

[54] FIBROUS WEB PRESS NIP STRUCTURE INCLUDING NONPOROUS BELTS BACKED BY FLUID PRESSURE CHAMBERS HAVING FLEXIBLE SILLS

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[52] U.S. Cl. 162/272, 100/118, 100/154, 100/211, 162/358, 308/5 R, 308/240
[51] Int. Cl. D21f 3/02, D21f 3/06
[58] Field of Search 162/358, 205, 305, 348, 162/272; 100/118, 119, 120, 151, 154, 211, 212; 308/5 R, 240, 9, DIG. 1

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Primary Examiner—S. Leon Bashore
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[57] ABSTRACT

An improved extended nip press for dewatering a traveling fibrous paper web with opposed looped belts defining a press nip therebetween and shoes within each of the belts providing a backing for a pressure chamber exposed to the belts opposite the nip. Sills made of a flexible material are connected to the shoes to form the pressure chambers and have surfaces for sliding engagement with the moving belts. Tipping of the sills is prevented by use of reinforcing ribs and/or by use of a perforated diaphragm attached to all four sides of the sills which apply a lateral inwardly directed force relative to the belt surfaces. The sills may be provided with conical recesses from the inside the outside surfaces to enhance their flexibility and the sills may contain passages for high pressure fluid to pass there-through to the sill surfaces.

