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SYRINGE.

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This invention relates to improvements in syringes, and particularly to a type of novel syringes having elastic nozzles sufficiently firm for insertion, and reinforced by a padding which is more elastic than genuine soft-rubber; and an object of this invention is to provide elements and arrangements of parts by which an elastic nozzle is developed into a spreading device for a cavity of the human body, and is flexible to a degree which excludes pain or inconvenience to the user.

Another object of this invention is to have means for a painless and actual closing of a cavity entrance internally.

A third object in view is a simple construction to lessen the efforts required to transform the nozzle to a spreading device, and to prolong an expansion without manual activity.

A further object of this invention is to provide a soft closure for the mouth of the womb.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention consists of the combination and arrangements of elements and parts, as described hereinafter with reference to the accompanying drawing in which—

Fig. 1 represents a syringe in longitudinal section, showing a padded elastic nozzle and an injection bulb thereon which is partly broken away. Fig. 2 illustrates a perspective view of a syringe comprising a nozzle and a compressible filler container therefor. Fig. 3 is an enlarged detail in longitudinal section of the syringe shown in Fig. 2, being taken on line *a* of Fig. 2. Fig. 4 is a partial elevation, and a partial longitudinal section being divided by (center) line *b* showing a syringe with an injection bulb thereon partly broken away.

Referring particularly to Fig. 1, there is shown a syringe having an injection bulb 1, shown partly broken away, and a fragmentary section thereof is designated by 2. United to bulb 1 there is a cylindrical tube 3, which I call a nozzle-stem, and a smooth continuation thereof is nozzle 4, which terminates in rounded tip 6. A narrower tube 7 passes lengthwise through said nozzle and stem, having an outwardly flaring end 5 tightly connected to stem 3, and its opposite end is united with tip 6; thereby is formed, between said outer tube 3, 4 and inner tube

7 a water-tight space filled permanently with fluid filler 8 through a temporary small hole closed by internal stopper 9. All the hereinbefore described parts are made preferably of soft-rubber, or of an equivalent elastic material. When injection bulb 1 is filled by the user by suction, or when discharged by compression, then both these will known operations are performed through passage 10 and outlet 11. Said filler 8 serves as an elastic padding for the nozzle and stem, and consists, in this instance, of a liquid fluid (as pure water, for example); as an alternative modification, a compressed gaseous element is employed as an elastic padding filler; the fillers are introduced into stem and nozzle as cold as possible, and before the syringe is used it is preferably placed for a few minutes in a warm water bath to heat up the nozzle to the temperature of the human body that it shall not be disagreeable to the user; this heating expands said cold filler and increases the elastic rigidity of the nozzle and its stem. When the filler consists of pure water the temperature at the introduction is preferably 1° C., and if the filler is composed of glycerin of a specific gravity of about 1.12, for example, then the filling temperature could be, as known, as low as -21° C.; a low filling temperature being desirable which varies according to the properties of the filler; fluids which have too low boiling points should not be used as a filler in order to avoid an excess of expansion in the nozzle; another requirement regarding the practicability of a fluid as a padding in this nozzle is that it must have a consistency of greater density than air in its atmospheric state; and should not be detrimental to the syringe, or to a human body. The syringe shown in Fig. 1 can be adapted, with suitably changed dimensions, as a nose or ear syringe, or, as a nozzle, mounted on the barrel of a piston-syringe, for example. Fig. 2 illustrates in a perspective view a syringe comprising a wedge-shaped compressible filler container 15 containing a fluid filler to be described hereinafter, a tubular elastic stem 17 and a similar nozzle 18 which has a rounded end 20 and a plurality of orifices 21 therein; in end-wall 28 of said container there is a threaded small flange 14 around an opening adapted for filling and normally to be kept closed by threaded stopper 29. End-wall 28 and top cover 36

are made of an elastic material, and side covers 37 and 38 of a stiff material but connected lengthwise by flexible strip 39; in said end-wall 28 there is also a threaded small flange 27 holding tightly a threaded end of tube 26 which is partly broken away and serves as a connection to a suitable source of an injection. In order to facilitate the compression of filler container 15 the user of the syringe may draw together the upper edges of stiff covers 37 and 38, on one of which there is mounted a small button 40 and on the other a hinged eye 41 to form a clasping closure when near to each other during said compression, and when button 40 is in hinged eye 41 they are kept in this locked position by the compressed fluid filler which exerts an internal pressure within the sides of the container, forcing them apart until released by opening said closure. The utility of the compression of container 15 will be described hereinafter.

