April 19, 1932. C. E. ZIEGLER 1,854,726

ATOMIZER

Filed Jan. 16, 1931

Fig. 1.

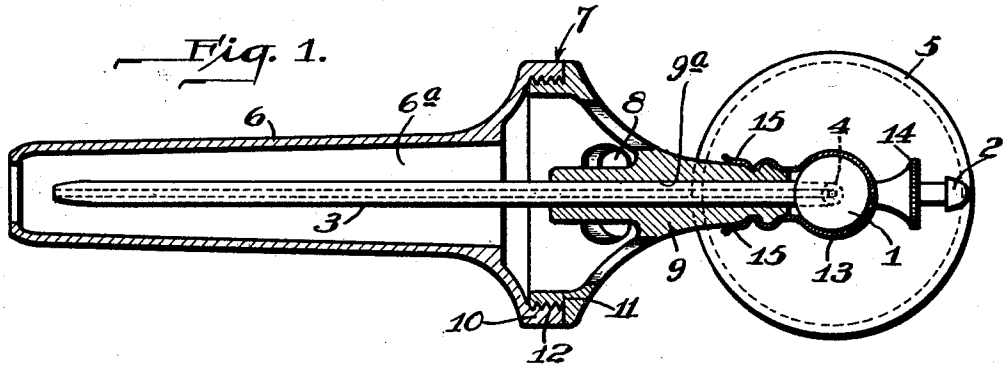


Fig. 2.

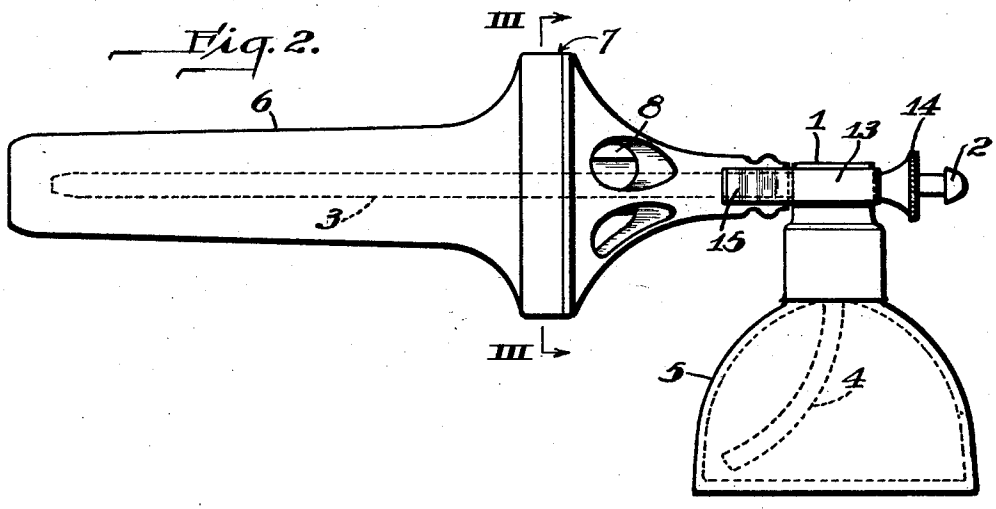
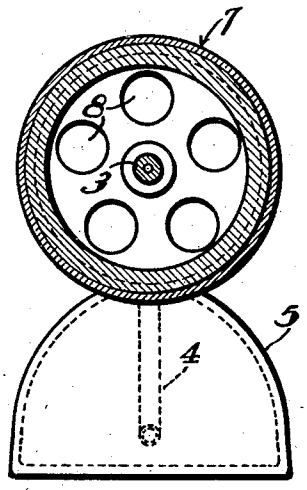


Fig. 3.



WITNESSES

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Patented Apr. 19, 1932 1,854,726

UNITED STATES PATENT OFFICE

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ATOMIZER

Application filed January 16, 1931. Serial No. 509,184.

This invention relates to devices for spraying bodily cavities with liquid medicaments, and especially to atomizers for use in sterilizing or otherwise treating the vagina.

