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(54) **A device for unpacking tiles**

Vorrichtung zum Auspacken von Fliesen

Dispositif pour déballer des carreaux

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Description

[0001] The usual field of application for this invention is in workshops which, generally working on behalf of third parties, perform post-firing operations on ceramic tiles. These operations include cutting, milling, etching and so on. The tiles are delivered from the ceramics factories in packs, generally packaged using cardboard wrapping. The packages typically have a cardboard border protecting the comers but leave the central bottom and top surfaces free.

[0002] In order for them to be sent on to work operations, the packages have to be opened once the tile packs have been removed from the pallets.

[0003] At present the cardboard packaging is removed manually, by cutting the cardboard using a knife or other manual cutting tool. This manual operation is long and cost-expensive, and of course involves the usual risks of injury involved in operations using sharp tools.

[0004] The present invention automates the above-described operation, thus eliminating the drawbacks due to manual operations, by means of the device according to claim 1.

[0005] An advantage of the device is that it can easily be inserted in normal tile-working lines.

[0006] A further advantage of the device is that it can operate on tile packs of any size.

[0007] A further advantage of the device of the invention is that it enables a rapid and efficient disposal of the cardboard packaging after it has been removed from the tile packs.

[0008] Further characteristics and advantages of the present invention will better emerge from the detailed description that follows of the device, illustrated purely by way of a non-limiting example in the accompanying figures, in which:

figure 1 is a schematic view from above of the device inserted upstream of subsequent work lines; figures 2, 3, 4, 5 and 6 show a sequence of various operational configurations assumed by the various elements of the device, some of which are shown enlarged in figure 4;

figure 7 is a schematic view from above of the device in the configuration shown in figure 4.

[0009] The device of the invention is used for opening packs 10 of tiles 9 which are packaged with a border 10a, normally made of cardboard, which surrounds the edges of the tile pack, leaving the central parts 10c of the bottom and top surfaces of the pack free. Briefly, the device is for freeing the tiles of their packaging as they arrive from the ceramics factories so that they can be sent on to work stations.

[0010] The packs are normally on pallets, and contain several rows of tiles. Usually the packs are composed of single rows but sometimes the tiles are so much nar-

rower in one direction than in another that they are in danger of falling over, and are therefore stacked in series of two using straps or the like. The packs, or groups of packs, are removed from the pallets either manually or, as illustrated in figure 1, by machine 13, and are arranged on a rest plane 5 provided on the device of the invention. The rest plane 5, for reasons which will better emerge hereinafter, is a conveyor equipped with a pair of parallel belts 5; the packs of tiles are taken onwards to the stations of the device by this conveyor. Obviously the method of depositing the packs or groups of packs on the conveyor 5 has no importance to the aims of the device.

[0011] When the packs are grouped in twos or more, a cutting device 11 of known type is used, located upstream of a station 1 which will be described in more detail hereinafter, and which comprises a rotating disc which is geared to the group of packs and cuts the straps or other binding holding the groups of packs 10 together.

A further, sub-dividing station 14 is provided, of known type, upstream of the station 1 and downstream of the cutting device 11, which removes a single pack 10 of tiles and deposits it at the station 1 which operates on single tile packs.

[0012] The device further comprises a deposit 15, downstream of the station, which will be better described hereinafter.

[0013] The station 1 comprises a raising device 2 which preferably includes a plate 2a connected to a first motor, of known type and preferably constituted by a cylinder, of which the stem 2b is illustrated in the figures. The first motor vertically translates the raising devices 2 in both directions. The plate 2a of the raising device 2 moves vertically between the belts 5 and, acting on the free central part 10c of the pack 10 of tiles, moves the pack 10 vertically from a first position A, in which the pack 10 is arranged on the belts 5 of the rest plane 5, to a second position B in which the pack 10 is brought into contact with a striker element 3, arranged above the rest plane 5, which comprises a plate which, by means of a cylinder 3a, can translate vertically in both directions on command. As will be better described herein below, the motor brings the pack 10 from position B into position A.

