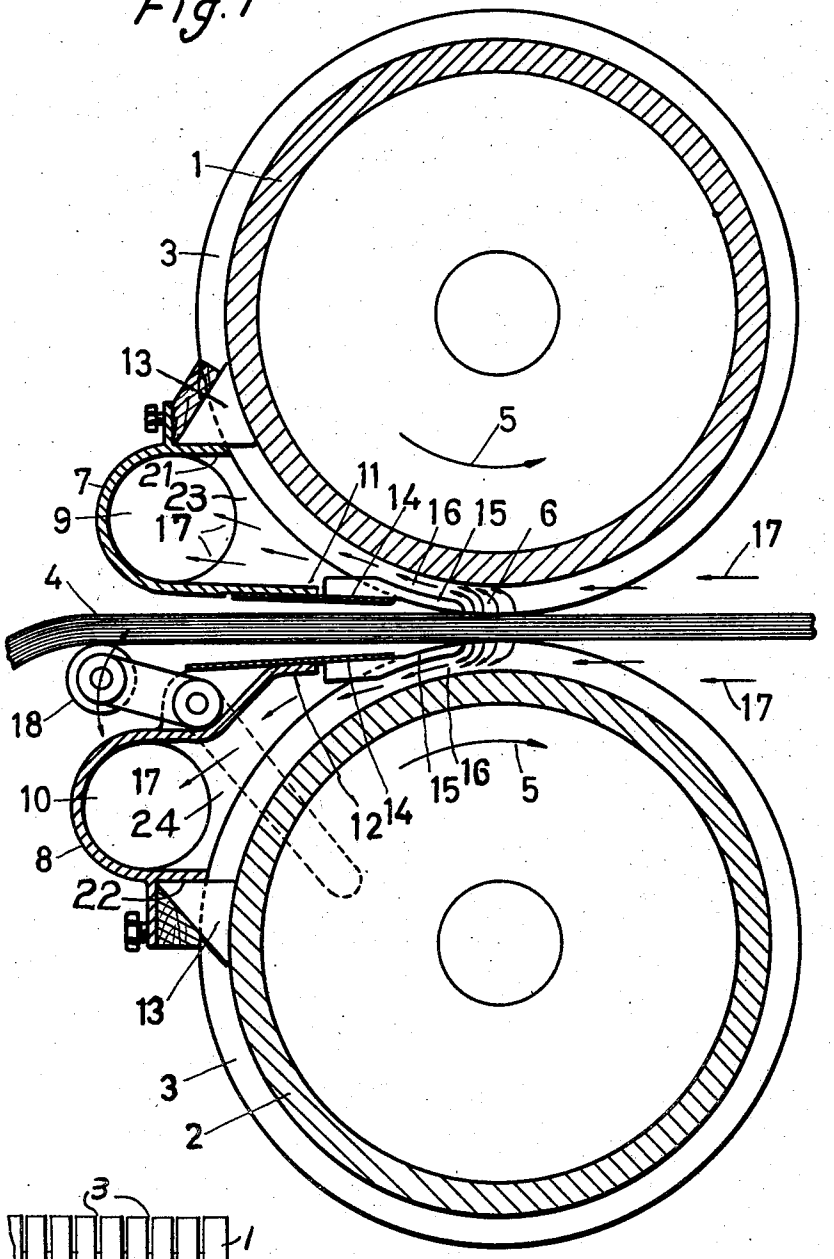
Nov. 4, 1958 R. E. WAGNER 2,858,747

ROTARY PRESSES AND THE LIKE

Filed Feb. 7, 1956

Fig. 1



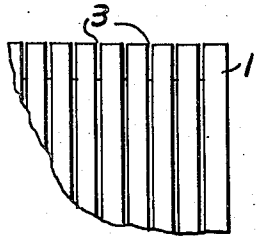


Fig. 2

United States Patent Office

2,858,747

Patented Nov. 4, 1958

2,858,747

ROTARY PRESSES AND THE LIKE

Rudolf Ernst Wagner, Stockholm, Sweden

Application February 7, 1956, Serial No. 563,968

Claims priority, application Sweden February 7, 1955

4 Claims. (Cl. 92—49)

The present invention relates to an improvement in rotary presses and other machines for pressing out liquid from fibrous materials, of the kind which are provided with two cooperating press rolls between which the fibrous material is caused to move in the shape of a web, and at least one of which rolls is provided with circumferential grooves or slots, a suction device being provided in the angle between the web of material and the roll having grooves or slots. Rotary presses provided with devices of this kind are particularly adapted for use in the manufacture of wood pulp, cellulose, paper, and so forth, and are described, for instance, in the specification of U. S. Patent No. 1,483,562, granted February 12, 1924.

It is an object of the present invention to effect, in an apparatus of the abovementioned kind, a more complete and efficient removal of the liquid that is pressed out of the web of material in the pressing region between the rolls, that is to say, the region between the rolls within which the surfaces of the rolls are in contact with the web of material, and thus positively to prevent the liquid pressed out of the web of material in the pressing region from collecting in the angles between the web of material and the surfaces of the rolls where the liquid might again be absorbed by the web of material. In prior apparatuses of the abovementioned kind it has not been possible to effect a complete removal by suction of the liquid pressed out of the material, and therefore, it has not been possible entirely to prevent bodies of water from collecting in the angles between the web of material and the surfaces of the rolls, for the reason that it was not possible to extend that wall or edge of the suction box which cooperates with the surface of the roll next to the pressing region, sufficiently far into the angle between the web of material and the surface of the roll to seal the slots adjacent the pressing region.

