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(54) Apparatus for expelling fluid and method of installing the apparatus

(57) The invention relates to apparatus for expelling water to the external environment from a combination boiler (10) situated internally of a building. The apparatus comprises a conduit (16) connected at its first end to a pressure relief valve of said boiler (10) and having its second end open to the external environment. The open end of the conduit (16) has an end portion (20) adapted to deflect the expelled water towards the external surface of an external wall (14). The end portion (20) is pre-fitted to the conduit (16) and is dimensioned such that it can be passed through an aperture (12) formed in the wall (14) without the need for any external installation.

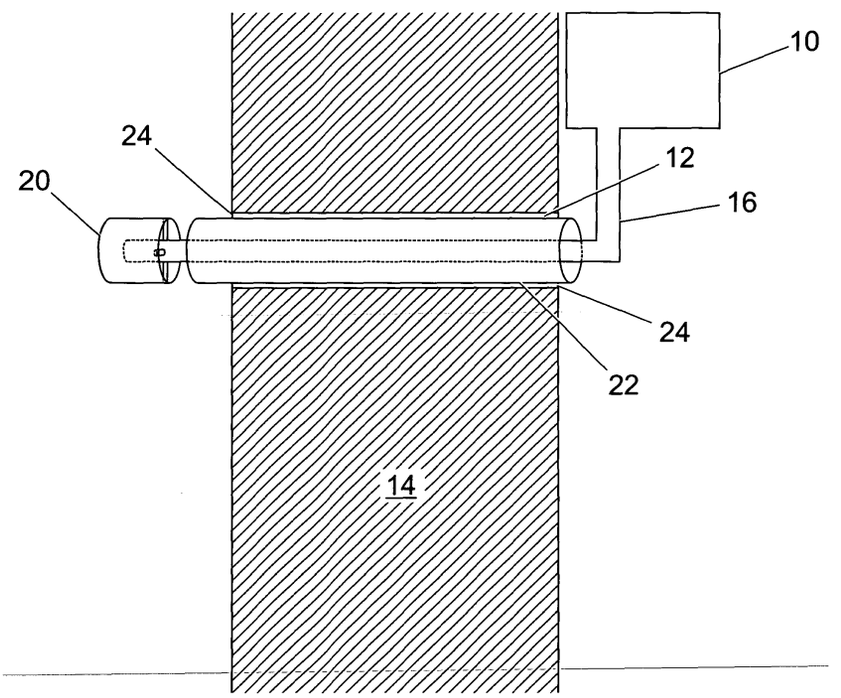

Fig. 3

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Description

[0001] The present invention relates to apparatus and method of installing the apparatus, used particularly but not exclusively for safely expelling water from the pressure relief valves of household combination boilers.

[0002] Demand for combination household boilers has grown due to their efficiency and convenience. Such boilers are typically maintained at pressure as this improves their efficiency. There is a danger that critical failures such as a pump or thermostat failure will cause the boiler to overheat and thus the pressure to rise to unsafe levels. Accordingly, for safety purposes, such boilers are provided with a pressure relief valve which allows pressure to be relieved from the boiler when pressure safe levels are exceeded.

[0003] Typically, a pressure relief pipe is connected to the pressure relief valve in order that water, which is typically at very high temperature and pressure, can safely be expelled from an internally housed boiler to the outside environment.

[0004] Conventionally, as shown in Fig. 1, water is expelled from a boiler 10 via a aperture 12 through an external wall 14 of a building, the aperture 12 being of substantially identical diameter to the outside diameter of an outlet pipe 16. Generally, the aperture 12 and pipe 16 are approximately 15mm in diameter. The outlet pipe 16 is passed through the aperture 12 and the internal end of the pipe 16 is connected to the pressure relief valve of the boiler 10. A standard double-ended elbow fitting 18 (normally formed of two Yorkshire bends and a small length of pipe which are fitted/welded or soldered together) are then attached to the external end of the outlet pipe 16, thus directing any expelled water back against the wall 14. The water cools as it runs safely down the wall 14.

[0005] Unfortunately, it is not possible to fit the double-ended elbow fitting 18 to the outlet pipe 16 prior to passing it through the aperture 12. The double-ended elbow fitting 18 must be fitted to the outside end of the outlet pipe 16 after it has been passed through the aperture 12 in the wall 14. Installation of the elbow fitting 18 can be inconvenient and dangerous since the outlet pipes 16 often exits the wall 14 well above ground level or in inaccessible positions.

[0006] Consequently, in practice, the installer often does not fit the required external elbow fitting 18, resulting in the possibility of high temperature/pressure water being expelled from the building without being directed back against the wall 14. Obviously there is danger that the expelled water can scald passers-by or animals as they pass by or under the external end of the outlet pipe 16.

[0007] According to a first aspect of the present invention there is provided apparatus for expelling fluid to the external environment from a boiler situated internally of a building, the apparatus comprising a conduit connectable at its first end to a pressure relief valve on said boiler and having its second end open, in use, to the external environment wherein the conduit has an end portion connected to its second open end, said end portion being adapted to intercept fluid expelled from the second open end of the conduit.

[0008] Preferably, the conduit and end portion are of circular cross-section and the end portion has a diameter greater than that of the conduit.

[0009] Preferably, the end portion is cup shaped and has its concave inner surface facing the open end of the conduit.

[0010] Preferably, the inner surface of the cup-shaped end portion is adapted to deflect fluid expelled from the conduit in a desired direction.

[0011] Preferably, said end portion is attached to said conduit via a plurality of spokes extending radially from the conduit.

[0012] Preferably, a grille covers the opening of said cup shaped end portion.

[0013] Preferably, the grille is annular in shape and is connected at its outer edge to the cup shaped end portion and at its inner edge to the second open end of the conduit.

