Transfer system for containers

The invention concerns a transfer system for containers with the features in the preamble of Claim 1.

Systems of this kind make it possible to bring certain media, which are ingredients of a separate container, into contact or to mix them via the connection system. Such processes are carried out widely in the medical and pharmaceutical fields for the purpose of providing preparations that consist of at least two separate components that have to be mixed prior to their use. A particularly widespread field of application concerns the production of preparations for parenteral application for medical or diagnostic purposes. In the production of preparations for infusions, for example in an infusion bottle, it is often necessary to add to the solvent that is present in the infusion bottle, such as water, an isotonic saline solution, a glucose solution, a Ringer's lactate solution or such like, a drug, for example an antibiotic, in liquid or powder form, which needs to be mixed with the solvent or dissolved therein. Particularly in the medical field, it is critical that errors are avoided in this process. These are described in detail, for example, by E. A. Flynn et al. in "Observational Study of Accuracy in compounding IV mixtures at five hospitals" (Am J Health-Syst Pharm Vol 54, Apr 15 1997, 904-912) on page 906. According to this, they include among others: wrong drugs, wrong dosage, wrong solvent volume, wrong solvent composition, and wrong reconstitution process. Moreover, Richard Bateman et al. point out in the publication "Errors associated with the preparation of aseptic products in UK hospital pharmacies …" (Qual Saf health care 2010; 19: e 29) and D. H. Cousins et al. in the publication "Medication errors in intravenous drug preparation and administration …" (Qual Saf Health Care 2005; 14: 190-195) the current shortcomings concerning medical safety in parenteral applications.

Moreover, it is desirable particularly for logistical reasons that the different components of the drug can be stored separately from each other if the component has to be kept chilled, which is often the case with sensitive biotechnological products, which have to be dissolved prior to parenteral administration as infusion to avoid having to extend the cold chain to the solvent.

EP 0 843 992 A1 discloses a transfer system for containers with at least a first and at least a second container which can be interconnected in a media-transferring way by a connection system, whereby an encryption system is provided, which permits or prevents a media-transferring connection between the respective assignable containers, which operates between a container and the connection system and which operates according to the mechanical lock and key principle, whereby at least one key element with physical coding on a container is provided, whereby a locking element, which is located on the connection system, is the lock of the lock and key system, and whereby the coding of the key element on the cap section of the container is provided at its circumference with recesses and/or protrusions.

High operational reliability and a simple construction can be achieved through an encryption system that is based upon the mechanical lock and key principle.

WO 95/00101 discloses another transfer system for containers.

Based on this prior art, it is the object of the invention to provide a transfer system for containers that largely excludes the possibility of wrong combinations.

According to the invention, the object is met by a transfer system for containers that exhibits the characteristics of claim 1 in its entirety.

According to the characterizing part of claim 1, the transfer system for containers is characterized in that the coding of the locking element is formed on the wall of its opening with protrusions and/or recesses that are complementary to the coding of the recesses and/or protrusions of the cap section.

The presence of an encryption system allows or prevents a media-transferring connection between the respective assignable containers. An incorrect combination of media is excluded due to the encryption.

Particularly advantageously in this respect through the key element the suitably coded locking element can be unlocked, which prevents in the locked state the connecting function of the connection system.

The arrangement may advantageously be such that the locking element in its locked state prevents the opening movement of a hollow puncture spike of the connection

system that establishes the media connection between the containers and thus prevents the media connection.

The key element associated with the container may, in an advantageous manner, be formed by a cap section that surrounds a perforable opening section of the respective container, wherein said cap section is provided on its outside with irregular form features that correspond to a code.

In particularly advantageous exemplary embodiments the locking element provides, as lock for the key element of the cap section, a body with an opening that is provided on the inside with coded, irregular form features in such a way that the cap section can be inserted into an operating position in which the media connection of the containers can be established, provided that the coding of its key element matches.

It is essential in this instance that the coding interrogation of key element and locking element must happen with little force and along a short, straight path to keep the application as intuitive and simple as possible and to avoid misalignment. Moreover, it is advantageous if there is a redundancy of coding provided in the key and the locking element, for example 2-fold or 3-fold, which is evenly distributed over the circumference and which prevents misalignment and makes orientation during insertion easier.

