July 27, 1971 H. LITTLE 3,595,746

SUCTION BOX FOR PAPER MAKING MACHINES

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Fig. 1.

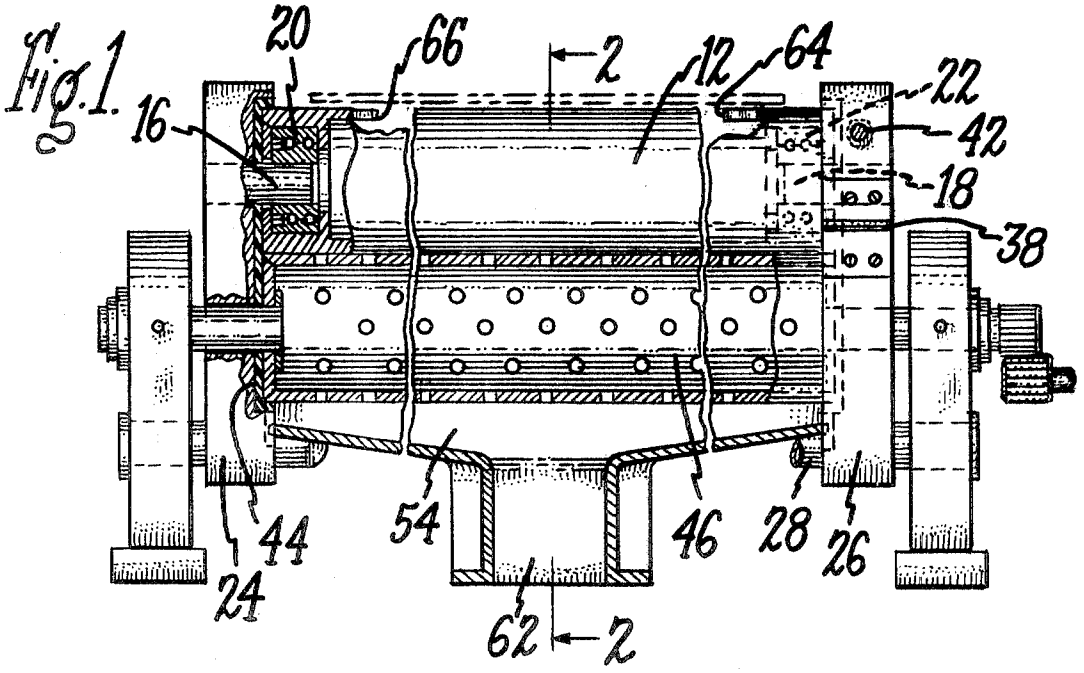


Fig. 2.

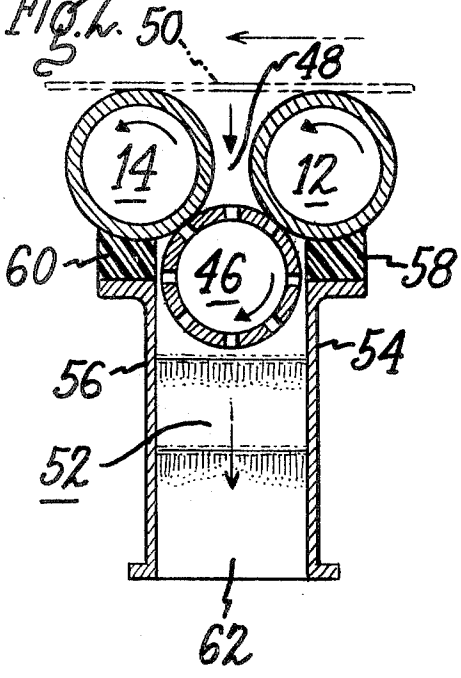
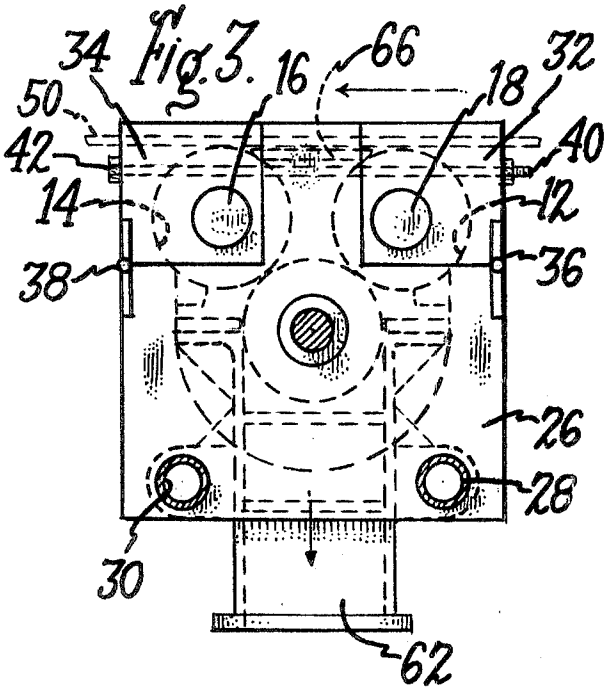


