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(54) **APPARATUS FOR MODULATING FLUID FLOW**

VORRICHTUNG ZUM MODULIEREN VON DURCHFLÜSSEN

APPAREIL DE MODULATION DE DEBIT DE FLUIDE

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(56) References cited:
WO-A-84/04805
WO-A-95/08683
DE-A- 2 600 572
DE-A- 4 324 555
GB-A- 137 461
GB-A- 272 673
US-A- 4 331 174
US-A- 4 816 155
US-A- 5 474 102
US-A- 5 596 773
US-A- 5 795 475

- **DATABASE WPI Derwent Publications Ltd., London, GB; Class T06, AN 1991-308799/42 & SU 1 608 620 A (SOKOLOV NA) 23 November 1990**

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Description

Field of the invention

[0001] The invention relates to an apparatus for modulating fluid flow according to the preamble of claim 1. More particularly, the invention relates to an apparatus for modulating fluid flow between a first fluid path and a second flow path which branches from the first flow path.

[0002] US 4,816,155 discloses an apparatus for mixing a solid/liquid slurry and separating said liquid from said slurry, wherein said apparatus comprises a horizontal slurry pipe for carrying a flow of the slurry, a plurality of mixing elements each comprising a cylindrical tube, inserted completely through said slurry pipe at angles perpendicular to the slurry flow, wherein the mixing elements obstruct only a portion of the slurry flow, wherein drainage surfaces of each of the mixing elements comprise openings in the tubes allowing passage of the liquid, and preventing passage of said solid into the mixing elements. Furthermore, this apparatus comprises an exit port connected to a lower end of each of the mixing elements for enabling removal of the liquid from the mixing elements.

[0003] US 5,474,102 discloses a fluid distribution manifold, where the input piping is inserted in through the manifold's circular intake opening and onto its cylindrical input port. The manifold's intake opening leads through a cylindrical path to a closed terminal end. Along the inner manifold wall, there are arranged in a sequence, a number of distribution outlet openings and their respective ports.

DISCLOSURE OF THE INVENTION

[0004] The invention provides apparatus for modulating fluid flow comprises a first flow path, a second flow path transverse to the first flow path, the second flow path having a fluid inlet which opens onto the first flow path whereby a portion of fluid flowing along the first flow path is diverted into the second flow path, the position of the fluid inlet being set in relation to the direction of fluid flow according to the extent of fluid to be diverted from the first flow path into the second flow path.

[0005] The position of the fluid inlet is adjustable to vary the extent of fluid diverted as desired. Such adjustment may be made prior to and/or during operation of the apparatus.

[0006] The second flow path is defined by a conduit which extends across the first flow path but which does not entirely block fluid flow therealong. The fluid inlet is located in a side wall of the conduit. Where the conduit is of circular cross section, the fluid inlet would be located in the cylindrical side wall of the conduit.

[0007] The fluid inlet comprise one or more apertures. In a particularly advantageous arrangement, the fluid inlet comprises two apertures circumferentially spaced about the conduit.

[0008] The conduit extends entirely across the first fluid path thereby providing two branch lines extending from opposed sides of the first flow path, providing thereby an even distribution of fluid flowing through the various branch outlets.

[0009] There is a plurality of said conduits positioned at spaced intervals along the first flow path.

[0010] The first flow path is defined by a conduit having an internal size greater than the external size of the conduit defining the second flow path.

[0011] The invention has been devised particularly, although not solely, for use in a fluid distribution manifold having a plurality of branch outlets, the arrangement allowing fluid discharging from the manifold through the branch outlets to be regulated. The regulation allows a uniform fluid flow through each of the branch outlets. Typically, a conventional manifold having a plurality of branch outlets does not provide an even distribution of fluid flowing through the various branch outlets.

[0012] A particular application of the apparatus according to the invention is In a horizontal swimming pool falter. A horizontal swimming pool filter typically has an inlet manifold positioned above a filtering media, the purpose of the manifold being to distribute water to be filtered evenly within a water space above the filtering media, so as to allow a laminar flow which does not disturb the surface of the filtering media bed. Uneven distribution of water would cause currents in the water space above the filtering media bed, causing scouring in the surface of the filtering media which in turn causes the filtering media to migrate, leaving areas of reduced media depth.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The invention will be better understood by reference to the following description of several specific embodiments thereof as shown in the accompanying drawings in which:

Figure 1 is a schematic plan view of a water distribution manifold, according to a first embodiment as used in a horizontal swimming pool filter;

Figure 2 is a schematic end view of the manifold;

Figure 3 is a view, partly cut-away, illustrating the position of various branch lines in the main chamber of the manifold;

Figure 4 is a schematic end view of a water distribution manifold according to a second embodiment, showing apertures in one position; and

Figure 5 is a view similar to Figure 4 except that apertures are shown in another position.

