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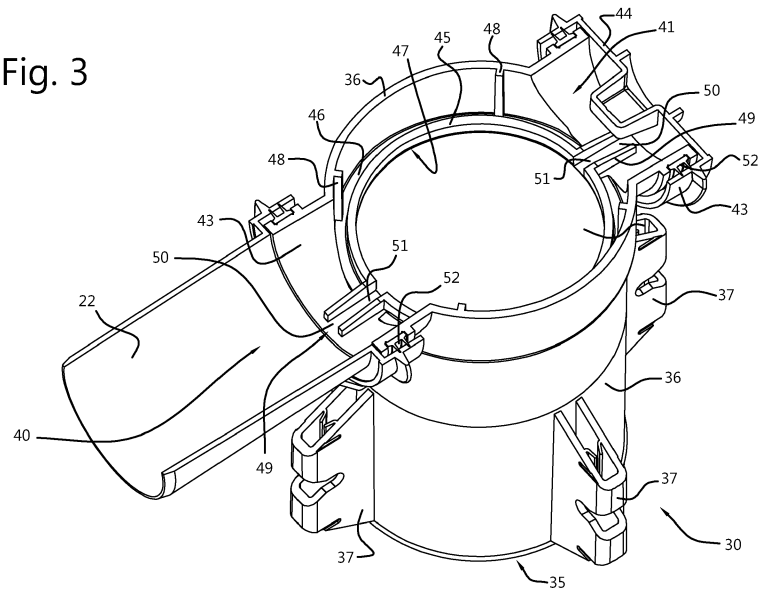
(54) TUBULAR COUPLING PIECE AND BRANCH PIPE, PARTICULARLY FOR USE IN A PIPE SYSTEM OF A VENTILATION OR FLUE GAS DISCHARGE CHANNEL

(57) Tubular coupling piece (30), particularly for use in a pipe system of a ventilation or flue gas discharge channel. The coupling piece (30) is provided in its peripheral wall (36) with at least one connecting opening (40, 41) for connection of a branch pipe (22) thereto. The coupling piece (30) is further provided with a stop for a pipe segment extending internally over a distance in radial direction around the peripheral wall (36). This stop is configured as fluid collection channel (45) for collecting fluid moving during use along the peripheral wall (36) in the coupling piece (30) and debouches into the at least one connecting opening (40, 41). The part (49) of the fluid collection channel (45) debouching into the connecting opening (40, 41) is provided with a fluid throughflow channel (51) connecting internally to the peripheral wall (36) of the coupling piece (30). Also provided is a branch pipe (22) with screw coupling for use with the coupling piece (30).

Fig. 3



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Description

[0001] The invention relates to a tubular coupling piece, particularly for use in a pipe system of a ventilation or flue gas discharge channel, and to an assembly of a coupling piece and pipe segment. The invention also relates to a branch pipe for use with such a coupling piece, for instance for connecting thereto a combustion device in the case of a pipe system operating as flue gas discharge channel, or for instance a ventilation device or ventilation grille in the case of a pipe system operating as a ventilation channel.

[0002] Separate or combined ventilation and flue gas discharge channels are installed in practice for ventilation purposes, such as for instance for supplying and/or discharging fresh air to and/or from a space, for discharging flue gases from heating devices or other combustion devices such as ovens, and for instance for supplying combustion air thereto.

[0003] Such ventilation and flue gas discharge channels are constructed nowadays from plastic or metal tubes or pipes, such as tubes or pipes of polypropylene, aluminium or stainless steel. The pipe material to be selected depends here on, among other factors, the type of combustion device, i.e. the type of combustion material such as gas, oil or wood, the final temperature of the flue gas to be discharged, which in higher efficiency devices will be lower than in the case of lower efficiency devices, and the degree of condensation in the pipe system.

[0004] Particularly in older buildings these ventilation and flue gas discharge channels may still consist of brickwork or concrete or other stone or ceramic shafts or chimneys, or ventilation or flue gas discharge shafts assembled from galvanized pipes. Particularly because of condensation on the pipe wall due to, among other factors, water vapour in the flue gas or in the air to be discharged from shower areas or bathrooms or other moist spaces, these galvanized pipes are highly susceptible to corrosion, whereby leakages occur in the pipe system after a period of time. In the case of a flue gas discharge system such leakages can result in potentially dangerous situations, since components present in the flue gas, such as nitrogen dioxide, carbon dioxide, carbon monoxide and sulphur dioxide, can be released in the building instead of being discharged to the outside via for instance a discharge or chimney flue on the roof of the building.

[0005] Also in the case an older combustion device is replaced by a more modern appliance it may be necessary, for instance on the basis of the composition and temperature of the flue gas to be discharged, to replace the existing flue gas discharge system by a pipe system constructed from materials better suited to the purpose. Such modern combustion devices have a relatively low flue gas temperature compared to older devices, although this is associated with a greater degree of condensation in the pipe system. The lower flue gas temperature does on the other hand make it possible however to construct the flue gas discharge system wholly from a plastic material.

[0006] In order to avoid cutting and breaking work as much as possible during replacement or renovation of existing installation and flue gas discharge channels, pipe systems constructed from mutually coupled pipe segments are arranged where possible in practice as ventilation and/or flue gas channels in the existing ventilation and flue gas discharge shafts. Not only ventilation and flue gas discharge channels to be replaced but also those to be newly installed are constructed in practice in the form of pipe systems assembled from mutually coupled pipe segments.

[0007] Tubular coupling pieces, also referred to as sleeves, are usually applied for coupling the pipe segments in longitudinal direction. In order to prevent pipe segments being received too far into a coupling piece during installation in a shaft, or even passing wholly through a coupling piece, these coupling pieces are provided internally with one or more stops, such as ribs or the like, running around the peripheral wall.

[0008] An example of such a pipe system is described in, among others, the non-prepublished Netherlands patent application, filed simultaneously with the present patent application in the name of applicant, with the title: "Pipe system, coupling piece and method for installing the pipe system in a shaft of a building". In an embodiment of this pipe system the tubular coupling pieces are provided with at least one connecting opening for connection thereto of a branch pipe or branch pipe part. The branch pipe then leads to an appliance to be connected to the pipe system. The stop or stops formed in this coupling piece serves or serve the purpose, among others, that the connecting openings cannot be blocked by a pipe element received in the coupling piece.

[0009] As already noted in the foregoing, during use of the pipe system fluid formation occurs along the inner wall thereof, for instance in the form of condensate as a result of the formation of vapour, such as water vapour, in air to be discharged or in flue gas or other combustion emission products to be discharged. During operation this condensed fluid or condensed liquid, such as condensed water or other liquid composition, flows downward in the pipe system under the influence of gravitational force. A part of the condensed fluid will of course also evaporate again and be discharged with the flue gas when sufficiently hot flue gas is for instance discharged from a flue gas discharge connected to the pipe system.

[0010] The liquid or fluid draining downward along the peripheral wall of the pipe segments and the coupling pieces, in the case of a pipe system used as flue gas discharge channel or as ventilation channel, is however blocked by the stop or stops formed in a coupling piece and will accumulate at such a stop. Particularly when the coupling piece and/or the pipe system does not run truly vertically, there is the risk that all the fluid such as water which has accumulated at the stop will flow in uncontrolled manner to a connected device or to a ventilation grille or the like. This can cause malfunction of a device

or for instance damage caused by water dripping out of a ventilation grille.

