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R. E. THOMPSON ET AL

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POWDER DISPENSER

Original Filed Nov. 18, 1948

2 Sheets-Sheet 1

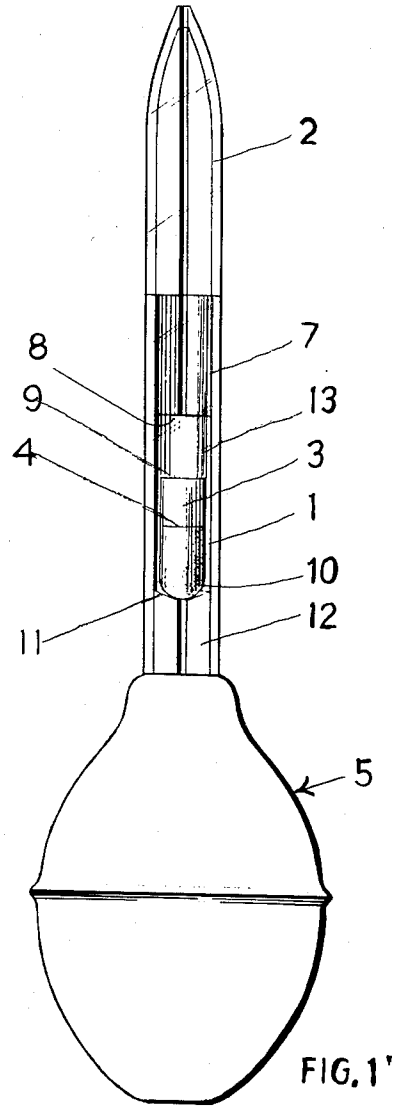
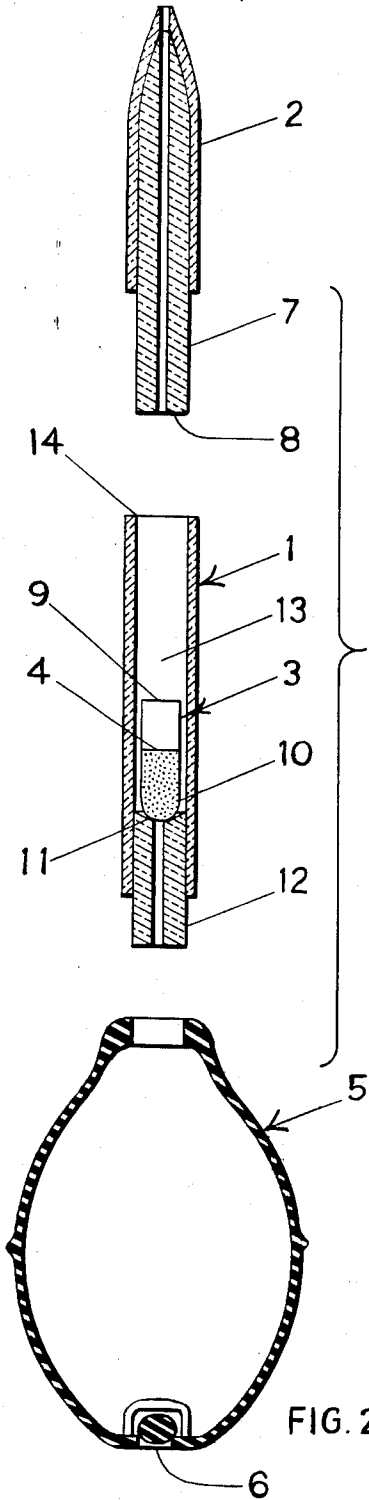


FIG. 2.

