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(54) **Watch or jewel ornamented with one or more precious stones**

(57) Watch or jewel (1) which is encrusted with one or several precious stones (10) whereby at least one precious stone (10) has fluorescent qualities, characterised in that the watch or jewel (1) is provided with means (12) which allow to make the above-mentioned precious stone or precious stones (10) fluoresce each with a desired

intensity, whereby these means (12) comprise one or several light sources (13,45) for emitting UV light and means (15-17) for guiding the light which is emitted by one or several of the above-mentioned light sources (13) through the precious stone or precious stones (10) having fluorescent qualities.

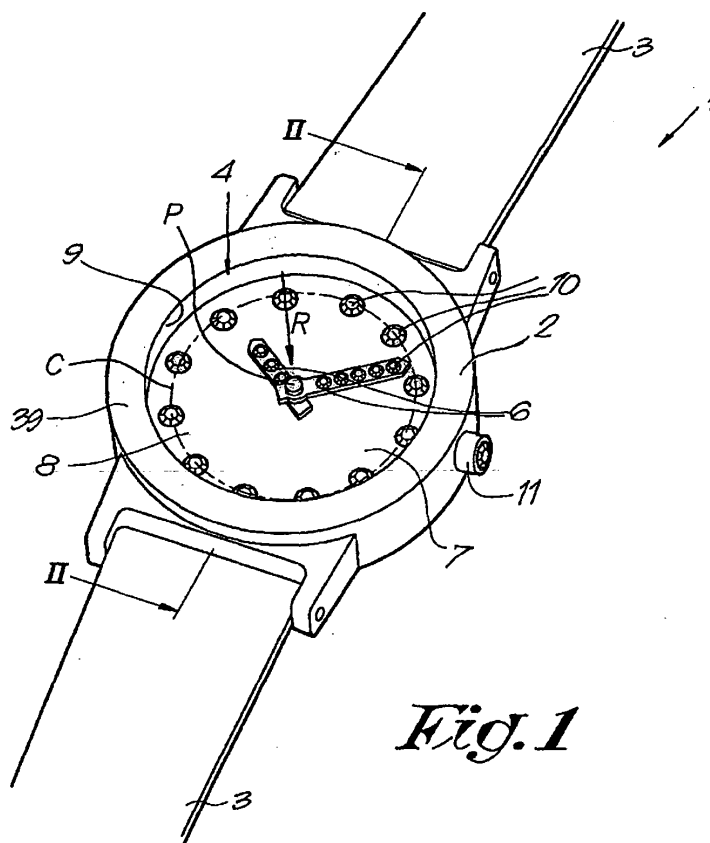


Fig. 1

Description

[0001] The present invention concerns a watch or jewel which is encrusted with one or several precious stones, preferably with diamonds.

[0002] In particular, the present invention mainly concerns a watch or jewel which is encrusted with one or several diamonds, whereby in particular at least one of these diamonds has fluorescent qualities.

[0003] When such diamonds with fluorescent qualities are irradiated with ultraviolet light (UV light), in other words with light having a wavelength outside the visible spectrum between 100 and 400 nm, they start to emit light themselves in the visible spectrum.

[0004] The colour of this emitted light may vary from yellow over orange to red, purple and blue in case of a diamond, depending on the chemical composition of the diamond and in particular on the number of nitrogen-related impurities in the diamond, which lends the watch or jewel more style.

[0005] Of course, watches or jewels are already known which are provided with diamonds having fluorescent qualities, whereby these diamonds are merely provided as an embellishment.

[0006] A disadvantage of these known watches or jewels is that they do no justice to the above-mentioned fluorescent qualities, as a result of which a major decorative effect of the diamonds is lost.

[0007] Another disadvantage of such known watches and jewels is that the fluorescent qualities of the diamonds are not used to light the watch or the jewel when it is dark.

[0008] Moreover, watches or jewels are known which are either or not encrusted with diamonds and which are provided with a light.

[0009] A disadvantage of most known lit watches or jewels is that their lighting is usually merely designed to meet functional demands, i.e. making the watch or jewel sufficiently visible in the dark so as to make it possible, for example, to see what time it is, such that the design of the lighting is little attractive and certainly does not emphasize the beauty of the jewel, for example by doing justice to the characteristic qualities of the diamonds, such as the fluorescent qualities.

[0010] In other embodiments, several sources of light are used to obtain a better lighting, which is disadvantageous in that such watches or jewels use a lot of power when they are lit, and in that such watches or jewels are usually sizeable, since they have to provide room for several light sources.

[0011] US-A-2004/213088 describes a watch in which different precious stones with fluorescent qualities are provided on the dial and whereby a LED is provided in the housing of the watch which emits light in the UV spectrum and which can make the precious stones fluoresce.

[0012] A disadvantage of a watch according to US-A-2004/213088 is that the position of the LED does not allow any efficient lighting of the precious stones and that

a major part of the emitted light does not go through the precious stones. The efficiency of the lighting of the precious stones is in other words low.

[0013] Another disadvantage is that, in the above-mentioned watch, it is impossible to obtain a uniform lighting of the precious stones.

[0014] Also, the present invention aims among others to obtain an efficient and at the same time more attractive lighting for watches or jewels which are encrusted with precious stones, preferably with diamonds.

[0015] The present invention aims to remedy one or several of the above-mentioned and other disadvantages.

[0016] To this end, the invention concerns a watch or jewel which is encrusted with one or several precious stones, whereby at least one precious stone has fluorescent qualities, whereby the watch or jewel has one or several light sources (13,45) for emitting UV light so as to make the above-mentioned precious stone or precious stones fluoresce and means for guiding the light, which is emitted by one or several of the above-mentioned light sources, through the precious stone or precious stones having fluorescent qualities, characterised in that the above-mentioned means for guiding the emitted light through one or several precious stones comprise what is called a light guide or light tunnel with an entry for the light opposite at least one light source and one or several exits opposite at least one of the above-mentioned precious stones.

[0017] An advantage of the present invention is that the above-mentioned light guide makes it possible to efficiently couple the light, coming from one or several light sources, in the precious stones. Indeed, the light guide makes it possible to guide the beam of light to the precious stones, as a result of which the emitted light is mainly incident on the precious stones.

[0018] Moreover, thanks to an appropriate choice of material for the light guide, the difference between the refractive index of the light guide and that of the precious stones can be minimised, as a result of which the coupling of the light in the precious stones is improved.

