(19) DANMARK

(10) **DK/EP 2592191 T3**

Patent- og Varemærkestyrelsen

(12) # Oversættelse af europæisk patentskrift

(51) Int.Cl.: ***F 16 L 21/00 (2006.01)*** ***E 03 B 7/04 (2006.01)*** ***F 16 L 41/02 (2006.01)*** ***F 16 L 55/027 (2006.01)***

(45) Oversættelsen bekendtgjort den: **2019-02-04**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2019-01-02**

(86) Europæisk ansøgning nr.: **12189183.2**

(86) Europæisk indleveringsdag: **2012-10-19**

(87) Den europæiske ansøgnings publiceringsdag: **2013-05-15**

(30) Prioritet: **2011-11-08 DE 102011055138**

(84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

(73) Patenthaver: **Viega Technology GmbH & Co. KG, Viega Platz 1, 57439 Attendorn, Tyskland**

(72) Opfinder: **Rischen, Christian, Obersalwey 19, 59889 Eslohe, Tyskland**
Rosenthal, Jörg, Am Rottland 1, 51580 Reichshof/Eckenhagen, Tyskland
Hartmann, Anton, Schuhmacherstraße 14, 57439 Attendorn, Tyskland

(74) Fuldmægtig i Danmark: **Zacco Denmark A/S, Arne Jacobsens Allé 15, 2300 København S, Danmark**

(54) Benævnelse: **RØRFORMET FORBINDELSESELEMENT**

(56) Fremdragne publikationer:
EP-A1- 1 882 784
FR-A- 625 733
GB-A- 1 490 889
US-A- 1 663 271
US-A- 3 894 562

Description

The present invention relates to a tubular connection element. The invention also relates to arrangements having the tubular connection element.

It is known from the prior art to connect pipes by means of connection elements, also called fittings. In this case, not only are straight connections to the next pipe section often enabled, but different functions are often also provided by the connection elements, such as for example direction changes, diameter changes or branchings. In this way, virtually any pipe line systems can be laid, for example for both cold and also warm drinking water. Individual water sampling points can in particular be provided on a floor of a building. What is problematic here however is that water may stagnate in certain regions in the case of certain configurations of the pipe line systems. Therefore, in the case of individual supply lines or series lines, only all the water can be replaced in the line when water is removed at the corresponding sampling point of the individual supply line or the respectively last sampling point of the series supply line. This can be circumvented by providing ring lines such that the water of the ring line is rinsed even in the case of removal at any sampling point of the ring line, insofar as a sufficient volume is removed or the removal takes place with sufficient frequency. What is problematic here, however, is that water also stagnates in ring lines, if water is not removed for long periods of time at any of the sampling points of the ring line.

For example, it is known from the publication EP 1 882 784 A1 to provide a fitting in the form of a T-piece to prevent stagnation in ring lines in drinking water technology, in the case of which a cross-sectional narrowing is provided before the joining opening or the branching connector of the T-piece in order to achieve circulation in the ring line adjoining the branching connector by means of a reduction of the static pressure occurring through the Venturi effect. The stagnation in the adjoining ring line will thus be prevented even when water is not removed through sampling points from the ring line itself. However, a special relatively complex fitting in the form of a T-piece or double T-piece is provided here for installation. The branching connector of the T-piece opening into the T-piece at certain angles also has particular relevance owing to the flow-dynamic design.

US 1, 663, 271 A describes a pipe fitting for a heating system which comprises a narrowed cross-section at one opening. The fitting is connectable to connectors via respectively an inner thread and an outer thread.

A connector for reducing pressure in a heating system is disclosed in FR 625 733 A. The connector is connectable via threads to a T-piece or cross joint.

GB 1 490 889 A relates to a screen for reducing the cross-section in a pipe system. The screen is arranged inside a press fitting.

A flow limiter for a fluid line is disclosed in US 3 894 562 A having the features of the preamble of Claim 1. The flow limiter comprises an inner bore hole which converges conically and is subsequently expanded conically once again as a diffuser.

The more complex a fitting is, the more time-consuming its manufacture is. Moreover, there is the danger in the case of more complex fittings that they will be installed incorrectly, for example upside down. Following successful installation, it also often cannot be verified whether the corresponding fitting was correctly installed or whether the fitting was installed at all and not for example instead a conventional T-piece without an integrated nozzle.

Owing to the wide variety of conventional T-pieces, which for example differ in the diameters, the lengths of the connection supports and/or the materials, these conventional T-pieces must be replaced by respectively correspondingly adapted T-pieces with cross-sectional narrowing. This large number of fittings is both disadvantageous for manufacture and for installation.

The object underlying the present invention is therefore to prevent the stagnation in line systems cost-effectively and yet effectively in the case of simple and secure installation.

The object is achieved according to the invention by a tubular connection element having the features of Claim 1: a tubular connection element with a first opening, a second opening, a first connection section, a second connection section, a nozzle section and a control region. In this case, the first connection section is connectable to a first connector, the second connection section is connectable to a second connector and the nozzle section is introducible into the second connector. The control region is also visible from the outside after connecting the first connector and the second connector. The first connection section is compressible with the first connector and the second connection is compressible with second connector, the connection sections being introducible into the corresponding connector and being formed as a support section, the nozzle section being fully introducible into the second connector, a flange region being provided on the outer circumference between the first connection section and the second connection section, which provides a stop for the connectors and makes the control region available, the second connection section adjoining the first connection section viewed in the flow direction of the medium and the nozzle section adjoining the second connection section.

Each connection element is essentially understood as a tubular connection element, which is capable of transporting a medium, preferably cold or warm water from the first to the second opening and is manufacturable by a connection to two connectors. In this case, the tubular connection element is preferably substantially a straight circular cylinder. However, it is also conceivable to design the cross-sectional surface of the tubular connection element for example in a prism or oval shape. The first and the second opening can also have different geometries. The tubular connection element is however preferably substantially rotationally symmetric around the main axis of the tubular connection element. It can hereby be manufactured as a rotating part particularly cost-effectively.

Connection sections mean a section of the tubular connection element which can be connected to a connector by a force-fitting, positive-locking and/or materially-bonded connection. Connection sections for force-fitting and/or positive-locking connection are, however, preferred. The connection is preferably undetachable in order to guarantee a connection that is as secure as possible.

The flow of a medium through the tubular connection element causes an increase of the dynamic pressure and a reduction of the static pressure in the region of the nozzle section. Circulation of the medium through a ring line, which opens in the region of the nozzle section, is achieved by the static pressure reduced in comparison to the unnarrowed pipe line. To this end, a branching connector of a T-piece can, for example, be located in the region of the nozzle from which the medium is then pressed out and as a result the line adjoining the branching connector is rinsed. However, such an underpressure can also be generated in fittings other than the mentioned T-pieces, for example fittings with a plurality of branchings and circulation can also be initiated.

As a result of the nozzle section being introducible into the second connector, the region of a lower static pressure is generated in the component which comprises the second connector. In this way, the tubular connection element can be combined with virtually any convention components, but preferably with T-pieces and pipes. Replacing conventional components with special components with cross-sectional narrowing is dispensed with since a reduction of the static pressure and thus circulation even with conventional components can be generated by the combination with the connection element according to the invention. The tubular connection element can thus be easily installed as an additional element between conventional components, the nozzle section being fully introducible into the second connector. The nozzle section is hereby provided as a cross-sectional narrowing of the tubular connection element to produce the Venturi effect. The cross-sectional narrowings can essentially comprise any geometry in order to design the tubular connection element for example to be as flow dynamic and/or stable as possible. The nozzle section also preferably comprises a rotational symmetry around the main axis of the tubular connection element.

By way of the control region, which is visible from outside after connecting the tubular connection element to the first connector and the second connector, a region is provided on the tubular connection element, which allows the fitter to check the position and in particular the alignment of the installed tubular connection element before, during and also even after completed installation and to potentially correct the position of the tubular connection element before a connection step, such as for example compression. This is not possible in the case of components which already have a nozzle installed or into which an element comprising a nozzle is fully inserted. The control region can in particular be a transition region between the connection sections.

Since a separately formed tubular connection element is provided, which comprises a nozzle section, which is introducible into the second connector, and which comprises a control region, which is visible from the outside after connecting the first and the second connector, a plurality of effects are achieved therewith. On the one hand, a tubular connection element that can be manufactured particularly cost-effectively is provided. This is in particular achieved by the simple construction. In addition, the production costs are lowered since the tubular connection element according to the invention is compatible with conventional components, in particular T-pieces and they can continue to be used. At the same time, the installation is designed so as to be particularly simple and safe by way of the control region provided.

Advantageously, a connection element according to the invention can be used, aside from adaptations of the diameter to the pipe system or the connectors and/or the selection of materials, without constructive changes for different T-pieces and, at the same time, effective circulation in ring lines can still be produced. Even T-pieces with different inner contours can be used with the tubular component according to the invention. An adaptation of the length of the tubular element to the component comprising the second connector is thus largely not required.

According to the invention, in the case of the tubular connection element - viewed in the flow direction of the medium- , the second connection section adjoins the first connection section. The nozzle section, in turn, adjoins the second connection section. The individual sections can also pass into one another by way of transition regions which for example change the inner or outer diameter of the tubular connection element.