It is now generally understood that the vagina usually contains pathogenic bacteria which may find their way into open wounds and abraded surfaces of the genital canal during and following childbirth. The infections arising in this manner are frequently followed by invalidism or death. Such infections frequently follow in operative cases where the hand of the operator or his instruments are passed through the infected vagina into the uterus.

In order to reduce mortality due to childbirth a liquid germicide, such as mercurochrome, has been instilled into the vagina during labor, to destroy the micro-organisms referred to. This practice has afforded striking results, in that it has reduced the percentage of infection following childbirth, with consequent reduction in mortality. This practice, however, is subject to a number of disadvantages which adversely affect its efficacy. For example, there is no assurance that the mere instilling of a liquid into a bodily cavity, such as the vagina, will cause the germicide to reach all portions of the tissues therein. Evidently, if all of the tissue surface is not reached there is still chance for infection. This practice also requires the use of a relatively large amount of liquid, the excess of which must be removed by retracting the opening of such cavity and absorbing the excess, as by mopping with sponges or cotton. Such procedure requires time, additional operating steps, and is wasteful of the antiseptics used.

Prior to my invention it was not possible to use atomizing devices for this purpose, because the vagina and similar cavities have but a single opening to the atmosphere, and the back pressure quickly built up to a point where spraying ceased.

The chief objects of this invention are to provide a spraying device for applying liquid medicaments to bodily cavities, which is efficient, simple, sturdy, easily sterilized and used, effectively covers all parts of all of the tissues within such cavities, may be used either by physicians and surgeons or by unskilled operators, and whose use requires a minimum amount of liquid.

A further object is to provide a cap for use with atomizers in spraying a bodily cavity, such as the vagina, which is applicable to standard atomizing heads now in use to afford the aforementioned advantages.

The invention may be described in connection with the accompanying drawings in which Fig. 1 is a horizontal section through the preferred embodiment; Fig. 2 a side elevation of the device shown in Fig. 1; and Fig. 3 a vertical section through the device taken on line III—III of Fig. 2.

The apparatus provided by this invention comprises an atomizer tip of conventional form in combination with a tip-enclosing cap member adapted to be inserted into a cavity to be treated, and provided with means to relieve back pressure created in spraying. In the preferred embodiment the cap forms an annular space around the tip through which pressure is relieved through openings disposed at the rear of the cap. Preferably also the cap projects somewhat beyond the extended end of the tip, and is maintained in co-axial alignment therewith.

The invention may be embodied in various ways, but I now prefer to use the construction represented in the accompanying drawings. As here shown, the device comprises a conventional atomizer head 1 having a connection 2 to a source of air or other gas under pressure, an elongate tubular atomizer tip 3, and a branch tube 4 which feeds liquid to tip 3 from a container 5 to which the head is applied. These structures are well known in the art and require no further detailed description or illustration.

The cap shown comprises a forward substantially cylindrical tubular body portion 6 which surrounds and is spaced from tip 3 to form an annular space 6*a*. This portion is joined to an intermediate hollow portion 7 of substantially larger diameter, having in its rear wall one or more perforations 8. These perforations provide for relief to the atmosphere through annular space 6*a* of

pressure in a cavity into which the device has been inserted for spraying. The rear or base portion of the cap includes a sleeve member 9 joined to intermediate portion 7. The bore 9*a* of this sleeve is adapted to make a snug sliding fit with a substantial length of tip 3, as best shown in Fig. 1. The longitudinal axis of this sleeve corresponds with that of the body portion, so that the cap is held co-axially of tip 3.

In order to simplify the manufacture and handling of this cap, it is preferred to form it in two parts as shown in the drawing. The forward part most suitably includes body portion 6, and the rear or base portion comprises sleeve 9. The rear end of portion 6, and the forward end of sleeve 9 are provided with flanges 10 and 11, respectively, having screw threads 12 for connecting the two parts. When the front and rear sections are connected, these flanges then form intermediate portion 7.