According to the present invention the suction box is provided at the edge thereof directed toward the pressing region between the rolls, with a comb-shaped extension member having teeth which reach into the slots in the roll and have a width or thickness that is substantially equal to the width of the slots, said teeth extending to the pressing region between the rolls and closing the slots outwards, the outer edges of the teeth, at least in the vicinity of the pressing region, being substantially on a level with the surface of the roll between adjacent slots, and the inner edge of each tooth being at a distance from the bottom of the slot, such that in each slot a passage is formed between the bottom surface of the slot and the inner edge of the tooth, through which passage the liquid pressed out of the web of material in the pressing region is drawn into the interior of the suction box.

Practical tests carried out with the apparatus according to the present invention have proved that the apparatus provides a considerably improved result in respect of the pressing out and removal of liquid from the web of material over apparatuses as hitherto proposed. With the latter arrangements, when employing two or three presses placed one after the other and through which the web of material is caused to run, and using a pressure of 45 to 50 kg. per linear centimeter of the width of the web, it is possible to obtain a dry matter content of 45 percent of the pulp treated, irrespective of whether a press felt is used or not. With the apparatus according to this invention, on the other hand, by using a single press and a pressure of about 50 kg. per linear centimeter it is possible to obtain a dry matter content of 40 to 45 percent, and by using two presses and a pressure of 50 and 75 kg. per linear centimeter, respectively, in said presses, a dry matter content of 55 to 60 percent of the treated paper pulp can be obtained without the use of press felts.

The accompanying drawing shows schematically a constructional form of an improved rotary press according to this invention, Fig. 1 showing a vertical section through the two rolls and the associated suction devices, and Fig. 2 showing diagrammatically a face view of a portion of one of the rolls.