In order to transfer the locking element into the unlocked state, the connection system may be provided with at least one latching member that engages with the opening of the locking element, wherein said latching member, when reaching the operating position, may be unlocked by the cap section that is inserted through the opening of the locking element in order to release the locked state of the hollow puncture spike.

In a particularly advantageous manner the irregular form features, which provide the coding, may be provided in form of the recesses and protrusions.

With particular advantage, the arrangement may be such that the coding consists of at least two subgroups, each with at least one recess and/or one protrusion, and that the subgroups are spatially offset from one another and characterize one and/or more different particularities of both containers, as mentioned previously (drug, dosage, solvent volume, solvent composition etc.).

Moreover, the arrangement may be advantageously such that the shape of the cap section on its outer circumference and the opening of the body of the locking element correspond to a Reuleaux triangle with rounded ends, wherein coding is provided on each of the three sides. Examples of this kind are characterized by being particularly user-friendly since there is for the insertion process not a single, unambiguous insertion position dictated by container and connection system, but three inserting positions are available.

It is of particularly advantage to design the coding of the annular body (25) in form of straight protrusions that extend along a longitudinal axis, and that of the cap (13) in form of straight recesses of varying width that extend along a longitudinal axis.
This allows for functions that are akin to those of mechanical locking facilities with master keys and slave keys. With respect to the present invention, this means that a coding of a cap (13) may fit into multiple different code formations of different annular bodies (25).
Thus it may, for example, be possible that a drug M1 in powder form is to be combinable with three different solvents L1, L2, L3 (1:3 allocation), whereas a different drug M2 is only allowed to be combined with the different solvents L1, L2 (1:2 allocation), and again a different drug M3 may only be allowed to be combined with the solvent L1 (1:1 allocation).
For the locking elements (solvents) and the key elements (drugs) in this example, the following is possible, for example:

Solvent L1 protrusion width 2 mm; solvent L2 protrusion width 3 mm,
Solvent L3 protrusion width 4 mm and
Drug M1 recess width 4 mm; drug M2 recess width 3 mm,
Drug M3 recess width 2 mm.
The wide recess of M1 permits the insertion of the protrusion of L1, L2 and L3, whereas for M2 this is only achieved with L2 and L1 (the wider protrusion of L3 blocks), and for M3 only L1 is possible (wider protrusions of L1 and L2 block).
Analogously, the further, above-described particularities may be allocated securely with additional code formations in form of protrusions and recesses of varying geometry at different positions of cap (13) and annular body (25) respectively (n:p allocations).

Another object of the invention is an encryption system for a transfer system for containers according to one of the claims 1 to 18, wherein the respective encryption system bears the characteristics of claim 19 and 20 respectively.

The invention is now explained in greater detail by way of the drawings. Shown are in:

Fig.1 a perspective view of an exemplary embodiment of the transfer system for containers according to the invention;

Fig. 2 a schematically simplified longitudinal cross-section of a container in form of a bottle containing a media component, the content of which is to be transferred by means of the transfer system according to the invention into a second container;

Fig. 3 a perspective view of the bottle in Fig. 2, depicted with the cap cover removed;

Fig. 4 a pulled-apart, perspective partial view of the exemplary embodiment, which depicts the state prior to the insertion into the connection system of the transfer system;

Fig. 5 a perspective view of the media transfer device that forms part of the connection system;

Fig. 6 a perspective view of the locking element of the connection system of the exemplary embodiment;

Fig. 7 a perspective view of the cap section with the cap cover of the moveable bottle removed, with view onto the free end face;

Fig. 8 a pulled-apart, perspective view of the encryption system that operates according to the lock and key principle, wherein the cap section of Fig. 7 that forms the key element is depicted prior to insertion into the locking element of Fig. 6, which acts as the lock of the system;

Fig. 9 a simplified, schematic depiction of a partial longitudinal cross-section of the connection system that contains the transfer device, and of the

allocated opening section of the moveable bottle, wherein said bottle is shown with its cap section in a centered position prior to insertion into the locking element of the connection system;

