

Description

Background of the Invention

Field of the Invention

[0001] The present invention relates to a watch connection structure and to a watch with the watch connection structure. The invention is particularly directed towards the ease of assembly and simplification of the watch parts, which are used for a flexible connection between a watch case and a watch band or two watch bands.

Description of the Related Art

[0002] Figs. 11 and 12 show an example of a watch connection structure for a conventional watch. In this prior art, a long insertion pin 34 and a short pipe 35 are used for a flexible connection between a watch case and a watch band.

[0003] The short pipe 35 is inserted into an insertion hole 31, which is made at a connection portion 30 of the watch case. Two connection portions of the watch band are set at the each side of the connection portion 30, as to bring two insertion holes 33,33 of the two connection portions and the insertion hole 31 into a line. The insertion pin 34 is inserted into the three insertion holes 33,31,33 and then small outer portion 36 of the insertion pin 34 is inserted into a small inner portion 37 of the short pipe 35.

[0004] With the above assembly, the insertion pin 34 is held by the short pipe 35 as not to fall off from the insertion holes 33,31,33. And the watch case and the watch band are connected with flexibility.

[0005] Fig. 13 shows another example of a watch connection structure, which was described in the Japanese patent application Laid-open No. Heisei8-224114. In the second prior art, an insertion pin 50 and a stopper 60 are used for the flexible connection between a watch case and a watch band.

[0006] The insertion pin 50 has an insertion rod 51 and two head portions 52,53 at each end of the insertion rod 51. The stopper 60 has a smaller hole 62 and a larger hole 61 adjacently in its body. The inner diameter size of the smaller hole 62 is substantially equal to the outer diameter size of the insertion rod 51. The inner diameter size of the larger hole 61 is bigger than the outer diameter size of the head portion. The smaller hole 62 and the larger hole 61 are made as a hole with a connection gap 63, the width of which is smaller than the outer diameter size of the insertion rod 51.

[0007] With a spacer 47, the stopper 60 is inserted into an insertion hole 46, which is made at a connection portion 45 of the band, with a posture where the smaller hole 62 is located nearer to the watch case than the larger hole 61. Two connection portions 42,42 of the watch case are set at each side of the connection portion 45

as to bring two insertion holes 41,41 of the two connection portions 42,42 and the larger hole 61 into a line. The insertion pin 50 is inserted into these insertion holes 41,61,41. The watch case and the watch band are pulled in the opposite directions and then the insertion rod 51 is moved from the larger hole 61 to the smaller hole 62.

[0008] With the above assembly, the insertion pin 50 is held by the stopper 60 as not to fall off from these insertion holes 41,62,41. And the watch case and the watch band is connected with flexibility.

[0009] However, these prior watch connection structures have the problems below.

[0010] In the first prior connection structure, which is shown in Figs. 11 and 12, the insertion pin 34 and the short pipe 35 have simple shapes thus easily produced. Extremely strong force is, however, required to insert the insertion pin 34 into the short pipe 35, because the insertion pin 34 has to be squeezed through the small portion 37 of the short pipe 35. Thus the assembly becomes difficult and may require longer process time.

[0011] Since the insertion pin 34 has very thin and long shape. If the comparatively strong force more than 5 Newtons is applied from the wrong direction, the insertion pin 34 is easily bent or buckled. This sometimes causes further problems at assembly, such as damage to the watch, in particular damage on the surface of watch, and damage on the surface of watch band. Particularly, because the insertion pin 34 has the small outer portion 36 at the middle of it, there is a weak point between the force influence position and the friction force position with the small inner portion 37.

[0012] Though a jig can be used for the assembly to try and prevent the above mentioned problems, such problems as bending of the insertion pin 34 and so forth still remain, and the production costs rises due to the specialised jig for the assembling.

[0013] In order to prevent the insertion pin 34 from bending at the assembly, the small inner portion 37 of the short pipe 35 may be modified to be larger to reduce the holding power of the pipe. However, the risk of drop-out of the insertion pin while the watch is in use will increase.

[0014] On the other hand, the small inner portion 37 can also be modified to be smaller, in order to increase the holding power of the pipe to prevent the pin from drop-out while the watch is in use. However, this causes substantial difficulties on ejecting the insertion pin 34 from the short pipe 35 when disconnection of those components is required.

[0015] In addition, the inner portion 37 of the short pipe 35 is plastically deformed at the assembly, and this causes certain difficulties to insert the insertion pin 34 into the short pipe 35, which has a bigger diameter than the inner portion 37 of the pipe. Further, the resistance force against pushing the pin into the pipe easily and varies widely.

[0016] In the second prior connection structure which is shown in Fig. 13, the connection or disconnection of

the watch and band is easily accomplished without strong force just to pull or push them linearly. However, it uses many complex shaped watch parts. Thus, it is difficult and needs much time to produce each part and it increases the possibility of loss of these parts. In particular, the shape of the stopper 60, the spacer 47, and the insertion hole 46 impose complex process on machining those components and increase the production costs. In order to make production of the insertion hole 46 easier, the connection portion 45 may be made of an upper part and a lower part (see the dotted line in Fig. 13). However, it increases the number of the watch parts and requires extra time to assemble these parts. Thus, it could not decrease the manufacturing time and the manufacturing cost.

[0017] In addition, this connection structure sets a considerable limit on designing watches, because a gap is left on the watch case 40 after the assembly, and needs an enough space on the watch case to slide the band.

Summary of the Invention

[0018] The present invention has been made in view of the easiness of the production of watch parts and the easiness of the assembly of these parts, so as to decrease the manufacturing costs and the manufacturing time.

[0019] According to the present invention, there is provided a watch connection structure comprising: at least one connection portion of a watch case or a watch band; at least one connection portion of a watch band; at least two insertion holes which are made in each of the connection portions; an insertion pin which has an insertion rod with the length enough to set in at least two of the insertion holes; and at least one coil spring which has at least in part a smaller inner size than the outer size of the insertion rod, wherein the connection portions are placed together to bring the insertion holes in one line, and the insertion pin is inserted into the insertion holes and into the coil spring(s).

[0020] With the watch connection structure, just the insertion pin is inserted into the insertion holes of the connection portions and into the coil spring(s), and the insertion pin is held at the position where the watch case and the watch band or the watch bands are flexibly connected.

[0021] According to one embodiment, a watch connection structure is provided comprising: at least one first connection portion each of which is made as part of a watch part selected from a watch case and a watch band or from two watch bands; at least two second connection portions each of which is made as part of a watch part selected as the rest from the watch case and the watch band or from the two watch bands; at least three insertion holes each of which is made in each of the first connection portion or each of the second connection portions; an insertion pin which has an insertion

rod with the length enough to set in at least three of the insertion holes; and at least one coil spring each of which has at least in part a smaller inner size than the outer size of the insertion rod, wherein each of the coil springs is inserted into the first connection portion; each of the first connection portions is placed between the second connection portions to bring the insertion holes in one line; and the insertion pin is inserted into the insertion holes and into the coil spring(s).

[0022] With the watch connection structure, the coil spring is inserted into the first connection portion, the insertion pin is inserted into the insertion holes of the connection portions and into the coil spring(s), and the insertion pin is held at the position where the watch case and the watch band or the watch bands are flexibly connected.

[0023] According to another embodiment a watch connection structure is provided comprising: at least one first connection portion each of which is made as part of a watch part selected from a watch case and a watch band or from two watch bands; at least two second connection portions each of which is made as part of a watch part selected as the rest from the watch case and the watch band or from the two watch bands; at least three insertion holes each of which are made in each of the first connection portions or each of the second connection portions; at least two insertion pins each of which has an insertion rod with the length enough to set in at least two of the insertion holes; and at least one coil spring each of which has at least in part a smaller inner size than the outer size of the insertion rod, wherein each of the coil springs is inserted into the first connection portion; each of the first connection portions is placed between the second connection portions to bring the insertion holes in one line; and each of the insertion pins is inserted into the insertion holes and into the coil spring(s).

[0024] With the watch connection structure, the coil spring is inserted into the first connection portion, each of the insertion pins is inserted into the insertion holes of the connection portions and into the coil spring(s), and the insertion pin is held at the position where the watch case and the watch band or the watch bands are flexibly connected.

[0025] Optionally the inner size of each of the insertion holes into which the coil spring is inserted, is bigger than the inner size of the insertion hole of the rest.

[0026] With the watch connection structure, because the coil spring is kept within the insertion hole while the insertion pin is inserted, it is easier to insert the insertion pin into the coil spring. In addition, the insertion pin is continually held by the coil spring while the watch is in use.

[0027] Optionally each of the insertion pins has a slope portion at least at the one end of the insertion rod; and the size of a side surface of the insertion rod where the slope portion is made, is smaller than the inner size of the coil spring.

[0028] With the watch connection structure, the insertion pin is easily inserted into the coil spring from the one end, even though the coil spring has at least in part a smaller inner size than the outer size of the insertion rod.

[0029] Optionally each of the coil springs has at least one small inner portion, the inner size of which is smaller than the outer size of the insertion rod.

[0030] With the watch connection structure, the insertion pin is easily inserted without any friction force until the one end of the insertion rod is at the small inner portion.

[0031] Optionally each of the insertion pins has at least one slot, which is made at the surface of the insertion rod; or the outer shape of each of the insertion rods is different from the inner shape of the coil spring.