BEST MODEL(S) FOR CARRYING OUT THE INVENTION

[0014] The embodiments shown in the drawings are each directed to a manifold for use in a horizontal swimming pool filter, the manifold being provided to distribute pool water evenly into a water space above a bed of filtering media contained within the filter.

[0015] In the first embodiment shown in Figures 1, 2 and 3, the manifold 10 comprises a first conduit 11 defining a first flow passage 13. The conduit 11 is cylindrical and closed at one end by way of a cap 15. Pool water to be filtered is delivered to the flow passage 13 through the other end of the conduit 11.

[0016] The manifold 10 further includes a plurality of branch lines 19. The branch lines 19 are in pairs on opposed sides of the first conduit 11, each pair of branch lines 19 being defined by a second conduit 21 extending transversely through the first conduit 11. Each second conduit 21 is received within holes 23 formed in the cylindrical side wall of the first conduit 11. In the first embodiment shown in the drawings, there are five such second conduits 21, identified by reference numerals 21 a, 21 b, 21 c, 21 d and 21 e respectively. Each second conduit 21 has an external diameter which is less than the interior diameter of the first conduit 11.

[0017] In this way, the second conduits do not block flow along the first flow passage 13. The second conduits 21 do, however, act as baffles in the first flow passage 13.

[0018] Each conduit 21 has a fluid inlet 31 opening into the interior of the first flow passage. With this arrangement, some of the fluid within the first flow passage can be diverted into the second conduit through the fluid inlet 31. The diverted fluid then flows along the two branch lines 19 defined by the respective second conduit 21.

[0019] The extent to which fluid is diverted from the first conduit 11 into each second conduit 21 can be regulated by the orientation of the inlet 31 with respect to the first conduit. In this way, the fluid inlets 31 in the five second conduits shown in the drawings can be so positioned that the volumetric flow rate of fluid through each of the branch lines 19 is approximately equal. As can be seen from figure 1 of the drawings, the fluid inlets 31 in the second conduits 21, have a range of positions including a position which directly faces the fluid flow in the first conduit, a position which faces a direction generally normal to the fluid flow and a position which faces a direction opposite to the fluid flow.

[0020] In assembling the manifold, the various second conduits 21 are rotated within the first conduit 11 so that the respective inlets 31 assume the required position and then the second conduits 21 are sealingly fixed in position within the first conduit 11. The fixing can be achieved in any suitable fashion such as by adhesive bonding or welding.

[0021] In the embodiment shown in Figures 1, 2 and 3 of the drawings, the fluid inlet 31 in each second conduit 21 is defined by a single aperture in the cylindrical side wall of the conduit. Referring now to Figures 4 and 5 of the drawings, there is shown apparatus according to a second embodiment in which each fluid inlet 31 comprises a plurality of apertures 35 in the cylindrical side wall of the respective second conduit 21. In the embodiment as shown, there are four such apertures 35, each of circular cross-section. The apertures 35 are in pairs 37, with the two apertures 39 in each pair being circumferentially spaced with respect to each other. The circumferential spacing is such that the centres of the apertures 39 in each pair 37 are approximately at 90° with respect to each other. In Figure 4 of the drawings, the second conduit is shown in an orientation in which one aperture 39 of each pair is directly facing the direction of fluid flow and the other aperture 39 of each pair is facing a direction generally normal to the direction of fluid flow. In figure 5 of the drawings, the second conduit 21 is shown in an orientation in which the apertures 39 in each pair 37 obliquely face the direction of fluid flow.

[0022] It should be understood that the apparatus can be operated in a reverse flow mode in which fluid enters the manifold 10 through the branch lines 19 and exits through the first conduit 11. In such use, the fluid inlets 31 can produce a venturi effect in the manifold.

[0023] From the foregoing, it is evident that the present invention provides a simple yet highly effectively apparatus for modulating fluid flow.

[0024] While the apparatus has been described in each of the two embodiments in an arrangement which provides uniform flow through the various branch lines, it should be understood that it can be arranged to deliver prescribed but nevertheless uneven flows to the various branch lines.

[0025] It should also be understood that the apparatus according to the invention has application for fluid flows other than pool water. Indeed, the apparatus may have application for modulating flow of any liquid or gaseous fluid (or combination thereof).

