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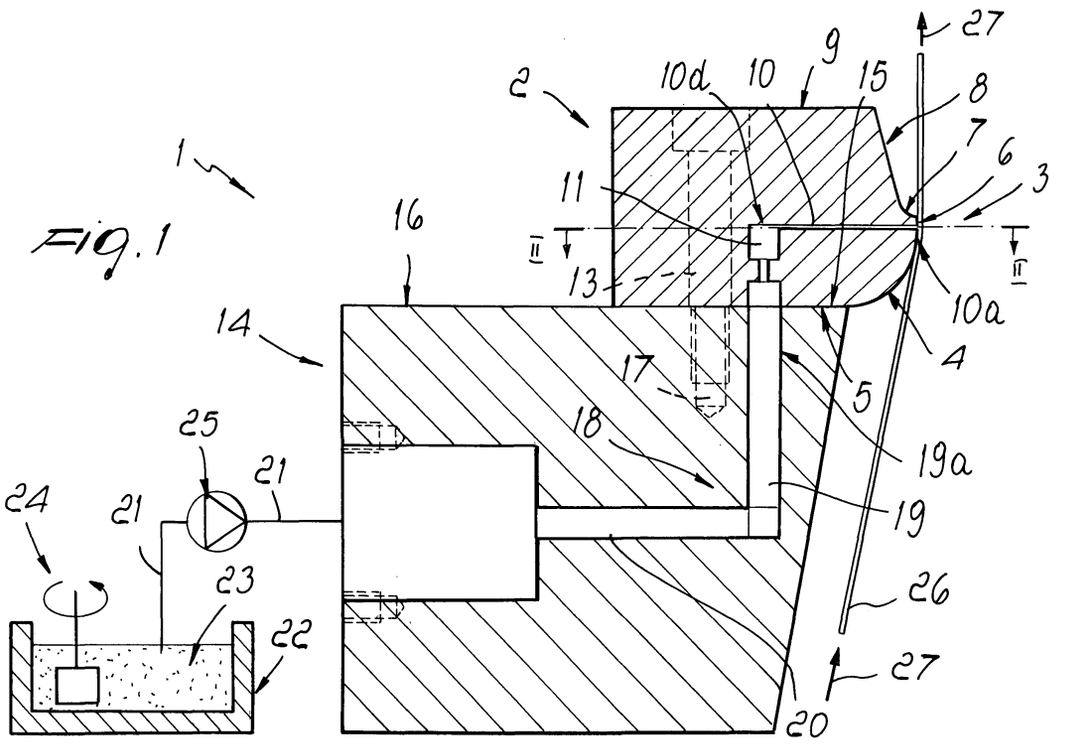
(54) Spreader particularly for depositing adhesives and/or polymeric materials in liquid dispersion

(57) A spreader (1), particularly for depositing adhesives and/or polymeric materials in a liquid dispersion, comprising a head (2), which can be associated or is associated with a footing and on which there is an active surface (3); the head has a profile that comprises a first convex region (4), which blends a second flat region (6), which belongs to the active surface, with a first wall (5) of the head (2). The active surface further comprises a third concave region (7), which blends the second flat region (6) with a fourth flat region (8), which is arranged obliquely to the second flat region (6) and is part of the active surface. A duct (10) is further formed within the head (2) and is connected to a tank (22) by means of a first passage (11) and a second passage (18), and a feeder unit is provided between the tank and the duct.



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Description

[0001] The present invention relates to a spreader particularly for depositing adhesives and/or polymeric materials in liquid dispersion.

[0002] Many fields of industry and distribution currently require intermediate components and finished products that are constituted by the bonding of two or more layers of materials made of fabric, or of materials known as non-woven fabrics, or comprising at least one layer of fabric and one layer made of non-woven fabric.

[0003] These materials made of woven and non-woven fabrics are commonly termed substrates in industrial practice, and their bonding can provide a chosen product or intermediate component; in particular, substrates made of woven material, commonly termed tissues, are widely used to manufacture paper napkins, handkerchiefs, wet wipes, toilet paper, towels, medical wipes, medical drapes and other products.

[0004] In order to ensure the bonding of two adjacent layers, adhesives in liquid dispersion of a known type are commonly used; they are interposed between said layers and have mechanical and stability properties that are suitable to meet the requirements of the users of the resulting product.

[0005] Another widespread requirement is to coat one or more of said substrates by means of polymeric materials in a liquid dispersion, in order to obtain particular properties of the product, such as for example a particular fragrance or greater stability of the fibers that compose the substrate.

