(12) **APPLICATION**

(11) **20190749** (13) **A1**

(19) NO

NORWAY (51) Int Cl.

F16L 59/12 (2006.01)
F16L 59/14 (2006.01)

Norwegian Industrial Property Office

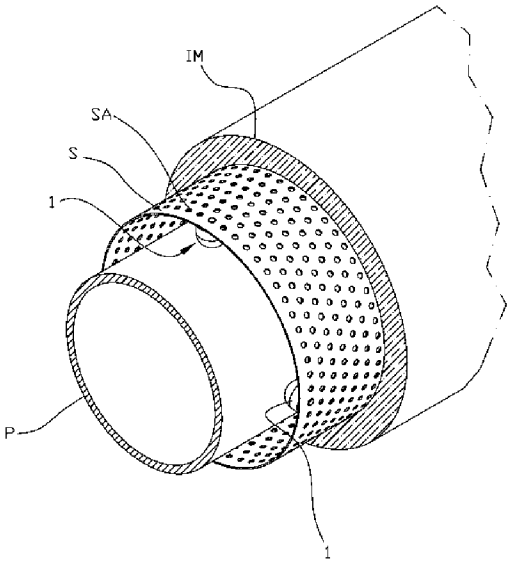
(21)	Application nr	20190749	(86)	Int. application day and application nr
(22)	Application day	2019.06.18	(85)	Entry into national phase
(24)	Date from which the industrial right has effect	2019.06.18	(30)	Priority
(41)	Available to the public	2020.12.21		

(71) Applicant KAEFER ENERGY AS, Geitaberget 17, 4031 STAVANGER, Norge
(72) Inventor Eivind Berg, Lars Vaages gate 5, 4009 STAVANGER, Norge
Kim Haave Eikenes, Steinhagen 10, 4014 STAVANGER, Norge
(74) Agent or Attorney HÅMSØ PATENTBYRÅ AS, Postboks 9, 4068 STAVANGER, Norge

(54) Title **A spacing device and method of using same**

(57) Abstract

A spacing device (1) for keeping a distance between an apertured sheet (S) for supporting an insulation, and an object (P), and a method of using same, the spacing device (1) comprising:
- a body (3) having a first end portion (5) and a second end portion (7);
- an engagement element (10) protruding from the second end portion (7) of the body (3), wherein engagement element (10) is fixed with respect to the body (3) and configured for engaging an aperture (SA) in the sheet (S) so that the spacing device in a position of use is secured to the sheet (S).



A SPACING DEVICE AND METHOD OF USING SAME

The present invention is related to a spacing device. More particularly, the invention is related to a spacing device for keeping a distance between an apertured sheet for supporting an insulation, and an object.

In for example a process plant, it is for technical, economic or environmental reasons sometimes necessary to insulate pipelines and related equipment such as valves and pumps, from the surrounding environment. A thermal insulation is most common, but a need for insulation may also be due to sound. A thermal insulation will be discussed in this document.

There are two main purposes for thermal insulation of a pipeline and related equipment.

One purpose of thermal insulation of a pipeline is to reduce a heat exchange between a fluid flowing through the pipeline and the surrounding environment.

Another purpose of thermal insulation is to protect the pipeline and/or fluid flowing through the pipeline, against heat that may occur for example in the event of a fire.

Depending on a temperature difference between an outside of the insulation facing a surrounding environment, and an inside of the insulation facing a body such as a pipe, and a relative humidity of the air within the insulation, condensation may occur. Such condensation may represent challenges with respect to reduced effect of the thermal insulation and increased weight. However, the most serious consequence of such condensation, is increased risk of corrosion of the insulated equipment. Such corrosion is known as CUI (Corrosion Under Insulation) and represents a safety risk in addition to increased maintenance costs.

To reduce the problem of condensation in an insulation material surrounding for example a pipeline, it is common practice to provide a space between the insulation material and

an outer surface of the insulated object, such as a pipeline.

To provide the space several types of spacing devices exist in the marked.

One such type of spacing device is undulating or corrugated metal ribbons surrounding the pipe and being spaced apart in an axial direction of the pipeline. The ribbons are configured for supporting a metal sheet providing a support for the insulation material. The corrugated metal ribbon is applied around the pipe and attached to itself by means pop rivets so that the ribbon is formed as an endless loop. The skilled person will appreciate that a pipeline in operation may be subject to vibrations. Such vibrations may cause rubbing and damage of the surface of the pipeline abutting ridges/valleys of the undulating metal ribbon and damage the pipeline. However, such rubbing may be avoided by arranging an isolating material, for example a rubber sheet between the surface of the pipeline and the undulating metal ribbon. Mounting such rubber sheets is cumbersome and time consuming. A further disadvantage of providing such a rubber sheet is that moisture may be trapped between the rubber sheet and the surface of the pipeline.