FIG. 1'

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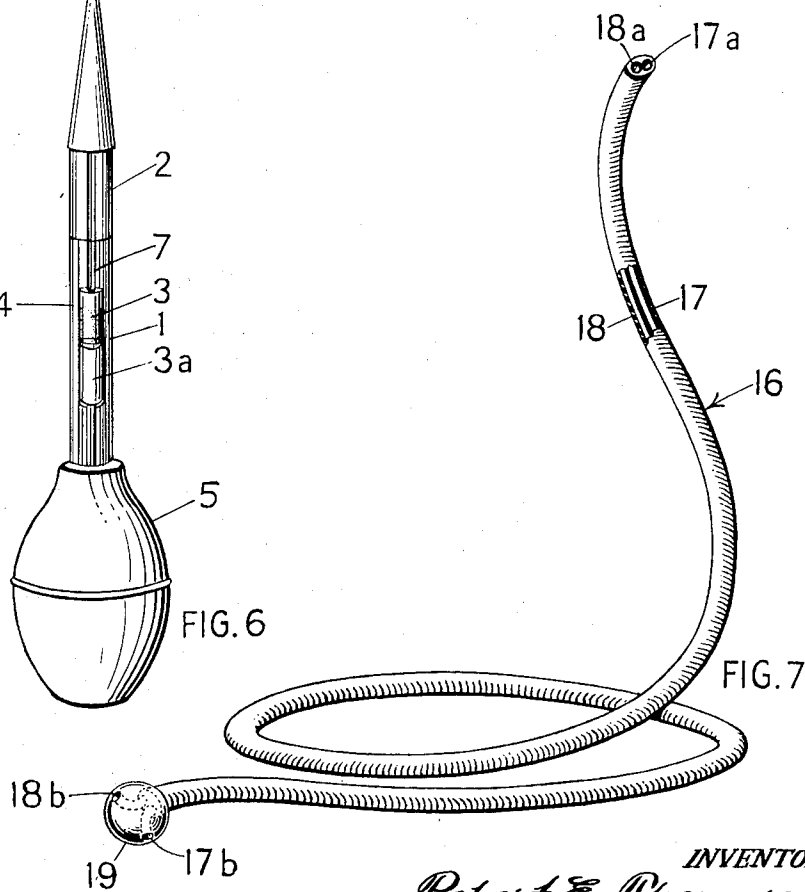
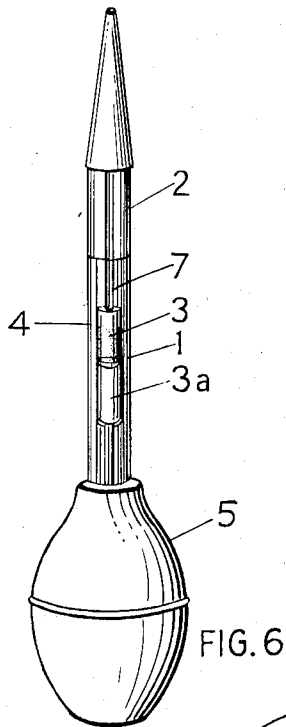
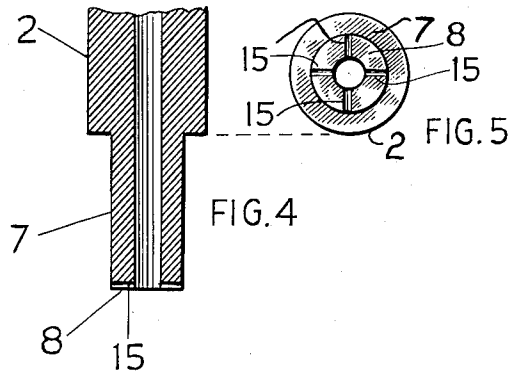
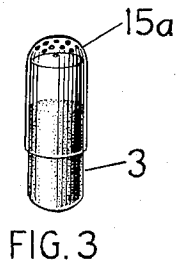
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POWDER DISPENSER

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Substituted for application Serial No. 60,665, November 18, 1948. This application March 22, 1949, Serial No. 82,816

12 Claims. (Cl. 128—266)

This invention relates to powder dispensers and more particularly to a device for dispensing powder from a capsule or the like.

The present application constitutes a substitute application for Robert E. Thompson application, Serial No. 60,665, filed November 18, 1948. The invention has been found to be a joint invention and the present application is filed by the two joint inventors for the subject matter of said earlier application.