The two rolls **1** and **2** are provided with circumferential slots **3**, in the usual manner, as shown in Fig. 2. The web of pulp **4** runs between the rolls **1** and **2** which rotate in the direction of the arrows **5**, and liquid is pressed out of the web of material in the pressing region **6**. In the instance illustrated, a suction device is positioned in the angle between each roll and the web of material. The said suction devices comprise suction boxes **7** and **8**, respectively, which have a substantially U-shaped cross section with their open sides directed toward the associate roll, and which are connected at one of their ends, at least, to suitable suction conduits **9** and **10**, and one horizontal wall **11** and **12**, respectively, of each of said suction boxes extends into the angle between the corresponding roll **1** and **2**, respectively, and the web of material **4**. The edges of the other walls of the suction boxes viz. the horizontal walls **21** and **22**, respectively, and the vertical walls **23** and **24**, respectively, bear against the surface of the respective roll and may be sealed against the roll surface in any suitable manner. For this purpose, scrapers or so-called doctors **13** consisting of triangular pieces of sheet metal having a thickness corresponding to the width of the slots, may be inserted in the slots at the edegs of the suction boxes remote from the pressing region, in order to make the seal more effective.

According to the invention, there is provided at the edge of that wall **11** and **12**, respectively, of each suction box which is directed toward the pressing region, a comb-shaped extension member which in each case consists of a comparatively thin sheet metal piece or plate **14** having teeth **15** extending therefrom. In the instance illustrated, the said teeth **15** are shaped as sheet metal strips or tongues which stand on edge and are secured to the plate **14**, as by being welded thereto. As shown in the drawing, the teeth **15** extend into the slots **3** in the rolls in which they extend from the edge of the plate **14** forward to the pressing region **6**. The teeth **15** have a thickness which is, of course, slightly less than the width of the slots. While there are thus narrow fissures formed between the teeth and the side walls of the slots, yet the teeth will practically close the slots against a flow of liquid from inside outwards along that portion of the periphery of the roll which lies between the pressing region and the edge of the plate **14**. In order to leave the angular space between the surface of the roll and the web of material as free as possible, the outer edges of the teeth should practically follow the contour of the roll, at least in the vicinity of the pressing region, that is, the outer edges of the teeth should be practically on a level with the surface of the roll between adjacent slots, as shown in the drawing. However, the outer edge or outer surface of the tooth **15** may be allowed to project slightly beyond the contour of the roll in order to exert

pressure on that portion of the surface of the moving web of material which comes in front of a slot and which, therefore, is not directly actuated by the roll surface, for in this manner to prevent, as far as possible, projecting ridges from being formed on the web of material being pressed. Due to the contact pressure the outer end of the tooth **15** will then yield inwards in the slot, so that it occupies the position shown in the drawing. The inner edge of each tooth **15** is at a distance from the bottom of the slot such that a passage **16** is formed in each slot between the bottom surface thereof and the inner edge of the tooth, through which passage the liquid pressed out of the web of material in the pressing region is carried into the suction box by the current of air which, in the instance illustrated, flows from right to left in the drawing as indicated by the arrows **17**. The teeth **15** prevent the liquid from passing out of the slots to the portion of the web of material in front of the pressing region.

The abovementioned plate **14** which carries the teeth **15** may suitably be attached to the wall **11** and **12**, respectively, of the suction box, for instance by means of screws or the like passing through slots (not shown in the drawing) in such manner that the plate **14** with the teeth **15** may be adjusted relatively to the suction box in a direction toward and away from the pressing region between the rolls. The entire suction box may suitably be supported in such manner that it is movable and adjustable about the axis of rotation of the roll, that is to say, in the peripheral direction of the roll, whereby it becomes easy to adjust the teeth **15** at the proper distance from the pressing region. For this purpose the suction box may be attached to arms which are pivoted on the axis of rotation of the roll, or the suction box may be provided with flanges having arcuate guides cooperating with arcuate guides carried by the bearings of the roll and concentric to the axis thereof.

