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(54) APPARATUS FOR THE PRODUCTION OF SINGLE-LAYER TILES

VORRICHTUNG ZUR HERSTELLUNG VON EINSCHICHTIGEN FLIESEN

APPAREIL DE PRODUCTION DE CARREAUX À COUCHE UNIQUE

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(56) References cited:

EP-A1- 0 893 219

EP-A2- 1 262 296

WO-A1-2012/160583

DE-A1-102007 030 324

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Description

[0001] The present invention relates to a unit for carrying out the steps of pressing and suction of water in processes for production of tiles, in particular single-layer tiles.

[0002] For the above purpose units are known of the type described, for example, in the Italian patent applications Nos. FI2001A000103 and FI2001A000104.

[0003] A further example of equipment for pressing and suction in processes for production of tiles is described in the patent application No. FI2005U000043, which regards a plate for presses for the production of tiles and a pressing assembly provided with said plate.

[0004] Known solutions have proven generally satisfactory and have represented a substantial innovation in the production of the single-layer tiles, thanks to the efficiency of the combined action of pressing and suction.

[0005] DE 10 2007 030 324 A1 discloses an apparatus for presses designed for the production of single-layer tiles starting from a water-based mix contained in a mould defining a pressing area in accordance with the preamble of claim 1.

[0006] An aspect of known systems that is open to improvement is linked to the relative difficulty in keeping the filtering and suction system clean and to the relatively frequent need to replace the filters used for removal of the excess liquid phase from the mix.

[0007] In the application No. FI2011A000107, the present applicant has proposed a pressing and suction unit for the production of single-layer tiles that is able to guarantee a more effective removal of water from the entire mass of the mix, as well as an increased ease of dismantling and cleaning of the unit and elimination of the need to provide a subfilter.

[0008] However, it has been found that the operations of cleaning of the plate and periodic maintenance of the filter may be further improved.

[0009] There is consequently felt the need for an apparatus that will enable easy cleaning of the plate and easy removal and cleaning of the filter.

[0010] The above purposes have been achieved by an apparatus according to one or more of the annexed claims.

[0011] A first advantage lies in the fact that the filters can be replaced without removing the plate from the pad, i.e., maintaining the plate and the pad fixed together, it being possible for them to be released only when it is necessary remove the plate to replace the filter and also to carry out cleaning of the inside of the various collectors, it being thus possible to reduce the frequency at which the latter operation is carried out.

[0012] A further advantage consists in the reduction of the weight of the plate, which facilitates handling of the plate during introduction and extraction from the mould.

[0013] The above and further advantages will be better understood by any person skilled in the branch from the ensuing description and from the annexed drawings,

which are provided by way of non-limiting example and in which:

- Figure 1 shows a front view of a generic press for the production of tiles;
- Figure 2 shows a detail of the lateral pressing region;
- Figure 3 shows an exploded view of a pressing and suction unit according to the invention;
- Figure 4 shows the unit of Figure 3 in an assembled configuration;
- Figure 5 shows a detail of a first corner area of the unit of Figure 4;
- Figure 6 shows a detail of a second corner area of the unit of Figure 4 in a region corresponding to the top suction collector;
- Figure 7 is a cross-sectional view of the path for suction of the liquid through the components of the apparatus;
- Figure 8 is a top plan view of the top monolithic plate of the unit;
- Figure 9 is a view from beneath of the plate of Figure 8;
- Figure 10 shows the detail "C" of the suction corner area of the plate of Figure 9;
- Figure 11 shows a top plan view of a perforated pressing plate according to the invention;
- Figure 11a shows a top plan view of a perforated plate according to the invention in a second embodiment;
- Figure 12 shows the detail "D" of the corner area of the plate of Figure 11;
- Figure 12a shows the detail "D" of the corner area of the plate of Figure 11a;
- Figure 13 shows a top plan view of a pressing filter;
- Figure 14 and 15 show, respectively, a top plan view and an enlarged detail "E" of the corner area of a bottom collector in the form of a metal mesh for a suction and pressing unit according to the invention;
- Figures 16 and 17 show, respectively, a top plan view and an enlarged detail of a cross section C-C of a monolithic frame according to the invention;
- Figure 18 shows a detail of the channels for pneumatic expulsion of the frame;
- Figure 19 shows the frame and the filter positioned at the bottom of the mould in a position where they are extracted from the pressing plate;
- Figure 20 is a cross-sectional view of a further embodiment of the suction plate and of the monolithic frame;
- Figure 21 and 21a show, respectively, a top plan view and a view according to the cross section a-a of the frame of Figure 20;
- Figure 22 and 23 show a detail of the plate and of the frame of Figure 20;
- Figure 24 shows the plate and the frame of Figure 21 in exploded view with respect to a pressing mould with the plate being inserted in the frame with filter;
- Figure 25 shows the frame of Figure 24 during ex-

pulsion from the plate; and

- Figure 26 shows a detail of the channels of the plate for pneumatic expulsion of the frame of Figure 20.

Detailed description

[0014] With reference to the attached drawings, there now follows a description of a preferred embodiment of a unit 1 according to the invention for presses P of the type used in the production of single-layer tiles starting from an underlying aqueous mix 2 contained in a pressing mould 3, which is in turn carried by a supporting base 4.

[0015] Starting from the area of contact with the mix 2, the unit 1 basically comprises:

- a perimetral frame 5 made of a single piece;
- a filter 6 withheld by the frame and set in contact with the mix for enabling suction of the liquid phase from above;
- a first bottom collector 7 in the form of a metal mesh;
- a second collector 8 in the form of a perforated plate in contact with the top face of the first collector 7; and
- a monolithic suction plate 9 fixed, preferably via magnets 10, to a vertically mobile pressing pad 11.

[0016] In greater detail, the frame 5 is a single monolithic piece obtained by moulding, for example a frame made of elastomer 13 reinforced by a rigid insert 15 obtained from welded L-shaped sectional elements to improve its capacity for withholding the filtering fabric of the filter 6.

[0017] The shape of the frame 5 is such that the bottom perimetral surface 12 of the monolithic plate 9, made of metal material, does not come into contact with the liquid mix during the pressing operations.

[0018] Advantageously, with this solution any small parts of the mix are prevented, during the pressing and suction steps, from getting stuck in this area, thus requiring cyclic removal.

[0019] According to the invention, the frame 5 has been conceived mainly so that it is possible to mount it on and remove it from the plate 9 without this having to be released from the pressing pad 11. By way of example, a method for mounting the frame is described in what follows (Figure 19).

[0020] A clean frame is introduced into, and rested on the bottom of, the compartment of the mould 3, and the filter 6 is inserted within the centring portion 45 of the frame. Then the pressing assembly comprising the pad 11 fixed to the plate 9 and to the collectors 7, 8 is made to drop, until it enters the compartment of the mould 3, slowly and with a low value of pressing pressure. The frame 5 is shaped with a projecting profile 14 so that it can penetrate with slight interference into a corresponding lateral slot 43 of the bottom surface of the plate 9 and in such a way that, during this movement, the filter 6, which had been inserted within the frame, will assume on the outside the same profile as that of the frame and

will remain thus blocked between the frame 5 and the plate 9. Advantageously, this operation is carried out automatically by the press following upon a manual command.

5 **[0021]** Preferably, the projecting profile of the frame has perimetral bevels 16 that have the purpose of facilitating its insertion into the slot 43 of the plate and to facilitating pneumatic expulsion therefrom, as will be described more fully hereinafter.

10 **[0022]** Advantageously, in order to carry out periodic replacement of the filter 6, when this is clogged, it is not necessary to detach the plate 9 from the pressing pad 11 but it is sufficient to cause the entire pressing assembly to drop into the compartment of the mould 3 until it rests on the bottom, where it remains with a low pressing pressure. Inside the pressing pad 11 a channel 17 is in fact present, which terminates with a vertical hole 18 within which air under pressure can be introduced (Figure 18). This hole 18 is set in such a way that its vertical axis corresponds to the centre line of the perimetral interlocking between the projection 14 of the frame and the slot 43 present underneath the plate 9. By introducing air under pressure into this hole, the pressure spreads over the entire surface defined by the projection 14 of the frame and is distributed perimetally both without and within the thickness owing to the surface that has remained free on account of the two bevels 16 that had the function of facilitating insertion of the frame into the plate. In this way, by maintaining the pressure in the vertical hole 18 of the pad, and without having to raise the pressing assembly, the frame tends to detach from the plate being, however, withheld by the fact that the entire pressing assembly keeps it in contact with the bottom of the mould. There is obtained a uniform distribution of the air introduced over the entire surface of the top perimetral planar portion of the projecting profile 14 in such a way that then, by continuing to maintain the pressure of the air in the hole 18 of the pad and controlling rising of the pressing assembly, there is obtained a uniform expulsion, i.e., an expulsion in a direction parallel to the bottom of the mould, of the frame 5 and of the filter from the plate 6. Advantageously, also this operation of detachment of the frame is carried out automatically by the press.

