

### [54] TRANSFER PACKAGING FOR BIOLOGICALS

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[51] Int. Cl. .... B65b 5/00

[58] Field of Search .... 53/36, 35, 37, 27; 206/47 A, 47 R, 63.4, 65

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### [57] ABSTRACT

Improved method and means for packaging multi-container biological, medical and pharmaceutical substances where shelf life demands small active ingredient bottle and large diluent bottle; improved storage, shipping and merchandising container for a pair of dif-

ferent sized bottles where one contains liquid; compartmented packaging for multiple bottle set where space is at a premium and immobility of containers or bottles within the package is desired; dimensioned packaging for receiving and stably positioning two bottles of markedly different size and typically different contents in a minimum space; an improved packaging blank having a lower larger component for vertical storage of a liquid-containing bottle and an upper compartment with bottle-receiving platform for horizontal storage of a solid-containing bottle, the two bottles so sized as to permit preparation of varying dosage levels or quantities in a specific case; improved method of dispensing biologicals such as viruses, wherein the freeze-dried virus is received within a minimum size bottle or container adequate to thereafter receive sufficient liquid diluent to dissolve all said freezer-dried virus cake, the diluent liquid received in a second, larger size bottle or container, the virus cake within the smaller said bottle which is transferred out of same dissolved in the diluent being sufficient to meet the minimum Government requirements for viral content when reconstituted with the entire quantity of diluent liquid in the accompanying second larger bottle, the second, larger diluent bottle so sized that it can receive both the maximum quantity of diluent to remain within the Government requirements for viral content when reconstituted and lesser quantities of said diluent.

3 Claims, 8 Drawing Figures

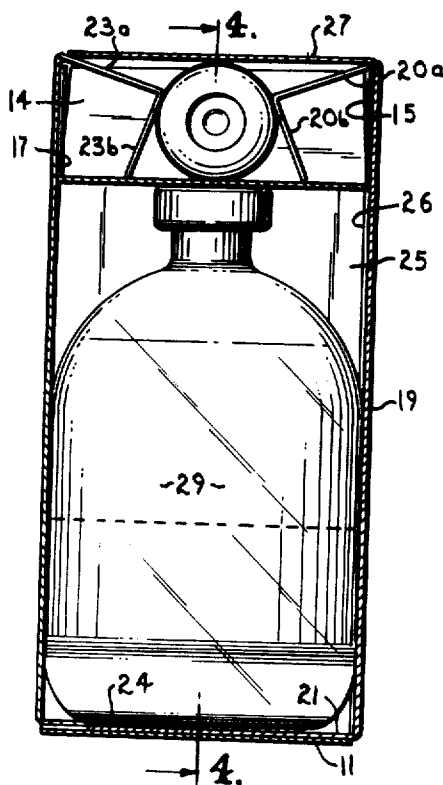


Fig. 1.

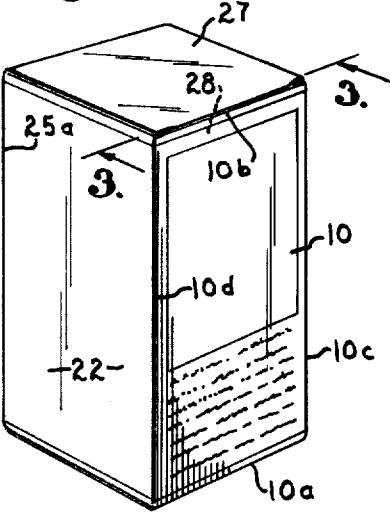


Fig. 2.

