Jan. 5, 1932. C. W. NELSON 1,839,249

FILTER FOR PAPER MAKING

Filed April 12, 1929

Fig. 1

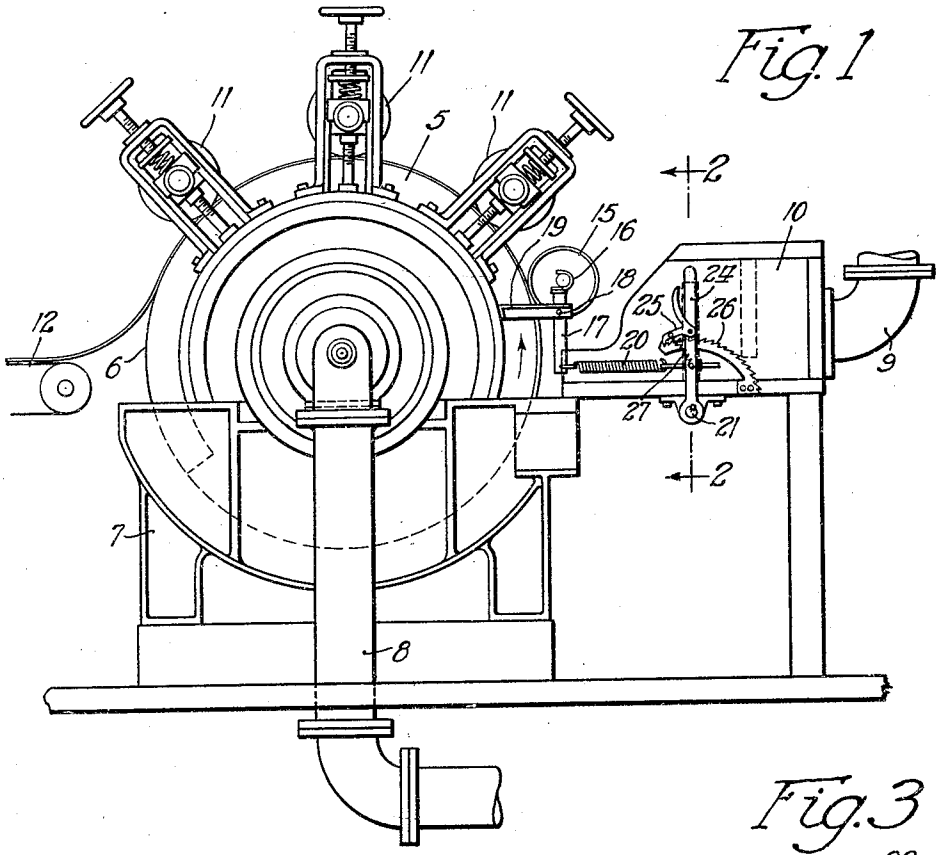


Fig. 3

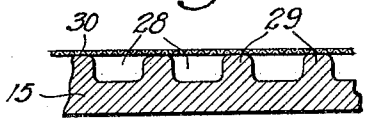


Fig. 2

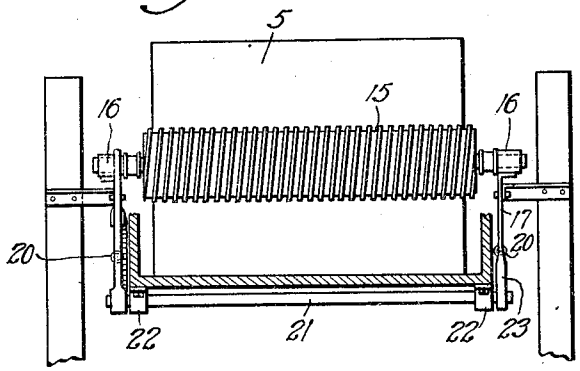
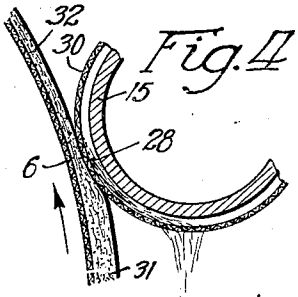


Fig. 4



Inventor

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UNITED STATES PATENT OFFICE

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FILTER FOR PAPER MAKING

Application filed April 12, 1929. Serial No. 354,504.

This invention relates to filters for paper making and has particular reference to the provision of improved means for extracting water or other fluid from a layer of paper stock which is deposited on a filter wire or the like, and especially in connection with cylinder machines wherein the wire is in the form of a rotating drum.

Important objects of the invention are to provide means for extracting a large portion of the water from a layer of paper stock carried by the filter wire or other conveying means; to provide such means which will be operative either before or early in the usual vacuum water extracting operation; to provide means for effecting removal of a larger amount of water from a layer of wet paper stock than has heretofore been possible or practical in a given length of time; and, in general, it is the object of my invention to provide improved means for drying paper stock.

