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Fluidum gázmentesítő berendezés, valamint eljárás fluidumok gázmentesítésére

Az európai szabadalom ellen, megadásának az Európai Szabadalmi Közlönyben való meghirdetésétől számított kilenc hónapon belül, felszólalást lehet benyújtani az Európai Szabadalmi Hivatalnál. (Európai Szabadalmi Egyezmény 99. cikk(1))

A fordítást a szabadalmas az 1995. évi XXXIII. törvény 84/H. §-a szerint nyújtotta be. A fordítás tartalmi helyességét a Szellemi Tulajdon Nemzeti Hivatala nem vizsgálta.

FLUID DEGASSING DEVICE AND METHOD FOR DEGASSING FLUIDS

The present invention relates to a device and method for degasification of fluids.

5 In the production of fibre composite components, artificial resins are used. In this instance, it is important for the resin to be free from air inclusions or bubbles to the greatest possible extent since such air inclusions have a structurally weakening action on the material.

Consequently, therefore, a degasification of the resin has to be carried out. Until now, the resin has been poured into agitation containers and agitated under vacuum. In this instance, the material degasification takes
10 place only in the region close to the surface.

Another variant for resin degasification involves so-called thin layer degasification. As already set out above, the degasification takes place in particular at the surface, whilst the high viscosity of the resin allows the gas bubbles to rise from the lower region to the surface only slowly and therefore a degasification is difficult. High dwell times are thereby necessary.

15 Alternatively, it is also possible to use semi-permeable films in order to enable resin degasification.

Reference may be made to WO 2003/064144 A1 and US 3,229,449 A as general prior art.

US 3,273,319 sets out a fluid degasification device having a structural element which is constructed as a grid for degasification of the fluid.

GB 1 401 382 sets out a fluid degasification device with a structural element which is constructed as a
20 non-woven fabric.

An object of the present invention is therefore to provide an improved continuous degasification of a resin.

This object is achieved by a device for degasification of fluids according to claim 1 and a method for degasification of fluids according to claim 9.

25 Consequently, a fluid degasification device for degasification of fluids, in particular resins, is provided. The device has a fluid supply element for supplying the fluid and a fluid discharge element for discharging the fluid. Between the supply element and the discharge element, at least one structural element is provided for destroying bubbles in the fluid when flowing through the structural element. Additionally or alternatively, there may be provided at least one profile element via which the fluid has to flow. The fluid degasification device
30 further has a first chamber in which the fluid is supplied through the fluid supply element. The first chamber has at least a first structural element which is constructed as a non-woven fabric. The device further has a second chamber which adjoins the first chamber. The second chamber has a second structural element which is constructed as a grid and via which the fluid is directed.

According to another aspect of the present invention, a partition wall is provided between the first and
35 second chambers. The partition wall has at least one gap.

According to another aspect of the present invention, the device has a third chamber which adjoins the second chamber and which has at least one convex element.

According to another aspect of the present invention, a partition wall is provided between the second and third chambers and has at least one gap.

40 According to another aspect of the present invention, the device has a pivot axis for pivoting the device.

According to another aspect of the present invention, the device has a grid element which is arranged around the fluid discharge element.

The invention also relates to a method for degasification of fluids, in particular resins. To this end, a fluid is supplied, bubbles in the fluid are destroyed by directing the fluid through at least one structural element and/or the fluid is directed via at least one profile element. Subsequently, the fluid can be discharged.

The invention is explained in greater detail below with reference to the embodiments and with reference to the drawings, in which:

Figure 1 is a schematic sectioned view of a resin degasification device,

Figure 2 is a schematic sectioned view of a first end of a degasification device according to an embodiment of the invention,

Figure 3 is a schematic sectioned view of a transition between a first and a second chamber of the degasification device of Figure 1,

Figure 4 is a schematic sectioned view of another transition between the second chamber and a third chamber in the degasification device according to Figure 1, and

Figure 5 is a schematic sectioned view of a detailed cut-out of an end of the third chamber of the degasification device.

