Dec. 9, 1958 E. DAVIDSON ET AL 2,863,454

ENCAPSULATED SUPPOSITORY AND CAPSULE THEREFOR

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Fig 1

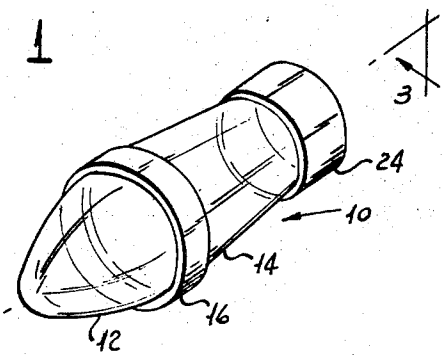


Fig 2

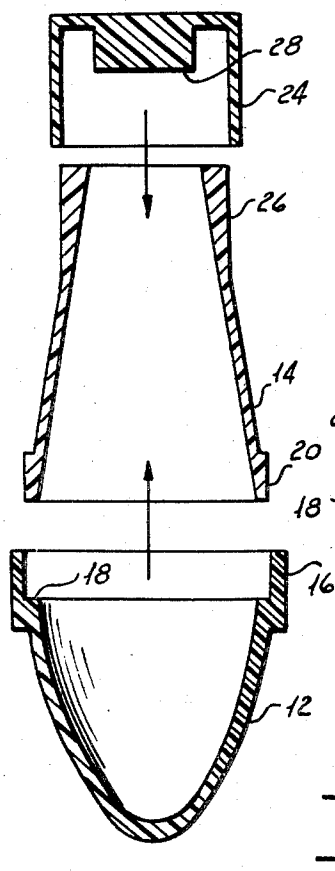


Fig 3

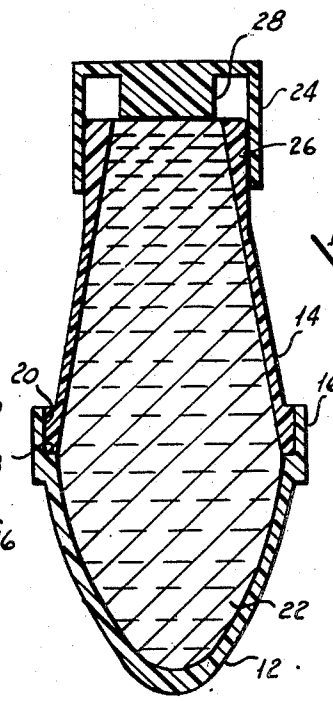
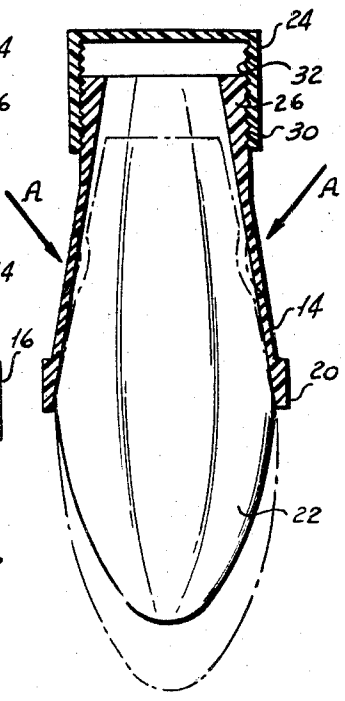


Fig 4



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ENCAPSULATED SUPPOSITORY AND CAPSULE THEREFOR

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2 Claims. (Cl. 128—271)

Our invention relates to an encapsulated suppository and capsule therefor and more particularly to an encapsulated suppository and its capsule which preserves the shape and character of the suppository.

In the prior art, suppositories are formed of a base and medication used in the treatment of irritations or diseases of the body cavities. After formation the suppositories are packaged by hand or machine in a separate operation. For example, the suppositories may be molded in press molds from which they are first removed and then packaged in wrappers of metal foil or the like. It will be appreciated that the suppository base must be a material which melts at a temperature of, or below, body temperature. For example, cocoa butter or a glyceride of one of the fatty acids, such as stearic, palmitic, oleic, and like fatty acids, is often used as a base. Cocoa butter has a melting point between 30° and 35° C. Since suppositories are formed of material which melts at a temperature below body temperature, they are easily deformed by high temperatures or by the application of pressure. Once deformed the suppository may not readily be resolidified or reformed to its original shape. As a consequence, users of suppositories must take special precautions in storing and handling them if they are to be available in condition for use when desired. It will be appreciated, moreover, that distributors and vendors of suppositories must take similar precautions to avoid losses resulting from melting and deformation of suppositories.

Many of the suppositories of the prior art include medications which are hygroscopic or deliquescent. If wrappers, such as metal foil wrappers, which do not completely protect the suppository from access to the air are used in packaging the suppositories can be stored for only a limited period of time without deteriorating to an extent which renders them unusable. It is desirable, therefore, that the suppository package protect the suppository from access to the air. The prior art provides glass vials for protecting suppositories from the atmosphere. It will be understood that such vials must be stored and handled with care and add materially to the cost of manufacturing and marketing suppositories. Further, difficulty is often experienced in attempting to remove a suppository from its vial.