Fig. 3.



Inventor,
Harry Little,
by Francis K. Doyle
His Attorney.

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Fig. 4.

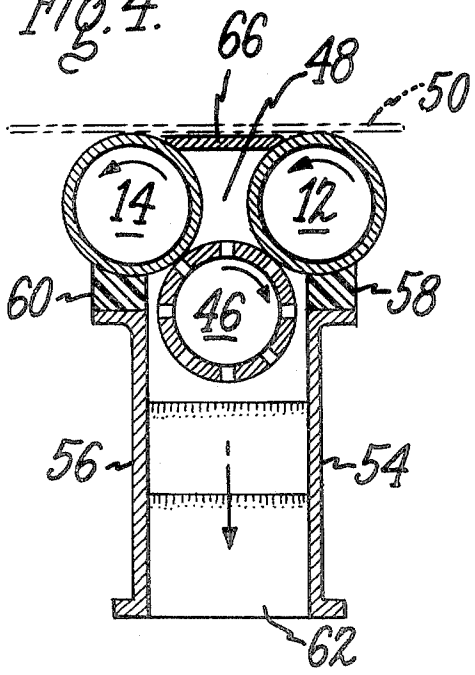


Fig. 5.

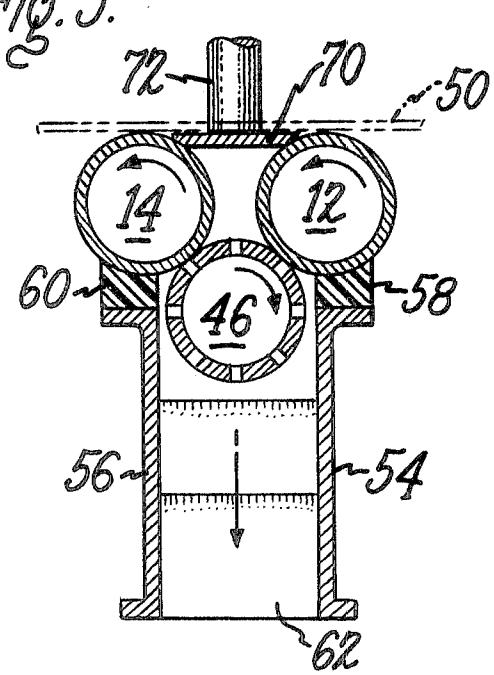
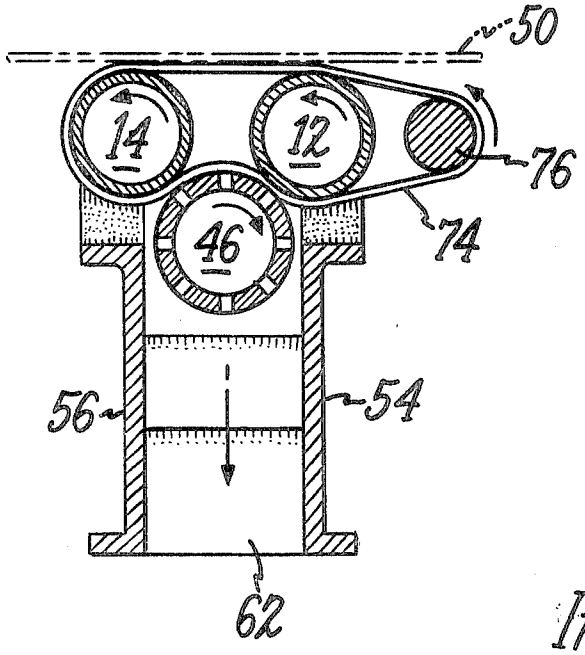


Fig. 6.



