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(54) **Compression device**

(57) The compression device (1) comprising pressing means (2) provided with a compression face (102) and arranged to compress ceramic materials (3) to be compressed for obtaining compressed materials, between said compression face (102) and said materials to be compressed (3) there being interposed separating means (7) for separating said compression face (102) from said compressed materials.

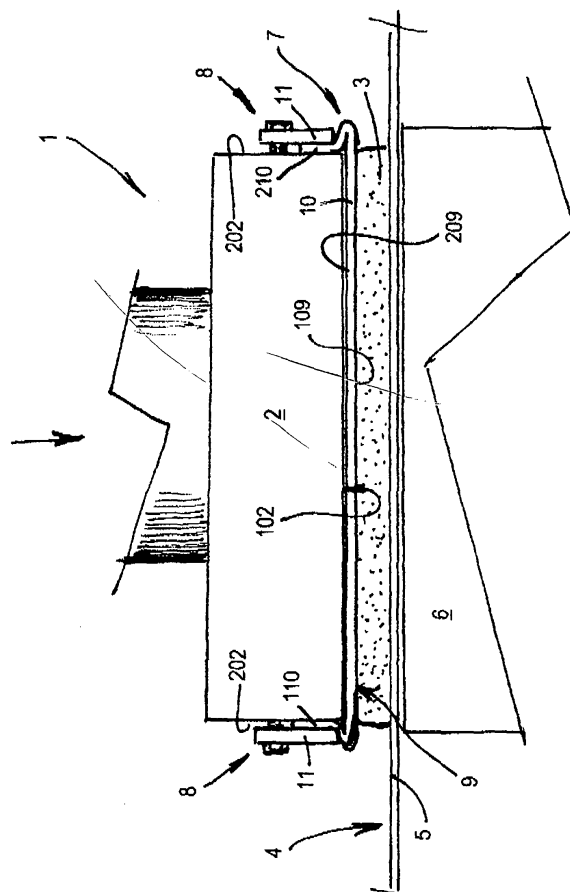


Fig. 1

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Description

[0001] The invention relates to a compression device. In many industrial sectors, amongst which the ceramics industry, have for some time used presses that have the purpose of forming products.

In the specific case the presses are used for compressing or for compacting ceramic materials placed inside moulds or on support surfaces and which are in a powder or plastic state: the pressure exerted on these ceramic materials causes their aggregation, forming tiles.

As is known, the presses comprise a pressing movable part and a fixed part or base that has a generally flat upper surface opposite and facing the pressing movable part and on which the materials to be pressed are deposited and in which a hollow die may be lodged.

The movable pressing part comprises a hydraulic driving cylinder that at an end facing the base supports a buffer, i.e. a male body shaped according to a preset perimeter; the buffer is suitable for compressing the layers of materials when the latter have been prepared on the surface of the fixed part or inside the die and for this reason has a compression face that faces the base and with which it acts in contact with the materials, possibly penetrating the die when the latter is present.

When the action of the buffer ceases and this is progressively lifted from the pressed materials, the surfaces of the formed tiles that are located in direct contact with the compression face of the buffer tend to adhere to the latter. The force of adhesion often causes damage to the surfaces of the tiles when the buffer is lifted up again after pressing, as the structure of the unfired tiles that have just been formed has a low cohesive force, whilst the force of adhesion to the surface of the buffer is sufficient to produce detachment of material from the formed tiles, irreparably damaging them.

[0002] This circumstance occurs especially in cases in which the ceramic materials used are in powder state. The technical aim of the invention is to improve the prior art.

An object of the invention is to provide a compression device that avoids damage to products formed by means of compacting or pressing.

According to an aspect of the invention a compression device is provided comprising: pressing means provided with a compression face and arranged for compressing materials to be compressed placed on supporting means, for obtaining compressed materials, characterised in that between said compression face and said materials to be compressed there is interposed separating means, for separating said compression face from said compressed materials.