According to the invention there is provided at least one guiding member for the web of material which consists, in the instance illustrated, of a guide roll **18** which may suitably be adjustable. This guide member occupies or is adjustable to such position relatively to the suction box **8** that the guide member guides the web of material **4** while the latter moves toward and between the rolls, in such manner that during this movement the said web is at a distance from the adjacent wall of the suction box **8**, as well as from the adjacent wall of the suction box **7**. This arrangement provides for an unimpeded current of air between the web of material and the suction boxes as well as between the cam-shaped extension members of the boxes and the web of material up to the pressing region, so that air may be drawn into the slots through the abovementioned fissures between the cam teeth **15** and the side surfaces of the slots **3**. In this way liquid is prevented from trickling through the said fissures, and instead, removal is effected of such liquid that may have been pressed through the web of material to the angle between said web and the roll surface.

Instead of making the teeth **15** of the shape of sheet metal strips or tongues, the teeth may be made of wire of a more or less elastic metal, for instance stainless steel, and such wires may have a square, round, oval, or other suitable cross section.

In the constructional form illustrated in the drawing in which the web of material **4** runs in a horizontal direction through the press, the suction boxes **7** and **8** are located in the entrance angles between the web of material and the roll surfaces. This arrangement is most suitable, as a rule, when the press is constructed in such manner that the web of material runs in a more or less horizontal direction when passing through the pressing region. In certain cases, however, it may be more suitable, even when the web of material runs in a direction as aforesaid, to place the suction boxes in the outlet angles between the web of material and the roll surfaces, that is to say, on the right-hand side of the rolls in the construction of the press shown in the drawing. When the web of material runs in a substantially vertical direction through the pressing region it is most suitable to place the suction box, or suction boxes, below the rolls irrespective of whether the web of material runs downward or upward through the pressing region.

Extraction of water from wood pulp and cellulose by pressing can be effected without the use of press felts. On the other hand, when extracting water from paper webs or carboard webs it is necessary to use press felts between the web of material and the surfaces of the press rolls to ensure the desired surface of the final product and to avoid marks of the slots on the product. When press felts are used they run between the web of material and the suction boxes.

The invention may be applied not only to rotary presses but also to other machines for pressing out liquid from fibrous materials, as for instance, so-called wet machines for wood pulp and cellulose.

Also in other respects the invention is not limited to the constructional form above described and illustrated in the drawing in which various changes and modifications are possible.

I claim:

1. A machine of the character described for pressing out liquid from fibrous materials, comprising two cooperating press rolls adapted to press against a web of material at a pressing region between the rolls, at least one of said rolls being provided with circumferential slots in its surface, a suction device located in front of such slotted roll in the angle formed between its surface and the web of material and adapted to draw off liquid pressed out from the web of material into said angle in front of the roll and into the slots in the roll, said suction device having an edge directed toward the pressing region between said rolls, and teeth provided along said edge of said suction device and projecting into said slots in said roll, said teeth having a thickness substantially equal to the width of said slots in said press roll, and said teeth extending to the pressing region between the rolls and sealing the slots outwards to form a substantially closed passage in each slot through which liquid pressed out of the web of material in the pressing region is drawn into the interior of the suction device.

2. A machine for pressing out liquid from fibrous materials, as defined in claim 1, in which the teeth are adjustable in a direction toward and away from the pressing region between the rolls.

3. A machine for pressing out liquid from fibrous materials, as defined in claim 1, in which the outer edge of each tooth, at least in the vicinity of the pressing region, is substantially on a level with the surface of the roll between adjacent slots therein, and the inner edge of each tooth is at a distance from the bottom of the slot to form a passage for liquid along the bottom of the slot.

4. A machine for pressing out liquid from fibrous materials, as defined in claim 1, further comprising a guide member for the web of material located in such position relatively to the suction device as to guide the web of material to run at a distance from the adjacent wall of the suction device to allow air to flow between the web of material and the wall of the suction device to the teeth between the edge of the suction device and the pressing region.

References Cited in the file of this patent

UNITED STATES PATENTS

1,483,562	Wagner	Feb. 12, 1924
1,770,814	Saverni	July 15, 1930
2,083,817	Berry	June 15, 1937
2,165,549	Hornbostel	July 11, 1939