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(12) **United States Patent**
Carpano et al.

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(54) **DYNAMIC FLUIDIC JEWELRY**

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(30) **Foreign Application Priority Data**

Oct. 6, 2016 (WO) PCT/IB2016/001448

(51) **Int. Cl.**
A44C 17/02 (2006.01)
A44C 1/00 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***A44C 15/00*** (2013.01); ***A44C 1/00*** (2013.01); ***A44C 5/0007*** (2013.01); ***A44C 7/009*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC A44C 17/02; A44C 25/00
See application file for complete search history.

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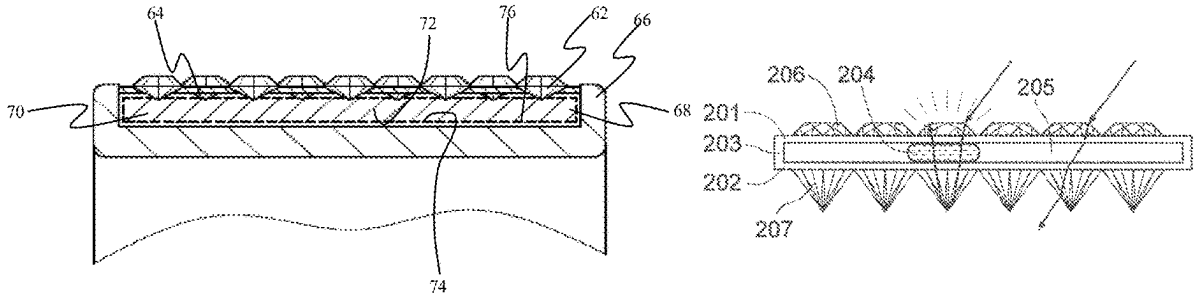
(74) *Attorney, Agent, or Firm* — DA VINCI PARTNERS LLC; John Moetteli

(57) **ABSTRACT**

A construct having an aesthetic form is adapted to please a wearer and to be worn by the wearer. The construct provides a structure having a wearer connection element such as a ring, a chain, a wristband, a pin, a clasp, a clip, and a body piercing element. The functional elements including a fluid reservoir in which at least two fluids are disposed, and a
(Continued)



motion generation system are integrated on the structure, The motion generation system is functionally affixed to the structure so as to agitate the at least two fluids, causing a visual animation effect. The construct, in particular jewelry, may have incorporated therein one or more channels and/or reservoirs containing one or more fluids wherein the fluids as well as the forms and surface treatments of channels/reservoirs are selected possess physical properties so as to promote a defined interaction with the one or more fluids. The interaction influences the visual appearance of the device, such device optionally being made at least in part of precious metals, natural components such as pearls, and/or precious stones.

9 Claims, 18 Drawing Sheets

Related U.S. Application Data

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(51) **Int. Cl.**

A44C 5/00	(2006.01)
A44C 7/00	(2006.01)
A44C 9/00	(2006.01)
A44C 15/00	(2006.01)
A44C 25/00	(2006.01)
G04B 45/00	(2006.01)

(52) **U.S. Cl.**

CPC ***A44C 9/0053*** (2013.01); ***A44C 15/0005*** (2013.01); ***A44C 25/002*** (2013.01); ***G04B 45/0007*** (2013.01)

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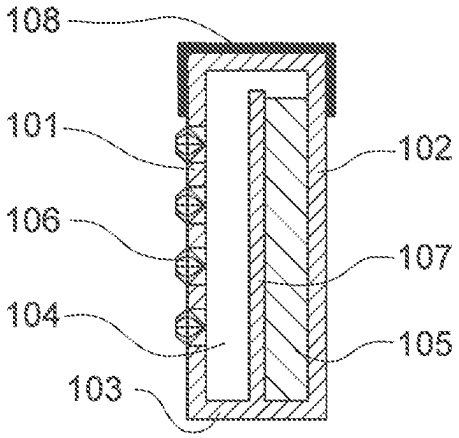