According to another aspect of the invention there is provided a compression method comprising the phases of arranging on supporting means a layer of material to be compressed for obtaining compressed material; compressing said layer with pressing means provided with a compression face facing said layer of material to be com-

pressed, moving said buffer pressing means away from said compressed materials, characterised in that between said compression face and said layer of materials to be compressed there is provided interposing separating means for separating said buffer means from said layer.

The compression device and the compression method thus enable products to be made without the surfaces of the latter being damaged during lifting of the buffer.

Further characteristics and advantages will become clearer from the disclosure of an embodiment of a compression device, illustrated by way of non-limitative example in the attached tables of drawings in which:

Figure 1 is a fragmentary side schematic view of a compression device in a compression phase of a layer of materials to be compressed;

Figure 2 is a fragmentary side schematic view of the device in Figure 1 in a phase of partial moving away or moving to the layer of materials to be compressed;

Figure 3 is a fragmentary side schematic view of the device in Figure 1 in a position of complete moving away from a layer of materials to be compressed or which have already been compressed.

With particular reference to the Figures, 1 indicates a compression device that comprises a buffer 2 that is alternatively movable between an active pressing position in contact with a layer 3 of materials to be compressed, in the specific case ceramic materials for forming tiles, and a non-active position in which it is detached from the layer 3.

The buffer 2 is driven by a driving unit 100 which a conventional press is provided with, or with a compacter, and is provided with a supporting compression face 102, normally not porous, that faces a rest surface 4 of the layer 3. In the embodiment shown in the Figures, the rest surface 4 comprises a conveyor belt 5 the upper conveying branch of which runs close to a contrast base 6 placed below the latter, to contrast the thrust of the buffer 2 when they are in the active compression position.

In a further embodiment that is not illustrated, the rest surface 4 comprises a hollow die, i.e. a mould, obtained in a fixed part of a press, i.e. the base, or on a plane of a compactor, and inside which layers 3 of materials to be compressed are deposited cyclically.

Between the face 102 and the layer 3 there is interposed separating means 7, for facilitating the separation between the face 102 and an opposite surface 103 of the layer 3, after completion of a compression phase, noticeably limiting the force of adhesion between them and consequently the occurrence of damage to the formed products, due to moving away of the buffer 2 from the layer 3 of compressed materials.

The separating means 7 is supported on the buffer 2 by supporting means 8 and comprises laminar means 9 that faces the face 102 and is substantially parallel to it.

The laminar means 9 has a first face 109 that faces the

layer 3 of materials and an opposite second rest face 209 that faces the rest face 102.

The laminar means 9 comprises at least a belt segment 10 that is attached to the buffer 2 in such a way as to be non-rigid and which has respective ends 110 and 210 bilaterally connected to the face 102 with the supporting means 8.

According to an embodiment of the laminar means 9, the first face 109 is smooth for making tiles that have the contact surface with the face 102 that is also smooth.

According to another embodiment of the laminar means 9, the first face 109 is rough to make tiles that have their contact surface with the face 102 provided with roughness.

According to a further embodiment of the laminar means 9, the first face 109 is provided with patterns made with low relief or high relief parts, possibly also in combination between themselves, for obtaining tiles that have the contact surface with the face 102 that negatively reproduces the in high relief or low relief patterns.

The supporting means 8 comprises, for each end 110, 210 of the belt segment 10, a clamping bar 11 that is substantially straight and arranged to clamp a corresponding end 110 and 210 between itself and a corresponding side 202 of the buffer 2.

Each clamping bar 11 is fixed to the respective side 202 for example with screws 12 that are screwable into respective threaded holes obtained in each side 202.

The compression device operates as follows: a layer of material 3 to be pressed is prepared on the conveyor belt 5, which positions it at the buffer 2 when the latter is in the raised non-active position.

[0003] In this position, shown in Figure 3, the belt segment 10 extends non-rigidly from the buffer 2, attached to the latter by means of the bars 11 that clamp the ends 110 and 210 thereof against the sides 202.