The nozzle section can be structured both symmetrically and asymmetrically in relation to the flow direction. In the case of a symmetric structure, the same flow profile would be produced irrespective of the direction of the flow. Since a medium frequently flows through many lines only in one direction, a nozzle profile adapted to this flow direction is advantageous. It is also preferred when the installation direction of the nozzle can be discerned based on the control region. This can be indicated for example with an arrow on the control region. This also facilitates the installation and checking of the same.

The first connection section is compressible with the first connector and the second connection section is compressible with the second connector. In this case, the properties of the connection sections must thus be selected such that they are either stable such that a connector placed on the connection section can be compressed with the same by a force acting radially inward or such that they are deformable such that the connector can be compressed with a connection section pushed into it. In this case, corresponding matching of the material of connector and connection section must be observed so that a tight connection is achieved by the compression.

The connectors and the connection sections are preferably, and particularly preferably the entire tubular connection element are made of the same material. To this end, it is in particular provided that the inner or outer circumferential surfaces of the connection sections are adapted to the outer or inner circumferential surfaces of the connectors.

The first further development of the tubular connection element according to the invention has in particular the effect that the tubular connection element according to the invention can be connected to the connectors for example by means of the same pressing tool by means of which the other components to be compressed are also connected. The installation is hereby further simplified and at the same time a secure undetachable connection provided.

According to a further configuration of the tubular connection element according to the invention, at least one connection section comprises a receiving portion for a sealing element, for example an O-ring. The tightness of the connection is hereby further increased without significant constructive changes. This applies in particular for a press connection. The first connection section in particular preferably comprises a receiving portion for a sealing element.

The connection sections are introducible into the corresponding connector and formed as a support section. In this case, it is advantageous for the second connection section to be introducible into the second connector and the nozzle section to adjoin the second connection section. As a result, the nozzle section must be introduced into the second connector together with the second connection section. Since pipe ends are normally introduced into the connectors of components, in particular T-pieces, the tubular connection element according to the invention is now introduced into the connector without any modifications of the component comprising the connector and the connector can be compressed as before for example by means of a pressing device. As a result, particularly simple installation results, the previous components also being used and still effectively preventing the stagnation of drinking water by way of the Venturi effect in a branching ring line.

If at least one connector is introducible into the corresponding connection section and the connection section is formed as a pressing section, pipes can be connected to the connection element according to the invention in a particularly simple manner as connectors. Since pipes must generally be flexibly cut to length, the connectors are at the circular cylindrical ends at the pipe ends to be connected. They are suitable particularly for being introduced into a connection section, which can comprise special configurations, for example receiving portions for O-rings and comprise a structure suitable for compressing. A further component, in particular a second T-piece can be provided on this pipe in particular at a large distance from the component, in particular T-piece, comprising the second connector. A further advantage is, in this case, that the second connection region formed as a pressing region is also visible from the outside after installation and can thus serve as a control region.

A cross-sectional narrowing of the nozzle section is preferably implemented by an at least partially conically tapering section. This section can comprise a thickened portion of the wall thickness in sections, preferably in the region of the largest narrowing. As a result, the stability of the nozzle section upon installation, in particular upon compression, is increased such that the occurrence of a predefined reduction of the static pressure can be ensured and stagnation of media in the pipe line system is effectively prevented without requiring particular care during installation.

A flange region is provided between the first connection section and the second connection section, in this manner a stop being, on the one hand, provided for the connectors. The flange region is hereby provided according to the outer circumferential surface of the tubular connection element such that the connectors can be pushed into the tubular connection element. In this case, the flange region is provided on the outer circumferential surface such that it provides a control region in a particularly advantageous manner.

It is further preferred when the nozzle section adjoins the second connection section and forms the second opening. As a result, the nozzle section together with the second connection section should be introduced into the second connector without the fitter having to worry about the positioning of the nozzle section inside the connector or the component comprising the connector. The nozzle section forms the second opening of the tubular connection element such that the tubular connection element is structured and can be manufactured in a particular simple manner, while the Venturi effect also being sufficient to achieve a sufficient reduction of the static pressure.

If the tubular connection element is manufactured from metal, in particular stainless steel, brass and/or copper, the connection element can be manufactured in a particularly stable, cost-effective manner as a rotating part and can also be used in the area of drinking water hygienically and harmlessly. If the metal is selected in accordance with the components to be connected, an optimal adaptation can be achieved such that a permanently tight connection is possible. However, a pairing of materials of the components to be connected made of stainless steel and brass is particularly chloride resistant. Manufacture using copper is particularly cost-effective.
The object is also achieved by an arrangement with a tubular connection element according to the invention and at least one T-piece comprising the first or second connector. The tubular connection element according to the invention is advantageous in particular in combination with a T-piece which comprises the first or second connector. Using one or a plurality of T-pieces, an inflow and outflow line for a line to be rinsed can be provided particularly easily through the branching connectors present on the T-pieces. However, the nozzle section of the tubular connection element can arrive to the region of the branching connector of the T-piece particularly easily by way of axial insertion in order to cause a reduction of the static pressure in the region of the branching.
The tubular connection element according to the invention is preferably connected at both sides, i.e. to the first and second connection section with respectively one T-piece. The branching connector of the second T-piece comprising the second connector, in this case, delivers the discharge of a ring line from which the medium contained is pressed out owing to the pressure difference due to the nozzle section inserted into the second T-piece, while the branching connector of the first T-piece comprising the first connector delivers the inflow of the ring line. If inflow and outflow of a ring line are further apart, a pipe piece can be connected to the tubular connection element instead of the first T-piece which is then connected to a T-piece.
If the branching connector of at least one T-piece has a smaller inner diameter in the arrangement according to the invention than the other two connectors of the T-piece, the stagnation in a line adjoining the branching connector of the T-piece can be particularly effectively prevented since a reduction of the static pressure is achieved by the larger volume flow along the main axis of the tubular connection element, by

way of which stagnation in a line with smaller cross-section adjoining the branching connector is particularly effectively prevented.

If, in the case of the arrangement according to the invention, the second opening is substantially in the region of the branching connector of the T-piece comprising the second connector, the pressure reduction caused by the nozzle section is particularly effectively utilised. It was surprisingly found that in relation to optimal flow dynamics, the position of the nozzle section is not critical in relation to a sufficient Venturi effect and thus a reduction of stagnation.

For the case where the nozzle section forms the second opening, it is, however, preferred when the second opening of the tubular connection element is located in the region of the branching connector of the T-piece comprising the second connector. The nozzle section therefore at least partially overlaps with the region of the branching connector of the T-piece comprising the second connector and the nozzle section, viewed in the flow direction, does not protrude over the region of the branching connector of the T-piece comprising the second connector. It is also preferred when the second opening of the tubular connection element, viewed in the flow direction, is located in the region of the first half of the branching connector of the T-piece comprising the second connector. This allows particularly short tubular connection elements to be provided, which can be manufactured particularly cost-effectively, but as was stated, cause a sufficient reduction of the static pressure. Since the second opening of the tubular connection element is located in the region of the branching connector of the T-piece comprising the second connector, the dead volume is also reduced in the region of the nozzle section such that reduced stagnation of the medium occurs in this region.

The object is also achieved by an arrangement with a pipe run and a ring line. In this case, the pipe run comprises a tubular connection element according to the invention, a first T-piece and a second T-piece comprising the second connector. The ring line connects the branching connector of the first T-piece and the branching connector of the second T-piece.

A drinking water supply line of a building is in particular meant by a pipe run which, for example as a riser pipe, supplies different floors with drinking water. Lines then branch off these pipe runs which supply the sampling points on the individual floors with drinking water. The pipe line of the pipe runs in particular has a nominal width of

22, 28 or 35, while the ring line has a nominal width of preferably 15. The ring line preferably has a length of maximum 20 meters in order to produce sufficient circulation in the case of average consumption at different sampling points, which produce a volume flow in the branch pipe, also in the unused ring line at whose outflow a tubular connection element according to the invention is provided.

It is particularly preferred for the ring line to be a seldom used ring line, such as the ring line of a heating fill fitting, of an individual sink, for example in the cellar or a garden fitting.

The arrangement is preferably designed such that owing to a volume flow through the pipe run of 5 to 100 l/min, the volume flow in the ring line is between 1 and 20%, preferably between 1.5 and 14% of the volume flow through the pipe run. It was found that with a tubular connection element according to the invention these volume flows through the ring line can be produced, even without a special adaptation of the tubular connection element according to the invention to the respective T-pieces being provided. The position of the nozzle section is changed by the geometric deviations of the conventional T-pieces, but sufficient rinsing of the ring line is also produced.

Further advantages and features of the invention can be inferred from the following description of a plurality of exemplary embodiments, in which reference is made to the enclosed drawing. In the drawing is shown:

Fig. 1 an exemplary embodiment of a tubular connection element according to the invention in a sectional view;

Fig. 2 the exemplary embodiment from Fig. 1 in a perspective sectional view;

Fig. 3 the exemplary embodiment from Fig. 1 in a perspective view;

Fig. 4a-c three exemplary embodiments of arrangements according to the invention which respectively comprise the exemplary embodiment of a tubular connection element according to the invention from Fig. 1 – 3;

Fig. 5 a further exemplary embodiment of an arrangement according to the invention which comprises a second exemplary embodiment of a tubular connection element according to the invention;

Fig. 6 a tubular connection element;

Fig. 7 an exemplary embodiment of an arrangement which comprises the tubular connection element from Fig. 6;

Fig. 8 an exemplary embodiment of a further arrangement according to the invention.

