

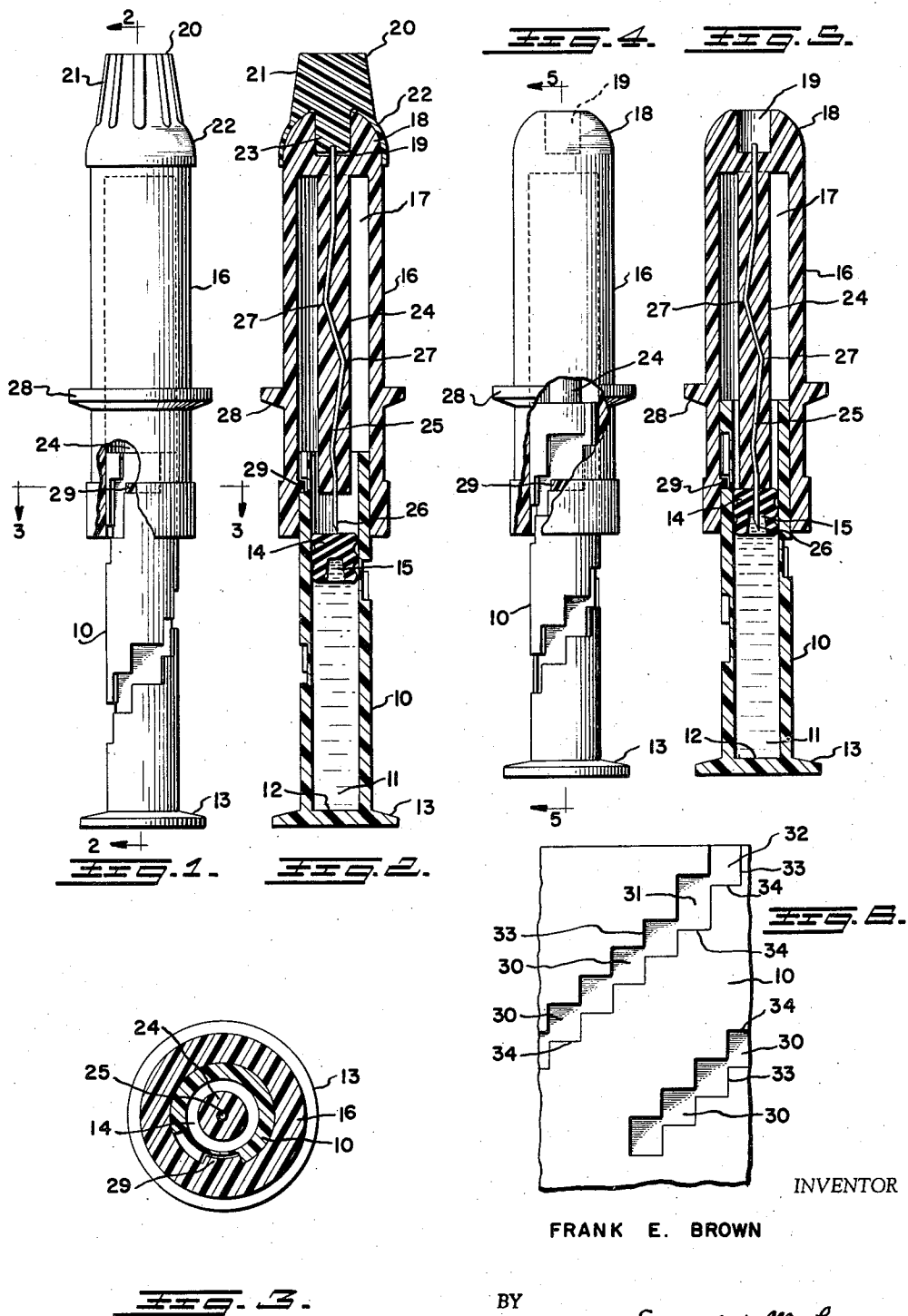
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DISPENSER

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2,855,931

DISPENSER

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1 Claim. (Cl. 128—233)

This invention relates to a structurally and functionally improved dispenser for use with fluid medicaments which are to be introduced into the nasal passages by gravity or inhalation or into the eyes in the form of drops after discharge from the dispenser under substantially predetermined measured dosage conditions.