35 **[0023]** Provided on top of the filter 6 is a first mesh collector 7, which is obtained from criss-cross weaving of stainless-steel wires and in the assembled configuration is contained precisely within an internal contrast profile 19 of the plate 9.

40 **[0024]** Provided on top of the first collector 7 is then a second collector 8 having the shape of a perforated plate, which is comprised between the first bottom collector and the plate 9 and is also contained precisely within the internal contrast profile 19 of the plate 9, said contrast profile 19 being appropriately sized so as to enable centring of the first and second collectors and for accommodating both of them for their entire thicknesses.

45 **[0025]** Fixing of the collectors 7 and 8 to the plate 9 is obtained by means of screws 46A, which are readily ac-

cessible and are inserted in corresponding holes 20, 21, 22 in such a way that the collectors remain adherent to the plate 9 when it is necessary to replace just the filter, or else in such a way that it is possible to remove the collectors when occasionally it is desired to carry out a more accurate cleaning thereof.

[0026] Preferably, the second collector 8 is obtained from a sheet of stainless steel having a thickness of 3 mm that is completely perforated, with holes having a diameter of 4.5 mm and a distance between centres of 15 mm. For example, in the 400x400-mm format, in this collector at least 552 active holes 33 are hence present with a total section of passage of 8779 mm² and are distributed at 45° with respect to the orthogonal axes of the plate 9.

[0027] Advantageously, the large number of holes 33 present in this collector and their uniform distribution have the function, during the pressing step, of receiving a greater amount of water prior to suction thereof and then of presenting an extensive and distributed passage of air that is to flow through the various elements, namely, the filter, the first and second collectors, and the plate, and then be rapidly expelled through the suction manifolds 23 provided in the pad 11.

[0028] With reference in particular to Figures 4 to 9, the bottom surface 24 of the monolithic plate 9 is machined to provide the slot 43 and the profile 19 so that it can house the frame, the filter, and the two collectors and form a substantially plane pressing surface 25 without any roughness or discontinuity that during pressing would come into contact with the liquid mix 2. Within the slot 43 and the profile 19 necessary for housing the frame and the two collectors, and more precisely on the surface where the second collector 8 rests, a series of channels 32 are moreover provided that cross one another once again diagonally like the holes 33 present on the second collector 8. The pitch of these channels distributed over the entire surface is advantageously equal to the distance between centres of the holes 33 of the second collector in such a way that the air/water will flow directly from the holes to the channels. The section of passage of these channels 32 has, in the top part, a rounded shape (Figures 5-6) and a sufficient depth so as to guarantee a good rate of flow and not to have regions with sharp corners where material would tend to deposit.

[0029] Present on the top surface 26 of the plate 9 (Figure 8) are:

- at the ends of the diagonals four housings 27 of a generally oval shape, each of which is surrounded by an O-ring; the housings 27 are reached by the negative pressure from the four holes 28 present in the pressing pad 11;
- a channel 29 for housing an O-ring to protect the magnets 10 housed in the pad 11;
- ducts for introduction of air 31 with O-rings, for pneumatic extraction of the frame when this is mounted together with the pad; these ducts or holes 31 are

moreover useful also when it is desired to remove the frame from the plate manually when the plate has been detached from the pad;

holes 47 for applying brackets for gripping and removal of the plate when it is resting on the bottom of the mould; and

referencing holes 46 for the centring pins for centring the pad and the plate with respect to one another.

[0030] The connection for the passage of air/water between the top and bottom sides of the plate 9 is obtained in areas corresponding to the top housings 27. In these four areas, generally L-shaped through openings 34 are provided that connect the bottom with the top of the plate and directly converging in which are the channels 32 of the bottom face of the plate (for example four channels 32) centred on the diagonals. All the other channels 32 are, instead, delimited in their extension by four perimetral channels 35. Preferably, the perimetral channels 35 are deeper than the diagonal ones 32 and converge in the L-shaped openings 34. Finally, the channels 35 give out on the outside of the plate via the holes 36 parallel to the surface of the plate and distributed over the four vertical sides of the plate (Figures 5 and 6).

[0031] Advantageously, the holes 36 have the function of sucking in the water and the slurry that gets stuck, during pressing, in the perimetral clearance that may arise between the plate and the compartment of the mould.

[0032] During use of the apparatus, the mix 2 is dosed and poured into the mould 3 in doses having a cylindrical shape that drop from a certain height. To obtain complete levelling of the dose in the compartment of the mould it is possible to set the mould in vibration, according to a technique in itself well known. However, even in the case where the vibration is obtained in the best possible way, at the vertices of the diagonals of the compartment of the mould 3 there will always be obtained a greater concentration of the lightest component in the mix, that is water, which reaches more easily the areas that are further away from the point where the mix is dropped.

[0033] Advantageously, the plate 9 according to the invention has been conceived for having a greater suction capacity at the vertices of the diagonals of the mould and perimetally.

[0034] For this purpose, the openings 34 have sides parallel to the corners of the mould and are set as close as possible to the vertices of the diagonals of the mould. In turn, the holes 28 of the pressing pad from where the suction pressure arrives have their projection that falls on these openings 34. The two channels 37 set on the right and on the left with respect to the diagonals have been prolonged beyond the opening 34 towards the corners of the mould until they find outlet in two holes 38 at the vertex of the second bottom collector 8 (Figure 12).

[0035] During use of the apparatus, the operations described in what follows are carried out.

[0036] By way of example, in a 400x400-mm tile having

a thickness of 23 mm the amount of water that we have to draw off from the tile is 0.57 to 0.95 l. Within the various collectors and channels present on the plate we have a space for housing approximately 1.07 l. It is thus possible to house in these elements, which are located in the point closest to the extraction point, all the water extracted even before the suction pressure can extract it and carry it out of the plate.

[0037] With reference to Figures 20-25, a further embodiment of a suction plate 90 is described associated to a frame 50 made of a single piece according to the invention, where the same reference numbers as those used for the parts of the plate 9 already described are used for designating the corresponding parts of the plate 90 that perform the same function.

[0038] With particular reference to Figure 21, the frame 50 is constituted by a monolithic internal rigid ring 51, made, for example, of metal, enveloped by an elastomeric coating 53 of small thickness, which is provided at the top with a perimetral projection 52 that emerges from a top contrast surface defined by the internal and external surfaces 58 and 59 of the frame 50, which have the function of withstanding the vertical forces that are generated during the pressing operations.

[0039] The internal edge of the frame 50 is defined by a stretch 60 substantially parallel to the projection 52, which is preferably provided with a wedge-shaped bottom lip 54.

[0040] Figures 22 and 23 show the operating configuration of the plate 90, with the projection 52 of the frame 50 inserted in the corresponding bottom perimetral cavity 56 of the plate 90, and the edge 55 of the filter 6 withheld between the internal stretch 60 of the frame and an opposed surface 61 of the cavity 56 of the plate 90.

[0041] In this embodiment, perimetral holes 33a are moreover present, distributed along the sides of the collector 8 for communicating directly with the channels 35 and improving suction from the perimetral pressing area.

[0042] Preferably, the height H of the projection 52 is slightly smaller than the depth of the cavity 56 in such a way that between the surface 63 of the projection 52 and the internal bottom surface 64 of the cavity 56 there remains a space 65 that defines a chamber communicating with the pneumatic duct 18 of the plate 90 (Figure 26), said duct being provided for pneumatic expulsion of the frame and having already been described previously.

[0043] Advantageously, with this solution, the compressed air sent during expulsion into the ducts 18 fills the space 65 and determines a uniform thrust on the elastomeric projection 52, which behaves as a piston that is able to slide in the cavity 56.

[0044] Furthermore, in the configuration of use, the internal stretch 60 of the frame 50 and the opposed surface 61 of the plate 90 are orthogonal with respect to the pressing surface, i.e., parallel to the direction of advance of the plate 90, and are set at a distance by an extent slightly smaller than the thickness of the edge 55 of the filter 6 in order to set the filter 6 in tension at the four sides at

the moment of insertion of the projection 52 into the perimetral cavity 56.

[0045] Furthermore, the range of the stroke, i.e., of the fluid-tight sliding between the projection 52 and the cavity 56 during expulsion, is greater than the height of the flap or edge 55 of the filter withheld between the surfaces 60 and 61 in such a way that the thrust of pneumatic expulsion is effective at least until complete extraction of the filter 6.

[0046] Figure 24 shows the plate 90 extracted from the mould 3, on the bottom of which the frame 50 has been rested with a filter 6 resting on the contrast surfaces 58 of the frame.

[0047] Figure 25 shows an intermediate step of exit of the projection 52 from the cavity 56, where the edges 55 of the filter 6 are already free from the surfaces 60, 61 of the frame and of the plate, respectively, and the projection 52 is still inserted in a fluid-tight way in the cavity 56.

