(19) DANMARK

(10) **DK/EP 2091716 T3**

Patent- og
Varemærkestyrelsen

(12) # Oversættelse af europæisk patentskrift

(51) Int.Cl.: ***B 29 C 53/16 (2006.01)*** ***B 28 C 5/40 (2006.01)***

(45) Oversættelsen bekendtgjort den: **2015-04-20**

(80) Dato for Den Europæiske Patentmyndigheds
bekendtgørelse om meddelelse af patentet: **2015-01-07**

(86) Europæisk ansøgning nr.: **07839893.0**

(86) Europæisk indleveringsdag: **2007-11-01**

(87) Den europæiske ansøgnings publiceringsdag: **2009-08-26**

(86) International ansøgning nr.: **US2007023059**

(87) Internationalt publikationsnr.: **WO2008057377**

(30) Prioritet: **2006-11-01 US 591957**

(84) Designerede stater: **AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR**

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(54) Benævnelse: **ANORDNING TIL INDSÆTNING AF RULLER**

(56) Fremdragne publikationer:

GB-A- 932 927
US-A- 2 579 770
US-A- 4 666 029
US-A1- 2003 221 937
US-A1- 2004 003 984
US-A1- 2004 250 900
US-A1- 2005 064 055

DESCRIPTION

TECHNICAL FIELD

[0001] The present embedment roll device relates generally to devices for embedding fibers in settable slurries, and specifically to a device designed for embedding fibers in a settable cement slurry along a cement board or cementitious structural panel ("SCP") production line.

[0002] Cementitious panels have been used in the construction industry to form the interior and exterior walls of residential and/or commercial structures. The advantages of such panels include resistance to moisture compared to standard gypsum-based wallboard. However, a drawback of such conventional panels is that they do not have sufficient structural strength to the extent that such panels may be comparable to, if not stronger than, structural plywood or oriented strand board (OSB).

[0003] Typically, the cementitious panel includes at least one hardened cement or plaster composite layer between layers of a reinforcing or stabilizing material. In some instances, the reinforcing or stabilizing material is fiberglass mesh or the equivalent. The mesh is usually applied from a roll in sheet fashion upon or between layers of settable slurry. Examples of production techniques used in conventional cementitious panels are provided in U.S. Patent Numbers 4,420,295; 4,504,335 and 6, 176,920. Further, other gypsumcement compositions are disclosed generally in U.S. Patent Nos. 5,685,903; 5,858,083 and 5,958,131.

[0004] One drawback of conventional processes for producing cementitious panels is that the fibers, applied in a mat or web, are not properly and uniformly distributed in the slurry, and as such, the reinforcing properties resulting due to the fiber-matrix interaction vary through the thickness of the board, depending on the thickness of each board layer. When insufficient penetration of the slurry through the fiber network occurs, poor bonding between the fibers and the matrix results, causing low panel strength. Also, in some cases when distinct layering of slurry and fibers occurs, improper bonding and inefficient distribution of fibers causes poor panel strength development.

[0005] Another drawback of conventional processes for producing cementitious panels is that the resulting product is too costly and as such is not competitive with outdoor/structural plywood or oriented strand board (OSB).

[0006] One source of the relatively high cost of conventional cementitious panels is due to production line downtime caused by premature setting of the slurry, especially in particles or clumps which impair the appearance of the resulting board, and interfere with the efficiency of production equipment. Significant buildups of prematurely set slurry on production equipment require shutdowns of the production line, thus increasing the ultimate board cost.

[0007] In instances, such as disclosed in commonly-assigned Serial No. 10/666,294 entitled MULTI-LAYER PROCESS AND APPARATUS FOR PRODUCING HIGH STRENGTH FIBER-REINFORCED STRUCTURAL CEMENTITIOUS PANELS (U.S. Pub. No. 2005-0064164A1), where loose chopped fiberglass fibers are mixed with the slurry to provide a cementitious structural panel (SCP) having structural reinforcement, the need arises for a way to thoroughly mix the fibers with the slurry. Such uniform mixing is important for achieving the desired structural strength of the resulting panel or board.

[0008] A design criteria of any device used to mix settable slurries of this type is that production of the board should continue uninterrupted during manufacturing runs. Any shutdowns of the production line due to the cleaning of equipment should be avoided. This is a particular problem when quick-setting slurries are created, as when fast setting agents or accelerators are introduced into the slurry.

[0009] U.S. Publication No. 2005/0064055 discloses a fiber embedment device that addresses the above design criteria and includes a plurality of first disks and a plurality of second disks that intermesh with each other to embed fibers in a slurry, see the preamble of claim 1.