[0032] With the watch connection structure, the friction force between the coin spring and the insertion pin is getting smaller and it makes it easier to insert the insertion pin into the coil spring.

[0033] Optionally each of the insertion pins has a screw thread which is made around the insertion rod in the same winding direction as the coil spring with the pitch which is wider than the pitch of the coil spring.

[0034] With the watch connection structure, just the insertion pin is screwed in the direction of application and the insertion pin is easily inserted into the coil spring. In addition, if the pitch of the coil spring is expanded by the insertion of the insertion pin, the coil spring is firmly fixed around the insertion pin and holds the insertion pin quite reliably.

[0035] Optionally each of the coil springs has at least one small inner portion, the inner size of which is smaller than the outer size of the insertion rod; and each of the insertion pins has at least one small outer portion at the corresponding position of the insertion rod to the small inner portion, each of which has the smaller outer size than the outer size of the rest of the insertion rod.

[0036] With the watch connection structure, while assembling, it is easily detected whether the insertion pin is inserted at the right position by means of the friction force change, which arises when the small outer portion is inserted properly at the small inner portion. In addition, once the small inner portion is inserted into the small outer portion, it is quite difficult to pull out the small inner portion from the small outer portion. Thus, the coil spring is firmly fixed around the insertion pin and held the insertion pin quite reliably.

[0037] Optionally each of the insertion pins has a slope portion on at least at the one side of the small outer portion.

[0038] With the watch connection structure, it makes easier to pull out the small inner portion from the small outer portion. In addition, to select a right angle of the slope portion, the insertion pin is pulled out from the coil spring without being damaged. Thus, the insertion pin and the coil spring could be used again.

[0039] Optionally each of the insertion pins has a jig

set portion at least at one end of the insertion rod, where a jig is connected to scroll and insert the insertion pin.

[0040] With the watch connection structure, the insertion pin could be screwed with a jig at the winding direction of the coil spring and inserted into the coil spring. Especially, if the another end of the coil spring bites and is fixed on the connection portion, the inner size of the coil spring is getting bigger by the winding force of the insertion pin and the insertion pin is inserted quite easily.

[0041] Optionally each of the insertion pins has a head portion at least at one end of the insertion rod, with a jig set portion where a jig is connected to scroll and insert the insertion pin.

[0042] With the watch connection structure, the insertion pin is screwed with a jig and inserted into the coil spring easily. In addition, because the jig set portion is made at the head portion, the jig set portion could be made in bigger size and could be added a higher screwing force.

[0043] Optionally each of the insertion rods has sufficient length to set in from the insertion hole where the coil spring is inserted to the insertion hole which is located at the end in the row of connection portions; and each of the insertion pins has a head portion at one end of the insertion rod, the size of which is bigger than the size of the insertion hole which is located at the end in the row of connection portions.

[0044] With the watch connection structure, the jig set portion is made bigger than the insertion hole and the insertion pin is screwed with a jig and inserted into the coil spring quite easily. In addition, the head portion may improve the appearance of the watch.

[0045] According to the present invention, there is provided a watch comprising: a watch case where a watch movement is located; and at least two watch bands each of which may be connected to the other to form a wrist band, wherein at least one of the connections, which is selected from the connections between the watch case and one of the watch bands or the watch bands, is connected with the watch connection structure as set out above.

[0046] With the watch connection structure, a watch band and a watch case or two watch bands are assembled easily, and every watch part is made easily.

Brief description of the drawings

[0047] In the accompanying drawings:

Fig. 1 shows a partially exploded perspective view in part of a watch in the first embodiment of the present invention;

Fig. 2 shows an enlarged cross-sectional view in part of the watch, showing a state where a connection pin is inserted into insertion holes and a coil spring;

Fig. 3 shows a longitudinal sectional view of the coil spring shown in Fig. 1;

Fig. 4 shows an enlarged cross-sectional view in part of another watch in the second embodiment of the present invention, showing a state where two connection pins are inserted into insertion holes and a coil spring;

Fig. 5 shows an enlarged cross-sectional view in part of the watch, showing a state before these insertion pins are inserted;

Fig. 6 shows an enlarged cross-sectional view in part of the watch, which is a modified embodiment of the present invention, using a coil spring without a small inner portion and an insertion pin without a small outer portion;

Fig. 7 shows an enlarged cross-sectional view in part of the watch, which is another modified embodiment of the present invention, using a coil spring with two small inner portions;

Fig. 8 shows modified insertion pins, where Fig. 8A shows an insertion pin without a small outer portion, and Fig. 8B shows two insertion pins with two head portions, jig set slots and screw threads;

Fig. 9 shows modified head portions, where Fig. 9A shows a square shaped head portion, Fig. 9B shows a pentagonal shaped head portion, Fig. 9C shows a hexagonal shaped head portion, Fig. 9D shows a circular shaped head portion containing a plurality of dimples, Fig. 9E shows a circular shaped head portion containing a plurality of projections;

Fig. 10 shows an enlarged cross-sectional view in part of the watch, which is another modified embodiment of the present invention, using a coil spring, which is longer than the length of the insertion hole of the first connection portion;

Fig. 11 shows a partially exploded perspective view in part of a conventional watch;

Fig. 12 shows an enlarged cross-sectional view in part of the watch, showing a state where a long insertion pin is inserted into a short pipe; and

Fig. 13 shows a partially exploded perspective view in part of another prior watch.

Detailed description of the preferred embodiments

[0048] Embodiments of the present invention are described with reference to the accompanied drawings.

[0049] Fig. 1 shows a partially exploded perspective view in part of a watch according to a first embodiment of the present invention. Fig. 2 shows an enlarged cross-sectional view in part of the watch, showing a state where a connection pin 7 is inserted into insertion holes 6,3,6 and a coil spring 8. Fig. 3 shows a longitudinal sectional view of the coil spring 8 shown in Fig. 1.

[0050] A watch case 1 where a watch movement is located has a connection portion 2 as a first connection portion, and a watch band 4 has two connection portions 5,5 as two second connection portions at the one end of it. As described below, the first connection portion 2 is placed between the second connection portions 5,5,

and then the watch case 1 and the watch band 4 are connected to each other flexibly. The watch band 4 has another connection portion at the other end of it, which is connected flexibly with another watch band to form a wrist band of a watch. In addition, the watch case 1 has another connection portion at the opposite position of the first connection portion 2, which is connected flexibly with another watch band at the other end of the wrist band.

[0051] Each of these three connection portions 5,2,5 has an insertion hole 6,3,6. These insertion holes 6,3,6 are brought in a line when the first connection portion 2 is placed between the second connection portions 5,5. Especially, in this embodiment, the inner diameter size D3 of the insertion hole 3 of the first connection portion 2 is larger than that of diameter size D6 of the insertion hole 6 of the second connection portion 5.

[0052] There is a coil spring 8 within the first insertion hole 3 of the watch case 1. The coil spring 8 has the same length as the insertion hole 3. The coil spring 8 is made of a coiled stainless steel line. It is acceptable to use the other metal or waterproof elasticity material as rubber or resin for the coil spring.

[0053] The coil spring 8 has the outer diameter size D8 smaller than the inner diameter size D3 of the insertion hole 3 of the first connection portion 2 (See Fig.3). For example, if the inner diameter size D3 is 1.40mm, the outer diameter size D8 may preferably be 1.37mm. It enables insertion of the coil spring 8 into the insertion hole 3 easily. In addition, it decreases the friction force sufficiently to get smooth flexibility, which is made between the coil spring 8 and the first connection portion 2 while the watch is used.

[0054] In addition, the outer diameter size D8 of the coil spring 8 is bigger than the inner diameter size D6 of the insertion hole 6 of the second connection portion 5. As described below, it increases the ease of assembly, and it prevents the coil spring 8 from falling off from the insertion holes 6,3,6.

[0055] There is an insertion pin within the three insertion holes 6,3,6. The insertion pin 7 has a column shaped insertion rod, which has the same length as the total length of the three insertion holes 6,3,6. The insertion pin 7 is made of metal as stainless steel. It is acceptable to use hard material as ceramics or engineering plastics for the insertion pin 7.

[0056] The outer diameter size D7 of the insertion rod is smaller than each of the inner diameter sizes D3,D6 of the insertion holes 6,3,6. It enables insertion of the insertion rod into these insertion holes 6,3,6 easily. In addition, it decreases the friction force sufficiently to get smooth flexibility, which is made between the insertion rod and each of the second connection portions 6,3,6 while the watch is used.

[0057] The size of the insertion pin 7 and the size of the coil spring 8 might be changed in according to the material.

[0058] As shown in Fig. 2, while the spring 8 is insert-

ed into the first connection portion 2, and the first connection portion 2 is placed between the two second connection portions 5,5 to bring these three insertion holes 6,3,6 in one line, the insertion pin 7 is inserted into the insertion holes 6,3,6 and into the coil spring 8. Then the watch case 1 and the watch band 4 are connected with flexibility.

[0059] Thus in this first embodiment, as shown in Fig. 3, there is a small inner portion 10 at the middle of the coil spring 8 to hold the insertion rod. The inner diameter size d8 of the small inner portion 10 is smaller than the outer diameter size D7 of the insertion rod at the state where the insertion rod is not inserted into it. It has the same effect in holding the insertion pin 7 as making all of the inner diameter size of the coil spring 8 smaller than the outer diameter size of the insertion rod.

