Aug. 13, 1968 E. N. RICKERT, JR 3,397,111

CLEANING APPARATUS FOR PAPER MACHINE PRESS FELTS

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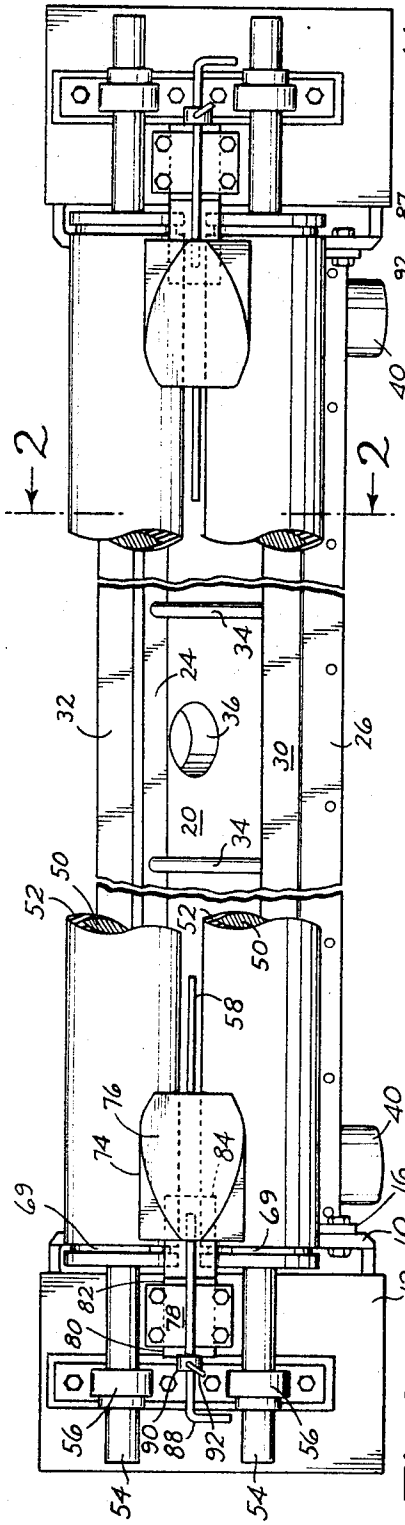


Fig. 1.

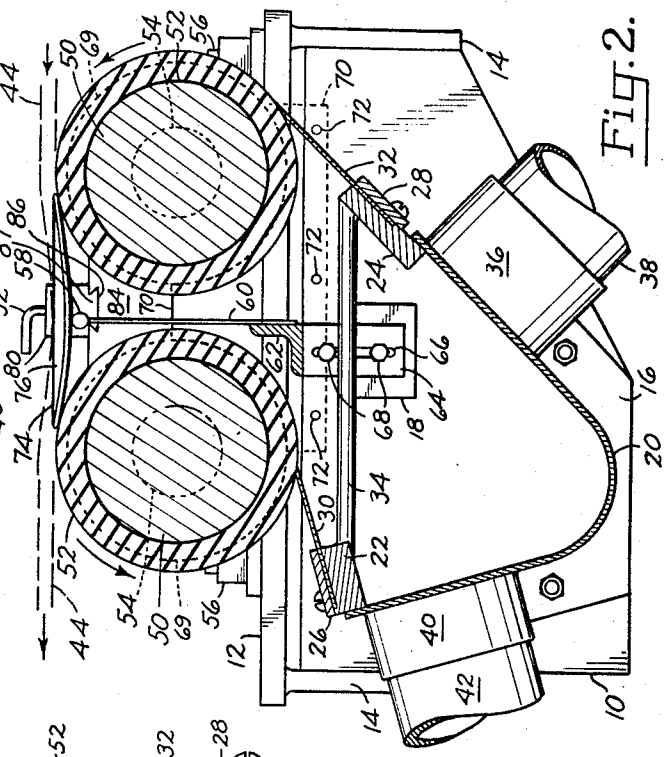


Fig. 2.