FIG. 1a

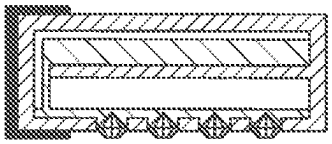


FIG. 1b

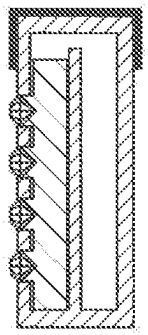


FIG. 1c

FIG. 1d

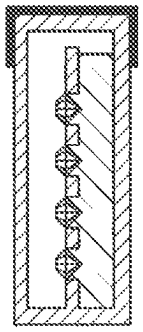


FIG. 1e

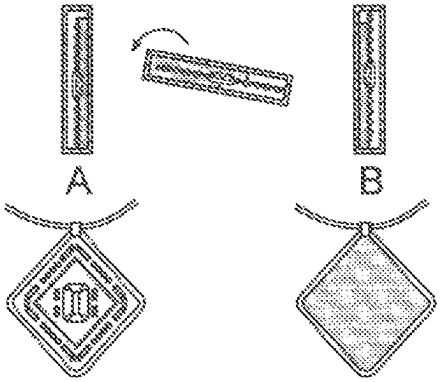


FIG. 1f

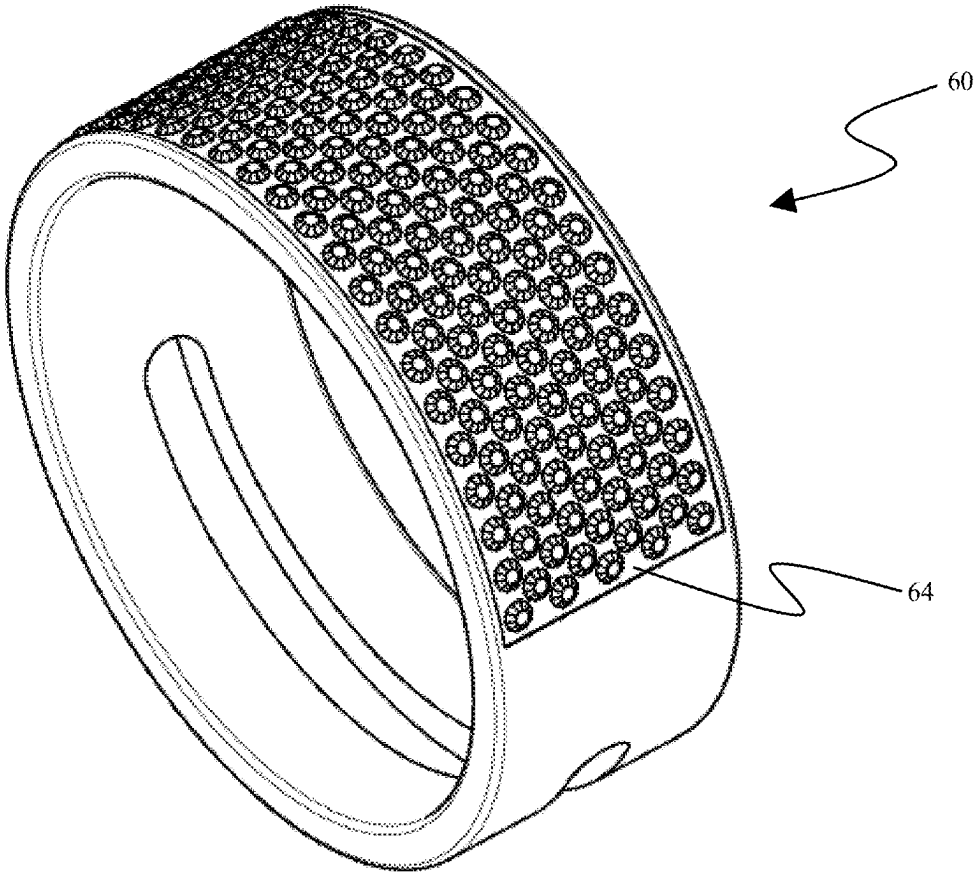


Fig. 2a

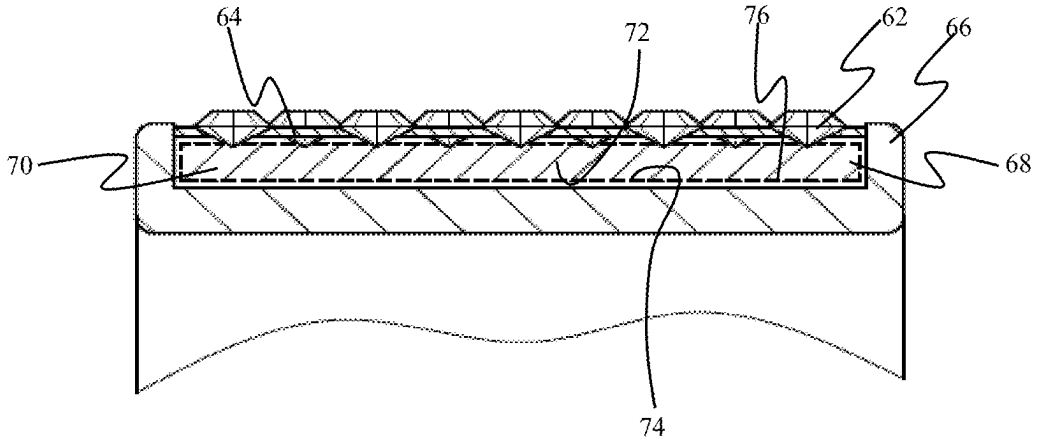


Fig. 2b

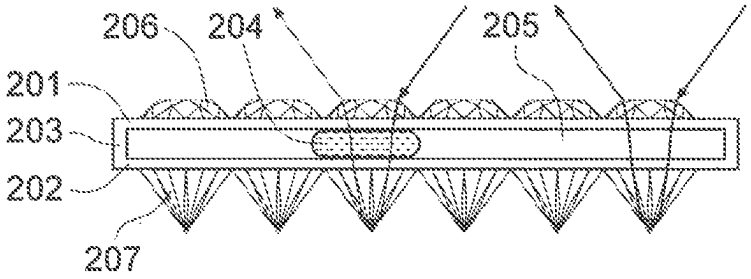


FIG. 2c

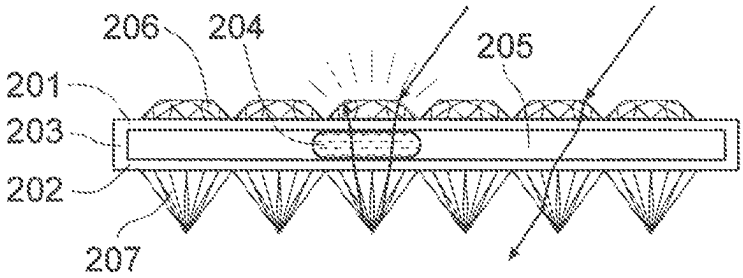


FIG. 2d

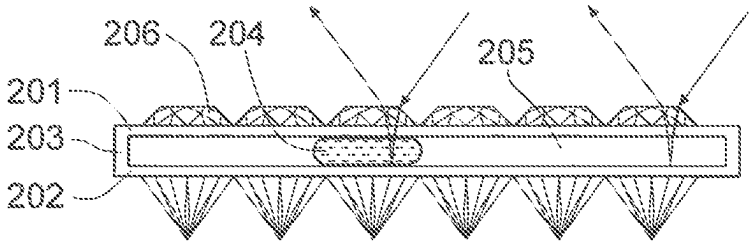


FIG. 2e

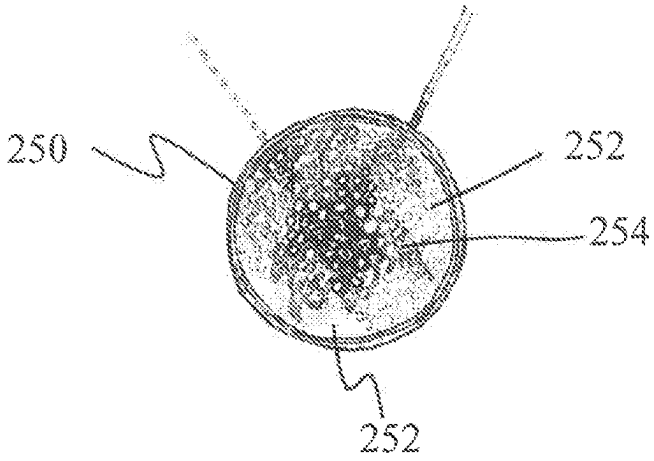


Fig. 2f

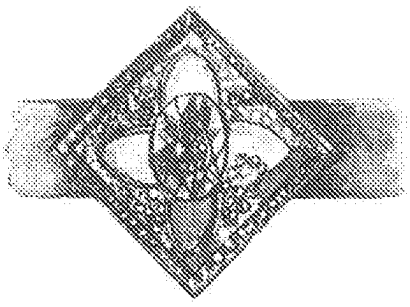


Fig. 2g

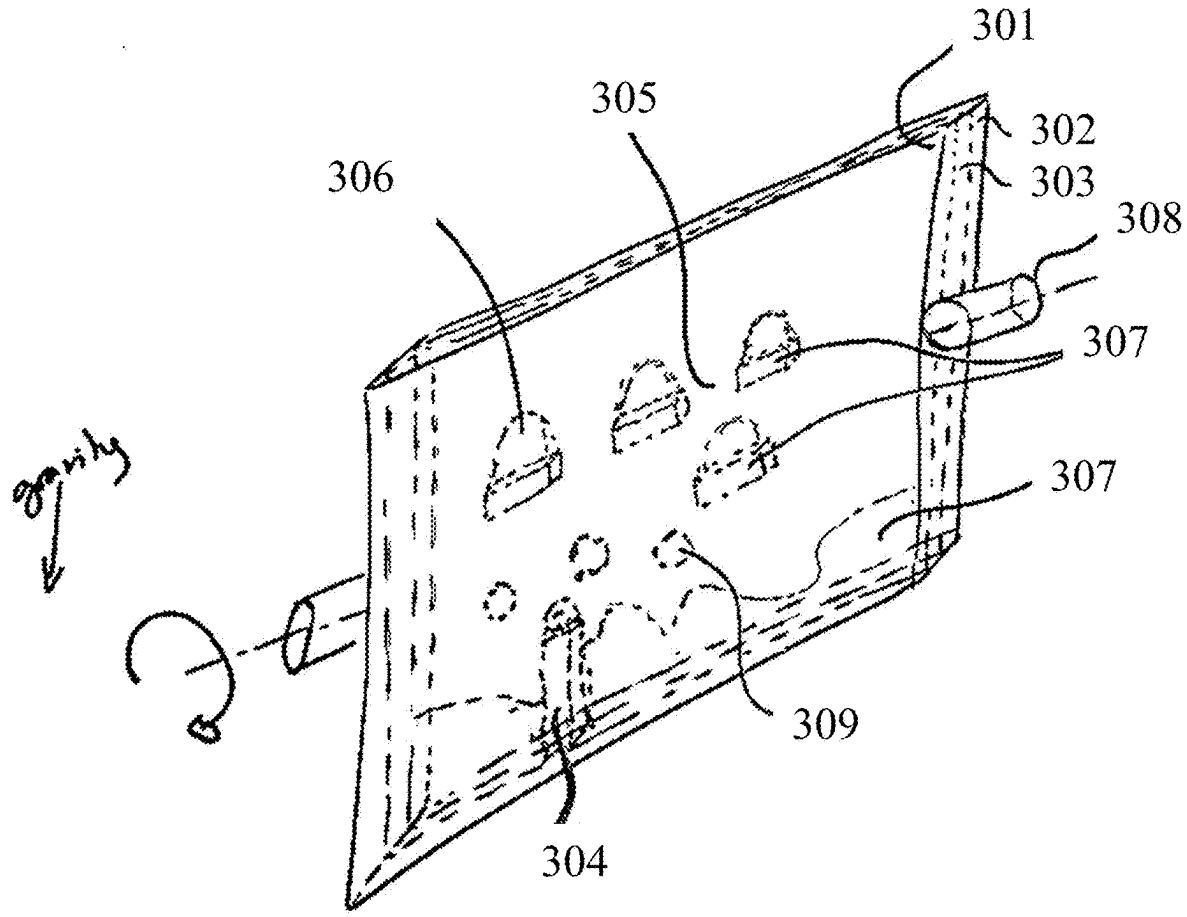


Fig. 3a

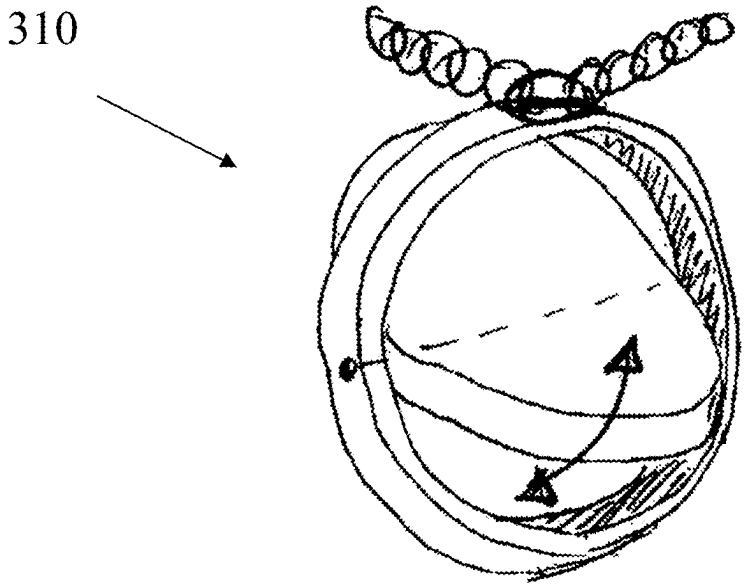
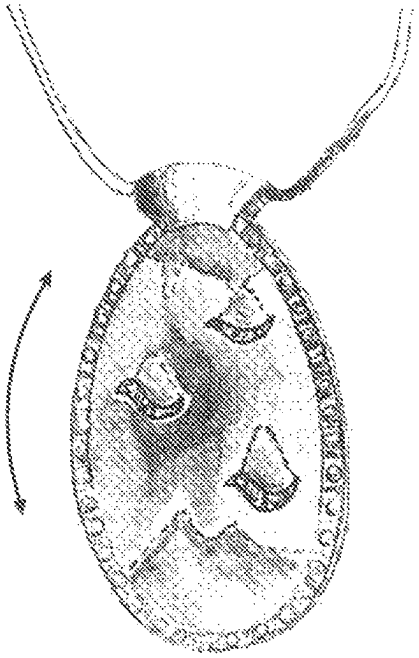


Fig. 3b



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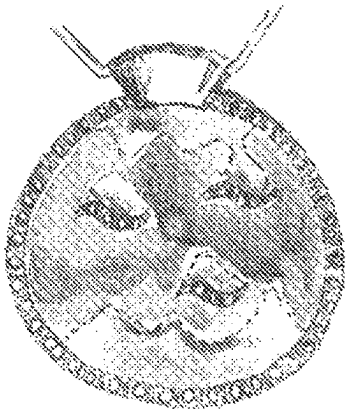


Fig. 3d

Fig. 3e

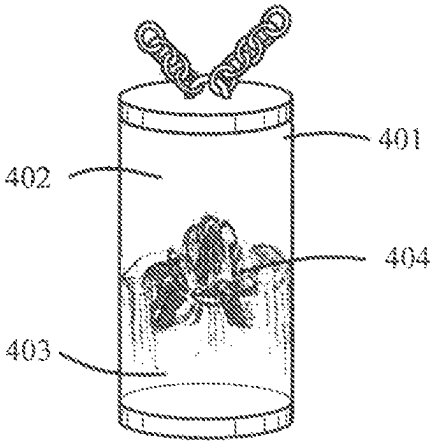


Fig. 4a

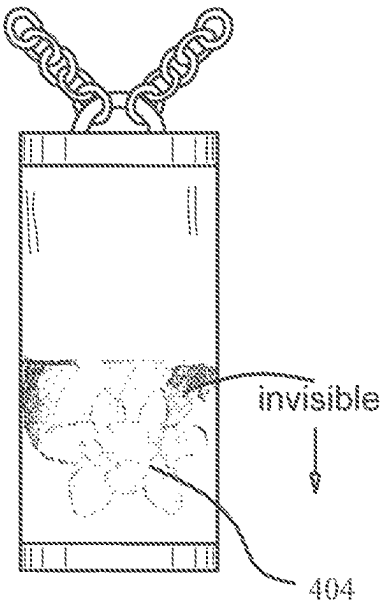
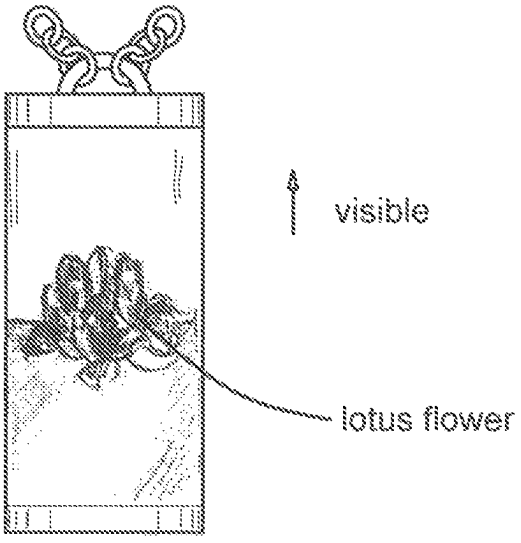


Fig. 4b



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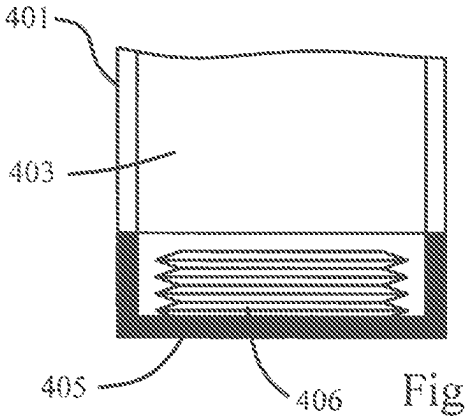


