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L. K. PITMAN
APPARATUS FOR TRANSFERRING LIQUID FROM
ONE CONTAINER TO ANOTHER

2,584,397

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2 SHEETS—SHEET 1

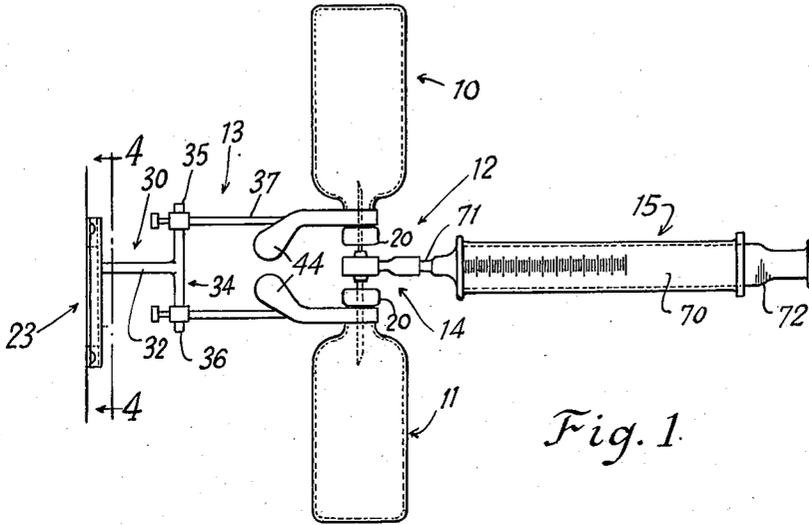


Fig. 1

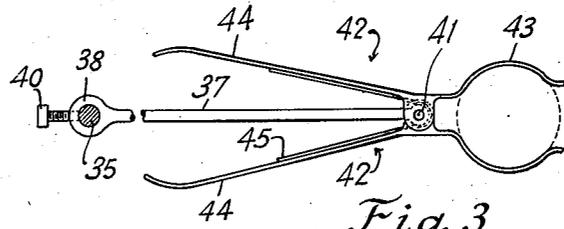


Fig. 3

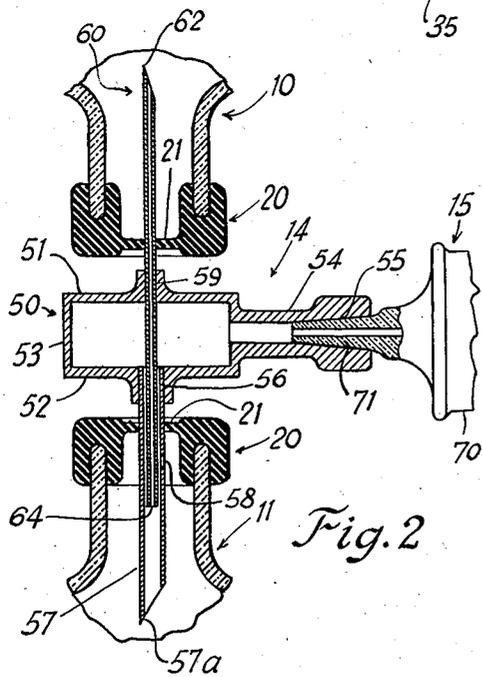


Fig. 2

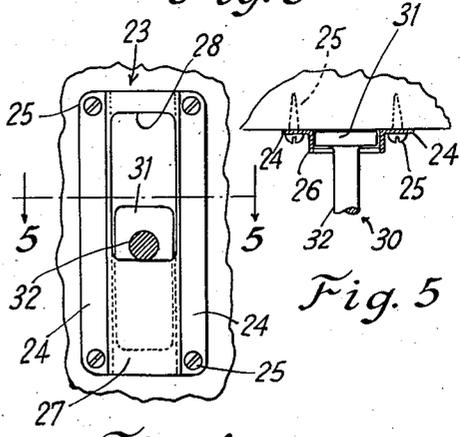


Fig. 4

Fig. 5

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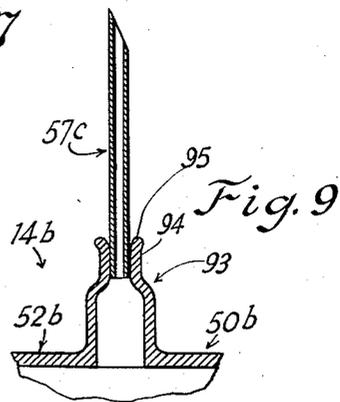
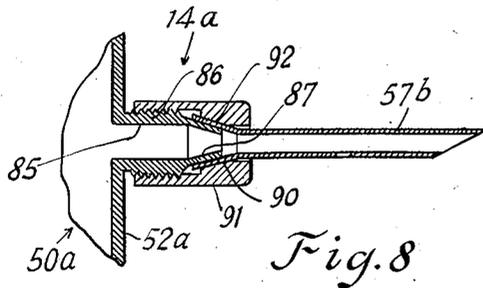