Another type of spacing device is a split ring made of a plastic material. The split ring is provided with a plurality of inwards protruding ribs extending in parallel with a longitudinal axis of the pipeline. In use, a plurality of split rings are spaced apart in an axial direction of the pipeline. The split rings are configured for supporting a metal sheet providing a support for the insulation material. A split ring of plastic is not encumbered with the rubbing damages of the surface of the pipeline as may be the case for the metal ribbon mentioned above. However, a split ring may only be used for a limited diameter range of the pipeline. Further, depending on which type of polymer the plastic is made from, a split ring of a certain type of plastic may be used for a limited temperature range. Thus, a range of diameters wherein each range is available in several types of plastic, may be required.

Still another type of spacing device is a ribbon made from rubber, wherein the ribbon is provided with undulating portions and “hinge type” locking means configured for providing an endless ribbon after being mounted around a pipeline. In use, a plurality of ribbons are spaced apart in an axial direction of the pipeline. The ribbons are configured for supporting a metal sheet providing a support for the insulation material. Although having a certain flexibility with regard to a dimension of the pipeline, it may in many cases be necessary to adapt the length of the ribbon in situ.

A spacing device being independent of a diameter of the pipeline are so-called spacer

knobs configured for being connected to a perforated sheet. For this type of spacing device a plurality of spacer knobs are arranged circumferentially and axially along the pipeline to keep the sheet and thus the insulation substantially equidistantly from the pipeline. The sheet serves as a support for the insulation material and is typically made of metal. The spacer knobs are typically made from polytetrafluoroethylene (PTFE), such as Teflon®. Each knob is secured to the metal sheet by means of a screw screwed through the knob and into a perforation in the metal sheet. As a minimum, three knobs are substantially equidistantly arranged around a periphery of the pipeline at predetermined intervals, for example three at each 300 mm along the pipeline, which results in a need for 1000 spacer knobs for each 100 m pipeline. Assembling of such prior art spacer knobs is a relatively time consuming and cumbersome assembly process in that the knob must be held in place by one hand while the screw is aligned with the perforation and screwed through the knob and into the perforation in the metal sheet. Experience shows that it is easy to lose a screw or a spacer knob while the assembly process is in progress.

The invention has for its object to remedy or to reduce at least one of the drawbacks of the prior art, or at least provide a useful alternative to prior art.

The object is achieved through features, which are specified in the description below and in the claims that follow.

In a first aspect of the invention, there is provided a spacing device for keeping a distance between an aperture sheet for supporting an insulation, and an object, the spacing device comprises: a body having a first end portion and a second end portion; and an engagement element protruding from the second end portion of the body. The engagement element is fixed with respect to the body and configured for engaging an aperture in the sheet for securing the spacing device to the sheet.

By the term fixed is meant that the engagement element forms an integral part with the body and is prevented from rotating with respect to the body of the spacing device.

The object may typically be a pipe or pipeline and pipeline-related items such as for example a valve forming part of a pipeline.

One effect of providing an engagement element that is fixed with respect to the body and configured for engaging the aperture so that the spacing device in a position of use is secured to the sheet, is that an operator can secure the spacing device to the sheet by one hand and without any tool. Since no tool, such as an electrical drill or screw driver is

required when securing the spacing device to the sheet, the operation may take place in so-called EX-zones (areas subject to gas explosion or flammable dust).

In one embodiment, the engagement element may be provided with at least one resilient locking device configured for allowing axial movement of the engagement element in a first direction through the aperture of the sheet but prevented from movement in a second direction opposite said first direction. In one embodiment, the resilient locking device is by means of at least one lip configured for snapping through the aperture of the sheet. A resilient locking device allows the spacing device to be secured to the sheet simply by pushing the engagement element through the aperture, i.e. applying an axial force towards the body of the spacing device, until the second end portion of the spacing device abuts an inner surface portion of the sheet. In order to prevent the engagement element from moving in the second direction, the lip must be capable of abutting an outer surface of the sheet after having passed the aperture of the sheet.

In another embodiment, the engagement element is provided with a threaded portion configured for engaging a periphery portion of an aperture in the sheet. In such an embodiment, the engagement element serves the same purpose as the prior art screw, while the body of the spacing device serves the additional purpose of a tool (such as a screwdriver/drill) of a prior art screw and spacer knob arrangement. For this embodiment, the engagement element and an aperture in the sheet must be substantially mating, preferably by providing an engagement element having a form and size adapted to an aperture of the sheet.

In still another embodiment, the engagement element of the spacing device comprises a helical portion for engaging an aperture of the sheet. This has the effect that a cross-section of the engagement element may be smaller than the aperture, as will be explained in more detail below.

At least for the above-mentioned embodiments wherein the engagement element may be provided with a threaded portion or a helical portion, the engagement element may be made of a material being different from the material of the body. In one embodiment, the engagement element may be made of a material being less flexible than a material of the body. In one embodiment, the engagement element is made from a metal, while the body is preferably made from a non-aggressive material such as for example silicone rubber. By the term “non-aggressive material” is meant a material that will not rub the surface of the body for example if the object vibrates.

