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(54) **REAGENT TRANSFER DEVICE**

(57) The present application relates to a reagent transfer device including a reagent container, a first sealing film, and a cover. The reagent container is provided with a first end. The first end is provided with a first opening in communication with a first chamber of the reagent container. The first sealing film is provided at the first end and capable of sealing the first opening. The cover is covered at the first end. The cover is provided with a soft member corresponding to a position of the first opening and not liable to be pierced by a needling member.

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Description

TECHNICAL FIELD

[0001] The present application relates to the technical field of medical devices, and in particular, to a reagent transfer device.

BACKGROUND

[0002] A conventional reagent transfer device includes a reagent container for storing a reagent. In a process of delivering the reagent transfer device into a medical analysis equipment for use, the reagent container needs to be pierced by a needling member so that the reagent stored in the reagent container flows out, and then the liquid reagent flowing out is subjected to related detection and analysis processing. The reagent container is tubular, and an end surface of the tubular reagent container is provided with a port, which is usually sealed with a sealing film that can be pierced by the needling member. When it is necessary to cause the liquid reagent contained in the reagent container to flow out, the needling member is driven by a driving device to press down and pierce the sealing film, and a piercing channel opening is formed on the sealing film, from which the medical analysis equipment transfers the reagent into other flow channels or containers. This protocol may enable storage of the reagent and then transfer of the reagent. However, the piercing needle of the medical analysis equipment may be contaminated due to direct contact with the reagent, which reduces the detection accuracy and requires frequent maintenance and cleaning operations of the medical analysis equipment.

SUMMARY

[0003] Accordingly, it is necessary to overcome the defects of the related art and provide a reagent transfer device which can ensure the detection accuracy and reduce the number of maintenance and cleaning times of the medical analysis equipment.

[0004] The technical solutions are as follows. A reagent transfer device includes: a reagent container provided with a first end, the first end being provided with a first opening in communication with a first chamber of the reagent container; a first sealing film provided at the first end and capable of sealing the first opening; a cover covered at the first end, the cover body being provided with a soft member corresponding to a position of the first opening and not liable to be pierced by a needling member.

[0005] For the above-mentioned reagent transfer device, when it is necessary to cause the liquid reagent stored in the reagent container to flow out, the needling member is driven to move, the needling member presses the soft member and the first sealing film. The soft member is not liable to be pierced during the pressing by the needling member, and the first sealing film is pierced during the pressing by the needling member. Since the needling member is always wrapped by the soft member during the process of piercing the first sealing film, the soft member can prevent the needling member from contacting the liquid reagent in the reagent container, thereby avoiding contamination of the reagent container, preventing the reagent container from contacting the needling member, and preventing the liquid reagent from being volatilized and diffused outward through the first opening. In this way, the detection accuracy can be ensured, and the number of maintenance and cleaning times for the medical analysis equipment can be reduced.

[0006] In one embodiment, the reagent container is provided with a second end opposite the first end, the second end is provided with a second opening in communication with the first chamber of the reagent container. The reagent container further includes a second sealing film disposed at the second end and capable of sealing the second opening. The reagent transfer device further includes a holder provided with a transition chamber thereon. The transition chamber is provided with an insertion opening corresponding to the second end, the second end extends into the transition chamber through the insertion opening. A piercing member configured to pierce the second sealing film is provided on a bottom wall of the transition chamber.

[0007] In one embodiment, the first sealing film is fixed to an end surface of the first end by hot pressing; and the second sealing film is fixed to an end surface of the second end by hot pressing.

[0008] In one embodiment, the first end is provided with a first flange surrounding the first opening at the end surface of the first end, and the first sealing film is tightly attached to the first flange. The second end is provided with a second flange surrounding the second opening at the end surface of the second end, and the second sealing film is tightly attached to the second flange.

[0009] In one embodiment, at least one third flange is circumferentially provided on an outer wall of the second end, the third flange abuts against a wall of the transition chamber.

[0010] In one embodiment, a groove is circumferentially provided on the outer wall of the second end, and an elastic sleeve is provided in in the groove; the third flange is disposed on an outer wall of the elastic sleeve.

[0011] In one embodiment, the reagent transfer device further includes a frame. The reagent container is disposed on the frame. The frame is disposed on the holder in a position-adjustable manner, and the frame has a first working position and a second working position. When the frame is in the first working position, a gap is provided between the second sealing film and the piercing member. When the frame is subjected to an external driving force greater than a preset force, the frame is moved from the first working position to the second working position by the external driving force, and the piercing member pierces the second sealing film when the frame is

moved to the second working position.

[0012] In one embodiment, the holder is provided with a support post, and the frame is provided with a limiting block corresponding to a position of the support post. The limiting block abuts against the support post when the frame is in the first working position;

[0013] The limiting block includes a guide sleeve and a fragile portion disposed at one end of the guide sleeve. The support post is movably disposed in the guide sleeve and abuts against the fragile portion. When the frame is subjected to the external driving force greater than the preset force, the support post causes the fragile portion to be broken and moves out of the guide sleeve. Or, at least one of the limiting block and the support post is an elastic block. Or, the limiting block abuts against the support post through an elastic block.

[0014] In one embodiment, at least three support posts and at least three limiting blocks are provided, and the three support posts and the three limiting blocks are provided in one-to-one correspondence.

[0015] In one embodiment, a plate edge is provided on an outer wall of the first end of the reagent container, the frame is provided with an avoidance opening. The reagent container is disposed in the avoidance opening, and the plate edge of the reagent container is placed on the frame.

[0016] In one embodiment, a plurality of reagent containers are provided and are connected in sequence; the cover covers the first ends of the plurality of reagent containers at the same time, and the soft member covers the first openings of the plurality of reagent containers at the same time.

[0017] In one embodiment, the reagent transfer device further includes a support member disposed at the first end. The support member is provided with an avoidance hole. A position of the avoidance hole is opposed to a piercing position of the needling member, and the support member is configured to support and abut against the first sealing film.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The accompanying drawings, which constitute part of the present application, serve to provide a further understanding of the present application, and the illustrative embodiments of the present application and their descriptions serve to explain the present application, and do not constitute an improper limitation of the present application.

[0019] In order to more clearly illustrate the technical solutions in the embodiments of the present application, the accompanying drawings required in the description of the embodiments will be briefly described below. Apparently, the accompanying drawings in the following description are merely some embodiments of the present application, and other drawings may be obtained by those skilled in the art without creative efforts.

FIG. 1 is a schematic view of a reagent transfer device according to an embodiment of the present application.

FIG. 2 is an exploded schematic view of a reagent transfer device according to an embodiment of the present application.

FIG. 3 is a cross-sectional view of a frame of a reagent transfer device according to an embodiment of the present application in a first working position.

FIG. 4 is an enlarged schematic view of a position A of FIG. 3.

FIG. 5 is an enlarged schematic view of a position B of FIG. 3.

FIG. 6 is a cross-sectional view of a frame of a reagent transfer device according to an embodiment of the present application in a second working position.

FIG. 7 is an enlarged schematic view of a position C of FIG. 6.

FIG. 8 is an enlarged schematic view of a position D of FIG. 6.

FIG. 9 is a schematic view of a limiting block of a reagent transfer device according to an embodiment of the present application.

FIG. 10 is a schematic view of a reagent container according to an embodiment of the present application.

FIG. 11 is an exploded schematic view of a reagent container according to an embodiment of the present application.

FIG. 12 is a schematic cross-sectional view of a reagent container according to an embodiment of the present application.

FIG. 13 is an enlarged schematic view of a position E of FIG. 12.

[0020] 10, reagent container; 11, first end; 111, first opening; 112, step; 113, first flange; 114, plate edge; 12, second end; 121, second opening; 122, second flange; 123, groove; 13, first chamber; 20, first sealing film; 30, cover; 31, soft member; 40, needling member; 50, second sealing film; 60, elastic sleeve; 61, third flange; 70, holder; 71, transition chamber; 711, insertion opening; 72, piercing member; 73, support post; 80, support member; 81, avoidance hole; 90, frame; 91, limiting block; 911, guide sleeve; 912, fragile portion; and 92, avoidance opening.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0021] In order to make the above objects, features, and advantages of the present application more apparent, specific embodiments of the present application will be described in detail with reference to the accompanying drawings. Many specific details are set forth in the following description to facilitate a full understanding of the present application. However, the present application can be implemented in many other ways different from those described herein, and those skilled in the art may

make similar modifications without departing from the contents of the present application, and the present application is not limited by the specific embodiments disclosed below.

