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(54) Cylinder cleaning apparatus

(57) There is disclosed an apparatus for cleaning the outer surface of a cylinder 6 with a cleaning fabric 2. The apparatus comprises a pressure pad 4 molded out of elastomer which includes fibers 28 incorporated thereinto. The cleaning fabric 2 is directed between the pressure pad 4 and the cylinder 6. The pressure pad 4 is deformed by pressurized air so that the cleaning fabric 2 can be pressed against the outer surface of the cylinder 6 by the pressure pad 4 to clean the outer surface of the cylinder 6.

Fig. 1

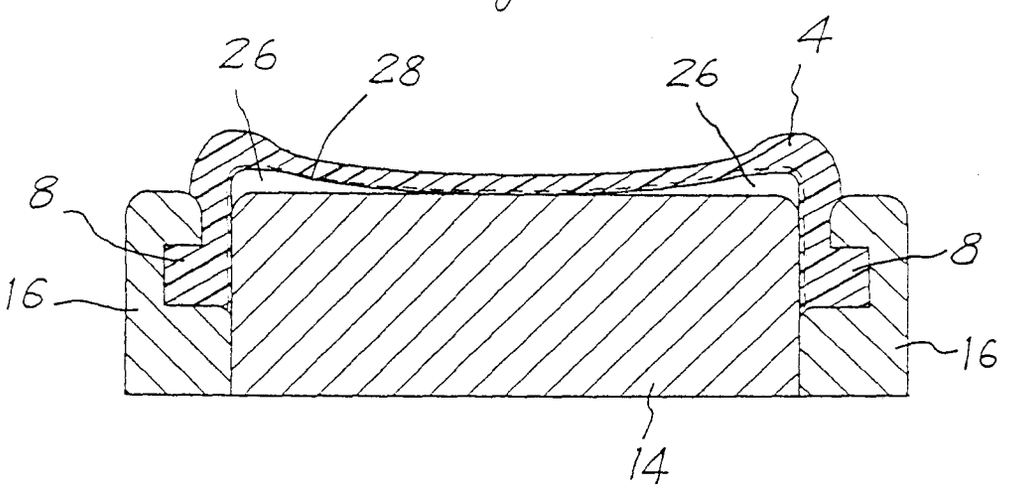

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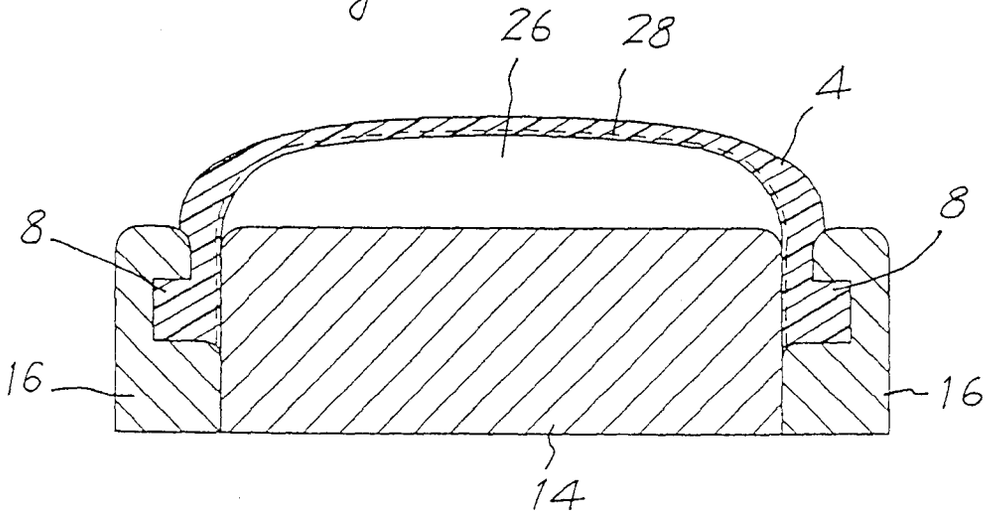
Fig.2



Description

[0001] The invention relates to an apparatus for cleaning the outer surface of a cylinder with a cleaning fabric in an offset printing press. The cylinder may be a blanket cylinder, plate cylinder, inking roller or the like. In particular, the invention relates to a pressure pad by which the cleaning fabric is pressed against the outer surface of the cylinder to clean the outer surface of the cylinder.