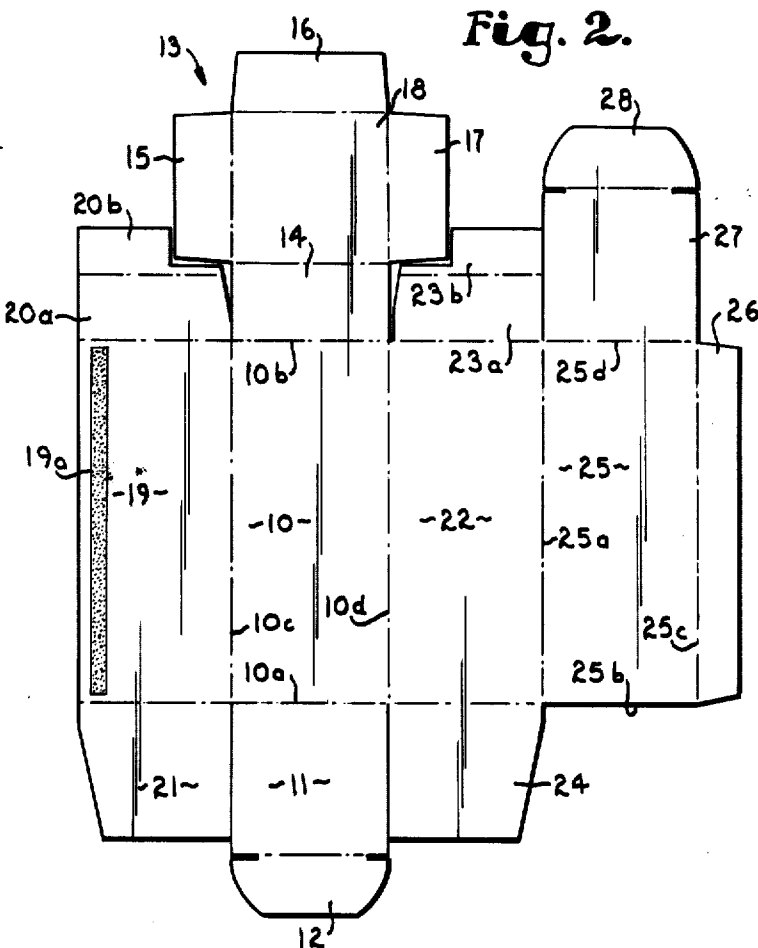


Fig. 3.

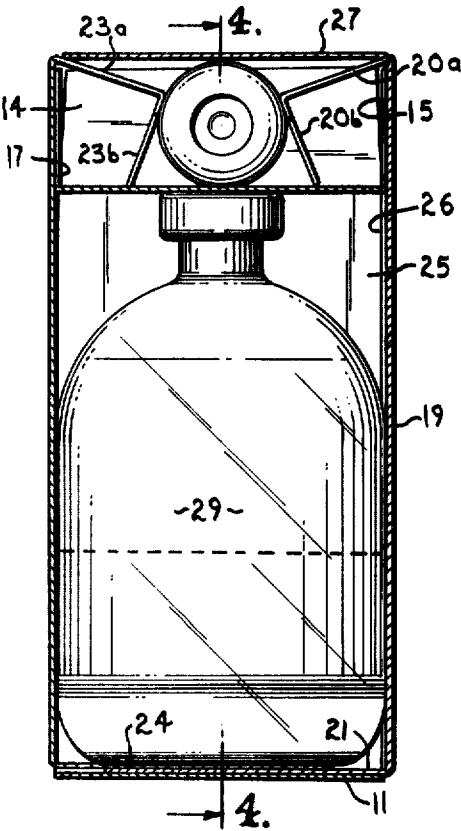


Fig. 4.