[0048] Finally, Figure 26 shows the pressing operating configuration, in which the plate rests on the surfaces 58, 59 of the frame, the projection 52 is completely inserted into the cavity 56 communicating with the expulsion ducts 18, and the filter 6 defines with the bottom surface 66 of the frame a pressing surface that is substantially smooth and without any irregularities, also thanks to the presence of the perimetral lip 54.

Claims

1. An apparatus (1) for presses (P) designed for the production of single-layer tiles starting from a water-based mix (2) contained in a mould (3) defining a pressing area, said apparatus comprising:

a monolithic plate (9) provided at the top with ducts (27) in fluid communication with a pneumatic suction system and a system for pressing from above, and a bottom surface (24) provided with channels (32, 34, 35) distributed over the pressing area and communicating with said ducts (27);

a first plate collector (8), which is provided with a plurality of through holes (33) distributed over the pressing area, and can be set superimposed on, and in fluid communication with, the channels of the bottom face of the plate (9);

a second mesh collector (7) which can be superimposed on said first collector (8);

a filter (6) applied to the bottom face of said collector (7); and

a perimetral frame (5) made of a single piece and connected to said plate for withholding said filter applied underneath said second collector (7),

characterized in that it comprises means for pneumatic expulsion of said frame from said plate.

2. The apparatus according to Claim 1, **characterized in that** said frame is a single-piece frame reinforced with internal inserts.
3. The apparatus according to any one of the preceding claims, wherein said frame (5) and said filter (6) in said pressing area form a substantially continuous pressing surface without any metal part in contact with the mix.
4. The apparatus according to any one of the preceding claims, wherein said frame (5) is fixed to said plate by means of forced fitting of a projecting profile (14, 52) in a corresponding slot (43, 56) of the plate.
5. The apparatus according to any one of the preceding claims, **characterized in that** said frame is a single-piece frame comprising a monolithic internal rigid ring (51) coated with an elastomeric coating (53) having an internal surface (60) perpendicular to the pressing area and opposed, in the operating configuration, to an opposed surface (61) of the plate (90), wherein said internal surface (60) of the frame (50) and said opposed surface (61) of the plate are set at a distance less than the thickness of the filter (6) in order to be able to withhold by mechanical interference the four lateral edges (55) of the filter and to enable uniform tensioning thereof.
6. The apparatus according to Claim 5, wherein said projecting profile is a projection made of elastomer (52) that is able to slide in a fluid-tight way in a slot (56) of the plate (90) and has a slightly smaller height in order to define in the expulsion configuration a free space (65) communicating with said pneumatic-expulsion means.
7. The apparatus according to Claim 5, wherein said frame (50) comprises a top contrast surface defined by internal and external surfaces (58, 59) of the frame (50) that have the function of withstanding the vertical forces that are generated during the pressing operations.
8. The apparatus according to Claim 5, wherein the extent of fluid-tight sliding between the projection (52) and the cavity (56) during expulsion is greater than the height of the flap or edge (55) of the filter withheld between said internal surface (60) and said opposed surface (61) in such a way that the thrust of pneumatic expulsion is effective at least until complete extraction of the filter (6) from the plate (90).
9. The apparatus according to any one of Claims 5-8, wherein said expulsion means comprise a channel (17) of the pad (11) that terminates with a vertical hole (18) into which air under pressure can be introduced, said hole (18) being set in such a way that

its vertical axis corresponds to the centre line of the perimetral interlocking between the projection (14, 52) of the frame and the slot (43, 56).

10. The apparatus according to any one of the preceding claims, wherein said bottom surface (24) of the monolithic plate (9) has a quadrangular shape and is provided at the corners with openings (34) into which a plurality of channels (32) distributed along the diagonals of the plate converge, and is moreover provided with perimetral channels (35).
11. The apparatus according to any one of the preceding claims, wherein said first plate collector presents an array of holes with a distance between centres equal to the distance between centres of corresponding parallel channels (32) of the bottom surface (24) of the monolithic plate (9).
12. The apparatus according to any one of the preceding claims, wherein said monolithic plate (9) comprises ducts (36) in fluid communication with the pneumatic suction system and with the outer sides of the plate in order to drain any possible infiltration of liquid between the plate and the mould.
13. The apparatus according to any one of the preceding claims, wherein said bottom surface (24) of the monolithic plate (9) is provided at the corners with channels (37) set on the right and on the left with respect to the diagonals, said channels (37) being prolonged beyond said opening (34) until they find an outlet in corresponding holes (38) set at the vertices of the second bottom collector (8).
14. The apparatus according to any one of the preceding claims, comprising automatic means for insertion and/or expulsion of the frame (5) and of the filter (6) into/from the plate (9).
15. The apparatus according to any one of the preceding claims, wherein said perforated plate collector (8) is provided with perimetral holes (33a) set in a region corresponding to, and directly communicating with, perimetral channels (34, 35) of the plate.

Patentansprüche

1. Vorrichtung (1) für Pressen (P), ausgelegt für die Produktion von Einschnittfliesen, die von einer wasserhaltigen Mischung (2) ausgeht, die in einer einen Pressbereich definierenden Form (3) aufgenommen ist, wobei die Vorrichtung umfasst:

eine monolithische Platte (9), die an der Oberseite mit Durchgängen (27) in fluidleitender Verbindung mit einem pneumatischen Saugsystem

- und einem System zum Pressen von oben versehen ist, und eine Bodenfläche (24), die mit Kanälen (32, 34, 35) versehen ist, die über den Pressbereich verteilt sind und mit den Durchgängen (27) in Verbindung stehen;
 einen ersten Plattensammler (8), der mit einer Vielzahl von über den Pressbereich verteilten Durchgangsbohrungen (33) versehen ist und mit den Kanälen der Unterseite der Platte (9) zur Überdeckung gebracht und in fluidleitende Verbindung mit diesen eingestellt werden kann;
 einen zweiten Siebsammler (7), der mit dem ersten Sammler (8) zur Überdeckung gebracht werden kann;
 einen Filter (6), der an der Bodenfläche des Sammlers (7) angebracht wird; und
 einen Umfangsrahmen (5), der aus einem Stück hergestellt und mit der Platte verbunden ist, um den unter dem zweiten Sammler (7) angebrachten Filter zu halten,
dadurch gekennzeichnet, dass sie Einrichtungen zur pneumatischen Abtrennung des Rahmens von der Platte aufweist.
2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** der Rahmen ein Rahmen aus einem Stück ist, der mit inneren Einsätzen verstärkt ist.
3. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei der Rahmen (5) und der Filter (6) in dem Pressbereich eine im Wesentlichen kontinuierliche Pressfläche ohne irgendein mit der Mischung in Kontakt befindliches Metallteil bilden.
4. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei der Rahmen (5) an der Platte durch kraftbelastetes Pressen eines hervorstehenden Profils (14, 52) in einem entsprechenden Schlitz (43, 56) der Platte befestigt wird.
5. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Rahmen ein Rahmen aus einem Stück ist, der einen monolithischen, inneren steifen Ring (51) einschließt, der mit einer elastischen dünnen Schicht (53) überzogen ist, die eine Innenfläche (60) senkrecht zum Pressbereich und, in der Betriebsanordnung, entgegengesetzt zu einer gegenüber liegenden Fläche (61) der Platte (90) aufweist, wobei die Innenfläche (60) des Rahmens (50) und die gegenüber liegende Fläche (61) der Platte in einem Abstand kleiner als die Dicke des Filters (6) festgelegt sind, um die vier seitlichen Kanten (55) des Filters durch mechanisches Übermaß halten zu können und gleichmäßiges Spannen derselben zu ermöglichen.
6. Vorrichtung nach Anspruch 5, wobei das hervorstehende Profil ein aus Elastomer (52) bestehender Vorsprung ist, der fluiddicht in einen Schlitz (56) der Platte (90) gleiten kann und eine etwas kleinere Höhe aufweist, um in der Abtrennanordnung einen freien Raum (65), der mit der pneumatischen Abtrennvorrichtung in Verbindung steht, zu definieren.
7. Vorrichtung nach Anspruch 5, wobei der Rahmen (50) eine obere Gegenfläche aufweist, die durch innere und äußere Flächen (58, 59) des Rahmens (50) gebildet sind, die die Funktion haben, den vertikalen Kräften standzuhalten, die während der Pressvorgänge erzeugt werden.
8. Vorrichtung nach Anspruch 5, wobei die Ausdehnung des fluiddichten Gleitens zwischen dem Vorsprung (52) und dem Hohlraum (56) während einer Abtrennung größer ist als die Höhe der Lasche oder Kante (55) des Filters, der zwischen der inneren Fläche (60) und der gegenüber liegenden Fläche (61) gehalten wird, derart, dass der Axialdruck einer pneumatischen Abtrennung zumindest bis zum vollständigen Herausziehen des Filters (6) aus der Platte (90) wirksam ist.
9. Vorrichtung nach einem der Ansprüche 5 bis 8, wobei die Abtrenneinrichtung einen Kanal (17) der Unterlage (11) umfasst, der mit einer vertikalen Bohrung (18) endet, in die Luft unter Druck eingeleitet werden kann, wobei die Bohrung (18) derart festgelegt ist, dass ihre vertikale Achse mit der Mittellinie des Umfangsverschlusses zwischen dem Vorsprung (14, 52) des Rahmens und dem Schlitz (43, 56) übereinstimmt.
10. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei die Bodenfläche (24) der monolithischen Platte (9) eine quadratische Form besitzt und an den Ecken mit Öffnungen versehen ist (34) versehen ist, in die eine Vielzahl von entlang der Diagonalen der Platte verteilten Kanälen (32) zusammenlaufen, und darüber hinaus mit Umfangskanälen (35) versehen ist.
11. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei der erste Plattensammler eine Anordnung von Bohrungen mit einem Abstand zwischen Mittelpunkten bildet, der dem Abstand zwischen Mittelpunkten entsprechender paralleler Kanäle (32) der Bodenfläche (24) der monolithischen Platte (9) entspricht.
12. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei die monolithische Platte (9) Durchgänge (36) in fluidleitender Verbindung mit dem pneumatischen Saugsystem und mit den Außenseiten der Platte aufweist, um ein mögliches Einsickern von Flüssigkeit zwischen der Platte und der Form abzuleiten.

13. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei die Bodenfläche (24) der monolithischen Platte (9) an den Ecken mit Kanälen (37) versehen ist, die links und rechts relativ zu den Diagonalen festgelegt sind, wobei die Kanäle (37) über die Öffnung (34) hinaus verlängert sind, bis sie einen Auslass in entsprechenden Bohrungen (38) finden, die an den Scheitelpunkten des zweiten Bodensammlers (8) festgelegt sind.
14. Vorrichtung nach einem der vorhergehenden Ansprüche, umfassend automatische Einrichtungen zum Einsatz und/oder zur Abtrennung des Rahmens (5) und des Filters (6) in die/von der Platte (9).
15. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei der durchlöchernte Plattensammler (8) mit Umfangsbohrungen (33a) versehen ist, die in einem Bereich festgelegt sind, der Umfangskanälen (34, 35) der Platte entspricht und mit diesen direkt in Verbindung steht.

Revendications

1. Appareil (1) pour des presses (P) conçues à la production de carreaux monocouche à partir d'un mélange en base aqueuse (2) contenu dans un moule (3) définissant une zone de pressage, ledit appareil comprenant :
- une plaque monolithique (9) munie au sommet de conduits (27) en communication de fluide avec un système d'aspiration pneumatique et un système pour le pressage par le haut, et d'une surface inférieure (24) pourvue de canaux (32, 34, 35) distribués sur la zone de pressage et communiquant avec lesdits conduits (27) ;
- un premier collecteur à plaque (8) qui est pourvu d'une pluralité de trous passants (33) distribués sur la surface de pressage, et peut être superposé sur, et en communication de fluide avec, les canaux de la face inférieure de la plaque (9) ;
- un deuxième collecteur à mailles (7) qui peut être superposé sur ledit premier collecteur (8) ;
- un filtre (6) appliqué sur la face inférieure dudit collecteur (7) ; et
- un cadre périphérique (5) réalisé d'une seule pièce et connecté à ladite plaque pour retenir ledit filtre appliqué au-dessous dudit deuxième collecteur (7),
- caractérisé en ce qu'il** comprend des moyens pour l'expulsion pneumatique dudit cadre par rapport à ladite plaque.
2. Appareil selon la revendication 1, **caractérisé en ce que** ledit cadre est un cadre d'une seule pièce renforcé par des inserts internes.

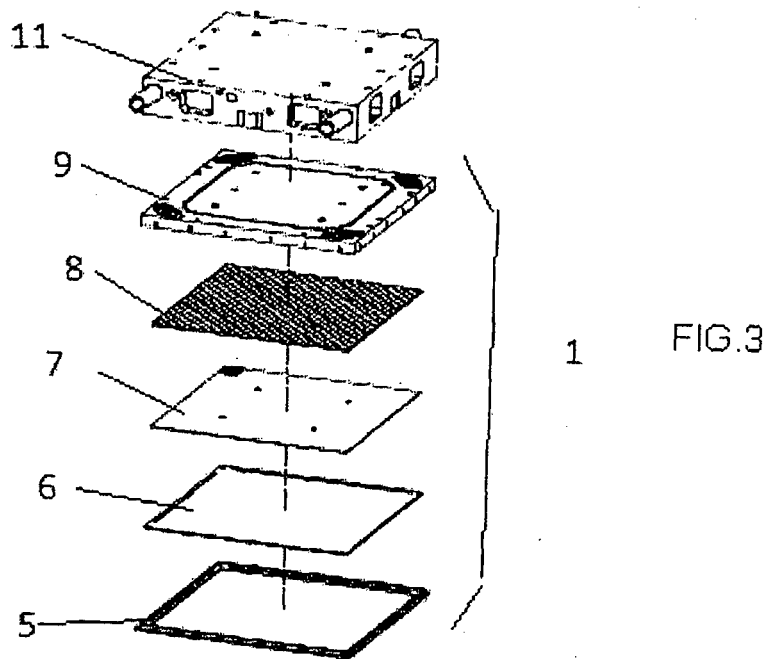
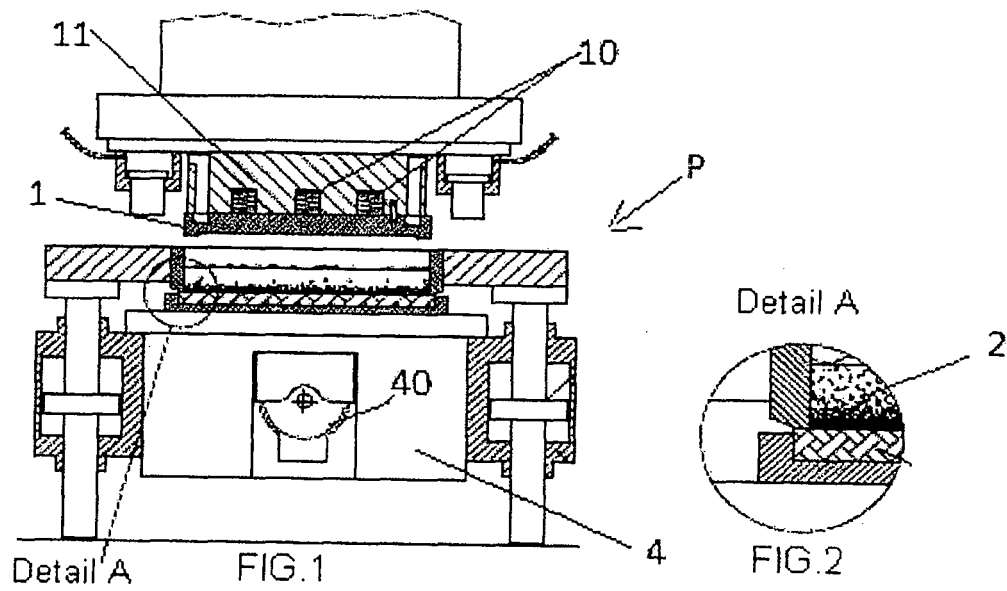
3. Appareil selon l'une quelconque des revendications précédentes, dans lequel ledit cadre (5) et ledit filtre (6) dans ladite zone de pressage forment une surface de pressage sensiblement continue sans aucune partie métallique en contact avec le mélange.
4. Appareil selon l'une quelconque des revendications précédentes, dans lequel ledit cadre (5) est fixé à ladite plaque au moyen d'un ajustement forcé d'un profil en saillie (14, 52) dans une fente correspondante (43, 56) de la plaque.
5. Appareil selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ledit cadre est un cadre d'une seule pièce comprenant un anneau rigide interne monolithique (51) revêtu avec un revêtement élastomère (53) ayant une surface interne (60) perpendiculaire à la zone de pressage et opposée, dans la configuration de fonctionnement, à une surface opposée (61) de la plaque (90), dans lequel ladite surface interne (60) du cadre (50) et ladite surface opposée (61) de la plaque sont réglées à une distance inférieure à l'épaisseur du filtre (6) de manière à être en mesure de retenir par interférence mécanique les quatre bords latéraux (55) du filtre et pour permettre leur mise en tension uniforme.
6. Appareil selon la revendication 5, dans lequel ledit profil en saillie est une saillie constituée d'élastomère (52) qui est adaptée pour glisser d'une manière étanche aux fluides dans une fente (56) de la plaque (90) et a une hauteur légèrement inférieure de manière à définir, dans la configuration d'expulsion, un espace libre (65) communiquant avec lesdits moyens d'expulsion pneumatique.
7. Appareil selon la revendication 5, dans lequel ledit cadre (50) comprend une surface supérieure de contraste définie par des surface intérieure et extérieure (58, 59) du cadre (50) qui ont pour fonction de résister aux forces verticales qui sont générées durant les opérations de pressage.
8. Appareil selon la revendication 5, dans lequel l'amplitude de glissement d'étanchéité aux fluides entre la saillie (52) et la cavité (56) durant l'expulsion est supérieure à la hauteur du volet ou bord (55) du filtre retenu entre ladite surface interne (60) et ladite surface opposée (61) de telle manière que la poussée d'expulsion pneumatique soit efficace au moins jusqu'à l'extraction complète du filtre (6) par rapport à la plaque (90).
9. Appareil selon l'une quelconque des revendications 5 à 8, dans lequel lesdits moyens d'expulsion comprennent un canal (17) du coussinet (11) qui se termine par un trou vertical (18) dans lequel de l'air sous pression peut être introduit, ledit trou (18) étant

