Nov. 19, 1946. F. A. DIECKBRADER 2,411,416

PAPERMAKING APPARATUS

Filed Oct. 6, 1943 2 Sheets-Sheet 1

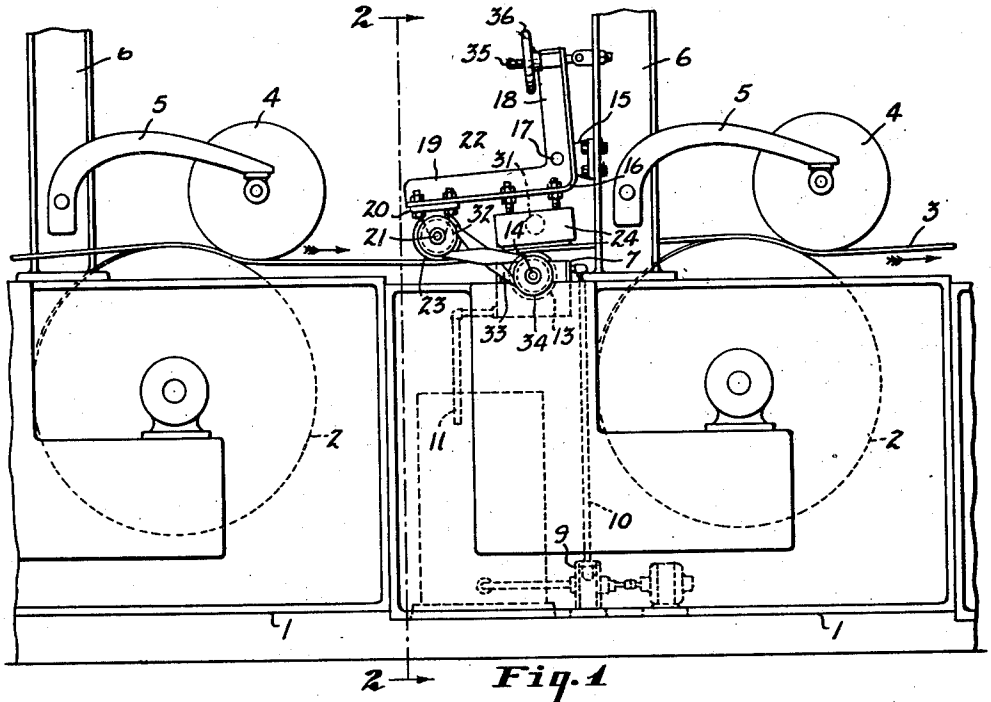


Fig. 1

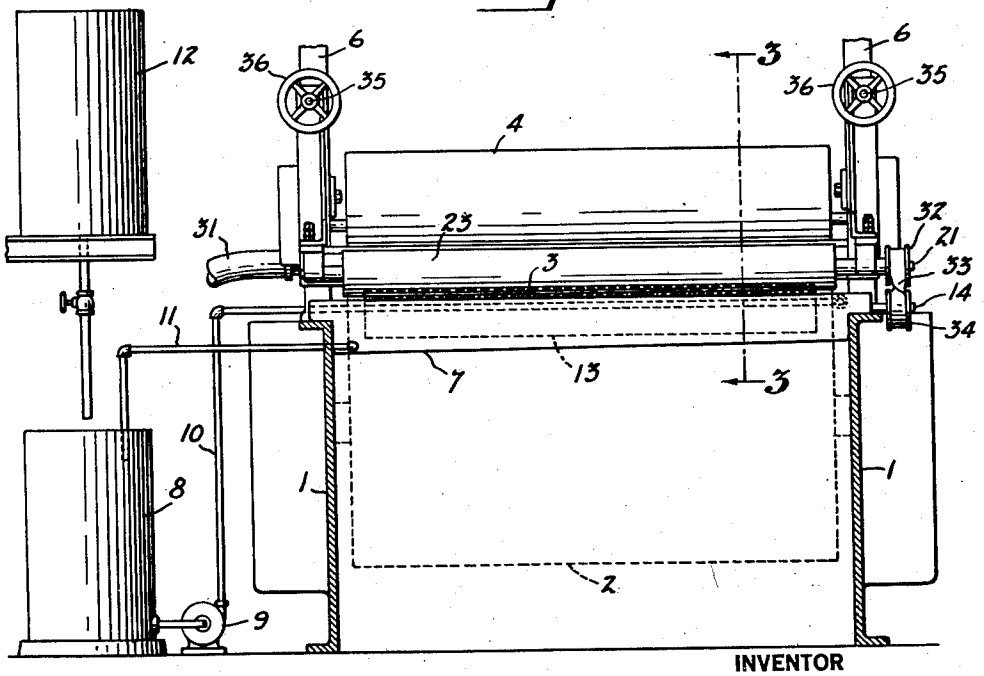


Fig. 2

INVENTOR
Frederick A. Dieckbrader
BY
Evans & McCoy
ATTORNEYS

Nov. 19, 1946. F. A. DIECKBRADER 2,411,416

PAPERMAKING APPARATUS

Filed Oct. 6, 1943 2 Sheets-Sheet 2

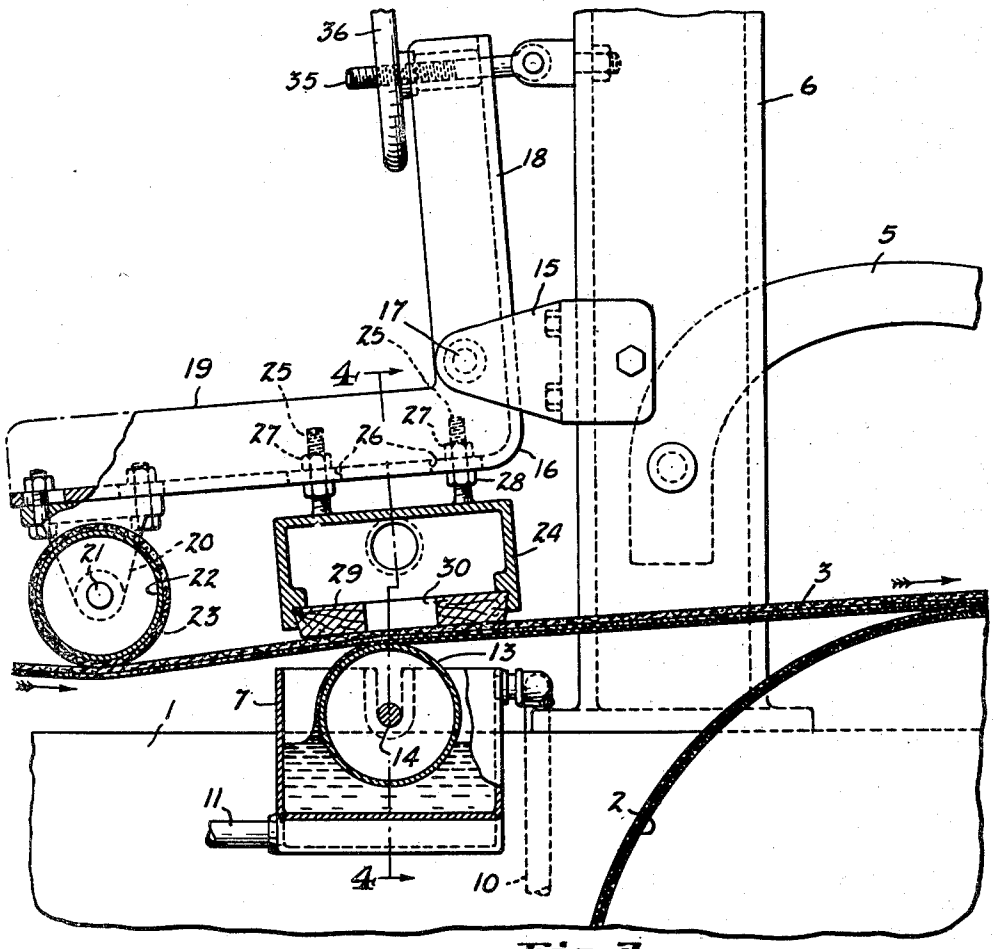


Fig. 3

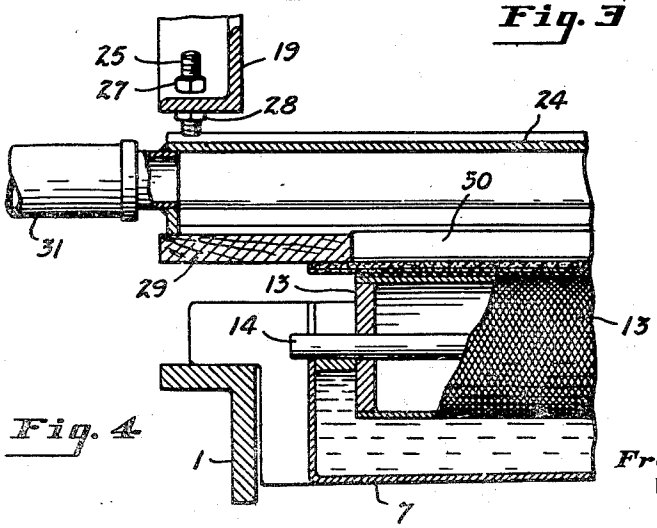


Fig. 4

INVENTOR
Frederick A. Dieckbrader
BY
Evans & Mecoy
ATTORNEYS

Patented Nov. 19, 1946

2,411,416

UNITED STATES PATENT OFFICE

2,411,416

PAPERMAKING APPARATUS

Frederick A. Dieckbrader, Toronto, Ontario, Canada, assignor to The Hinde & Dauch Paper Company, Sandusky, Ohio, a corporation of Ohio

Application October 6, 1943, Serial No. 505,169

4 Claims. (Cl. 92—41)

1

The present invention relates to paper-making apparatus and more particularly to a device for continuously applying a layer of filling material, such as asphalt, starch, formaldehyde, etc. between layers of paper stock on the felt during the passage of the felt over the cylinders at the wet end of a cylinder paper-making machine for waterproofing, stiffening, preserving or otherwise affecting the properties of the paperboard.