[0002] There has been commercially available an apparatus for cleaning the outer surface of a cylinder with a cleaning fabric in an offset printing press, as disclosed in U.S. Patent No. 4,344,361. In the apparatus, the cleaning fabric 2 is directed between a pressure pad 4 and the cylinder 6, as shown in Fig. 8. The pressure pad 4 comprises an expandable bladder made of elastomer which has opposite side edges 8 extending parallel to the cylinder 6.

[0003] The apparatus includes a support bar 10 extending between and mounted on a pair of side plates 12 for supporting the pressure pad 4. The side plates 12 are mounted on the side frames of the printing press. A back up bar 14 is fixed to the support bar 10 to extend between the side plates 12. Clamps 16 are fixed to the back up bar 14 so that the opposite side edges 8 are clamped and fixed between the clamps 16 and the back up bar 14 to support the pressure pad 4. The pressure pad 4 includes ridges formed along the opposite side edges 8 thereof to be received in grooves formed in the clamps 16.

[0004] The apparatus further includes a supply roll 18 extending between and mounted on the side plates 12 for rotation. The cleaning fabric 2 is supplied to the pressure pad 4 from the supply roll 18 through a spray bar 20. The spray bar 20 is arranged to spray a cleaning agent or detergent onto the cleaning fabric 2. The apparatus further includes a take-up roll 22 extending between and mounted on the side plates 12 for rotation. The cleaning fabric 2 is directed to the take-up roll 22 from the pressure pad 4 through a guide bar 24. The apparatus further includes drive means, not shown, for intermittently rotating the take-up roll 22 to take-up the cleaning fabric 2 about the take-up roll 22 so that the cleaning fabric 2 can be intermittently fed through the pressure pad 4.

[0005] In addition, an air chamber 26 is formed between the pressure pad 4 and the back up bar 14 and connected to a compressor not shown. Pressurized air is supplied into the air chamber 26 from the compressor so that the pressure pad 4 can be elastically expanded between the opposite side edges 8 thereof to be convex toward the outer surface of the cylinder 6. The cleaning fabric 2 is therefore nipped between the pressure pad 4 and the cylinder 6 with a nip width and pressed against the outer surface of the cylinder 6 by the pressure pad 4 when the cylinder 6 is rotated in a direction indicated by an arrow, to clean the outer surface of the cylinder 6.

[0006] The pressurized air is then discharged from the air chamber 26 so that the pressure pad 4 can be elastically contracted to be spaced from the outer surface of the cylinder 6. The cleaning fabric 2 is therefore disengaged and retracted from the outer surface of the cylinder 6. The cleaning fabric 2 is then intermittently fed for a length to exchange the cleaning fabric 2 for fresh one on the pressure pad 4.

[0007] The pressure pad 4 is expanded again so that the fresh fabric 2 can be pressed against the outer surface of the cylinder 6 by the pressure pad 4 to clean the outer surface of the cylinder 6. The pressure pad 4 is elastically expanded and contracted with an elongation percentage of 7 to 10 % by the pressurized air having a pressure of about 0.5 Kg/cm^2.

[0008] However, the pressure pad 4 has to be elastically expanded and contracted several or scores of times in a cleaning cycle to complete the cleaning. In a printing factory in which printing plates are exchanged for other ones again and again, it is usual to accomplish many cleaning cycles a day. The pressure pad 4 is therefore elastically expanded and contracted a great number of times in all, resulting in fatigue and deterioration of the pressure pad 4.

[0009] In addition, the pressure pad 4 takes the form of a rectangle having a great ratio of length to width, as shown in Fig. 9. The pressure pad 4 is tightly fixed not only at opposite side edges 8 but also at opposite ends by the clamps 16. This results in differences in elastic expansion and contraction between the opposite side edges 8, the opposite ends and the other portion of the pressure pad 4, and variations with age of the factors such as the nip width of the pressure pad 4 pressed against the outer surface of the cylinder 6. It is therefore required to frequently adjust the factors such as the nip width of the pressure pad 4. The pressure pad 4 may be damaged for the last time. In addition, stresses concentrate on the portions of the pressure pad 4 adjacent the clamps 16 so that the portions will be liable to be damaged.

[0010] The pressure pad 4 is made of a special composite by a special method to obtain a mechanical strength enduring the repeated expansion and contraction of the pressure pad 4 in addition to a corrosion resistance to the cleaning agent or detergent such as xylene for cleaning the outer surface of the cylinder 6. There must exist irregularities in composite of the pressure pads 4 and method by which the pressure pads 4 are made, resulting in a large difference in duration of life between the pressure pads 4.

