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(54) **Removable connector for peristaltic pump**

Abnehmbares Verbindungsstück für peristaltische Pumpe

Raccords amovible pour pompe peristaltique

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Description

[0001] The present invention relates to a peristaltic pump comprising a removable connector.

[0002] EP 1763636 B1 is considered to represent the closest prior art and discloses a roller or peristaltic pump comprising a stator provided with a pump seat formed therein, formed in the carter of the same, and a rotor, which acts on a flexible pipe disposed in an arcuate manner in said pump seat, and that is itself fixed to said peristaltic pump by means of a removable connector.

[0003] Said removable connector realises the hydraulic connection between said flexible pipe inside said pump seat, and two flexible pipes, external to said pump seat, for the feed and delivery of a fluid. It is made of elastically flexible plastic material.

[0004] The stator carter provides, laterally with respect to the pump seat, two fixing elements with different shapes, in order to permit the housing of said removable connector, which is fixed between the same to allow the shape mating and further elastic snap.

[0005] More specifically, in order to allow said shape mating and further snap, one of said two fixing housings is made in the shape of a curvilinear arc, while the other of said two housings is made with angular configuration.

[0006] However, said known removable connector has a structure which necessarily needs two following steps of implementation, that are:

- primarily, insertion between said two fixing housings by means of shape mating,
- then, further insertion until the realization of said elastic snap, which ensures the stable fixing.

[0007] It is evident that said known removable connector presents inevitable practical difficulties for the operator, both during the step of inserting between said two fixing housings, and the step of decomposition with respect to the same, since it does not permit an only and continuous operation of both insertion and fixing, in a fast way and in safety conditions.

[0008] The present invention, starting from the notion of the aforesaid problems, intends to provide a solution.

[0009] An object of the present invention is to provide a removable connector for peristaltic pump, able to allow an easy and fast assembly and following decomposition, in fully safe conditions.

[0010] A further object of the present invention is to provide a removable connector for peristaltic pump, having a simplified structure and relatively low costs.

[0011] In view of these objects, the present invention provides a removable connector for peristaltic pump, the essential characteristic of which forms the subject of claim 1.

[0012] Further advantageous characteristics of the invention are described in the dependent claims.

[0013] The aforesaid claims are intended as fully incorporated herein. These and other objects, character-

istics and advantages of the present invention will be more apparent from the detailed description below with reference to the accompanying drawing, provided purely by way of non-limiting example, wherein:

- Figure 1 is a three-dimensional perspective view from above of an example of embodiment of the removable connector for peristaltic pump, according to the present invention;
- Figure 2 is a similar view to the one of Fig. 1, but seen in perspective from below;
- Figure 3 is a plan view from above and in minor scale of the removable connector for peristaltic pump of Fig. 1;
- Figure 4 is a plan view from below of the removable connector for peristaltic pump of Fig. 3;
- Figures 5 and 6 are sectional views, according to the lines V-V and VI-VI of Fig. 4, respectively;
- Figure 7 is a view in the direction of the arrow VII of Figure 4;
- Figure 8 is a plan view from above of a peristaltic pump, in the stator seat of which the removable connector according to the invention is applied.

[0014] First of all, with reference to Figure 8, letter P indicates as a whole a peristaltic pump comprising a stator, having a pump seat S formed in the same, and a rotor R, which acts on a flexible pipe F, housed in an arcuate manner inside said pump seat S, and that is in turn fixed in said seat S by means of a removable connector 10, subject of the present invention.

[0015] Said removable connector 10 realizes the hydraulic connection between said flexible pipe F inside said seat S, and two flexible pipes T, T' external to said seat S, for the feed and delivery of a fluid, in particular human blood. Said internal pipe F has a larger diameter than the one of said flexible pipes T, T'.

[0016] Said removable connector 10 is made of elastically flexible plastic material.

[0017] The stator carter of said peristaltic pump P has, in said seat S, a lateral opening A, delimited by two different-shaped fixing housings M, M', to permit the housing of said removable connector 10.

[0018] In particular, said housing M is made with profile of a curvilinear arc, while the housing M' is made with angular configuration.

[0019] With reference to Figures 1 and 2, said removable connector 10 comprises two tubular sections 11, 11', mutually superimposed and in a single body (refer to Figures 5 and 6).

[0020] As can be clearly seen also from Figure 4, the axis of said two tubular sections 11, 11', in plan view, form a substantially X-shaped configuration (refer to Figures 3 and 4), wherein each of said tubular sections 11, 11', comprises:

- a first end 12, 12' including a cylindrical cavity 13, 13' of larger diameter, end which - when said con-

connector 10 is housed in said opening A of said seat S - is located inside said seat S and wherein there is fixed, with seal, a respective end of said flexible pipe of larger diameter F;

- a second end 14, 14', which - when said connector 10 is housed in said opening A of said seat S - is partly external with respect to said seat S, and includes a cylindrical cavity 15, 15' of lesser diameter with respect to that of said first end, and wherein there is fixed with seal an end of a respective of said flexible pipes of lesser diameter T, T'.