The invention has application where it is desired to contact the interior surface of the nasal cavity, the vagina, the rectum, and other body cavities with medicinal powder. Although devices made in accordance with this invention are particularly suitable for such purposes, they are not limited thereto but are capable of a variety of other uses.

It is an object of our invention to provide a device which makes it possible to dispense powder directly from the capsule in which the powder is sold, thus avoiding the inconvenience connected with transferring powder from the capsule to the device.

It is a further object of our invention to provide a powder dispenser which is simple and durable in construction, easy and efficient in operation, and which can be manufactured and sold at a reasonable cost.

Another object of our invention is to provide a powder dispenser by means of which a substantially uniform and controlled amount of powder is dispensed with each successive puff of air from the source of air pressure.

Further objects of the invention will become apparent as this description proceeds.

In the accompanying drawings, which form a material part of this disclosure:

Fig. 1 is a side elevational view of a powder dispenser made in accordance with our invention, and showing the same attached to a collapsible bulb as a source of air pressure.

Fig. 2 is a longitudinal sectional view showing the nozzle member and the bulb separated from the capsule-receiving member.

Fig. 3 is an enlarged detail view of a modified powder capsule adapted for use in our device and having its open end covered by a perforated cap.

Figure 4 is an enlarged longitudinal sectional view of a modified form of nozzle in which the parts are formed integrally.

Fig. 5 is an exterior view showing grooves in the end of the nozzle member illustrated in Fig. 4.

Fig. 6 is a perspective view showing another modification of our invention in which two capsules have been inserted in the device.

Fig. 7 is a representation of a long, flexible tube which, in another modification of the device, may be attached to the free end of the nozzle member.

In one embodiment of the invention, the powder dispenser generally comprises a tube providing a seat at one end and a stop at the other. Within the tube and between the seat and stop is a capsule adapted to contain powder, and having a lower end resting upon said seat and its outer

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end which may be open or partially open adapted to engage the stop. Any means for providing a differential in pressure whereby the capsule is caused to strike the stop may be provided. Air may be discharged through the tube toward said seat or, if desired, suction may be applied to the opposite end of the tube.

The powder dispenser generally comprises a tubular capsule-receiving member 1, having associated at one end a source of air pressure; a tubular nozzle member 2 separably attached to the other end of the capsule-receiving member; a capsule 3 adapted to contain powder and disposed within the capsule-receiving member having its closed end toward the source of air pressure and its open end toward the nozzle member; and air passage means from the source of air pressure past the capsule into the nozzle member.

More specifically, and as illustrated in the accompanying drawings, capsule-receiving member 1 is a rigid length of tubing, having both ends open and being made of a transparent polystyrene material. It is not necessary to the efficient operation of the dispenser that the capsule-receiving tube be transparent. It may be made of any suitable material, metal or non-metal, but, in a preferred embodiment of our invention, both capsule 3 and capsule-receiving member 1 are made transparent, thus enabling the operator to watch the downward progress of powder level 4 as powder is dispensed from the capsule.

Attached to one open end of the capsule-receiving member is a collapsible bulb 5, made of rubber or any similar flexible material, and equipped with a valve 6. It is apparent that other sources of air pressure may be substituted for the collapsible bulb, but we prefer to use such a bulb since it provides a positive means for controlling the frequency and force of the puffs of powder issued from our device.

At the other end of the capsule-receiving tube is a nozzle member 2. Preferably, this nozzle member is provided with a tubular extension 7, the outside diameter of which is slightly smaller than the inside diameter of capsule-receiving member 1. When our dispenser is assembled, extension 7 is inserted in the capsule-receiving member and is held in position by friction, thus providing a stop 8 against which capsule 3 is impinged in operation of the device. The nozzle member may be attached to the capsule-receiving tube by means other than a device such as extension 7, but in any event, the nozzle member must provide, or be provided with, a stop against which the open end 9 of capsule 3 may impinge. The stop therefore may be the end 8 of nozzle member 2 or it may be, for example, a device which is positioned within the nozzle member and which admits the passage of air but acts as a stop against which capsule 3 must impinge. The purpose of stop 8 is to retain capsule 3 within chamber 13 and at the same time to permit the passage of air from chamber 13 into nozzle member 2. In the modification of our invention illustrated in Figs. 4 and 5, the inserted end 8 of extension 7 is provided with one or more grooves 15 in order to permit the passage of air more easily from chamber 13 into nozzle member 2.

