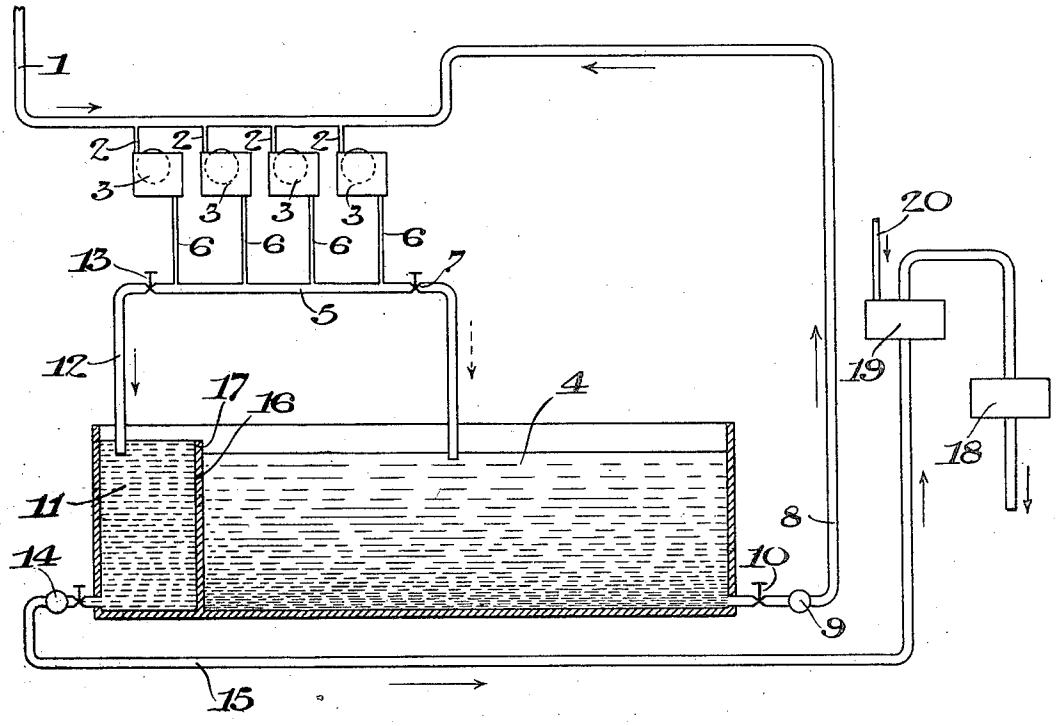
Oct. 30, 1923. 1,472,238

G. P. BERKEY

PROCESS OF TREATING PAPER PULP STOCK TO INSURE UNIFORM CONSISTENCY

Filed May 8, 1922



WITNESSES

M. E. Downey

C. L. Haal

INVENTOR

George P. Berkey

By R. S. C. Caldwell

ATTORNEY

Patented Oct. 30, 1923.

1,472,238

UNITED STATES PATENT OFFICE.

GEORGE PHELPS BERKEY, OF WISCONSIN RAPIDS, WISCONSIN.

PROCESS OF TREATING PAPER PULP STOCK TO INSURE UNIFORM CONSISTENCY.

Application filed May 8, 1922. Serial No. 559,294.

To all whom it may concern:

Be it known that I, GEORGE P. BERKEY, a citizen of the United States, and resident of Wisconsin Rapids, in the county of Wood and State of Wisconsin, have invented new and useful Improvements in Processes of Treating Paper Pulp Stock to Insure Uniform Consistency, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

The invention relates to paper-making and more particularly to a process for treating the paper pulp stock to insure a uniform consistency thereof when the same is sent to the various machines and apparatus which form it into paper.