Fig. 1, 2 and 3 show an exemplary embodiment of a tubular connection element 1 according to the invention. In this case, Fig. 1 shows the exemplary embodiment of a tubular connection element 1 according to the invention in a sectional view, Fig. 2 in a perspective sectional view and Fig. 3 in a perspective view.
The cut planes in Fig. 1 and 2 are parallel to the flow direction which is represented by the arrow 2. The rotationally-symmetric axis 4 of the tubular connection element 1 is also in the cut planes. The tubular connection element comprises a first opening 6, a first connection section 8, a control region 10, a second connection section 12, a nozzle section 14 and a second opening 16.
The connection sections 8, 12 are in this case formed as support sections. The outer diameter of the support sections 8, 12 is in this case formed such that the support section 8, 12 can be respectively introduced into a connector of a component, fitting or pipe and then compressed with it. The first support section 8 in this case comprises a chamfer 18 at the opening 6 which simplifies the introduction into a corresponding component, for example a T-piece. The first support section 8 is connected to the second support section 14 by the control region 10. The control region 10 is formed as a flange region 11. The outer diameter of the tubular connection element 1 is increased in the flange region 11 such that the flange region 11 forms a stop 20 in the flow direction 2 and a stop 22 counter to the flow direction 2. In this case, the insertion depth of the tubular connection element 1 in relation to the two connection sections 8, 12 can, on the one hand, be limited. On the other hand, it is thus ensured that the control region 10 is also still visible from the outside after connecting the tubular connection element 1 to the corresponding components comprising the connectors. Since the surface 26 is in particular still visible, it can be marked for example in colour to signal the installation of the tubular connection element 1. A marking can also be provided on the surface 26 which indicates the position and/or alignment of the nozzle.
The nozzle section 14 is formed as a conically tapering cross-sectional narrowing 24 adjoining the second support section 12. The wall thickness is in this case reduced in comparison to the connection sections 8, 12. However, the wall thickness increases

again in the region of the second opening 16 until it substantially corresponds to the wall thickness of the connection regions 8, 12. The stability of the nozzle section can also be ensured during compressions by the increased wall thickness. The tubular connection element 1 comprises a rounded contour 25, which serves to improve the flow dynamics in the region of the outlet opening of the nozzle section 14, which is formed by the second opening 16.

If a medium, for example water, flows in the flow direction 2 from the first opening 6 through the connection sections 8, 12 and through the nozzle section 14 to the second opening 16, the cross-section of the tubular connection element 1 narrows in the nozzle section 14 owing to the cross-sectional narrowing 24. As a result, a higher flow speed in comparison to the previously passed regions develops in this region which leads to a lower static pressure. Due to the tubular connection element 1, a volume flow can then be caused by way of the reduction of the static pressure in the component, into which it is inserted with the nozzle section and prevent stagnation of, for example, drinking water in connected ring lines. The tubular connection element 1 shown is, in this case for example usable in connection with conventional T-pieces without having to consider geometric differences of the T-pieces.

The tubular connection element 1 represented is in this case manufactured from copper, stainless steel or brass.

An exemplary embodiment of an arrangement 27 according to the invention is respectively shown in Fig. 4a-c which respectively comprises the exemplary embodiment of a tubular connection element according to the invention from Fig. 1 - 3.

Fig. 4a shows a first T-piece 28a which provides the first connector with the connector 30a and which comprises a further connector 32a and a connector 34a branching at a right angle. Many conventional T-pieces comprise such right angles, but such a right angle is not mandatory. The connector 30a is pushed onto the first connection section 8 of the tubular connection element 1. In this case, the outer diameter of the connection region 8 is adapted to the inner diameter of the connector 30a. To this end, the inner diameter of the connector 30a increases in the region 42a. The connector 28a also comprises a groove 36a into which a sealing element, for example an O-ring (not represented) is placed. The further connector 32a and the branching connector 34a also comprise one such groove 38a, 40a respectively. The connector 30a is not yet compressed with the first connection section 8 of the tubular connection element 1 designed as a support section in the represented state. However, this may occur with a commercially-available pressing tool (not represented). In the present exemplary embodiment, the insertion depth of the tubular connection element 1 is limited both by the region 42a and also the contact surface 20. The branching connector 34a comprises a smaller inner diameter than the other two connectors 30a, 32a. The connection region 8 of the tubular connection element 1 is located behind the branching connector 34a viewed in the flow direction such that an interruption of the flow flowing into the branching connector 34a does not occur.

The arrangement 27 comprises a further second T-piece 28’ structurally identical to the first T-piece 28a. The T-piece 28a’, with the connector 30a’, comprises the second connector into which the tubular connection element 1 is pushed. In this case, both the nozzle section 14 and the second connection section 12 are pushed into the connector 30’ of the second T-piece 28a’. The connector 30a’ is also still not compressed with the second connection section 12 of the tubular connection element 1 designed as the support section in the represented state. This may also occur with a commercially-available pressing tool. The insertion depth of the tubular connection element 1 in the connection supports 30a’ of the second T-piece 28a’ is limited both by the region 42a’ and the contact surface 22. The opening 16 of the nozzle section 14 is positioned in the region of the branching connector 34a’ as a result.

If a medium, for example water, flows in the flow direction 2 through the connector 32a of the first T-piece, through the tubular connection element 1 and lastly through the connector 32a’ of the second T-piece, the cross-section of the tubular connection element 1 narrows to a greater extent in the nozzle section 14 owing to the cross-sectional narrowing 24 than in the other line. As a result, in this region 14 and closely behind it a higher flow speed in comparison to the previously passed regions develops which leads to a lower static pressure. A reduction of the static pressure is caused by the tubular connection element 1 in the region of the branching connector 34a’ of the second T-piece. The medium located in the branching connector 34a’ or in the component connected thereto is pressed out of the same into the T-piece 28a’. If, for example, a ring line is connected to the branching connectors 34a and 34a’, a volume flow is also generated through the ring line by a volume flow along the flow direction 2 since a part of the volume flow is pressed into the branching connector 34a by the Venturi effect owing to the pressure difference and is branched off and is transported out of the ring line again via the connector 34a’ and joins with the volume flow along the flow direction 2 once again. In this manner, the stagnation in the line systems can be cost-effectively and yet effectively prevented without further adaptations of the conventional T-piece.

Fig. 4b and 4c respectively show an arrangement 44 or 48 similar to the arrangement 27 represented in Fig. 4a.

The arrangement 44 differs from the arrangement 27 in that instead of the T-pieces 28a and 28a’, the T-pieces 28b and 28b’ are provided. They are similar to the T-pieces 28b and 28b’, but different in that they comprise a greater wall thickness, in particular in the regions marked with 46. As a result, the inner contour of the T-pieces changes for example especially in the region of the branching connectors.

The arrangement 48 also differs from the arrangement 44. In the arrangement 48, instead of the T-pieces 28a and 28a’, the T-pieces 28c and 28c’ are provided. They are similar to the T-pieces 28a and 28a’, but differ, in turn, in that they comprise a greater wall thickness, in particular in the regions marked with 50. As a result, the inner contour of the T-pieces also does not change only insignificantly in the case of the T-pieces 28c, 28c’. It can also be discerned that owing to different geometries of the T-pieces, in particular owing to different length of the connector 30c’ of the T-piece 28c’ viewed in the flow direction, the second opening 16 of the nozzle section 14 is pushed further in the flow direction in relation to the branching connector 34c’ of the second T-piece 28c’ than was the case for the arrangement 27. A greater overlap of nozzle section 14 and branching connection opening 34c’ thus results.

The need for the different configurations of the T-pieces 28a, 28b, 28c can, for example, be caused by different material properties, insofar as the T-pieces are manufactured from different materials. In spite of the different geometries of the T-pieces, a sufficient Venturi effect can be achieved with the same tubular connection element 1. In particular, in the case of a volume flow of 5 to 100 l/min along the flow direction 2, a volume flow of 1 to 20% of the volume flow along the flow direction 2 can be produced in the ring lines connected to the branching connectors 34a, 34a’, 34b, 34b’ and 34c, 34c’ irrespective of the T-piece used.

Fig. 5 shows a further exemplary embodiment of an arrangement 52 according to the invention which comprises a second exemplary embodiment of a tubular connection element 1'. The tubular connection element 1' is inserted into the two T-pieces 28b and 28b' similar to the arrangement represented in Fig. 4b. The tubular connection element 1' differs from the tubular connection element 1 by an alternatively designed flange region 11' serving as a control region 10' and an alternatively designed nozzle section 14'. The flange region 11', in contrast to the flange region 11, does not comprise an indentation. The nozzle section 14' adjoins the second connection section 12' as a conically tapering region in order to produce a cross-sectional narrowing. In contrast to the nozzle section 14, the nozzle section 14' does not comprise a reinforcement in the region of the second opening 16' in the form of an increased wall thickness, but rather a substantially constant wall thickness.