When the active compression action starts, which may be pressing or a lighter compacting that differ from one another only through the compression values that are applied by the buffer 2 to the layer 3, the belt segment 10 rests progressively with the first face 109 thereof on it, more precisely on the opposite surface 103 of the layer 3, until the compression face 102 compresses the layer 3, compacting or pressing it.

When the buffer 2 has completed the compression action on the layer 3, it is moved away from the latter, recalled by the press driving unit.

The belt segment 10 follows the movement of the buffer 2, but, being non-rigid, separates from the surface 103 of the layer 3 not instantaneously but progressively, starting the detachment from the peripheral zones of the latter and continuing to the centre, until complete separation. This causes a division for each point of contact between the belt segment 10 and the surface 103 of the adhesion force and a consequent consistent proportional decrease of the value of the latter at each of these points of contact; thus the progressive separation that is prolonged over time and not complete and instantaneous enables de-

tachment of material from the surface zones 103 of the formed tiles to be avoided.

5 Claims

1. Compression device comprising: pressing means (2) provided with a compression face (102) and arranged to compress ceramic materials (3) to be compressed placed on rest means (4) for obtaining compressed ceramic materials, **characterised in that** between said compression face (102) and said ceramic materials to be compressed (3) there is interposed separating means (7), for separating said compression face (102) from said compressed ceramic materials (3).
2. Device according to claim 1 wherein said pressing means comprises buffer means (2) couplable with said rest means (4) or die means.
3. Device according to claim 1 or 2 wherein said separating means (7) is supported on said buffer means (2) by supporting means (8).
4. Device according to claim 1 or 3 wherein said separating means (7) comprises supported flexible laminar means (9) facing said compression face (102) and having a first face (109) facing said ceramic materials (3) to be compressed and an opposite second rest face (209) facing said compression face (102).
5. Device according to claim 4 wherein said laminar means (9) comprises at least a belt segment (10) supported non-rigidly on said buffer means (2) and having respective ends (110, 210) bilaterally connected to said compression face (102) with said supporting means (8).
6. Device according to claim 4 wherein said first face (109) is smooth.
7. Device according to claim 4 wherein said first face (109) is rough.
8. Device according to claim 4 wherein said first face (109) is provided with low relief/high relief parts.
9. Device according to claim 3 or 5 wherein said supporting means (8) comprises, for each end (110, 210) of said belt segment (10): a clamping bar (11) suitable for clamping a corresponding end against a corresponding side of said buffer means (2); fixing means (12) for fixing said clamping bar to said side of said buffer means (2).
10. Compression apparatus, **characterised in that** it comprises a compression device (1) according to

any one of claims 1 to 9.

11. Compression method, comprising the phases of arranging on rest means (4) a layer of ceramic material (3) to be compressed for obtaining compressed material; compressing said layer of material (3) with pressing means (2) provided with a compression face (102) facing said layer of ceramic material (3) to be compressed, moving said pressing means (2) away from said layer of compressed ceramic materials (3), **characterised in that** between said compression face (102) and said layer of materials (3) to be compressed there is provided interposing separating means (7) for separating said pressing means (2) from said layer of ceramic materials (3).
12. Method according to claim 11 wherein said separating means (7) comprises supported flexible laminar means (9) facing said compression face (102) and having a first face (109) facing said layer of materials (3) to be compressed and an opposite second rest face (209) facing said compression face (102).
13. Method according to claim 12 wherein said laminar means (9) comprises at least a belt segment (19) non-rigidly supported on said pressing means (2) and having respective ends (110, 210) bilaterally connected to said compression face (102) by supporting means (8).
14. Method according to claim 12 wherein said first face (109) is smooth.
15. Method according to claim 12 wherein said first face (109) is rough.
16. Method according to claim 12 wherein said first face (109) is provided with low relief/high relief parts.