[0060] In addition, in this first embodiment, to make the holding the insertion rod by the coil spring 8 firmer, there is a small outer portion 9 at the middle of the insertion rod. The outer diameter size D9 of the small outer portion 9 is smaller than that D7 of the rest of the insertion rod. To prevent the small inner portion from having been expanded by the insertion rod, the outer diameter size of the small outer portion 9 is preferably smaller than the inner diameter size of the small inner portion 10.

[0061] The insertion pin 7 is inserted into the coil spring 8 until the small inner portion 10 is placed within the small outer portion 9 and held firmly. Because the small inner portion 10 is placed within the small outer portion 9, it is difficult to pull out the insertion pin 7 from the coil spring 8. In addition, while inserting the insertion pin 7, it is easily detected whether the insertion pin 7 is inserted at the right position by means of the friction force change, which arises when the small outer portion 9 is inserted at the small inner portion 10.

[0062] In addition, in this first embodiment, the insertion pin 7 has two slope portions 7b,7b at the both ends of the insertion rod. Each of the slope portions 7b has a tapered shape, and the size of each side surface of the insertion rod is smaller than the inner size of said coil spring 8 and the inner size of the small inner portion 10. It makes it easier to insert the insertion rod into the coil spring 8.

[0063] The insertion pin 7 also has two tapered slope portions 7c,7c at both sides of the small outer portion 9. These portions 7c,7c make it easier to pull out the insertion rod from the coil spring 8 without any damage on them, and both of them could be used again.

[0064] It is acceptable to make the angle of the slope portions 7b,7b to the axis of the insertion rod the same as the angle of the slope portions 7c,7c to it. However, as described below, since the slope portions 7b,7b at the ends of the insertion rod are made just for the ease of insertion, the angles are preferred to be made smaller. On the contrary, since the slope portions 7c,7c at the sides of the small outer portion 9 are made both for the ease of pulling out the insertion rod from the small inner

portion 10 and for the prevention of the falling off of the insertion pin 7, the angles are preferred to be made bigger.

[0065] Once the small outer portion 9 holds the small inner portion 10, it is difficult to pull the insertion rod out from the coil spring 8. Thus, it can be ensured that the insertion pin 7 does not fall off from the insertion holes 6,3,6 during general use of the watch.

[0066] In addition, just being pushed to the state where the slope portion 7b at the one end of the insertion rod is inserted into the small inner portion 10, the insertion pin 7 expands the inner size of the small inner portion 10 and is easily inserted into the small inner portion 10 without any damage on them.

[0067] In addition, just being pushed to the state where the slope portion 7c at one side of the small outer portion 9 is inserted into the small inner portion 10, the insertion pin 7 expands the inner size of the small inner portion 10 and is easily pulled out from the small inner portion 10 without any damage on them.

[0068] Even with the slope portions 7b,7c, if the inner size of the small inner portion 10 is too much smaller than the outer size of the insertion rod, it is difficult to insert and pull out the insertion pin 7. Especially, because the insertion rod has very thin and long shape, it is more difficult. The inventor estimates that, if the insertion pin 7 and the coil spring 8 are made as described above, and the inner diameter size of the small inner portion 10 is made smaller than the outer diameter size of the insertion rod by less than 0.2mm, the insertion rod is easily inserted into the small inner portion 10 with less than a 10 Newton insertion force and without any damage on them.

[0069] However, for a heavy duty watch such as a diver's watch or the other sport watches, the insertion pin 7 from the insertion holes 6,3,6 may fall out with less than 0.2mm difference in the diameter size.

[0070] For these heavy duty watches, the diameter size difference needed is more than 0.2mm, preferably more than 0.5mm. With the diameter size difference, it can be ensured that with the heavy duty watch, the insertion pin does not fall out from the insertion holes.

[0071] To solve the drawback in this embodiment, as shown in Fig. 2, the insertion pin 7 has two jig slots 7a, 7a at the both ends of the insertion rod, where a screwdriver is connected to screw and insert the insertion pin. If the insertion pin 7 is screwed with the screwdriver at the winding direction of the coil spring 8, the another end of the coil spring 8 bites and is fixed on the second connection portion 5, the inner size of the coil spring 8 is getting bigger by the winding force of the insertion pin 7, and the insertion pin 7 is inserted more easily.

[0072] In this embodiment, the slope portions 7b,7b and the jig slots 7a,7a are made in the both ends of the insertion rod. If there is no need to pull the insertion pin 7 out, it is enough to make the slope portion 7b at the one end of the insertion rod and the jig slot 7a at the other end of the insertion rod.

[0073] At the state where one of the slope portions 7b is inserted into the small inner portion 10, and the screwdriver is connected to the jig slot 7a of the other end of the insertion rod, the screwdriver adds a pressure force. The pressure force is added in the direction from the other end to the leading end of the insertion rod and the screwing force is added in the direction of the winding direction of the coil spring 8. With these forces, the inner size of the coil spring 8 is getting bigger, and then the insertion rod is inserted into the small inner portion 10 quite easily.

[0074] For example, as being shown in Fig. 2, if the pressure force is added to the coil spring 8 from the left side of it, the right end of the coil spring 8 bites and is fixed on the left surface of the right second connection portion 5. Then if the screwing force is added to the insertion pin 7 at the left jig slot 7a with the screwdriver, the left end of the coil spring 8 is forced to rotate with the insertion rod. However, because of the friction force of the right end of the coil spring 8, actually the coil spring 8 is not rotated. Thus, the coil spring 8 is forced to reduce the turn of it by these forces at the both ends of it and the inner diameter size of the coil spring 8 is getting bigger. The inner diameter size of the small inner portion 10 is getting bigger enough to insert the insertion rod into it quite easily with low pressure.

[0075] With these inventions, it is quite easy to insert an insertion pin 7 into the small inner portion 10, even though the inner diameter size of the small inner portion 10 is smaller than the outer diameter size of the insertion rod by 0.5mm. In addition, the insertion pin 7 is not damaged by the insertion. Further, both of the coil spring 8 and the insertion pin 7 may be used again.

[0076] For example, the inner diameter size S of the small inner portion 10 (see fig. 2) may be 0.90mm, the outer diameter size of the small outer portion 9 may be 0.80mm, and the outer of the insertion rod may be 1.04mm.

[0077] In addition, because the insertion pin 7 is locked by the coil spring 8 at the position where the small outer portion 9 is inserted into the small inner portion 10 and kept on holding firmly, it is ensured that with the heavy duty watch, the insertion pin 7 does not fall out from the insertion holes 6,3,6.

[0078] Further, the insertion pin 7 is easily pulled out from the coil spring 8 with the same assembling process. For example, at the state of Fig. 2, the pressure force and the screwing force are added to the insertion pin 7 with the screwdriver, the insertion pin 7 is pulled out from the small inner portion 10 of the coil spring 8 easily. The insertion pin 7 and the coil spring 8 may be used again.

[0079] In this embodiment, because the jig slot 7a is also made in the right end of the insertion rod, the pressure force and the rolling force could be added from the right end of the insertion rod with the screwdriver.

[0080] In this embodiment, as being shown in Fig. 2, the insertion pin 7 could not be pulled out without the special screwdriver with a very thin rod which is smaller

than the insertion holes 6,3,6. It prevents ordinary person from assembling or from overhauling, and it guarantees that the watch is assembled by a reliable person.

[0081] It is preferred to make gaps between the insertion rod and the insertion holes 6,3,6 or the coil spring 8, to screw the insertion pin 7 without excessive friction force. For example, the outer diameter size D7 of the insertion rod may be 1.04mm, the inner diameter size d8 of the coil spring 8 may be 1.05mm, and the inner diameter size of the second insertion holes 6 may be 1.10mm. These gaps decrease the friction forces between the insertion rod and the insertion holes 6,3,6 or the insertion rod and the coil spring 8, enough to prevent the insertion rod from being damaged, even though the coil spring 8 is made the same length as the length of the insertion hole of the first connection portion 2 to make it easier to add these forces on the insertion pin 7. In addition, to make the coil spring 8 this length prevents the insertion pin 7 from being projected out from the insertion holes 6,3,6.

[0082] In addition, in this embodiment, the inner diameter size D6 of each of the second insertion holes 6,6 may be 1.10mm, the inner diameter size D3 of the first insertion hole 3 may be 1.40mm, and the outer diameter size D8 of the coil spring 8 may be 1.37mm. Thus, the coil spring 8 is held within the first insertion hole 3 and is able to generate the expanding force toward the said size of the coil spring 8.

[0083] In addition, in this embodiment, because the watch case 1 and the watch band 4 are connected just by the insertion pin 7 and the coil spring 8, the number of the watch parts is decreased. Each of the watch parts as the insertion pin 7 or the coil spring 8 has a simple shape enough to make it easy to produce it. Thus in this embodiment, the watch case 1 and the watch band 4 are connected easily and at low cost.

[0084] In addition, because the insertion pin 7 and the coil spring 8 have simple shapes, and because the insertion pin 7 is held only by the coil spring 8 and is kept within the insertion holes 6,3,6, the insertion holes 6,3,6 could be made in as small as possible and each of the connection portions 5,2,5 could be made in as thin as possible. Moreover, because the slope portions 7b,7b, 7c,7c and the jig slots 7a,7a make it easier to insert the insertion pin 7 into the coil spring 8, the insertion rod and the connection portions 5,2,5 are made in as thin as possible. Thus, the design of the watch with the watch connection structure could be quite simple and sophisticated.