[0010] A potential problem when creating cement structural panels in a moving production line, is for portions of the slurry to prematurely set, forming blocks or chunks of various sizes. When these chunks break free and become incorporated into the final board product, they interfere with the uniform appearance of the board, and also cause structural weaknesses. In conventional structural cement panel production lines, the entire production line must be shut down to clean clogged equipment to avoid the incorporation of prematurely set slurry particles into the resulting board.

[0011] Another design criteria of devices used to mix chopped reinforcing fibers into a slurry is that the fibers need to be mixed into the relatively thick slurry in a substantially uniform manner to provide the required strength.

[0012] Thus, there is a need for an improved device for thoroughly mixing fiberglass or other structural reinforcing fibers into a settable slurry so that the device does not become clogged or impaired by chunks or setting slurry.

DISCLOSURE OF INVENTION

[0013] The above-listed needs are met or exceeded by the present embedment device according to claim 1. The embedment device includes at least a pair of elongate shafts disposed on the fiber-enhanced settable slurry board production line to traverse the line. The shafts are disposed in spaced parallel relation to each other. Each shaft has a plurality of axially spaced disks along the shaft. During board production, the shafts and the disks rotate axially. The respective disks of the adjacent, preferably parallel shafts are intermeshed with each other for creating a "kneading" or "massaging" action in the slurry, which embeds previously deposited fibers into the slurry so that the fibers are distributed throughout the slurry. In addition, the close, intermeshed and rotating relationship of the disks prevents the buildup of slurry on the disks, and in effect creates a "self-cleaning" action which significantly reduces board line downtime due to premature setting of clumps of slurry.

[0014] More specifically, an embedment device is provided including a first integrally formed elongate shaft rotatably secured to the support frame and having a first plurality of axially spaced disks axially fixed to the first shaft, a second integrally formed elongate shaft rotatably secured to the support frame and having a second plurality of axially spaced disks axially fixed to the second shaft, the first shaft being disposed relative to the second shaft to be horizontally aligned and so that the disks intermesh with each other, and wherein, when viewed from the side, peripheries of the first and second pluralities of disks overlap each other.

[0015] In another embodiment, an embedment device is provided including a first roll secured to the support frame including a first shaft and a first plurality of axially spaced disks, a second roll secured to the support frame including a second shaft and a second plurality of axially spaced disks, the first roll and the second roll arranged on the support frame such that the first plurality of axially spaced disks and the second plurality of axially spaced disks intermesh with each other approximately twice a distance of embedment of the disks into the slurry.

[0016] In yet another embodiment, an embedment device is provided including a first roll rotatably secured to the support frame including a first shaft and a first plurality of axially spaced disks axially fixed to the first shaft, a second roll rotatably secured to the support frame including a second shaft and a second plurality of axially spaced disks axially fixed to the second shaft, the first roll being disposed relative to the second roll to be horizontally aligned and so that the first plurality of axially spaced disks and the second plurality of axially spaced disks intermesh with each other approximately twice a distance of embedment of the disks into the slurry, wherein a clearance between adjacent intermeshed disks of the first plurality of axially spaced disks and the second plurality of axially spaced disks is less than a diameter of a sample fiber bundle of the chopped fiber bundle.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017]

FIG. 1 is a top perspective view of a first embodiment of the present embedment device on a structural slurry board production line;

FIG. 2 is a fragmentary overhead plan view of the embedment device of FIG. 1;

FIG. 3 is a side elevation of the embedment device of FIG. 2;

FIG. 4 is a schematic diagram of the patterns of embedment tracks/troughs created in the slurry by the present embedment device;

FIG. 5 is a top perspective view of an alternate embodiment of the present embedment device on a structural slurry board production line;

FIG. 6 is a fragmentary overhead plan view of a first disk configuration of the embedment device of FIG. 5;

FIG. 7 is a side elevation view of the embedment device of FIG. 5; and

FIG. 8 is a fragmentary overhead plan view of another disk configuration of the embedment device of FIG. 5.

BEST MODE OF CARRYING OUT THE INVENTION

[0018] The embodiments shown in FIGs. 1-4 are known from US-A-2005/64055 and do not represent the invention.