Disposed within capsule-receiving tube 1 is a capsule seat 11, on which the closed end 10 of capsule 3 may rest. Preferably, and as illustrated in the drawings, capsule seat 11 is the permanently inserted end of a tube 12 having an outside diameter which is slightly smaller than the inside diameter of capsule-receiving tube 1, and which is fitted therein by friction. The inserted end 11 of tube 12 thus acts as a seat for the closed end 10 of capsule 3 in the same manner as the inserted end 8 of nozzle member extension 7 acts as a stop for the open end 9 of capsule 3. However, it is obvious that a capsule seat may be provided by means other than an inserted tube such as tube 12. The purpose of the capsule seat is to prevent

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movement of capsule 3 past the seat toward bulb 5 and at the same time to permit passage of air from bulb 5 into chamber 13.

Also disposed within capsule-receiving tube 1 is a capsule 3, which is adapted to contain powder and which has one open end 9 and one closed end 10. Capsule 3 may be made of any suitable material, but, as indicated above, is preferably made of a transparent material, such as gelatin, so that the operator may watch the downward progress of powder level 4 as powder is dispensed from the capsule. The outside diameter of capsule 3 is smaller than the inside diameter of capsule-receiving tube 1, thus rendering capsule 3 freely slidable along the inside of tube 1 and also providing means for the passage of air from bulb 5 past capsule 3 into nozzle member 2.

In the operation of our powder dispenser, capsule-receiving member 1 is separated from nozzle member 2, and a powder capsule 3 is dropped into the open end 14 of capsule-receiving tube 1 so that the closed end 10 of capsule 3 rests on seat 11. Extension 7 of nozzle member 2 is then inserted in capsule-receiving tube 1, thus forming a chamber 13. When bulb 5 is compressed, a stream of air flows through tube 12 and propels capsule 3 along the inside of chamber 13 so as to cause it to impinge sharply on stop 8, thus jarring loose a portion of the surface powder in capsule 3. In addition to propelling the capsule against stop 8, the stream of air also passes around capsule 3 into nozzle member 2. In doing so, the stream of air passes across the open end 9 of capsule 3 and carries away with it the surface powder jarred loose by the sudden impingement of capsule 3 on stop 8. The powder-laden stream of air which has thus made its way into nozzle member 2 finally reaches the free end of nozzle member 2 and issues therefrom in the form of a powder-laden puff.

Each successive compression of bulb 5, therefore, causes capsule 3 to impinge on stop 8 and results in the emission of a puff of powder from the free end of nozzle member 2, together with a corresponding fall of powder level 4 in the capsule. Release of pressure on the bulb causes capsule 3 to return to its original position in contact with seat 11. It should be noted that, in the operation of our powder dispenser, a substantially uniform amount of powder is jarred loose from the surface and dispensed with each compression of bulb 5. The stream of air passes around the capsule and across its top but not through the capsule, and thus there is not the usual channeling or stirring up of the powder which results when the stream of air must pass through the powder, as is the case in many other types of powder dispensers.

The different purposes for which our powder dispenser is adaptable may require that different amounts of powder be discharged, and our invention includes several modifications according to which the amount of powder discharged or the force of the discharge may be varied. In one modification of our invention, the open end of capsule 3 is covered by a perforated cap 15, as illustrated in Fig. 3. The number and size of the perforations may be varied to control the amount of powder discharged with each compression of the bulb, and the powder dispenser is operable even in connection with a capsule having only a single perforation in its cap.

