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Préskötés és alkalmazása

Az európai szabadalom ellen, megadásának az Európai Szabadalmi Közlönyben való meghirdetésétől számított kilenc hónapon belül, felszólalást lehet benyújtani az Európai Szabadalmi Hivatalnál. (Európai Szabadalmi Egyezmény 99. cikk(1))

A fordítást a szabadalmas az 1995. évi XXXIII. törvény 84/H. §-a szerint nyújtotta be. A fordítás tartalmi helyességét a Szellemi Tulajdon Nemzeti Hivatala nem vizsgálta.

Press fitting and its use

The invention relates to a press fitting having a tubular component and having an end section of the tubular component which can be compressed to produce a connection, wherein the tubular component consists of copper or of a copper alloy, in particular
5 red brass, or of steel, wherein the end section has an opening for receiving a pipe, wherein the end section has a first area having an annular bulge for receiving a sealing ring, wherein the end section has a second area arranged on the side of the bulge facing the opening and a third area arranged on the side of the bulge facing away from the opening, and wherein the first, second and third areas define the insert area of the
10 pipe. Such a press fitting is known from US-A-2009/173130.

Such press fittings are known from the prior art and are used in particular in pipe installations, for example in indoor installation work. In order to connect a pipe to such a press fitting, a pipe end of the pipe is inserted into the opening of the end
15 section of the press fitting until the pipe end reaches the third area of the tubular component. The press fitting can subsequently be pressed together with the pipe end in the first and second areas, and possibly also in the third area, using a pressing tool which is usually in the shape of pliers with two pressing jaws. The pressing operation in the second area and optionally in the third area results in the pipe end being
20 securely fixed to the fitting. In addition, a sealing ring provided in the annular bulge is pressed against the outer surface of the pipe end during the pressing operation, so that the connection is sealed. In this way, a durable and seal tight connection between the press fitting and the pipe can be easily produced without a welding or soldering
operation being required.

25 Since press fittings of this type often consist of a copper alloy or of steel, in particular high-grade steel, the material costs make up a large proportion of the production costs of press fittings.

The present invention is therefore based on the object of providing a press fitting which can be produced more economically and nevertheless has a good seal tightness and durability.

5 In the case of the press fitting mentioned in the introduction, this object is achieved according to the invention by the overall wall thickness of the press fitting being at least in sections increased in the second area compared to the overall wall thickness of the tubular component in the third area.

10 What is meant by the overall wall thickness of the press fitting is the whole thickness of the wall which if required may also consist of a plurality of layers. Layers which can be easily moved in the axial direction in relation to the tubular component, such as the actual pipe to be connected or sleeves which are not connected to the tubular
15 thickness. The wall thickness of the tubular component only means the wall thickness of the one-piece tubular component alone.

It has been recognised that the amount of material required to produce a press fitting can be reduced with the press fitting according to the invention. Up to now, such a
20 reduction could not be achieved because the pressing operation with a pressing tool requires the press fitting to have a certain minimum wall thickness. Furthermore, the press fittings have to be compatible with the pressing tools available on the market, so that the press fittings particularly need to have set external dimensions in order to be accepted by the market. In addition, the internal dimensions of the press fittings are
25 predetermined by the external dimensions of the pipes to be connected.

However, it has now become apparent that the minimum wall thickness for producing a pressing together which is tight and durable is only required in the second area. In contrast, the tubular component can have a narrower wall thickness in the third area,
30 so that tubular component material can be saved at this place. At the same time, however, by means of the increased overall wall thickness of the press fitting in the

second area, the pressing together can be made sufficiently stable and compatibility with the pressing tools available on the market can be achieved.

Therefore, the saving in material is in particular achieved in the case of the press fittings according to the invention by selectively increasing the overall wall thickness of the press fitting. On the other hand, the wall thickness of the tubular element can at least in sections, particularly in the third area, be reduced. In particular, the tubular element can correspondingly at least in sections have narrower wall thicknesses than the tubular components of the press fittings from the prior art.

When the fitting is pressed together, the first area is deformed in such a way that the O-ring, which is accommodated inside the bulge formed there, seals the inserted pipe in relation to the fitting. In the second area, and possibly in the third area, the deformation during the pressing operation results in the fitting in sections being pressed into the pipe material. The pipe can thereby be secured axially relative to the fitting. Compression of the second area, and possibly of the third area, consistently results in a polygonal shape, in particular a hexagonal shape. Hence, by suitably combining the different areas of the fitting both a sealing function and a retaining function are obtained.

The press fitting can be formed in any desired way, for example as a pipe coupling, a T-piece or bend element. A particularly large amount of material can be saved with press fittings which have a particularly large third area, as is the case with curved elements for example.

The reliable compressibility and the stability of the press fitting during the pressing operation can preferably be improved by extending the increase in the overall wall thickness in the second area as far as the opening of the end section.

The press fitting can be produced particularly economically from a pipe whose wall thickness essentially corresponds to the wall thickness of the third area.

In a first embodiment of the press fitting, the overall wall thickness of the press fitting in the second area is at least in sections increased by at least 50 %, preferably by at least 75 %, in particular by at least 100 %, compared to the wall thickness of the tubular component in the third area. It has become apparent that the wall thickness in the third area is still sufficiently great enough to ensure that the press fitting is stably and securely pressed. At the same time, the difference thereby obtained between the overall wall thickness in the second area and the wall thickness in the third area results in a further saving in material.

Particularly large savings in material costs are achieved according to the invention by the tubular component being made of copper or of a copper alloy, in particular red brass, or of steel. Copper or copper alloys or steels, i.e. in particular high-grade steels, are often characterised by a high material price which is also subject to large price fluctuations. Furthermore, these materials are the preferred materials for producing press fittings, so that there is a particularly great demand for such press fittings and the press fittings are produced in large quantities. As a result, by reducing the material requirement in the case of such press fittings, a particularly large saving can be achieved.

A further embodiment of the press fitting derives from the fact that the tubular component consists of copper or of a formable copper alloy or of a copper alloy which is to be machined, in particular red brass, and that with a nominal width of the press fitting between DN 12 and DN 35 the wall thickness of the tubular component in the third area is between 0.85 and 1.3 mm and in the second area at least in sections is between 1.3 and 2.4 mm or that with a nominal width of the press fitting of more than DN 35 the wall thickness of the tubular component in the third area is between 1.0 and 1.5 mm and in the second area at least in sections is between 1.5 and 2.5 mm.

A further embodiment of the press fitting arises from the fact that the tubular component consists of steel, in particular high-grade steel, and that with a nominal width of the press fitting between DN 12 and DN 35 the wall thickness of the tubular component in the third area is between 0.5 and 1.3 mm, in particular between 0.5 and

0.7 mm, and in the second area at least in sections is between 1.0 and 2.5 mm or that with a nominal width of the press fitting of more than DN 35 the wall thickness of the tubular component in the third area is between 1.0 and 1.8 mm and in the second area at least in sections is between 1.5 and 2.5 mm.

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With previous steel fittings from the prior art, with a nominal width between DN 12 and DN 35 a continuous wall thickness between 1.35 and 1.6 mm was deemed necessary or with a nominal width of more than DN 35 a wall thickness between 1.8 and 2.2 mm was deemed necessary. By reducing the wall thickness of the tubular component in the third area, a clear reduction in the material costs and, at the same time, good stability and compressibility of the press fitting can be achieved.

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Within the scope of this application, the nominal width of the press fitting is understood as the nominal width according to DIN EN 1057 for copper and copper alloys and according to DIN EN 10312 for high-grade steel.

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The overall wall thickness in the first area, and possibly in the second area, is at least in sections increased by an integral local thickening of the tubular component. Only one section of the second area, the whole of the second area or the first area and the second area can be thickened. In this way, the increased overall wall thickness can be easily brought about by the tubular component itself. Furthermore, in this way, a uniform appearance of the press fitting can be obtained, since separate elements for increasing the overall wall thickness can be dispensed with.

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What is meant by an integral local thickening is that the increased overall wall thickness in the second area is at least partly brought about by the tubular component itself. For this purpose, the wall thickness of the tubular component can be increased in sections for example.

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Thus, the integral local thickening can be particularly simply achieved by upsetting the tubular component, so that the wall thickness of the tubular component is locally increased.

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The present invention, independently of the previously described press fitting, also relates to a method for producing a press fitting, in which an end section of the tubular component is upset on the end, in this way increasing the wall thickness of a section
5 facing the open end of the component with a predetermined length in relation to the wall thickness of the pipe piece in the initial state, in which a bulge is formed into the pipe piece and in which the pipe piece is widened at least along one end section, wherein the end section has a first area with the bulge, a second area arranged on the side of the bulge facing the opening and a third area arranged on the side of the bulge
10 facing away from the opening.

The widening can be carried out before or after the upsetting operation and in particular before or after introducing the bulge. The order of the individual processing steps can therefore be chosen in such a way as is the most favourable dependent on
15 the material and dimensions of the press fitting.

Alternatively or in addition to the previously described press fittings, the tubular component at least in sections can be formed in two or more layers lying one above the other. For this purpose, for example, the end section of the tubular component can
20 be folded at least partly outwards or inwards, so that the tubular component is formed in two layers in the area of the folding. Hence, instead of a thickening, an integral two-layered arrangement is created which can be produced by a folding operation.

The invention, independently of the previously described press fitting with a folding,
25 also relates to a method for producing a press fitting, in which an end section of the tubular component is folded outwards on the end over a predetermined length, in which the component is widened along an end section and in which a bulge is formed into the component, wherein the end section has a first area with the bulge, a second area arranged on the side of the bulge facing the opening and a third area arranged on
30 the side of the bulge facing away from the opening.

Alternatively to this, the invention likewise independently also relates to a method for producing a press fitting, in which a component is folded inwards on the end over a predetermined length, in which the component is widened along an end section and in which a bulge is formed into the component, wherein the end section has a first area
5 with the bulge, a second area arranged on the side of the bulge facing the opening and a third area arranged on the side of the bulge facing away from the opening.

In the last two described methods, the widening can also be carried out before and after the folding operation and in particular before or after introducing the bulge. The
10 order of the individual processing steps can therefore also in these cases be chosen in such a way as is the most favourable dependent on the material and dimensions of the press fitting.

An area of the tubular component adjacent to the opening is therefore widened and
15 bent over, so that the tubular component at least in sections is formed in two or more layers lying one above the other, but at the same time integrally, i.e. in one piece.

The flexible applicability of the press fitting is enhanced in a further embodiment by increasing the overall wall thickness in the second area by a separate annular element.
20 In this way, the thickness and/or the material of the annular element which brings about the increased overall wall thickness can be chosen according to the application. In addition, in this way, the fitting can be produced simply, since a subsequent forming step on the tubular component can be omitted.

25 The annular element can in particular consist of the same material as the tubular component or of a different material, in particular of a plastic material, steel or of an aluminium alloy. Polypropylene (PP), polyamide (PA) or polyoxymethylene (POM), in each case, in fact, with or without glass fibre reinforcement, come into consideration as plastic materials, for example. If the annular element consists of the same material
30 as the tubular component, then a uniform appearance of the press fitting can be ensured. Using a different material enables the properties to be optimised for the respective application, for example in order to simplify the pressing operation. In

particular, cheaper materials or lower-grade alloys can also be used for the annular element, so that the material costs of the press fitting are further reduced. Since the annular element does not come into contact with the media conveyed in the press fitting, the material can be chosen regardless of its resistance to corrosion and/or its suitability for drinking water. In order to prevent contact corrosion, an intermediate layer can be provided between the annular element and the tubular component, for example by providing the tubular component and/or the annular element with a coating.

In a further embodiment, it is ensured that the pressing together of the press fitting takes place in a secure and simple manner by at least in the axial direction fixing the annular element to the tubular component by means of a force-fit, materially bonded and/or form-fit connection. In this way, the annular element cannot be moved axially in relation to the tubular component, so that the annular element cannot slip out of position or fall off or out during the pressing operation.

The axial direction is understood as the directions parallel to the centre axis of the tubular component. What is meant by fixing in the axial direction is that the annular element cannot be moved or can only be moved with considerable expenditure of force, and in particular cannot be moved by hand, in relation to the tubular component. In particular, the annular element can, in fact, be pushed on or pushed in in the axial direction during production of the press fitting. When mounting the fitting, i.e. for example on site, it is preferable if the annular element is no longer able to be moved in the axial direction by the installer.

In a further embodiment of the press fitting, the annular element is arranged outside the tubular component. In this way, the press fitting can be produced in a particularly straightforward manner, since the increase in the overall wall thickness is simply achieved by attaching an outer annular element. In addition, with this embodiment a reduction in the pressing force required for the pressing together of about 30% can be achieved preferably by a suitable choice of material for the annular element. The annular element can in particular be formed as a closed ring or as a split C-ring. The

tubular component preferably has an inner diameter in the second area which essentially corresponds to the outer diameter of the pipe to be inserted.