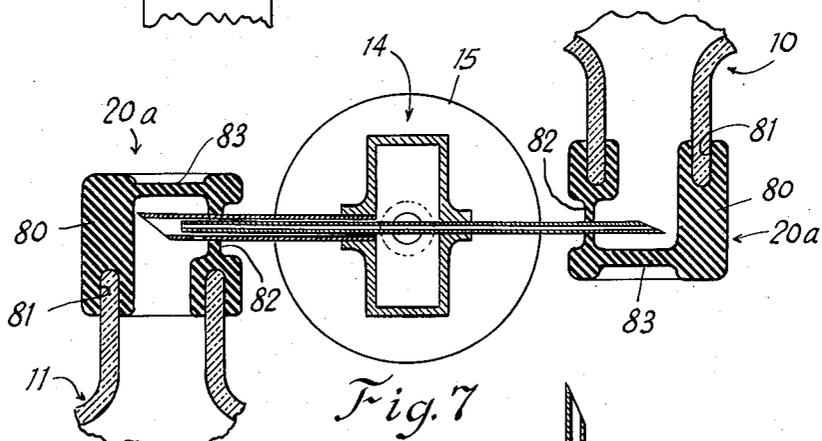
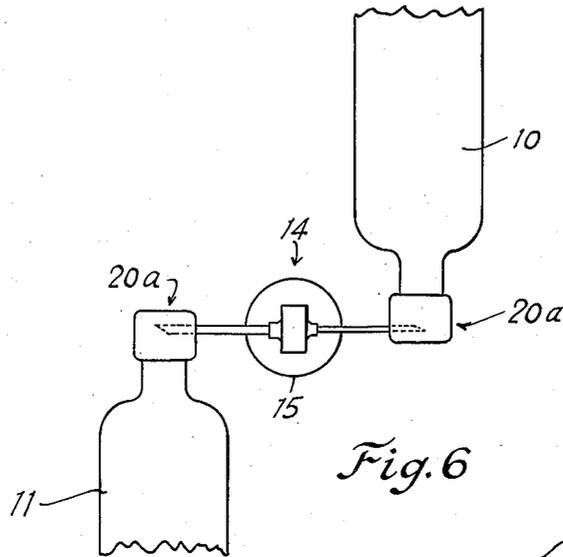
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2 SHEETS—SHEET 2



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APPARATUS FOR TRANSFERRING LIQUID FROM ONE CONTAINER TO ANOTHER

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8 Claims. (Cl. 226—116)

1

This invention relates to apparatus for transferring liquid from one container to another. It is particularly directed to means for transferring liquid from one bottle to another without admitting outside air to the bottles during transfer.