[0019] Another advantage of such a watch or jewel according to the invention is that the precious stones with fluorescent qualities can be lit, such that the desired fluorescence of the different precious stones with fluorescent qualities can be obtained.

[0020] Another advantage of such a watch or jewel is that it allows to make several precious stones fluoresce, whereby the UV light can be distributed by the above-mentioned light tunnel according to a predetermined pattern, for example evenly, over the different precious stones, such that the precious stones fluoresce with the desired intensity when the UV light source is activated.

[0021] Of course, it is not excluded to emit, apart from the UV light, light with other frequencies.

[0022] According to another preferred embodiment, an adjustable screen is provided between the precious stones and one or several of the exits of the light tunnel

or light guide, in view of the individual adjustment of the intensity of the light which is being guided through the precious stones.

[0023] An advantage of a watch or jewel according to the latter preferred embodiment is that, by adjusting the screen, the amount of incident light in the precious stone concerned can be altered, such that small differences in the fluorescent qualities of the different precious stones, for example due to irregularities in the composition of the precious stones, can be absorbed to thus obtain a desired intensity, for example an even intensity, of the fluorescence of the different precious stones.

[0024] Said screen is preferably formed of a cylindrical sleeve which is sealed on one far end and cut slantwise on the other far end and whereby, by simply rotating the cylindrical sleeve, there may be more or less incident rays of light on the neighbouring precious stone.

[0025] Of course, other embodiments of this screen are not excluded.

[0026] In order to better explain the characteristics of the invention, the following preferred embodiments of watches or jewels according to the invention which are encrusted with one or several precious stones and preferably with diamonds, are given as an example only without being limitative in any way, with reference to the accompanying drawings, in which:

- figure 1 represents a watch according to the invention, seen in perspective;
- figure 2 represents a section according to line II-II in figure 1 to a larger scale;
- figure 3 represents the part indicated by F3 in figure 2 to a larger scale;
- figures 4 and 5 represent the light guide and the screening cap respectively, indicated by F4 and F5 in figure 3, seen in perspective and to a larger scale;
- figures 6 to 8 included represent a variant of a watch according to figures 2 up to 4 included;
- figures 9 up to 11 included represent another variant of a watch according to figures 1 to 3; and
- figure 12 represents the part indicated by F12 in figure 10 to a larger scale.

[0027] The first embodiment of a watch 1 according to the invention, represented in figures 1, 2 and 3, mainly consists of a housing 2 onto which two parts of a wristlet 3 are hinged and in which, in a central space 4 of the housing 2, is provided a driving module 5, which is schematically represented here by means of a frame in a chain line, for driving hour hands 6 which move over a dial 7, and whereby the whole is covered with a screening glass 8.

[0028] The dial 7 is connected to the housing 2 via a standing wall 9 or it is part of it.

[0029] To indicate the hours, precious stones with fluorescent qualities, in this case diamonds 10, are provided in the dial 7 at regular distances over a circle C.

[0030] In this embodiment are also provided diamonds

10 on the hour hands 6 and in a control knob 11.

[0031] Further, the watch 1 is provided with means 12 which make it possible for at least a part of the above-mentioned diamonds 10 to fluoresce, each with a desired intensity.

[0032] These means 12 mainly consist of light sources for emitting UV light in the form of LEDs (Light Emitting Diodes) 13 which are provided on a flexible board 14 between the housing 2 and the standing wall 9 and a light guide 15 which is placed between the LEDs 13 and the diamonds 10 and which makes it possible to guide the light emitted by the light sources 13 through the diamonds 10.

[0033] Of course, it is not excluded for the light sources 13 to emit light outside the UV spectrum.

[0034] In the given example, an adjustable screen 16 is provided in the form of a screening cap 17 which has been provided under every diamond 10 and with which the intensity of the light coming out of the light guide 15 can be individually adjusted for each diamond 10 before being guided to the pavilion 18, in other words the basis, of the diamonds 10.

[0035] The above-mentioned light guide 15 and the screening caps 17 are in this case provided on a supporting plate 19 fixed under the dial 7 on the housing 2.

[0036] In this embodiment, the flexible board 14 has been folded into a cylindrical sleeve and the LEDs 13 are provided on it, such that they emit the light mainly in a radial direction R to the middle point P of the watch 1.

[0037] As is represented in figure 4, the light guide 15 is in this case a flat, ring-shaped disc 20 made of a transparent material, such as for example quartz, in which holes 21 are provided at the height of the diamonds 10, tapered towards the screening glass 8.

[0038] The LEDs 13 are provided opposite a side edge 22 of the light guide 15, whereby this side edge 22 forms an entry via which the light, coming from the LEDs 13, can enter into the light guide 15 and can leave via the light guide 15 through exits formed by the side walls 23 of the conical holes 21.

[0039] Every above-mentioned screening cap 17 is in this case mainly formed of a cylindrical sleeve 24 which is sealed on one far end 25 and cut slantwise on the other far end 26, whereby every screening cap 17 is provided in the supporting plate 19 and can rotate around a shaft directed in an axial direction QQ' transversal to the dial 7.

[0040] Further, also a notch 27 is provided on the sealed far end 25 which makes it possible to turn the screening cap 17 by means of a screwdriver.

[0041] The use and lighting of such a watch 1 according to the invention is very simple and as follows.

[0042] In order to lighten the diamonds 10, the LEDs 13 are activated, for example by pressing the control knob 11, as a result of which an electric circuit 10 is closed and electricity from the battery supplies current to the LEDs 13, via the board 14, so that they lighten.

[0043] The emitted light is guided through the light guide 15 via the side edge 22 forming an entry and then

leaves the light guide 15 via the side edges 23 of the conical holes 21 forming an exit, such that the light is distributed over the diamonds 10 situated opposite the exits and the diamonds 10 are lit, as a result of which they start to fluoresce.

[0044] The intensity of the incident light on the diamonds 10 can be individually adjusted for every diamond 10 by turning the screening caps 17 concerned, so that they can screen off the light coming out of the light guide 15 via a side wall 23 to a higher or lesser degree before it is guided to the pavilion 18 of the neighbouring diamond 10.

[0045] It is clear that the relative position of the side walls 23 of the light guide 15, the screening caps 17 and the pavilion 18 of the diamonds 10 are tuned to each other in such a manner that the light coming from the light guide 15 enters the pavilion 18 of the diamond 10 at an appropriate angle of incidence, such that for example a sufficient amount of UV-light can enter the diamond 10 so as to make it fluoresce.