With the so-called continuous process of preparing pulp stock for the paper-making machines in which the ground wood stock or sulphite pulp stock going from grinders or digesters is passed through deckers or thickeners and then to a large storage tank from which the stock is drawn to mixing apparatus and finally to the paper machines, it was found that owing to the settling action of the pulp in the large storage tanks that a regulator was necessary for keeping the consistency of the stock within certain limits after it was withdrawn from the tank. Such regulators are known in the art as consistency regulators and can take 3% stock or thicker and thin it down very satisfactorily and uniformly by adding water, but a large part of the stock in the storage tank is very thin stock, too thin for use even though all of the water at the consistency regulator be shut off, but the consistency regulator cannot thicken stock which is too thin and as such stock is invariably present in the so-called continuous process where the pulp is drawn from a large storage tank, the present methods do not insure pulp stock of uniform consistency when the same is drawn from stock chests or tanks containing stock of varying consistency. The object of this invention is a process for insuring not only the proper functioning of the consistency regulator, but also to obviate the use of consistency regulators where it is not necessary to maintain the consistency of the pulp within narrow limits.

With the above and other objects in view the invention consists in the process and the steps of the process hereinafter described and all equivalents.

Ground wood or sulphite pulp stock coming from the grinders or digesters must be highly diluted, approximately 300 parts of water to one of stock in order to be effectively screened. The drawing shows a conduit 1 conducting the thin stock from the grinders or digesters to branch pipes 2 leading to deckers or thickeners 3 which remove the large amount of water used for screening so as to make the pulp of thicker consistency so that it is suitable for use in subsequent pulp or paper-mill apparatus, or for the purpose of storage. These deckers or thickeners 3 take this thin stock from the pipe 1 and discharge it as "slush" pulp containing 30 parts of water to one of stock.

Where the continuous process is used this slush pulp is discharged into a large storage tank 4 from a pipe 5 connected to the deckers by branch pipes 6 and having a control valve 7 located in the line. When the large storage tank or tanks 4 are filled their capacity is so great that in conjunction with additional stock which is constantly being prepared it may take several days to empty them. What is usually done is to use the storage tank or tanks for storage of the Sunday production of pulp, on which day the other departments of the mill are closed down. During the week the pulp is gradually drawn out of the storage tank or tanks 4 for use in the mill at the same time that other pulp is being made and supplied to the tanks, but as the rate of use of pulp from the tank during the week is generally greater than is supplied during the week-days the tank will be emptied and again ready for full charging at the end of the week. Holding slush pulp stock in storage for even a few hours means that a settling action takes place and that the consistency of the stock in storage will vary at different depths throughout the tank. For instance, such stock may vary from thick 4% stock at the bottom of the tank to water at the top. Consequently, as the stock is drawn off from the storage tank for use it will vary widely in consistency and such variation is the cause or source of trouble and expense in those processes to which the pulp is later

subjected which require pulp stock of uniform consistency for finished economical production.

To acquire uniform consistency and prevent settling various forms of mechanical agitators have been tried in the storage tanks, but the size of these tanks is so great that such mechanical agitators have proved impractical and excessive in cost. The most widely adopted method in attempting to obtain uniform consistency is the use of various types of consistency regulators, the constructional features of which are well known to those skilled in this art. Such regulators all operate on the principle of adjusting the apparatus for a certain consistency of stock, and as the stock from the storage tank becomes thinner or thicker a device is actuated which shuts off or turns on a flow of water into the stock. Such regulators obviously depend upon a supply of stock which is thicker than is wanted for use in the subsequent handling of the stock. Pulp stock is usually used at the consistency of 2½ or 3% and consistency regulators can take 3% or thicker and thin it down very satisfactorily and uniformly by adding water, but a large part of the stock in the storage tank is very thin, too thin for use even though all the thinning water at the consistency regulator be shut off, so that the consistency regulator has not been found satisfactory because it cannot thicken stock which is too thin.