Fig. 6 shows a tubular connection element 1''. Said connection element comprises a connection section 12'' comparable to the second connection section 12 of the tubular connection element 1. Said connection section 12'' is designed as a support section and is pushed into a connector together with the nozzle section 14''. The first connection section 8'' is, however, not designed as a support section but as a pressing section. A connector can thus be pushed into the connection section 8''. In this case, the first connection section 8'' designed as a pressing section comprises a larger inner diameter than the second connection section 12'' designed as a support section. The second connection section also comprises a receiving portion in the form of a groove 7'' into which a sealing element, for example an O-ring (not represented) can be introduced similar to the connectors of the T-pieces 28a, 28b or 28c to increase the tightness after compression.

Since the second connection section 12'' designed as the pressing section is still visible after compression, it also serves as the control region 10''.

The flange region 11'' between the first connection section 8'' and the second connection section 12'', which comprises a smaller inner diameter, serves as the stop 22'' for the connector to be introduced into the first connection section 8''.

The nozzle section 14'' comprises three regions adjoining the second connection section 12''. A cylindrical region 14a'' firstly follows, which adjoins the connection section 12'' by means of a transition region. A conically tapering region 14b'', in turn, adjoins this cylindrical region 14a'', said conically tapering region provides a cross-sectional narrowing. Lastly, a further cylindrical region 14c" adjoins this conically tapering region 14b" which comprises the nozzle outlet with the second opening 16".

Fig. 7 shows an exemplary embodiment of an arrangement 54 which comprises the tubular connection element 1" from Fig. 6. The tubular connection element is pushed into the T-piece 28c' which corresponds to the T-piece from Fig. 4c. As can be discerned, a connection section 8" is provided by the tubular connection element 1" which is structurally identical to the connector 30c' of the T-piece 28c'. In this respect, conventional T-pieces are provided with a nozzle section but without having additional impacts on further connection or compression steps since further connections can take place as before without a tubular connection element. The components to be connected are now simply pushed into the connection section 8" of the tubular connection element 1" instead of directly into the connector 30c' of the T-piece 28c'. Unlike the exemplary embodiments in Fig. 4a-c, a pipe can now for example be connected to the connection section 8" in order to then install a further T-piece, i.e. the first T-piece 28c, somewhat at a distance from the tubular connection element.

Fig. 8 shows an exemplary embodiment of a further arrangement 56 according to the invention. The arrangement comprises a pipe run 58, which for example supplies the different floors of a building with drinking water and a ring line 60 which supplies for example two water sampling points 64 in the cellar with drinking water. In this case, one of the arrangements 27, 44, 48 or 52 is for example installed in the pipe run 58 at the point 62. The ring line 60 in this case connects the branching connector 34a, 34b, 34c of the first T-piece 28a, 28b or 28c and the branching connector 34a', 34b', 34c' of the second T-piece 28a, 28b' or 28c'. The water located in the ring line 60 also circulates through a volume flow along the flow direction 2, which can be caused by one or a plurality of the water sampling points 66 without one of the sampling points 64 having to be used. In the region of the sampling point 66, either rinsing of the ring lines is not required since the water cannot stagnate in the ring line owing to regular use or decentralised rinsing systems can also be provided which substantially amount to the use of one of the sampling points 66.

Patentkrav

1. Rørformet forbindelseselement med
- en første åbning (6, 6'),
- en anden åbning (16, 16'),
- et første forbindelsesafsnit (8, 8'),
- et andet forbindelsesafsnit (12, 12'),
- et dyseafsnit (14, 14') og
- et kontrolområde (10, 10'),
- hvor det første forbindelsesafsnit (8, 8') kan forbindes med et første tilslutningsstykke (30a, 30b, 30c),
- hvor det andet forbindelsesafsnit (12, 12') kan forbindes med et andet tilslutningsstykke (30a', 30b', 30c'),
- hvor dyseafsnittet (14, 14') kan føres ind i det andet tilslutningsstykke (30a', 30b', 30c'),
- hvor kontrolområdet (10, 10') kan ses udefra efter forbindelsen med det første tilslutningsstykke (30a, 30b, 30c) og det andet tilslutningsstykke (30a', 30b', 30c'),
- hvor det første forbindelsesafsnit (8, 8') kan sammenpresses med det første tilslutningsstykke (30a, 30b, 30c), og det andet forbindelsesafsnit (12, 12') kan sammenpresses med det andet tilslutningsstykke (30a', 30b', 30c'),
- hvor forbindelsesafsnittene (8, 8', 12, 12') kan føres ind i det tilsvarende tilslutningsstykke (30a, 30b, 30c, 30a', 30b', 30c') og er udformet som et støtteafsnit,
- hvor der mellem det første forbindelsesafsnit (8, 8') og det andet forbindelsesafsnit (12, 12') er tilvejebragt et flangeområde (11, 11') på den ydre omkredsflade, hvilket flangeområde tilvejebringer et anslag (20, 22) for tilslutningsstykkerne (30a, 30b, 30c, 30a', 30b', 30c') og stiller kontrolområdet (10, 10') til rådighed,

kendetegnet ved,
- **at** det andet forbindelsesafsnit (12, 12') set i mediets strømningsretning er tilsluttet det første forbindelsesafsnit (8, 8'), og dyseafsnittet (14, 14') er tilsluttet det andet forbindelsesafsnit (12, 12'), og at

dyseafsnittet (14, 14') kan føres fuldstændigt ind i det andet tilslutningsstykke (30a', 30b', 30c').

2. Rørformet forbindelseselement ifølge krav 1,
kendetegnet ved,
at mindst et forbindelsesafsnit (8, 8', 12, 12') har en optagelse (7") til et tætningselement.

3. Rørformet forbindelseselement ifølge krav 1 eller 2,
kendetegnet ved,
at dyseafsnittet (14, 14') er tilsluttet det andet forbindelsesafsnit (12, 12') og har den anden åbning (16, 16').

4. Rørformet forbindelseselement ifølge et af kravene 1 til 3, **kendetegnet ved,**
at det rørformede forbindelseselement (1, 1') er fremstillet af metal, især ædelstål, rødgods og/eller kobber.

5. Anordning med
- et rørformet forbindelseselement (1, 1') ifølge et af kravene 1 til 4 og
- mindst et T-stykke (28a, 28a', 28b, 28b', 28c, 28c'), der har det første tilslutningsstykke (30a, 30b, 30c) eller andet tilslutningsstykke (30a', 30b', 30c').

6. Anordning ifølge krav 5,
kendetegnet ved,
at det afgrenede tilslutningsstykke (34a, 34a', 34b, 34b', 34c, 34c') af mindst et T-stykke (28a, 28a', 28b, 28b', 28c, 28c') har en mindre indvendig diameter end de to andre tilslutningsstykker (30a, 32a, 30a', 32a', 30b, 32b, 30b', 32b', 30c, 32c, 30c', 32c') af T-stykket (28a, 28a', 28b, 28b', 28c, 28c').

7. Anordning ifølge et af kravene 5 eller 6,
kendetegnet ved,
at den anden åbning (16, 16') ligger i det væsentlige i området af det afgrenede tilslutningsstykke (34a'. 34b', 34c') af T-stykket (28a', 28b', 28c'), som har det andet tilslutningsstykke (30a', 30b', 30c').

8. Anordning med
- en rørstreng (58) og
- en ringledning (60),
- hvor rørstrengen (58) har
- et rørformet forbindelseselement (1, 1') ifølge et af kravene 1 til 4,
- et første T-stykke (28a, 28b, 28c) samt
- et andet T-stykke (28a', 28b', 28c'), som har det andet tilslutningsstykke (30a', 30b', 30c'), og
- hvor ringledningen (60) forbinder det afgrenede tilslutningsstykke (34a, 34b, 34c) af det første T-stykke (28a, 28b, 28c) og det afgrenede tilslutningsstykke (34a', 34b', 34c') af det andet T-stykke (28a', 28b', 28c').