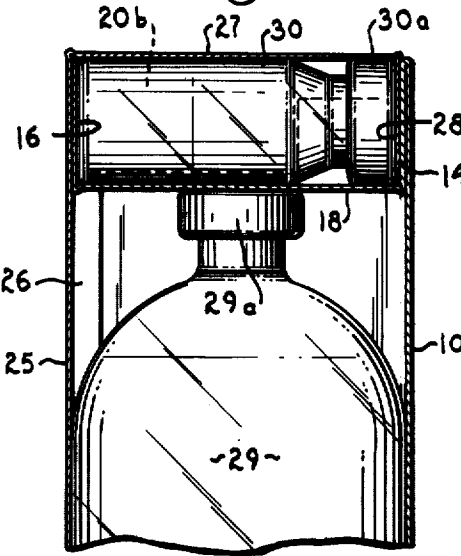


**Fig. 5.**

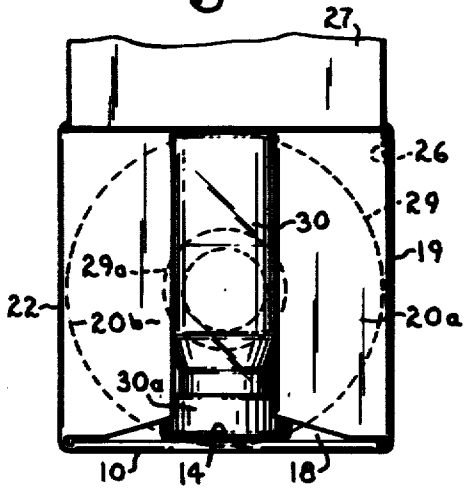


**Fig. 6.**

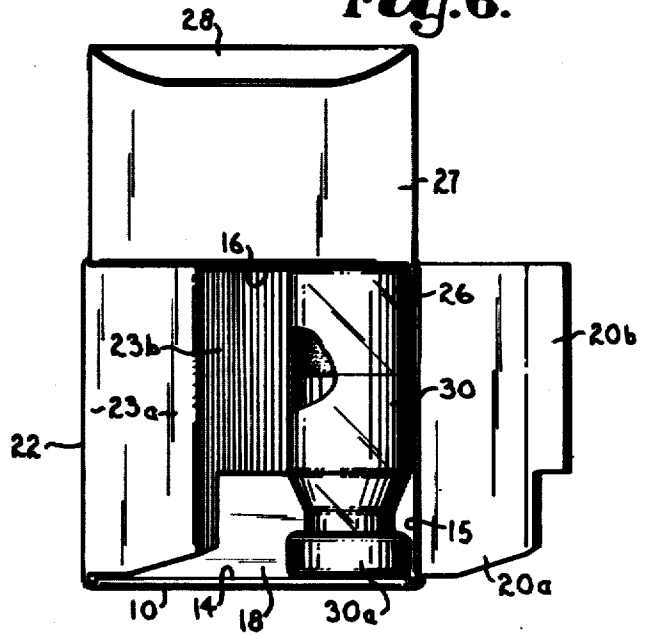


**Fig. 7.**

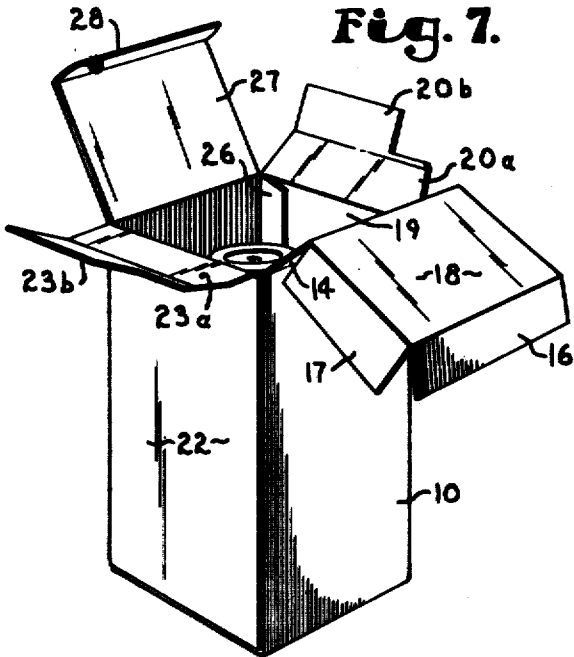
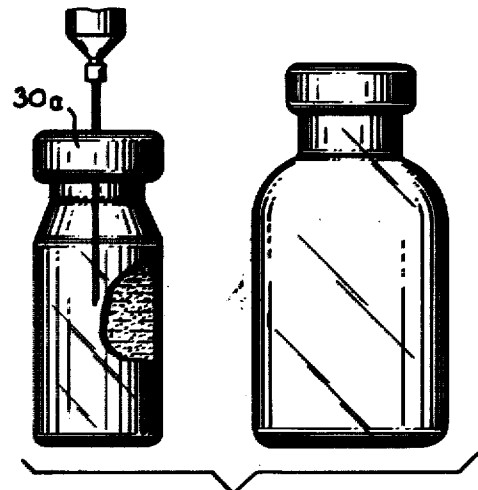


**Fig. 8.**



## TRANSFER PACKAGING FOR BIOLOGICALS

## DESCRIPTION OF THE INVENTION

This invention relates first to an improved package or box of cardboard or the like which has two compartments therein. A lower compartment thereof is provided for vertical storage of a relatively large diluent or solvent-containing bottle. A second compartment is provided for horizontal storage of an active ingredient bottle, the active ingredient typically a solid, such as a quantity of freeze-dried virus. The outer diameter and the height of the larger solvent or diluent-containing bottle is precisely that dimension which fits snugly within the vertical side walls (front, back and sides) of the lower compartment with the lower wall of the upper compartment resting on (preferably) the upper cap or lid of the solvent or diluent bottle. The height of the upper compartment is preferably the outer diameter of the smaller active ingredient bottle with the width thereof equal to the height of the (or length of the) smaller bottle. Side spacing means are provided to essentially fixedly position the smaller bottle centered in the upper compartment over the larger bottle.

While the bottles are not of unusual structure, per se, (they are typically glass vials or bottles of conventional size and shape for their given volume having rubber or sealing sheets or slabs capping same with metal perforate caps for syringe aspiration or transfer needle operation), as previously noted, the dimensions of same, both height and length and outer diameter are gauged to the outer package or vice versa, so as to achieve the desired snug fit and relationships, as will be further described specifically.

The second aspect of the invention relates to the utilization of a novel method of packaging biologicals, particularly including viruses, for transfer and reconstitution (of same with diluent) whereby, first, a fixed quantity of, say, freeze-dried virus is always utilized and provided in a first, smaller container and, secondly, a second larger container of diluent is provided which contains a fixed maximum quantity of diluent or some lesser quantity thereof.

