Nov. 30, 1954 J. BAXTER, JR 2,695,550

SEALING MEANS FOR CYLINDER PAPERMAKING MACHINES

Filed March 31, 1951

Fig-1

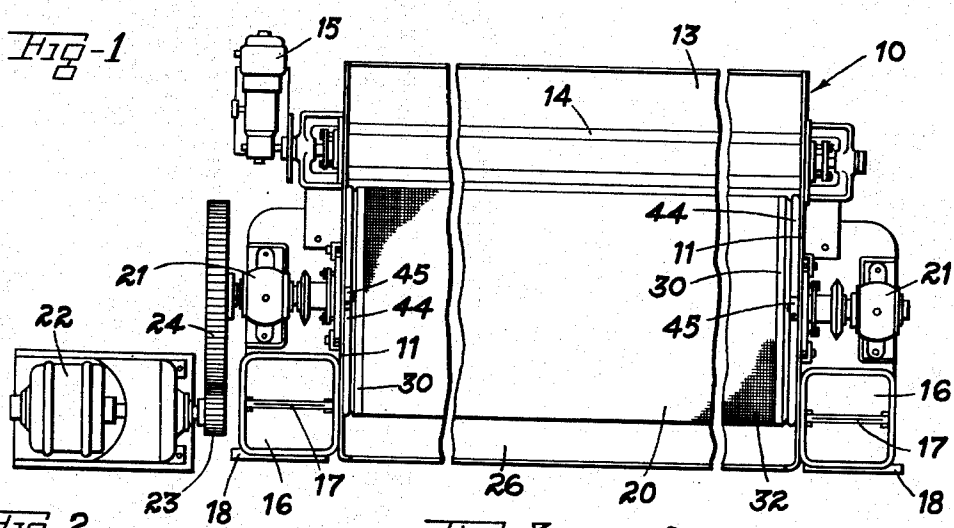


Fig-2

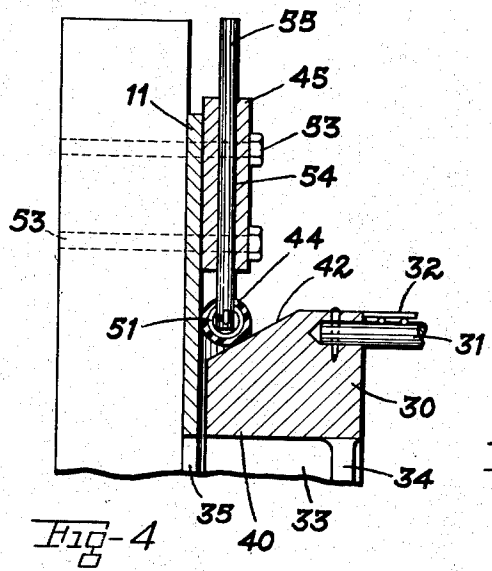


Fig-3

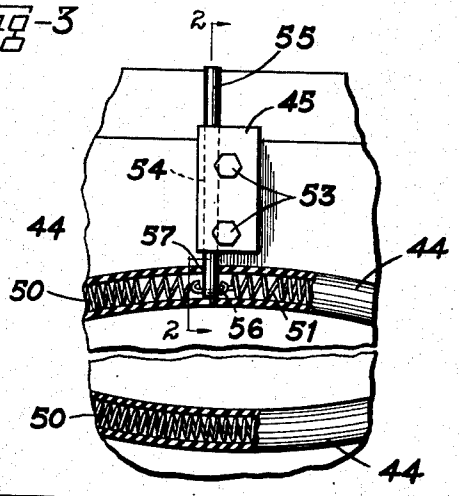


Fig-4

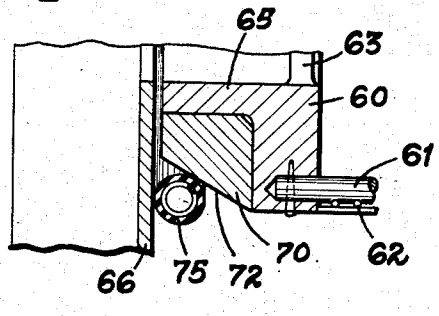
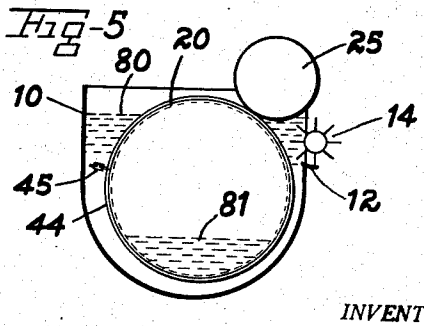


Fig-5



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SEALING MEANS FOR CYLINDER PAPERMAKING MACHINES

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1 Claim. (Cl. 92—43)

This invention relates to paper machinery, and more particularly to paper machines and stock thickeners of the cylinder type which include a vat having a cylinder mold mounted for rotation therein.