[0014] The station 1 further comprises at least one hooking device 6 which is shaped and arranged so as to hook an internal edge 10b of the border 10a surrounding the pack 10 when the latter is in the second position B. In particular two of the hooking devices 6 are provided, which are arranged laterally of two internal parallel and opposite edges 10b of the border 10a so as each to be able to hook one of the edges 10b.

[0015] Preferably each hooking device 6 comprises a plurality of rods, each having a hook-shaped end 6a which engages with the internal edge 10b of the border 10a. The hooking devices are positioned at the sides of the pack 10 so as not to interfere with the movement of the pack from position A to position B, and vice versa.

A second motor of known type and not illustrated in the figures, is provided, which, when the pack is in position B, moves the hooking devices 6 to bring the hooked ends into contact with the respective internal edges 10b of the border 10a. Once the internal edges 10a have been hooked-up, the second motor once more moves the hooks and draws the hooking device and the internal edges 10a away from the tile pack 10.

[0016] The second motor imparts the following movements on the hooking devices: a first movement on a horizontal plane to bring the hooks 6a under the tile pack 10, at the free zone 10c of the tile pack; a second, vertical movement so as to bring the hooks 6a into contact with the free zone 10c; a third movement on a horizontal plane so as to bring the hooks and the by-now attached internal borders 10a away from the tile pack 10. It is also possible, especially in devices destined to operate on a high number of packs having a same thickness, to treat the vertical movement of the device 6 as an adjusting movement for regulating the position of the devices 6 to the thickness of the tile packs 10. In this case the devices 6 will be provided with flexible elements (for example the rods can be made of small steel bars) which enable the hooks to make the first movement by sliding on the packaging surrounding the tile pack 10 without hooking onto it. Obviously the hooking devices can be made differently from what is described herein, for example a single structure could be used, having the same section, instead of a plurality of rods, as long as the same functions are performed.

[0017] The station 1 further comprises gripping organs 4 which are arranged laterally of the striker element 3 and comprise suction cups 4a which can be activated on command in a way which will be described hereinafter. The gripping organs 4 have the function of holding the border 10a when detached from the pack 10, and of carrying the detached borders 10a to the deposit 15 where the removed packs are collected. Known type means for translation and/or raising (not illustrated) are provided for translating and/or raising the gripping organs, and the border connected to it, from the station 1 to the deposit 15.

[0018] The device operates as described herein below.

[0019] The tile pack 10 or group of packs removed from the pallets are deposited on the belts 5 of the rest plane. If the pack is a single pack it is transported directly below the station 1. If it is a group of packs the cutting device 11 cuts the belts keeping the packs together, and once freed the packs are sent on to the sub-dividing station 14 which divides the packs 10 and deposits it on the station 1 which, as mentioned, operates on single packs 10. Once the pack has been placed in the station 1, which position is illustrated in figure 2, the station 1 carries out the operation as described herein below and as schematically illustrated in figures from 2 to 6.

[0020] The raising device 2 is activated and the plate moves vertically between the belts 5 in order to reach

the free central part 10c of the pack 10 and to bring the pack 10 from the first position A into the second position B, illustrated in figure 3, in which the pack 10 is brought into contact with the striker element 3.

[0021] The hooking devices 6 which, as can be seen in figure 2, are positioned at the sides of the tile pack 10 so as not to interfere with the movement of the pack from position A to position B, make the first horizontal movement in order to bring the hooks 6a below the tile pack 10, at the free zone 10c of the tile pack 10. Then the second vertical movement is made, to bring the hooks 6a into contact with the free zone 10c of the tile pack 10 (illustrated in figure 4).

[0022] The gripping organs 4 are activated to grip the border 10a. Then the hooking device makes its third movement, bringing the hooks and the internal edges 10b connected thereto by the hooks away from the tile pack 10.

[0023] During this movement, the hooks lacerate the contact points, generally glue-spots, which keep the packaging edges together, and the packaging and the tiles are thus freed one from the other.

[0024] The raising device 2 is then re-activated, with an oppositely-directed movement to the previous one, to bring the freed tiles from the second position B into the first position A; during this movement, the striker element 3 is translated vertically and downwards so as to ease separation of the tiles from the edges and to accompany the tiles in their downward movement. Figure 5 illustrates this position.

