

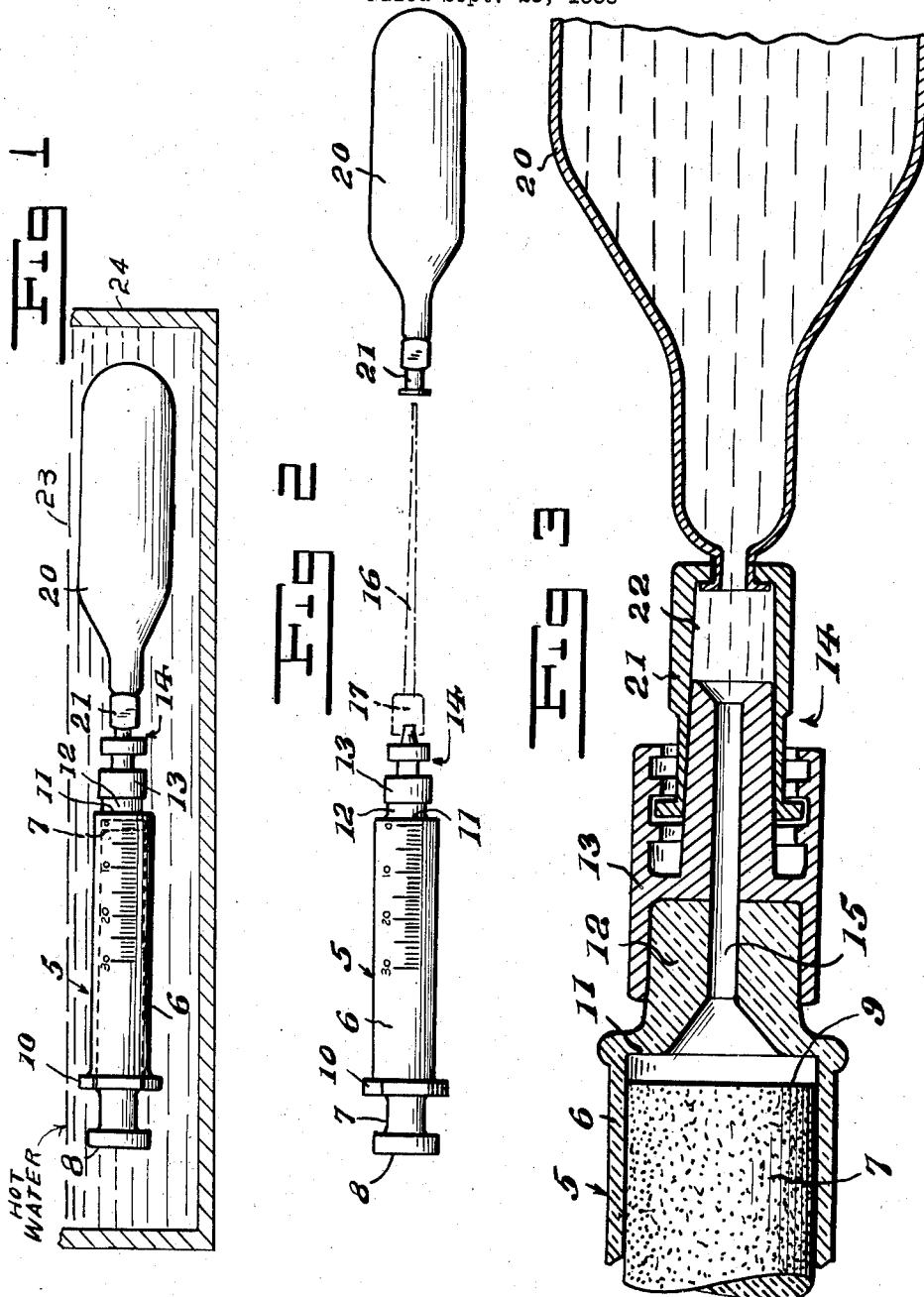
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HYPODERMIC SYRINGE DEFREEZING MEANS AND METHOD

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1

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HYPODERMIC SYRINGE DEFREEZING MEANS AND METHOD

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My invention relates to defreezing means and more particularly to a method and means effective for defreezing or unlocking frozen plungers within barrels of syringes or other similar structures.