In the operation of apparatus of this type, both for paper making and for stock thickening, a lower liquid level is maintained within the cylinder mold than in the portion of the vat outside the mold in order to create a partial vacuum within the mold drawing the white water through the perforate or foraminous mold face, and thus causing the fiber to be deposited on the outer surface of the mold while the white water is discharged through the open ends of the mold to the discharge outlets of the vat. Since the cylinder mold rotates continuously in operation, it requires running clearance with respect to the adjacent end walls of the vat, and unless this clearance area is effectively sealed, not only will the effective vacuum and suction through the mold face be reduced, but fiber will be drawn directly through this area and either be lost or else must be subsequently recovered from the white water. Many attempts have been made to provide effective seals for this purpose, but in general they have resulted in relatively complex sealing devices and arrangements which have been comparatively expensive as well as difficult to install and maintain.

It is accordingly the principal object of the present invention to provide a sealing device for the space between the ends of the cylinder mold and the end walls of a vat which is simple and economical to construct, install and replace, which offers low frictional resistance to rotation of the cylinder mold in operation, which does not require special adjustment or alignment between the mold and the vat walls, and which provides a substantially complete seal around the entire circumference of the end of the mold.

It is also an object of the invention to provide a sealing device for the above purpose which may with equal ease be built into a new cylinder machine or thickener or be installed on an existing cylinder mold without requiring modification or reconstruction of the adjacent end walls of the vat.

Other objects and advantages of the invention will be apparent from the following description, the accompanying drawing and the appended claim.

In the drawing—

Fig. 1 is a top view showing a stock thickener of the vat type embodying a sealing device for the ends of the cylinder mold constructed in accordance with the present invention;

Fig. 2 is an enlarged fragmentary section on the line 2—2 of Fig. 3 showing the sealing device and associated retainer on the end of the cylinder mold;

Fig. 3 is a view of the sealing device looking from right to left in Fig. 2 with the cylinder mold and fitting removed;

Fig. 4 is a section similar to Fig. 2 showing another form of the sealing device especially adapted for use on an existing cylinder mold; and

Fig. 5 is a somewhat diagrammatic view illustrating the use of the sealing device of the invention to provide a substantially complete 360° seal around the end of a cylinder mold.

Referring to the drawing, which illustrates preferred embodiments of the invention, the thickener in Fig. 1 includes a vat **10** having end walls **11** and an overflow outlet lip **12** to the discharge trough **13** for the thickened stock, the discharge being controlled by a transfer roll

14 driven by a motor **15**. The white water outlet troughs **16** at either end of the vat are provided with adjustable overflow gates **17**, and their lower ends are fitted at **18** for attachment to suitable conduit pipes. The cylinder mold **20** is mounted for rotation in the vat by means of bearings **21** and is driven by the motor **22** through a pinion **23** and large gear **24**, and Fig. 5 shows the usual couch roll **25**. In operation, the thin stock enters the vat at **26** by way of a suitable inlet flow trough, not shown, and the white water drawn through the face of the mold passes out through the open mold ends to the outlet troughs **16**. The overflow gates **17** are adjustable to vary the white water level within the interior of the mold in order to establish the proper difference in head between the stock in the outer portion of the vat and the white water within the mold and thus to maintain the desired vacuum within the mold.

For maximum efficiency in operation, it is desirable to seal as completely as possible the clearance space necessarily present between the ends of the mold and the adjacent end walls **11** of the vat, and a sealing device provided for this purpose in accordance with the present invention is shown in detail in Figs. 2 and 3. One of the end spiders **30** of the mold **20** is shown fragmentarily in Fig. 2, together with one of the supporting rods **31** for the wire covering **32** which forms the foraminous mold face. As shown, the spider **30** is open at **33** between its spokes **34** to provide direct communication through the opening **35** in the vat wall **11** into the adjacent outlet trough **16**. The outer end of the spider **30** includes an annular flange **40**, and this flange is proportioned to extend into closely spaced relation with the vat wall **11** and is beveled at **42** to provide a frusto-conical surface having its smaller end outermost.

The sealing member of the invention includes a sealing ring **44**, which fits over the frusto-conical surface **42** and is proportioned for cooperation therewith in cammed relation towards the adjacent vat wall **11** to seal the space therebetween as shown in Fig. 2. It is desirable to hold the sealing ring against rotation with the mold, and this may be done by means of the retainer **45** and mounted on vat wall **11**. The member **44** is formed of a flexible material having a low coefficient of friction such as a natural or synthetic rubber, and highly satisfactory results have been obtained in practice with this member **44** formed of a tube of the synthetic resin commercially available under the trade name of Koroseal, which has the advantages of high strength and toughness as well as low frictional qualities, especially when constantly lubricated with water as normally occurs in the practice of the invention.

The sealing ring **44** is provided with an inner core **50** shown as a relatively stiff helical spring having the coils thereof relatively close together to support the tube **44** against compression, and the spring core **50** may be secured within the tube **44** by partial embedding of the coils thereof in the material of the tube, which is readily done by heating the spring core temporarily to soften the plastic material of the tube. In order to hold the ends of the tube **44** together and thus to form it into a substantially continuous ring, a more flexible spring portion **51** is provided at each end of the core **50**, and these spring portions **51** are proportioned for connection under sufficient tension to retain the ends of the tube **44** in abutting relation as shown in Fig. 3.