[0011] Furthermore, when exchanging the pressure pad 4 for fresh one for maintenance in the cylinder cleaning apparatus, the fresh pad has to be strained longitudinally and widthwise thereof and mounted on the back up bar 14. If relaxedly mounted on the back up bar 14, the pressure pad 4 can not be conveniently pressed against the outer surface of the cylinder 6 to clean the outer surface of the cylinder 6. It has a problem in such

the condition that the pressure pad 4 is pressed against the outer surface of the cylinder 6 with a nip width which is too wide to waste the material of cleaning fabric 2. The majority of user has not a special tool by which the pressure pad 4 is strained longitudinally and widthwise thereof and mounted on the back up bar 14. It is therefore usual that the user sends back the apparatus to a maker to exchange the pressure pad 4 for fresh one.

[0012] It is therefore an object of the invention to provide a new and improved apparatus for cleaning the outer surface of a cylinder with a cleaning fabric, to thereby overcome the above problems.

[0013] Another object of the invention is to provide the apparatus including a pressure pad by which the cleaning fabric is pressed against the outer surface of the cylinder, the pressure pad being improved to increase the mechanical strength thereof.

[0014] Other object of the invention is to minimize the fatigue and deterioration of the pressure pad.

[0015] Other object of the invention is to prevent the pressure pad from being damaged to increase the duraticn of life of the pressure pad.

[0016] Other object cf the invention is to minimize the variations with age of the factors such as the nip width of the pressure pad pressed against the cuter surface of the cylinder, to decrease the times of adjustment thereof.

[0017] Other object of the invention is to facilitate exchange of the pressure pad for new one without difficulty.

[0018] According to the invention, there is provided an apparatus for cleaning the outer surface of a cylinder with a cleaning fabric. The apparatus comprises a pressure pad molded out of elastomer which includes fibers incorporated thereinto. The cleaning fabric is directed between the pressure pad and the cylinder. The pressure pad is deformed by pressurized air so that the cleaning fabric can be pressed against the outer surface of the cylinder by the pressure pad to clean the outer surface of the cylinder.

[0019] The pressure pad may have opposite side edges extending parallel to the cylinder, the pressure pad being deformed between the opposite side edges thereof to be convex toward the outer surface of the cylinder.

[0020] The pressure pad may have an original shape spaced from the outer surface of the cylinder, the pressure pad being restored between the opposite side edges thereof into the original shape when the pressurized air is discharged.

[0021] The pressure pad may be restored between the opposite side edges thereof into the original shape which is concave with respect to the outer surface of the cylinder.

[0022] The pressure pad may be deformed cr restored between the opposite side edges thereof to be convex or concave without considerable elastic expansion and ccntraction of the pressure pad.

[0023] The pressure pad may be deformed or restored between the opposite side edges thereof symmetrically.

[0024] The fibers may ccmprise synthetic or natural fibers.

[0025] The fibers may take the form of a non-woven or woven fabric incorporated into the elastomer.

[0026] The invention will further be described by way of example and with reference to the following drawings in which:-

[0027] Fig. 1 is a cross sectional view cf a pressure pad according to the invention.

[0028] Fig. 2 is a cross sectional view of the pressure pad of Fig. 1 deformed by pressurized air.

[0029] Fig. 3 is a schematic plan view showing a non-woven or woven fabric to be incorporated into elastomer in the pressure pad of Fig. 1.

[0030] Fig. 4 is a schematic plan view of other embodiment.

[0031] Fig. 5 is a schematic side view showing the relative arrangement between the fabric and the pressure pad of Fig. 1.

[0032] Fig. 6 is a schematic side view of other embodiment.

[0033] Fig. 7 is a schematic side view of other embodiment.

[0034] Fig. 8 is a cross sectional view of an apparatus for cleaning the outer surface of a cylinder in prior art.

[0035] Fig. 9 is a perspective view of the pressure pad of Fig. 8.