Fig. 4d

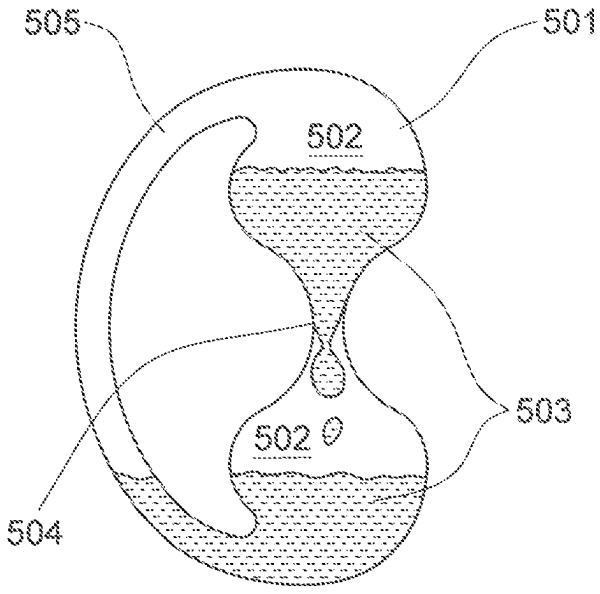


FIG. 5a

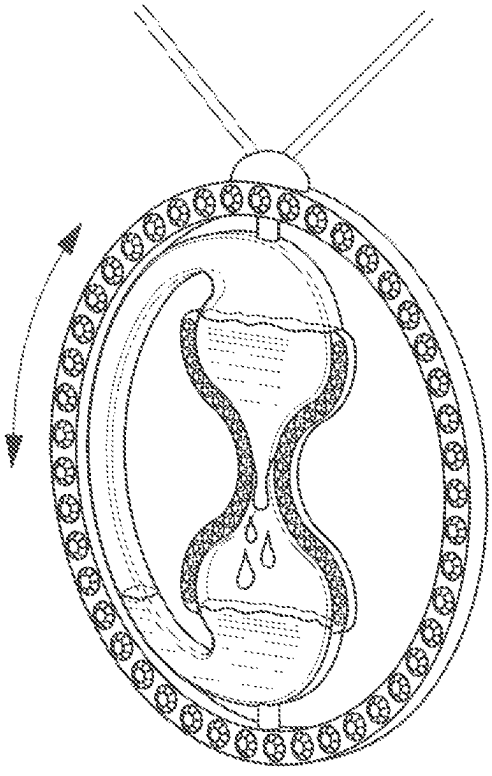


FIG. 5b

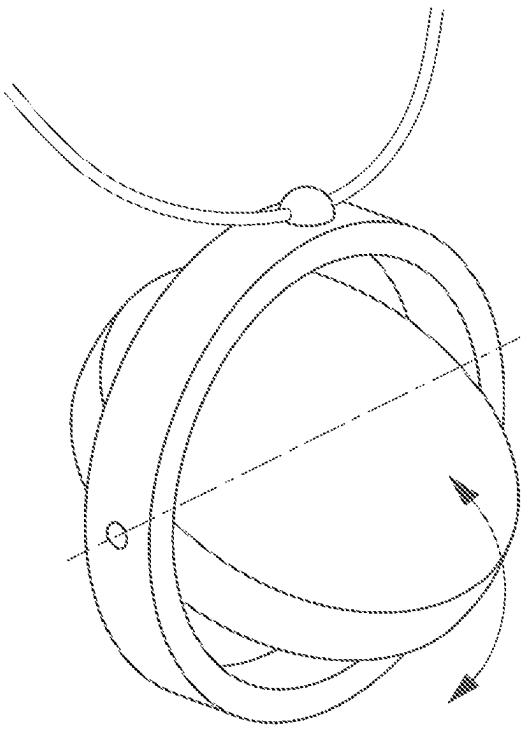


FIG. 5c

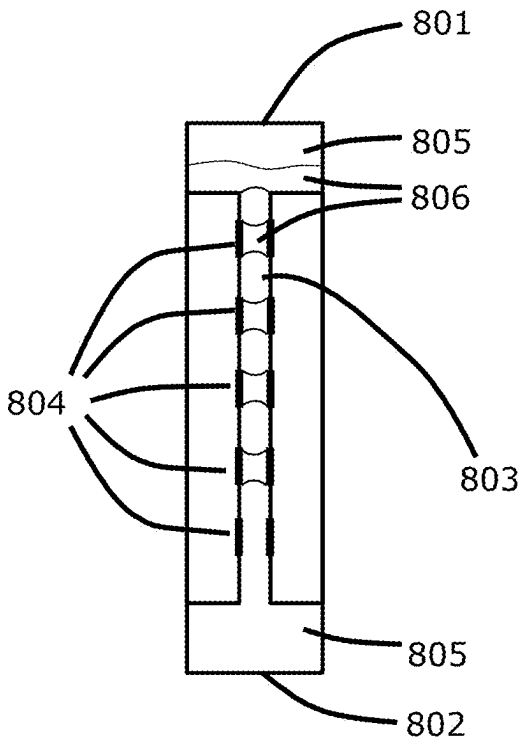
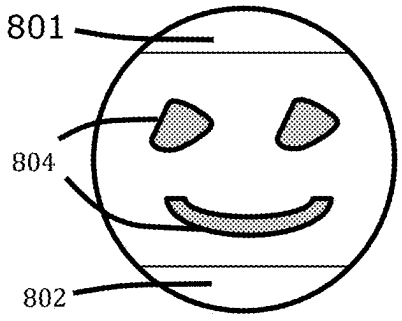


Fig. 6a



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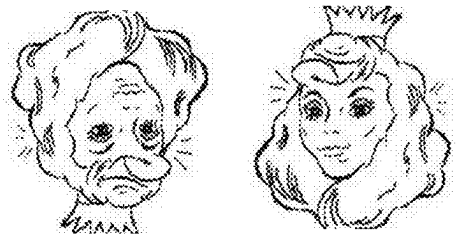

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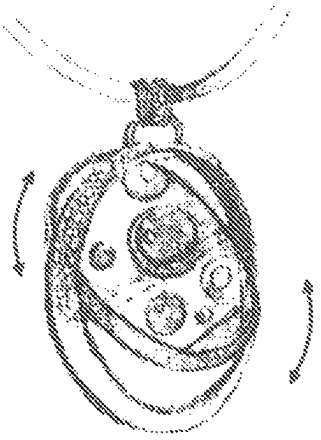
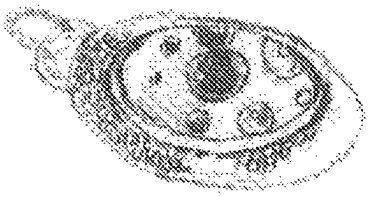


Fig. 6d



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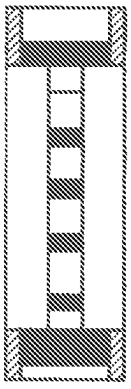


