

Oct. 10, 1950

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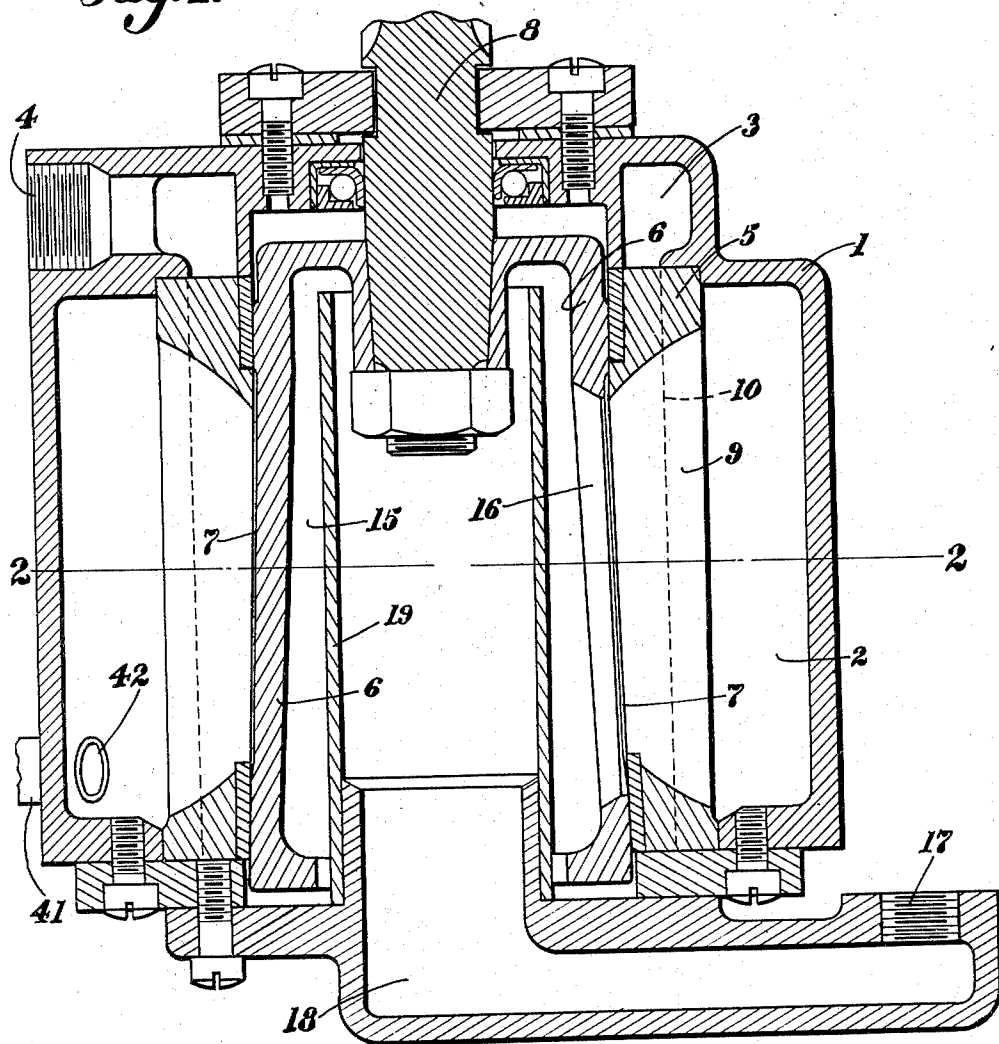
2,525,701