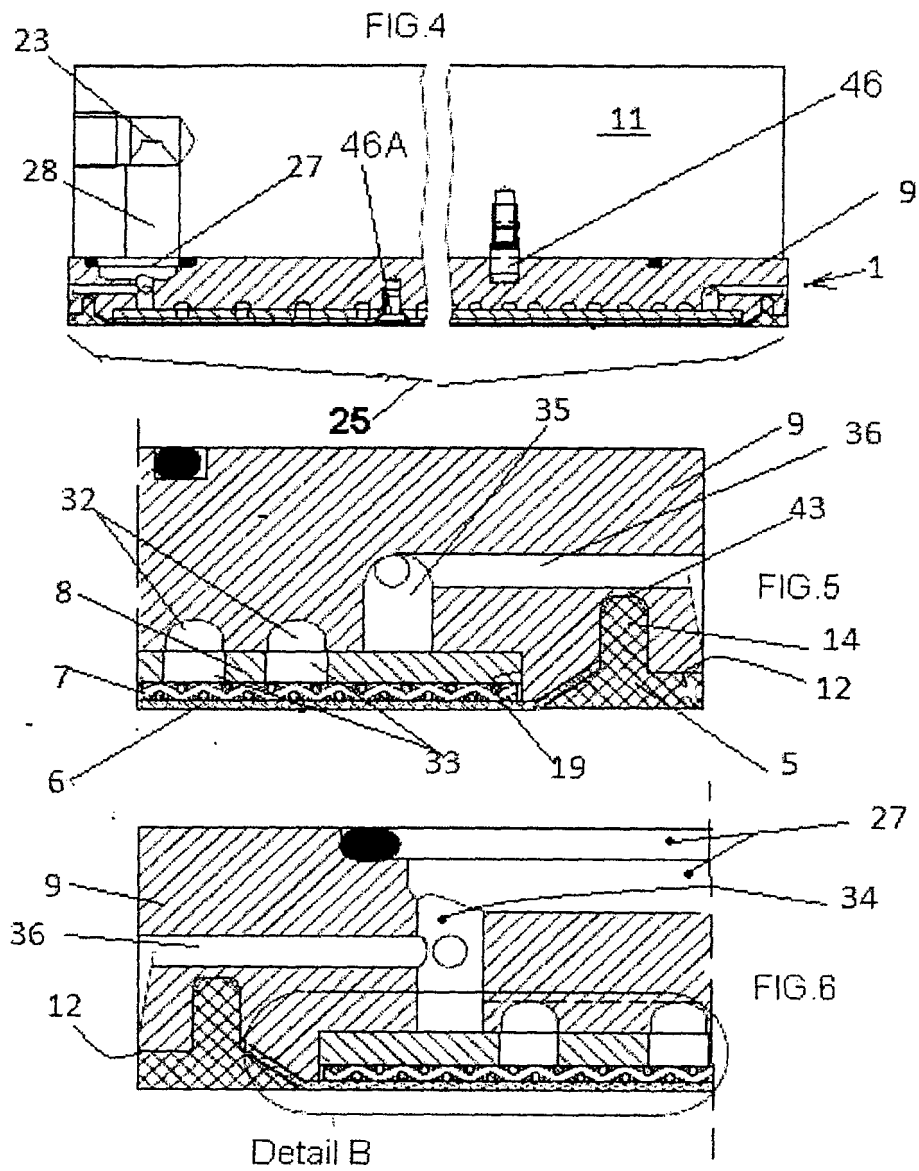
disposé de telle manière que son axe vertical corresponde à la ligne médiane du verrouillage réciproque périphérique entre la saillie (14, 52) du cadre et la fente (43, 56).

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10. Appareil selon l'une quelconque des revendications précédentes, dans lequel ladite surface inférieure (24) de la plaque monolithique (9) a une forme quadrangulaire et est pourvue au niveau des coins d'ouvertures (34) vers lesquelles converge une pluralité de canaux (32) distribués suivant les diagonales de la plaque, et est pourvu par ailleurs de canaux périphériques (35). 10
11. Appareil selon l'une quelconque des revendications précédentes, dans lequel ledit premier collecteur à plaque présente un réseau de trous avec une distance entre centres égale à la distance entre centres de canaux parallèles correspondants (32) de la surface inférieure (24) de la plaque monolithique (9). 15 20
12. Appareil selon l'une quelconque des revendications précédentes, dans lequel ladite plaque monolithique (9) comprend des conduits (36) en communication de fluide avec le système d'aspiration pneumatique et avec les côtés extérieurs de la plaque de manière à évacuer toute infiltration éventuelle de liquide entre la plaque et le moule. 25
13. Appareil selon l'une quelconque des revendications précédentes, dans lequel ladite surface inférieure (24) de la plaque monolithique (9) est pourvue au niveau des coins de canaux (37) disposés sur la droite et sur la gauche par rapport aux diagonales, lesdits canaux (37) étant prolongés au-delà de ladite ouverture (34) jusqu'à ce qu'ils trouvent une sortie dans des trous correspondants (38) situés aux sommets du deuxième collecteur inférieur (8). 30 35
14. Appareil selon l'une quelconque des revendications précédentes, comprenant des moyens automatiques pour l'insertion et/ou l'expulsion du cadre (5) et du filtre (6) dans/hors de la plaque (9). 40
15. Appareil selon l'une quelconque des revendications précédentes, dans lequel ledit collecteur à plaque perforée (8) est pourvu de trous périphériques (33a) situés dans une région correspondant aux et communiquant directement avec les canaux périphériques (34, 35) de la plaque. 45 50