[0036] Turning now to the drawings, Fig. 1 illustrates a pressure pad 4 used in an apparatus according to the invention. The apparatus is arranged to clean the outer surface of a cylinder 6 with a cleaning fabric 2 in an offset printing press, as in the case of the apparatus in Fig. 8. The cleaning fabric 2 is directed between the pressure pad 4 and the cylinder 6. The pressure pad 4 has opposite side edges 8 extending parallel to the cylinder 6. The apparatus includes the same support bar 10, side plates 12, back up bar 14 and clamps 16 as those in Fig. 8. The clamps 16 are fixed to the back up bar 14 so that the opposite side edges 8 are clamped and fixed between the clamps 16 and the back up bar 14 to support the pressure pad 4. The apparatus further includes the same supply roll 18, spray bar 20, take-up roll 22 and guide bar 24 as those in Fig. 8, the cleaning fabric 2 being intermittently fed to the take-up roll 22 from the supply roll 18 through the spray bar 20 and the pressure pad 4. The spray bar 20 is arranged to spray the cleaning agent or detergent onto the cleaning fabric 2.

[0037] The pressure pad 4 is molded out of elastomer which includes fibers 28 incorporated thereinto. The elastomer comprises a synthetic rubber such as nitril rubber having a corrosion resistance to the cleaning agent or detergent such as xylene. The fibers 28 comprises synthetic or natural fibers. In the embodiment, the fibers 28 take the form of a woven or non-woven fabric incorporated into the elastomer.

[0038] In addition, an air chamber 26 is formed be-

tween the pressure pad 4 and the back up bar 14 and connected to the compressor, pressurized air being supplied into the air chamber 26 from the compressor. The pressure pad 4 is therefore deformed rather than elastically expanded between the opposite side edges 8 so that the cleaning fabric 2 can be nipped between the pressure pad 4 and the cylinder 6 with a nip width and pressed against the outer surface of the cylinder 6 by the pressure pad 4 to clean the outer surface of the cylinder 6, as shown in Fig. 2.

[0039] In the embodiment, the pressure pad 4 is deformed between the opposite side edges 8 to be convex toward the outer surface of the cylinder 6. In this connection, the pressure pad 4 is more thin at central portion thereof than opposite side edges 8 to be conveniently deformed. Accordingly, the cleaning fabric 2 can be reliably nipped between the pressure pad 4 and the cylinder 6 with the nip width and pressed against the outer surface of the cylinder 6.

[0040] The pressurized air is then discharged from the air chamber 26. The pressure pad 4 has an original shape spaced from the outer surface of the cylinder 6, as shown in Fig. 1. The pressure pad 4 is restored between the opposite side edges 8 thereof into the original shape when the pressurized air is discharged. In the embodiment, the pressure pad 4 is restored between the opposite side edges 8 into the original shape which is concave with respect to the outer surface of the cylinder 6. The cleaning fabric 2 is therefore disengaged and retracted from the outer surface of the cylinder 6. The cleaning fabric 2 is then intermittently fed for a length to exchange the cleaning fabric 2 for fresh one on the pressure pad 4.

[0041] The pressure pad 4 is deformed again so that the fresh fabric 2 can pressed against the outer surface of the cylinder 6 by the pressure pad 4 to clean the outer surface of the cylinder 6. In the embodiment, the pressure pad 4 is deformed by the pressurized air having a pressure of about 0.5 kg/cm^2.

[0042] Accordingly, in the pressure pad 4 of the apparatus according to the invention, the fibers 28 effectively increase the mechanical strength of the pressure pad 4 to endure the repeated deformation and restoration of the pressure pad 4 even if the pressure pad 4 is deformed and restored a great number of times. On the other hand, the elastcmer and the fibers 28 cooperate with each other so that the pressure pad 4 can be conveniently deformed along the outer surface of the cylinder 6 to obtain the nip width when pressed against the outer surface of the cylinder 6.

[0043] In addition, in the embodiment, the pressure pad 4 is defcrmed or restored between the opposite side edges 8 thereof to be convex and concave symmetrically, without considerable elastic expansion and contraction of the pressure pad 4. This minimizes the fatigue and deterioration of the pressure pad 4 and prevents the pressure pad 4 from being damaged to increase the duration of life of the pressure pad 4.

[0044] Furthermore, the elastomer and the fibers 28 cooperate with each other to obtain a stable repeatability of deformation and restoration of the pressure pad 4. This minimizes the variations with age of the factors such as the nip width of the pressure pad 4 pressed against the outer surface of the cylinder 6, to decrease the times of adjustment thereof.