We have invented an encapsulated suppository and capsule therefor which retains the shape and character of the suppository charge. After having melted or softened during shipment or storage, our suppository will not lose its original form and can easily be rendered ready for use by chilling the charge before removing it from its capsule. We provide our suppository capsule with means for initiating the removal of the suppository from the capsule. The capsule of our suppository also functions as the mold into which the material making up the suppository is poured in manufacturing the suppository.

One object of our invention is to provide an encapsulated suppository and capsule therefor which retains the shape of the suppository.

Another object of our invention is to provide an encapsulated suppository and capsule therefor in which the suppository shape will be retained after softening.

A further object of our invention is to provide an encapsulated suppository and capsule therefor which includes means for initiating the removal of the suppository from the capsule.

Yet another object of our invention is to provide an encapsulated suppository and capsule therefor in which the capsule acts as a mold into which the material forming the suppository may be poured in manufacturing the suppositories.

A still further object of our invention is to provide an encapsulated suppository and capsule therefor which protects the material forming the suppository from the air.

Other and further objects of our invention will appear from the following description.

In general our invention contemplates the provision of an encapsulated suppository and capsule therefor in which the capsule body forms the mold into which the suppository forming material such as a molten medication is poured to form the suppository. Our capsule is air tight to protect the suppository from the atmosphere. It includes means permitting ready access to the suppository and easy removal of the suppository from the capsule when it is to be used.

In the accompanying drawings which form part of the instant specification and which are to be read in conjunction therewith and which like reference numerals are used to indicate like parts in the various views:

Figure 1 is a perspective view of one form of a capsule for our encapsulated suppository.

Figure 2 is an exploded view, with the parts in section and drawn on an enlarged scale, of the capsule shown in Figure 1.

Figure 3 is a sectional view, drawn on an enlarged scale, of our encapsulated suppository and capsule therefor, taken along the line 3—3 of Figure 1, but with the suppository in position.

Figure 4 is a sectional view of a second form of our encapsulated suppository and capsule therefor with a part of the capsule removed and the suppository ready for ejection.

More particularly referring now to the drawings, our encapsulated suppository, indicated generally by the reference character 10, includes a capsule body formed by a nose section 12 and a body section 14. We mold sections 12 and 14 from any suitable plastic resinous material, such, for example, as polystyrene or polyethylene. As can be seen by reference to Figures 2 and 3, we form the nose section 12 of the capsule body with an annular flange 16 around the periphery of its open end. Flange 16 forms an annular body 18 with the section 12. We form one end of the central capsule body section 14 with a peripheral boss 20 for engaging flange 16 to seat the section 14 on the section 12. It is to be understood that, if desired, we could provide section 14 with flange 16 and provide section 12 with boss 20. We mate the outer surface of boss 20 and the inner surface of flange 16 to provide an airtight seal when sections 12 and 14 are in assembled relationship. This may conveniently be accomplished by a friction fit, snap fit, or screw joint between the engaging surfaces. It will be understood that the sections 12 and 14 of a capsule body for our encapsulated suppository may be assembled on a suitable machine (not shown).

While we have shown the joint between sections 12 and 14 as lying in a plane perpendicular to the axis of the assembled sections 12 and 14, this joint may lie in a plane

making any other convenient angle with the axis of the assembled sections 12 and 14. The joint should be such that the widest part of the suppository charge, to be described hereinafter, is not enclosed by section 14.

When assembled, sections 12 and 14 form a mold into which the molten suppository charge 22 is poured. After charges of a base material, such as cocoa butter, or the like, and a suitable medication have been poured into the assembled sections 12 and 14, we close the suppository capsule by a cylindrical cap 24 formed of any appropriate plastic resinous material, such as polyethylene, polystyrene or the like. We form the central section 14 with a thickened wall at its end to provide a cylindrical boss 26 for seating cap 24.

The contour of the interior surface provided by the assembled sections 12 and 14 is such as to shape the suppository charge 22 in its intended form. For example, as is known in the art, the charge 22 may have a torpedo shape or a bullet shape. We form the sections 12 and 14 to provide a joint between the sections at the widest diameter of the charge 22, whether it be a bullet shape or a torpedo shape. This formation facilitates removal of the suppository from the capsule without deforming it.

In the form of our invention shown in Figures 2 and 3, we form a plunger 28 on the base of cap 24 in the interior of the cap. When the suppository is to be used, end section 12 of the capsule body is removed to expose the nose of the suppository. We assemble cap 24 on section 14 with plunger 28 almost in engagement with an end of charge 22 remote from the end exposed when the section 12 is removed. After the nose section 12 has been removed, cap 24 is pressed to slide it down on boss 26 of section 14 to force suppository charge 22 out of section 14 by plunger 28.