Fig. 10 a depiction corresponding to that of Fig. 9 of a further stage of the transfer process, wherein, with matching code formations of the key element of the bottle and of the locking element, which serves as lock, the cap section of the bottle is partially inserted into the locking element, and wherein the in the drawing shown as the upper part of the Fig. 10 depicts a cross-sectional plane that is rotated by 90° compared to the depiction in Fig. 9;

Figs. 11 to 15 partial longitudinal cross-sections similar to those in Figs. 9 and 10, depicting subsequent positions in the transfer process;

Fig. 16 a perspective view corresponding to the depiction in Fig. 15;

Fig. 17 for the purpose of providing greater clarity of the coding principle, the outline of the cap section of the bottle that forms the key element, wherein on each of the three sides of the Reuleaux triangle two coding sections for two coding subgroups each are shown;

Figs. 18 & 19 the cap section inserted into the locking element, which itself is provided with code formations that permit the insertion;

Figs. 20 to 22 the depiction of two further coding examples similar to those in Figs. 17 to 19;

Figs. 23 to 25 in corresponding representation two further coding examples;

Figs. 26 to 28 a diagrammatic representation to show other possible, different outline shapes for the key element on the cap section of the moveable bottle;

Fig. 29 a highly schematic and partially longitudinal cross-sectional view of a modified exemplary embodiment of the transfer system for containers according to the invention;

Figs. 30 & 31 the depiction of a third and fourth exemplary embodiment respectively, similar to that of Fig. 9;

Fig. 32 a diagrammatic representation of a cross-section of the transfer device of the exemplary embodiment of Fig. 31;

Fig. 33 a representation of a cross-section of a further exemplary embodiment similar to that of Figs. 30 and 31, and

Fig. 34 a schematic, simplified representation of the locking element of the exemplary embodiment of Fig. 33.

The invention will now be explained in greater detail by way of exemplary embodiments, in which the transfer system for a media exchange between containers is provided, wherein said containers are preferably used for medical, diagnostic, enteral or parenteral applications. The specific exemplary embodiments shown in the drawing depict in this respect (see in particular Fig. 1) a first container in form of an infusion container 1 in form of a plastic container, which is manufactured, for example, according to the known blow-fill-seal method, described for example in EP 2 269 558 A1, and which is also known to those skilled in the art as bottlepack® system. Containers of this kind are usually provided with at least one connection 3 for an infusion set. Certain safety criteria must be met if a further liquid or powdery media component is to be added to the content of the infusion container 1, which may, for example, contain a certain volume of a solvent for the preparation of a specific infusion liquid.

In medical or diagnostic applications it is important that attention is paid not only to sterility at the media transition between an additional component, which in applications of this kind is located in a glass or polymer bottle 5, but it also must be ensured that the media transition takes place from a bottle 5, which contains a certain quantity of the required substance, into an infusion container 1. To achieve a corresponding, simple and sterile transfer process, provision may be made, as disclosed in document WO 95/00101, that a connection system can be or is attached to the infusion container 1. The connection system comprises a transfer device with a hollow puncture spike in form of continuous passages that pass through between perforating spikes, which is normally locked in a non-operating position, wherein both perforating spikes of the hollow puncture spike are located at a distance from a perforable opening section of

the infusion bottle 1 and a perforable perforation section of the bottle 5 that is intended for the transfer process. The connection system has a largely cylindrical, sleeve-like seat into which the bottle 5, which is provided for the transfer process, may be inserted, wherein the sleeve-like seat forms a guide for the movement of bottle 5, wherein the perforable opening section of bottle 5 approaches the hollow puncture spike, unlocks the lock of the transfer device and moves the same into an end position in which the hollow puncture spike perforates the opening sections of bottle 5 and infusion bottle 1 and thus creates the media connection.

The transfer system for containers is to that extent based upon the same operating principle. Nevertheless, the basic difference of the invention lies in the fact that the unlocking of the transfer device designated with the number 27 in the Figures, and thus the enabling of a media-transferring connection, is only possible when using a moveable container that was designed particularly for the respective transfer process, that is, the bottle 5. In the invention specific control means are provided on the moveable bottle 5 through which the locking device of the transfer device may be unlocked. Thus the danger of an operating error, which is possible with the described prior art, that is, a media transfer of prohibited substances and/or volumes, is precluded through an encryption between bottle 5 and connection system 7. Details of such an encryption between the bottle 5 and the connection system 7 that is made possible by the invention become apparent from the further Figures 2 et. seq.