[0021] Each pair of ends of said tubular sections 11, 11', formed by a first and by a second of said ends 12/14', 12'/14 of the one and of the other tubular section 11, 11', provides, respectively, a substantially V-shaped elastic clamp 16, 16', which - when said connector 10 is housed in said opening A of said seat S - elastically surrounds a respective of said fixing housings M, M', maintaining stably in position the same removable connector 10, as a result of bilateral elastic clamping.

[0022] Said substantially V-shaped elastic clamps 16, 16' have each other a mirror image symmetry with respect to the vertical median plane of the X-shaped configuration formed by the axes of the tubular sections 11, 11' of said removable connector 10. Said removable connector 10 further comprises a finger projection 18, provided on one of said second ends 14, and which - when said connector 10 is accurately housed in said opening A, engages from below a corresponding protrusion of the fixing housing M' (Figure 8), improving the fixing stability of the same removable connector 10 between said housings M, M' of the pump P.

[0023] In order to improve the structural robustness of said removable connector 10, said second ends 14, 14' also have integrated stiffening projections, 19, protruding upwards and 19', protruding downward.

[0024] On the other hand, in order to facilitate correct positioning of said removable connector 10 in said opening A of the seat S, between said housings M, M', in the upper part of one of said second ends 14', there is provided a fixed button 17, on which the operator intuitively practices a downward pressure, when installing the connector 10.

[0025] In addition, in order to provide a further grant of correct operational positioning of said removable connector 10, one of said second ends 14' is provided, in its inferior part, with an integrated pin 20 protruding downward and that, when said removable connector 10 is correctly positioned, is inserted in a corresponding hole (not shown) provided in said pump seat S. When the insertion of said pin 20 in said hole is realized, the operator is provided with the confirmation that the correct positioning and stable insertion of said removable connector 10 in said opening A of said pump seat S, between said housings M, M', have happened, and so it is possible to proceed with the starting up of the peristaltic pump in safety conditions.

[0026] The stable positioning of said connector 10 in said opening A of said seat S as a consequence of bilateral elastic clamp of the end 12/14', 12'/14 pairs, is also easily detachable by manual extraction of the same connector 10 from above with respect to said seat S. Considering the foregoing description, the steps of stable positioning and decomposition of said removable connector 10 with respect to the housings M, M' of the pump seat S, are evident and so are not further described.

[0027] Thus, said removable connector 10 according to the invention comprises, as evident from what is written and illustrated, a structure that permits an easy, fast and safe insertion and following decomposition of the same with respect to the pump seat S, able to allow the operator to operate with fast manoeuvres and in safe conditions.

[0028] Further, said removable connector 10 has a simplified structure, with relatively low costs.

[0029] As will be clear from the foregoing, the present invention allows the objects set forth in the introduction of the present description to be achieved in a simple and effective manner.

Claims

1. Peristaltic pump comprising a removable connector (10), made of elastically flexible plastic material, for hydraulic connection between a flexible pipe (F), housed in an arcuate manner inside a seat (S) of a peristaltic pump (P), and two flexible pipes (T, T') external to said seat (S), for the feed and delivery of a fluid, respectively, said removable connector (10) being positioned between two opposed fixing housings (M, M'), provided in a lateral opening (A) of said seat (S),
said removable connector (10) comprises two tubular sections (11, 11'), mutually superimposed and in a single body, wherein the axes, in plan view, form a substantially X-shaped configuration, **characterized in that** each of said tubular sections (11, 11'), comprises:

- a first end (12, 12') including a cylindrical cavity (13, 13') of larger diameter; end which - when said connector (10) is housed in said opening (A) of said seat (S)- is located inside said seat (S) and wherein there is fixed, with seal, a respective end of said flexible pipe of larger diameter (F);

- a second end (14, 14'), which - when said connector (10) is housed in said opening (A) of said seat (S)- is partly external with respect to said seat (S), and includes a cylindrical cavity (15, 15') of lesser diameter with respect to that of said first end, and wherein there is fixed with seal an end of a respective of said flexible pipes of lesser diameter (T, T'),

and in that

each pair of ends of said tubular sections (11, 11') formed by a first and by a second of said ends (12/14', 12'/14) of the one and of the other tubular section (11, 11'), provides a substantially V-shaped elastic clamp (16, 16'), which - when said connector (10) is housed in said opening (A) of said seat (S)- elastically surrounds a respective of said fixing housings (M, M'), maintaining stably in position the same removable connector (10),
as a result of bilateral elastic clamping easily detachable by manual extraction of said connector (10) from above with respect to said seat (S).