[0014] Preferably, perforations are provided in said grille and adapted to direct expelled fluid in a desired direction. The perforations may comprise one or two apertures or may comprise numerous apertures.

[0015] Preferably, the conduit is adapted to extend from a connection to said pressure relief valve on the internally situated boiler to the external environment via an aperture in an external wall of said building.

[0016] Preferably, a sleeve surrounds at least part of the conduit.

[0017] Preferably, the diameter of the end portion is less than or equal to the diameter of the sleeve.

[0018] Preferably, lids are provided on either end of the sleeve having apertures therein to permit the passage of the conduit therethrough.

[0019] Filling material may be introduced between the outer surface of the conduit and the inner surface of the sleeve to substantially fill the gap between the two.

[0020] Preferably, in use the sleeve is held in position within the aperture by a sealant.

[0021] Preferably, a weather seal is provided which acts as a barrier between the internal and external environments.

[0022] Preferably, the end portion is pre-fitted to the conduit during manufacture.

[0023] Preferably, markings are provided on the apparatus to assist in ascertaining its correct rotational orientation during installation such that fluid is deflected and/or directed in a desired direction.

[0024] Preferably, markings are provided on the apparatus to assist in ascertaining the length of the apparatus such that the apparatus can be cut to the correct length for installation.

[0025] Preferably, the boiler is a household combination boiler.

[0026] Preferably, the end portion is formed of copper.

[0027] Alternatively, the portion is formed of a plastics material.

[0028] Preferably lids are provided on either end of the sleeve, with apertures to permit the passage of the conduit therethrough.

[0029] According to a second aspect of the present invention there is provided a method of installing the apparatus of the first aspect comprising the steps of:

i) forming an aperture through an external wall of sufficient dimensions to allow passage of the apparatus therethrough;
ii) inserting the apparatus with the pre-attached end portion into the aperture;
iii) positioning the apparatus such that the end portion lies beyond the external surface of the wall; and
iv) connecting the first end of the conduit to the boiler.

[0030] Preferably a sealant is inserted between the aperture and the sleeve.

[0031] Preferably, filling material is introduced between the outer surface of the conduit and the inner surface of the sleeve to substantially fill the gap between the two.

[0032] Preferably, the conduit and the sleeve are precut to the desired length. This may be done using markings on the apparatus.

[0033] Preferably, the apparatus is rotated into its correct orientation using pre-formed markings on the apparatus.

[0034] Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Fig. 1 shows a schematic cross-sectional view of a conventional safety apparatus with double-ended elbow fitting;

Fig. 2 shows a perspective view of the safety apparatus of the present invention;

Fig. 3 shows a schematic partial cross-sectional view of the safety apparatus of Fig. 2 in-situ;

Fig. 4 illustrates the flow of fluid through the safety apparatus of Fig. 2;

Figs. 5 a) and 5 b) show the end portion of the safety apparatus of Fig. 2;

Fig. 6 shows an alternative embodiment of the present invention in which the conduit is offset relative to the longitudinal central axis of the sleeve; and

Fig. 7 is a schematic perspective view of the apparatus of Fig. 2.

[0035] Referring to Figs. 2 to 7, there is illustrated safety apparatus 1 comprising a conduit 16 of circular cross section connected at its first end to a pressure relief valve of a household boiler 10 and a sleeve 22 (typically of diameter 22mm) surrounding the conduit 16 (typically of diameter 15mm) within an aperture 12 in an external wall 14.

[0036] The inner diameter of the sleeve 22 is greater than the outer diameter of the conduit 16 thus defining a space between the conduit 16 and the sleeve 22. The outer diameter of the sleeve is substantially equal to the diameter of the aperture 12.

[0037] Lids 40 and 42 are provided which act as a barrier between the internal and external environments and also to hold the conduit 16 within the sleeve 22.

[0038] An end portion 20 is provided on the second end of the conduit 16 which, in use, lies externally of the building. The end portion 20 is generally 'cup' shaped and is connected to the conduit 16 via spokes which extend radially from the second end of the conduit 16. The diameter of the end portion 20 is greater than that of the conduit but is sufficiently small to be transmitted through the aperture 12 in the wall 14. The end portion 20 is of suitable dimensions to avoid it protruding significantly from the wall 14. The end portion 20 is of less than or equal diameter to the diameter of the sleeve 22.

[0039] The internal concave surface of the cup-shaped end portion 20 faces the second open end of the conduit 16. The internal surface of the cup-shaped end portion 20 is adapted to deflect water expelled from the conduit 16 in a desired direction. Deflection may be achieved by integral angled portions within the concave internal surface and/or directional flaps 28. The directional flaps 28 are selectively orientated (preferably to direct the fluid downward). The desired orientation of the directional flaps (or the integral angled surfaces) corresponds to markings provided on the conduit 16 (or on the sleeve 22).

[0040] Markings are also provided to indicate where to cut the apparatus to the correct length such that the end portion 20 will protrude the desired length from the wall, the distance between lid 42 and end portion 20 being of a predetermined length. The length of the apparatus required will depend on the thickness of the wall.

[0041] An annular shaped grille 21 covers the opening of the cup-shaped end portion 20 and is connected at its outer edge to the cup-shaped end portion 20 and at its inner edge to the free end of the conduit 16. The grille 21 therefore forms a tight fit around the conduit 16. The grille 21 is provided with perforations which are adapted to direct expelled water in a desired direction. Perforations can include numerous apertures or a generally solid plate having one or two apertures in the desired direction.

