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(54) **ACCESSORY FOR MAGNETIC CONSTRUCTION GAMES**

ZUBEHÖR FÜR MAGNETISCHES KONSTRUKTIONSSPIELZEUG

ACCESSOIRE POUR JEU DE CONSTRUCTION MAGNETIQUE

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Description

[0001] The present invention relates to an accessory for magnetic construction games, and in particular to an accessory which allows the mutual movement of one or more member groups of a magnetic construction game.

[0002] WO 99/60583 and DE-U-20208736 disclose magnetic construction games comprising a plurality of magnetic bars suitable for being mutually joined by means of ferromagnetic spheres so as to made up a complex structure.

[0003] WO 02/055168 and WO 02/076565 disclose instead some accessories for said magnetic game, which serve for reinforcing the joining between the magnetic bars and the ferromagnetic spheres.

[0004] However, the structure made up of the magnetic bars, the ferromagnetic spheres and the relevant accessories is substantially static, i.e. does not allow a smooth mutual movement of the members, so that the user's fun is limited with respect to other construction games of the dynamic kind.

[0005] It is therefore an object of the present invention to provide an accessory which overcomes said disadvantage, i.e. an accessory which allows the mutual movement of one or more member groups of a magnetic construction game of the above mentioned kind. Said object is achieved with an accessory, the main features of which are disclosed in the first claim, while other features are disclosed in the subsequent claims.

[0006] Thanks to the ferromagnetic ring and to the ferromagnetic hub, the accessory according to the present invention can be inserted into a complex structure of the magnetic game for allowing the mutual movement of some parts thereof, so that this structure is not static but dynamic.

[0007] Furthermore, thanks to the particular shape, material and/or size of the ring and the hub, the accessory according to the present invention can be added to a known magnetic game without any modification of the existing members nor aesthetic or modularity problems.

[0008] According to a particular aspect of the invention, the accessory according to the present invention can be employed not only for the mutual movement of the parts of a composite structure, but also as a wheel of pulley, so that this structure can slide on any surface or being employed for pulling threads. For this purpose, the ferromagnetic ring of the accessory according to the present invention comprises an outer groove in which a thread can be wound or pulled or a rubber ring can be inserted for improving the sliding on said surface.

[0009] Further advantages and features of the accessory according to the present invention will become clear to those skilled in the art from the detailed and non-limiting description of two embodiments thereof with reference to the attached drawings, wherein:

- figure 1 shows a side view of the accessory according to the first embodiment of the present invention;
- figure 2 shows a front cross-sectioned view along plane II-II of the accessory of figure 1;
- figure 3 shows a front view of the accessory of figure 1;
- figure 4 shows a side view of the accessory according to the second embodiment of the present invention;
- figure 5 shows a front cross-sectioned view along plane V-V of the accessory of figure 4; and
- figure 6 shows a front view of the accessory of figure 4.

[0010] Referring to figures 1 to 3, it is seen that the accessory according to the first embodiment of the invention comprises a ferromagnetic ring 1 and a ferromagnetic hub 2 which is suitable for being arranged in a coaxial manner in the middle of this ring. Ring 1 has a substantially cylindrical profile, as well as a groove 3 along the outer cylindrical surface and/or a groove 4, 5 on one or both circular lateral surfaces. Furthermore, the inner radius R of ring 1 is substantially equal to the sum of the length of the known magnetic bars 6 and the radius of the known ferromagnetic spheres 7, so that two mutually aligned magnetic bars 6 and a ferromagnetic sphere 7 arranged between these bars can be firmly applied inside ring 1. The inner radius R is in particular comprised between 20 and 22 mm or between 31 and 33 mm.