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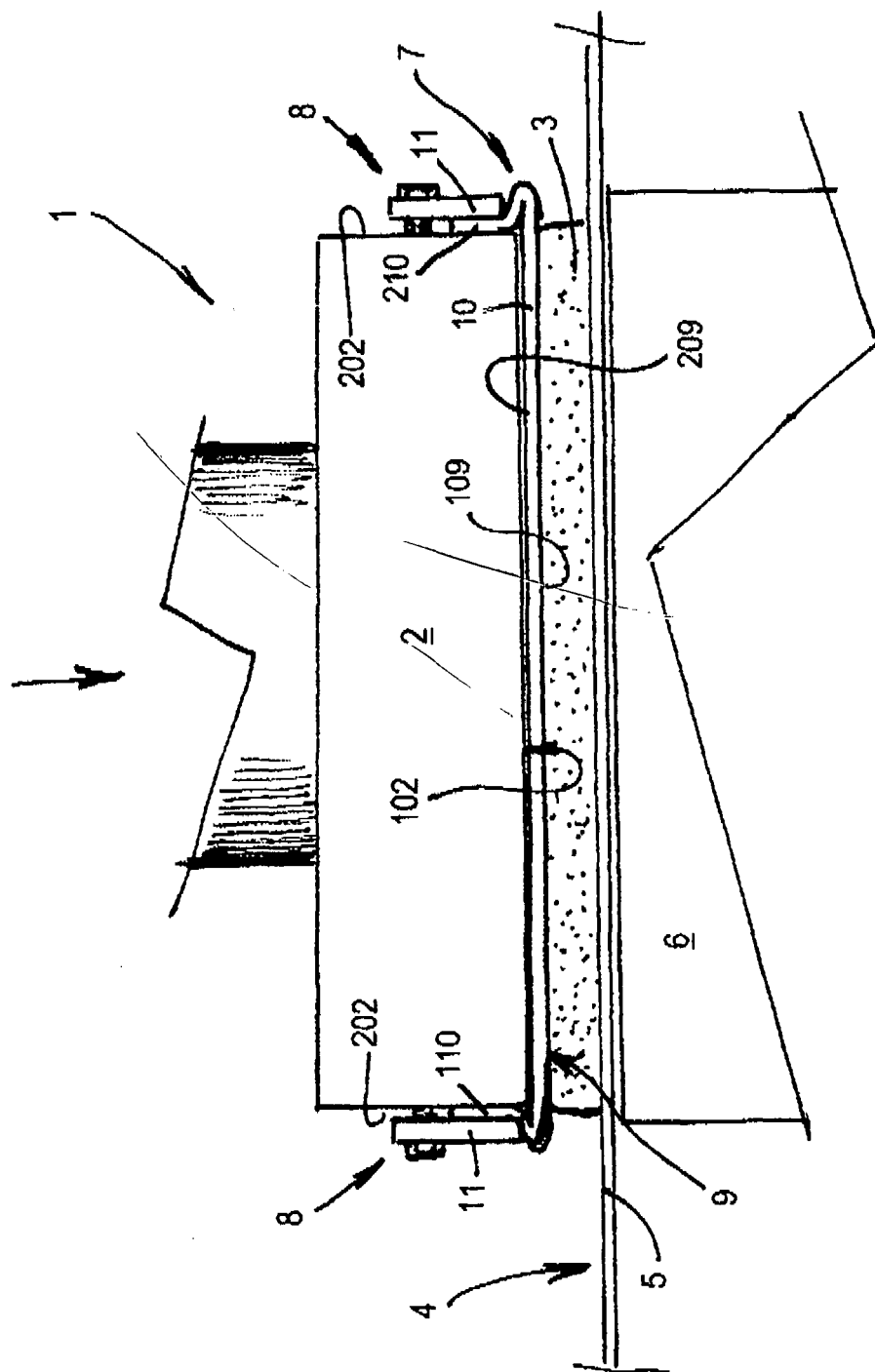