After use, glass hypodermic syringes are often left with the plunger disposed entirely or partially within the barrel and with at least a film of the medicinal fluid being retained within the discharge end of the barrel. Frequently, when this condition prevails, the plunger becomes frozen or locked within the barrel thus preventing any movement thereof and its removal for cleaning purposes. In some instances, the plunger can be unlocked or released by the manual application of considerable force or pull. This manner of defreezing or releasing the plunger is highly unsatisfactory because often a nurse or other person will not or is physically incapable of applying sufficient force or pull to effect the release. Furthermore, the exertion of force or pull thus applied often results in a breakage of the barrel and injury to the hands by cutting and sometimes the subsequent introduction into the wounds of some of the residue of the fluid which may be dangerous. In many hospitals, institutions, laboratories and offices, no appreciable attempt is made to defreeze frozen plungers or syringes with the result that the syringes are discarded. In each of many hospitals, it is not unusual for several hundred syringes a year to be discarded or destroyed because of frozen plungers. Obviously, this represents a considerable monetary loss.

My invention overcomes the foregoing difficulties and disadvantages, it being one of the objects thereof to provide defreezing means for attachment to a hypodermic syringe and which is effective for releasing or defreezing the plunger.

Another object of my invention is to provide defreezing means of the foregoing described character which may be readily attached to the discharge end of the barrel of a syringe without modification of said syringe.

A further object of my invention is to provide a method for defreezing the plunger of a syringe by means responsive to temperature variation.

An important object of my invention is to provide defreezing means of the foregoing described character which is simple in construction, durable in use, efficient in operation, economical in manufacture, capable of extended and frequent uses over long periods and easily conditioned for reuse.

With the above and other objects in view, as will hereinafter appear, the invention consists in the combination and arrangement of parts hereinafter set forth and illustrated in the accompanying drawings from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

Referring to the drawings wherein like reference characters designate like parts throughout the several views: Figure 1 is a side elevation of a hypodermic syringe having my invention applied thereto.

Figure 2 is a view similar to Figure 1 but showing

2

the components in disassembled relation and the syringe equipped with a needle.

Figure 3 is a detail fragmentary longitudinal section of the components disclosed in Figure 1.

In practicing my invention, as illustrated in the drawing, I provide a hypodermic syringe 5 of ordinary construction comprising a glass barrel 6 in which is reciprocally mounted a ground glass plunger 7 provided with the usual flange or finger-piece 8 at its outer end to ease its use and a flat or plane radial face 9 at its inner end. One end of the barrel 6 is provided with a flange or finger-piece 10 for coaction with the flange 8 to facilitate operation of the plunger 7 in the accepted manner. The opposite or needle-end of the barrel 6 is formed with the usual radial wall 11 provided with an outwardly disposed relatively wide collar or nipple 12 on which is fixed a coupling member 13 constituting a component of a coupling 14. An opening 15 extends through the wall 11, nipple 12 and member 13 whereby medicinal fluid may be introduced into the barrel and discharged therefrom as is the customary practice. As illustrated in broken lines in Figure 2 of the drawing, a hypodermic needle 16 is provided with a coupling member 17 constituting another component of the coupling 14 and which coacts with the member 13 to detachably secure the needle to the barrel to permit injection of the fluid contained in the barrel into the body.

In the operation of syringes of the foregoing described character, medicinal fluid is drawn through the opening 15 into the end of the barrel 6 by pulling the plunger 7 outwardly until a preestablished amount of the fluid is contained within the barrel 6 between the face 9 of the plunger 7 and the wall 11 whereupon, the needle 16 being appropriately inserted within the body, the plunger 7 is moved inwardly and thus discharges or forces the fluid from the barrel and through the opening 15 to thus complete the injection. Upon the injection being completed, the needle is usually removed by disconnecting the member 17 from the member 13. In instances where the plunger 7 is left in its discharged position or partially withdrawn from the barrel 6, it often becomes frozen or locked therein against relative movement as is well known in the art.

In order to effect defreezing, unlocking or release of the plunger 7 relative to the barrel 6, I provide a relatively small flask or container, for instance, a hollow metal cylinder 20, open and provided at one end with a coupling member 21 for interlocking relation with the member 13. The member 21 is identical or similar to the member 17 of the needle and thus constitutes a component of the coupling 14. The member 21 is formed with a relatively small opening 22 communicating with the interior of the cylinder 20 and, when connected with the member 13, the opening 22 coacts with the opening 15 to provide a continuous passage effecting communication between the interior of the barrel 6 and the interior of the cylinder 20. The cylinder contains a wetting agent, for instance, a liquid mixed with soap or other suitable detergent having an appreciable expansive ratio in response to temperature variation.

In use—assuming the plunger 7 is frozen within the barrel 6 and the cylinder 20 connected to the barrel by the coupling 14—the syringe and cylinder are submerged in hot water 23 held in some suitable container 24, as shown in Fig. 1, with the result that the wetting agent expands within the cylinder and is thus forced through the openings 15 and 22 into the barrel against the plunger 7. When the wetting agent is thus forced into the barrel, it penetrates the seal about the plunger and breaks the same thus unlocking, releasing or defreezing the plunger and permitting it to be removed from the barrel. When the plunger is thus released, the cylinder is detached from the barrel and may be readily refilled with the wetting agent by submerging the cylinder in a bath of the wetting agent of a

reduced temperature, the cylinder being disposed in an upright position within the bath and with the opening 22 at the top thereof whereby the wetting agent enters and fills the cylinder through the opening 22.

