Dec. 8, 1953 E. J. GRUEN 2,661,668

PULP STORAGE TANK CURRENT CONTROL

Filed March 18, 1950 2 Sheets-Sheet 1

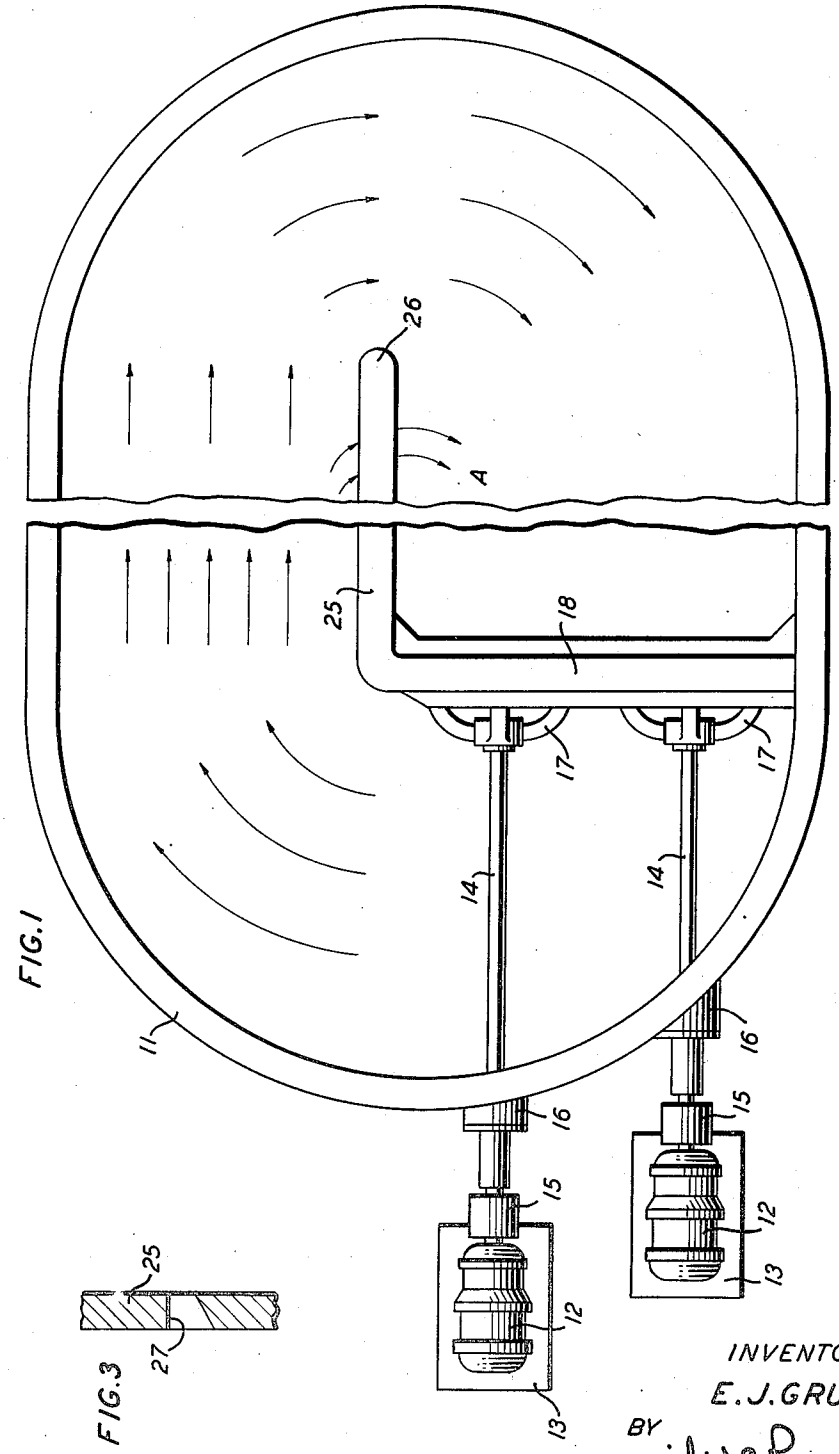


FIG. 1

FIG. 3

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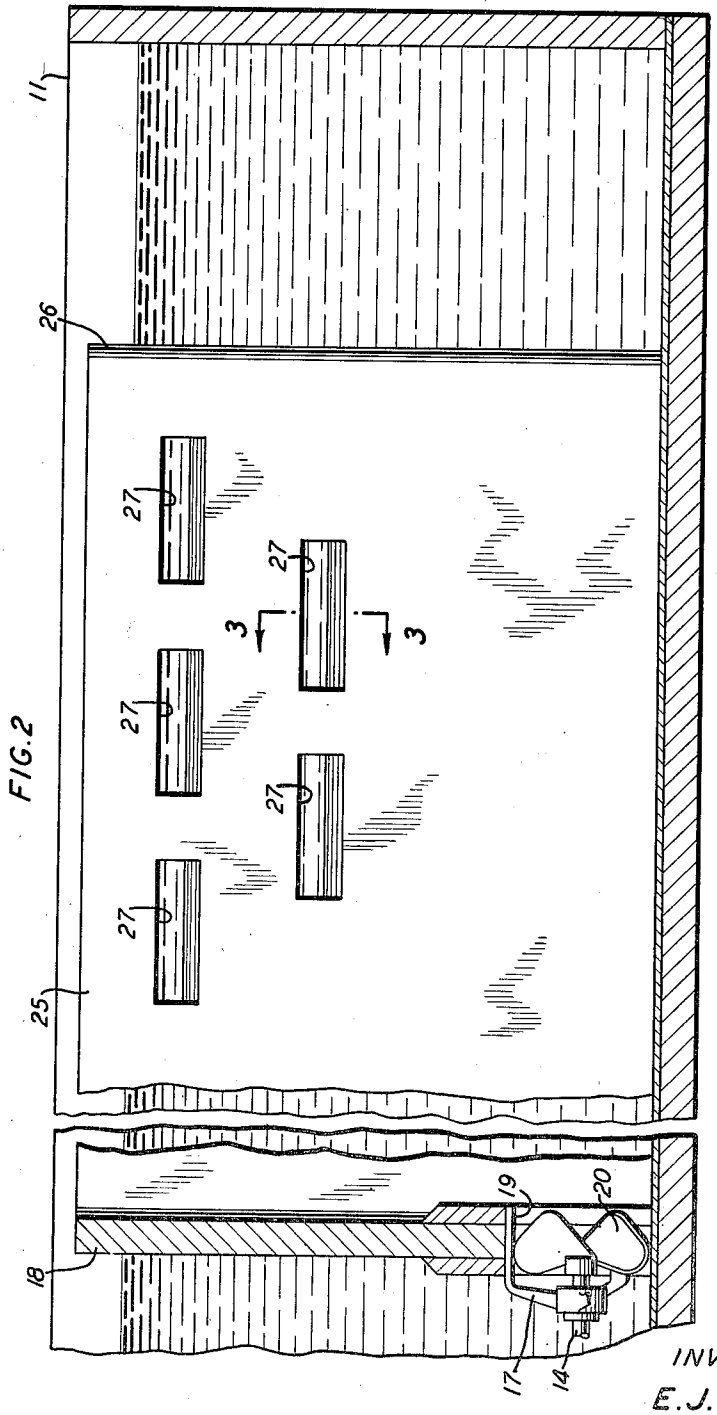


FIG. 2

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PULP STORAGE TANK CURRENT CONTROL

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2 Claims. (Cl. 92—37)

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This invention relates to the manufacture of paper pulp and particularly to preventing pulp from settling out of suspension in storage tanks.

Paper pulp as generally used in the paper making industry and also in the insulation of electrical conductors is usually procured in sheet form, the sheets being fed through apparatus for breaking the pulp into small particles. After the pulp particles have been reduced to the proper size, they are immersed in a water conveyor, and the pulp suspension passed through beating machines, which impart work to the fibers and increase the slowness of the pulp to give to it desired physical properties such as tensile strength.

From the beating machines, the pulp suspension is pumped into a tank, which stores the suspension until the wire insulating machines are ready for the pulp. In passing from the storage tanks to the insulating machines, the pulp slurry is passed through Jordan machines which exert a cutting action on the pulp fibers, after which sufficient water is added to the slurry to bring the consistency of the suspension to the final desired value.

While the pulp is in suspension in the storage tank, it is necessary to keep the slurry in a state of agitation to prevent the pulp from settling out of the suspension and to prevent lumping of the pulp which remains in suspension. Either of these results would cause uneven distribution and consistency of the pulp as it enters the