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APPARATUS FOR STEEPING CELLULOSE

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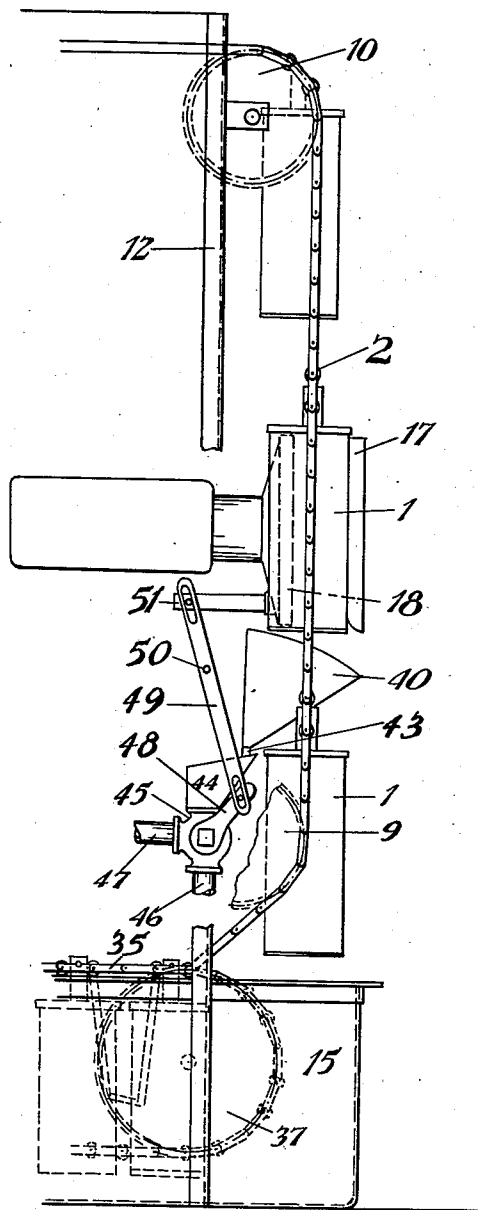


Fig. 1

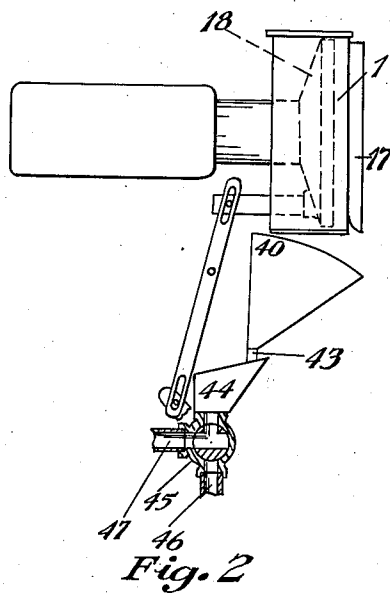


Fig. 2

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APPARATUS FOR STEEPING CELLULOSE

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1 Claim. (Cl. 23—260)

This invention relates to apparatus for treating cellulose or like materials in caustic solution or other liquid, as described in my copending United States Patent, No. 2,174,241, issued September 26, 1939; and has for its object the provision of novel apparatus for collecting the treating solution pressed from the treated material, separating the first pressed dirty solution from the cleaner solution subsequently extracted from the material, directing it to waste and directing the cleaner solution back to the treating vat or tank for reuse.

The invention by which this object is attained utilizes in a novel manner certain properties of cellulose or like fibrous or finely divided material when pressed in a mass. Before pressing a batch of cellulose the dirt originally in the cellulose which renders the solution unfit for further use is distributed throughout the mass, while any dirt present in the bath will be additionally deposited in the marginal surfaces of the mass as the solution penetrates toward its center. When pressure is first applied the dirt suspended in the fluid around the margins of the mass of material is carried out with the liquid, which is thereby soiled. As further pressure is applied liquid is forced out from the central portion of the mass and is filtered through a substantial depth of fibrous material. Thus when this liquid reaches the surface of the mass it is substantially cleaner than that first extracted and is usable for further treatment of additional cellulose.

The invention, which takes advantage of this characteristic of the treated material, consists of the provision of a two-way valve and duct system between the funnel or pan which collects the extracted liquid, the treating vat and a waste tank or sewer. One duct leads from the valve to the vat, the other leads to waste; and the valve is operatively connected to or otherwise actuated synchronously with the drive or control mechanism of the pressure means so that during the first part of the pressing operation the liquid expressed is directed to waste, then during the remainder of the pressing operation the remainder of the liquid is returned to the treating vat for further use.

One embodiment of the invention is illustrated diagrammatically in the accompanying drawing in which like numerals designate like parts throughout the same. Reference may be had also to Figs. 1, 2, and 7 of the drawing of my copending patent referred to above, in which corresponding elements are similarly numbered

and which show such elements in their relation to a complete treating apparatus.

Referring to the drawing,

Fig. 1 is a diagrammatic side elevation of one end of a continuous treating apparatus, showing the invention in its relation thereto. A hydraulic ram and the synchronously actuated valve are shown in their positions in which expressed liquid is sent to waste during the first part of an extracting operation; and

Fig. 2 is a part sectional view of the apparatus of Fig. 1, showing the ram and the valve at the end of an extracting operation, with the expressed liquid being returned to the treating vat.