[0042] In use, the apparatus 1 is installed by first forming the aperture 12 through the external wall 14 (i.e. by

drilling). The aperture 12 must have a large enough diameter to allow the end portion 20 to pass through to the outside. The installer then passes the apparatus 1 (having the end portion 20 attached) through the aperture 12 until the end portion 20 is suitably positioned beyond the external surface of the external wall 14. In its preferred position, the end portion 20 will have sufficient clearance from the external wall 14 to allow water to be expelled effectively but will not protrude excessively from the wall 14. Non-setting sealant 24 is then inserted into the space between the sleeve 22 and the aperture. The internal end of the conduit 16 of the apparatus 1 can then be connected to pressure relief valve of the household boiler 10.

[0043] When the household boiler 10 pressure exceeds safe levels, the pressure relief valve of the boiler 10 allows pressurised water to escape through the conduit 16 towards the end portion 20. When the water is expelled from the second open end of the conduit 16 it is directed against the inside surface of the end portion 20 and is deflected back safely against the wall 14. The non-setting sealant 24 ensure that the apparatus 1 is held securely in place, in the wall 14, and also provide a protective barrier from external elements and prevent the fluid from returning to the interior of the building.

[0044] A further weather seal (not shown) is provided which acts as a barrier between the internal and external environments.

[0045] Markings (not shown) are provided on the apparatus 1 to assist in ascertaining the correct rotational orientation of the apparatus 1. For example a groove may be provided on the conduit 16.

[0046] Length markings may also be provided to assist in cutting the apparatus to a desired length.

[0047] Modifications and improvements may be made to the foregoing without departing from the scope of the invention.

[0048] For example, the conduit 16 may be sloped at an angle relative to the horizontal such that fluid can flow more easily from the conduit 16 in order to avoid build-up of fluid.

[0049] As seen in Fig. 6, the conduit 16 may be eccentrically situated with respect to the longitudinal axis of the sleeve 22 to assist in the flow of fluid onto the wall 14.

[0050] The conduit 16 may have any shaped cross section, such as square, or triangular.

[0051] The sleeve 22 is preferred but may be omitted, with the space between the conduit 16 and the wall 14 being filled with an appropriate filler.

[0052] The end portion 20 may be made of a material which has a high resistance to heat and corrosion, therefore prolonging the lifetime of the apparatus.

[0053] The end portion 20 may have a number of spokes located within the cup which project radially inward and connect to the conduit 16, rather than the conduit 16 having spokes which project radially outwards. These may be moulded onto the end portion 20 during manufacture.

[0054] The end portion 20 may have a profile which prevents build-up of snow or dirt on its top surface, for example an inverted tear drop shape.

[0055] The end portion 20 may be attached to the sleeve 22 directly by way of a plastic strip, the strip acting as a bridge between the end portion 20 and sleeve 22. This removes the need to attach the end portion 20 to the conduit 16.

[0056] The end portion 20 may be any shape that directs the fluid back towards the wall 14 effectively.

[0057] A space filing material 26 may be used to fill the space between the outer surface of the conduit 16 and the inside surface of the sleeve 22.

[0058] The space filling material 26 may be made of material which has a high resistance to heat, therefore prolonging the lifetime of the apparatus.

[0059] The space filling material 26 may be made of epoxy resin, fibre-glass, foam, rubber, silicon sealant, or any other appropriate material.

[0060] The space filling material 26 is optional. The conduit 16 could be secured and insulated by other means, for example, a lid situated at either or both ends of the sleeve. The lid having a diameter similar to that of the sleeve 22 with a aperture provided to accommodate the conduit 16.

[0061] The wall 14 need not be an external wall.

Claims

1. Apparatus for expelling fluid to the external environment from a boiler (10) situated internally of a building, the apparatus comprising a conduit (16) connectable at its first end to a pressure relief valve on said boiler (10) and having its second end open, in use, to the external environment **characterised in that** the conduit (16) has an end portion (20) connected to its second open end, said end portion (20) being adapted to intercept fluid expelled from the second open end of the conduit (16).

2. Apparatus according to claim 1, wherein the conduit (16) and end portion (20) are of circular cross-section and the end portion (20) has a diameter greater than that of the conduit (16).

3. Apparatus according to claim 2, wherein the end portion (20) is cup-shaped and has its concave inner surface facing the open end of the conduit (16).

4. Apparatus according to claim 3, wherein the inner surface of the cup-shaped end portion 20 is adapted to deflect fluid expelled from the conduit 16 in a desired direction.

5. Apparatus according to any of claims 2 to 4, wherein said end portion (20) is attached to said conduit (16)

via a plurality of spokes extending radially from the conduit (16).

6. Apparatus according to any of claims 2 to 5, wherein a grille (21) covers the opening of said cup shaped end portion (20).

7. Apparatus according to claim 6 wherein the grille (21) is annular in shape and is connected at its outer edge to the cup shaped end portion (20) and at its inner edge to the second open end of the conduit (16) .

8. Apparatus according to claims 6 or 7, wherein perforations are provided in said grille (21) and adapted to direct expelled fluid in a desired direction.

9. Apparatus according to any preceding claim, wherein the conduit (16) is adapted to extend from a connection to said pressure relief valve on the internally situated boiler (10) to the external environment via an aperture (12) in an external wall (14) of said building.

10. Apparatus according to claim 9, wherein a sleeve (22) surrounds the conduit (16).

11. Apparatus according to claim 10, wherein the diameter of the end portion (20) is less than or equal to the diameter of the sleeve (22).

12. Apparatus according to claims 10 and 11, wherein lids (40,42) are provided on either end of the sleeve (22) having apertures therein to permit the passage of the conduit (16) therethrough.

13. Apparatus according to claims 10 to 12, wherein a filling material (26) is introduced between the outer surface of the conduit (16) and the sleeve (22) to substantially fill a gap between the two.