[0019] Referring now to FIGs. 1 and 2, a structural panel production line is fragmentarily shown and is generally designated 10. The production line 10 includes a support frame or forming table 12 which supports a moving carrier 14, such as a rubber-like conveyor belt, a web of craft paper, release paper, and/or other webs of support material designed for supporting a slurry prior to setting, as is well known in the art. The carrier 14 is moved along the support frame 12 by a combination of motors, pulleys, belts or chains and rollers (none shown) which are also well known in the art. Also, while the present invention is intended for use in producing structural cement panels, it is contemplated that it may find application in any situation in which bulk fibers are to be mixed into a settable slurry for board or panel production.

[0020] While other sequences are contemplated depending on the application, in the present invention, a layer of slurry 16 is deposited upon the moving carrier web 14 to form a uniform slurry web. While a variety of settable slurries are contemplated, the present embedment device is particularly designed for use in producing structural cement panels. As such, the slurry is preferably made up of varying amounts of Portland cement, gypsum; aggregate, water, accelerators, plasticizers, foaming agents, fillers and/or other ingredients well known in the art. The relative amounts of these ingredients, including the elimination of some of the above or the addition of others, may vary to suit the application. A supply or bundle of chopped fibers 18, which in the preferred embodiment are chopped fiberglass fibers, are dropped or sprinkled upon the moving slurry web 16.

[0021] It is preferred that two applications of chopped fibers 18 are utilized for each layer of slurry 16 to provide additional structural reinforcement. Further, a vibrator (not shown) is optionally located in operational proximity to the moving carrier 14 to vibrate the slurry 16 and more uniformly embed the fibers 18 as they are deposited upon the slurry.

[0022] The present embedment device, generally designated 20, is disposed on the support frame 12 to be just "downstream" or after the point at which the fibers 18 are deposited upon the slurry web 16. Included in the device 20 are at least two elongate shafts 22, 24 each having ends 26 engaged in a bracket 28 located on each side of the support frame 12. Although two shafts 22, 24 are depicted, additional shafts may be provided if desired. One set of shaft ends 26 is preferably provided with toothed sprockets or pulleys 30 (best seen in FIG. 2) or other driving mechanism to enable the shafts 22, 24 to be axially rotated in the brackets 28. It is preferred that the shafts 22, 24, and the associated disks 32, 34, are rotated in the same direction. Motorized belt drives, chain drives or other typical systems for driving rollers or shafts along a production line are considered suitable here. It will be seen that the shafts 22, 24 are mounted generally transversely on the support frame 12, and are in spaced, generally parallel relationship to each other. In the preferred embodiment, the shafts 22, 24 are parallel to each other.

[0023] Each of the shafts 22, 24 is provided with a plurality of axially spaced main or relatively large disks 32, with adjacent disks being axially spaced from each other. The spacing is maintained by a second plurality of relatively smaller diameter spacer disks 34 (FIG. 2) which are each located between an adjacent pair of main disks 32. As is seen in FIG. 3, it is preferred that at least the main disks 32, and preferably both the main and the spacer disks 32, 34 are keyed to the respective shaft 22, 24 for common rotation. The toothed sprockets 30 are also preferably keyed or otherwise secured to the shafts 22, 24 for common rotation. In the preferred embodiment, keyed collars 36 (best seen in FIG. 3) located adjacent each shaft end 26 are secured to the shaft, as by set keys or set screws 38 and retain the disks 32, 34 on the shafts 22, 24 against lateral movement.

[0024] It will also be seen from FIGs. 1-3 that the disks 32, 34 of the respective shafts 22, 24 are intermeshed with each other, so that the main disks 32 of the shaft 22 are located between disks 32 of the shaft 24. It will also be seen that, upon becoming intermeshed, peripheral edges 40 of the main disks 32 overlap each other, and are disposed to be in close, yet rotational relationship to peripheral edges 42 of the opposing spacer disks 34 of the opposing shaft (best seen in FIG. 3). It is preferred that the shafts 22, 24, and the associated disks 32, 34, are rotated in the same direction 'R' (FIG. 3).

[0025] While the relative dimensions of the disks, 32, 34 may vary to suit the application, in the preferred embodiment, the main disks 32 are ¼" (0.64 cm) thick and are spaced 5/16" (0.79 cm) apart. Thus, there is a close, yet relatively rotational tolerance created when the adjacent disks 32 of the shafts, 22, 24 intermesh with each other (best seen in FIG. 2). This close tolerance makes it difficult for particles of the settable slurry 16 to become caught between the disks 32, 34 and set prematurely. Also, since the shafts 22, 24, and the associated disks 32, 34 are constantly moving during SCP panel production, any slurry which is caught between the disks is quickly ejected, and has no chance to set in a way which would impair the embedment operation. It is also preferred that the peripheries of the disks 32, 34 are flattened or perpendicular to the plane of the disk, but it is also contemplated that tapered or otherwise angled peripheral edges 40, 42 could be provided and still achieve satisfactory fiber embedment.