[0006] One application of this second type of process relates for example to the production of paper handkerchiefs, wet wipes, toilet paper, towels, medical wipes and drapes for medical use.

[0007] Stabilization of the substrate, for example by depositing a polymeric material on its surface, is required since especially in the case of substrates that contain mixed fibers said fibers are bonded by means of weak bonds and accordingly tend to separate easily from the surface once they are subjected to an external abrasive action, causing the release of particles that can be inconvenient for the end user.

[0008] The substrates that are used in adhesive bonding processes and in coating processes may be very thin, down to thicknesses on the order of a few microns, so that the products manufactured with them are particularly soft and pleasant to the touch.

[0009] The layers of adhesive or polymeric material deposited for bonding and coating also have an extremely limited thickness, since a deposit that can vary between 0.01 grams per square meter and 20 grams per square meter is required.

[0010] In order to achieve high productivity, which is rendered absolutely necessary by the low profit margins per unit that characterize this industrial sector, the substrate, in the form of a ribbon up to approximately 2700 millimeters wide, must further be processed at a very high speed, advancing at the devices for depositing the liquid solution that contains the adhesive or polymeric materials at a speed that can reach 900 meters per minute.

[0011] Moreover, recovery of production waste is particularly important and absolutely necessary in order to protect the narrow profit margins; said waste is conveyed and returned to the substrate production cycle by means of appropriate recovery systems.

[0012] Known types of device that operate with a blade or with the gravure method are currently used to perform processes for adhesive bonding and coating of woven and non-woven materials.

[0013] In blade devices, the ribbon of substrate is made to slide below a tray that contains the dispersion to be applied and is provided with a slot from which said dispersion can fall onto the substrate, the thickness to be deposited being adjusted by changing the height of said tray with respect to the underlying ribbon.

[0014] A second known type of blade device is constituted by a first rotating roller, on the lateral surface of which the dispersion to be applied is made to adhere; a blade is arranged at right angles to said lateral surface and at an adjustable distance from it, so that downstream of said blade the dispersion that adheres to the first rotating roller has a controlled thickness, which can therefore be transferred to the substrate by means of a second roller that rotates in contact with the first roller.

[0015] In known gravure or reverse-roll devices, the dispersion to be deposited is made to adhere to the lateral surface of a first rotating roller and is transferred from there to a second rotating roller, from which it is finally deposited on the substrate.

[0016] The main drawback of these known types of device is that due to their shape and to the process performed therein, they require considerable time to perform substrate treatment, allowing a very low productivity, which is absolutely incompatible with current market requirements.

[0017] Another drawback of these known types of device is that they ensure only approximate control over the dosage of the liquid dispersion that contains the adhesive or polymeric coating material.

[0018] Another drawback is further constituted by the fact that the technologies used in these known types of device entail the formation of large amounts of dirt.

[0019] A second known type of device provides for depositing the liquid dispersion, which contains the bonding or coating materials, by means of spreaders, which are usually used instead to deposit adhesives commonly known as hot-melt.

[0020] These conventional spreading devices are constituted by a deposition head, which generally has a pointed shape and on the end of which there is a slit through which the hot-melt adhesive or, in the case being considered, the liquid dispersion is deposited on the ribbon of substrate that slides in contact with it.

[0021] The main drawback of these known types of

spreader is that continuous friction between said spreader and the substrate, in view of the mechanical characteristics of said substrate and of its high advancement speed, causes separation of the surface fibers, generating large amounts of dust, which tends to deposit on the head of said spreader.

[0022] Since this dust has high hygroscopic properties, it rapidly absorbs part of the liquid component of the dispersion that comprises the adhesive or polymer to be deposited on the substrate, making it impossible to dose correctly or even obstructing the slit provided on the head of the spreader, accordingly forcing frequent and onerous stops of the apparatus.

[0023] Specifically for the case of depositing a layer of adhesive, known devices constituted by the spreaders described here are used to deposit adhesives of the hot-melt type on substrates, as occurs in various other fields of industrial production.

[0024] These adhesives in fact are not deposited in a liquid dispersion and further have a higher viscosity and lower wettability than adhesives in a liquid dispersion, and therefore the dust generated by the friction of the substrates against the head of the spreader does not mix with them and does not produce formations that might partially or completely obstruct the slit of said head.

[0025] This avoids the problems in deposition uniformity described above, which are typical of the use of adhesives in a liquid dispersion.

[0026] The main drawback that arises from the application of said known hot-melt adhesives by means of known spreaders is that since said adhesives are not water-soluble, it is unfeasible to recover production waste, although this is necessary for cost reasons, since said adhesives would rapidly clog the filters provided on the waste recovery and reprocessing units, causing an unacceptable increase in production costs.

