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(54) **Production method of columnar cork and molding apparatus for producing columnar cork**

Verfahren zur Herstellung von säulenförmigen Kork und Formvorrichtung zur Herstellung von säulenförmigen Kork

Procédé de fabrication de bouchon de type colonne et appareil de moulage pour sa fabrication

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EP-A1- 1 977 871
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Description

TECHNICAL FIELD

[0001] The present invention relates in general to a columnar cork for blocking up the mouth of container for use with beverages like wine, and more specifically to its production method according to claim 1, and to a molding apparatus according to claim 3 for executing the method.

BACKGOUND ART

[0002] A columnar cork has been often used as a stopper for blocking up the mouth of beverage container because it is superior in sealing ability and it has a special texture. Such a columnar cork is formed by compressing and molding a kneaded mixture of a lot of cork granules and binder resin with a molding machine, and the binder resin is heated to be hardened (for example, refer to Patent Citation 1). The columnar cork for beverage container is a columnar molded body and compression is executed along the longitudinal direction (axis line direction) by a mold as shown in the patent citation 1.

[0003] The cork granules are pushed out like a bar by an extruder to be cut in an appropriate length. In this case, molding is executed while compression force is applied along the longitudinal direction. Fig. 7 is a diagrammatical front view of the columnar cork obtained as mentioned above. The columnar cork 100 in Fig. 7 is a columnar molded body in which each cork granule 101 is compressed along the longitudinal direction (in a direction of axis line L) and is solidified with binder resin 102 while being flattened.

Patent Citation 1: JP-A-8-072 024

EP 1 977 871 (A1) discloses a cork granules batching machine for manufacturing agglomerated stoppers. The machine comprises a plurality of cradles for containing cork granules to be compacted in order to obtain the batch to be used in the manufacturing of stoppers. Adjustment means are associated with cradles to regulate the predetermined load volume for the cradles and adjust the amount of granules present in each batch formed by the machine. Said adjustment means comprise means for varying the height of the load volume.

[0004] US 4 999 156 A discloses an apparatus and methods for compressing a mass utilizing a plurality of interfitting anvils mounted for movement relative to one another along co-planar paths and include faces which, when the anvils are operatively moved relative to one another, exert compression on a mass positioned between the faces in at least two directions in a plane simultaneously. The faces of the apparatus can be so shaped that the cross section of the mass being compressed is urged toward a shape other than that of a regular polygon. Methods of the invention include the consolidation of a mass of compactable material enclosed within a hollow tube having deformable walls, the extraction of juice or oil from fruit or seeds and the internal fracturing of solids so as to swell materials such as solid rocket propellants.

DE 25 20 329 A1 discloses a further example of a compression apparatus.

DISCLOSURE OF INVENTION

PROBLEMS TO BE SOLVED IN INVENTION

[0005] A columnar cork is required to be flexible in its radial direction and be strong (anti pull force) in its longitudinal direction for use in a beverage container like a wine bottle. It is because the mouth of the container has a low sealing ability when the flexibility in the radial direction is poor, and the columnar cork is broken at the time of opening when the strength in the longitudinal direction is small. The columnar cork 100 in Fig. 7 is compressed in its longitudinal direction as mentioned above, and each cork granule 101 is flattened, so that the flexibility in its radial direction is apt to be bad. It is possible to increase the flexibility in the radial direction by adjusting the compression pressure, however, the strength in the longitudinal direction becomes low if the flexibility becomes large. Therefore, it has been difficult to keep the balance in a molding method executed by compressing along the longitudinal direction.

[0006] The present invention is proposed according to the above-mentioned problems and its object is to provide a columnar cork which has a good flexibility in its radial direction, has strength in its longitudinal direction, and is excellent in sealing ability and uncork ability, to provide its production method, and to provide a molding apparatus for producing the same.

MEANS TO SOLVE THE PROBLEMS

[0007] The present invention provides a production method of a columnar cork and a molding apparatus for producing the same according to independent patent claims 1 and 3 respectively. Further embodiments of the invention may be realized in accordance with the corresponding dependent claims. The columnar cork made through compression molding

process of a lot of cork granules mixed with binder resin is characterized in that the cork is made by being compressed in a direction normal to its longitudinal direction in the compression molding process.

[0008] In the present invention, the molding cavity may be cylindrical in its shape when the plurality of divided mold dies are narrowed down by being slid.

[0009] In a further embodiment of the present invention, the cover body and the molding base have bores provided at a position corresponding to the narrowed down molding cavity and formed in substantially same shape as the sectional shape of the molding cavity, and the bores are provided with seal members respectively, each of the seal members being capable of being taken out together with the molded body made at the compression molding process. In such a case, the bores of the molding base are detachably provided with a hollow container which contains the molded body as taken out together with the sealing members. Further, the bores of the cover may be provided with an extruding means with which the molded body is extruded together with the sealing members

EFFECT OF INVENTION

[0010] In the columnar cork of the present invention, the compression in case of compressing and molding a lot of cork granules with binder resin is exerted along a direction normal to the longitudinal direction (radial direction) of the columnar body, so that the respective cork granules are not flattened in the longitudinal direction like the compression molding along the longitudinal direction of the columnar body and has superior flexibility in the radial direction.

[0011] Further, the strength or intensity in the longitudinal direction becomes large combined with the binding force of the binder resin. Accordingly, the followability of the columnar cork to the mouth of the container is improved to give more sealing ability, the force required for uncorking is reduced, and the cork is hardly broken when being uncorked, thereby obtaining a comfortable uncork feeling.

According to the production method of columnar cork of the present invention and the molding apparatus for producing the columnar cork of the present invention, the kneaded mixture of cork granules and binder resin is charged in the molding cavity surrounded with a plurality of divided mold dies on the molding base, and the plurality of divided mold dies are slid on the molding base into a direction to narrow down the molding cavity, so that the mixture is compressed and molded in columnar by the operation of narrowed molding cavity

[0012] Such a narrowing operation of the molding cavity acts in a direction normal to the longitudinal direction of the columnar body, namely into a centripetal direction. The cork granules in thus obtained columnar molded body are solidified with binder resin, then a columnar cork having flexibility in the radial direction and having high strength in the longitudinal direction can be obtained.

[0013] The binder resin includes thermoplastic resin series, heat-hardening resin series and elastomer series and is desirably suitable for making contact with food. In addition, when the shape of the molding cavity narrowed by sliding the plurality of divided mold dies is designed to be cylindrical, the resultant columnar molded body becomes cylindrical, the compression force equally acts in radial directions of the cylindrical body to obtain suitability as a stopper for closing the mouth of beverage containers for wine, and flexibility in the radial direction can be equally achieved in the circumferential direction.