PULP SCREEN

Filed Dec. 10, 1948

3 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

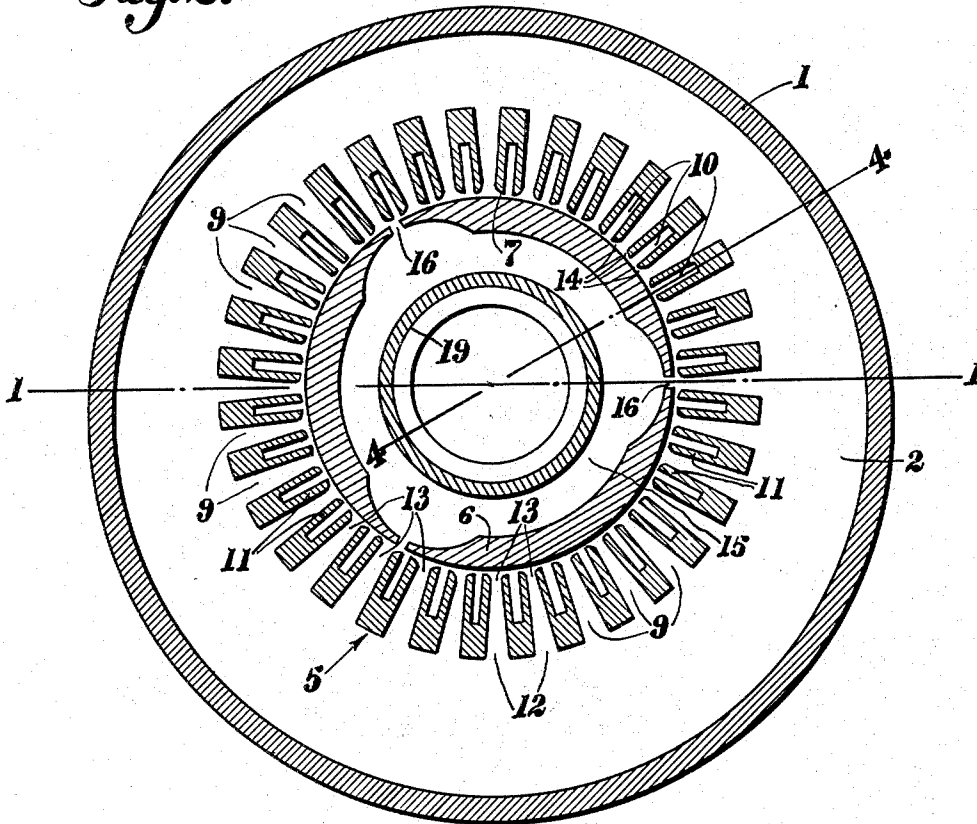


Fig. 3.

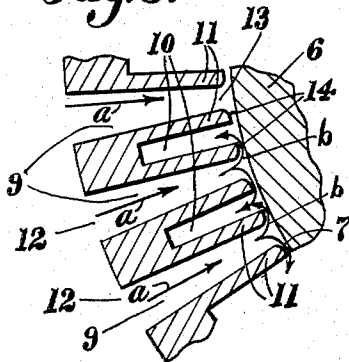
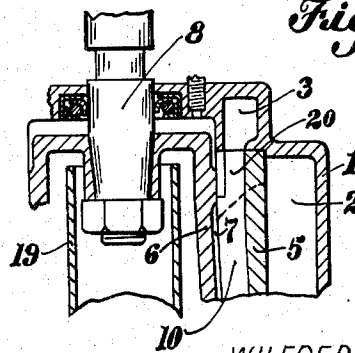


Fig. 4.



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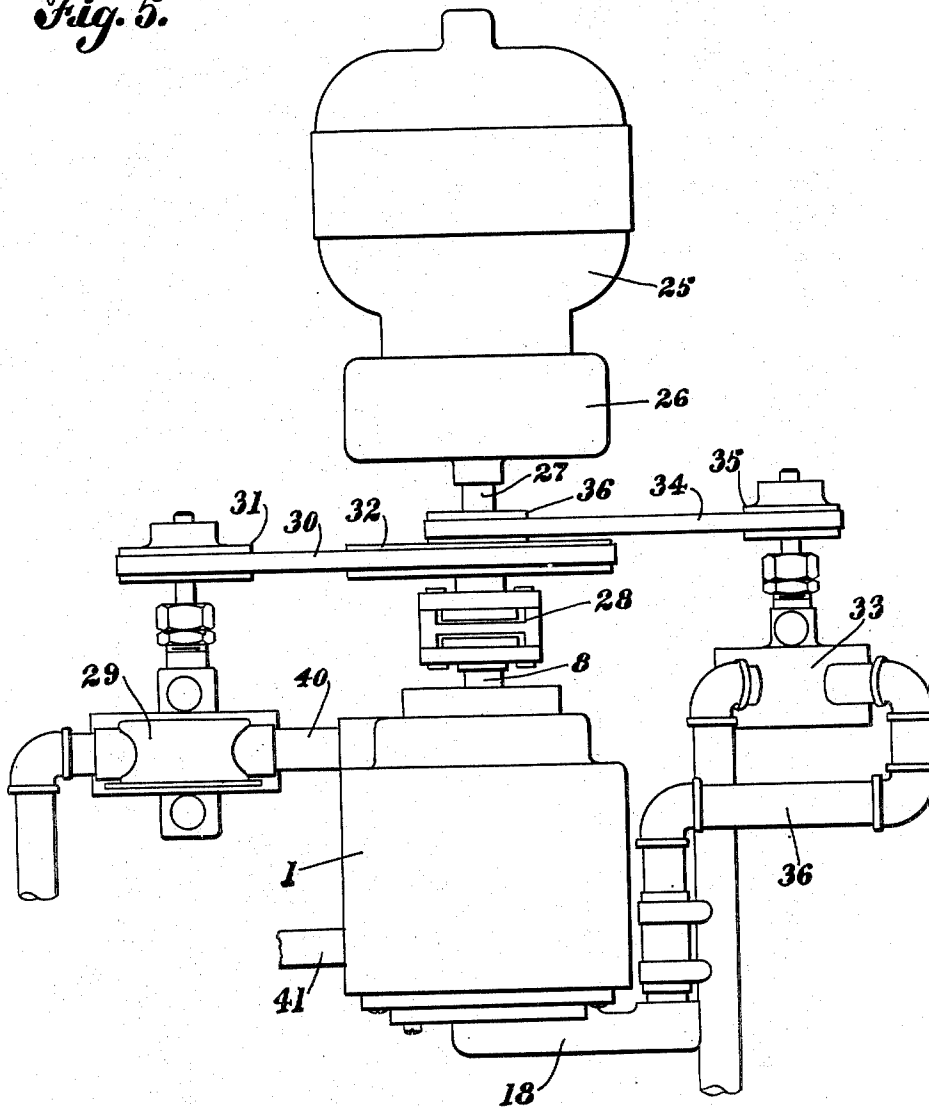
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Fig. 5.