In a second aspect of the invention, there is provided a method for providing a space between an object and a sheet by means of the spacing device according to the first aspect of the invention. The method comprises the steps of:

- a) aligning the engagement element of the spacing device with an aperture provided in the sheet;
- b) urging a portion of the engagement element through the aperture by applying a force to the body of the spacing device to secure the spacing device to the sheet; and
- c) repeating steps a) and b) to provide a plurality of spaced-apart spacing devices protruding from a surface of the sheet; and
- d) moving the sheet with the protruding spacing devices towards the object so that the first end portion of the spacing devices abut a surface of the object.

The aperture for receiving the engagement element of the spacing device are preferably premade.

In step b) the force applied to the body is a torque and/or a compressive force.

In a third aspect of the invention there is provided an insulated object comprising the spacing device according to any embodiments of the first aspect of the invention. The object may typically be a pipeline wherein the sheet is kept substantially equidistantly from an outer surface of the pipeline by a plurality of spacing devices abutting, in a position of use, a surface of the pipeline. The insulating material abuts an outside of the sheet. Thus, the sheet and the spacing devices keep the insulation material spaced-apart from an outer surface of the pipeline.

It is further conceivable to attach the spacing device to the sheet by means of an adhesive. For example, a double-sided tape could provide a binding between the top portion of the spacing device and the sheet. In one embodiment, the spacing device is provided with both the connection element and an adhesive.

The invention is defined by the independent patent claims. The dependent claims define advantageous embodiments of the invention.

In the following are described examples of preferred embodiments illustrated in the accompanying drawings, wherein:

Fig. 1 shows spacing devices according to the invention provided in a position of use between a pipe and an apertured sheet;

Fig. 2 shows a radial view of fig. 1 seen from the left;

Fig. 3a – 3b show in larger scale a first embodiment of a spacing device according to the present invention;

Fig. 4a – 4b show in larger scale a second embodiment of a spacing device according to the present invention; and

Fig. 5a – 5c show in larger scale a third embodiment of a spacing device according to the present invention.

Any positional specifications used herein refer to the positions shown in the figures.

In the figures, same or corresponding elements are indicated by the same reference numerals and letters.

A person skilled in the art will understand that the figures are just principle drawings.

In the figures, reference numeral 1 denotes a spacing device according to the present invention.

The spacing device, here shown as a knob 1 comprises a body 3 having a first end portion 5 and a second end portion 7. The knob 1 further comprises an engagement element 10 protruding from the second end portion 7 of the body 3.

The engagement element 10 is fixed with respect to the body 3, meaning that the engagement element 10 forms an integral part with the body 3, and that the engagement element 10 is prevented from rotating with respect to the body of the spacing device or knob 1.

Figures 1 and 2 show the knob 1 in a typical position of use. A plurality of knobs 1 (four shown in fig. 2) are distributed circumferentially around an outer surface of an object, here shown as a pipe P. In what follows, the pipe P will also be denoted pipeline P.

A purpose of the knob 1 is to provide a space between the pipe P and a sheet S configured for providing a supporting base for an insulation material IM for insulating the pipe P. A purpose of the space is inter alia to reduce the problem of condensation in the insulation material, and to avoid any wet insulation to be in contact with a surface of the pipe P. At certain intervals along a longitudinal axis of the pipe P, for example each 300mm, a new set of minimum three knobs 1 maintains sheet S spaced apart from the outer surface of

the pipe P. The purpose of the insulation material IM is to provide a thermal insulation, a fire protection insulation and/or a sound insulation as will be appreciated by a person skilled in the art.

Each knob 1 is secured to the sheet S by urging the engagement element 10 through a desired aperture SA provided in the sheet S. In the embodiment shown in fig. 1, the sheet S is provided with a plurality of premade apertures, i.e. the sheet is an apertured or perforated sheet S. Such an apertured sheet S is typically made from a metal.

It should be noted that the knobs 1 according to the invention, in the same way as a prior art knob/screw-arrangement as discussed above, are secured to the sheet S prior to folding the sheet S with knobs 1 attached thereto, around the pipeline P.

To form an “endless” sheet S surrounding the pipeline P, the end portions of the sheet which are substantially in parallel with a longitudinal axis of the pipeline P, are typically made overlapping and secured to each other by a fastening means such as for example pop rivets (not shown).

Figures 3a – 5c show various embodiments of the engagement element 10 of the knob 1.

In figures 3a and 3b the engagement element is in the form of a pin 10 provided with a lip or flange 12 extending radially outwards from an end portion of the pin 10.

A diameter of the flange 12 is larger than a diameter of the aperture SA (see fig. 1) in the sheet S, but still sufficiently small and also resilient to allow an outer portion of the flange 12 to bend downwards (towards the second end portion 7 of the body 3) when urged through the aperture SA, and to recapture its original disk-shaped form when having passed through the aperture SA. A diameter of the pin 10 may be smaller than a diameter of the aperture SA, i.e. the pin 10 does not have to fully mate with the periphery of the aperture SA.