2. Peristaltic pump comprising a removable connector (10) according to claim 1, **characterized in that** it comprises a projection (18), provided on one of said second ends (14, 14'), and which - when said connector (10) is housed in said opening (A) of said seat (S)- engages from below a corresponding protrusion of one of said fixing housings (M, M'), improving the fixing stability of the removable connector (10) between said housings (M, M').
3. Peristaltic pump comprising a removable connector (10) according to claim 1 and/or 2, **characterized in that** on one of said second ends (14') there is provided a fixed button (17) to facilitate correct positioning of the removable connector (10) between said housings (M, M').
4. Peristaltic pump comprising a removable connector (10) according to any one of the preceding claims, **characterized in that** at least one of said second ends (14, 14') has at least one integrated stiffening projection (19, 19').
5. Peristaltic pump comprising a removable connector (10) according to claim 1, **characterized in that** said substantially V-shaped elastic clamps (16, 16') have mirror image symmetry with respect to the vertical median plane of the X-shaped configuration formed by the axes of the tubular sections 11, 11' of said removable connector 10.

Patentansprüche

1. Peristaltische Pumpe umfassend ein lösbares, aus elastisch biegsamem Kunststoff hergestelltes Anschlußstück (10) zur hydraulischen Verbindung von einem gekrümmt im Inneren eines Gehäuses (S) einer peristaltischen Pumpe (P) angeordneten Schlauch (F) mit zwei sich außerhalb des besagten Gehäuses (S) befindliche Schläuchen (T, T'), jeweils zur Zuführung und Ausgabe eines Fluids, wobei das besagte lösbare Anschlußstück (10) zwischen zwei gegenüberliegenden, in einer Seitenöffnung (A) des

besagten Gehäuses (S) vorhandenen Befestigungsaufnahmen (M, M') angeordnet ist, wobei das besagte lösbare Anschlußstück (10) zwei rohrartige, sich gegenseitig überlagernde und einen einzigen Körper bildende Abschnitte (11, 11') umfasst, deren Achsen im Grundriss gesehen einen im Wesentlichen x-förmigen Aufbau bilden, **dadurch gekennzeichnet, dass** jeder der besagten rohrartigen Abschnitte (11, 11') folgendes umfasst:

- ein erstes einen zylinderförmigen Hohlraum (13, 13') größeren Durchmessers einschließendes Ende (12, 12'); Ende, das sich - wenn besagtes Anschlußstück (10) in besagter Öffnung (A) von besagtem Gehäuse (S) aufgenommen ist - im Inneren des besagten Gehäuses (S) befindet und in dem ein jeweiliges Ende des besagten Schlauchs größeren Durchmessers (F) abgedichtet befestigt ist;
- ein zweites Ende (14, 14'), das wenn besagtes Anschlußstück (10) in besagter Öffnung (A) von besagtem Gehäuse (S) aufgenommen ist - teilweise außerhalb des besagten Gehäuses (S) liegt und einen zylinderförmigen Hohlraum (15, 15') mit einem geringeren Durchmesser gegenüber dem des besagten ersten Endes einschließt, und in dem ein Ende eines jeweiligen der besagten Schläuche geringeren Durchmessers (T, T') abgedichtet befestigt ist,

und dadurch, dass

jedes Endenpaar der besagten rohrartigen Abschnitte (11, 11'), das aus einem ersten und aus einem zweiten der besagten Enden (12/14, 12'/14) des einen und des anderen rohrartigen Abschnitts (11, 21') gebildet ist, mit einem elastischen im Wesentlichen V-förmigen Greifer (16, 16') versehen ist, der - wenn besagtes Anschlußstück (10) in besagter Öffnung (A) von besagtem Gehäuse (S) aufgenommen ist - elastisch an einer jeweiligen der besagten Befestigungsaufnahmen (M, M') angreift, wobei er das Anschlußstück (10) selbst, durch elastische, zweiseitige, leicht durch manuelles Herausziehen des besagten Anschlußstücks (10) von oben gegenüber besagtem Gehäuse (S) entriegelbare Einspannung, stabil in Position hält.

2. Peristaltische Pumpe umfassend ein lösbares Anschlußstück (10) nach Anspruch 1, **dadurch gekennzeichnet, dass** sie einen auf einem der besagten zweiten Enden (14, 14') vorhandenen Vorsprung (18) umfasst, und dass sie - wenn besagtes Anschlußstück (10) in besagter Öffnung (A) von besagtem Gehäuse (S) aufgenommen ist - von unten in eine entsprechende Auskragung einer der besagten Befestigungsaufnahmen (M, M') eingreift, wobei die Stabilität der Befestigung des lösbaren Anschlußstücks (10) zwischen den besagten Aufnah-

men (M, M') verbessert wird.

