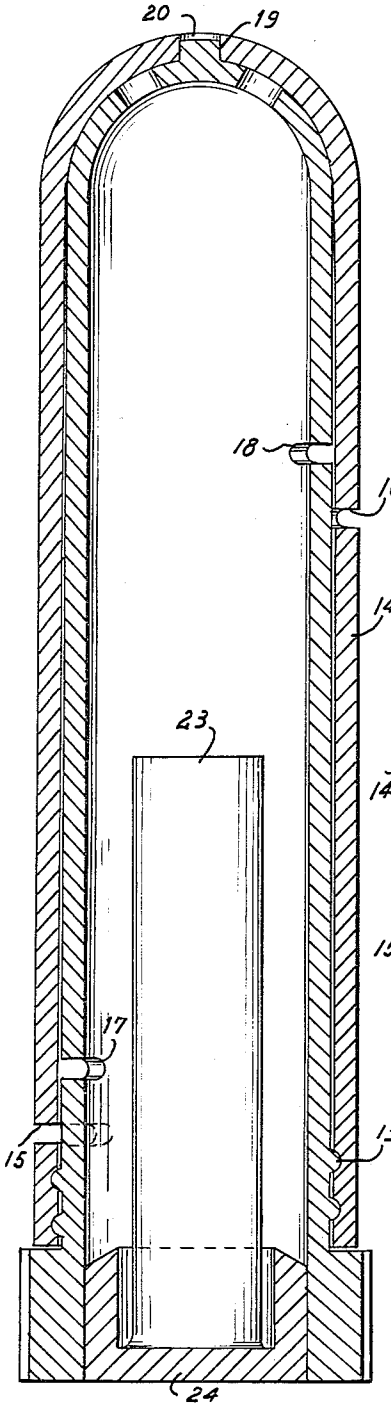
July 31, 1962 T. C. GRUBB ET AL 3,046,983

VARIABLE DOSE INHALER

Filed Oct. 1, 1959 2 Sheets-Sheet 1

FIG. 2



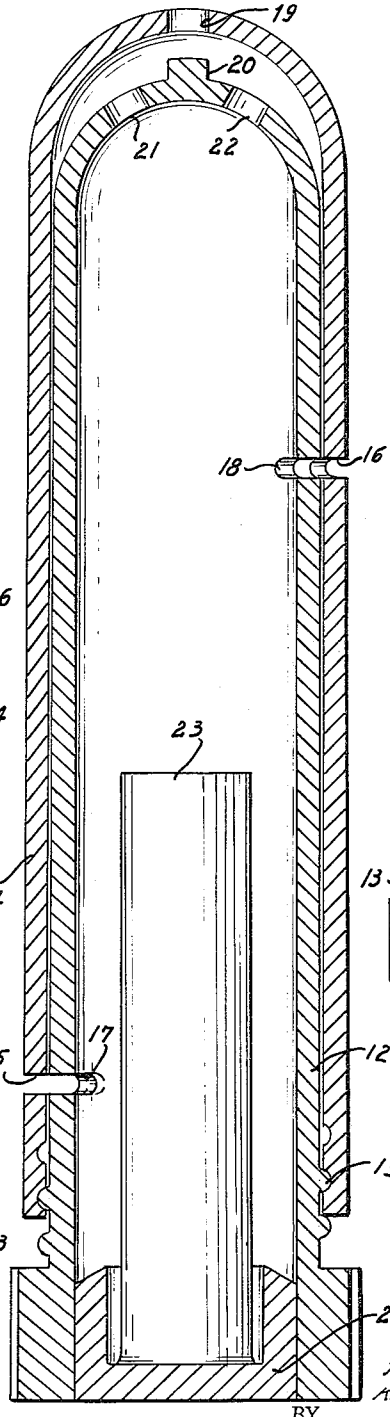
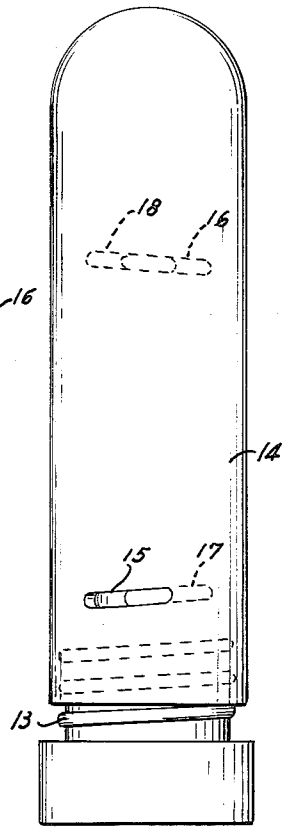