20 Claims, 16 Drawing Figures

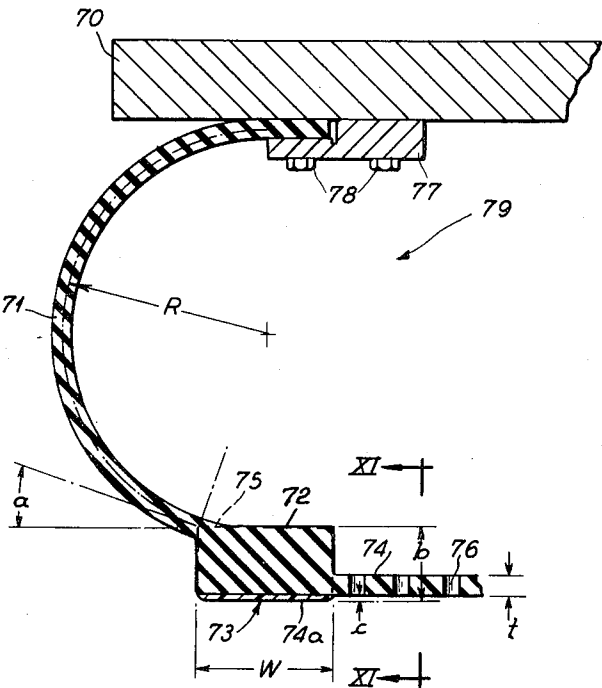


Fig. 1

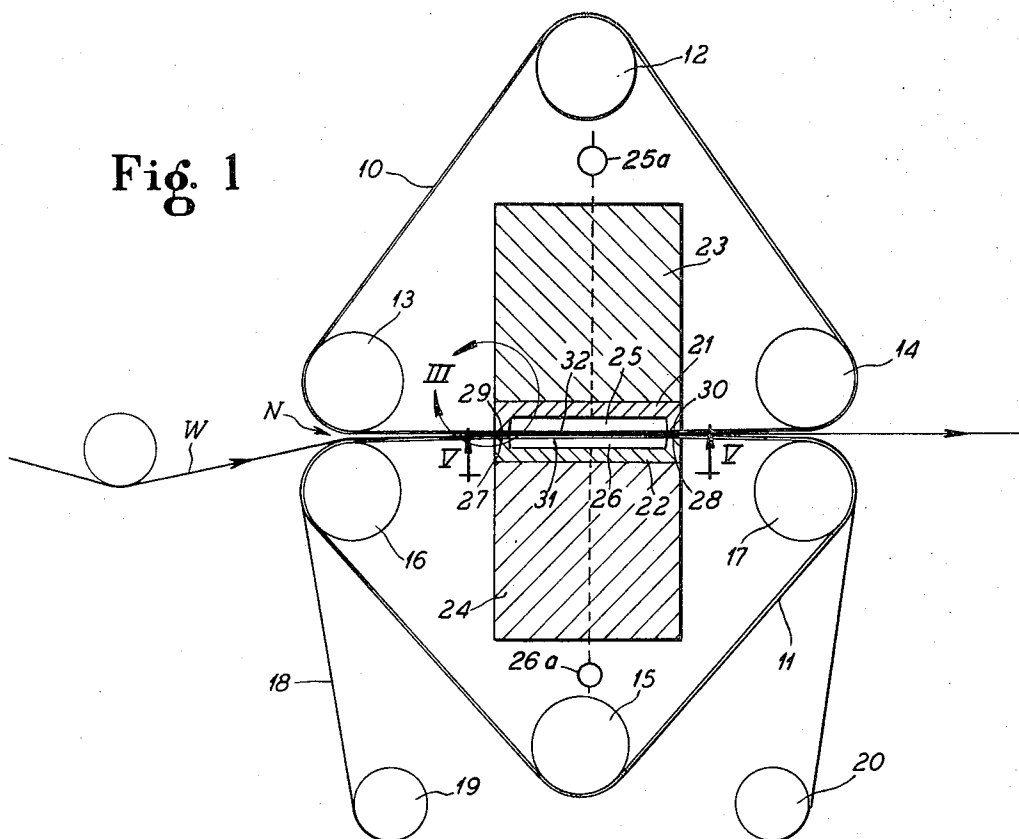


Fig. 2 A

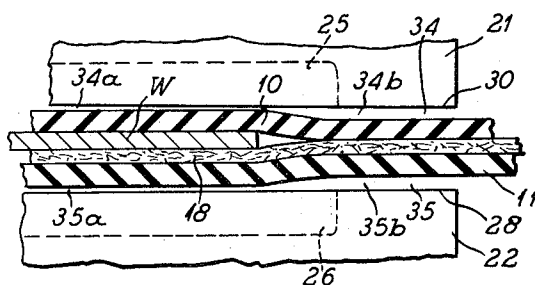


Fig. 2 B

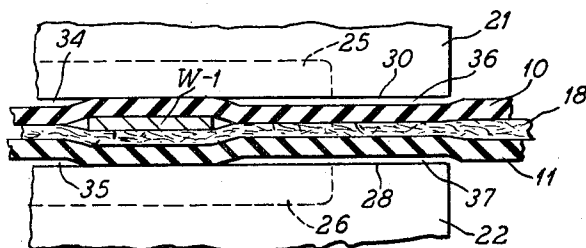


Fig. 2 C

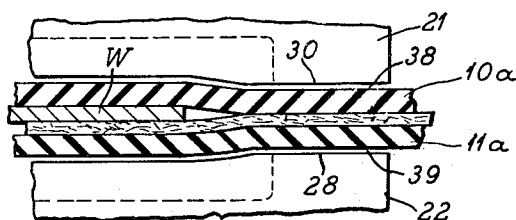


Fig. 3

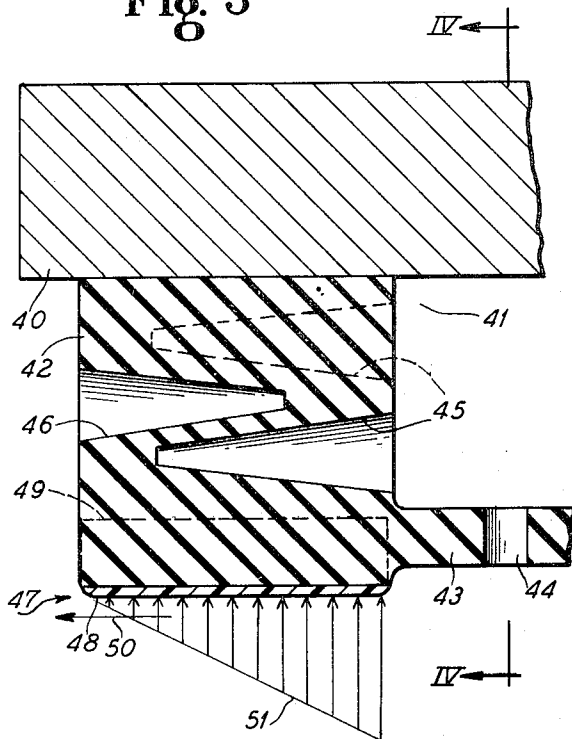


Fig. 4

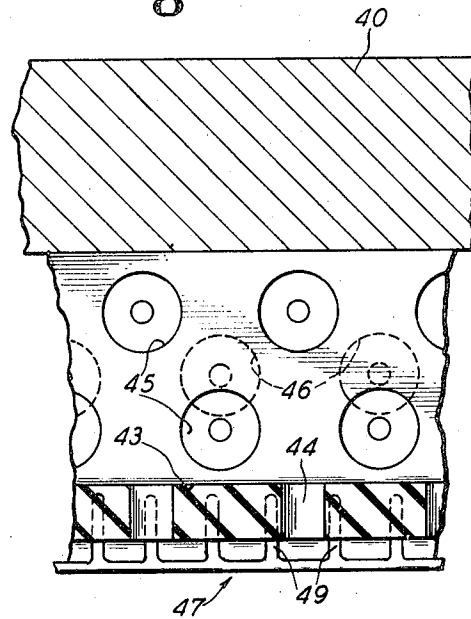


Fig. 5

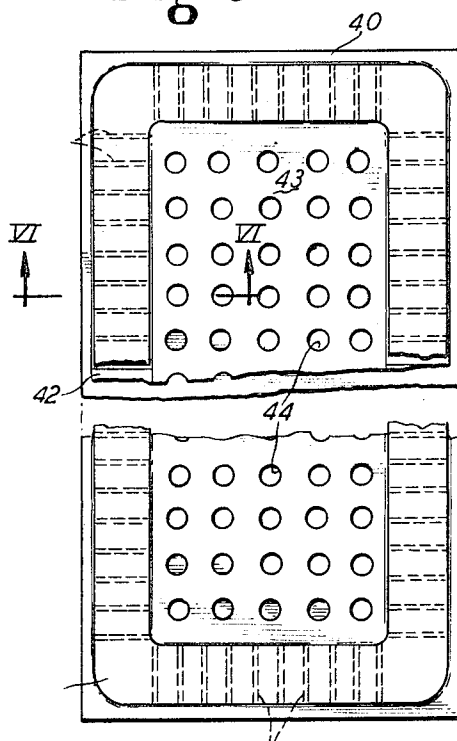


Fig. 6

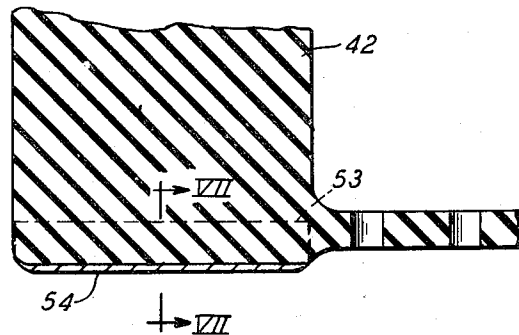


Fig. 7

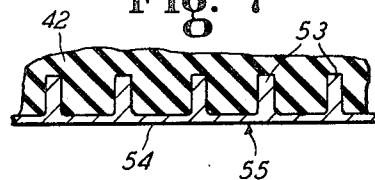


Fig. 8

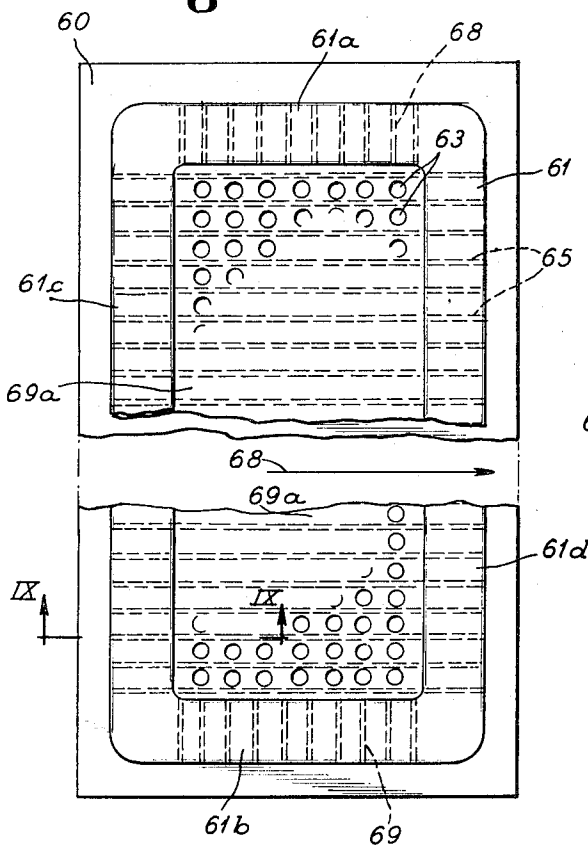


Fig. 9A

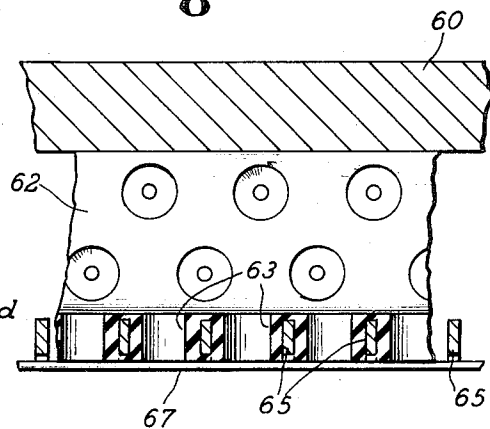


Fig. 9

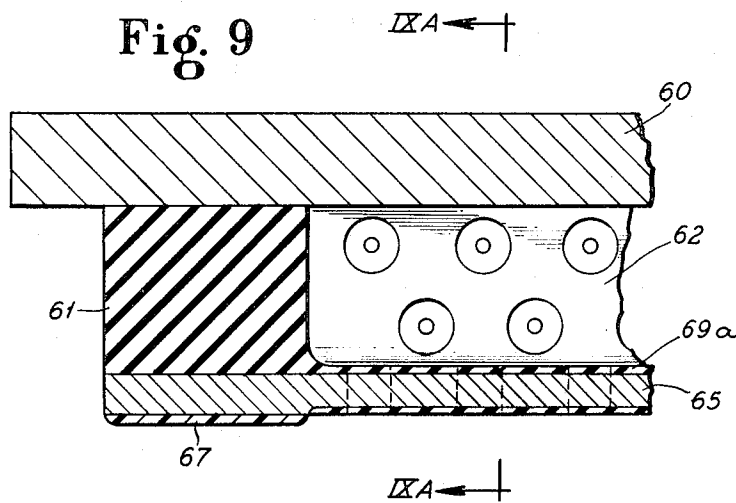


Fig. 10

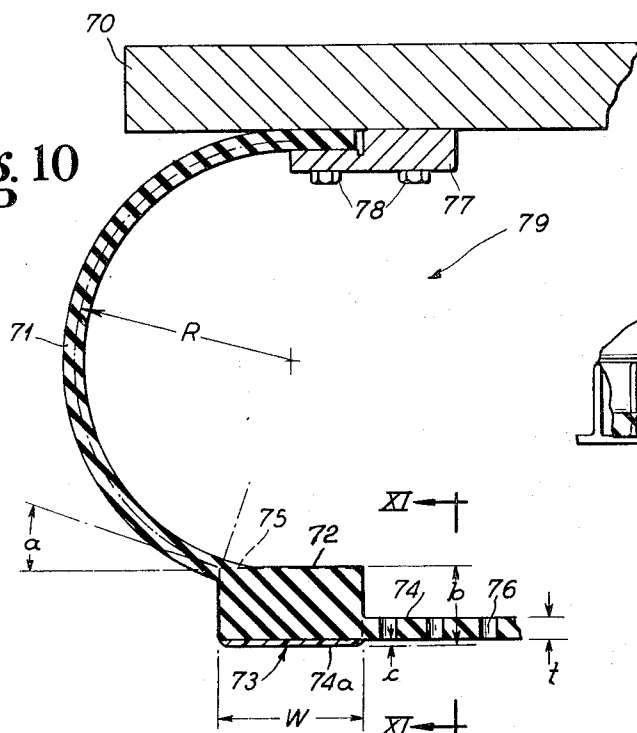


Fig. 11

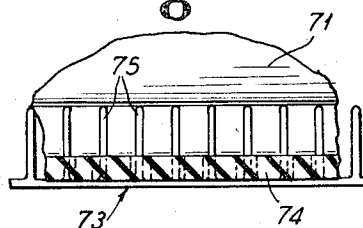


Fig. 13

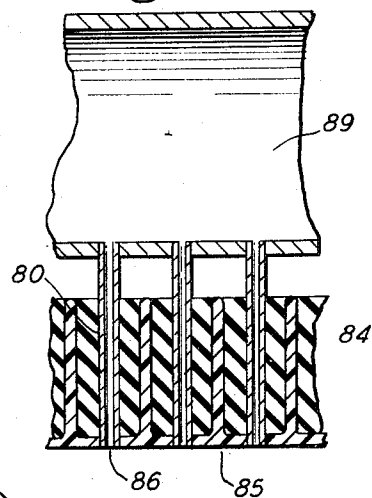
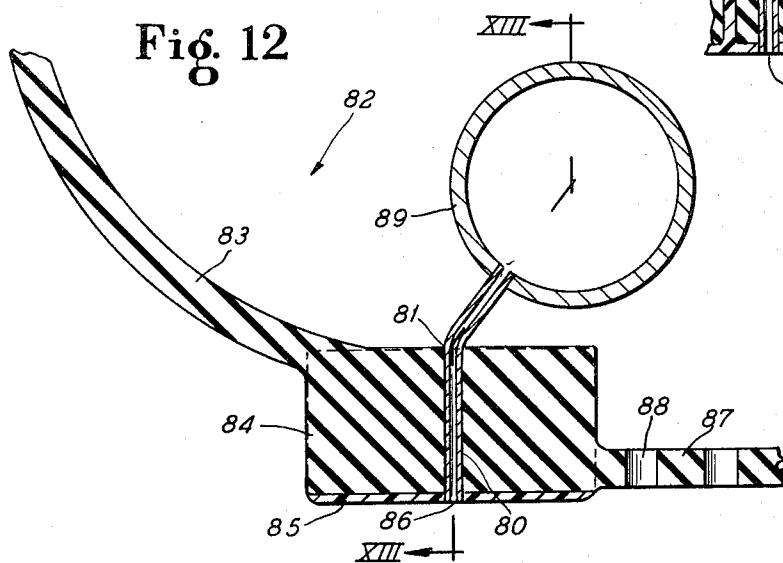


Fig. 12



FIBROUS WEB PRESS NIP STRUCTURE INCLUDING NONPOROUS BELTS BACKED BY FLUID PRESSURE CHAMBERS HAVING FLEXIBLE SILLS

BACKGROUND OF THE INVENTION

Improvements in the art of dewatering traveling fibrous webs such as a paper web coming from the forming zone of a paper making machine have included the provision of extended presses which apply a dewatering pressure to the web over a longer period of time than the conventional two roll press couple and achieve a greatly improved dewatering effect. An example of one of these types of presses which have come to be known as extended nip presses is shown in the copending application, Ser. No. 90,921 of Leroy H. Busker and Carl J. Francik, now U.S. Pat. No. 3,748,225.

The present invention relates to improvements in extended presses and particularly to improved structures for extended nip presses. The improved structures relate to the design of pressure chambers which apply a fluid pressure to traveling belts for extended nip presses.