3. Peristaltische Pumpe umfassend ein lösbares Anschlussstück (10) nach Anspruch 1 und/oder 2, **dadurch gekennzeichnet, dass** auf einem der besagten zweiten Enden (14') ein fester Druckknopf (17) vorhanden ist, um die korrekte Positionierung des lösbaren Anschlussstücks (10) zwischen den besagten Aufnahmen (M, M') zu erleichtern. 5
4. Peristaltische Pumpe umfassend ein lösbares Anschlussstück (10) nach einem beliebigen der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** zumindest eines der besagten zweiten Enden (14, 14') zumindest einen vollständigen Verstärkungsvorsprung (19, 19') aufweist. 10
5. Peristaltische Pumpe umfassend ein lösbares Anschlussstück (10) nach Anspruch 1, **dadurch gekennzeichnet, dass** die besagten elastischen, im Wesentlichen V-förmigen Greifer (16, 16') zueinander spiegelsymmetrisch bezüglich der vertikalen Mittelebene des von den Achsen der rohrartigen Abschnitte (11, 11') des besagten lösbaren Anschlussstücks (10) gebildeten X-förmigen Aufbaus sind. 15 20 25

Revendications

1. Pompe péristaltique comprenant un raccord amovible (10), réalisé en matière plastique élastiquement flexible, pour la liaison hydraulique entre un tuyau flexible (F), logé de manière arquée au sein d'un siège (S) d'une pompe péristaltique (P), et deux tuyaux flexibles (T, T') extérieurs audit siège (S), destinés respectivement à l'alimentation et à la distribution d'un fluide, ledit raccord amovible (10) étant placé entre deux logements de fixation (M, M') en vis-à-vis, pourvus dans une ouverture latérale (A) dudit siège (S), ledit raccord amovible (10) comprenant deux tronçons tubulaires (11, 11') réciproquement superposés et d'un seul tenant, dont les axes vus en plan forment une configuration sensiblement en X, **caractérisée en ce que** chacun desdits tronçons tubulaires (11, 11') comprend : 30 35 40 45
 - une première extrémité (12, 12') comportant une cavité cylindrique (13, 13') de plus grand diamètre ; ladite extrémité - lorsque ledit raccord (10) est logé dans ladite ouverture (A) dudit siège (S) - étant située au sein dudit siège (S) et dans laquelle une extrémité respective dudit tuyau flexible de plus grand diamètre (F) est fixée de manière étanche; 50
 - une deuxième extrémité (14, 14'), laquelle - lorsque ledit raccord (10) est logé dans ladite ouverture (A) dudit siège (S) - est partiellement extérieure par rapport audit siège (S) et inclut 55
2. Pompe péristaltique comprenant un raccord amovible (10) selon la revendication 1, **caractérisée en ce qu'elle** comprend un bourrelet (18) prévu sur l'une desdites deuxième extrémités (14, 14') et qui - lorsque ledit raccord (10) est logé dans ladite ouverture (A) dudit siège (S) - engage par le dessous une saillie correspondante de l'un desdits logements de fixation (M, M') améliorant ainsi la stabilité de la fixation du raccord amovible (10) entre lesdits logements (M, M').
3. Pompe péristaltique comprenant un raccord amovible (10) selon la revendication 1 et/ou 2, **caractérisée en ce que** sur l'une desdites deuxième extrémités (14') il est pourvu un bouton-poussoir fixe (17) pour faciliter le positionnement correct du raccord amovible (10) entre lesdits logements (M, M').
4. Pompe péristaltique comprenant un raccord amovible (10) selon l'une quelconque des revendications précédentes, **caractérisée en ce que** au moins l'une desdites deuxième extrémités (14, 14') présente au moins un bourrelet de raidissement (19, 19') intégral.
5. Pompe péristaltique comprenant un raccord amovible (10) selon la revendication 1, **caractérisée en ce que** lesdits pinces élastiques (16, 16') sensiblement en forme de V sont mutuellement symétriques de manière spéculaire par rapport au plan médian vertical de la configuration en X formée par les axes des tronçons tubulaires (11, 11') dudit raccord amovible (10).

une cavité cylindrique (15, 15') de plus petit diamètre par rapport à celle de ladite première extrémité, et dans laquelle une extrémité d'un respectif desdits tuyaux flexibles de plus petit diamètre (T, T') est fixée de manière étanche,

et en ce que

chaque couple d'extrémités desdits tronçons tubulaires (11, 11'), formé par une première et une deuxième desdites extrémités (12/14', 12'/14) de l'un et de l'autre tronçon tubulaire (11, 11'), pourvoit une pince élastique sensiblement en forme de V (16, 16') qui - lorsque ledit raccord (10) est logé dans ladite ouverture (A) dudit siège (S) - engage de manière élastique le logement respectif desdites logements de fixation (M, M'), en maintenant en position le même raccord amovible (10) de façon stable sous l'effet d'un serrage élastique bilatéral facilement démontable au moyen d'une extraction manuelle par le haut dudit raccord (10) par rapport audit siège (S).