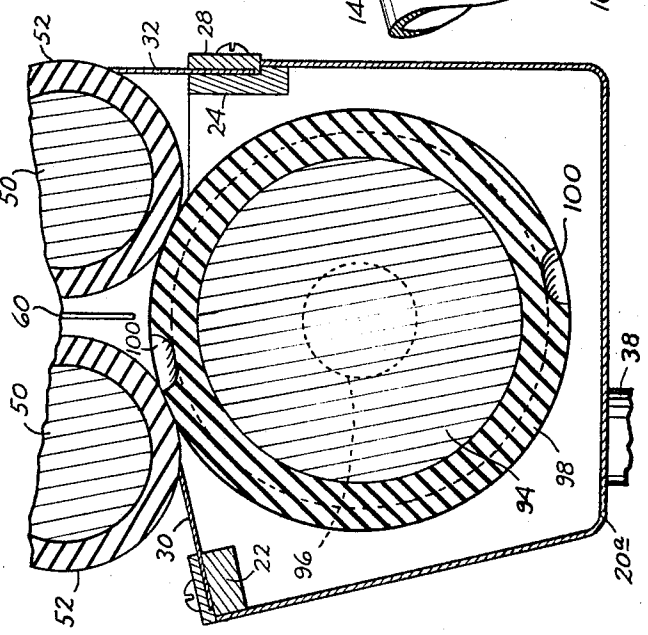


Fig. 3.

Edward N. Rickert Jr.
INVENTOR

BY Eugene D. Farley

Atty.

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CLEANING APPARATUS FOR PAPER MACHINE PRESS FELTS

Edward N. Rickert, Jr., Portland, Oreg., assignor to Monarch Forge and Machine Works, Inc., Portland, Oreg., a corporation of Oregon

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ABSTRACT OF THE DISCLOSURE

A vacuum chamber has an open top partially closed by a pair of spaced rolls over which a paper machine press felt is moved for drying. A first seal is provided between the ends of the rolls and chamber, and a second, adjustable seal is provided between the spaced rolls at the end portions thereof for accommodating press felts of varying width. A baffle between the rolls directs water from the felt into the chamber.

This invention relates to cleaning apparatus for paper machine press felts.

In the manufacture of paper, the paper making pulp slurry is run from the head box onto a forming wire where the pulp is deposited in a thin sheet and drained until the sheet is self-sustaining. The sheet is transferred to endless press felts which remove further quantities of water and subject the sheet to a certain amount of consolidating pressure. The finished paper sheet passes from the press felts to the drier rolls and other processing units and then is rolled on a reel and transferred to other locations for storage or further processing. This sequence of operations is effectuated at machine speeds of up to several thousand feet per minute.

With use, the press felt becomes saturated with water as well as impregnated with wood fibers and small particles of other materials which, if permitted to accumulate, interfere with the proper functioning of the press felts and adversely affect the quality of the paper. It is the general purpose of the present invention to provide apparatus which continuously will dry, clean and open up the press felts of paper making machines, thereby overcoming the foregoing problem.

Further objects of the present invention are the provision of cleaning apparatus for paper making machine press felts:

(1) Which is adaptable to conventional machines without substantial modification thereof.

(2) Which is adjustable to accommodate felts of varying widths.

(3) Which cleans the felts efficiently without subjecting them to undue wear and abrasion.

(4) Which functions at high operating speeds and accordingly increases the production capacity of a given machine.

(5) Which increases the life of the felts.

Generally stated, the press felt cleaning apparatus of my invention comprises a vacuum chamber open at the top and having a length greater than the width of the felt. The chamber is positioned for traversal by the nonworking stretch of the endless felt with the paper sheet-contacting surface of the latter facing the chamber.

A pair of parallel spaced rolls are mounted rotatably across the open top of the vacuum chamber, longitudinally thereof. The outer surface of the rolls is adapted to be traversed by the felt.

Adjustable seal means are provided for sealing both the top and ends of the chamber. Baffle means are mounted between the rolls for directing water removed from the felt into the collection area of the vacuum chamber.

Accordingly as the water-saturated felt traverses the

open top of the vacuum chamber at a high rate of speed, the water contained in the felt is sucked through the contaminated contact surface thereof and transferred into the collection area of the vacuum chamber. As the water is being removed from the felt, it cleans the working surface of the latter and opens up its pores. The resulting dried felt then may be returned on a continuous basis to the pressing and drying of a further quantity of wet paper sheet.