For specific example, a first, smaller container (typically the so-called universal virus vial or the so-called single dose vial holding six milliliters) receives a freeze-dried virus cake sufficient in quantity to meet the minimum Government requirements for viral content when reconstituted with 100 milliliters of diluent. This, in the standard 2 cc. dose, would be the 50 dose quantity of diluent. Here there are two requirements. The first of these is that the vial holding the freeze-dried virus cake be sufficiently large that all of the virus cake will dissolve on filling of the vial or bottle with the diluent. Secondly, that quantity of virus mixed with the total quantity of diluent after transfer (100 milliliters) will still be sufficient in quantity to meet the minimum Government requirements for viral content.

With the maximum dose number or diluent quantity then fixed with respect to the quantity of freeze-dried virus in the smaller container or bottle, thereafter any lesser quantity of diluent may be employed in the same size diluent bottle or in a lesser size bottle to give a reconstituted diluted viral fluid for injection which will meet the minimum Government requirement. The great advantage of using the same large size diluent bottle (for example, the noted 100 milliliter or 50 dose bottle) with a lesser quantity is that the improved pack-

aging of the instant invention, without resizing, may be employed.

One method of preparing sterile solutions intended for injection or infusion involves the manufacturer actually preparing the sterile solution which is supplied to the veterinarian or physician in a suitable receptacle. Certain substances, however, may not be supplied in this manner because the active ingredient is not sufficiently stable on storage in dissolved form.

In such a case, the active substance may be introduced in sterile form into a first bottle or container, while a sterile solvent for the active substance is provided in a separate container. The active ingredient may be solid, liquid or a solution. Thereafter, the sterile solvent is combined with the active agent, preferably in such a manner that a sterile solution results, that is, neither the active ingredient nor the solvent come into contact with nonsterile instruments or air.

In the instant improvement, the problem of preparing a sterile solution of a solid substance or of combining the sterile solvent with the active agent is accomplished by aspirating into a syringe enough solvent to dissolve the solid or obtain a sterile solution of the active agent. This solvent is injected into the container containing the active agent or solid. Thereafter, the resulting mixture or solution is reaspirated into the syringe and injected into the original solvent container whereby to provide an ultimate solution of the desired strength.

Another mode of achieving, first, transfer of solvent into the active ingredient container and thereafter retransferring into the solvent container may utilize the auxiliary transfer device of Huebner et al., U.S. Pat. No. 3,484,849, issued Dec. 16, 1969. The Huebner transfer device comprises a body member or block having two bores with a cannula inserted in each bore and projecting from different or opposed ends of the bores. Thus it is possible to transfer from one bottle containing a sterile solvent into a second bottle containing a sterile substance a quantity of solvent sufficient to dissolve the sterile active substance present in the second bottle and then to return the solution thus obtained to the first bottle.

The instant invention is not particularly concerned with the means of transfer and either method described, and apparatus associated therewith (a syringe or Huebner's auxiliary device) may be employed.

## OBJECTS OF THE INVENTION

An object of the instant invention is to provide an improved package for containing storing and dispensing sterile solutions intended for injection or infusion wherein it is necessary that the active ingredient be separately packaged or contained from the ultimate solvent therefor.

Another object of the invention is to provide an improved package or container for a pair of bottles, one of said bottles containing an active ingredient and of relatively small dimension, the other bottle containing a sterile solution for said active ingredient and of relatively greater dimension and volume than the bottle holding the active ingredient.

Another object of the invention is to provide a unique packaging combination wherein a first small bottle is provided of a height or length substantially equal to the outer diameter or greatest thickness dimension of a second larger container, whereby the larger container, holding a quantity of liquid or sterile

solvent, may be packaged in a vertical position while the smaller container, normally holding a solid substance, may be packaged in a horizontal position thereabove.

Another object of the invention is to provide a novel new packaging construction and concept wherein two bottles or containers of differing size are packaged together in such a manner as to occupy a minimum of space for optimum shipping and storage thereof at minimum cost, the containers separated from but adjacent to one another and so received within the package walls as to each be definitely spatially located at all times with respect to one another and the package itself when the container is assembled and closed.

Another object of the invention is to provide a simple, novel, improved packaging arrangement which is easily and conveniently produced or manufactured, easily assembled in final form from the configured blank, easily loaded or charged with its commercial contents and readily emptied or unloaded by the ultimate user, said container also providing optimum arrangement and storage of the two containers so as to protect the separate contents of the two bottles.

Another object of the instant invention is to provide an improved method and means of packaging biologicals, particularly including freeze-dried viruses, for reconstitution wherein the freeze-dried virus is received in a relatively small bottle and the diluent therefor in a relatively larger bottle, two requirements being satisfied, namely, the virus cake bottle being of sufficient size that all of the virus cake will dissolve when said bottle is filled with diluent and, secondly, the diluent bottle so sized as to receive no more diluent than that which, when the virus cake is dissolved therein, contains sufficient viral fluids to meet the minimum Government requirements for viral content.