[0046] In this embodiment, the diamonds 10 in the hour hands 6 are lit by a part of the light which is guided through the diamonds 10 of the dial 7.

[0047] The intensity of the UV light reaching these diamonds 10 on the hour hands 6 can possibly be increased by applying a UV-reflecting coating under the screening glass 8.

[0048] On the other hand, in another embodiment it is possible to obtain, precisely by omitting said coating, that the diamonds 10 in the hour hands fluoresce under the influence of UV light coming from outside, for example UV light from the sun light or from a UV light source, as is for example often used in discotheques and the like.

[0049] Figures 6 and 7 represent a second embodiment of a watch 1 according to the invention, whereby, over the circumference of the watch 1, in the standing side wall 9 between the housing 2 and the dial 7 has been left an opening 28 to light the dial 7.

[0050] In this case, the light guide 15 is ring-shaped as well, and the light guide 15 is provided with a standing edge 29 extending up to the above-mentioned opening 28 in the side wall 9.

[0051] Said standing edge 29 ends in a bevel at the bottom 30 and a bevel at the top 31 running parallel with the latter, opposite said opening 28.

[0052] The standing edge 29 is provided with an overhang 31 on the outside of its free end, having a flat side 33 which is parallel to the supporting plate 19 and a bent side 34 which connects the flat side 33 to the bevel 31.

[0053] The board 14 is in this case a ring-shaped disc on which are provided LEDs 13 under the flat side of the overhang, such that this flat side 33 forms an entry for the light emitted by the LEDs 13 in a direction QQ' transversal to the supporting plate 19.

[0054] The inner edge 35 of the ring-shaped light guide 15 is more or less knurled in this embodiment, as is represented in figure 8, whereby opposite the diamonds 10 in the dial 7 are provided holes 36 with side walls 37

which are practically semi-circular and which are tapered towards the screening glass 8.

[0055] Between these semi-circular holes 36 are provided V-shaped recesses 38 whose tips are directed radially outward.

[0056] Just as in the preceding embodiment, screening caps 17 are also provided between the side walls 37 of the tapered holes 36 and the diamonds 10.

[0057] The use and working of a watch 1 according to this embodiment are analogous to those of the preceding embodiment and they are as follows.

[0058] When the LEDs 13 are excited, the flat side 33 of the overhang 32 forms an entry via which the light enters the light guide 15.

[0059] The bent side 34 functions as a reflector, such that the light is reflected on it and cannot leave the light tunnel 15 via this bent side 34.

[0060] Naturally, the reflecting effect of the side 34 can also be obtained by means of a mirror or the like.

[0061] However, a part of the light reaches the bevel 31 and leaves the light guide 15 there via this bevel 31 which thus forms an exit of the light guide 15, such that the dial 7 is lit via the opening 28.

[0062] This is particularly desirable when a diamond powder or a phosphor powder or the like is provided on the dial 7 so as to embellish it.

[0063] The remaining part of the light leaves the light guide 15 via the side walls 37 of the tapered semi-circular holes 36 forming the exit to light the diamonds 10 in the dial 7, as described in the preceding embodiment.

[0064] De semi-circular holes 36 hereby each time provide a lens functionality which makes it possible to focus the light on the diamonds 10 when it leaves the light guide 15, which increases the efficiency of the coupling of the light in the diamonds 10.

[0065] Thanks to the screening caps 17, the lighting of every diamond 10 can be individually adjusted.

[0066] It is clear that, with this embodiment of a watch 1 according to the invention, a better lighting can be obtained above the dial 7, such that also the diamonds 10 or the diamond powder or the like present in the hour hands 6 or on the dial 7 can be lit more intensely with for example UV light so as to make the diamonds 10 or the like fluoresce.

[0067] Figures 9 to 12 included represent a third alternative embodiment of a watch 1 according to the invention.

[0068] In this embodiment, diamonds 10 are provided on the outside 39 of the watch 1 in holes 40 in the housing 2 and in the hour hands 6.

[0069] Adjacent to the diamonds 10 in the housing 2, between the standing edge 9 and the housing 2, in particular under the diamonds 10, is provided a ring-shaped light guide 15 with a rectangular section, whereby in the light guide 15 is provided a conical recess 41 under every diamond 10 which serves as a seating for the pavilion 18 of the diamond 10 concerned.

[0070] The LEDs 13 are in this case provided under

the ring-shaped light guide 15 and they are designed such that they emit their light in a direction QQ' transversal to the dial 7 to the bottom face 42 of the light guide 15.

[0071] In this third specific embodiment, the watch 1 is equipped with an additional hand 43 with a shaft 44 which can be driven by a driving mechanism which is part for example of the driving module 5 and which is designed as a light guide 15 made of a translucent material.

[0072] In the prolongation of the above-mentioned shaft 44 of the additional hand 43 is provided a LED 45 whose light beam is directed towards the shaft 44 of said hand 43, as is represented to a larger scale in figure 12.

[0073] The watch 1 is equipped with two control knobs, a first control knob 11 for activating the LEDs 13 and a second control knob 46 for simultaneously activating the LED 45 and the above-mentioned driving mechanism of the additional hand 43 respectively.

[0074] By pressing the first control knob 11, the LEDs 13 are activated and the diamonds 10 in the housing 2 are lit by the light coming from the LEDs 13 which enters the light guide 15 via the bottom face 42 and which leaves the light guide 15 via the conical recesses 41.

[0075] Pressing the second control knob 46 makes sure that the additional hand 43, which is designed as a light guide 15, turns one or several times round its shaft 44, and at the same time the LED 45 is activated, so that each time the hour hands 6 pass, the diamonds 10 which are provided in the latter hour hands 6 fluoresce and thus make it possible to see the watch 1 in the dark.

[0076] In order to avoid direct eye contact with harmful UV light, it is preferably made sure in the different embodiments that no UV light can leave the watch 1.

[0077] This can be done for example by providing a UV filter, for example in the shape of a coating which is provided on the visible parts of the diamonds 10 or on the screening glass 8 by means of evaporation techniques or other techniques.

[0078] Another possibility consists in selecting diamonds 10 having a fluorescence level which is situated above a certain minimum, so that all or at least a sufficient amount of the UV light is absorbed by the diamonds 10 and is transformed in visible light.

[0079] Of course, other techniques are not excluded.