[0022] Referring to FIGS. 1, 2, 11, and 12, FIG. 1 shows a schematic view of a reagent transfer device according to an embodiment of the present application, FIG. 2 shows an exploded schematic view of a reagent transfer device according to an embodiment of the present application, FIG. 11 shows an exploded schematic view of a reagent container 10 according to an embodiment of the present application, and FIG. 12 shows a schematic cross-sectional view of a reagent container 10 according to an embodiment of the present application. An embodiment of the present application provides a reagent transfer device including a reagent container 10, a first sealing film 20, and a cover 30. The reagent container 10 is provided with a first end 11. The first end 11 is provided with a first opening 111 in communication with a first chamber 13 of the reagent container 10. The first sealing film 20 is disposed at the first end 11 and can seal the first opening 111. The cover 30 is covered at the first end 11, and the cover 30 is provided with a soft member 31 corresponding to the position of the first opening 111 and not liable to be pierced by a needling member 40.

[0023] For the above-mentioned reagent transfer device, when it is necessary to cause the liquid reagent stored in the reagent container 10 to flow out, the needling member 40 is driven to move, the needling member 40 presses the soft member 31 and the first sealing film 20. The soft member 31 is not liable to be pierced during the pressing by the needling member 40, and the first sealing film 20 is pierced during the pressing by the needling member 40. Since the needling member 40 is always wrapped by the soft member 31 during the process of piercing the first sealing film 20, the soft member 31 can prevent the needling member 40 from contacting the liquid reagent in the reagent container 10, thereby avoiding contamination of the reagent container 10, preventing the reagent container 10 from contacting the needling member 40, and preventing the liquid reagent from being volatilized and diffused outward through the first opening 111. In this way, the detection accuracy can be ensured, and the number of maintenance and cleaning times for the medical analysis equipment can be reduced.

[0024] It should be noted that the soft member 31 which is not easily pierced by the needling member 40 is specifically a soft rubber having good toughness, for example, PU soft rubber, elastic rubber, silicone, etc., which is not limited herein and may be provided as required.

[0025] Referring to FIGS. 2 to 5, FIG. 3 is a cross-sectional view of a frame 90 of a reagent transfer device according to an embodiment of the present application in a first working position, FIG. 4 is an enlarged schematic view of the position A of FIG. 3, and FIG. 5 is an enlarged schematic view of the position B of FIG. 3. Further, the reagent container 10 is provided with a second end 12 opposite to the first end 11, and the second end 12 is provided with a second opening 121 in communication with the first chamber 13 of the reagent container 10. The reagent container further includes a second sealing film 50. The second sealing film 50 is disposed at the second end 12 and can seal the second opening 121. In addition, the reagent transfer device further includes a holder 70. The holder 70 is provided with a transition chamber 71 thereon. The transition chamber 71 is provided with an insertion opening 711 corresponding to the second end 12, the second end 12 extends into the transition chamber 71 through the insertion opening 711. A piercing member 72 for piercing the second sealing film 50 is provided on a bottom wall of the transition chamber 71. In this way, in the process of driving the needling member 40 to move so that the needling member 40 presses the soft member 31 and the first sealing film 20, the second end 12 of the reagent container 10 is moved toward the bottom wall of the transition chamber 71, and the piercing member 72 is in contact with the second sealing film 50 to pierce the second sealing film 50, so that both the first sealing film 20 and the second sealing film 50 are pierced, and the liquid reagent in the reagent container 10 can flow out from the reagent container 10 to the transition chamber 71 smoothly.

[0026] Referring to FIGS. 11 to 13, FIG. 13 is an enlarged schematic view of the position E of FIG. 12. In one embodiment, the first sealing film 20 is fixed to an end surface of the first end 11 by hot pressing. In this way, after the first sealing film 20 is fixed to the end surface of the first end 11 by hot pressing, the first sealing film 20 can seal the first opening 111.

[0027] Referring to FIGS. 11 to 13, in one embodiment, the second sealing film 50 is fixed to an end surface of the second end 12 by hot pressing. In this way, after the second sealing film 50 is fixed to the end surface of the second end 12 by hot pressing, the second sealing film 50 can seal the second opening 121.

[0028] It should be noted that the first sealing film 20 may also seal the first opening 111 in other manners, for example, by adhering the first sealing film 20 to the end surface of the first end 11, etc., which is not limited herein. Similarly, the second sealing film 50 may also seal the second opening 121 in other manners, for example, by adhering the second sealing film 50 to the end surface of the second end 12, etc.

[0029] Referring to FIGS. 11 to 13, in one embodiment, the first end 11 is provided with a first flange 113 surrounding the first opening 111 at the end surface thereof, and the first sealing film 20 is tightly attached to the first flange 113. The second end 12 is provided with a second flange 122 surrounding the second opening 121 at the end surface thereof, and the second sealing film 50 is tightly attached to the second flange 122. In this way, since the first flange 113 surrounding the first opening 111 is provided on the end surface of the first end 11, when the first sealing film 20 is fixed to the end surface of the first end 11 by hot pressing, the first opening 111 can be sealed tightly, and the sealing performance is

better. Similarly, since the second flange 122 surrounding the second opening 121 is provided on the end surface of the second end 12, when the second sealing film 50 is fixed to the end surface of the second end 12 by hot pressing, the second opening 121 can be sealed tightly, and the sealing performance is better.

[0030] Referring to FIG. 13, in one embodiment, the second end 12 is circumferentially provided with at least one third flange 61 on an outer wall thereof. The third flange 61 abuts against a wall of the transition chamber 71. In this way, after the reagent container 10 is pierced and the liquid reagent flows into the transition chamber 71, since at least one third flange 61 abuts against the wall of the transition chamber 71, a better sealing performance can be realized, which can prevent the liquid reagent in the transition chamber 71 from flowing out through the insertion opening 711.

[0031] Referring to FIG. 13, further, a groove 123 is circumferentially provided on the outer wall of the second end 12, and an elastic sleeve 60 is provided in the groove 123. The third flange 61 is disposed on an outer wall of the elastic sleeve 60. Specifically, in order to ensure the sealing effect, the elastic sleeve 60 is a soft rubber with good elasticity, such as TPE soft rubber, silicone, rubber, etc., which is not limited herein and may be provided according to actual needs.

[0032] Referring to FIGS. 3 to 8, FIG. 6 is a cross-sectional view of a frame 90 of a reagent transfer device according to an embodiment of the present application in a second working position, FIG. 7 is an enlarged schematic view of the position C of FIG. 6, and FIG. 8 is an enlarged schematic view of the position D of FIG. 6. In one embodiment, the reagent transfer device further includes a frame 90. The reagent container 10 is disposed on the frame 90. The frame 90 is disposed on the holder 70 in a position-adjustable manner, and the frame 90 has a first working position and a second working position. When the frame 90 is in the first working position, a gap is provided between the second sealing film 50 and the piercing member 72. When the frame 90 is subjected to an external driving force greater than a preset force, the frame 90 is moved from the first working position to the second working position by the external driving force, and the piercing member 72 pierces the second sealing film 50 when the frame 90 is moved to the second working position. It should be noted that the specific magnitude of the preset force is provided according to the actual situation, and is not limited herein. Before the reagent container 10 is pierced, the frame 90 is in the first working position, and the frame 90 supports the reagent container 10 so that there is a gap provided between the second sealing film 50 and the piercing member 72. In this way, since the piercing member 72 does not contact the second sealing film 50, the second sealing film 50 will not be pierced. In addition, the frame 90 is moved from the first working position to the second working position only when the external driving force received is greater than the preset force, that is, the frame 90 is always in the first working position when the external driving force is less than the preset force, so that the sealing film of the reagent container 10 can be prevented from being pierced during the assembly and transportation of the reagent transfer device. When both the first sealing film 20 and the second sealing film 50 of the reagent container 10 need to be pierced, the needling member 40 is driven to move, and the needling member 40 presses the soft member 31 and the first sealing film 20. On the one hand, the needling member 40 pierces the first sealing film 20, on the other hand, the cover 30, the reagent container 10, and the frame 90 are also pushed toward the holder 70 by the soft member 31 when the needling member 40 is moved, so that the frame 90 is subjected to the external driving force greater than the preset force, and then the frame 90 is moved from the first working position to the second working position by the external driving force, and the piercing member 72 pierces the second sealing film 50 when the frame 90 is moved to the second working position.

[0033] Referring to FIGS. 3 to 5, further, the holder 70 is provided with a support post 73, and the frame 90 is provided with a limiting block 91 corresponding to the position of the support post 73. When the frame 90 is in the first working position, the limiting block 91 abuts against the support post 73.

[0034] Referring to FIGS. 3 to 5, in one embodiment, the limiting block 91 includes a guide sleeve 911 and a fragile portion 912 disposed at one end of the guide sleeve 911. The support post 73 is movably disposed in the guide sleeve 911 and abuts against the fragile portion 912. When the frame 90 is subjected to the external driving force greater than the preset force, the support post 73 causes the fragile portion 912 to be broken, and moves out of the guide sleeve 911. In this way, during the process that the support post 73 causes the fragile portion 912 to be broken and moves out of the guide sleeve 911, the frame 90 and the reagent container 10 on the frame 90 are moved from the first working position to the second working position. When the reagent container 10 is moved to the second working position, the piercing member 72 pierces the second sealing film 50.