Without further elaboration, the foregoing will so fully explain the invention that others may, by applying current knowledge, readily adapt the same for use under various conditions of service. Moreover, it is not indispensable that all the features of the invention be used conjointly since they may be employed advantageously in various combinations and subcombinations.

It is obvious that the invention is not confined solely to the use herein disclosed in connection therewith as it may be utilized for any purpose to which it is adaptable. It is therefore to be understood that the invention is not limited to the specific construction as illustrated and described, as the same is only illustrative of the principles involved which are capable of extended application in various forms, and the invention comprehends all construction within the scope of the appended claims.

What I claim is:

1. The method of releasing a frozen and normally reciprocable piston disposed within a cylinder, comprising filling with an expansible liquid wetting agent a portable receptacle adapted to be freely supported in the hands of a human being, coupling said receptacle to said cylinder to effect open communication between said cylinder and said receptacle, and subjecting said receptacle to a sufficiently higher temperature than said liquid to expand the latter to a degree wherein it is introduced into said cylinder at such a rate that it penetrates and breaks the freezing seal between said piston and said cylinder to force release of said piston.

2. The method of releasing a frozen and normally reciprocable plunger disposed within the barrel of a hypodermic syringe, comprising filling with an expansible liquid wetting agent a portable receptacle adapted to be freely supported in the hands of a human being, coupling said receptacle to said barrel to effect open communication between said barrel and said receptacle, and subjecting said receptacle to a sufficiently higher temperature than said liquid to expand the latter to a degree wherein it is introduced into said barrel at such a rate that it penetrates and breaks the freezing seal between said plunger and said barrel to force release of said barrel.

3. The method of releasing a frozen and normally reciprocable plunger disposed within the barrel of a hypodermic syringe, comprising, filling with an expansible liquid wetting agent a portable receptacle adapted to be freely supported in the hands of a human being, coupling said receptacle to said barrel to effect open communication between said barrel and said receptacle, and submerging said receptacle into a fluid having a sufficiently higher temperature than said liquid to expand the latter to a degree wherein it is introduced into said barrel at such a rate that it penetrates and breaks the freezing seal between said plunger and said barrel to force release of said plunger.

4. Means for freeing a frozen plunger in a hypodermic syringe of the type having a barrel equipped with a plunger normally reciprocable within the barrel and a coupling element on one end of the barrel for cooperation with coupling means on one end of a hypodermic needle for detach-

ably connecting the needle to said barrel, comprising a portable flask adapted to be freely supported in the hands of a human being and having walls of a material that readily conducts heat, said flask defining a chamber of a constant predetermined volume for containing an expansible liquid and having a single port communicating with said chamber through which said liquid flows, said walls being fixed relative to each other and structurally integrally connected together to maintain the constancy of said volume against variation for effecting flow of said liquid out of said chamber through said port upon expansion of said liquid by heat when said flask is heated to a pre-established degree, and coupling means on said flask substantially like said coupling means on said needle for cooperation with said coupling element for detachably connecting said flask to the barrel to prevent separation of said barrel and said flask under the influence of pressure alone and to establish communication between said flask and the barrel through said port so as to permit flow of said liquid into said barrel from said chamber to engage and release said frozen plunger upon expansion of said liquid into said barrel when said flask is heated to said degree.

5. In combination with a hypodermic syringe of the type having a frozen and normally reciprocable plunger disposed within a barrel and a coupling element on one end of the barrel for cooperation with coupling means on one end of a hypodermic needle for detachably connecting the needle to said barrel, a portable flask adapted to be freely supported in the hands of a human being and having walls of a material that readily conducts heat, said flask defining a chamber of a constant predetermined volume for containing an expansible liquid and having a single port communicating with said chamber through which said liquid flows, said walls being fixed relative to each other and structurally integrally connected together to maintain the constancy of said volume against variation for effecting flow of said liquid out of said chamber through said port upon expansion of said liquid by heat when said flask is heated to a pre-established degree, and coupling means on said flask substantially like said coupling means on said needle cooperating with said coupling element for detachably connecting said flask to the barrel to prevent separation of said barrel and said flask under the influence of pressure alone and to establish communication between said flask and the barrel through said port so as to permit flow of said liquid into said barrel from said chamber to engage and release said frozen plunger upon expansion of said liquid into said barrel when said flask is heated to said degree.

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