[0011] German patent application DE 43 12 094 A1 and the British patent application GB 2 415 033 disclose a tubular coupling piece particularly for use in a pipe system of a ventilation or flue gas discharge channel, which coupling piece has an inlet end and an outlet end for connection to a pipe segment of the pipe system and wherein the coupling piece is provided in its peripheral wall between the inlet end and the outlet end with at least one connecting opening for connection of a branch pipe thereto, wherein the coupling piece is further provided with a stop for a pipe segment extending internally over a distance in radial direction around the peripheral wall, which stop is embodied as fluid collection channel for collecting fluid moving during use along the peripheral wall in the coupling piece, wherein the fluid collection channel connects to the at least one connecting opening.

[0012] By embodying the or each stop in the coupling piece as fluid collection channel fluid draining along the peripheral wall in the coupling piece is collected during use in the collection channel even when the coupling piece or the pipe system is not installed truly vertically. This fluid collection channel can for instance consist of an approximately U-shaped peripheral channel, the open side of which is directed toward the inlet end of the coupling piece. Having the fluid collection channel also connect to a connecting opening achieves that the collected liquid can, if desired, be discharged via a branch pipe or branch pipe part connected to the connecting opening and a device, such as a combustion device, connected thereto. Modern combustion devices do after all generally themselves have a discharge for discharging, for instance via a sewer connection, condensed fluid formed in the device. A problem then however occurs when the collected fluid or condensate may not or cannot drain via the connecting opening.

[0013] The invention has for its object to provide a solution for the purpose of allowing fluid, such as condensed fluid, collected by a fluid collection channel to also drain in a controlled manner when the connecting opening is closed or when collected fluid may not be discharged via the connecting opening and a branch pipe connected thereto.

[0014] This object is achieved by the invention in that the fluid collection channel debouches into the at least one connecting opening and the part of the fluid collection channel debouching into the at least one connecting opening is provided with a fluid throughflow channel connecting internally to the peripheral wall of the coupling piece for the purpose of draining through the coupling piece fluid collected by the fluid collection channel.

[0015] For guided discharge of fluid from the fluid collection channel according to the invention, the part of the fluid collection channel debouching into the connecting opening is provided with a fluid throughflow channel connecting internally to the peripheral wall of the coupling piece and having a fluid throughflow opening for the purpose of draining through the coupling piece fluid collected by the fluid collection channel.

[0016] In the case that fluid collected in the fluid collection channel may not or cannot be discharged via a branch pipe connected to a respective connecting opening and a device connected thereto, such as a combustion device, the solution according to the invention thus provides the option of guiding the collected fluid via the fluid throughflow channel or fluid overflow channel back into the coupling piece.

[0017] Such a situation can for instance occur when the connected device does not have its own condensation discharge, or for instance in the case of a ventilation grille or the like.

[0018] Another situation is that where a connecting opening is not or not yet being used and for instance is closed to the outside by means of a cover or cap. Without fluid throughflow channel or fluid overflow channel the fluid collecting in the collection channel would accumulate at the cover, whereby for instance a sealing gasket of the cover which is in contact with the fluid could in time be adversely affected by the aggressive substances in the condensed fluid. The fluid throughflow channel prevents such an accumulation in that the fluid is guided back into the coupling piece and for instance discharged via a combustion device lying below or for instance via a condensation outlet connected to the lowest coupling piece.

[0019] In an embodiment of the invention is the fluid collection channel arranged, as seen in the direction from the inlet end to the outlet end of the coupling piece, at the bottom of the connecting opening and connects thereto. That is, the fluid collection channel is open from the connecting opening. The dimensions of the channel, i.e. the collecting volume thereof, can be adjusted to the extent of expected condensation. A channel will generally suffice with a width and height of for instance 5-10 mm.

[0020] In yet another embodiment of the invention the fluid throughflow channel is provided in the direction towards the peripheral wall of the coupling piece with a fluid flow resistance. Such a fluid or liquid flow resistance achieves that the collected fluid is preferably discharged in the first instance via a connected branch pipe. Only from a certain level will collected fluid also be able to flow back into the coupling piece via the fluid throughflow channel. The quantity of fluid flowing into the branch pipe can be adjusted by adjusting the flow resistance.

[0021] When for instance a connecting opening is closed as described above, the flow resistance ensures that, as soon as fluid begins to flow back into the coupling piece, a certain flow of fluid also occurs in the fluid collection channel, whereby the fluid in the collection channel is 'refreshed', resulting in no or far fewer aggressive substances remaining behind in the fluid collection channel than without such a flow.

[0022] In an embodiment the fluid flow resistance is formed by the fluid throughflow channel rising from the part of the fluid collection channel debouching into the

connecting opening to the peripheral wall of the coupling piece. The fluid throughflow channel preferably rises here with a uniform inclination.

[0023] In a further embodiment of the coupling piece, wherein the fluid collection channel debouches into the connecting opening over a distance transversely thereof, for instance in the form of a spout, the fluid throughflow channel or fluid return flow channel is arranged in the debouchment.

[0024] For connection of a branch pipe to a connecting opening the coupling piece is provided, in an embodiment, with a tubular flange protruding outward over a distance transversely of the peripheral wall of the coupling piece, wherein the fluid collection channel is formed over a distance along the flange and connects thereto.

[0025] For further controlled drainage of possibly surplus fluid from the fluid collection channel via a branch pipe according to the invention, in yet another embodiment, the flange is formed inclining in the direction of the outlet end of the coupling piece. The angle of inclination relative to the normal to the peripheral wall of the coupling piece amounts, in this embodiment, to only a few degrees.

[0026] In order to prevent leakage of fluid from the connection of a branch pipe to the coupling piece the flange is provided on its outer periphery with at least one sealing ring so that the at least one sealing ring engages fluid-tightly on the inner periphery of a branch pipe to be arranged over the flange.

[0027] In an embodiment the flange is provided with attaching members for attaching a branch pipe or branch pipe part releasably to the coupling piece. Such as for instance attaching members in the form of a screw coupling.

[0028] An embodiment as screw coupling has the advantage that the force required to slide a branch pipe over the sealing ring or gasket on the outer periphery of the flange, which force can be relatively great in the case of a coupling piece received in a flue gas discharge channel because it is precisely here that an exceptionally good fluid-tight seal is essential, can be generated relatively easily by means of a screwing movement.

[0029] In an embodiment as screw coupling the attaching members comprise at least a first and second nose-shaped member protruding outward from the peripheral wall of the coupling piece, which nose-shaped members are disposed opposite each other at a distance from the flange adjacently thereof, with a connecting groove facing toward the flange for receiving therein a radially outward protruding connecting lip of a branch pipe to be arranged over the flange.

[0030] The connecting lip of the branch pipe and the connecting groove in the attaching members form a fitting screw thread connection in the form of a bolt/nut connection, the attaching members of which form the nut part and the branch pipe the bolt part.

[0031] In a further embodiment the screw coupling is embodied as self-positioning screw coupling, wherein an end of a branch pipe for use with a coupling piece is formed for receiving the flange therein, wherein the radially outward protruding connecting lip is a single helical revolving connecting lip with a pitch distance such that, when the revolving connecting lip is placed against the nose-shaped members and in this position the branch pipe is then rotated, the connecting lip engages automatically in the connecting grooves of the nose-shaped members.

[0032] Such a self-positioning screw coupling facilitates the connection of a branch pipe to the coupling piece, particularly in the case of connections at locations which are difficult to access, or for instance a connection via an opening in an existing shaft.