From the Figures 2 and 3, which show a moveable bottle 5 separately, it is apparent that on the neck part 11 of bottle 5, on which the perforable opening section 48 is disposed, for example in form of an elastomeric plug that is not depicted in great detail, a cap section 13 is attached, which in the present example consists of a single-piece, injection-molded plastic part. The Figures 1 and 2 depict the cap section 13 in its initial state prior to use, wherein the top of the cap section 13 is provided with a molded-on cover 15 as an authenticity mark, which may be easily removed mechanically by the user prior to using the bottle 5. It is possible to provide a removable foil instead of the cover 15. On removing the cover 15 a central opening 17 is revealed on the cap section 13, which is flush with the perforable opening section 48 on the neck section 11 of the bottle 5. If a radiation-permeable foil is provided instead of the cover 15, it is possible to radiate such a foil with high-energy radiation, e.g., UV radiation or beta radiation, so as to kill any germs that may be present on the elastomer surface (perforation surface). The cap section 13, which is preferably made from a polymer, may be clipped to the edge of the neck part 11 of the bottle 5, as shown in Fig. 2.

Alternatively, it is possible that the caps 13, with code formations according to the invention, may be part of multi-piece plastic caps that are known per se and are as described in WO 2011/032798 A1, WO 2011/039004 A1 and EP 0655042 B1, which are used with particular advantage for freeze-drying of drugs or medical products.

The outline of the cap section 13 has the shape of a Reuleaux triangle with rounded corners. To provide the encryption according to the lock and key principle, the cap section 13 forms with the outer circumference of the Reuleaux triangle a physically coded key element, wherein the coding on the cap section 13 is formed through recesses 21. The recesses 21 take the form of grooves that are recessed inwards from the circumference, wherein the circumference length of said grooves is limited by the walls 23, which define, with respect to the opening 17, radial planes of which only in Fig. 7 some walls 23 are referenced. The axial depth of the recesses 21 is less than the thickness of the cap section 13, so that the recesses 21 are open at the end face that is apparent in Fig. 7, and the side of the cap section 13 that faces the main part of the bottle 5 is free of recesses 21, as shown in Fig. 8.

Provided as a codeable lock for the lock and key system is an annular body 25 (see in particular Figures 6 and 8), which forms a locking element as part of the locking device of the transfer device 27, which is represented in particular in Fig. 5. For the purpose of inserting the key element, which is formed by the cap section 13, the annular body 25 is provided with an opening 29 that is matched to the circumference of the cap section 13, that is, it has the form of a Reuleaux triangle. The opening 29 is provided on the inside with coding in form of protrusions 31, which match the recesses 21 of the key part on the cap section 13 if the coding fits. The protrusions 31 do not extend to the upper edge of the annular body 26, as shown in Fig. 6, so that when starting to insert the cap section 13 at the beginning of the transfer process an orientation plane is defined, on which the cap section 13 may be brought into the rotating position of the alignment of recesses 21 and protrusions 31 and, if the coding fits, may be inserted into the opening 29 of the annular body 25. When viewing Fig. 8, the protrusions 31 form heels at the upper end that may be brought in contact with the corresponding heels of the recessed ends of the recesses 21 of the cap section 13, so that when the container or bottle 5 is moved axially towards the infusion container 1, the cap section 13 brings the annular body 25 with it by necessity.