A further embodiment of the press fitting is characterised in that the tubular
5 component has a widening in the second area for receiving the annular element and in that the annular element is arranged inside the tubular component. In this way, the annular element does not come into contact with the pressing tool during the pressing operation, so that it cannot be detached from the press fitting by the pressing forces which occur during the pressing operation. Furthermore, in this way, a uniform
10 appearance of the press fitting can be achieved. Preferably, the inner diameter of the annular element essentially corresponds to the inner diameter of the press fitting in the third area. In addition, the annular element can also be designed in particular to improve the pressing together between the press fitting and the pipe.

15 The annular element can also be formed as a retaining element which, by means of elevations, protrusions and/or projecting edges for example, ensures that the pipe inserted into the press fitting is secured. The annular element preferably has a continuous outer surface, so that it abuts over the entire circumference and essentially over its entire width on the inside of the tubular component. In this way, a
20 continuous increase in the overall wall thickness in the second area is produced. In addition, fixing means, for example protrusions or projecting edges, can be provided on the side facing the inner surface of the tubular component, so that it is ensured that the annular element is securely fixed into the tubular component, in particular in the axial direction. Preferably, the annular element can reach as far as the opening of the
25 end section. Further preferably, the annular element can have a constant thickness essentially over the entire circumference. Local weak points in the connection on the circumference of the annular element can be prevented in this way during the pressing operation.

30 An additional saving in material is also achieved according to the invention by increasing the overall wall thickness of the press fitting in the second area compared to the overall wall thickness in the third area.

In a further embodiment of the press fitting, the outer diameters of the press fitting in the second and third areas essentially match each other. The pressing tool can thereby act evenly on the second and third areas, so that an essentially symmetrical pressing
5 together can take place. Furthermore, the pressing tools which are known from the prior art and which are prevalent on the market can also continue to be used.

In a further embodiment, the connection between the press fitting and a pipe can be additionally sealed by providing a sleeve element consisting of an elastic material, in
10 particular consisting of an elastic plastic material, in the third area inside the tubular component. Furthermore, the gap between the press fitting and the inserted pipe can be filled by the sleeve element, so that the formation of deposits or contamination of the press fitting through microbial growth can be reduced or even prevented. The sleeve element can preferably consist of a plastic material approved for hygienic
15 connectors, for example PSU (polysulphone), PPSU (polyphenylsulphone) PVDF (polyvinylidene fluoride) or PTFE (polytetrafluoroethylene or Teflon).

In a further embodiment of the press fitting, the sleeve element has a thickening on the side facing away from the opening, optionally with a stop face for a pipe to be
20 inserted. By means of the thickening of the sleeve element, the cross-sectional widening of the inner channel can be fluidically optimised at the transition from the pipe to the press fitting. The formation of eddies and the loss of pressure associated with it can thereby be reduced. The depth of insertion of the pipe to be connected to the press fitting can be determined by an optional stop face. Furthermore, the pipe
25 abuts in this way directly on the thickening of the sleeve element, so that a fluidically optimised inner channel is formed in the press fitting.

In a further embodiment, the press fitting can be sealed in an improved and in particular more durable manner by the wall thickness of the tubular component being
30 narrower in the area of the bulge than the overall wall thickness of the press fitting in the second area. As a result of the narrower wall thickness produced in this way in the first area, a larger amount of space is available in the bulge to enable an O-ring with a

greater cord thickness to be used. As a result of the greater contact surface of an O-ring with a greater cord thickness on the press fitting and on the pipe, a better seal and improved corrosion protection and/or oxidation protection can be achieved. The O-ring preferably consists of the elastomeric materials which are known for this purpose.

In a further embodiment of the press fitting, an annular bulge cover covering the bulge is provided outside the tubular component. A reduced wall thickness of the tubular component in the first area can be compensated by the bulge cover, so that pressing tools from the prior art can be used for pressing together the press fitting. Furthermore, in this way, the overall wall thickness is increased in the first area, so that a more stable pressing together is possible. The bulge cover can be fully circumferential or split, in particular it can be formed as a C-ring for sliding on. It can in particular consist of plastic material, for example polypropylene or glass-fibre-reinforced polyacrylate (PA-6). The bulge cover can also be integrally formed with the annular element. The bulge cover also constitutes a separate invention in itself.

Press fittings of the above mentioned type, according to a further teaching of the invention, are in particular suitable for drinking water or process water piping systems and for gas and heating installations. It has become apparent that even with the saving in material achieved with these press fittings, a durable and secure pressing together is guaranteed, which is in particular required with in-wall house installation work. With these press fittings, even with the saving in material, the medium conveyed only comes into contact with high-grade materials. The press fittings are therefore particularly suitable for use as hygienic connectors, for example for drinking water applications.

Further features and advantages of the invention result from the following description of various exemplary embodiments, in which reference is made to the accompanying Figures:

Fig. 1 shows a press fitting from the prior art,

- Fig. 2 shows a first exemplary embodiment of a press fitting according to the invention,
- 5 Fig. 3 shows a second exemplary embodiment of a press fitting according to the invention,
- Fig. 4 shows a third exemplary embodiment of a press fitting according to the invention,
- 10 Figs. 5a-b show a fourth exemplary embodiment of a press fitting,
- Figs. 6a-b show a fifth exemplary embodiment of a press fitting according to the invention,
- 15 Figs. 7a-c show a sixth exemplary embodiment of a press fitting according to the invention,
- Figs. 8a-b show a seventh exemplary embodiment of a press fitting according to the invention,
- 20 Fig. 9 shows an eighth exemplary embodiment of a press fitting according to the invention,
- 25 Figs. 10a-c show a schematic representation of method steps for producing a press fitting according to Fig. 2,
- Figs. 11a-c show the press fitting according to Fig. 2 in the different stages of production,
- 30 Fig. 12 shows a ninth exemplary embodiment of a press fitting according to the invention,

Figs. 13a-c show a schematic representation of method steps for producing a press fitting according to Fig. 12,

5 Figs. 14a-c show the press fitting according to Fig. 12 in the different stages of production,

Fig. 15 shows a tenth exemplary embodiment of a press fitting according to the invention,

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Figs. 16a-c show a schematic representation of method steps for producing a press fitting according to Fig. 15,

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Figs. 17a-c show the press fitting according to Fig. 15 in the different stages of production,

Fig. 18 shows an eleventh exemplary embodiment of a press fitting according to the invention,

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Figs. 19a-d show the press fitting according to Fig. 18 in the different stages of production,

Fig. 20 shows a twelfth exemplary embodiment of a press fitting according to the invention and

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Figs. 21a-c show the press fitting according to Fig. 20 in the different stages of production,

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Fig. 1 shows a press fitting 2 from the prior art with a tubular component 4, an end section 6 and an opening 8 for receiving a pipe (not shown) in a cross-sectional view. The end section 6 has a first area 10 with an annular bulge 12, in which a sealing ring 14 formed as an O-ring is arranged. In addition, the end section 6 has a second area 16

arranged on the side of the bulge 12 facing the opening 8 and a third area 18 arranged on the side of the bulge 12 facing away from the opening 8. The inner diameter d_1 in the second area 16 of the press fitting 2 is predetermined by the outer diameter of the pipe to be inserted. The wall thickness d_2 of the press fitting 2 and the outer diameter d_3 in the first area 10 of the press fitting 2 are adapted to the pressing tools available on the market. In order to connect a pipe to the press fitting 2, a pipe end of the pipe is inserted into the opening 8 in the press fitting 2, in particular as far as a provided tapering 20. The press fitting 2 can subsequently be pressed together with the pipe by means of a pressing tool which in particular is in the shape of pliers. The pipe is fixed in the press fitting by means of the pressing together in the second area 16 and optionally in the third area 18, while the sealing ring 14 by means of the pressing together in the first area 10 ensures that the connection is seal tight. The wall thickness of the tubular component 4 is essentially constant with the press fitting 2.

In the exemplary embodiments illustrated in the following figures, in each case elements of the same type are provided with the same reference numbers.

Fig. 2 shows a first exemplary embodiment of a press fitting according to the invention in a cross-sectional view. The press fitting 30 also has a tubular component 32 with an end section 33 and an opening 34 for receiving a pipe (not shown).

A bulge 38 having a sealing ring 40 accommodated in it is arranged in a first area 36. In addition, the end section 33 has a second area 42 arranged on the side of the bulge 38 facing the opening 34 and a third area 44 arranged on the side of the bulge 38 facing away from the opening 34.

The inner diameter g_1 in the second area 42 of the press fitting 30 is predetermined by the outer diameter of the pipe to be inserted and in the illustrated exemplary embodiment corresponds to the inner diameter d_1 of the press fitting 2 shown in Fig.

1.

In the second area 42, the overall wall thickness of the press fitting 30 compared to the wall thickness of the tubular component 32 in the third area 44 is in sections increased by an integral local thickening 46 of the tubular component 32. The overall wall thickness in the second area 42 is preferably chosen such that the press fitting 30 can be securely pressed together. The overall wall thickness g_2 of the press fitting 30 in the second area 42 preferably at least partly corresponds to the wall thickness d_2 of the press fitting 2 from Fig. 1.

Further preferably, the outer diameter g_3 in the first area 36 of the press fitting 30 also corresponds to the corresponding outer diameter d_3 of the press fitting shown in Fig. 1. As a result, the press fitting 30 is compatible with the pressing tools from the prior art available on the market. The pressing contour 49 of such a pressing tool is schematically illustrated in Fig. 2. In contrast, the wall thickness of the tubular component 32 is reduced in the other areas, so that the press fitting 30 has a lower material requirement compared to the press fitting 2 illustrated in Fig. 1 and hence can be produced more economically. The press fitting 30 can also have a tapering 47 of the inner channel 48 as a stop for a pipe to be inserted.

In particular, the overall wall thickness in the second area 42 is also increased compared to the wall thickness of the tubular component 32 in the first area 36. As a result, with the same outer diameter of the press fitting 30 in the first area 36 a larger amount of space is available for the sealing ring 40, so that a sealing ring 40 with an increased cord thickness can be used. This improves the durable seal tightness of the press-fit connection.

The press fitting 30 or the tubular component 32 could in particular have been produced from a pipe which had a wall thickness essentially corresponding to the wall thickness of the tubular component 32 in the third area 44. The thickening 46 could, for example, have been produced by upsetting the tubular component 32.

Three different situations during the production of a press fitting according to Fig. 2 are illustrated in Figs. 10a to 10c. The method basically has the following steps.

Fig. 10a shows the initial state of the device for producing the press fitting, while Fig. 11a shows the component 32 itself. For the upsetting operation, the component 32 is clamped in a clamping jaw 20, while a mandrel 202 is arranged inside the component 32, in order to support the tubular component 32 outwardly. In addition, a die 204 is provided, the inner contour of which in the lower area abuts on the outside of the tubular component 32 and in the upper section leaves a gap 206 free. Finally, an upsetting sleeve 208 is arranged between the mandrel 202 and the die 204.

10 Starting from this position according to Fig. 10a the upsetting sleeve 208 is pressed downward, whereby the end of the tubular component 32 – in Fig. 10b the upper end – is compressed, i.e. deformed. The upsetting sleeve 208 in the process is moved downwards until the whole gap 206 is filled up by material of the component 32.

15 Hence, the wall thickness of the section 42 facing the open end of the component 32 with a predetermined length in relation to the wall thickness of the component 32 in the initial state is increased in the form of the thickening. This is also shown in Fig. 11b.

20 In the next step, which is illustrated in Fig. 10c, a bulge 38 is formed into the component 32. For this purpose, another die 210 is arranged above the clamping jaw 200, the inner contours of which correspond to one another and leave a gap 212 between themselves and the component 32 free. If now a further upsetting sleeve 214 is applied from above, then the tubular component 32 is again pressed downwards, so
25 the bulge is formed by the deformation of the material of the component 32. Hence, the shape of the component 32 illustrated in Fig. 11c is produced.

A further processing step is required to arrive at the configuration illustrated in Fig. 2. The tubular component 32 is widened at least along the end section 33, in order to
30 form a stop 47 for the pipe to be inserted.

Fig. 3 shows a further exemplary embodiment of the press fitting in a cross-sectional view. In the second area 42, the press fitting 50 has an annular element 52 which is arranged outside the tubular component 32. In this way, the overall wall thickness in the second area 42 is increased compared to the wall thickness in the third area 44.

5 The overall wall thickness of the press fitting 50 is understood as the whole thickness of the two layers of the tubular component 32 and of the annular element 52 lying one above the other. Increasing the overall wall thickness in the second area 42 in turn guarantees that the press fitting 60 is securely pressed together with a pipe (not shown). At the same time, the tubular component 32 can at least in sections have a
10 narrower wall thickness, so that the material costs of the press fitting 50 are reduced. The annular element 52 can, for example, consist of the same material as the tubular component 32.

