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APPARATUS FOR TREATING FIBER MASSES

Filed June 10, 1963

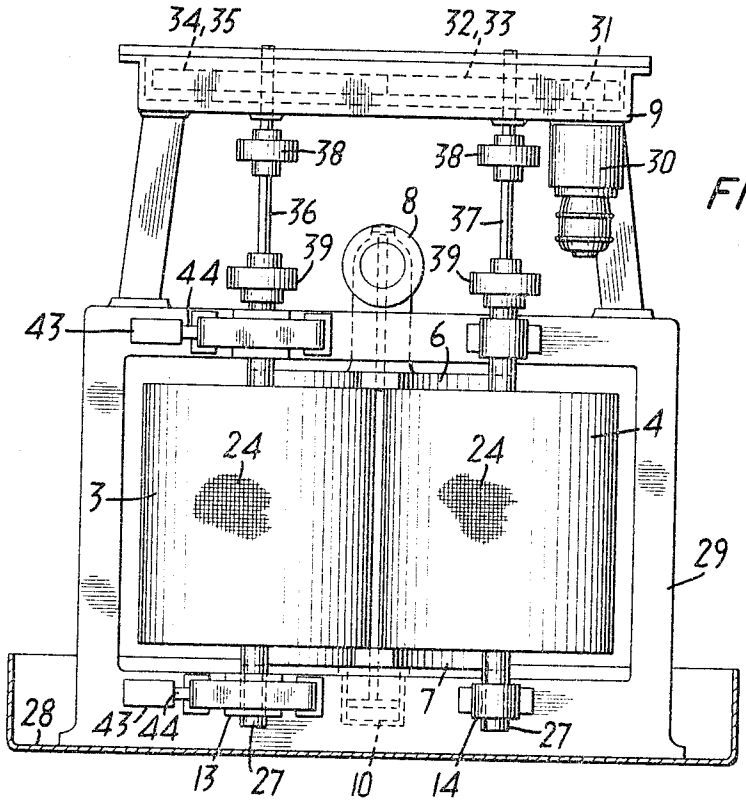


FIG. 2

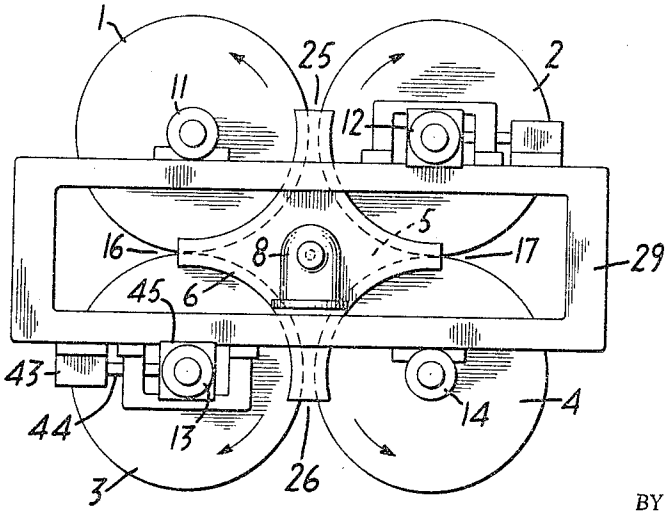


FIG. 1

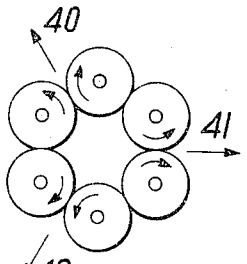


FIG. 3

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APPARATUS FOR TREATING FIBER MASSES

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5 Claims. (Cl. 100—121)

This invention relates to a device for pressing out liquid from a celluose fiber suspension and this application is a continuation-in-part of my co-pending application Serial No. 814,050, filed May 18, 1959, now abandoned, for "Drum Press or Machine for Pressing Liquid From Cellulose and Other Fiber Masses."

Devices which are used in pressing out liquids from cellulose and other fiber masses have certain drawbacks. Thus, rotating filters are used in connection with thin and easy-flowing suspensions. Such filters, however, can not easily be built sufficiently strong that they can withstand the high loads which may be used to obtain the desired pressing-out. For this reason, screw presses are used after the filters, and the last part of the pressing-out under high pressure then takes place in such machines. By means of screw presses it is possible to obtain the desired content of dried substance, but in some cases the mechanical treatment of the fiber mass fed to the screw presses may be detrimental to the fibers.

It is an object of this invention to provide a device for treating fiber masses which avoids such drawbacks and disadvantages of prior constructions.

In the construction according to the present invention it is possible to treat relatively easy-flowing masses as well as thick masses, and such masses will be subjected to a very lenient treatment, and mechanical treatment can be avoided, because the fibers are not put into motion relatively to the straining plates, but follow the same during the pressing operation.

