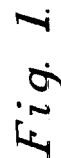


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APPARATUS FOR EXTRACTING WATER FROM WEBS OF PULP OR PAPER

4 Sheets-Sheet 1



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June 24, 1952

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2,601,378

APPARATUS FOR EXTRACTING WATER FROM WEBS OF PULP OR PAPER

Filed Jan. 31, 1947

4 Sheets-Sheet 2

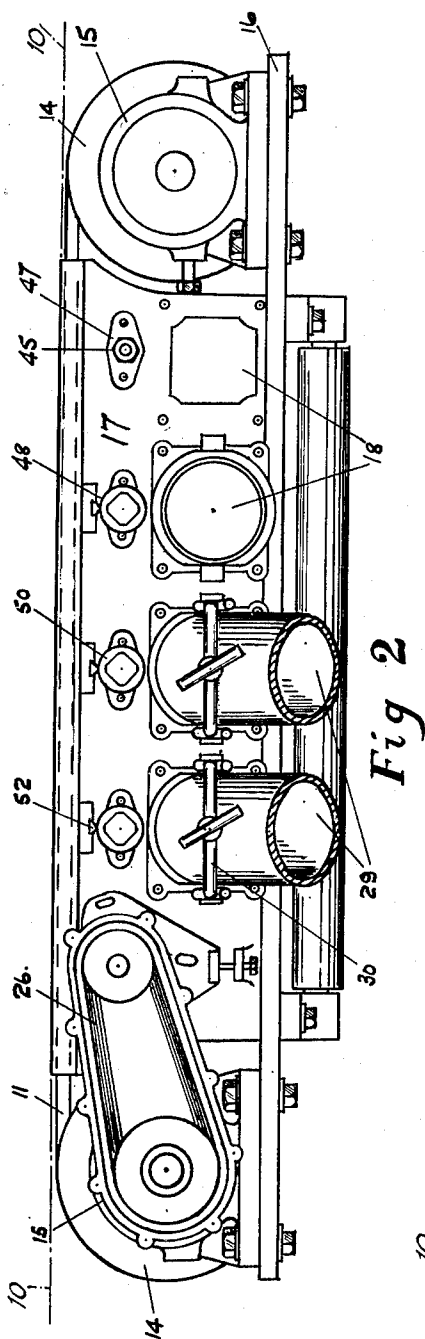


Fig 2

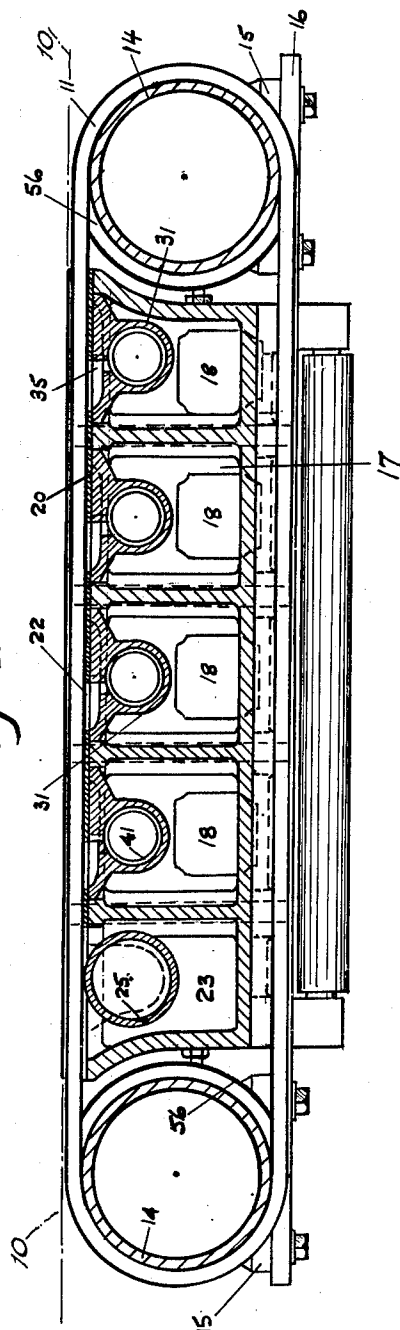


Fig 3

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4 Sheets-Sheet 3

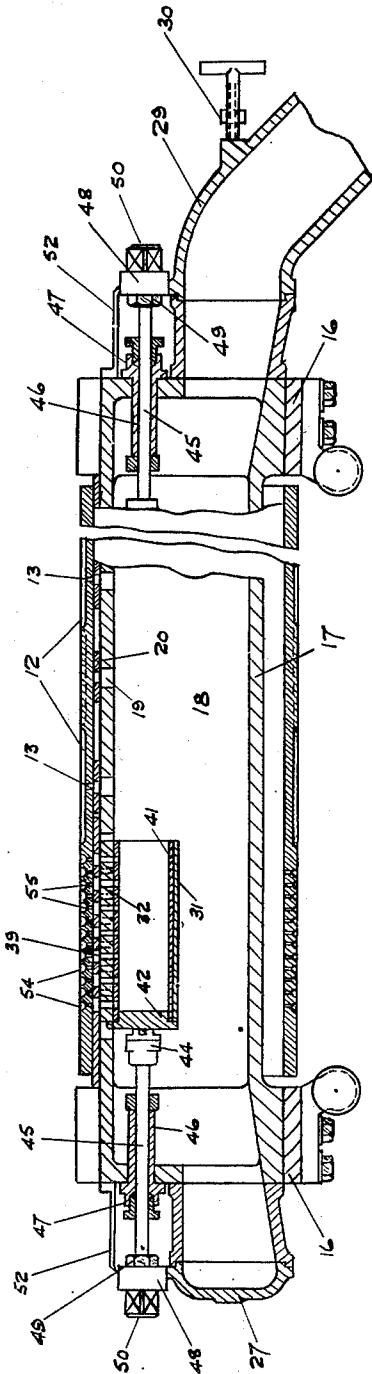


Fig. 4.

