(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 106 264 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
19.01.2005 Bulletin 2005/03

(51) Int Cl.[7]: **B07B 1/15**, B07B 1/50

(21) Application number: **00125944.9**

(22) Date of filing: **28.11.2000**

(54) **Screen for sorting solid waste**

Sieb zur Abfallsortierung

Tamis pour le tri de déchets

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR

(30) Priority: **01.12.1999 IT PD990268**
17.04.2000 IT PD000095

(43) Date of publication of application:
13.06.2001 Bulletin 2001/24

(73) Proprietor: **ECOSTAR S.r.l.**
36066 Sandrigo, (Vicenza) (IT)

(72) Inventor: **Domenico, Cappozzo**
36066 Sandrigo, (Vicenza) (IT)

(74) Representative: **Gustorf, Gerhard, Dipl.-Ing.**
Patentanwalt,
Bachstrasse 6 A
84036 Landshut (DE)

(56) References cited:
DE-U- 29 711 724
US-A- 2 722 314

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 1 106 264 B1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The present invention concerns the sector of screening and sorting processes and in particular it concerns a new screen for sorting solid waste.

[0002] Several types of screen are presently used, mainly wire netting screens and screens with plate rollers, such as that disclosed in document DE-U-297 11 724.

[0003] Wire netting screens comprise a net with meshes with increasing size, through which the material to be screened falls in sequence. Smaller objects pass through the net, that is, they fall first, in the area with finer meshes, while bigger objects fall in the successive areas, where the net has larger meshes.

[0004] Wire netting screens are expensive due to the fact that the net is dragged and wears out rather quickly, and they also require a material advance system.

[0005] The screens with plate rollers comprise a series of parallel rollers, each one of which is constituted by an axis with plates fixed to it.

[0006] The pitch between the rollers and between the plates of the same roller may be constant or increasing.

[0007] All the rollers are set rotating at the same time and in the same direction. The upper area of each roller rotates towards the rollers that are most spaced and have the most spaced plates.

[0008] The objects to be screened are put onto the first rollers with reduced pitch, which provide for conveying them towards the rollers with increased pitch. Along their course, the smaller objects fall into the spaces between rollers and plates, while the objects with increasing size pass through the successive rollers and plates.

[0009] Up to now the screens with plate rollers have been used to screen solid objects, for example stones, but have not been extensively used for the screening of urban solid waste or similar materials, since thin and long objects, like bags, are twisted around the rollers, clogging them and obstructing the spaces between the rollers and between the plates, which obviously makes the screening process useless.

[0010] In order to eliminate the drawbacks mentioned above, a new type of screen for sorting urban solid waste has been designed and implemented.

[0011] The new sorting screen comprises, in its main parts, a support and alignment frame, a set of rollers with plates and anti-clogging elements.

[0012] The frame is constituted by several metal parts and has the function of supporting and aligning all the rollers, of containing the material to be screened and of covering all the members that transmit motion to the rollers. The frame houses the various rollers, which are parallel to one another and whose pitch may be constant or increasing in the direction of advance of the material to be screened.

[0013] The rollers comprise a main axis with perpendicular plates fixed to it. Between the various plates, around the axes, there are anti-clogging elements constituted by movable cylindrical tubes whose diameter is longer than that of the axis.

[0014] The plates may have any shape, that is, they may be circular, elliptic, triangular, quadrangular, pentagonal, hexagonal, etc.

[0015] The edge of each plate is provided with a metal strip perpendicular to the plate itself, so that the section of the plate has the shape of a double T.

[0016] As an alternative, a double, angled strip can be applied to the plate edge and inclined towards the centre of the plate, so that the section of the plate itself has the shape of a double arrow.

[0017] As a further variant of the invention, the plate edge may also be provided with two lateral strips arranged along the diameter of the plate and perpendicularly to it, instead of the double inclined strip. These double strips may be polygonal, like the plate itself, or annular.

[0018] If the plate is circular or elliptic, the strip/s is/are shaped like a curved ring, while if the plate is polygonal the strip has the shape of a polygonal ring, formed by several plane sections that are as long as the side of the plate/polygon.

[0019] The various plates are fixed to the roller axis, so that the surface of the plate is perpendicular to the axis length.

[0020] The anti-clogging elements are inserted around the axis, between each plate pair of each roller.

