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PAPER STOCK HANDLING MEANS

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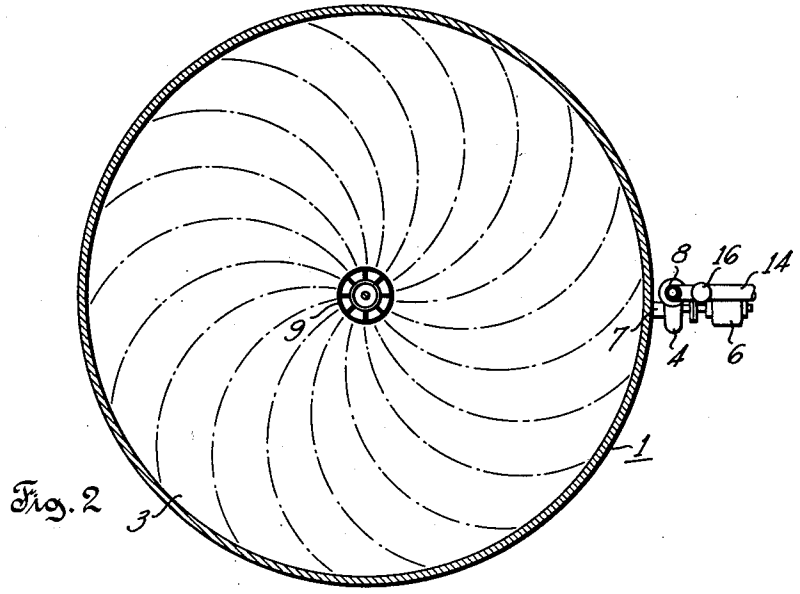


Fig. 2

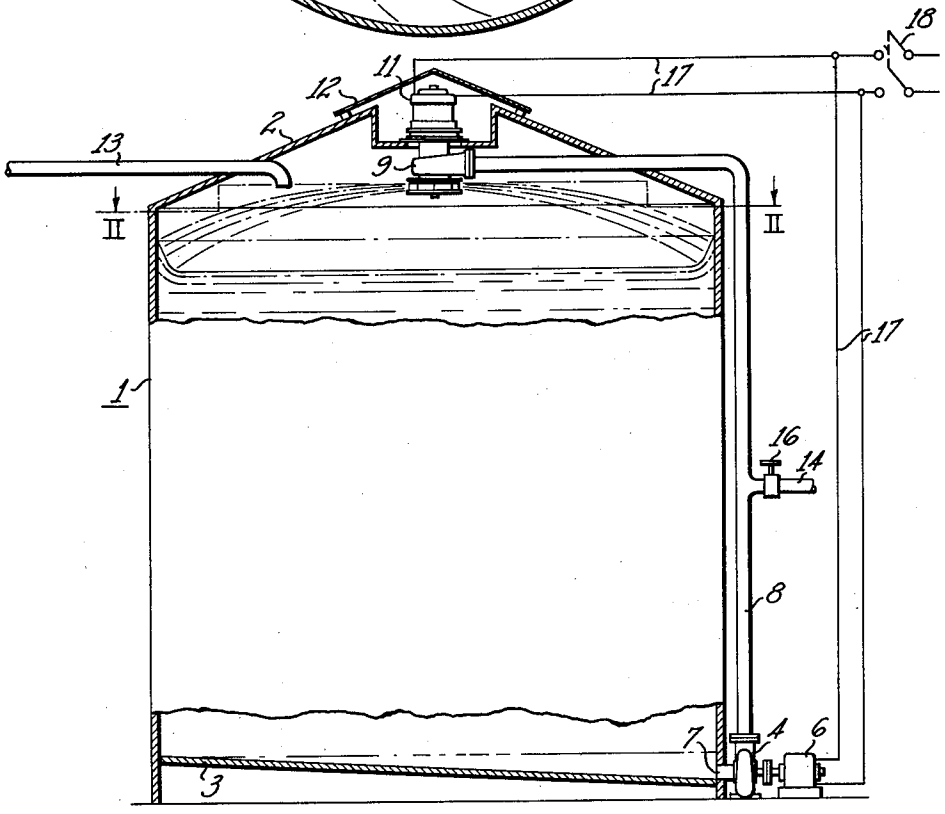


Fig. 1

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PAPER STOCK HANDLING MEANS

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1 Claim. (Cl. 92—7)

This invention relates generally to the storage and handling of paper stock and the like, and is more particularly concerned with moving a confined mass of stored stock in an improved manner designed to maintain the stock in a uniform state of fluidity, and to eliminate the formation of flow paths therethrough upon withdrawal of stock from the stored mass.