Figs. 1 and 2 show containers 1 carrying sheets of felted cellulose pivotally suspended at intervals from a pair of conveyor chains 2. The conveyor chains 2 pass around a series of sprockets in a circuitous path (shown fully in the parent application), including sprockets 9 and 10 shown in Fig. 1. Conveyor chains 2 are driven as described in said copending application or by other suitable means, with an intermittent step-by-step motion. The containers 1 travel from a loading station to a treating vat 15, through which they are carried in close order upon a second conveyor 35 traveling around sprockets, as shown at 37. During its passage through treating vat 15, the cellulose in the containers is treated for the requisite length of time, after which the containers are lifted from vat 15 by chains 2, as shown in Fig. 1. As they travel upwardly each container comes to rest between the anvil 17 and pallet 18 of a press of suitable construction, shown diagrammatically here and in my original application as hydraulically actuated. The press, 17, 18 is coupled to the drive mechanism of conveyor 2 so that it is put into operation each time the conveyor comes to rest. The excess treating solution is pressed from the cellulose and disposed of by the novel apparatus of the invention, as described below.

The operation of conveyor 2 and the synchronously governed press 17, 18 follows the following cycle:

As each container reaches the press the conveyor 2 stops and the pallet 18 travels to the right, pressing the contents of the container against the anvil 17. At the conclusion of its stroke the pallet 18 moves back out of engagement with the container and the conveyor 2 moves another pitch distance, bringing the next container into position for pressing.

Beneath the press a drip pan or funnel 40 is

positioned to receive and drain away the excess solution pressed from the cellulose in containers 1. In the apparatus shown, the funnel 40 is pivoted to permit it to swing free of containers 5, 1 on the conveyor as they pass. This feature, however, forms no part of the present invention, which is applicable also to a batch pressing plant in which the masses of cellulose are placed in the press manually or by means other than a 10 conveyor. The outlet 43 of funnel 40 is positioned at all times over a stationary funnel 44, which in turn drains into a two-way valve 45. Valve 45 has two alternative outlets, 46 and 47. Outlet 46 leads to waste and outlet 47 is connected by a duct, not shown, to return liquid to 15 vat 15. Through it the so-called "yellow" caustic solution which is pressed from the cellulose and is still usable for treating purposes is returned to the vat. Outlet 46 is connected to a waste tank where the "black" caustic solution is 20 collected, or a sewer.

The valve 45 is operatively coupled by suitable known means to some part of the conveyor mechanism or directly to the press itself. In the embodiment illustrated the valve is provided with 25 a lever arm 48 connected by a lever 49 pivoted at 50 to some part of the frame (not shown). The upper end of lever 49 is pivotally secured to a rod 51 fixed to the pallet 18 of the press.

30 During each pressing operation the pallet 18 moves to the right into the position shown in Fig. 1, and through the connecting links 48-51 the valve 45 is positioned to direct fluid to waste outlet 46. As the press moves further to the 35 right toward the position shown in Fig. 2 the valve is rotated into the position shown in Fig. 2, so that it directs fluid through outlet 47 back to the vat 15. The point at which the valve is turned from one position to the other is determined by observation of the stage in the pressing 40 operation at which the fluid extracted becomes sufficiently clean for reuse. The timing of valve 45 may be adjusted during the consumption of a vat full of fluid by suitable means not shown, so that as the fluid becomes dirtier 45 through continuous use the proportion returned to the vat is reduced, that is, the valve will turn later in the pressing stroke.

By thus automatically discarding the solution first pressed from the cellulose and returning the cleaner solution subsequently extracted to vat 15, a considerable saving in solution is effected. Only enough fresh caustic solution need be added 5 to the vat to replace the dirty solution discharged through outlet 46. The improved apparatus thus automatically skims off the spent solution.

Various changes and modifications in individual elements of the apparatus described may be made without departing from the invention and the scope of the claim. Also, certain novel elements may be used by themselves or with other 10 apparatus. For example, the two-way valve assembly, operatively associated with the press, may be employed profitably in the earlier used apparatus above referred to for extracting caustic solution from individual batches of cellulose. It is 15 also applicable to other filter presses for the removal of solvents or other liquids from treated materials, wherein the first liquid pressed from the outside of a mass of material is more dirt-laden than that later extracted from the inside 20 of the mass and filtered through the outer portions.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

In combination with a bath for treating batches of fibrous or other porous material and pressure 30 means for extracting from said material excess solution in which it has been treated, a funnel for receiving the solution so extracted, a two-way valve connected to receive liquid from said funnel, conduits connected to said valve and arranged to direct said solution alternatively to 35 waste or back to the treating bath for re-use, and means operatively connecting the actuating mechanism of said extracting means and said two-way valve arranged to actuate said valve in 40 timed relation to the operation of said extracting means, so that the fluid first extracted from each batch of material is directed to the waste conduit and the cleaner fluid last extracted is directed to the return conduit leading to the treating bath. 45

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