Fig. 6f

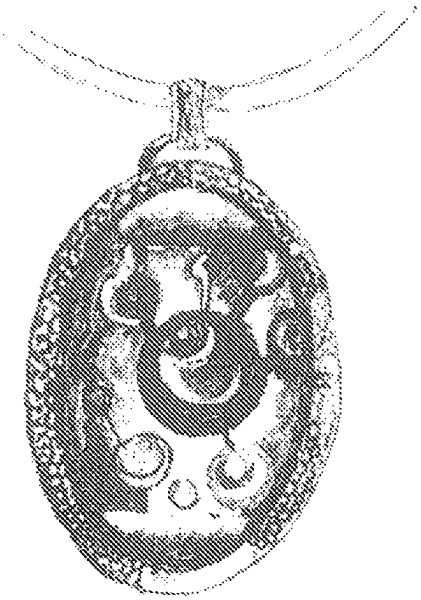


Fig. 6g

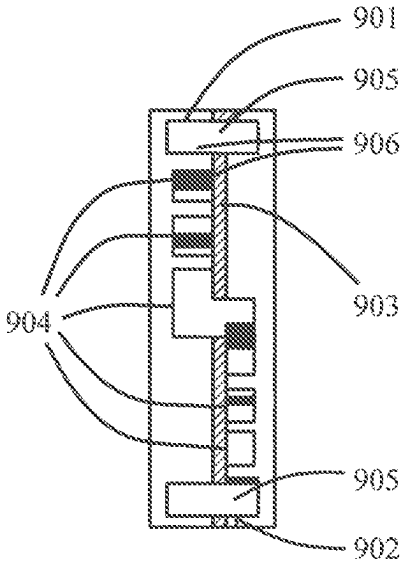


Fig. 7a

Fig. 7b

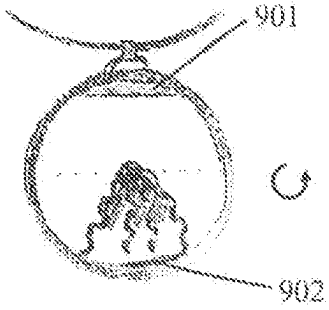


Fig. 7c

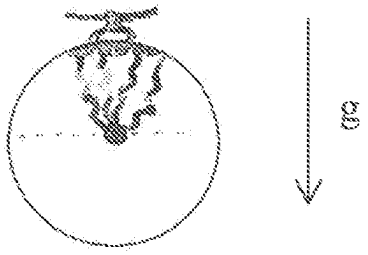


Fig. 7d

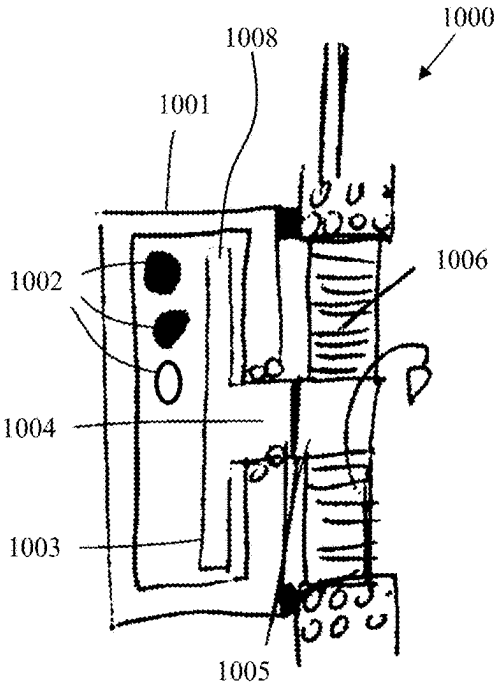


Fig. 8a

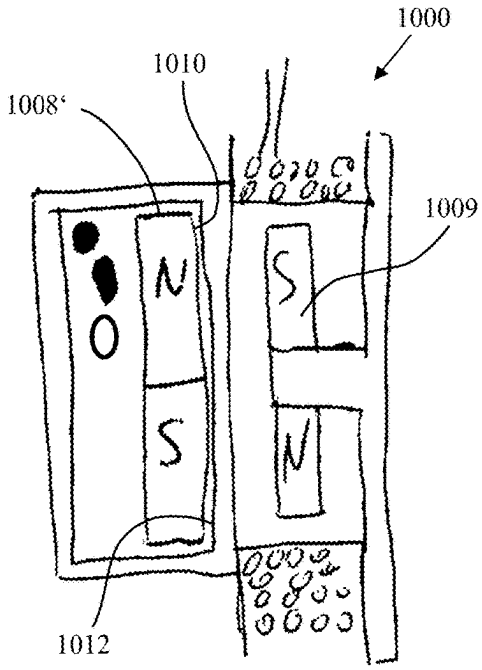
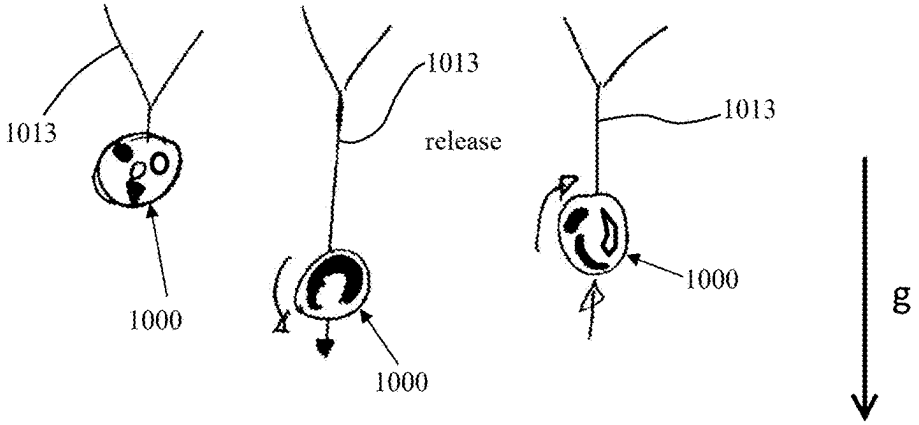


Fig. 8b



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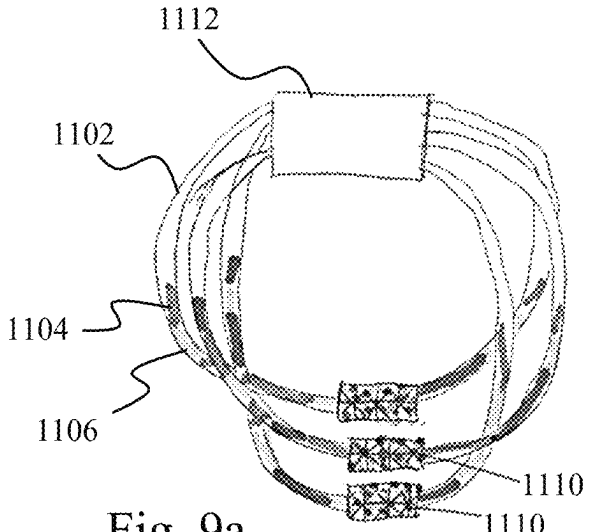