[0021] Each anti-clogging element comprises a cylindrical tube whose diameter is longer than the roller axis and whose length is substantially identical to the distance between two adjacent plates of the roller.

[0022] Unlike the plates, the cylindrical anti-clogging tubes are not fixed to the rollers, but they simply surround the axis section included between two plates and are free to rotate around the roller axis.

[0023] The plates and/or the cylindrical anti-clogging tubes may be made of metal, plastic or any other suitable material.

[0024] The pitch between the various plates in the rollers may be the same for all rollers or increase starting from the first rollers towards the final rollers along the course of the objects to be screened.

[0025] The plane constituted by the various rollers may be fixed with respect to the frame or inclinable by means of hydraulic mechanisms, in such a way as to optimize the screening process.

[0026] The roller rotation speed is set by the operator and it may be constant, or it may vary in all rollers, or vary according to the position of the rollers at the beginning, at the centre or at the end of the course of the material to be screened.

[0027] The sorting screen constituted as described above makes it possible to sort solid waste without any problem, since the cylindrical tubes provided on the rollers and the strips present on the plate edges prevent the twisting and entanglement of thin and/or long objects and/or similar elements. The special polygonal shape of

the plates and the strip present on the plate edges facilitates the advance of the material to be screened that, due to its size, cannot pass between the least spaced rollers.

[0028] The new sorting screen can be used for any waste with suitable consistency, like urban solid waste, industrial wastes from the woodworking, plastic, textile sectors, agricultural wastes like compost, algae, grass and loose materials in general.

[0029] The following is just an example among many of the invention in question, illustrated in the enclosed drawings, wherein:

[0030] Figure 1a shows an horizontal section of two rollers (1) positioned side by side, while Figure 1b is an axonometric view of a portion of roller (1).

[0031] In both figures it is possible to observe the centre axis (1.1), the plates (1.2) perpendicular to the axis and provided with the strip (1.21) on their edge, so that the section of each plate (1.2) has the shape of a double T. The anti-clogging elements constituted by cylindrical tubes (1.3) whose diameter is longer than that of the axis (1.1) are positioned between the various plates (1.2) of the rollers (1), around the axis (1.1).

[0032] Figure 2 shows an example of the arrangement of the rollers (1) on the frame (2). Figure 3 shows a vertical section of the new sorting screen, where it is possible to observe the frame (2) that supports the rollers (1) and the sides (3) that contain the material to be screened.

[0033] Figure 4a shows an horizontal section of two rollers (1) positioned side by side, while Figure 4b is an axonometric view of a portion of roller (1).

[0034] In both figures it is possible to observe the centre axis (1.1), the plates (1.2) perpendicular to the axis and provided with the strips (2.21) on their edge, so that the section of each plate (1.2) has the shape of a double arrow. The anti-clogging elements constituted by cylindrical tubes (1.3) whose diameter is longer than the axis (1.1) are positioned between the various plates (1.2) of the rollers (1), along the axis (1.1).

[0035] Figures 5a, 5b and 5c show other possible variants of the invention, in which the lateral strips (2.22, 2.23) are positioned along the diameter of the plate (1.2) and have the shape of a polygon (2.22) or of a ring (2.23).

Claims

1. Screen for sorting solid waste provided with rollers (1), each roller comprising an axis (1.1) with plates (1.2) parallel to one another and perpendicular to the axis itself, **characterized in that** between the various rollers of an axis there is an anti-clogging element in the shape of a cylindrical tube (1.3), said anti-clogging element being free to travel and being substantially parallel to the axis, and wherein the diameter of said anti-clogging element in the shape of a cylindrical tube is longer than that of the axis and shorter than the . diameter of the plates.

2. Screen for sorting solid waste according to claim 1, **characterized in that** the edge of said parallel plates is provided with a strip (1.21) that is perpendicular to the plate, so that the plate itself has T-shaped section along its entire perimeter.

3. Screen for sorting solid waste according to claim 1, **characterized in that** the edge of said plates is provided with two strips (2.21) inclined towards the centre of the plate, so that the plate itself has arrow-shaped section along its entire perimeter.

4. Screen for sorting solid waste according to claim 1, **characterized in that** the diameter of the plates is provided with two strips (2.22) that are perpendicular to the plate, so that the plate itself has cross-shaped section along its entire perimeter

5. Screen for sorting solid waste according to claim 1, 2, 3 or 4, **characterized in that** the plates have polygonal section.