[0027] Moreover, adhesives of the hot-melt type are known whose characteristics are compatible with production waste recovery requirements, allowing in principle to use them to bond substrates made of fabric or non-woven fabric.

[0028] A drawback of this known type of adhesive, however, is their cost, which is much higher than the cost of traditional hot-melt adhesives and of adhesives in a liquid dispersion and makes them absolutely unusable to bond two or more substrates made of fabric or non-woven fabric.

[0029] Finally, units for depositing adhesive or polymers in a liquid dispersion are known which are provided with nozzles through which the dispersion that contains the adhesive or polymeric coating material is sprayed against the substrates in the regions where one wishes to obtain deposition of said adhesive or of said polymers.

[0030] Accordingly, in these known types of unit there is no direct contact between the substrates and the spray nozzles, in order to avoid separation of the topmost fibers of said substrates as a consequence of sliding against the deposition devices and thus limit the formation of dust, which as mentioned prevents correct dosage of the material that one wishes to deposit.

[0031] The main drawback of these known types of unit is that since the substrates are conveyed by means of motorized rollers, large amounts of dust are still generated due to the friction of said substrates against the surface of said rollers, said dust being capable of clogging the spray nozzles and of accordingly making the deposition process unreliable even if said nozzles are protected with known systems of various kinds, such as for example pressurized housings.

[0032] The aim of the present invention is to solve the above-mentioned problems, eliminating the drawbacks of the cited background art, by providing a spreader that allows to deposit an adhesive or a polymeric material in a liquid dispersion on one or more substrates constituted by materials made of fabric, non-woven fabric, or a mixture thereof, in a controlled and efficient manner.

[0033] Within this aim, an object of the present invention is to provide a spreader that allows to ensure optimum operation even with substrates that have surface fibers that can separate easily.

[0034] Another object is to provide a spreader that allows to deposit layers of adhesive or of coating material that have a wide variety of shapes and thicknesses.

[0035] Another object is to allow quick and easy transition between the various types of deposition that are available.

[0036] Another object of the invention is to ensure high wear-resistance and to allow quick and easy maintenance, accordingly requiring low operating costs.

[0037] Another object is to provide a spreader that is structurally simple and has low manufacturing costs.

[0038] This aim and these and other objects that will become better apparent hereinafter are achieved by a spreader, particularly for depositing adhesives and/or polymeric materials in a liquid dispersion, characterized in that it comprises a head, which can be associated or is associated with a footing and on which there is an active surface that has a profile constituted by a first convex region, a second flat region, a third concave region and a fourth flat region, a duct being formed within said head and being connected to a tank by means of a first passage and a second passage, a feeder unit being further provided between said tank and said duct.

[0039] Further characteristics and advantages of the invention will become better apparent from the following detailed description of a particular but not exclusive embodiment thereof, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a sectional view of the spreader according to the invention;

Figure 2 is a sectional view, taken along the line II-II of Figure 1, of a detail of the spreader;

Figure 3 is a perspective view of a detail of the

spreader;

Figure 4 is a highly enlarged-scale view of a detail of the spreader.

[0040] In the embodiments that follow, individual characteristics, given in relation to specific examples, may actually be interchanged with other different characteristics that exist in other embodiments.

[0041] Moreover, it is noted that anything found to be already known during the patenting process is understood not to be claimed and to be the subject of a disclaimer.

[0042] With reference to the figures, the reference numeral 1 designates a spreader according to the invention, which is composed of a head 2, which is substantially shaped like a parallelepiped and an active surface 3 of which has a profile that is composed of a first convex region 4, whose profile is constituted for example by an arc of a circle and blends a first wall 5 of the head 2 with a second region 6, which is flat and arranged approximately at right angles to the first wall 5, of the active surface 3.

[0043] The upper end of the second region 6 is blended, by means of a third concave region 7 whose profile is constituted for example by an arc of a circle, with a fourth flat region 8 arranged approximately obliquely.

[0044] The fourth region 8, the upper end of which is contiguous to a second wall 9 of the head 2, is arranged so that said head tapers toward said second wall.

[0045] Conveniently, the active surface 3 of the head 2 is provided with a surface treatment, for example by chrome-plating or other treatments, so that it has excellent wear-resistance characteristics and very low friction coefficients.

[0046] A duct 10 is formed within the head 2 and is arranged for example substantially parallel to the first wall 5; said duct also affects, at a first end 10a, the active surface 3, so that it is open in a point that is located preferably proximate to the blending portion between the first convex region 4 and the second flat region 6.