Fig. 4 shows a third exemplary embodiment of the press fitting in a cross-sectional
15 view. The press fitting 60 differs from the press fitting 50 shown in Fig. 3 by the fact that the annular element 62 at least partly extends into the first area 36 of the end section 33. In this way, the reduced wall thickness of the tubular component 32 in the first area 36 can be compensated, so that improved compressibility of the press fitting is obtained. Furthermore, a sealing ring 40 can be used with a cord thickness which is
20 standard with the press fittings from the prior art. In addition, by partially covering the bulge 38 by means of the annular element 62, i.e. by means of the bulge covering, the bulge 38 can also be additionally protected against the particularly high pressing forces which occur in this area during the pressing operation.

25 A further exemplary embodiment of the press fitting, which, however, is not part of the invention, is shown in Fig. 5a in a cross-sectional view. Fig. 5b shows an enlarged detail from Fig. 5a. The press fitting 70 is designed as a symmetrical pipe connector with two end sections 72, 74, by means of which two pipes can be connected together. Only the right end section 72 is described below, since the effect of the second end
30 section results in corresponding fashion. The end section 72 differs from the end section 33 of the press fitting 2 illustrated in Fig. 2 by the fact that a separate annular element 76 is arranged on the outside around the tubular component 32 in the second

area 42 and extends over the first area and third area as far as the end section 74. The annular element 76 can, for example, be produced from a cheaper material than the tubular component 32. The end section 72 has an essentially constant overall thickness in the first, second and third areas as a result of the annular element 76, so that the press fitting 70 can be pressed together particularly symmetrically. Furthermore, the pressability of the press fitting 70 with the pressing tools known from the prior art and available on the market and which up to now have been used for pressing together the press fitting 2 shown in Fig. 1 is improved. At the same time, the material costs are reduced by the annular element 76 which consists of a cheaper material.

A further exemplary embodiment of a press fitting is shown in Fig. 6a in a cross-sectional view. Fig. 6b shows an enlarged detail from Fig. 6a. The press fitting 80 is designed as a symmetrical pipe connector with a first end section 82 and a second end section 84. Only the right end section 82 is described below. The tubular component 32 has a thickening 46 in the second area 42 of the end section 82. In addition, optionally an outer annular element 86 is provided which in sections increases the overall wall thickness in the second area 42 and extends as far as the first area 36. The outer circumference of the tubular component 32 in the third area 44 is essentially adapted to the outer circumference of the press fitting 80 in the section of the increased overall wall thickness in the second area 42. In this way, a more even and easier pressing together of the press fitting 80 is obtained with a pressing tool, since the press fitting 80 is formed essentially symmetrically in the area of the bulge 38.

Since the wall thickness of the tubular component 32 is reduced in the third area 44 compared to the second area, the tubular component 32 has a greater inner diameter in the third area 44. As a result of this, a free space is provided, in which, for example, a sleeve element 88 consisting of an elastic material, in particular consisting of an elastic plastic material, can be arranged. The sleeve element 88 preferably has a cylindrical area 90 and a thickening 92, optionally with a stop face 94 for a pipe to be inserted. The wall thickness of the cylindrical area 90 is preferably selected such that the inner diameter of the area 90 corresponds to the inner diameter of the second

area 42 or essentially corresponds to the outer diameter of the pipe to be inserted (which is not shown). With the sleeve element 88, a gap being formed between the pipe to be inserted and the tubular component 32 in the third area 44 can be prevented. As a result, deposits or contamination of the connection through microbial growth can be reliably prevented, so that the press fitting 80 can be used, for example, as a hygienic connector, preferably in a drinking water piping system.

The insertion depth of the pipe to be inserted into the press fitting can be defined by means of the stop face 94. Furthermore, the thickening 92 brings about an accommodation of the inner contour of the pipe to be inserted with the inner contour of the press fitting 80 such that the occurrence of eddies and a drop in pressure associated with it can be reduced. The stop face 94 to that end preferably has a height which corresponds to the typical overall wall thickness of the pipes to be inserted.

In principle, the press fittings 70 and 80 can also be designed as asymmetrical pipe connectors. In this way, different types of connections or pipes can be connected to the press fittings. Furthermore, in principle, all press fittings can not only be designed as pipe connectors, but also as other components for pipe installations, for example as T-pieces, elbow pieces or the like.

A further exemplary embodiment of a press fitting is shown in a cross-sectional view in Fig. 7a. Fig. 7b shows an enlarged detail from Fig. 7a. The press fitting from Fig. 7a is illustrated in cross-section in Fig. 7c. The press fitting 100 has a widening 101 in the second area 42, i.e. the inner diameter in this area is at least partly, preferably essentially completely increased compared to the inner diameter in the third area 44. The widening 101 serves to receive an annular element 102 arranged inside the tubular component. The overall wall thickness of the press fitting 100 in the second area 42 is increased by the annular element 102 compared to the wall thickness of the tubular component 32 in the third area 44. The annular element 102 is, as illustrated in Figs. 7a to 7c, provided with mounting slots 104 which enable the element 102 to be locked in place inside the press fitting.

A further exemplary embodiment of the press fitting is shown in a cross-sectional view in Fig. 8a. Fig. 8b shows an enlarged detail from Fig. 8a. In the case of the press fitting 110, the increased overall wall thickness in the second area 42 of the tubular component 32 is brought about by an annular element 112 arranged inside the tubular component 32 and designed as a retaining element. The tubular component 32 to that end has a widening 114 in the second area 42, which enables the retaining element 112 to be accommodated. The inner diameter of the retaining element 112 essentially corresponds to the outer diameter of the pipe to be inserted. As is illustrated in Fig. 8b, the retaining element 112 has two annular elevations 116, 118 on its inside which guarantee that the inserted pipe is securely fixed when the press fitting 110 is pressed together with a pipe. In addition, an annular elevation 120 is provided on the outside of the annular retaining element 112 and produces a force-fit and/or form-fit connection between the retaining element 112 and the tubular component 32 and thereby prevents the retaining element 112 from being axially displaced with respect to the press fitting 110.

Fig. 9 shows a further exemplary embodiment of the press fitting. The press fitting 130 is designed as a pipe connector with a first end section 132 and a second end section 134 and differs from the press fitting 80 illustrated in Fig. 6a in that no annular element 86 is provided. A first pipe 136 is inserted into the first end section 132 and a second pipe 138 is inserted into the second end section 134. The first end section 132 is in an uncompressed state whilst the second end section 134 has already been pressed together with the pipe 138. It can be clearly recognised that the section increased by the thickening 46 in the second area 42 of the second end section 134 has resulted in the pipe 138 being fixed firmly. At the same time, the seal tightness of the connection is ensured by the sealing element 40 provided in the bulge 86. The gap between the pipe 138 and the third area 44 of the tubular component 32 is filled by the sleeve element 88, so that no deposits or contamination through microbial growth can occur here. In addition, the transition of the inner channel from the pipe 138 to the tubular component 32 is compensated by the thickening 92 of the sleeve element 88, so that eddy formation and a loss of pressure are reduced.

Fig. 12 shows a ninth exemplary embodiment of a press fitting 220 according to the invention. The tubular component 32, as in the first exemplary embodiment according to Fig. 2, has an end section 222 which has a first area 36 with a bulge 38, a second area 42 and a third area 44. In contrast to the first exemplary embodiment, the second area 42 is provided with an overall wall thickness over its entire length which is increased by an integral thickening 224 compared to the wall thickness of the tubular component 32 in the third area 44. Therefore, no step is formed along the second area 42.

Figs. 13a to 13c and 14 explain – similar to Figs. 10 and 11 – the method for producing the press fitting according to Fig. 12. In Fig. 13, the same reference numbers indicate the same elements as in Fig. 10. The functionality is in other respects the same as was described in connection with Fig. 10. The difference compared to Fig. 10 is that the gap 206 is longer and that when the end section 33 is upset a longer section, namely the entire second area 42, is upset and has a greater wall thickness than the tubular component 32 in its initial shape.

Fig. 14, in the same way as Fig. 11, shows the different shapes which the tubular component 32 adopts before, during and after the upsetting operation. The lengthened area of the thickening 46 can also be identified here.

Fig. 15 shows a tenth exemplary embodiment of a press fitting 230 according to the invention. The tubular component 32, as in the first exemplary embodiment according to Fig. 2 and in the ninth exemplary embodiment according to Fig. 12, has an end section 222 which has a first area 36 with a bulge 38, a second area 42 and a third area 44. In contrast to the first and ninth exemplary embodiments, both the second area 42 and the first area 36 are provided with an overall wall thickness over their entire lengths which is increased by an integral thickening 234 compared to the wall thickness of the tubular component 32 in the third area 44. Therefore, no step is formed along the second area 42 and the bulge 38 also has a greater wall thickness.

Figs. 16a to 16c and 17 explain – similar to Figs. 10 and 11 as well as Figs. 13 and 14 – the method for producing the press fitting according to Fig. 15. In Fig. 16, the same reference numbers indicate the same elements as in Figs. 10 and 13. The functionality is in other respects the same as was described in connection with Fig. 10. The

5 difference compared to Figs. 10 and 13 is that the gap 206 is once again longer and that when the end section 33 is upset a once again longer section, namely the entire second area 42 and the first area 36 with the bulge 38 arising from it, is upset and has a greater wall thickness than the tubular component 32 in its initial shape.

10 Fig. 17, in the same way as Figs. 11 and 14, shows the different shapes which the tubular component 32 adopts before, during and after the upsetting operation. The lengthened area of the thickening 46 and the bulge 38 can also be identified here.

In the case of the exemplary embodiments for the methods for producing the first, ninth and tenth exemplary embodiments according to the invention, the widening can
15 be carried out before or after the upsetting operation and in particular before or after introducing the bulge. The order of the individual processing steps can therefore be chosen in such a way as is the most favourable depending on material and dimensions of the press fitting.

20 Fig. 18 shows an eleventh exemplary embodiment of a press fitting 240 according to the invention. The tubular component 32 has a second area 242 which has a first area 36 with a bulge 38, a second area 42 and a third area 44. The second area 42 is at least partly folded outwards and is hence integrally formed in two layers in the area of the
25 folding 244.

Fig. 19 shows the different shapes of the press fitting 240 during production. Fig. 19a shows the tubular component 32, the edge of which is initially folded outwards by 90° in the area of the opening 34. Fig. 19b shows the complete folding 244. In the next
30 step, see Fig. 19c, the component 32 is widened from the side of the opening 34, whereby, on the one hand, the folding 244 is folded in and produces a two-layered form and whereby, on the other hand, the stop 47 is formed which is provided for

positioning a pipe inside the press fitting. Subsequently, as illustrated in Fig. 19d, the bulge 38 is formed into the tubular component 32, so that the three areas 36, 42 and 44 result, as already shown in Fig. 18.

5 Fig. 20 shows a twelfth exemplary embodiment of a press fitting 250 according to the invention. The tubular component 32 has a second area 252 which has a first area 36 with a bulge 38, a second area 42 and a third area 44. The second area 42 is at least partly folded inwards and is hence integrally formed in two layers in the area of the folding 254.

10

Fig. 21 shows the different shapes of the press fitting 250 during production. Fig. 21a shows the tubular component 32 which is already widened and has a stop 47 for the pipe to be inserted. The edge of the component 32 is folded inwards in the area of the opening 34. Fig. 21b shows the complete folding 244 which has been produced by a
15 second widening which only extends in the second area 42. In the next step, see Fig. 21c, the bulge 38 is formed into the tubular component 32, so that the three areas 36, 42 and 44 result, as already shown in Fig. 20.

15

The inwardly produced folding 254 has a further advantage. The edge 256 resulting
20 through the inwardly directed folding 254 produces during pressing together with an inserted pipe an additional edge which can be pressed into the material of the pipe. The locking of the pipe inside the press fitting 250 is thereby strengthened.

20

The features of the press fittings illustrated in the various designs and exemplary
25 embodiments can, of course, be advantageously combined with one another in order to adapt the press fitting to the respective imposed requirements.

25

714004/DO

PRÉSKÖTÉS ÉS ALKALMAZÁSA

SZABADALMI IGÉNYPONTOK

1. Préskötés

- egy csőszerű alkatrész (32) és
- a csőszerű alkatrész (32) egy, a kötés előállítása során összenyomható végszakaszával,
- ahol a csőszerű alkatrész rézből vagy egy rézötvözetből, különösképp vörösöntvényből, vagy acélból van,
- ahol a végszakasz egy csövet befogadó nyílást (34) tartalmaz,
- ahol a végszakasznak van egy első területe (36), amely egy tömítést (40) befogadó gyűrű alakú dudorral (38) van ellátva,
- ahol a végszakasz egy, a dudor (38) nyílás (34) felőli oldalán elrendezett második területet (42) és egy, a dudor (38) nyílással (34) átellenes oldalán elrendezett harmadik területet (44) tartalmaz és
- ahol az első, második és harmadik terület a cső beillesztési területét határozza meg, azzal jellemezve,
- hogy a csőszerű alkatrész (32) teljes falvastagsága a második területen (42) a csőszerű alkatrész (32) harmadik területének (44) teljes falvastagságához képest legalább szakaszosan meg van növelve.