The construction of the present invention consists of four or six operating straining drums, the six drums being advantageously utilized in larger presses, with a perforated peripheral surface, suitably in the form of netting. Thus, the drums define cylindrical surfaces consisting of straining netting. The drums are arranged in a battery in such manner that the middle of the battery defines a space or chamber into which the fiber mass or stock may be passed. The side surfaces of this chamber are formed by portions of the cylindrical surfaces of the respective drums, and the end surfaces consist of two stationary plates which are tightened against the drums and their nettings.

The mass is fed to said space under pressure through one of the two tightening plates. This arrangement results in the provision of two pressing places diametrically opposing each other. The mass which is deposited upon the straining nettings or screens is passed continuously out through the pressing places. Two of the drums may be journaled stationarily and two drums can be journaled yieldingly. The last-mentioned ones are then pressed against the stationarily journaled ones by means of hydraulic press cylinders.

The hydraulic press system is formed in such manner that the bearing pressure is varied automatically according to the mass pressure in the central space and the shaft of the movable drum tends to adjust itself in parallel relationship with the shaft of the stationarily-journaled drum. The driving device may be formed in such manner that the driving shafts of the several drums are driven by gear wheels with approximately the same pitch circle diameter as the diameter of the drums, and the gear wheel for one drum is in engagement with the gear wheels for the two side drums.

In the drawing,

FIG. 1 is a plan view of a preferred embodiment of the invention;

FIG. 2 is a corresponding side elevation; and

FIG. 3 shows diagrammatically, in plan view, an embodiment with six rolls.

Drum **1** rotates counter-clockwise on vertical shafts journalled in stationary bearings **11**. Drum **2** rotates clockwise on vertical shafts journalled in sidewise adjustable bearings **12**. Drum **3** rotates clockwise on shafts journalled in sidewise adjustable bearings **13**, and drum **4** rotates counterclockwise on shafts journalled in stationary bearings **14**. The side-wise adjustable bearings **12** and **13** make it possible to regulate the pressure between adjacent drums between which the pulp mat issues so that there can be provided a predetermined dryness in the mat.

An example of an adjustable arrangement is illustrated in FIGS. 1 and 2 by hydraulic cylinder **43**, piston rod **44** and slidable bearing **45**.

Between the four drums there is a chamber designated **5** in FIG. 1. This chamber is closed on its upper side by a tightening or sealing plate **6** and on its lower side by a similar plate **7**. The weight of the drums may be taken up by a hydraulic cylinder **10**, the piston rod of which exercises an upward pressure on the plate **7**.

The drums are each provided on their periphery with a filtering netting or screen as indicated at **24** in FIG. 2. The mass to be dewatered is pumped into chamber **5** through pipe **8** arranged on the tightening plate **6**, and during the rotation of the drums water is squeezed out from the mass, and a mat passes out at **25** between drums **1** and **2** and also at **26** between drums **3** and **4**. The mass is supplied at adjustable pressures as desired by means of a pump or like known means (not shown).

The water squeezed out passes through the nettings **24** into the interior of all of the drums and may, as shown in dotted lines **27** in FIG. 2, be removed through a bore in each of the lower trunnions. This water is collected in a vat **28**, upon the bottom of which rests a drum-carrying frame **29**, which in turn carries the drum-driving device **9**. The driving motor **30** drives a pinion **31** in gear with one of four intermeshing cog wheels **32**, **33** and **34**, **35** for shafts **36** coupled to the drums **1** and **3**, and shafts **37** coupled to the drums **2** and **4**. In each of the shafts **36**, **37** are interposed movable couplings **38** and **39**.

According to the preferred embodiment (FIGS. 1, 2) with four drums, the drum axes are arranged at the corners of a regular quadrangle. According to FIG. 3, there are six drums arranged at the corners of a hexagon, wherein mats pass out at three places **40**, **41**, **42** disposed at an angular distance of 120° from each other. Instead of having the plates **6**, **7** tightened against the drums, they may be arranged at a small distance from the end faces of the drums, e.g. about 1 mm.

A substantial portion of the frictional resistance between the end faces of the drums and the tightening plates is thereby avoided, and the thick mass which is passed into the central space, then itself represents the necessary tightening material.

Further embodiments may be employed wherein, for instance, all four cylinders are movably journalled, or all four cylinders may be arranged with stationary journals. In the last-mentioned case, the cylinders must be mounted with a suitable slit opening at the places **25**, **26** where the pressed mass passes out, and simultaneously the degree of pressing may be regulated by varying the number of revolutions of the drums, for instance by varying the velocity of the motor **30**.

The necessary parallelism of drums **1**, **2** and of drums **3**, **4**, respectively, may be obtained by any known means, e.g. by hydraulically acting upon the members **43**, **44**,

45, for drum 3 and similarly upon the corresponding members for drum 2.