[0026] The self-cleaning property of the present embedment device 20 is further enhanced by the materials used for the construction of the shafts 22, 24 and the disks 32, 34. In the preferred embodiment, these components are made of stainless steel which has been polished to obtain a relatively smooth surface. Also, stainless steel is preferred for its durability and corrosion resistance, however other durable, corrosion resistant and non-stick materials are contemplated, including Plexiglas material or other engineered plastic materials.

[0027] Further, the height of the shafts 22, 24 relative to the moving web 14 is preferably adjustable to promote embedment of the fibers 18 into the slurry 16. It is preferred that the disks 32 not contact the carrier web 14, but extend sufficiently into the slurry 16 to promote embedment of the fibers 18 into the slurry. The specific height of the shafts 22, 24 above the carrier web 14 may vary to suit the application, and will be influenced, among other things, by the diameter of the main disks 32, the viscosity of the slurry, the thickness of the slurry layer 16 and the desired degree of embedment of the fibers 18.

[0028] Referring now to FIG. 4, the plurality of main disks 32 on the first shaft 22 are disposed relative to the frame 12 to create a first trough pattern 44 (solid lines) in the slurry 16 for embedding the fibers 18 therein. The trough pattern 44 includes a series of valleys 46 created by the disks 32 and hills 48 located between the disks as the slurry 16 is pushed to the sides of each disk. Since the fibers 18 have been immediately previously deposited upon an upper surface 50 of the slurry 16, a certain percentage of the fibers will become mixed into the slurry through the formation of the first trough pattern 44. It will be appreciated that as the shafts 22, 24 are rotating and turning the associated disks 32, 34, the carrier web or belt 14 is also moving in a direction of travel 'T' (Fig. 2) from the first shaft 22 to the second shaft 24. In this manner, a churning dynamic movement is also created which will enhance the embedment of the fibers 18.

[0029] Immediately after leaving the vicinity of the disks 32 of the first shaft 22, the slurry 16 encounters the disks 32 of the second shaft 24 (shown in phantom), which proceed to create a second trough pattern 52. Due to the laterally offset position of the disks 32 of the respective shafts 22, 24, at any selected point, the second trough pattern 52 is opposite to the pattern 44, in that hills 54 replace the valleys 46, and valleys 56 replace the hills 48. In that the trough patterns 44, 52 generally resemble sinusoidal waves, it may also be stated that the trough patterns 44, 52 are out of phase relative to each other. This transversely offset trough pattern 52 further churns the slurry 16, enhancing the embedment of the fibers 18. In other words, a slurry massaging or kneading action is created by the rotation of the intermeshed disks 32 of the shafts 22, 24.

[0030] During development of the embedment device 20, it was found that in some cases, individual fiber bundles can become lodged between rotating disks of the devices, expanding in diameter as they are rolled together with other fibers and causing the devices to lock up or stop. As a result, the entire SCP panel production line must generally be shut down to disassemble the embedment devices 20 and remove the lodged fibers from the disks, increasing the ultimate board cost and reducing the efficiency of the production line. Accordingly, an alternate embedment roll device 60 is provided and is illustrated in FIG. 5. Components used in the device 60 and shared with the device 20 of FIGs. 1-4 are designated with identical reference numbers, and the above description of those components is considered applicable here. Similarly, an applicable SCP panel production line is described in co-pending and commonly owned United States Patent No. 7,182,589.

[0031] Similar to the embedment device 20, the embedment device 60 is rotatably disposed on the support frame 12 just "downstream" of where the fibers 18 are deposited upon the slurry web 16. As discussed in the above described process application, it is contemplated that an embedment device 60 is provided for each slurry layer used to create an SCP panel. The device 60 includes a first integrally formed elongate shaft 62 secured to the support frame 12 and has a first plurality of axially spaced disks 64 axially fixed to the first shaft, and a second integrally formed elongate shaft 66 secured to the support frame and having a second plurality of axially spaced disks 68 axially fixed to the second shaft.

[0032] The embedment device 20 includes disks having a thickness of less than ½ inch (1.27 cm) to provide a greater number of disks on each shaft and to more uniformly embed the fibers 18 into the slurry 16. However, in the course of development of the embedment device 60, it was found that by increasing the thickness of the disks 64, 68 and decreasing the number of disks by approximately one-half, friction between the disks was reduced by half, while still providing uniform embedment. Preferably, the thickness of the disks 64, 68 is approximately ½-1 inch (1.27-2.54 cm), although this range may vary to suit the application. It is contemplated that reducing the friction between adjacent disks 64, 68 will prevent jamming of the disks and reduction in rotational speed of the shafts 62, 66.