[0033] In a further embodiment the revolving connecting lip takes a resilient form over a distance in axial direction of the branch pipe such that at the position of this resilient part the pitch distance of the revolving connecting lip differs.

[0034] During connection to the coupling piece, after screwing or rotating of the branch pipe beyond a connecting groove of a nose-shaped member, this resilient part forms a discernible indication that the branch pipe has been screwed a sufficient distance over the flange, and also forms a barrier, in the form of a safety catch, against loosening of the branch pipe due to vibrations or temperature fluctuations or the like.

[0035] A similar effect is obtained with another embodiment of the branch pipe wherein the revolving connecting lip takes a resilient form over a distance in radial direction of the branch pipe such that at the position of this resilient part the connecting lip protrudes further outward in radial direction than the remaining part of the revolving connecting lip.

[0036] Such a screw coupling provides for a safe and mechanically secure connection of a branch pipe to a coupling piece.

[0037] In an embodiment the invention also provides a cover for fluid-tight closure of a connecting opening, this cover corresponding in respect of the part to be connected to the coupling piece to the end of the branch pipe to be connected to the connecting opening, and wherein the other end of the branch pipe is closed.

[0038] In the case that a device for connection is for instance not suitable for condensation discharge, according to the invention the internal diameter of the part of the branch pipe not engaging on the flange is smaller than the internal diameter of the flange. This creates an effective barrier to condensation discharge via the branch pipe so that the fluid collected in the fluid collection channel flows via the fluid throughflow channel back into the coupling piece. The branch pipe can of course be provided, with the same effect, with an internal radially protruding elevation or the like which acts as barrier to condensation discharge via the branch pipe. This can in fact also be interpreted however as a reduction in the diameter of the branch pipe as described above.

[0039] In an embodiment of the invention, the fluid col-

lection channel is formed as double-sided collection channel for collecting both from the inlet end and from the outlet end fluid moving along the peripheral wall during use.

[0040] In an embodiment the invention also provides an assembly of a coupling piece and a pipe segment connected fixedly to each other, particularly wherein the pipe segment and the coupling piece are welded together.

[0041] The invention is now elucidated by way of example in more detail with reference to the accompanying figures. The invention is by no means limited to the embodiment of the invention shown in the figures. The same or similar elements also have the same reference numerals in the figures.

Figure 1 shows schematically and in partial cross-section a pipe system provided with coupling pieces according to an embodiment of the invention and installed in a flue gas discharge shaft of a building consisting of multiple storeys.

Figure 2 shows schematically and in perspective on enlarged scale a cylindrical tubular coupling piece of the pipe system according to an embodiment of the invention shown in figure 1.

Figure 3 shows schematically and in perspective a cross-section of the coupling piece along the line III-III in figure 2.

Figure 4 shows a schematic, partially cross-sectional view along the line IV-IV in figure 2.

Figure 5 shows schematically and in perspective on enlarged scale a detail of the coupling piece as shown in figure 2 with connecting opening and a branch pipe to be attached thereto.

Figure 6 shows schematically and in perspective on enlarged scale a cover for closing a connecting opening of the coupling piece as shown in figure 2.

[0042] Shown schematically in figure 1 is a flue gas discharge system 10 of a building consisting of multiple storeys 11, 12. Arranged in the flue gas discharge shaft 14 is a pipe system 15 which in the shown example and as seen in the direction from the ground floor 11 to the roof 13 comprises a first cylindrical pipe segment 25, a second cylindrical pipe segment 26 and a third cylindrical pipe segment 27 which have connecting thereto in each case a first cylindrical tubular coupling piece 28, a second cylindrical tubular coupling piece 29 and a third cylindrical tubular coupling piece 30 located at a distance from each other in longitudinal direction in the flue gas discharge shaft 14.

[0043] The first pipe segment 25 is received fitting with an end in the first coupling piece 28 and received fitting with another end in the second coupling piece 29. The second pipe segment 26 is received fitting with an end in the second coupling piece 29 and received fitting with another end in the third coupling piece 30. The third pipe segment 27 is received fitting with an end in the third coupling piece and the other end of the third pipe segment 27 ends on the roof 13 of the building in an end 19 of the pipe system 15 which is open to the outside air.

[0044] The first and second coupling pieces 28, 29 are attached to each other by an elongate connecting element 31 extending in longitudinal direction of the first pipe segment 25. The second and third coupling pieces 29, 30 are attached to each other via an elongate connecting element 32 extending in longitudinal direction of the second pipe segment 26, and extending from the third coupling piece 30 in longitudinal direction of the third pipe segment 27 in the direction of the roof 13 is a third elongate connecting element 33, which is attached to the roof. The pipe system 15 thus consists here of a cascade of pipe segments 25, 26, 27 and coupling pieces 28, 29, 30 freely suspended in the flue gas discharge shaft 14, this in accordance with the non-prepublished Netherlands patent application filed simultaneously with the present patent application in the name of applicant with the title "Pipe system, coupling piece and method for installing the pipe system in a shaft of a building".

[0045] Located on the ground floor 11 in the shown embodiment of the pipe system are two combustion devices 17, 18, such as a central heating boiler and/or a hot water appliance, the flue gas discharge of each of which are connected via a branch pipe or branch pipe part 20, 21 to the first coupling piece 28. Situated on the first floor 12 of the building in the shown embodiment is a single combustion device 16 which is connected via a branch pipe 22 to the third coupling piece 30. No devices are connected to the second coupling piece 29. This coupling piece functions solely for the purpose of connecting the first and second pipe parts 25, 26.

[0046] Although the combustion devices 16, 17, 18 are all shown mounted at the same height, it should be understood that these devices and their branches 19, 20, 21 to a respective coupling piece 28, 30 on the various floor levels 11, 12 can be located at different heights. Although not shown, the end 23 of the pipe system 15 can be connected to an outlet for discharging fluid collected in the pipe system 15, such as condensed water from flue gas to be discharged. Instead of installation in an existing flue gas discharge shaft 14, the pipe system 15 can of course also be applied in new building projects.

[0047] One or more of the combustion devices 16, 17, 18 can be provided with its own condensation outlet to, for instance, the sewer (not shown).

[0048] Although a pipe system is shown in figure 1 as flue gas discharge channel, it should be appreciated that the pipe system 15 can also be used as ventilation channel, wherein the devices 16, 17, 18 are for instance air discharge devices or air grilles.

[0049] The first, second and third coupling pieces 28, 29, 30 may substantially each be of differing form. From the viewpoint of costs and convenience of mounting it is advantageous to couple the pipe segments to each other by means of a uniform coupling piece and to connect the various devices hereto via a uniform branch pipe part.

[0050] Figure 2 shows by way of example on enlarged scale the third tubular coupling piece 30 shown in figure 1. The coupling piece 30 has a cylindrical, tubular and elongate peripheral wall 36 which extends between an inlet end 34 and an outlet end 35 of the coupling piece. The inlet end 34 and the outlet end 35 are suitable for receiving therein a pipe segment of the pipe system 15, such as respectively the third 27 and second pipe segment 26 as shown in figure 1.

[0051] Arranged for the purpose of attaching the coupling piece 30 to an attaching element 32, 33 are attaching elements 37, 38 located externally on the peripheral wall 36 near the outlet end 35 and the inlet end 34. The attaching elements 37, 38 have in the shown embodiment a strip-like or strip-shaped receiving slot 39 extending in longitudinal direction of the coupling piece 30 for movably receiving therein and attaching a strip-like or strip-shaped connecting element 31, 32, 33.