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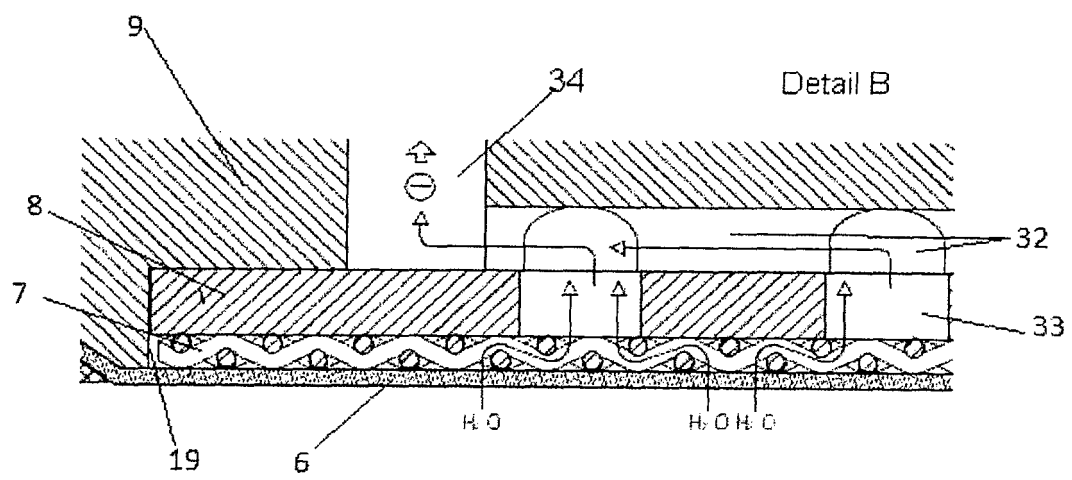
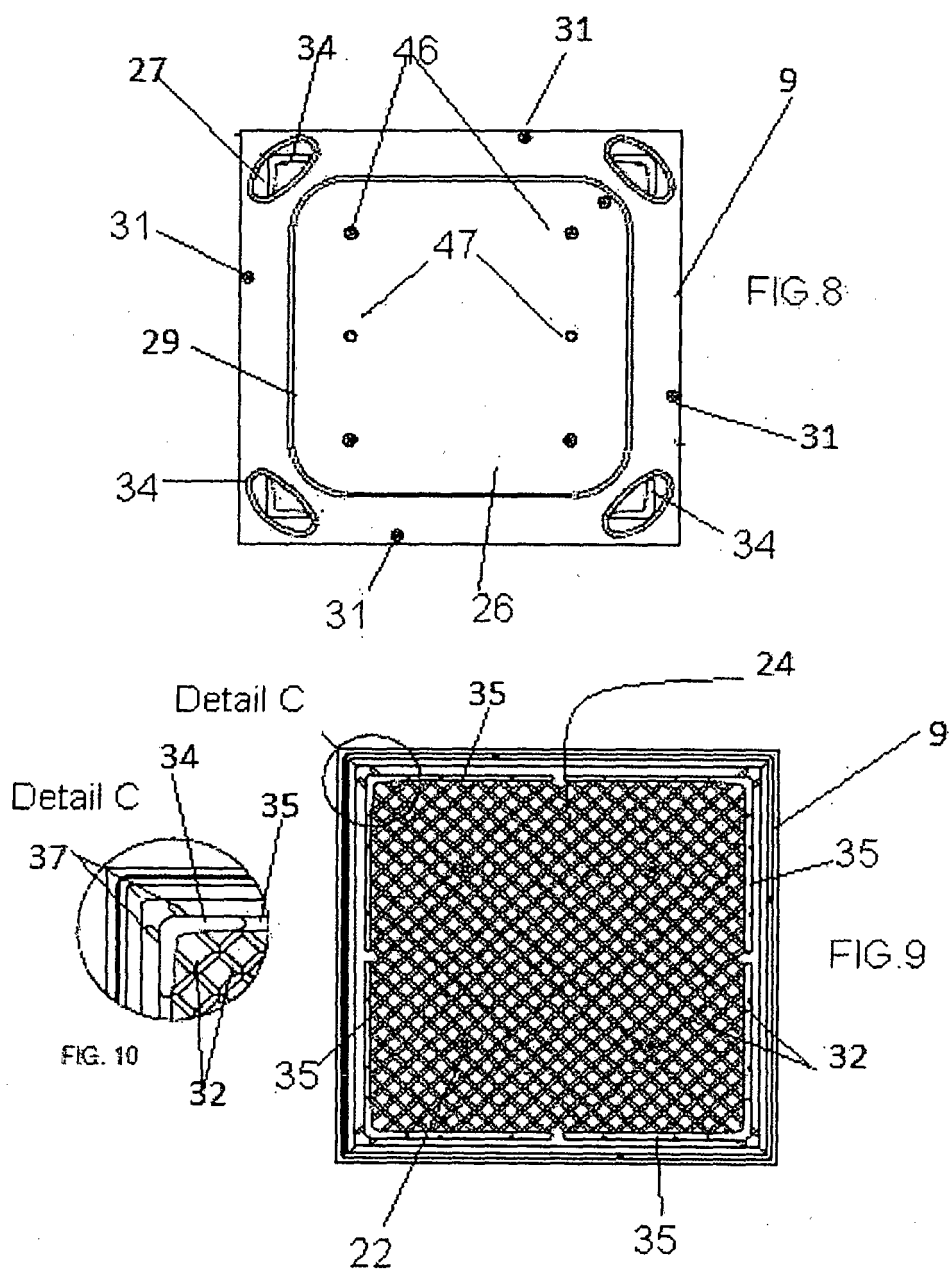
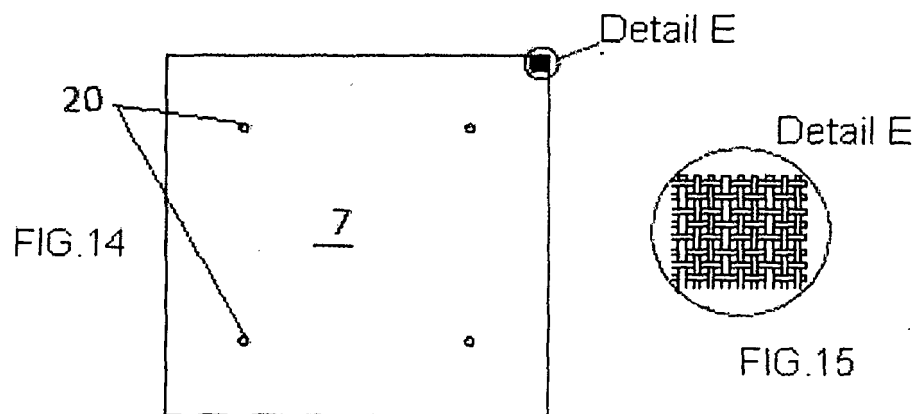
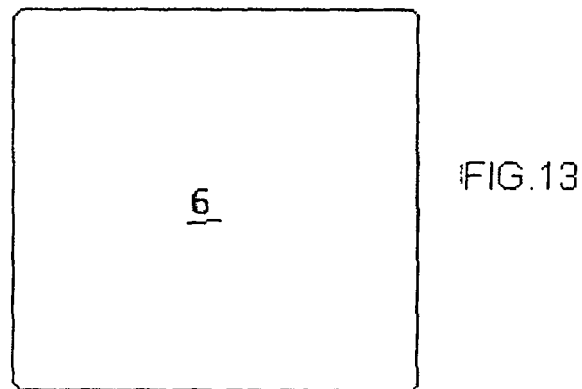
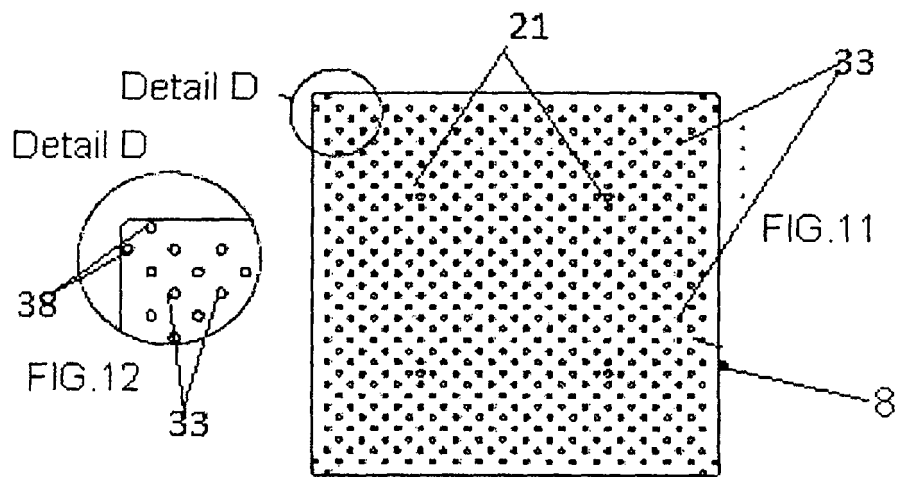