[0035] It should be noted that the fragile portion 912 can be specifically designed in various ways, as long as the support post 73 can break the fragile portion 912 and move out of the guide sleeve 911 when the frame 90 is subjected to an external driving force greater than the preset force. In addition, when the frame 90 is subjected to an external driving force not greater than the preset force, the support post 73 abuts against the fragile portion 912 to support the frame 90 and the reagent container 10 thereon. For example, the fragile portion 912 is a limiting piece provided at one end of the guide sleeve 911, and an edge of the limiting piece is connected to the guide sleeve 911 through at least one fragile strip. When the force of the limiting piece by the support post 73 reaches a set value, the fragile strip will be broken, and the limiting piece is separated from the guide sleeve 911, so that the

support post 73 can break the fragile portion 912 and move out of the guide sleeve 911. For another example, the fragile portion 912 is a film member, frangible glass, frangible paperboard, or the like fixed to one end of the guide sleeve 911. When the force of the fragile portion 912 by the support post 73 reaches a set value, the support post 73 can break the fragile portion 912 and move out of the guide sleeve 911.

[0036] In another embodiment, the limiting block 91 and the support post 73 are also not limited to the arrangements in the above-described embodiments. For example, at least one of the limiting block 91 and the support post 73 is an elastic block. Only when the frame 90 is subjected to the external driving force reaching a preset force, the limiting block 91 and the support block can be sufficiently deformed and compressed so that the frame 90 and the reagent container 10 thereon are moved from the first working position to the second working position. When the reagent container 10 is moved to the second working position, the piercing member 72 pierces the second sealing film 50. For another example, the limiting block 91 abuts against the support post 73 through the elastic block. Similarly, the elastic block can be sufficiently deformed and compressed only when the frame 90 is subjected to the external driving force reaching a preset force, so that the frame 90 and the reagent container 10 thereon are moved from the first working position to the second working position. When the reagent container 10 is moved to the second working position, the piercing member 72 pierces the second sealing film 50.

[0037] As an alternative solution, the arrangements of the support post 73 and the limiting block 91 can be interchanged, i.e., the support post 73 is arranged on the frame 90 and the limiting block 91 is arranged on the holder 70.

[0038] Referring to FIG. 2, in one embodiment, at least three support posts 73 and at least three limiting blocks 91 are provided, and the three support posts 73 and the three limiting blocks 91 are provided in one-to-one correspondence. In this way, the at least three support posts 73 correspondingly support and abut against the at least three limiting blocks 91, respectively, the frame 90 can be stably disposed on the holder 70.

[0039] It should be noted that one, two, or other numbers of the support posts 73 may be provided, which are not limited herein. Similarly, one, two, or other numbers of the limiting blocks 91 may be provided, which are not limited herein.

[0040] Referring to FIGS. 2 and 3, in one embodiment, a plate edge 114 is provided on an outer wall of the first end 11 of the reagent container 10. The frame 90 is provided with an avoidance opening 92. The reagent container 10 is arranged in the avoidance opening 92, and the plate edge 114 of the reagent container 10 is placed on the frame 90.

[0041] Referring to FIGS. 2 and 3, in one embodiment, a plurality of reagent containers 10 are provided and are connected in sequence. The cover 30 covers the first ends 11 of the plurality of reagent containers 10 at the same time, and the soft member 31 covers the first openings 111 of the plurality of reagent containers 10 at the same time.

[0042] Referring to FIGS. 11 to 13, in one embodiment, the reagent transfer device further includes a support member 80. The support member 80 is disposed at the first end 11, and the support member 80 is provided with an avoidance hole 81. The position of the avoidance hole 81 is opposed to the piercing position of the needling member 40, and the support member 80 is used to support and abut against the first sealing film 20. In this way, in the process of piercing the first sealing film 20 by pressing the needling member 40 down, since the support member 80 can support and abut against the first sealing film 20, and the support member 80 is provided with the avoidance hole 81 that can avoid the needling member 40, the movement stroke of the needling member 40 when the first sealing film 20 is pierced is reduced and the effect of piercing the first sealing film 20 is more significantly improved. In this way, the sealing film can be easily pierced, the possibility that the sealing film is not pierced is greatly reduced, and the effect of piercing the first sealing film 20 is better.

[0043] Referring to FIGS. 11 to 13, further, a step 112 is provided on a wall of the first opening 111, and the support member 80 is arranged on the step 112. In this way, during the production of the reagent container 10, the support member 80 is mounted on the step 112, and the support member 80 is positioned by the first sealing film 20 mounted at the first end 11, and the assembly operation of the reagent container 10 is relatively convenient. In addition, when the support member 80 is mounted on the step 112, an upper surface of the support member 80 is substantially flush with an end surface of the first end 112, thereby ensuring the sealing performance of the first sealing film 20 to the first opening 111.

[0044] It should be noted that the support member 80 is not limited to be provided at the first end 11 by being mounted at the step 112. The support member 80 may be provided at the first end 11 in other manners, for example, being fixedly mounted at the first end 11 by means of mounting members such as screws, pins, rivets, clips, etc., or may be fixedly provided at the first end 11 by means of bonding, welding, etc., or the support member 80 and the first end 11 may be made into an integrated structure, which is not limited herein and is provided according to actual needs.

[0045] Referring to FIGS. 11 to 13, further, the support member 80 is a baffle plate placed on the step 112, and the avoidance hole 81 is disposed in the middle part of the baffle plate. In this way, when the needling member 40 is pressed down to pierce the first sealing film 20, the needling member 40 generally acts on the middle part of the first sealing film 20 to achieve a better piercing effect on the first sealing film 20. Correspondingly, the avoidance hole 81 is arranged in the middle part of the baffle

plate, so that the avoidance hole 81 can smoothly avoid the needling member 40. Of course, if the needling member 40 is pressed down to pierce other parts of the first sealing film 20, such as the peripheral part, the avoidance hole 81 is arranged on the peripheral part of the baffle plate.

[0046] In one embodiment, the first end 11 is the top end of the reagent container 10, and the second end 12 is the bottom end of the reagent container 10. In addition, an opening size of the second opening 121 is smaller than an opening size of the first opening 111. Here, the opening size of the second opening 121 is small, and the second sealing film 50 on the second opening 121 is easily pierced by the piercing member 72 on the bottom wall of the second chamber, so that it may not be necessary to provide the support member 80 at the first opening 111 similarly to the first end 11. That is, it is not necessary to provide the support member 80 on the second end 12, and of course, the support member 80 may also be provided, which is not limited herein.

[0047] Referring to FIGS. 11 to 13, in one embodiment, the plate edges 114 of the first ends 11 of the at least two reagent containers 10 are connected to each other. Further, the end surfaces of the first ends 11 of the at least two reagent containers 10 are on the same plane.

[0048] In addition, when at least two reagent containers 10 and at least two support members are provided, and the at least two support members 80 are disposed on the first ends 11 of the at least two reagent containers 10 in a one-to-one correspondence. In this way, when the at least two needling members 40 are simultaneously pressed down to pierce the first sealing film 20, the first sealing film 20 at the at least two first openings 111 can be ensured to be pierced under the action of the at least two support members 80.

[0049] In addition, in this embodiment, the first sealing film 20 is disposed at the first ends 11 of the at least two reagent containers 10 and can simultaneously seal the first openings 111 of the at least two reagent containers 10. In this way, the first sealing film 20 can simultaneously seal the first openings 111 of the at least two reagent containers 10 by means of, for example, hot-pressing fixing, and the working efficiency is high without sealing operations on the first openings 111 of the reagent containers 10, respectively.

[0050] Referring to FIGS. 11 to 13, in one embodiment, the assembling steps of the above-mentioned reagent container 10 include as follows.

[0051] The support member 80 is first placed on the step 112 on the inner wall of the first opening 111.

[0052] The first sealing film 20 is then fixed on the end surface of the first end 11 by, for example hot pressing and seals the end surface of the first end 11.

[0053] Thereafter, the liquid reagent is introduced into the second chamber of the reagent container 10 through the second end 12 of the reagent container 10.

[0054] Finally, the second sealing film 50 is fixed on the end surface of the second end 12 by, for example hot pressing, and seals the end surface of the second end 12.

[0055] Referring again to FIG. 2, in one embodiment, the assembling steps of the reagent transfer device include as follows.

[0056] First, the frame 90 is mounted on the holder 70, so that the limiting blocks 91 of the frame 90 correspondingly abut against the support posts 73 on the holder 70.

[0057] The reagent container 10 is then mounted in the frame 90, and the cover 30 is disposed on the first end 11 of the reagent container 10. Specifically, the cover 30 is fixedly mounted on the plate edge 114 of the outer wall of the first end 11 of the reagent container 10.

[0058] It should be noted that the "first flange 113" may be "a part of the first end 11", that is, the "first flange 113" and the "other part of the first end 11" are integrally formed. Alternatively, the "first flange 113" may also be an independent component that can be separated from "the other part of the first end 11", that is, the "first flange 113" may be manufactured independently, and then combined with the "other parts of the first end 11" as a whole. Referring to FIG. 13, in one embodiment, the "first flange 113" is a part of the "first end 11" which is integrally formed.