[0047] The duct 10 has a substantially rectangular cross-section, the outline of which is visible on the second region 6.

[0048] Optionally, it is possible to provide, at the first end 10a of the duct 10, profiles 10b, which are mutually parallel and equidistant and are arranged longitudinally with respect to the duct, so as to divide the transverse cross-section of said duct, proximate to its first end 10a, into a plurality of passage channels 10c.

[0049] At a second end 10d, which is arranged inside the head 2, the duct 10 is connected to a first passage 11, which is arranged approximately at right angles to it and is connected, at a first end 11a, to the first wall 5.

[0050] At least one through hole 12 is formed in the head 2 and is suitable to accommodate at least one threaded screw 13, by way of which the head 2 can be coupled to a footing 14 that is adjacent to said head.

[0051] The footing 14 in fact has, in a fifth region 15 of a first surface 16 thereof that is shaped complementarily with respect to the first wall 5 of the head 2 and is for example flat, at least one threaded cavity 17, with a thread that is suitable to mate with the thread provided on the at least one screw 13.

[0052] In this manner, the head 2 can be associated stably with the footing 14 and it is sufficient to extract the at least one screw 13 in order to disengage said head from said footing.

[0053] A second passage 18 is formed inside the footing 14 and is provided with a first portion 19, which is approximately perpendicular to the fifth region 15 of the first surface 16 and is open, at a first end 19a, onto the fifth region 15, in such a position that when the head 2 is coupled to the footing by means of the at least one screw 13, the first end 19a of the first portion 19 mates with the first end 11a of the first passage 11 provided within the head 2.

[0054] By way of the action of the at least one screw 13 and optionally of the interposition of a gasket, a good seal is accordingly provided between the first passage and the second passage.

[0055] As an alternative, it is possible to provide the head monolithically with the footing, but in this case it is impossible to replace said head.

[0056] The second passage 18 further comprises a second portion 20, which is for example approximately perpendicular to the first portion 19, is connected to said first portion and, by means of a tube 21, to a tank 22 inside which there is a liquid dispersion 23 that contains in suspension an adhesive or a polymeric coating material.

[0057] A mixing unit 24, shown schematically in Figure 1, is preferably arranged within the tank 22 and is suitable to keep the adhesive or the polymeric coating material suspended in the liquid in which it is dispersed and to render the dispersion 23 homogeneous.

[0058] The spreader 1 further comprises a feeder unit 25, which is constituted by at least one pump, preferably of the gear type, which is shown schematically in the figure and is arranged for example along the tube 21, between the tank 22 and the second portion 20 of the second duct 18.

[0059] Operation is therefore as follows: with reference to Figure 1, a ribbon 26 of substrate, made for example of woven or non-woven material or a mixture thereof or tissue, is made to slide in contact with the active surface 3 of the head 2 in the direction indicated by the arrow 27.

[0060] In this manner, the ribbon 26 is guided by the first convex region 4 and slides on the second flat region 6 of the active surface 3, affecting the first end 10a of the duct 10.

[0061] By means of the pump 25, the liquid dispersion 23 contained in the tank 22 is conveyed under pressure into the footing 14 along the second passage 20 until it reaches the first passage 11 and the duct 10, which are formed inside the head 2.

[0062] The liquid dispersion 23 is then expelled from the head 2 at the first end 10a of the duct 10 and is deposited on the ribbon 26 that slides in contact with it.

[0063] The particular shape of the active surface 2 constitutes accordingly a guide for the ribbon of substrate 26, the surface fibers 28 of which, shown by way of example in Figure 4, are further slightly pressed before depositing the liquid dispersion and therefore do no tend to separate from said ribbon, accordingly preventing the formation of dust constituted by said fibers.

[0064] The separation of the surface fibers from the ribbon 26 is further limited by the surface treatments performed on the active surface 3, which are intended to reduce the friction and therefore the abrasion, applied to each other by the head 2 and by the ribbon of substrate.

[0065] The formation of said dust would be extremely damaging, since as mentioned earlier said dust is highly hygroscopic and by depositing proximate to the first end 10a of the duct 10 it would mix with the liquid part of the dispersion 23, forming deposits capable of hindering correct dosage of the dispersion or even of blocking the duct 10 completely, thus causing an onerous stop of the spreading system.

[0066] The spreader 1 according to the invention, by preventing the formation of said dust, is therefore not subjected to these problems, ensuring a deposition of the dispersion 23 on the ribbon 26 that can be dosed with high precision and high uniformity and continuity in operation.