Fig. 4 depicts the initial state prior to the start of the transfer process, wherein the annular body 25 is located at the upper end of a sleeve-like seat 9 of the connection

system 7. As is shown most clearly in Fig. 6, the annular body 25, which forms the locking element, is provided on the outer circumference with continuous axial grooves 33 through which the annual body 25 is guided on axial guide strips (not depicted) of the sleeve-like seat 9. The transfer device 27, which is shown separately in Fig. 5, is guided, axially moveable, below the annular body 25 in the sleeve-like seat 9 to facilitate its opening movement. As Fig. 5 shows most clearly, the transfer device 27 is provided with a disk 35 that matches the internal diameter of the sleeve-like seat 9 and which serves as support for a centrally located, hollow puncture spike 37, which takes the form of a multichannel cannula that is known per se and which protrudes on both sides of the disk 35 to be able to perform the opening process by perforating the opening section 50 of the infusion bottle 1 as well as the opening section 48 of the bottle 5. Disposed around the circumference of disk 35 are upright operating elements. Three of these are guide tabs with the reference number 39, with which the disk 35 is guided during movements at the inner wall of the sleeve-like seat 9. Disposed between two subsequent guide tabs 39 are two tabs each, where each is provided with three reeds 41, 43 and 45 that are attached to each other. Furthermore, located above the surface of the disk 35 are inward-pointing latches 47 that facilitate the formation of a snap-action connection, which will be described in greater detail below.

As depicted in Fig. 4, the annular body 25, which forms the locking element of the locking device, is disposed at the upper edge of the sleeve of seat 9. In this instance, the annular body 25 is in a locked state, that is, in a state in which an axial movement is not possible. The transfer device 27, which is located below the annular body 25, is itself locked against axial movement because the disk 35 with the locking catches 49 is locked in a locking groove 51 of the sleeve with the reeds 41, which are braced outwards slightly. Thus, the annular body 25, which acts as locking element, is also in a locked position because the reeds 45 of the upright tabs of the disk 35 prevent the movement of the annular body 25. This state is depicted in Fig. 9. If the code formations of the cap section 13 of the bottle 5 and those of the annular body 25 match, the cap section 13 can be inserted into the annular body 25, as shown in Figures 10 and 11. During this movement, the hollow spike 37 perforates the opening section 48 of bottle 5 and the cap section 13 comes into contact with a locating latch 53 on the reeds 43. Through the continued insertion movement of the cap section 13, the reeds 43, 45 are deflected for the unlocking process. Thus the annular body 25 is moveable relative to the disk 35 of the transfer device 27, wherein the reeds 41, 43, 45 of the tabs are guided such in the guide channels 55 of the annular body 25 that the locking catches 49 on the reeds 41 are lifted out of the locking groove 51 of the sleeve

of the seat 9. This state is reached in the depiction of Fig. 13. This allows the bottle 5 with the cap section 13 to be inserted further, as shown in Fig. 14, through which the annular body 25 is also moved, which in turn is in contact with the disk 35 of the transfer device 27 and pulls this one also in for the opening movement (see Fig. 4), through which the hollow puncture spike 37 also perforates the opening section 50 of the infusion container 1. For the transfer process the hollow puncture spike 37 is provided with two transfer channels that extend parallel to the respective puncture direction.

Disposed at the base of the sleeve of seat 9 is a further locking groove 57 to form a latching means for the transfer device 27 at the final position at the end of the connection process, as shown in Figures 15 and 16. In said end position, the latches 47, which protrude inwards above the disk 35 (see Fig. 5), form a snap-action connection with the cap section 13 by gripping its edge 59 that is free of recesses 21 (see Fig. 16). As a result, the bottle 5 is positively locked in the connection system 7 when it reaches the final position of the transfer process.

Akin to operating diagrams, the Figures 17 to 25 depict the encryption system for the exemplary embodiment shown. Figure 17 shows that on the circumference of the cap section 13, which has the shape of a Reuleaux triangle with rounded corners, a coding section is provided on each side of the triangle, wherein each coding section has two groups 61 and 63 with coding positions, and the groups 61, 63 are spatially separated from each other by a code-free intermediate space 65. Since each side of the triangle is provided with the same code groups 61, 63 with the same code positions selected for the formation of a corresponding key, the key element may be inserted in three different positions into a lock that is coded the same way. For the present application the coding of code positions of one of the groups 61, 63 is characteristic for the fill volume of the corresponding bottle 5, whereas the other group 61 or 63 represents the content type of a container. As already indicated, in the present example the coding on the cap section 13 is provided by recesses 21 within the groups 61, 63. The diagrammatic representation of Fig. 17 depicts the blank state, without coding through recesses 21.