Fig. 9a

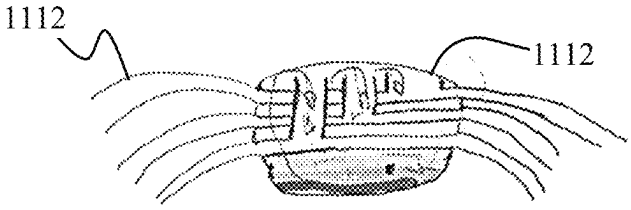

Fig. 9b

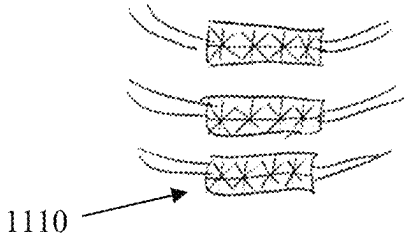

Fig. 9c

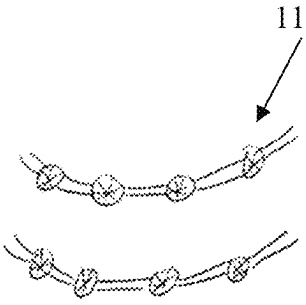

Fig. 9d

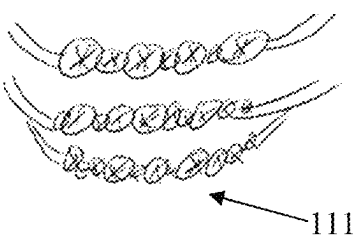

Fig. 9e

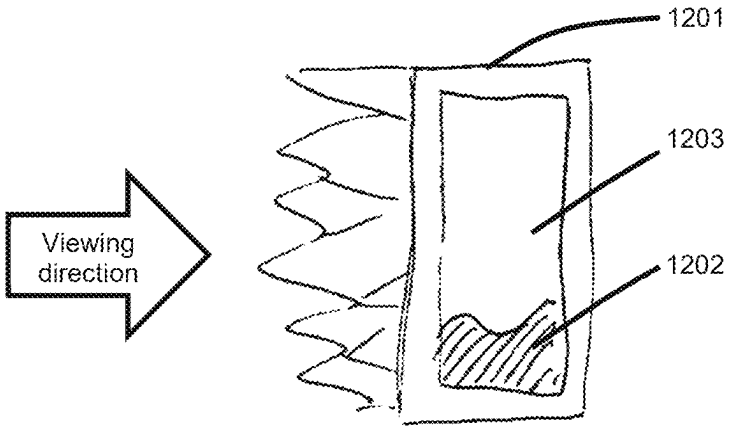

Fig. 10a

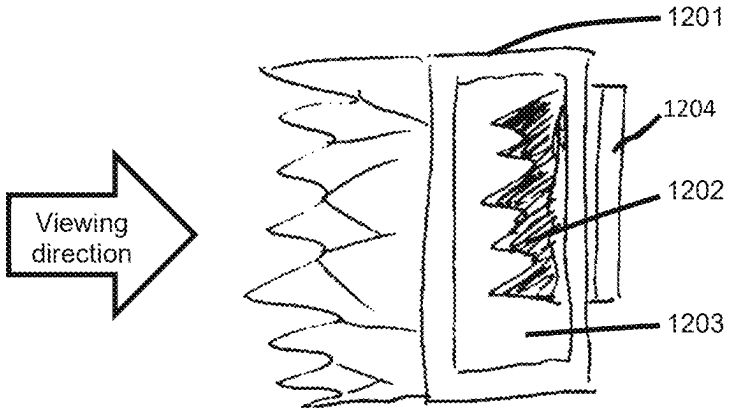

Fig. 10b

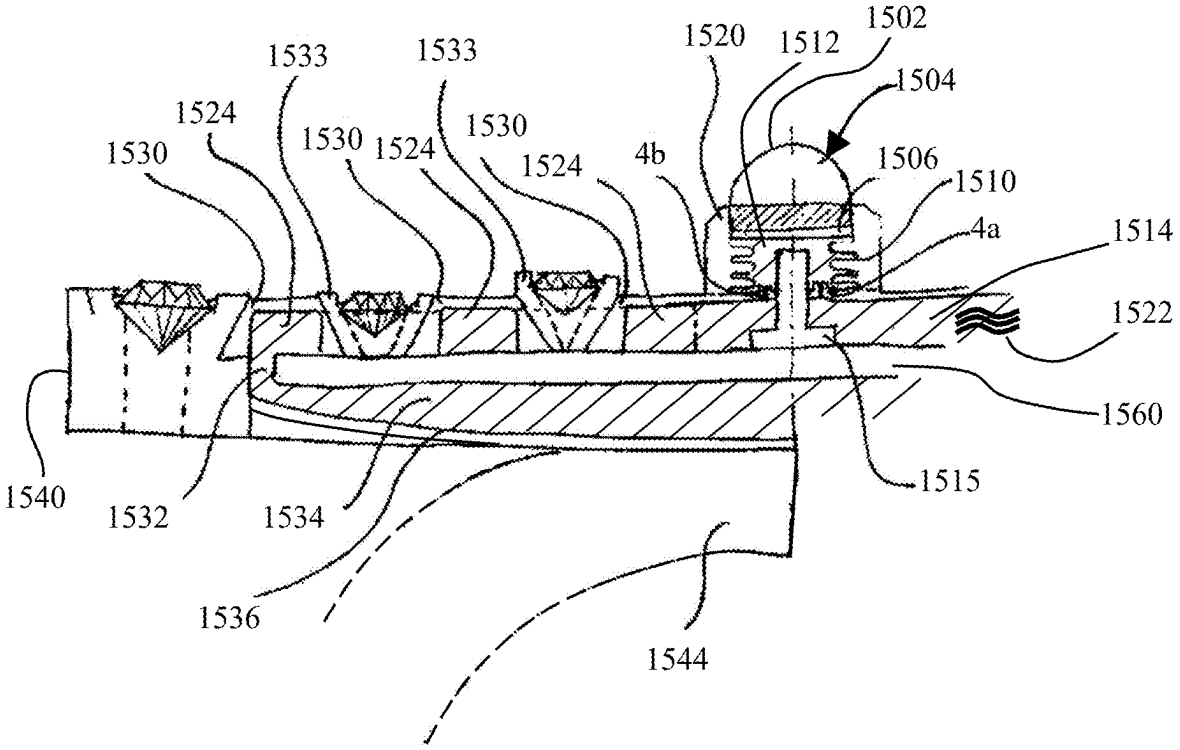

Fig. 11a

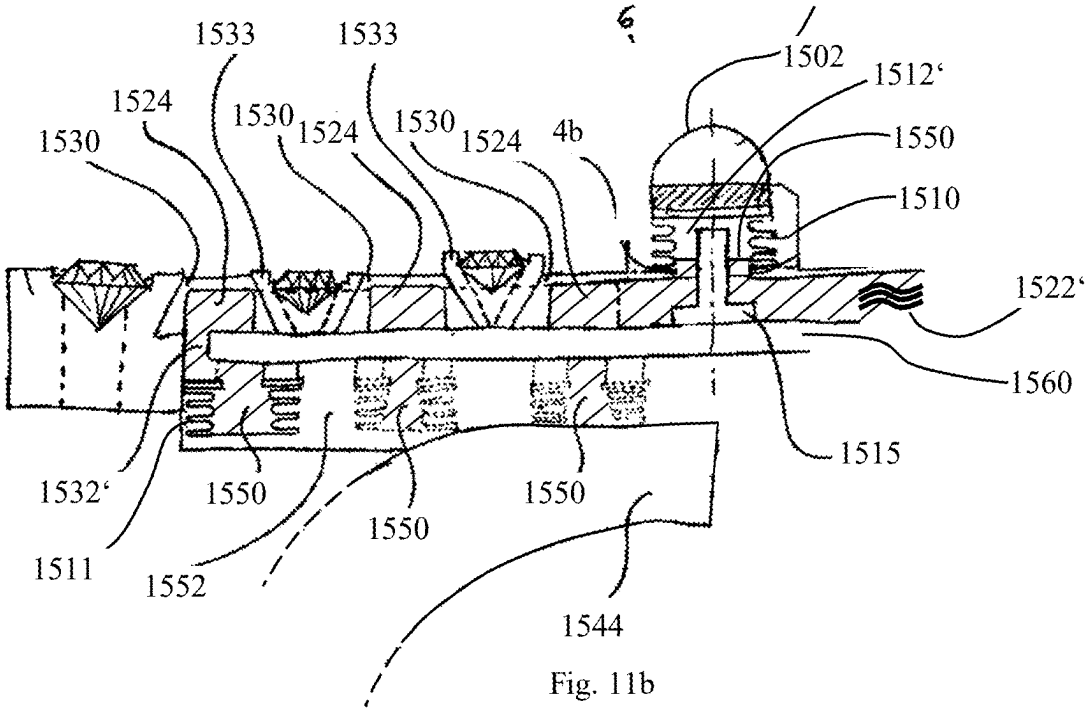

Fig. 11b

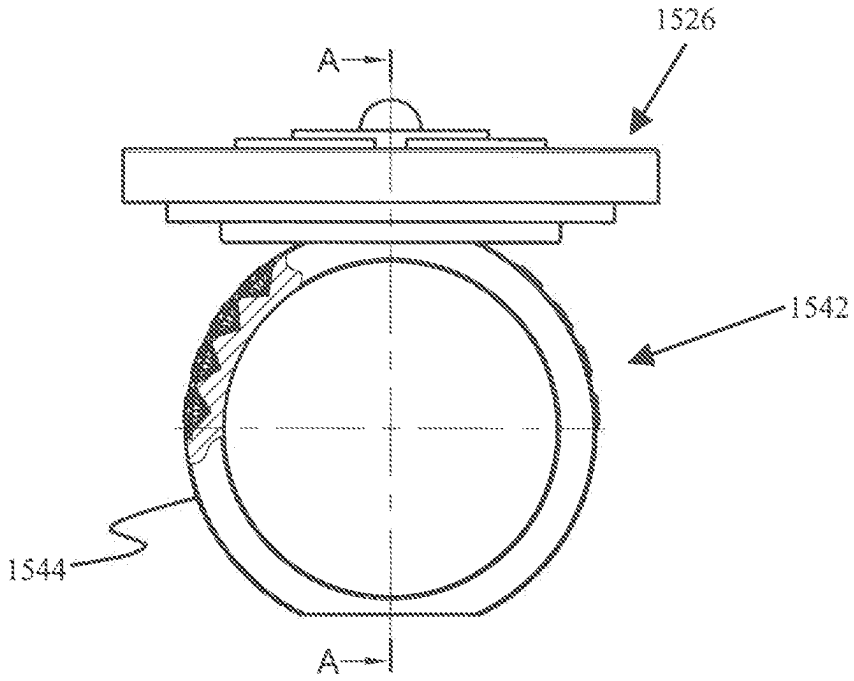

Fig. 11c

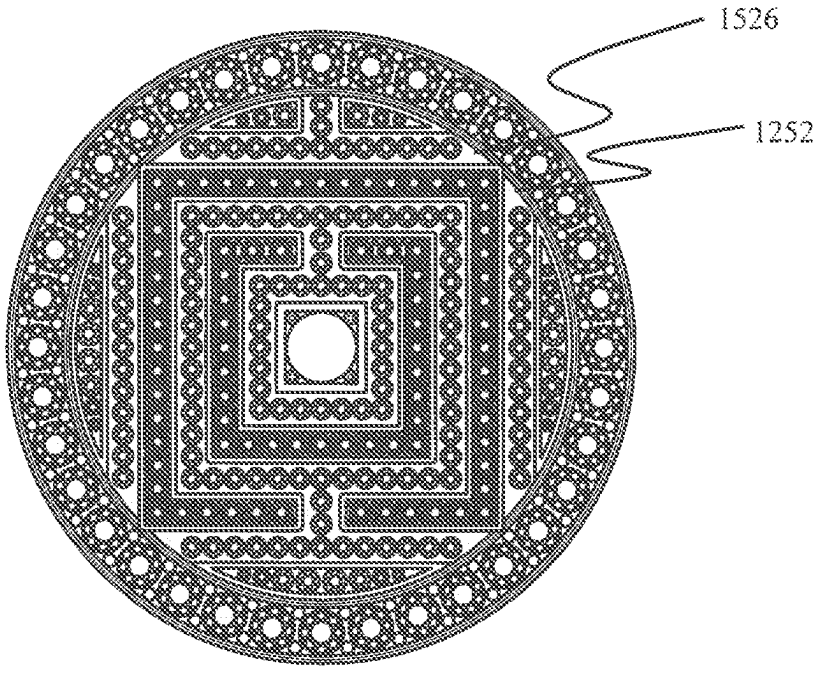

Fig. 11d

DYNAMIC FLUIDIC JEWELRY

CROSS REFERENCE TO RELATED APPLICATIONS

This application is the National Stage of International Application No. PCT/IB2017/001146, filed Sep. 20, 2017, which claims benefit under 35 USC § 119(a), to U.S. provisional patent application Ser. No. 62/396,833, filed Sep. 20, 2016, to U.S. provisional patent application Ser. No. 62/404,978, filed Oct. 6, 2016, to International Application No. PCT/IB2016/001448, filed Oct. 6, 2016, and to U.S. provisional patent application Ser. No. 62/445,050, filed Jan. 11, 2017.

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BACKGROUND OF THE INVENTION

This invention relates to devices, in particular to jewelry. It is the nature of jewelry to offer an aesthetic design and/or to be equipped with noble elements like crystals, stones, precious metals, and so on. However, typically no visual effects are actively applied to the jewelry. Precious elements are associated therewith in order to further enhance its appearance.

What is needed therefore is a means to enhance the appearance of jewelry by applying visual effects using particular fluids and channels/reservoirs, making use of the fluid's specific physical properties (e.g., immiscibility with other fluids, density, density change in function of the temperature, volume change in function of the temperature, refraction, color, transparency, conductivity, viscosity, ferromagnetic, surface tension, opacity, or state) and/or the channels'/reservoirs' specific physical properties (e.g. surface tension, opacity, transparency, surface structuration, conductivity, ferromagneticity, or state) and/or by influencing/moving the fluid(s) via a mechanical input e.g. through pushing a button or displacing of a jewel element and/or by at least one electrically activated mobile element as aesthetic features.

SUMMARY OF THE INVENTION

A construct of the invention has an aesthetic form is adapted to please a wearer and to be worn by the wearer. The construct provides a structure having a wearer connection element such as a ring, a chain, a wristband, a pin, a clasp, a clip, and a body piercing element. The functional elements including a fluid reservoir in which at least two fluids are disposed, and a motion generation system are integrated on the structure, The motion generation system is functionally affixed to the structure so as to agitate the at least two fluids, causing a visual animation effect.

The construct, in particular jewelry, may have incorporated therein one or more channels and/or reservoirs containing the at least two fluids wherein the fluids as well as the forms and surface treatments of channels/reservoirs are selected possess physical properties so as to promote a defined interaction with the one or more fluids. The interaction influences the visual appearance of the device, such device optionally being made at least in part of precious metals, natural components such as pearls, and/or precious stones.

These fluids, or a portion of the fluids, are visible to an observer and serve as an aesthetic element. Such elements may be colored or without color, may contain floating/non-floating particles or particles in suspension, and so may be animated. The animation in a jewelry piece or a time piece is attained by activating powerable elements relative to their position. The animation elements contain a decorative component that can be precious stones. The fluids may be of gas or liquid, and where there are more than one liquid, these liquids may be immiscible. The device further including any feature or element described in the instant description and/or the drawings herein. A method of operation of the device as described in the instant description and/or the drawings herein.

The thermal expansion of the fluid(s) is managed and compensated according to the invention disclosed in the Patent applications PCT/IB2016/000448, filed on Apr. 7, 2016, PCT/IB2016/000004, filed on Jan. 7, 2016, PCT/IB2015/001611, filed on Sep. 11, 2015, PCT/IB2015/001336, filed on Aug. 6, 2015, PCT/IB2015/000446, filed on Apr. 7, 2015. PCT/IB2015/000448, filed on Apr. 7, 2015, the content of which are incorporated by reference and relied upon to define the invention claimed herein.

The instant document reveals different embodiments of the claimed invention. The embodiments show examples of how to make use of physical properties to establish a defined interaction between channels/reservoirs, fluids and decoration elements.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1***a* is a cross-sectional view of a first embodiment of the invention.

FIG. **1***b* is the cross-sectional view of FIG. **1***a* in another position.

FIG. **1***c* is the cross-sectional view of FIG. **1***a* in still another position.

FIG. **1***d* is the cross-sectional view of FIG. **1***a* in still another position.

FIG. **1***e* is the cross-sectional view of another variant of the same embodiment.

FIG. **1***f* is a schematic view of the first embodiment.

FIG. **2***a* is a perspective view of a second embodiment.

FIG. **2***b* is a cross-sectional view of the second embodiment.

FIG. **2***c* is a cross-sectional view of the second embodiment of the invention in one phase of operation.

FIG. **2***d* is a cross-sectional view of the second embodiment of the invention in a second phase of operation.

FIG. **2***e* is a cross-sectional view of the second embodiment of the invention in a third phase of operation.

FIG. **2***f* is a cross-sectional view of the second embodiment of the invention in a forth phase of operation.

FIG. **2***g* is a cross-sectional view of the second embodiment of the invention in a fifth phase of operation.

FIG. **3***a* is a schematic view of a third embodiment.

FIG. **3***b* is a view of the third embodiment set as a necklace.

FIG. **3***c* is a second view of the third embodiment set as a necklace.

FIG. **3***d* is a third view of the third embodiment set as a necklace.

FIG. **3***e* is a side view of the third embodiment.

FIG. **4***a* is a perspective view of a forth embodiment of the invention.

FIG. **4***b* is a front view of the forth embodiment in one phase.

FIG. **4***c* is a front view of the forth embodiment in another phase.

FIG. **4***d* is a front cross-sectional view of the forth embodiment showing a bellows reservoir.

FIG. **5***a* is a schematic diagram of a fifth embodiment.

FIG. **5***b* is a perspective view of the fifth embodiment implemented in a necklace pendant.

FIG. **5***c* is a schematic perspective view of the fifth embodiment pendant implementation.

FIG. **6***a* is a cross-section view of a sixth embodiment.

FIG. **6***b* is a front view of the sixth embodiment.

FIG. **6***c* shows the sixth embodiment displaying a picture when filling in upright/upside down position.

FIG. **6***d* is a perspective view of one implementation of the sixth embodiment as a pendent.

FIG. **6***e* is another view of the sixth embodiment.

FIG. **6***f* is a schematic side view of the sixth embodiment.

FIG. **6***g* is a front view of the sixth embodiment.

FIG. **7***a* is a schematic cross-sectional view of a seventh embodiment.

FIG. **7***b* shows an implementation of the seventh embodiment.

FIG. **7***c* shows a front view of the implementation of the seventh embodiment.

FIG. **7***d* shows a rear view of the implementation of the seventh embodiment, which is not visible to a viewer.