In extended nip presses of the type above referred to, the traveling paper web passes through an extended nip formed between two pressure surfaces. The pressure surfaces are formed between looped hydraulically loaded belts. The belts are pressed against each other by means of hydraulic fluid pressure chambers provided by cavities in each of opposing shoes. A necessary part of this system is a means of maintaining a peripheral seal around each hydraulic cavity so as to prevent excessive leakage of the pressurized fluid, yet to provide a lubricating film of the fluid flowing through a very small rubbing gap between each rubber belt and the seal. This seal may also be termed a sill, and has leading and trailing sill portions ahead of and behind the shoe cavity, and side sill portions at the sides of the shoe cavity. The sills provide a sliding seal between the belt and the shoe. In the operation of such an extended nip press, the fluid flow to each of the shoe cavities will be automatically controlled so that the pressure in each cavity will be equal. The shoe may be supported on a beam or be itself hydraulically backed in the manner shown by the aforementioned patent application, Ser. No. 90,921, now U.S. Pat. No. 3,748,225.

If all dimensions are perfect and the thickness of the rubber belts is completely uniform, and the press felt and the paper web going through the press are absolutely uniform, then the gap thickness between each shoe and the surface of the belt will remain uniform throughout operation. However, in practical operation these conditions do not exist.

In using a relatively deformable material for the belts, such as reinforced rubber, it has been found that a certain amount of self-correction of sealing gap thickness will occur. When the gap tends to close up locally in some positions, such as due to a locally excess thickness of belt, felt or paper web, the distribution of the fluid pressure between the sill and the belt changes in such a manner so as to oppose the closing of the gap. Such self-correction is limited by the degree of deformability of compliance of the belts and felt, and by the limit of change in pressure profile across the sill.