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4 Sheets-Sheet 4

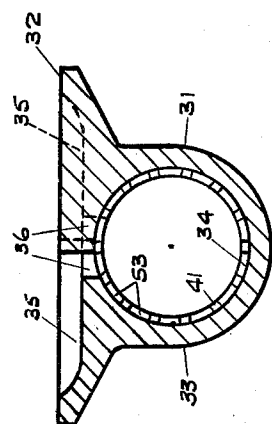


Fig. 7

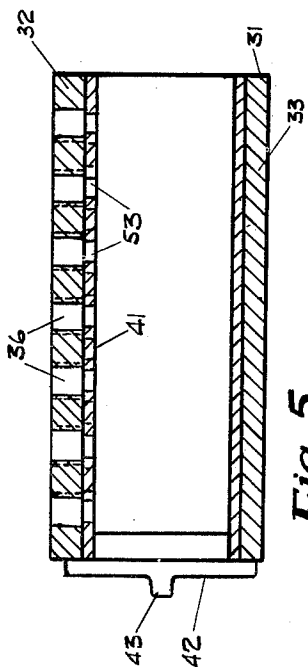


Fig. 5

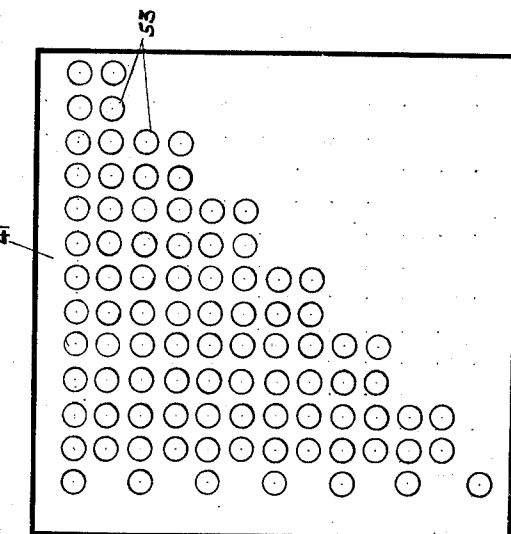


Fig. 6

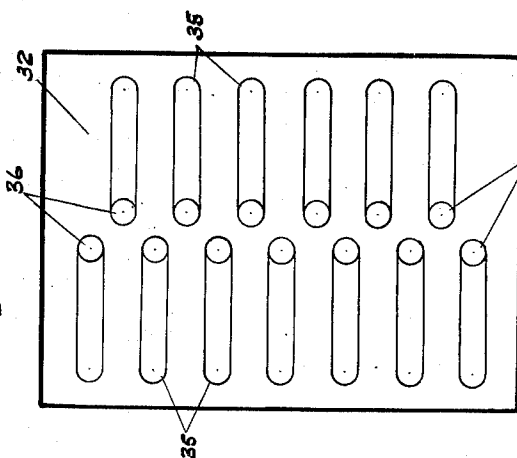


Fig. 8

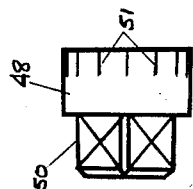


Fig. 9

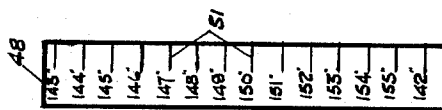


Fig. 10

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UNITED STATES PATENT OFFICE

2,601,378

APPARATUS FOR EXTRACTING WATER
FROM WEBS OF PULP OR PAPERJames William Weston Evans, Clifton, near
Manchester, EnglandApplication January 31, 1947, Serial No. 725,518
In Great Britain February 5, 1946

5 Claims. (Cl. 92—52)

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This invention relates to paper-making machines, and particularly, but not exclusively, to the type of apparatus for extracting water from a paper web described in the specification of prior United States Patent No. 2,039,308, dated May 5, 1936.

In the specification referred to, the wet web of paper was delivered to a travelling "wire" or felt supported and carried forward by an endless grooved and perforated rubber belt, which was driven to pass over, and be supported by, suction boxes, usually in sets of three or more, the vacuum in the boxes drawing the water through the belt, and delivering it to a backwater system in the same way as the ordinary suction box.

Whilst a machine constructed in accordance with the prior patent specification referred to worked well in practice, it had several defects which prevented it from becoming established in the trade as an excellent means of drying the wet felt. For example, the wear on the rubber belt caused by the friction engendered as it was drawn across the top of the suction boxes considerably shortened the effective life of the belt, whilst the rapid accumulation of material in the suction boxes soon rendered them only partly efficient. Also the provision of variable deckle straps capable of being manually adjusted laterally across the face of the belt to suit the width of paper to be produced, resulted in a varying width due to the absence of any definite or measured indications or calibrations, whilst wear on the deckle straps was heavy, owing to the suction pulling the said straps into contact with the belt.

The object of the present invention is to provide an improved apparatus for extracting water from webs of pulp or paper in paper-making machines of the type referred to.

