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(54) **Apparatus and method for maintaining the permeability of paper and board machine felts.**

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Description

This invention relates to apparatus and to methods of maintaining the permeability of paper and board machine press felts.

Such machines employ press felts to transport the raw paper or board and to accept water pressed from the raw material during the manufacture of paper and board in the press section of machinery for making paper, board and asbestos/cement sheets and in the so-called "making" section of machines for making asbestos/cement sheets.

All press felts will compact in use to an extent related to their design, compressibility, length, press loading speed and contamination.

As they compact the ability of the felt to accept water and to allow water passage through its structure reduces, and this reduces the ability of the felt to receive contaminants because the compaction reduces the available volume in the felt between the interstices thereof.

Thus, the condition of the felt continuously deteriorates throughout its life and its efficiency gradually reduces. To overcome this, the present method is to use a high-pressure needle-jet shower, operating at a pressure of say 35 bar, whose high energy jets of water loosen the contaminants and rebulk the felt. The high pressure is needed, to be effective, but the use of the shower is usually discontinuous, say 30 minutes per shift, for if operated continuously the structure of the felt would be damaged. The current system incorporates an intermittent high-pressure, needle-jet, oscillating shower, to rebulk the felt, a continuous, low-pressure fan shower to wash out the contaminants, and a vacuum box to remove contaminated water from the felt.

All felts have their particular felt/water ratio maximums, i.e. saturation, and minimums, i.e. through vacuum extraction, and they operate within those limits, to accept water pressed out of the paper or board sheet. If the ratio is high then the low pressure fan shower is often not used because there is enough water to act as a contaminant transport for the vacuum box. However, the high-pressure, needle-jet shower must be incorporated to maintain the bulk and the vacuum box must be incorporated to remove the water from the paper.

It has been proposed to control the intermittent operation of the high-pressure shower by monitoring the permeability of the felt and to bring the high-pressure shower into operation only when the measured felt permeability indicates that it is required. US—A—3 859 163, for example, proposes that the vacuum level in the vacuum box should be used as an indicator of felt permeability and that the high pressure shower should be switched on when the vacuum rises to a predetermined high level and switched on when the vacuum falls to a predetermined low level.

Although intermittent shower operation reduces the risk of overbulking the felt and also reduces wastage of cleaning fluid, it has been found that the cleaning process is still not fully effective in that due consideration has not been given to ensuring that cleaning fluid is applied evenly across the surface of the felt.

It is an object of the present invention to ensure that the intermittent high pressure shower is used more effectively to maintain the felt in good condition and so prolong its working life and to ensure efficient water extraction.

According to the present invention a method of maintaining the permeability of a felt in a paper, board or like machine comprises the steps of monitoring the permeability of the felt, and bringing into operation a spray means for directing at the felt at least one high pressure spray jet of liquid for reconditioning the felt, when the monitored permeability reaches a first predetermined value, the spray means being moved cyclically widthwise of the felt, and terminating the operation of the spray means, when the permeability reaches another, second predetermined value higher than the first value, characterised by the further steps of sensing the speed of the felt and using the sensed value to determine the spray cycle time of the spray means, moving the spray means to spray the entire width of the felt in each cycle, and terminating the operation of the spray means at the end of a spray cycle.

Using a constant volume vacuum source, as is common, to draw water/air through the felt through a slotted or drilled top, on a vacuum box, the vacuum level in the box becomes a measurement of resistance to flow. This resistance directly relates to the condition of the felt and to its bulk or compaction and contamination and one method according to the present invention is based upon the use of a vacuum level as a signal to control apparatus sensitive to preset/minimum/maximum vacuum levels for optimum felt condition. When the maximum level is reached, the spray means will be activated. When the minimum level is reached, and also the end of a spray cycle, the spray means is shut down. This is operated throughout the felt life.

Typically, the system would not activate in the first 2—3 days of a felt's life, then it would commence and increase, for say 80% of the expected life, then reduce because of the effect of felt wear.

As has been stated above, the felt tends to compact during use, and therefore, the thickness of the felt also characterises its permeability.

Thus, in another method according to the invention, monitoring of the permeability is effected by assessing changes in the thickness of the felt and bringing into operation the spray means when the thickness reaches a predetermined first value and terminating the operation of the spray means when the thickness in-

creases to a predetermined second value.

The thickness of the felt may be monitored by a roller so mounted as to be bodily movable, the extent of the movement characterising the thickness of the felt. The roller cooperates with another surface which may be that of another roller and which provides a datum for the movable roller.

Alternatively, thickness changes may be determined by a movable probe whose movement from a datum characterises the thickness of the felt. The movable probe may be of shoe like form with a smoothly-rounded sole to avoid damage to the felt or material thereon or it may be of caliper-like form with suitably shaped surface, again to avoid damage to the felt.

Where the felt thickness is monitored, it is essential to position the monitoring means at a position along the length of the belt where the layer is not conveying material.