For example, the edge or the threading tail of a heavy paper board web would cause a sufficient large change

in the thickness of the sandwich going through the press nip so that with a noncompliant shoe sill, it would lead to a large variation in gap thickness. This variation in gap thickness could either lead to an excess leakage of fluid from the chamber, or to a compression between the opposing sills and consequent lack of fluid film lubrication at certain points. If thicker belts are used, or if softer belts are used which give a greater amount of compliance, it has been found that they absorb proportionately more driving power in operation of the press so that this is not a successful solution to the problem. It is also more costly to provide very thick belts, and they will be limited with respect to the size of rollers over which they can be run.

Therefore, it is an object of the present invention to provide an improved shoe sill construction which provides a bearing and seal sufficiently compliant so that it will conform to the maximum irregularity or curvature which the belt can assume during operation thereby avoiding either excessive high leakage (caused by a very large gap) or excessively low leakage and consequent high friction rubbing.

Another problem which is encountered by the sills or seals for the shoe chamber is that they must be able to absorb the lateral or sideways pressure of the fluid within each of the shoe chambers. This lateral pressure tends to push the sills outwardly at the sides of the chamber and outwardly for the leading and trailing sill. This pressure also tends to tilt or tip the sills so that they do not slide against the belt with a smooth surface pressure, but tend to open up the sealing gap at one side and to press against the belt in line engagement at the other side. Such tilting or rotation invariably changes the sealing gap height distribution and causes leakage and/or rapid wear on the belt and sill surface.