[0052] Between the inlet end 34 and the outlet end 35 the coupling piece 30 is provided, in its peripheral wall 36, with first and second opposite connecting openings 40, 41 for connection of a branch pipe 20, 21, 22 thereto. In the shown embodiment the branch pipe 22 is connected via a self-positioning releasable screw coupling 42 to the connecting opening 40.

[0053] Between the inlet end 34 and the outlet end 35 the coupling piece 30 is provided in its peripheral wall 36 with first and second opposite connecting openings 40, 41 for connection of a branch pipe 20, 21, 22 thereto. In the shown embodiment the branch pipe 22 is connected via a self-positioning releasable screw coupling 42 to the connecting opening 40.

[0054] Figure 3 shows a cross-sectional view along the line III-III in figure 2. Both connecting openings 40, 41 are provided with a tubular flange 43 protruding a distance outward transversely of the peripheral wall 36 of the coupling piece 30 for connection of the branch pipe or branch pipe part 22.

[0055] As seen in the direction from the inlet end 34 to the outlet end 35 of the coupling piece 30 an approximately U-shaped fluid collection channel 45 extending internally in the coupling piece 30 over a distance in radial direction around the peripheral wall 36 is situated at the bottom of the connecting openings 40, 41. The open side 46 of the fluid collection channel faces toward the inlet end 34 of the coupling piece 30 (see figure 2) and connects here to the connecting openings 40, 41 for the purpose of collecting fluid moving during use along the peripheral wall 36 in the coupling piece 30 and the connecting openings 40, 41 or a branch pipe 22 connected hereto. The closed base side 47 of the fluid collection channel 45 forms a stop for preventing a pipe element received in the coupling piece from the outlet end 35, such as the second pipe element 26 shown in figure 1, from being able to block the connecting openings 40, 41.

[0056] In order to prevent a pipe segment received from the inlet end 34 blocking the connecting openings 40, 41 ribs 48 protruding radially along the peripheral wall are formed internally in longitudinal direction of the coupling piece 30 at the position of the connecting openings 40, 41.

[0057] In the embodiment as shown in figure 3 the fluid collection channel 45 debouches approximately in the form of a spout in the connecting openings 40, 41. The spout-like part 49 extends internally along the wall of the flange 43 over a distance transversely of a connecting opening 40, 41, i.e. in axial direction of a branch pipe 22 to be connected to the flange 43. The part 49 of the fluid collection channel 45 debouching in the connecting opening 40, 41 is provided with a fluid throughflow opening 50 which connects internally to the peripheral wall 36 of the coupling piece 30 via a fluid throughflow channel 51. Via this fluid throughflow opening 50 and the fluid throughflow channel 51 fluid collected in the collection channel 45 during operation, such as condensed liquid, which cannot be discharged via a branch pipe 22, can be drained in controlled, guided manner through the coupling piece 30 and, via a lower-lying coupling piece or finally at the end 23 of the pipe system 15, be collected and/or discharged (not shown).

[0058] The length of the debouching part 49 is shorter than the length of the flange 43 as measured transversely of a connecting opening 40, 41. When an connecting opening which is not or not yet being used is closed with a cover, such as the connecting opening 41 which is closed with a cover 44, space is left so that fluid collected in the fluid collection channel 45 can be drained via the fluid throughflow opening 50 and the fluid throughflow channel 51 through the coupling piece 30.

[0059] Leakage of fluid along the connection of the branch pipe 22 and/or a cover 44 on the flange 43 is hereby prevented in that the flange 43 is provided on its outer periphery with at least one sealing ring 52 for fluid-tight engagement of the sealing ring 52 on the inner periphery of a branch pipe 22 or the cover 44 to be arranged over the flange 43. Sealing rings 52 for fluid-tight closure of the mutually engaging flange 43 and the branch pipe 22 and the cover 44 are commercially available. In the shown embodiment the sealing ring 52 is received in a groove or recess 57 in the outer periphery of the flange 43.

[0060] Because the collected condensed fluid is drained via the fluid throughflow channel 51 in the coupling piece accumulation of fluid or liquid at the cover 44 is effectively prevented and as a result there is no chance, or a greatly reduced chance, of the sealing ring 52 being adversely affected by substances in the condensed fluid, this resulting in a greatly reduced risk of leakage of flue gases and fluid along the connection of the cover 44 to the flange 43.

[0061] The flanges 43 of the coupling piece 30 are formed inclining through a few degrees, for instance between 2-10 degrees, in the direction of the outlet end 35 relative to the normal to the outer periphery 36, as indicated in figure 4 with the angle α. This achieves that collected fluid drains away in the first instance via a

branch pipe 22 connected to the flange 43.

[0062] As indicated in figure 4 with the angle β, the bottom of the fluid throughflow channel or fluid return flow channel 51 inclines upward to some extent, i.e. upward as seen in the plane of the drawing, from the fluid throughflow opening 50 in the direction toward the peripheral wall 36 of the coupling piece. This incline forms a fluid flow resistance with which the quantity of fluid flowing in the branch pipe and back into the coupling piece can be adjusted. This flow resistance also achieves that, when for instance a connecting opening is closed, flow also occurs in the fluid collection channel 46 so that fluid residues do not accumulate herein. A rib or other flow resistance can also be arranged in the fluid return flow channel 51 instead of an incline. The angle of inclination β relative to the normal to the outer periphery 36 of the coupling piece amounts in practice to about 3 degrees.

[0063] In the case that a device for connecting is for instance not suitable for condensation discharge, an effective barrier against condensation discharge via the branch pipe 22 can be brought about by selecting an internal diameter of the part of the branch pipe 22 not engaging on the flange 43 which is smaller than the internal diameter of the flange 43, so that the fluid collected in the fluid collection channel 46 flows via the fluid throughflow channel 51 back into the coupling piece 30. The branch pipe 22 can of course be provided, with the same effect, with an internal radially protruding peripheral elevation 64 or the like which acts as barrier against condensation discharge via the branch pipe 22, as shown schematically with broken lines in figure 4. This of course such that, when a branch pipe 22 is connected to the flange 43, the fluid throughflow opening 50 remains open on the side of elevation 64 for discharge of fluid from the fluid collection channel 46 in the coupling piece 30.

[0064] Figure 5 shows on enlarged scale the screw coupling 42 of the branch pipe 22 to the flange 43 of the connecting opening 40. Figure 6 shows on enlarged scale the cover 44. In the shown embodiment the screw coupling 42 is embodied as self-positioning screw coupling and comprises attaching members formed by at least a first and second nose-shaped member or body 53 protruding outward from the peripheral wall 36 of the coupling piece 30, see figures 2, 4 and 5. These nose-shaped members 53 are disposed opposite each other at a distance from the flange 43 adjacently thereof, with a connecting groove 54 facing toward the flange 43 for receiving therein a radially outward protruding connecting lip of a first end of the branch pipe 22 or the cover 44 to be arranged over the flange 43.

[0065] The radially outward protruding connecting lip 55 takes the form of a single helical revolving connecting lip along the outer periphery of the branch pipe 22 with a first end 61 and second end 62 lying opposite each other at a pitch distance s. The pitch distance s of the helical revolving connecting lip 55 corresponds to the distance s between the outward protruding end 63 of the nose-shaped members 53 and the connecting groove 54 formed therein.