[0025] Alternatively to the above-described movements, when the pack is held by the raising device 2 and the striker element 3, it is possible to raise the gripping organs 4, with the packaging connected, and thus drag it upwards. This also eases the separation of the tiles from the packaging. Subsequently, by lowering the raising device 2, the tiles freed of the packaging are brought from the second position B to the first position A. This movement can if desired be accompanied by a vertical movement of the striker element 3.

[0026] Once the tiles have been deposited on the rest plane 5 which, by activation of the conveyor transports the tiles to the following work stations, the striker element 3 is raised and the hooking device disengages from the edge (figure 6). By moving the gripping organs 4 to which the packaging is still solidly connected, the packaging is transported to the deposit 15. By releasing the aspiration from the gripping organs, the packaging detaches and fall into the deposit 15. Note that the deposit 15 can also comprise devices, of known type, for directly treating the packaging and facilitating its removal; for example, a shredder could cut the packaging into small pieces.

[0027] Once this operation has been concluded, the gripping organs are positioned as illustrated in figure 2 and a new cycle can begin.

[0028] As illustrated in figure 1, to accelerate the operations the device can be provided with two lines, each

provided with a station 1. In this case there will be a single group of gripping organs which will operate alternatively on one or the other line.

Claims

1. A device for unpacking tiles (9), operating on tile packs (10) arranged on a rest plane (5) and packaged using a border (10a) which wraps around edges of the pack (10) leaving central parts (10c) of top and bottom surfaces of the pack (10) free, **characterised in that** it comprises a station (1) operating on a single pack (10) of tiles (9), which station (1) comprises: a raising device (2) which acts on the free central part (10c) and moves in a vertical direction the pack (10) of tiles (9) from a first position (A), in which the pack (10) is arranged on the rest plane (5), to a second position (B) in which the pack (10) is in contact with a striker element (3) arranged above the rest plane (5) and vice versa; at least one hooking device (6), conformed and arranged in order to be able to hook on to an internal edge (10b) of the border (10a) which is wrapped around the edges of the pack (10) when the pack (10) is in the second position (B); a first motor, of known type, for vertically translating the raising device (2) in both directions; a second motor, of known type, for moving the hooking device (6) and hooking the internal edge (10b) of the border (10a) and drawing the hooking device (6) and the internal edge (10b) away from the tile pack (10).
2. The device of claim 1, **characterised in that** the station (1) comprises two of the hooking devices (6), conformed and arranged in order to hook on to two of the internal edges (10b) of the border (10a), which internal edges (10b) are parallel and opposite to one another.
3. The device of claim 1, **characterised in that** the hooking device (6) comprises a hooked end (6a) for engaging with the internal edge (10b).
4. The device of claim 1, **characterised in that** the station (1) comprises gripping organs (4) for gripping the border (10a).
5. The device of claim 4, **characterised in that** the gripping organs (4) are arranged laterally to the striker element (3) and comprise suction cups (4a) which can be activated on command.
6. The device of claim 4, **characterised in that** it comprises: a deposit (15) located downstream of the station (1), for collecting the borders (10a) when detached from the packs (10); means for translating and/or raising, of known type, for translating and/or

raising the gripping organs (4) from the station (1) to the deposit (15).

7. The device of claim 1, **characterised in that** it comprises a cutting device (11) of known type located upstream of the station (1) and having a function of cutting binding elements, of known type, which keep two or more of the packs (10) together.
8. The device of claim 7, **characterised in that** it comprises a sub-dividing station (14) of known type located upstream of the station (1) and downstream of the cutting device (11) and having a function of removing a single pack (10) of tiles (9) and depositing the pack (10) at the station (1).
9. The device of claim 1, **characterised in that** the striker element (3) is able to translate, on command, vertically in both directions.