6. Screen for sorting solid waste according to claim 1, 2, 3 or 4, **characterized in that** the plates have circular section.

7. Screen for sorting solid waste according to claim 1, 2, 3 or 4, **characterized in that** the plates have elliptic section.

8. Screen for sorting solid waste according to claim 2, 3 or 4, **characterized in that** the lateral strips are polygonal, like the plates.

9. Screen for sorting solid waste according to claim 2, 3 or 4, **characterized in that** the lateral strips (2.23) are annular.

Patentansprüche

1. Sieb zur Abfallsortierung mit Rollen (1), von denen jede eine Achse (1.1) mit Scheiben (1.2) hat, die parallel zueinander und rechtwinklig zur Achse verlaufen, **dadurch gekennzeichnet, daß** zwischen den einzelnen Rollen einer Achse ein Verstopfungen verhinderndes Element in Form eines zylindrischen Rohres (1.3) angeordnet ist, das frei beweglich und im wesentlichen parallel zu der Achse ist, wobei der Durchmesser des Rohres größer als derjenige der Achse und kleiner als derjenige der Scheiben ist.

2. Sieb nach Anspruch 1, **dadurch gekennzeichnet, daß** am Rand der parallelen Scheiben ein Band

(1.21) angebracht ist, das rechtwinklig zur Ebene der Scheibe ausgerichtet ist, so daß die Scheibe über ihren gesamten Umfang einen T-förmigen Querschnitt hat.

3. Sieb nach Anspruch 1, **dadurch gekennzeichnet, daß** am Rand der Scheiben zwei Bänder (2.21) angebracht sind, die zum Zentrum der Scheibe geneigt sind, so daß die Scheibe über ihren gesamten Umfang einen pfeilartigen Querschnitt hat.

4. Sieb nach Anspruch 1, **dadurch gekennzeichnet, daß** an einem Durchmesserbereich der Scheiben zwei Bänder (2.22) angebracht sind, die rechtwinklig zu der Scheibe verlaufen, so daß die Scheibe über ihren gesamten Umfang einen kreuzförmigen Querschnitt hat.

5. Sieb nach einem der Ansprüche 1,2,3 oder 4, **dadurch gekennzeichnet, daß** die Scheiben eine Polygonform haben.

6. Sieb nach einem der Ansprüche 1,2,3 oder 4, **dadurch gekennzeichnet, daß** die Scheiben eine Kreisform haben.

7. Sieb nach einem der Ansprüche 1,2,3 oder 4, **dadurch gekennzeichnet, daß** die Scheiben eine elliptische Form haben.

8. Sieb nach einem der Ansprüche 1,2,3 oder 4, **dadurch gekennzeichnet, daß** die seitlichen Bänder (2.22) eine Polygonform wie die Scheiben haben.

9. Sieb nach einem der Anprüche 1,2,3 oder 4, **dadurch gekennzeichnet, daß** die seitlichen Bänder (2.23) eine Kreisform haben.

Revendications

1. Crible classeur pour le tri de déchets solides comprenant des rouleaux (1) chaucun desquels étant composé d'un axe (1.1) supportant des disques (1.2) parallèles l'un par rapport à l'autre et perpendiculaires à l'axe, **caractérisé par le fait qu'**entre les rouleaux d'un axe est positionné un élément anti-engorgement sous forme de tube cylindrique (1.3) à mouvement libre et généralement parallèle à l'axe, le diamètre dudit élément anti-engorgement sous forme de tube cylindrique étant plus grand que le diamètre de l'axe et plus petit que le diamètre des disques.

2. Crible classeur selon la revendication 1, **caractérisé par le fait qu'**au bord des disques parallèles est fixé un ruban (1.21) perpendiculaire au disque, de sorte que ledit disque présente un profil en T tout autour de son périmètre.

3. Crible classeur selon la revendication 1, **caractérisé par le fait qu'**au bord des disques sont fixés deux rubans (2.21) inclinés vers le centre dudit disque, de sorte que le disque présente un profil en forme de flèche tout autour de son périmètre.