As shown in Fig. 1, the cap is applied to an atomizer head by inserting tip 3 in sleeve 9 and sliding the cap to the rear of the tip. The device is then ready for use. The extended engagement of the tip by sleeve 9 eliminates all tendency toward wobbling or looseness of the cap. The cap may be, and preferably is, held in position by means of U-shaped spring clip 13 disposed about head 1 and held in position by a nut 14. The arms 15 of the clip are provided with grooved portions for engagement in complementary grooves and projections formed in sleeve 9, as seen in Fig. 1. This type of spring connection satisfactorily holds the cap in place in use, and provides for ready assembly or disassembly of the structure without the use of tools.

In order to prevent damage to the tissues by tip 3, body member 6 preferably extends somewhat beyond its forward end. The front end of the cap is rounded and reduced in section somewhat, so as to permit it to be passed readily through the opening of the cavity to be treated. The cap may be formed of any suitable rigid material, it is now preferred to use molded plastics, such as the phenol-formaldehyde resins. These materials may be molded readily to any desired shape, they are light, strong, rigid, resistant to the action of chemicals, and the processes of sterilzation, including boiling, do not injure them.

The use of the device may be described in connection with the treatment of the vagina, for example to destroy pathogenic bacteria during childbirth, or for medication in other instances. The liquids used in all such cases are designated generically herein as "liquid medicaments." The benefits to be derived through the use of the device provided by this invention may be understood through its application during childbirth, to which it is particularly adapted.

A solution of a suitable medicament, such as mercurochrome, metaphen, or pyridium or mollophene, is placed in container 5, which is connected to a source of air pressure, for example an atomizer bulb, or compressed air. After labor has begun, but before delivery has started, spraying is commenced, the spray being directed over the external regions contiguous to the vagina. When these parts have been covered, the cap is inserted into the vagina and spraying is continued while moving the cap repeatedly in an inward and outward direction.

When the cap is in the vagina the air which separates from the atomized liquid escapes freely to the atmosphere through annular space 6*a* and openings 8. Thus there is no building up of back pressure in the vagina, so that this disadvantage which characterized prior devices and prevented their use for this purpose, is overcome. Also, the action of the cap is to cause the atomized liquid to reach and cover every portion of the tissues in the vagina, so that all portions are treated. When the container has become empty through spraying the vagina, the cap is withdrawn and moved over the previously sprayed exterior regions, while continuing the air pressure. This rapidly dries the antiseptic on the exterior regions.

For use in treating the female genital organs it is preferred to make the tubular body portion of relatively large diameter, and of gradually increasing cross section from the tip rearwardly so that it expands the opening of the vagina when inserted, and separates the tissues when moved therein. I have found that a cap having a front section 4⅜ inches in length, which is ¾ inch in diameter at its forward end, ⅞ inch in diameter adjacent its flanged rear end, and having its expanded flanged end 2 inches in diameter, is fully satisfactory.

Exceptionally small amounts of antiseptic are needed to thoroughly cover all of the tissues in the genital canal, as well as a sufficiently large area of the external regions. For example, actual tests have shown that one ounce of solution is adequate for this purpose.

It will appear to those skilled in the art that the use of this device assures full coverage of every portion of the tissue in the genital canal, providing effective medication or sterilization, as the case may be, because spraying is effective for this purpose. This action is enhanced by the cap, which separates the walls of the vagina, so that the spray can reach all portions. This is much more efficient than by instilling a liquid as such. Because effective atomization is provided, excesses of liquids are avoided, the apparatus thus affording substantial economy of these

medicaments. Also, the use of retractors or specula to open the vagina, and mopping of excess liquid which have characterized prior procedures of this type are eliminated. Furthermore, the device may be used efficiently and readily, not only by skilled operatives, but also by those having no skill in surgical matters, for example for home medication. Other advantages will be understood by those skilled in the art.

According to the provisions of the patent statutes, I have explained the construction and mode of use of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be embodied otherwise than as specifically illustrated and described.

I claim:

1. In a device for continuously atomizing a liquid medicament within a body cavity having a single constricted outlet, such as the vagina, a portion to be inserted into the cavity comprising in combination a tubular cap member closed throughout its longitudinal extent and an atomizer tip disposed within and spaced from said cap to form an annular space therewith, the forward end of said cap extending beyond the end of said tip and being provided with an enlarged outlet opening for atomization from the tip, and the cap being provided with pressure-relief means connecting said annular space with the atmosphere to permit air separated from the liquid during spraying to escape from the cavity and permit continuous atomization within said cavity.