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UNITED STATES PATENT OFFICE

2,525,701

PULP SCREEN

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Application December 10, 1948; Serial No. 64,539

3 Claims. (Cl. 92—35)

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This invention relates to pulp screens of the type shown in my U. S. Patent No. 2,450,838, October 5, 1948.

The pulp screen illustrated in said patent comprises a casing having an inlet for the unscreened pulp and an outlet for the screened pulp, and pulp-screening means within the casing comprising two concentric substantially cylindrical screen members providing between them an annular clearance space of sufficient size for the fine acceptable portion of the unscreened pulp to pass therethrough, but of insufficient size for the coarse unacceptable portion of such pulp to pass therethrough. One of the screen members is formed on its face which bounds the clearance space with a plurality of slots or grooves which extend parallel to the axis of the concentric screen members, certain of which slots constitute inlet slots and have communication with the inlet to the casing while the remaining slots constitute discharge slots and have communication with the outlet for the screened pulp. Each of these slots have parallel walls and they are situated closely adjacent each other, the alternate slots being inlet slots so that each inlet slot has a discharge slot on each side thereof.

In the operation of screening the pulp, the unscreened pulp which is delivered through the inlet of the casing flows into the inlet slots and from the latter into the clearance space, the acceptable portion of the pulp which enters each inlet slot flowing through the clearance space and into the discharge slots on either side of the inlet slot, from which discharge slots the screened pulp is delivered through the outlet to the casing.

While the clearance space is of a size to permit the acceptable portion of the pulp to pass therethrough, yet its size is insufficient to permit shives and other coarse unacceptable portions of the pulp to pass.

In order to prevent such unacceptable portion of the pulp from clogging the screen, the non-slotted screen element is provided with a plurality of openings, and one of the screen elements is rotated relative to the other about their common axis so that when during such a relative rotation, any coarse unacceptable portion of the pulp which is unable to pass through the clearance spaces comes into register with one of the openings, such unacceptable portion will be flushed through the opening, thus clearing the screen element.

In the device of the above-mentioned patent, the walls or ribs which separate the various grooves have flat faces and each wall presents two

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sharp corners at the edge thereof adjacent the clearance space, around which the acceptable portion of the pulp must flow in traveling from an inlet slot through the clearance space into an outlet or discharge slot. It has been found that in flowing from an inlet slot into a discharge slot through the clearance space, a fiber of pulp stock which of itself would be classified as acceptable sometimes gets caught on one of the sharp corners of the wall instead of flowing freely through the clearance space, and when this happens another acceptable fiber is likely to cling to the blocked acceptable fiber and thereby a clot of acceptable fibers may be built up at the point where the inlet slot opens into the clearance space, which clot forms an obstruction to the flow of acceptable fiber through the clearance space in the same manner as would be produced by the blocking of the passage by the unacceptable portion of the pulp. If such a blockade or clot of acceptable portion of the pulp is formed, then as the screen members rotate relative to each other, such blockade of acceptable portion will be flushed out through the opening in the non-slotted member and will be added to the tailings or unacceptable portion of the pulp. This, of course, constitutes a needless waste of good material.