[0066] The helical progression of the connecting lip 55 forms together with the connecting grooves 54 a screw thread-like connection such that the force necessary to slide the branch pipe 22 over the sealing ring 52, which force can be relatively great because a highly fluid-tight seal can be envisaged, is generated from the screwing movement during connection of the branch pipe 22 to a coupling piece. The branch pipe 22 is thus pulled over the sealing ring 52 by the relatively light force necessary for the screwing movement.

[0067] The positioning and pitch distance s of the single helical revolving connecting lip 55 and the corresponding distance s between the end 63 of the nose-shaped members 53 and their connecting grooves 54 facilitate a self-positioning screw coupling 42. That is, a branch pipe 22 to be connected can be placed initially with its revolving connecting lip 55 against the outer ends 63 of the nose-shaped members 53, wherein by subsequently rotating or screwing the branch pipe 22 to the right the revolving connecting lip 55 engages automatically in the connecting grooves 54, and by being rotated the branch pipe 22 can be screwed firmly onto the flange 43 in a second position of the branch pipe 22. By rotating an attached branch pipe 22 to the left back from the second position to the first position it can be uncoupled again and removed.

[0068] In the shown embodiment the revolving connecting lip 55 has close to the second end 62 a part 56 which takes a resilient form over a distance such that at the position of this resilient part 56 the pitch distance of the revolving connecting lip differs from the pitch distance s between the first and second ends 61, 62 of the revolving connecting lip 55. This differing distance may be greater or smaller than the distance s.

[0069] During connection to the coupling piece, after screwing or rotating of the branch pipe 22 beyond a connecting groove 54 of a nose-shaped member 53, this resilient part 56 forms a discernible indication that the branch pipe 22 has been screwed a sufficient distance over the flange 43, and also forms a barrier, in the form of a safety catch, against loosening of the branch pipe 22 due to vibrations or the like.

[0070] Instead of a part 56 which is resiliently divergent in axial direction of the branch pipe 22 or the cover 44, this part can with the same effect take a resiliently divergent form in radial direction of the branch pipe 22 or the cover 44.

[0071] The cover 44 has substantially the same construction as the branch pipe 22, is only shorter and wherein the other end 58 of the branch pipe 22 is closed, so that the branch pipe forms a closing cover 44 for closing the at least one connecting opening 40, 41 of the coupling piece to the outside. Formed for mounting purposes in the closed end 58 is a cavity 59 with dimensions for receiving herein for instance a box spanner of standardized dimensions for the purpose of loosening and/or tightening the cover 44 on a connecting opening 40, 41 of the

coupling piece 30 from a shaft opening.

[0072] In an embodiment of the coupling piece according to the invention the fluid collection channel 45 is formed as double-sided collection channel, with an outer end which is open to both the inlet end 34 and the outlet end 35 of the coupling piece 30 for the purpose of collecting from the inlet end 34 as well as from the outlet end 35 fluid moving internally during use along the peripheral wall of the coupling piece 30.

[0073] The pipe segments 25, 26, 27 and coupling pieces 28, 29, 30 are connected movably to each other in mutually gas and liquid-tight manner, for instance by means of a per se known sealing ring 60 arranged along the inner periphery of a coupling piece 28, 29, 30 at the ends thereof and/or a sealing ring arranged along the outer periphery of a pipe segment 25, 26, 27 or another type of sealing means known in practice for this purpose.

[0074] Provided in an embodiment of the invention is an assembly of a respective coupling piece 29, 30 and a pipe segment 25, 26 fixedly connected thereto. The pipe segment 25, 26 is then preferably connected fixedly to a respective coupling piece 29, 30 at the outlet end 35. Such a connection can for instance be performed by means of self-tapping screws, but preferably by means of a thermal weld connection.

[0075] A coupling piece, such as the coupling piece 28 in figure 1, can also take a closed form at an outer end, for instance by a closed bottom being formed in the coupling piece 28 close to the outlet end 35 thereof.

[0076] It will be appreciated that the above described screw coupling, in particular the self-positioning embodiment of the screw coupling, can with the same advantages be embodied on coupling pieces without fluid collection channel.

[0077] In a practical embodiment use is for instance made of pipe segments with fixed lengths in the range of 100-200 cm, preferably with a length of about 160 cm, for use in buildings with storey heights of for instance 270-300 cm and with pipe segment diameters in the range of 80 to 250 mm, preferably with diameters of 100, 130, 160 and 200 mm. The coupling pieces can have a length here in the range of 40-60 cm, preferably about 50 cm. The diameter of a coupling piece at a respective end 34, 35 is of course adapted here to the diameter of a pipe segment to be received therein. The branch pipe parts have for instance a diameter in the range of 30-80 mm, preferably a diameter of 32 mm or 75 mm, adapted to standard connecting diameters for combustion devices.

[0078] The coupling pieces, pipe segments and branch pipes can be manufactured from, among other materials, polypropylene, PP, polybutylene terephthalate, PBT, or polyvinylidene fluoride, PVDF, with wall thicknesses of for instance 2-3 mm.

Claims

1. A tubular coupling piece (30), particularly for use in a pipe system (15) of a ventilation or flue gas discharge channel (14), which coupling piece (30) has an inlet end (34) and an outlet end (36) for connection to a pipe segment (26, 27) of the pipe system (15) and wherein the coupling piece (30) is provided in its peripheral wall (36) between the inlet end (34) and the outlet end (35) with at least one connecting opening (40, 41) for connection of a branch pipe (22) thereto, wherein the coupling piece (30) is further provided with a stop for a pipe segment (26, 27) extending internally over a distance in radial direction around the peripheral wall (36), which stop is configured as fluid collection channel (45) for collecting fluid moving during use along the peripheral wall (36) in the coupling piece (30), and wherein the fluid collection channel (45) connects to the at least one connecting opening (40, 41), **characterized in that** the fluid collection channel (45) debouches into the at least one connecting opening (40, 41) and the part (49) of the fluid collection channel (45) debouching into the at least one connecting opening (40, 41) is provided with a fluid throughflow channel (51) connecting internally to the peripheral wall (36) of the coupling piece (30) for the purpose of draining through the coupling piece (30) fluid collected by the fluid collection channel (45).

2. The coupling piece (30) according to claim 1, wherein the fluid collection channel (45) is arranged, as seen in the direction from the inlet end (34) to the outlet end (35) of the coupling piece (30), at the bottom of the at least one connecting opening (40, 41) and connects thereto.

3. The coupling piece (30) according to one or more of the preceding claims, wherein the fluid throughflow channel (51) is provided in the direction toward the peripheral wall (36) of the coupling piece (30) with a fluid flow resistance.

4. The coupling piece (30) according to claim 3, wherein the fluid flow resistance is formed by the fluid throughflow channel (51) rising (β) from the part (49) of the fluid collection channel (45) debouching into the at least one connecting opening (40, 41) to the peripheral wall (36) of the coupling piece (30), particularly wherein the fluid throughflow channel (50) rises with a uniform inclination.

5. The coupling piece (30) according to one or more of the preceding claims, wherein the at least one connecting opening (40, 41) is provided with a tubular flange (43) protruding outward over a distance transversely of the peripheral wall (36) of the coupling piece (30) for connection of the branch pipe (22) and

wherein the fluid collection channel (45) is formed over a distance along the flange (43) transversely of the at least one connecting opening (40, 41).

6. The coupling piece (30) according to claim 5, wherein the flange (43) is formed inclining (α) in the direction of the outlet end (35) of the coupling piece (30).