[0011] Hub 2 comprises in turn a ferromagnetic member 8 having a substantially cylindrical shape pivoted by means of a pin 9 between two ferromagnetic members 10, 11 having a substantially hemispherical shape. For this purpose, pin 9 is arranged in a rotating manner in an axial hole, i.e. perpendicular to the center of the circular plane surfaces, made in the ferromagnetic members 8, 10, 11, so that the latter can rotate in an independent matter in the direction indicated by the arrows of figure 2 around the longitudinal axis A of pin 9, which substantially coincides with the axis of ring 1. For preventing the longitudinal sliding of the ferromagnetic members 8, 10, 11 in the axial holes, pin 9 is provided with circular protrusions arranged in corresponding seats made in the axial holes of the ferromagnetic members 10, 11 close to the curved surfaces. Pin 9 is made of steel or brass, while the ferromagnetic members 8, 10, 11 are made of steel, with a high percentage of ferrite. The magnetic bars 6 can thus be applied to any point of the hemispherical or cylindrical surface of the ferromagnetic members 8, 10, 11, so as to allow the mutual rotation of these bars around axis A.

[0012] The outer cylindrical surface of the ferromagnetic member 8 is preferably provided with a groove 12. The width w of grooves 3, 4, 5 and/or 12 is substantially equal to the diameter of the magnetic bars 6, in particular comprised between 5 and 7 mm, so that an end of these bars can be inserted into one of these grooves. The inner radius r of the ferromagnetic member 8 comprised between its axis and the throat of groove 12 is substantially equal to the radius of the ferromagnetic spheres 7.

[0013] The hemispherical surface of the ferromagnetic members 10, 11 is preferably provided with a plurality of holes 13 in which an end of the magnetic bars 6 can be inserted. The inner radius r of the ferromagnetic members 10, 11 comprised between their center and the bottom of holes 13 is substantially equal to the radius of the ferromagnetic spheres 7, in particular comprised between 6 and 7 mm.

[0014] Referring to figures 4 to 6, it is seen that the accessory according to the second embodiment of the invention comprises, as in the first embodiment, a ferromagnetic ring 1 and a ferromagnetic hub 2 arranged in a coaxial manner in the middle of this ring. However, ring 1 is joined to hub 2 by means of a plurality of fixed spokes 14. Furthermore, the two ferromagnetic members 10, 11 having a substantially hemispherical shape pivoted to hub 2 have an outer radius r substantially equal to the radius of the ferromagnetic spheres 7. Furthermore, a rubber ring 15 which projects beyond the outer cylindrical surface of ring 1 can be arranged in the outer groove of this ring.

[0015] Further variations and/or additions may be made by those skilled in the art to the embodiments hereinabove described and illustrated, while remaining within the scope of the invention as defined by the appended claims.

Claims

1. Accessory for magnetic construction games which comprise one or more magnetic bars (6) suitable for being mutually joined through ferromagnetic spheres (7) so as to made up a complex structure, **characterized by** comprising a ferromagnetic ring (1) and a ferromagnetic hub (2) which is suitable for being arranged in a coaxial manner in the middle of this ring (1) and is provided with two or more ferromagnetic members (8, 10, 11) which are mutually pivoted for rotating in an independent manner around an axis (A) which substantially coincides with the axis of the ferromagnetic ring (1).

2. Accessory according to the previous claim, **characterized in that** the ferromagnetic ring (1) has a groove (3) along the outer surface and/or a groove (4, 5) on one or both lateral surfaces.

3. Accessory according to claim 2, **characterized in that** a rubber ring (15) which projects beyond the outer cylindrical surface of the ferromagnetic ring (1) is arranged in the outer groove of this ring (1).

4. Accessory according to one of the previous claims, **characterized in that** the inner radius (R) of the ferromagnetic ring (1) is substantially equal to the sum of the length of said magnetic bars (6) and the radius of said ferromagnetic spheres (7).

5. Accessory according to claim 4, **characterized in that** the inner radius (R) of the ferromagnetic ring (1) is comprised between 20 and 22 mm or between 31 and 33 mm.

6. Accessory according to one of the previous claims, **characterized in that** the ferromagnetic hub (2) comprises a ferromagnetic member (8) having a substantially cylindrical shape pivoted between two ferromagnetic members (10, 11) having a substantially hemispherical shape.