[0085] Especially, because the insertion pin 7 has the jig slots 7a,7a and is screwed, the difference between the outer diameter size of the insertion rod and the inner diameter size of the small inner portion 10 may be more than 0.14mm, and the coil spring 8 is kept on holding the insertion pin 7 firmly. The insertion force is needed less than 10 Newtons. If there is not the jig slot 7a for screwing the insertion pin, the difference might be made less than 0.05mm, or the insertion force might be more

than 30 Newtons.

[0086] Fig. 4 shows an enlarged cross-sectional view in part of another watch in the second embodiment of the present invention, showing a state where two connection pins 11,11' are inserted into insertion holes 6,3,6 and a coil spring 15. Fig. 5 shows an enlarged cross-sectional view in part of the watch, showing a state before these insertion pins 11,11' are inserted. In this embodiment, each of the watch parts or each of the portions, which is the same or corresponding to that in the first embodiment, is indicated by the same reference symbol.

[0087] In this embodiment, a coil spring 15 has a small inner portion 15a. As shown in Fig. 5, the small inner portion 15a is made to be half the length of the coil spring 15. In this embodiment, two insertion pins 11,11' are used instead of an insertion pin 7.

[0088] As shown in Fig. 4, each of the insertion pins 11,11' has a half length insertion rod, a head portion 12,12' at the one end of the insertion rod, a jig slot 11a, 11a' in the head portion 12,12', another jig slot 11b,11b' at the other end of the insertion rod, and a small outer portion 13,13' at this other end of the insertion rod.

[0089] The outer diameter size of the head portion 12,12' is bigger than that of the insertion rod. The outer diameter size of the small outer portion 13,13' is smaller than that of the rest of the insertion rod. In addition, there are three slope portions at the other end of the insertion rod and on both sides of the small outer portion 13,13'.

[0090] The conditions for the inner size of the coil spring 15, the inner size of the small inner portion 15a, the outer size of each of the insertion rods, the outer size of each of the small outer portions 13,13', the angle of each of the slope portions, are same as those of the first embodiment. For example, the inner diameter size D3 of the insertion hole 3 of the first connection portion 2 may be 1.40mm; the inner diameter size D6 of each of the insertion holes 6,6 of the second connection portions 5,5 may be 1.10mm; the outer diameter size D15 of the coil spring 15 may be 1.37mm; the inner diameter size of the small inner portion 15a may be 0.90mm; the outer diameter size of the insertion rod may be 1.04mm; and the outer diameter size of the small outer portion 13,13' may be 0.80mm.

[0091] As shown in Fig.5, the coil spring 15 is inserted into the insertion hole 3 of the first connection portion 2; the first connection portion 2 is placed between the second connection portions 6,6 to bring these insertion holes 6,3,6 in a line; and each of the insertion pins 11,11' is inserted into the insertion holes 6,3,6 and the coil spring 15. Both of the insertion pins 11,11' are held by the one coil spring 15 at the state where the both of small outer portions 13,13' are inserted into the small inner portion 15a, and the watch case 1 and the band 4 are connected each other with flexible.

[0092] Especially in this embodiment, the ways of insertion of the two insertion pins 11,11' are different from that of the first embodiment.

[0093] Firstly, as being described in the first embodiment, one of the insertion pins 11,11' is inserted into the coil spring 15 with being screwed by the screwdriver in the same direction as the winding direction of the coil spring 15. With the inserting force and the screwing force, the one end of the coil spring 15 bites and fixed on the surface of the second connection portion 5, and the inner size of the coil spring 15, including the small inner portion 15a, gets bigger. Thus, the first insertion pin 11(11') is inserted easily with a small insertion force.

[0094] Secondly, with the head portion 12(12') of the first inserted insertion 11(11') pin being held, the other insertion pin 11'(11) is inserted into the coil spring 15 with being screwed in the same direction as the winding direction of the coil spring 15. With the holding force, inserting force and the screwing force, the inner size of the coil spring 15 including the small inner portion 15a gets bigger. Thus, the second insertion pin 11'(11) is inserted easily with a small insertion force.

[0095] The ways of pulling out of the two insertion pins 11,11' are also different.

[0096] Firstly, with the head portion 12(12') of the first inserted insertion pin 11(11') being held, the second insertion pin 11'(11) is forced to pull out by being screwed in the opposite direction to the winding direction of the coil spring 15. Because the coil spring 15 is forced to be held at the same position with the holding force on the first insertion pin 11(11') and with the screwing force on the coil spring 15, the second insertion pin 11'(11) is pulled out easily with a small pulling out force.

[0097] Secondly, the screwdriver is inserted into the insertion holes 6,3,6 where the second insertion pin 11'(11) was inserted, and is set in the jig slot 11b(11b'), which is made at the inner end of the insertion rod. The first insertion pin 11(11') is forced to pull out from the coil spring 15 and to screw in the same direction of the winding direction of the coil spring 15 with the screwdriver. With the pulling out force and the screwing force, the one end of the coil spring 15 bites and is fixed on the surface of the second connection portion 5, and the inner size of the coil spring 15 including the small inner portion 15a gets bigger. Thus, the first insertion pin 11(11') is pulled out easily with a small pulling out force.

[0098] It makes no difference if the first insertion pin 11(11') is pulled out first and the second insertion pin 11'(11) is pulled out second.

[0099] In this second embodiment, neither of the insertion pins 11,11' falls out from the insertion holes 6,3,6 while the watch is in use, even if a string or something is hooked between the head portion 12(12') and the second connection portion 5. Because, to pull out the insertion pins 11,11', the least that is needed to add a pulling out force on the one of the insertion pin 11(11') and a holding force on the other insertion pin 11'(11).

[0100] In addition, because the head portions 12,12' are located outside of the insertion holes 6,3,6, the size of the head portions 12,12' could be made larger than that of the insertion holes 6,3,6 enough to cover it. The

design of the watch is getting very different and novel. Especially, if the shape and colour of the head portions 12,12' are designed effectively, the watch looks quite preferable.

[0101] These embodiments decrease the damage at assembly, especially when inserting the insertion pin 7,11,11' into the insertion holes 6,3,6. Because these embodiments connect the watch case 1 and the watch band 4 with the simple shaped insertion pins 7,11,11' and the coil springs 8,15, they could be assembled easily enough to reduce the assembling cost and used again after pulling out from the insertion holes 6,3,6. This means that with the connection structure a highly reliable and low cost watch is available.

[0102] In addition, because the insertion pins 7,11,11' are pulled out from the insertion holes 6,3,6 just only by a specially shaped jig, ordinary people could not take the watch apart and the reliability and security of the watch can be guaranteed.

[0103] In addition, because, with the connection structure, the insertion pins 7,11,11' are easily inserted and held within the insertion holes 6,3,6, the possibility of damaging the watch parts or the watch case is reduced.

[0104] In addition, because of the simple shaped and fewer parts are used for the connection, the flexibility of the design is increased and the connection portions 5,2,5 may be made thin. This increases the quality of the watch and reduces the weight of the watch.

[0105] Each of above embodiments is one of the preferred embodiments of this invention. However, it is possible to change the shape, the size, the balance, and the number of the each component.

[0106] For example, each of the embodiments is also applied to the connection between two watch bands with flexibility. This makes it easier to adjust the length of the wrist band. In addition, both of the embodiments may be used in a watch.

[0107] In addition, as shown in Fig. 6, a coil spring 17 without a small inner portion and an insertion pin 16 without small outer portion could be used for the connection between the watch case and the watch band or between the two watch bands. In this variation embodiment, the outer size of the insertion rod 16 is larger than the inner size of the coil spring 17. In the other word, the length of the small inner portion is made as same as that of the coil spring 17. Even in this variation embodiment, the insertion rod is easily inserted into the coil spring 17, if the inner diameter size of the coil spring 17 is made smaller than the outer diameter size of the insertion rod by from 0.02mm to 0.05mm. The slope portions and the jig slots 16a,16a are recommended in this variation embodiment.

[0108] In addition, as shown in the Fig. 7, a coil spring 18 could have more than two small inner portions 18a, 18a. An insertion pin could have more than two small outer portions. In this variation embodiment, because more than two small inner portions 18a,18a are made

separately in the coil spring 18 or more than two small outer portions are made separately in the insertion rod, especially comparing to the second embodiment, the friction force is reduced and the insertion pin is more easily inserted into the coil spring 18, and the insertion pin is held by the more than two small inner portions 18a,18a or more than two small outer portions and is firmly held by the coil spring 18.

[0109] As shown in Fig. 8(A) or Fig. 8(B), each of the insertion pins 19,21,21' has a screw thread 19a,20,20' winding around the insertion rod. In this variation embodiment, the friction force, which is generated at the insertion of the insertion pins 19,21,21' into the coil spring(s), is reduced. If the winding direction of the screw thread 19a,20,20' is same as that of the coil spring (s), the friction force is further reduced.

[0110] Especially, if the pitches of the screw threads 19a,20,20' are larger than those of the coil spring(s), the insertion pin 19,21,21' are inserted into the coil spring (s) and expand the length of the coil spring(s). Then, the coil spring(s) is(are) tightly coiled around the insertion pins 19,21,21' and hold them more firmly.