Inventor,
Harry Little,
by Francis L. Doyle
His Attorney.

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3,595,746

SUCTION BOX FOR PAPER MAKING MACHINES

Harry Little, New Lebanon, N.Y. 12125

Continuation-in-part of application Ser. No. 628,796, Apr. 5, 1967. This application Dec. 8, 1969, Ser. No. 883,109

Int. Cl. D21f 1/50

U.S. Cl. 162—373 9 Claims

ABSTRACT OF THE DISCLOSURE

A suction box for paper making machines of the Fourdrinier type. The suction box comprises a pair of support rolls or cylinders over which the paper carrying screen travels and a perforated roll or cylinder on which the pair of support rolls rotate. A sealed chamber is provided about the perforated cylinder, with seals engaging a portion of the pair of support rolls. Suction is provided to the sealed chamber, substantially at the center of the length of the perforated cylinder. This draws the water from the web, through the perforated cylinder and into the suction drain outlet. Seals are provided at the ends of the cylinders to complete the suction box. Sealing means are also provided along the edge of the web, between the pair of support cylinders to improve the suction and prevent damage to the traveling screen.

This is a continuation-in-part of application Ser. No. 628,796 filed Apr. 5, 1967, now abandoned, in the name of the same inventor for "Roller Vacuum Dewatering Devices."

BACKGROUND OF THE INVENTION

This invention relates to paper making machines and, more particularly, to a suction box for paper making machines.

As is well known to those skilled in the paper making art, the paper is manufactured from a fibrous pulp having a large percentage of water. The water pulp is fed onto a wire screen which travels over a plurality of rolls or cylinders and over a suction box to draw out a substantial amount of the water in order to form a self-supporting paper web. In many types of paper making machines flat, rectangular boxes are provided for suction. These devices, being stationary, are inclined to cause excessive wear on the traveling wire. To improve the wear of the wire a suction box has been provided using rolls or cylinders in contact with the traveling wire and rotating on another roll or cylinder to form therein a suction chamber or box. While this has improved the life of the traveling wire, it has led to other problems.

A basic problem with the roller suction box is that of evacuating the water between the rollers rapidly enough to prevent its being carried back onto the paper web by the forward roll. As the speed of the wire increases more water is carried into the suction box. The water collects in the valley formed by the bottom cylinder and the meeting surfaces of the upper cylinders. If the vacuum is not sufficient to remove this water rapidly, the water tends to cling to the rotating surface of the forward roll and be carried back to the traveling web, rewetting the web. As will be apparent, the wider the web and the faster the travel of the web, the greater will be the problem of rewetting. From the above, it will be clear that there is presently a need in the paper making machine art to provide a suction box which will not excessively wear the traveling wire and which will not cause rewetting of the paper web.

It has recently been discovered that if the bottom roll is perforated with suction provided below such roll that more water can be removed from the area without danger of rewetting the traveling web. Further, if the suction is provided at substantially the center of the length of the roll, rather than at one of the ends thereof, the suction path is decreased, enabling a more rapid removal of water. This will result in complete removal of the water across the entire web, allowing greater production speeds and uniform vacuum across the web.

Therefore, it is one object of this invention to provide a novel suction box for paper making machines using a plurality of rolls to prevent damage to the traveling screen.

A further object of this invention is to provide a novel suction box for paper making machines in which a perforated roll is used with support rolls to remove water from the traveling paper web.

Yet another object of this invention is to provide a novel suction box for paper making machines in which a perforated roll is used and suction is provided at substantially the center of the length of such roll.