In the past, the withdrawal of stock from a storage tank or the like has presented serious difficulties due to the formation of flow paths through the confined mass which usually result in some stock remaining in the tank above the normal fluid level of the confined mass. This is highly objectionable in that the stock thus remaining becomes stagnant, that is, oxidizes and decays, and upon becoming mixed with subsequent charges produces an inferior grade of stock. Such stock yields a paper which has discolored specks in it and which is of relatively little value.

Heretofore numerous attempts have been made to obviate the above mentioned difficulties experienced in handling stock. One such attempt involves placing an agitating device in the storage tank beneath the level of the stored stock. This, of course, involves a considerable expenditure and poses the problem of actuating the agitating device located within the mass of stored stock from a source of energy without the storage tank. This situation necessitates the use of some sort of sealing arrangement, and of course, the normal difficulties are experienced as with all liquid sealing devices. An additional problem of evenly agitating the entire mass of stored stock is also present, and its solution requires the provision of extensive apparatus representing a sizeable investment.

Another attempt contemplates a circulation of stock by first withdrawing it from a storage tank and then reintroducing it thereto through a system of pipes or ducts in such a manner that stock enters the tank through a plurality of outlets in about the same horizontal plane. This allegedly maintains a desired stock consistency throughout the stored mass, but it does not induce a constant and uniform flow of stock toward the point of discharge. This is so because there is no provision made for preventing adherence of stock to the internal periphery of the side walls of the storage tank. It is readily obvious that a simple circulation of stock affords only a partial solution to the problem heretofore experienced.

The present invention contemplates a continual deposition of stock upon and adjacent the upper internal peripheral tank wall structure, thereby creating a tendency for an ever increasing head of stock to form and assuring a continual flow of stock down the side wall of the tank. Further assistance to this wall flow action is afforded by the centrifugal throwing of stock against the tank wall with force so that liquid is squeezed from the stock onto the tank wall, thereby lubricating the wall and materially lessening resistance to stock flow therealong.

Accordingly, it is an object of this invention to provide a simple and inexpensive means for handling a stored

mass of paper stock by maintaining a uniform consistency and insuring an even and uniform flow thereof during random stock withdrawals therefrom.

Another object of this invention is to provide an improved paper stock handling apparatus which, in addition to the aforementioned advantages, possesses the further advantage of having a refining action on the stock handled effective to break up undesirable agglomerated bundles thereof.

Another object of this invention is to prevent the freezing of paper stock to the walls of a tank in which it is stored during periods of subfreezing weather to which the tank is exposed.

Other objects and advantages will appear from the following description of an embodiment of the invention, reference being had to the accompanying drawing, in which:

Fig. 1 is a side elevation of a cylindrical paper stock storage tank incorporating the invention with a portion broken away to better illustrate the coaction and function of the parts; and

Fig. 2 is a cross section of the same stock storage tank taken on the line II—II.

Referring to Fig. 1 of the drawing it will be apparent that the invention is applied to an upstanding cylindrical paper stock storage tank 1, having a vertically disposed peripheral side wall structure and a conical top portion 2. The bottom 3 of tank 1 comprises an inclined plate for directing stock to one side of the tank.

A centrifugal paper stock pump or first impelling means 4, driven by an electric motor 6, is disposed adjacent a lower portion of tank 1, and paper stock is fed therefrom to the eye of pump 4 through a pipe line 7. Stock passes through pump 4 and into a discharge pipe or conduit means 8 leading up to the top of the tank and opening into the eye of a second centrifugal pump or second impelling means 9 which is operatively mounted in the upper central portion of the tank 1. Pump 9 is driven by an electric motor 11, and is provided with an open impeller to serve as a rotary stock slinging element which throws paper stock radially of the tank 1, and toward the sides thereof. The top of tank 1 has a conical roof portion 12 which effectively covers the electric motor 11 drivingly connected with pump 9 and prevents dirt and debris from collecting around the motor 11. A fresh supply of paper stock is intermittently introduced to the tank 1 by any suitable means such as a feed pipe 13 shown at the upper portion of tank 1 in Fig. 1.

Pipe line 8 is provided intermediate its two opposite ends with a bleed off pipe or a selectively controllable stock withdrawal branch 14 which is equipped with a valve 16 for controlling the withdrawal of paper stock through pipe 14 as desired for use in succeeding paper making operations. Stock which is not drawn off through pipe 14 recirculates through the storage tank 1 as long as the operation of pump 4 is continued. In this connection, it should be noted that the two electric motors 6 and 11 are connected by wires 17 to a common switch 18 which communicates with any appropriate external source of electric power not shown. It is readily apparent that such an electrical circuit, when closed by the switch 18, simultaneously connects both of the electric motors 6 and 11 with the source of electric power not shown, and thereby initiates simultaneous operation of the motors. It should likewise be apparent that an opening of switch 18 results in a simultaneous interruption of electric current flowing to both of the electric motors 6 and 11, and a consequent simultaneous stoppage of both motors. Switch 18 may be considered as a means for selectively effecting simultaneous operation of the pumps 4 and 9.