When having passed in a first direction through the aperture SA, the knob 1 is prevented from movement in a second direction opposite said first direction due to the flange 12 abutting a periphery of the aperture SA on an outer surface of the sheet S. The engagement element 10 shown in figures 3a and 3b may be regarded as a snap-in locking device activated by applying an axial force towards the first end portion 5 of the body 3. The force may typically be applied by a thumb of an operator.

The embodiment shown in figures 4a and 4b has similarities with the embodiment shown

in figures 3a and 3b in that the engagement element 10 is in the form of a pin 10. However, instead of the lip or flange 12 as shown in figures 3a and 3b, the engagement element 10 shown in figures 4a and 4b is provided with a threaded portion 14. The threaded portion 14 is configured for engaging a periphery portion of the aperture SA of the sheet S. Thus, the diameter of engagement element 10 must be mating with a diameter for the aperture SA.

The engagement element 10 shown in figures 4a and 4b may be regarded as a screw-in locking device activated by applying a torque on the body 3. The force may typically be applied by two fingers of an operator.

The embodiment shown in figures 5a – 5c has similarities with the embodiment shown in figures 4a and 4b in that the engagement element 10 is secured to the sheet S by applying a torque on the body 3. However, instead of being a threaded pin, the engagement element 10 shown in figures 5a - 5c has a spiral-form.

A further advantage of the embodiment shown in figures 5a – 5c in view of the embodiment shown in figures 4a and 4b in particular, is that a diameter of a rod formed into the spiral is independent of a diameter of the aperture SA of the sheet S to which the knob 1 is to be connected, as long as the rod passes through the aperture SA. Thus, the knob 1 having an engagement element 10 as shown in figures 5a – 5c may be used for sheets having apertures of different diameters or different designs. When screwed into the aperture SA of a sheet S, a periphery portion of the aperture SA of the sheet S will be "wedged" or "jammed" between an inclined portion of the engagement element 10 facing the second end portion 7 of the body 3, and the second end portion 7 itself.

The engagement element 10 shown in figures 5a – 5c may typically be made from a helical spring made from a metal and partly submerged into a suitable body material such as for example a rubber material, a plastic material or other non-aggressive cast materials. Fig. 5c indicates by dotted lines an engagement element 10 partly submerged in the body 3 of the knob 1.

Similarly, the engagement element 10 shown in figures 4a and 4b may in one embodiment be made from a metal and partly submerged into a suitable body material such as for example a rubber material, a plastic material or other non-aggressive cast materials.

Thus, the material of the body 3 of the knob 1 may be made from a material having different material characteristics from that of the engagement element 10.

In the embodiments shown, a portion of the body 3 which is configured for abutting for example a pipeline P, is hemispherical. One purpose of such a form is to reduce a contact area between the spacing device or knob 1 and a surface of the pipeline P. A reduced contact area will represent a reduced risk of entrapping any moisture in the interface between the knob 1 and the pipeline P.

From the above the skilled person will understand that the spacing device 1 according to the invention is a “one-piece” spacing device 1 that is securable to a sheet S for use as for example an insulation support S, without the need of any tool apart form a hand of an operator.

It should be noted that the above-mentioned embodiments illustrate rather than limit the invention, and that those skilled in the art will be able to design many alternative embodiments without departing from the scope of the appended claims. In the claims, any reference signs placed between parentheses shall not be construed as limiting the claim. Use of the verb "comprise" and its conjugations does not exclude the presence of elements or steps other than those stated in a claim. The article "a" or "an" preceding an element does not exclude the presence of a plurality of such elements.

Claims

1. A spacing device (1) for keeping a distance between an apertured sheet (S) for supporting an insulation, and an object (P), the spacing device (1) comprising:
- a body (3) having a first end portion (5) and a second end portion (7);
- an engagement element (10) protruding from the second end portion (7) of the body (3), characterised in that engagement element (10) is fixed with respect to the body (3) and configured for engaging an aperture (SA) in the sheet (S) for securing the spacing device to the sheet (S).

2. The spacing device (1) according to claim 1, wherein the engagement element (10) is provided with at least one resilient locking device (12) configured for allowing axial movement of the engagement element (10) in a first direction through the aperture (SA) of the sheet (S) but prevented from movement in a second direction opposite the said first direction.

3. The spacing device (1) according to claim 1, wherein the engagement element (10) is provided with a threaded portion (14) configured for engaging a periphery portion of said aperture (SA).

4. The spacing device (1) according to claim 1, wherein the engagement element (10) comprises a helical portion for engaging said aperture (SA).

5. The spacing device (1) according to claim 3 or 4, wherein the engagement element (10) is made of a material being different from the material of the body (3).

6. The spacing device (1) according to claim 5, wherein the engagement element (10) is made of a material being less flexible than a material of the body (3).