According to one feature of the invention, apparatus for extracting water from webs of pulp or paper in connection with paper-making and like machines and comprising a travelling "wire" or felt for carrying the web to be treated, an endless, grooved and perforated rubber belt supporting said "wire" or felt, one of such elements being driven and acting to carry forward the other of said elements, and at least one suction box across whose mouth the operative run of the belt travels so that water is drawn through it from the web, characterised by the inclusion of lubricating means whereby a film of water is introduced between the underside of the operative run of said belt and the top of said suction box or boxes.

Preferably, the lubricating means aforesaid

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comprise a water tank and a wetting roller whereby such water from such tank is applied to the underside of the belt prior to the same making contact with the mouth or mouths of the suction box or boxes.

According to a further feature of the invention, the, or each, suction box is formed with means to facilitate removal of accumulated silt, such means comprising a removable end plate for the box, and a quick-release coupling connecting a suction pipe to the latter so that, on removal of said plate and release of the coupling, the box can be flushed out with water.

According to a still further feature of the invention, the deckles are located within the ends of the, or each, suction box, so that the suction applied at the edges of the belt is interrupted from below the latter, variable means being also provided to enable the deckles to accommodate different widths of web.

In the accompanying drawings:

Fig. 1 is a part-sectional plan view of the improved apparatus.

Fig. 2 is a side elevation, and

Figs. 3 and 4 are sections on the lines 3—3 and 4—4, respectively, of Fig. 1.

Fig. 5 is a sectional side elevation, to an enlarged scale, of one of the deckles, and

Fig. 6 is a development of the perforated tube associated therewith.

Fig. 7 is a transverse section of a deckle, to the same scale as Fig. 5, and

Fig. 8 is a plan view of the same.

Fig. 9 is a side elevation, to the same scale, of the adjusting knob for the deckle tube, and

Fig. 10 is a development of the graduated portions of the knob.