It is known to oscillate the high pressure shower, although not at a speed related to the rate of movement of the felt. It is found that if the spray cycle is short, uneven bulking of the felt can result, and thus a preferred feature of the invention is that the spray means should complete a widthwise movement equal to one jet diameter per felt revolution to prevent cross-overs and to provide even effect. As felt lengths are variable due to manufacturing tolerances, tension and time of life, and also due to speed, a signal can be taken either from the tensioner position and speed monitor, or a metal thread or other detectable insert in the felt. This signal is then used to control the cycle time of the oscillating shower. An override is incorporated in the control panel so that when the minimum vacuum level is reached the shower will continue to operate to the end of its stroke thus ensuring full even coverage.

According to the present invention, apparatus for maintaining the permeability of paper and board machine felts comprises a spray means for directing at a felt at least one high pressure spray jet of liquid for reconditioning the felt, the spray means being movable cyclically widthwise of the felt, means for monitoring the permeability of the felt and a control device responsive to the output of said monitoring means to bring the spray means into operation when the monitored permeability reaches a first predetermined value and to terminate the operation of the spray means when the monitored permeability reaches a second predetermined value higher than the first value, characterised in that there is included a means responsive to the speed of the felt whose output is used to control the cycle time of the spray means for moving the spray means to spray the entire width of the felt in each cycle, and further means for terminating the operation of the spray means at the end of a spray cycle.

The monitoring means may comprise at least one vacuum chamber over which the press felt passes in such manner that air can be drawn

through the press felt into the chamber in order to detect the extent of the permeability of the felt.

The vacuum chamber may be additional to the vacuum box used to extract water from the felt and which forms a conventional feature of existing paper and board machines or where possible, or as explained above, the vacuum level in the vacuum box may be used.

Alternatively, monitoring of the permeability may be effected by a device that is responsive to the thickness of the felt. Such a device initiates operation of the spray means when the thickness reaches a predetermined value and terminates the operation when the thickness reaches a higher predetermined value.

The device may incorporate a roller whose bodily movement characterises the thickness of the felt or it may comprise probes or a suitable form of caliper.

The spray means may be brought into use by the opening of a flow control valve to admit cleaning and/or treatment liquid to the spray means and/or by the energisation of a pump whose output supplies high pressure cleaning and/or treatment liquid to the spray means.

In addition, reciprocating machinery for reciprocating the spray means across the width of the felt may also be brought into operation by the monitoring means.

The press felt may be of a compressible felt construction or it may be of the so-called non-compressible felt construction, the latter being, in practice, compressible to a limited extent.

By way of example only, embodiments of the invention will now be described in greater detail with reference to the accompanying drawings of which:—

Fig. 1 shows a first embodiment in diagrammatic form only,

Fig. 2 shows in schematic form a pneumatic control system for use with the embodiment of Fig. 1,

Fig. 3 shows in schematic form part of an alternative embodiment of the invention, and

Fig. 4 is an explanatory drawing.

Referring first to Fig. 1, a felt 1 in the form of a closed loop passes between the nip of rollers 2, 3 which form part of the press section of a paper making machine, over an idler roller 4 to a position adjacent to shower apparatus 12 which, when in use, directs a series of jets of water under high pressure, for example, 35 bar, towards the surface of the felt 1. Paper material 1a undergoing processing leaves the felt 1 after passing through between the rollers 2, 3 as indicated in the drawing.

A low pressure shower 6 is used to spray water into the felt to ensure, in conjunction with a closely-adjacent turning roller 7, substantial saturation of the press felt. The felt then passes over a conventional vacuum box 8. The box has a support which supports the felt as it passes over the box. The box 8 is connected to a vacuum pump 9 to establish a partial vacuum

therein.

The extent of the partial vacuum in the box 8 is conveyed via line 10 to control apparatus shown as block 11 which is adapted to control the operation of the shower apparatus 12 in dependence upon the vacuum conditions existing in the box 8 and the speed of the felt.

The control apparatus also receives an input from a sensor indicated diagrammatically at 5 responsive to the movement of the felt and which acts to signal to the apparatus each complete revolution of the felt.

Tension in the felt is maintained by tensioning means 13 of any conventional form whilst turning rollers 14 and 16 guide the felt back to the nip of the rollers 2 and 3. Between the turning rollers is an alignment roller 15 which keeps the press felt in alignment with the rollers 14 and 16.

When new or after reconditioning, the felt may have a thickness typically of say 4—6 mm but during use this reduces and may reach a value as low as 1 mm.

When in its new condition, the felt, in passing over the vacuum chambers, sets up a partial vacuum therein of say 0.5 m Hg and this is insufficient to bring the shower apparatus 12 into operation. However, when the felt has been compressed to a thickness of say 2 mm, the partial vacuum has changed to, say 0.40 m Hg and this brings the shower apparatus into use.