[0014] The opening of the molding cavity is covered with the cover body in a further embodiment of the present invention, so that the kneaded mixture charged in the cavity is molded by the compression force accompanied with sliding of the divided mold dies in a space surrounded with the molding base, the plurality of divided mold dies and the cover body. The sliding operation of the divided mold dies is facilitated by the pressing operation means.

[0015] In addition, when the cover body and the molding base are designed to have a bore provided at a position corresponding to the narrowed molding cavity and formed in substantially the same shape as the sectional shape of the molding cavity, respectively and each bore is designed to have a sealing member, the molded body can be taken out together with the sealing member and the binder resin can be hardened under such a condition. In this case, the binder resin may be hardened by heating the taken-out molded body. Or a heater may be embedded in the divided mold dies, the molding base or the cover body and the binder resin may be hardened by heating during compression molding.

[0016] Specifically, the hollow container is designed to be detachably provided for the bore of the molding base for receiving the molded body taken out together with the sealing member, and the molded body can be heated in a heating oven while being contained in the hollow container, thereby eliminating the risk of causing damage on the shape during heating. In addition, when the extruding means is designed to be provided for the bore of the cover body for extruding the molded body together with the sealing member, the molded body can be easily transferred to be contained in the hollow container. Further, the sealing member is provided at both ends of the molded body, so that the extruding force of the extruding means does not directly act on the molded body and the shape of the molded body is not damaged.

[0017] Still further, the hollow container may be detachably mounted in the bore of the cover body, the molded body may be contained in the hollow container in such a manner that the molded body thrusts out of the molding base, and they may be heated in a heating oven under such a condition.

BRIEF DESCRIPTION OF DRAWINGS

[0018]

Fig. 1	is a front view diagrammatically showing the columnar cork.
Fig. 2	is a vertical sectional view of the molding apparatus for producing the columnar cork.
Fig. 3	is a vertical sectional view of an essential part showing how the columnar cork is molded with the molding apparatus.
Fig. 4	is a vertical sectional view of an essential part showing how the molded body obtained by the molding apparatus is taken out.
Fig. 5	is a vertical sectional view showing how the taken-out molded body is heat treated.
Fig. 6a and Fig. 6b	are plan views of an essential part showing when the cover body of the molding apparatus is removed, wherein
Fig. 6a	corresponds to the condition in Fig. 2 and
Fig. 6b	corresponds to the condition in Fig. 3.
Fig. 7	is a front view diagrammatically showing the prior columnar cork.

BEST MODE FOR CARRYING OUT INVENTION

[0019] Next, the best mode for carrying out the present invention according to claims 1-7 is explained referring to the attached drawings.

[0020] Fig. 1 shows a columnar cork 1 produced by compressing and molding a lot of cork granules 1a together with binder resin 1b and by solidifying the cork granules 1a with the binder resin 1b. It is characterized in that the compression at molding is executed along directions normal to the longitudinal direction (in the direction of the axis line L), namely radial directions, of the columnar cork 1. The circumferential edges at the top and bottom ends of the columnar cork 1 in the figure are chamfered, however, such chamfer is not always necessary.

[0021] Comparing with the columnar cork 100 in Fig. 7 which is compressed and molded along the axis line, it is apparently understood that the respective cork granules 1a of the columnar cork 1 are not solidified in a flattened condition along the axis line L. This means that the inner stress along the direction of the axis line L is small and its anti-uncork force can be strong compared with those of the cork 100 in Fig. 7. In addition, it is compressed in directions normal to the direction of the axis line L, so that the flexibility in the radial direction is superior, the fllowability to the mouth of the beverage container is high and a superior sealing ability is achieved.

[0022] Next, the molding apparatus for producing the columnar cork 1 is explained. The molding apparatus 2 in Fig. 2 has a horizontal molding base 21 which is square in plan view, four divided mold dies 3 (31 to 34, see Fig. 6) slidably placed on the molding base 21 to form a molding cavity 30, and a cover body 22 which covers the space where the divided mold dies 3 are provided, the space including the upper opening of the molding cavity 30, and which is closely provided on the divided mold dies 3. It further has pressing operation means 4 which press the four divided mold dies 31 - 34, slides them in a direction to narrow the molding cavity 30 into which a kneaded mixture 10 (see Fig. 3) of the cork granules and binder resin has been charged, and compresses and molds the kneaded mixture 10 to becomes a columnar molded body 10A (see Fig. 3 and Fig. 4).

[0023] Parallel guide walls 23, 24 are erected along the sides at the front and back (front side and back side on the sheet of Fig. 2) of the molding base 21 as shown in Fig. 6a, 6b, and the both ends of each guide wall 23, 24 are bridged to each other with bridging bars 25, 25. The cover body 22 is detachably provided so as to stride the upper ends of the guide walls 23, 24. As omitted in the presentation in Fig. 2, the cover body 22 is positioned on the upper ends of the guide walls 23, 24 with pins, and detachably provided and fixed by lock means. A pair of slide blocks 41, 41 slidable in the space between the guide walls 23, 24 along the guide walls 23, 24 are mounted on the molding base 21.

[0024] The slide blocks 41, 41 are provided in a bilaterally symmetrical manner along the center line normal to the guide walls 23, 24 on the molding base 21 and their opposite faces are provided with V-shaped notch portions 41a, 41a forming 90 degrees, respectively. The notch portions 41 a, 41 a are designed to form a substantially square airspace (rhombus) in plan view when the slide blocks 41, 41 are butted against each other as shown in Fig. 6b.

[0025] Bodies 42, 42 to be operated and formed like cams are fixed at the back of the slide blocks 41, 41. Operation levers 45, 45 are swingably provided for the brackets 43, 43, fixed at both ends at the right and left sides of the molding base 21, via hinge pins 44, 44. Operating bodies 47, 47 are designed to be formed as cam follower members at the tips of swing arms 46, 46 which are integral with the operation levers 45, 45 and to act on the bodies 42, 42 to be operated by operating the operation levers 45, 45 in the direction of the arrows shown in Fig. 2.

[0026] When the operating bodies 47, 47 are to be acted on the bodies 42, 42 to be operated, the slide blocks 41, 41 can be slid on the molding base 21 so as to come close to each other. Thus the pressing operation means 4 are constituted for pressing and sliding the four divided mold dies 31 - 34. Fig. 6b shows that the pressing operation means 4 are

operated from the condition of Fig. 6a, the four divided mold dies 31 - 34 are pressed and slid, and the molding cavity 30 is narrowed into a circular shape in cross-section. The pressing operation means 4 other than the slide block 41 and the body 42 to be operated is not shown in Fig. 3, Fig. 4, and Fig. 6.