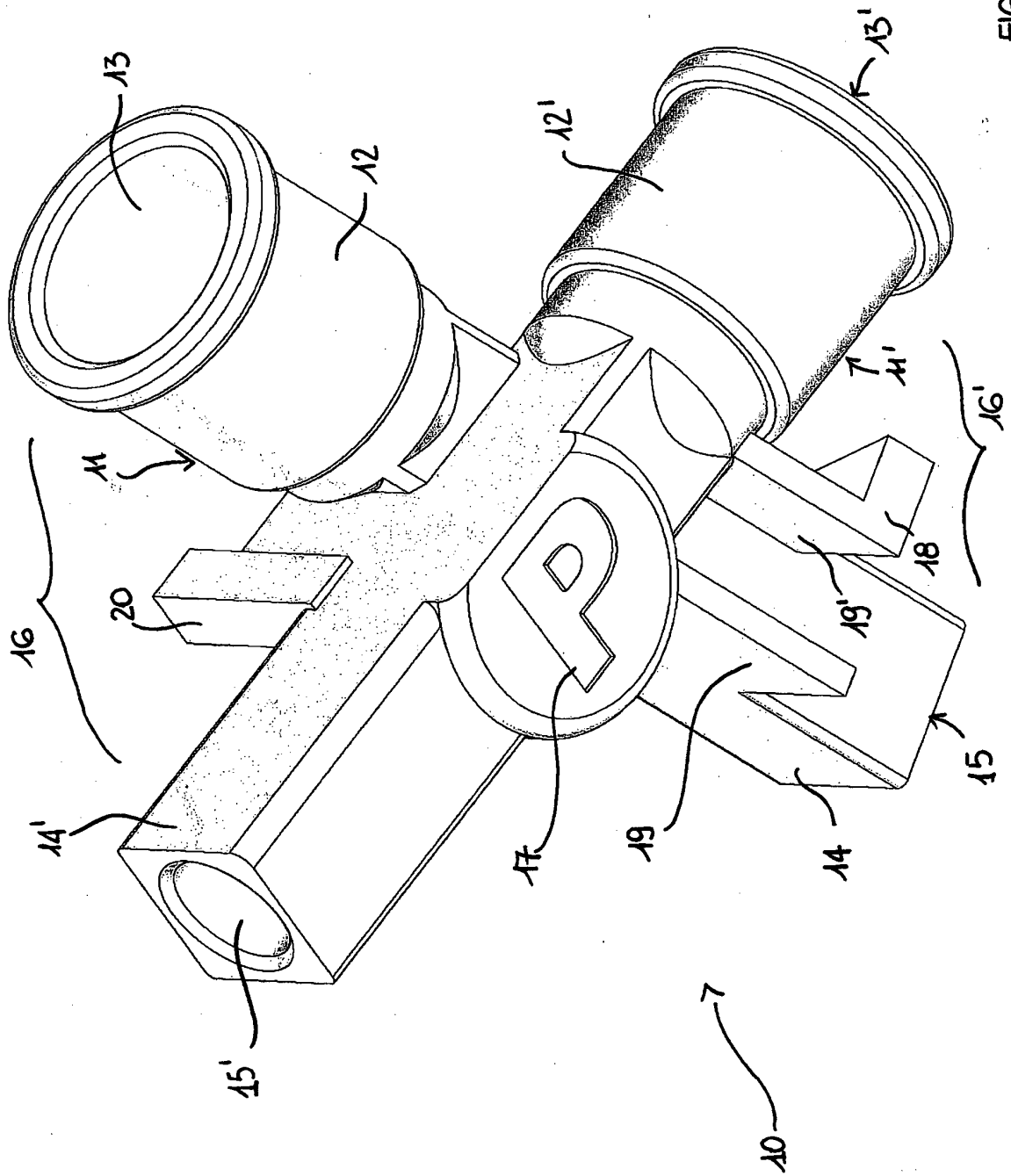
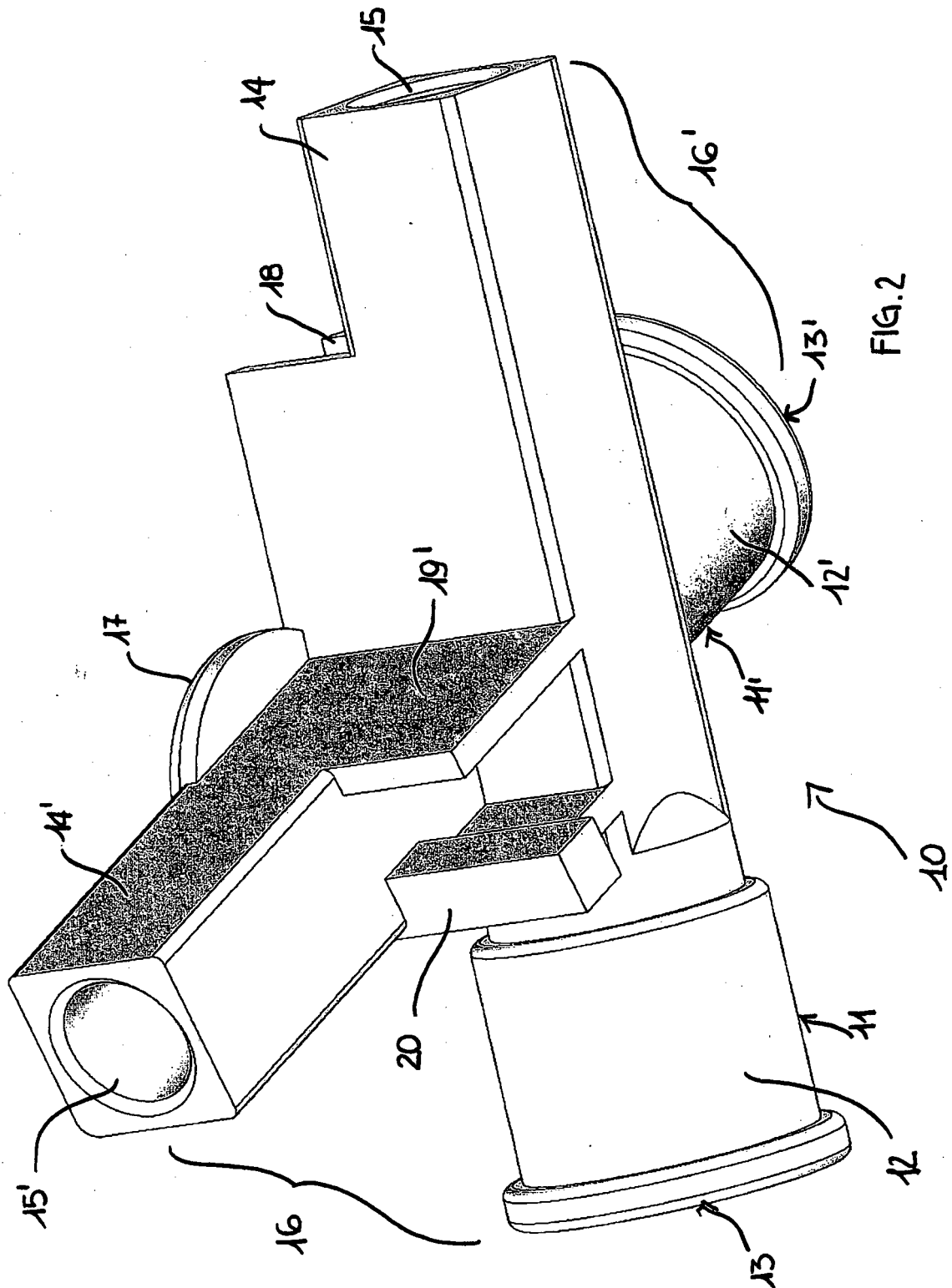