The action of the jets of water is to recondition the felt and the latter increases in thickness as it leaves the vicinity of the shower apparatus. Although there is a degree of compression of the felt as it next passes through the nip of the rollers 2, 3, there is a further reconditioning effected by the shower apparatus and this continues until the partial vacuum conditions in the box 8 reach a value indicating that a desired reconditioning has been achieved and the control apparatus 11 then terminates the shower.

The cycle repeats when next the degree of compression of the felt reaches a value at which the control apparatus 11 initiates the shower again.

Fig. 2 shows in diagrammatic form only a high pressure needle jet shower 17 which may be of the form described in European Patent Specification No. 0009399 (Application No. 79.301942.3). Shower 17 is powered by a pneumatic motor indicated by block 18 fed with compressed air via control line 19.

Fig. 2 also shows the vacuum box 8 and the vacuum pump 9 and although Fig. 2 shows those components in close proximity to shower 17, this is not normally the case in practice. The vacuum inside box 8 is communicated to control apparatus via line 20, a filter 21a being included to prevent the transmission along the line 20 of any contaminants that may be present.

Line 20 is connected to a sensor 21 comprising a housing with an internal chamber

divided into two parts by a flexible diaphragm 22, line 20 being connected to one of the chamber parts. The diaphragm is resiliently-loaded as indicated diagrammatically by spring 23 and the loading is adjustable via a manual control 24.

In practice, the diaphragm 22 may be spring loaded or it may be loaded by means of a variable pneumatic pressure.

Linked to the diaphragm 22 is a pneumatic control valve 25 adapted to join an outlet line 26 either to atmosphere at outlet 27 or to a source of compressed air via inlet 28.

Line 26 is joined to a first actuator of another pneumatic control valve 29 operable to connect line 19 either to atmosphere at outlet 30 or to a connecting line 31.

Also connected to line 20 is a second sensor 32 whose construction is similar to that of sensor 21 except that the diaphragm loading is preset by means of control 33 and once preset is not normally adjusted by the user. The diaphragm is pneumatically loaded.

Linked to the diaphragm of sensor 32 is a pneumatic control valve 34 movable to connect output line 35 either to atmosphere at outlet 36 or to the source of compressed air via input 37.

Line 35 is joined to a device 38 for emitting a visual warning. Device 38 may comprise an electric light connectable to a power source (not shown) by means of a pressure responsive switch (not shown) that is controlled by pressure changes in line 35.

Line 35 is also connected to a reservoir valve 39 having a throttled outlet 40 to atmosphere, and a first output 41 joined directly to a pneumatic actuator 42 for control valve 43. The actuator 42 operates against a spring bias 44. Control valve 43 is adapted to connect output line 45 either to the source of compressed air via inlet 46 or to atmosphere via outlet 47. Reservoir valve 39 also has a second outlet 48 connected to actuator 42 via adjustable throttles 49, 50.

Output line 45 is connected to a klaxon 51 which provides, as will be described later, an audible warning in the event that the vacuum in the box 8 reaches a very high value.

Flow line 20 is also joined to a further sensor 52 whose construction is identical to that of sensor 21. Sensor 52 operates a pneumatic flow control valve 53 connected to join an output line 54 either to atmosphere via outlet 55 or to the source of compressed air via inlet 56.

Output line 54 is joined to a second actuator of the control valve 29 as shown.

Flow line 20 is also joined to yet another sensor 57 whose construction is the same as that of sensor 32 and which controls the operation of flow valve 58. Flow valve 58 is connected to join an output line 59 either to atmosphere at outlet 60 or to the source of compressed air at 61.

Output line 59 is connected to actuate a

visual warning light 62 and also to actuate another flow control valve 63 connected in the line 31 to valve 29.

Valve 63 is adapted to connect line 31 either to atmosphere at outlet 64 or to line 65 itself connected to a main manually-operated flow control valve 66. Valve 66 has a control knob 67 rotation of which against the biasing of a spring 68 opens the valve to connect line 65 to the source of compressed air shown as box 69 and which may be a compressor or some other source of compressed air or to atmosphere at outlet 70.

Sensor 21 is loaded to a value determined by the working conditions and the nature of the felt in use to connect line 26 to source 28 when the vacuum conditions in box 8 reach a high value indicating that the felt has compacted to an extent sufficient to effect deleteriously the extraction of liquid therefrom. The application of pneumatic pressure to line 26 causes the first actuator of valve 29 to connect line 19 to line 31 and on the assumption that valves 63 and 66 are in the positions shown pneumatic pressure will be applied to line 19 and this will initiate operation of the high pressure shower 17.

As the spray operates, it rebulks the felt and the vacuum in box 8 drops to a value at which sensor 21 releases and sensor 52 responds. The second actuator of valve 29 is pressurized and the first connected to atmosphere via line 26 and valve 25. The position of valve 29 changes and line 19 is connected to atmosphere and the spraying operation at shower 17 is terminated.

This process repeats as the permeability conditions of the felt require.