[0067] Due to the high advancement speeds of said ribbon, which can reach 900 meters per minute, the head 2 in the long term may be subject to wear, which is in any case minimized by the same factors described above, which allow easy sliding of the ribbon on the head, and in particular by the advantageous shape of the active surface 2.

[0068] If the head is in any case worn, it can be replaced easily by simply removing the at least screw 13, disconnecting the head from the footing 14 and inserting a new head.

[0069] Moreover, the use of one or more gear pumps to feed the dispersion allows a very accurate dosage of the deposit on the ribbon 26 and its real-time control.

[0070] If the profiles 10b are provided at the first end 10a of the duct 10, the dispersion 23 can be deposited on the ribbon 26 in multiple parallel longitudinal bands, whereas if the profiles 10b are not provided, said deposition is continuous.

[0071] It has thus been found that the invention has achieved the intended aim and objects, a spreader having been devised which allows to deposit, in a controlled and efficient manner, an adhesive or a polymeric material in liquid dispersion on a layer of substrate that is constituted by a material made of woven fabric, non-woven fabric, or a mixture thereof, or tissue, even if said substrate has surface fibers that are weakly bonded and therefore can separate easily from it.

[0072] Another object that is achieved by the invention is to require no halting of the machining in order to clean the spreader, accordingly requiring low management costs.

[0073] Another object achieved by the invention is to allow to deposit layers of adhesive or of coating material that have a wide variety of shapes and thicknesses, ensuring accurate control of the thickness of the deposit.

[0074] Another object achieved by the invention is to allow easy maintenance of the device and rapid replacement of any worn components.

[0075] The materials used, as well as the dimensions that constitute the individual components of the invention, may of course be any according to specific requirements.

[0076] The various means for performing certain different functions need not certainly coexist only in the illustrated embodiment but can be present per se in many embodiments, including ones that are not illustrated.

[0077] The characteristics mentioned as being advantageous, convenient or the like may also be omitted or be replaced with equivalents.

[0078] The disclosures in Italian Patent Application No. TV2003A000150, from which this application claims priority, are incorporated herein by reference.

[0079] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A spreader, particularly for depositing adhesives and/or polymeric materials in a liquid dispersion, **characterized in that** it comprises a head, which can be associated or is associated with a footing and on which there is an active surface that has a profile constituted by a first convex region, a second flat region, a third concave region and a fourth flat region, a duct being formed within said head and being connected to a tank by means of a first passage and a second passage, a feeder unit being further provided between said tank and said duct.

2. The spreader according to claim 1, **characterized in that** said first convex region blends said second flat region with a first wall of said head, which is arranged approximately at right angles to said second flat region.

3. The spreader according to claims 1 and 2, **characterized in that** said second region is blended to said fourth region by means of said third region, said

fourth region being arranged substantially obliquely with respect to said second region.

4. The spreader according to claims 1 and 3, **characterized in that** said duct is arranged preferably in a direction that is substantially parallel to said first wall, affects said working surface at a first end, and is open in a point that is located proximate to the blending between said first convex region and said second flat region.

5. The spreader according to claims 1 and 4, **characterized in that** said duct has a substantially rectangular transverse cross-section.

6. The spreader according to claims 1 and 5, **characterized in that** it comprises, at said first end of said duct, a plurality of parallel profiles, which are mutually equidistant and are arranged longitudinally with respect to said duct, so as to divide its transverse cross-section, proximate to said first end thereof, into a plurality of passage channels.

7. The spreader according to claims 1 and 6, **characterized in that** a first passage is provided inside said head, is arranged approximately at right angles to said duct, and is connected thereto at a second end of said duct, said first passage being connected to said first wall at a first end.

8. The spreader according to claims 1 and 7, **characterized in that** at least one through hole is formed in said head and at least one threaded screw can be inserted in said hole in order to couple said head to said footing.

9. The spreader according to claims 1 and 8, **characterized in that** said footing has a fifth region, which is formed on a first surface thereof that is shaped complementarily with respect to said first wall of said head, at least one threaded cavity being provided in said fifth region, said cavity having a thread that is suitable to mate with the thread provided on said at least one screw.

10. The spreader according to claims 1 and 9, **characterized in that** a second passage is formed inside said footing and comprises a first portion that is approximately perpendicular to said fifth region of said first surface and is open, at a first end, in a corresponding position, when said head is rigidly coupled to said footing by means of said at least one screw, to said first end of said first duct, which is formed inside said head.