2. Az 1. igénypont szerinti préskötés, azzal jellemezve, hogy a csőszerű alkatrész (32) teljes falvastagsága a második területen (42) a csőszerű alkatrész (32) harmadik területének (44) falvastagságához képest legalább, 50%-al előnyösen legalább 75%-al, különösen előnyösen legalább 100%-al meg van növelve.

3. Az 1. vagy a 2. igénypont szerinti préskötés, azzal jellemezve, hogy a csőszerű alkatrész (32) teljes falvastagsága az első területen (36) és adott esetben a második területen (42) egy integrált helyi tömítéssel (46) legalább szakaszonként meg van növelve.

4. Az 1-3. igénypontok bármelyike szerinti préskötés, azzal jellemezve, hogy a csőszerű alkatrész (32) második területe (42) legalább részlegesen kívülről vagy belülről peremezve van és hogy a második terület (42) a peremezés területén (244) kétrétegűen van kialakítva.

5. Az 1-3. igénypontok bármelyike szerinti préskötés, azzal jellemezve, hogy a teljes falvastagság a második területen (42) egy különálló, gyűrű alakú elem (52, 62, 76, 86, 102, 112) által van megnövelve.

6. Az 5. igénypont szerinti préskötés, azzal jellemezve, hogy a gyűrű alakú elem (52, 62, 76, 86, 102, 112) egy erőzáró, anyagzáró és/vagy alakzáró kötéssel legalább tengelyirányban a csőszerű alkatrészen (32) rögzítve van.

7. Az 5. vagy a 6. igénypont szerinti préskötés, azzal jellemezve, hogy a gyűrű alakú elem (52, 62, 76, 86) a csőszerű alkatrészen (32) kívül helyezkedik el.

8. Az 5-7. igénypontok bármelyike szerinti préskötés, azzal jellemezve, hogy a csőszerű alkatrész (32) a második területen (42) a gyűrű alakú elem (102, 112) számára egy bővítést (101, 114) tartalmaz és hogy a gyűrű alakú elem (102, 112) a csőszerű alkatrészen (32) belül helyezkedik el.

9. Az 5-8. igénypontok bármelyike szerinti préskötés, azzal jellemezve, hogy a gyűrű alakú elem (52, 62, 76, 86, 102, 112) lényegében a teljes kerületén azonos vastagsággal rendelkezik.

10. Az 1-9. igénypontok bármelyike szerinti préskötés, azzal jellemezve, hogy a harmadik területen (44) a csőszerű alkatrészen (32) belül egy elasztikus anyagú, különösen elasztikus műanyag hüvelyelemet (88) tartalmaz.

11. A 10. igénypont szerinti préskötés, azzal jellemezve, hogy a hüvelyelem (88) a nyílással (34) átellenes oldalán egy opcionálisan behelyezett cső számára kialakított ütközőfelületet (94), egy zömítést (92) tartalmaz.

12. Az 1-11. igénypontok bármelyike szerinti préskötés, azzal jellemezve, hogy a csőszerű alkatrész (32) falvastagsága a dudor (38) területén kisebb, mint a csőszerű alkatrész (32) teljes falvastagsága a második területen (42).

13. Az 1-12. igénypontok bármelyike szerinti préskötés, azzal jellemezve, hogy a cső-szerű alkatrész (32) külsején egy, a dudort (38) elfedő, gyűrű alakú dudorfedő van.

14. A 1-14. igénypontok bármelyike szerinti préskötés alkalmazása ivóvíz- vagy szennyvízbekötés, vagy gáz- és fűtésbekötés kialakítására.

A meghatalmazott:

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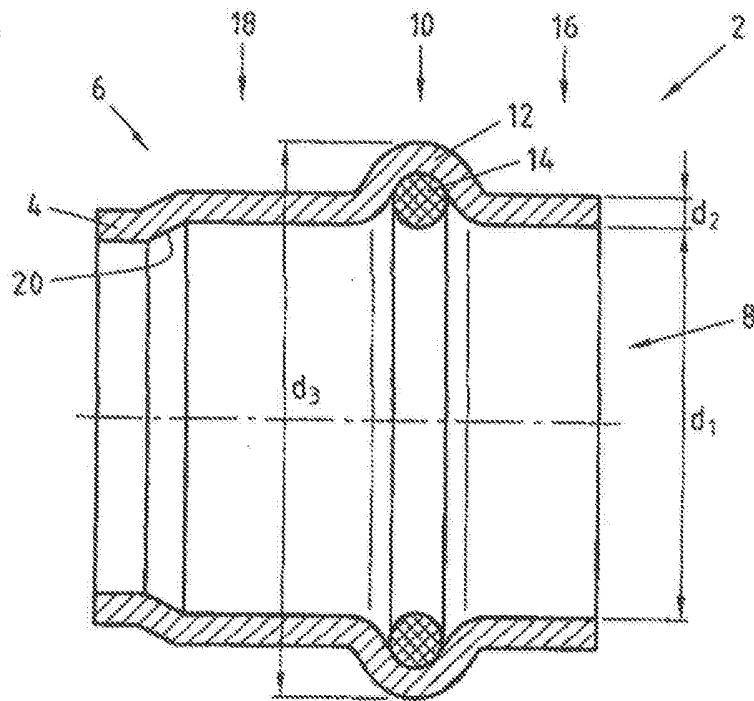


Fig.1
Technical field

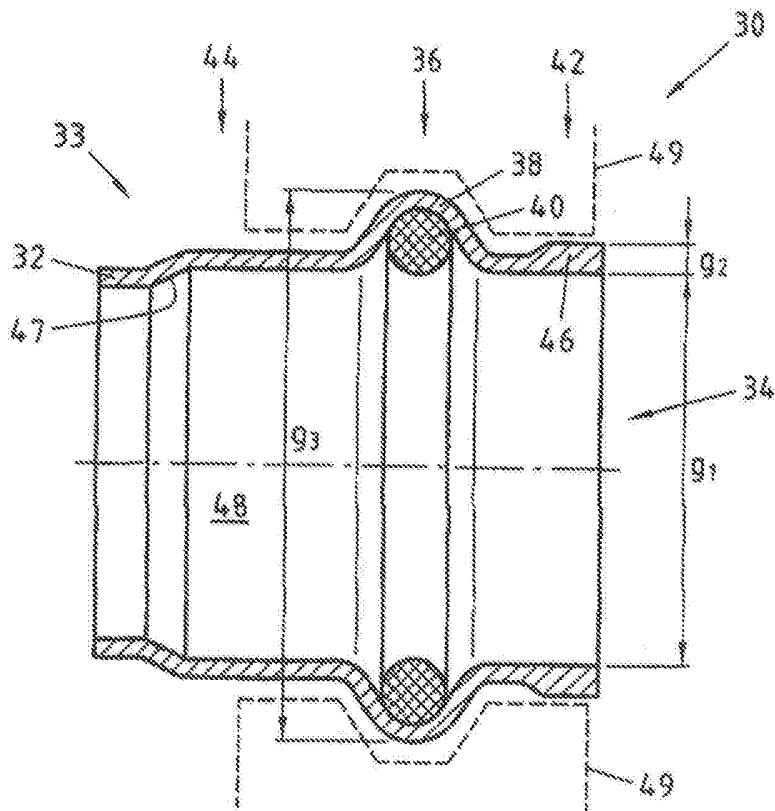
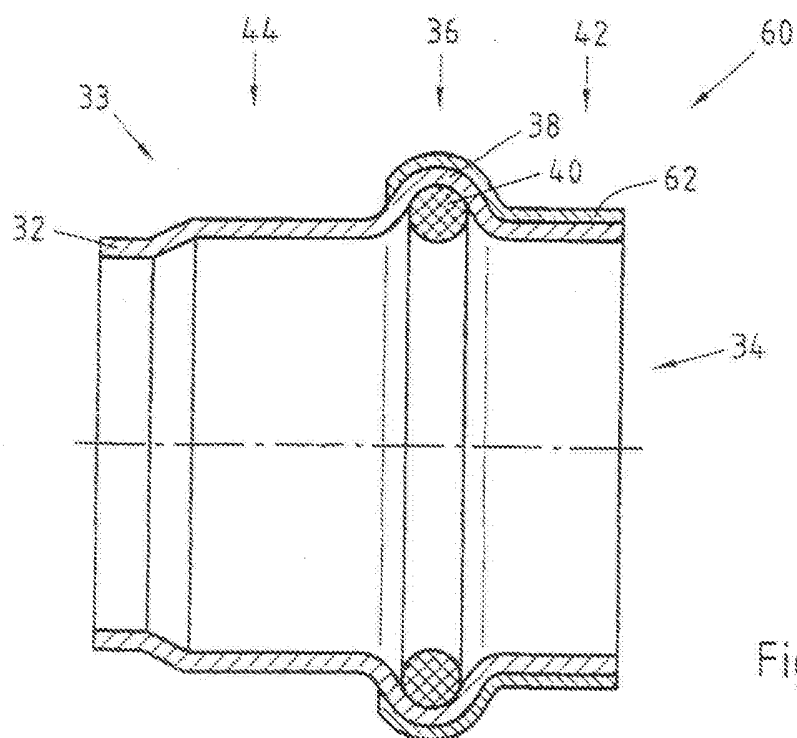
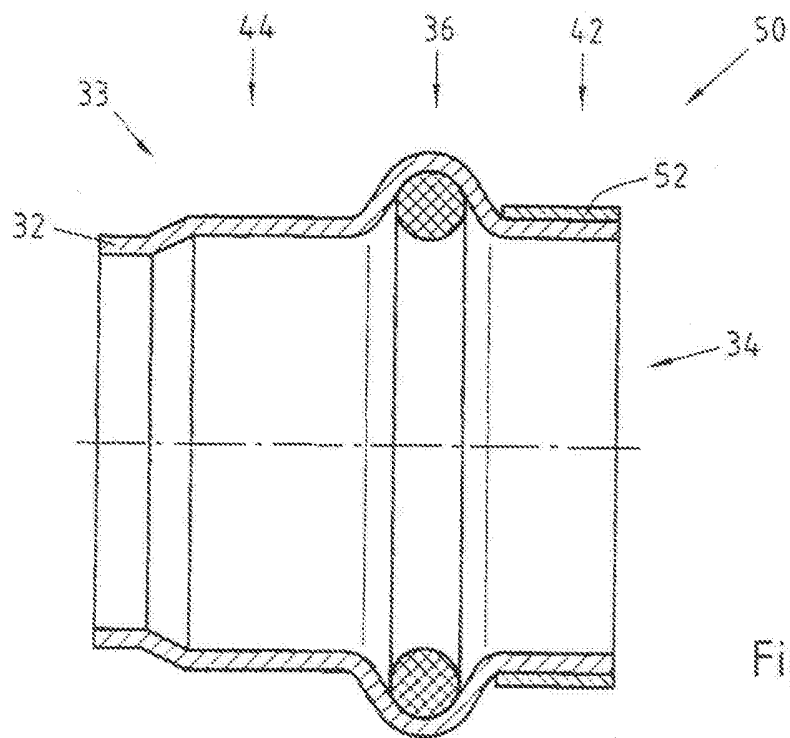


Fig.2



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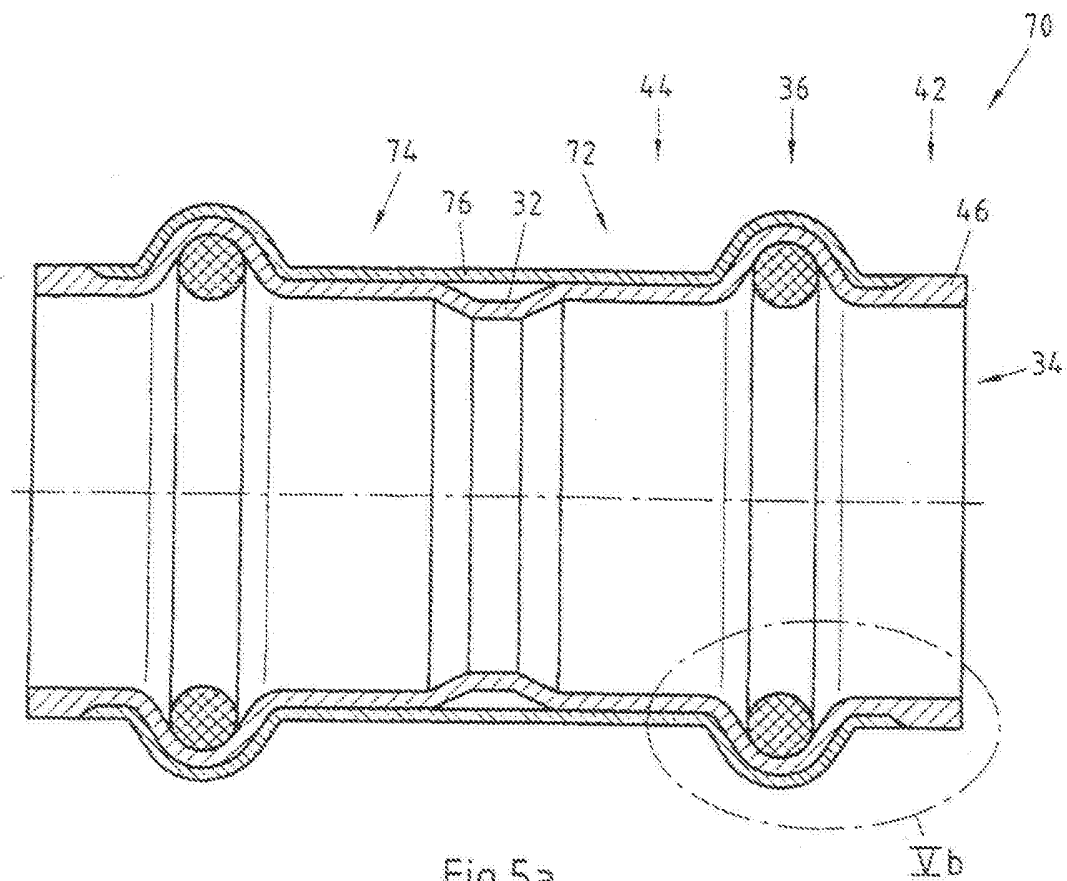