[0045] By the way, the cleaning fabric 2 may be wrinkled by the cleaning agent or detergent. The wrinkle is also formed by the difference in taking-up state of the cleaning fabric 2 between the opposite ends of the take-up roll 22. It is therefore required to prevent the wrinkle of the cleaning fabric 2 from being brought into contact with the outer surface of the cylinder 6 when printing, otherwise it would disturb the image of ink and dampening water applied onto the outer surface of the cylinder 6 to result in poor print. In the embodiment, the pressure pad 4 has the original shape which is concave with respect to the outer surface of the cylinder 6 so that the pressure pad 4 can be spaced frcm the cuter surface of the cylinder 6 at a distance of at least 6 mm when restored. Accordingly, the cleaning fabric 2 is not brought into contact with the outer surface of the cylinder 6 even if it is wrinkled.

[0046] When exchanging the pressure pad 4 for fresh one for maintenance, the fresh pad can be mounted cn the back up bar 14 without the special tool. An user can exchange the pressure pad 4 for fresh cne without difficulty. It is therefore not required to send back the apparatus to a maker to exchange the pressure pad 4 for fresh one.

[0047] The fibers 28 should have a strength to restrain the pressure pad 4 from being elastically expanded by the pressurized air having the pressure of about 0.5 kg/cm^2. It is preferable that the fibers 28 are woven coarsely with a mesh of about 1mm square to prevent it from being separated from the elastomer such as synthetic rubber and cause the pressure pad 28 to be conveniently deformed at central portion thereof. The fibers 28 may woven to extend obliquely to the pressure pad 4, as shown in Fig 3. The fibers 28 may be woven to extend longitudinally and widthwise of the pressure pad 4, as shown in Fig. 4.

[0048] The pressure pad 4 takes the form of the rectangle having the great ratio of length to width, as described above. The pressure pad 4 is tightly fixed not only at opposite side edges 8 but also at opposite ends by the clamps 16. It is therefore inclined to be more elastically expanded and contracted widthwise thereof than longitudinally. The fibers 28 effectively restrains the pressure pad 4 from being elastically expanded widthwise thereof when woven shown in Fig. 4.

[0049] The fibers 28 may be incorporated into elastomer to be positioned adjacent one of the opposite surfaces of pressure pad 4 which is opposed to the outer surface of the cylinder 6, as shown in Fig. 5. In the case, it is desired to select the stiffness and thickness of the fibers 28 to keep the outer surface of the cylinder 6 from

being damaged by the fibers 28. Suitable roughness can also be formed on the surface of the pressure pad 4 by the fibers 28 to effectively clean the outer surface of the cylinder 6. On the ccntrary, the fibers 28 may be positioned adjacent the other surface of the pressure pad 4, as shown in Fig. 6. They may be positioned intermediate between the opposite surfaces of the pressure pad 4, as shown in Fig. 7.

[0050] In the embodiments, the fibers 28 should have a thickness of 0.1 to 1.0 mm. An annoying process is not required to increase the mechanical strength of the elastomer with a special additive since the fibers 28 effectively increase the mechanical strength of the pressure pad 4.

Claims

1. An apparatus for cleaning the outer surface of a cylinder with a cleaning fabric, said apparatus comprising:

   a pressure pad molded out of elastomer which includes fibers incorporated thereinto, said cleaning fabric being directed between said pressure pad and said cylinder, said pressure pad being deformed by pressurized air so that said cleaning fabric can be pressed against said outer surface of the cylinder by said pressure pad to clean said outer surface of the cylinder.

2. The apparatus as set forth in claim 1 wherein said pressure pad has opposite side edges extending parallel to said cylinder, said pressure pad being deformed between said opposite side edges thereof to be convex toward said outer surface of the cylinder.

3. The apparatus as set forth in claim 2 wherein said pressure pad has an original shape spaced from said outer surface of the cylinder, said pressure pad being restored between said opposite edges thereof into said original shape when the pressurized air is discharged.

4. The apparatus as set forth in claim 3 wherein said pressure pad is restored between said opposite side edges thereof into said original shape which is concave with respect to said outer surface of the cylinder.

5. The apparatus as set forth in claim 4 wherein said pressure pad is deformed or restored between said opposite side edges thereof to be convex or concave without considerable elastic expansion and ccntraction of said pressure pad.

6. The apparatus as set forth in claim 5 wherein said pressure pad is deformed or restored between said cppcsite side edges thereof to be convex or concave symmetrically.

7. The apparatus as set forth in any one of claims 1 to 6 wherein said fibers comprise synthetic or natural fibers.

8. The apparatus as set forth in claim 7 wherein said fibers take the form of a woven or non-woven fabric incorporated into said elastomer.