Patentansprüche

1. Vorrichtung zum Auspacken von Fliesen (9), arbeitend an einem Packen (10) von Fliesen, angeordnet auf einer Auflagefläche (5) und verpackt unter Verwendung eines Rahmens (10a), welcher um die Kanten des Packens (10) verläuft und die mittleren Teile (10c) der oberen und unteren Oberflächen des Packens (10) frei lässt, **dadurch gekennzeichnet, dass** sie eine an einem einzelnen Packen (10) von Fliesen (9) arbeitende Station (1) enthält, welche Station (1) wie folgt enthält: eine Hebevorrichtung (2), die auf den mittleren freien Teil (10c) wirkt und den Packen (10) von Fliesen (9) in einer vertikalen Richtung bewegt, und zwar aus einer ersten Position (A), in welcher der Packen (10) auf der Auflagefläche (5) angeordnet ist, in eine zweite Position (B), in welcher der Packen (10) sich im Kontakt mit einem Anschlagenelement (3) befindet, angeordnet oberhalb der Auflagefläche (5), und umgekehrt; wenigstens eine Einhakvorrichtung (6), so ausgebildet und angeordnet, dass sie an einem innenliegenden Rand (10b) des um die Kanten des Packens (10) verlaufenden Rahmens (10a) eingehakt werden kann, wenn der Packen (10) sich in der zweiten Position (B) befindet; einen ersten Motor von bekanntem Typ, um die Einhakvorrichtung (6) zu bewegen und in den innenliegenden Rand (10b) des Rahmens (10a) einzuhaken und die Einhakvorrichtung (6) und den innenliegenden Rand (10b) von dem Fliesenpacken (10) fortzuziehen.
2. Vorrichtung nach Patentanspruch 1, **dadurch gekennzeichnet, dass** die Station (1) zwei Einhakvorrichtungen (6) enthält, so ausgebildet und angeordnet, dass sie an zwei innenliegenden Rändern (10b) des Rahmens (10a) eingehakt werden kann,

welche innenliegenden Ränder (10b) parallel zueinander sind und sich einander gegenüberliegen.

3. Vorrichtung nach Patentanspruch 1, **dadurch gekennzeichnet, dass** die Einhakvorrichtung (6) ein Hakenende (6a) zum Einhaken in den innenliegenden Rand (10b) enthält. 5
4. Vorrichtung nach Patentanspruch 1, **dadurch gekennzeichnet, dass** die Station (1) Greifelemente (4) zum Greifen des Rahmens (10a) hat. 10
5. Vorrichtung nach Patentanspruch 4, **dadurch gekennzeichnet, dass** die Greifelemente (4) seitlich des Anschlagelementes (3) angeordnet sind und Saugnäpfe (4a) enthalten, die auf einen Befehl hin aktiviert werden können. 15
6. Vorrichtung nach Patentanspruch 4, **dadurch gekennzeichnet, dass** sie wie folgt enthält: ein Sammeldepot (15), angeordnet stromabwärts der Station (1), zum Sammeln der Rahmen (10a), wenn diese von den Packen (10) entfernt sind; Mittel zum Verschieben und/oder Anheben von bekanntem Typ zum Verschieben und/oder Anheben der Greifelemente (4) von der Station (1) bis zum Sammeldepot (15). 20
7. Vorrichtung nach Patentanspruch 1, **dadurch gekennzeichnet, dass** sie eine Schneidvorrichtung (11) von bekanntem Typ enthält, angeordnet stromaufwärts der Station (1), welche die Aufgabe des Aufschneidens von Bindeelementen bekannten Typs hat, die zwei oder mehrere der Packen (10) zusammenhalten. 25
8. Vorrichtung nach Patentanspruch 7, **dadurch gekennzeichnet, dass** sie eine Station (14) zur Unterteilung von bekanntem Typ hat, angeordnet stromaufwärts der Station (1) und stromabwärts der Schneidvorrichtung (11), welche die Aufgabe des Entnehmens eines einzelnen Packens (10) von Fliesen (9) und des Ablegens des Packens (10) an der Station (1) hat. 30
9. Vorrichtung nach Patentanspruch 1, **dadurch gekennzeichnet, dass** das Anschlagelement (3) in der Lage ist, sich auf einen Befehl hin vertikal in beiden Richtungen zu verschieben. 35