One use of the device is in transferring water or solvent from one bottle to another bottle containing penicillin in powder form, the advantage of the device being that the transfer may be made when the penicillin is to be used, as it is not desirable to mix the powder with the liquid long before use.

An object of this invention is to provide a simple apparatus of the character described which will transfer liquid from one bottle to another rapidly while maintaining sterility because no outside air enters the bottles during transfer.

Another object of this invention is to provide apparatus of the character described including a clamp adapted to engage the necks of two bottles for maintaining the bottles in opposed relation, said clamp having handle means so positioned that both clamps may be opened at the same time, said clamps being furthermore adjustable to permit regulation of the bottles toward and away from each other.

Still another object of this invention is to provide a bottle provided with a cap having a thin diaphragm at the top and at the side so that a hypodermic needle may be inserted into the bottle either through the top diaphragm or through the side diaphragm.

Still another object of this invention is to provide, in apparatus of the character described a hypodermic needle removably assembled so as to permit replacement thereof in case of breakage.

Still another object of this invention is to provide, in apparatus of the character described, a hypodermic needle so attached to the needle holder as to permit flexing or bending of the needle without breakage.

Yet another object of this invention is to provide a neat, compact and durable apparatus of the character described which shall be relatively inexpensive to manufacture, easy to manipulate, and yet practical and efficient to a high degree in use.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts which will be exemplified in the construction hereinafter described, and of which the scope of application will be indicated in the following claims.

2

In the accompanying drawing, in which is shown one of the various possible illustrative embodiments of this invention:

Fig. 1 is a side elevational view of apparatus embodying the invention for transferring liquid from one bottle to another;

Fig. 2 is an enlarged, partial, cross-sectional view through the axes of the bottles;

Fig. 3 is a top plan view of one of the bottle clamps;

Fig. 4 is an enlarged cross-sectional view taken on line 4—4 of Fig. 1;

Fig. 5 is a cross-sectional view taken on line 5—5 of Fig. 4;

Fig. 6 is a side elevational view showing apparatus embodying the invention and illustrating a modified form of cap for the bottles;

Fig. 7 is an enlarged partial cross-sectional view taken through the axes of the bottles;

Fig. 8 is a cross-sectional view of part of the transfer apparatus illustrating a modified construction;

Fig. 9 is a view similar to Fig. 8 and illustrating yet another modified construction.

Referring now in detail to the drawing, 10 designates an upper bottle, 11 a lower bottle, and numeral 12, apparatus for transferring liquid from the upper bottle to the lower bottle. The apparatus 12 comprises a clamp 13 for supporting the bottles 10 and 11 in opposed relation, a transfer mechanism 14 interconnecting the bottles, in the manner hereinafter appearing, and a hypodermic syringe 15 connected to the mechanism 14 for effecting the transfer. Each of the bottles 10 and 11 has a cap 20 provided with a diaphragm 21 adapted to be pierced by a hypodermic needle.

The clamp 13 comprises a wall bracket 23 having flanges 24 contacting the wall and formed with openings to receive screws 25 for attaching the bracket to said wall. Extending from flanges 24 are side walls 26 disposed at right angles thereto and interconnected by a web 27. Web 27 is formed with a cutout or opening 28. Mounted on the wall bracket 23 is a bracket member 30 comprising a flat plate 31 adapted to be inserted through opening 28 and thus slidably moved downwardly so as to be disposed between the web 27 and the wall to which the bracket is attached.

Extending from the upper end of plate 31 is a horizontal arm 32. Integrally formed with the latter is a vertical rod 34 having an upwardly extending arm 35 and a downwardly extending arm 36. Rotatably mounted on arm 35 is a rod 37 formed with an eye 38 at one end to receive said arm. A set screw 40 serves to fix the rod 37

3

in vertically and angularly adjusted positions. At the outer end of rod 37 is a pivot pin 41 to which are pivoted a pair of similar, symmetrically disposed spring clamps 42. Each clamp 42 has a curved portion 43 adapted to engage the neck of the bottle and rearwardly and downwardly extending handle 44. Disposed about pivot pin 41 and engaging the handles 44 is a torsion spring 45 adapted to normally separate the handles so that portions 43 will resiliently clamp the neck of the bottle.

