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SYRINGE

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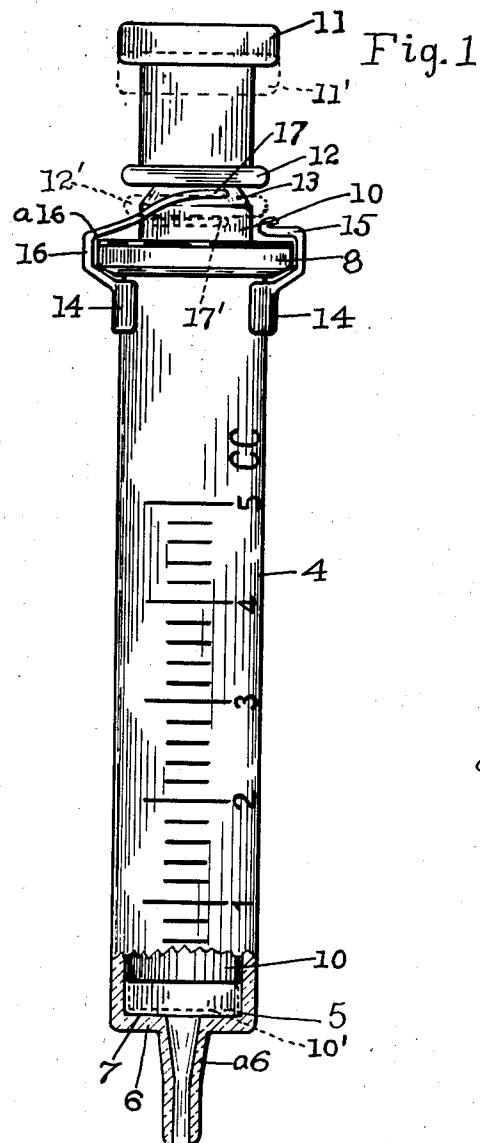


Fig. 1

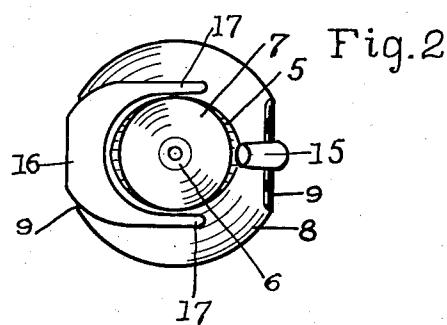


Fig. 2

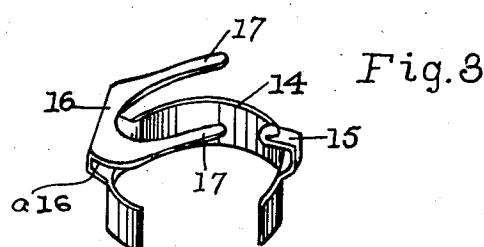


Fig. 3

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## SYRINGE

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1 Claim. (Cl. 128—215)

My invention relates to improvements in syringe springs, and has for an object to provide a metal spring suitable for being disposed between the open end of the syringe cylinder and a boss on the outer end of the syringe plunger to cushion the blows by the inner end of the plunger on the cylinder head during operative use of the syringe.

Syringe cylinders of the character with which this invention is concerned are usually made of glass and the closed or head end thereof is easily broken out by a blow from the plunger which may be caused to bear thereon during use thereof.

Hitherto various devices have been employed to avoid this danger, among which is a rubber band disposed around the outer end of the plunger beneath a boss thereon to bear on the open end of the cylinder and cushion the blow on the head thereof which may be delivered by the inner end of the plunger. This has been found objectionable in that rubber is injured during sterilization in boiling water.

Also, resilient clamping devices have been engaged with the syringe plunger to retard the free movement thereof during its entire travel. These required added power and sometimes encourage an excessive use thereof thus increasing the force of the blows on the cylinder head rather than diminishing the same.

Other objects of my improvement will appear as the description proceeds.

I attain these and other objects of my improvement with the device illustrated in the accompanying sheet of drawings, which form a part of this specification, in which Figure 1 is a side elevation of a glass syringe on which my metal spring is mounted in operative position drawn on a larger scale than ordinarily used, Fig. 2 is a top plan view of Fig. 1 with the syringe plunger removed therefrom, and Fig. 3 is a perspective view of my spring shown alone.

Similar characters refer to similar parts throughout. Certain parts are broken away to show other parts hidden thereby.

With more particular reference to the designated parts: A glass cylinder 4 has a bore 5 and a closed end or head 6. An outlet through the head is provided by nozzle 6a. The inner end of the cylinder bore is, preferably, flat and at right angles with the bore as shown at 7. On the open end of the cylinder is provided flange 8 which has diametrically opposite flats 9, 9.

