereof, as shown in the drawings, in order to provide a stable base for the massive structure and to make the wedge self-supporting, and to also permit free and unobstructed circulation of the fluent pulp near the top of the chamber 9. The bottom 16 of each chest 8 is also preferably inclined downwardly and forwardly away from the wedge 10, so as to permit disposition of the pump 11 in the lowermost portion of the chamber 9, and a suitable drain 17 may be provided at this lowermost chest portion, see Fig. 1.

The pulp stock circulating pump 11 which is confined directly within the stock confining chamber 9 and is firmly bolted to the front wall of the chest, may be of any suitable axial inlet radial

discharge type capable of producing the required circulation, and may be driven at any desired speed from the exterior of the chest 8 by means of power applied through a pulley 18 or the like. The upright stock circulating pipe 14 and its delivery branches 15 are preferably formed of circular transverse cross-section in order to facilitate construction thereof; and while the treated fibrous pulp stock may be either intermittently or continuously withdrawn from the chamber 9 by means of a centrifugal pump 19 or the like, having its inlet 20 in communication with the lower portion of the agitating zone, the fresh pulp stock may be delivered to the upper portion of the chamber 9 at various localities. As illustrated in Figs. 1 and 2, the fresh pulp is admissible to the chamber 9 either intermittently or continuously, through a supply pipe 21 which communicates with the upper extremity of the circulating pipe 14 midway between the branches 15. As depicted in Figs. 3 to 6 inclusive, the fresh stock may be introduced into the agitating chamber in a modified manner, through a supply pipe 22 disposed in axial alinement with and above the upper extremity of the wedge 10, and the stock inlet pipe 22 may communicate with the washer or heater 23 as shown in Fig. 4.

It has previously been indicated, that the horizontal cross-sectional area of the chest 8 may assume various forms, and while Fig. 1 is a typical vertical section through a chest embodying the invention, different typical cross-sections which may be applied to these chests are shown in Figs. 3 to 6 inclusive. In the embodiment of Fig. 3, the horizontal cross-sectional area of the agitating chamber 9 of the chest 8' is square, except for the smoothly rounded corner portions 25 thereof; while in Figs. 2 and 4, the transverse cross-sectional area of the stock confining chamber 9 of the chest 8 is rectangular with similarly rounded corner portions 25. In the embodiment of Fig. 5, the horizontal cross-sectional area of the storage chamber 9 of the chest 8'' is oval with smoothly rounded opposite side walls 26; whereas in Fig. 6 the transverse cross-sectional area of the circulating chamber 9 of the chest 8''' is round or circular, and the circulating pipe branches 15' have been directed at an angle relative to each other to conform with this rounding. However, in each of the several modifications, the wedge 10, circulating pump 11, and pipe 14 are disposed in a common central plane, and all corner portions of the chamber bounding walls and bottom are smoothly rounded so as to eliminate sharp corners and flow obstructing and local whirl producing niches. All other portions of the various modified assemblages, are the same as previously described, and the functioning of the several units is precisely the same.

In view of the similarity in operation of the various pulp stock storage and agitating units, it will suffice to describe the normal operation of but one of them. During such normal operation, the stock circulating and agitating pump 11 will be operated with the aid of the pulley 18, and the chamber 9 should be maintained filled to approximately the level indicated in Fig. 1 by admitting fresh pulp through the inlet pipe 21, 22, and by withdrawing properly treated pulp stock through the outlet 20 with the aid of the discharge pump 19. This supply and discharge of material may be carried on either continuously or at suitable intervals, and while the pulp is confined within the chamber 9, it is constantly circulated by the pump 11 disposed directly with-

in this chamber, as clearly indicated by the arrows in the various views. The fluent pulp stock drawn into the pump inlet 12 is delivered by the pump upwardly through the riser pipe 14 and after being segregated into two equal streams, it is delivered from the branches 15 against the curved corner portions of the side walls of the chest 8. The two branch streams are thereafter caused to flow rearwardly and to circulate freely in the upper unobstructed portion of the chamber 9, and eventually engage the smoothly curved surfaces of the wedge 10, whereupon they are directed forwardly and intermingle at the central lower portion of the chamber 9, being ultimately again returned to the pump 11 for further circulation. During this constant circulation of the pulp stock, the pulp fibres are continuously agitated and maintained in uniform suspension and distribution throughout the masses of liquid, so that the stock which is finally delivered from the chest by the pump 19 is always assured of uniform consistency.

From the foregoing detailed description it will be apparent that my present invention provides an improved pulp stock storage and agitating unit which besides being extremely simple and compact in construction, is highly efficient in normal use and is adapted to most effectively treat the confined pulp. The location of the circulating pump directly within the treating chamber 9 is of considerable importance since it not only simplifies the entire assemblage, but also provides for most efficient continued circulation of the fibrous material without permitting undesirable floating or settling of the fibres. The provision of the central wedge 10 and the location of this wedge in central alinement with the pump inlet, also enhances the agitating effect and insures most efficient treatment of all portions of the liquid; and the tapered formation of this wedge 10 and the inclined disposition of the chamber bottom 16, causes the liquid in all portions of the chamber 9 to be constantly agitated and thoroughly mixes the small fibres with all portions of the confined liquid. The improved units may be custom built to meet various requirements, with either square, rectangular, oval, or circular transverse cross-sections, and by gradually rounding all corner portions of the interior of the chamber 9, undesirable accumulation of fibres is positively eliminated. The installations can be readily built at minimum cost, and by admitting the fresh fibre stock through an inlet pipe 21 communicating with the upper extremity of the circulating pipe 14 midway between the branches 15, rapid treatment of the fresh material is assured and the newly admitted fibres are quickly and uniformly mixed with the liquid material previously admitted to the chest 8. By forming the circulating pipe 14 and the branches 15 thereof of circular cross-section, construction of the equipment is further facilitated; and while the improved storage and agitating device is especially applicable for the treatment of fibrous paper stock pulp, it may also be advantageously applied for other purposes.

It should be understood that it is not desired to limit this invention to the exact details of construction or to the precise mode of use and operation, herein shown and described, for various modifications within the scope of the appended claims may occur to persons skilled in the art.

I claim:

A paper pulp agitator, comprising, a chest forming a centrally unobstructed pulp storage chamber bounded by a flat front upright surface and a rear surface having an upright chamber bounding wedge projecting centrally and forwardly therefrom toward the chamber center and toward the mid-portion of the front surface, said wedge having concavely curved chamber bounding surfaces merging along smoothly curved opposite side surfaces with said front surface and being of gradually increasing wedge-shaped transverse cross-section approaching the bottom of the chamber, and said chamber bottom being inclined downwardly and forwardly away from the largest lower wedge end and cooperating with the wedge bounding surfaces to provide a continuous smooth upwardly and rearwardly inclined liquid guiding surface extending from the lowest front portion of the chamber to the uppermost rear portion thereof, and a circulating pump located within said chamber near the lowest mid-portion of said front surface and having an unobstructed inlet in open communication with the chamber center and directed centrally away from the lower wedge extremity and also having an outlet directed upwardly along and laterally toward the opposite side surfaces of said chamber at said uppermost chamber portion.

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