[0033] Similar to the embedment device 20, each of the shafts 62, 66 have ends 69 engaged in the bracket 28 located on each side of the support frame 12. It is preferred that the shafts 62, 66 and their associated disks 64, 68, are rotated in the same direction. Due to their resistance against slippage, motorized chain drives (not shown) are preferred for rotating the shafts 62, 66, although it is appreciated that other systems for driving the shafts may be suitable, as known in the art.

[0034] As seen in FIG. 5, the shafts 62, 66 are mounted generally transversely on the support frame 12 and are oriented on the frame to be generally parallel to each other, and define a plane vertically displaced from and parallel to the moving carrier 14.

[0035] As seen in FIG. 2, the large disks 32 of the embedment device 20 generally intermesh with each other to approximately the outer peripheral edge 42 of the spacer disks 34. However, it has been found that in some cases, fibers can become caught between the intermeshed disks, preventing rotation of the shafts and requiring production line shutdown.

[0036] Accordingly, in the embedment device 60 and as shown in FIGs. 6-7, the first plurality of axially spaced disks 64 and the second plurality of axially spaced disks 68 preferably intermesh with each other only in regions of their respective outer peripheral edges 70, or a distance approximately twice a distance "D" of embedment of the disks into the slurry 16. Preferably still, the first plurality of axially spaced disks 64 and the second plurality of axially spaced disks 68 intermesh with each other to create approximately ½ inch (1.27 cm) of overlap, although other distances may be appropriate, depending on the application. It is contemplated that this arrangement prevents jamming of the disks 64, 68 while still providing uniform embedment of the fibers 18 into the slurry 16.

[0037] To further prevent clogging between adjacent disks, a clearance "C" (FIG. 6) between adjacent intermeshed disks of the first plurality of axially spaced disks 64 and the second plurality of axially spaced disks 68 is preferably less than a diameter of a sample fiber of the chopped fibers 18. Preferably, the clearance "C" is approximately 0.01-0.018 inches (0.03-0.05 cm), although this range may vary to suit the application. It is contemplated that this arrangement prevents fibers 18 from jamming between adjacent disks during rotation, which can require shutdown of the entire production line 10 to disassemble the embedment device 60 and remove the jammed fibers. It is further contemplated that this configuration still provides a self-cleaning action by ejecting any fibers/slurry that might normally catch between the intermeshed disks 64, 68, due to the constant movement of the shafts 62, 66 during SCP panel production.

[0038] Best seen in FIG. 6, the embodiment of the embedment device 60 further includes a groove 72 defined between adjacent disks 64, 68 and integrally formed on the first and second shafts 62, 66. It is contemplated that by integrally forming the groove 72 and the disks 64, 68 on the shafts 62, 66, the clearance between adjacent intermeshed disks remains consistent after continued operation and provides a more uniform and efficient embedment. Since the shafts 62, 66 and the disks 64, 68 are integrally formed, the groove 72 is also an outer peripheral edge 74 of the shafts. Preferably, the groove 72 is approximately 1.4-1.8 inches (3.56-4.57 cm) deep, although it is appreciated that other ranges may be appropriate to suit the application.

[0039] It will be understood that in integrally forming the shafts 62, 66 to create the plurality of spaced disks 64, 68 separated by the grooves 72, each shaft is preferably fabricated by machining the grooves 72 into a solid cylindrical shaft. Thus, the disks 64, 68 will not be distinct from the grooves as one progresses towards the axis of the shaft radially inwardly from the groove 72. Nevertheless, since the shaft produced in this manner results in a plurality of spaced, circular, flat shapes which at their peripheries act like the disks 32 in the embedment device 20, they are also referred to as disks in reference to the device 60. Also, other fabrication techniques are contemplated for producing integrally formed shafts with disks 64, 68, including, but not limited to welding or otherwise integrally fastening individual components, or using chemical adhesives or the like.