7. A method for providing a space between an object (P) and a sheet (S) by means of the spacing device (1) according to any of the preceding claims, characterised in that the method comprises:
- a) aligning the engagement element (10) of the spacing device (1) with an aperture (SA) provided in the sheet (S);
- b) urging a portion of the engagement element (10) through the aperture (SA) by applying a force to the body (3) of the spacing device (1) to secure the spacing device (1) to the sheet (S); and
- c) repeating steps a) and b) to provide a plurality of spaced-apart spacing devices (1) protruding from a surface of the sheet (S); and

- d) moving the sheet (S) with the protruding spacing devices (1) towards the object (P) so that the first end portion (5) of the spacing devices (1) abut a surface of the object (P).

8. An insulated object (P) comprising the spacing device (1) according to any of the claims 1-6.

9. The insulated object (P) according to claim 8, wherein the object (P) is a pipeline, and the sheet (S) is kept substantially equidistantly from an outer surface of the pipeline (P) by a plurality of spacing devices (1) abutting, in a position of use, a surface of the pipeline (P).

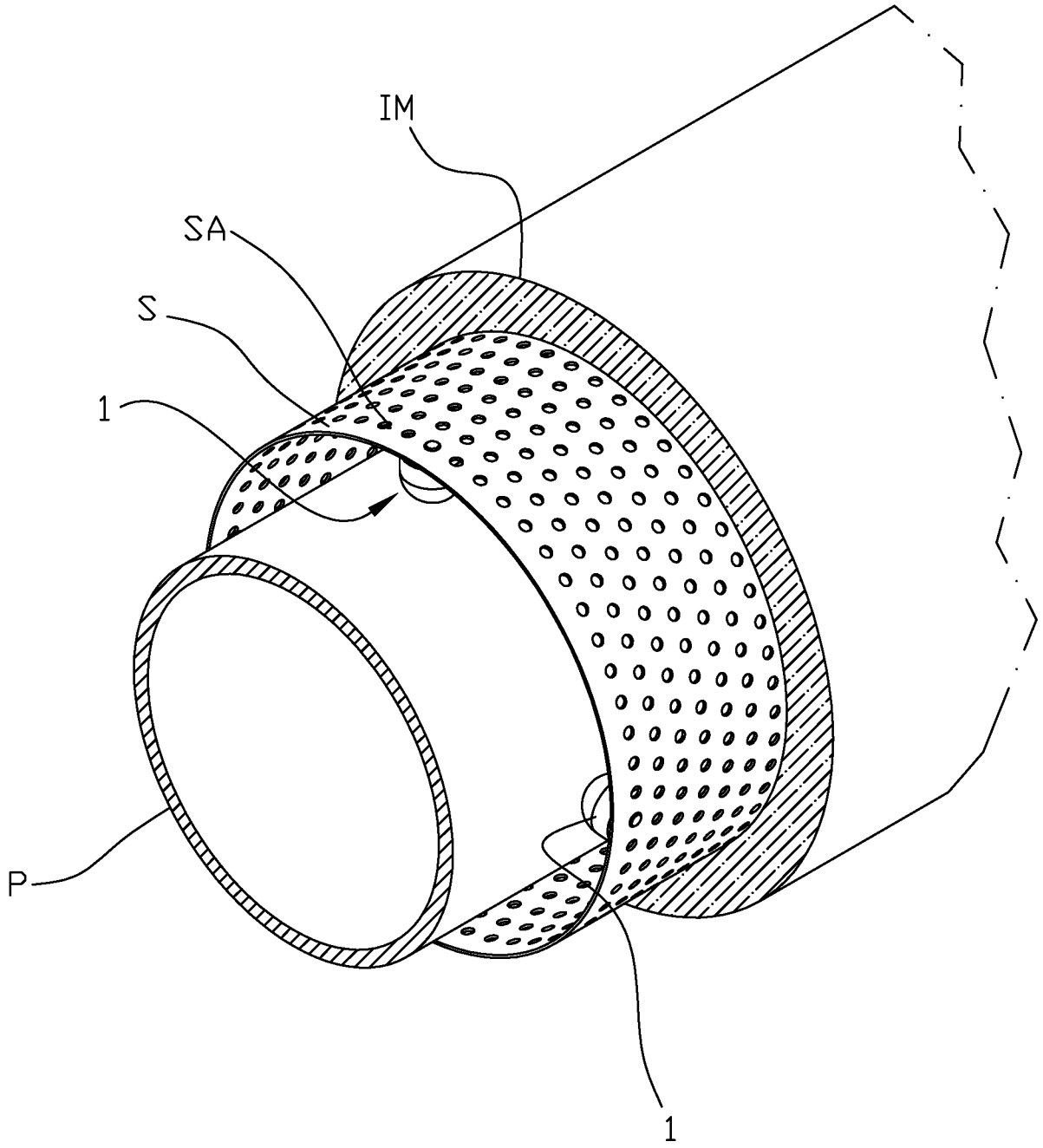