7. The coupling piece (30) according to claim 5 or 6, wherein the flange (43) is provided on its outer periphery with at least one sealing ring (52) so that the at least one sealing ring (52) engages fluid-tightly on the inner periphery of a branch pipe (22) to be arranged over the flange (43).

8. The coupling piece (30) according to claim 5, 6 or 7, wherein the flange (43) is provided with attaching members for attaching a branch pipe (22) releasably to the coupling piece (30), particularly wherein the attaching members are embodied as screw coupling (42).

9. The coupling piece (30) according to claim 8, wherein the attaching members comprise at least a first and second nose-shaped member (53) protruding outward from the peripheral wall (36) of the coupling piece (30), which nose-shaped members (53) are disposed opposite each other at a distance from the flange (43) adjacently thereof, with a connecting groove (54) facing toward the flange (43) for receiving therein a radially outward protruding connecting lip (55) of a branch pipe (22) to be arranged over the flange (43).

10. A branch pipe (22) for use with a coupling piece (30) according to claim 9, wherein an end of the branch pipe (22) is formed for receiving the flange (43) of the coupling piece (30) therein, and is provided with connecting lip (55) protruding outward in radial direction, wherein the radially outward protruding connecting lip (55) is a single helical revolving connecting lip (55) with a pitch distance (s) such that, when the revolving connecting lip (55) is placed against the nose-shaped members (53) and in this position the branch pipe (22) is then rotated, the revolving connecting lip (55) engages in the connecting grooves (54) of the nose-shaped members (53).

11. The branch pipe (22) according to claim 10, wherein the revolving connecting lip (55) takes a resilient form over a distance in axial direction of the branch pipe (22) such that at the position of this resilient part (56) the pitch distance (s) of the revolving connecting lip (55) differs.

12. The branch pipe (22) according to claim 10, wherein the revolving connecting lip (55) takes a resilient form over a distance in radial direction of the branch pipe (22) such that at the position of this resilient part the revolving connecting lip (55) protrudes further outward in radial direction than the remaining part of the revolving connecting lip (55).

13. The branch pipe (22) according to claim 11 or 13, wherein another end (58) of the branch pipe (22) is closed such that the branch pipe forms a closing cover (44) for closing the at least one connecting opening (40, 41) of the coupling piece (30) to the outside.

14. The branch pipe (22) according to claim 11 or 12, wherein the internal diameter of the part of the branch pipe (22) not engaging on the flange (43) is smaller than the internal diameter of the flange (43).

15. An assembly of a coupling piece (30) according to one or more of the claims 1 to 9 and a pipe segment (26; 27) connected fixedly to the coupling piece (30), particularly wherein the pipe segment (26; 27) and the coupling piece (30) are welded together.

Fig. 1

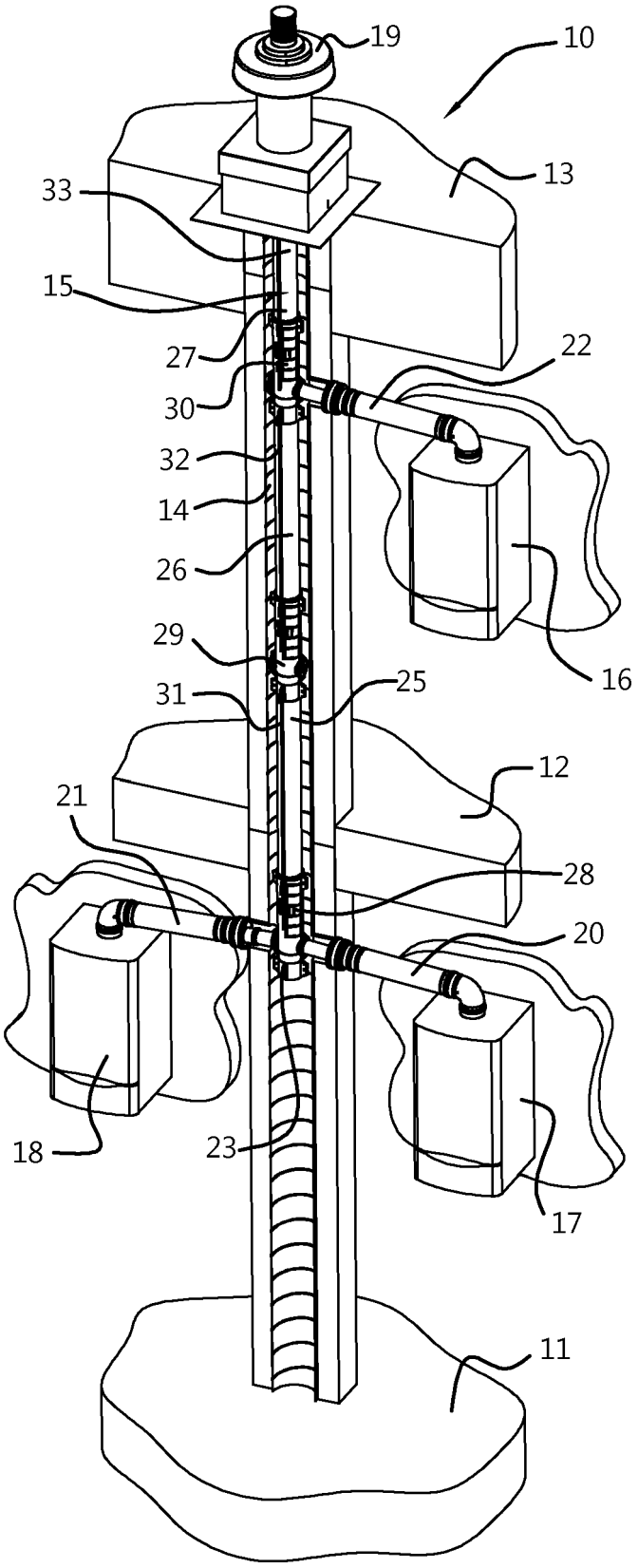
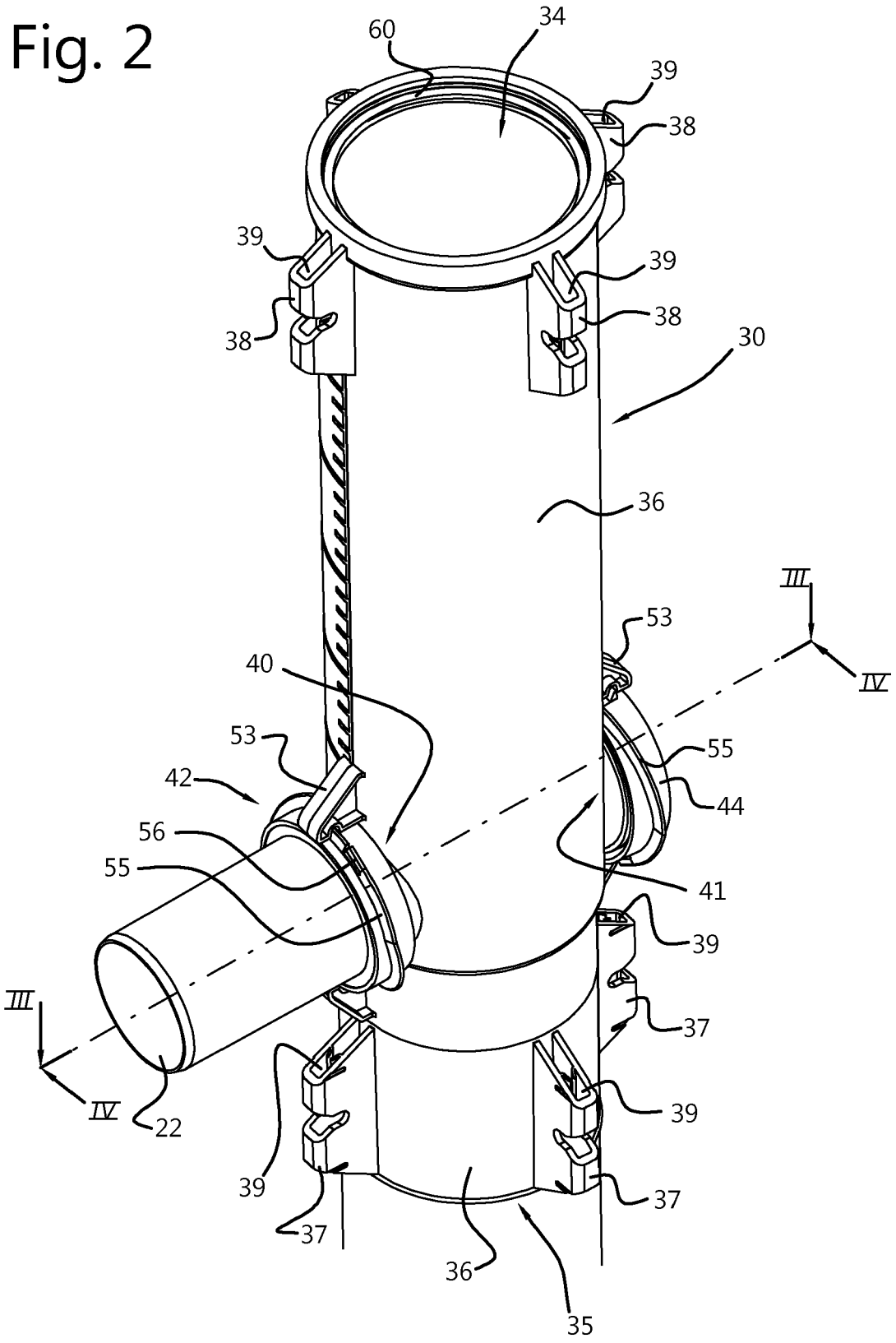


