Dec. 15, 1931. A. J. HAUG 1,836,243

FILTER AND PRESS ROLL THEREFOR

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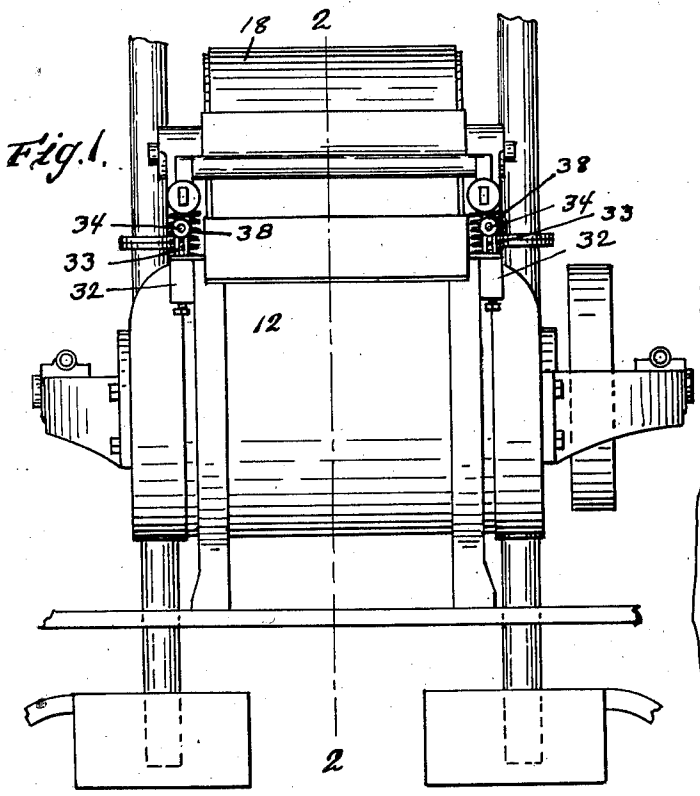


Fig. 1.

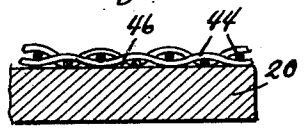


Fig. 5.

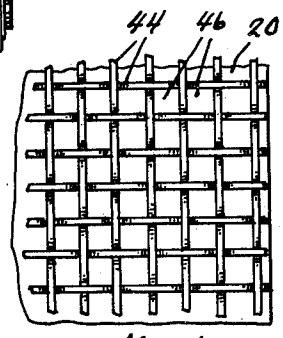


Fig. 6.

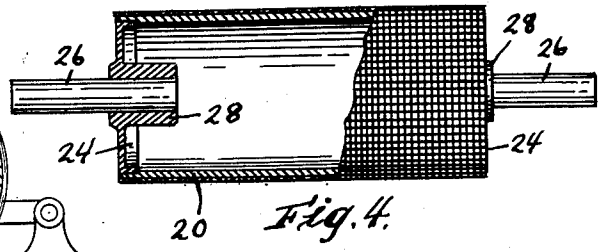


Fig. 4.

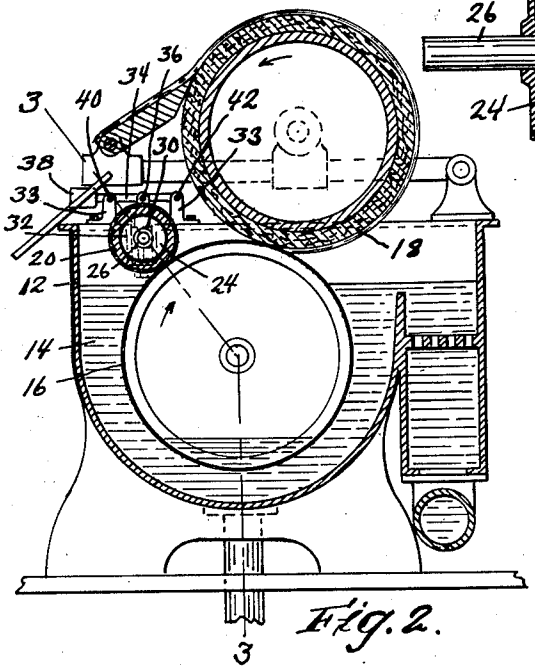


Fig. 2.

Inventor.