Fig. 1

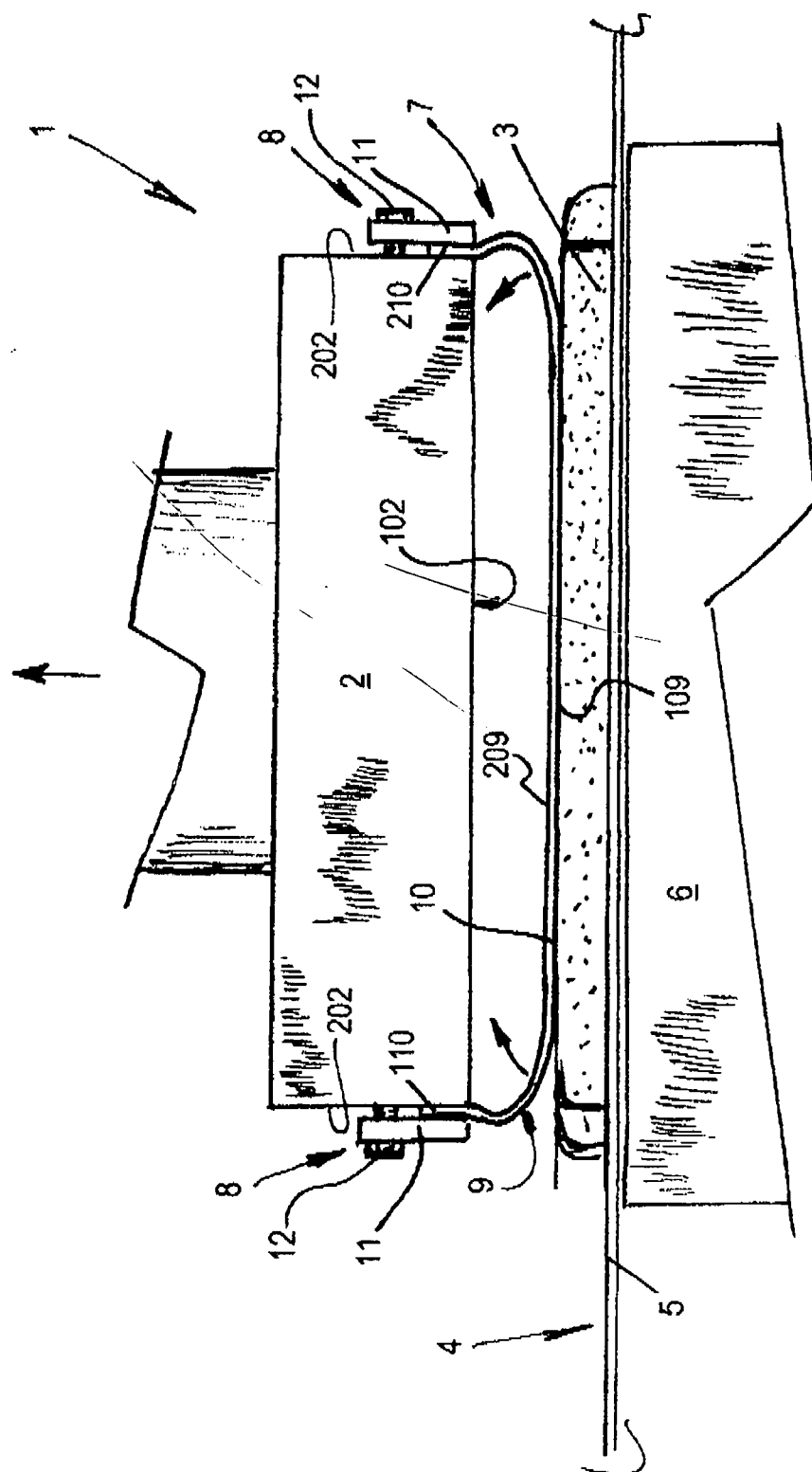