Considering the foregoing in greater detail and with particular reference to the drawings, wherein:

FIG. 1 is a foreshortened plan view of the presently described cleaning apparatus for paper machine press felts in a first embodiment;

FIG. 2 is a transverse sectional view taken along line 2—2 of FIG. 1; and

FIG. 3 is a transverse sectional view similar to FIG. 2 but illustrating the presently described press felt cleaning apparatus in a second embodiment adaptable for use with felts of great width.

As has been explained above, the paper machine press felt cleaning apparatus of my invention may be applied to the cleaning of a continuously running press felt. The apparatus may be stationed at a selected location between the point at which the paper sheet leaves the felt and that at which it again is picked up by the felt. Thus it may be located to advantage just beyond the point at which the paper sheet leaves the felt for the driers, at or near the reverse bend made by the felt as it is returned to the head of the pressing unit.

The apparatus may be arranged at various angles depending upon whether it is applied to vertical, horizontal or intermediate stretches of the felt. Where it is located at the reverse bend at the discharge end of the felt, it would be arranged at a counterclockwise angle of from 45–90° with reference to the position illustrated in FIG. 2.

The apparatus is mounted in a frame which includes a pair of heavy, vertically arranged end plates **10**. Each of plates **10** mounts a longitudinally extending shelf **12** supported on brackets **14**.

A second pair of plates **16** are bolted to the inside faces of plates **10**. A trough **20** defines a vacuum chamber. It is open at its top and is welded between plates **16**. The upper margins of plates **16** are provided with cut-away notches **18**.

The longitudinal upper margins of the trough support inwardly directed bearing plates **22**, **24**. Clamp plates **26**, **28**, respectively are bolted to the latter. The clamp plates in turn mount doctor blades **30**, **32** which extend the length of the rolls and serve the important secondary function of sealing off the top marginal areas of the vacuum chamber. Transverse brace rods **34** extend between plates **22**, **24**.

Means are provided for applying vacuum to chamber **20** and also for draining away water collected therein. To this end the vacuum box is provided with a centrally located nipple **36** and attached conduit **38** on one side and a pair of spaced nipples **40** and attached conduits **42** on the other side.

Keeping in mind that the position of the apparatus is from 45–90° counterclockwise from the FIGURE 2 position thereof, the conduit **38** is attached to a source of vacuum while conduits **42** are connected to a sump or sewer line for the collection of water drained from the felt.

Vacuum chamber **20** is provided with a pair of rotatably mounted roller lips which are traversed by and support felt **44**.

As seen particularly in FIG. 1, the vacuum chamber lips comprise a pair of rolls **50** extending in parallel, spaced relation to each other longitudinally of the vacu-

um chamber. The diameter of rolls **50** must be held to a minimum for optimum operation. They should be located as closely together as possible. Their peripheral surfaces bear a covering **52** of rubber, fiberglass or other material to give better traction and reduce corrosion.

Rolls **50** may be driven at a speed substantially equal to the linear speed of felt **44**. In the alternative, and as shown, they may be rotatably mounted as idler rolls relying on frictional engagement with felt **44** for their drive. Thus the ends of shaft **54** of each of the rolls are journaled in bearings **56** bolted to shelves **12**.

Water deflector means is positioned between the rolls. This member guides water thrown by centrifugal force from one roll downwardly into the collection area at the bottom of the vacuum chamber. This prevents the water from being thrown against the adjacent roll and returned to the felt.

A smooth rod **58** extends between the rolls substantially the entire length thereof, just beneath the plane of their upper peripheral surfaces. As is evident particularly in FIG. 2, the smooth, round contour of rod **58** minimizes felt wear in the event the felt from time to time should come in contact with it, as a result, for example, of the application of increased vacuum to chamber **20**.

Rod **58** is supported by a deflector plate **60** which extends longitudinally of the rolls in the space between them. Plate **60** has a width which is substantially equal to the diameter of the rolls. Its upper end areas are cut away.