Revendications

1. Dispositif pour déballer des carreaux (9), opérant sur des paquets de carreaux (10) disposés sur un plan d'appui (5) et emballés en utilisant un cadre (10a) qui englobe les bords du paquet (10) en laissant libres les parties centrales (10c) des surfaces 40

supérieure et inférieure du paquet (10), **caractérisé en ce qu'il** comprend une station (1) opérant sur un seul paquet (10) de carreaux (9), laquelle station (1) comprenant: un dispositif de soulèvement (2) qui agit sur la partie centrale libre (10c) et déplace dans une direction verticale le paquet (10) de carreaux (9) d'une première position (A), dans laquelle le paquet (10) est disposé sur le plan d'appui (5), à une seconde position (B), dans laquelle le paquet (10) est en contact avec un élément de butée (3) disposé au-dessus du plan d'appui (5) et vice-versa; au moins un dispositif d'accrochage (6), conformé et disposé de manière à pouvoir s'accrocher sur un bord interne (10b) du cadre (10a) qui englobe les bords du paquet (10) lorsque le paquet (10) se trouve dans la seconde position (B); un premier moteur, de type connu, pour traduire verticalement le dispositif de soulèvement (2) dans les deux directions; un second moteur, de type connu, pour déplacer le dispositif d'accrochage (6) et accrocher le bord interne (10b) du cadre (10a) et tirer le dispositif d'accrochage (6) et le bord interne (10b) pour les distancer du paquet de carreaux (10).

2. Dispositif selon la revendication 1, **caractérisé en ce que** la station (1) comprend deux des dispositifs d'accrochage (6), conformés et disposés de manière à s'accrocher sur deux des bords internes (10b) du cadre (10a), lesquels bords internes (10b) sont parallèles et opposés entre eux. 25
3. Dispositif selon la revendication 1, **caractérisé en ce que** le dispositif d'accrochage (6) comprend une extrémité à crochet (6a) pour s'engager sur le bord interne (10b). 30
4. Dispositif selon la revendication 1, **caractérisé en ce que** la station (1) comprend des organes de prise (4) pour la prise du cadre (10a). 35
5. Dispositif selon la revendication 4, **caractérisé en ce que** les organes de prise (4) sont disposés latéralement à l'élément de butée (3) et comprennent des ventouses aspirantes (4a) pouvant être activées sur commande. 40
6. Dispositif selon la revendication 4, **caractérisé en ce qu'il** comprend: un dépôt (15) situé en aval de la station (1), pour recueillir les cadres (10a) lorsque ceux-ci sont détachés du paquet (10); des moyens pour traduire et/ou soulever, de type connu, pour traduire et/ou soulever les organes de prise (4) de la station (1) au dépôt (15). 45
7. Dispositif selon la revendication 1, **caractérisé en ce qu'il** comprend un dispositif de coupe (11) de type connu disposé en amont de la station (1) et ayant une fonction de découpe des éléments liants, de ty- 50

pe connu, qui maintiennent ensembles deux ou plus paquets (10).

8. Dispositif selon la revendication 7, **caractérisé en ce qu'il** comprend une station (14) de subdivision de type connu située en amont de la station (1) et en aval du dispositif de coupe (11) et ayant la fonction de prélever un seul paquet (10) de carreaux (9) et de le déposer dans la station (1).
9. Dispositif selon la revendication 1, **caractérisé en ce que** l'élément de butée (3) peut translater, sur commande, verticalement dans les deux directions.