Fig. 5a

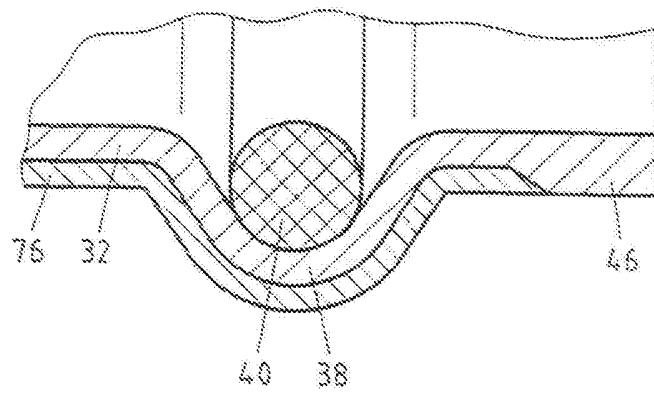
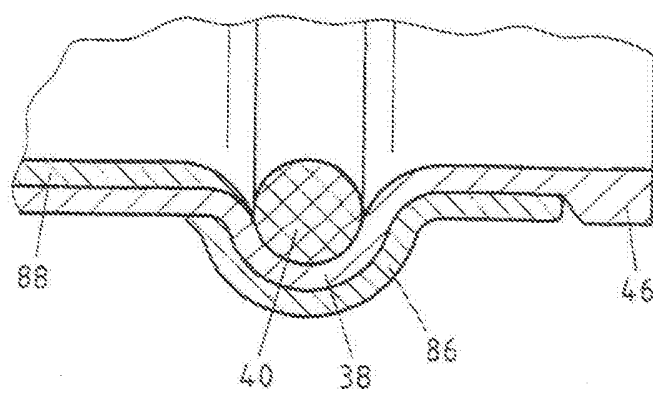
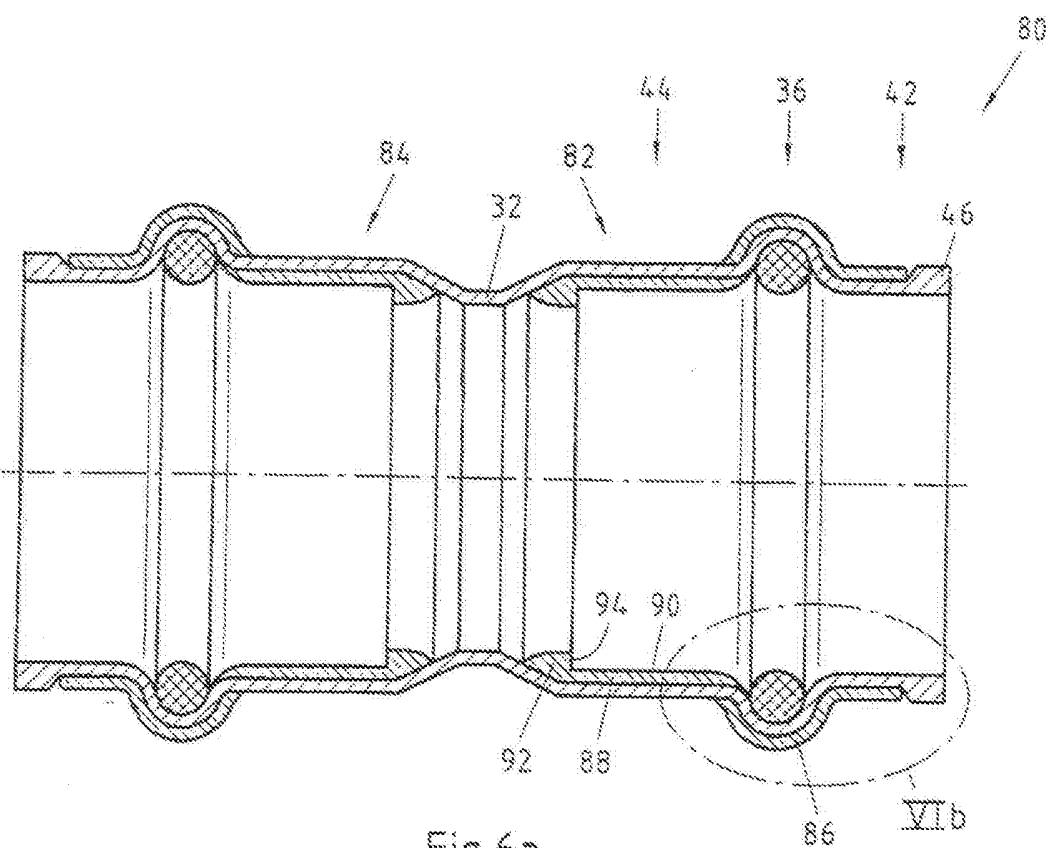


Fig. 5b

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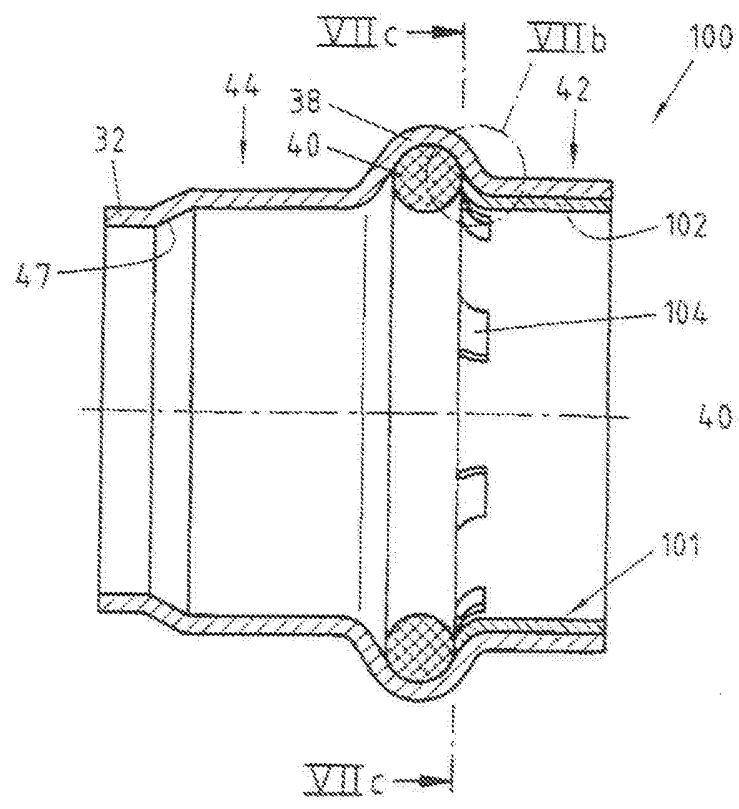


Fig. 7a

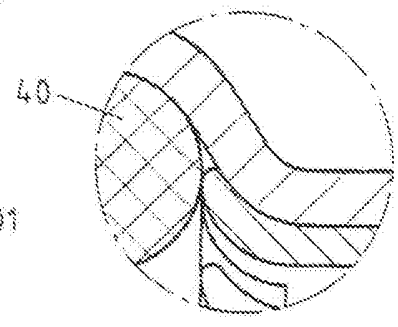


Fig. 7b

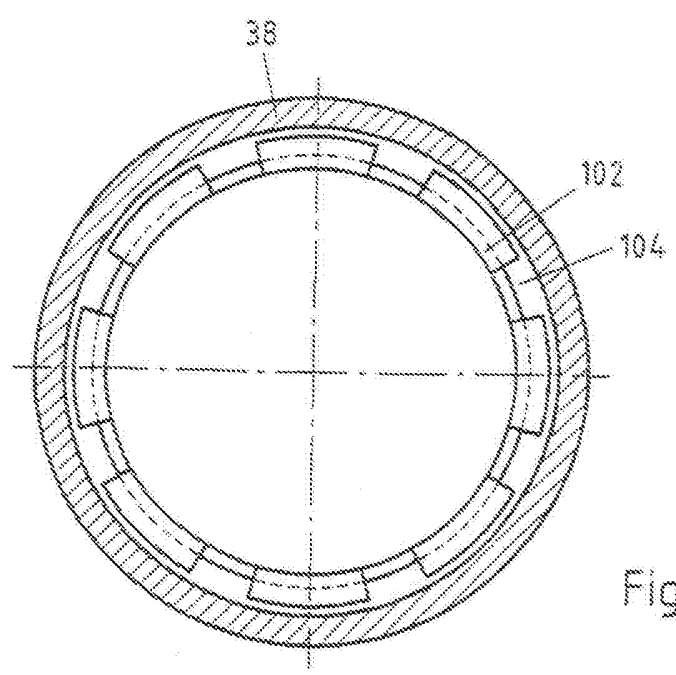


Fig. 7c

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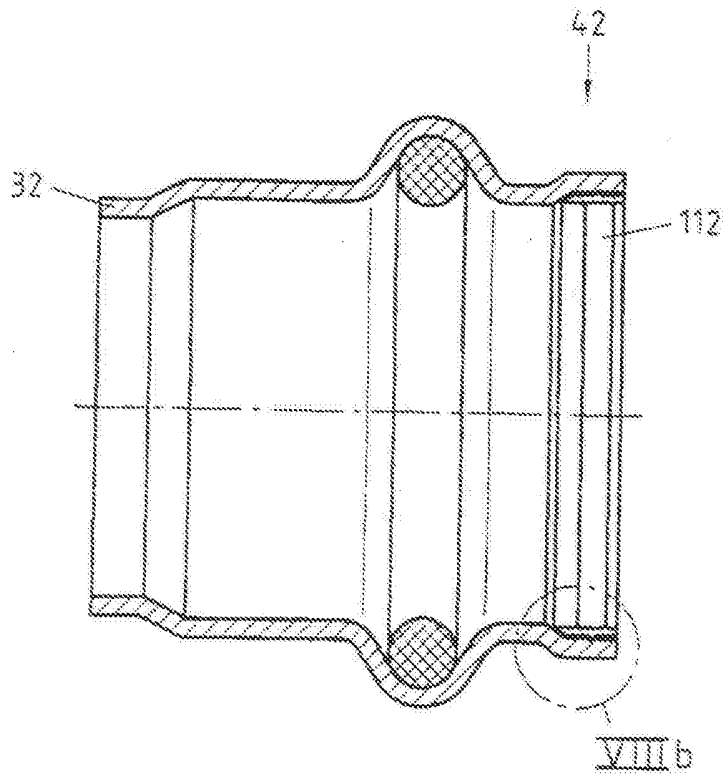