FIG.7





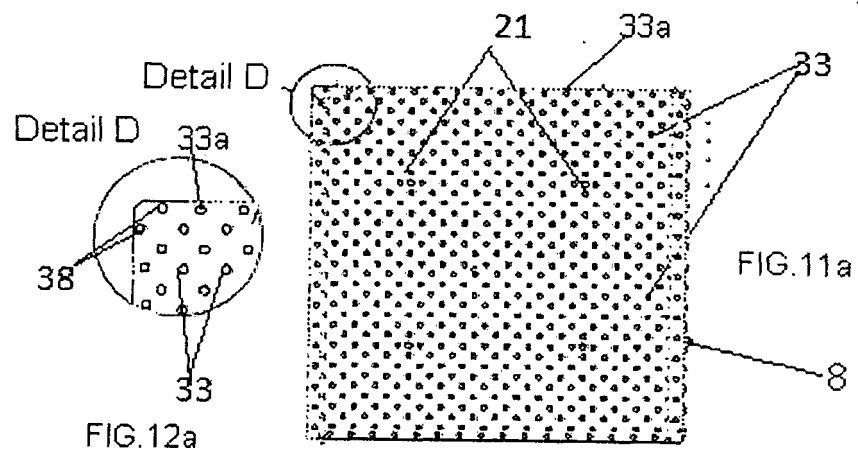


FIG. 16

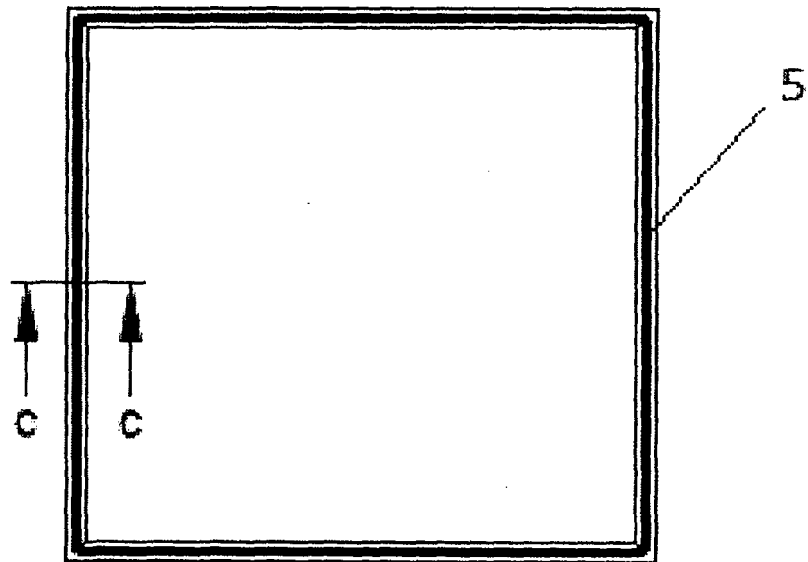


FIG. 17

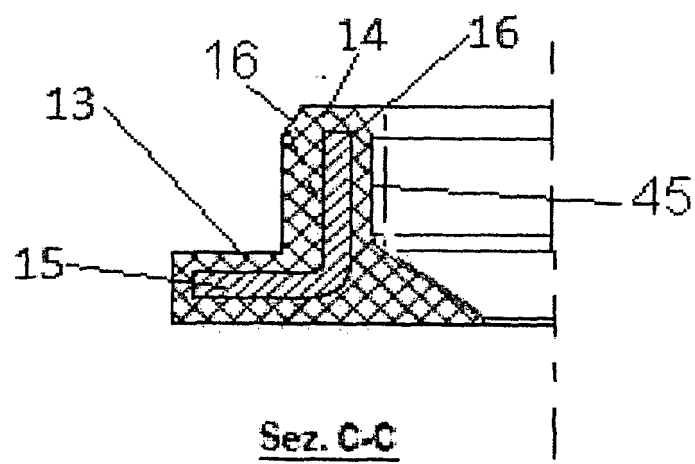


FIG. 18

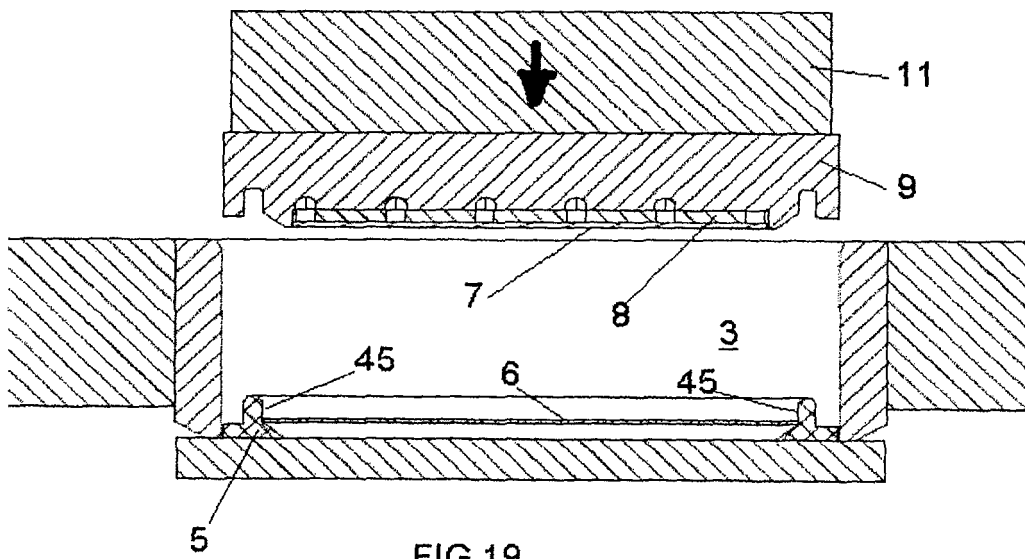
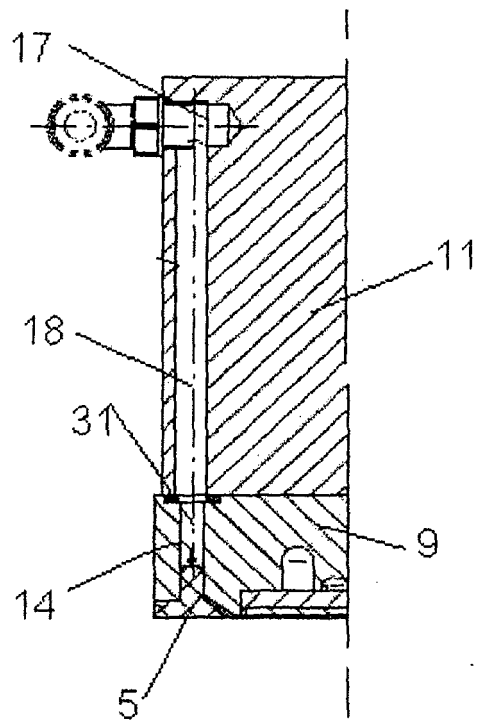
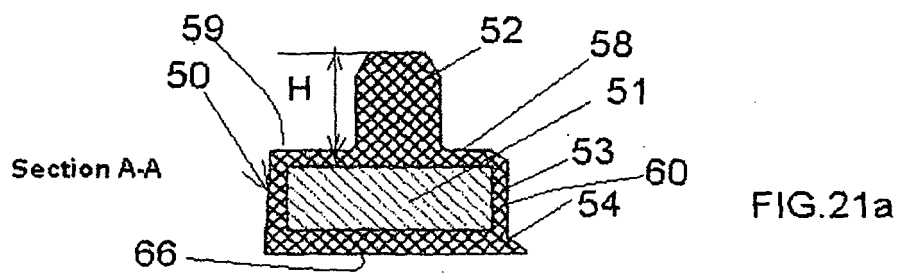
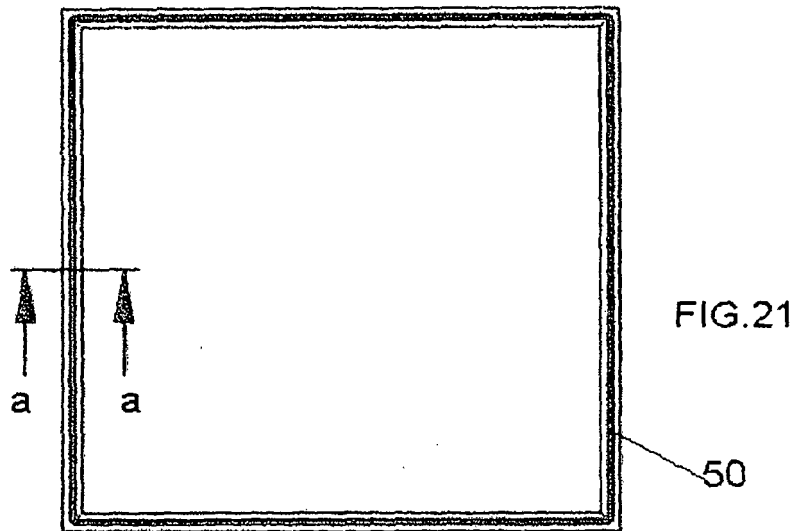
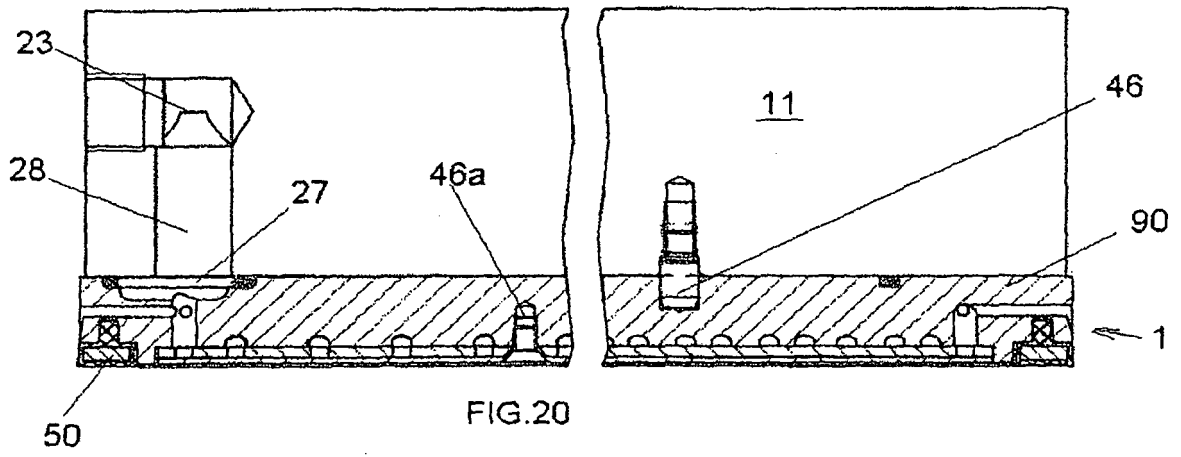
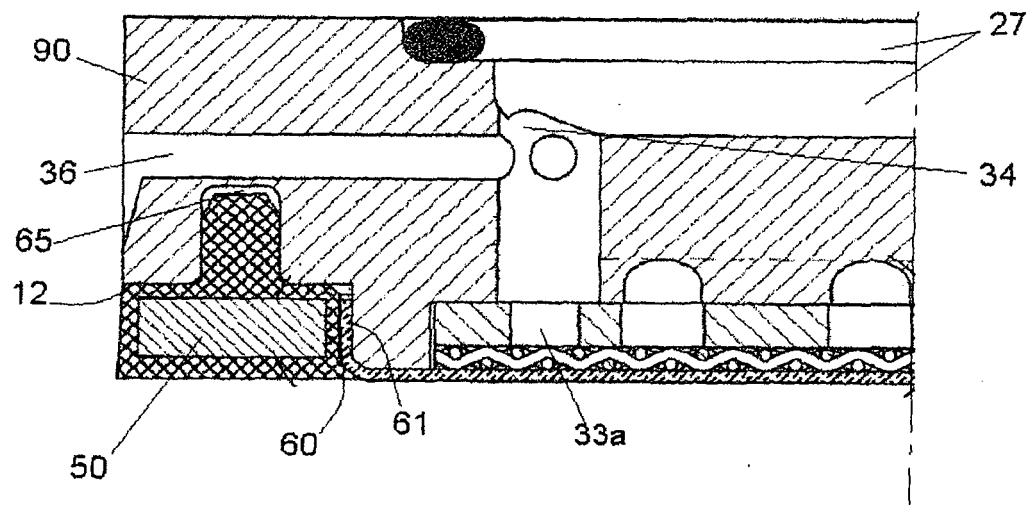