[0059] It should be noted that the "second flange 122" may be "a part of the second end 12", that is, the "second flange 122" and the "other part of the second end 12" are integrally formed. Alternatively, the "second flange 122" may also be an independent component that can be separated from "the other part of the second end 12", that is, the "second flange 122" may be manufactured independently, and then combined with the "other parts of the second end 12" as a whole. Referring to FIG. 13, in one embodiment, the "second flange 122" is a part of the "second end 12" which is integrally formed.

[0060] It should be noted that the "third flange 61" may be "a part of the elastic sleeve 60", that is, the "third flange 61" and the "other part of the elastic sleeve 60" are integrally formed. Alternatively, the "third flange 61" may also be an independent component that can be separated from "the other part of the elastic sleeve 60", that is, the "third flange 61" may be manufactured independently, and then combined with the "other parts of the elastic sleeve 60" as a whole. Referring to FIG. 13, in one embodiment, the "third flange 61" is a part of the "elastic sleeve 60" which is integrally formed.

[0061] It should be noted that the "support member 80" may be "a part of the reagent container 10", that is, the "support member 80" and the "other part of the reagent container 10" are integrally formed. Alternatively, the "support member 80" may also be an independent component that can be separated from "the other part of the reagent container 10", that is, the "support member 80" may be manufactured independently, and then combined with the "other parts of the reagent container 10" as a whole.

[0062] The technical features of the above embodiments may be arbitrarily combined. In order to make the

description succinct, there is no describing of all possible combinations of the various technical features in the foregoing embodiments. It should be noted that as long as there is no contradiction in the combination of these technical features, these should be considered as falling within the scope of the description.

[0063] Although the present application is illustrated and described herein with reference to specific embodiments, the present application is not intended to be limited to the details shown. It is to be noted that, various modifications may be made in the details within the scope and range of equivalents of the claims and without departing from the present application. Therefore, the protection scope of the present application shall be subject to the protection scope of the claims.

[0064] In the description of the present application, it should be understood that orientation or positional relationships indicated by terms "center", "longitudinal", "transverse", "length", "width", "thickness", "upper", "lower", "front", "rear", "left", "right", "vertical", "horizontal", "top", "bottom", "inner", "outer", "clockwise", "counterclockwise", "axial" ,"radial", "circumferential", etc. are based on orientation or positional relationship shown in the drawings, which are merely to facilitate the description of the present application and simplify the description, not to indicate or imply that the device or elements must have a particular orientation, be constructed and operated in a particular orientation, and therefore cannot be construed as a limitation on the present application.

[0065] In addition, the terms "first" and "second" are used for description only and cannot be understood as indicating or implying relative importance or implicitly indicating the number of technical features described. Thus, the features defined with "first" and "second" may include at least one of the features explicitly or implicitly. In the description of the present application, the meaning of "plurality" is at least two, such as two, three, etc., unless explicitly defined otherwise.

[0066] In the present application, unless explicitly specified and limited otherwise, the terms "mounting", "connecting", "connected", "fixed" and the like should be understood in a broad sense. For example, it may be a fixed connection or a detachable connection, or an integration, may be a mechanical connection or electrical connection, may be a direct connection, or may be an indirect connection through an intermediate medium, may be the connection between two elements or the interaction relationship between two elements, unless explicitly defined otherwise. The specific meanings of the above terms in the present application can be understood by one of those ordinary skills in the art according to specific circumstances.

[0067] In the present application, unless explicitly specified and limited otherwise, the first feature being "on" or "below" the second feature may be that the first and second features are in a direct contact, or the first and second features are in an indirectly contact through an intermediate medium. Moreover, the first feature being "over", "above" and "on" the second feature may be that the first feature is directly above or obliquely above the second feature, or simply means that the first feature is higher than the second feature in horizontal direction. The first feature being "beneath", "under", and "below" the second feature may be that the first feature is directly below or obliquely below the second feature, or simply means that the first feature is lower than the second feature in horizontal direction.

[0068] It should be noted that when an element is referred to as being "fixed" or "disposed on" another element, it may be directly on another element or there may also be an intermediate element therebetween. When an element is considered to be "connected" to another element, it may be directly connected to another element or there may be an intermediate element therebetween. As used herein, the terms "vertical", "horizontal", "upper", "lower", "left", "right", and similar expressions are for illustration only and are not meant to be the only embodiments.

Claims

1. A reagent transfer device, comprising:

a reagent container, provided with a first end, the first end being provided with a first opening in communication with a first chamber of the reagent container;
a first sealing film provided at the first end and capable of sealing the first opening; and
a cover covered at the first end, the cover being provided with a soft member corresponding to a position of the first opening and not liable to be pierced by a needling member.

2. The reagent transfer device according to claim 1, wherein the reagent container is provided with a second end opposite to the first end, the second end is provided with a second opening in communication with the first chamber of the reagent container; the reagent container further comprises a second sealing film disposed at the second end and capable of sealing the second opening; the reagent transfer device further comprises a holder provided with a transition chamber thereon; the transition chamber is provided with an insertion opening corresponding to the second end; the second end extends into the transition chamber through the insertion opening; and a piercing member configured to pierce the second sealing film is provided on a bottom wall of the transition chamber.

3. The reagent transfer device according to claim 2, wherein the first sealing film is fixed to an end surface of the first end by hot pressing; and the second sealing film is fixed to an end surface of the second end

by hot pressing.

4. The reagent transfer device according to claim 3, wherein the first end is provided with a first flange surrounding the first opening at the end surface of the first end, and the first sealing film is tightly attached to the first flange; the second end is provided with a second flange surrounding the second opening at the end surface of the second end, and the second sealing film is tightly attached to the second flange.

5. The reagent transfer device according to claim 2, wherein at least one third flange is circumferentially provided on an outer wall of the second end, the third flange abuts against a wall of the transition chamber.

6. The reagent transfer device according to claim 5, wherein a groove is circumferentially provided on the outer wall of the second end, and an elastic sleeve is provided in in the groove; the third flange is disposed on an outer wall of the elastic sleeve.

7. The reagent transfer device of claim 2, further comprising a frame; wherein the reagent container is disposed on the frame; the frame is disposed on the holder in a position-adjustable manner, and the frame has a first working position and a second working position;
when the frame is in the first working position, a gap is provided between the second sealing film and the piercing member; when the frame is subjected to an external driving force greater than a preset force, the frame is moved from the first working position to the second working position by the external driving force, and the piercing member pierces the second sealing film when the frame is moved to the second working position.

8. The reagent transfer device according to claim 7, wherein the holder is provided with a support post, and the frame is provided with a limiting block corresponding to a position of the support post; the limiting block abuts against the support post when the frame is in the first working position;
the limiting block comprises a guide sleeve and a fragile portion disposed at one end of the guide sleeve; the support post is movably disposed in the guide sleeve and abuts against the fragile portion; and when the frame is subjected to the external driving force greater than the preset force, the support post causes the fragile portion to be broken and moves out of the guide sleeve; or, at least one of the limiting block and the support post is an elastic block; or, the limiting block abuts against the support post through an elastic block.

9. The reagent transfer device according to claim 8, wherein at least three support posts and at least three limiting blocks are provided, and the three support posts and the three limiting blocks are provided in one-to-one correspondence.

10. The reagent transfer device according to claim 7, wherein a plate edge is provided on an outer wall of the first end of the reagent container, the frame is provided with an avoidance opening; the reagent container is disposed in the avoidance opening, and the plate edge of the reagent container is placed on the frame.

11. The reagent transfer device according to any one of claims 1 to 10, wherein a plurality of reagent containers are provided and are connected in sequence; the cover covers the first ends of the plurality of reagent containers at the same time, and the soft member covers the first openings of the plurality of reagent containers at the same time.

12. The reagent transfer device according to any one of claims 1 to 10, further comprising a support member disposed at the first end, wherein the support member is provided with an avoidance hole, a position of the avoidance hole is opposed to a piercing position of the needling member, and the support member is configured to support and abut against the first sealing film.