11. The spreader according to claims 1 and 10, **characterized in that** said second passage further comprises a second portion, which is substantially perpendicular to said first portion and is connected to said first portion and to a tank by means of a tube.

12. The spreader according to one or more of the preceding claims, **characterized in that** said active surface of said head is provided with a surface treatment.

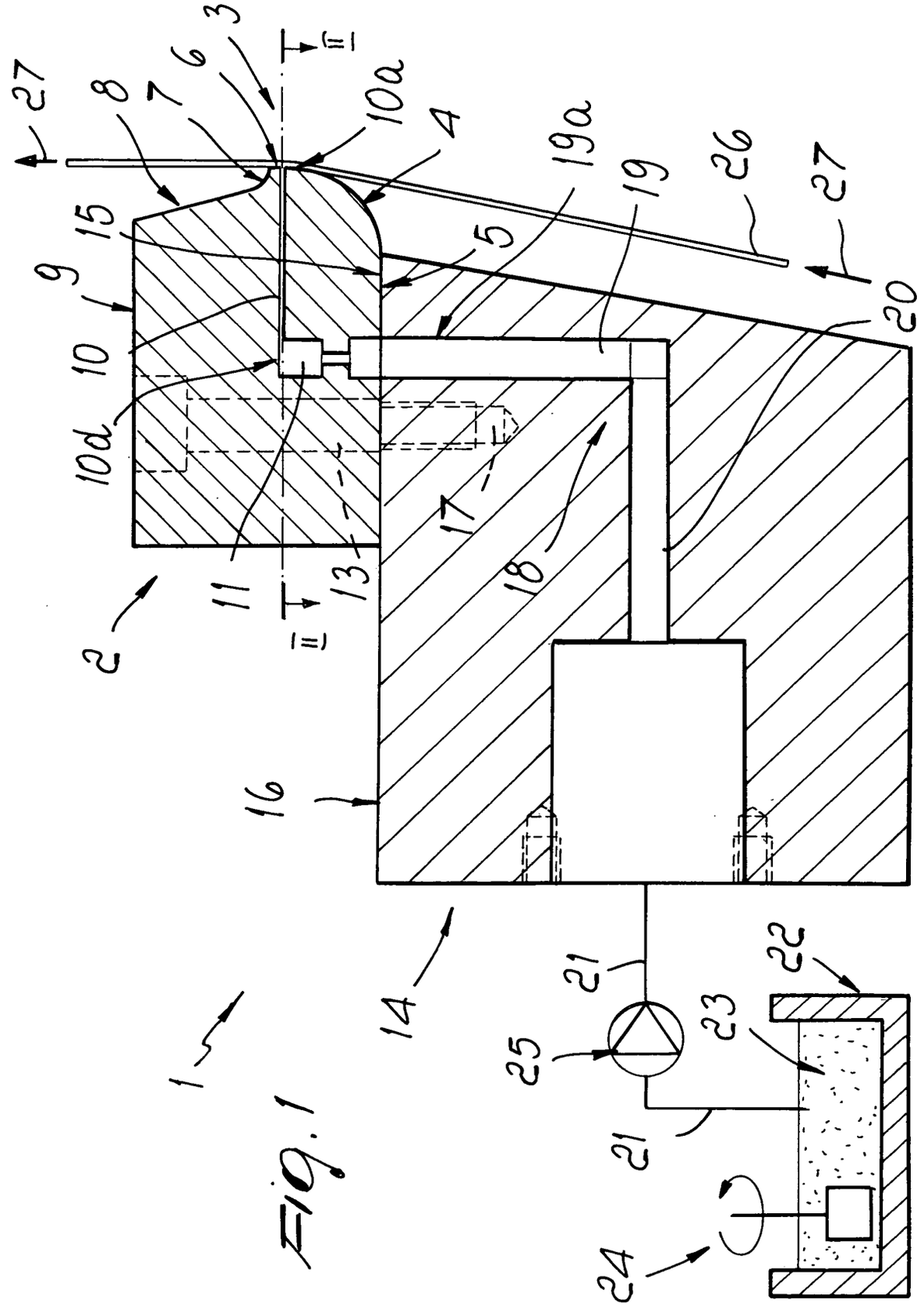
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Fig. 1