[0026] Throughout the specification, unless the context requires otherwise, the word "comprise" or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.

Claims

1. An apparatus (10) for modulating a fluid flow comprising

- a first flow path (13) and
- a second flow path (19) transverse to the first flow path (13),

wherein the second flow path (19) is defined by a conduit (21) which extends across the first flow path (13), but which does not entirely block fluid flow the-

realong,
wherein the conduit (21) has a fluid inlet (31) which opens into the first flow path (13) whereby a portion of fluid flowing along the first flow path (13) is diverted into the second flow path (19),
wherein the position of the fluid inlet (31) is adjustable between first and second positions for varying the extent of fluid to be diverted, the first position being upstream in relation to the direction of fluid flow in the first flow path (13) and the second position being downstream in relation to the direction of fluid flow in the first flow path (13),
characterized in that the conduit (21) provides two branch lines extending from opposed sides of the first flow path (13).

2. An apparatus for modulating fluid flow according to claim 1, **characterized in that** the position of the inlet (31) is adjusted to a set position between the first and second positions and fixed with respect to the direction of the fluid flow in the first flow path (13) after having been placed in the set position.

3. An apparatus for modulating fluid flow according to claim 1, **characterized in that** the fluid inlet (31) is located in a side wall of the conduit (21).

4. An apparatus for modulating fluid flow according to claim 3, **characterized in that** the conduit (21) is circular in cross section, so that the fluid inlet (31) is located in the cylindrical side wall of the conduit (21).

Patentansprüche

1. Vorrichtung (10) zum Modulieren einer Fluidströmung umfassend

- einen ersten Strömungsweg (13) und
- einen zweiten Strömungsweg (19), der quer zu dem ersten Strömungsweg (13) verläuft,

wobei der zweite Strömungsweg (19) von einer Leitung (21) gebildet wird, die sich quer durch den ersten Strömungsweg (13) erstreckt, aber die Fluidströmung längs diesem nicht vollständig blockiert,
wobei die Leitung (21) einen Fluideinlass (31) aufweist, der in den ersten Strömungsweg (13) mündet, wodurch ein Teil des längs des ersten Strömungswegs (13) strömenden Fluids in den zweiten Strömungsweg (19) umgeleitet wird,
wobei die Position des Fluideinlasses (31) zum Variieren der Menge des umzuleitenden Fluids zwischen einer ersten und einer zweiten Position einstellbar ist, wobei die erste Position bezüglich der Richtung der Fluidströmung in dem ersten Strömungsweg (13) stromaufwärts und die zweite Position bezüglich der Richtung der Fluidströmung in dem ersten Strömungsweg (13) stromabwärts liegt,
dadurch gekennzeichnet, dass die Leitung (21) zwei Abzweigleitungen bereitstellt, die sich von entgegengesetzten Seiten des ersten Strömungswegs (13) erstrekken.

2. Vorrichtung zum Modulieren einer Fluidströmung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Position des Einlasses (31) auf eine bestimmte Position zwischen der ersten und zweiten Position eingestellt und in Bezug auf die Richtung der Fluidströmung in dem ersten Strömungsweg (13) fixiert wird, nachdem er in der bestimmten Position platziert worden ist.

3. Vorrichtung zum Modulieren einer Fluidströmung nach Anspruch 1, **dadurch gekennzeichnet, dass** der Fluideinlass (31) sich in einer Seitenwand der Leitung (21) befindet.

4. Vorrichtung zum Modulieren einer Fluidströmung nach Anspruch 3, **dadurch gekennzeichnet, dass** die Leitung (21) einen kreisförmigen Querschnitt hat, so dass sich der Fluideinlass (31) in der zylindrischen Seitenwand der Leitung (21) befindet.

Revendications

1. Appareil (10) de modulation d'un écoulement de fluide, comprenant :

- un premier trajet d'écoulement (13) et
- un second trajet d'écoulement (19) perpendiculaire au premier trajet d'écoulement (13),

dans lequel le second trajet d'écoulement (19) est défini par un conduit (21) qui s'étend transversalement au premier trajet d'écoulement (13) mais qui ne bloque pas totalement l'écoulement de fluide le long de celui-ci,
dans lequel le conduit (21) est pourvu d'une entrée de fluide (31) qui s'ouvre sur le premier trajet d'écoulement (13), une partie du fluide s'écoulant le long du premier trajet d'écoulement (13) étant déviée dans le second trajet d'écoulement (19),
dans lequel la position de l'entrée de fluide (31) peut être réglée entre une première et une seconde positions pour faire varier la quantité de fluide à dévier, la première position étant en amont par rapport à la direction de l'écoulement de fluide dans le premier trajet d'écoulement (13) et la seconde position étant en aval par rapport à la direction de l'écoulement de fluide dans le premier trajet d'écoulement (13),
caractérisé en ce que le conduit (21) fournit deux ramifications s'étendant depuis des côtés opposés du premier trajet d'écoulement (13).