If, for some reason, the vacuum in box 8 continues to rise above the value to which sensor 21 is set, sensor 32 will respond and valve 34 will cause pneumatic pressure to be applied to line 35 thus energising warning light 38 and causing klaxon 51 to sound via the conventional energising circuit described above. The on-off periods of the klaxon are determined by the settings of the variable throttles 49, 50.

Similarly, if the vacuum pressure in box 8 continues to drop below the value at which sensor 52 responds, sensor 57 will then respond and via valve 58, warning light 62 will be energised.

The manual control knobs of sensors 21 and 52 are mounted upon the front of control box 11 so that they can be set by a user. A pneumatic gauge 71 is also mounted upon the front of the control box to enable the user to make the appropriate adjustments to the setting of the sensors 21 and 52.

A second pneumatic gauge 72 is located within the control box close to the preset controls for the sensors 32 and 57 so that the latter can be preset to the desired values. It will be appreciated that gauge 71 may not be visible during the setting of sensors 32 and 57.

A further warning light 73 indicates when the

manually operated valve 66 is actuated to its "ON" position allowing air under pressure into line 65.

Fig. 3 shows in diagrammatic form a form of device for sensing the thickness of the felt shown at 1. A caliper-like frame 74 supports probes in the form of shoes 75, 76 whose rounded surfaces lightly contact the upper and lower surfaces respectively of the felt 1. At least the upper shoe is lightly spring-loaded to enable it to follow variations in the thickness of the felt 1.

Shoe 75 is movable vertically in the caliper and its movement is sensed by a sensor 77 whose output 78 is used, in a manner similar to that of the sensors 21 and 52 to initiate and terminate operation of the high pressure spray.

Suitable safeguards are provided to sense excessive compaction of the felt also excessive "re-bulking" and these safeguards operate in a manner analogous to those described above with reference to Fig. 2.

If desired, the shoes can be traversed cyclically across the width of the felt. Such movement may be achieved in any convenient manner, for example by a pneumatic or electric motor or by a piston-cylinder arrangement. This is indicated diagrammatically in Fig. 3 by the dotted rectangle.

It is possible to traverse the high pressure spray in synchronism with the shoes.

The use of relatively small area shoes makes it possible to detect localised areas of web compaction. For example, and as shown in Fig. 4, the web 1 may have reached a condition in which a longitudinal area 80 exists over which a relatively high degree of compaction of the felt exists and another longitudinal area 81 over which a relatively low degree of compaction exists.

If the vacuum box technique described above is used, the box 8 being shown in Fig. 4, the existence of the areas 80 and 81 would probably remain undetected but a shoe, shown at 82 in Fig. 4, moving across the felt will detect the areas and bring the spray into operation as necessary to "re-bulk" area 80.

Reference has been made above to the stopping of the spray only at the end of a cycle of movement. This may be achieved in a number of ways, for example a control line 83 shown dotted in Fig. 2 is used to control a valve 84 in line 54 which prevents energisation of the second actuator of valve 29.

Claims

1. A method of maintaining the permeability of felts in paper, board and like machines, comprising the steps of monitoring the permeability of the felt, and bringing into operation a spray means for directing at the felt at least one high pressure spray jet of liquid for reconditioning the felt, when the monitored permeability reaches a first predetermined value, the spray means

being moved cyclically widthwise of the felt, and terminating the operation of the spray means, when the permeability reaches another, second predetermined value higher than the first value, characterised by the further steps of sensing the speed of the felt and using the sensed value to determine the spray cycle time of the spray means, moving the spray means to spray the entire width of the felt in each cycle, and terminating the operation of the spray means at the end of a spray cycle.

2. A method as claimed in claim 1, in which the permeability of the felt is monitored by means responsive to the degree of vacuum applied to the felt.

3. A method as claimed in claim 2, in which the degree of vacuum is that applied to the felt to extract water therefrom.

4. A method as claimed in claim 1, in which the permeability is monitored by assessing changes in the thickness of the felt.

5. A method as claimed in claim 1, in which the spray means completes a widthwise movement equal to one jet diameter for each revolution of the felt.

6. Apparatus for maintaining the permeability of paper and board machine felts, comprising a spray means (12, 17) for directing at a felt (1) at least one high pressure spray jet of liquid for reconditioning the felt, the spray means (12, 17) being movable cyclically widthwise of the felt (1), means (8) for monitoring the permeability of the felt (1), and a control device (11) responsive to the output of said monitoring means (8) to bring the spray means (12, 17) into operation when the monitored permeability reaches a first predetermined value and to terminate the operation of the spray means (12, 17) when the monitored permeability reaches a second predetermined value higher than the first value, characterised in that there is included a means (5) responsive to the speed of the felt (1) whose output is used to control the cycle time of the spray means (12, 17), means for moving the spray means to spray the entire width of the felt in each cycle, and further means (83, 84) for terminating the operation of the spray means (12, 17) at the end of a spray cycle.