Fig. 2

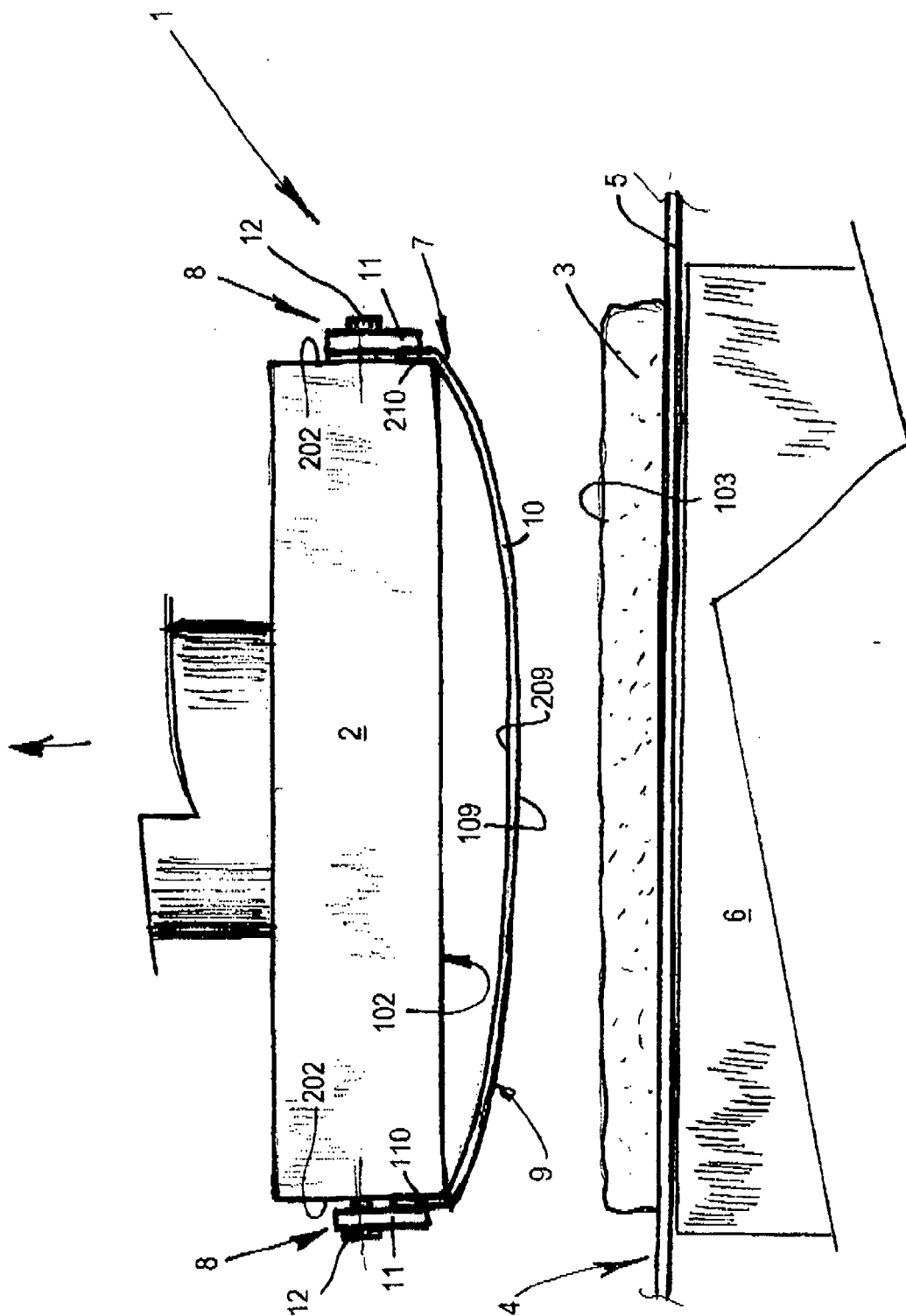


Fig. 3