Another object of the invention is to provide such improved method of sizing and filling concentrated biological and diluent materials as to enable a single packaging construction to accommodate varying dose quantities of the biological in question.

Other and further objects of the instant invention will appear in the course of the following description thereof.

### DRAWINGS

In the drawings, which form a part of the instant specification and are to be read in conjunction therewith, an embodiment of the instant improvement and invention is shown. Like numerals are employed in the various views to indicate like parts.

FIG. 1 is a three-quarter perspective view of the improved package, assembled and filled, taken from the front and slightly above the package.

FIG. 2 is the configured blank from which the container is finally assembled shown before it is folded upon itself to assemble the final package and adhesively secured.

FIG. 3 is a view taken along the line 3—3 of FIG. 1 in the direction of the arrows and shows the two bottles packaged within the closed container after assembly thereof.

FIG. 4 is a view taken along the line 4—4 of FIG. 3 in the direction of the arrows.

FIG. 5 is a top plan of the container of FIGS. 1, 3 and 4, but with the top closure flap opened so that the upper smaller bottle may be seen positioned and

spaced by the inner flaps of the package on its supporting platform.

FIG. 6 is a view like that of FIG. 5 but with one of the spacing flaps pulled out of the upper compartment to display how the smaller container is positioned in its compartment.

FIG. 7 is a three-quarter perspective view like that of FIG. 1, but with, first, the top closure flap pulled out and pushed back, secondly, the spacing flaps for the upper compartment and smaller bottle pulled out to each side of the top closure flap, the small container removed from the upper compartment and the upper compartment pulled outwardly on its mounting flap so that the top of the large solution-carrying container may be seen in the view.

FIG. 8 shows two bottles in scale: a 10 (2 cc) dose or 20 ml. diluent bottle and the "universal single dose vial" (6 cc) dissolving the virus cake.

### THE PACKAGE BLANK

Referring first to FIG. 2, therein is illustrated the expanded, configured blank from which the container seen in the other views (package for two bottles) is assembled. The viewer is looking at the inside of all of the various segments in FIG. 2.

Front panel 10 has connected to the lower edge 10a thereof bottom closure flap 11 with tab 12. At the top end 10b of front panel 10 there is provided a platform generally designated 13 comprising four ultimately vertically oriented wall flaps 14, 15, 16 and 17 (14 is the connecting flap) and ultimately horizontal floor 18. Edges 10a and 10b comprise fold lines.

Connected to edge 10c (fold line) is a first side panel 19 having an upper small bottle spacing and positioning flap with two parts 20a and 20b. Portion 20a is separated from side panel 19 by a fold line and portion 20b from 20a by a fold line, as seen. At the bottom edge of side panel 19 and separated therefrom by a fold line is a bottom side closure flap 21.

At the other side edge 10d (fold line) of front panel 10 there is provided the second side panel 22. At the top edge of side panel 22, like at the top edge of side panel 19, there is provided a two part positioning flap 23a and 23b, a fold line dividing side panel 22 from portion 23a and a fold line dividing portion 23b from portion 23a. Again analogous to side flap 19, there is provided a side closure flap (bottom) 24 at the lower edge of side panel 22 divided therefrom by a fold line.

There is no connection between bottom closure 11 and side flaps 21 and 24. Likewise, there is no connection between the platform 13 and the spacing and positioning flaps 20 and 23. The fold lines separating the bottom side closures 21 and 24 from side panels 19 and 22 are in line and continuous with the fold line 10a. The same is true with respect to positioning flaps 20 and 23, namely, their defining fold lines at the upper ends of side panels 19 and 22 are in line with and continuous with the fold line 10b.

Back side panel 25 is divided from side panel 22 by a fold line 25a. The lower edge 25b of back panel 25 has no flap attached thereto. A securing flap 26 is provided along the edge 25c defined by a fold line. An adhesive strip may be provided along the flap 26 on the side thereof away from the viewer. This adhesive strip adheres to the visible edge of flap 19 in the portion thereof designated 19a when the carton or package is assembled. The upper edge 25d of back flap 25 is de-

finished by a fold line and has top closure 27 connected thereto with engaging or retaining flap 28 thereon defined by a fold line seen between closure 27 and retaining flap 28.