Figure 1 is a schematic sectioned view of a resin degasification device according to a first embodiment. This device is used for degasification and may in this instance be provided with a pivot bearing 300 via which the degasification device can be adjusted. As a result of the degree of inclination, the flow speed of the resin can be adjusted. The inclination of the device may in this instance be adjusted between 1 and 10% and determines the resin layer thickness and the dwell time in the vacuum, that is to say, ultimately the degasification quality.

The resin to be degasified is introduced through a connection piece 12 into a first chamber 150. Subsequently, the resin flows through a second chamber 160 into a third chamber 190 in order to then flow away via a discharge 310. In the first chamber 150, the resin flows out of the supply connection piece 12 through a non-woven fabric 100 to the floor of the first chamber 150 in order to flow through a first gap 200 or an opening in a first wall 210 between the first and the second chamber 150, 160 into the second chamber 160. In the second chamber, a plurality of grids 180 are clamped. The resin has to flow through the grid 180 so that bubbles in the resin can be removed. The resin flows into the third chamber 190 through a second gap or opening 201 in a second wall 211 between the second and third chambers 160, 190. There are provided in the third chamber 190 a large number of profiles 220 over which the resin flows. Consequently, in the third chamber, the region of the resin which is close to the surface is increased, which has a positive effect during the degasification. At the end of the third chamber 190 there is provided a discharge 310, via which the degasified resin can flow away again.

Figure 2 is a schematic sectioned view of a first end (detail F) of the degasification device of Figure 1. The resin is introduced through a supply (connection piece) 12 into the container, that is to say, into the first chamber 150. At least one layer of non-woven fabric 100 is provided below the supply 12. The non-woven fabric 100 is intended in this instance to be constructed in such a manner that the resin can flow slowly through. As a result of the structure of the non-woven fabric, the first bubbles can consequently already be removed from the resin. The resin consequently flows through the non-woven fabric 100 and through a first gap or opening 200 in the first wall 210 from the first chamber 150 into the second chamber 160.

Figure 3 is a detailed view of the detail E of Figure 1, that is to say, the transition between the first and second chamber 150, 160 of Figure 1. In the second chamber 160, a large number of transverse struts 170 are arranged in each case on the ceiling and on the floor of the chamber 160. Between the respective transverse struts 170, there are clamped grids 180 which have, for example, a mesh width of a few millimetres. The resin which flows through the first opening 200 in the first wall 210 into the second chamber 160 has to overcome the first transverse strut 170 on the floor of the chamber and consequently flows over this transverse strut 170 so that the resin, when flowing down from the transverse strut 170, has to flow through the grid 180. In addition, the transverse struts 170 may optionally have gaps 206 on the floor of the second chamber 160. Consequently, as a result of the provision of the transverse struts 170, it is possible for the resin to flow upwards on the transverse struts 170 so that the surface of the resin is increased, which leads to an improved degasification. Furthermore, when flowing down from the transverse struts 170, the resin has to flow through the grids 180, which bring about a further degasification of the resin.

The first gap 200 may in this instance be selected to be relatively thin in order to achieve a relatively thin layer of resin which flows therethrough so that the bubbles are moved into the region close to the surface. The viscosity or the flow speed can be adjusted by means of the temperature. The grids 180 can also be constructed in several layers. The grid structure may in this instance be constructed from plastics fibre or metal as long as it is ensured that the grid is not broken down or dissolved by the resin.

Consequently, the grid structure represents a parameter in the resin degasification. The transverse struts 170 do not necessarily have to terminate directly at the floor of the left chamber 160, but instead gaps may also be present between the transverse struts and the floor of the left chamber 160 so that the output during the degasification can be increased.