In order to insure stock of uniform thickness or consistency either with or without a consistency regulator, where such stock is obtained from large storage tanks in which, due to settling, it is of varying consistency, I provide for redeckering the stock taken from the storage tank since such redeckered stock will be of substantially uniform consistency as it leaves the deckers. This redeckering may be done in separate deckers, but conditions of mill operations are such that the number of deckers or thickeners used in filling the storage tank or tanks 4 is generally greater than the number used when the stock is being drawn from storage. The result is that sufficient deckers or thickeners are standing idle when stock is being drawn from storage so that the redeckering mentioned above may be carried out in the idle deckers. As indicated in the drawing, the slush pulp from the tank 4 is conducted through a pipe 8 to the deckers 3 in any suitable manner, as by means of a pump 9, and a control valve 10 is provided in the pipe 8 whereby the pulp from the large storage tank is pumped back over the deckers or thickeners and redeckered or thickened prior to its passage to the other machines which make it into the finished product. As is usual with the deckers, provision is made for adding water before redeckering so that the thick stock will work to better advantage in the deckers, but this water supply does not have to be regulated as the greater dilution of the thicker stock will not influence the uniform discharge of thick stock from the deckers so that the stock will be of uniform consistency regardless of a wide variation in the consistency of the stock going to the deckers and consequently the uniform consistency of the stock passing from the deckers after redeckering is assured and such stock as used in many products of the mill may be subjected to subsequent operations without the use of a consistency regulator.

In order that the flow of the redeckered slush pulp may be uniform, I provide a small tank 11 into which the redeckered pulp may be discharged from the deckers 3 through a branch 12 of the pipe 5, a control valve 13 being located in this branch pipe. The stock is drawn off from the small tank 11 by a pump 14 through a pipe 15 at such a rate as to prevent a settling of the stock, in other words this tank 11 is provided to contain stock of uniform consistency. This condition is accomplished by making the smaller tank of such a size as to properly handle the volume of stock which will be pumped through it without giving the stock time to settle. As shown in the drawing, this tank may be formed in the main tank by providing a partition 16 adjacent the main tank with the top 17 of its wall located slightly above the level of the pulp stored in the tank 4 so that it may overflow into the larger tank. Since the consistency of the pulp in the small tank 11 can always be maintained within certain limits, the pulp from such tank may be pumped through the pipe 15 directly to other apparatus, such as continuous mixing system apparatus 18, from which the pulp is taken to various other machines or apparatus where it goes to make up the finished product. Where, however, it is desired to maintain the consistency of the slush pulp within relatively narrow limits a consistency regulator 19 of any suitable type is located in the pipe line 15, a pipe 20 being used to supply the thinning water to the consistency regulator, the general operation of which has been previously explained. Since the auxiliary tank 11 prevents pulp being delivered to the consistency regulator of a consistency which is too thin for said regulator to handle, it is obvious that the consistency regulator when used with the redeckering, as above described, will properly perform its function of adding water to the stock coming into it if it is necessary, that is, if the stock is too thick, but it does not have to deal with the stock which is too thin because of the relatively uniform consistency of the stock introduced into the tank 11 from the deckers, which

consistency is preserved because the stock does not have a chance to settle while in the tank 11. This tank 11 is placed in the system so as to insure enough slush pulp of the proper consistency being available when it is needed for immediate use in the mill.

What I claim as my invention is:

1. The method of withdrawing in a substantially uniform consistency the deckered slush pulp from large storage tanks in which it has settled so as to be of varying consistency, which consists in drawing the variable pulp from the tank as needed, adding water thereto and redeckering to a uniform consistency.

2. The method of withdrawing in a substantially uniform consistency the deckered slush pulp from large storage tanks, in which it has settled so as to be of varying consistency, which consists in drawing the variable pulp from the tank as needed, adding water thereto, and redeckering to a uniform consistency and a thickness suitable for a consistency regulator.

3. In paper-making where a plurality of deckers are used to furnish slush pulp to storage tanks for subsequent use, the method of withdrawing in a substantially uniform consistency the deckered slush pulp from the storage tanks in which it has settled so as to be of varying consistency, which consists in drawing such pulp from storage as needed, adding water thereto and redeckering to a uniform consistency in deckers then not in use for replenishing the supply of stored slush pulp.

In testimony whereof, I affix my signature.

GEORGE PHELPS BERKEY.