[0111] These insertion pins 19,21,21' may be used with any of the above coil springs 8,15,17,18. However, the insertion pin 19 being shown in Fig. 8(A) is favourable to be used with the coil springs 15,17, and the insertion pins 21,21' being shown in Fig. 8(B) is favourable to be used with the coil springs 15,17,18.

[0112] In addition, the shape and size of the head portions 21a of the insertion pins 21(21') are variable. For example, as shown in Fig. 9(A),(B)or(C), the head portion 21a could have a cubic shape, a hexagonal shape, or an octagonal shape.

[0113] In addition, the shape and size of the jig slots 19b,21b are also variable. For example, as shown in Fig. 9(D)or(E), each of the jig slots 19b,21b could be made of some points or some dimples. Further, each of the jig slots 19b,21b could have a cross shaped slot, or a polygonal shaped slot. In addition, for the connection between the insertion pin and the jig, there is no need for a jig set portion to be made as well as some slot(s). The jig set portion could have a single or cross bar shaped projection, a polygonal shaped projection, or an oval shaped projection.

[0114] In addition, there could be two coil springs, which are inserted into the second insertion holes 6,6 and an insertion pin is inserted into the two coil springs.

[0115] In addition, there could be more than two first connection portions or more than two second connection portions. The first connection portion is made as part of the watch band 4 and the second connection portions are made as part of the watch case 1. Even if there are only one first connection portion and only one second connection portion, the watch case 1 and the watch band 4 could be connected each other with flexibility by the insertion pin(s) and the coil spring(s). Especially, with an insertion pin having a head portion and a coil spring could connect the watch case 1 and the watch

band 4, or the two watch bands.

[0116] In addition, in all above embodiments, each of the insertion holes 6,3,6 has the same inner configuration in full length respectively, however, as shown in Fig. 10, each of the insertion holes could have different inner configuration at every portion. Further, at least the length of one of the insertion hole is made shorter than the width of the connection portion.

[0117] In addition, in all above embodiments, the connection structure using the insertion pin(s) and the coil spring(s) is used for a watch, but also the connection structure is used for a decoration as a necklace or for a necessity as a chain.

Claims

1. A watch connection structure comprising:

at least one connection portion of a watch case or a watch band;
at least one connection portion of a watch band;
at least two insertion holes which are made in each of said connection portions;
an insertion pin which has an insertion rod with the length enough to set in at least two of said insertion holes; and
at least one coil spring which has at least in a part a smaller inner size than the outer size of said insertion rod,

wherein said connection portions are placed together to bring said insertion holes in one line, and said insertion pin is inserted into said insertion holes and into said coil spring(s).

2. A watch connection structure comprising:

at least one first connection portion each of which is made as part of a watch part selected from a watch case and a watch band or from two watch bands;
at least two second connection portions each of which is made as part of a watch part selected as the rest from said watch case and said watch band or from said two watch bands;
at least three insertion holes each of which is made in each of said first connection portions or each of said second connection portions;
an insertion pin which has an insertion rod with the length enough to set in at least three of said insertion holes; and
at least one coil spring each of which has at least in part a smaller inner size than the outer size of said insertion rod,

wherein each of said coil springs is inserted into said first connection portion; each of said first

connection portions is placed between said second connection portions to bring said insertion holes in one line; and said insertion pin is inserted into said insertion holes and into said coil spring(s).

3. A watch connection structure comprising:

at least one first connection portion each of which is made as part of a watch part selected from a watch case and a watch band or from two watch bands;
at least two second connection portions each of which is made as part of a watch part selected as the rest from said watch case and said watch band or from said two watch bands;
at least three insertion holes each of which is made in each of said first connection portions or each of said second connection portions;
at least two insertion pins each of which has an insertion rod with the length enough to set in at least two of said insertion holes; and
at least one coil spring each of which has at least in part a smaller inner size than the outer size of said insertion rod,

wherein each of said coil springs is inserted into said first connection portion; each of said first connection portions is placed between said second connection portions to bring said insertion holes in one line; and each of said insertion pins is inserted into said insertion holes and into said coil spring(s).

4. A watch connection structure according to any one of claims 1 to 3,

wherein the inner size of each of said insertion holes into which said coil spring is inserted, is bigger than the inner size of said insertion hole of the rest.

5. A watch connection structure according to any one of claims 1 to 4,

wherein each of said insertion pins has a slope portion at least at the one end of said insertion rod; and

the size of a side surface of said insertion rod where said slope portion is made, is smaller than the inner size of said coil spring.

6. A watch connection structure according to any one of claims 1 to 4,

wherein each of said coil springs has at least one small inner portion, the inner size of which is smaller than the outer size of said insertion rod.

7. A watch connection structure according to any one of claims 1 to 4,

wherein each of said insertion pins has at least one slot which is made at the surface of said

insertion rod; or the outer shape of each of said insertion rods is different from the inner shape of said coil spring.

8. A watch connection structure according to any one of claims 1 to 4,
 wherein each of said insertions pin has a screw thread which is made around said insertion rod in the same winding direction as said coil spring with the pitch which is wider than the pitch of said coil spring. 5
9. A watch connection structure according to any one of claims 1 to 4,
 wherein each of said coil springs has at least one small inner portion, the inner size of which is smaller than the outer size of said insertion rod; and
 each of said insertion pins has at least one small outer portion at the corresponding position of said insertion rod to said small inner portion, each of which has the smaller outer size than the outer size of the rest of said insertion rod. 10
10. A watch connection structure according to claim 9,
 wherein each of said insertion pins has a slope portion on at least one side of said small outer portion. 15
11. A watch connection structure according to any one of claims 1 to 4,
 wherein each of said insertion pins has a jig set portion at least at one end of said insertion rod, where a jig is connected to scroll and insert said insertion pin. 20
12. A watch connection structure according to any one of claims 1 to 4,
 wherein each of said insertion pins has a head portion at least at one end of said insertion rod, with a jig set portion where a jig is connected to scroll and insert said insertion pin. 25
13. A watch connection structure according to any one of claim 1 to 4,
 wherein each of said insertion rods has sufficient length to set in from said insertion hole where said coil spring is inserted to said insertion hole which is located at the end in the row of connection portions; and
 each of said insertion pins has a head portion at one end of said insertion rod, the size of which is bigger than the size of said insertion hole which is located at the end in the row of connection portions. 30

14. A watch comprising:

a watch case where a watch movement is located; and
 at least two watch bands each of which is connected each other or one another to form a wrist band,

wherein at least one of the connection, which is selected from the connections between said watch case and one of said watch bands or said watch bands, is connected with the watch connection structure according to any one of claims 1 to 13.