FIG. **8***a* is a schematic cross-sectioned view of an eighth embodiment.

FIG. **8***b* is still another schematic of the eighth embodiment.

FIG. **8***c* shows a different implementation of the eight embodiment.

FIG. **9***a* is a schematic view of a ninth embodiment.

FIGS. **9***b* to **9***e* are variations of the ninth embodiment.

FIG. **10***a* is a schematic view of a tenth embodiment.

FIG. **10***b* is a phase in operation of the tenth embodiment.

FIG. **11***a* is across-section view of an eleventh embodiment.

FIG. **11***b* is a cross section view of a variation of the eleventh embodiment.

FIG. **11***e* is a cross-section frontal view of the eleventh embodiment.

FIG. **11***d* is a top view of the eleventh embodiment.

Those skilled in the art will appreciate that elements in the figures are illustrated for simplicity and clarity and have not necessarily been drawn to scale. For example, dimensions may be exaggerated relative to other elements to help improve understanding of the invention and its embodiments. Furthermore, when the terms 'first', 'second', and the like are used herein, their use is intended for distinguishing between similar elements and not necessarily for describing a sequential or chronological order. Moreover, relative terms like 'front', 'back', 'top' and 'bottom', and the like in the description and/or in the claims are not necessarily used for describing exclusive relative position. Those skilled in the art will therefore understand that such terms may be interchangeable with other terms, and that the embodiments described herein are capable of operating in other orientations than those explicitly illustrated or otherwise described.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The following description is not intended to limit the scope of the invention in any way as they are exemplary in nature and serve to describe the best mode of the invention known to the inventors as of the filing date hereof. Consequently, changes may be made in the arrangement and/or function of any of the elements described in the disclosed exemplary embodiments without departing from the spirit and scope of the invention.

Referring now to FIGS. **1***a* to **1***f*, the device of the invention, typically a piece of jewelry, is made up of a front plate **101**, a back plate **102** and a spacer **103**. The front plate **101** is preferably made of semi-transparent or partially opaque material, or decorated with transparent parts such as stones, crystals, inclusions, or similar decorative materials **106**. The combination of front plate **101**, back plate **102** and spacer **103** creates a chamber that can contain one or more fluids **104**, **105**; fluids **104**, **105** may or may not have the same refraction index as the materials of the plates **101**, **102** or their decoration **106**. The fluids **104**, **105** are preferably liquids and/or vapors. The separation **107** (optionally a transparent/semi-transparent/opaque separation or a mirror . . .) divides the chamber into two reservoirs. The attachment **108** of the device ensures an equilibrium position (relative to gravity) so that each fluid remains in one of the reservoirs. The attachment **108** can also be provided with a hidden thermal compensation system. By temporarily changing the position of the device, from its first position shown in FIG. **1***a*, to a second position shown in FIG. **1***b*, the user can bring the fluids to change their position. FIG. **1***c* shows the device once again in its initial position. The transparent parts of the front plate have changed from one color to another, have become visible or invisible, or are darker/lighter depending on the physical properties of the fluids **104**, **105**. Changing the position of the device to a third position shown in FIG. **1***d* brings the fluids **104**, **105** back to their initial position as shown in FIG. **1***a*. Referring now to FIG. **1***e*, s an alternative embodiment incorporates stones, crystals, inclusions, or similar decorative materials **106**, placed on the separation **107** which ensures water tightness of the device. Swapping the fluids **104**, **105** changes the visibility of the decorative material **106**, e.g. crystals. Referring now to FIG. **1***f*, the device is implemented in an earring.

Referring now to FIGS. **2**A and **2**B, a bracelet **60** with a setting of precious or semi-precious stones **62** is shown, set in a glass or crystal plate **64**, itself bonded to a base **66**. One or more fluids **68**, **70**, one of which may be a gas, are contained between this base **66** and this plate **64**, with one of the liquids optionally being a ferrofluid. hydrophobic, hydrophilic or oleophobic or oleophilic coatings **72**, **74** that repel and/or attract the liquids and so cause pockets of said liquid **68** or **70** to wet a certain number of stones **62**, inside a chamber **76** on the metal base **66** and/or on the glass or crystal **64**. The stones **62** are preferably coated or non-coated. The refraction index of the liquids **68**, **70** is chosen so as to dull the luster of the stones **62** which forms a contrast with the stones whose base is in the gas. This creates moving designs in the setting as shown. The stones **62** are impermeably mounted in a watertight manner to the glass or crystal **64**.

Referring now to FIGS. **2***c* to **2***g*, a variant of the embodiment shown in FIGS. **2***a* and **2***b* in which the shape of the plates' decoration **206** and **207** are designed in such a way as to recreate the appearance of diamonds or other shapes. In particular, FIG. **2***c* shows the embodiment equipped with a transparent/semi-transparent back plate **202**. The color of some of the decorative elements **206** (a crystal in FIG. **2***c*) change depending of the position of the fluid **204**. In FIG. **2***c*, fluid **204** is colored and fluid **205** is transparent. FIG. **2***d* shows the embodiment equipped with a transparent/semi-transparent back plate **202**. The visibility of some of the decorative elements **206** (as well in FIG. **2***d* in which the decorative element is a crystal) change depending of the position of the fluid **204**. In FIG. **2***d*, fluid **204** has a refraction index selected in order to refract the light to change the visibility of the decorative element **206** located near the fluid **204**. FIG. **2***e* shows the embodiment equipped with a back plate **202** made up of a metalized surface (providing a mirror effect). The color of some of the decorative elements **206** (as well in FIG. **2***e* a crystal) change depending of the position of the fluid **204**. The fluid **204** is preferably colored or transparent and have refraction indexes selected in order to refract the light to change the visibility of the decorative element **206** located near the fluid **204**. FIG. **2***f* shows the device implemented in a pendent **250**. By way of example, the pendent **250** is preferably made of glass **252** and/or precious stones **254**, for example, crystals. The pendent **250** contains a fluid or liquid **256**. In particular, FIG. **2***g* shows the device implemented in another bracelet.

Referring now to FIGS. **3***a* to **3***e*, the device of the invention is made up of front plate **301** and a back plate **302**. The front plate **301** is preferably made of transparent, semi-transparent or partially opaque material, or is preferably decorated with stones, crystals, inclusions, or similar decorative materials. The back plate **302** is preferably made of transparent, semi-transparent, partially opaque, opaque or metallized materials (providing a mirror effect), or decorated with stones, crystals, inclusions, or similar decorative materials. The combination of front plate **301**, back plate **302** and spacer **303** creates a chamber **307** that contains one or more immiscible fluids of different density. The fluids may contain one or more particles or mobile elements **309**. The fluids may or may not have the same refraction index as particles or mobile elements **309**. The chamber **307** may contain shelves **304**, the shelves **304** generating an accumulation **306** of fluids and/or particles or mobile elements **309**. The shelves **304** may generate a flow limitation **305** for fluids or particles or mobile elements **309** in order to accumulate at the bottom of chamber **307**. The shelves **304** are preferably visible or hidden. A rotation axis **308** allowing to orientate the system upside down, initiating movement of the fluid with the higher density to flow downwards and hence creating a new partially random picture. The flow speed of particles or mobile elements **309** is also influenced by fluids' properties (viscosity, presence of bubbles, . . .) The chamber **307** is preferably shaped as a rectangle as shown in FIG. **3***a*, but of course may be round as shown in FIG. **3***b*, or in another form such as oval or square (not shown in the Figures). Referring to FIGS. **3***b* to **3***e*, round chamber **310** and alternate attachment mechanisms allowing the rotation of the chamber.

Referring now to FIGS. **4***a* to **4***d* show a container **401** of the invention being made of a transparent, semi-transparent, or partially opaque material, or a material decorated with stones, crystals, inclusions, or similar decorative elements. The container **401** may contain a visible or a hidden temperature compensation system. The container **401** further encloses a top fluid **402** and a bottom fluid **403**. The top fluid **402** is preferably transparent, semi-transparent or colored, may consist of more than one fluid (including gas bubbles to aid in thermal expansion management), or may be gas. The top fluid **402** has a lower density than the bottom fluid **403**. The top fluid **402** and the bottom fluid **403** are non-miscible. The bottom fluid **403** may be transparent, semi-transparent or colored. The bottom fluid **403** has a higher density than the top fluid **402**. The bottom fluid **403** may have the same refraction index as the aesthetic element **404**. The bottom fluid **403** is selected to have a large variation in density with temperature. The aesthetic element **404** is contained in the container **401** and is essentially surrounded by at least one fluid. The aesthetic element **404** is made of transparent or colored material and may itself contain another fluid or liquid advantageously having a substantially different form or shape than the element **404** itself. In this embodiment, although the element **404** becomes invisible when surrounded with a liquid having substantially the same refraction index, what is contained in the element **404** is of another shape, giving the impression that the element **404** completely changes form or transforms into another shape as the liquid covers or recedes from it. The aesthetic element **404** is preferably held in the system by a transparent fixture such as e.g. a thread. The density of the aesthetic element **404** may be adjusted via, for example, connection with bellows **406**, which controls the amount of fluid pumped into the element **404** to cause the element to float or sink. In another variant, the density of the aesthetic element **404** is adjusted in order to cause the element to float below the surface of the bottom fluid **403** when the temperature of the device (container **401**, top fluid **402**, bottom fluid **403**, aesthetic element **404**) is below a given temperature and to float partially on the surface of the bottom fluid **403** when the temperature of said device is above that temperature. When the temperature is low, the aesthetic element **404** floats below the surface of the bottom fluid **403**, and if the refraction index of bottom fluid **403** is the same as the aesthetic element **404**, it becomes invisible. Alternatively, in order to obtain the same effect, the bottom fluid **403** is preferably opaque, or the container **401** may be opaque in its lower part. When the temperature is higher, the aesthetic element **404** moves up and becomes partially/fully visible. Referring to FIG. **4***d*, a variant of container **401** is shown, comprising a flexible bellows **406** filled with a fluid with high thermal expansion properties. Expansion or contraction of the bellow **406** changes the level of the bottom fluid **403**, hiding or displaying the aesthetic element **404**. As a further alternative, the aesthetic element **404** is preferably fixed on the bellow and moves up/down, hiding or showing in function of the thermal expansion/contraction of the fluid contained within the bellow **406**.

Referring now to FIGS. **5***a* to **5***c*, a container **501** of the invention includes transparent, semi-transparent or partially opaque material, or is decorated with stones, crystals, inclusions, or similar decorative elements. The container **501** may contain a visible or a hidden temperature compensation system. The container further contains a light weight fluid **502** and a heavy weight fluid **503**. The light weight fluid **502** may be transparent, semi-transparent or colored. The light weight fluid may consist of more than one fluid (including gas bubbles for thermal expansion management), or may be gas. The light fluid **502** has a lower density than the heavy weight fluid **503**. The light weight fluid **502** and the heavy weight fluid **503** are non-miscible. The heavy weight fluid **503** may be transparent, semi-transparent or colored. The

heavy weight fluid **503** has a higher density than the lighter weight fluid **502**. The container **501** comprises a tight opening **504** (optionally calibrated), allowing the heavy weight fluid **503** to drip down into the lower part of the container **501** and the light weight fluid **502** to drip or flow up into the higher part of the container **501**. Channel **505** (optional) enables bringing bring back the heavy weight fluid **503** into the top part of the container **501** when the system is turned upside down. An attachment system **506** holds the system in an upright position. FIG. **5***c* illustrates an alternative attachment system **506**, allowing the system to be turned upside down, which has as the advantage that no channel **505** is necessary.