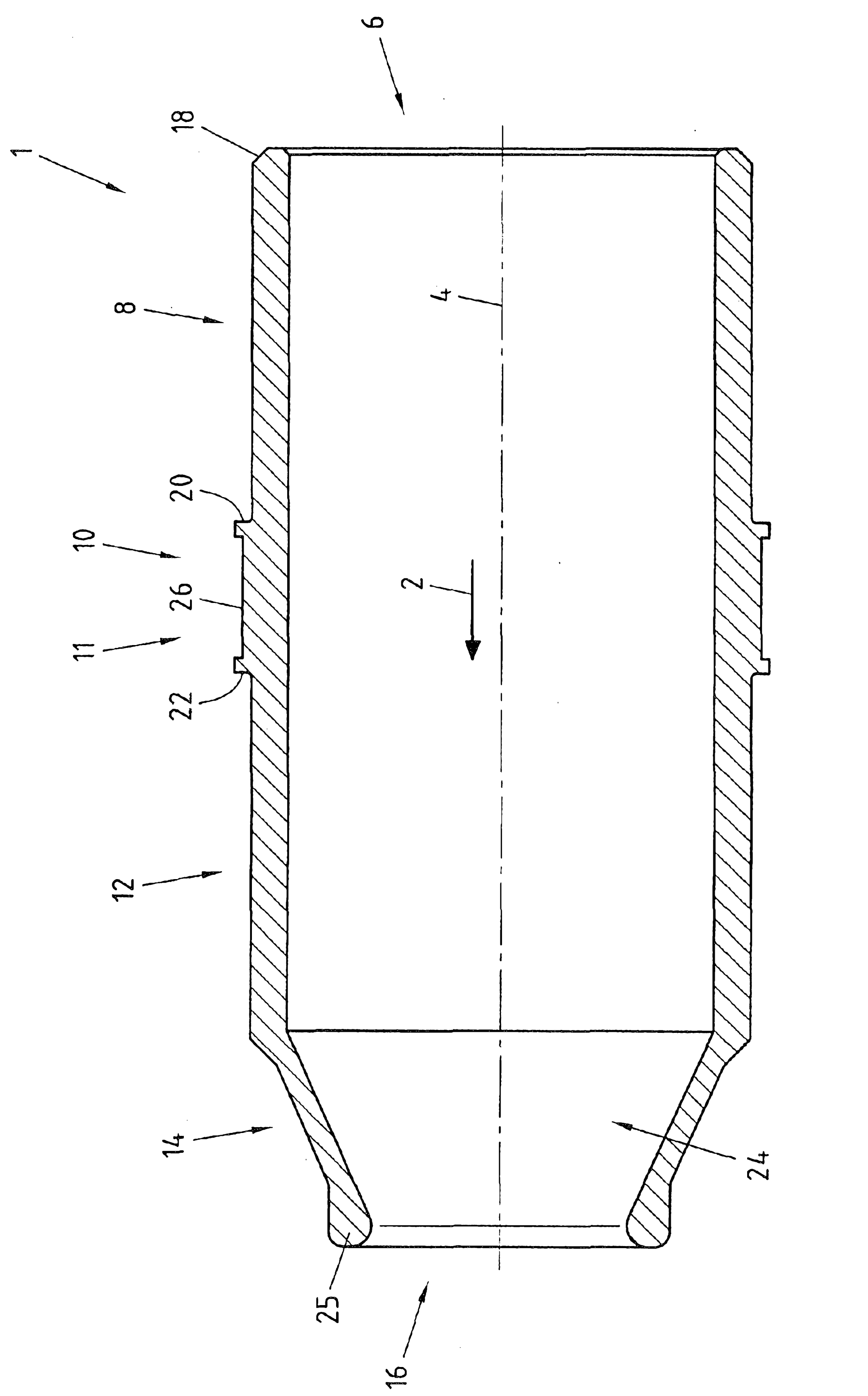

Fig.1

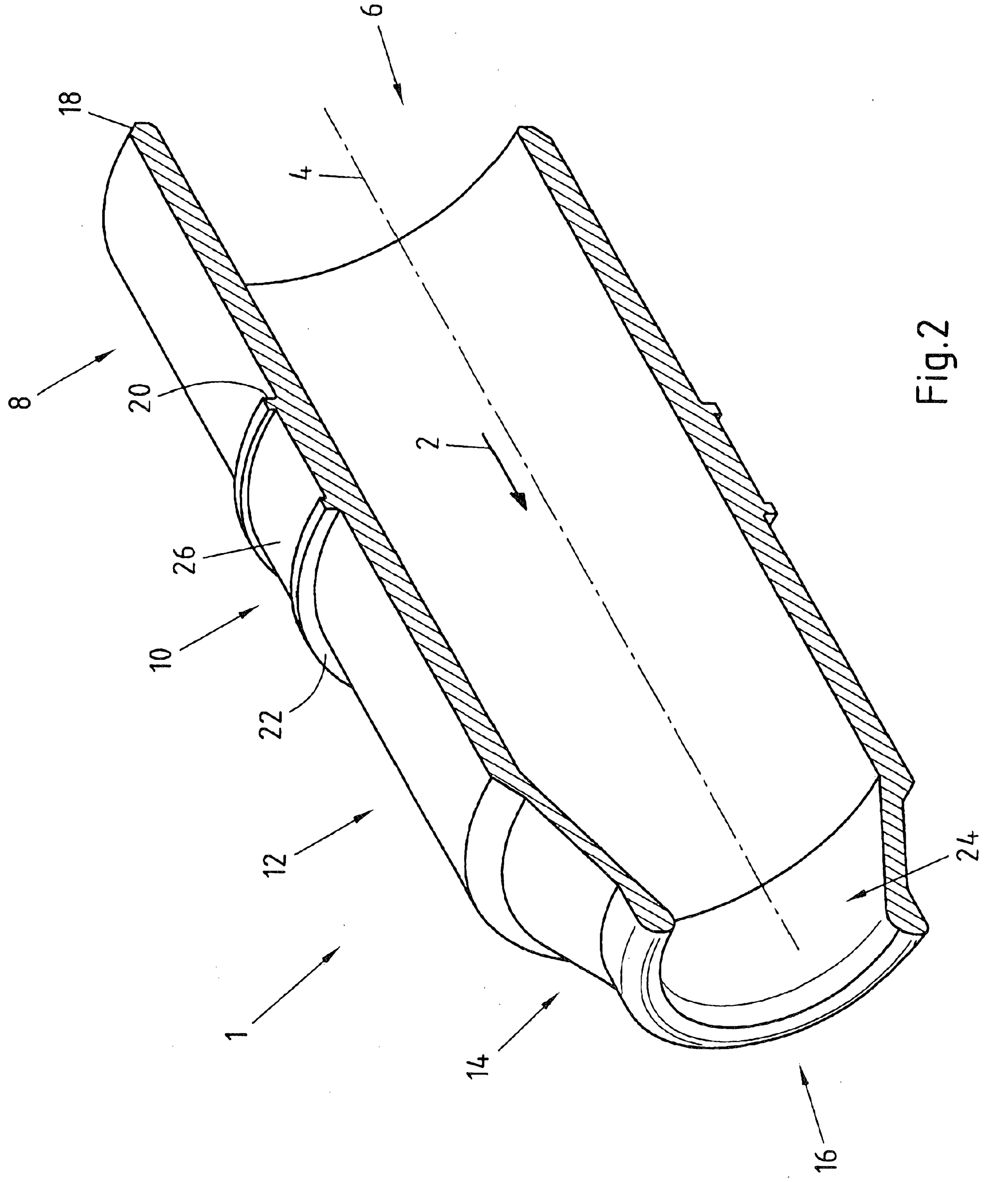

Fig.2

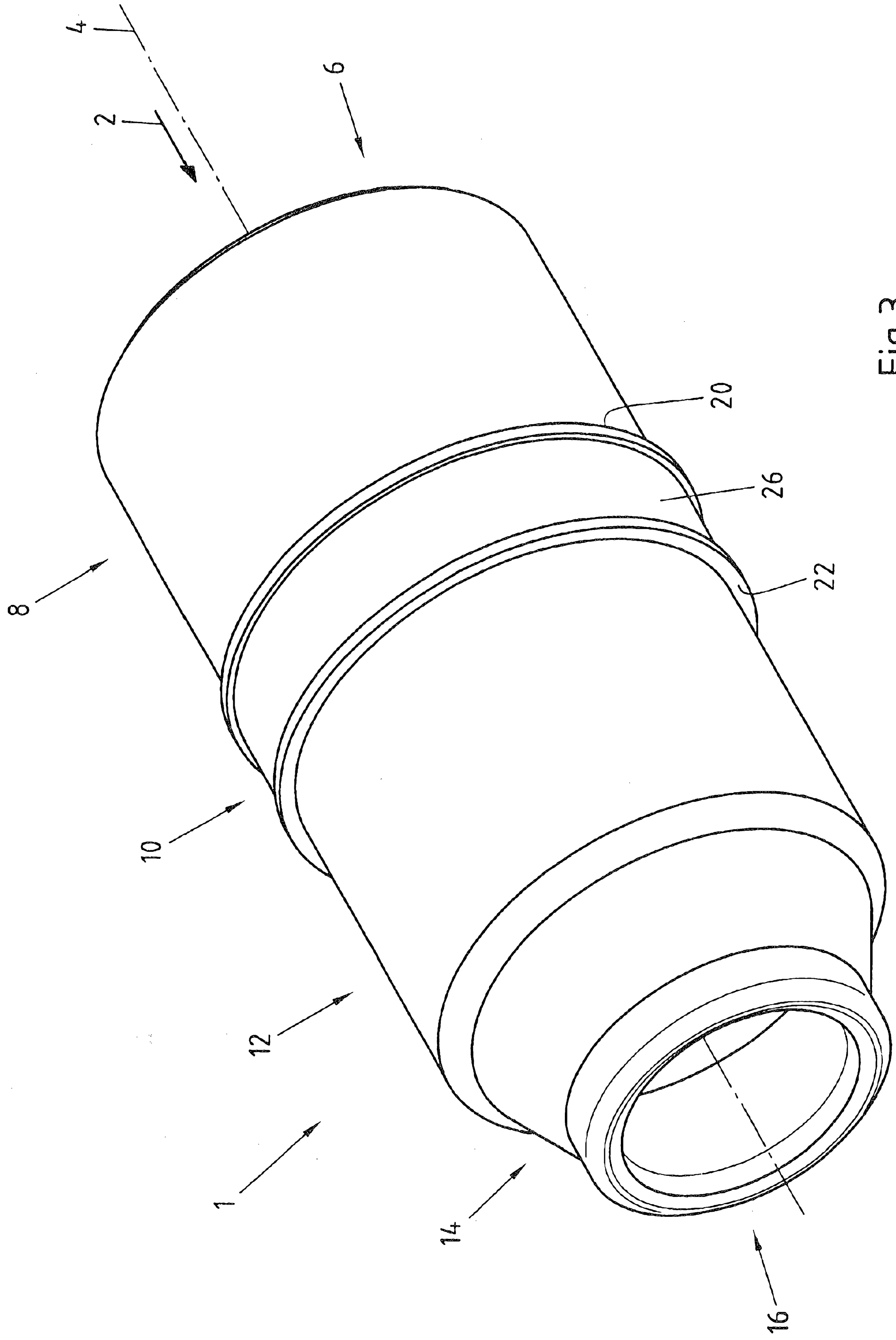