Fig. 3 is an enlarged detail of a syringe in longitudinal section taken on line *a* in Fig. 2, similar numeral characters denoting corresponding parts. In Fig. 3, filler container 15 is shown united with the flaring end 16 of tubular elastic stem 17 having an inwardly tapering wall-thickness 43 gradually decreasing in thickness up to a line designated by 47, and then continued as tubular nozzle 18 which shows a thinner but even wall-thickness 44. A further extension thereof is chamber 19 and the half-round nozzle-end 20. In the exterior wall of chamber 19 is a plurality of orifices as 21, and at the center of its bottom there is a round opening 22 to which is connected tightly the narrow flexible tube 23 forming injection passage 24 and extending lengthwise through nozzle, stem and container it is fastened therein to tube union 25 which connects it to the threaded end of tube 26 which protrudes out of the container wall through threaded flange 27, which (shown partly broken away) serves as a connection to a suitable source of an injection, preferably to one which supplies an injection fluid by gravity pressure through said short tube 26 and passage 24 into distributing chamber 19 to be discharged through the plurality of orifices 21. Said container, stem, nozzle and its end contain a fluid padding filler 30, 31, 32 and 33 which will be described hereinafter. Chamber 19 is spaced from the end of the nozzle, and as a communication between the nozzle and its end, there are four small tube conduits passing through and strengthening the chamber, of which 34 is shown in section and 35 is indicated with dotted lines, and filler portion 33 reaches the nozzle-end through said conduits. Imbedded in the structure of passage tube 23 is a spirally spread out thin wire coil 48. When, after an insertion of

the nozzle, pressure is exerted on filler container 15, as described in connection with Fig. 2, the fluid filler portion 30 will be forced into stem 17 and nozzle 18, its thin wall 44 distends to a pear-shape as indicated with dotted outline 45; this expansion of the nozzle serves as a spreading device to open the natural folds of a cavity membrane, in a tender manner, for cleansing or medicating purposes. Nozzle-end 20, if made thin-walled as shown, will be distended as indicated with dotted outline 46, and can be used as a soft closure of the womb, when circumstances demand that an injection there should be prevented. A further advantage of this expansion nozzle is that it can be used as a delicate internal closure for the entrance of the vagina, when the discharge of a back-flow is to be delayed to lengthen the action of a medical injection, or for sanitary technicalities; this actual closing of a cavity entrance from inside, is accomplished, after insertion, with an internally developed soft plug as indicated by outline 45, which is partially effected by the tapering wall 43 of stem 17.

Fig. 4 represents a simplified syringe of which A is the half part of an elevation shown diagrammatically, and B designates a partial longitudinal section divided by (center) line *b*, in which a tubular elastic nozzle 50 has an extension as stem 51, a continuation thereof is a compressible ball as filler container 52 which is connected by its solid neck 53 to a larger injection bulb 54, shown partly broken away. In the shown upper part of injection bulb 54 opens one end of a narrow flexible tube 64 and passing through the center of neck 53, its opposite end terminates in nozzle-tip 55 and united thereto it forms outlet 57 of passage 58, for the liquid contents of injection bulb 54. Said tip, nozzle, stem and filler container, as a whole, form an air-tight vessel which is filled with an elastic fluid filler 61, to be described hereinafter, through a temporary small hole closed by internal stopper 63. Nozzle 50 is shown as made of a thinner wall 59 than the inwardly projecting thickness of stem wall 60, in order to feature said nozzle wall as having a greater elasticity than the stem wall. Thus it will be comprehensible at a glance that, after insertion of the nozzle, if pressure is exerted on filler container 52, and its portion of filler 61 is forced to flow into stem and nozzle, it distends the more elastic nozzle to a bulb shape as indicated with dotted outline 62, for the purpose to be used as painless spreading device for cleansing or medicating a vaginal or rectal cavity; and, if made in reduced proportions to suit particular purposes, it can be used as an expansion syringe for ear or nose cavities.

The hereinbefore named elastic fluid fill-

ers which constitute the paddings shown in Fig. 3 as 30, 31, 32 and 33, and in Fig. 4 as 61, consist in these instances, of a suitable liquid fluid, which is to be filled in at a temperature as low as the character of a suitable liquid will allow, for the plausible purpose to gain a slight expansion of the filler, and to obtain thereby an increased rigidity of the nozzle and stem when immersed in hot water for a few minutes to heat it up to the temperature of the human body. Similar results can be obtained with a readily melting gelatinous substance used as padding filler. As an alternative modification of said padding filler, a suitable gaseous fluid is employed therefor in a compressed and cooled state. Practically any fluid may conveniently serve as a filler if it has not a too low boiling point, and is harmless to the human body and to the material of the syringe.