14. Apparatus according to claims 10 to 13, wherein, in use, said sleeve (22) is held in position within the aperture (12) by a sealant (24).

15. Apparatus according to any preceding claim, wherein a weather seal is provided which acts as a barrier between the internal and external environments.

16. Apparatus according to any preceding claim, wherein said end portion (20) is pre-fitted to the conduit (16) during manufacture.

17. Apparatus according to any preceding claim, wherein markings are provided on the apparatus (1) to assist in ascertaining a correct rotational orientation of the apparatus (1) during installation such that fluid is deflected and/or directed in a desired direction.

18. Apparatus according to any preceding claim, wherein markings are provided on the apparatus (1) to assist in ascertaining the length of the apparatus (1) such that the apparatus (1) can be cut to the correct length for installation.

19. Apparatus according to any preceding claim, wherein said boiler (10) is a household combination boiler.

20. Apparatus according to any preceding claim, wherein said end portion (20) is formed of copper.

21. Apparatus according to any of claims 1 to 19, wherein said end portion (20) is formed of a plastics material.

22. A method of installing the apparatus according to any of claims 1 to 21, said method comprising the steps of:

i) forming an aperture (12) through an external wall (14) of sufficient dimensions to allow passage of the apparatus (1) therethrough;
ii) inserting the apparatus (1) with the pre-attached end portion (20) into the aperture (12);
iii) positioning the apparatus (1) such that the end portion (20) lies beyond the external surface of the wall (14); and
iv) connecting the first end of the conduit (16) to the boiler (10).

23. The method according to claim 22, wherein a sealant (24) is inserted between the aperture (12) and the sleeve (22).

24. The method according to claims 22 and 23, wherein filling material (26) is introduced between the outer surface of the conduit (16) and the inner surface of the sleeve (22) to substantially fill a gap between the two.

25. The method according to claims 22 to 24 wherein the conduit (16) and the sleeve (22) are pre-cut to the desired length.

26. The method according to any of claims 21 to 25 wherein the apparatus (1) is rotated into its correct orientation using pre-formed markings on the apparatus (1).