Fig.3

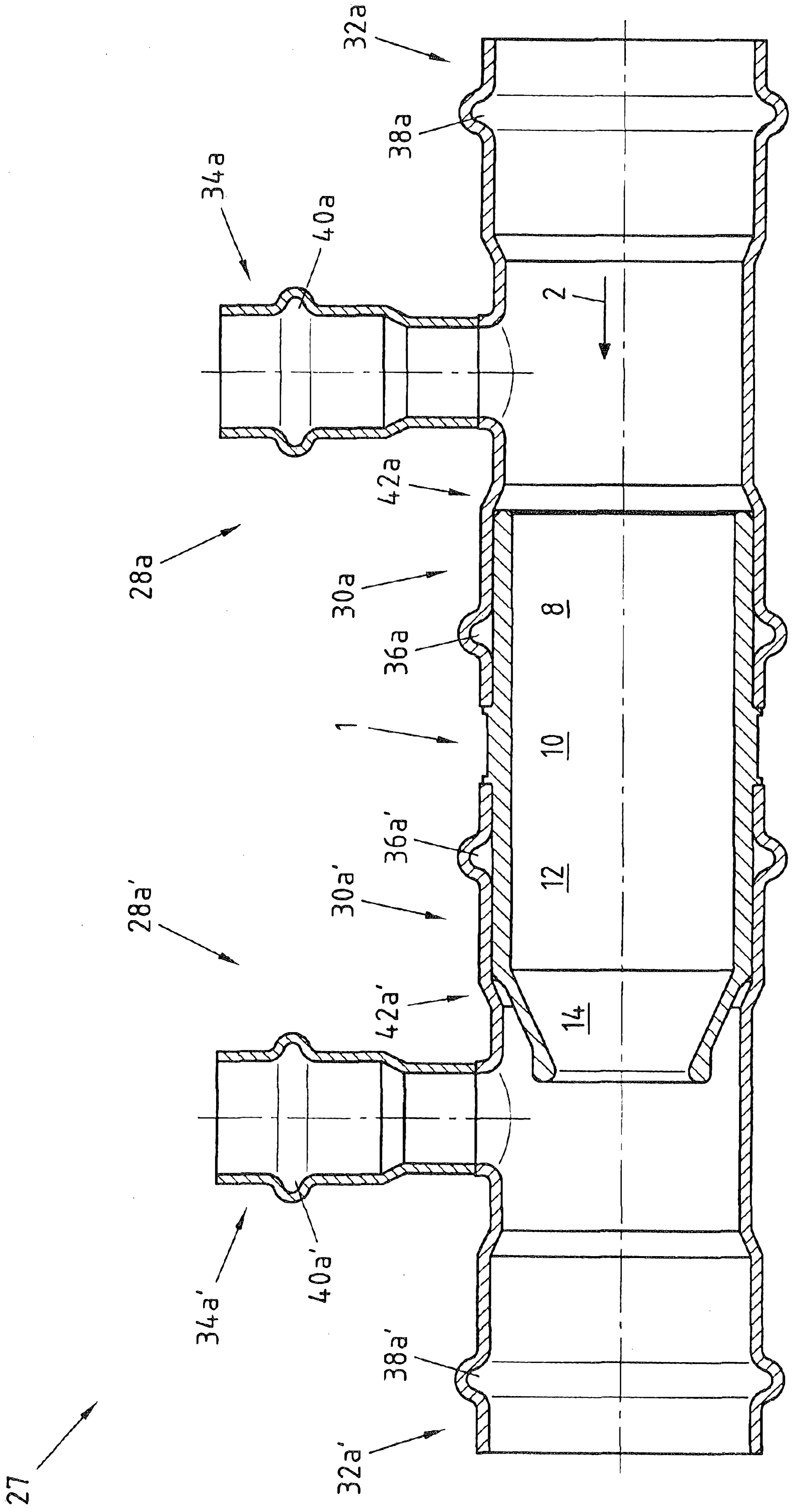
32a
38a
34a
40a
2
42a
28a
30a
8
36a
1
10
36a'
12
30a'
28a'
42a'
14
40a'
34a'
38a'
32a'
27