One of the main objects of the present invention is to provide a means for applying a uniform coating of filling material to the wet paper stock adhering to the felt without injury to the paper sheet.

A more specific object of the present invention is to provide means for firmly holding the paper stock to the felt during the application of the layer of filling material thereto.

It is also an object of the invention to provide an applicator roll that bears lightly but without slippage against the paper stock carried by the felt.

A further object of the present invention is to provide a coating mechanism that is adapted to be mounted between successive cylinder molds in a conventional paper-making machine.

With the above and other objects in view, the invention may be said to comprise the apparatus as illustrated in the accompanying drawings, hereinafter described and particularly set forth in the appended claims, together with such variations and modifications thereof as will be apparent to one skilled in the art to which the invention pertains.

Reference should be had to the accompanying drawings forming a part of this specification, in which:

Figure 1 is a side elevation of a portion of a paper-making machine showing the device of the present invention applied thereto;

Fig. 2 is a section taken on the line indicated at 2—2 in Fig. 1; and

Fig. 3 is a fragmentary vertical section on an enlarged scale, taken on the line indicated at 3—3 in Fig. 2.

Fig. 4 is a section taken on the line indicated at 4—4 in Fig. 3.

In the accompanying drawings, the device of the present invention is shown mounted upon one of the vats 1 at the wet end of a cylinder paper-making machine. In each of the vats 1 there is mounted a cylinder mold 2 that collects a layer of paper-forming fibers from the liquid in the vats on its periphery and transfers this layer of fibers to a felt 3 that travels continuously

2

over the cylinder molds. A couch roll 4 bears upon the upper surface of the felt adjacent the top of each of the cylinder molds 2 to hold the felt in engagement with an arc of each cylinder, so as to cause adhesion between the layers of paper stock on the cylinder mold and the underside of the felt or between the paper stock on the cylinder and a layer of paper stock adhering to the underside of the felt. Each couch roll 4 is carried by arms 5 that are pivotally attached to columns 6 mounted upon opposite sides of the vat 1 and adjacent the cylinder mold in the vat.