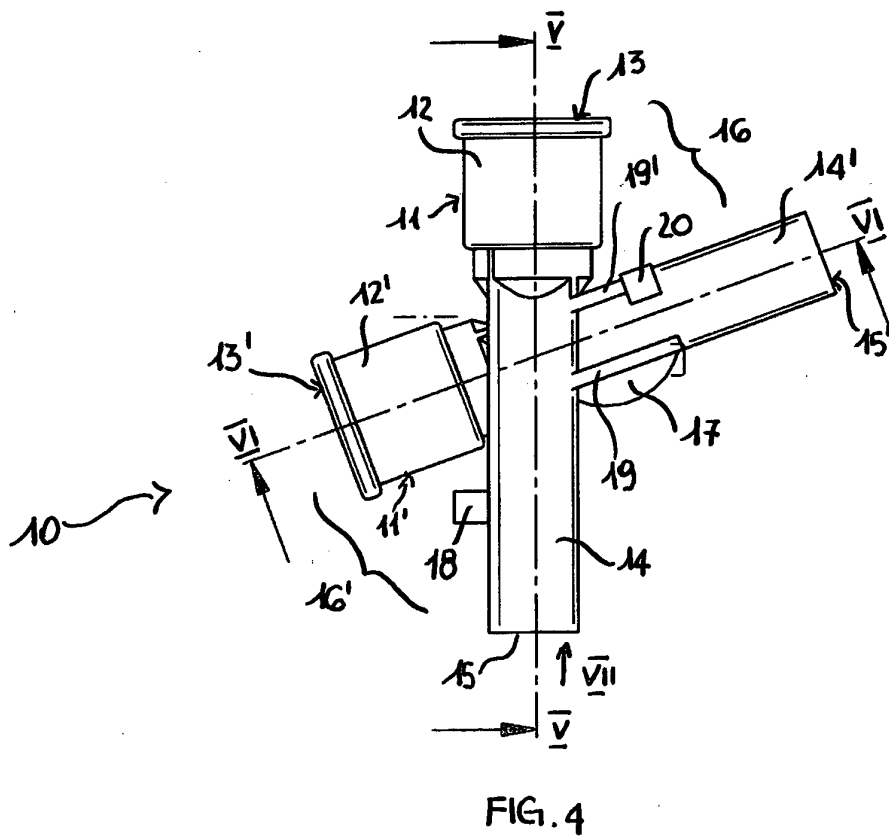
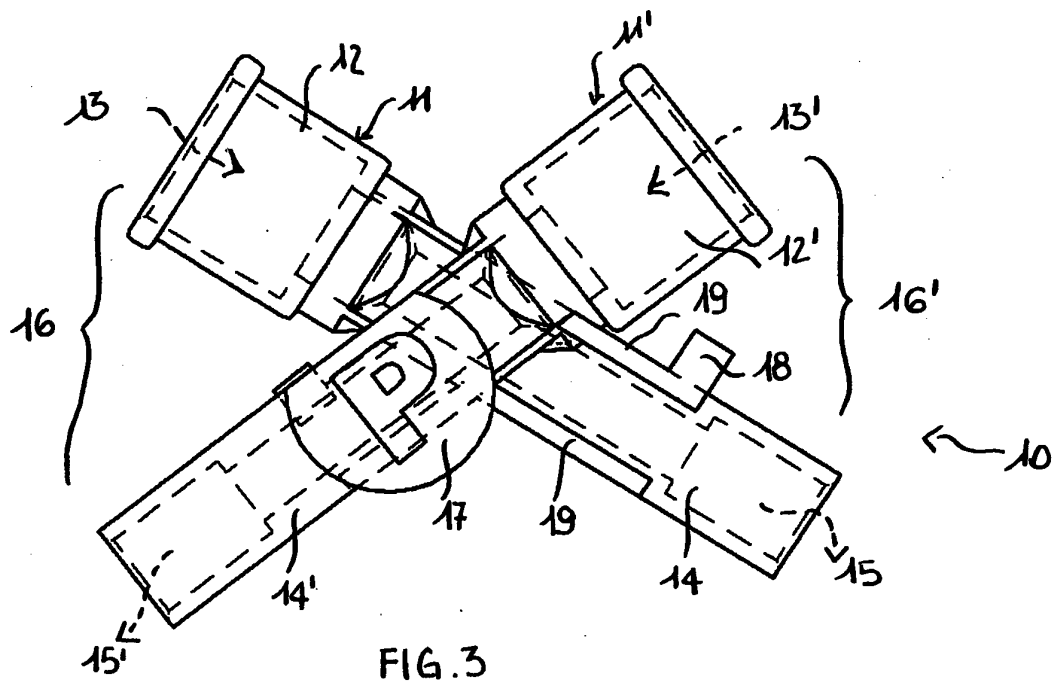
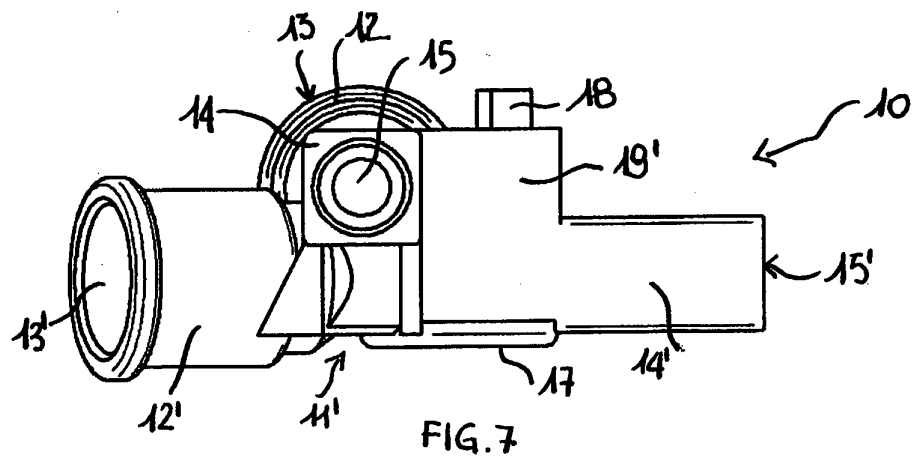