Accordingly, it is a further object of the invention to provide a sill construction that functions so that the gap thickness is uniform during operation and that the sill will not tilt or rotate over a varying range of pressures within the shoe pressure chamber.

A further object of the invention is to provide an improved pressure sill structure so that the sill engages the belt in smooth surface sliding engagement and so that the pressure of the fluid in the gap between the belt and sill varies linearly from inside the shoe chamber to the outer edge of the sill.

A still further object of the invention is to provide a highly compliant sill for an extended nip press which can accommodate a wide range of variation in pressures and thicknesses without the sill leaving its proper operating positions and without it tipping or rotating or binding so as to insure a long operating life without damage or unreasonable wear to the sill or to the belt.

Other objects, advantages and features will become more apparent, as will equivalent structures which are intended to be covered herein, with the teaching of the principles of the invention in connection with the disclosure of the preferred embodiments thereof in the specification, claims and drawings, in which:

DRAWINGS

FIG. 1 is a somewhat schematic elevational view, shown partially in section, of an extended nip press of the type for embodying structure employing principles of the present invention;

FIGS. 2A, 2B and 2C are enlarged detailed vertical sectional views illustrating operational conditions encountered with an extended nip press;

FIG. 3 is an enlarged detailed vertical sectional view taken in the area shown by the circle III of FIG. 1, with the details being omitted from FIG. 1;

FIG. 4 is a fragmentary vertical sectional view taken substantially along line IV—IV of FIG. 3;

FIG. 5 is a fragmentary horizontal sectional view taken substantially along line V—V of FIG. 1 with the details being omitted from FIG. 1;

FIG. 6 is an enlarged fragmentary vertical sectional view taken substantially along line VI—VI of FIG. 5;

FIG. 7 is a detailed fragmentary view taken substantially along line VII—VII of FIG. 6 with portions omitted for clarity;

FIG. 8 is a plan view similar to FIG. 5, but showing another form of sill construction;

FIG. 9 is an enlarged fragmentary vertical section taken substantially along line IX—IX of FIG. 8;

FIG. 9A is a fragmentary sectional view taken substantially along line IXA—TXA of FIG. 9;

FIG. 10 is an enlarged fragmentary sectional view taken substantially in the area shown by the encircling line III of FIG. 1 with the details omitted from FIG. 1, and showing an alternate form of construction of the invention;

FIG. 11 is a fragmentary vertical sectional view taken substantially along line XI—XI of FIG. 10;

FIG. 12 is an enlarged fragmentary vertical sectional view taken generally in the area indicated by the encircling line III of FIG. 1 showing another form of construction; and

FIG. 13 is a vertical sectional view taken substantially along line XIII—XIII of FIG. 12.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 illustrates a form of extended nip press having opposed pressing means in the form of looped traveling belts 10 and 11. The upper belt is guided by rolls 12, 13 and 14, and the lower belt by rolls 15, 16 and 17. The belts are brought together in an extended pressure nip, and the guide rolls 13 and 14 for the upper belt and the guide rolls 16 and 17 for the lower belt are positioned to guide the belts through the nip shown generally at N. An oncoming fibrous continuous paper web W passes into the nip and a looped water receiving means in the form of a felt 18 also passes through the nip to receive the water pressed out of the web. The felt passes over lower guide rolls 19 and 20 and also passes over the rolls 16 and 17 for the lower belt.

The extended press nip is formed between an upper pressure shoe 21 and a lower pressure shoe 22. Each of the pressure shoes are provided with fluid pressure chambers 25 and 26 which are open to the belts 10 and 11 respectively for the length of the press nip. Fluid under pressure is supplied to the chambers from fluid pumps 25a and 26a or other suitable sources. The pressure of the fluid in the chambers 25 and 26 presses opposingly against the upper and lower belts to act uniformly and press the water from the web while it is traveling through the nip. The shoes are supported across the width of the belts by beams 23 and 24. These beams may be provided with deflection preventing means such as by very rigid reinforcing or they may be provided with fluid backing chambers which support the

shoes 21 and 22 uniformly along the length as disclosed in the copending application, Ser. No. 90,921, now U.S. Pat. No. 3,748,225, referred to above.

Surrounding the fluid pressure chambers 25 and 26 are sills which slide against the inner surfaces of the belt and provide a sliding seal preventing the fluid from leaking from the chambers 25 and 26 during operation. At the leading edge of the chamber are sills 29 and 27 respectively for the upper and lower chambers. At the sides of the chamber are side sills 32 and 31 (shown at the far side of the chamber in the sectional view of FIG. 1). At the trailing end of the chambers 25 and 26 are trailing sills 30 and 28. Thus, the sills extend completely around the chamber to prevent leakage therefrom. At the sliding surface where the sills engage the belt is a gap which is extremely small. This gap must be maintained such as the leakage therethrough is at a minimum so that pressure within the chambers 25 and 26 is not lost, but so that the sliding surface is lubricated by being wetted by the fluid within the chamber. Preferably, the chamber is pressurized with a liquid such as water, and suitable controlled pressure supply pumps connect to the chambers. While the preferred arrangement shows opposing chambers and such a construction will substantially always be used, it is possible to provide a construction with only one traveling belt while the opposed press surface is provided by a different type of traveling surface such as a large roll.

FIGS. 2A, 2B and 2C show the effect of varying operating conditions with opposed shoes having rigid sills. FIG. 2A illustrates in greatly enlarged section the relative positions of the trailing sills 30 and 28 and the adjoining parts when a lead end, such as a heavy threading tail of a paper web W comes into the press nip. When the thick lead end of web is received, the shoes 21 and 22 must be positioned apart a sufficient distance to accommodate the web W. At the lead end of the nip, the gaps 34 and 35 at 34a and 35a are closed by the thickness of the belts, web and felt. However, further along the nip at location 34b and 35b, the gap is not filled by the thickness of the paper web so that an excessive gap occurs which will permit leakage of liquid from the chambers 25 and 26.