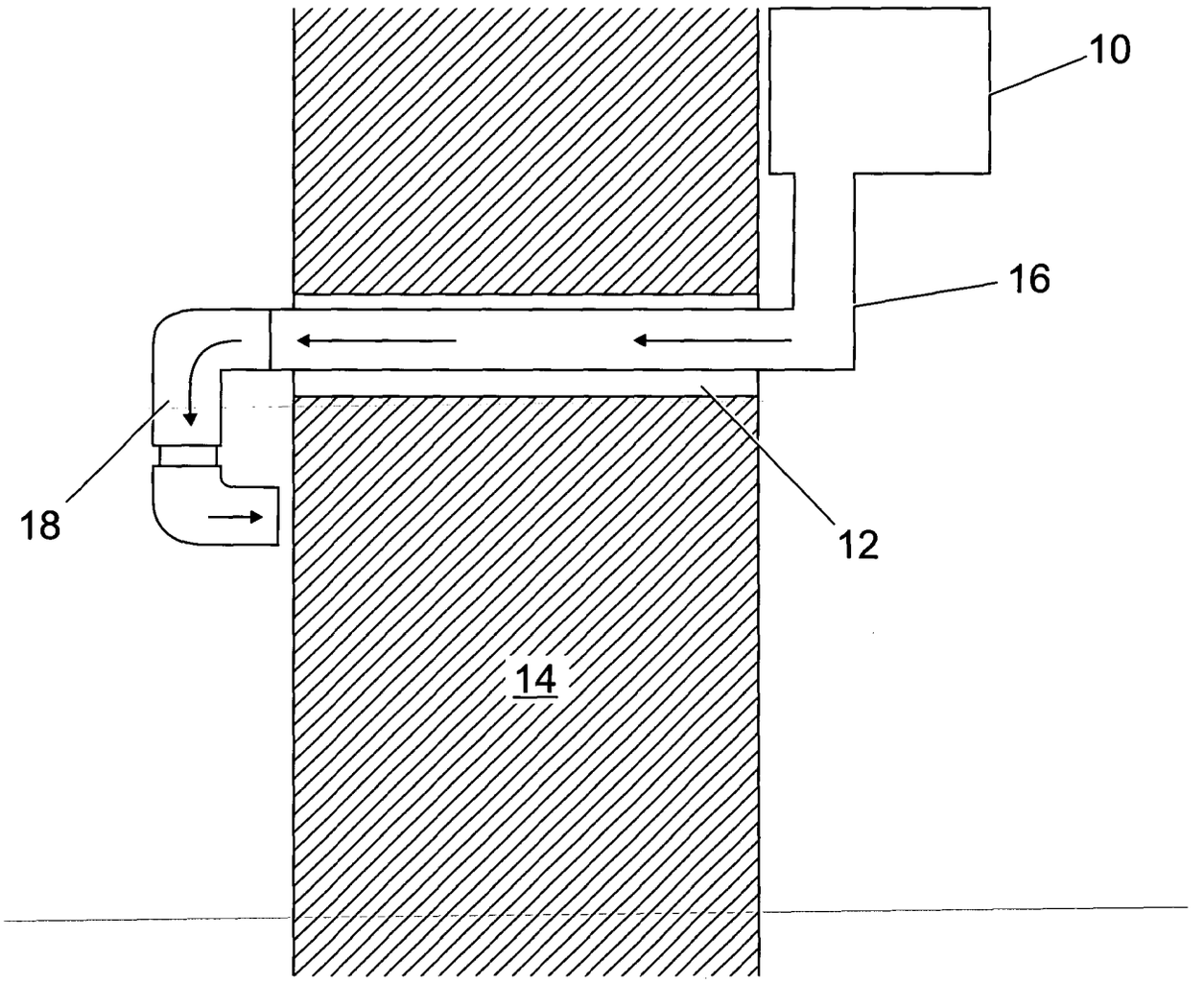

Fig. 1

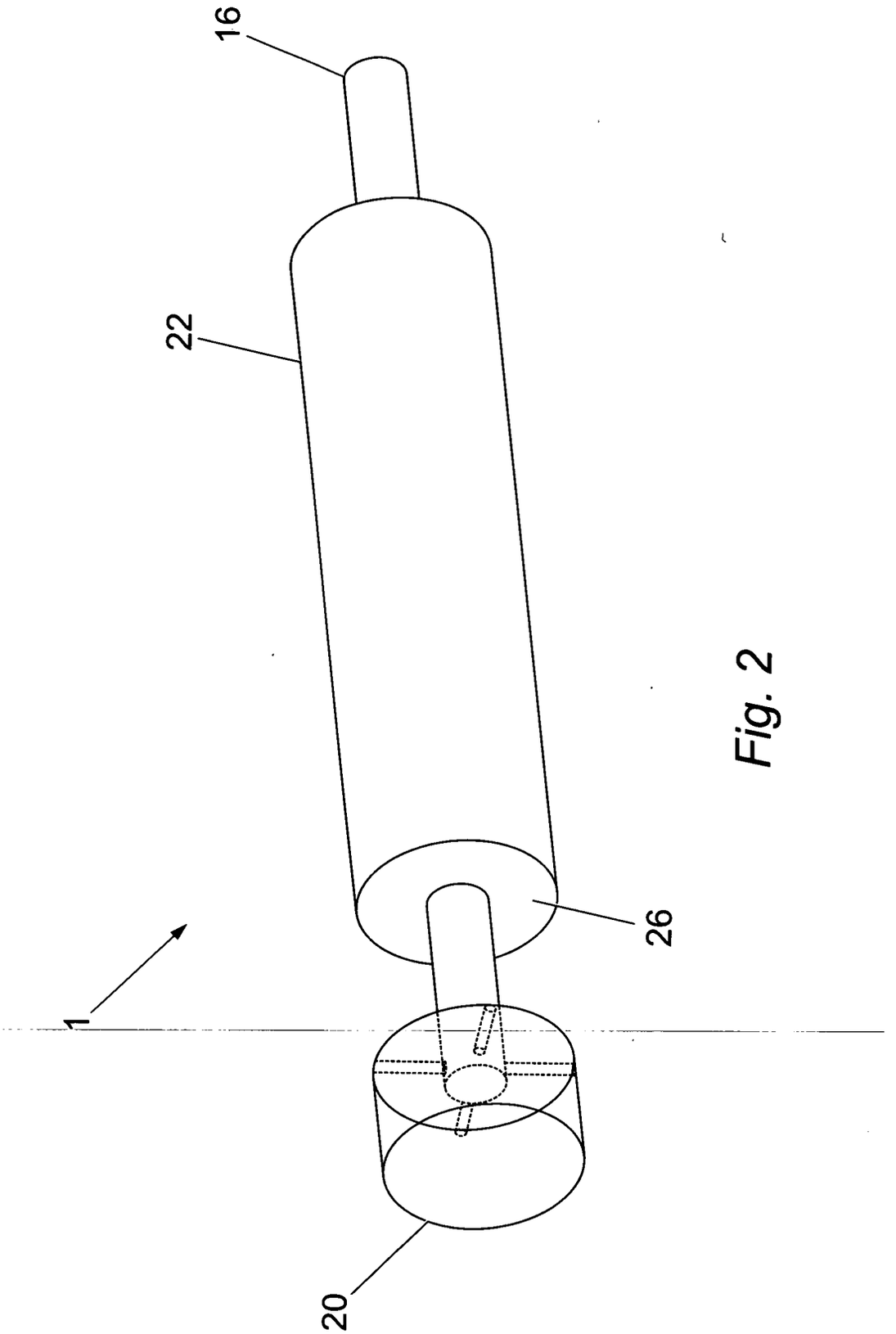

Fig. 2

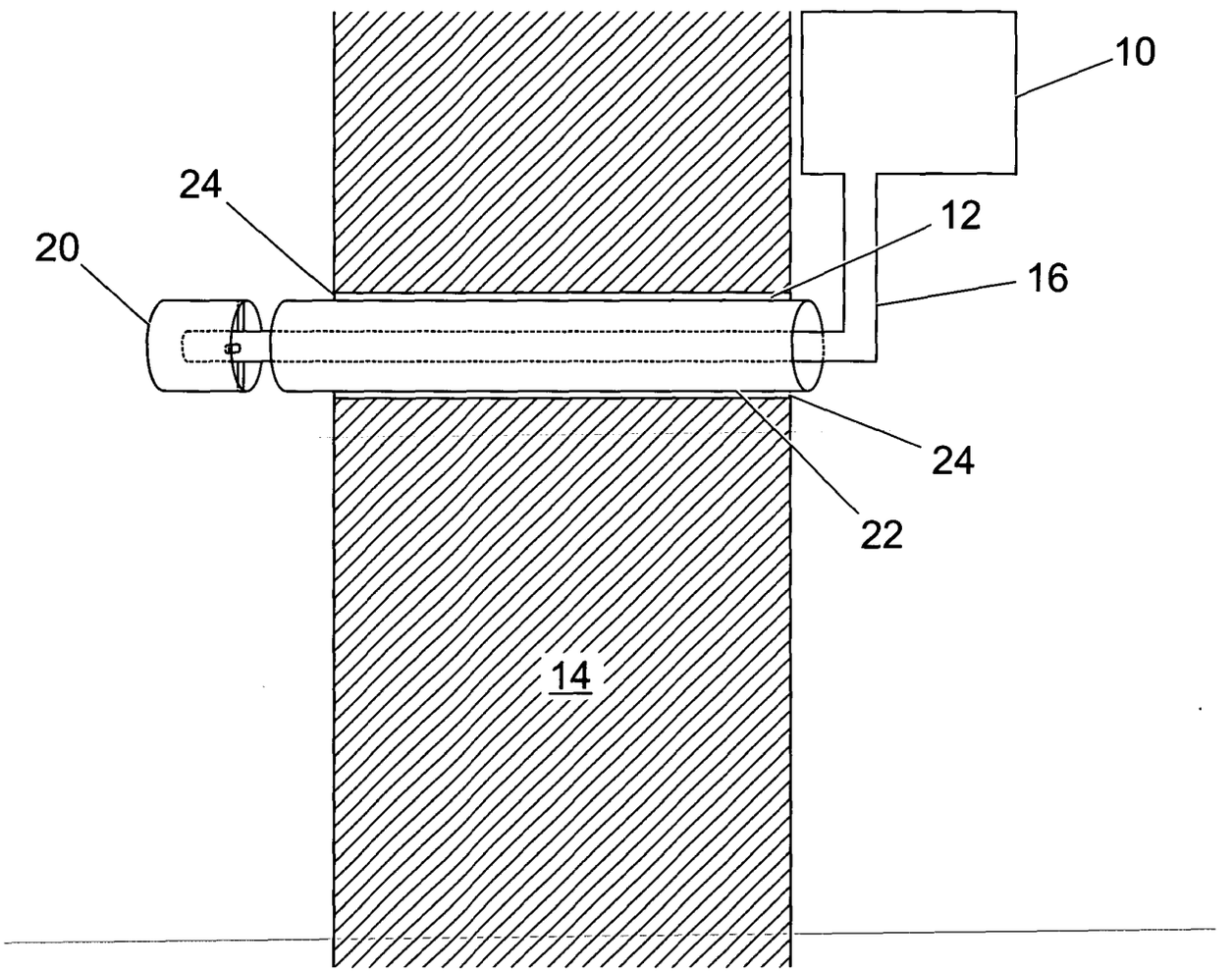

Fig. 3