[0080] It is clear that with a watch or jewel 1 according to the invention, the aim can be reached, i.e. that the light of a light source 13 with the required intensity can be guided up to the diamonds 10 by means of a light guide 15 and an adjustable screen 16 in the form of several screening caps 17 so as to obtain a desirable dispersion of the fluorescence of the diamonds 10, such as for example an even dispersion.

[0081] The invention is by no means limited to the embodiments given as an example and represented in the accompanying drawings.

[0082] A similar lighting 13 and a light guide 15, as well as an adjustable screen 16, can be applied just as well for example in a brooch or any other jewel which is en-

crusted with fluorescent precious stones or diamonds.

[0083] It is also conceivable to provide a watch or jewel 1 according to the invention with the necessary electronics, whereby for example the energy consumption of the LEDs 13 can be restricted by switching them on in turns, whereby the time during which the LED 13 is switched on can be adjusted for example by means of a pulse width modulation adjustment.

[0084] Such an electronic adjustment also makes it possible, for example, to switch the different LEDs 13 on and off according to a certain pattern or to control different LEDs 13 emitting UV light from another part of the UV spectrum, such that all sorts of fluorescence colours can be generated in the diamonds 10. In yet another embodiment can be provided for example phosphor on the diamonds 10, such that the natural fluorescence colour of the diamonds 10, which often verges on blue, can be emphasized or altered.

[0085] The invention is by no means restricted to the embodiment given as an example and represented in the accompanying drawings; on the contrary, such a watch or jewel 1 according to the invention which is encrusted with one or several precious stones 10 can be made in different shapes and dimensions while still remaining within the scope of the invention.

Claims

1. Watch or jewel (1) which is encrusted with one or several precious stones (10) whereby at least one precious stone (10) has fluorescent qualities, and whereby the watch or jewel (1) comprises one or several light sources (13,45) for emitting UV light to make the above-mentioned precious stone or precious stones (10) fluoresce, and means (15-17) to guide the light which is emitted by one or several of the above-mentioned light sources (13) through the precious stone or precious stones (10) having fluorescent qualities, **characterised in that** the above-mentioned means (15-17) for guiding the emitted light through one or several precious stones comprise what is called a light guide or light tunnel (15) with an entry (22,33,42,44) for the light opposite at least one light source (13,45) and one or several exits (23,37,41,43) opposite at least one of the above-mentioned precious stones (10).
2. Watch or jewel according to claim 1, **characterised in that** a light source (13,45) is provided which emits light outside the UV spectrum.
3. Watch or jewel according to claim 1, **characterised in that** the light guide or light tunnel (15) is such that the light coming from the light sources (13,45) is distributed over the individual precious stones (10) according to a predetermined pattern.

4. Watch or jewel according to claim 3, **characterised in that** the light guide or light tunnel (15) is such that the light coming from the light sources (13) is evenly distributed over the individual precious stones (10). 5
5. Watch or jewel according to claim 3 or 4, **characterised in that** between the precious stones (10) and one or several of the exits (23,31) of the light tunnel or light guide (15) is provided an adjustable screen (16) for the individual adjustment of the intensity of the light which is guided through the precious stones (10). 10
6. Watch or jewel according to claim 5, **characterised in that** the above-mentioned screen (16) is mainly formed of a cylindrical sleeve (24) which is sealed on one far end (25) and which is cut slantwise on the other far end (26) and whereby, by rotating the cylindrical sleeve (24), there can be more or less incident light on the neighbouring precious stone (10). 15 20
7. Watch or jewel according to any one of the preceding claims, **characterised in that** the watch or jewel (1) is provided with a UV filter which stops the UV light coming from the watch or the jewel (1). 25
8. Watch or jewel according to claim 7, **characterised in that** the UV filter is formed of a coating which has been provided at least on visible parts of the precious stones (10). 30
9. Watch or jewel according to claim 7 or 8, **characterised in that** the watch or jewel (1) is provided with a screening glass (8) and **in that** the UV filter is formed of a coating which is provided on this screening glass (8). 35
10. Watch or jewel according to any one of the preceding claims, **characterised in that** a fluorescent substance is provided on or round the precious stones (10). 40
11. Watch or jewel according to claim 10, **characterised in that** the fluorescent substance is a diamond powder or a phosphor powder. 45
12. Watch or jewel according to any one of the preceding claims, **characterised in that** the light tunnel or light guide (15) is formed of one or several hands (43). 50
13. Watch or jewel according to any one of the preceding claims, **characterised in that** the precious stone or precious stones are diamonds (10). 55