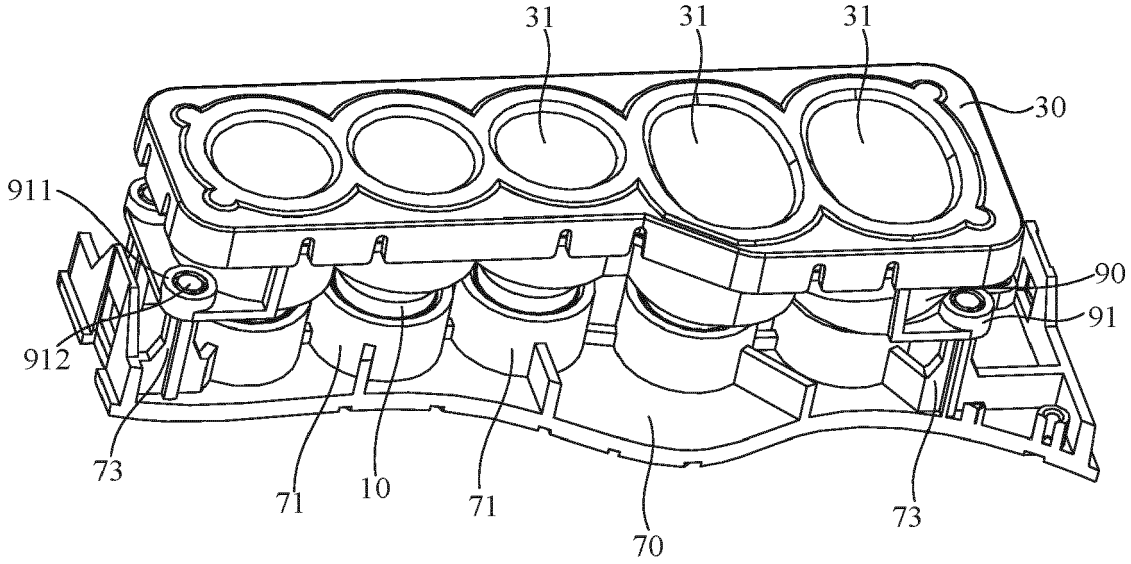

FIG. 1

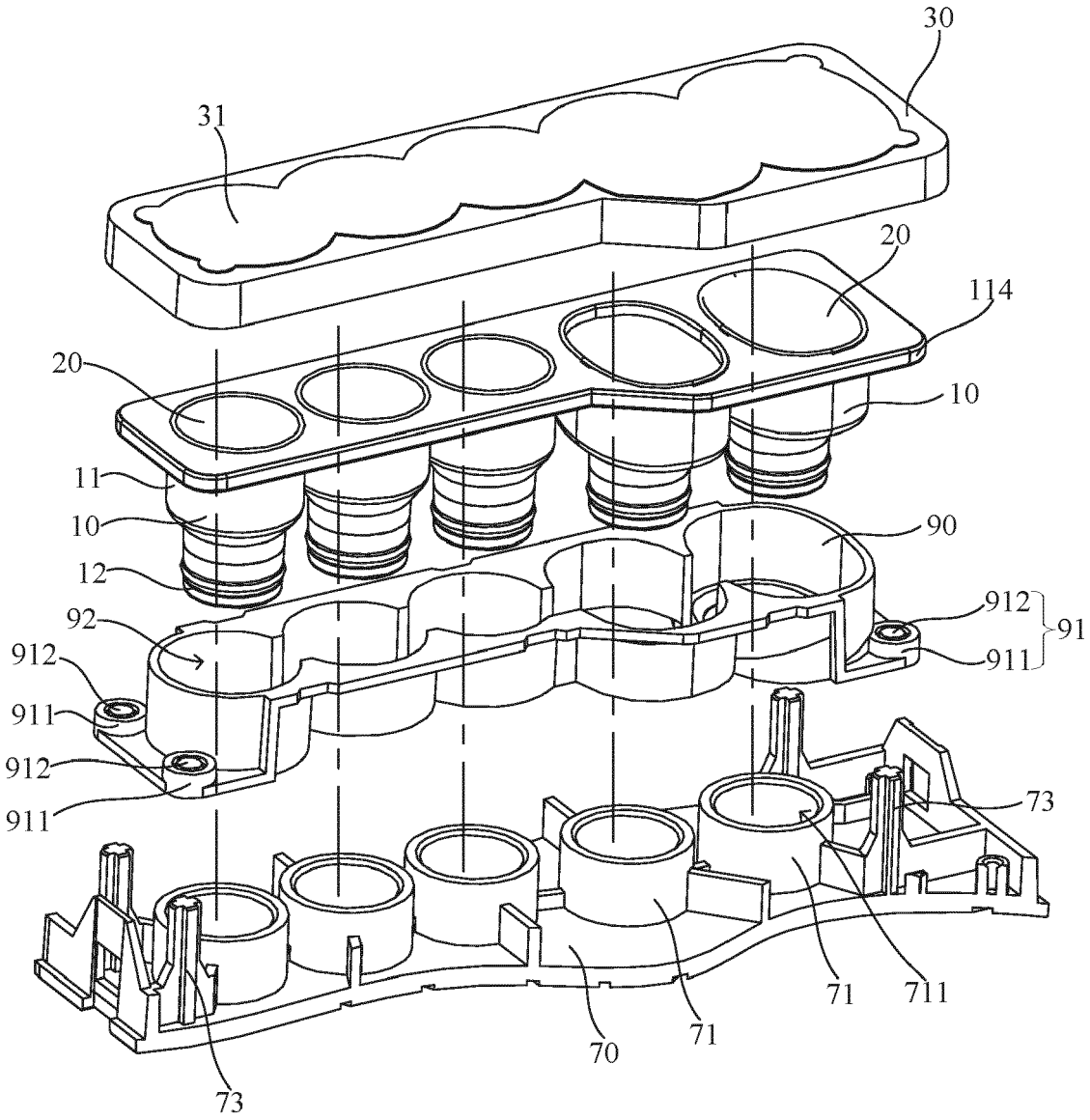
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FIG. 2