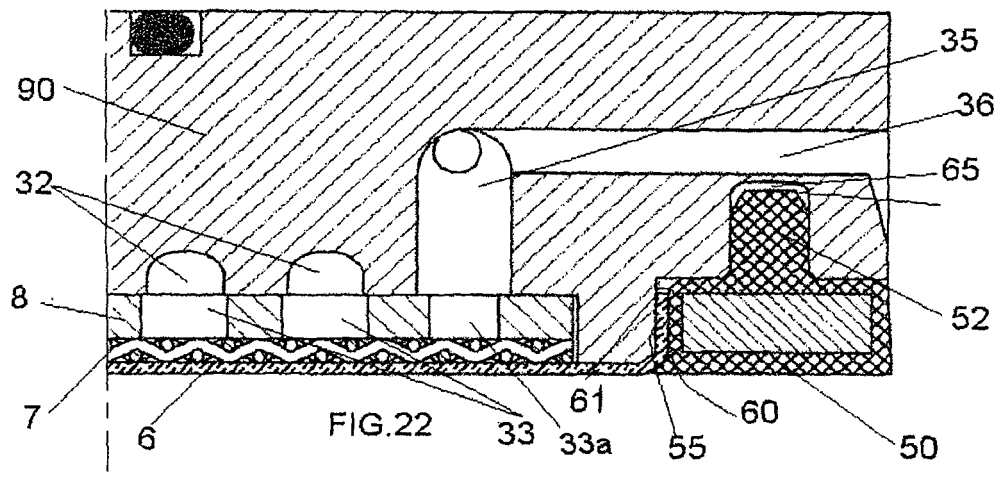
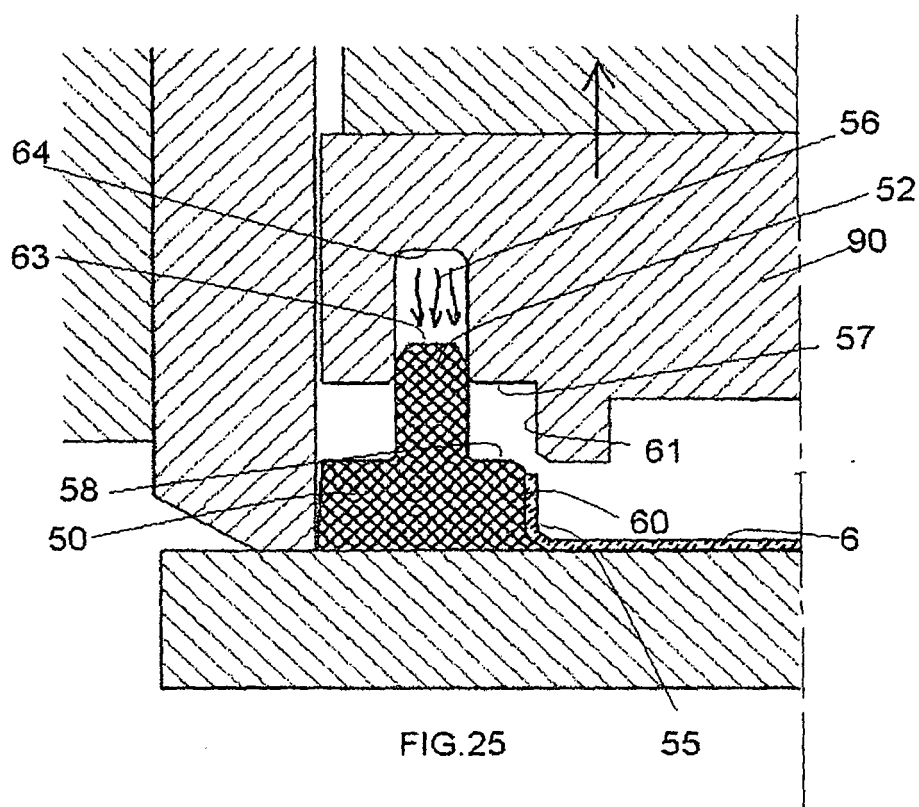
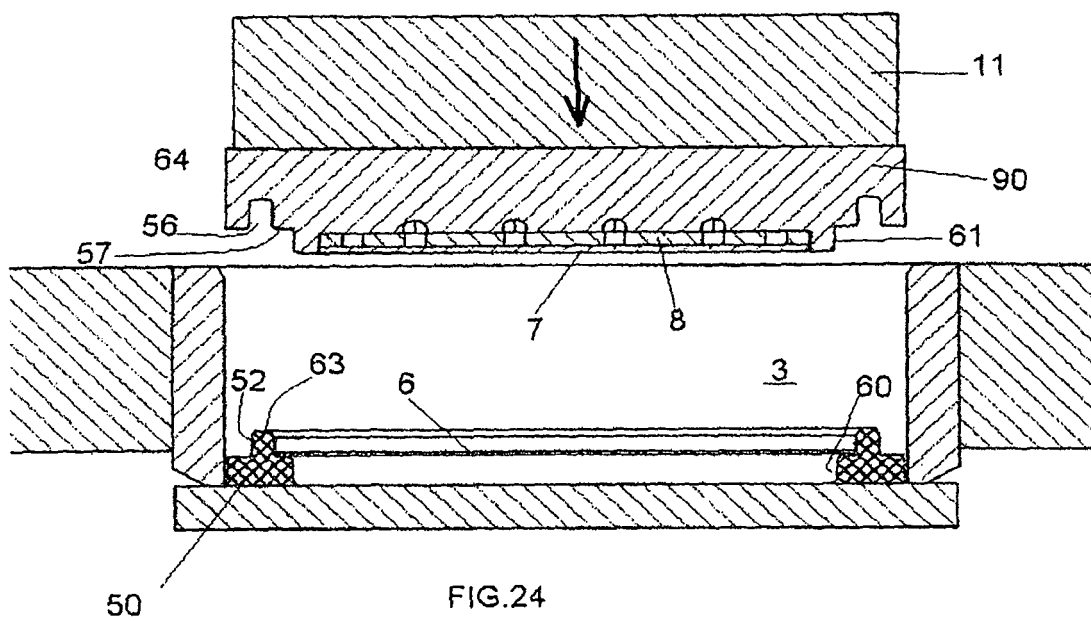
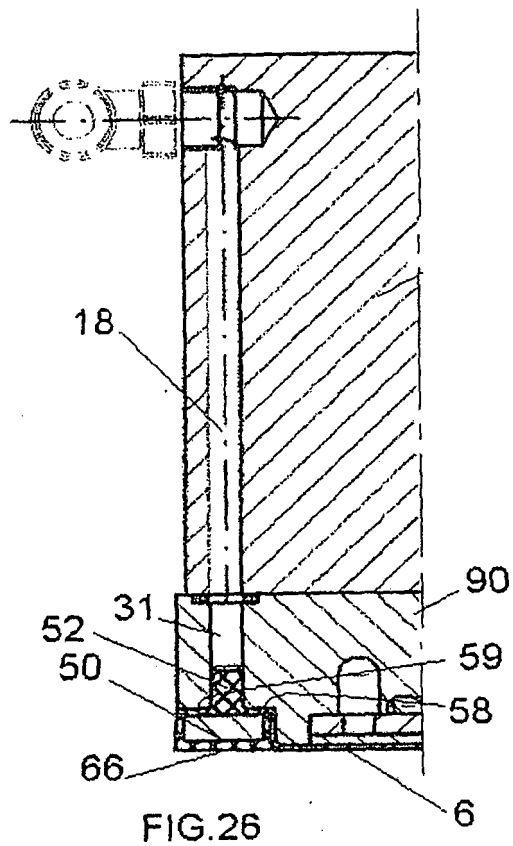


FIG.19









REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- IT FI20010103 A [0002]
- IT FI2001 A [0002]
- IT 000104 A [0002]
- IT FI20050043 U [0003]
- DE 102007030324 A1 [0005]
- IT FI20110107 A [0007]