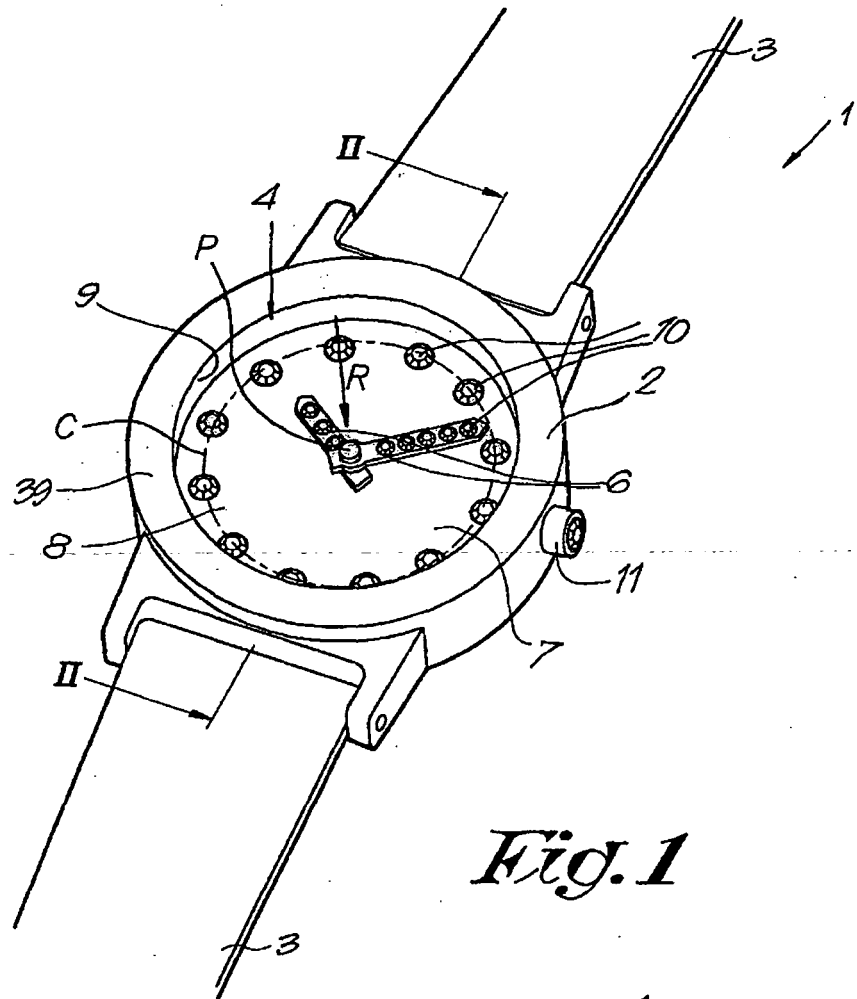


Fig. 1

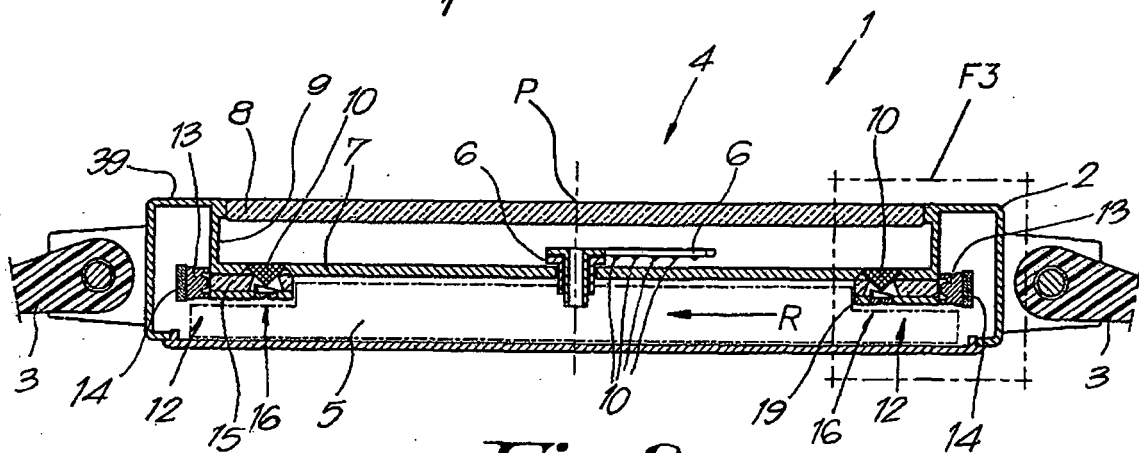
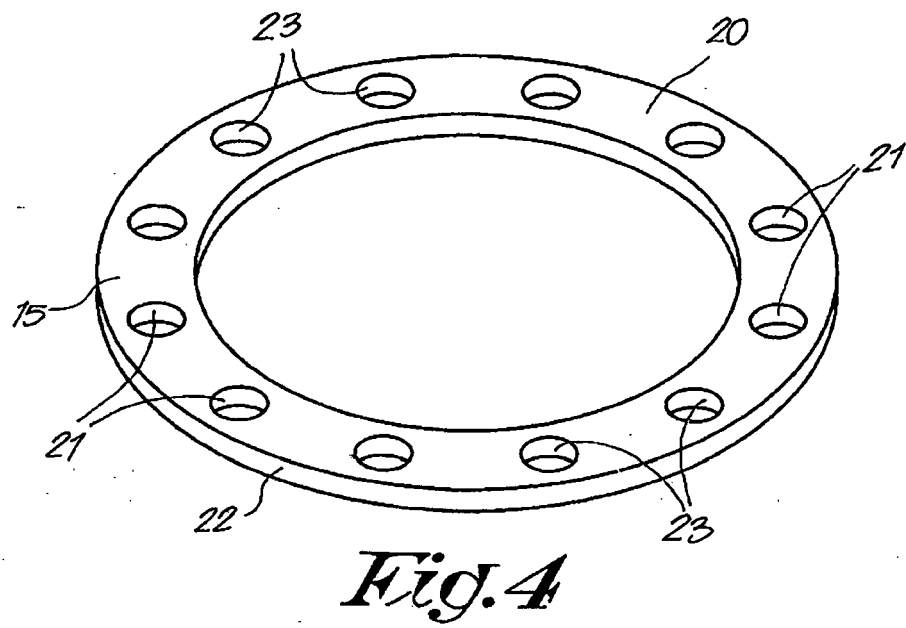