Fig. 1

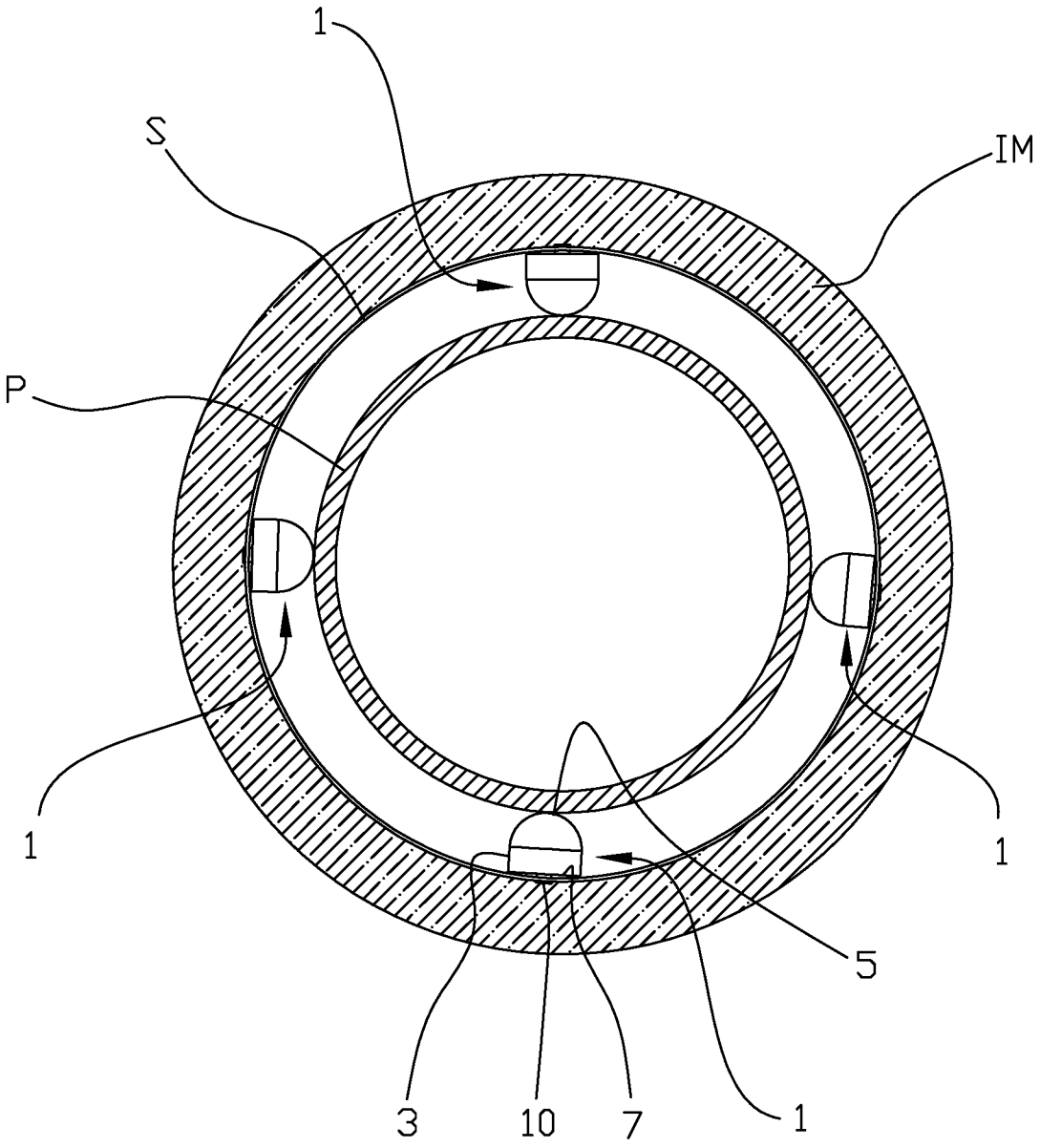


Fig. 2

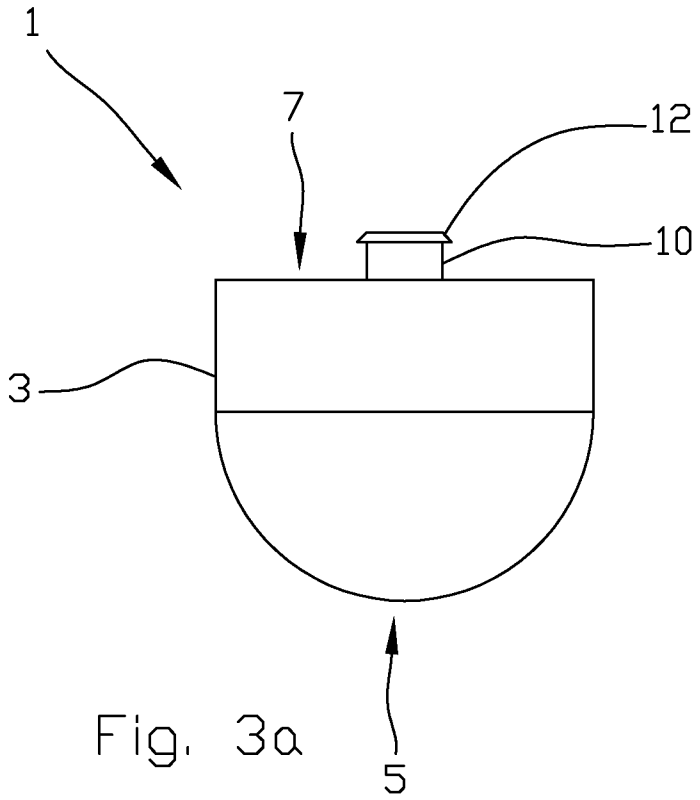


Fig. 3a

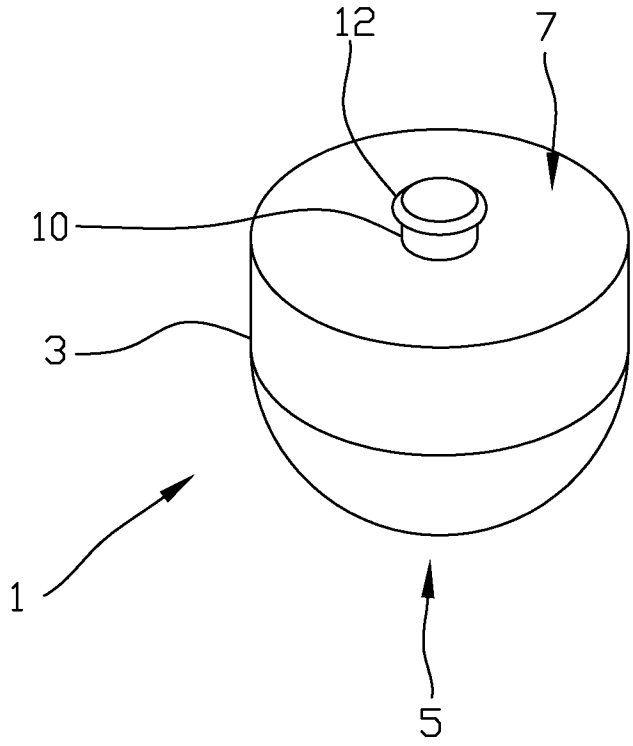


Fig. 3b

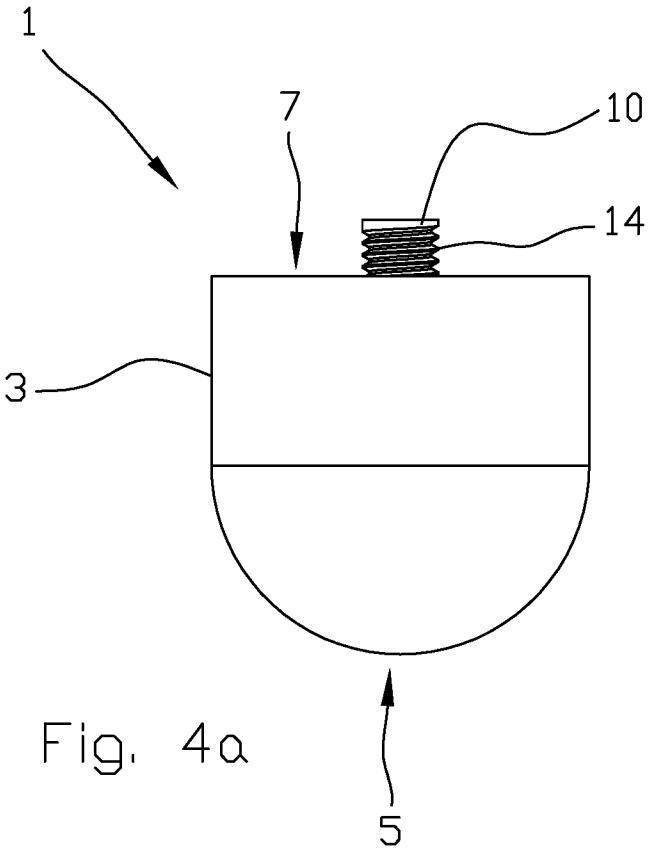


Fig. 4a

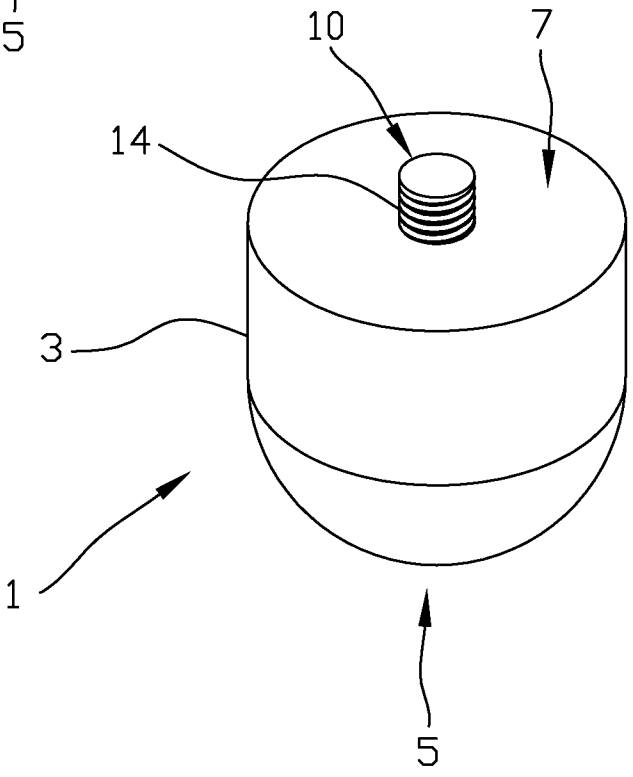


Fig. 4b

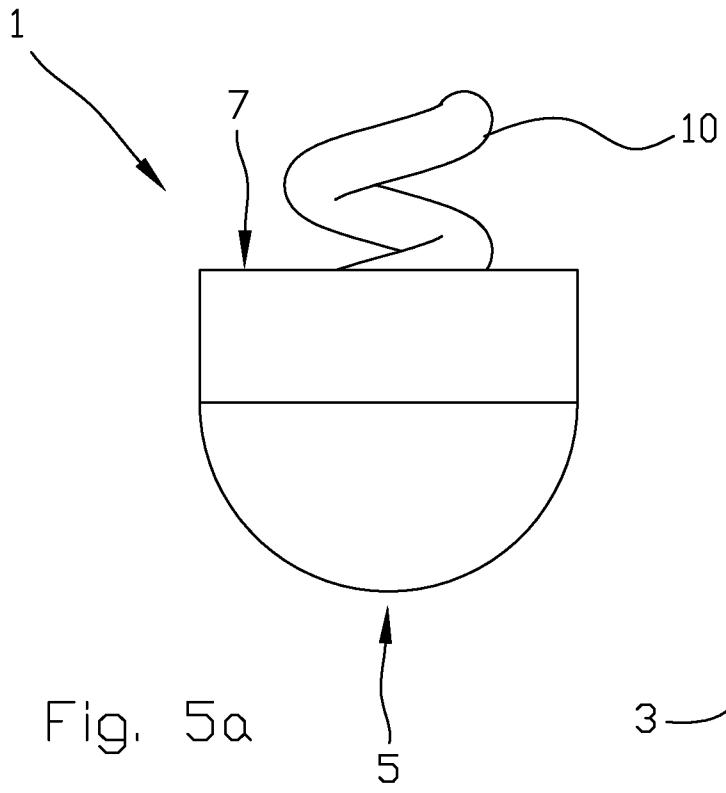


Fig. 5a

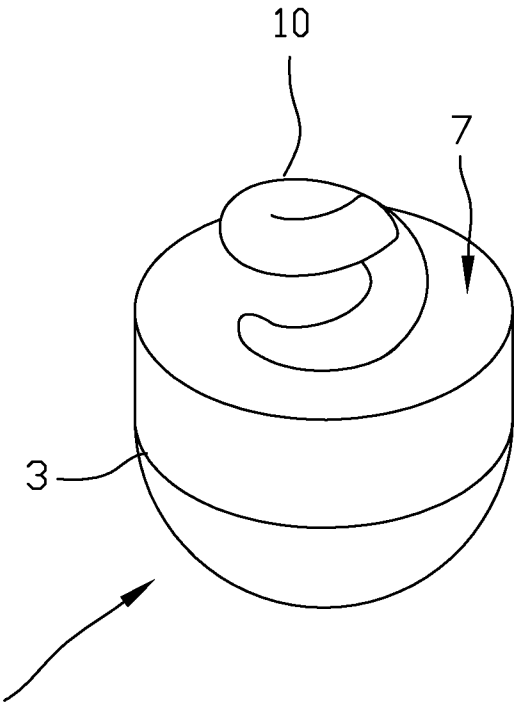


Fig. 5b

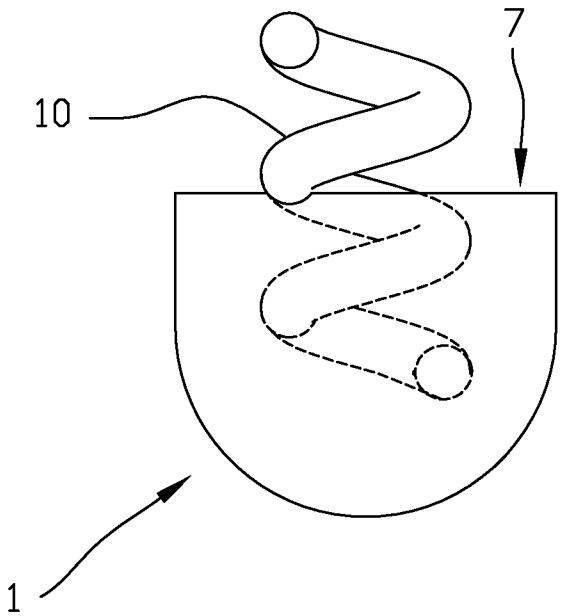


Fig. 5c