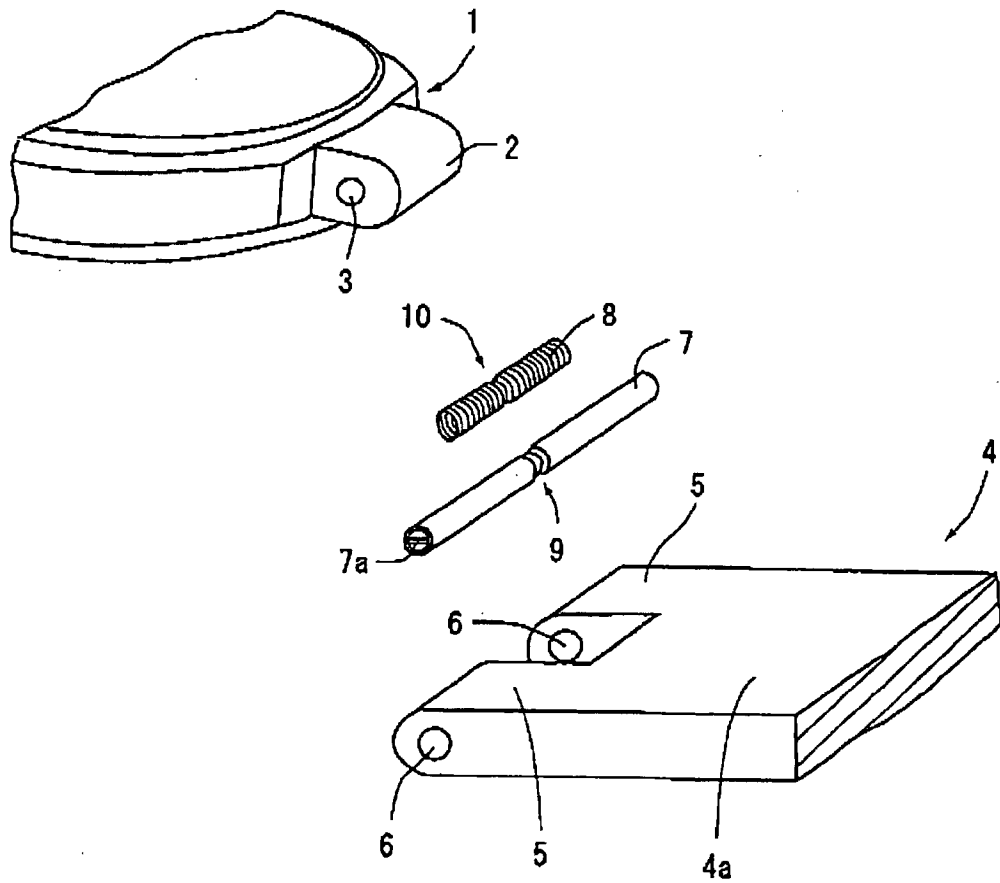


Fig. 01

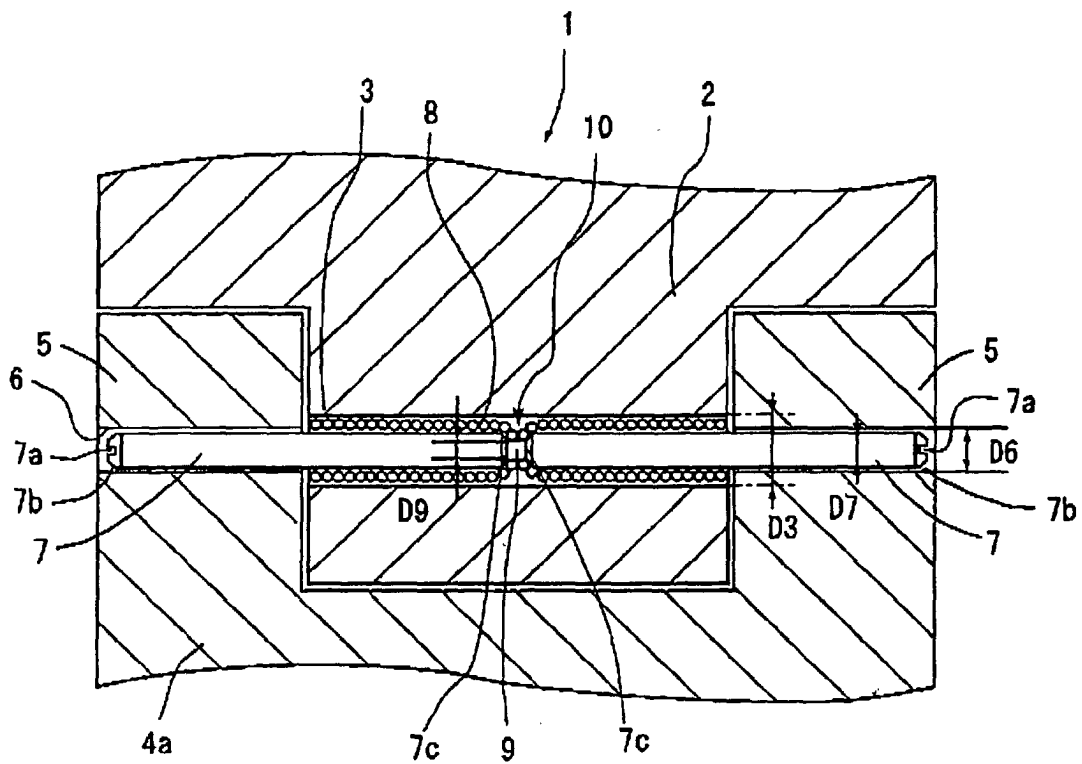


Fig. 02

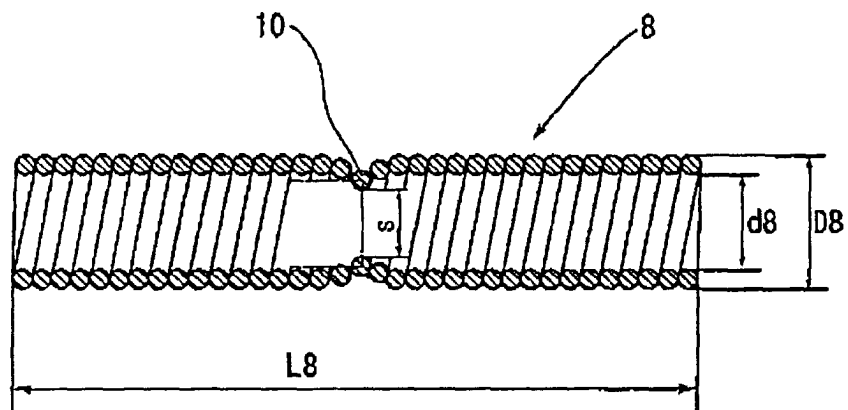
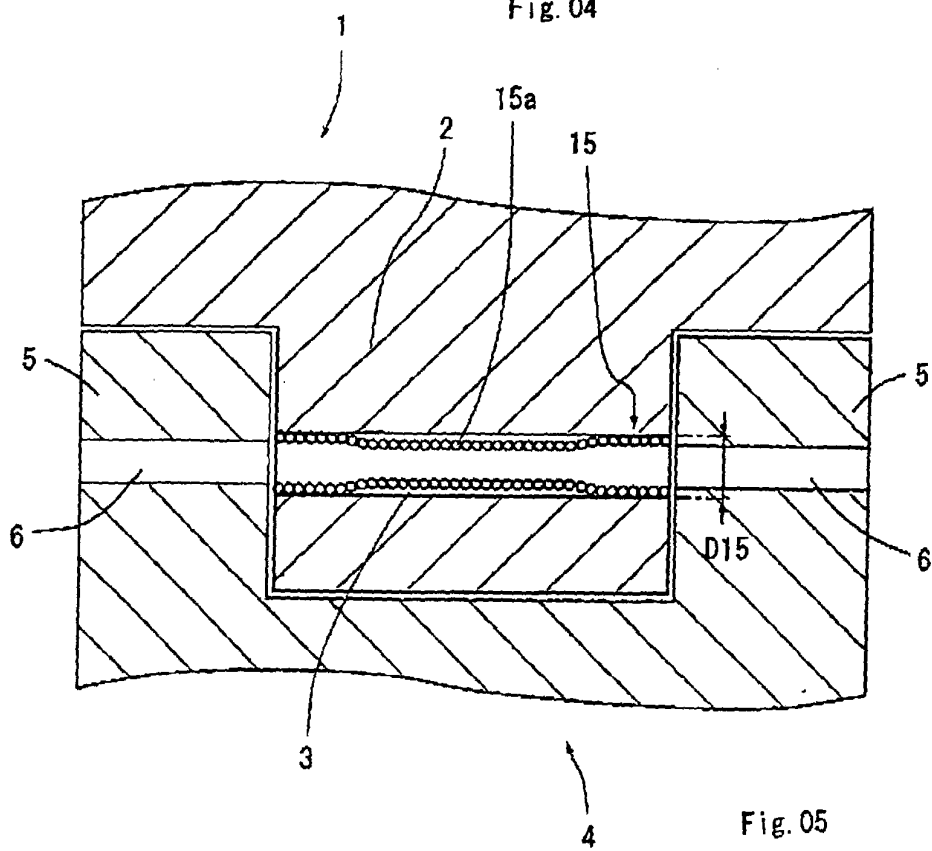
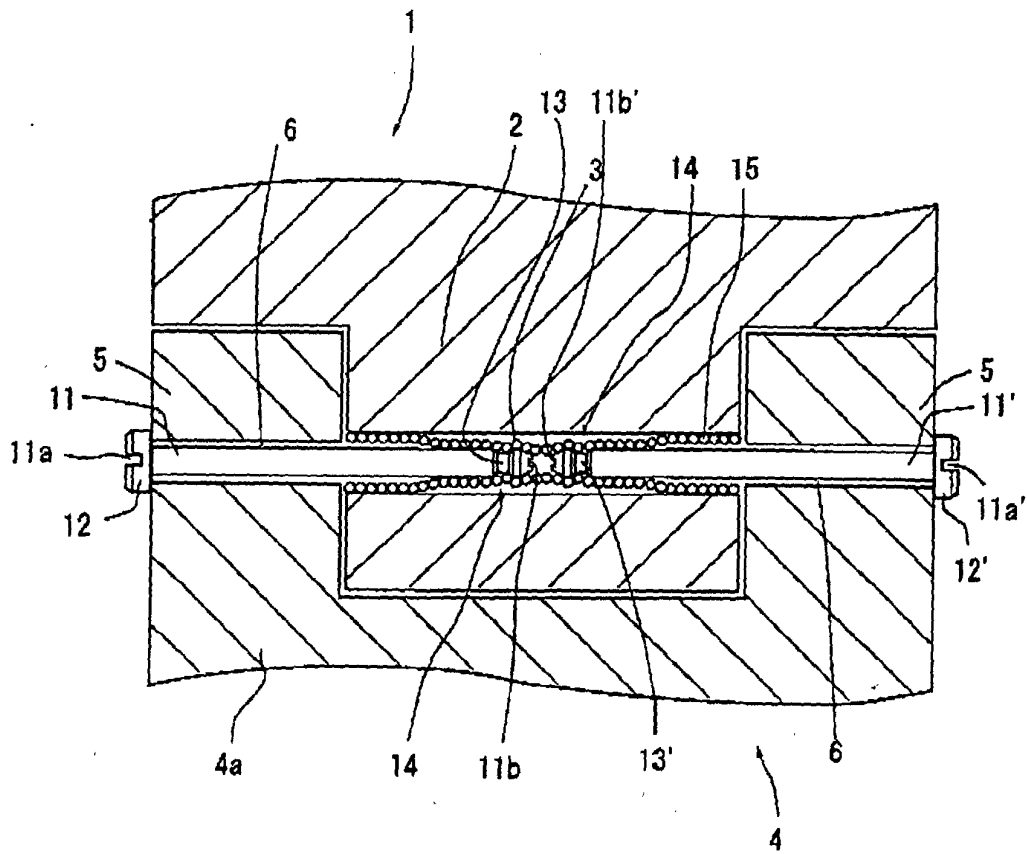
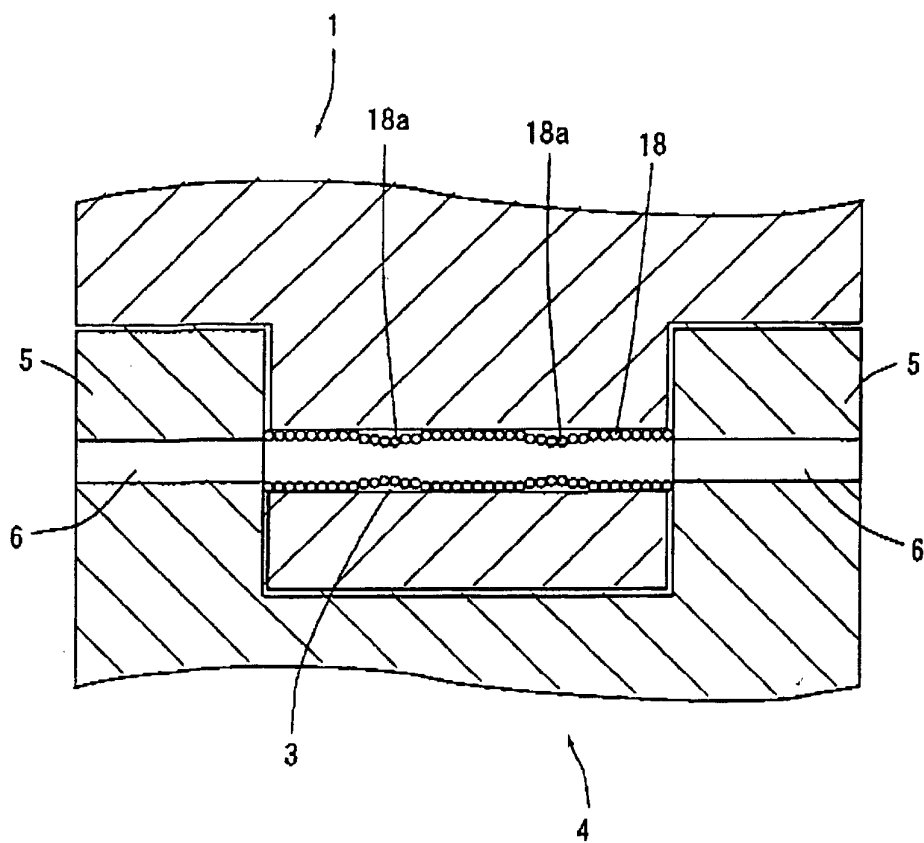
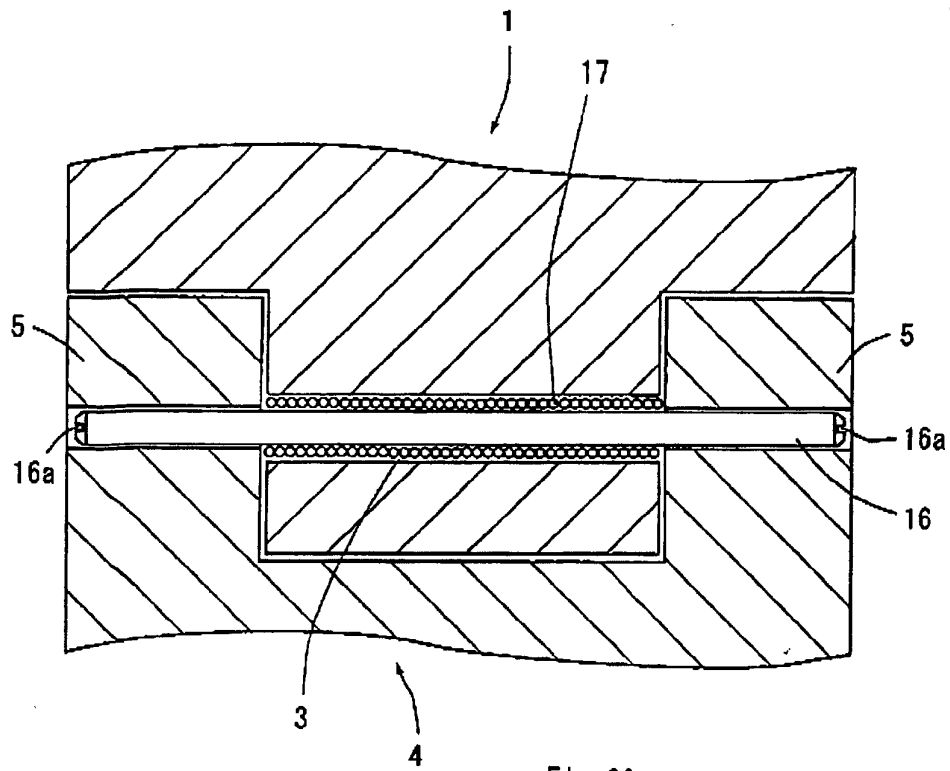