Rotatably mounted on the lower end of arm 36 is a bottle clamp member similar to the clamp 37, 42 but symmetrically disposed thereto. The handles 44 of the lower clamping member therefore extend upwardly toward the handles 44 of the upper clamp member. With such construction, the handles 44 of the two clamp members are located close to each other and may be pressed together simultaneously so as to release the bottles. It will be noted that the upper clamp member engages the neck of bottle 10, whereas the lower clamp member engages the neck of bottle 11.

The transfer mechanism 14 comprises an annular chamber 50 having an upper wall 51, a lower wall 52, a cylindrical wall 53 interconnecting said upper and lower walls. Extending from cylindrical wall 53 is a tubular stem 54 provided with a flaring mouth 55. The lower wall 52 is formed with a through opening 56. Extending into said opening 56 and fixed therein is the upper end of a tubular hypodermic needle 57. Needle 57 extends downwardly from chamber 50. It is formed with an intermediate hole or opening 58 for the purpose hereinafter appearing. The upper wall 51 is formed with a through opening 59. Extending therethrough is a hypodermic needle 60 thinner than needle 57. The needle 60 is fixed within opening 59. The upper end of said needle 60 is pointed as at 62. Said needle 60 extends through the chamber 50 and passes into the thicker needle 57 in concentric, spaced relation thereto. The lower end 64 of needle 60 is preferably disposed below opening 58 but above the lower pointed end 57a of needle 57.

The hypodermic syringe 15 comprises a barrel 70 formed with the usual tapered tip 71 which is inserted into the flaring opening 55 of stem 54. Within the barrel 70 is a usual plunger 72.

The transfer of liquid from the upper bottle 10 to the lower bottle 11 will now be described. The thick needle 57 is pushed into the lower empty bottle through the diaphragm 21 of its cap 20. The upper end of needle 60 is pushed through the diaphragm 21 of the cap 20 of the upper bottle. The plunger 72 is pushed forwardly to closed position, and then the tip 71 is inserted into opening 55. Liquid is in the upper bottle and is to be transferred to the lower bottle which is empty. The plunger 72 is then pulled out gently to draw air from the lower bottle through the opening 58, through the chamber 50, and into the syringe, thereby creating a partial vacuum or reducing pressure in the lower bottle, and causing liquid in the upper bottle to flow through the thin needle into the lower bottle. The plunger is then pushed to cause air in the syringe to pass through the chamber 50 and up through the thin needle to the upper bottle. Air is thus transferred from the lower bottle to the upper bottle and liquid from the upper bottle to the lower bottle.

The procedure is repeated until all the liquid is transferred from the upper bottle to the lower

4

bottle. The advantages of the above described apparatus is simplicity and rapidity of manipulation. Furthermore, sterility is maintained because no outside air enters during the transfer.

In Figs. 6 and 7 there is shown a modified construction of bottle cap. The bottle caps 20a shown in Figs. 6 and 7 may be made of rubber and each comprises a cylindrical wall 80 which may be attached to the neck of the bottle in any suitable manner. The cylindrical wall may thus be formed with an annular groove 81 to receive the upper end of the bottle neck. The cylindrical wall 80 is formed with a thin diaphragm 82 at one side. Said bottle cap is also formed with a thin diaphragm 83 at the top. With such construction, the needles may be inserted either through the top diaphragms 83 or the side diaphragms 82. Thus in Figs. 6 and 7 the mechanism 14 is shown applied by piercing the needles through the side diaphragms 82. The needles are thus in horizontal position and the bottles may be supported by the same clamp or holder as shown in Fig. 1.