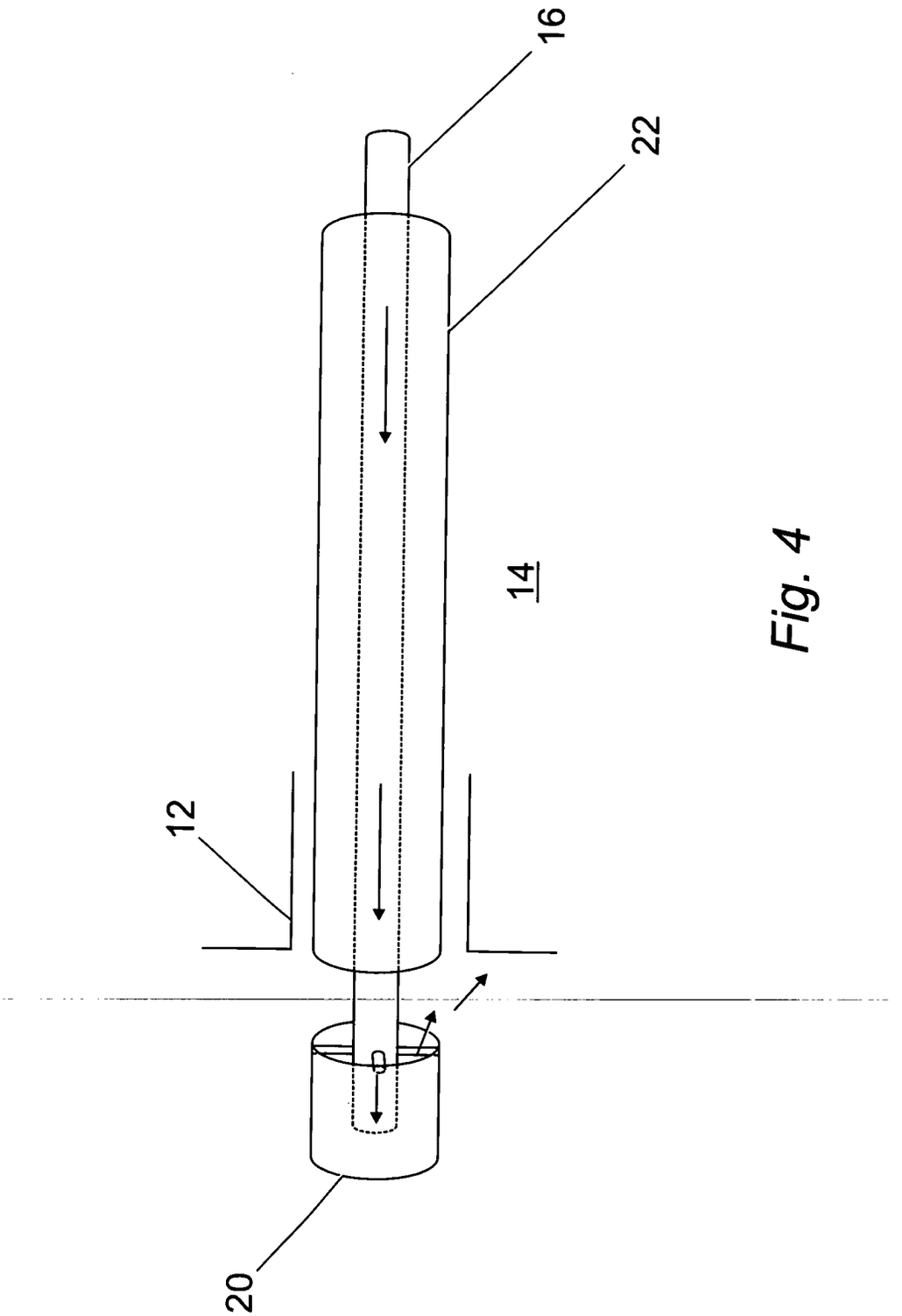

Fig. 4

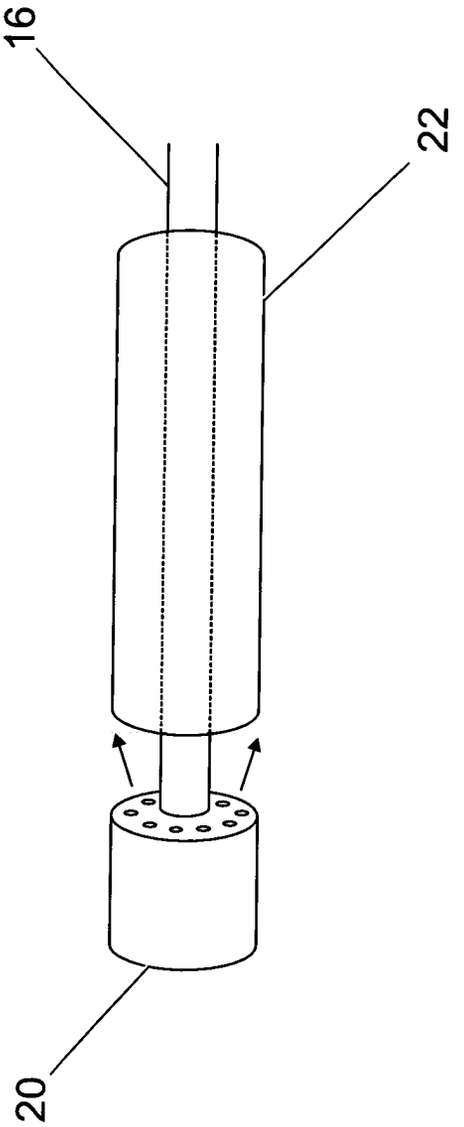

Fig. 5b

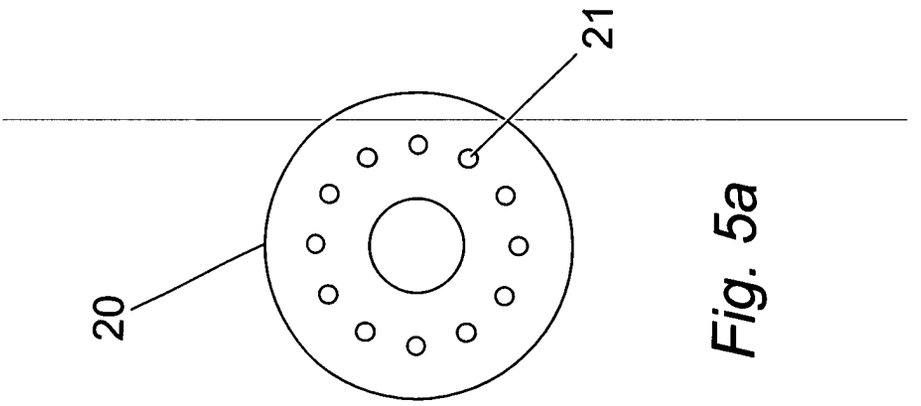

Fig. 5a