9. A pressure pad molded from an elastomer which includes fibres incorporated therein, for use in apparatus according to any preceding claim.

10. A method for cleaning the outer surface of a cylinder with a cleaning fabric in an offset printing press, characterised by using apparatus according to any of claims 1 to 8, and/or a pressure pad according to claim 9.

Fig.1

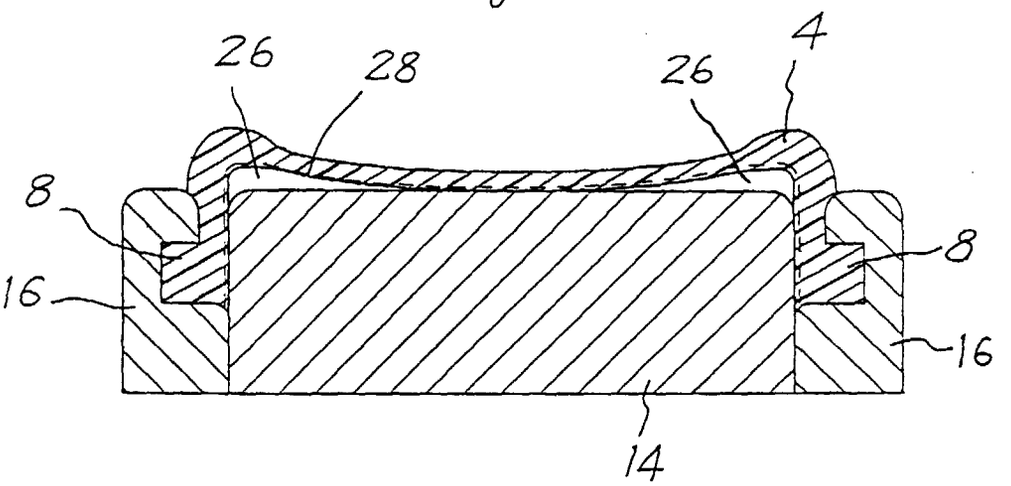


Fig.2

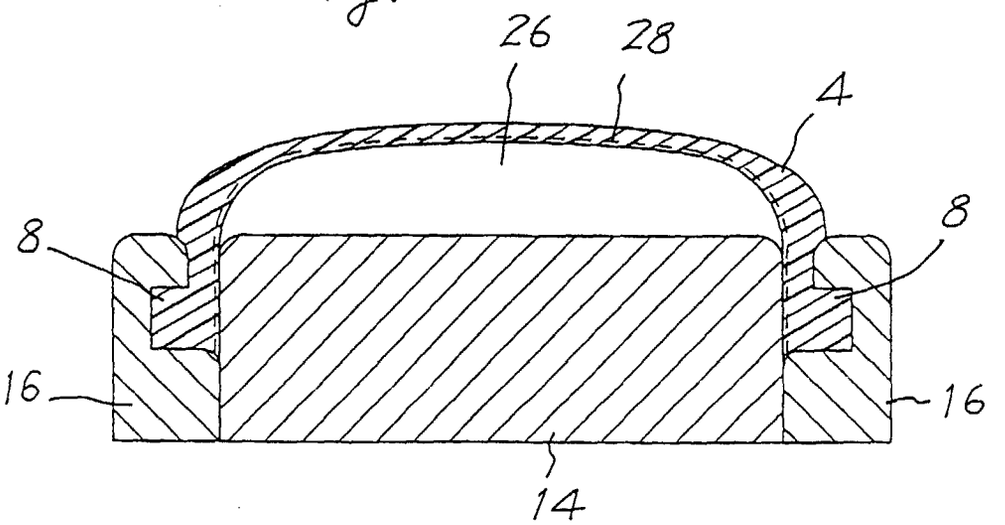


Fig. 3

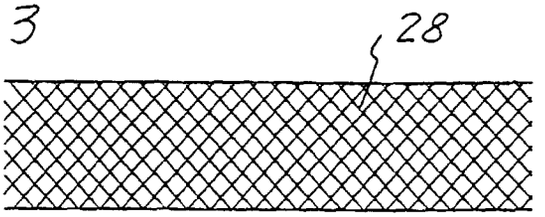


Fig. 4

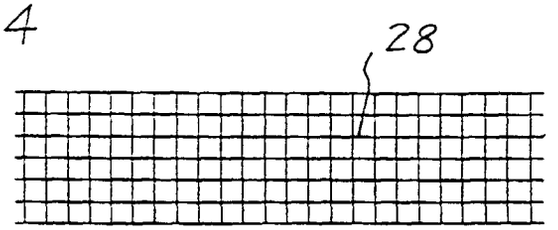


Fig. 5

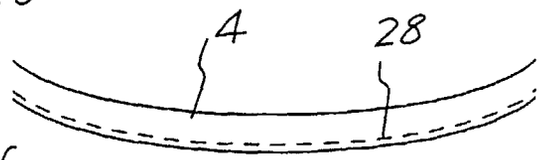


Fig. 6

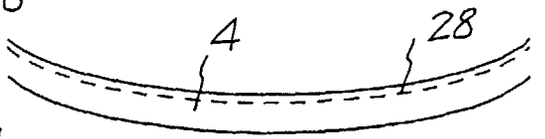


Fig. 7

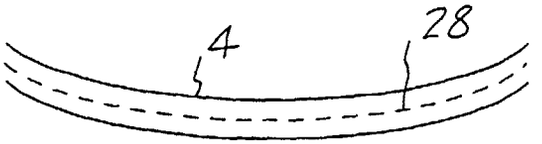