Fig. 8a

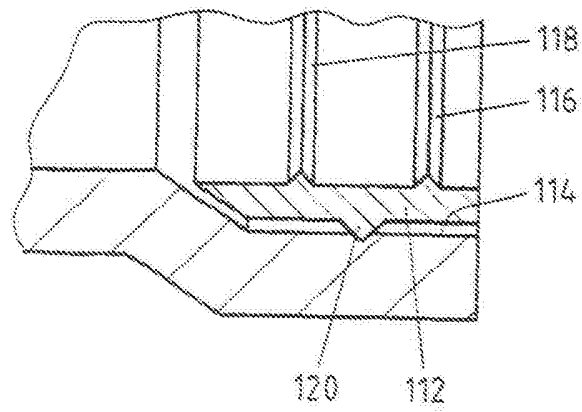


Fig. 8b

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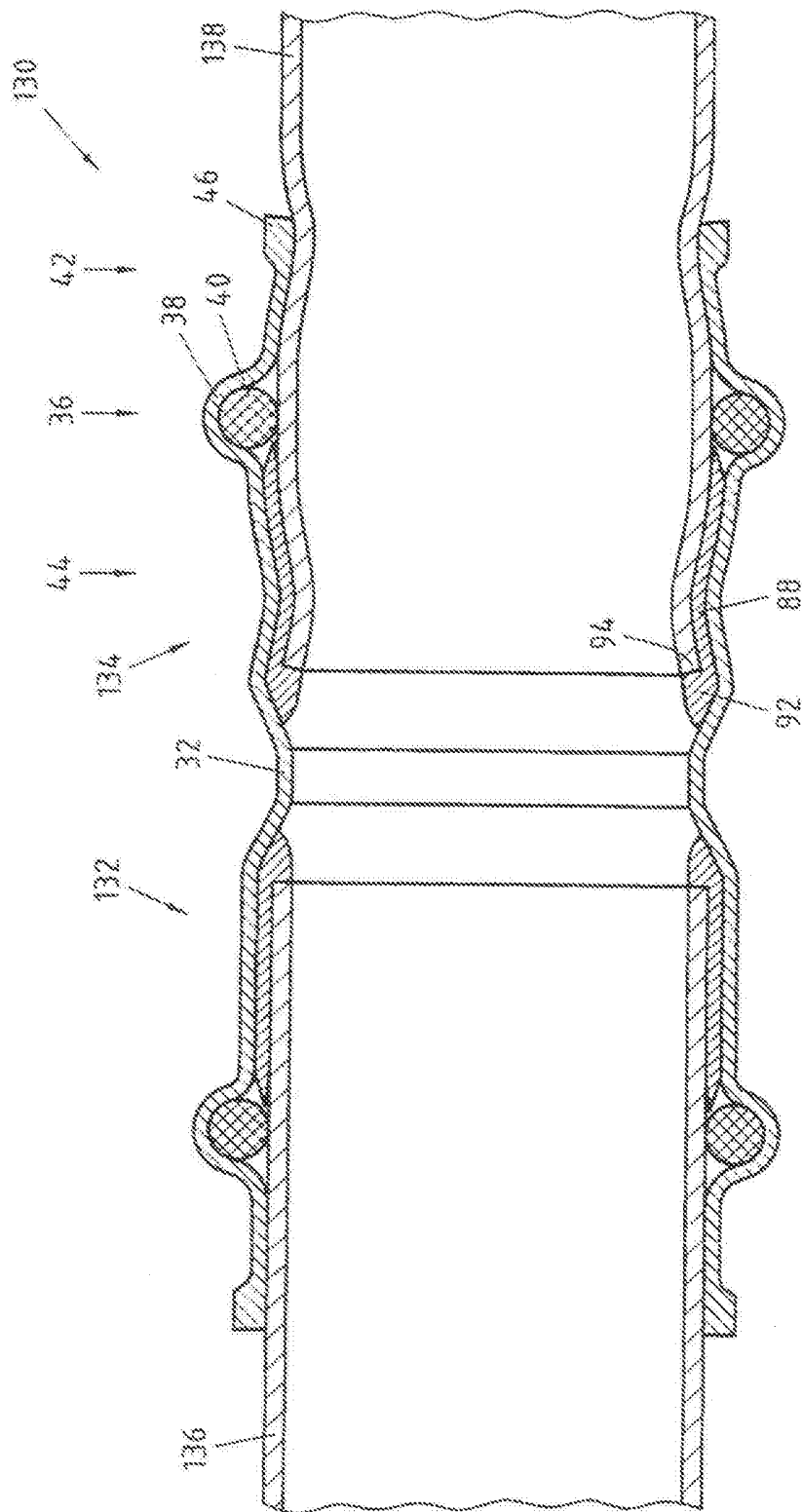


Fig.9

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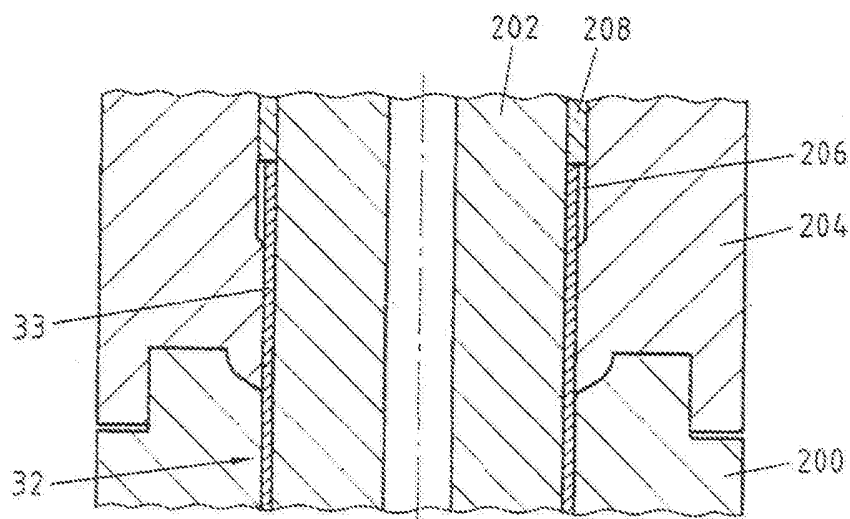


Fig.10a

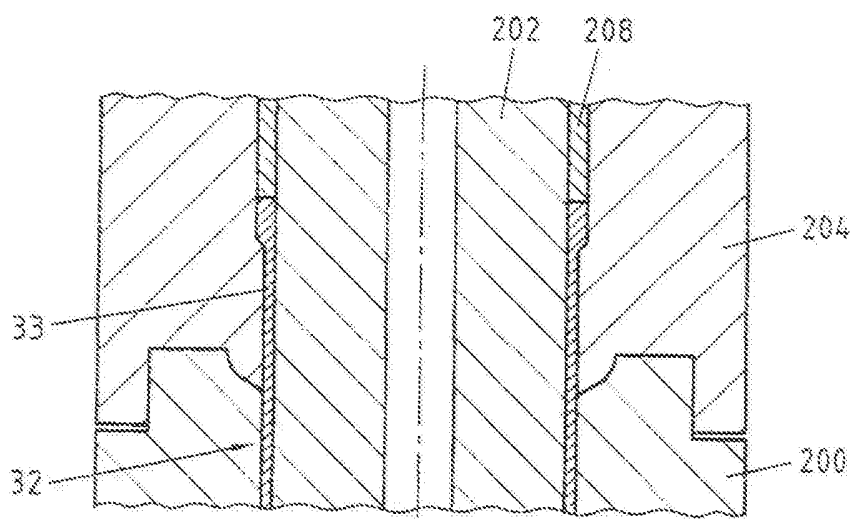


Fig.10b

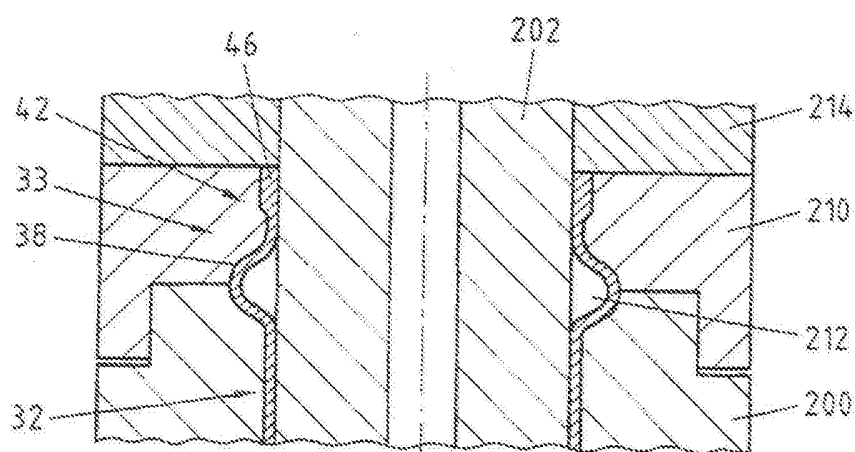


Fig.10c

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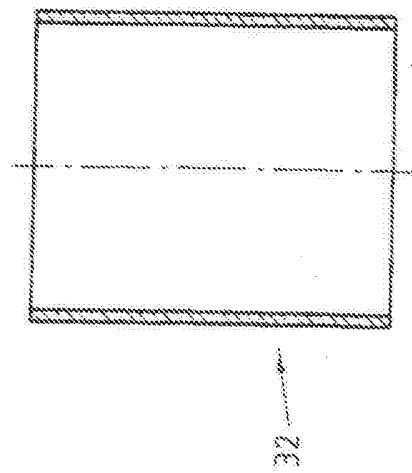