The device of the present invention may be applied to the wet end of a cylinder paper machine to apply a coating to paper stock adhering to the underside of the felt after one or more layers of paper stock have been picked up by the felt. The two vats herein shown may be any two of the vats of the paper-making machine and it is to be understood that identical coating devices may be mounted between other cylinder molds in the machine where additional layers of the filling material in the paperboard are desired. In the top portion of one of the vats adjacent the cylinder mold therein, there is mounted an applicator box 7 that extends across the space between the side walls of the vat with its open top above the top of the vat. The box 7 conains the filling material to be applied to the paper stock which may be in solution or in suspension in a liquid, and means is provided for continuously circulating the liquid through the box 7. At one side of the vat there is mounted a circulating tank 8 and a pump 9 that draws liquid from the lower portion of the tank 8 and discharges it through a pipe 10 into one end of the box 7. From the other end of the box 7 a drain pipe 11 leads into the upper portion of the circulating tank 8. A suitable batch tank 12 may be provided in which the solution, emulsion or suspension of the filling material may be formed and from which it may be delivered into the circulating tank 8. Within the box 7 there is mounted an applicator roll 13, preferably knurled, which projects slightly above the top box 7 and which dips into the liquid contained in the box so that a continuous film of filling material will be maintained upon the roll 13 when it is rotated. The roll 13 is mounted upon a shaft 14 journaled in the ends of the box 7 and preferably extends the full width of the felt 3 to apply a coating throughout the width of the paper sheet.

Above the felt 3 brackets 15 are attached to the columns 6 at opposite sides of the vat upon which the box 7 is mounted. These brackets

serve to support two L-shaped suspension members 16 that are connected by axially aligned pivots 17 to the brackets 15. Each of the suspension members 16 has an upwardly extending arm 18 and an arm 19 that is disposed substantially parallel with the felt 3, the arms 18 and 19 of each member extending from the pivot 17 that is located near the angle between the two arms. Adjacent their free ends, the arms 19 have bearing brackets 20 depending therefrom and in the brackets 20 there is journalled a shaft 21 that carries a pressure roller 22 that preferably extends the full width of the felt 3. The pressure roller 22 bears against the top face of the felt 3 during operation and has its cylindrical periphery covered with a layer 23 of felt that serves to resist slipping between the roller 22 and the felt 3.

Mounted on the arm 19 between the pressure roller 22 and the pivot 17 there is a suction box 24 that has bolts 25 fixed to the top wall thereof and extending upwardly through elongated, longitudinal slots 26 in the arms 19. Each of the bolts 25 has two nuts 27 and 28 thereon that engage the top and bottom faces of the arms 19. The suction box 24 has a bottom face 29 preferably formed of wood and provided with a longitudinal slot 30 extending the full length of the roller 13. One end of the suction box may be connected by a flexible conduit 31 to a suction pump (not shown) for maintaining a sub-atmospheric pressure within the box.

During operation of the machine, the suction box 24 bears upon the upper surface of the film 3 above the roller 13, the box being preferably positioned so as to lightly press the felt 3 against the periphery of the applicator roll 13. The slot 30 is located directly over the engaging portion of the applicator roll 13 so that the suction within the box serves to draw the portion of the paper sheet passing between the suction box and the roll 13 tightly against the underside of the film 3, so that engagement of the paper sheet with the roll 13 will not cause the paper sheet to be loosened from the felt.

To enable an unbroken liquid film to be continuously transferred from the surface of the applicator roll to the paper sheet on the underside of the felt, it is desirable that the roll 13 engage the paper sheet on the felt without slippage and, since the applicator roll 13 bears lightly against the paper stock, it is desirable that means be provided to drive the roll 13 at a peripheral speed that corresponds to the linear speed of the felt. To this end, the shaft 21 of the pressure roll 22 has a pulley 32 fixed thereto, which receives a crossed belt 33 that extends over a pulley 34 fixed to the shaft 14 of the applicator roll. The roll 22 is driven without slippage by the traveling felt 3 and drives the roll 13 through the belt 33 at the proper speed to maintain a non-slip rolling engagement with the underside of the paper sheet carried by the felt. As herein shown, the roll 22 and the pulley 32 are of the same diameters as the roll 13 and pulley 34 so that the peripheral speed of both rolls is the same as the linear speed of the felt.

The suspension members 16 are adapted to be adjusted about the axis of the pivot 17 to vary the pressure of the suction box 24 and roll 22 on the felt 3 by means of screws 35 pivoted to the columns and extending through openings in the arms 18 and handwheels 36 that have threaded engagement with the screws 35 and bear against the arms 18. By properly adjusting the suction box 24 and the roll 22 by means of the handwheels 36, the felt 3 may be held with the proper pressure against the applicator roll 13. The brackets 20 are preferably adjustably connected to the arms 19 by means of bolts 37 passing through the brackets 20 and through longitudinal slots 38 in the arms 19. By adjusting the brackets 20 on the arms 19 the proper tension may be applied to the belt 33.