[0027] Each of the four divided block 31 - 34 comprises a block body of substantially rectangular solid and of same shape and is arranged in the space formed by the notch portions 41a, 41a of the slide blocks 41, 41 in a manner that the phase thereof is displaced per 90 degrees to each other in the surface area direction. Divided mold die faces 31a, 32a, 33a, 34a, each of which shape seen from the top is a quarter arc of the same curvature radius, are formed at one end of the inner face of each divided block 31 - 34 under such conditions. Further, in such an arrangement, the four divided blocks 31 - 34 form the square molding space 30 of which the corners have a quarter curvature radius.

[0028] From the arrangement in Fig. 6a it is apparent that the pressing operation means 4 are operated to slide the slide blocks 41, 41 so as to come close to each other, and then the back (outer side) of each of the divided blocks 31 - 34 is acted by the notch portions 41 a, 41a to be slid in the centripetal direction on the molding base 21. As the result, the molding cavity 30 is narrowed down, when the slide blocks 41, 41 come to be butted to each other as shown in Fig. 6b, and the respective each divided mold die faces 31a, 32a, 33a, 34a fit together to make the initial molding cavity 30 to become a cylindrical molding cavity 30A. The curvature radius of the cylindrical molding cavity 30A becomes the same as that of the quarter arc face of each of the divided mold dieing faces 31a, 32a, 33a, 34a.

[0029] A circular bore 21a is formed in the molding base 21 at the corresponding position of the molding cavity 30A. A lower bush 23 having the same inner diameter as the molding cavity 30A is fitted into the circular bore 21a and the inner diametrical portion 23a of the lower bush 23 constitutes a bore communicating the front face and back face of the molding base 21. A disk-like lower sealing member 5 is provided for the inner diametrical portion (bore) 23a so as to seal the bore 23a. How the bore 23a is sealed with the lower sealing member 5 is explained later.

[0030] A circular bore 22a is formed on the cover body 22 at the position corresponding to the molding cavity 30A. An upper bush 24 having the same inner diameter as the molding cavity 30A is fitted into the circular bore 22a, and the inner diametrical portion 24a of the upper bush 24 constitutes a bore communicating the front face and back face of the cover body 22. A disk-like upper sealing member 6 is provided for the inner diametrical portion (bore) 24a so as to seal the bore 24a. How the bore 24a is sealed with the upper sealing member 6 is explained later.

[0031] The molding base 21 is supported by four pillars 27, and two bars 26, 26 are hung and supported at the lower face of the molding base 21. A middle base 70 is supported by the hung bars 26, 26 and is screwed with a screw bar 71 so as to screw back and forth in the perpendicular direction. A table 7 for receiving and supporting the cylindrical container (hollow container) 8, mentioned later, is fixed on the upper end of the screw bar 71. The screw bar 71 is designed to screw back and forth by turning an operation dial 72 fixed at the lower end around the axial center, thereby moving the table 7 up and down.

[0032] The upper face of the table 7 is formed like a dish so as to be able to place the cylindrical container 8 thereon. The cylindrical container 8 mounted on the table 7 is designed such that the upper end is to be accepted and stopped at a concave portion 23b formed at the lower face of the lower bush 23 when the table 7 is moved up according to a turning motion of the operation dial 72. The inner diameter of the cylindrical container 8 is substantially the same as or a little larger than that of the outer diameter of the lower sealing member 5 and the upper sealing member 6, and these sealing members 5, 6 are slidably movable up and down in the cylindrical portion of the cylindrical container 8.

[0033] An inward brim portion 8a is formed at the lower end of the cylindrical container 8 in order to prevent the lower sealing member 5 fitted in the cylindrical container 8 from dropping out. Further, two stopper screws 8b penetrating the tubular wall of the cylindrical container 8 are screwed into the tubular wall around the upper end of the cylindrical container 8. How the stopper screws 8b operate is explained later.

[0034] A push-up bar 80 is inserted into the axial center of the table 7 and the screw bar 71 and its upper portion extends to the inner cylindrical portion of the cylindrical container 8 placed on the table 7. The upper end 80a of the push-up bar 80 is designed to be fitted and inserted into a concave portion 5a formed at the center of the lower face of the lower sealing member 5 and to support the sealing member 5 from the lower side. The lower end 80b of the push-up bar 80 is designed to be held in order not to be dropped by a stopper piece 73 attached at the lower face of the operation dial 72.

[0035] While the lower end 80b of the push-up bar 80 is held with the stopper piece 73, the lower sealing member 5 supported with the upper end 80a is kept at the position for sealing the bore 23a. Fig. 2 and Fig. 3 show that the lower sealing member 5 is kept so as to seal the bore 23a. The stopper piece 73 is supported so as to be horizontally turnable by a hinge pin 73a fixed at the lower face of the operation dial 72, and the tip end is formed with a hook portion 73c capable of engaging to a hook pin 73b fixed at the lower face of the operation dial 72. Accordingly, when the hook portion 73c is engaged to the hook pin 73b, the push-up bar 80 can be held so as not to fall, on the other hand, when the engagement is released to horizontally turn the stopper piece 73 (see Fig. 4), the push-up bar 80 goes down to be able to be removed.

[0036] The lower end of a plunger 9 movable up and down is inserted to the inner diametrical portion 24a of the upper bush 24, the lower end face of the plunger 9 is attached with a permanent magnet 9a, and a metal upper sealing member

6 is attached and kept with the permanent magnet 9a. Fig. 2 and Fig. 3 show that the plunger 9 is held with a stopper (not shown) and the upper sealing member 6 stuck by the permanent magnet 9a seals the bore 24a. The plunger 9 is movable up and down by operation means (including manipulating means), not shown, which constitute extruding means for pushing down the molded body 10A in the molding cavity 30A, mentioned later, together with the upper and the lower sealing members 6, 5 by releasing the stopper.

[0037] Now explained is how the molded body 10A of the columnar cork 1 is formed by the above-mentioned molding apparatus 2. At first, as shown in Fig. 6a, the table 7 is mounted such that the lower face of the lower bush 23 is butted and stopped with the upper end of the cylindrical container 8, and the bore 23a of the molding base 21 is sealed with the lower sealing member 5 supported with the push-up bar 80 extending to the inner cylindrical portion of the cylindrical container 8. A kneaded mixture 10 (see Fig. 3) in which cork granules 1a and binder resin 1b are mixed in a predetermined ratio is charged in the molding cavity 30 formed by the initial position of the divided mold dies 31- 34 shown in Fig. 6a.

[0038] Then, the cover body 22 is positioned and fixed so as to stride the upper end of the guide walls 23, 24 to cover the upper opening of the molding cavity 30. The lower end portion of the plunger 9 is inserted in the upper bush 24, and such an inserted condition is kept by the stopper, not shown, and the bore 24a of the cover body 22 is sealed by the upper sealing member 6 stuck and held at the lower end face of the plunger 9 with the permanent magnet 9a.