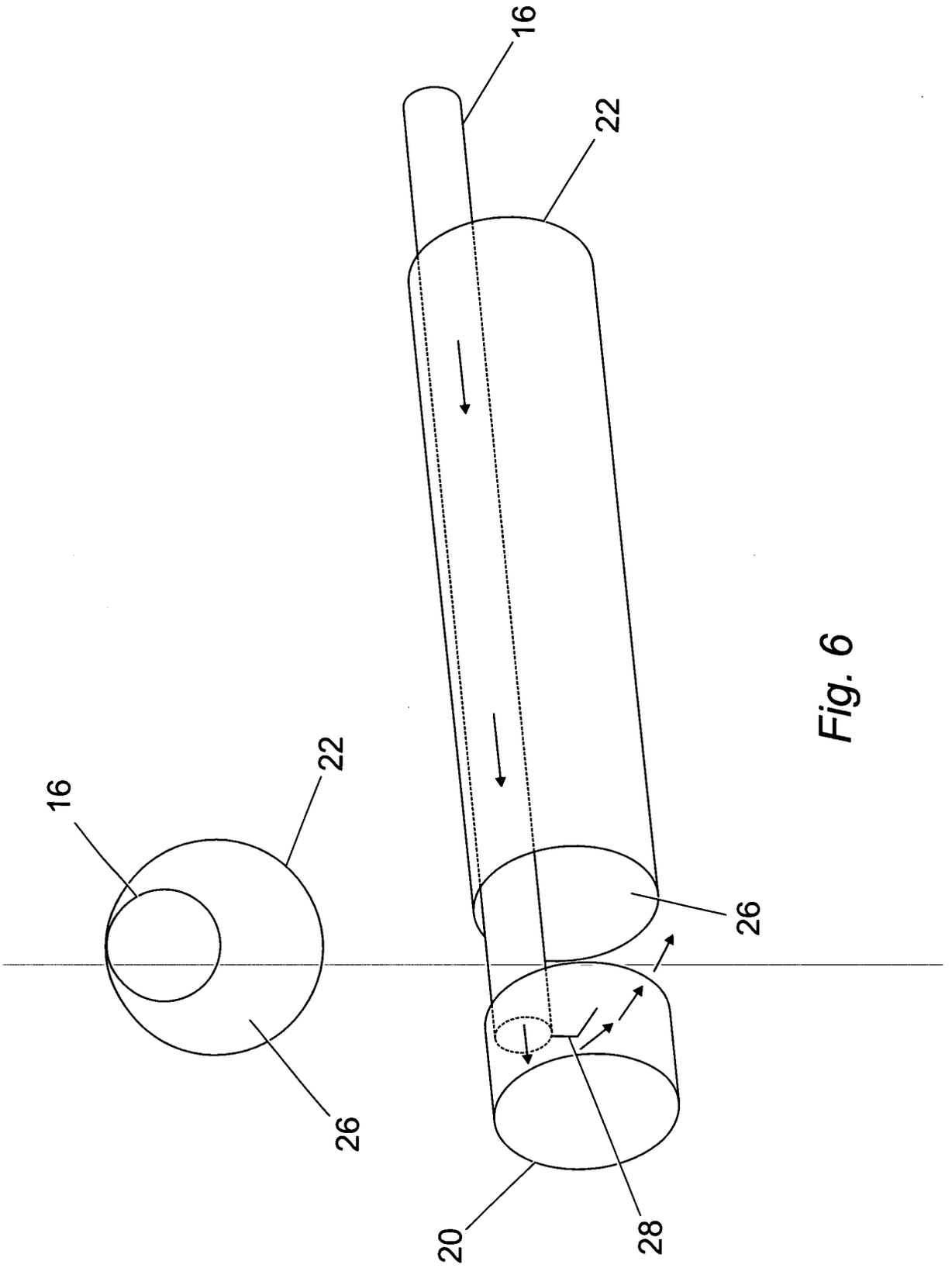

Fig. 6

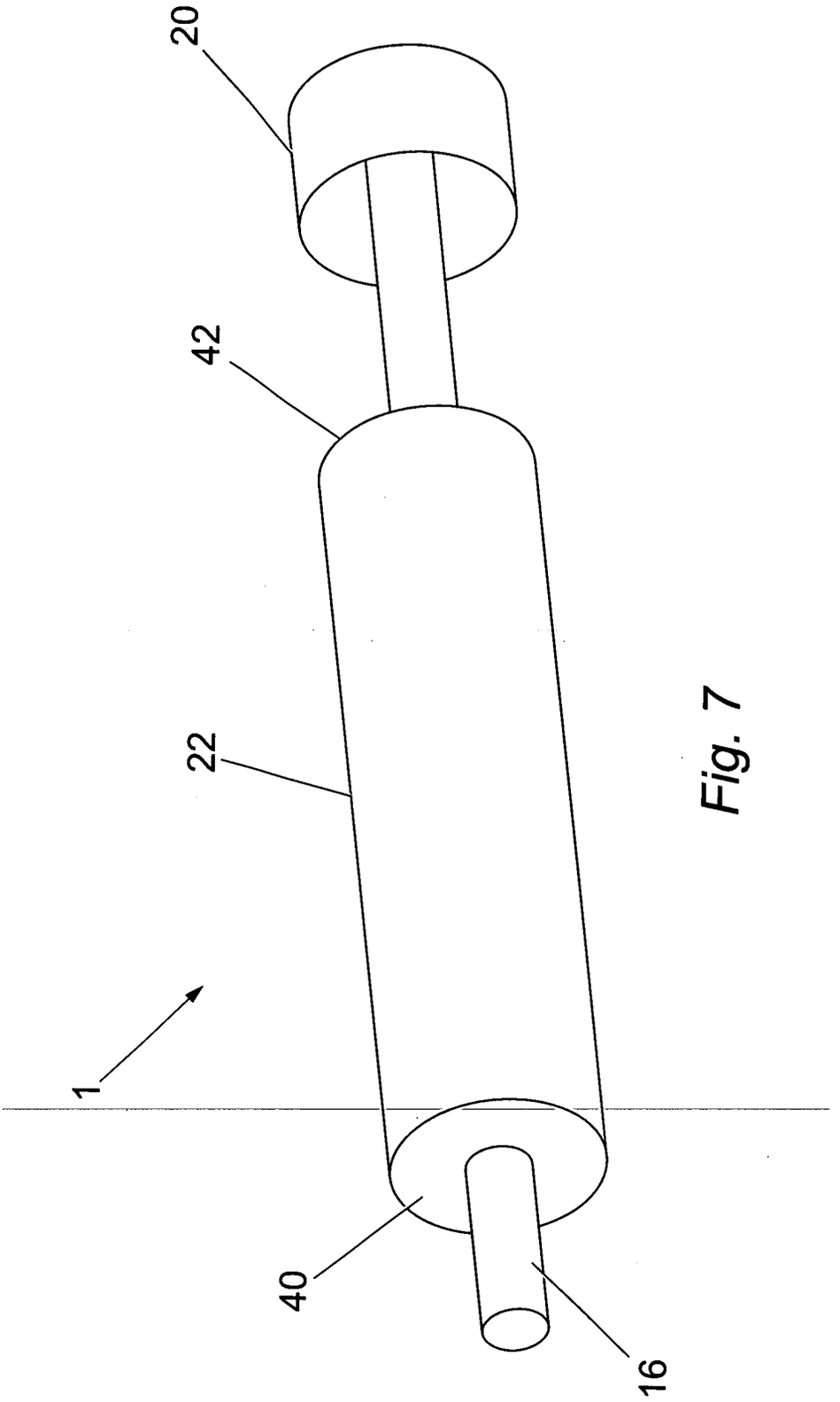

Fig. 7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 25 6436

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	19 January 2004	Leclaire, T

CATEGORY OF CITED DOCUMENTS

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