In the present example the coding in the respective group 61 characterizes the kind of content of a container, for example the kind of solvent present in the infusion bottle 1, whereas the coding of group 63 signifies a volume, for example the volume of a solvent, to which a substance is to be added, or is permitted to be added, that is

present in the bottle 5. On the annular body 25, which forms the lock, the protrusions 31 characterize in a corresponding manner the volume of the infusion bottle 1 for the respective code groups 61, 63, or the type of content of a container, for example the formulation of the solvent present in the infusion bottle 1.

Fig. 18 shows an example in which the cap section 13 signifies, through a recess 21 in a first code position of group 61, that the bottle 5 is reserved for admixture to a content A of bottle 1, whereas the group 63 has no recess 21, which signifies that the bottle 1 contains a certain solvent volume. In the example shown in Fig. 19, a recess 21 is formed in the groups 63 that spans across multiple coding positions, which signifies a different solvent volume, whereas a recess in the groups 61 in a coding position that differs from that of Fig. 18 signifies a different solvent type, for example a solvent B, for example 50 ml, corresponding to the recess in group 63.

Figures 20 to 22 show examples in which the bottle 5, through wider recesses 21 in groups 61, signifies that it is reserved for a supply of media to a solvent A as well as to a solvent B in bottle 1. Through lack of a recess 21 in the groups 63 is signified at the same time that the additive is only designed for a certain solvent volume in bottle 1, for example 250 ml. The example of Fig. 21 shows accordingly that the bottle 5 can be combined with a bottle 1 that contains the solvent A with 250 ml. As shown in Fig. 22, however, the combination is not possible with a bottle 1 that contains the solvent B with a different volume, for example 50 ml.

Corresponding to Figures 20 to 22, the Figures 23 to 25 show examples in which the bottle 5 signifies through a recess 21 in only one coding position of group 61 that the bottle 5 is only designed for a solvent A in bottle 1, however, a recess 21 that extends across two coding positions of group 63 signifies that the combination is permitted over a larger volume range, for example for 100 to 250 ml of solvent. As shown in Fig. 24, the bottle 5 fits an infusion bottle with the solvent A at 250 ml. In contrast, Fig. 25 shows that the combination is excluded for a different solvent B as well as for a different solvent volume.

Figures 26 to 28 depict diagrammatically further possibilities of the outline design of the key element, which is shown uncoded, wherein the Fig. 26 shows the triangular shape that has been adopted for the description of the exemplary embodiment, whereas Fig. 27 has a different, non-circular outline in form of a type of ellipse 69. It is also possible with a circular outline, as shown in Fig. 28, to provide irregular form features, such as a

pattern of protrusions and recesses, of which only one protrusion 71 is shown in Fig. 28, which again can be provided in groups separated from each other. In the instance of a circular configuration, the lock and key connection is only possible through a single unambiguous, relative insertion position, whereas with the ellipse 69, shown in Fig. 27, coding groups may be provided on both long curved sides, so that the lock and key connection is possible for two relative insertion positions. To form matching coding groups it is also possible to use recesses instead of protrusions on one component, which are then matched to the protrusions of the other component.

The Fig. 29 shows in a purely schematic and simplified representation an exemplary embodiment in which the body 73 of the transfer device, which supports the hollow puncture spike 37, forms a kind of pot, which forms with its inner wall 75 the lock element into which the cap element 13 of the bottle 5 may be inserted, with matching coding, in such a way that, when the cap element 13 presses against the body 73, it moves said body for the perforation process. Since in this movement the body 73 is guided with its circumferential rib 75 in a threaded path 77 of the seat 9, the perforation process takes place advantageously in a rotational movement of the hollow puncture spike 37.

The Fig. 30 shows in a purely schematic and simplified representation a further exemplary embodiment of the lock and key design. In this example, the sleeve body, which forms the seat 9 of the connection system, as well as body 73 of the transfer device that supports the hollow puncture spike 37 are already pre-assembled on the bottle 5, but its opening section 48 is not yet perforated. The coding of the lock and key system is provided by a pin 79 or multiple pins on the body, which may be inserted into corresponding bore holes 81, which are formed as lock on the neck part 67 of the bottle 1 in a coded arrangement.