[0040] In another embodiment of the embedment device 60, generally designated 60a in FIG. 8, a first shaft 76 includes a first plurality of relatively small diameter disks 78 located between the first plurality of axially spaced disks 64, and a second shaft 80 includes a second plurality of relatively small diameter disks 82 located between the second plurality of axially spaced disks 68. The disks 78, 82 are individually formed and alternately placed between disks 64, 68 on the shafts 62, 66, respectively. Each of the shafts 62, 66 have ends 84 engaged in the bracket 28 located on each side of the support frame 12. One set of shaft ends 84 is preferably provided with toothed sprockets or pulleys 30 to enable rotation of the shafts. As described above in relation to FIG. 3, preferably both the main disks 64, 68 and the smaller disks 78, 82 are keyed to the respective shafts 76, 80 for common rotation. The toothed sprockets 30 are also preferably keyed to the respective shaft 76, 80 for common rotation.

[0041] Similar to the groove 72, the relatively small diameter disks 76, 78 are sized such that the intermesh between adjacent disks 64, 68 is only in the region of the disk outer peripheral edges 70. Due to the increased thickness of the disks 64, 68, it is contemplated that the arrangement of smaller diameter disks 76, 78 and disks 64, 68 will maintain a consistent clearance "C" between adjacent intermeshed disks during continued operation of the device 60.

[0042] Thus, the present embedment device provides a mechanism for incorporating or embedding chopped fiberglass fibers into a moving slurry layer. An important feature of the present device is that the disks of the respective shafts are intermeshed with, and overlap each other for providing a kneading, massaging or churning action to the slurry in a way which minimizes the opportunity for slurry to clog or become trapped in the device.

[0043] While a particular embedment roll device has been shown and described, it will be appreciated by those skilled in the art that changes and modifications may be made thereto without departing from the invention in its broader aspects and as set forth in the following claims.

REFERENCES CITED IN THE DESCRIPTION

Patent documents cited in the description

- US4420295A [0003]

- US4504335A [0003]
- US6176920A [0003]
- US5685903A [0003]
- US5858083A [0003]
- US5958131A [0003]
- US10666294B [0007]
- US20050064164A1 [0007]
- US20050064055A [0009]
- US200564055A [0018]
- US7182589B [0030]

ANORDNING TIL INDSÆTNING AF RULLER

PATENTKRAV

1. Anordning (60) til indsætning og til anvendelse i en produktionslinje til konstruktionsplader, hvor slam transporteres på en bevægelig bærer (14) i forhold til en støtteramme (12), og skårne fibre (18) aflejres på slammet, hvilken anordning indbefatter

en første aflang aksel (62, 76) i ét stykke, der er roterbart fastgjort til støtterammen (12) og har en første flerhed af skiver (64), der er placeret aksialt med afstand og aksialt fastgjort til den første aksel; og

en anden aflang aksel (66, 80) i ét stykke, der er roterbart fastgjort til støtterammen (12) og har en anden flerhed af skiver (68), der er placeret aksialt med afstand og fastgjort til den anden aksel, hvor periferierne af den første og anden flerhed af skiver overlapper hinanden, når de betragtes fra siden;

anordning kendetegnet ved, at:

en rille (72) er defineret mellem tilstødende skiver af flerhederne af skiver på hver af den første og anden aksel og ligeledes definerer en ydre periferikant af hver aksel;

hvor den første aksel er placeret i forhold til den anden aksel til at være horisontalt justeret og således at skiverne griber ind i hinanden.

2. Anordning ifølge krav 1, hvor den første flerhed af skiver (64), der er placeret aksialt med afstand og den anden flerhed af skiver (68), der er placeret aksialt med afstand, kun griber ind i hinanden i områder af deres respektive ydre periferikanter (70).

3. Anordning ifølge et hvilket som helst af de foregående krav, hvor den første flerhed af skiver (64), der er placeret aksialt med afstand, og den anden flerhed af skiver (68), der er placeret aksialt med afstand, griber ind i hinanden for at frembringe en overlapning på ca. 1,27 cm (0,5 tommer).

4. Anordning ifølge et hvilket som helst af de foregående krav, hvor en afstand (C) mellem tilstødende i hinanden indgribende skiver af den første flerhed af skiver (64), der er placeret aksialt med afstand, og den anden flerhed af skiver (68), der er placeret aksialt med afstand er ca. 0,03 cm til 0,05 cm (0,01 til 0,018 tommer).

5. Anordning ifølge et hvilket som helst af de foregående krav, hvor rillen (72) er ca. 3,56 til 4,57 cm (1,4 - 1,8 tommer) dyb.

6. Anordning ifølge et hvilket som helst af de foregående krav, hvor akslerne (62, 66) er orienteret på akslen til at være generelt på tværs af bevægelsesretningen for slam langs produktionslinjen og til at være generelt parallelle med hinanden og definere et plan, der er vertikalt forskudt i forhold til og parallelt med den bevægelige bærer (14).