2. Appareil de modulation d'un écoulement de fluide selon la revendication 1,
caractérisé en ce que la position de l'entrée (31) est réglée sur une position définie entre les première et seconde positions et fixée par rapport à la direction de l'écoulement de fluide dans le premier trajet d'écoulement (13) après avoir été placée dans la position définie.

3. Appareil de modulation d'un écoulement de fluide selon la revendication 1,
caractérisé en ce que l'entrée de fluide (31) est située dans une paroi latérale du conduit (21).

4. Appareil de modulation d'un écoulement de fluide selon la revendication 3,
caractérisé en ce que le conduit (21) a une section transversale circulaire, de sorte que l'entrée de fluide (31) est située dans la paroi latérale cylindrique du conduit (21).

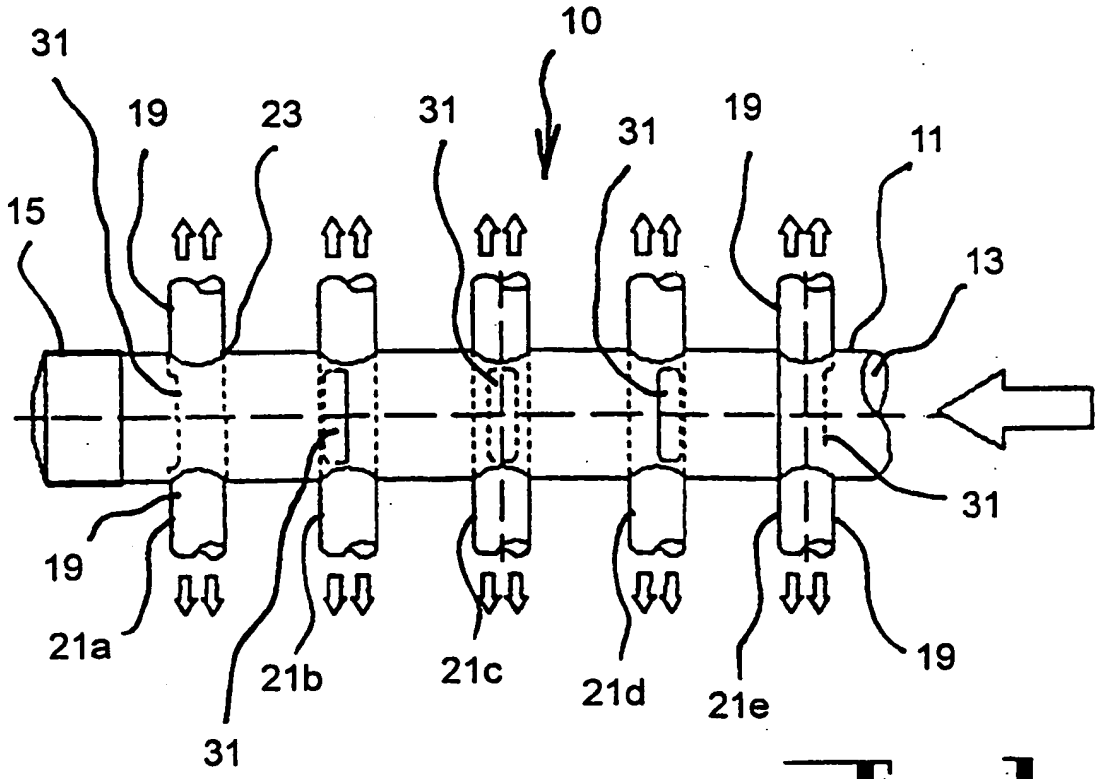

31
19
23
10
31
31
19
11
15
13
31
19
21a
21b
21c
21d
21e
19
31

Fig. 1

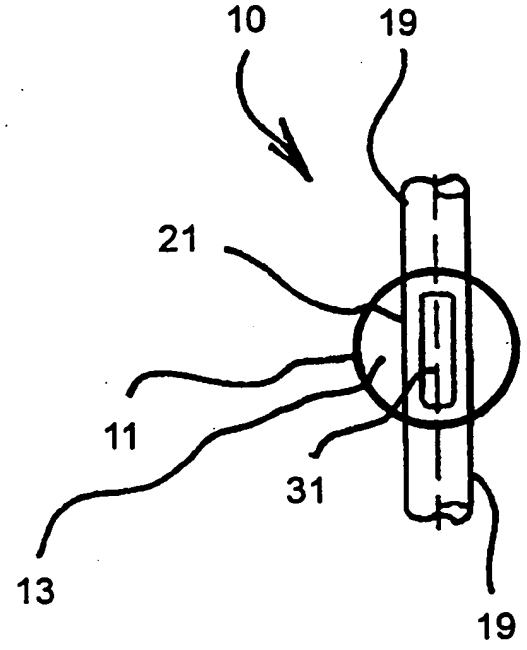

10
19
21
11
31
13
19

Fig. 2

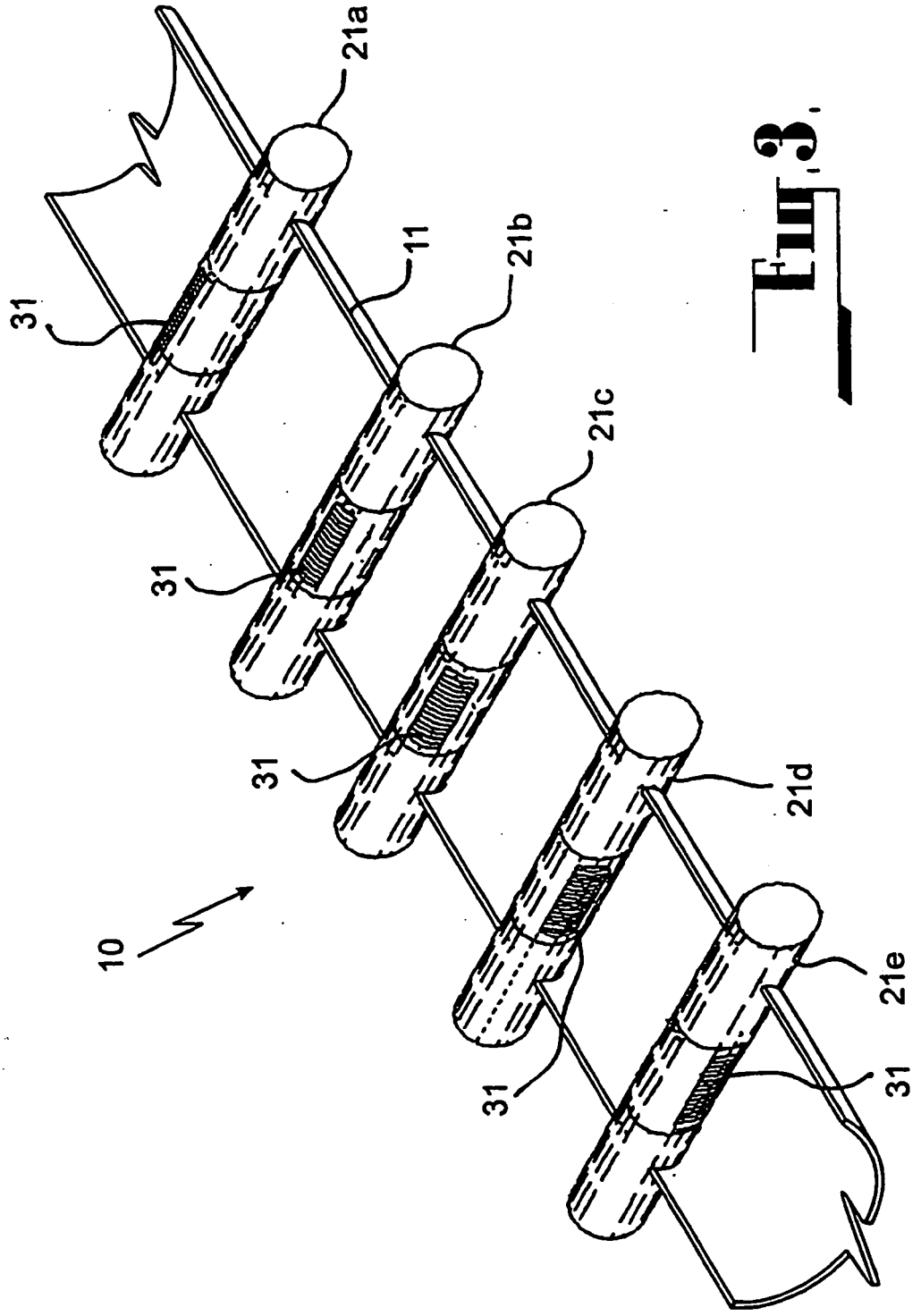


Fig. 3.