Referring now to FIGS. **6***a* to **6***g*, the device, again, typically a piece of jewelry, consisting of a top reservoir **801** and a bottom reservoir **802**. The top reservoir **801** consisting of transparent, semi-transparent, partially opaque or opaque material. The top reservoir **801** may contain a visible or an invisible temperature compensation system. The bottom reservoir **802** is made up of a transparent, semi-transparent, colored, partially opaque or opaque material. The bottom reservoir **802** may contain a visible or a hidden temperature compensation system. This device further includes a picture chamber **803**. The picture chamber **803** may be of transparent, semi-transparent or colored material. The picture chamber **803** is connected to the top reservoir **801** and the bottom reservoir **802**. The picture chamber has further zones with surface treatment and/or micro-structuration creating patterns **804**. The container provided through the connected top reservoir **801**, the picture chamber **803** and the bottom reservoir **802** contains a light weight fluid **805** and a heavy weight fluid **806**. The light weight fluid **805** may be transparent, semi-transparent or colored. The light weight fluid **805** may be made up of more than one non-miscible fluid (include gas bubbles for thermal expansion management), or may be gas. The light weight fluid **805** has a lower density than the heavy weight fluid **806**. The light weight fluid **805** and the heavy weight fluid are non-miscible. The heavy weight fluid **806** may be transparent, semi-transparent or colored. The heavy weight fluid **806** has a higher density than the light weight fluid **805**. An attachment system **807** holds the system in upright position and allows the device to be held in upright or upside down position. In the position of the device illustrated in FIG. **6***a*, the heavy weight fluid **806** moves down due to gravity from top reservoir **801** to the bottom reservoir **802**, but is slowed down in zones with specific coating or micro structuration **804**, progressively filling the picture chamber **803**, then emptying it, until the heavy weight fluid is completely contained in the bottom reservoir **802**. During that time, the light weight fluid **805** moves up from the bottom reservoir **802** to the top reservoir **801**. A selected combination of the viscosity of the fluids **805**, **806** and the size of the channels given by the picture chamber **803** may be carefully made in order to set the time for fade in/fade out of the image illustrated through the heavy weight fluid **806** which is slowed down. Then the device is adapted to be turned upside down, and at this time, the filling or emptying of the image restarts. The coating and/or micro structuration patterns **804** are preferably made in such a way as to display a different picture when filling in upright or upside down position (FIG. **6***c*). By way of example, FIGS. **6***d* to **6***g* illustrate the present embodiment implemented in jewelry.

Referring now to FIGS. **7***a* to **7***d*, the device includes a top reservoir **901** and a bottom reservoir **902**. The top reservoir **901** is made up of transparent, semi-transparent, partially opaque or opaque material. The top reservoir **901** may contain a visible or a hidden temperature compensation system. The bottom reservoir **902** is made up of transparent, semi-transparent, colored, partially opaque or opaque material. The bottom reservoir **902** may contain a visible or a hidden temperature compensation system. The device further optionally includes a picture background **903** of transparent, semi-transparent, colored, partially opaque or opaque material. A network of channels **904**, with or without surface treatment and/or micro-structuration, is connected to the top reservoir **901** and the bottom reservoir **902**. The network channels **904** can either be in front or behind the picture background **903**. The device contains a light weight fluid **905** and a heavy weight fluid **906**. The light weight fluid **905** may be transparent, semi-transparent or colored. The light weight fluid **905** may be made up of more than one fluid (include gas bubbles for thermal expansion management), or may be gas. The light weight fluid **905** has a lower density than the heavy weight fluid **906**. The light weight fluid **905** and the heavy weight fluid are non-miscible. The heavy weight fluid **906** may be transparent, semi-transparent or colored. The heavy weight **906** fluid has a higher density than the light weight fluid **905**. An attachment system **907** holds the system in upright position and allows the device to be held in upright or upside down position. The heavy weight fluid **906** moves down due to the effect of gravity from top reservoir **901** to bottom reservoir **902**, but is slowed down and distributed in the network channels **904**, progressively filling the picture, then emptying it, until it is completely contained in the bottom reservoir **902**. During that time, the light fluid **905** moves up from the bottom reservoir **902** to the top reservoir **901**. Combination of the viscosity of the fluids **905**, **906** and size of the channels **904** is very carefully made in order to set the time during which the picture is to be visible or "alive". Then the device is turned upside down, and the filling/emptying of the image restarts.

Referring now to FIGS. **8***a* to **8***c*, the device **1000**, optionally embodied in a piece of jewelry, is made up of a container **1001**. The container **1001** is preferably of transparent, semi-transparent or partially opaque material, or is decorated with stones, crystals, inclusions, or similar decorative materials. The container **1001** may contain a visible or a hidden temperature compensation system. The container **1001** contains fluids **1002**. The fluids **1002** may be transparent, semi-transparent or colored. The fluids **1002** are non-miscible with each other and of high viscosity. The device comprises a mixer **1003**. The mixer **1003** may be of transparent, semi-transparent or colored material. The surface of the mixer **1003** may be visible or invisibly structured (via, e.g., localized coating, micro-structuration, etc. The mixer is driven by a transmission **1004**. FIG. **8***b* shows a contactless magnetic transmission. FIG. **8***a* shows a direct mechanical link. The device further optionally comprises a motor **1005** to drive the transmission **1004**. By way of example, the motor **1005** is preferably realized as a spring barrel release mechanism or as an electrical motor. The motor **1005** could further include a speed limiter. A spring barrel **1006** or a battery is preferably used as a source of energy to drive the motor **1005**. Alternatively, the transmission is driven manually, e.g. through a cord, a push-button, a crown like a watch rewinding mechanism. A user may activate the energy input (for example by pulling the cord, switching the power on, etc.). The motor **1005** activates the mixer **1003** via the transmission **1004**, mixing the fluids **1002** in the container **1001**. Such movement generates an evolving random picture of mixing fluids, until consumption of the energy stored in storage **1006** or until switch-off by the user. When the mixing is stopped, the fluids regroup.

Referring now to FIGS. **9***a* to **9***e*, the device, optionally, the jewelry of the invention, is made up of one or more flexible transparent tubes **1102** containing one or more immiscible fluids **1104**, **1106**. The transparent tubes **1102** containing the fluids are preferably decorated with stones, or crystals, or similar decorative elements **1110**, and are connected to a mixer/container **1112**. The mixer/container optionally has the capacity to contain the fluids, and may be visible or hidden depending its position (for example, behind the neck of the wearer), activated as mentioned in the example of FIG. **8** (e.g., spring barrel system, electrical motor, push-button, etc.), or may rely only on gravity for its functioning. The immiscible fluids flow into the flexible channels in a sequence defined by the mixer/container. If the mixer/container relies only on gravity for its functioning, after use of the necklace, it is stored in upside-down position, so that the fluids return to the mixer/container, where the fluids regroup according to their density and immiscibility.

Referring now to FIGS. **10***a* to **10***b*, the device of the invention, preferably a piece of jewelry, is made up of a container **1201**. The container **1201** may be of transparent, semi-transparent or partially opaque material, or may be decorated with stones, crystals, inclusions, or similar decorative materials. The container **1201** may contain a visible or a hidden temperature compensation system. The container **1201** contains fluids **1202** and **1203**. The fluid **1202** is ferromagnetic and/or contains ferromagnetic particulates and may be transparent, semi-transparent or colored. The fluid **2013** may be transparent, semi-transparent or colored. The fluids **1202** and **1203** are non-miscible with each other. The device of the invention comprises a magnet **1204**. The magnet **1204** may be made of a number of smaller magnets arranged in a specific shape. The device of the invention includes a motor **1205** (not represented here, but similar to **1005** of FIG. **8**), able to generate a movement of magnet **1204**. The motor **1205** is preferably able to generate a complex movement, for example, in more than one direction and/or more than one plane. The motor **1205** is preferably a spring barrel release mechanism, or an electrical motor. It may include a speed limitation. The device of the invention optionally includes an energy storage capacity (not represented here, similar to **1006** of FIG. **8**), that may be a spring barrel or a battery. The device includes a manual energy input (not represented here, and similar to FIG. **8**) such as a cord, a push-button, a crown like a watch rewinding mechanism. The user activates the energy input **1207** (for example by pulling the cord, switching the power on, etc.); the motor **1205** moves the magnet **1203**, which generates a movement of the ferrofluid **1202** in the container **1201**. Such movement generates an evolving random shape of ferrofluid **1202**, until consumption of the energy stored in storage **1206** or until switch-off by the user. The shape of the ferrofluid is preferably used to generate changes of appearance of the containers' decoration (for example crystals)

Referring now to FIG. **11***a*, a ring with a transparent pane of glass, crystal or sapphire is provided which has a baseplate and elevated channels forming a labyrinth. The elevated channels are fixed on the baseplate in a watertight manner. The system is made up of channels having different forms, as e.g. perpendicular channels, tree structure, spiral, or others forms. Between or within the channels, traditional jewelry embellishments, such as, e.g. elements made of precious material, can be placed along the border of the channels, in the channels, and/or as decoration.

A first movement of the fluids inside the channels is activated through pushing, gliding or displacing a jewel element. This jewel element is mechanically connected with a first bellows. The first bellows contains a first colored or non-colored liquid which may be pressed/forced into the channel(s) through pushing of the jewel element. The first liquid pushes a second colored or non-colored liquid. The first and the second liquid are immiscible. The channels are in liquid communication with a hidden chamber on the backside of the ring. The chamber features an elastic, deformable, metallic membrane **1536**. The membrane **1536** is capable of deforming elastically if pressure is applied to the membrane by a finger, for example, and to revert gradually to its initial position and thereby return the second liquid and consequently the first liquid into the bellows. This creates a second movement, substantially in the opposite direction of the first movement. The speed of the first movement as well as the speed of the second movement is controlled either by the hydraulic resistance of the channels itself, by adding small orifices **1507** or **4***b* or through adding a substance to increase the hydraulic resistance.