[0039] After completing the above preparation, the pressing operation means 4, 4 are operated to slide the slide blocks 41, 41 so as to come close to each other, and the four divided mold dies 31 - 34 are slid in the centripetal direction by the operation of notch portions 41a, 41a accompanied with sliding operation of the slide blocks 41, 41. The initial molding cavity 30 is narrowed down by the sliding movement of the divided mold dies 31- 34 and each of the divided mold die faces 31a, 32a, 33a, 34a fit with each other to form a cylindrical molding cavity 30A. While the initial molding space 30 is narrowed to the cylindrical molding cavity 30A, the kneaded mixture 10 charged in the molding cavity 30 is compressed to obtain the columnar molded body 10A.

[0040] The compression operation by the divided mold dies 31 - 34 is executed along directions orthogonal to the axial center direction of the columnar molded body 10A. Fig. 3 shows that the kneaded mixture 10 is compressed by such an operation of the divided mold dies 31 - 34 and the columnar molded body 10A is formed. In such a condition, the columnar molded body 10A is sealed in the space formed with the divided mold dieing faces 31a, 32a, 33a, 34a and the upper and lower sealing members 6, 5.

[0041] After compression molding as mentioned above, the stopper of the plunger 9 is released, the engagement of the stopper piece 73 to the hook pin 73b is also released, and the stopper piece 73 is turned to release holding of the push-up bar 80. Thus, the push-up bar 80 can be removed. Under such a condition, the plunger 9 is moved down and the molded body 10A in the molding cavity 30A is downwardly extruded together with the upper and the lower sealing members 6, 5.

[0042] The upper end of the cylindrical container 8 supported by the table 7 is received and stopped at the concave portion 23b of the lower bush 23 and the molded body 10A extruded by the plunger 9 is received in the inner cylindrical portion of the cylindrical container 8 accordingly, as shown in Fig. 4. The inner diametrical portion 24a of the upper bush 24 and the inner diametrical portion 23a of the lower bush 23 function as a guide tube when the plunger 9 moves up and down. The lower sealing member 5 goes down while slidably contacting with the inner cylindrical portion of the cylindrical container 8 and is engaged with the inner brim portion 8a at the lower end.

[0043] The upper sealing member 6 is inserted and kept into the opening at the upper end of the cylindrical container 8. Accordingly, when the molded body 10A is received in the cylindrical container 8, it is held with the upper and lower sealing members 6, 5, so that its shape is not damaged. Then, the operation dial 72 is turned, the screws 8b, 8b provided at the upper end of the cylindrical container 8 are screwed, the tip ends of the stopper screws 8b, 8b are engaged into a circumferential groove 6a (see Fig. 5) formed on the circumferential face of the upper sealing member 6 to fix the upper sealing member 6 into the opening at the upper end of the cylindrical container 8.

[0044] When the plunger 9 goes up while the upper sealing member 6 is fixed at the opening at the upper end of the cylindrical container 8, the upper sealing member 6 is released from the magnetic force of the permanent magnet 9a, and the cylindrical container 8 the upper opening of which is sealed with the upper sealing member 6 is left on the table 7. The lower opening of the cylindrical container 8 on the table 7 is sealed with the lower sealing member 5 and its upper opening is sealed with the upper sealing member 6, so that the molded body 10A is contained in the inner cylindrical portion.

[0045] Further, the operation dial 72 is turned to lower the table 7, and the cylindrical container 8 is taken out from the table 7 to be placed in an oven 11 shown in Fig. 5. The cylindrical container 8 is heated at a fixed temperature in the oven 11 to harden binder resin and to solidify the cork granules. After the heating process, the stopper screw 8b is unscrewed to remove the upper sealing member 6 and the columnar molded body 10A is taken out of the cylindrical container 8.

[0046] Thus, the heat treatment is executed while the molded body 10A is contained in the cylindrical container 8, so that the binder resin 1b can be hardened without damaging the shape of the molded body 10A. Then, the upper and lower circumferential edges of the molded body 10A are chamfered and the columnar cork 1 shown in Fig. 1 is obtained.

The heating method of the oven 11 is not specifically limited, however, an electromagnetic induction type oven is preferably used.

[0047] In the above-mentioned embodiments, a test model example is shown as the pressing operation means 4, however, a ball screw type operating body the driving source of which is a hydraulic cylinder or a motor is adopted when the pressing operation means are used for an actual production procedure. Four divided mold dies 31 - 34 are described to be centripetally pressed and slid from two facing directions.

Claims

1. A production method of a columnar cork,
which comprises the following steps:

   - kneading cork granules (1a) and binder resin (1b) to make a kneaded mixture (10);
   - placing on a molding base (21) four divided mold dies (31-34) with divided mold die faces (31 a-34a), the shape of each of which seen from the top is quarter arc of the same curvature radius, which is formed at one end of the inner face of each divided mold die (31-34) under such conditions, wherein, in such an arrangement, the four divided mold dies (31-34) form a square molding cavity (30) the corners of which have a quarter curvature radius;
   - charging the mixture (10) into the molding cavity (30); and
   - sliding a pair of slide blocks (41, 41), provided on their opposite faces with V-shaped notch portions (41a) forming 90° respectively, on the molding base (21) so as to come close to each other, thereby acting upon the four divided mold dies (31-34) to narrow down the molding cavity (30); and
   - compressing and molding the mixture (10) to form a columnar molded body, and heating and solidifying the compressed and molded mixture (10).

2. The production method according to claim 1, **characterized in that** the four divided mold dies (31- 34) are substantially rectangular solid block bodies.

3. A molding apparatus for producing a columnar molded body of cork through a compression molding process of a lot of cork granules (1a) mixed with binder resin (1b), comprising;

   - a molding base (21);
   - a pair of slide blocks (41) provided on their opposite faces with V-shaped notch portions (41a) forming 90° respectively arranged on the molding base (21);
   - four divided mold dies (31-34) with divided mold die faces (31 a-34a), the shape of each of which seen from the top is a quarter arc of the same curvature radius, which is formed at one end of the inner face of each divided mold die (31-34), under such conditions, wherein in such an arrangement the four divided mold dies (31-34) form a square molding cavity (30) the corners of which have a quarter curvature radius;
   - a cover body (22) for covering an opening of the molding cavity (30); and
   - pressing operation means (4) for sliding a pair of slide blocks (41, 41) provided on their opposite faces with V-shaped notch portions (41 a) forming 90° respectively, on the molding base (21) so as to come close to each other, thereby acting upon the four divided mold dies (31-34) to narrow down the molding cavity (30), and compressing and molding the charged mixture (10) to form a columnar molded body.