7. Accessory according to claim 6, **characterized in that** the outer surface of the ferromagnetic member (8) having a substantially cylindrical shape is provided with a groove (12).

8. Accessory according to claim 2,3 or 7, **characterized in that** the width (w) of one or more of said grooves (3, 4, 5, 12) is substantially equal to the diameter of said magnetic bars (6).

9. Accessory according to claim 8, **characterized in that** said width (w) is comprised between 5 and 7 mm.

10. Accessory according to claim 7, **characterized in that** the inner radius (r) of the ferromagnetic member (8) having a substantially cylindrical shape comprised between its axis and the throat of its groove (12) is substantially equal to the radius of said ferromagnetic spheres (7).

11. Accessory according to one of claims 6 to 10, **characterized in that** the outer surface of the ferromagnetic members (10, 11) having a substantially hemispherical shape is provided with a plurality of holes (13) in which an end of said magnetic bars (6) can be inserted.

12. Accessory according to claim 11, **characterized in that** the inner radius (r) of the ferromagnetic members (10, 11) having a substantially hemispherical shape comprised between their center and the bottom of the holes (13) is substantially equal to the radius of said ferromagnetic spheres (7).

13. Accessory according to one of claims 6 to 11, **characterized in that** the outer radius (r) of the ferromagnetic members (10, 11) having a substantially hemispherical shape is substantially equal to the radius of said ferromagnetic spheres (7).

14. Accessory according to claim 10, 12 or 13, **characterized in that** said inner or outer radius (r) is comprised between 6 and 7 mm.

15. Accessory according to one of the previous claims,

characterized in that the ferromagnetic ring (1) is joined to the ferromagnetic hub (2) by means of a plurality of fixed spokes (14).

16. Accessory according to one of the previous claims, **characterized in that** a pin (9) is arranged in a rotating manner in an axial hole made in the ferromagnetic members (8, 10, 11) so that the latter can rotate in an independent manner around the longitudinal axis (A) of the pin (9).

17. Accessory according to claim 16, **characterized in that** the pin (9) is provided with circular protrusions arranged in corresponding seats made in the axial holes of the ferromagnetic members (10, 11) having a substantially hemispherical shape close to the curved surfaces.

Patentansprüche

1. Zubehör für magnetische Konstruktionsspielzeuge, die einen oder mehrere Magnetstäbe (6) umfassen, die dazu geeignet sind, miteinander durch ferromagnetische Kugeln (7) so verbunden zu werden, dass sich eine komplexe Struktur ergibt, **dadurch gekennzeichnet, dass** es einen ferromagnetischen Ring (1) und eine ferromagnetische Nabe (2) umfasst, die dazu geeignet ist, auf koaxiale Weise in der Mitte dieses Rings (1) angeordnet zu werden, und mit zwei oder mehr ferromagnetischen Elementen (8, 10, 11) versehen ist, welche zueinander drehbar gelagert sind, um sich auf unabhängige Weise um eine Achse (A), die im Wesentlichen mit der Achse des ferromagnetischen Rings (1) zusammenfällt, zu drehen.

2. Zubehör nach dem vorhergehenden Anspruch, **dadurch gekennzeichnet, dass** der ferromagnetische Ring (1) eine Nut (3) entlang der Außenfläche und/oder eine Nut (4, 5) an einer oder beiden seitlichen Fläche(n) aufweist.

3. Zubehör nach Anspruch 2, **dadurch gekennzeichnet, dass** ein Gummiring (15), der über die äußere zylindrische Fläche des ferromagnetischen Rings (1) hinausragt, in der äußeren Nut dieses Rings (1) angeordnet ist.

4. Zubehör nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Innenradius (R) des ferromagnetischen Rings (1) im Wesentlichen gleich der Summe aus der Länge der Magnetstäbe (6) und dem Radius der ferromagnetischen Kugeln (7) ist.