Fig. 2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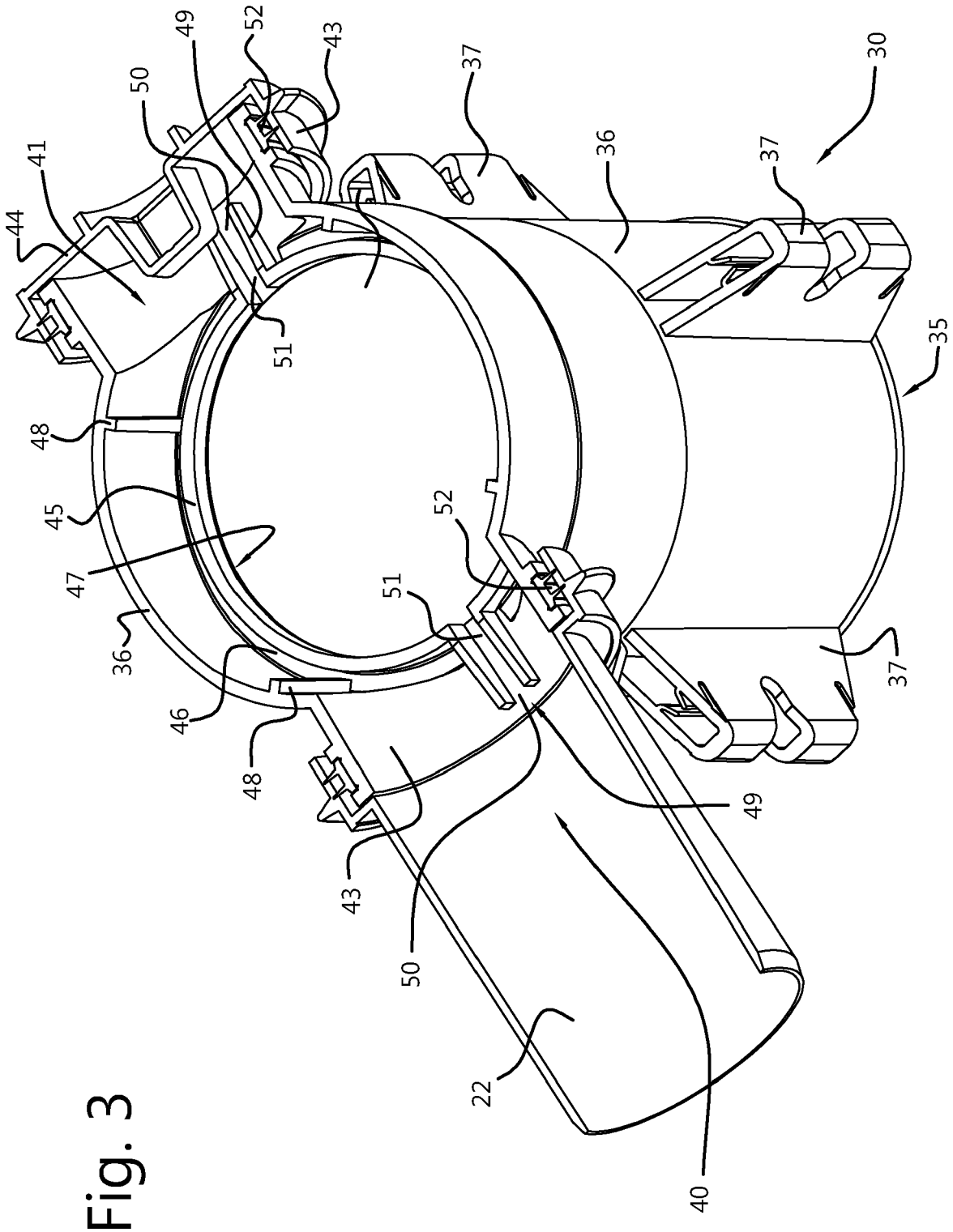