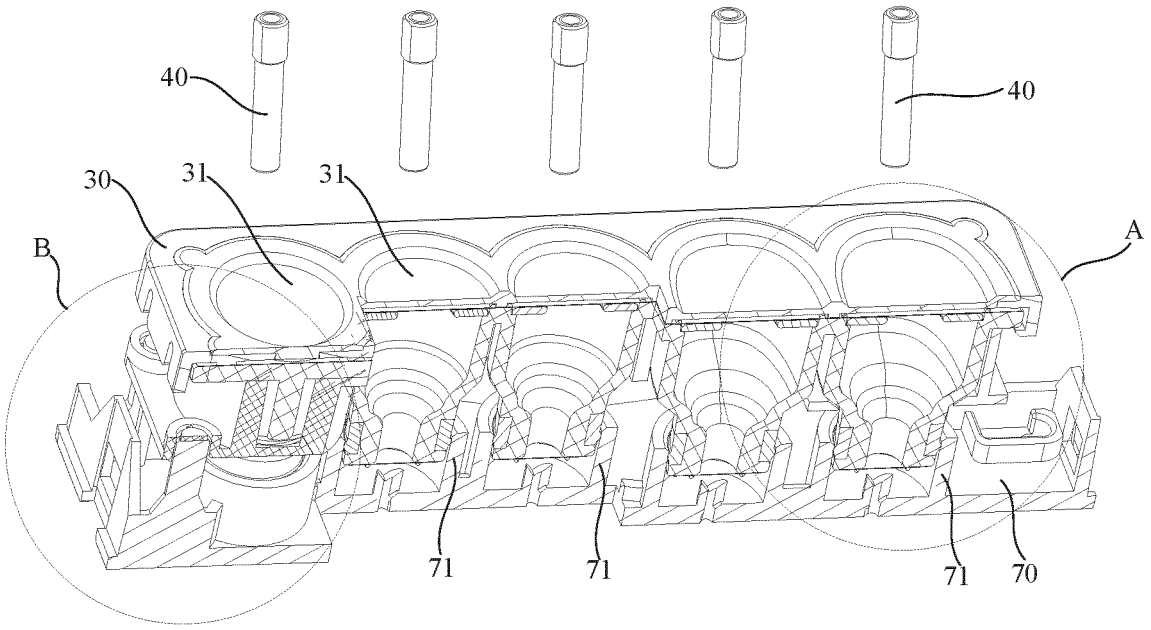

FIG. 3

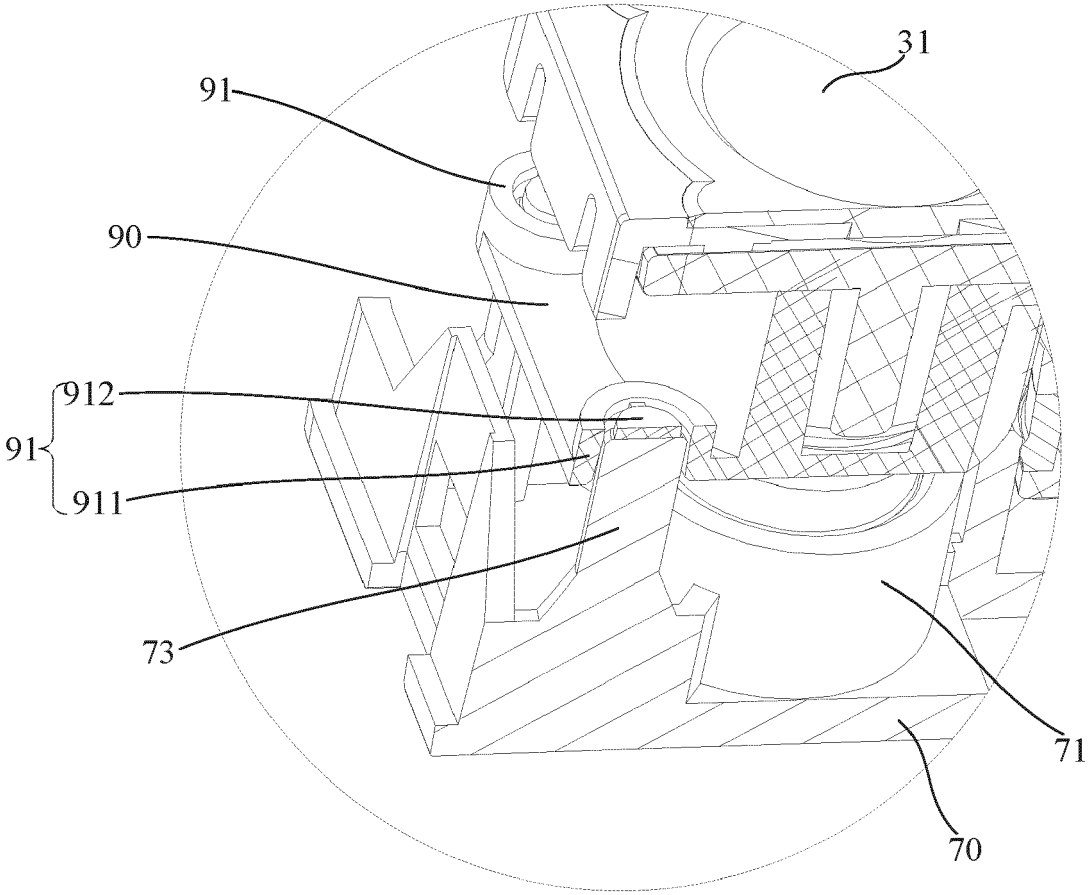

FIG. 4

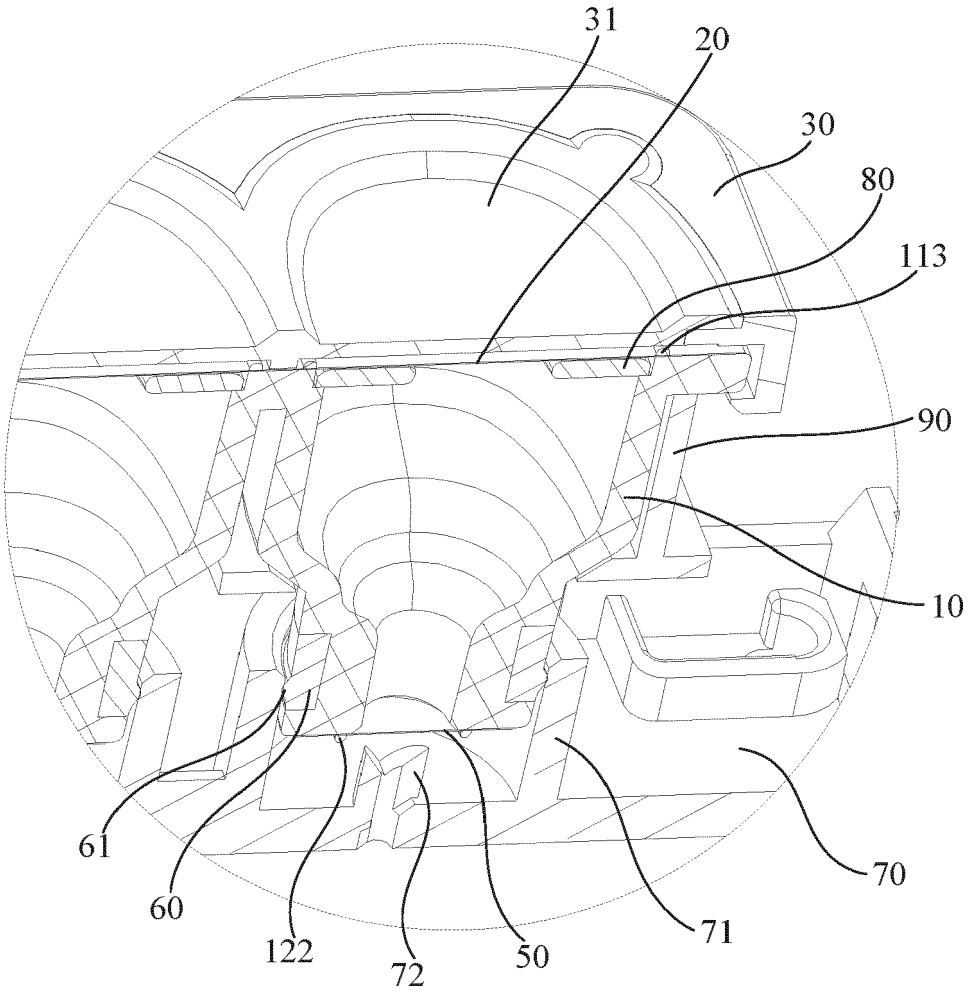

FIG. 5

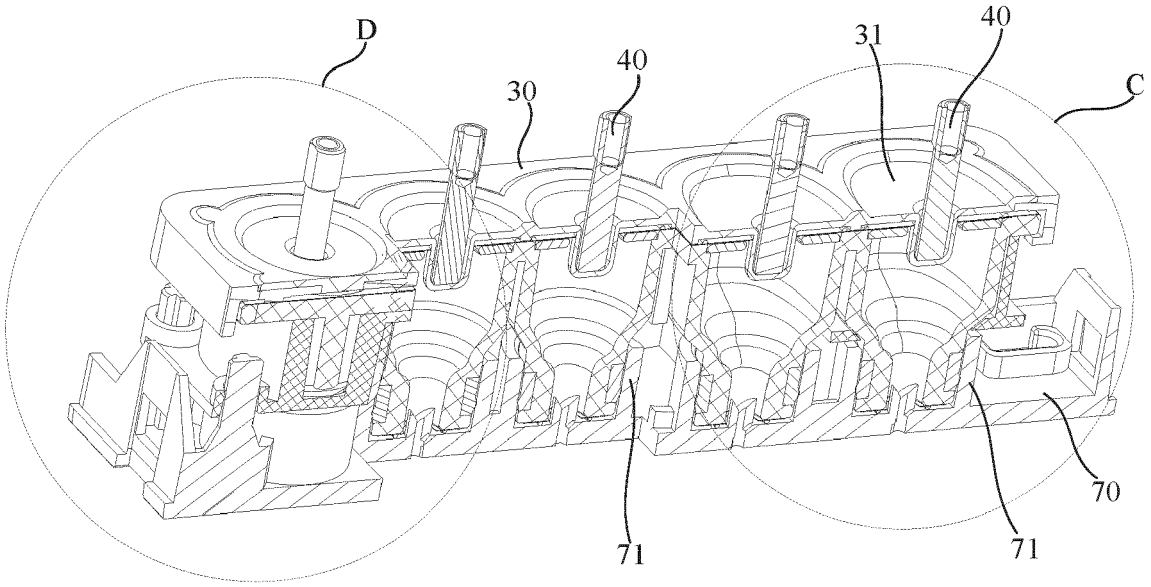

FIG. 6

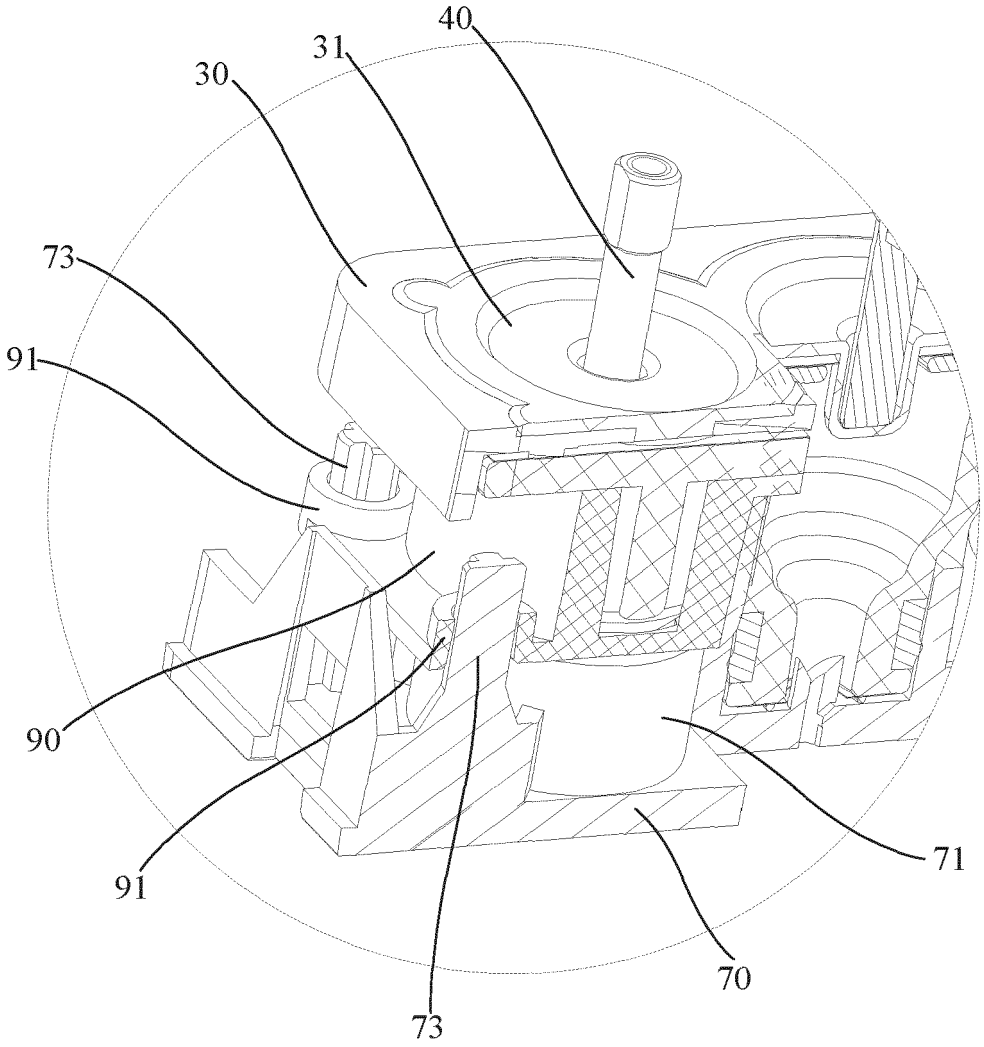

FIG. 7

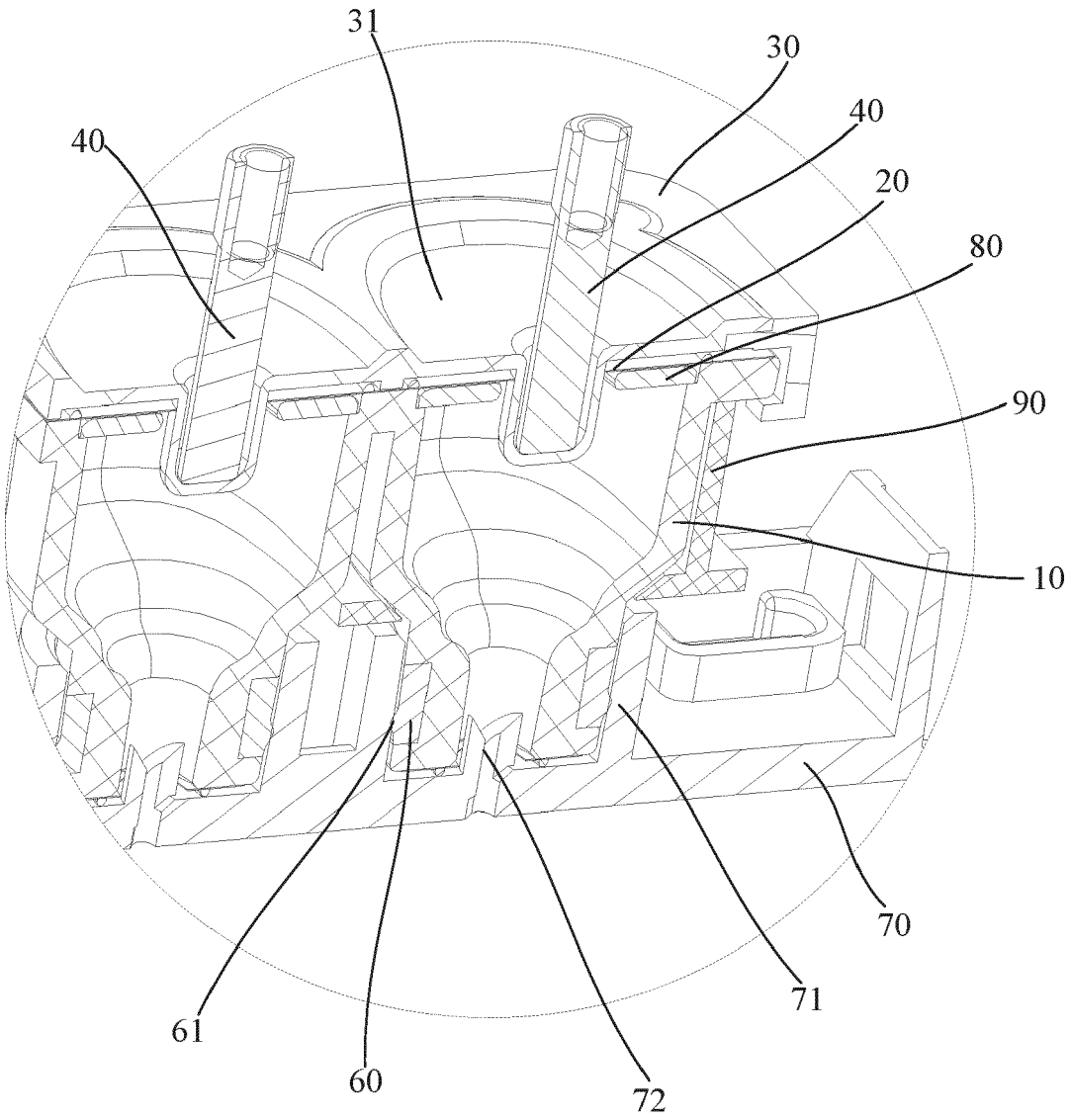

FIG. 8

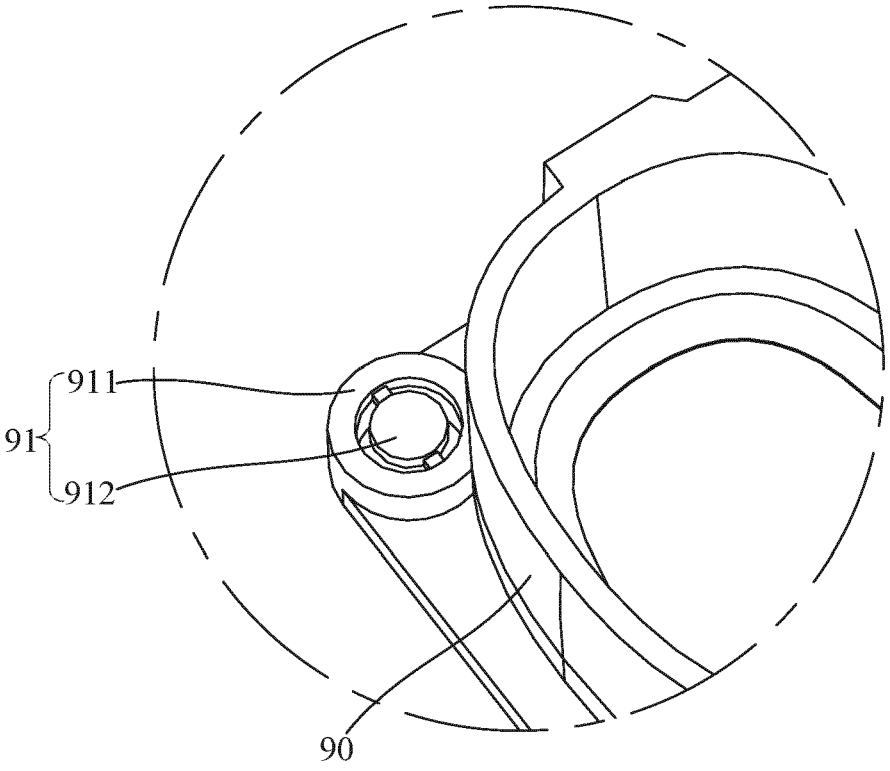

FIG. 9

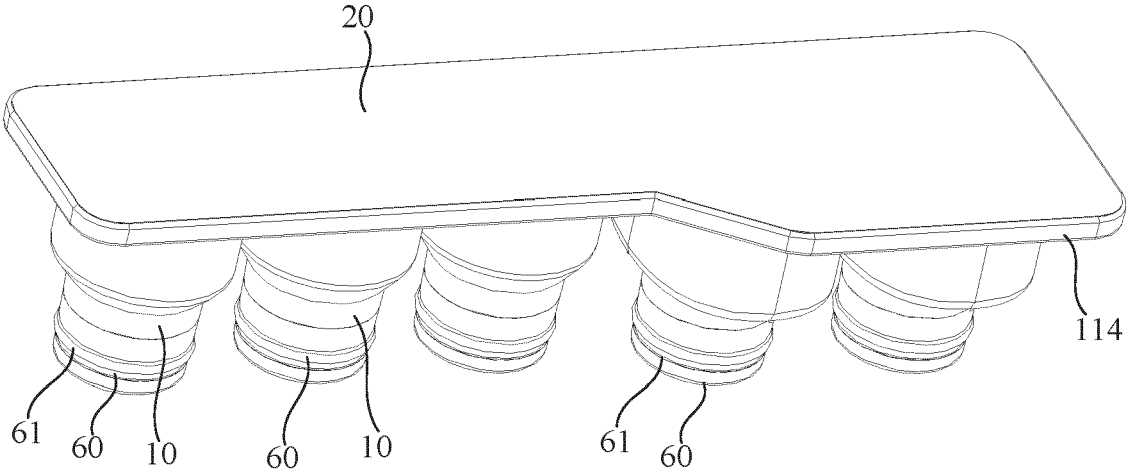

FIG. 10

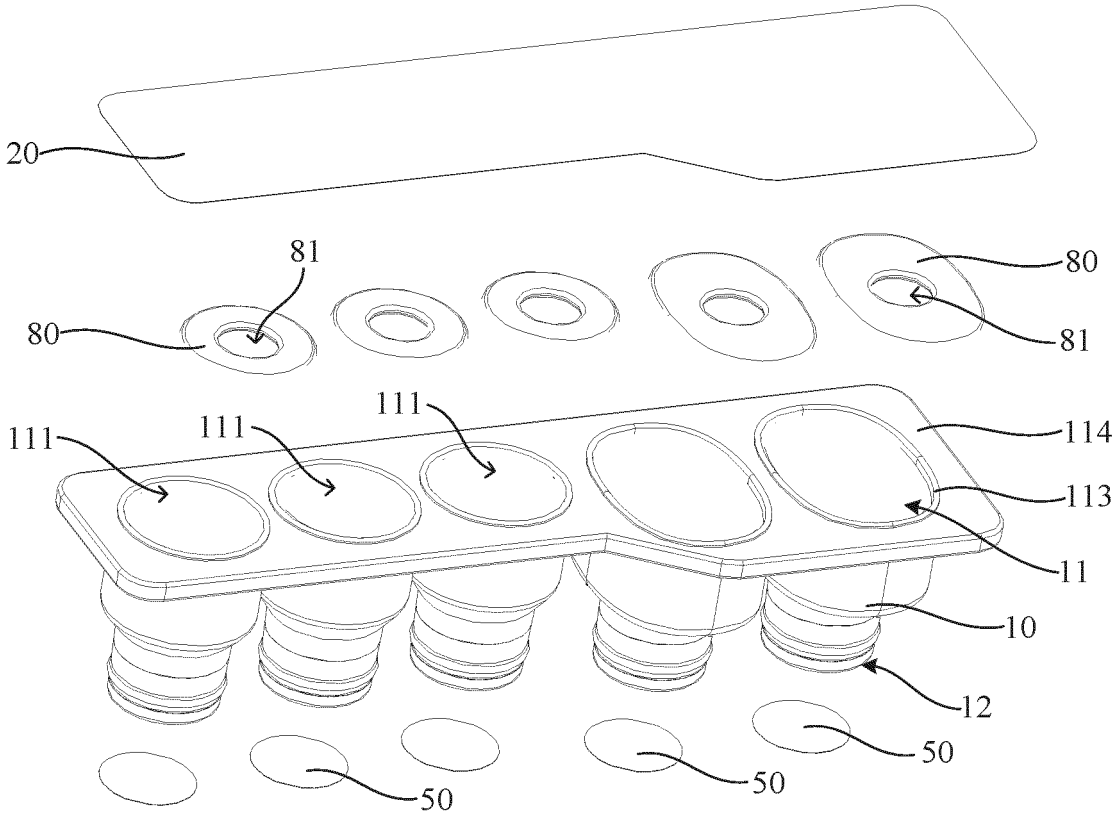

FIG. 11