7. Anordning ifølge et hvilket som helst af de foregående krav, hvor den første flerhed af skiver (64) er placeret i forhold til rammen (12) for at frembringe et første gennemgående mønster i slammet for indlejring af fibrene (18) deri, og den anden flerhed af skiver (68) er placeret i forhold til rammen for at frembringe et andet gennemgående mønster i slammet, hvilket andet mønster er forskudt på tværs i forhold til det første mønster.

8. Anordning ifølge et hvilket som helst af de foregående krav, hvor akslerne (62, 66) er konfigureret til at rotere i samme retning.

9. Anordning (60, 60a) ifølge krav 1, hvilken anordning endvidere omfatter:

en første rulle, der er fastgjort til støtterammen (12) og indbefatter den første aksel (62, 76) og den første flerhed af skiver (64), der er placeret aksialt med afstand; og

en anden rulle, der er fastgjort til støtterammen (12) og indbefatter den anden aksel (66, 80) og en anden flerhed af skiver (68), der er placeret aksialt med afstand.

10. Anordning ifølge krav 9, hvilken anordning endvidere indbefatter en første flerhed af skiver (78) med en relativt lille diameter, der er fastgjort til den første aksel (76) mellem den første flerhed af skiver (64), der er placeret aksialt med afstand, og en anden flerhed af skiver (82) med en relativt lille diameter, der er fastgjort til den anden aksel (80) mellem den anden flerhed af skiver (68), der er placeret aksialt med afstand.

11. Anordning (60, 60a) ifølge krav 1, hvilken anordning endvidere omfatter:

en første rulle, der er roterbart fastgjort til støtterammen (12) og indbefatter den første aksel (62, 76), og den første flerhed af skiver (64), der er placeret aksialt med afstand og aksialt fastgjort til den første aksel; og

en anden rulle, der er roterbart fastgjort til støtterammen (12) og indbefatter den anden aksel (66, 80), og den anden flerhed af skiver (68), der er placeret aksialt med afstand og aksialt fastgjort til den anden aksel;

hvilken første rulle er placeret i forhold til den anden rulle til at være horisontalt justeret og således at den første flerhed af skiver (64), der er placeret aksialt med afstand og den anden flerhed af skiver (68), der er placeret aksialt med afstand, griber ind i hinanden ca. to gange afstanden for indsætningen af skiver i slammet.

12. Anordning ifølge krav 11, hvor den første flerhed af skiver (64), der er placeret aksialt med afstand, og den anden flerhed af skiver (68), der er placeret aksialt med afstand, er dannet i et på deres respektive aksler.

13. Anordning ifølge krav 11 eller 12, hvor afstanden (C) mellem tilstødende i hinanden indgribende skiver af den første flerhed af skiver (64), der er placeret aksialt med afstand, og den anden flerhed af skiver (68), der er placeret aksialt med afstand er ca. 0,03 til 0,05 cm (0,01-0,018 tommer).