7. Apparatus as claimed in claim 6, and further comprising a vacuum-operated device for applying a vacuum to the felt, and in which the monitoring means is such as to respond to the degree of vacuum in a vacuum chamber of the device.

8. Apparatus as claimed in claim 6, and further comprising a vacuum-operated, liquid extraction device for removing liquid from the felt, and in which the monitoring means is such as to respond to the degree of vacuum in a vacuum chamber of the device.

9. Apparatus as claimed in claim 6, in which there is provided a device responsive to changes in the thickness of the felt for monitoring the changes in the permeability thereof.

10. A paper, board or sheet making machine incorporating apparatus as claimed in claim 6.

Patentansprüche

1. Verfahren zum Aufrechterhalten der Durchlässigkeit von Filzen in Papier-, Kartonmaschinen u.dgl., umfassend die Stufen des Überwachens der Durchlässigkeit des Filzes und Ingangsetzens einer Sprüheinrichtung zum Richten von wenigstens einem Hochdrucksprühstrahl aus Flüssigkeit zum Rekonditionieren des Filzes auf den Filz, wenn die überwachte Durchlässigkeit einen ersten vorbestimmten Wert erreicht, wobei die Sprüheinrichtung zyklisch über die Breite des Filzes bewegt wird, und Beendigen der Betätigung der Sprüheinrichtung, wenn die Durchlässigkeit einen anderen zweiten vorbestimmten Wert höher als der erste Wert erreicht, gekennzeichnet durch die weiteren Schritte des Abtastens der Geschwindigkeit des Filzes und der Verwendung des abgetasteten Wertes zum Bestimmen der Sprühzykluszeit der Sprüheinrichtung, des Bewegens der Sprüheinrichtung zum Besprühen der gesamten Breite des Filzes in jedem Zyklus und des Beendens der Betätigung der Sprüheinrichtung am Ende eines Sprühzyklus.

2. Verfahren wie in Anspruch 1 beansprucht, bei dem die Durchlässigkeit des Filzes durch Mittel überwacht wird, die auf die Stärke des Vakuums, das an den Filz angelegt ist, anspricht.

3. Verfahren wie in Anspruch 2 beansprucht, bei dem die Stärke des Vakuums diejenige ist, die an den Filz zum Entfernen des Wassers hiervon angelegt wird.

4. Verfahren wie in Anspruch 1 beansprucht, bei dem die Durchlässigkeit über ermittelte Änderungen in der Stärke des Filzes überwacht wird.

5. Verfahren wie in Anspruch 1 beansprucht, bei dem die Sprüheinrichtung eine Breitenbewegung gleich einem Strahldurchmesser für jeden Umlauf des Filzes vervollständigt.

6. Apparat zum Aufrechterhalten der Durchlässigkeit von Papier- oder Kartonmaschinenfilzen, umfassend eine Sprüheinrichtung (12, 17) zum Richten von wenigstens einem Hochdrucksprühstrahl aus Flüssigkeit zum Rekonditionieren des Filzes auf den Filz (1), wobei die Sprüheinrichtung (12, 17) zyklisch über die Breite des Filzes (1) beweglich ist, Mittel (8) zum Überwachen der Durchlässigkeit des Filzes (1) und eine Steuereinrichtung (11), die auf den Ausgang des Überwachungsmittels (8) anspricht, um die Sprüheinrichtung (12, 17) in Betrieb zu setzen, wenn die überwachte Durchlässigkeit einen ersten vorbestimmten Wert erreicht, und um den Betrieb der Sprüheinrichtung (12, 17) zu beenden, wenn die überwachte Durchlässigkeit einen zweiten vorbestimmten Wert höher als der erste Wert erreicht, dadurch gekennzeichnet, daß Mittel (5)

auf die Geschwindigkeit des Filzes (1) ansprechend, dessen Ausgang verwendet wird, um die Zykluszeit der Sprüheinrichtung (12, 17) zu steuern, Mittel zum Bewegen der Sprüheinrichtung zum Besprühen der gesamten Breite des Filzes in jedem Zyklus und weitere Mittel (83, 84) zum Beenden des Betriebs der Sprüheinrichtung (12, 17) am Ende jedes Sprühzyklus eingeschlossen sind.

7. Apparat wie in Anspruch 6 beansprucht und ferner umfassend eine vakuumbetätigte Einrichtung zum Anlegen eines Vakuums an den Filz und bei dem die Überwachungsmittel derart sind, daß sie auf die Stärke des Vakuums in einer Vakuumkammer der Einrichtung ansprechen.

8. Apparat wie in Anspruch 6 beansprucht und ferner umfassend eine Vakuumbetätigte Flüssigkeitsextraktionseinrichtung zum Entfernen von Flüssigkeit aus dem Filz und bei dem die Überwachungsmittel derart sind, daß sie auf die Stärke des Vakuums in einer Vakuumkammer der Einrichtung ansprechen.

