VAGINAL MEDICAMENT APPLICATORS
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This invention relates to medication applicators and has as its general object to provide an improved vaginal medicament applicator more effective in distributing a medicament directly to the opening of the cervix and into all recesses of the vaginal cavity regardless of variations in position of the cervix and in internal contours and dimensions therein.

The invention contemplates an applicator having a plurality of flexible nozzles adapted to be extended in spread relation after insertion into the cavity, in a manner to reach the cervix opening regardless of variations in the position of the cervix and to reach into the most remote recesses for applying medicament to all surface areas. More specifically, the invention aims to provide a plurality of nozzles adapted to flex and yield upon contact with a rear wall of the cavity so that other nozzles may extend on into more remote recesses. Thus provision is made for conforming the array of nozzles to varying shapes and dimensions in the internal wall contours.

Other objects will become apparent in the ensuing specifications and appended drawing in which:

Fig. 1 is a side view of an applicator embodying the invention, fully collapsed; Fig. 2 is an end view of the same; Fig. 3 is a side view of the same, partially in section, fully extended; Fig. 4 is an axial sectional view of the applicator, partially extended.

Referring now to the drawing in detail, I have shown, as an example of one form in which the invention may be embodied, an applicator including a shell 10 of cylindrical form having a rounded tip 11 which may be approximately spherical or oval in shape, for facilitating insertion of the applicator. At its rear end 14 it is provided with a flange 12 which may be detachably secured thereto as by means of a collar 13. Collar 13 may be attached in any suitable manner, as by cementing, or by means of the threads illustrated. Tip 10 is provided with five nozzle guide ports including a central port 14 disposed on the major longitudinal axis of the applicator, and four lateral ports 15 equidistantly spaced circumferentially about port 14. The number of ports 15 may be varied within a range of, for example, three and six, without departing from the scope of the invention. Ports 15 are disposed in conically flaring array, diverging forwardly as shown.

Slidably mounted within shell 10 is a nozzle unit including a barrel 16 fitted snugly within collar 13 with just sufficient clearance to be freely slidable therein. At its inner end barrel 16 has a head 17 of resilient material such as soft rubber in which are anchored the rear ends of five nozzle tubes including a central tube 18 and four lateral tubes 19. Tube 18 is slidably received in central port 14 and tubes 19 are slidably received in ports 15, being thereby flexed to forwardly spreading relationship corresponding to that of ports 15. Nozzle tubes 19 are of medium flexibility, such as to readily yield when pushed into contact with a cavity wall, but are not limp, being adapted to remain self supporting as projected from the tip of shell 10, even when filled with medicament. A moderately plasticized thermoplastic resin (e. g. vinyl resin) may be satisfactorily utilized. The rear ends of the nozzle tubes may be secured in barrel head 17 in any suitable manner, as by cementing them in place with a suitable adhesive for such resins, especially satisfactory results being obtained where the barrel 16 is made of a similar plastic resin. In such case, the barrel 16 is relatively unplasticized, being relatively rigid.

At its rear end barrel 16 is formed with handle means 20 which may be in the form of diametrically opposed finger grips, as in a surgical hypodermic syringe, or may be in the form of a flange, as shown. Also at the rear end of the barrel is a retainer flange projecting inwardly and defining a cylindrical bearing wall 21 and a retainer shoulder 22. At its forward end, barrel 16 is provided with a retainer collar 23 which, for the purpose of assembly (as in the case of collar 13) is fabricated as a separate unit and secured in encircling relation to barrel 16, as by cementing or by means of threads.

In assembling the applicator, barrel 16 is inserted through collar 13 and retainer collar 23 is attached thereto prior to insertion into casing 10. Slidably mounted in barrel 16 is a piston 24 which has a cylindrical body wall fitted to bearing wall 21. At its forward end, piston 24 is provided with a head 25 the periphery of which is fitted to the internal wall of barrel 16. Head 25 may be in the form of a flat ring, as shown, fitted over a neck 26 at the forward end of piston 24 and suitably secured thereto, as by cementing, after piston 24 has been assembled within barrel 16. A filling duct 27 extends through piston 24, full length along its major axis, and is normally closed at its rear end by a stopper 28, which is preferably threaded into the piston 24 so as to be securely anchored thereto when fluid pressure is developed in duct 27 as hereinafter set forth. A flange 29 on the rear end of the piston engages the rear end of barrel 16 to determine a forward limit of projection of piston 24 into barrel 16. Engagement of the projecting periphery of head 25 against shoulder 22 determines a rearward limit of withdrawal of piston 24 from barrel 16, and prevents the parts of the applicator from being pulled apart.