In the construction illustrated, the web of paper or pulp to be treated is delivered on to a driven, traveling pervious band comprising an endless "wire" or felt 10 whose operative run is supported upon, and carries forward as it travels, a horizontally disposed endless rubber belt 11, this latter being formed with staggered rows of transverse grooves 12 and perforations 13, the grooves being in an intermediate series, intermediate the side edges of the belt, and a series adjacent each such side edge and being supported by a pair of conveyor rollers 14 mounted in adjustable bearings 15 on the framework 16 of the apparatus. The upper or operative run of the belt 11 is adapted to pass over and be supported by a suction box 17, comprising four separate compartments 18, the upper wall of the box being flat and formed, above each

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such compartment, with a row of slots 19. Fixed to and covering the upper surface of the box 17 is a belt-contacting bearing plate 20 which is slotted or grooved longitudinally, as at 21, which grooves allow air to pass beneath the belt 11 to balance the atmospheric pressure on its upper face, the plate 20 being also provided with apertures 22 adapted to register with the slots 19 in the suction boxes. Forward of and adjacent the first compartment 18 of the suction box 17 is a chamber 23 in which water is maintained at a constant level by any known means and which has mounted therein, in suitable bearings 24, a wetting roller 25, diametrically opposite peripheral portions of such roller respectively depending into the water aforesaid and making contact with the underside of the rubber belt 11 so as to lubricate the latter. The roller 25, which may be covered with felt or other suitable material, is driven by a belt 26 or chain from one of the conveyor rollers 14, the diameter of the roller 25 and the velocity ratio of the drive being so arranged that the peripheral speed of the roller 25 is the same as the linear speed of the belt 11 to prevent wear of the latter. The bearings 24 for the wetting roller 25 are adjustable to vary the tension of the belt 26 or chain, and to control the area of contact between the rubber belt 11 and the roller periphery.

Each of the suction compartments 18 extends across the width of the rubber belt 11, and is fitted at one end with a cover plate 27 held in place by quick-release clamps 28, whilst its other end is suitably arranged to receive the end of a suction pipe 29 whereby each compartment 18 is connected to the manifold of a pump forming part of a backwater system. The suction pipe 29 may be removably attached to the compartment by means of a quick-release clamp 30, the clamps 28, 30 both being preferably of the type which comprises a pivoted stirrup member with a pressure screw mounted therein as shown in Fig. 1. The various suction pipes 29 may be fitted with valve control means, whereby the suction on each or any compartment 18 may be adjusted, and any given compartment may have a suction pipe at either end thereof or at both ends.

The deckles 31 for controlling the width of paper to be produced are located within the suction compartments 18, one at either end of each compartment. As shown more particularly in Figs. 5 to 8, each deckle comprises a cast metal body with a flat top 32 of rectangular profile and a lower portion 33 of semi-circular section, a bore 34 of substantial diameter being fashioned longitudinally through the casting. The deckle top 32 is formed with two rows of transverse grooves 35 at opposite sides of a medial line, the grooves in one row being staggered relatively to those in the other row, and an aperture 36 leading to the bore 34 being cut in the inner end of each groove. The marginal portions 37 of the belt-contacting surface 20 extend over the deckles 31 to provide a second bearing plate and each such portion is formed with corresponding grooves 38 and apertures 39 which register with the apertures 36 (see Fig. 1), it being understood that the flat top 32 of each deckle is located in a rectangular aperture 40 in the upper wall of the suction box 17 and lies flush with the surface of the latter.

Fitting within and slidably engaging the periphery of the longitudinal bore 34 in each deckle 31 is a tube 41, one end of which is open to the suction compartment 18, whilst the other end is

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closed by a flanged plate 42. An external projection 43 on such end plate is engaged by a suitable dog 44 on a spindle 45 extending through a supporting bush 46 and packing gland 47 in the end wall of the compartment 18.

The outer extremity of this spindle 45 has a knob 48 screwed thereon and retained by a lock-nut 49 at the back, this knob having a squared or other non-circular portion 50 for engagement by a spanner and graduations 51 around its periphery which cooperate with an index finger 52 fixed to the end wall of the suction box 17.

The deckle tube 41 is formed with a plurality of closely spaced circumferential and longitudinal rows of apertures 53, the number and lateral spacing of such rows corresponding to the number and spacing of the apertures 36 in the top of the deckle.

In the developed view of the tube shown in Fig. 6, it will be seen that the row of apertures 53 nearest to the open end of the tube extends substantially wholly around the periphery of the latter, the next row having one aperture less, the third row two apertures less and so on, until at the closed end of the tube there is one aperture only.