9. Apparat wie in Anspruch 6 beansprucht, bei dem eine Einrichtung vorgesehen ist, die auf Änderungen in der Stärke des Filzes zum Überwachen der Änderungen in der Durchlässigkeit hiervon anspricht.

10. Papier-, Karton- oder Plattenherstellungsmaschine, in die ein Apparat wie in Anspruch 6 beansprucht eingegliedert ist.

Revendications

1. Procédé de maintien de la perméabilité de feutres dans des machines à papier, à carton et analogues, comprenant les étapes consistant à contrôler la perméabilité du feutre et à enclencher un moyen de pulvérisation pour diriger sur le feutre au moins un jet de liquide pulvérisé à haute pression pour reconditionner le feutre, lorsque la perméabilité contrôlée atteint une première valeur prédéterminée, le moyen de pulvérisation étant déplacé cycliquement dans le sens de la largeur du feutre, et à arrêter le fonctionnement du moyen de pulvérisation lorsque la perméabilité atteint une autre, seconde valeur prédéterminée supérieure à la première valeur, caractérisé par les autres étapes consistant à détecter la vitesse du feutre et à utiliser la valeur détectée pour déterminer la durée du cycle de pulvérisation du moyen de pulvérisation, à déplacer le moyen de pulvérisation pour assurer la pulvérisation sur toute la largeur du feutre dans chaque cycle et à arrêter le fonctionnement du moyen de pulvérisation à la fin d'un cycle de pulvérisation.

2. Procédé selon la revendication 1, dans lequel la perméabilité du feutre est contrôlée par un moyen répondant au degré de vide appliqué

au feutre.

3. Procédé selon la revendication 2, dans lequel le degré de vide est celui appliqué au feutre pour extraire de l'eau de celui-ci.

5 4. Procédé selon la revendication 1, dans lequel la perméabilité est contrôlée par détermination de variations de l'épaisseur du feutre.

10 5. Procédé selon la revendication 1, dans lequel le moyen de pulvérisation exécute un mouvement dans le sens de la largeur qui est égal à un diamètre de jet pour chaque révolution du feutre.

15 6. Dispositif pour maintenir la perméabilité de feutres de machines à papier et à carton, comprenant un moyen de pulvérisation (12, 17) pour diriger sur un feutre (1) au moins un jet de liquide pulvérisé à haute pression pour reconditionner le feutre, le moyen de pulvérisation (12, 17) étant déplaçable cycliquement dans le sens de la largeur du feutre (1), un moyen (8) pour contrôler la perméabilité du feutre (1), et un dispositif de commande (11) réagissant au signal de sortie dudit moyen de contrôle (8) pour enclencher le moyen de pulvérisation (12, 17) lorsque la perméabilité contrôlée atteint une première valeur prédéterminée et pour arrêter le fonctionnement du moyen de pulvérisation (12, 17) lorsque la perméabilité contrôlée atteint une seconde valeur prédéterminée supérieure à la première valeur, caractérisé en ce qu'il est prévu un moyen (5) réagissant à la vitesse du feutre (1) et dont le signal de sortie est utilisé pour commander la durée du cycle du moyen de pulvérisation (12, 17), un moyen pour déplacer le moyen de pulvérisation afin qu'il assure la pulvérisation de toute la largeur du feutre dans chaque cycle, et un autre moyen (83, 84) pour arrêter le fonctionnement du moyen de pulvérisation (12, 17) à la fin d'un cycle de pulvérisation.

40 7. Dispositif selon la revendication 6, et comprenant en outre un appareil actionné par vide pour appliquer un vide au feutre, et dans lequel le moyen de contrôle est agencé de façon à réagir au degré de vide régnant dans une chambre à vide de l'appareil.

45 8. Dispositif selon la revendication 6, et comprenant en outre un appareil d'extraction de liquide actionné par vide pour enlever du liquide du feutre, et dans lequel le moyen de contrôle est agencé de façon à répondre au degré de vide régnant dans une chambre à vide de l'appareil.

50 9. Dispositif selon la revendication 6, dans lequel il est prévu un appareil réagissant à des variations de l'épaisseur du feutre pour contrôler les variations de sa perméabilité.

55 10. Machine de fabrication de papier, de carton ou de feuille comportant un dispositif tel que revendiqué dans la revendication 6.