Anton J. Haug

by

atty

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FILTER AND PRESS ROLL THEREFOR

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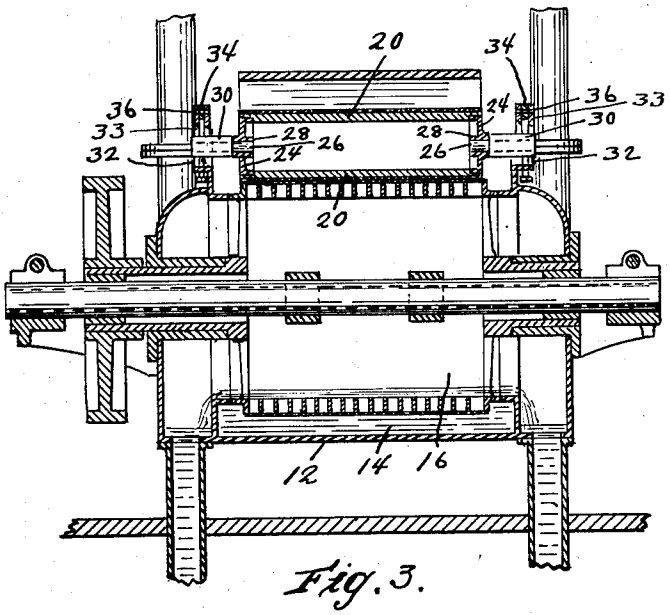


Fig. 3.

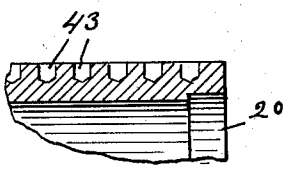


Fig. 7.

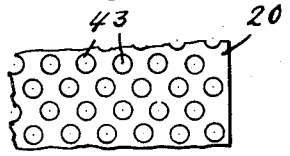


Fig. 8.

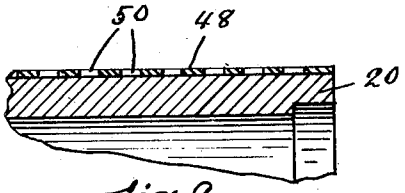


Fig. 9.

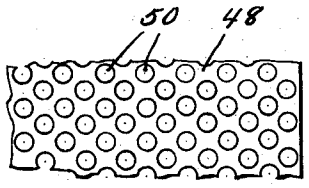


Fig. 10.

Inventor.

Anton J. Haug

by [illegible] Atty

Patented Dec. 15, 1931

1,836,243

UNITED STATES PATENT OFFICE

ANTON J. HAUG, OF NASHUA, NEW HAMPSHIRE

FILTER AND PRESS ROLL THEREFOR

Application filed December 20, 1928. Serial No. 327,391.

This invention relates to filters and to paper making and is particularly concerned with expressing water from the pulp sheet on the paper making wire or other support for the sheet.

It is common practice to use press rolls which bear on the wet paper sheet while it is on the wire to express water from the sheet through the paper making wire. These rolls, known as "dandy rolls", are hollow and have a perforated periphery, commonly consisting of a wire screen. In use some of the water which is expressed from the wet paper sheet passes through the periphery of the roll into the interior thereof and is subsequently discharged again upon the partly dry paper sheet, thus partially destroying the object of the roll.

Furthermore, the roll especially when operating on short fibred stock has a tendency to detach some of the short pulp fibres from the paper sheet, thereby impairing the quality of the sheet.

An object of the present invention is the provision of a paper making machine and a roll therefor which will operate to express water from the paper sheet through the paper making wire without picking up and subsequently discharging water onto the partly dried sheet and without detaching pulp fibres from the sheet and also without disturbing the paper sheet or forming a wave thereon, just in front of the line of contact between the roll and the paper sheet.

I have found that I can obtain highly satisfactory results with a roll, the sheet-engaging surface of which is imperforate but has small pockets therein in which some of the water in the wet paper sheet can collect but from which pockets the water can not escape at the time they are at the paper sheet; and this constitutes a further object of the invention.

Another object of the invention is the provision of a press roll for a paper making machine which has an imperforate cylindrical wall and has detachable means on said wall that forms isolated pockets that are open in the sheet-engaging face of the roll.

Another object of the invention is generally to improve the construction and operation of paper making machines.

Fig. 1 is a side elevation of a cylinder type of paper making machine embodying the invention.

Fig. 2 is a sectional elevation through the machine of Fig. 1.

Fig. 3 is a section along line 3—3 of Fig. 2.