DRAWINGS

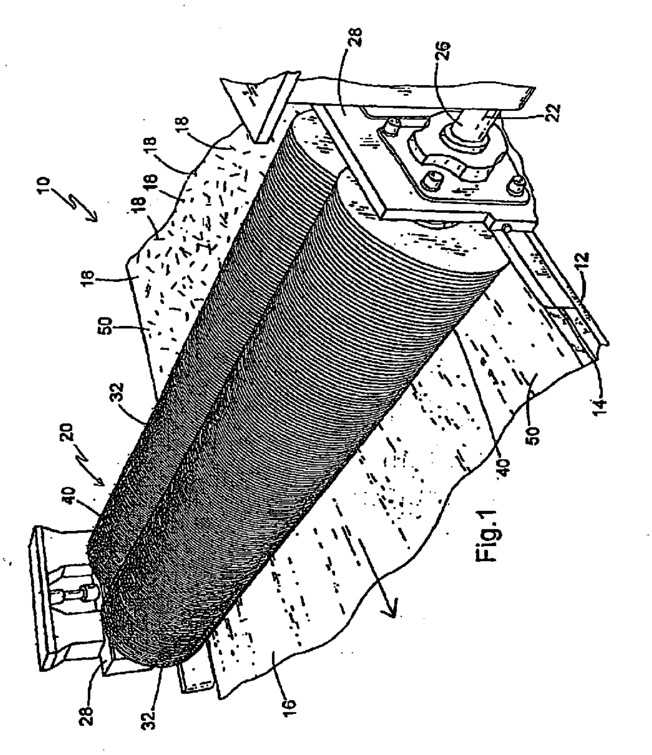

Fig.1

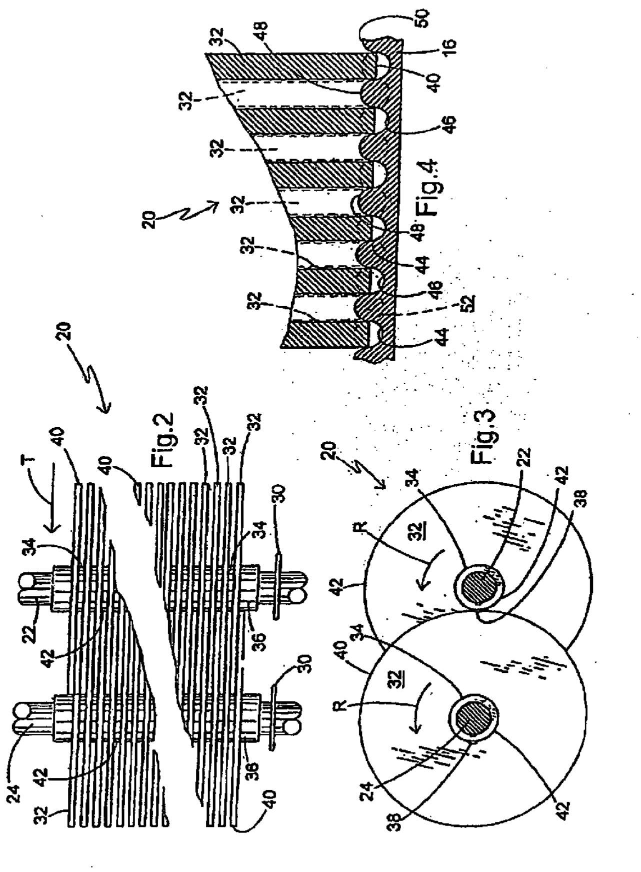
Fig.2
Fig.3
Fig.4

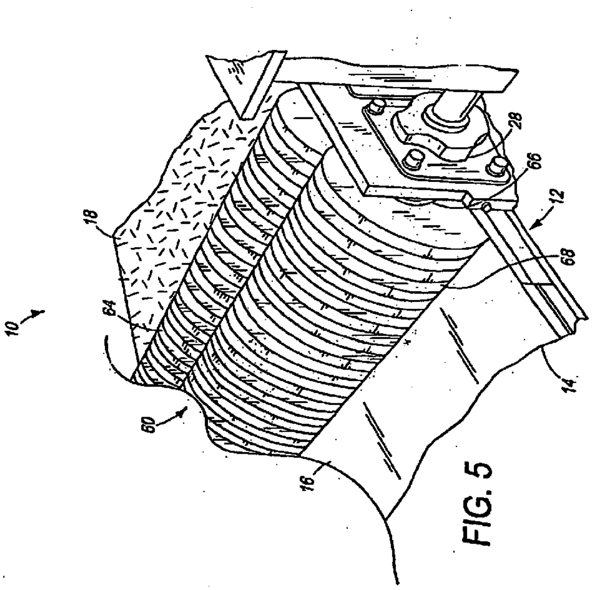

FIG. 5

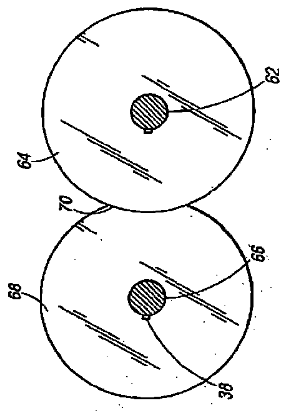

FIG. 7

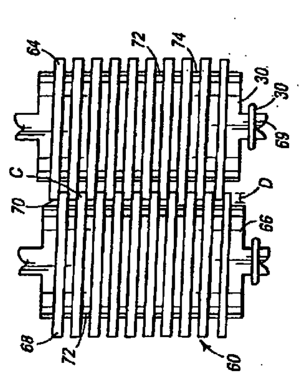

FIG. 6

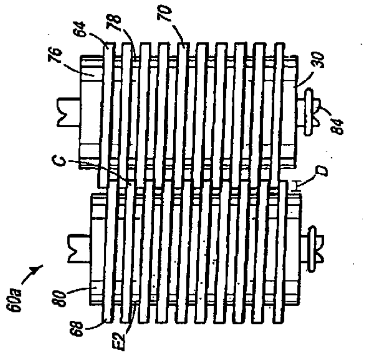

FIG. 8