SUMMARY OF THE INVENTION

Briefly, in one form, this invention comprises a suction box for paper making machines in which a pair of support rolls are provided with the paper carrying screen traveling over such rolls. A perforated roll is mounted below the support rolls in a sealed chamber, in contact with the pair of support rolls. Suction is applied substantially at the center of the perforated roll to withdraw water from the traveling paper web.

The invention which is sought to be protected will be clearly pointed out and distinctly claimed in the claims appended hereto. However, it is believed that this invention and the manner in which its objects and advantages are obtained, as well as other objects and advantages thereof, will be better understood from the following detailed description of a preferred embodiment, particularly when considered in the light of the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a sectional view of a preferred form of suction box according to this invention;

FIG. 2 is a sectional side view taken on the line 2—2 of FIG. 1;

FIG. 3 is a side view of the suction box shown in FIG. 1;

FIG. 4 is a sectional side view similar to FIG. 2 but showing a preferred form with a bridge member;

FIG. 5 is a sectional side view similar to FIG. 4, showing a modification of the invention; and

FIG. 6 is a sectional side view similar to FIGS. 4 and 5 showing a further modification of the invention.

DESCRIPTION OF PREFERRED EMBODIMENT

This invention relates to suction boxes for use with paper making machines. As is well known to those skilled in the paper making art, a fibrous pulp is carried by a wire screen over a plurality of rolls, past a suction box where it is formed into a self-supporting paper web. The fibrous pulp has a large percentage of water which must be removed to form the self-supporting paper web. Some of the water is removed through the wire screen as it passes over the various rolls. However, most of the water removal occurs at the suction box just prior to the removal of the self-supporting paper web from the wire screen. Thus it is very important that sufficient water be removed, and that none of the removed water be carried back to the paper web. In the preferred form of this invention the suction box is formed by a pair of support rolls 12 and 14, which are carried on stationary shafts, such as 16 and 18, as shown in FIG. 1. Bearing members, such as

20, 22 are provided to allow support rolls 12 and 14 to freely rotate on the stationary shafts, as is shown in FIG. 1. The stationary shafts, such as 16 and 18 are fixed in the end members 24, 26, as is best shown in FIGS. 1 and 3. Tie rods 28, 30 are provided to space end members 24, 26 and hold them securely in position.

In the preferred form, the end members 24, 26 are provided with hinged portions 32, 34 on each end member (only one side being shown in FIG. 3) to allow access to the support rolls 12 and 14, and removal as necessary. As shown in FIG. 3, hinges 36 and 38 are provided between the portions 32, 34 respectively, and the end member 26. A bolt 40 is provided extending through portions 32, 34 holding them together, with nut 42, and it may be readily removed by taking off nut 42 and withdrawing bolt 40, as will be clearly understood. End members 24, 26 are provided with gaskets, such as the gasket 44, shown in FIG. 1, to seal the vacuum chamber as will be more fully explained as the description proceeds.

A perforated roll 46 is also provided, below the spaced support rolls 12, 14 and in contact therewith, as is best shown in FIG. 2. As is apparent from FIG. 2, the support rolls 12, 14 and the perforated roll 46, form an enclosed area 48 below the wire screen 50. With end members 24 and 26, sealed against rolls 12 and 14, and perforated roll 46, area 48 is substantially fluid tight and forms a suction box. As is best shown in FIG. 2, a suction chamber 52 is formed around perforated roll 46 by means of sealing members 54 and 56, which are sealed to rolls 12 and 14 by means of sealing gaskets 58 and 60. In the preferred embodiment, gaskets 58 and 60 are made of a flexible plastic material which will allow free rotation of rolls 12 and 14 with little friction. A preferred plastic material would be a flexible silicone or similar material, such as "Teflon." A suction outlet or drain 62 is provided, which is connected to a suction device (not shown), in a manner familiar to those skilled in this art. As clearly appears from FIG. 1, the suction outlet or drain 62 is substantially in the center of the length of perforated roll 46. This will provide a suction to the area 48, throughout the entire length of the perforated roll 46. As will be clear, the suction from area 48 will be more uniform over the entire area, when compared with prior types of suction which were placed at one or the other end of the suction chamber.