Assembly of the device and improved results in operation are obtained by connecting the spring portions **51** by means of the retainer **45**, which is shown as a block bolted at **53** to the vat wall **11** and having a bore **54** therethrough which has a rod **55** slidably received therein. The lower end of the rod **55** carries a double ended hook **56** adapted for connection with the outer ends of the spring portions **51**, and semi-cylindrical notches **57** are provided in the ends of the tube **44** for receiving rod **55** so that when the two spring ends are secured to hook **56**, the ends of the tube **44** will be drawn tightly together as shown.

Preferred results are obtained in accordance with the invention if the parts are so proportioned that when the sealing member **44** is mounted in position as shown, it will be under sufficient circumferential tension to seat

on the beveled surface **42** in such cammed relation therewith that it will be constantly urged against the vat wall **11**. Thus the beveled surface **42** and the tension provided in the sealing member will combine to urge the sealing member into wedged relation with both the surface **42** and the surface of the vat wall to form an effectively tight seal around the entire circumference of the mold, and since the suction condition within the mold in operation will tend only to draw the sealing member more tightly into this sealing position, highly effective sealing of the junction between the fitting **40** and vat wall **11** will be constantly maintained. At the same time, with the part **44** formed of material properly chosen for low friction with respect to the surface **42**, as is obtained with the Koroseal material noted above, there is little frictional resistance to rotation of the mold and correspondingly low wear on the sealing members.

In addition to its simplicity of construction and efficiency in operation, the sealing device of the invention has outstanding practical advantages from the standpoint of ease of installation and replacement. Since the sealing ring is arranged for direct engagement with the adjacent surface of the vat wall, special construction of the wall and careful fitting of the parts in manufacture and assembly are not required, and also there is considerable allowable tolerance for variation between the overall length of the mold and the length of the space between the end walls of the vat in which the mold is received. Thus the initial installation of the sealing device and the replacement of a worn sealing member are equally quick and easy, requiring only that the new sealing member be threaded around the end of the mold and its two spring ends be connected to the retaining hook.

A special advantage of the sealing device of the invention lies in the fact that the junction between the ends of the sealing member **44** may readily be located below the liquid level in the outer part of the vat where it is desired to seal substantially completely against the passage of air between the vat walls and the ends of the cylinder mold. As shown in Fig. 5, the retainer **45** may readily be installed below the level **80** of stock outside the vat so that the junction of the ends of member **44** will be completely covered by the stock, the level of white water within the mold being indicated at **81**. This arrangement is especially useful where it is desired to provide a positive air pressure within the mold to aid in removing the thickened pulp from the top surface of the mold. With the sealing device arranged as shown in Fig. 5, an effectively complete seal is provided around the entire 360° of the mold, since any minor gap which might exist at the junction of the ends of the sealing member will be effectively sealed against in leakage of air by the pressure of the liquid stock above this junction.

The invention is readily applicable to an existing cylinder mold and vat as well as a mold in which the beveled fitting for supporting the sealing ring is constructed as part of the end spider. Thus Fig. 4 shows a fragment of an end spider **60** of a cylinder mold including supporting rods **61** for the foraminous mold covering **62** and having spokes **63** providing an open

end construction for discharge of the white water. The spider **60** is formed with an axially projecting annular flange **65** which in a conventional construction of sealing device is carefully aligned with a similar flange on the vat wall **66** to support a sealing strap. In accordance with the present invention, however, a ring **70** having a beveled outer surface **72** is shrunk or otherwise secured on the flange **65** for cooperation with a sealing ring **75** of the same construction as shown in Figs. 2 and 3, thus providing the same practical advantages already described in connection with the form of the invention shown in Figs. 2 and 3, and it will be apparent that the length of the ring **70** may readily be altered as required to fit in properly close relation with the vat wall.

While the forms of apparatus herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to these precise forms of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claim.

What is claimed is:

In combination with a cylinder mold mounted for rotation in a vat having a flat vertical end wall and provided with means for maintaining a lower liquid level within said mold than in the portion of the vat outside said mold, sealing means for the junction between said flat wall and the adjacent end of said mold comprising means forming an outwardly converging frusto-conical end surface on said end of said mold, said mold being proportioned to fit within said vat with the smaller end of said surface in closely spaced relation with said flat vat wall, a sealing member of flexible material proportioned to encircle said frusto-conical surface, means for resiliently connecting the ends of said sealing member to form said member into a substantially continuous ring seated on said frusto-conical surface in rotatably wedged relation with said surface and said flat vat wall, and means on said wall for retaining said connected ends of said sealing member on said wall at a level below the level of liquid in the portion of the vat outside said mold to effect sealing of the junction between the ends of said sealing member by the liquid thereabove while causing said sealing member to be continuously cammed by said frusto-conical surface into said wedged relation therewith and with said vat wall.

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