4. The molding apparatus according to claim 3,
characterized in that the cover body (22) and the molding base (21) have bores (22a, 23, 24a) provided at the position corresponding to the narrowed down molding cavity (30A) and formed in substantially the same shape as the sectional shape of the molding cavity (30),
and **in that** the bores (23a, 24a) are provided with seal members (5, 6) respectively, each of the seal members (5, 6) capable of being taken out together with the molded body (10A) made at the compression molding process.

5. The molding apparatus according to claim 4,
characterized in that the bores of the molding base (21) are detachably provided with a hollow container (8) which contains the molded body (10A) as taken out together with the sealing members (5, 6).

6. The molding apparatus according to claim 4 or 5,
characterized in that the bores (22a) of the cover (22) are provided with extruding means (9) with which the molded

body (10A) is extruded together with the sealing members (5, 6).

7. The molding apparatus according to claim 3, **characterized in that** the four divided mold dies (31- 34) are substantially rectangular solid block bodies.

Patentansprüche

1. Verfahren zum Herstellen von säulenförmigen Korken,
das folgende Schritte aufweist:

- Kneten von Korkgranulat (1a) und Bindemittelharz (1b), um eine geknetete Mischung (10) herzustellen;
- Anordnen von vier geteilten Werkzeugformen (31-34) mit geteilten Werkzeugformflächen (31a-34a) auf einer Formungsbasis (21), wobei die Gestalt von jeder Werkzeugform (31-34) von oben betrachtet ein Viertelbogen mit dem gleichen Krümmungsradius ist, welcher unter solchen Bedingungen an dem einen Ende der inneren Fläche der jeweiligen Werkzeugform (31-34) gebildet ist, wobei in einer solchen Anordnung die vier geteilten Werkzeugformen (31-34) einen rechteckigen Formungshohlraum (30) bilden, dessen Ecken ein Viertel des Krümmungsradius aufweisen.
- Einbringen der Mischung (10) in den Formungshohlraum (30); und
- Schieben eines Paares von Gleitblöcken (41, 41), die an ihren gegenüberliegenden Flächen mit V-förmigen Aussparungen(41 a) versehen sind, die jeweils einen Winkel von 90° bilden, auf der Formungsbasis (21), so dass sich die Gleitblöcke (41, 41) einander nähern, und dadurch auf die vier geteilten Werkzeugformen (31-34) einwirken, um den Formungshohlraum (30) einzuengen; und
- Komprimieren und Formen der Mischung (10), um einen säulenförmigen geformten Körper zu bilden, und Heizen und Verfestigen der komprimierten und geformten Mischung (10).

2. Herstellungsverfahren nach Anspruch 1,
dadurch gekennzeichnet,
dass die vier geteilten Werkzeugformen (31-34) im Wesentlichen rechteckige feste Blockkörper sind.

3. Formungsvorrichtung zum Herstellen eines säulenförmigen geformten Korkenkörpers mit Hilfe eines Kompressions-Formungsprozess aus einer Charge Korkgranulat (1a), welches mit Bindemittelharz (1b) vermischt ist, wobei die Formungsvorrichtung folgendes aufweist:

- eine Formungsbasis (21);
- ein Paar von Gleitblöcken (41, 41), die an ihren gegenüberliegenden Flächen mit V-förmigen Aussparungen (41 a) versehen sind, die jeweils einen Winkel von 90° bilden, wobei das Paar von Gleitblöcken (41, 41) auf der Formungsbasis (21) angeordnet ist;
- vier geteilte Werkzeugformen (31-34) mit geteilten Werkzeugformflächen (31a-34a), wobei die Gestalt von jeder Werkzeugform (31-34) von oben betrachtet ein Viertelbogen mit dem gleichen Krümmungsradius ist, welcher unter solchen Bedingungen an dem einen Ende der inneren Fläche der jeweiligen geteilten Werkzeugform (31-34) gebildet ist, wobei in einer solchen Anordnung die vier geteilten Werkzeugformen (31-34) einen rechteckigen Formungshohlraum (30) bilden, dessen Ecken ein Viertel des Krümmungsradius aufweisen,
- einen Abdeckkörper (22), um eine Öffnung des Formungshohlraums (30) abzudecken; und
- eine Press-Betätigungseinrichtung (4), um ein Paar von Gleitblöcken (41, 41), die an ihren gegenüberliegenden Flächen mit V-förmigen Aussparungen (41 a) versehen sind, die jeweils einen Winkel von 90° bilden, auf der Formbasis zu schieben, so dass sich die Gleitblöcke einander nähern und dadurch auf die vier geteilten Werkzeugformen (31-34) einwirken, um den Formungshohlraum (30) einzuengen und die eingebrachte Mischung (10) zu komprimieren und zu formen, um einen säulenförmigen geformten Körper zu formen.

4. Formungsvorrichtung nach Anspruch 3,
dadurch gekennzeichnet,
dass der Abdeckkörper (22) und die Formungsbasis (21) Bohrungen (22a, 23, 24a) aufweisen, die an Positionen entsprechend dem eingeengten Formungshohlraum (30A) angebracht sind und im Wesentlichen mit der gleichen Gestalt wie der Querschnitt des Formungshohlraums (30) ausgebildet sind,
und **dass** die Bohrungen (23a, 24a) jeweils mit Dichtelementen (5, 6) versehen sind, wobei jedes der Dichtelemente (5, 6) zusammen mit dem geformten Körper (10A), der durch den Kompressions-Formungsprozess hergestellt wird, herausgenommen werden kann.

5. Formungsvorrichtung nach Anspruch 4,
dadurch gekennzeichnet,
dass die Bohrungen der Formungsbasis (21) abnehmbar mit einem Hohlraumbehälter (8) ausgestattet sind, welcher den geformten Körper (10A) enthält, wenn er zusammen mit den Dichtelementen (5, 6) herausgenommen wird.

6. Formungsvorrichtung nach Anspruch 4 oder 5,
dadurch gekennzeichnet,
dass die Bohrungen (22a) der Abdeckung (22) mit einer ExtrusionsEinrichtung (9) ausgestattet ist, mit denen der geformte Körper (10A) zusammen mit den Dichtelementen (5, 6) extrudiert wird.

7. Formungsvorrichtung nach Anspruch 3,
dadurch gekennzeichnet,
dass die vier geteilten Werkzeugformen (31-34) im Wesentlichen rechteckige feste Blockkörper sind.