Plate **60** is mounted for adjustment toward and away from felt **44**. To accomplish this purpose, the lower end of the plate is welded to an angle iron support **62** which extends substantially the entire length of the apparatus. At each end angle iron **62** is welded to a support plate **64** having a slot **66**. Slot **66** registers with a cooperating slot through frame plate **16**. Bolts **68** mount plate **64** so that it may be adjusted toward and away from the felt in the desired manner.

Seal means are present for sealing against the ingress of air the areas at the ends of the rolls and the areas at the top end margins of the rolls.

To accommodate the seal means employed for sealing off the areas as the ends of the rolls, the rubber surfaces **52** of the latter are formed with annular grooves **69**, one at each end. A flexible seal plate **70** having a top surface contoured to fit in grooves **69** then is bolted with bolts **72** to the outside of frame plate **14**. It is lubricated by water removed from the felt. Seal plate **70** is made of micarta, rubber or other stiffly flexible material. When positioned in the manner indicated, it seals off the area at the ends of the rolls so that air can not enter to break the vacuum existing within vacuum chamber **20**.

The seal means employed for sealing off the area at the top end margins of the rolls is adjustable inwardly with respect to the rolls to accommodate felts of varying width.

The margin seal means employed at each end thus comprises a plate or deckle **74** having a tapered, dished, upper surface **76**. The length of deckle **74** is sufficient to underlie the longitudinal side edge of felt **44**. Its width is sufficient to span the distance between the top surfaces of rolls **50**.

The mounting means for mounting deckle **74** not only permits inward and outward adjustment of the deckle, but also cooperates with seal plate **70** in sealing off the end area between the rolls.

The mounting means comprises a flat plate **78** bolted to the upper surface of shelf **12**. Extending upwardly from the outer end of plate **78** is standard **80**. Extending upwardly from its inner end is a standard **82**.

Bolted to the inner face of plate **82** is a deckle support member **84**. The lower surface of support member **84** is flat. It meets the upper surface of seal plate **70** to complete the seal at the end of the rolls.

The side surfaces of support member **84** are arcuate,

having a radius substantially the same as that of the rubber coverings of rolls **50**. The upper surface of support member **84** is formed with a dove-tailed shaped guideway **86**. The under surface of deckle **74** is provided with a complementary dove-tailed shaped slide **87** which is received in guideway **86**.

The inner end of an adjusting rod **88** is secured to the lower portion of deckle **74**. Adjusting rod **88** is supported in an extension **90** extending upwardly from standard **78**. A screw clamp **92** working in extension **90** fixes adjusting rod **88** in any desired position of inward adjustment.

The form of the invention illustrated in FIG. 3 is analagous to that above described with the exception that provision is made for a third roll, a back-up roll which is in peripheral supporting engagement with rolls **50** supporting them along their length. This is of particular importance when the felts being cleaned are of great width. Such felts require the application of rolls **50** of corresponding length. Such rolls are subject to deflection because of their inherent weight. Deflection of the rolls obviously would result in imperfect contacting of the roll surfaces by the felt, with the result that the vacuum would be broken and the apparatus would operate imperfectly.

Hence in the FIG. 3 form of the invention, a vacuum chamber **20***a* is dimensioned and contoured to accommodate a large back-up roll **94** mounted on shaft **96**. Roll **94** may be an idler roll driven by peripheral engagement with rolls **50** which in turn are driven by frictional engagement with felt **44**. Roll **94** has a rubber cover **98**, the peripheral surface of which is formed with a worm pattern of grooves **100** to allow for the passage of water and to transfer the vacuum from the vacuum chamber to the underside of the felt.

OPERATION

In operation, the herein described cleaning apparatus for paper machine press felts is arranged with the non-working stretch of the felt in driving frictional engagement with the outer peripheral surfaces of rolls **50**. Deflector plate **60** is adjusted to its optimum working position. This is accomplished by adjusting support plates **64** with adjustment bolts **68**. Side deckles **74** are adjusted inwardly by means of adjusting rods **88** and clamp **90** until their dished, tapered top surfaces properly underlie the side margins of the felt.