The exemplary embodiment shown in Figures 31 and 32 provides as key on the cap section 13 of the bottle 5 a pattern of axial bore holes 83 and a corresponding pattern of pins 85 on the disk-shaped support 73 of the hollow puncture spike 37. The lock element in this example is therefore integrated into the support 73 as a single piece. With matching coding of bore holes 83 and pins 85, the cap element 13 may be placed against the spring-loaded locking bars 87 in order to release the locking of the support 73 on the seat 9 so that said support is moveable through the insertion of the bottle 5 for the connection process. Through adaptation of the length of the cap element 13 or the length of the pins 85 respectively in relation to the protrusion of the locking bars 87

above the pins 85 it may be set whether the support 73 is first moved towards the bottle 1 during the connection process and penetrated and only after that the bottle 5, or whether the bottle 5 is penetrated first and then bottle 1. If the locking bars 87 protrude much above the pins 85, the support 73 is first unlocked from the locking bars 87 and a movement of the support towards the bottle 1 takes place. Since the penetration force of the elastomer plug 48 of bottle 5 is greater than the penetration force of the bottle 1, the latter is penetrated first by the hollow puncture spike 37. Analogously to the already in detail described previous examples, it is possible to also integrate locking and/or guiding elements into support 73 similar to those shown in Fig. 5 and to provide corresponding grooves in the seat 9.

The exemplary embodiment depicted in Figures 33 and 34 provides for the unlocking of the body 73, which supports the spike 37, a ring 89, shown in detail in Fig. 34, made from pressure elements 91 that are elastically connected to each other. Said pressure elements may be spread apart by the insertable cap element 13 of the bottle 5 with matching coding in such a way that the rim 93 of body 73, formed on bottle neck 1, is expanded, as indicated with arrows 95, so that the body 73 is released from a step 97 of the rim 93 for the opening movement.

With the solution according to the invention, it is possible to connect all kinds of media-transferring and media-containing containers, which broadly speaking also includes tube systems, to couple them in a sterile and fluid-tight manner for the purpose of exchanging media.

Claims

1. A transfer system for containers with at least a first (1) and at least a second container (5) which can be interconnected in a media-transferring way by a connection system (7), whereby an encryption system (13, 21, 25, 31, 79, 81, 83, 85) is provided, which permits or prevents a media-transferring connection between the respective assignable containers (1, 5), which operates between the containers (1, 5) and the connection system (7) and which operates according to the mechanical lock and key principle, whereby at least one key element (13, 21) with physical coding on the second container (5) is provided, whereby a locking element (25), which is located on the connection system (7), is the lock of the lock and key system, and whereby the coding of the key element (21) on a cap section (13) of the second container (5) is provided at its circumference with recesses (21) and/or protrusions (31) **characterized in** that the coding of the locking element (25) is formed on the wall of an opening (29) of the locking element (25) of an annular body (25) with protrusions (31) and/or recesses (21) that are complementary to the coding of the recesses (21) and/or protrusions (31) of the cap section (13).

2. The transfer system for containers according to Claim 1, characterized in that through the key element (13, 21) the suitably coded locking element (25), which is located on the connection system (7), can be unlocked, which prevents in the locked state the connecting function (7) of the connection system.

3. The transfer system for containers according to Claim 1 or 2, characterized in that the locking element (25) in its locked state prevents the opening movement of a hollow puncture spike (37) of the connection system (7) that establishes the media connection between the containers (1, 5) and thus prevents the media connection.

4. The transfer system for containers according to any one of claims 1 to 3, characterized in that the key element (21), which is allocated to the second container (5), is formed by the cap section (13) that surrounds a perforable opening section (48) of the second container (5), wherein said cap section (13) is provided on the outside with irregular form features (21) that correspond to a code (61, 63).

5. The transfer system for containers according to any one of claims 1 to 3, characterized in that the key element (9), which is allocated to the second container (5), is formed by the cap

section (13) that surrounds a perforable opening section (48) of the second container (5), wherein said cap section (13) is provided at the end face with irregular form features that correspond to a code (79, 81, 83, 85).