In the form of our invention shown in Figure 4, we provide threads 30 on the outer surface of boss 26 for engagement with threads 32 on the interior of cap 24. In this form of our invention we may form the section 14 of the capsule body from a flexible material such as polyethylene. After the nose section 12 of the suppository capsule has been removed, section 14 is squeezed in the region of the arrows A shown in Figure 4 to force the suppository 22 out of section 14. It is to be noted that the provision of the joint between sections 12 and 14 at the widest part of the charge 22 permits the charge to be readily ejected from section 14.

In the manufacture of our encapsulated suppository, we first form the capsule body sections 12 and 14 from a suitable plastic resinous material, such as polyethylene, polystyrene, or the like. Any convenient plastic forming method may be employed to make these parts. After the parts have been formed, section 14 is assembled with section 12 by sliding boss 20 within flange 16 to rest on shoulder 18. As has been explained hereinabove, the fit between sections 12 and 14 may be a friction fit, snap fit, or the like. Alternatively, a screw joint between the two sections could be employed. Whatever type joint we use, we provide an airproof and moistureproof seal between the two sections. After sections 12 and 14 have been assembled, we pour the molten suppository material comprising the base and the medicament making up the suppository 22 into the assembled sections 12 and 14. These operations may conveniently be performed automatically by any filling machine known to the art.

In the form of our invention shown in Figures 1 to 3, we provide a cap 24 formed of any appropriate material, such as polyethylene, polystyrene, or the like. The capsule may advantageously be transparent but we may use an opaque synthetic resin if desired. Cap 24 includes a plunger 28 adapted to be inserted within section 14 to eject the suppository charge from the section. In assembling cap 24 on boss 26 of section 14, we dispose plunger 28 in contact with or very nearly in contact with an end of the charge 22. This is the disposition of parts shown in Figure 3. When assembled our capsule seals the

suppository from the atmosphere to prevent gain or loss of moisture by the suppository. The capsule acts as a mold for the charge 22, permitting the charge to be solidified by refrigeration after melting under high temperatures without loss of shape. When this form of our suppository is to be used, end section 12 is first removed to expose the nose of the suppository. In order to ensure that the suppository remains in the section 14, we may silicone or otherwise lubricate the interior surface of nose section 12 to facilitate its removal from the nose of charge 22. If desired, we may lubricate the body interior as well. After the nose of charge 22 has been exposed, cap 24 is slid down on boss 26 to force plunger 28 into section 14 to initiate removal of charge 22 from section 14. We can form all of the members of the capsule of the same material. This material can be any appropriate synthetic resin. We may, if we desire, form different components of the capsule from differing materials. For example, we may form the section 14 and its cap 24 of polyethylene while forming section 12 of polystyrene. Similarly, we may form the section 14 of polyethylene and make the cap 24 and the section 12 of polystyrene.

In the form of our invention shown in Figure 4, we follow the procedure described with respect to the form of our invention shown in Figures 1 to 3 for assembling sections 12 and 14 and for forming charge 22 in the assembled sections. It is to be noted that in this form of our invention, section 14 is formed of polyethylene while section 12 and cap 24 may be formed either of polyethylene or polystyrene. After the charge 22 has been formed in the assembled sections 12 and 14, we place cap 24 on boss 26 to provide a seal between the cap and section 14. Any suitable type joint may be used to form this seal. Conveniently, we have shown a screw joint including threads 30 on boss 26 and threads 32 on cap 24. When the suppository of this form of our invention is to be used, we remove end section 12 to expose the nose of charge 22. The removal of charge 22 from section 14 may be accomplished by applying pressure at the points indicated by the arrows A in Figure 4 to squeeze charge 22 out of section 14.

It will be seen that we have accomplished the objects of our invention. We have provided an encapsulated suppository and capsule therefor in which the capsule acts as a mold for forming the suppository. We have provided the capsule with means for initiating the removal of the suppository from the capsule. Our capsule is substantially airtight and moistureproof, with the result that the charge will not lose or gain moisture during shipment and storage. The capsule of our suppository permits resolidifying of the suppository after melting without change of shape. In order to provide a differential release between the body sections of our capsule, we may coat the interior of one of the sections with a lubricant.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of our claims. It is further obvious that various changes may be made in details within the scope of our claims without departing from the spirit of our invention. It is therefore to be understood that our invention is not to be limited to the specific details shown and described.

Having thus described our invention, what we claim is:

1. An encapsulated suppository including in combination a capsule nose section, a capsule body section, means forming a joint assembling said capsule nose section with said capsule body section, a suppository disposed within said assembled nose and body sections, a cap carried by said body section, a plunger carried by said cap for movement therewith, said body section being formed with a bore tapering from said joint toward said cap and means mounting said cap on said body section

for relative movement with respect to said body section to permit the suppository to be ejected from said body section when said nose section is removed.

2. An encapsulated suppository as in claim 1, in which said cap and said plunger are integrally molded.

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