I claim:

1. Separation apparatus for separation of fibrous material from a liquid with which the fibrous material is mixed without subjecting the fibers of said material to a grinding or crushing action regardless of the density of said fibrous material in a mixture thereof with said liquid comprising, a plurality of vertically disposed cylindrical drums having straining walls, said drums being relatively disposed with the walls thereof defining a chamber substantially enclosed circumferentially by said straining walls, means closing opposite lower and upper ends of said chamber, means to deliver a mixture of said fibrous material and said liquid into said chamber for separation of said fibrous material from said liquid, means for selectively rotating said drums in selected directions with next adjacent drums rotating in opposite directions, means for removing from the interior of said drums liquid removed from the mixture of liquid and fibrous material in said chamber, and at least two of said drums being disposed defining a longitudinally extending space in communication with said chamber for delivery of fibrous material from said chamber as a mat of fibers automatically during rotation of said drums.

2. Separation apparatus for separation of fibrous material from a liquid with which the fibrous material is mixed without subjecting the fibers of said material to a grinding or crushing action regardless of the density of said fibrous material in a mixture thereof with said liquid comprising, a plurality of vertically disposed cylindrical drums having strained walls, said drums being relatively disposed with the walls thereof defining a chamber substantially enclosed circumferentially by said straining walls, means closing opposite lower and upper ends of said chamber, means to deliver a mixture of said fibrous material and said liquid under pressure into said chamber for separation of said fibrous material from said liquid, means for selectively rotating said drums in selected directions with next adjacent drums rotating in opposite directions, means for removing from the interior of said drums liquid removed from the mixture of liquid and fibrous material in said chamber, at least two of said drums being disposed defining a longitudinally extending space in communication with said chamber for delivery of fibrous material from said chamber as a mat of fibers automatically during rotation of said drums, and means for variably spacing the longitudinal axes of said drums thereby to vary the width of said space and for variably regulating the pressure applied to said fibrous material in said chamber to variably determine the dryness of said mat.

3. Separation apparatus for separation of fibrous material from a liquid with which the fibrous material is mixed without subjecting the fibers of said material to a grinding or crushing action regardless of the density of said fibrous material in a mixture thereof with said liquid comprising, a plurality of vertically disposed cylindrical drums having straining walls, said drums being relatively disposed with the walls thereof defining a chamber substantially enclosed circumferentially by said straining walls, means closing opposite lower and upper ends of said chamber, means to deliver a mixture of said fibrous material and said liquid into said chamber for separation of said fibrous material from said liquid, means for selectively rotating said drums in selected directions with next adjacent drums rotating in opposite directions, means for removing from the interior of said drums liquid removed from the mixture of liquid and fibrous material in said chamber, at least two of said drums being disposed defining a longitudinally extending space in communication with said chamber for delivery of fibrous material from said chamber as a mat of fibers automatically during rotation of said drums, means for variably spacing the longitudinal axes of said drums thereby to at least vary the width of said space to variably determine the dryness of said mat.

4. Separation apparatus for separation of fibrous material from a liquid with which the fibrous material is mixed without subjecting the fibers of said material to a grinding or crushing action regardless of the density of said fibrous material in a mixture thereof with said liquid comprising, a plurality of disposed cylindrical drums having straining walls and vertically extending axes disposed in section in a configuration of a figure in which the axes are at apices of said figure, said drums being relatively disposed with the walls thereof defining a chamber substantially enclosed circumferentially by said straining walls, means closing opposite lower and upper ends of said chamber, means to deliver a mixture of said fibrous material and said liquid into said chamber for separation of said fibrous material from said liquid, means for selectively rotating said drums in selected directions with next adjacent drums rotating in opposite directions, means for removing from the interior of said drums liquid removed from the mixture of liquid and fibrous material in said chamber, at least two of said drums being disposed defining a longitudinally extending space therebetween in communication with said chamber for delivery of fibrous material from said chamber as a mat of fibers automatically during rotation of said drums, means for variably spacing the longitudinal axes of said drums thereby to vary the dimensions of said chamber for variably regulating the pressure applied to said fibrous material in said chamber to variably determine the dryness of said mat.

5. Separation apparatus for separation of fibrous material from a liquid with which the fibrous material is mixed without subjecting the fibers of said material to a grinding or crushing action regardless of the density of said fibrous material in a mixture thereof with said liquid comprising, a plurality of vertically disposed cylindrical drums having straining walls, said drums being relatively disposed with the walls thereof defining a chamber substantially enclosed circumferentially by said straining walls, means closing opposite lower and upper ends of said chamber, means to deliver a mixture of said fibrous material and said liquid into said chamber for separation of said fibrous material from said liquid, means for selectively rotating said drums in selected directions with adjacent drums rotating in opposite directions, means for removing from the interior of said drums liquid removed from the mixture of liquid and fibrous material in said chamber, at least two of said drums being disposed defining a longitudinally extending space therebetween in communication with said chamber for delivery of fibrous material from said chamber as a mat of fibers automatically during rotation of said drums, means for variably spacing the longitudinal axes of said drums thereby to vary the dimensions of said chamber for variably regulating the pressure applied to said fibrous material in said chamber to variably determine the dryness of said mat.

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