Revendications

1. Procédé de production d'un bouchon en forme de colonne,
qui comprend les étapes suivantes:

- on pétrit des granulés de liège (1a) et un liant en résine (1b) pour réaliser un mélange pétri (10);
- on place sur une base de moulage (21) quatre matrices de moule divisé (31-34) avec des faces de matrice de moule divisé (31a-34a), chacune ayant une forme qui, vue de dessus, est un quart d'arc présentant le même rayon de courbure, qui est formée à une extrémité de la face intérieure de chaque matrice de moule divisé (31-34) sous des conditions telles que, dans un tel agencement, les quatre matrices de moule divisé (31, 34) forment une cavité de moulage carrée (30) dont les coins ont un rayon de courbure en quart;
- on charge le mélange (10) dans la cavité de moulage (30); et
- on fait coulisser une paire de blocs coulissants (41, 41), dotés sur leurs faces opposées de portions d'encoches (41a) en forme de V formant respectivement 90°, sur la base de moulage (21), de manière à se rapprocher l'un de l'autre, agissant ainsi sur les quatre matrices de moule divisé (31-34) pour rétrécir la cavité de moulage (30); et
- on comprime et on moule le mélange (10) pour former un corps moulé en forme de colonne, et on fait chauffer et solidifier le mélange comprimé et moulé (10).

2. Procédé de production selon la revendication 1,
caractérisé en ce que les quatre matrices de moule divisé (31-34) sont des corps en blocs pleins sensiblement rectangulaires.

3. Appareil de moulage pour produire un corps de bouchon moulé en forme de colonne via un processus de moulage par compression d'un paquet de granulés de liège (1a) mélangé avec un liant en résine (1b),
comprenant:

- une base de moulage (21);
- une paire de blocs coulissants (41), dotés sur leurs faces opposées de portions d'encoches (41a) en forme de V formant respectivement 90° et agencés sur la base de moulage (21);
- quatre matrices de moule divisé (31-34) avec des faces de matrice de moule divisé (31a-34a), chacune d'elles ayant une forme qui, vue depuis le dessus, est un quart d'arc ayant le même rayon de courbure, qui est formé à une extrémité de la face intérieure de chaque matrice de moule divisé (31-34), sous des conditions telles que dans un tel agencement les quatre matrices de moule divisé (31-34) forment une cavité de moulage carrée (30) dont les coins ont un rayon de courbure en quart;
- un corps de couvercle (22) pour couvrir une ouverture de la cavité de moulage (30); et
- un moyen d'actionnement le pressage (4) pour faire coulisser une paire de blocs coulissants (41, 41), dotés sur leurs faces opposées de portions d'encoches (41a) en forme de V formant respectivement 90°, sur la base de moulage (21) de manière à se rapprocher l'un de l'autre, et agissant ainsi sur les quatre matrices de moule divisé (31-34) pour rétrécir la cavité de moulage (30), et pour comprimer et mouler le mélange chargé (10) afin de former un corps moulé en forme de colonne.

4. Appareil de moulage selon la revendication 3,
caractérisé en ce que le corps de couvercle (22) et la base de moulage (21) ont des perçages (22a, 23, 24a)

prévus à la position correspondant à la cavité de moulage rétrécie (30A) et formés sensiblement sous la même forme que la forme de section de la cavité de moulage (30),
et **en ce que** les perçages (23a, 24a) sont dotés d'éléments de joint (5, 6) respectivement, chacun des éléments de joint (5, 6) étant capable d'être enlevé ensemble avec le corps moulé (10A) réalisé lors du processus de moulage par compression.

5. Appareil de moulage selon la revendication 4,
caractérisé en ce que les perçages de la base de moulage (21) sont dotés de manière détachable d'un conteneur creux (8) qui contient le corps moulé (10A) tel qu'enlevé ensemble avec les éléments de joint (5, 6).

6. Appareil de moulage selon la revendication 4 ou 5,
caractérisé en ce que les perçages (22a) du couvercle (22) sont dotés de moyens d'extrusion (9) avec lesquels le corps moulé (10A) est extrudé ensemble avec les éléments de joint (5, 6).

7. Appareil de moulage selon la revendication 3,
caractérisé en ce que les quatre matrices de moule divisé (31-34) sont des corps en blocs pleins sensiblement rectangulaires.