In the circumstance of FIG. 2B, the edge W-1 of a threading tail is passing through. The gap in this situation tends to close locally at the position of the edge W-1, but in advance and behind the edge W-1, the gap 34 and 35 is larger. Self-correction occurs to some degree, but this self-correction is limited by the degree of deformability of compliance of the rubber belts 10 and 11. At the location of the tail, the gap is likely to be pressed so small that it wipes the sill surface dry to cause abrasion between the rubbing sill surface and the belt.

In FIG. 2C an arrangement is shown wherein a pair of softer or more compliant belts 10a and 11a are employed. With these thicker or softer belts, they will accommodate the uneven thickness in the space between shoes 21 and 22 so that the gaps 38 and 39 remain the same at the location where the paper web lead end W is located and the position ahead of the paper web. However, with this type of belt it has been found that they absorb proportionately more driving power in operation of the press and are undesirable for that reason. It is also more costly initially in the cost of equipment to provide very thick belts and softer belts are limited

in the driving power they can assimilate in their wearing life.

FIG. 3 illustrates one form of sill structure which may be employed with the shoes for avoiding the problems illustrated in FIGS. 2A and 2B and achieving further advantages in avoiding leakage and providing an improved paper web produced by the press. In the arrangement of FIG. 3, a shoe 40 is provided. FIG. 3 is an enlarged view taken at one corner of the shoe as shown by the line III in FIG. 1. It will be understood that the shoes above and below the upper and lower belts will be of substantially identical construction so that only one need be illustrated. Further, the sill will be of uniform construction extending entirely around the chamber provided by the shoe. The shoe 40 provides a pressure chamber 41 to which is connected a fluid pressure source not shown. The chamber below that will also be supplied with fluid under the same pressure. Mounted to the shoe 40 is a resilient sill 42 made of rubber or other flexible material having a high degree of deformability. The sill is made sufficiently thick in the direction perpendicular to the belt surface so that small changes in pressure imposed on the sill face will cause large displacements of the sill face in a direction normal to the belt. This compliance of the sill will maintain a substantially uniform distribution of pressure along the length of the sill against the rubber belt so that even with variation in the thickness of the web passing through the pressing nip, there will not be concentrations in pressure or localized relief in pressure between the belt and the sill. In other words, the width of the sealing gap between the lower sill surface with slides on the belt will remain constant. It will be understood that the sill is preferably one piece and extends rectangularly completely around the pressure chamber 41. In some constructions it may be desirable to have the sill formed in sections with one type of section on the opposite sides of the chamber 41 and another type of construction for the leading and trailing sills, but preferably, the sill is rectangular shaped and formed of one piece. The sill is bonded to the shoe by suitable means and has an integral rubber diaphragm 43 extending across the rectangle. The diaphragm has openings 44 therethrough so that the pressure beneath the diaphragm is the same as above, and the full pressure of the fluid acts on the top of the traveling belt.

To increase the flexibility of the sill in a direction normal to the belt, a plurality of cavities are formed extending laterally into the sill. Each of the cavities are conically shaped, and cavities 45 are shown opening into the pressure chamber, and cavities 46 are shown opening to the outside of the sill. The cavities 45 will fill with pressurized liquid from the chamber 41 and will tend to aid in pressing the sill down against the belt and yet, will not reduce the strength of the sill substantially in a lateral direction.

Thus, the diaphragm 43 which is attached at all four sides to the sill functions as a means for applying a lateral inwardly directed force relative to the belt surface preventing the sill from being forced outwardly by the fluid pressure in the chamber. Additional means are provided for stiffening or reinforcing the sill and resisting its bending in a direction laterally of the belt. This is shown in the form of stiffening ribs 49 which are part of a stiffening assembly having a lower planar sliding surface 48 which slides on the belt. The stiffening member 49 may be made of various compositions stronger

than the flexible rubber of the sill, and a plastic such as Teflon will provide a good sliding surface 48 and will substantially stiffen the sill. The stiffening ribs are embedded vertically in the sill and project upwardly at right angles to the surface of the belt and extend continuously in a direction lateral of the sill for maximum lateral strength.

With a uniform gap between the lower surface of the sill and the moving belt, the pressure profile across the sill will drop at a uniform rate from its inner edge to its outer edge as shown by the graph 51. The gap will provide a slight leakage of fluid for lubrication of the belt against the surface 48 with the leakage flow being in the direction indicated by the arrow 50. Because the sill is highly resilient and deforms with slight changes in pressure, the sill presses against the belt uniformly along its length to provide for uniform lubrication and uniform gap width around the sill.

FIGS. 6 and 7 illustrate a sill 42 with the stiffening ribs being formed of a metal insert 55. The metal insert has vertical ribs 53 which extend into the rubber sill and has a lower sliding smooth surface 54.

In the arrangement of FIG. 8, a shoe 60 has a rectangular sill 61 thereon to enclose a pressure chamber 62. The belt travels beneath the sill in the direction indicated by the arrowed line 68. The sill 61 is mounted to the shoe 60 and on the lower face of the sill, a plastic or thin flexible metal surface 67 provides a sliding surface to engage the belt.

The sill extends rectangularly around the pressure chamber 62 to provide a leading sill portion 61c and a trailing sill portion 61d with side portions 61a and 61b.

Embedded in the side portions are vertical ribs 68 and 69 which project upwardly from the lower sill face 67 and provide lateral stiffening.

Extending across the open chamber 62 is an interconnecting sheet 69a which has openings 63 therethrough to permit pressure equalization.