In order to better seal the area 48 between the support rolls 12, 14 and the perforated roll 46, below the wire screen 50, bridge members 64, 66, are provided on opposite ends of the support rolls 12, 14 as is shown in FIGS. 1 and 4. As is best shown in FIG. 4, the bridge members 64 and 66 are mounted on the ends members 24, 26, between rolls 12 and 14, such that the upper surface of the bridge members is substantially tangential with the top of the rolls 12 and 14. As is clear from FIG. 1, the bridge members 64 and 66 only extend from the end members 24 and 26 inwardly, just beyond the edge of the wire screen 50. This provides sealing for the edges of the wire screen 50, improving the suction of the area 48.

In a modified form of the invention, a rotating disc 70 is provided between each edge of the rolls 12 and 14, as is shown in FIG. 5. In this form of the invention each disc 70 (only one shown in FIG. 5) is rotated by means of a shaft 72, driven through the drive means of the paper making machine (not shown). As will be understood the rotating discs 70 will rotate with the movement of the wire screen 50, preventing any damage to the edges of such wire screen.

In place of the bridge members 64, 66 or the rotating discs 70, a sealing belt may be used at each end of the rolls 12, 14 as is shown in the modification of FIG. 6. In this form of the invention, a sealing belt 74 is trained over each of the rolls 12, 14 (only one being shown in FIG. 6). As is shown in FIG. 6, the belt 74, of plastic or other similar material, is trained over the rolls 12 and 14, from an idler pulley 76. As will be understood, pulley 76 can be adjustable to maintain the tautness of the belt 74. The use of belt 74 will enable the edges of the wire screen to freely move over the rolls 12 and 14 with little friction, thus preventing damage to the screen.

From the above detailed description, it will be clear that there is provided a novel suction box for use in paper making machines which fulfills all of the objects hereinbefore set forth. Of course, it will be clear to those skilled in the art that various changes may be made in the detailed construction set forth without departing from the spirit and scope of the invention, particularly as it is set forth in the appended claims.

What is claimed as new and which it is desired to secure by Letters Patent of the United States is:

1. A suction box for paper making machines comprising, in combination, a machine frame, a pair of support rolls rotatably mounted in said machine frame for rotatably supporting a paper carrying screen, a perforated roll rotatably mounted in said frame below said support rolls and in driving contact with said support rolls, means for driving said perforated roll, a sealed chamber about said perforated roll having sealing means engaging a portion of each of said support rolls, suction means connected to said sealed chamber and side sealing means between said frame and said support rolls and said perforated roll.

2. A suction box for paper making machines as claimed in claim 1 in which said side sealing means are gaskets.

3. A suction box for paper making machines as claimed in claim 1 in which additional sealing means are provided between said support rolls in contact with said frame adjacent said wire.

4. A suction box for paper making machines as claimed in claim 3 in which said additional sealing means are stationary bridging members attached to said frame.

5. A suction box for paper making machines as claimed in claim 3 in which said additional sealing means are rotatable disks.

6. A suction box for paper making machines as claimed in claim 3 in which said additional sealing means are rotatable belts trained over said support rolls.

7. A suction box for paper making machines as claimed in claim 1 in which said suction means is connected to said sealed chamber substantially at the center of the length of said perforated roll.

8. A suction box for paper making machines comprising, in combination; a pair of spaced support rolls rotatably mounted in a frame forming a portion of the machine for rotatably supporting a paper carrying screen, a perforated roll rotatably mounted in said frame below said support rolls and in driving contact with the surface of each of said support rolls, said support rolls and said perforated roll forming an enclosed area therebetween, means for driving said perforated roll, a sealed chamber formed about said perforated roll and having sealing means which engage the surface of each of said support rolls, suction means connected to said sealed chamber and side sealing means between said frame and said support rolls and said perforated roll.

9. A suction box for paper making machines as claimed in claim 8 in which said suction means is connected to said sealed chamber substantially at the center of the length of said perforated roll.

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S. LEON BASHORE, Primary Examiner

ALFRED D'ANDREA JR., Assistant Examiner

U.S. Cl. X.R.

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