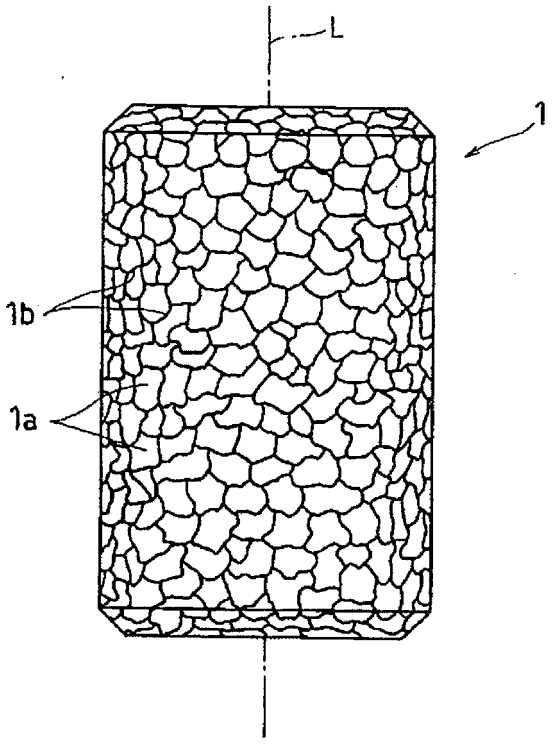


Fig.1

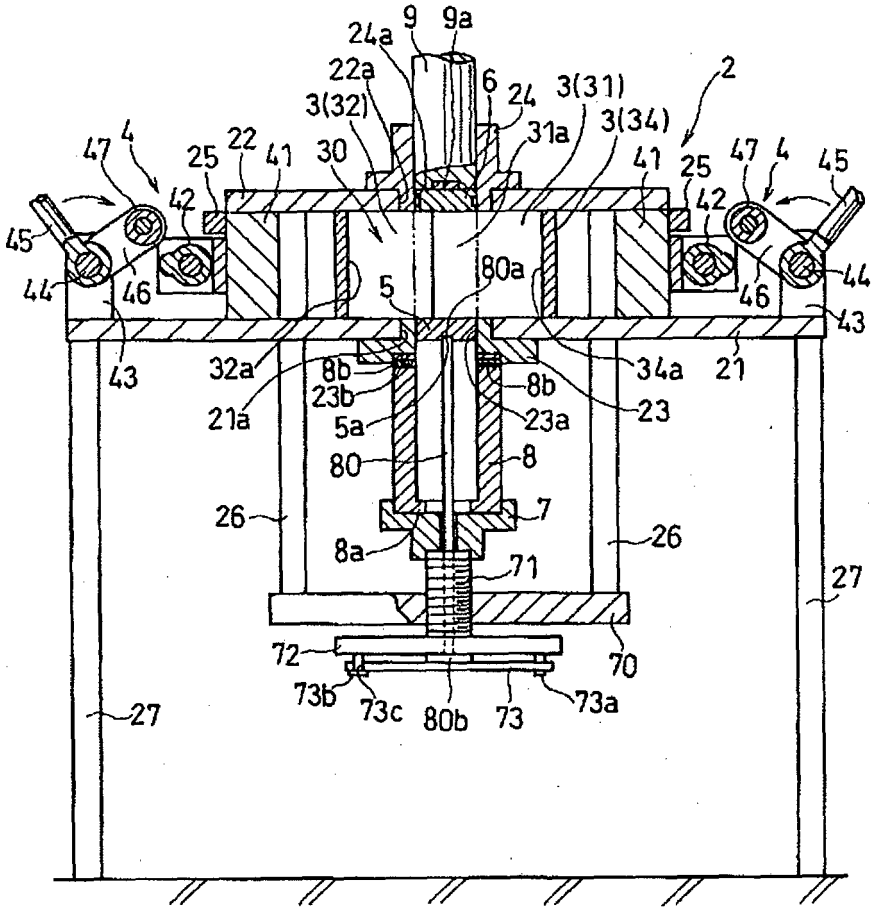

9
9a
24a
22a
6
24
3(31)
2
3(32)
31a
3(34)
47
4
25
22
41
30
41
25
47
4
45
42
42
45
44
46
5
80a
46
44
43
43
32a
8b
34a
21
21a
23b
8b
23
5a
23a
80
8
26
7
26
8a
71
27
72
70
73b
73c
80b
73
73a
27

Fig.2

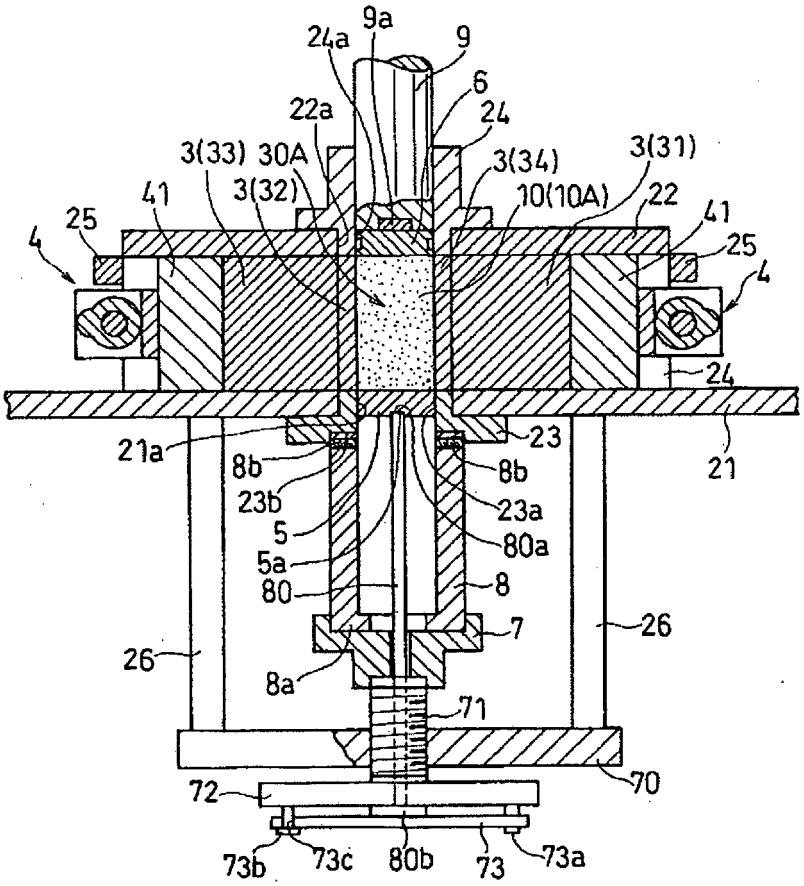

9a
24a
9
6
22a
24
3(33)
30A
3(32)
3(34)
3(31)
10(10A)
22
41
25
4
24
21a
8b
23b
5
5a
80
23
8b
23a
80a
8
7
26
8a
71
70
72
73b
73c
80b
73
73a
21

Fig.3

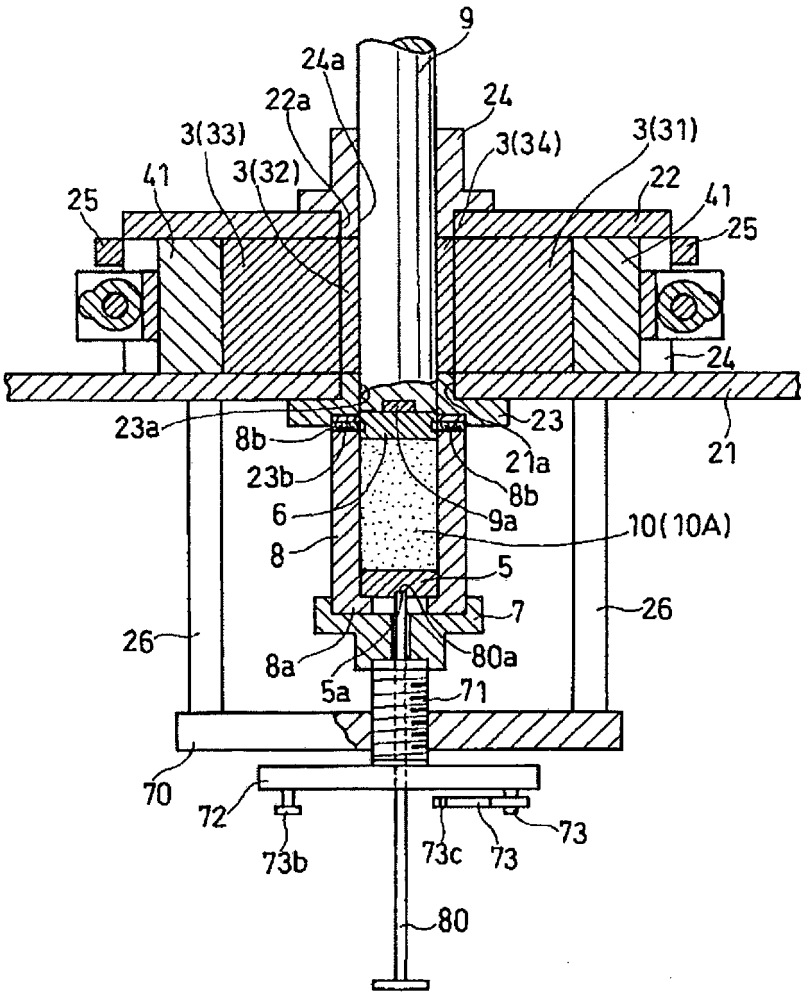

9
24a
22a
24
3(33)
3(34)
3(31)
3(32)
41
22
41
25
25
24
23a
8b
23
21a
23b
8b
21
6
9a
10(10A)
8
5
7
26
26
8a
80a
5a
71
70
72
73b
73c
73
73
80