#### PACKAGE ASSEMBLY

Now referring to all drawings, in assembly of the blank of FIG. 2, the side panels 19 and 22 are positioned at right angles to front panel 10 by folding along the fold lines 10c and 10d. Back panel 25 is then positioned opposite front panel 10 by folding at right angles to side panel 22 along fold line 25a. Connecting or attaching panel 26 is then folded inside of side panel 19 and adhesively or otherwise attached thereto, the line of connection being shown at 19a in FIG. 2 on panel 19. In order to close the bottom end of the package, either one of the side closures 21 or 24 is first folded upwardly along the fold line connecting same to side panel 19 or 22 and the other one thereafter. Finally, bottom closure 11 is folded around its connecting fold line 10a to front panel 10 with tab 12 positioned inside of back panel 25.

The latter described procedure results in a container configuration as seen in FIG. 7. At this point, the larger container generally designated 29 may be placed within the lower portion of the package in the manner seen particularly in FIGS. 3, 4 and 7. As previously noted, the finished container in plan view is square with the outer diameter of solvent container 29 being substantially equal to the inner transverse (horizontal) dimensions of the container so that there are substantially four points of contact of the solvent container 29 with the four wall panels 10, 19, 22 and 25. (The vertical center line of each said panel as in FIG. 5.)

Thereafter, the upper platform assembly 14-18, inclusive, may be inserted into the top of the container above the top of solvent container 29. This is accomplished by folding tabs 14, 15, 16, and 17 away from the viewer (see FIG. 7) in FIG. 2 along the fold lines connecting same with the floor 18 of the bottle receiving platform. The floor 18 is then folded away from the viewer in FIG. 2 along the fold line connecting it with tab 14. Connecting tab 14, to insert the whole assembly in the top of the package from the position of FIG. 7, is folded over along the fold line 10b connecting same to the front panel 10 so that the platform and its side walls 14-17, inclusive, arrives in the position seen in FIGS. 3, 4, 5 and 6. Before this is done the large solvent container has been loaded in the lower end of the container as seen in FIG. 7.

At this point, the upper container generally designated 30 may be placed on the floor 18 of the platform assembly. A first one of the retaining flaps 23 may be folded inwardly as in FIG. 6 along the fold line connecting same to side panel 22, thereafter the secondly flap 23b being folded to the position best seen in FIG. 3 along the fold line connecting same to flap 23a. Flap 20, with its two parts, is then moved into the position seen in FIGS. 3 and 5 whereby upper bottle 30 is firmly received with its upper end abutting or close to platform flap 14 and its lower end next platform flap 16. The position of the container may be reversed (container 30) longitudinally with respect to these flaps. Thereafter, the top closure 27 may be folded over around its fold line connection 25d to back panel 25 with the retainer flap 28 going next to platform flap 14 in the manner seen in FIG. 4.

#### SPECIFIC EXAMPLE

As a specific example of a veterinary biological preparation which is adapted to the instant packaging arrangement, reference is made to Bovine Rhinotracheitis Vaccine. This is a modified live virus vaccine produced by tissue culture methods in cells of porcine origin. Porcine tissue culture is used to reduce the possibility of extraneous viruses associated with homologous tissue cultures. The vaccine is freeze dried under vacuum and stabilizing agents are added to enhance stability. Penicillin, Streptomycin and Mycostatin are added as preservatives during the manufacturing process. This virus is used for the prevention of Infectious Bovine Rhinotracheitis Infection (Red-Nose) in healthy cattle.

Previously, the freeze dried virus (a solid) was provided in a large bottle of substantially the same volume as the solvent bottle seen in the Figures. The relative size of the solvent bottle depended on the dosage quantity desired and, typically, this was supplied in 10-dose, 25-dose and 50 dose containers.

When it was desired to inject the cattle, the entire contents of the diluent vial or container was transferred into the vaccine bottle or vial, using aseptic technique and sterile transfer needle. One the solvent was transferred into the vaccine vial or bottle, the bottle was shaken gently until the product was in solution. Thereafter, the animals were injected, typically intramuscular, using aseptic techniques.

On the other hand, in the instant packaging arrangement, as seen in the Drawings, a sterile syringe is employed to withdraw from the solvent bottle 29 a sufficient quantity (indicated on the package or one of the bottles within the package) of solvent to dissolve the vaccine plug or body received in the smaller bottle 30. This quantity of solvent is injected directly into the bottle 30, which is then shaken or manipulated to dissolve the body of vaccine therewithin. After dissolving, the same syringe is utilized to aspirate the entire contents of the bottle 30, thereafter same being injected back into the sterile solution bottle 29. After suitable gentle shaking, the desired product dose level is achieved and the entire bottle 29 contents may be used to inject the animals.

It is noted that in the smaller dosage levels or quantities, the outer diameter of the container 29 may remain the same, but the total height of the container 29 reduced. In such case, the overall height of the package may be reduced or, alternatively, a plug of foam plastic or other material may be used to overlie the top of the container 29 and underlie platform 18. Alternatively, the entire scale of the container may be changed which would involve differences in diameter and height of container 29, perhaps and/or changes in diameter and height of container 30.