Other objects and advantages of my invention will be understood by reference to the following specification and accompanying drawing in which I have illustrated a standard Oliver type filter to which has been added a selected form of my invention.

In the drawings:

Fig. 1 is a side elevation.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a detail section showing the surface formation of the water extracting means; and

Fig. 4 is a diagrammatic illustration of the operation of my improved water removing mechanism.

Referring now to the drawings, a standard filter of the type referred to includes ordinarily a drum 5 which is covered with wire netting 6 and rotatably supported in suitable frame work 7 at both sides of the machine. The drum 5 with its reticulated covering 6 is rotated by any suitable mechanism well known in the art and not herein illustrated. Vacuum is applied to predetermined sections of the drum surface by means of suction boxes arranged on the inside of the drum in accordance with well known practice, the suction boxes being exhausted through the agency of a pipe line 8 which is connected to a suitable exhaust pump or the like.

Wet paper stock is supplied to the drum 5 through a stock inlet 9 which leads to a mixing chamber 10 in accordance with usual practice. The stock being thoroughly mixed in the chamber 10 is deposited in a well known manner on the covering 6 of the drum 5, which thereupon carries a relatively thick and wet layer of the stock upwardly, the drum being rotated in a counterclockwise manner as viewed in Fig. 1. The layer of stock thus carried by the drum is subjected to the action of the above mentioned interior suction boxes which ordinarily serves to remove a large amount of the water from the layer of stock and also to the action of adjustably mounted press rolls 11—11 which serve to compress the paper stock layer in a well known manner. The layer of paper stock thus treated is removed from the surface of the drum 5 and is conveyed by suitable means such as a conveyor 12, to means for rolling the dried layer of paper stock into rolls for subsequent use or the stock may be conveyed to means for further treating the same or forming the same into paper.

The mechanism so far described constitutes the essential elements of an Oliver type filter which is generally well known to those skilled in the art. By means of the following described mechanism which is combined with the Oliver filter structure, I have found that the efficiency of the filter is greatly increased, particularly in that the paper stock is more completely dried than is possible by the standard mechanism so far described.

The means for facilitating the drying operation and increasing the efficiency of the filter comprises a dewatering roll 15 which is rotatably mounted in bearings such as 16, at its opposite ends, the latter being secured to the upper ends of pivoted levers 17. The levers 17 are pivotally mounted as shown at 18 on brackets 19 carried by a part of the supporting frame 7 and the lower ends of the levers 17 are connected by means of tension springs 20 to arms carried by a rock shaft 21. The rock shaft 21 is mounted in bearings 22—22 and the spring 20 at the right

hand side of the machine as viewed in Fig. 2, is connected to the upper end of an arm 23 which, at its lower end, is rigidly secured to the shaft 21. The spring 20 at the other side of the machine is anchored to an adjusting lever 24 which is also rigidly secured at its lower end to the shaft 21. The adjusting lever 24 projects upwardly from the shaft and is provided with a hand controlled dog 25 which is adapted to engage a toothed rack 26 which is rigidly secured to any conveniently accessible part of the filter frame, as best shown in Fig. 1. The dog or pawl 25 is normally urged into engagement with the rack 26 by means of a spring 27.

It will be seen that the arrangement is such that the dewatering roll 15 is yieldingly urged into engagement with the surface of the drum 5 by means of the springs 20 and also that the tension of the spring 20 is adjustable by means of the adjusting lever 25. The bearings 16 for the roll 15 are preferably of the open, U-shaped type clearly shown in Fig. 1 which facilitates removal of the roll 15 from the machine without the necessity of dismantling numerous parts, or the taking out of numerous bolts or the like, it merely being necessary to relieve the tension of the springs 20 sufficiently to permit the pivoted levers 17 to be swung rearwardly at their upper ends so that the roll 15 can be entirely disengaged from the bearings 16.

The roll 15 is preferably in the form of a hollow cylinder having spaced channels 28 in its surface, the channels being separated by means of rib-like formations 29. A covering of wire netting 30 or other perforated material is secured to the roll over the rib-like projections 29, thereby forming channels in the roll under the said covering 30. The channels 28 may be formed in a variety of ways but, for convenience in manufacture, I prefer to form the same by means of one or more helical grooves which start at one end of the roll and traverse substantially the entire length thereof as clearly shown in Fig. 2.

The operation of the roll 15 is best shown in Fig. 4 wherein a comparatively heavy or thick layer of wet paper stock is indicated at 31 on the wire coverng 6 of the drum 5. The wire 6 moving in an upward direction as indicated by the arrow, carries the thick layer of wet paper stock under the dewatering roll 15 which serves to compress the layer 31 of paper stock to a considerably smaller thickness as indicated at 32. In so compressing the thick layer 31 of paper stock, water is extracted therefrom, the same passing through the screen covering 30 of the roll 15 and into the channels 28 wherein it is permitted to freely flow downwardly and away from the paper stock layer 31 and drum 5.