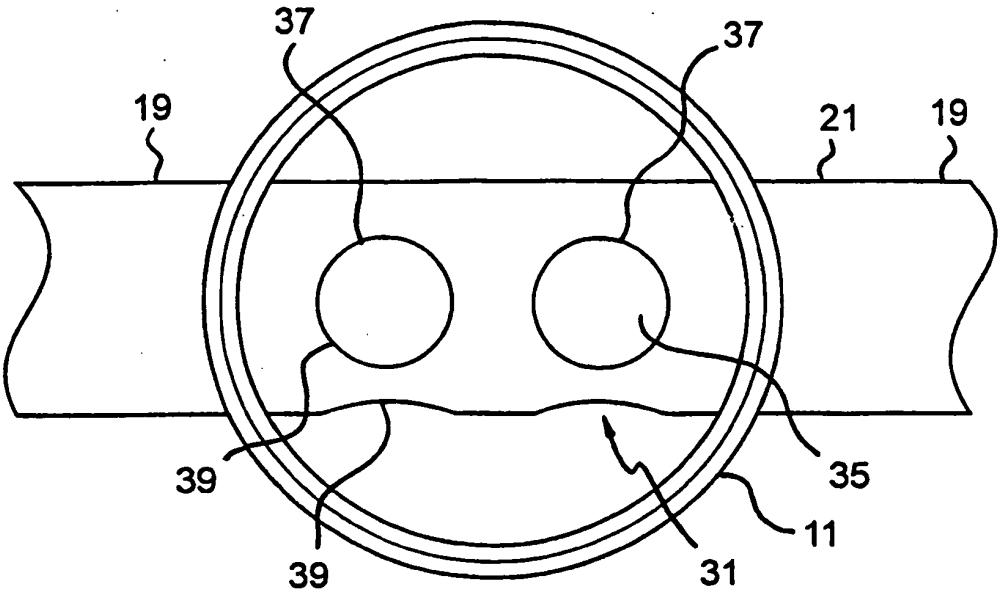


Fig. 4

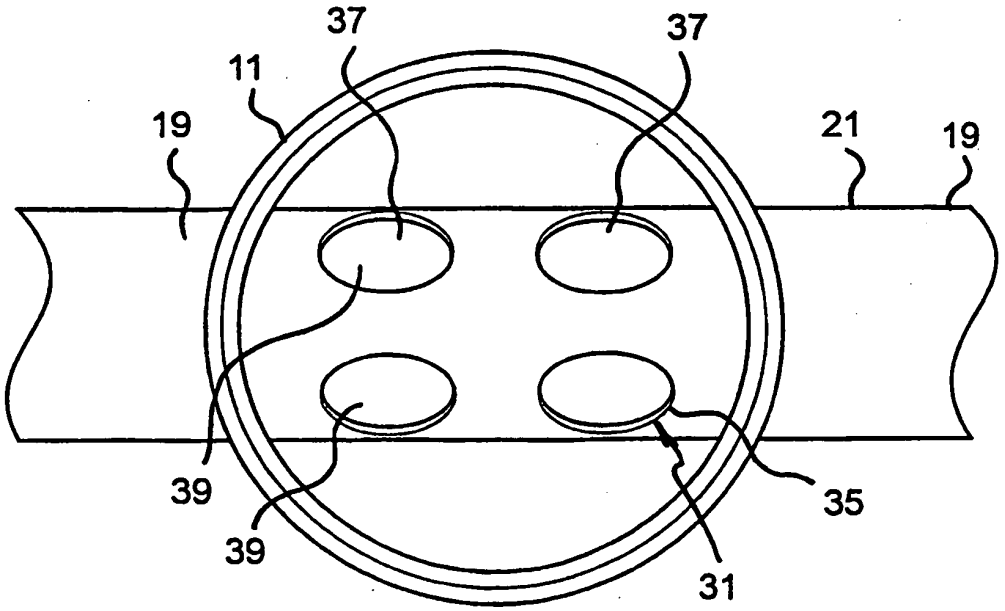


Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 4816155 A **[0002]**
- US 5474102 A **[0003]**