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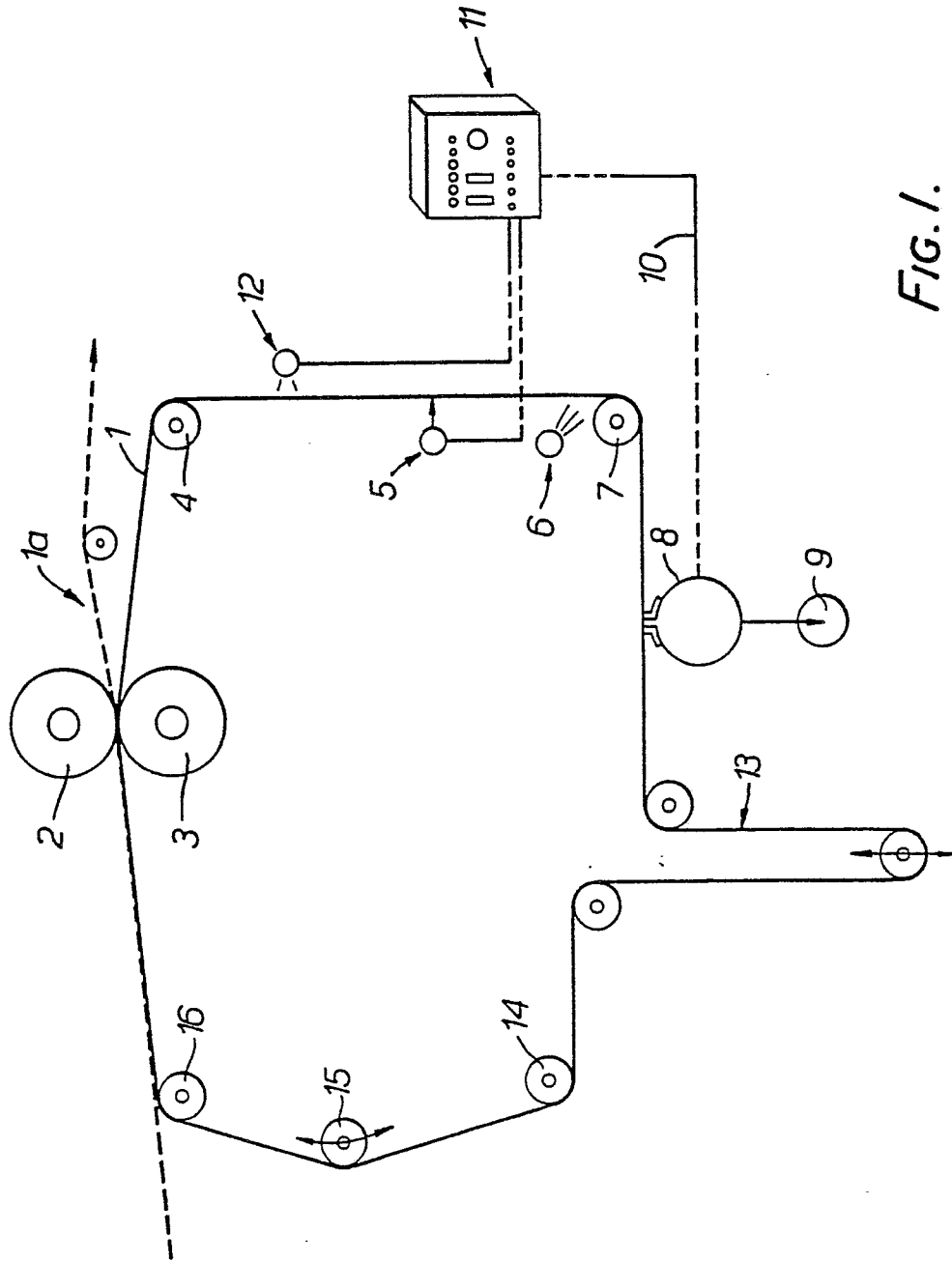


FIG. 1.