The top of the applicator roll 13 is below the normal path of travel of the felt 3 and, when the applicator is not in use, the supporting members 16 are actuated to hold the roll 22 and suction box 24 clear of the felt 3 so that the normal operation of the machine is not interfered with.

To put the device of the present invention into operation, a batch of the material to be applied is made up in the batch tank 12, run into the circulating tank 8 and then circulated through the applicator box 7 by means of the circulating pump 9. The felt roll 22 and suction box 24 are lowered upon the felt 3 until the felt is depressed firmly against the applicator roll by the leading edge of the bottom face 29 of the suction box. The helper drive belt 33 is then put in place. After the applicator has been operatively connected as above described, the material prepared for application in the batch tank 12 and circulated through the applicator box 7 by means of the circulating pump 9 is picked up by the knurled applicator roll 13 and applied to the sheet of paper that is adhering to the underside of the felt 3. The following cylinders 2 each add their layer of paper stock and the completed board then consists of top and bottom layers composed of conventional paper stock with an intermediate layer of the filling material.

The device of the present invention continuously applies an unbroken film of the filling material to the wet and fragile sheet of paper stock on the felt, damage to the paper being avoided by holding the paper sheet to the felt by suction and a uniform, unbroken coating being insured by the action of the knurled applicator roll over which the felt 3 travels without slippage due to the helper drive.

It is to be understood that variations and modifications of the specific device herein shown and described for purposes of illustration may be made without departing from the spirit of the invention.

What I claim is:

1. A device for continuously applying a layer of filling material to paper stock adhering to the underside of the felt during its travel between cylinders at the wet end of a cylinder paper machine comprising an applicator roll beneath the felt, means for maintaining a coating of filling material upon the surface of said roll, a suction box overlying the roll and extending transversely across the felt and engaging the top of the felt above said roll adjacent the point of engagement of the felt with said roll for maintaining a suction upon paper stock engaging said roll, a pressure roll parallel with the suction box and in engagement with the top of the felt adjacent the box, and means for simultaneously raising or lowering said pressure roll and suction box.

2. A device for continuously applying a layer of filling material to paper stock adhering to the underside of the felt during its travel between cylinders at the wet end of a cylinder paper machine comprising an applicator roll beneath the felt, means for maintaining a coating of filling material upon the surface of said roll, a pair of

parallel arms mounted above the felt, one at each side of the felt and extending longitudinally thereof, means for supporting said arms to swing about a horizontal axis adjacent an end thereof, a pressure roll rotatably supported upon said arms adjacent their free ends, a suction box attached to said arms between the roller and the pivotal axis, and means for adjusting said arms about said pivotal axis to regulate the pressure of the roll and box upon the felt.

3. The combination with a wet end of a cylinder paper machine having vats positioned side by side, mold cylinders in each vat and a felt traveling over the cylinders to pick up layers of paper stock therefrom, of a device for applying filling material to paper stock carried by the felt, comprising a box within one of the vats alongside its cylinder, an applicator roll mounted in the box with its top edge above the top thereof, means for maintaining a supply of liquid filling material in said box covering the lower portion of said roll, a suction box overlying the roll and engaging the felt above said roll for pressing the felt against the roll and maintaining a suction upon the paper stock passing over

said roll, and means for adjusting said box to regulate the pressure of the felt against said roll.

4. The combination with the wet end of a cylinder paper machine having vats positioned side by side, mold cylinders in each vat and a felt traveling over the cylinders to pick up layers of paper stock therefrom, of a device for applying filling material to paper stock carried by the felt, comprising a box within one of the vats alongside its cylinder, an applicator roll mounted in the box with its top edge above the top thereof, means for maintaining a supply of liquid filling material in said box covering the lower portion of said roll, a suction box overlying the roll and engaging the felt above said roll for pressing the felt against the roll and maintaining a suction upon the paper stock passing over said roll, a pressure roll engaging the top of the felt adjacent said suction box, means for simultaneously adjusting said pressure roll and suction box to regulate the pressure of the felt against said applicator roll, and a crossed belt forming a driving connection between said pressure roll and applicator roll.

FREDERICK A. DIECKBRADER.