6. The transfer system for containers according to any one of the preceding claims, characterized in that the locking element (25) provides, as lock for the key element (21) of the cap section (13), the annular body (25) with the opening (29) that is provided on the inside with coded irregular form features (31) in such a way that the cap section (13) can be inserted into the opening (29) of the locking element (25) into an operating position, provided that the coding of its key element (21) matches.

7. The transfer system for containers according to any one of claims 3 to 6, characterized in that the connection system (7) may be provided with at least one latching member (43, 53) that engages with the opening (29) of the locking element (25), wherein said latching member (43, 53), when reaching the operating position, may be unlocked by the cap section (13) that is inserted through the opening (29) of the locking element (25) in order to release the locked state of the hollow puncture spike (37).

8. The transfer system for containers according to any one of claims 4 to 7, characterized in that the irregular form features, which provide the coding, are provided in form of one or more recesses (21) and one or more protrusions (31).

9. The transfer system for containers according to Claim 8, characterized in that the irregular form features, which provide the coding, are provided in form of one or more recesses (21) that extend along a longitudinal axis and one or more protrusions (31) that extend along a longitudinal axis.

10. The transfer system for containers according to any one of the preceding claims, characterized in that the transfer system further comprises the annular body (25) and the cap section (13) and the annular body (25) are each made as a single piece.

11. The transfer system for containers according to any one of claims 8 to 10, characterized in that the coding consists of at least two subgroups (61, 63), each with at least one recess (21) and/or one protrusion (31), and that the subgroups (61, 63) are spatially offset from one another and characterise one and/or more different

particularities of ingredients and/or volumes and/or ingredient quantities of the containers (1, 5).

12. The transfer system for containers according to any one of the preceding claims, characterized in that the shape of the cap section (13) on its outer circumference and the opening (29) of the annular body (25) of the locking element (25) correspond to a regular polygon or Reuleaux triangle, wherein at least one coding (61, 63) is provided on each of the sides.

13. The transfer system for containers according to any one of the preceding claims, characterized in that the cap section (13) is provided with a removable cover (15).

14. The transfer system for containers according to Claim 13, characterized in that the cap section (13) is provided with a removable cover (15) in form of a foil, which may be radiated with high-energy radiation.

15. The transfer system for containers according to any one of the preceding claims, characterized in that the coding of the cap section (13) is achieved by the shape of the cap section (13) itself.

16. The transfer system for containers according to any one of the preceding claims, characterized in that the maximum outer diameter of the cap section (13) is smaller or equal to the maximum outside diameter of the second container (5).

17. The transfer system for containers according to any one of the preceding claims, characterized in that the cap section (13) is attached to the second container (5) in such a way that an at least partial rotation of the cap section (13) with respect to the second container (5) is possible.

18. The transfer system for containers according to any one of the preceding claims, characterized in that the cap section (13) forms part of a multi-piece sealing system, which serves in particular for sealing the second container (5) after freeze drying.

19. An encryption system for a transfer system for containers according to any one of the preceding claims which, in order to provide a mechanical lock and key system, is provided with the key element (13, 21) on

the second container (5) wherein the key element (13, 21) is mechanically coded, and on the connection system (7) the locking element (25), which locks it in the functionally disabled state wherein the locking element (25) is mechanically coded, which may be unlocked with coding that matches that of the key element (13, 21) by said key element (13, 21), whereby the coding of the key element (21) on the cap section (13) of the second container (5) is provided at its circumference with recesses (21) and/or protrusions (31) **characterized in** that the coding of the locking element (25) is formed on the wall of the opening (29) of the locking element (25) with protrusions (31) and/or recesses (21) that are complementary to the coding of the recesses (21) and/or protrusions (31) of the cap section (13).

20. The encryption system for a transfer system for containers according to Claim 19 which, in order to provide a mechanical lock and key system, is provided with the key element (13) on the second container (5), and which is provided with a mechanical coding (85) on a disk-shaped support (73) of a hollow puncture spike (37), as well as at least one spring-loaded, latching locking element (87), which may be unlocked with coding (85) that matches that of the key element (13).