Fig. 03





(A)

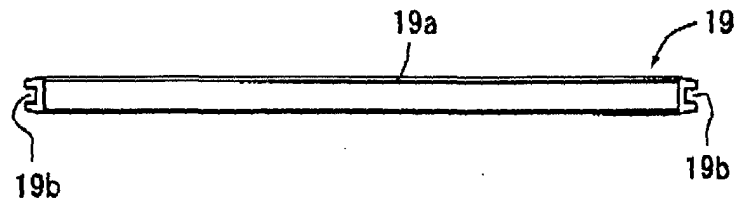


Fig. 08

(B)

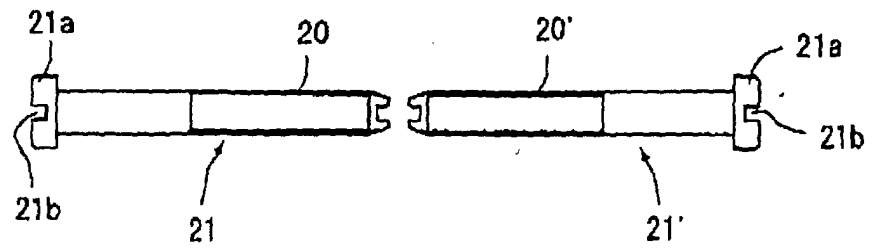


Fig. 09

(A)



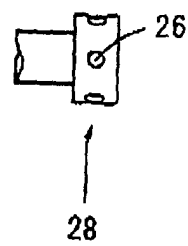
(B)



(C)



(D)



(E)

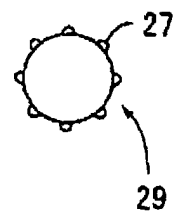
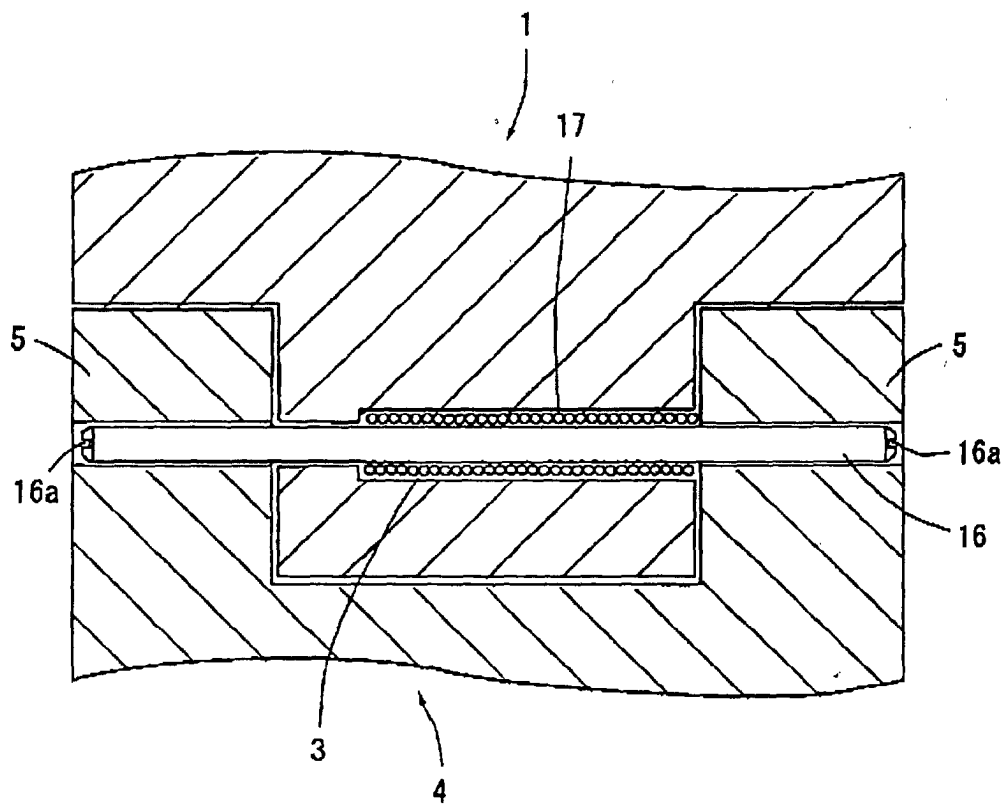