In Fig. 8 there is shown a modified form of transfer mechanism. The transfer mechanism 14a shown in Fig. 8 is similar to transfer mechanism 14 except as described hereinafter. The mechanism 14a comprises a chamber 50a formed with a bottom wall 52a, similar to chamber 50, and its wall 52, as illustrated in Fig. 2. Wall 52a however is formed with a tubular projection 85 having an externally screw threaded portion 86. Extending from portion 85 is a tapered portion 87. Mounted on said portion 87 is a hypodermic needle 57b. The needle 57b has, at its base, a flaring or tapered portion 90 contacting the external surface of the tapered portion 87 and complementary thereto.

Means is provided to releasably attach the needle 57b to the tapered portion 87. To this end there is screwed onto the threaded portion 86 a sleeve 91 having an internally tapered portion 92 contacting the flaring portion 90 of the needle for pressing the same against said tapered portion 87. It will now be understood that should the needle 57b break it may be easily replaced by a new needle.

In Fig. 9 there is shown a still further modified form of transfer mechanism. In Fig. 9 there is shown transfer mechanism 14b comprising a chamber 50b having a wall 52b. Extending from wall 52b is a tubular hub portion 93 formed at its outer end with a reduced portion 94 provided with an outwardly flaring mouth 95. Inserted into the reduced portion 94 is the lower or base end of a needle 57c. The lower end of the needle is swedged to the reduced portion 94. Flexing or bending of the needle 57c is permitted due to the outwardly flaring mouth 95.

The surgeon is confronted with a problem for it is not uncommon for the needle to break during an injection. The break is usually in the area where the needle is swedged to the hub. This area is the weakest portion of the needle due to pressure exerted on that area during swedging. Removing the broken needle from the tissue is a problem and very often the cause for law suits. The construction shown in Fig. 9 is applicable to hypodermic needles used for injections and with such construction when the needle is accidentally bent the flare will brace the needle so that the needle will bend but not break.

It will thus be seen that there is provided a device in which the several objects of this in-

5

vention are achieved, and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A device for transferring liquid from one vessel to another comprising a chamber, means on the chamber to receive the nozzle of a syringe, said chamber having a pair of opposite walls, one of said opposite walls having an opening, a relatively thick hollow needle attached to said wall and said chamber and extending therefrom and having one end fixed within said opening, said needle having a pointed outer end, the other of said walls being formed with an opening aligned with the first opening, and a relatively thin hollow needle passing through the opening in said other wall, and being fixed to said wall and having a portion traversing the chamber, and a portion projecting into said relatively thick needle in spaced concentric relation thereto, and said relatively thin needle having a portion projecting away from said chamber in a direction opposite to the relatively thick needle, and being formed with a pointed outer end.

2. A device for transferring liquid from one vessel to another comprising a chamber, means on the chamber to receive the nozzle of a syringe, said chamber having a pair of opposite walls, one of said opposite walls having an opening, a relatively thick hollow needle attached to said wall and said chamber and extending therefrom and having one end fixed within said opening, said needle having a pointed outer end, the other of said walls being formed with an opening aligned with the first opening, and a relatively thin hollow needle passing through the opening in said other wall, and being fixed to said wall and having a portion traversing the chamber, and a portion projecting into said relatively thick needle in spaced concentric relation thereto, and said relatively thin needle having a portion projecting away from said chamber in a direction opposite to the relatively thick needle, and being formed with a pointed outer end, said relatively thick needle having an opening located between the outer end of the portion of the thin needle which projects into the thick needle and the first mentioned wall of said chamber.

3. A device of the character described comprising a rigid chamber having a pair of opposed walls and being formed with a tubular stem, means on said stem to receive the nozzle of a syringe, one of said walls being formed with an opening, a relatively thick hypodermic needle having its base end projecting into said opening and fixed to said wall, said needle extending from said wall and having a pointed outer end, the opposite wall of said chamber being formed with a through opening, a relatively thin hollow needle extending through said opening and fixed to said wall and having a portion extending away from the chamber in the direction opposite to the thick needle, said thin needle having a portion passing through said chamber and passing into the thick needle in spaced concentric relation thereto, said thin needle having a pointed outer end.