Fig. 11a

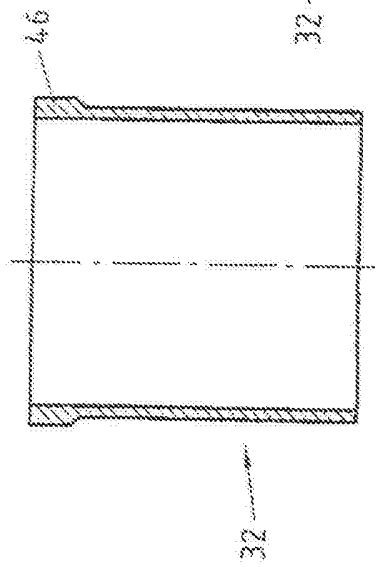


Fig. 11b

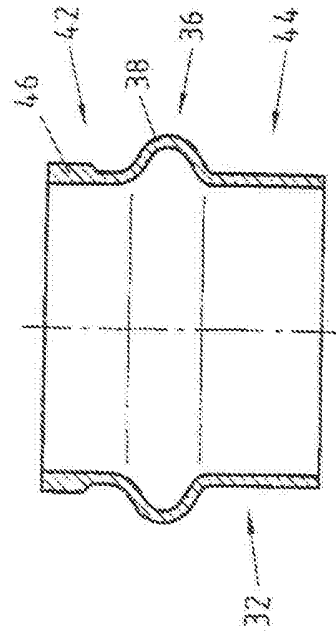


Fig. 11c

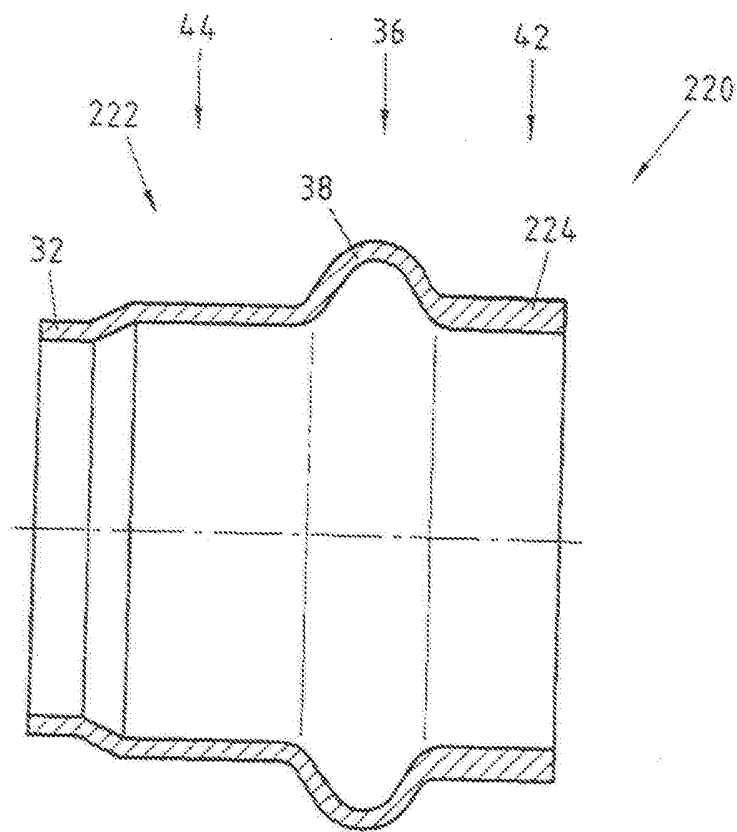


Fig.12

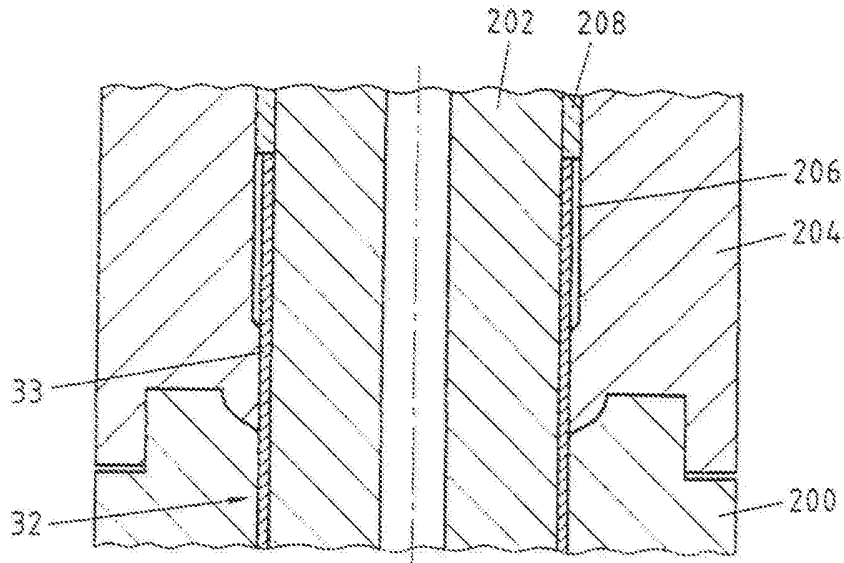


Fig. 13a

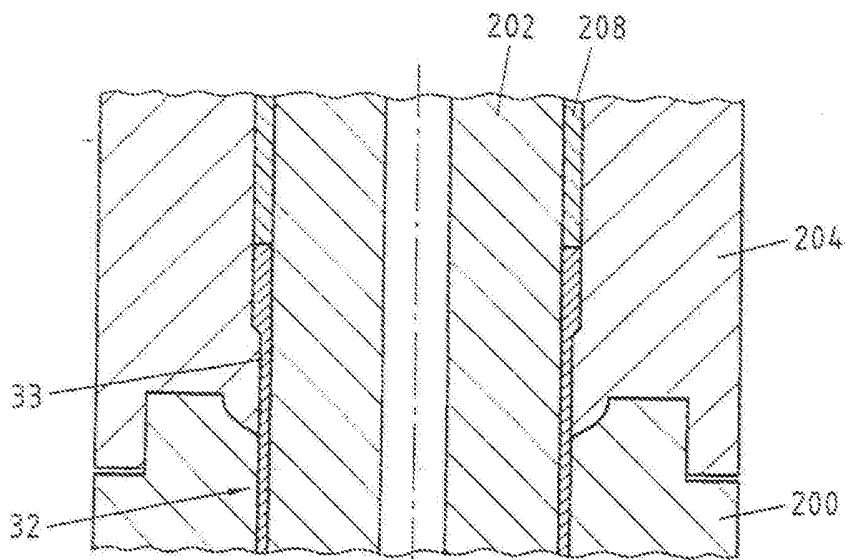


Fig. 13b

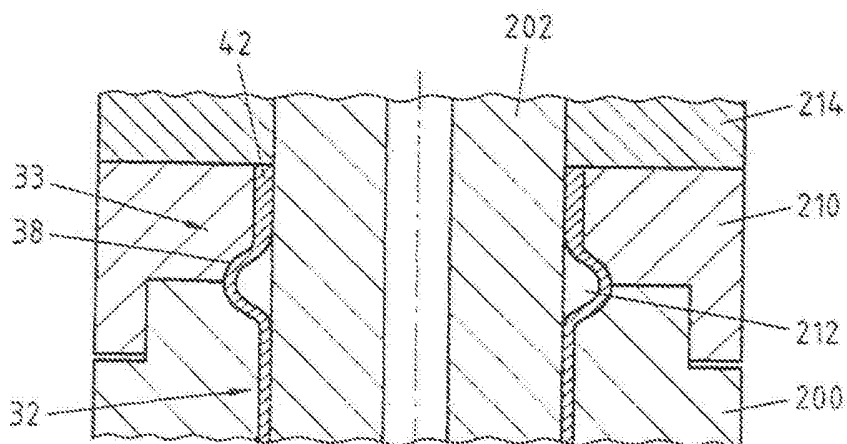


Fig. 13c

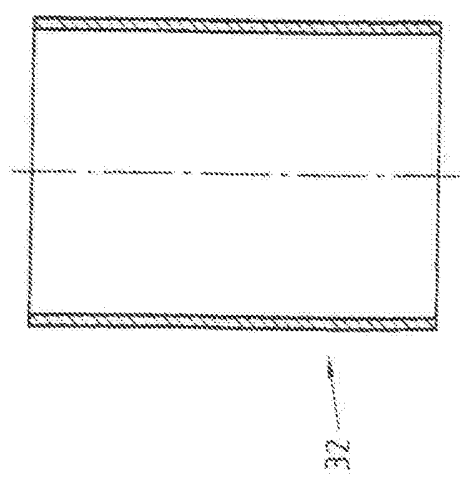


Fig. 14a

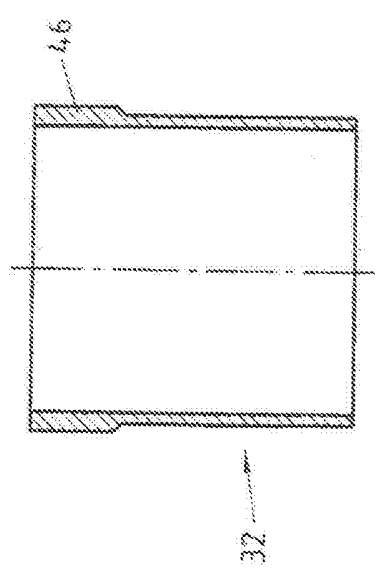


Fig. 14b

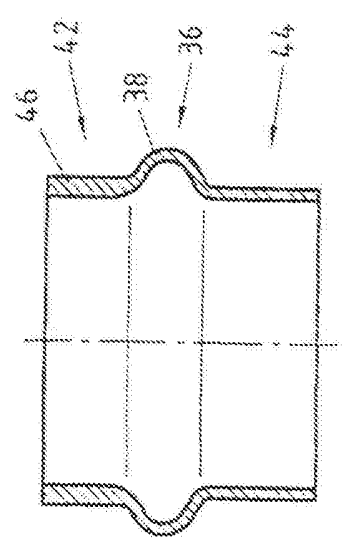


Fig. 14c

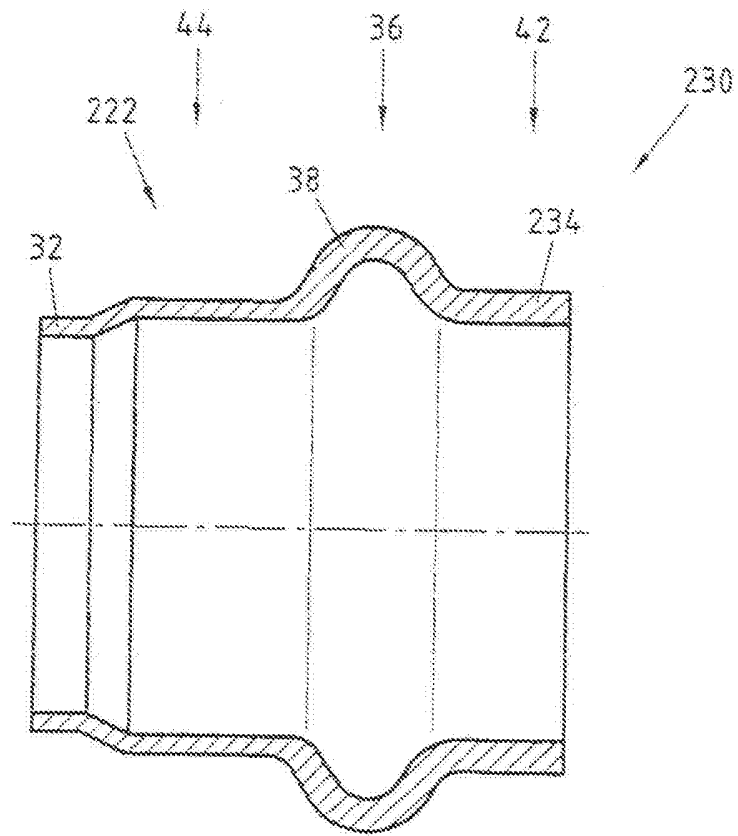


Fig.15

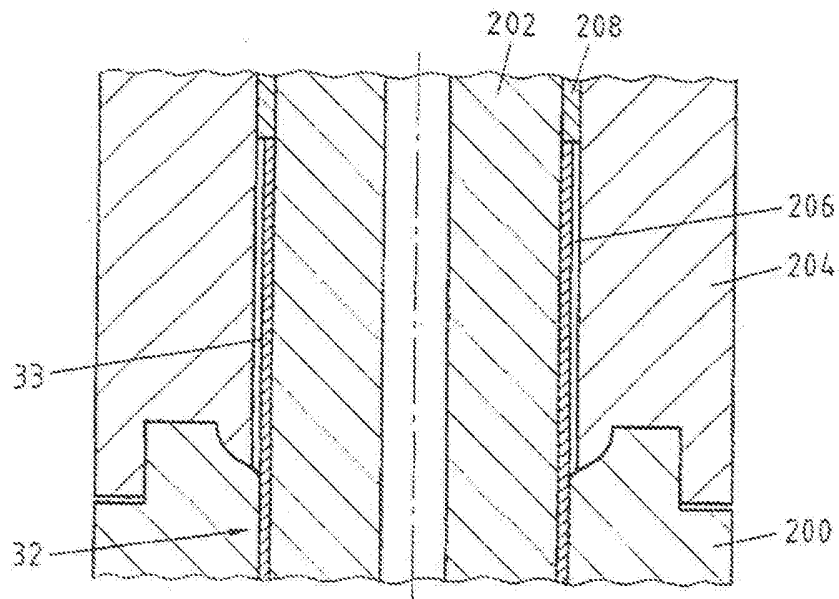


Fig. 16a

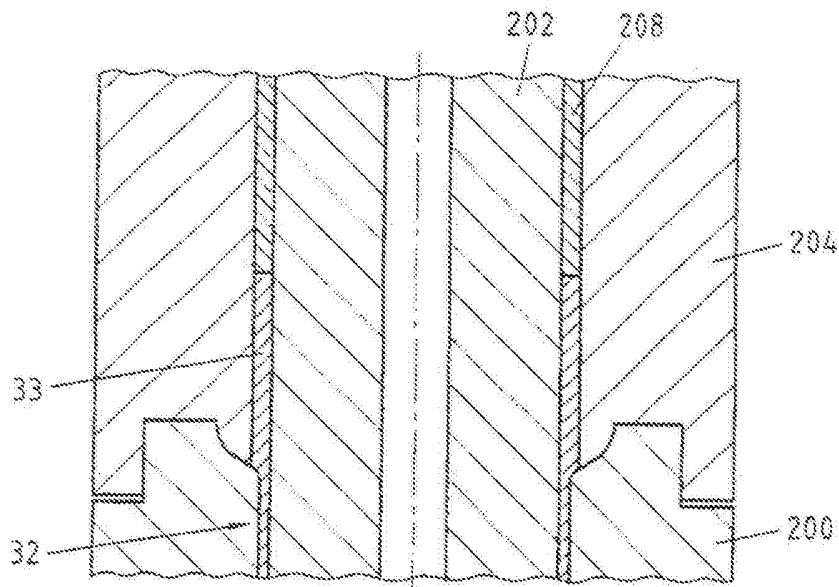


Fig. 16b

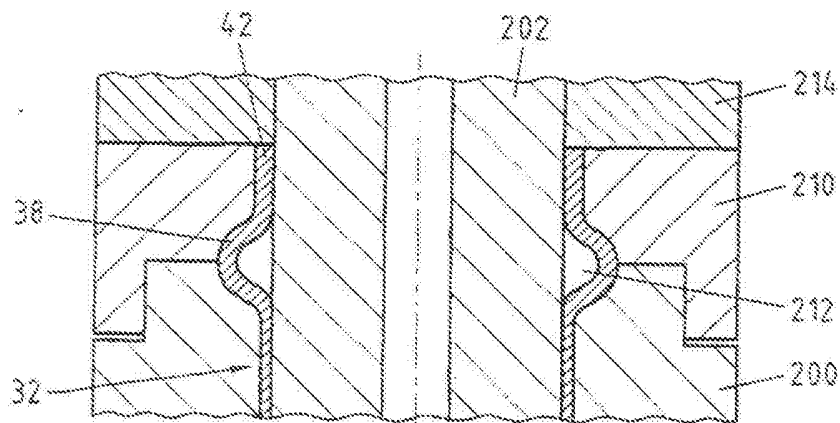


Fig. 16c

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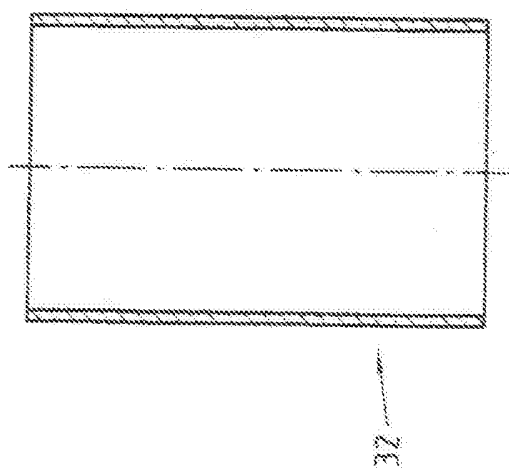