5. Zubehör nach Anspruch 4, **dadurch gekennzeichnet, dass** der Innenradius (R) des ferromagnetischen Rings (1) zwischen 20 und 22 mm oder zwischen 31 und 33 mm beträgt.

6. Zubehör nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die ferromagnetische Nabe (2) ein eine im Wesentlichen zylindrische Gestalt aufweisendes ferromagnetisches Element (8) umfasst, das zwischen zwei eine im Wesentlichen halbkugelförmige Gestalt aufweisenden ferromagnetischen Elementen (10, 11) gedreht wird.

7. Zubehör nach Anspruch 6, **dadurch gekennzeichnet, dass** die Außenfläche des eine im Wesentlichen zylindrische Gestalt aufweisenden ferromagnetischen Elements (8) mit einer Nut (12) versehen ist.

8. Zubehör nach Anspruch 2, 3 oder 7, **dadurch gekennzeichnet, dass** die Breite (w) einer oder mehrerer der Nuten (3, 4, 5, 12) im Wesentlichen gleich dem Durchmesser der Magnetstäbe (6) ist.

9. Zubehör nach Anspruch 8, **dadurch gekennzeichnet, dass** die Breite (w) zwischen 5 und 7 mm beträgt.

10. Zubehör nach Anspruch 7, **dadurch gekennzeichnet, dass** der Innenradius (r) des eine im Wesentlichen zylindrische Gestalt aufweisenden ferromagnetischen Elements (8) zwischen dessen Achse und der Kehle von dessen Nut (12) im Wesentlichen gleich dem Radius der ferromagnetischen Kugeln (7) ist.

11. Zubehör nach einem der Ansprüche 6 bis 10, **dadurch gekennzeichnet, dass** die Außenfläche der eine im Wesentlichen halbkugelförmige Gestalt aufweisenden ferromagnetischen Elemente (10, 11) mit einer Vielzahl von Löchern (13) versehen ist, in welche ein Ende der Magnetstäbe (6) eingesetzt werden kann.

12. Zubehör nach Anspruch 11, **dadurch gekennzeichnet, dass** der Innenradius (r) der eine im Wesentlichen halbkugelförmige Gestalt aufweisenden ferromagnetischen Elemente (10, 11) zwischen deren Zentrum und dem Boden der Löcher (13) im Wesentlichen gleich dem Radius der ferromagnetischen Kugeln (7) ist.

13. Zubehör nach einem der Ansprüche 6 bis 11, **dadurch gekennzeichnet, dass** der Außenradius (r) der eine im Wesentlichen halbkugelförmige Gestalt aufweisenden ferromagnetischen Elemente (10, 11) im Wesentlichen gleich dem Radius der ferromagnetischen Kugeln (7) ist.

14. Zubehör nach Anspruch 10, 12 oder 13, **dadurch**

gekennzeichnet, dass der Innen- oder Außenradius (r) zwischen 6 und 7 mm beträgt.

15. Zubehör nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der ferromagnetische Ring (1) mit der ferromagnetischen Nabe (2) mittels einer Vielzahl von feststehenden Speichen (14) verbunden ist.

16. Zubehör nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** ein Zapfen (9) auf drehbare Weise in einem in den ferromagnetischen Elementen (8, 10, 11) erstellten axialen Loch angeordnet ist, so dass letztere sich auf unabhängige Weise um die Längsachse (A) des Zapfens (9) drehen können.

17. Zubehör nach Anspruch 16, **dadurch gekennzeichnet, dass** der Zapfen (9) mit kreisförmigen Vorsprüngen versehen ist, die in entsprechenden, in den axialen Löchern der eine im Wesentlichen halbkugelförmige Gestalt aufweisenden ferromagnetischen Elemente (10, 11) gefertigten Sitzen nahe den gekrümmten Oberflächen angeordnet sind.