In another embodiment of our invention, capsule 3 is provided with a ball or pellet which rests on top of powder level 4. The pellet may be of any suitable material, such as metal or glass, and, in cases where the powder being used is difficult to maintain in dry condition, the pellet is preferably made of a drying agent such as silica gel or calcium chloride. The size of the pellet may be varied to control the amount of powder which is allowed to escape from the surface in capsule 3.

Another variation of the invention involves means for increasing or decreasing the length of chamber 13—i. e. the distance between capsule seat 11 and stop 8. The amount of powder dispensed with each compression of

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the bulb is decreased by any decrease in the length of the chamber along which capsule 3 is propelled, and thus a measure of control is exerted by the distance to which extension 7 is inserted into capsule-receiving tube 1; or, as illustrated in Fig. 6, two capsules may be placed in chamber 13, to reduce the distance which capsule 3 is allowed to travel.

We have found that the length of nozzle member 2 may be increased to a surprising extent without any appreciable decrease in the quality or force of the puff which finally issues therefrom, and a still further embodiment of our invention involves a long flexible tube 16, such as the one illustrated in Fig. 7, which may be attached to the free end of nozzle member 2 and used for treating the inside of a patient's stomach with medicinal powder. Tube 16 may be made of any suitable flexible material, such as rubber or the like, and contains two smaller tubes 17 and 18 disposed in parallel relation with each other within tube 16. At one end, tube 16 terminates in a substantially spherical enlargement 19 which is provided with openings 17b and 18b for tubes 17 and 18. In practice, the free end of nozzle member 2 is inserted in opening 17a of tube 17, and the patient then swallows the enlarged spherical end 19 of large tube 16. Compression of bulb 5 causes a puff of powder to be emitted from opening 17b, thus providing a means for treating the stomach with powder. The purpose of smaller tube 18 is to prevent any building up of air pressure within the stomach, excess air in the stomach being passed into opening 18b and allowed to escape into the atmosphere through opening 18a.

In another modification of our invention, bulb 5 is removed and the free end of nozzle member 2 is fitted with an inhaler mouthpiece or nose-piece device. In the operation of this device, the patient places the mouthpiece or nose-piece in position and inhales, thereby creating a vacuum and causing a stream of air to enter the open end of tube 12. The stream of air thus caused by inhalation actuates the powder dispenser and results in a puff of powder being deposited on the inner surface of the patient's mouth or nasal cavity. If desired, accessory air passages may be provided to allow normal quantities of air to be inhaled.

The telescoping or connected tubes which are employed for forming the capsule chamber may be of any desired arrangement. For example, the chamber may be formed in the tube portion connected to the bulb or, if desired, the chamber may be formed practically entirely in the upper tube portion having a discharge end. It will be understood that other equivalent structures may be employed for providing a chamber in which the capsule may be reciprocated and whereby a seat is furnished at one end of the chamber and a stop at the other end. For example, a single tube may be provided for receiving the capsule and any suitable stop means may be added thereto, it being sufficient for the operation that the tube provide the rest or seat or stop for the one end of the cartridge at one end of the chamber and a stop at the other end of the chamber so that as the capsule reciprocates within the chamber, powder is shaken therefrom and carried away in a stream of air, etc.

By "capsule" as used in the specification and claims, we mean any container or receptacle for holding powder constructed of gelatin, glass, plastic, or any other suitable material and which will be effectively reciprocated within the cylinder for the shaking of increments of powder upon the repeated impacts.

While we have shown and described our invention in several of its preferred embodiments, it is to be understood that we are not to be limited thereto and that the right is reserved to all modifications coming within the true spirit and scope of our invention as defined in the appended claims.

We claim:

1. A powder dispenser comprising a tubular capsule-

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receiving member, having associated at one end a source of air pressure; a tubular nozzle member separably attached to the other open end of said capsule-receiving member; a capsule adapted to contain powder and slidably disposed within said capsule-receiving member with a closed end toward said source of air pressure and the other end toward said nozzle member provided with a dispensing opening; and air passage means from said source of air pressure past said capsule into said nozzle member.