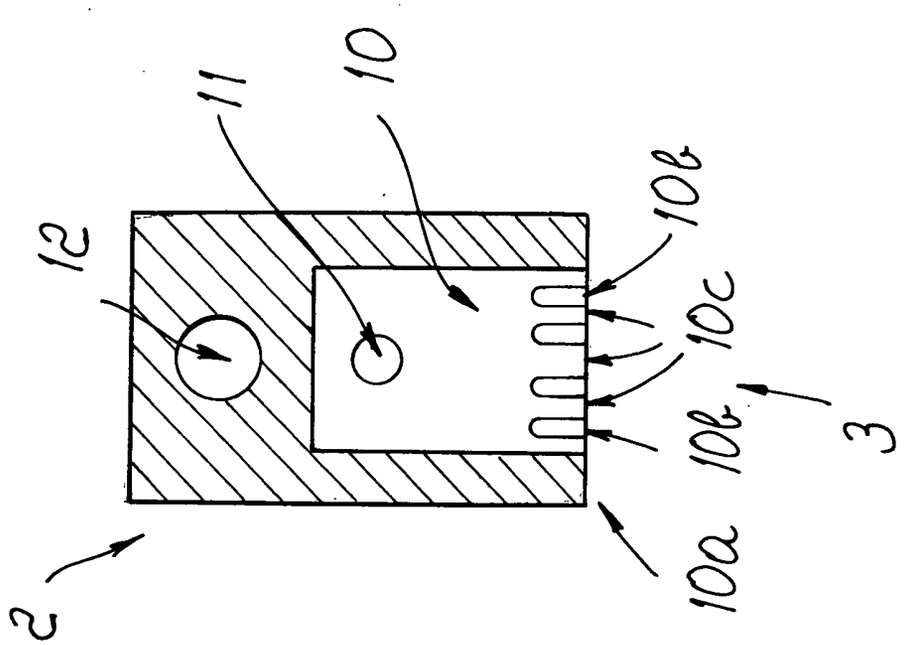

Fig. 2

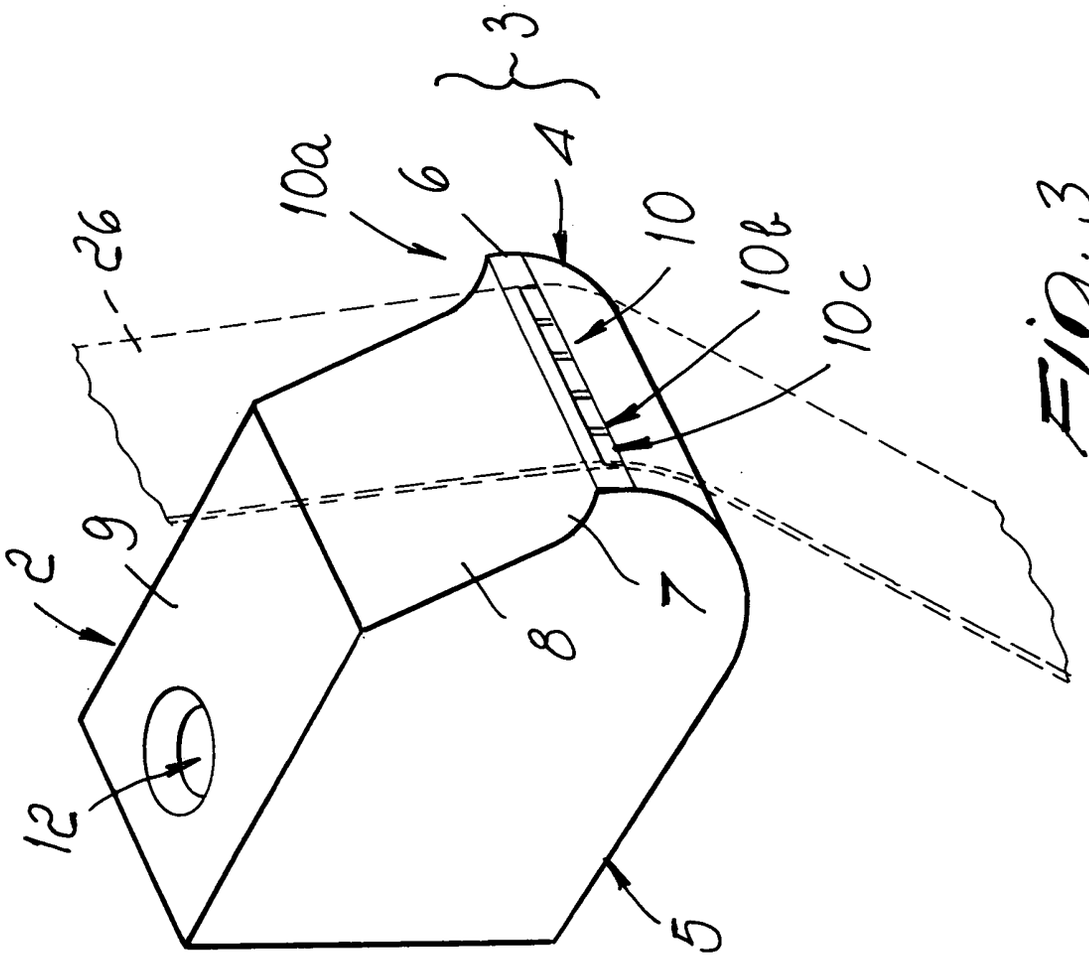