Figure 4 shows a detail D of Figure 1, that is to say, a transition between the second chamber 160 and a third chamber 190, which adjoins the second chamber 160 at the left-hand side. The second partition wall 211 between the second chamber 160 and the third chamber 190 in turn has a second gap 201 at the lower side thereof. Consequently, the resin is again forced to flow through this thin second gap 201, whereby the surface or the region close to the surface is further increased.

In the third chamber 190, profiles 220 are arranged in such a manner that the resin has to flow over the profiles so that the surface or the region of the resin close to the surface is further increased. Advantageously, the profiles 220 are arranged so as to be inverted in such a manner that the resin can flow thereover. The profiles may be constructed in a convex manner. The third chamber 190 may be divided by means of a plurality of partition walls 212 - 215 with a gap 202 - 205, respectively. At least one profile 220 is arranged in each of the divided chambers. As a result of the fact that the gaps 202 - 205 are constructed to be only very narrow between the chambers or portions in the additional chamber 190, only a small quantity of resin flows through the gap 202 - 205 so that resin can accumulate in front of the gap, that is to say, a resin blockage 230 is produced. As a result of the fact that only a thin film of resin flows over the edges of the profiles 220, the region close to the surface is increased, which has a positive effect during the degasification.

Figure 5 shows a detail H of Figure 1, that is to say, a left-hand cut-out of the left end of the third chamber 190. In this instance, there is shown a discharge connection piece 310 which is not located on the floor, but instead has been placed at such a high position that only the uppermost layer of the resin is skimmed. In addition, yet another grid 320 may be provided in order to remove additional bubbles from the resin.

Using such a device, a degasification of significantly more than 90% of the resin can be achieved. The entire device is operated under vacuum. The pressure is in this instance approximately 10 mbar.

The resin which has been degasified by the fluid degasification device described above can be used to produce a wind turbine rotor blade. Alternatively, the resin which is degasified by the fluid degasification device can also be used to produce other components of a wind turbine.

FLUIDUM GÁZMENTESÍTŐ BERENDEZÉS, VALAMINT ELJÁRÁS FLUIDUMOK GÁZMENTESÍTÉSÉRE

Szabadalmi igénypontok

1. Fluidum gázmentesítő berendezés gyanták gázmentesítésére, melynek van
10 fluidumbetápláló eleme (12) gyanta betáplálására,
fluidumkivezető eleme (310) gyanta kivezetésére,
azzal jellemezve, hogy tartalmaz továbbá
nemszövött kelmeként kiképzett legalább egy első szerkezeti elemmel (100) ellátott első kamrát (150) a
gyantában lévő buborékok szétrombolására, ahol a gyanta az első kamrába a gyantabetápláló elemen (12)
15 keresztül kerül betáplálásra, továbbá a gyanta a betápláló elem (12) és a kivezető elem (310) között az első
szerkezeti elem (100) keresztül halad,
rácsként kialakított legalább egy második szerkezeti elemmel (180) ellátott és az első kamrához (150)
csatlakozó második kamrát (160), ahol a gyanta a második szerkezeti elem (180) át halad, valamint
profilelemként (220) kiképzett legalább egy konvex elemmel (220) ellátott és a második kamrához (160)
20 csatlakozó harmadik kamrát (190), ahol a gyanta a betápláló elem (12) és a kivezető elem (310) között a
profilelemen (220) keresztül áramlik.
2. Az 1. igénypont szerinti berendezés, ahol egy az első és a második kamra (150, 160) között lévő
elválasztófal legalább egy első réssel (200) rendelkezik.
3. Az 1. igénypont szerinti berendezés, ahol egy a második és a harmadik kamra (160, 190) között lévő
25 második elválasztó fal legalább egy második réssel (201) rendelkezik.
4. Az 1-3. igénypontok bármelyike szerinti berendezés, amelynek lengőtengelye (300) van a
berendezés elforgatásához.
5. Az 1-4. igénypontok bármelyike szerinti berendezés, amelynek egy a gyantakivezető elem (310)
körül elrendezett rácsos eleme (320) is van.
- 30 6. Eljárás gyanták gázmentesítésére, amelynek keretében
gyantát táplálunk be,
a gyantában lévő buborékokat szétromboljuk,
a gyantát letritjük,
azzal jellemezve, hogy a gyantában lévő buborékokat a gyanta első kamrában (150), nemszövött kelmeként
35 kiképzett legalább egy első szerkezeti elem (100) való átvezetése révén, valamint a gyanta második
kamrában, rácsként kialakított második szerkezeti elem (180) való átvezetése révén romboljuk szét, továbbá
a gyantát harmadik kamrában (190) legalább egy konvex elemként kialakított profilelemen keresztül vezetjük.