A comparatively small amount of water may also be forced out of the layer of paper stock inwardly through the screen cover 6 of the drum but the most effective work results from the provision of the grooves or channels 28 which receive and convey the extracted water away from the paper stock layer as shown in Fig. 4.

The dewatering roll 15 is preferably located at the wet side of the drum, that is to say, the side of the drum where the layer of stock emerges from the depositing vat of the filter and contains substantially the maximum amount of water. By so locating the roll, the usual drying mechanism of the filter is caused to operate on partly dried stock so that the dried web of stock which is discharged by the machine is considerably drier than the dried stock discharged by the standard filter mechanism when operated without a dewatering means such as I have herein described.

The water extracting roll 15 need not be positively driven since it is effectively rotated by its frictional engagement with the stock layer on the drum 5. The speed of rotation of the roll 15 is not great enough to prevent the extracted water from flowing downwardly in the channels 28 as above described, since, in actual practice, the filter drum 5 is rotated quite slowly, usually about two revolutions per minute.

The pressure with which the roll 15 bears against the layer 31 of paper stock may be adjusted through the agency of the adjusting lever 24 and springs 20—20 until a maximum amount of water is removed by means of the roll 15, thereby leaving a smaller amount of work to be done by the usual suction boxes above referred to.

While I have described my improved dewatering roll as associated with a standard Oliver type filter, it is to be understood that the dewatering means is not limited to this specific application since it may be associated with other suitable means for conveying a layer of wet paper stock, and I am aware that changes may be made in the construction and arrangement of the dewatering roll and its associated and cooperating parts without departing from the spirit of the invention, the scope of which should be determined by reference to the following claims, the same being construed as broadly as possible consistent with the state of the art.

I claim as my invention:

1. In a machine for drying paper stock, the combination of means for carrying a layer of wet paper stock, a roll engaging the wet stock on said means, for pressing water from said stock, said roll being provided with openings in its surface for permitting water to pass therethrough and with channels for carrying away such water.

2. In a paper stock drying machine, the combination of means for receiving and propelling a layer of wet paper stock, and an axially horizontal roll engaging the layer

of stock on said means, adjacent the point where the stock is applied thereto, for pressing water therefrom, said roll being arranged to extract and receive said water, said stock carrying means arranged in such a manner that the lower surface portion of the roll is spaced horizontally from the stock whereby the extracted water may be withdrawn from the roll without re-entering the stock layer.

3. In a filter of the class described, the combination of a filter drum and a roll serving to extract water from paper stock deposited on the surface of said drum, said roll being provided with openings covered with foraminous material for receiving and conveying the extracted water away from said drum.

4. In a filter of the class described, the combination of a filter drum and a roll serving to extract water from paper stock deposited on the surface of said drum, said roll being provided with circumferential channels in its surface for conducting the extracted water away from said drum and with foraminous material covering said channels.

5. In a filter of the class described, the combination of a filter drum, a roll engaging a layer of paper stock deposited on the surface of said drum, said roll being provided with openings in its circumferential surface for conducting the extracted water away from said stock, and a wire screen overlying the openings.

6. In a filter of the class described, the combination of a filter drum, a roll associated with the outside of said drum, located adjacent the wet side thereof, and yieldingly urged toward the surface of the latter so as to be operative to compress a layer of paper stock deposited on the surface of the drum, thereby to press out water from the stock.

7. In a filter of the class described, the combination of a filter drum, a roll associated with the outside of said drum, and means for forcing said roll toward the surface of the drum so as to compress a layer of wet paper stock deposited on the surface of the drum, thereby to press out water from the stock, said roll being provided with a reticulated surface, and circumferential grooves thereunder for receiving and conveying away the water.

8. In a filter of the class described, the combination of a filter drum, a roll associated with the outside of said drum, adjustable means for yieldingly urging said roll toward the surface of the latter, whereby the roll is operative to compress a layer of wet paper stock deposited on the surface of the drum, thereby to press out water from the stock, said roll being provided with a reticulated surface and with openings thereunder for receiving and conveying away the water.

9. In a filter of the class described, the combination of a filter drum and a roll associated with the outside of said drum for compressing and thereby extracting water from wet paper stock deposited on the surface of the drum, said roll being provided with helical channels extending transversely of its length for receiving and causing the extracted water to flow away from said drum.

10. In combination with a rotary filter, a roll associated with the outside of the filter drum for extracting water from wet paper stock deposited on said drum, said roll being located adjacent the wet side of said drum so as to be operative on the layer of stock when the latter contains substantially the maximum amount of water, whereby the water extracting mechanism of the standard filter is operative on partly dried stock.

11. In combination with a rotary filter, means associated with the outside of the filter drum for extracting water from wet paper stock deposited on said drum, said means being located adjacent the wet side of said drum so as to be operative on the layer of stock when the latter contains substantially the maximum amount of water, whereby the water extracting mechanism of the standard filter is operative on partly dried stock.

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