The cabochon or piece of jewelry of the invention is activated by the user applying pressure as a push-button **1502**. The push-button **1502** preferably has a precious stone **1504** embedded into it. A boundary layer **1506** is disposed between precious stone **1504** and a bellows **1510**. The bellows **1510** contains the liquid **1512**. Fluid restrictors **4***a*/**4***b* restrict the fluids flow between the bellows **1510** and a central fluid cavity **1514**, providing additional hydraulic resistance as desired. A stroke limiter **1515** limits the stroke of the push-button **1502** to avoid crushing the bellows **1510**. A metallic boss **1520** supports the mechanism which activates the movement of the liquids **1522** in the cavity **1514**. The internal form of a channel **1524** of a labyrinth **1526** may be rectangular, square (as in FIGS. **11***c* and **11***d*) or rounded or another form. A plate **1530** with holes (to allow the mounted precious stones **1533** to protrude through the plate) is sealingly disposed against a baseplate **1560** in a watertight manner in order to create the system of channels **1524**. Traditional jewel elements such as the precious stones **1533** are disposed or mounted above the channels **1524** of the labyrinth **1526**. Such channels **1524**, given that the plate **1530** is preferably transparent, are visible to the wearer. A passage channel **1532** is provided for the liquid **1522** to be guided into a hidden chamber **1534** while the movement of the liquids is activated. Storage chamber **1534** provides adequate storage space for the liquid **1522**. An elastic membrane **1536** made out of metal closes the storage or hidden chamber **1534**. A parametrical structure **1540** of, for example, a ring **1542**, provides a frame for the labyrinth **1526**. Of course, other forms of traditional jewelries besides a ring **1542** can be made, such as a stud, broach or pin, cufflink or a pendant for a necklace. Of course, the ring **1542** includes an annular portion **1544** for fitting on a finger.

Referring now to FIG. **11***b*, the ring **1542** is provided with a transparent pane or plate **1530** of glass, crystal or sapphire sealingly mounted against a baseplate **1534** and elevated channels **1524** forming a labyrinth **1526**. The elevated channels **1524** are fixed on the baseplate **1560** in a watertight manner and may be investment cast in place as part of the baseplate. The jewelry according to this embodiment has channels **1524** that may have different forms, as e.g. perpendicular channels, tree structure, spiral, or any other form. Over the channels **1524** and between the channel walls **1525**, traditional jewels, such as e.g. elements made of precious material, can be placed bordering the channels and/or as decoration. Precious stones can of course be placed within the channels.

An initial movement of the liquids **1522** inside the channels **1524** is preferably activated through pushing on, sliding or otherwise displacing a jewel element such as the push-button **1502**. This jewel element **1502** is in fluidic communication with a first bellows **1510** via a boundary layer **1506**. In another embodiment of the ring **1542'**, the first bellows **1510** contains a first colored liquid **1512'** or non-colored liquid **1522** which is pressed into the channel(s) **1524** by pushing of the jewel element or push-button **1502**. The first liquid **1512'** pushes the second colored or non-colored liquid **1550**. The first and the second liquid **1512'** and **1550** are immiscible. Each channel **1524** of the ring **1542'** features a hidden bellows **1511** at the end of the channel **1532'**. The bellows **1511** at the channels endings are able to re-press or return the second liquid **1550** into the channels **1524** and consequently returning the first liquid **1512'** into the first bellows **1510**. This creates a second movement, substantially in the opposite direction of the first movement. The speed of the first movement as well as the speed of the second movement is controlled either by the hydraulic resistance of the channels itself, or through adding a substance (e.g., high viscosity element) to increase the hydraulic resistance. A hidden chamber **1552** is provided for the accommodation of the bellows **1511** at the end of the channels **1532'**.

Advantageously, the motion generation system is a battery-operated electrical motor agitating at least one of the at least two fluids.

Advantageously, the motion generation system is a spring-barrel energized motor agitating at least one of at least one of the at least two fluids.

Advantageously, the motion generation system is a flexible part of the fluid reservoir initially deformed by the user and which returns to its state of equilibrium.

Advantageously, the motion generation system is the combination of the environment temperature and the thermal expansion property of at least one of the at least two fluids.

Advantageously, the motion generation system is the combination of a magnetic attraction force and a ferromagnetic property of at least one of the at least two fluids.

Advantageously, the motion generation system is the combination of the construct's wearer movements and the mass of at least one of the at least two fluids.

Advantageously, the motion generation system includes the effect of gravity, surface tension of the fluids and/or the fluids reservoir such as capillary action and/or surface micro structuration and/or coating of the fluids reservoir.

Advantageously, the animation causes a change of appearance of the construct's decorative elements, such as switching ON/OFF stones or stone-like looking elements, or immersing/emerging decoration elements in the fluids. The animation may cause a temporary and/or permanent mixing of the fluids.

Advantageously, the particulate is suspended in at least one of the at least two fluids.

Advantageously, the fluids are at least partially immiscible, and at least one of the fluids is a liquid, the other optionally being a gas.

Advantageously, the fluids are of different colors or refraction indexes so that one fluid is readily visually discernable from the other. Decorative elements, such as gold leaf, is preferably suspended in at least one fluid.

Advantageously, the reservoir includes a visible or hidden temperature compensation system.

Advantageously, the construct is a timepiece.

Advantageously, the fluids are movable by a mechanical input.

Advantageously, the construct is a closed system, where the motion of the mobile elements is controlled by the presence of one or more fluids.

Advantageously, in a method of operation of the construct of the invention, a wearer performs the steps of:

a. orienting the construct;

b. activating a motion generator; and/or

c. changing the orientation of the construct so as to change the angle through which the force of gravity acts through the construct, thereby changing or triggering an animation effect.

It should be appreciated that the particular implementations shown and described herein are representative of the invention and its best mode and are not intended to limit the scope of the present invention in any way. Furthermore, any connecting lines shown in the various figures contained herein are intended to represent exemplary functional relationships and/or physical couplings between various elements. It should be noted that many alternative or additional physical connections or functional relationships may be present and apparent to someone of ordinary skill in the field.

Moreover, the apparatus, system and/or method contemplates the use, sale and/or distribution of any goods, services or information having similar functionality described herein.

The specification and figures are to be considered in an illustrative manner, rather than a restrictive one and all modifications described herein are intended to be included within the scope of the invention claimed, even if such is not specifically claimed at the filing of the application. Accordingly, the scope of the invention should be determined by the claims appended hereto or later amended or added, and their legal equivalents rather than by merely the examples described above. For instance, steps recited in any method or process claims should be construed as being executable in any order and are not limited to the specific order presented in any claim. Further, the elements and/or components recited in any apparatus claims may be assembled or otherwise operationally configured in a variety of permutations to produce substantially the same result as the present invention. Consequently, the invention is not limited to the specific configuration recited in the claims.

Benefits, other advantages and solutions mentioned herein are not to be construed as necessary, critical, or essential features or components of any or all the claims.

As used herein, the terms "comprises", "comprising", or any variation thereof, are intended to refer to a non-exclusive listing of elements, such that any process, method, article, composition or apparatus of the invention that comprises a list of elements does not include only those elements recited, but may also include other elements described in this specification. The use of the term "consisting" or "consisting of" or "consisting essentially of" is not intended to limit the scope of the invention to the enumerated elements named thereafter, unless otherwise indicated. Other combinations and/or modifications of the above-described elements, materials or structures used in the practice of the present invention may be varied or otherwise adapted by the skilled artisan to other design without departing from the general principles of the invention.

The patents and articles mentioned above are hereby incorporated by reference herein, unless otherwise noted, to the extent that the same are not inconsistent with this disclosure.

Other characteristics and modes of execution of the invention are described in the appended claims.

Further, the invention should be considered as comprising all possible combinations of every feature described in the instant specification, appended claims, and/or drawing figures which may be considered new, inventive and industrially applicable.

Multiple variations and modifications are possible in the embodiments of the invention described here. Although certain illustrative embodiments of the invention have been shown and described here, a wide range of modifications, changes, and substitutions is contemplated in the foregoing disclosure. While the above description contains many specifics, these should not be construed as limitations on the scope of the invention, but rather as exemplifications of one or another preferred embodiment thereof. In some instances, some features of the present invention may be employed without a corresponding use of the other features. In addition, the term "flexible" as used herein encompasses the concept of variable, in that a variable volume reservoir should be considered a flexible chamber, even if no individual components flex. Accordingly, it is appropriate that the foregoing description be construed broadly and understood as being given by way of illustration and example only, the spirit and scope of the invention being limited only by the claims which ultimately issue in this application.

What is claimed is:

1. A construct to be worn by a wearer, the construct comprising:

at least one reservoir, the reservoir enclosing a liquid and a gas and comprising a wall, the wall surrounding an inner space, the wall having an inside surface and an outside visible surface;

at least one decorative component through which light is capable of passing and which spans the wall from the outside visible surface to the inside surface, and

the liquid and the gas having the physical property of refractivity which differs from each other, the liquid and the gas being disposed within the inner space so as to be capable of contact with an at least a portion of at least one decorative component spanning the wall thereof, the portion making up part of the inside surface of the wall whereby, upon contact of the at least one portion of the at least one decorative component with the liquid, the construct is adapted to change the appearance of the at least one portion of the outside visible surface of the decorative component when viewed by an observer through the outside visible surface of the at least one decorative component into the inner space.

2. The construct of claim **1**, wherein the at least one decorative component is impermeably mounted in a watertight manner with respect to the reservoir.

3. The construct of claim **1**, further including a wearer connection element selected from one of a group of wearer connection elements consisting of a ring, a chain, a wristband, a pin, a clasp, a clip, and a body piercing element.

4. The construct of claim **1**, wherein the at least one decorative component is selected from among stones, crystals, or inclusions.

5. The construct of claim **1**, including a motion generating system adapted for agitating the two fluids so as to cause intermittent contact of one fluid with at least one decorative component thereby changing the appearance of the decorative components causing a visual animation effect.

6. The construct of claim **1**, wherein at least two fluids have a further physical property which is different from the other fluid or the channels'/reservoirs' surface.

7. A construct to be worn by a wearer comprising at least one fluid reservoir having a wall defining an inside and an outside surface of a front plate of the reservoir, at least one inside surface of the reservoir consisting at least in part of the front plate including at least one decorative component through which light is capable of passing and which spans the wall of the front plate from the outside to the inside surface of the reservoir and

at least two immiscible fluids having differing physical properties disposed in the fluid reservoir and adapted to intermittently come into contact with a portion of the inside surface of the at least one decorative component which comprise part of the inside surface of the reservoir, the contact or non-contact changing the appearance of the at least one when viewed through the decorative component.

8. A construct to be worn by a wearer, the construct comprising:

at least one reservoir, the reservoir enclosing at least two fluids and comprising a wall, the wall surrounding an inner space, the wall having an inside surface and an outside visible surface each comprising at least one portion of said inner or outer surface;

a plurality of decorative components through which light is capable of passing and which span the wall from the outside surface to the inside surface such that the appearance of the at least one portion of the decorative components change depending on the position of the fluids, and

the fluids having the physical property of refractivity which differs from one to the other, the fluids being disposed within the inner space so as to be capable of contact with the at least one portion of the decorative components, the portion making up part of the inside surface of the wall.

9. A construct to be worn by a wearer, the construct comprising:

at least one reservoir, the reservoir comprising a wall, the wall surrounding an inner space, the wall having an inside surface and an outside visible surface;

a plurality of decorative components through which light is capable of passing and which span the wall from the outside visible surface to the inside surface, and

at least two immiscible fluids having the physical property of refractivity which differs from one fluid to the other fluid, the fluids being disposed within the inner space so as to be capable of contact with a transparent or semi-transparent portion of the decorative components, the portion making up part of the inside surface of the wall.

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