The arrangement of the apertures 53 in the tube 41, in conjunction with the location of the apertures 36 in the deckle top, ensures that circumferential movement of the tube through a distance equal to that between two longitudinal rows of apertures 53 increases or reduces by one the number of such apertures in register with the deckle apertures 36.

In this way, the total cross-sectional area of the apertures through which water is drawn through the marginal grooves 54 and apertures 55 in the belt 11 and into the adjacent suction compartment 18 may be readily varied by angular adjustment of the knob 48.

It will be obvious that the width of paper to be produced can be easily and accurately set by rotating the knob 48 until the required calibration 51 thereon is opposite the finger 52, such setting uncovering the requisite number of apertures 36 in the deckle top 32 to give the width desired.

In operation, the knob 48 is set to the width of paper it is required to produce, and the apparatus is set in motion. As the rubber belt 11 travels along, its underside becomes lubricated with water from the wetting roller 25 before making contact with the suction box 17, thus enabling it to slide across the surface plate 20 covering the suction compartments 18 without undue wear on the belt 11 or plate 20. The valves in the suction pipes 29 enable the suction in the several compartments 18 to be varied according to requirements, so that all such compartments extract their quota of water from the pulp or web.

When it is required to remove silt from the suction compartments, the end plates 27 are removed and the suction pipes 29 uncoupled, after which a hose pipe can be used to flush the compartments with water under pressure.

The apparatus can be varied in construction without departing from the spirit of the invention. For example, more than one lubricating roller 25 may be used, and any such additional rollers could, if desired, be located between the suction compartments 18. Alternatively, the water could be delivered to the underside of the belt 11 in the form of a jet or jets from a nozzle or a series of nozzles.

Should it be found in practice that the rubber

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belt 11 has a tendency to "wander" when in operation, the conveyor rollers 14 may be fitted with projecting flanges 56 to confine the belt to its correct path of travel.

I declare that what I claim is:

1. Apparatus for extracting water from webs of pulp or paper comprising a traveling pervious band for carrying the web to be treated, an endless rubber belt having side edges, supporting the band, one of the two elements being driven and carrying forward the other, the rubber belt having a series of grooves intermediate the side edges and a second series of grooves adjacent each side edge, each of the series of grooves having openings in their medial portions, a suction box under the belt adapted to draw water from the web through the band and belt, a cover plate for the suction box having a series of openings therein intermediate the side edges and rectangular apertures adjacent each side edge, a bearing plate between the cover plate and the operative run of the belt having a series of apertures therein coinciding with the intermediate openings of the cover plate and belt, a plurality of longitudinal grooves in the bearing plate intermediate each series of the apertures in the bearing plate, a plurality of deckles mounted within the suction box at each side edge, each deckle comprising a stationary hollow body open to the suction box at one end, the top of each deckle extending through the rectangular apertures of the cover plate and having a series of staggered grooves extending in opposite directions from the medial portion and apertures in the inner adjacent ends of each groove, a second bearing plate covering the deckles and having like grooves and apertures therein adapted to coincide the second series of grooves and their openings of the rubber belt with the grooves and apertures of the deckles, a hollow tube rotatably mounted within the hollow body of each deckle angularly adjustable therein, and having a plurality of rows of openings therein, the number of openings in each of the rows being graduated, the tube having a closure at one end, with the other end open to the suction box, an operating rod extending through a wall of the suction box having a knob on one end and being connected with the closure

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on the other end, whereby upon rotation of the knob and operating rod the tube may be rotated within the hollow body of the deckle to change the number of effective openings of the deckle and the second series of openings of the rubber belt to the suction box.

2. The apparatus as defined in and by claim 1 wherein the intermediate grooves of the rubber belt are transverse to the direction of travel of the belt and the second series of grooves are longitudinal to the direction of travel of the belt.

3. The apparatus as defined in and by claim 1 wherein the intermediate openings of the cover plate and the apertures of the bearing plate are longitudinal to the direction of travel of the belt and are coextensive with each other.

4. The apparatus as defined in and by claim 1 wherein the deckle includes a flat top with at least two rows of apertures therein and the rows of openings of the hollow tube being so arranged that each row may be effective to some of the apertures when the tube is angularly adjusted within the deckle.

5. The apparatus as defined in and by claim 1 wherein the longitudinal grooves of the bearing plate extend substantially the width of the cover plate and allow air to enter beneath the rubber belt to prevent subatmospheric conditions thereunder.

JAMES WILLIAM WESTON EVANS.

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