It is important to note that this invention involves the following congruences or spatial relationships between the package and the containers received therewithin. First, it is desired that the outer diameter of container 29 jibe with the inner dimensions of the container, whereby the wall of the container 29 bears uniformly upon the four walls of the container. Secondly, it is desired, preferably, that the top 29a of container 29 underlie or bear against the floor 18 when the platform 13 is received within the upper portion of the package. As previously described, an insert may be employed between the top of the container 29 and the underfloor

18 of the upper compartment, but this involves an extra operation and adjustment in packaging. Thirdly, the height or length of container 30 preferably is such that the bottom portion thereof lies against either tab 16 or the top closure tab 28, while the top 30a thereof lies against the other one of said pair of members 16 or 28. This provides for a snug longitudinal fit of the bottle 30 on the platform. The outer diameter of bottle 30 should correspond to the internal height of the compartment defined by the platform on top of bottle 29 and under top closure 27, whereby to provide another bearing fit within the container. Finally, the positioning tabs 20 and 23 should bear against the sides of the upper container as seen in FIG. 3, so there will be no rolling or lateral motion thereof.

#### FREEZE-DRIED VIRUS CAKE — DILUENT QUANTITIES PROVIDED

One of the basic invariants in the instant improvement lies in the absolute quantity of virus provided in the smaller dimension bottle or container. This quantity of virus in the vial, bottle or container is always that which is required for the maximum content diluent bottle. Thus, if a 50-2cc. dose diluent bottle (100 ml.) is the largest quantity of diluent which will be employed with a given product, then the quantity of freeze-dried virus cake provided in the smaller bottle will be that quantity which, when reconstituted with the entire quantity of diluent liquid in the accompanying second larger bottle, will meet the minimum Government requirement for viral content.

A second invariant is constituted in that the volume of the virus vial must be sufficiently large that, when containing the freeze-dried virus cake corresponding to the largest diluent dosage to be employed therewith, still leaves sufficient room in the virus vial to receive a sufficient quantity of diluent to dissolve all of the virus cake in a single transfer operation. That is, when a quantity of diluent liquid is aspirated by syringe or otherwise, (transfer needle) from the diluent bottle and discharged into the virus cake vial, this single quantity, which may essentially fill the vial, must dissolve all the virus cake so a single reaspiration by syringe will serve to transfer same (dissolved freeze-dried virus cake in diluent) back to the diluent bottle. I have found that, in almost all cases (and in all the specific examples recited in this application) that the universal single dose vial (6 cc.) will receive the virus cake for a 100 ml. (50-2 cc. dose) quantity of diluent.

A next invariant consideration which follows from the above described requirements lies in that any lesser quantity of diluent than that which is the maximum permitted (by Government requirement definition) with the virus cake quantity may be employed with the same virus cake quantity. Additionally, where the diluent quantity (or dose number) is less than the maximum, but relatively close thereto, it is entirely feasible to use the same size diluent bottle with a lesser quantity of diluent therein which permits the optimum employment of the previously described packaging without modification thereto. It also permits the employment of a standard size diluent bottle (for example the 100 ml. — 50—2 cc. dose bottle). Thus, specifically, using the virus cake quantity for a 50 dose maximum diluent quantity, it is entirely feasible to use with that virus cake diluent quantities for 40 doses, 30 doses, 25 doses, 10 doses, etc. This is because the Government require-

ments merely fix the minimum virus quantities required, while there is no maximum. The mentioned 40, 30 and 25 dose quantities of diluent, for example, can be conveniently packaged in the 50 dose (100 ml.) bottle with great convenience and savings in packages, packaging, bottles held in inventory, etc. All that is needed is the required precise labeling with respect to dosage numbers, etc.

It is also evident that if the virus cake quantities for the 100 ml. (50—2cc. dose) diluent quantity will dissolve in the virus vial size fixed, the same will dissolve in the same diluent for any lesser dosage because the same transfer quantity is employed. The basic consideration here is that the diluent bottle, whatever its relative content with respect to its total size (one-quarter, one-half, three-quarters or entirely full) never sees the freeze-drier. On the other hand, the virus vial or bottle must go into the freeze-drier to produce the desired freeze-dried virus cake. The smaller the virus vial, the greater the quantity of virus which may be handled at a given time in the freeze-drier. The only consideration, as above noted, is that this quantity of freeze-dried virus cake in the virus vial must be dissolvable in a single transfer quantity of liquid diluent. In short, the viral fluid which go into the desiccating bottle must be sufficient to meet the minimum Government requirements for viral content when reconstituted with the accompanying quantity of diluent.