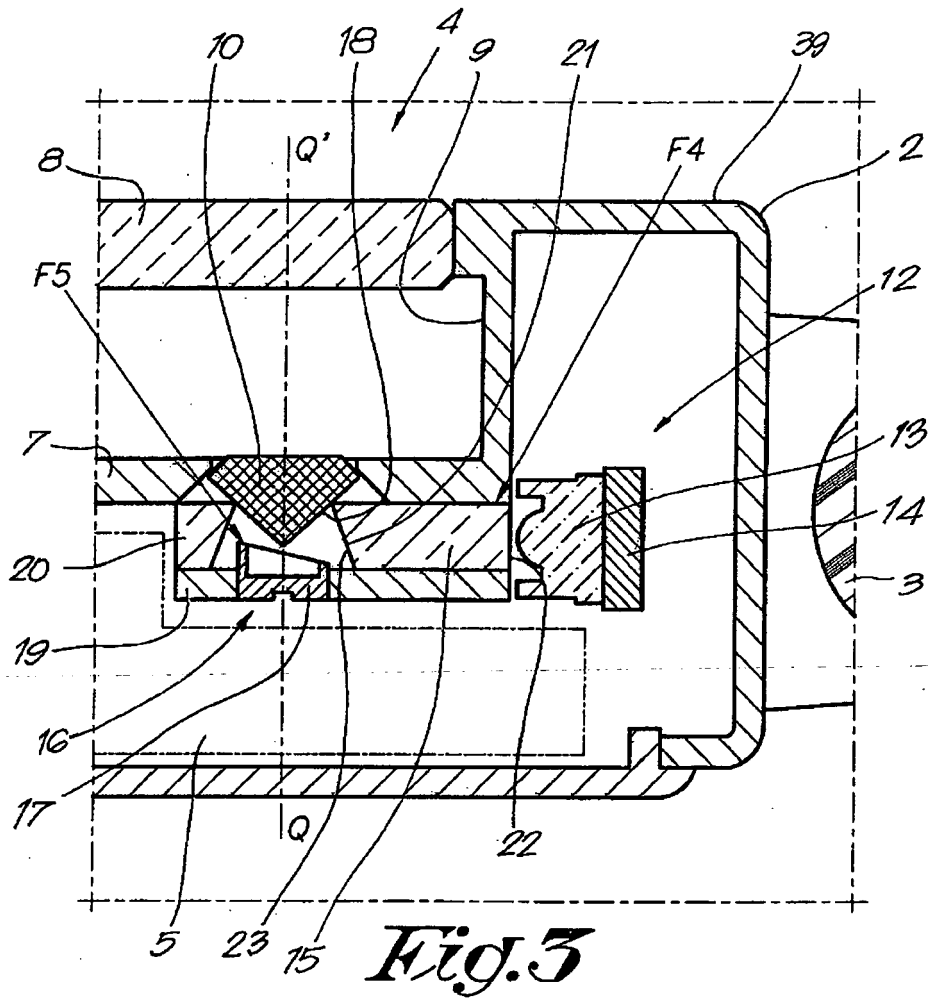
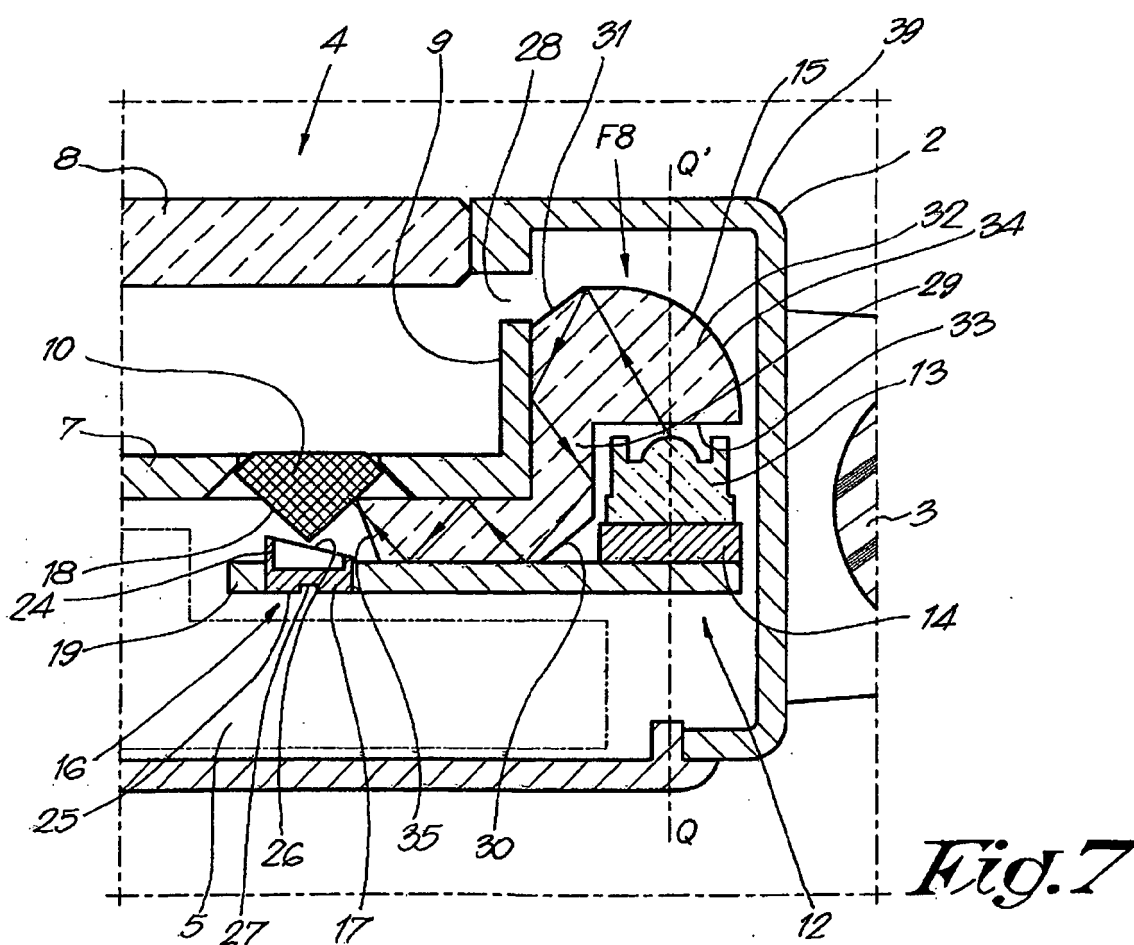
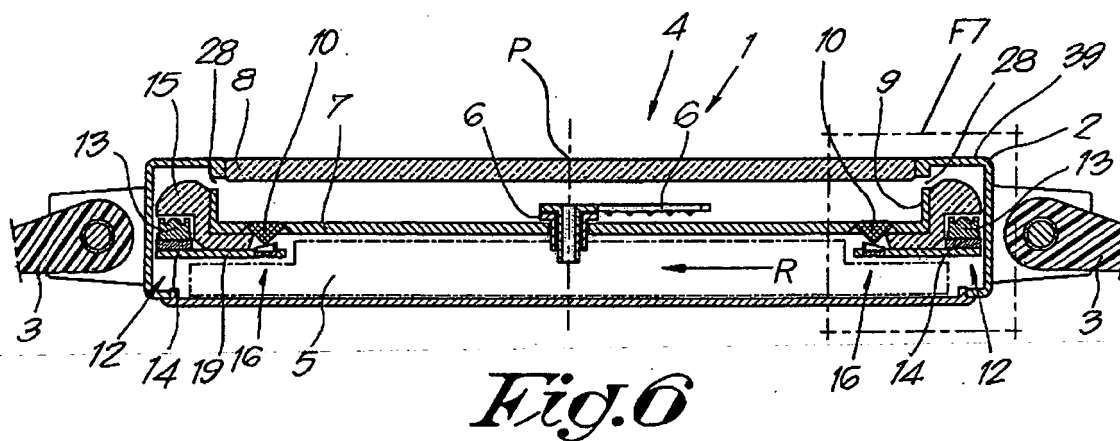
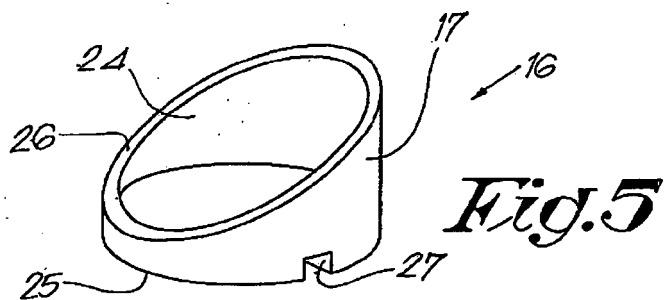