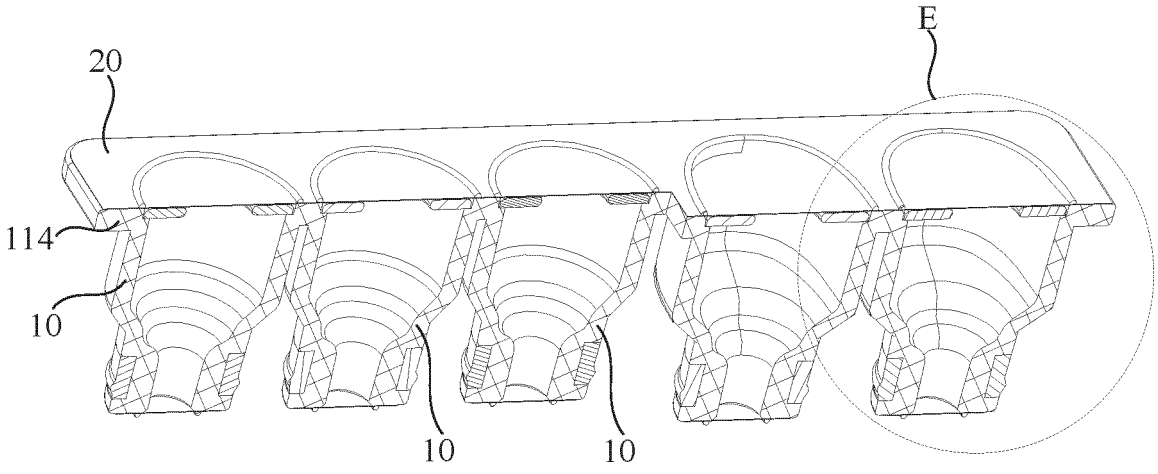

FIG. 12

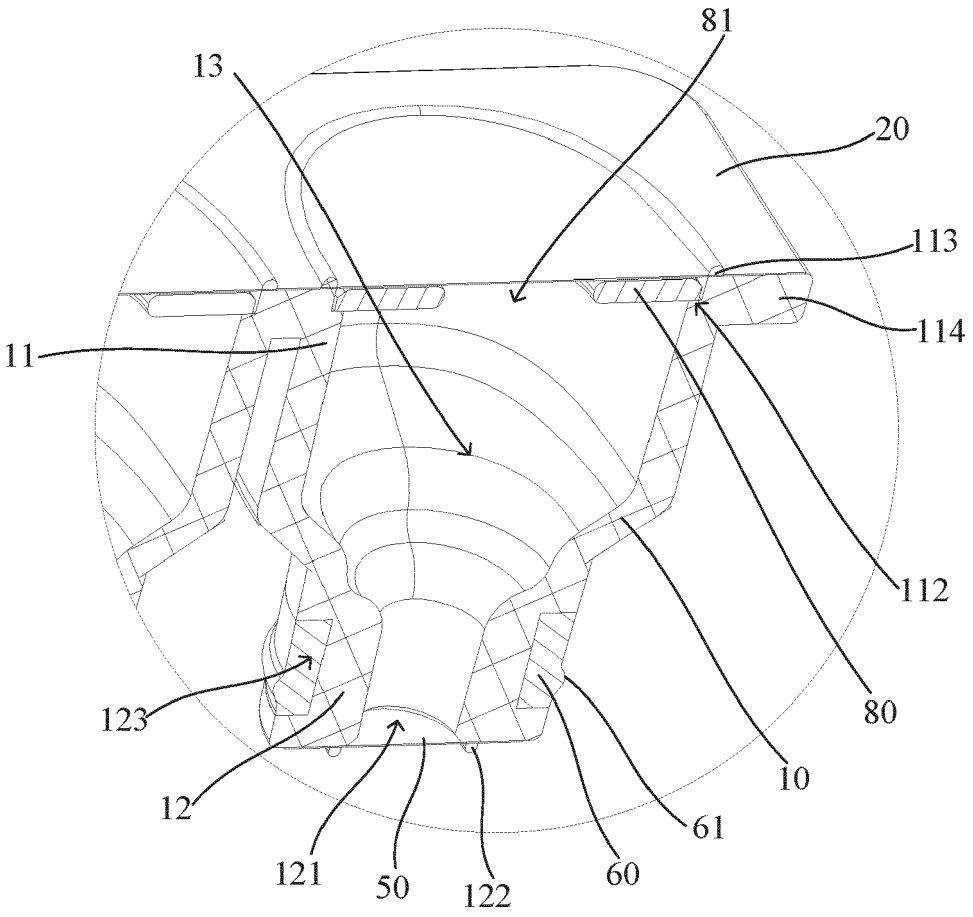

FIG. 13

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EUROPEAN SEARCH REPORT

Application Number
EP 22 17 5868

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2009/029422 A1 (HANAFUSA NOBUHIRO [JP] ET AL) 29 January 2009 (2009-01-29) * paragraphs [0091] - [0107]; figures 1A-C, 2, 4E-F *	1-10,12	INV. B01L3/00 B01L9/00
X	EP 2 943 278 A1 (TECAN TRADING AG [CH]) 18 November 2015 (2015-11-18) * paragraphs [0035] - [0039], [0067] - [0071], [0148] - [0154]; figures 5, 13-14 *	1,3,11	

TECHNICAL FIELDS SEARCHED (IPC)

B01L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	25 October 2022	Ruiz-Echarri Rueda

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 17 5868

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25-10-2022

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82