Fig. 8

Prior Art

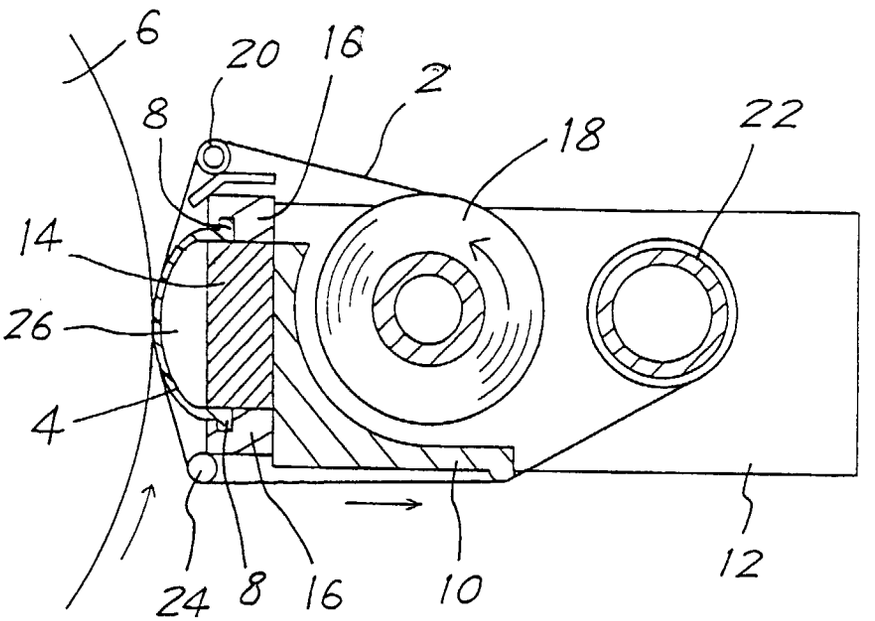
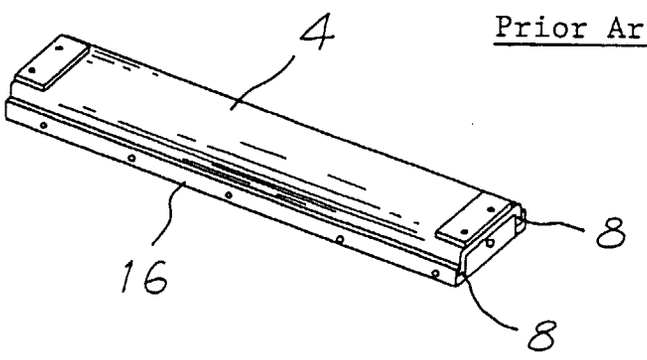


Fig. 9

Prior Art



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EUROPEAN SEARCH REPORT

Application Number
EP 99 30 1139

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
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A	GB 2 300 388 A (HEIDELBERGER DRUCKMASCH AG) 6 November 1996 * page 8, line 1 - page 8, line 21; figure 3 *	1-10	
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			TECHNICAL FIELDS SEARCHED (Int.Cl.6) B41F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	28 May 1999	Madsen, P

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