Plunger 10 is usually of glass and is mounted in cylinder 4 for reciprocation to which it is fitted

throughout its entire length. The outer end of the plunger is provided with flange 11 and when the plunger fully occupies the cylinder its outer end protrudes from the same for a hand hold. Said outer end of the plunger also is provided with boss 12 disposed adjacent cylinder flange 8 when the inner end of the plunger is adjacent cylinder head 6. Adjacent the inner side of boss 12 is groove 13 in the plunger.

The syringe as thus described is suitable for operative use; but in practice, when not otherwise protected, not infrequently the cylinder head 6 is broken from its body 4 by a blow from plunger 10 delivered when ejecting liquid from the syringe during operative use thereof. This destructive blow occurs immediately following the passing of the last portion of liquid from the cylinder into nozzle 6a.

My invention is designed to cushion this blow and thus save the cylinder from destruction.

My spring, which is used to cushion said blow, consists of spring clip 14 adapted for firmly clasping the cylinder to mount my cushioning spring thereon. This clip is operatively disposed on the cylinder adjacent flange 8 and is sufficiently resilient to be easily removed and replaced in operative position. Fastened to clip 14, preferably integral therewith, is spring shank 16 shaped for passing over flange 8 at one of the flats 9 thereof, and disposed adjacent the outer edge of flange 8 at 16a of the shank.

Shank 16 is bifurcated by a relatively large notch providing tongues 17, 17 which are shaped for disposal on opposite sides of plunger 10 adjacent thereto without contacting therewith. When the several parts of the device are in the operative position shown in solid lines in Fig. 1 annular boss 12 on the plunger bears on spring tongues 17, 17 which react between the cylinder and said boss to retain the plunger in its position of proximity to the bottom 7 of the cylinder. When pressure is applied, as by hand, to the outer end of the plunger to move the same farther into the cylinder, as to its dotted-line position at 10', 11', 12', spring 16, 17, 17 may yield allowing said movement of the plunger to occur and move tongues 17 toward the cylinder to occupy positions shown for one of them at 17' in Fig. 1. With sufficient pressure applied to plunger flange 11 the inner end of the plunger may be caused to bear on the bottom or head 7 of the cylinder, and when said pressure is released spring 16, 17, 17 will react and move the plunger to its relative position shown in solid lines in Fig. 1.

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The outer end of lug 15 is preferably disposed adjacent the outer side of flange 8 of the cylinder but it may never contact with boss 12 of the plunger. This lug is shaped to closely fit flange 8 at one of flats 9 thereof and serves to localize clip 14 on the cylinder and also provide a finger hold useful when the spring assembly is being removed from or placed in its operative position.

In operation: The plunger is withdrawn to the 10 position in the cylinder which admits therein the desired quantity of liquid and then is pushed into the cylinder, in the usual way, to expel the liquid through nozzle 6a and into and through the hypodermic needle, usually attached thereto but not 15 shown. The syringe will operate in all ways the same as though my spring were not mounted thereon till, in its approach to the cylinder, plunger boss 12 bears on spring tongues 17 when resilient opposition is offered thereby warning the operator 20 of the syringe that the charge of liquid therein is nearly expelled and further progress of the plunger will continue with caution till the head of the cylinder is reached by the plunger with a pressure which the same is well able to withstand 25 without injury thereto.

If preferred, one of spring tongues 17 will serve very well and the other may be omitted. Also, in place of the flat spring illustrated, a spring wire can be shaped to serve the purpose of the 30 syringe spring.

Since my syringe spring is entirely made of metal, it may remain in place on the syringe while the same is being sterilized by boiling water without injury to the spring. Also, its removal and

replacement are so easily attained that the syringe may be freed from it whenever desired.

Having thus disclosed my invention, what I claim as new therein and desire to secure by Letters Patent is,—

A syringe comprising a barrel having a nozzle end and a plunger end, a ledge projecting outwardly from the plunger end, a plunger having an annular boss at the outer portion thereof and means for supporting and maintaining the inner 10 end of the plunger out of contact with the nozzle end of the barrel in the normal lower most position of the plunger in the barrel when the barrel is empty, said means comprising a clip of resilient material having a barrel embracing portion 15 seated beneath the ledge, an integral resilient extension engaging the upper portion of the ledge and comprising a resilient finger extending upwardly from the ledge and having a terminal cam face, the length of the plunger from its fluid- 20 ejecting end to the under side of the boss being less than that of the inner extent of the barrel plus the height of the terminal cam face of the finger above the upper edge of the ledge whereby 25 a surface of said cam face will be engaged by the boss on the plunger at the moment when the plunger is in a position close to but still out of contact with the inner face of the nozzle end of the barrel, said boss thereupon, on application of further pressure applied to the plunger, flexing 30 the finger and thereby enabling the plunger to be moved to a position where it makes contact with the inner face of the nozzle-end of the barrel.

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