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Fig. 7

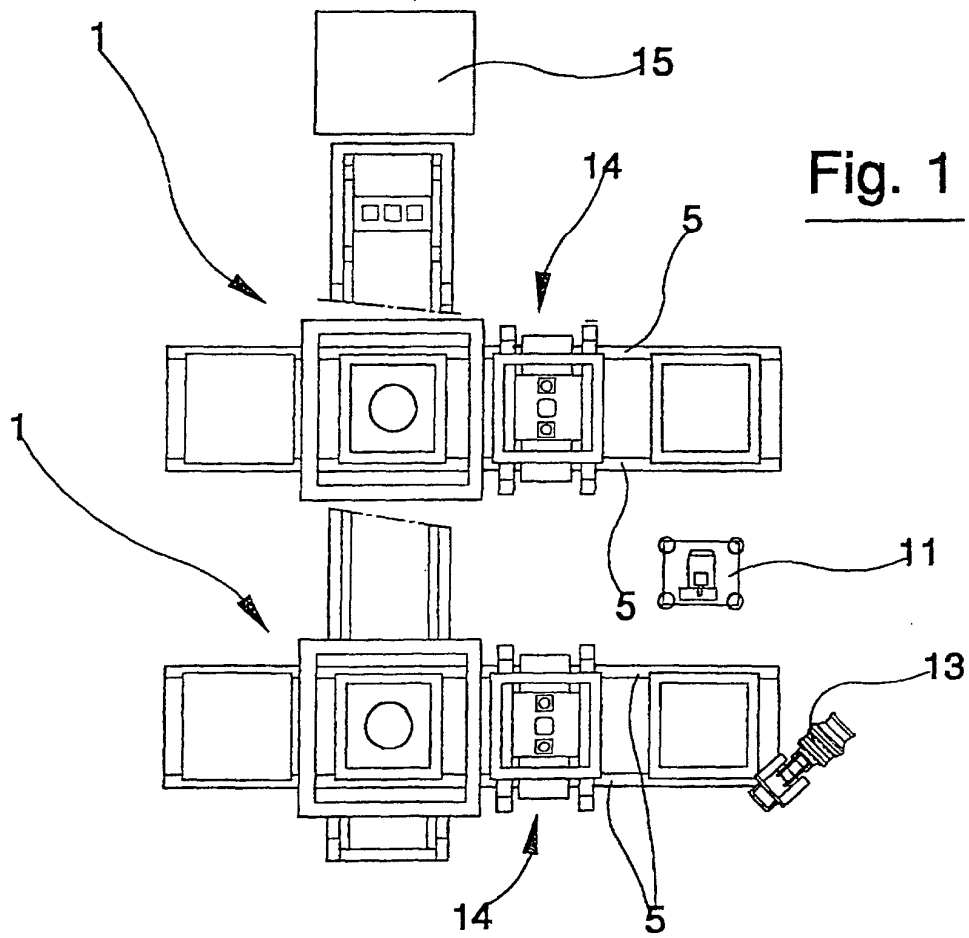
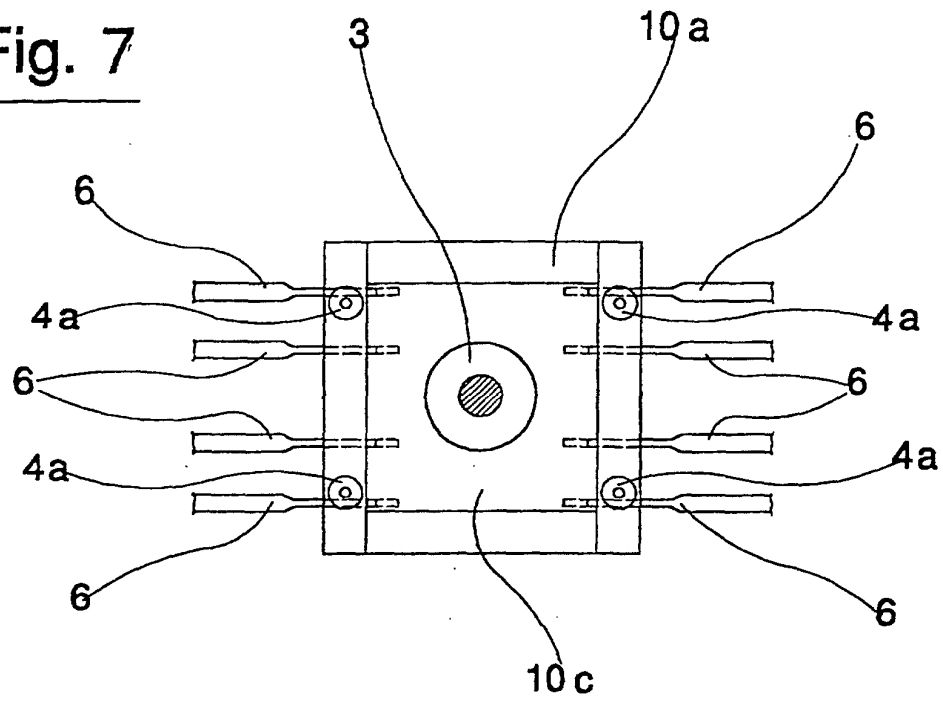