Embedded in the diaphragm are reinforcing straps 65 to provide additional strength. The embedded straps 65 accommodate nontilting deformation of the sills with changes in loading. Since they preferably extend in the machine direction, they resist the lateral pressure imposed on the rubber sills due to the pressure in the chamber and also the frictional forces exerted on the leading and trailing portions of the sills due to the rapidly traveling rubber belts. The straps are molded into the rubber of the sill as well as into the rubber of the sheet. The straps are illustrated as running only in a machine direction, but may also be employed in the cross-machine direction. The rubber diaphragm 69 is continuous across the opening chamber and attached to the four sides of the sill to prevent tilting or rotating and spreading.

FIG. 10 shows another arrangement for meeting the requirements of providing a sill which does not rotate or twist or press laterally outwardly and which yieldably engages the traveling belt so as to maintain a constant sealing gap. In FIG. 10 a shoe 70 provides a pressure chamber 79 above a belt. A rubber base portion 72 is provided. The base 72 is flexible and formed of a material such as rubber arranged in a rectangular shape to enclose the pressure chamber 79. A reinforced rubber membrane or wall 71 extends downwardly from the shoe with the base 72 being integral therewith at its lower edge and together the base 72 and wall 71 form

the sill. The upper edge of the membrane is clamped to the shoe by clamping block 77 held against the under-surface of the shoe by capscrews 78. A strengthening insert 73 with vertical transverse ribs 75 is embedded in the base 72, FIG. 11.

The rubber membrane 71 is preferably formed having a half cylindrical cross-section with a radius shown by the letter R. The membrane is carried around all four edges of the shoe with suitably rounded corners. The centerline of the membrane is positioned so that it intersects the top surface of the rubber sill at an angle α . The sill face has a width dimension w with a thickness dimension b . A diaphragm 74, integral with the sill, extends across the open space between the base 72 and is provided with pressure equalizing holes 76. The sheet has a thickness t . The rubber sill is constructed so as to be relatively free to move in a direction perpendicular to the surface of the moving belt with very little restraint imposed upon it by the membrane 71, and with a sufficiently small change in loading of the rubber sill, deflection will occur so as not to appreciably disturb the desired orientation of the sill face with respect to the moving belt. For example, if the sill width w is 4 inches and if the radius R is 6 inches, the thickness b is 1-½ inches and thickness t is ½ inch. The gap c which represents the distance between the sheet 74 and the upper surface of the traveling belt is 0.0625 inch. If the pressure in the chamber 79 is 1,000 pounds per square inch, the tension in the cylindrically shaped membrane will be 6,000 pounds per linear inch, and the tension in the flat membrane will be about 6,000 pounds per linear inch. By making the sheet 74 of reinforced rubber, such tensions can be withstood, while at the same time the parts remain quite flexible. With the same dimensions given as examples above, the pressure loads and tension loads acting upon the rubber sill are in equilibrium, assuming a linear pressure gradient acting upon the sill face so that these loads will not lead to any deflection or tilting of the sill until there is a change in pressure distribution acting upon the sill face. A local deflection of the rubber sill of 0.25 inch will lead to a change in angle α of about 2°. This will lead to a change in loading of the rubber sill which is very small, but is of a magnitude and direction so as to cause a very small rotation of the sill in the counter-clockwise direction as viewed in FIG. 10. This small rotation will lead to a redistribution of fluid pressure acting upon the sill face which in turn will come into balance with the other loads acting upon the sill to reach a new state of equilibrium.

In the arrangements discussed above, the advantages have been reviewed with respect to compliance of the shoe sills. In the arrangement of FIG. 12, a structure is employed which increases the corrective pressure between the sill and belt in a manner so that when the gap tends to close locally, the pressure is increased locally thus counteracting the gap closure. This is accomplished by utilizing a fluid with higher pressure than that in the main shoe chamber and feeding this fluid pressure to bleed holes 86 located approximately midway across the sill face and spaced approximately over ½ inch to 1 inch around the sill perimeter. The fluid is supplied through passages 80, from a supply tube 89. When the sealing gap is in a normal condition, there is enough flow of the high pressure fluid so that the pressure drop in this high pressure fluid between the supply duct and the bleed hole is large enough so that this high

pressure fluid does not add greatly to the pressure between the sill and belt. However, if the gap tends to close, then the flow from the bleed hole is reduced and also the said pressure drop is decreased, thus resulting in higher pressure between the belt and sill in the region of the bleed hole. This high pressure will, of course, counteract the gap pressure, and will do so to a greater extent than can be done merely by the change in pressure distribution of the fluid flowing through the gap without such auxiliary supply of high pressure fluid. Alternately, the bleed holes in the sill may be simply connected to the fluid pressure already in the shoe cavity without any supply of higher pressure fluid. In other words, as shown in FIGS. 12 and 13, the tubes 80 feeding the bleed holes may simply be terminated at point 81 so as to communicate with the chamber 82. This will provide a simple construction, but would still provide a greater amount of corrective pressure distribution change as a result of tendencies of the gap dimensions to open or close and is provided without such bleed holes, but would not be as effective if a higher fluid pressure supply were provided to the passages 80.

In the arrangement of FIG. 12, a membrane or wall 83 is attached to a shoe, not shown, and has a flexible base 84 at its lower edge. The base is provided with a lower sliding surface 85 and has a diaphragm 87 extending across to join the base 84 at its periphery. Pressure equalizing holes 88 are provided through the diaphragm.

The high pressure fluid passages 80 lead to the openings 86 along the lower base of the sill. The passages are supplied with pressure by the high pressure supply hose 89 positioned within the pressure chamber 82. The lower sliding surface 85 is part of an insert which provides stiffening ribs 90 extending into the base 84.

I claim as my invention:

1. An extended press for pressing moisture from a fibrous paper web comprising in combination:
opposed traveling surfaces defining an extended press nip therebetween, at least one of said surfaces including;

a looped flexible traveling belt;
a shoe within said belt;

a sill on the shoe, said shoe and sill defining a fluid pressure chamber facing the belt opposite the nip exposed to the inner surface of the belt with the sill at the edges of the chamber between the shoe and belt for preventing the free escape of fluid from the chamber with the sill having a surface being in surface sliding engagement with the belt; said sill constructed of a flexible material;

means for pressurizing said chamber with fluid;

and means for applying a force directed laterally inwardly relative to the belt surface against said sill substantially at the sill surface preventing the sill from being forced outwardly by the fluid pressure in said chamber.