Water discharge conduits **42** are connected to the sewer and vacuum conduit **38** is connected to a vacuum pump. As felt **44** passes across rolls **50** it is sucked inwardly, thereupon being supported by the peripheral surface of the rolls. The water with which the felt is saturated is withdrawn by the force of the suction. As it leaves the felt, it washes out the felt pores and frees them from clogging impurities. The felt thus is dried, cleaned and made ready for the pressing and drying of a further quantity of paper.

It accordingly will be seen that there is provided an apparatus in which the several objects of this invention are achieved and which is well adapted for the conditions of practical use.

It is to be understood that the form of my invention herein shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. Cleaning apparatus for paper machine press felts comprising:

(a) a vacuum chamber open at the top and having a length greater than the width of the felt,

(b) evacuating means communicating with the vacuum chamber,

(c) a pair of parallel, spaced rolls mounted across the open top of the vacuum chamber longitudinally

thereof, the outer surfaces of the rolls being in contact with the felt and in sealing engagement with the sides of the chamber below the area of contact with the felt,

(d) mounting means for mounting the rolls for rotation in the direction of felt travel,

(e) first seal means for sealing the area at the ends of the rolls, and

(f) second seal means engaging the end portions of the rolls and extending across and sealing the space therebetween.

2. The apparatus of claim 1 including baffle means mounted between the rolls for directing water removed from the felt into the vacuum chamber.

3. The apparatus of claim 1 wherein the rolls are provided with annular grooves one at each end and wherein the first seal means comprises a plate fastened to the frame of the apparatus and extending between the rolls and into the grooves.

4. The apparatus of claim 1 wherein the second seal means comprises a pair of deckle plates mounted across the outer surfaces of the rolls, one at each end of the roll pair.

5. The apparatus of claim 1 wherein the second seal means comprises a pair of deckle plates mounted across the outer surfaces of the rolls, one at each end of the roll pair, the deckle plates having dished, tapered upper surfaces.

6. The apparatus of claim 1 wherein the second seal means comprises a pair of deckle plates mounted across the outer surfaces of the rolls, one at each end of the roll pair, the deckle plates having dished, tapered upper surfaces and adjusting means for adjusting the deckle plates inwardly and outwardly with respect to the rolls as required to accommodate felts of varying widths.

7. The apparatus of claim 1 wherein the second seal means comprises a pair of deckle plates mounted across the outer surfaces of the rolls, one at each end of the roll pair, the deckle plates having dished, tapered upper surfaces and adjusting means for adjusting the deckle plates inwardly and outwardly with respect to the rolls as required to accommodate felts of varying widths, the adjusting means comprising an adjusting rod connected to the deckle plate and clamp means for releasably maintaining the adjusting rod in a selected position of adjustment.

8. The apparatus of claim 1 including a back-up roll positioned inwardly of the roll pair parallel with the same and between the component rolls thereof in peripheral contact therewith, the back-up roll being rotatably mounted lengthwise of the vacuum chamber and having a peripheral surface provided with channels to accommodate the passage of air and water.

9. Cleaning apparatus for paper machine press felts comprising:

(a) a vacuum chamber open at the top and having a length greater than the width of the felt,

(b) evacuating means communicating with the vacuum chamber,

(c) a pair of parallel spaced rolls rotatably mounted across the open top of the vacuum chamber longitudinally thereof, the outer surface of the rolls being adapted to be traversed by the felt, each roll being formed with an annular groove at each end,

(d) end seal means mounted across the ends of the vacuum chamber between the rolls, being received in the annular grooves therein,

(e) top marginal seal means comprising a pair of deckle plates positioned one across the top outer surface of the rolls, one at each end of the roll pair,

(f) adjusting means connected to the deckle plates for adjusting the same inwardly and outwardly as required to accommodate felts of varying width,

(g) a rod positioned between the rolls in alignment therewith,

(h) a baffle plate aligned with the rod, positioned between the rolls for intercepting water centrifugally discharged therefrom and directing it toward the lower portion of the vacuum chamber,

(i) the upper margin of the baffle plate supporting the rod,

(j) and adjustable mounting means connected to the baffle plate for adjustably positioning it toward and away from the felt.

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ALBERT C. HODGSON, *Assistant Examiner.*