Fig. 2





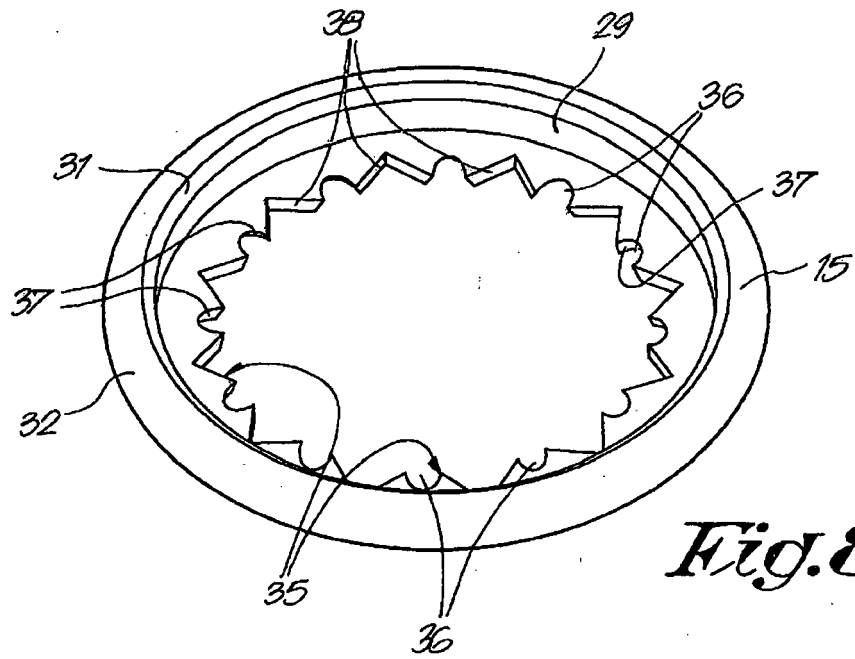


Fig. 8

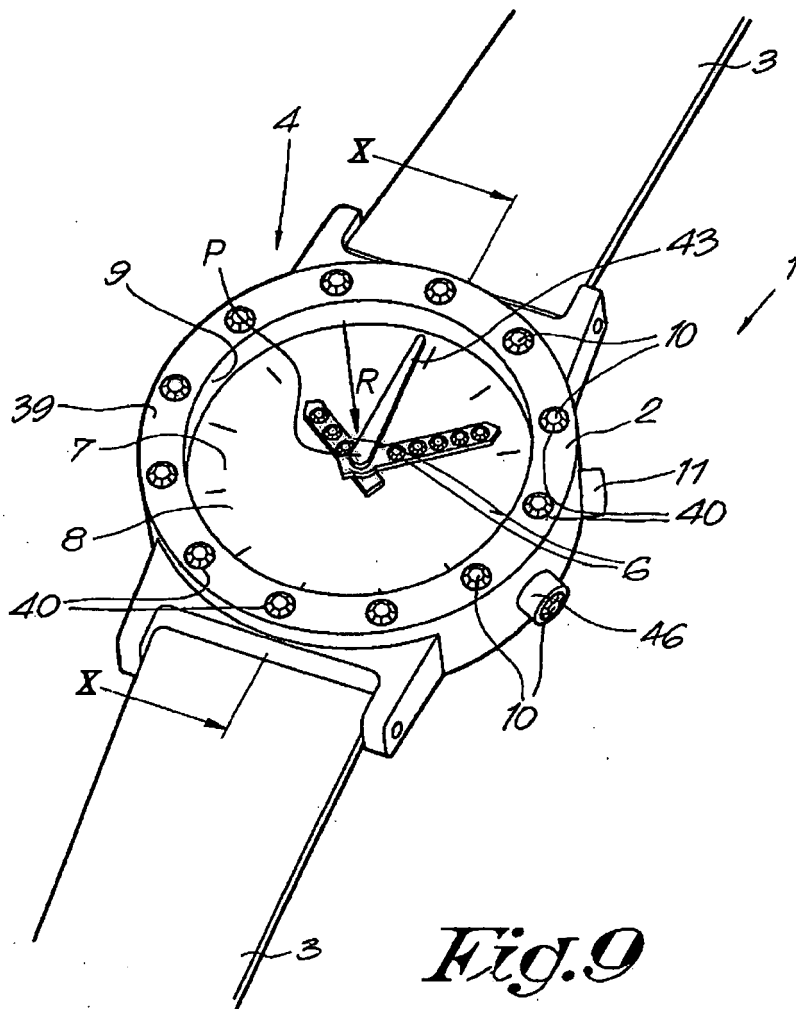
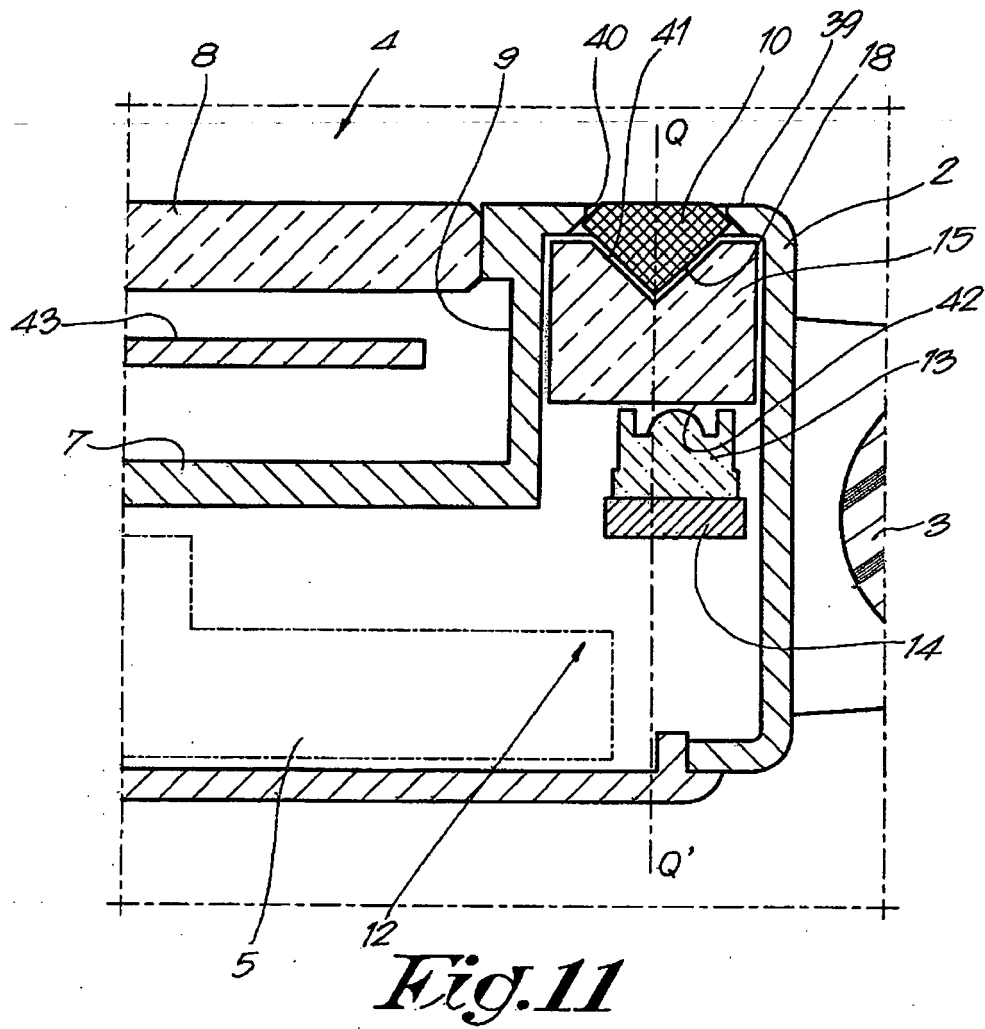
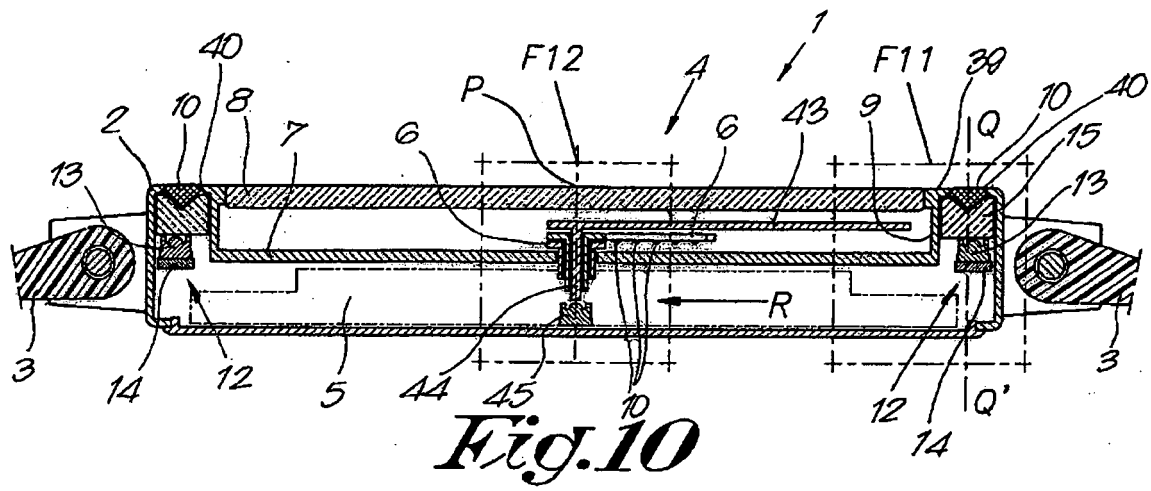