Fig. 3

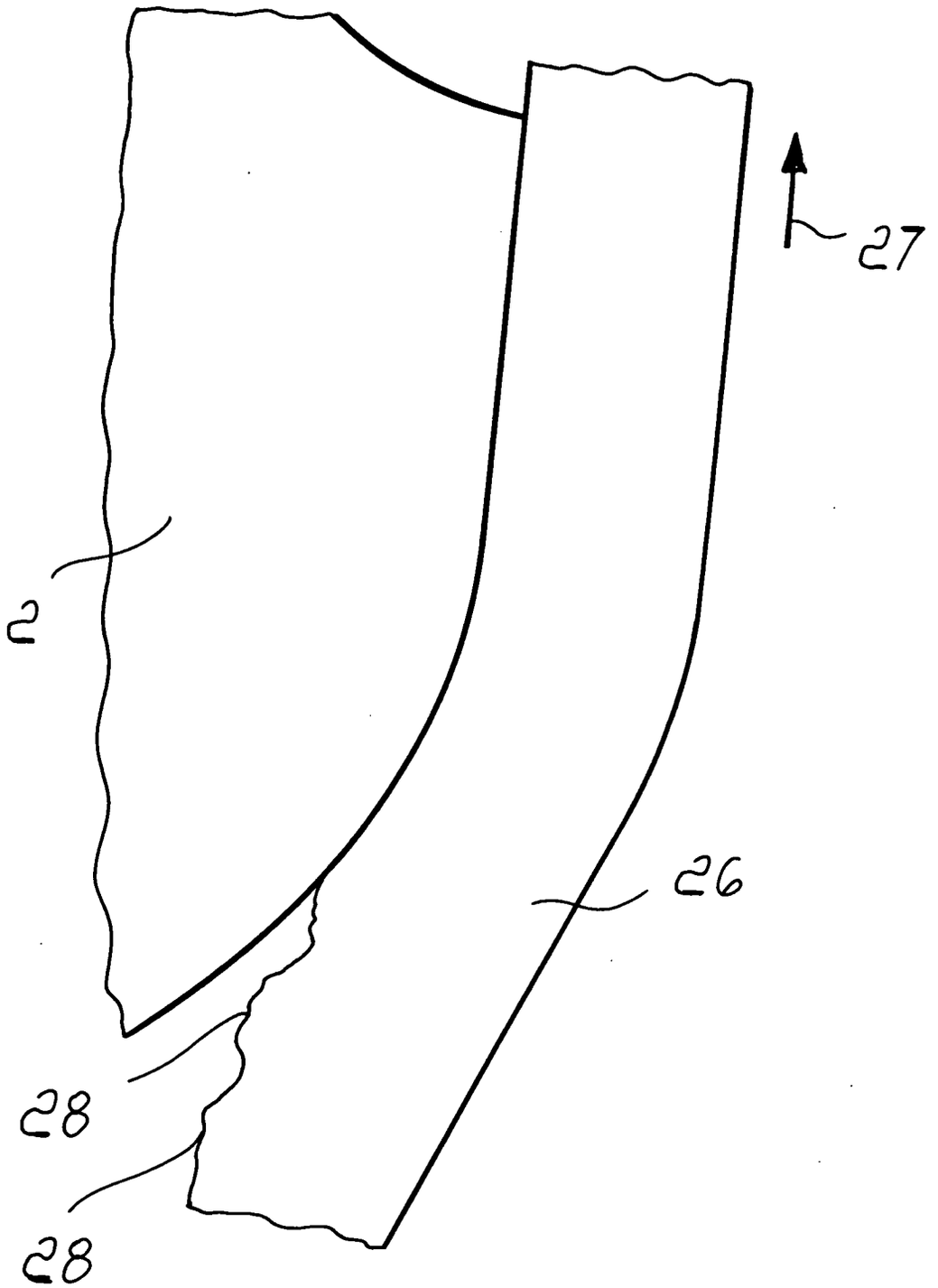

Fig. 4