Pipe line 7, pump 4, motor 6, pipe line 8, pump 9 and

motor **11** may be considered as a means for withdrawing stock from a lower portion of the tank **1** and reintroducing at least a portion of the withdrawn stock into an upper portion of the tank **1**.

In using the aforedescribed apparatus, the two pumps **4** and **9** are simultaneously started into operation by closing the switch **18** before it is desired to withdraw any stock from the storage tank **1**. It is generally considered best to allow the stock to recirculate through tank **1**, pipe **7**, pump **6**, pipe **8** and pump **9** for a short period before withdrawing any stock through pipe **14**. This is done so that a proper distribution of uniformly consistent stock in tank **1** is effected. During operation of both pumps, the stock which is thrown against the wall of tank **1** under centrifugal force by pump **9** flows down along this wall and is prevented from clinging thereto and becoming stagnant by the ever present mass of stock which is continually being deposited up at the top of the tank and along the walls thereof by the action of pump **9**. Wall flow action is also materially aided by the lubrication which the tank wall receives from liquid which is squeezed from the stock onto the upper portion of the inner peripheral tank wall as a result of the stock being thrown against that wall portion under centrifugal force. This wall flow characteristic of the present invention prevents channeling of the stock in flow paths through the center of the tank. In addition, the agitation which the stock receives by passing through the whirling impeller of pump **9**, and by being thrown against the wall of tank **1** with considerable force, has a refining or bundle breaking effect on the pulp which is very desirable.

Another important feature of the present invention is that it tends to prevent stock from freezing to the walls of a storage tank during periods when the tank is exposed to subfreezing temperatures, for example, during the winter months. This is so because warmer stock is continuously being introduced along the cold walls of the tank by the action of the pump **9**, which thereby tends to maintain a constant stock temperature throughout the tank.

It will be apparent to those skilled in the art that the present invention contemplates a method of operating a stock handling apparatus including an upstanding stock storage tank presenting a vertically disposed peripheral side wall structure and including means for withdrawing stock from a lower portion of the tank and reintroducing at least a portion of the withdrawn stock into an upper portion of the tank, which method includes filling the tank with paper stock to a level below that at which reintroduction occurs, reintroducing withdrawn stock into a central portion of the tank, and uniformly distributing the reintroduced stock radially outward from the central portion of the tank to form an umbrella of falling stock substantially completely coextensive with the interior cross sectional configuration of the upper portion of the tank. Although the stream of reintroduced stock will generally take the shape of an umbrella, it is obvious that substantially all of it will land on or adjacent to the internal peripheral side wall structure of the tank **1**.

It will be obvious to those skilled in the art that the method aforedescribed can be practised with apparatus other than that hereinbefore disclosed, for example, a man can be stationed at the top of the stock tank with a fire hose through which stock from a lower portion of the tank is pumped. The man can distribute stock around the upper portion of the tank as desired by manually changing the direction in which the fire hose nozzle points. Another possible method is to have a fire hose mounted on a mechanical contraption which moves around with the hose nozzle and which is ultimately controlled manually. However, it should likewise be obvious that the present invention proposes an apparatus which has the advantage of being simple and economical to construct, operate and maintain, and with which the aforedescribed method can be practiced with a minimum of effort and expense, which represents a substantial advance in the art.

The accompanying disclosure illustrates but one practical construction embodying the present invention. Accordingly it is to be understood that this disclosure is not intended to limit the invention to the exact details of construction, combination, and/or operation herein set forth for purposes of illustration as various modifications falling within the scope of the appended claim may occur to persons skilled in the art.

It is claimed and desired to secure by Letters Patent:

A method for agitating paper stock formed from a mixture of pulp and liquid in a tank having vertically extending side walls, said method comprising the steps of filling said tank with paper stock to a preselected level, withdrawing stock from the lower portion of said tank, reintroducing a part of said withdrawn stock into said tank above said level, imparting kinetic energy to said part of said stock concomitant with said reintroduction to said tank, depositing said part of said stock having kinetic energy on said side walls above said preselected level to create a head of stock contiguous to said side walls, and utilizing said kinetic energy for pressing said stock against said side walls to squeeze liquid therefrom for lubricating said walls and lessening stock flow resistance thereof whereby adherence of stock to said side walls is prevented.

References Cited in the file of this patent

UNITED STATES PATENTS

1,291,877	Herrbold	Jan. 21, 1919
1,405,946	Shartle	Feb. 7, 1922
1,415,902	Shartle	May 16, 1922
1,432,774	Miller	Oct. 24, 1922
1,455,594	Miller	May 15, 1923
2,270,847	Hyman	Jan. 27, 1942