In operation, the applicator is filled with a medicament by removing stopper 28, withdrawing piston 24 to its rearward limit position shown in Fig. 3, and injecting medicament through duct 27 into the chamber which is defined within barrel 16 by the withdrawal of the piston. With barrel 16 withdrawn from casing 10, so that nozzles 18, 19 are retracted, as shown in Fig. 5, the casing 10 is inserted into the vaginal cavity. The barrel 16 is then projected into casing 10, to the position shown in Fig. 4, thus projecting the nozzles 18, 19 and spreading them as shown, into the remote recesses of the cavity. The spreading of the nozzles is facilitated by the resiliency of mounting head 17, which will yield to allow a limited amount of pivotal movements of the anchored ends of tubes 18, 19 in head 17. The piston 24 is then projected into barrel 16, expelling the medicament backward through nozzles 18, 19 to the vaginal areas to be treated. The applicator will then be in the fully collapsed position shown in Fig. 1.

The invention contemplates as an alternative to the moderate flexibility of tubes 18, 19, referred to above, the possibility of using tubes that are rigid, depending upon the flexibility of head 17 for their yielding action. I claim:

1. In a medicament applicator, a casing having at its forward end a tip provided with a plurality of bearing
3. ports the axes of which are outwardly flared; a barrel slidably mounted in said casing, projecting from the rear end thereof and having a head at its forward end; a plurality of flexible nozzle tubes the rear ends of which are anchored in said barrel head, said nozzle tubes being slidably received in said casing ports for projection from the casing in spreading relation when the barrel is projected into the casing, said barrel providing a medication-containing chamber communicating with said nozzle tubes; and a piston slidably mounted in said barrel, projecting from the rear end thereof, and operable to eject medicament from the barrel and through said nozzle tubes when projected into the barrel.

2. An applicator as defined in claim 1, wherein said piston is provided with an axial filling passage through which medicament may be injected into said chamber to fill the same; and means to normally close the outer end of said passage.

3. In a medicament applicator, a casing having at its forward end a tip provided with a plurality of bearing ports the axes of which are outwardly flaring; a barrel slidably mounted in said casing, projecting from the rear end thereof and having a head at its forward end; a plurality of flexible nozzle tubes the rear ends of which are anchored in said barrel head, said nozzle tubes being slidably received in said casing ports, said barrel being operable between a rearward limit position withdrawn from the casing wherein said nozzle tubes are retracted into the casing with their forward ends received within said ports and a forward limit position telescoped into the casing, wherein said nozzle tubes are projected from the casing in spread relation, said barrel providing a medicament-container chamber communicating with the rear ends of said nozzle tubes; and means operable to eject medicament from said barrel through said tubes.

4. In a medicament applicator, a cylindrical casing having at its forward end a rounded tip provided with a plurality of bearing ports the axes of which are outwardly flaring and having handle means at its rear end; a cylindrical barrel slidably mounted in said casing, having at its forward end a head provided with a plurality of apertures and having an open rear end provided with handle means; a plurality of flexible nozzle tubes the rear ends of which are anchored in said barrel head apertures, said nozzle tubes being slidably received in said bearing ports, said barrel and casing having coacting stop means for establishing forward and rearward limits of sliding movement of said barrel in said casing, said barrel being operable in such sliding movement to withdraw said nozzle tubes into said casing with the forward ends of the tubes received in said bearing ports at the rearward limit, and to project said tubes from the casing in spreading relation at the forward limit; and a piston slidably mounted in said barrel, projecting from the rear end thereof, and operable to eject medicament from the barrel and through said nozzle tubes when projected into the barrel.

5. In a medicament applicator, a cylindrical casing having at its forward end a rounded tip provided with a plurality of bearing ports and having an open rear end provided with handle means; a cylindrical barrel slidably mounted in said casing, having at its forward end a head of yieldable elastic material; a plurality of flexible nozzle tubes the rear ends of which are anchored in said head for limited pivotal movement accommodated by the yielding of said head, said nozzle tubes being slidably received in said bearing ports; said barrel and casing having coacting stop means for establishing forward and rearward limits of sliding movement of said barrel in said casing, said barrel being operable in such sliding movement to withdraw said nozzle tubes into said casing with the forward ends of the tubes received in said bearing ports at the rearward limit, and to project said tubes from the casing in spreading relation at the forward limit; and a piston slidably mounted in said barrel, projecting from the rear end thereof, and operable to eject medicament from the barrel and through said nozzle tubes when projected into the barrel.

6. In a medicament applicator, a casing having at its forward end a tip provided with a plurality of bearing ports and having an open rear end; a barrel slidably mounted in said casing, projecting from said open end and having at its forward end a head provided with a plurality of apertures; a plurality of flexible nozzle tubes having rear ends anchored to said head and communicating with said apertures, said barrel being operable, upon sliding the same between forward and rearward limit positions, to withdraw said nozzle tubes into the casing, with the forward ends of the tubes received in said bearing ports in the rearward limit position, and to project said nozzle tubes from the casing in the forward limit position, said nozzle tubes being adapted to assume outwardly spreading relation to one another in said projected positions; and means operable to eject medicament from said barrel through said tubes.

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