4. Crible classeur selon la revendication 1, **caractérisé par le fait que** sur une zone du diamètre des disques sont fixés deux rubans (2.22) perpendiculaires au disque, de sorte que ledit disque présente un profil en forme de croix tout autour de son périmètre.

5. Crible classeur selon les revendications 1, 2, 3 ou 4, **caractérisé par le fait que** les disques présentent une forme polygonale.

6. Crible classeur selon les revendications 1, 2, 3 ou 4, **caractérisé par le fait que** les disques présentent une forme circulaire.

7. Crible classeur selon les revendications 1, 2, 3 ou 4, **caractérisé par le fait que** les disques présentent une forme elliptique.

8. Crible classeur selon les revendications 1, 2, 3 ou 4, **caractérisé par le fait que** les rubans latéraux (2.22) ont une forme polygonale comme les disques.

9. Crible classeur selon les revendications 1, 2, 3 ou 4, **caractérisé par le fait que** les rubans latéraux (2.22) ont une forme annulaire.

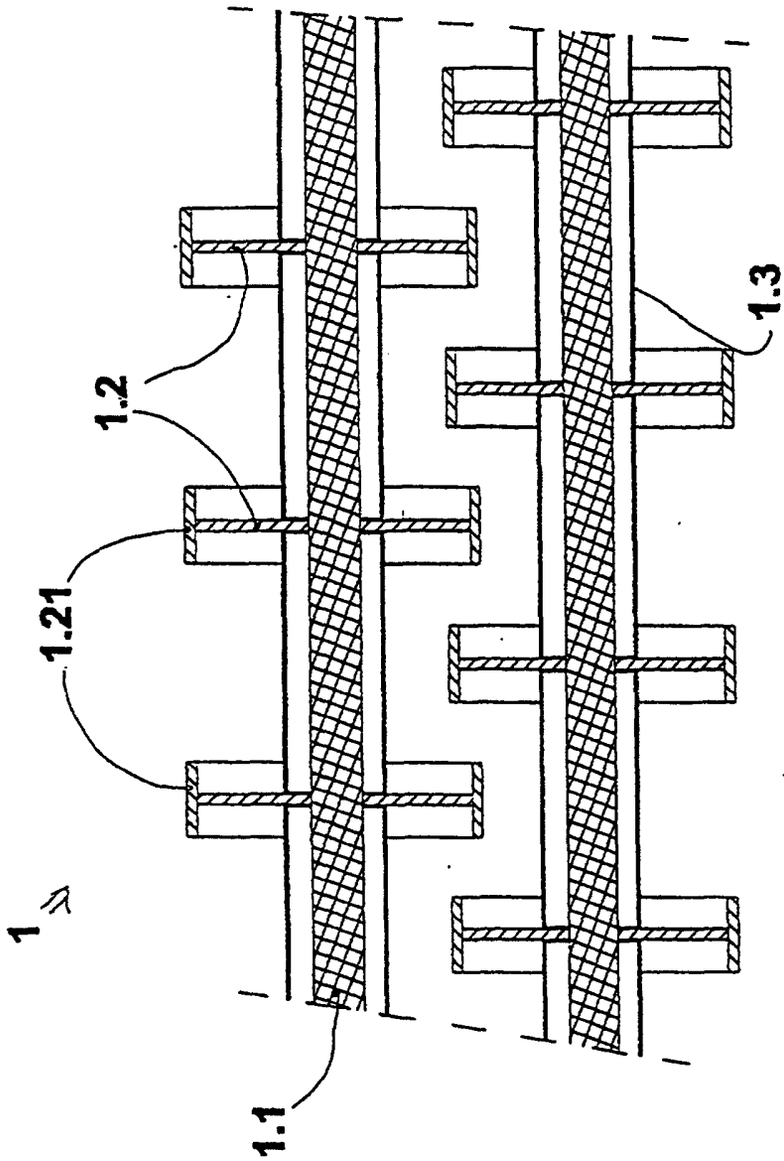


Fig. 1a

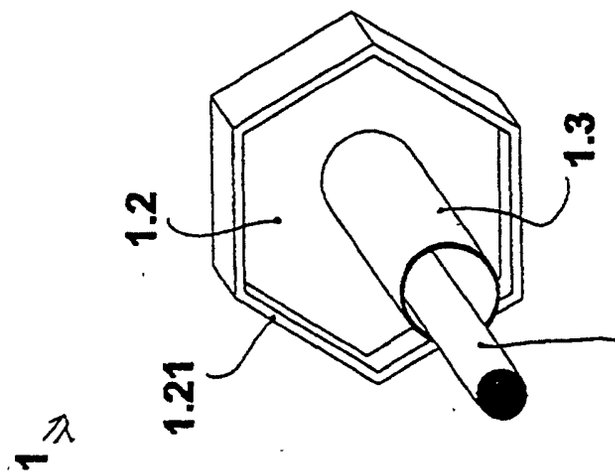


Fig.1b

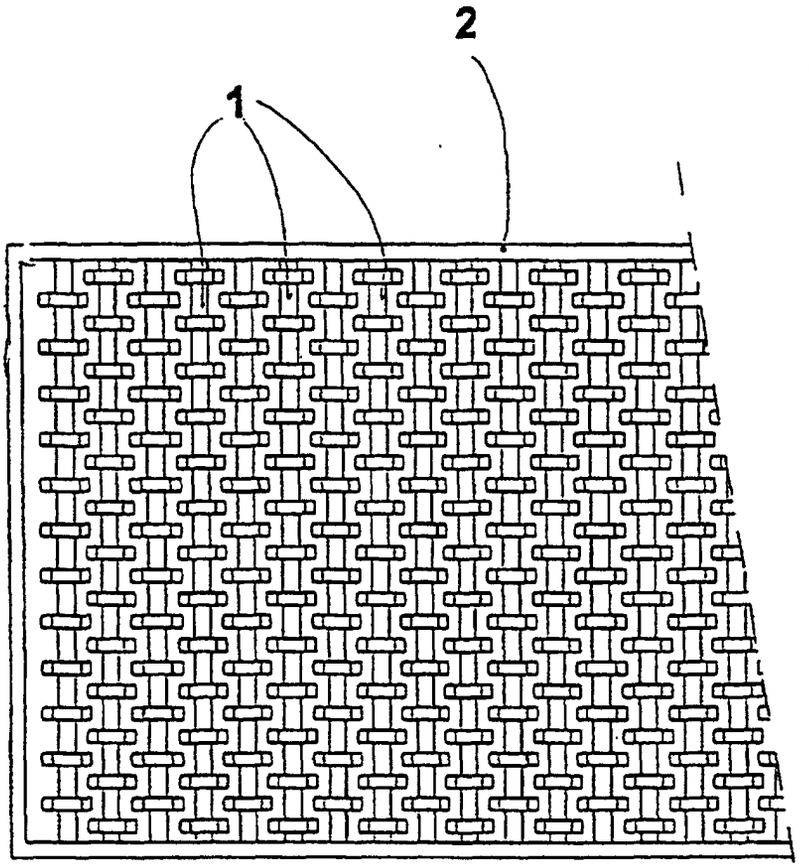


Fig. 2

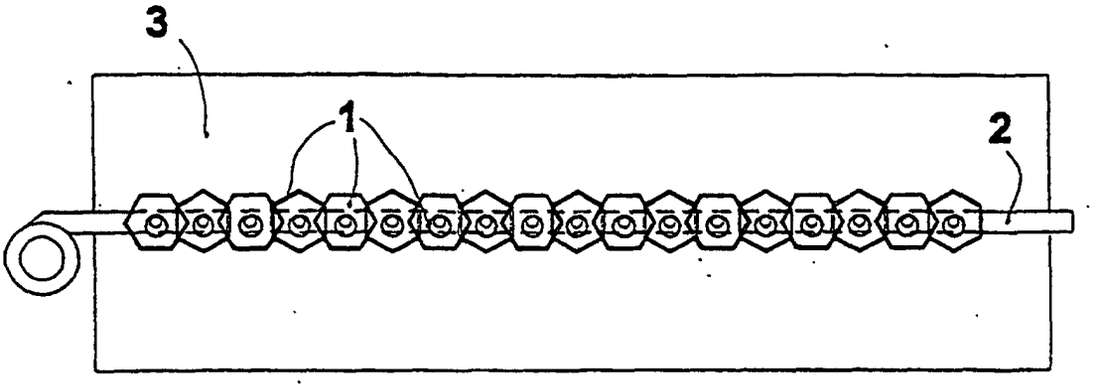


Fig. 3

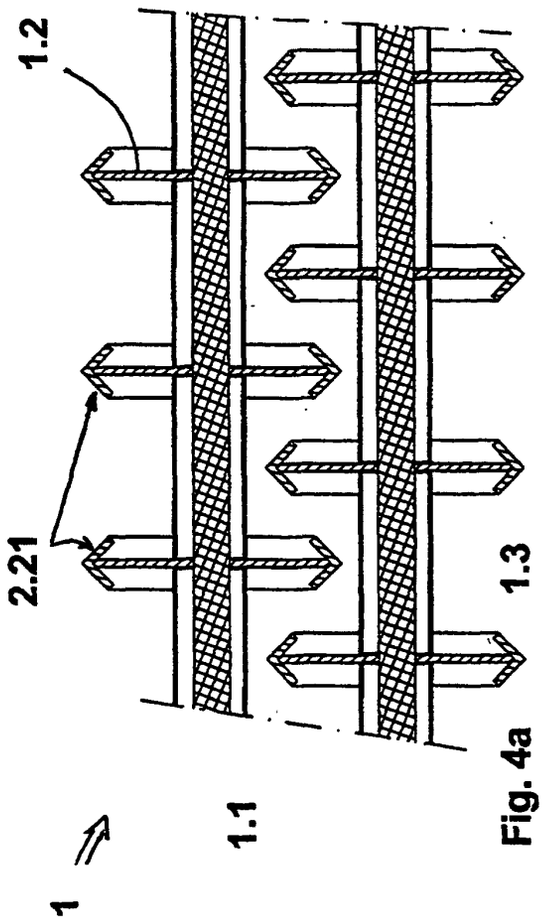


Fig. 4a

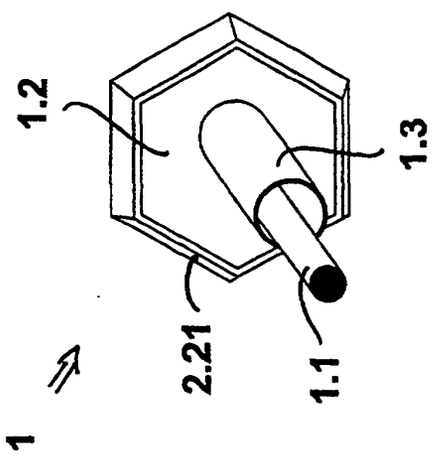


Fig. 4b

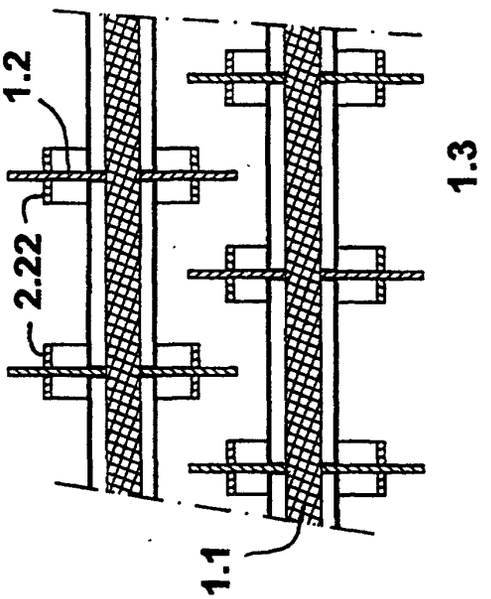


Fig. 5a

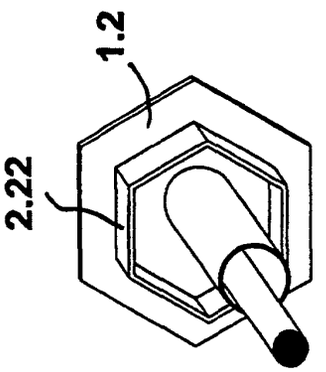


Fig. 5b

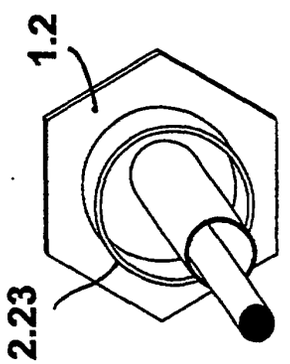


Fig. 5c