Fig.4

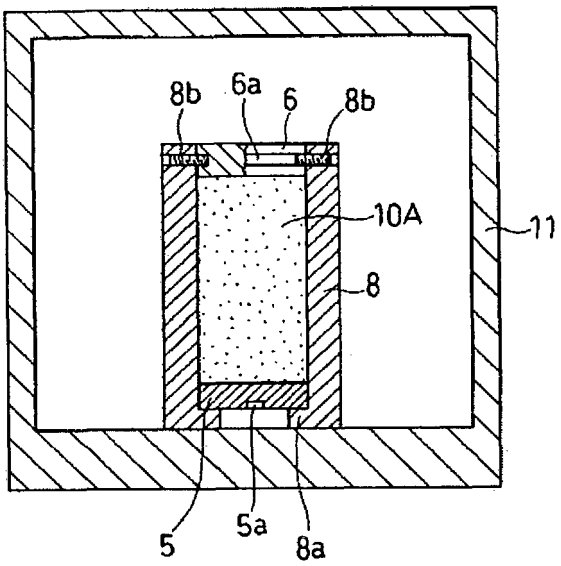


Fig.5

Fig.6a

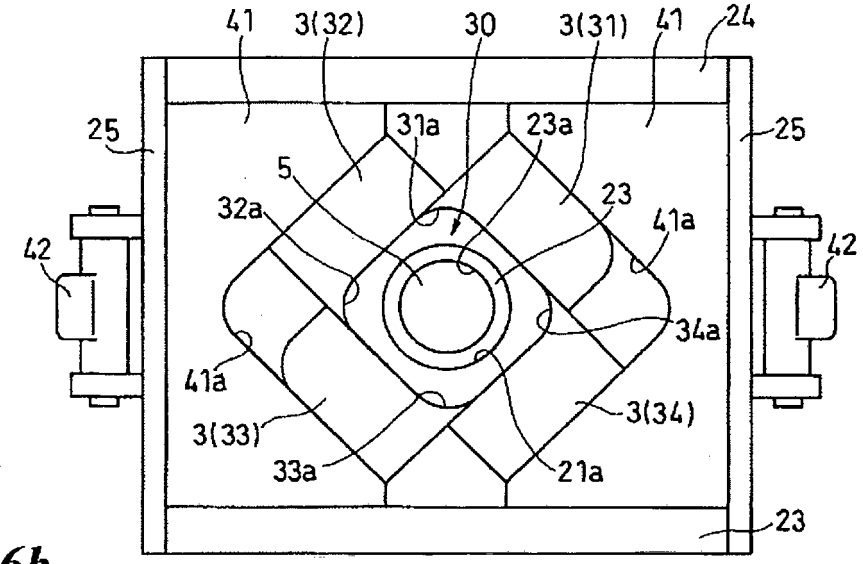
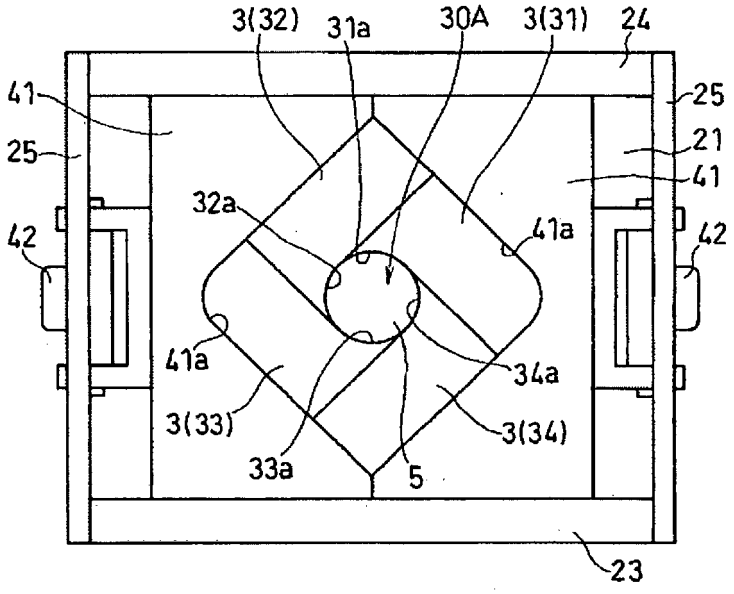
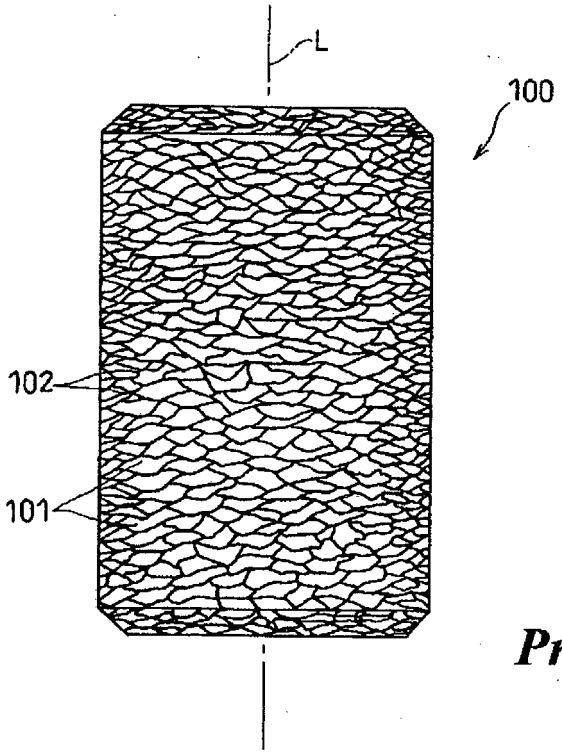

41
3(32)
30
3(31)
41
24
25
31a
23a
25
5
23
32a
41a
42
42
34a
41a
3(34)
3(33)
33a
21a
23

Fig.6b


3(32)
31a
30A
3(31)
24
41
25
25
21
41
32a
42
41a
42
41a
34a
3(33)
3(34)
33a
5
23



Prior Art

Fig. 7

REFERENCES CITED IN THE DESCRIPTION

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