Fig. 17a

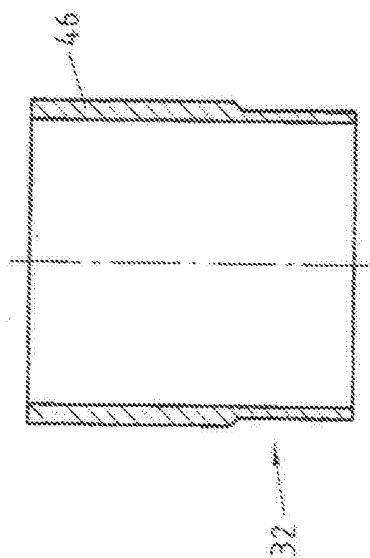


Fig. 17b

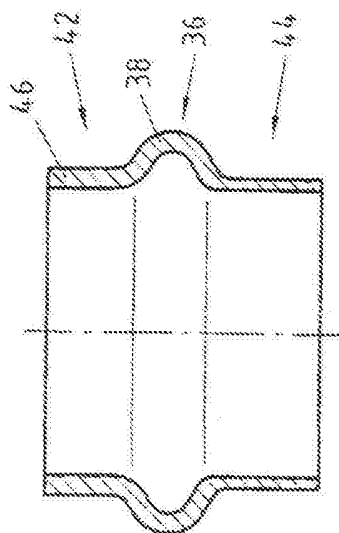


Fig. 17c

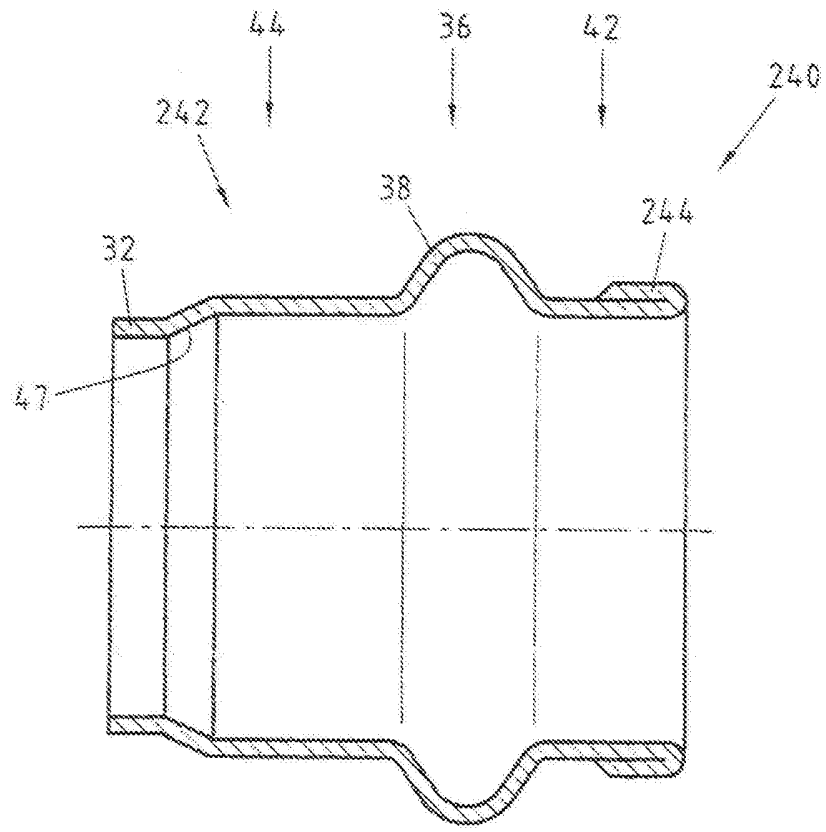


Fig.18

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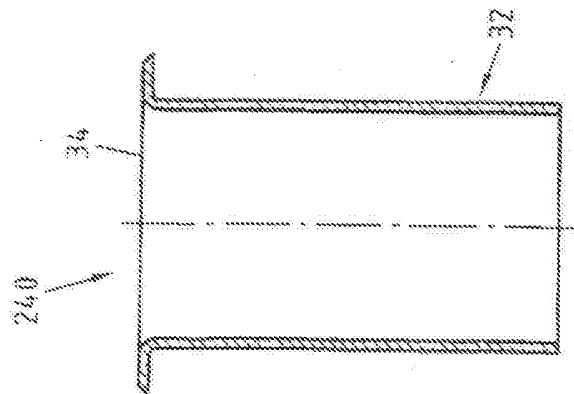


Fig. 19a

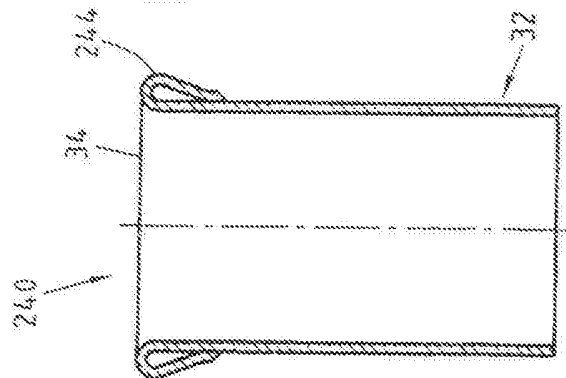


Fig. 19b

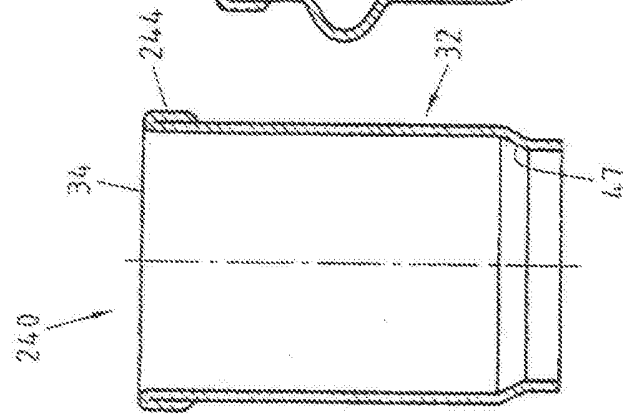


Fig. 19c

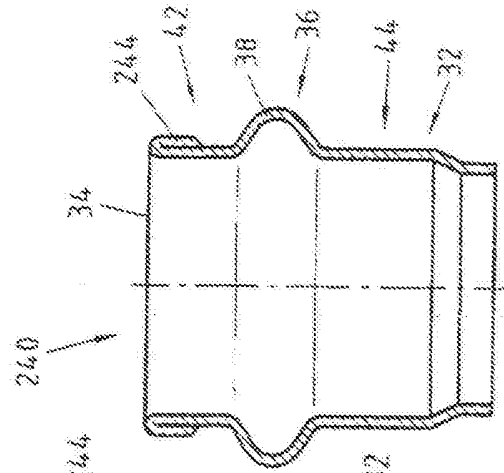


Fig. 19d

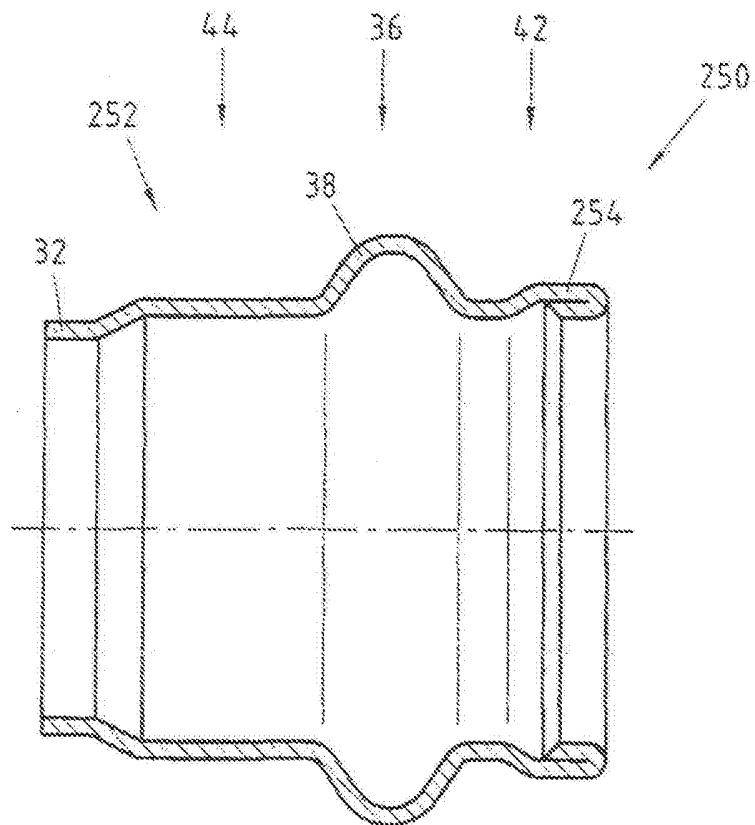


Fig.20

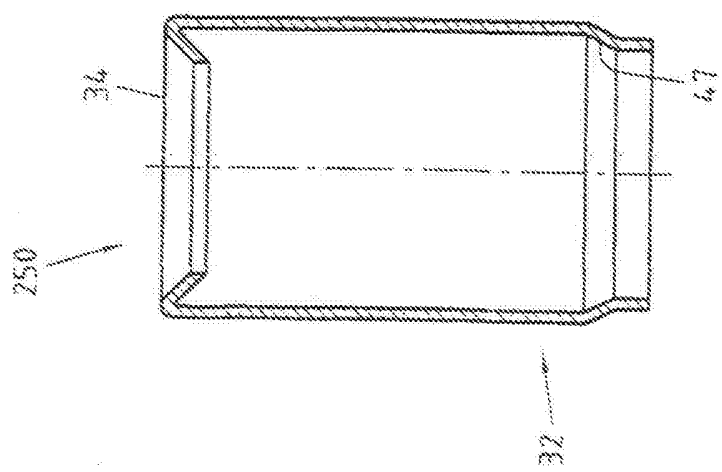


Fig. 21a

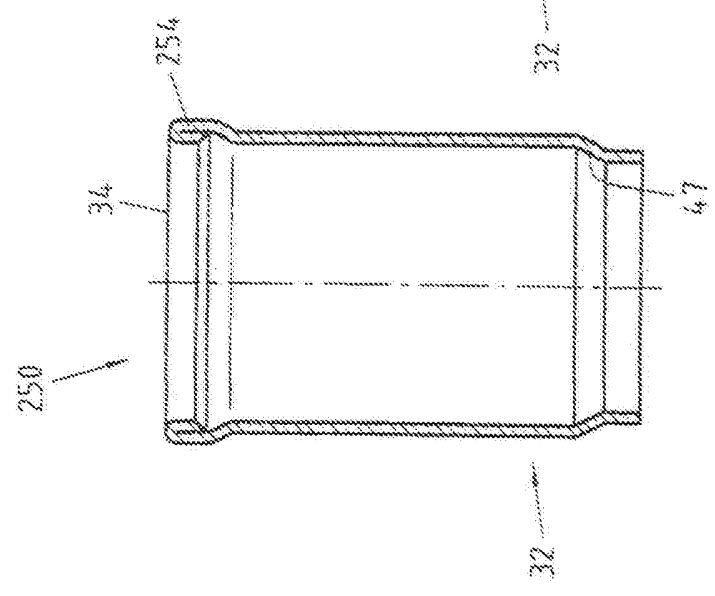


Fig. 21b

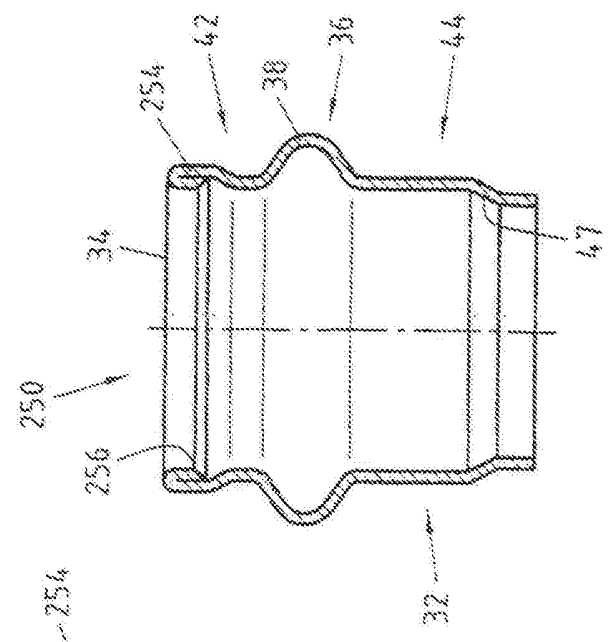


Fig. 21c