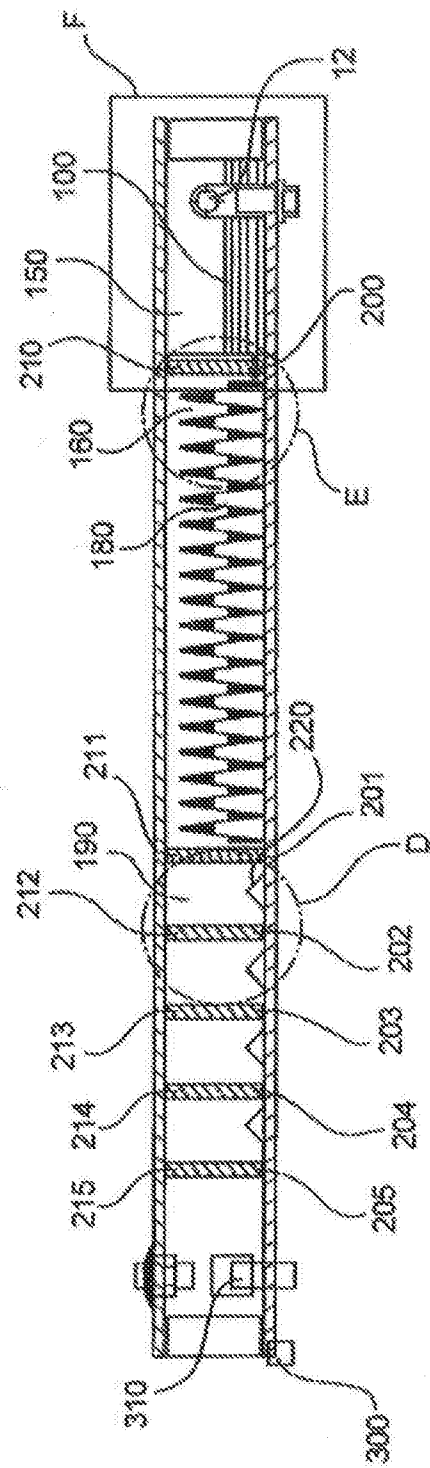
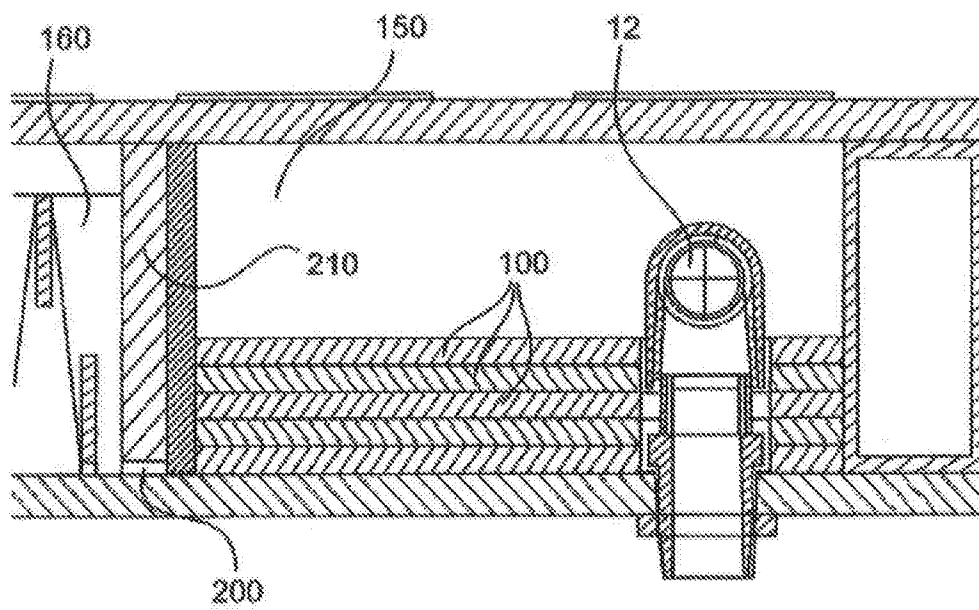