FIG. 3

FIG. 1



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Filed Oct. 1, 1959 2 Sheets-Sheet 2

FIG. 4

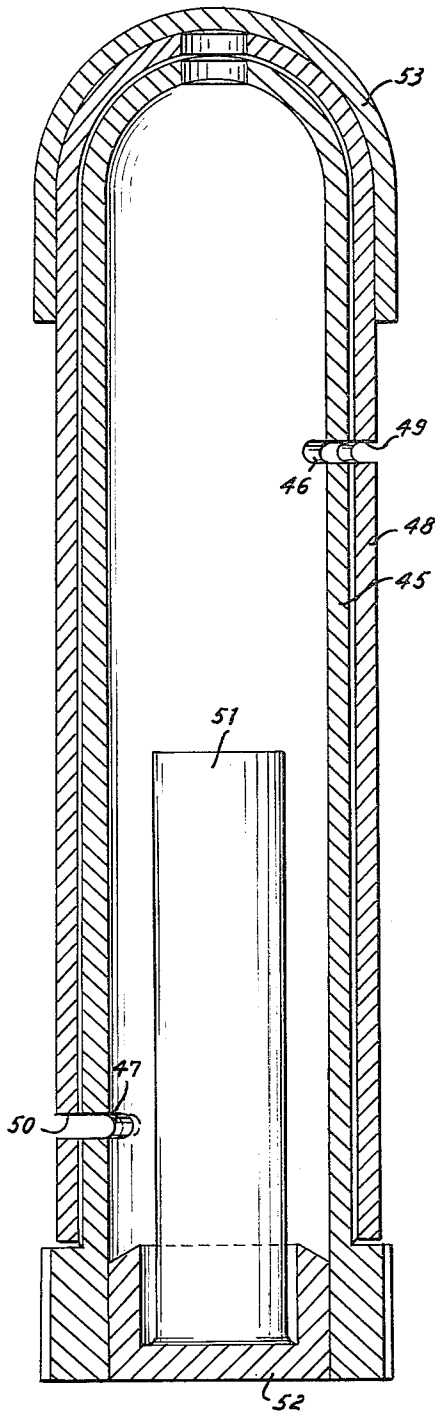


FIG. 6

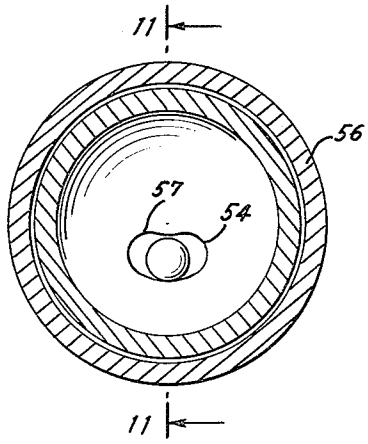
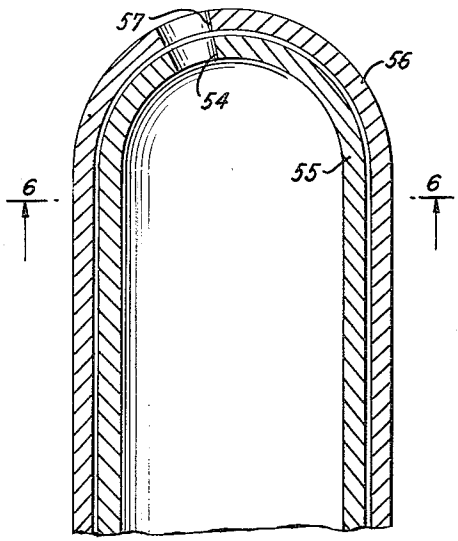


FIG. 5



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VARIABLE DOSE INHALER

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3 Claims. (Cl. 128—200)

This invention relates to new variable dosage inhaler for dispensing volatile medicaments to the upper respiratory tract.