Fig. 4 is a front elevation partly broken away of the dandy or press roll of Figs. 2 and 3.

Fig. 5 is an enlarged sectional detail of the imperforate cylindrical wall of the press roll and illustrating the pocket-forming wire screen thereon.

Fig. 6 is an enlarged plan detail of the periphery of the press roll illustrating the pockets in the face thereof.

Fig. 7 is a view similar to Fig. 5 but illustrating a modified method of forming the pockets in the sheet-engaging face of the roll, the pockets being shown in exaggerated size.

Fig 8 is a plan detail of a portion of the surface of the roll constructed as illustrated in Fig. 7.

Fig. 9 is a section similar to Fig. 5 but illustrating a further modified construction of the roll.

Fig 10 is a plan detail of a portion of the surface of the roll of Fig 9, the size of the pockets being magnified.

The invention for simplicity is here shown as embodied in a paper making machine of the cylinder type although it is not limited in its application to this type. The machine comprises a tank 12 having a cylinder compartment 14 in which a paper making cylinder 16 of any suitable construction is rotatable. A couch roll 18 is located above and in engagement with the cylinder for the purpose of taking off the paper sheet from the paper making wire on the cylinder above the level of the pulp stock in the compartment 14.

A press or dandy roll 20 is located above the paper making cylinder and is in engagement with the paper or pulp-sheet thereon above the level of the pulp stock and in front of the couch roll for the purpose of expressing water from the wet paper sheet and for

forcing the water through the perforate paper making cylinder into the interior thereof. The press roll comprises a cylinder, see especially Fig. 4, which is of a suitable diameter and length and, in accordance with this invention, is imperforate. End plates 24 are located within the ends of said cylinder and are fixed thereto. Shafts 26 are fixed in hubs 28 of said end plates and form rotatable bearing supports for the roll.

The roll is held in pressure applying rolling engagement with the paper sheet on the cylinder by its own weight which can be enhanced or partially offset by a suitable counterweight. To this end, the shafts 26 are rotatable in bearing blocks 30, one of which is shown in Fig. 2, that are vertically slidable between spaced upstanding guides 32 of the frame 12.

A lever 34 is located above the bearing block and is pivoted thereto by a pin 36. A counterweight 38 is slidable on said lever. Said lever can also be pivotally connected with either one of the arms 33 by means of a pivot pin which can be located in either one of the pivot holes 40 and 42. When the lever is connected to one of said guides, the pressure of the roller is increased by the weight of the counterweight 38 and the leverage thereof. When the lever is connected to the other guide, the pressure of the roll on the paper sheet is diminished by the weight of the counterweight and the leverage thereof. The construction thus described is the same at both ends of the press rolls.

In accordance with this invention, the outer or sheet-engaging imperforate periphery of the roll is provided with a plurality of small pockets which are excluded or substantially excluded from communication with each other and are each open only at the sheet-engaging periphery of the roll. The pockets can be made in any suitable manner. In Figs. 7 and 8 I have shown the periphery of the roll formed with a plurality of small pockets 43 which are drilled into the roll from the outer periphery thereof. This method of forming the pockets is expensive, however, and I prefer to form the pockets as shown in Figs. 6 or 9. In Fig. 6, the pockets are formed by wrapping a wire screen 44 upon the outer periphery of the roll and securing the screen detachably thereto. The open spaces between the warp and filler strands of the wire screen form pockets 46 which excellently fulfill the requirements of my invention The wire screen can be of any suitable mesh. A twenty mesh screen is satisfactory. A forty and also a sixty mesh screen will give good results.

The characteristic feature of the pockets is that they are so small that they collect and retain only sufficient water to lubricate the surface of the roll, to prevent the web from adhering to it. The pockets are not intended to abstract any material amount of water from the web.

In Fig. 9 the pockets are formed by securing a closely perforated plate 48 detachably about the periphery of the roll. In this case, the perforations 50 of the plate form the pockets and the inner openings of the perforations are closed by the cylinder.

With such constructions, it is apparent that water can not pass through the pocketed imperforate cylinder and be subsequently deposited on the partially dried paper sheet as is the case with the usual perforate press roll.

I find also that a press roll constructed as above described, does not pick up any material amount of short fibres from the paper sheet, the reason apparently being that the small perforations fill with water just before the roll comes in pressure contact with the sheet and since the water can not escape through the roll, there is no force that detaches the short fibres from the sheet and attaches them onto the roll or deposits them in the perforations thereof.