Revendications

1. Accessoire pour jeu de construction magnétique qui comporte une ou plusieurs barres magnétiques (6) adaptées pour être reliées mutuellement par l'intermédiaire de sphères ferromagnétiques (7) de manière à constituer une structure complexe, **caractérisé en ce qu'**il comporte un anneau ferromagnétique (1) et un moyeu ferromagnétique (2) qui est adapté pour être agencé de manière coaxiale au milieu de cet anneau (1) et qui est muni de deux ou plus de deux éléments ferromagnétiques (8, 10, 11) qui sont montés mutuellement pivotants pour tourner d'une manière indépendante autour d'un axe (A) qui coïncide sensiblement avec l'axe de l'anneau ferromagnétique (1).

2. Accessoire selon la revendication 1, **caractérisé en ce que** l'anneau ferromagnétique (1) a une gorge (3) le long de la surface extérieure et/ou une gorge (4, 5) sur une ou les deux surfaces latérales.

3. Accessoire selon la revendication 2, **caractérisé en ce qu'**un anneau en caoutchouc (15) qui fait saillie au-delà de la surface cylindrique extérieure de l'anneau ferromagnétique (1) est agencé dans la gorge extérieure de cet anneau (1).

4. Accessoire selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le rayon intérieur (R) de l'anneau ferromagnétique (1) est sensiblement égal à la somme de la longueur desdites barres magnétiques (6) et du rayon desdites sphères ferromagnétiques (7).

5. Accessoire selon la revendication 4, **caractérisé en ce que** le rayon intérieur (R) de l'anneau ferromagnétique (1) est compris entre 20 et 22 mm ou entre 31 et 33 mm.

6. Accessoire selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le moyeu ferromagnétique (2) comporte un élément ferromagnétique (8) ayant une forme sensiblement cylindrique monté pivotant entre deux éléments ferromagnétiques (10, 11) ayant une forme sensiblement hémisphérique.

7. Accessoire selon la revendication 6, **caractérisé en ce que** la surface extérieure de l'élément ferromagnétique (8) ayant une forme sensiblement cylindrique est munie d'une gorge (12).

8. Accessoire selon la revendication 2, 3 ou 7, **caractérisé en ce que** la largeur (w) d'une ou plusieurs desdites gorges (3, 4, 5, 12) est sensiblement égale au diamètre desdites barres magnétiques (6).

9. Accessoire selon la revendication 8, **caractérisé en ce que** ladite largeur (w) est comprise entre 5 et 7 mm.

10. Accessoire selon la revendication 7, **caractérisé en ce que** le rayon intérieur (r) de l'élément ferromagnétique (8) ayant une forme sensiblement cylindrique, compris entre son axe et le fond de sa gorge (12) est sensiblement égal au rayon desdites sphères ferromagnétiques (7).

11. Accessoire selon l'une quelconque des revendications 6 à 10, **caractérisé en ce que** la surface extérieure des éléments ferromagnétiques (10, 11) ayant une forme sensiblement hémisphérique est munie d'une pluralité de trous (13) dans lesquels une extrémité desdites barres magnétiques (6) peut être insérée.

12. Accessoire selon la revendication 11, **caractérisé en ce que** le rayon intérieur (r) des éléments ferromagnétiques (10, 11) ayant une forme sensiblement hémisphérique, compris entre leur centre et le fond des trous (13) est sensiblement égal au rayon desdites sphères ferromagnétiques (7).

13. Accessoire selon l'une quelconque des revendications 6 à 11, **caractérisé en ce que** le rayon extérieur (r) des éléments ferromagnétiques (10, 11) ayant une forme sensiblement hémisphérique est sensiblement égal au rayon desdites sphères ferromagnétiques (7).

14. Accessoire selon la revendication 10, 12 ou 13, **caractérisé en ce que** ledit rayon intérieur ou extérieur (r) est compris entre 6 et 7 mm.

15. Accessoire selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'anneau ferromagnétique (1) est relié au moyeu ferromagnétique (2) par l'intermédiaire d'une pluralité de rayons fixes (14).