Small pocket size inhalers for administering volatile medicaments to the upper respiratory tract are widely used. These inhalers are generally molded of a low cost plastic material and so constructed to provide means for permitting air to pass from the lower-most section of the inhaler past an absorbent body which holds a volatile medicament and from thence out the top of the inhaler into the nostril of the user. They have the disadvantage that no means is provided for varying the concentration of the medicament which leaves the inhaler and enters the respiratory tract. Accordingly, the dosage may be too strong for an individual and when the inhaled medicament is of certain types undesirable side effects may occur. It is desirable, therefore, that an inhaler be made available in which the concentration of the medicament in the air stream can be varied. The present invention fills this need.

In order that the nature of the invention be made more apparent, reference is made to the accompanying drawings in which—

FIGURE 1 is an elevational view of a preferred form of the inhaler of the present invention.

FIGURE 2 is an elevational cross section of the inhaler of FIGURE 1 and FIGURE 3 is another cross section of the inhaler with the cap partially raised. These views are enlarged over the view shown in FIGURE 1.

FIGURE 4 is an elevation in cross section of another embodiment of the invention.

FIGURE 5 is a cross section of the upper portion of an inhaler illustrating a particular type of closure and FIGURE 6 is a cross sectional view taken along lines 6—6 of FIGURE 5.

FIGURE 1 illustrates a preferred form of the inhaler which provides simultaneous increase of the volume of air coming through the lower part of the inhaler with a decreasing amount of air entering the upper portion of the inhaler. This design provides constant air flow. In this embodiment of the invention, the barrel 12 (FIG. 3) of the inhaler is provided with screw threads 13 adapted to engage grooves molded in the cover 14. Slots 15 and 16 are provided in the cover 14 at the lower and upper ends of the inhaler. These slots are pitched to an angle corresponding to the pitch of the threads 13. Similar pitched slots are provided in the barrel 12 at both lower and upper sections of the barrel 17 and 18.

In operating position as shown in FIGURE 3, the slots 15, 17 and 16, 18 overlap, as shown to best advantage in FIGURE 1, and as air is drawn through the inhaler by the user of the device, a quantity of air will pass through the passage way provided by slots 15, 17 and pass up through the barrel of the inhaler carrying with it volatile medicament. Air will also pass through the opening formed by slots 16, 18 and this air will mix with the medicated air and dilute it. Turning the cap or base with relation to each other will either increase the size of the lower air port and decrease the size of the upper one or will do the opposite, thus providing a means of varying the concentration of the volatile medicinal agent in the air leaving the inhaler through the port 19.

When the inhaler is not in use, the cover is screwed down and the air ports are closed as shown in FIGURE 2.

FIGURE 4 shows another means of varying the concentration of the volatile medicament leaving the inhaler. In this device, the inner barrel 45 is provided with slots 46 and 47 which extend a short distance around the diameter of the barrel. Closely fitting over this inner barrel but being free to turn is a casing 48 which also has slots 49 and 50 extending a short distance around the diameter of the casing. When the outer casing is in an operative position, the slots 47, 50 and 46, 49 overlap each other, thus permitting air to enter. These slots are so positioned that when the outer casing is turned with relationship to the barrel, the degree of overlap of the slots changes, so that while the size of the lower opening is being increased, the size of the upper opening is decreased. Upon further turning of the outer casing 48, both ports will be closed. This is essentially the same type of dosage control as provided by the inhaler in FIGURE 1 but is of somewhat simpler construction. This inhaler also has an absorbent medicament carrier 51, base 52, and a cap 53.

The necessity for a cover can be avoided by adopting the construction shown in FIGURES 5 and 6. In this construction, an air port 54 is provided in the upper end of the barrel 55 which opening is located off the central axis of the barrel. The outer casing 56 is also provided with an off center air port 57. As shown in FIGURE 5, the air passes out through ports 57 and 54 which are in alignment. These air ports 54 and 57 are off center and oblong as shown in FIGURE 6 which is a cross sectional view taken along lines 6—6 of FIGURE 5. As will be observed, these oblong openings 54 and 57 continue to be overlapping as the outer casing 56 is turned for a distance. However, as the turning increases, they cease to overlap and there is no longer an air passage through these holes. This, of course, effectively seals the upper end of the inhalator. These oblong openings are also positioned in respect to the slots 46, 49, 47, 50, so that when these slots overlap and permit air to enter or pass through, slots 54 and 57 will also overlap and conversely when these slots on the barrel in casing do not overlap, the upper air exit port will be closed.