The pocketed imperforate roll also prevents the formation of a thickened mass or wave of wet pulp stock immediately ahead of its point of contact with the paper sheet, as is the case with a solid imperforate press roll since the pockets, being empty before they engage the roll, serve to receive the water on the sheet that would otherwise be pushed ahead of the roll.

The cylinder machine here illustrated in connection with this invention is described and claimed in my copending application Serial No. 327,944 filed December 22, 1928.

I claim:

1. In a paper making machine, the combination of a paper making wire on which the paper sheet is made, and a press roll that is in direct engagement with the wet paper sheet on the wire for expressing water out of the wet paper sheet and through the wire having an imperforate sheet-engaging face which is provided with closely disposed pockets which are of small extent axially and peripherally of the roll and are isolated from each other and are open only at the sheet-engaging surface of the roll and which are so small that they retain therein water which prevents the adherency of the sheet to the roll.

2. In a paper making machine, the combination of a paper making wire on which the paper sheet is made, and a press roll that is in direct engagement with the wet paper sheet on the wire for expressing water from the paper sheet through said wire having an imperforate periphery that has small water-retaining pockets therein that are open only at the sheet-engaging periphery of the roll.

3. In a paper making machine, the combi-

nation of a movable surface that supports a wet pulp sheet, and a press roll bearing directly on the pulp sheet to express water therefrom through said movable surface having a water-imperforate porous sheet-engaging surface the pores of which are isolated from each other and are open only at said surface of the roll and are sufficiently small to retain water therein which prevents the adherency of said sheet to the roll.

4. In a paper making machine, the combination of a perforate surface which supports a wet paper sheet, and a press roll bearing directly on the paper sheet to express water therefrom through said perforate surface, said roll having an imperforate sheet-engaging face formed with small isolated water-retaining pockets therein that are closed both axially and circumferentially of the roll and are open only at said sheet-engaging face of said roll.

5. In a paper making machine, the combination of a paper making wire which supports a wet paper web, and a press roll bearing directly on said web to express water therefrom, said roll having a smooth imperforate cylindrical wall and a sheet having isolated perforations encircling and carried by said wall in direct contact therewith and having a smooth surface that directly engages said wet pulp web, said cylindrical wall forming a closure for the bottoms of the perforations in said sheet, so that they are open only at the sheet, and the perforations being so small as to retain water therein.

6. In a paper making machine, the combination of a paper making wire which supports a wet paper web, and a press roll bearing directly on the wet paper web having an imperforate cylindrical wall, and a sheet having small isolated perforations encircling said wall on the outer face thereof having its perforations closed at the bottom by said wall.

7. In a paper making machine, the combination of a movable surface which supports a wet pulp sheet, and a press roll which bears upon the wet pulp sheet to express water therefrom, said roll having an imperforate cylindrical wall and having a wire screen which engages on its outer face and which is adapted to bear upon the wet pulp sheet, said screen having a mesh which is sufficiently small to retain water therein, and said wall forming a closure which prevents water from passing through said screen.

8. A press roll which is adapted to bear directly upon a wet paper sheet to express water therefrom having a smooth imperforate sheet-engaging wall that has small water-retaining pockets in its sheet-engaging face that are open only at said sheet engaging face, the pockets being sufficiently close together to provide the sheet-engaging face of said roll with a water-film that prevents the adherence of said sheet to said roll.

9. A press roll which is adapted to bear directly upon a wet paper web to express water therefrom having a smooth imperforate cylindrical wall and a cylindrical sheet which bears directly on the outer face of said wall and which has small, closely-spaced, water-retaining perforations therein which are closed at the bottom by said wall.

10. A press roll adapted to bear upon a wet paper sheet to express water therefrom having a smooth imperforate cylindrical wall and a wire screen on and in direct engagement with the smooth outer face of said wall, the wall thus sealing the openings in said screen and preventing water from passing therethrough.

11. In a paper making machine, the combination of a paper making wire on which the paper sheet is made, and a press roll which directly engages the paper sheet and expresses water therefrom through said wire, said press roll having a plurality of isolated pockets in its sheet-engaging surface which are open only at the surface of the roll and are so small and so closely spaced that they retain on the roll surface, and between the surface and the sheet, films of water which are sufficiently peripherally continuous to prevent the adhering of the sheet to the roll.

In testimony whereof, I have signed my name to this specification.

ANTON J. HAUG.