insulating machines, and this variation would make for unsatisfactory insulation. One conventional way of accomplishing this agitation has been to provide one or more propeller mixers to impart velocity to the pulp suspension in conjunction with a centrally located plate or midfeather which serves to increase the velocity thus created.

It has been found that while this method has been generally satisfactory, there has been a tendency for dead pockets of pulp slurry to form on the backside of the midfeather because of the velocity of the slurry as it passes around the end of the midfeather. These dead pockets are undesirable as they allow part of the pulp in the storage tank to either settle out or form lumps which cause poor insulation to be formed on the wires. Attempts to eliminate these dead pockets by running the agitating mixers at slower speeds have not proved to be an adequate solution as the resultant lower velocity of the slurry increases the tendency of the pulp to settle out from the suspension as a whole.

It is therefore an object of this invention to eliminate the dead pockets which are formed

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when this conventional method of agitating pulp slurry in the storage tank is used.

Applicant accomplishes this object according to the invention by providing the midfeather with a plurality of openings which allow sufficient slurry to pass through the plate to prevent the formation of these pockets.

Other objects and features will be apparent from the following detailed description taken in conjunction with the attached drawings in which:

Fig. 1 is a plan view of the storage tank, including the agitator pump drives;

Fig. 2 is a side elevational view of the tank, partly in section, showing the location of the openings in the central plate;

Fig. 3 is a sectional view of one of the openings in the central plate, taken along the line 3—3 of Fig. 2.