Fig. 3

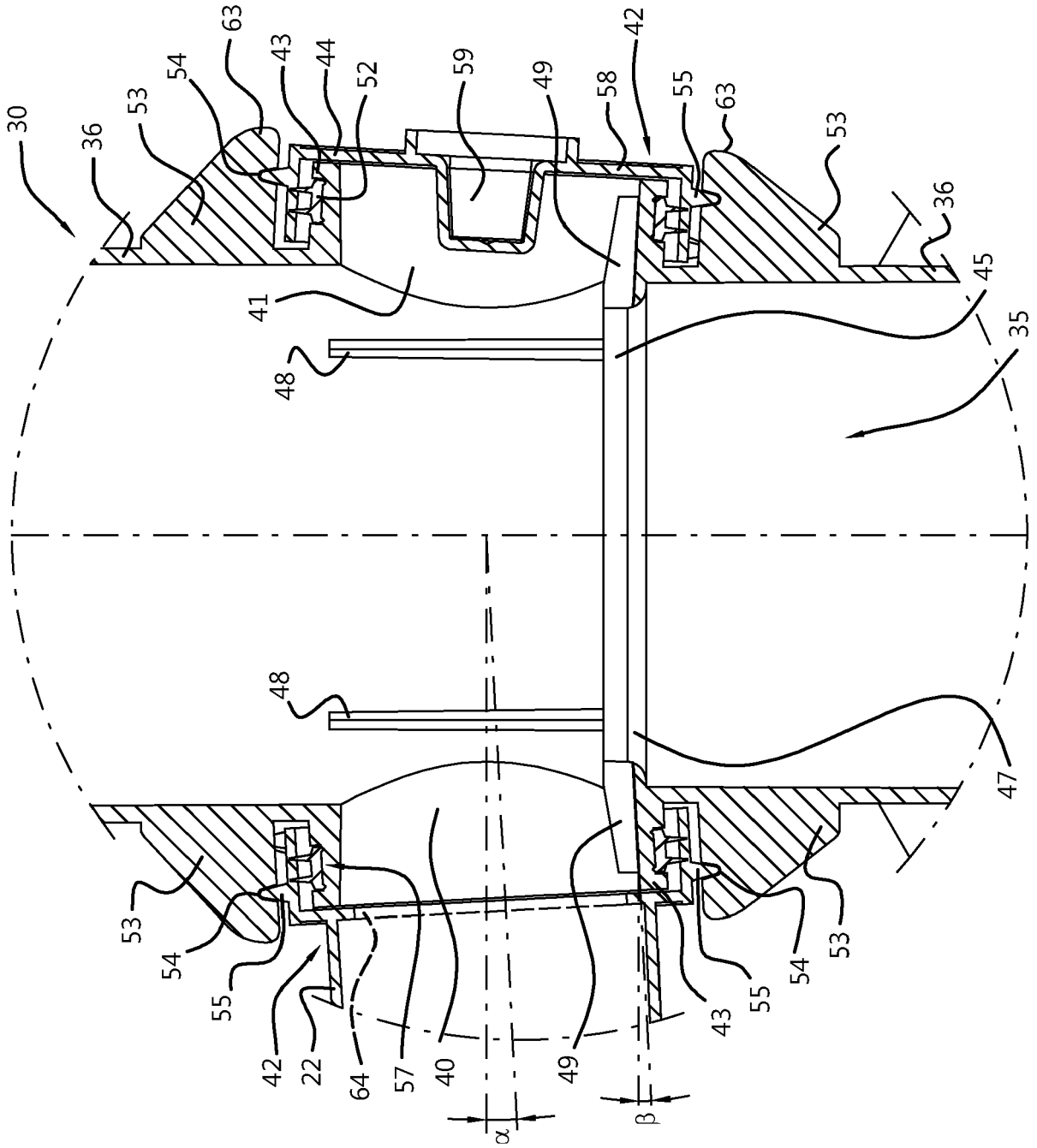
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Fig. 4

Fig. 5

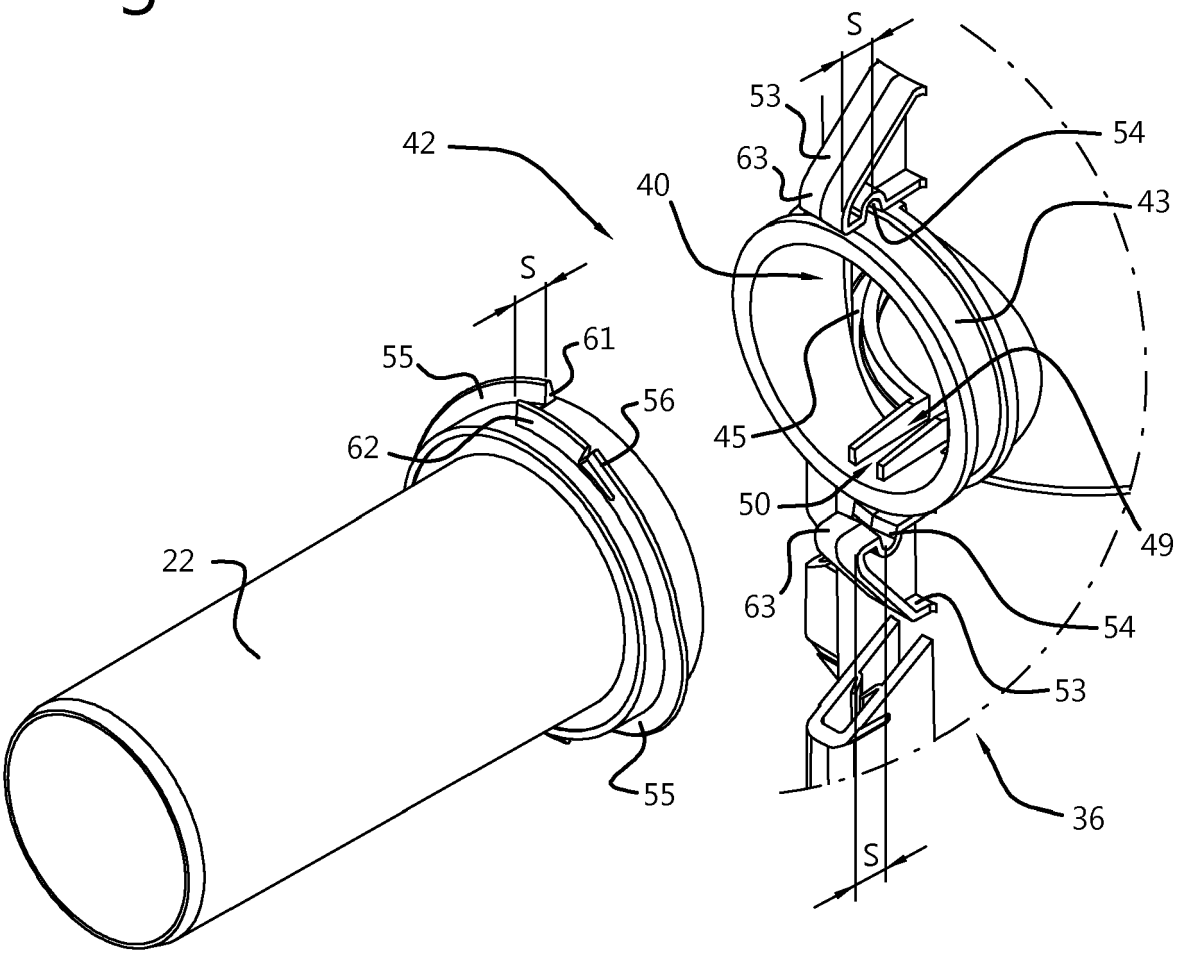
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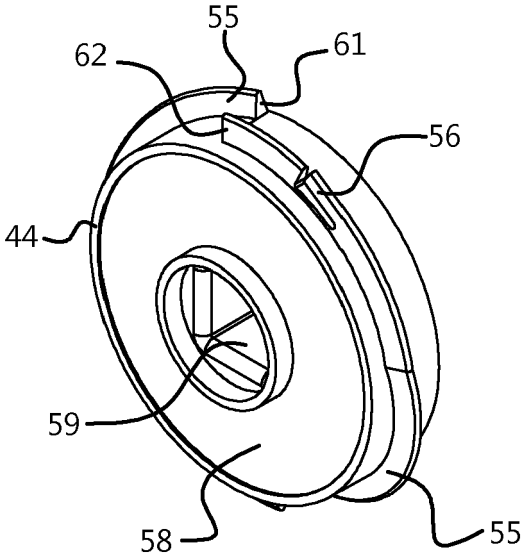
Fig. 6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EUROPEAN SEARCH REPORT

Application Number
EP 16 19 4206

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