2. An extended press for pressing moisture from a fibrous paper web constructed in accordance with claim 1:

wherein said force applying means consists of an attachment means extending from the sill at one side of the chamber to the sill at the other side of the chamber.

3. An extended press for pressing moisture from a fibrous paper web constructed in accordance with claim 2:

wherein said attachment means is in diaphragm form having a continuous attachment to the sills at the sides of the chamber.

4. An extended press for pressing moisture from a fibrous paper web constructed in accordance with claim 3:

including means defining openings through the diaphragm for the free passage of fluid from the chamber to the space between the sheet and the belt.

5. An extended press for pressing moisture from a fibrous paper web constructed in accordance with claim 3:

wherein said diaphragm is formed of a yieldable flexible material and includes strengthening ribs extending therethrough having a relatively high tensile strength.

6. An extended press for pressing moisture from a fibrous paper web constructed in accordance with claim 3:

wherein said sill is continuous and encircles the chamber extending over four sides thereof to provide a leading and trailing sill portion and side sill portions.

7. An extended press for pressing moisture from a fibrous paper web constructed in accordance with claim 3:

including a second looped traveling belt at the other side of the nip;
and a shoe within said second belt opposite the nip;

sills, said shoe and sills forming a second fluid pressure chamber exposed to the inner surface of the belt;

and a diaphragm joining the sills of the second chamber; each of said sills being continuous and extending completely around the sides of the chambers providing leading and trailing sill portions and side sill portions.

8. An extended press for pressing moisture from a fibrous paper web comprising in combination:
opposed traveling surfaces defining an extended press nip therebetween with at least one of said surfaces including:

a looped flexible traveling belt;

a shoe positioned within the belt opposite the nip;

a sill, said shoe and sill forming a fluid pressure chamber with the chamber exposed to the inner surface of the belt;

said sill having a sill surface slidably engaging the belt and preventing the free escape of fluid from the chamber with said sill constructed of a flexible material;

and means defining recesses into the sill extending in a lateral direction relative to the belt surface.

9. An extended press for pressing moisture from a fibrous paper web constructed in accordance with claim 8:

wherein said recesses extend from the inner edge of said sill in an outward direction therefore admitting fluid from within the chamber being pressurized thereby.

10. An extended press for pressing moisture from a fibrous paper web constructed in accordance with claim 8:

wherein lateral recesses extend inwardly from the outside of said sill and from the inside of said sill staggered with respect to each other.

11. An extended press for pressing moisture from a fibrous paper web constructed in accordance with claim 10:

wherein said recesses are conically shaped and are of a length so that the deepest portion of the inner recesses extend beyond the deepest portion of the outer recesses.

12. An extended press for pressing moisture from a fibrous paper web comprising in combination:

opposed traveling surfaces defining an extended press nip therebetween with at least one of said surfaces including;

a looped flexible traveling belt;

a shoe positioned within the belt;

flexible sill walls attached to the shoe and defining a fluid pressure chamber within the belt opposite the nip exposed to the inner surface of the belt; said walls having sills with sill surfaces in sliding engagement with the belt;

and means applying a lateral force to the sills substantially at said sill surfaces preventing them from moving outwardly away from the chamber.

13. An extended press for pressing moisture from a fibrous paper web constructed in accordance with claim 12:

wherein said sill surfaces have substantially greater lateral dimensions than the walls.

14. An extended press for pressing moisture from a fibrous paper web constructed in accordance with claim 13:

including reinforcing means embedded in said sills preventing them from being outwardly away from the chamber in a direction parallel to the belt surface.

15. An extended press for pressing moisture from a fibrous web comprising in combination:

opposed traveling surfaces defining an extended press nip therebetween with at least one of said surfaces including:

a looped flexible traveling belt;

a shoe within the belt;

sills at the edges of the chamber having sill surfaces in sliding engagement with the belt; said shoe and sills form a liquid pressure chamber with the chamber exposed to the inner surface of the belt opposite the nip;

and fluid passages opening through said sill surfaces intermediate the edges of the surfaces for directing fluid under pressure through the openings with said fluid flowing against the traveling belt surface.

16. An extended press for pressing moisture from a fibrous paper web constructed in accordance with claim 15:

including means for directing fluid through said sill openings at a pressure higher than the pressure in said chamber.

17. An extended press for pressing moisture from a fibrous paper web constructed in accordance with claim 16:

wherein the size of said passages is such that the fluid pressure drop therethrough results in a pressure at the sill openings substantially equal to the normal pressure in the sealing gap at normal gap width.

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18. An extended press for pressing moisture from a fibrous paper web constructed in accordance with claim 15:
including a high pressure conduit within said chamber connected to the fluid passages through said sill. 5
19. An extended press for pressing moisture from a fibrous paper web comprising in combination:
opposed traveling surfaces defining an extended press nip therebetween with at least one of said surfaces including: 10
a looped flexible traveling belt;
a shoe within the belt opposite the nip;
a sill at the sides of the chamber having a sill surface in sliding engagement with the belt and being 15

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formed of a flexible yieldable material; said shoe and sill forming a fluid pressure chamber exposed to the inner surface of the belt;
and lateral stiffening means embedded in said sills for said sills preventing the sills from being forced outwardly on the edge of the belt from pressure within the chamber.
20. An extended press for pressing moisture from a fibrous paper web constructed in accordance with claim 19:
wherein said lateral stiffening means includes ribs embedded in the sills having a strength greater than the material of the sills and extending laterally outwardly of the chamber.
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