With reference to the drawings, the tank used for the storage of the pulp suspension is designated as 11. In installations where the paper insulation of electrical conductors takes place on an extensive scale, tanks of this type often become quite large in size, having dimensions of the order of 36′ long by 18′ wide by 8′ high. The tank 11 has means (not shown) for pumping the pulp slurry into the tank after it leaves the beating machines, and also for pumping the suspension from the tank to the Jordan machines in preparation for being fed into the insulating machines.

Mixer motors 12 are used to provide agitation for the pulp suspension in the storage tank. These motors are mounted on bases 13 and have propeller shafts 14 driven from suitable gear reduction boxes 15. These shafts 14 are supported by housings 16 at the points where they enter the end wall of the storage tank 11 and are supported at their propeller ends by brackets 17 mounted on a supporting wall 18 projecting within the interior of the tank from the main tank wall as shown in Fig. 1. The supporting wall 18 has two openings 19 which allow the pulp slurry to pass through the wall as it is drawn by propellers 20 mounted on the ends of shafts 14.

As the pulp slurry is forced through the openings 19, it continues on around the oblong shaped tank, as shown by the arrows, passing in its travel up one side and down the other of a vertical plate or midfeather 25. This midfeather, which is approximately as high as the tank, extends from the interior end of the supporting wall 18 to a point only a few feet from the opposite end wall of the tank. As will be seen from Fig. 1,

the midfeather is slightly offset from the longitudinal axis of the tank so that the channel on one side is narrower than on the other. This causes an increase in velocity and head of the slurry flow in the narrower channel, and results in a difference in the solution level in the two sides.

When the pulp slurry is kept moving by the propeller mixers at a rate fast enough to prevent settling of the pulp from its water conveyor, the velocity of the slurry around the end 26 of the midfeather often creates undesirable dead pockets in the suspension in the vicinity marked A.

Applicant has discovered that by creating openings 27 in the midfeather adjacent to this area, the difference in liquid level on the two sides will cause a certain amount of slurry to pass through these openings in the direction shown instead of going around the end 26 of the midfeather, the slurry thus passing through being sufficient in quantity and having a velocity great enough to prevent the formation of these dead pockets. Uniform distribution and consistency of the pulp when it is pumped to the wire insulating machines is thus assured.

It has been found that when the pulp suspension in the tank has reached a sufficiently low depth, the mixers 12 would have sufficient power with respect to the volume of slurry in the tank to move the slurry at a velocity high enough to create a back-eddy current in the area where the dead pockets normally occur. The cost of agitating equipment large enough to create preventive back-eddy currents of this type when the storage tank is full would be prohibitive, and good economic practice dictates the use of mixers which would have power sufficient to create such eddy currents when the pulp suspension is from one-third to one-half full tank level. The openings 27, which have been formed in the midfeather, are therefore located in the upper half of the midfeather so as to prevent the formation of dead pockets from a full level of pulp slurry down to a level at which the mixers are sufficiently strong to prevent their formation.

The openings 27 are approximately 6'' high by 18'' long for large storage tanks of a size as previously noted. As seen in Fig. 3, the bottom of these openings are sloped downwardly approximately 15° from the high pressure side to the low pressure side so that the pulp will flow off after the liquid level has gone below the opening. The spacing of these openings as shown in Fig. 2 has proved satisfactory in actual practice, this arrangement comprising three openings in an upper level and two alternately spaced openings in a lower level.

The openings 27 should be made small enough in size with respect to the size of the storage tank to prevent their acting as a by-pass of the normal slurry flow, and thereby creating possible dead pockets at the end of the storage tank adjacent the end 26 of the midfeather.

The use of these openings as herein proposed has resulted in a low cost solution to an old problem in the large scale paper insulation of electrical conductors, and has assured the supply of uniformly dispersed pulp suspension to the insulating machines.

Although the invention has been described with particular reference to paper pulp as used for insulating purposes, it is of course not limited thereto but is of general application wherever there exists the problem of preventing a substance from settling out of solution while in storage.

It is to be understood that the above described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. A horizontally oblong storage tank for pulp slurry having a midfeather wall extending longitudinally of the tank and terminating short of the ends thereof means disposed within and adjacent the bottom of the tank near one end of the wall for causing the slurry to circulate in a circuitous path around the near and far ends of the wall at a rate sufficient to maintain the pulp in dispersed suspension when the level of the slurry in the tank is at an intermediate level, said means being insufficient to prevent the formation of dead pockets adjacent the far end when the slurry is at high levels in the tank, said wall having a plurality of spaced apertures disposed in a group in its upper portion adjacent its far end to prevent the formation of dead pockets when the slurry is at high levels in the tank.

2. A tank according to the preceding claim in which the midfeather wall is of substantial thickness and the apertures are located on at least two levels and have sills sloping downwardly in the direction of slurry flow to prevent the pulp from lodging on the sills.

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