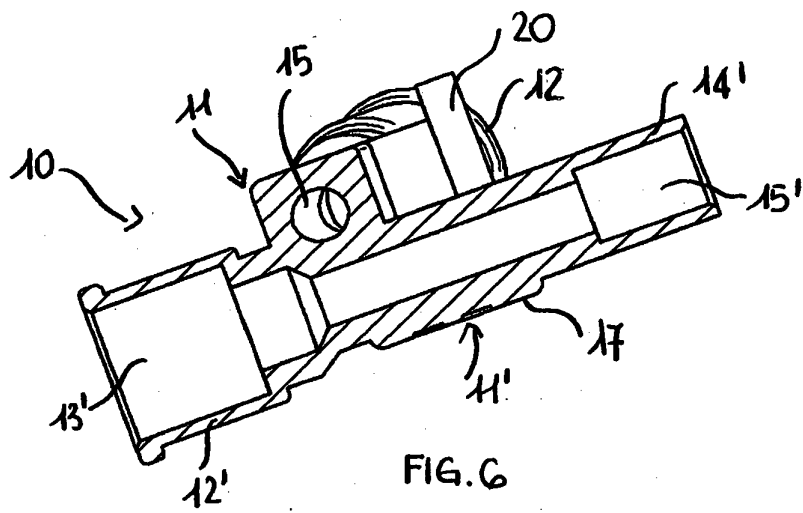
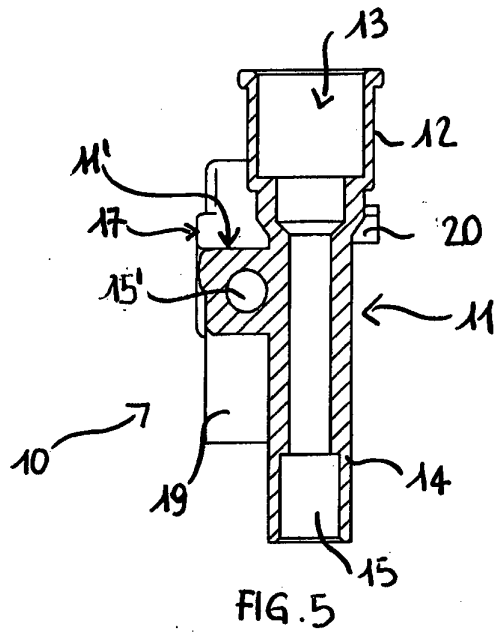