Fig.4a

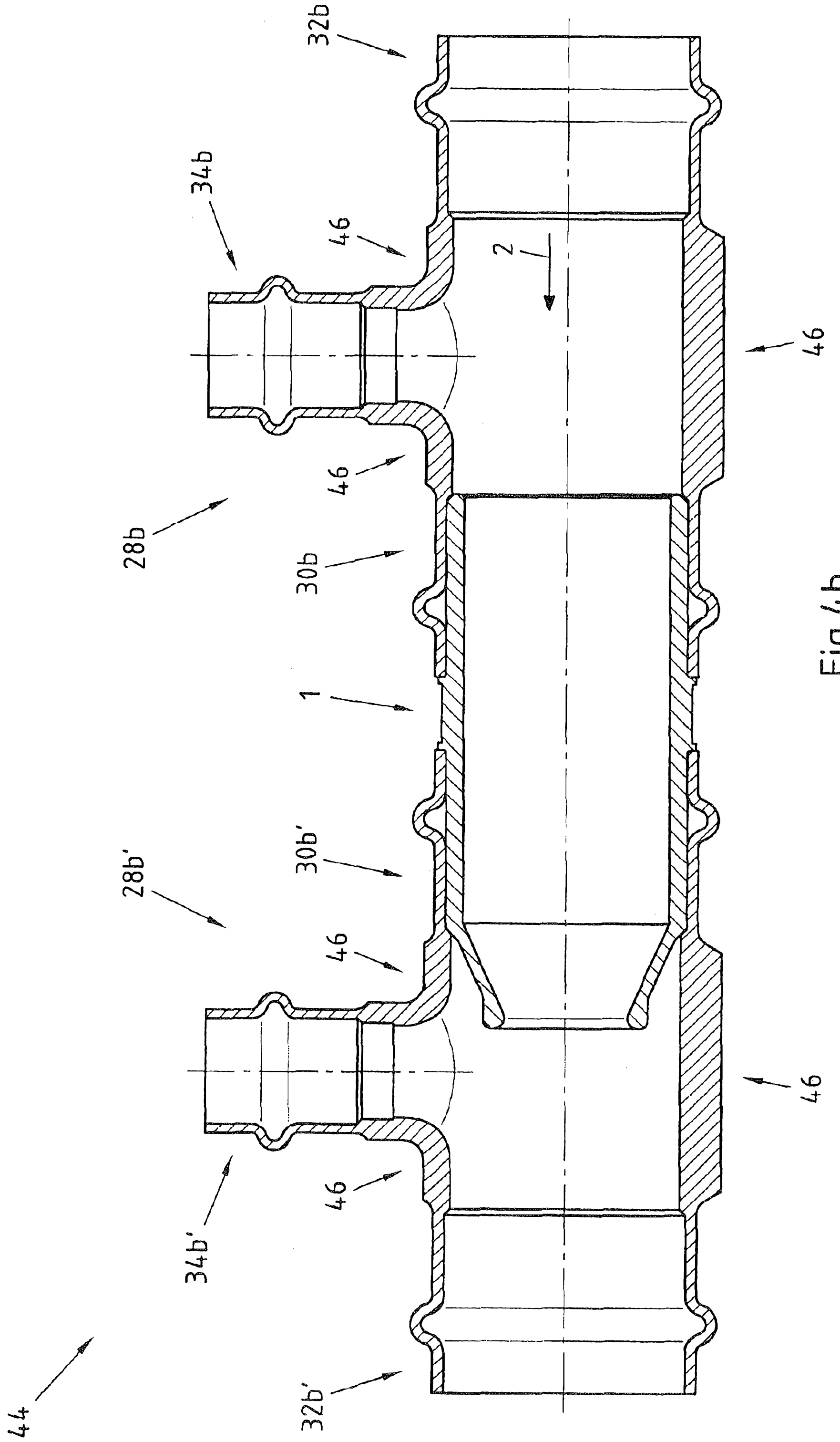

Fig.4b

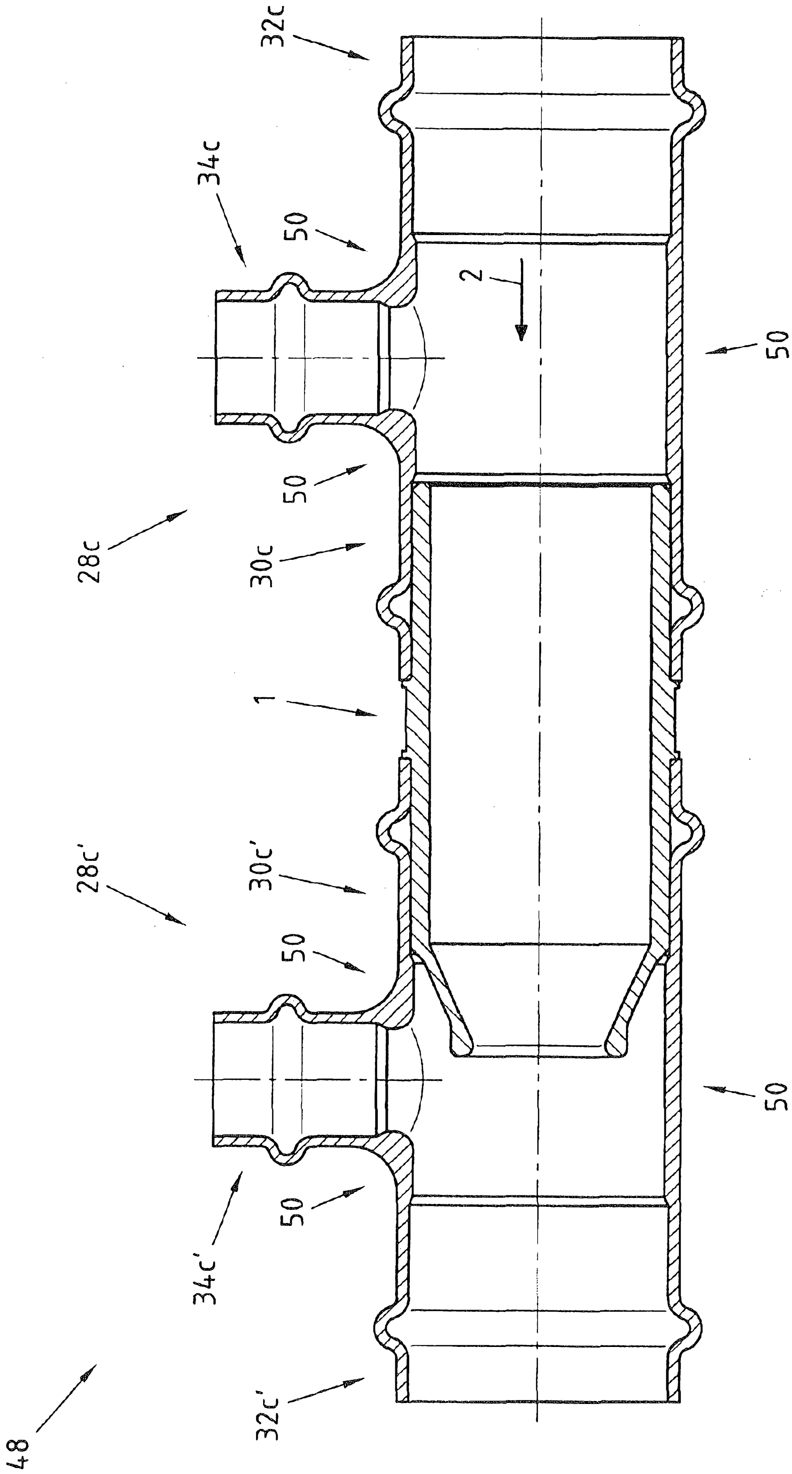

Fig.4c

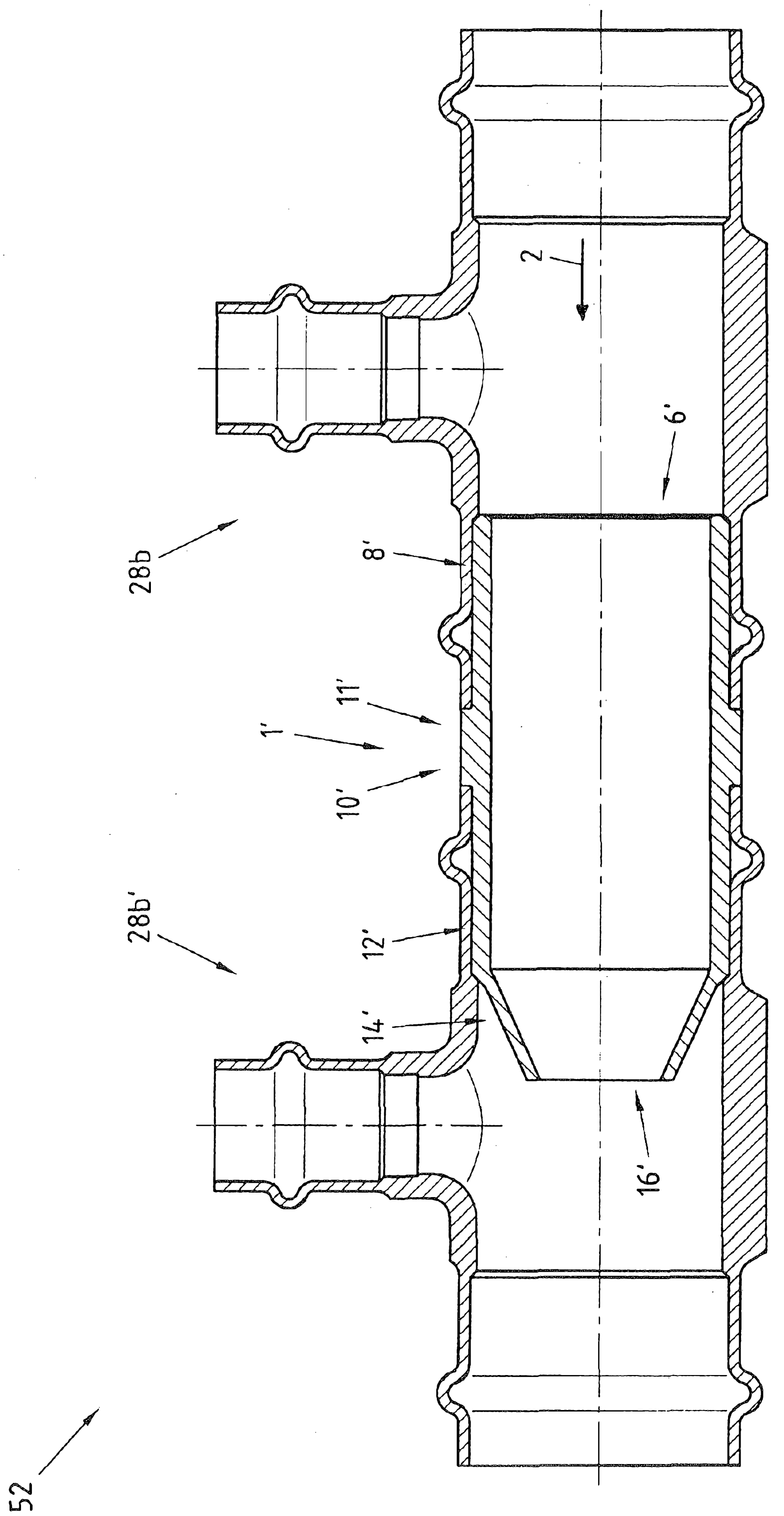