Fig. 2

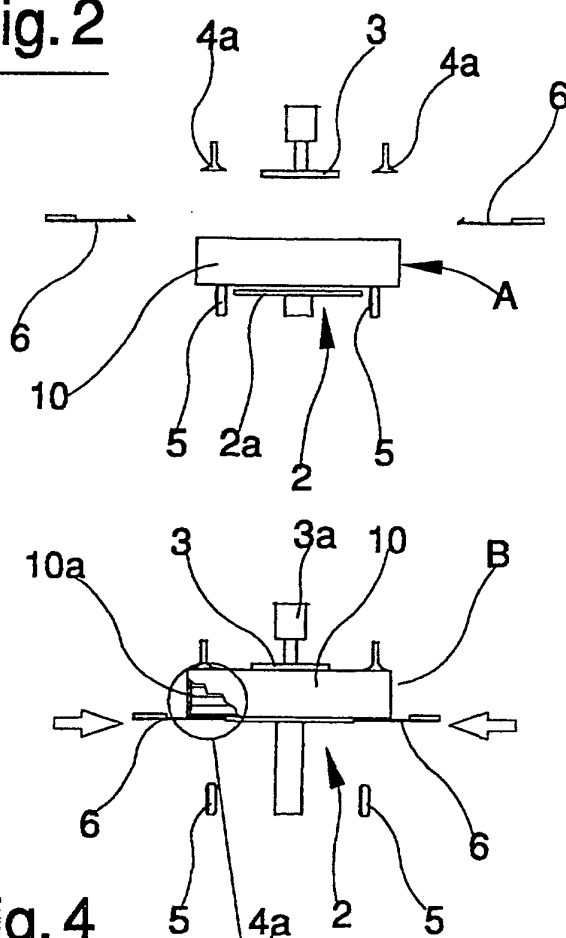


Fig. 4

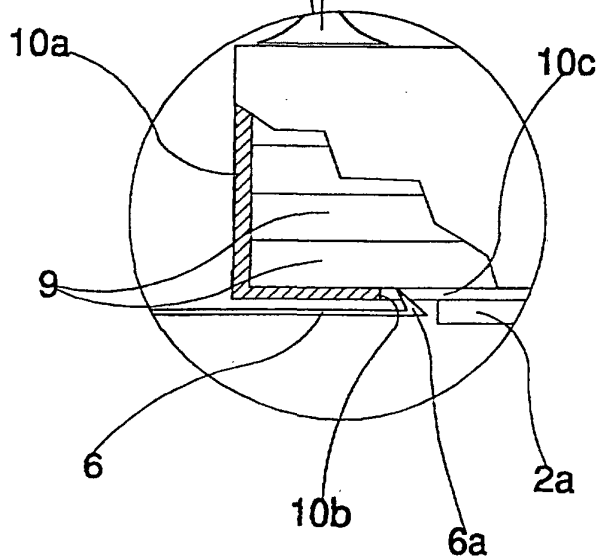


Fig. 6

Fig. 3

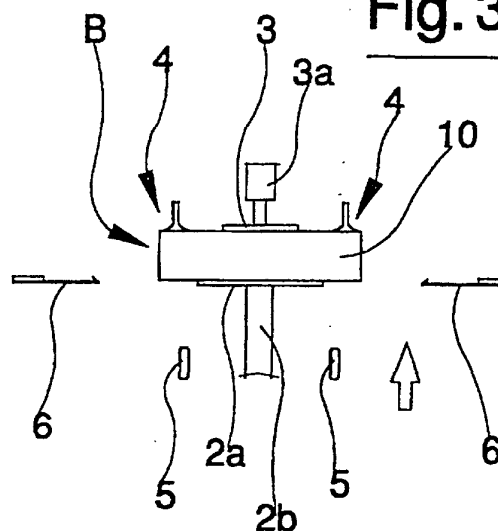


Fig. 5