Fig. 10



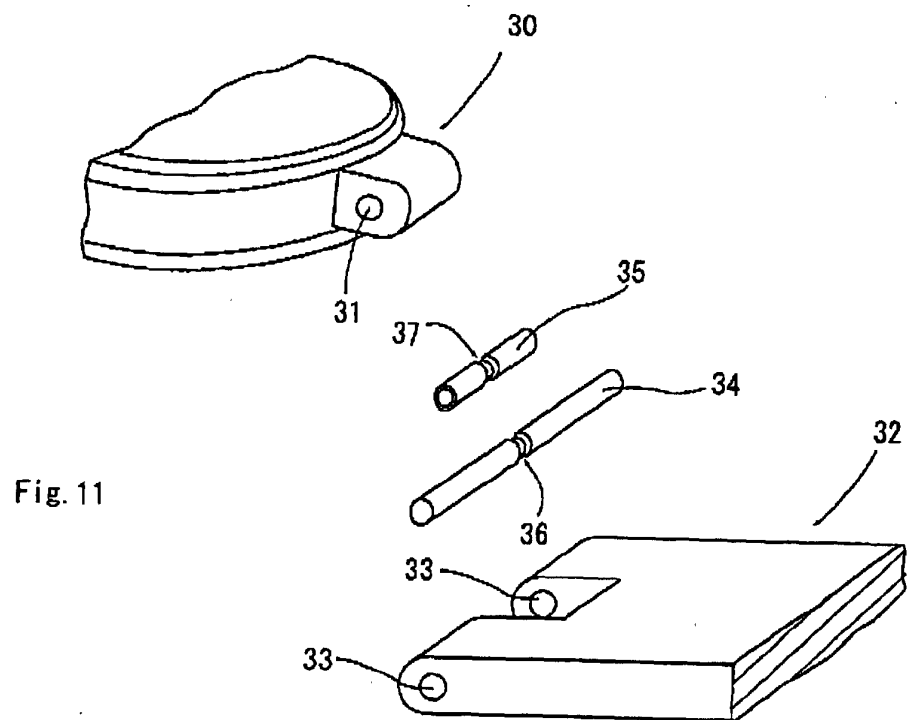


Fig. 11

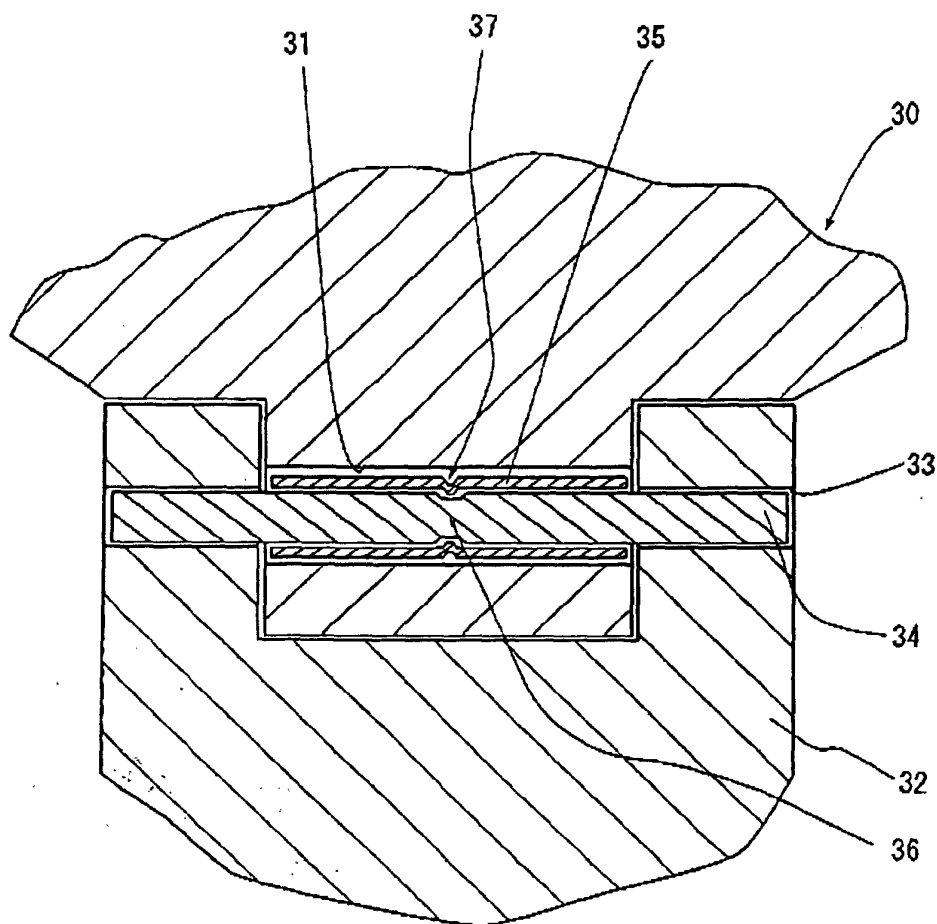
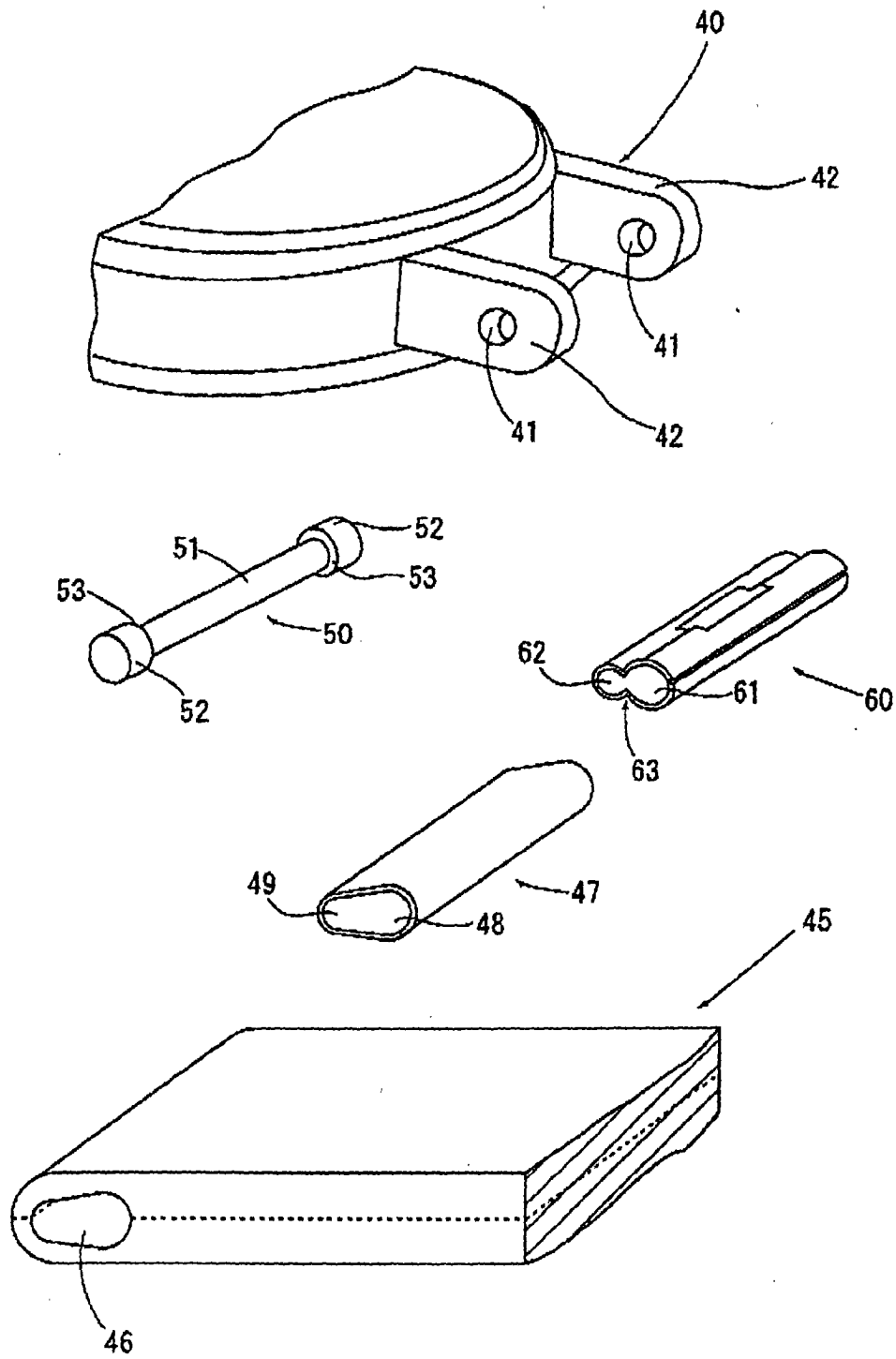


Fig. 12

Fig. 13





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 01 30 6963

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
P, X	EP 1 106 096 A (TAKASHIMA SANGYO CO LTD) 13 June 2001 (2001-06-13) * column 3, line 2 - column 4, line 33 * * column 7, line 55 - column 12, line 51 * * figures *	1-14	A44C5/14 G04B37/14
A	US 4 149 662 A (RAMACIERE ROMUALD) 17 April 1979 (1979-04-17) * abstract; figures *	1-3	
A	CH 662 028 A (SOLANOR AG) 15 September 1987 (1987-09-15) * abstract; figures *	1-3	
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 26 November 2001	Examiner Kock, S
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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26-11-2001

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