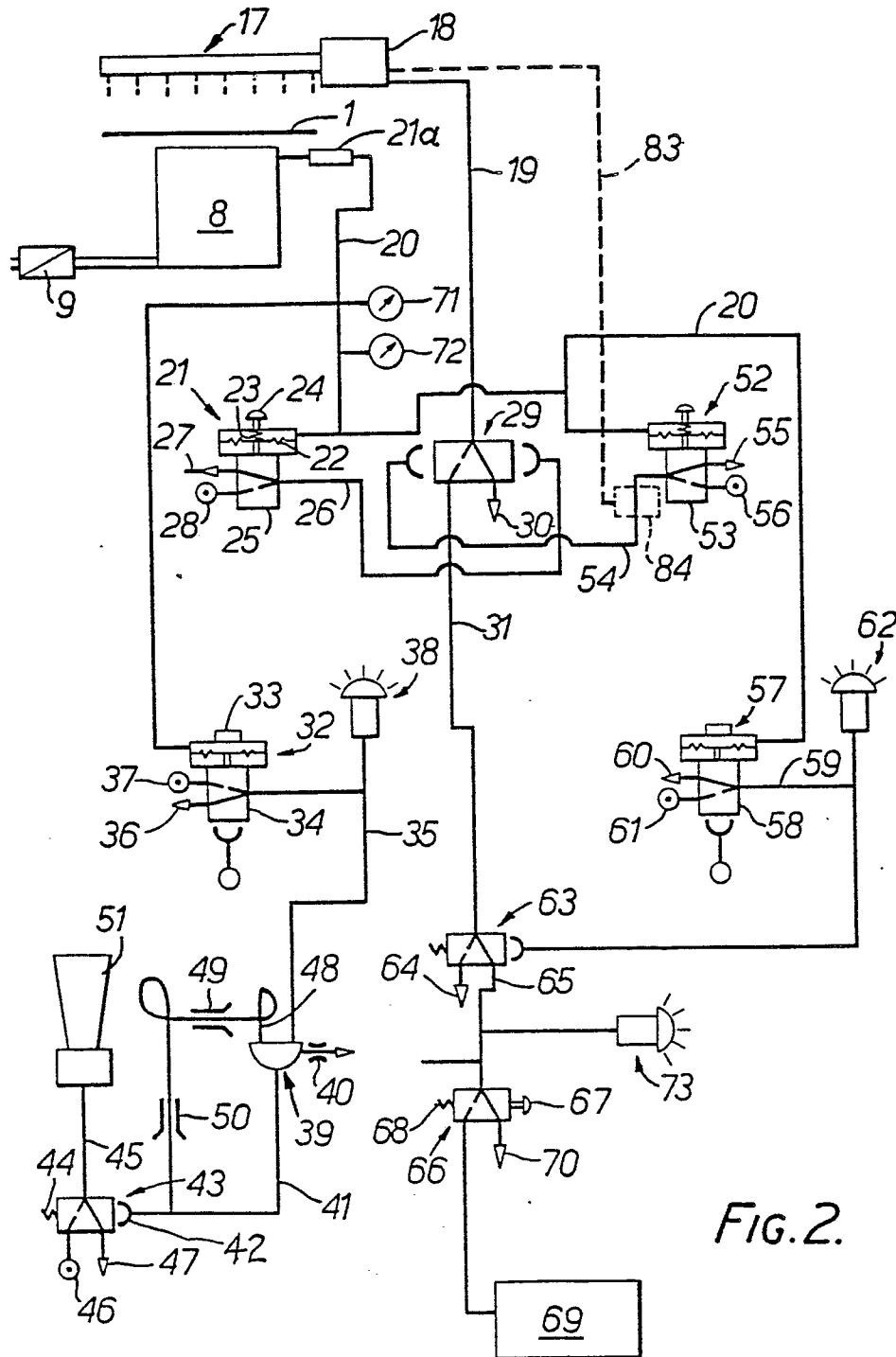


FIG. 2.

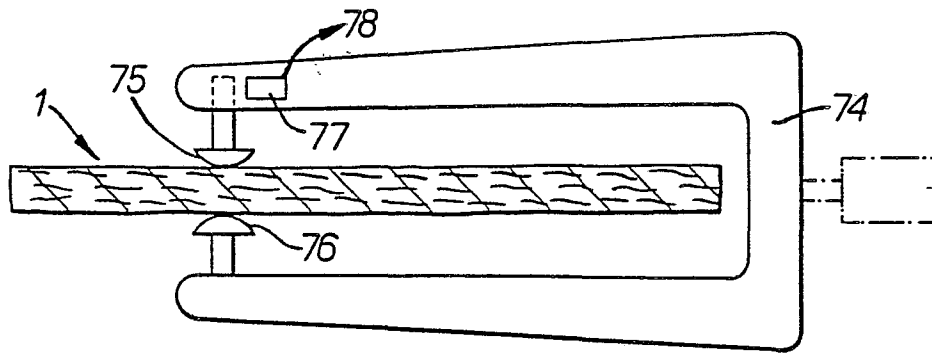


FIG. 3.

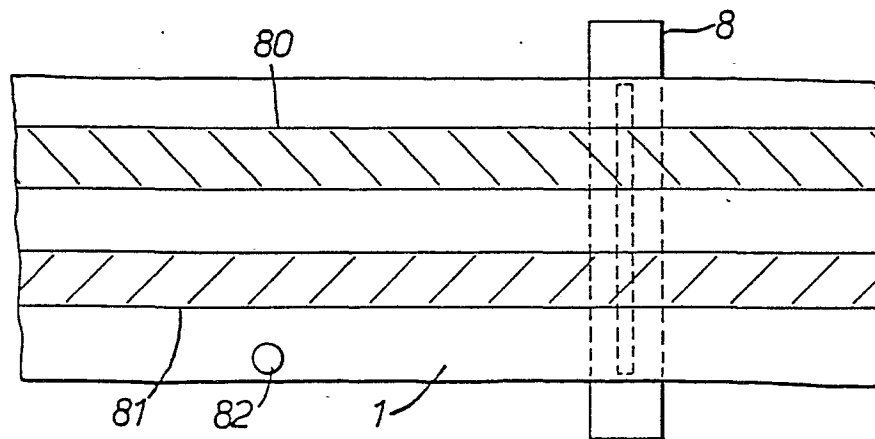


FIG. 4.