Fig. 9



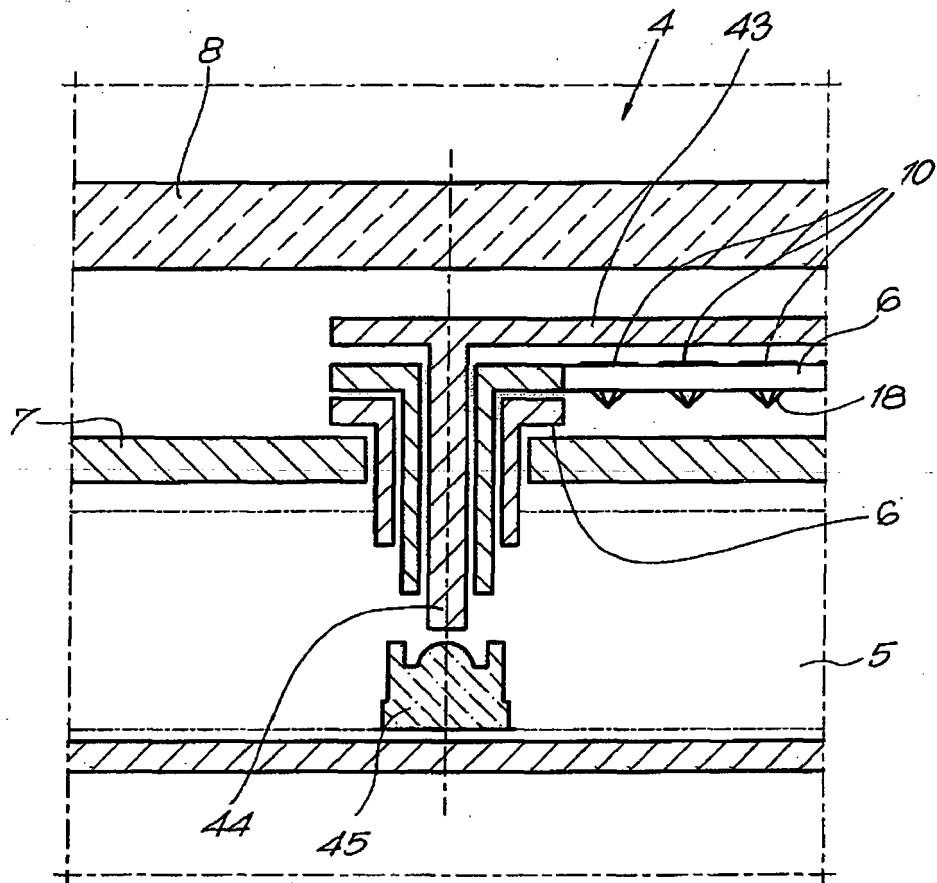


Fig. 12

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2004213088 A [0011] [0012]