While the accompanying drawing illustrates the preferred embodiment of this invention it is understood that this invention is not limited thereto, as various changes can be made in the elements, construction, arrangements and proportion of parts within the scope of this invention as defined in the claims. Referring to the syringe shown in in Fig. 3, for example, the injection passage can be made of a hard-rubber tube because it is surrounded by an elastic padding. Instead of the presently shown close relation between a nozzle-stem and filler container, they can be connected by an extended flexible tube conduit, and the container compressed by stepping on it. A nozzle expansion can be stabilized to different volumes if hinge 41 in Fig. 2 will be provided with several holes instead of a single eye. The cross section of the nozzles could be elliptical or angular, instead of being circular. The two stiff covers facilitating pressure on a filler container would be round or oval in case the container consists of a ball or bulb.

The hereinbefore specified elastic and stiff parts of this invention are made preferably of soft-rubber, and of hard-rubber respectively, but they can be produced of one of their substitutes, or of equivalent materials.

I claim:

1. A syringe comprising an elastic nozzle, a permanent reinforcement consisting of a fluid introduced into the nozzle, a flexible injection passage surrounded by said permanent reinforcement, and means engaged thereto to supply and discharge an injection.

2. A syringe of the class described, comprising an elastic tubular nozzle having a continuous stem, a permanent padding filler consisting of a fluid introduced in a cooled state into the nozzle and stem, an injection passage surrounded by the permanent filler in the nozzle, means for supplying internally a fluid pressure to said filler, and

means for controlling the fluid pressure supplied to the filler.

3. A syringe comprising an expansible, elastic, tubular nozzle having a continuous flexible tubular stem, a reinforcement consisting of a cooled fluid introduced in said nozzle and stem, a compressible container united with the stem, a cooled fluid in the container transmitting a fluid pressure to the nozzle for distension, a flexible passage tube centrally passing therethrough adapted to distribute an injection, and means to supply an injection.

4. The combination in a spreading device for a syringe of an expansible, tubular nozzle having a flexible stem, of varying wall-thickness, a compressible container connected therewith, a fluid filler filling the container stem and nozzle, said filler serving to expand the nozzle when pressure is exerted on the container, a tube centrally located in the nozzle and stem adapted to convey an injection, a compressible bulb connected with the tube as means to supply and discharge an injection.

5. The combination in a spreading and closing device for a syringe of an expansible, elastic, tubular nozzle having a flexible tubular stem at one end and a perforated hollow chamber at the opposite end adapted to distribute an injection, a compressible container connected with said stem, a fluid filler filling the container stem and nozzle, said filler serving to expand the nozzle when pressure is exerted on the container thereby forming a closure for the vagina, a tube centrally located in the nozzle and stem and terminating in said distributing chamber, and means connected to said tube to supply and discharge an injection.

6. A syringe comprising an expansible elastic cylindrical nozzle having a flexible stem and an end adapted for distribution of an injection, a compressible container in a spaced relation connected to said stem, a permanent filler introduced in the container, stem, and nozzle, said filler serving to expand the nozzle when pressure is exerted on the container thereby forming an elastic spreading device for a vaginal cavity, a flexible tube centrally located in the nozzle and stem and terminating in said distributing chamber, reinforcing for said tube consisting of a spirally spread wire coil imbedded in the wall of the tube, and means connected to said tube to supply and discharge an injection.

7. The combination in a spreading and closing device for a syringe of an expansible, elastic, tubular nozzle having an elastic tubular stem with a wall of tapering thickness, a compressible container connected therewith, a fluid filler filling the container stem and nozzle, said filler serving to expand the nozzle when pressure is exerted on the con-

tainer thereby forming a pear-shaped closure for the vagina due to the elongation of the wall of the nozzle and said tapering wall of the stem, a pair of rigid covers on the container for applying pressure to the fluid therein, a fastening for the covers by which said closure is held in its expanded condition, a tube centrally located in the nozzle and stem adapted to convey an injection, and means engaged thereto to supply and discharge an injection.

8. A syringe comprising an expansible, elastic, cylindrical nozzle having an expansible end, a perforated hollow chamber in the nozzle adapted to distribute an injection, small tube conduits in the chamber as a reinforcement thereof, an elastic cylindrical nozzle-stem with a wall of tapering thickness, a compressible wedge shaped container connected therewith, a permanent fluid filler filling the container stem nozzle and nozzle-

end, said filler serving to expand the nozzle and nozzle-end when pressure is exerted on the container thereby forming an elastic closure for the womb by the expansion of said nozzle-end and a pear shaped spreading and closing device for the vagina due to the elongation of the expanded wall of the nozzle and said tapering wall of the stem, a pair of rigid covers on the container for applying pressure to the fluid therein, a fastening for the covers by which said closure is held in its expanded condition, a tube centrally located in the nozzle and stem terminating in said distributing chamber and adapted to convey an injection, and means connected thereto to supply and discharge an injection.

Signed at the borough of Manhattan, city, county, and State of New York, this eighth day of October, 1921.

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