2. In a device for continuously atomizing a liquid medicament within a body cavity having a single constricted outlet, such as the vagina, a portion to be inserted into the cavity comprising in combination a tubular cap member closed throughout its longitudinal extent and having a cross sectional area adapted to separate the walls of said cavity when inserted therein to permit free access of atomized medicament to every portion thereof, and an atomizer tip mounted coaxially within said cap and forming an annular space therewith, the forward end of said cap extending beyond the end of said tip and having an enlarged outlet opening for atomization from the tip, and the outer end of said cap being perforated to permit air separated from the liquid during spraying to escape through said annular space to the atmosphere and permit continuous atomization in the cavity.

3. A cap for use with atomizers in spraying a body cavity having a constructed outlet and walls which closely approach one another, comprising a rigid elongate tubular forward member closed peripherally throughout its longitudinal extent and provided at its front end with an enlarged atomization outlet, and being of a cross sectional area adapted to separate the walls of said cavity to permit atomization onto every portion of its walls, and a base member connected to the rear end of said forward member and provided with a bore adapted to seat upon an atomizer tip inserted in the cap and to maintain it in coaxial alignment in said forward member, the base member being provided with an opening connecting the bore of the forward member with the atmosphere to prevent back pressure in said cavity during spraying and permit continuous atomization therein.

4. A cap for use with atomizers in spraying a body cavity having a constricted outlet and walls which closely approach one another, comprising a rigid elongate tubular forward member closed peripherally throughout its longitudinal extent and provided at its front end with an enlarged atomization outlet opening and at its rear end with a flange of said member being adapted to form an annular passage around an atomizer tip inserted therein and having a cross sectional area adapted to separate the walls of said cavity to permit atomization onto every portion of its walls, and a base portion having an internal sleeve member surrounded peripherally with a flange having perforations aligned with the bore of the forward member, said flanges being provided with cooperating screw threads for connecting the forward and base members, said sleeve seating slidably upon a substantial length of said tip to hold it in coaxial alignment in the cap, and pressure due to atomization within said cavity being relieved through said annular space and perforations to permit continuous atomization.

5. A vaginal atomizer capable of continuous action comprising the combination with an atomizer head including an elongate atomizer tip, of a cap surrounding said tip and extending beyond its atomizing end, said cap comprising an elongate rigid tubular body member closed peripherally throughout its longitudinal extent and provided at its forward end with an enlarged outlet for atomization from the tip and terminating at its other end in a flange portion of substantially increased cross sectional area, the cap forming an annular space around the tip and having a cross sectional area adapted to separate the walls of the vagina to permit atomization onto every portion thereof, and a base member having a flange provided with a plurality of perforations connecting the bore of the body member with the atmosphere and also provided with a sleeve portion engaging a substantial length of the rear end of said tip and holding it in coaxial alignment in the cap, said flanges being provided with complementary screw threads for

connecting the forward and base members, and air separated during spraying being released to the atmosphere from the vagina through said annular space and perforations to permit continuous atomization.

6. A vaginal atomizer capable of continuous action comprising the combination with an atomizer head including an elongate atomizer tip, of a cap annularly surrounding said tip and extending therebeyond at its forward end, said cap comprising an elongate rigid tubular body member closed peripherally throughout its longitudinal extent and having a cross sectional area adapted to separate the walls of the vagina and permit atomization onto every part of its walls, the body member having at its forward end an enlarged opening for atomization from said tip and terminating at its rear end in a flange of increased cross sectional area, and a base member having a flange provided with a plurality of perforations connecting the bore of the body member with the atmosphere and having a sleeve portion snugly engaging a substantial length of the rear end of said tip and holding it in coaxial alignment with the cap, said flanges being provided with complementary screw threads for connecting the forward and base members, and a spring clip associated with said head engaging said base member to hold the cap firmly in position, air separated during spraying being released from the vagina to the atmosphere through said cap and perforations to permit continuous atomization.

In testimony whereof, I sign my name.

CHARLES E. ZIEGLER.