FIG. 1







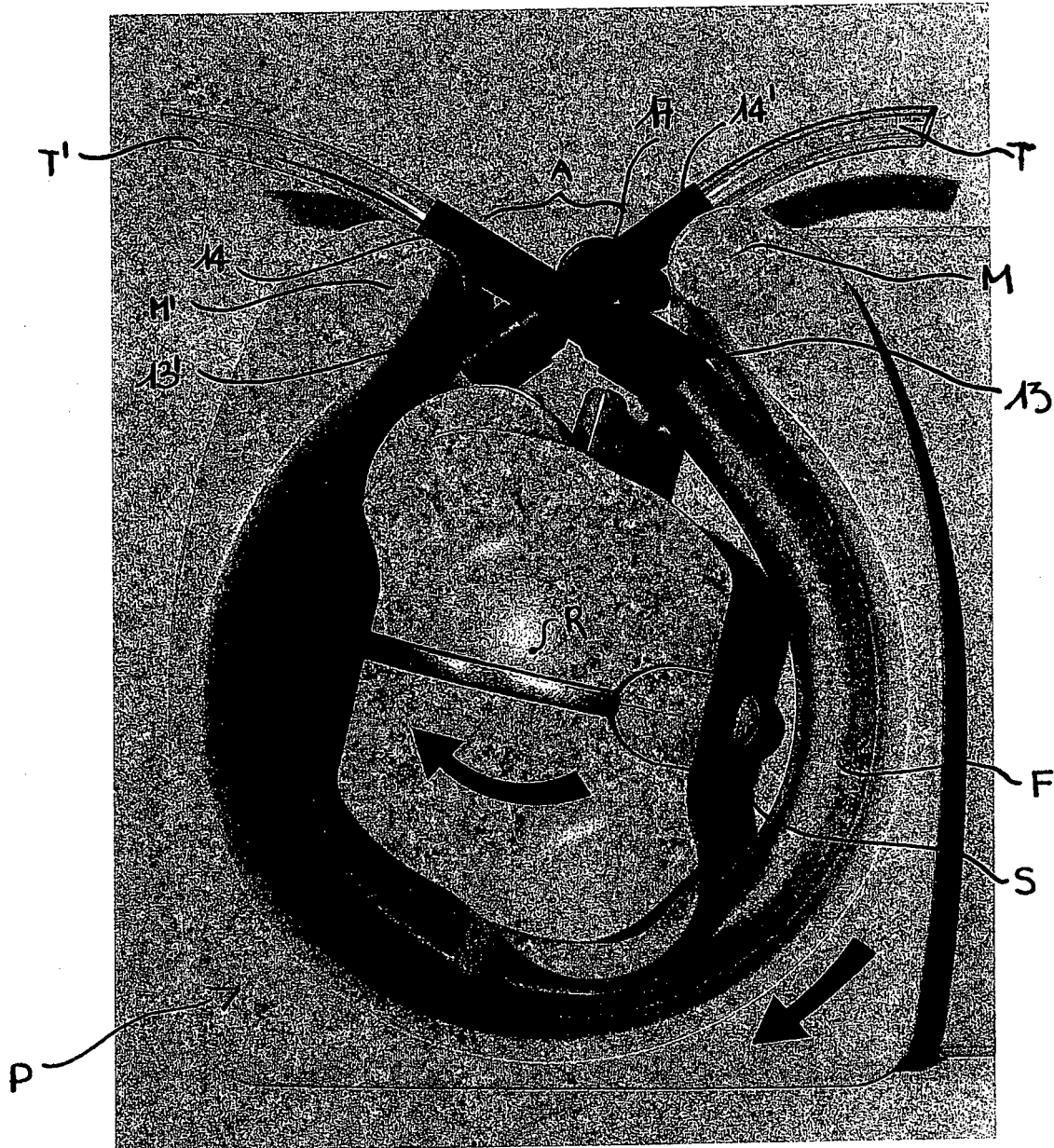


FIG. 8

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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