It is one of the objects of the present invention to provide an improved pulp screen of the above type which is so constructed as to reduce to a minimum, or even to practically eliminate, the possibility of any blockade or clot of acceptable portion of the stock developing in the clearance space, thereby providing a screen which will yield a higher percentage of screened pulp from a given quantity of unscreened pulp.

Other objects of the invention are to improve pulp screens of the above type in the particulars hereinafter set forth.

I have illustrated the present invention as it might be embodied in a laboratory type pulp screen rather than in a full sized commercial machine, but the construction and operation of the screen elements is the same in both types.

In the drawings:

Fig. 1 is a vertical sectional view through a pulp screen embodying my invention taken on the line 1—1, Fig. 2.

Fig. 2 is a horizontal section taken on the line 2—2, Fig. 1.

Fig. 3 is an enlarged fragmentary view of the operative portions of the two screen elements.

Fig. 4 is a fragmentary sectional view on the line 4—4, Fig. 2.

Fig. 5 is a view illustrating a laboratory type screen embodying the features shown in the other figures of the drawings.

My improved screen comprises a casing element 1 which is formed with an annular inlet chamber 2 to which the unscreened pulp is delivered and with an annular discharge chamber 3 into which the screened pulp is delivered after having passed through the screening elements, said discharge chamber 3 having an outlet 4 to which a discharge pipe 40 may be connected (see Fig. 5). The unscreened pulp may be fed to the annular inlet chamber 2 in any suitable way, such as an inlet pipe 41 leading to an inlet opening 42.

The two screen elements are indicated at 5 and 6 respectively. These two elements are substantially cylindrical and are arranged concentric with each other, the element 5 constituting the outer screen element, and the element 6 constituting the inner screen element.

Said screen elements are so constructed that there exists between them an annular clearance space 7 which is of a size to permit the fine acceptable portion of the pulp to pass therethrough but which is insufficient in size to permit the coarse unacceptable portion of the pulp to pass.

In the present embodiment of the invention, the outer screen member 5 is a stationary member and is stationarily mounted within the casing in such a way as to form between itself and the casing the annular inlet chamber 2. The inner screen member 6 is a rotary member, and it is shown as mounted on a shaft 8 which is journaled in the casing for rotative movement.

The stationary screen member 5 is formed with a series of vertical slots 9 which extend radially therethrough and which thus communicate with both the surrounding inlet chamber 2 and the annular clearance space 7. Said slots 9 thus constitute passages through which the unscreened pulp flows from the inlet chamber 2 into the clearance space and are therefore referred to as inlet slots.

The screen member 5 is also provided with a second series of slots 10 which are parallel to the slots 9 and which communicate with the clearance space 7 but have no communication with the inlet chamber 2 except through the clearance space. These slots 10 extend through the upper end of the screen member 5 and open into the discharge chamber 3 as shown at 20 in Fig. 4 and hence are referred to as discharge slots.

The slots 9 and 10 are so arranged that they alternate with each other, every other slot being an inlet slot and hence each inlet slot 9 has a discharge slot 10 on each side thereof, the adjacent slots being separated by walls or partitions 11.

In the present embodiment of my invention, each inlet slot 9 has a progressively decreasing width from its outer side 12 to its inner delivery side 13 as best seen in Figs. 2 and 3, and is narrowest at the point where said slot communicates with the clearance space. Furthermore the partition walls 11 are made with rounded corners 14 on the sides thereof which bound the inlet slots 9 as best seen in Fig. 3.

During the screening of the stock the unscreened stock which flows inwardly through each inlet slot 9 as shown by the arrows *a* in Fig. 3 will divide as it flows into the clearance space 7 as indicated by the arrows *b*, part of

such stock flowing around the wall 11 on one side of the inlet slot into the adjacent discharge slot 10, and the other part flowing around the wall 11 on the other side of the inlet slot into the corresponding discharge slot 10. The converging or tapered shape of the inlet slots 9 tends to cause pulp to flow with an increased velocity through the clearance space and around the walls 11, and the rounded corners 14 of the walls serve to facilitate such flow and tend also to reduce materially the possibility of any pulp fiber of an acceptable size and length from being caught in the clearance space.

Of course any large coarse unacceptable portion of the pulp stock which cannot pass through the clearance space 7 will become lodged or blockaded at the entrance to the clearance space.

For flushing out such blocked or lodged portions of pulp, the inner screen member 6 is made with an interior chamber 15 and is provided with a plurality of flushing openings 16 which lead into said chamber. These openings 16 are in the nature of elongated slots as shown in Fig. 1. When during the rotation of the inner screen member 6 any flushing slot 16 comes into register with any portion of pulp which has been blockaded at the clearance space, such blockaded portion of the pulp will be flushed through the slot 16 and into the interior chamber 15 in which the tailings collect.