16. Accessoire selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'**un arbre (9) est agencé de manière rotative dans un trou axial réalisé dans les éléments ferromagnétiques (8, 10, 11) de sorte que ces derniers peuvent tourner de manière indépendante autour de l'axe longitudinal (A) de l'arbre (9).

17. Accessoire selon la revendication 16, **caractérisé en ce que** l'arbre (9) est muni de saillies circulaires agencées dans des sièges correspondants réalisés dans les trous axiaux des éléments ferromagnétiques (10, 11) ayant une forme sensiblement hémisphérique, à proximité des surfaces incurvées.

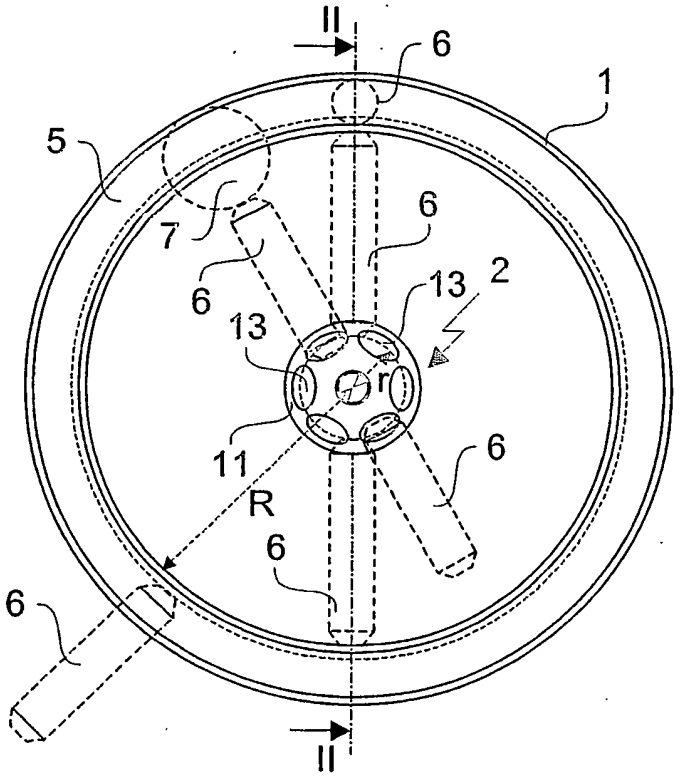

Fig. 1

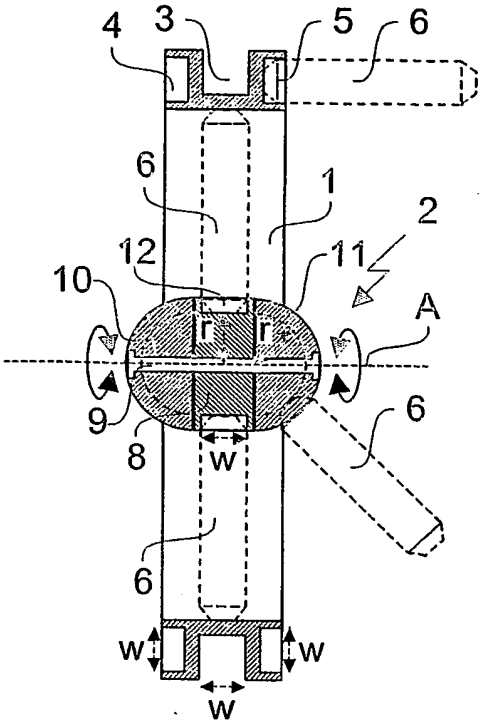

Fig. 2

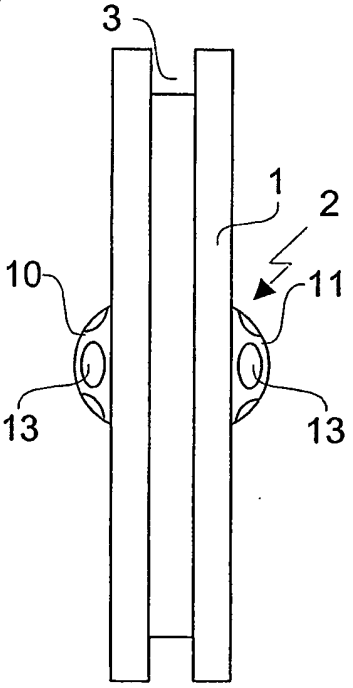

Fig. 3

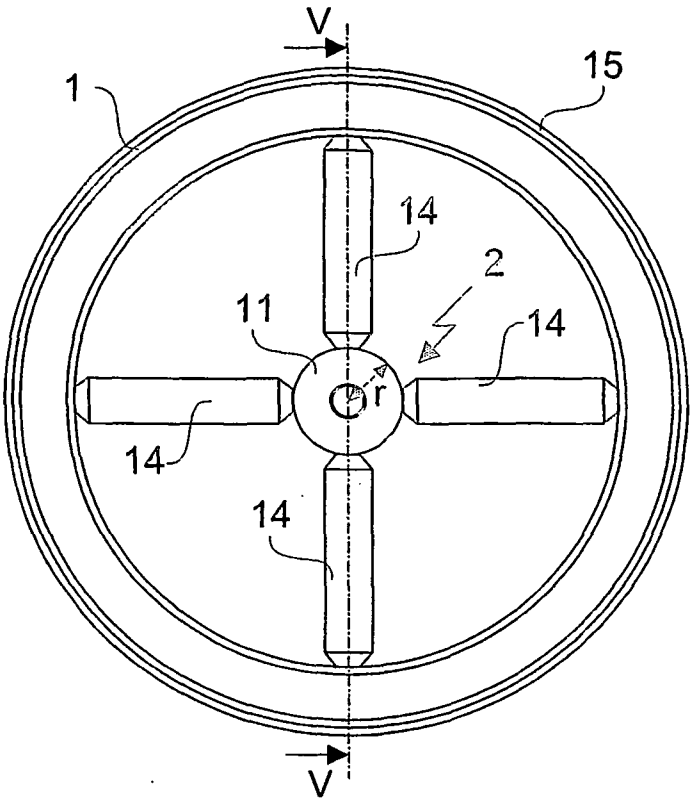

Fig. 4

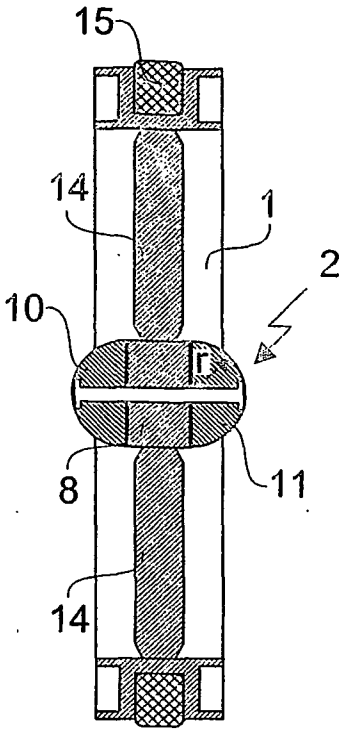

Fig. 5

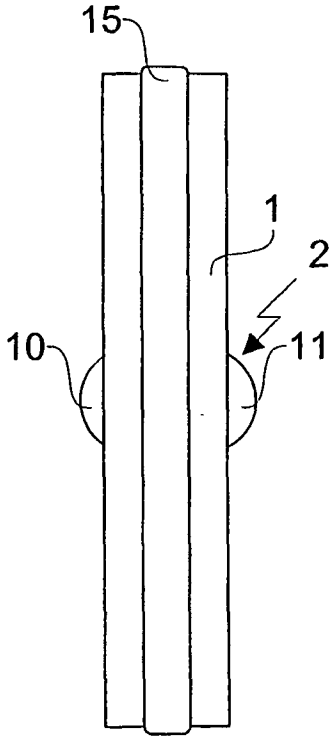

Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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