The volatile medicament used in the inhaler is not a part of the invention. Many different kinds can be used. The amount of material will depend upon the size of the inhaler and the volatility of the essential components. In a typical pocket size inhaler, the volatile medicament consisted of 1 ml. of a solution containing 250 mg. of 1-desoxyephedrine the remainder being a mixture of aromatic materials including menthol, camphor, methyl salicylate, bornyl acetate and oil of sassafras. Likewise the nature of the absorbent body holding the volatile medicament is relatively immaterial and not a part of the present invention. A compressed wad of cotton is usually employed, but the material may be of porous inorganic substance if the nature of the medicament precludes the use of cotton. The material with which the inhaler is made is also relatively unimportant but will usually be a moldable plastic composition of low cost.

We claim:

1. An inhaler for dispensing volatile medicaments which comprises a tubular elongated barrel having at one end an air inlet port and at the other end an air outlet port, a second air inlet port between the first air inlet port and air outlet port, an absorbent body adapted to hold a volatile medicament within said barrel positioned adjacent to the first air inlet port, a tubular outer casing covering said tubular barrel closely fitting thereover but being adapted to turn, an air inlet port at one end of said casing positioned so as to overlap the first air inlet port of said barrel, a second air inlet port in said casing so positioned as to overlap the intermediate air inlet port, an air outlet port in said casing permitting air to flow from

the air outlet port of said barrel through the air outlet port of said casing, the two air inlet ports of said casing and said barrel being in such relationship that as the casing is turned with respect to the barrel overlapping of one set of ports is increased while the overlapping of the second set of air inlet ports is decreased.

2. An inhaler for dispensing volatile medicaments which comprises a tubular elongated barrel having at one end an elongated air inlet port and at the other end an air outlet port, an absorbent body adapted to hold a volatile medicament within said barrel positioned adjacent to the first air inlet port whereby air passing through said port passes within close proximity to the absorbent body, a second elongated air inlet port between the absorbent body and the air outlet port, a tubular outer casing closely fitting over said tubular barrel and being adapted to turn with respect thereto said casing being fitted with screw threads adapted to engage screw threads of a similar pitch on said barrel whereby as the outer casing is turned it moves longitudinally with respect to the said inner barrel, two elongated air inlet ports on said casing having a pitch substantially the same as that of the screw threads on said barrel and positioned so as to overlap the air inlet ports in said barrel at one position and provide openings through the casing and barrel the two air inlet ports being in such relationship to each other and to the air inlet ports of the barrel that as the barrel is turned the overlapping of one set of ports is increased and the overlapping of the second set of air ports is decreased.

3. An inhaler for dispensing volatile medicaments which comprises a tubular elongated barrel having a domed end and having at the other end an elongated air

inlet port the domed end thereof having an opening not covering the axis of said barrel, an absorbent body adapted to hold a volatile medicament within said barrel positioned adjacent to the first air inlet port whereby air passing through said port passes within close proximity to the absorbent body, a second elongated air inlet port between the absorbent body and the opening in the domed end, a tubular outer domed barrel casing closely fitting over said first tubular barrel and being adapted to turn with respect thereto, two elongated air inlet ports on said outer casing positioned so as to overlap the air inlet ports in said inner barrel the two air inlet ports being in such relationship to each other and to the air inlet ports of the barrel that as the barrel is turned the overlapping of one set of ports is increased and the overlapping of the other set of ports is decreased, the said outer casing having therein an opening not overlapping the axis of said casing and so positioned with the opening of the domed inner barrel that the two openings overlap and provide an air passageway when the elongated air inlet ports on the tubular section of the barrel provide a passageway therein and being apart from each other closing the said passageway in the domed sections when the elongated air ports on said tubular sections are also positioned apart and the said air inlets are closed.

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