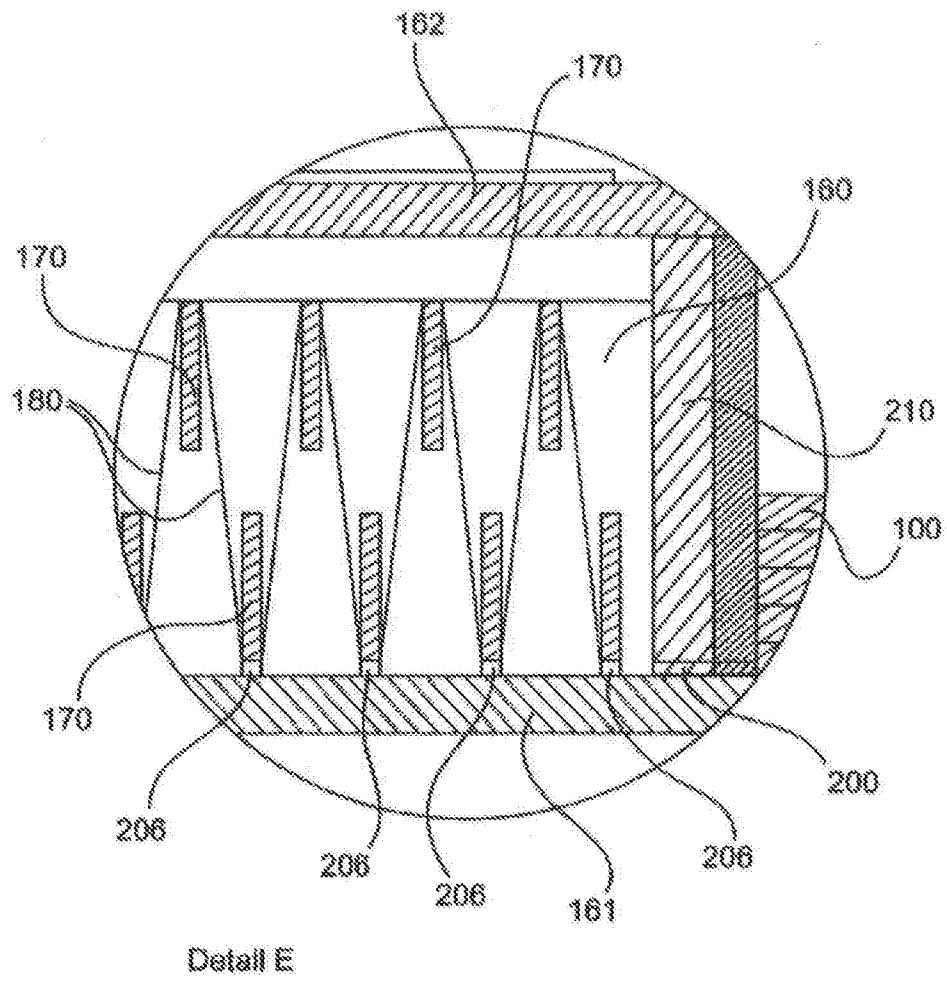


Fig. 1



Detail F

Fig. 2

**Fig. 3**