2. A powder dispenser according to claim 1 wherein the dispensing end of said powder capsule is covered by a perforated cap.

3. A powder dispenser comprising a tubular capsule-receiving member, having associated at one end a source of air pressure; a tubular nozzle member separably attached to the other end of said capsule-receiving member; a capsule seat within said capsule-receiving member; a capsule adapted to contain powder and disposed within said capsule-receiving member with a closed end toward said capsule seat and an open end toward said nozzle member; a stop disposed at a point between the open end of said capsule and the free end of said nozzle member; and air passage means from said source of air pressure past said capsule into said nozzle member.

4. A powder dispenser according to claim 3 wherein said capsule-receiving member and said powder capsule are made of transparent material.

5. A powder dispenser comprising a tubular capsule-receiving member, having associated at one end a source of air pressure; a tubular nozzle member separably attached to the other end of said capsule-receiving member; a capsule seat within said capsule-receiving member; a capsule adapted to contain powder and disposed within said capsule-receiving member with a closed end toward said capsule seat and an open end toward said nozzle member; a stop disposed at a point between the open end of said capsule and the free end of said nozzle member; a long flexible tube having one end attached to the free end of said nozzle member; and air passage means from said source of air pressure past said capsule into said nozzle member.

6. A powder dispenser comprising a tubular capsule-receiving member, having associated at one end a source of air pressure; a tubular nozzle member separably inserted in the other end of said capsule-receiving member; a capsule seat within said capsule-receiving member; a capsule adapted to contain powder and slidably positioned within said capsule-receiving member with a closed end toward said capsule seat and an open end toward said nozzle member; and air passage means from said source of air past said capsule into said nozzle member.

7. A powder dispenser according to claim 6 wherein said air passage means into said nozzle member comprises at least one groove in that end of the nozzle member which is inserted in the capsule-receiving member.

8. A powder dispenser according to claim 6 wherein said powder capsule contains a substantially spherical pellet between the level of powder and the open end of said capsule.

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9. A powder dispenser comprising a transparent tubular capsule-receiving member having both ends open; an air inlet tube, the outside diameter of which is the same as the inside diameter of said capsule-receiving member and one end of which is permanently inserted in an open end of said capsule-receiving member to form an annular capsule seat within said capsule-receiving member; a collapsible bulb attached to the non-inserted end of said air inlet tube; a tubular nozzle member, also having both ends open and having on one open end a tubular extension, the outside diameter of which is the same as the inside diameter of said capsule-receiving member, and the free end of which is separably inserted in the other open end of said capsule-receiving member to form an annular stop within said capsule-receiving member; a transparent capsule adapted to contain powder and slidably disposed within said capsule-receiving member with a closed end toward said annular capsule seat and an open end toward said annular stop; and air passage means from said collapsible bulb through said air inlet tube and capsule seat, past said capsule, and through said capsule stop into said nozzle member.

10. A powder dispenser comprising a tubular capsule-receiving member having both ends open; a capsule seat within said capsule-receiving member; an inhaler mouthpiece member having a tubular extension attached thereto, said tubular extension being separably inserted in one open end of said capsule-receiving member; a capsule adapted to contain powder and slidably positioned within said capsule-receiving member with a closed end toward said capsule seat and an open end toward said mouthpiece member; and air passage means into the free, open end of said capsule-receiving member, past said capsule, and into said tubular extension of said mouthpiece member.

11. A powder dispenser according to claim 8 wherein said pellet is a drying agent.

12. In a powder dispenser, a tube providing an elongated chamber adapted to receive a capsule, said tube providing a seat at one end of said chamber and a stop at the other end thereof, and a capsule adapted to contain powder slidably mounted in said chamber between said seat and said stop, said capsule having a closed end adapted to engage said seat and an opening adapted to discharge powder when the capsule engages said stop, inlet means for admitting air to said chamber and outlet means for withdrawing air from said chamber, said inlet means and outlet means providing with said chamber and capsule a passage through which air may pass through said tube when said capsule is in engagement with said stop.

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