As specific examples of freeze-dried virus cakes, the following viruses to be used with cattle are noted:

1. Bovine Rhinotracheitis;
2. Para-Influenza-3;
3. Bovine Virus Diarrhea;
4. Any combination of two or three of the above.

As diluents for these specific viruses (to be used in the larger diluent bottles), the following are usable:

1. Sterile Water;
2. Lepto Pomona Bacterin in liquid form;
3. Pasteurella Bacterin in liquid form;
4. A combination of Lepto and Pasteurella in liquid form.

As noted above, a sufficient quantity of each of these viruses is produceable in a freeze-dried virus cake in the 6 ml. universal single dose vial to be transferrable in a single dissolving diluent quantity in said vial to a 100 ml. diluent liquid body to meet the minimum Government requirements for viral content when reconstituted with the accompanying said 100 ml. of diluent. However, alternatively, the viral body may be housed in a small bottle of slightly larger size, if required. In any case, the minimum viral vial or bottle size is desirable in order to produce the maximum quantity of virus from the freeze drier in a given batch.

It is important to note that, in the instant method and procedure, the diluent is not transferred from the main, original diluent bottle into an equal size, virus cake-containing bottle. Rather, the procedure comprises transferring a single, limited quantity of diluent (by transfer needle or syringe) from the diluent bottle into the small virus cake-containing bottle. This is seen in the left-hand side of FIG. 8 where a syringe needle has filled the small virus-containing bottle with diluent for dissolution of the virus cake therewithin. Thereafter, after the virus cake-containing bottle is shaken or otherwise manipulated to mix the virus cake into the diluent and dissolve same. A single batch of liquid is transmitted back, via transfer needle or syringe, into the

larger original diluent bottle whereby the viral dosages are dispensed from the original diluent bottle.

Looking at FIG. 3, there is shown two dosage levels therewithin, namely, 100 ml. fill (50—2cc doses) and 50 ml. fill (25—2cc doses). The latter is shown by the dotted line, the former by the full line thereabove in the view. A typical virus cake fill in the universal virus vial may be seen in FIG. 6 in the cutaway portion.

The quantity of virus cake and the viral count thereof is not limited with respect to the dosage size save that there must be a sufficient viral content to give adequate (Government required) viral content in the maximum quantity of diluent in the largest diluent bottle fill which will be employed therewith. It is well known that the load of a freeze drier is a serial number of the virus. Therefore, the largest number of small bottles which may be put into a given freeze drier raises the number of dosages within the serial number. Yet another advantage of having a single size virus vial lies in the necessity of only stocking and printing a single size for a multiplicity of dosage levels or diluent bottles or both employed therewith.

A specific example of a USDA Standard requirement for a veterinary biological is V-32, the "Standard Requirement For Bovine Rhinotracheitis Vaccine" dated Mar. 1, 1972, six pages.

The typical virus cake, as well known, involves both the viral content and suitable stabilizers of conventional type.

From the foregoing, it will be seen that this invention is one well adapted to attain all of the ends and objects hereinabove set forth together with other advantages which are obvious and which are inherent to the structure.

It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of the claims.

As many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. A method of separately sub-packaging freeze-dried virus cake and the diluent therefor in a common

package for later reconstitution of the virus cake and diluent by mixing same together comprising the steps of:

packaging the freeze-dried virus cake within a first relatively smaller bottle,

the quantity of virus cake in the first bottle such and the first bottle sized substantially no larger than that a single filling of the first bottle with diluent will dissolve the entire virus cake therein for transfer thereof to said second bottle,

packaging the diluent in a second relatively larger size bottle, said diluent operative to reconstitute the virus cake for use when mixed therewith,

the largest quantity of diluent receivable in the second bottle such and the second bottle so sized, that, when the virus cake in the first bottle is dissolved therein, the resultant solution meets the Government requirement for minimum viral quantity in use,

said first and second bottles packaged together in a third disposable container for ultimate use and application by a further step wherein, after removal of said first and second bottles from the said third containers,

a single quantity of diluent is transferred in a single batch from the said second larger bottle to said first smaller bottle thereby to dissolve all of the freeze-dried virus cake therein and thereafter the said completely dissolved viral fluids, in diluent, are transferred back to said second relatively larger bottle in a single batch to provide in said second bottle a properly proportioned and concentrated virus solution.

2. A method as in claim 1 wherein the diluent bottle is initially substantially filled with said diluent whereby the ultimately reconstituted virus solution in the diluent bottle is at essentially a concentration equal to the government requirement for minimum viral quantity in use.

3. A method as in claim 1 wherein the said diluent bottle is initially substantially less than filled with said diluent, whereby the ultimately reconstituted virus solution in the diluent bottle is at a concentration substantially greater than the Government requirement for minimum viral quantity in use.

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