The casing 1 is provided with a tailings outlet 17 which communicates with a chamber 18 that in turn opens into the interior chamber 15 of the inner screen member. There is provided a tube 19 which extends from the chamber 18 nearly to the top of the chamber 15 so that any tailings or unacceptable pulp which flows through the slots 16 into the chamber 15 is required to flow over the top of the tube 19 in order to be delivered from the casing.

The unscreened pulp may be delivered to the inlet cylinder 2 in any suitable way, and there is shown for this purpose a supply pipe 41 communicating with an inlet opening 42 leading to the inlet chamber 2.

The drawings show the pulp screen as it might be embodied in a laboratory model, but the embodiment of the novel features in a full sized commercial machine merely involves making them on a larger scale than is found in the laboratory model.

In the device shown herein the shaft 8 by which the rotary screening element 6 is rotated is driven from a motor 25 through suitable reduction gears contained in a casing 26, the power output shaft 27 of the reduction gears being connected to the shaft 8 through suitable universal joint connection 28.

The outlet pipe 40 for the screened pulp is shown as connected to the inlet of a pump 29 which assists in maintaining a flow of the pulp through the pulp screen.

The pump is of the rotary type and is driven from the shaft 27 through a belt 30 extending around a driving pulley 32 on a shaft 27 and a driven pulley 31 on the shaft of the pump.

The outlet 17 for the tailings leads into a discharge pipe 36 and there is shown another pump 33 in the pipe 36 for maintaining circulation therethrough. This pump 33 is also driven from the shaft 27 through the medium of a driving belt 34 and pulleys 35 and 36.

I claim:

1. A pulp screen comprising a casing, two concentric screen elements located therein and form-

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ing between them an annular clearance space of sufficient size for the passage therethrough of the acceptable portion of the pulp but of insufficient size for the coarse unacceptable portion of the pulp to pass therethrough, said casing and the outer screen element forming between them both an annular inlet chamber and a discharge chamber, said outer screen element having a plurality of radially arranged spaced partition members forming between them slots, all of which slots communicate with the clearance space, the alternate slots also communicating with the inlet chamber and constituting inlet slots and the remaining slots communicating with the discharge chamber and constituting discharge slots, each partition presenting a rounded corner at the junction of the corresponding inlet slot and the clearance space over which the acceptable portion of the pulp flows smoothly into the clearance space and from thence to a discharge slot, thereby reducing the possibility of the clearance space becoming clogged by acceptable portion of the pulp.

2. A pulp screen comprising a casing, two concentric screen elements located therein and forming between them an annular clearance space of sufficient size for the acceptable portion of the pulp to pass therethrough but of insufficient size for the coarse unacceptable portion of the pulp to pass therethrough, said casing and the outer screen element forming between them both an annular inlet chamber and a discharge chamber, said outer screen element having a plurality of inlet slots forming a communication between the inlet chamber and said clearance space and also having a plurality of discharge slots communicating both with the clearance space and with the discharge chamber, said inlet and discharge slots alternating in position and each inlet slot having a progressively decreasing width from the inlet chamber to the clearance space and being narrowest at the place where it opens into said clearance space, whereby the accelerated flow of the pulp as it passes into the clearance space from each inlet slot resulting from the progressive decrease in the width of the

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slot minimizes the possibility of the clearance space becoming clogged by acceptable portion of the pulp.

3. A pulp screen comprising a casing, two concentric screen elements located therein and forming between them an annular clearance space of sufficient size for the acceptable portion of the pulp to pass therethrough but of insufficient size for the coarse unacceptable portion of the pulp to pass therethrough, said casing and the outer screen element forming between them both an annular inlet chamber and a discharge chamber, said outer screen element having a plurality of radially arranged spaced partition members forming between them slots, all of which slots communicate with the clearance space, the alternate slots also communicating with the inlet chamber and constituting inlet slots and the remaining slots communicating with the discharge chamber and constituting discharge slots, the walls of each inlet slot being non-parallel and having a converging relation from the inlet chamber to the clearance space, the distance between the walls of each inlet slot being least where said slot opens into the clearance space, each partition presenting a rounded corner at the junction of the corresponding inlet slot and the clearance space, whereby the accelerated movement of the pulp as it leaves each inlet slot due to the convergence of the walls of the slot, together with said rounded corners, reduces to a minimum the possibility that the clearance space will become clogged by acceptable portion of the pulp.

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