4. A device of the character described comprising a rigid chamber having a pair of opposed

6

walls and being formed with a tubular stem, means on said stem to receive the nozzle of a syringe, one of said walls being formed with an opening, a relatively thick hypodermic needle having its base end projecting into said opening and fixed to said wall, said needle extending from said wall and having a pointed outer end, the opposite wall of said chamber being formed with a through opening, a relatively thin hollow needle extending through said opening and fixed to said wall and having a portion extending away from the chamber in the direction opposite to the thick needle, said thin needle having a portion passing through said chamber and passing into the thick needle in spaced concentric relation thereto, said thin needle having a pointed outer end, said thick needle being formed with an opening located between the end of the portion of the thin needle which projects into the thick needle and the first mentioned wall of said chamber.

5. Apparatus for transferring fluid from one container to another, each container being provided with a cap, said apparatus comprising a chamber, means on the chamber to receive the nozzle of a syringe, a relatively thick hollow needle fixed to a wall of said chamber and extending therefrom and communicating with the chamber and being provided with a pointed end to pierce the cap of one container, a relatively thin hollow needle fixed to an opposite wall of said chamber and having a portion extending from said chamber, said portion having a pointed outer end to pierce the cap of the other container, said relatively thin hollow needle having a portion traversing the chamber and projecting into the relatively thick needle in spaced concentric relation thereto, said relatively thick needle having an opening disposed between the end of the portion of the thin needle which projects into the thick needle and the first mentioned wall of said chamber, said relatively thick needle projecting beyond the portion of the relatively thin needle which projects thereto.

6. Apparatus for transferring fluid from one container to another, each container being provided with a cap, said apparatus comprising a chamber having a pair of opposite walls, a relatively thick hollow needle fixed to one of said walls and extending therefrom and communicating with the interior of said chamber and being provided with a pointed outer end to pierce the cap of one container, a relatively thin hollow needle fixed to the opposite wall of said chamber and having a portion extending from said chamber and provided with a pointed outer end to pierce the cap of the other container, said relatively thin needle having a portion traversing the chamber and a portion projecting into the relatively thick needle in spaced relation thereto, said chamber being provided with a hollow stem formed with a tapered opening and a hypodermic syringe comprising a barrel and a tapered needle received in the tapered opening in said stem.

7. Apparatus for transferring fluid from one container to another, each container being provided with a cap, said apparatus comprising a chamber having a pair of opposite walls, a relatively thick hollow needle fixed to one of said walls and extending therefrom and communicating with the interior of said chamber and being provided with a pointed outer end to pierce the cap of one container, a relatively thin hollow needle fixed to the opposite wall of said chamber and having a portion extending from said cham-

7

ber and provided with a pointed outer end to pierce the cap of the other container, said relatively thin needle having a portion traversing the chamber and a portion projecting into the relatively thick needle in spaced relation thereto, said chamber being provided with a hollow stem formed with a tapered opening and a hypodermic syringe comprising a barrel and a tapered needle received in the tapered opening in said stem, said relatively thick needle extending beyond the portion of the relatively thin needle which projects thereinto.

8. A device for transferring liquid from one vessel to another comprising a chamber formed with a mouth adapted to receive the nozzle of a valveless, hand pump, a tube communicating with said chamber and extending therefrom in one direction, and a second tube communicating with said chamber and extending therefrom in another direction, and having a portion extending through the chamber, and a portion projecting into the first tube in spaced, concentric relation thereto, said first tube having an opening on a portion disposed exteriorly of the chamber, said opening being located between the outer end of

8

the portion of the second tube which projects into the first tube, and said chamber.

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