Fig.5

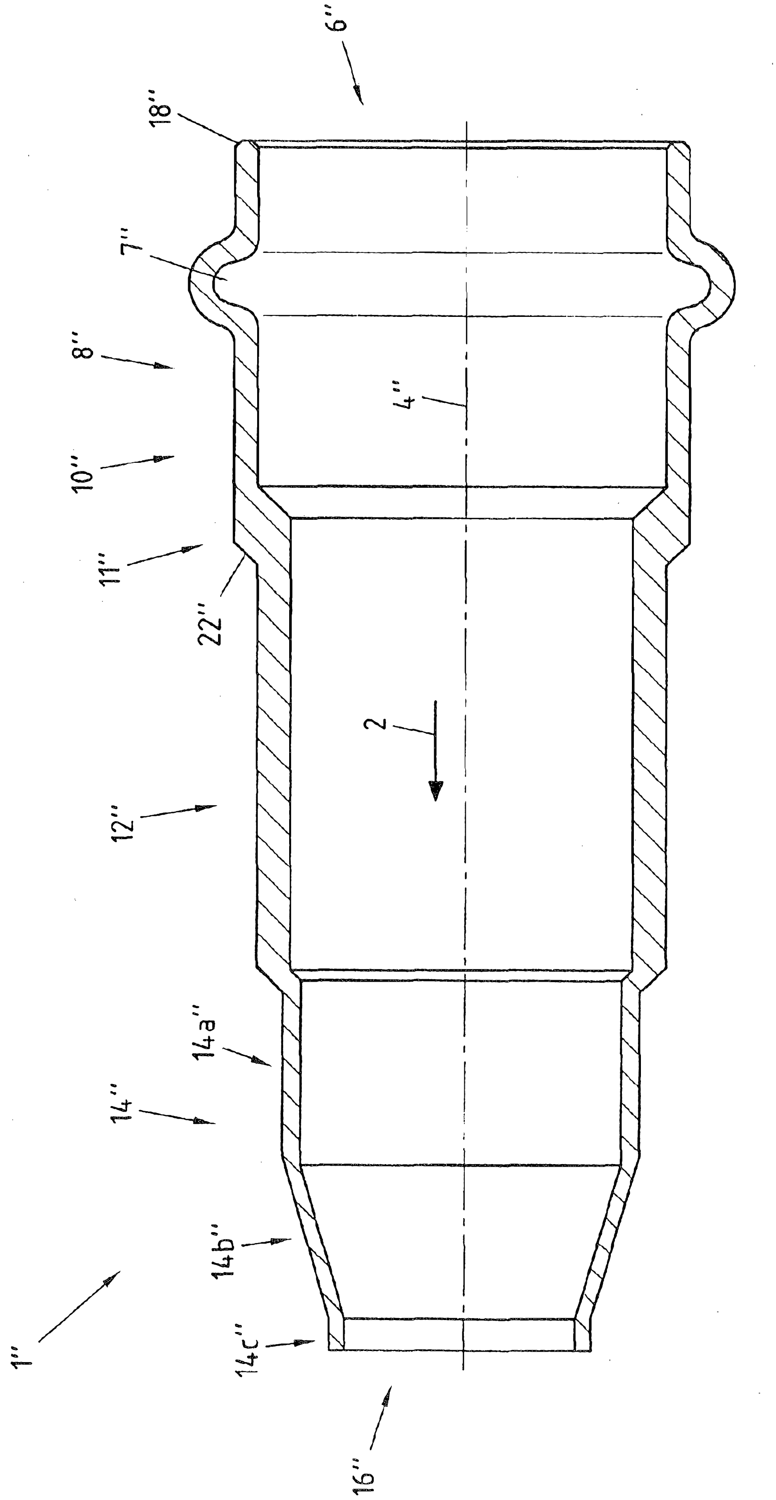

Fig.6

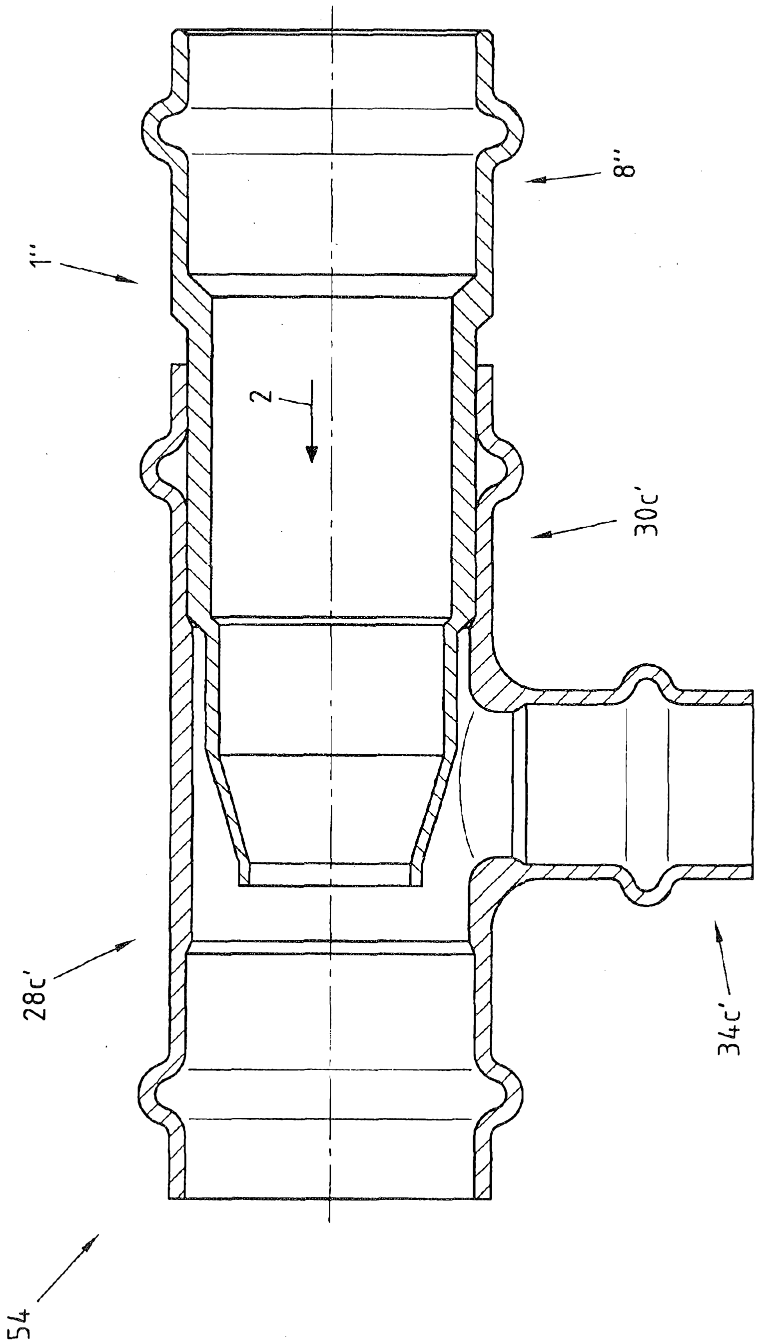

Fig.7

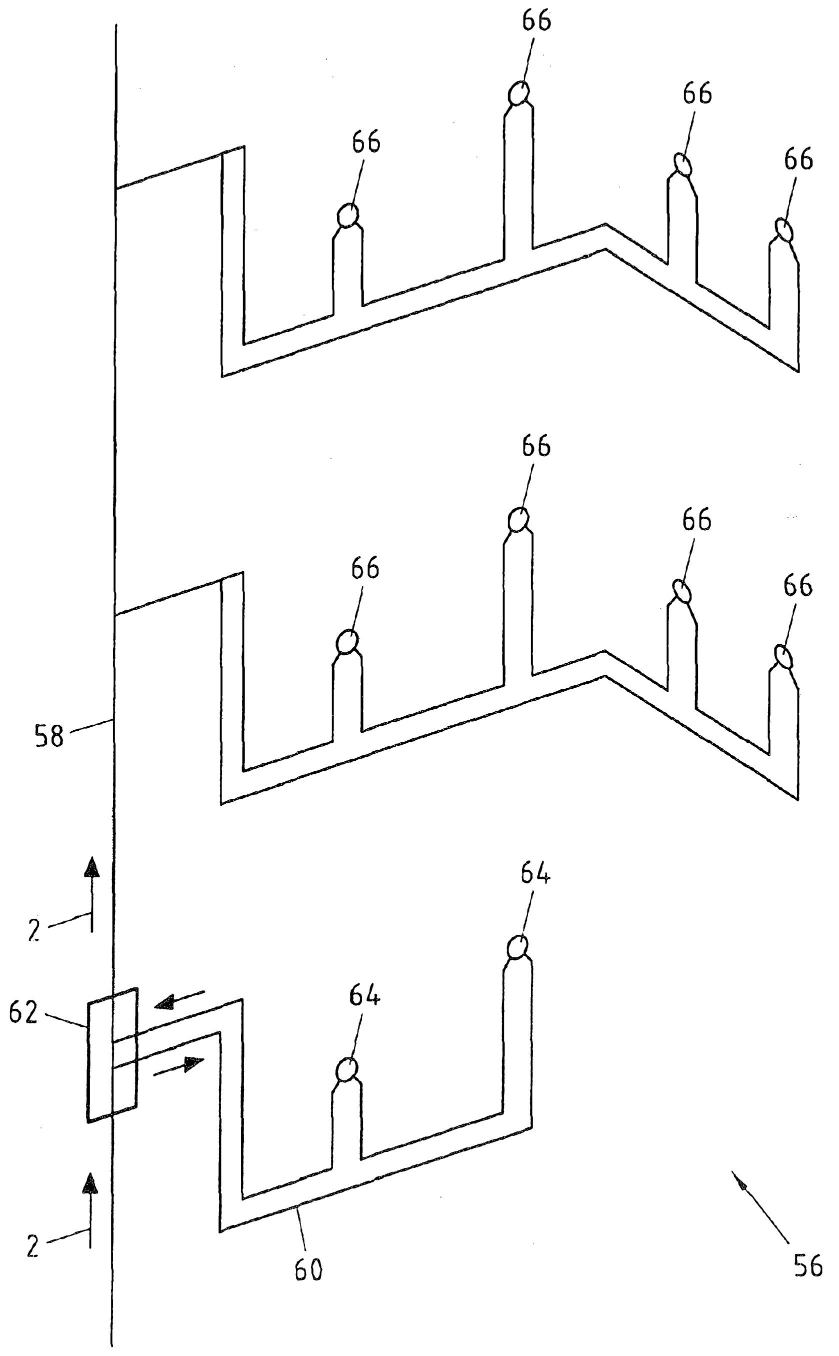

Fig.8