It is a primary object of this invention to provide a dispenser which may be filled or charged with a fluid medicament and which will maintain the medicament in a stable and uncontaminated condition for a substantial period of time.

A further object is that of providing a dispenser which may be rendered operative with the expenditure of minimum time and effort, and by which, even after use, the medicament to be dispensed is maintained in a sterile condition.

Among the further objects of this invention are those of providing a dispenser by means of which a predetermined metered amount of proper dosage of a medicament can be dispensed without the risk of such dosage involving too great a volume, the dispenser contemplating a relatively simple assembly embodying few parts, each part being individually simple and rugged in construction and capable of production in quantity at relatively little expense.

With these and other objects in mind, reference is made to the drawings illustrating a preferred embodiment, and in which:

Figure 1 is a side elevation of the dispenser with the cap in place and the body members in the initial or extended position, and with parts broken away to illustrate the means for controlling the dispensing of medicament in predetermined metered amounts;

Figure 2 is a side view in section of the dispenser, the section being taken along the line 2—2 of Figure 1;

Figure 3 is a transverse section of the dispenser, the section being taken along the line 3—3 of Figure 1;

Figure 4 is a side elevation of the dispenser with the body members telescoped to the position where the dispenser is ready to dispense the initial metered amount of medicament, and with parts broken away to illustrate the means for controlling the dispensing of medicament in predetermined metered amounts;

Figure 5 is a side view in section of the dispenser, the section being taken along the line 5—5 of Figure 4; and

Figure 6 is a fragmentary pattern layout of means for controlling the dispensing of medicament in predetermined metered amounts.

In the drawings, wherein like elements are indicated by the same reference numeral, the numeral 10 represents a body member having an axially extending passage 11 opening on one end thereof, the other end of body member 10 being closed by a preferably integral end wall 12. Preferably, body member 10 is in the form of a cylinder or barrel and passage 11 is likewise preferably cylindrical. The exterior closed end of barrel 10 is provided with an annular flange 13 which is integral with end wall 12, and the central portion of the exterior side of end wall 12 is

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preferably slightly recessed to receive the tip of the thumb of the person operating the dispenser. The opposite, open end of barrel 10 is hermetically sealed by a stopper or piston 14 formed of natural or synthetic rubber, which is projectable through the bore of the barrel 10. As illustrated, the inner face of piston 14 may have a centrally located recess 15, thereby presenting a pierceable diaphragm portion between the exterior face and recessed portion of the piston. The sealed bore 11 of barrel 10 forms a chamber for containing a fluid medicament which is to be dispensed.

A second body member or casing 16 has an axially extending passage 17 for telescopically receiving barrel 10. Preferably, body member 16 is cylindrical and passage or bore 17 is likewise cylindrical. The exterior cylindrical side wall of barrel 10, preferably, slidably engages the side wall of cylindrical bore 17 of casing 16. The outer or dispensing end of casing 16 terminates in a preferably dome-shaped nose portion 18 formed with a dispensing bore or trap 19 centrally located in the exterior surface thereof. The dispensing end of casing 16 is provided with a removable closure or cap 20 having a head portion 21, a skirt 22 and a lug 23. The skirt sealingly engages the outer surface of dome-shaped nose portion 18, while lug 23 sealingly engages the side walls of trap 19 of casing 16.

Within bore 17 of casing 16 is a piston rod 24, which is rigidly mounted to nose portion 18, and extends axially of and for a substantial distance within bore 17. Piston rod 24 preferably is concentric with bore 17 and sufficiently small in cross-section to be capable of projection through the bore 11 of barrel 10. Piston rod 24 is structurally integral with casing 16, and is of material which is preferably integral with the material of casing 16. Extending lengthwise or axially within piston rod 24 is a cannula 25. One end of the cannula opens on the exterior side of casing 16 into trap 19 and the other end thereof is in the form of a point 26 which extends beyond the end of piston rod 24 a distance greater than the thickness of the piston or of the pierceable diaphragm portion of piston 14 where the latter-type piston is employed. Cannula 25 is prevented from movement within piston rod 24 by kinking the former so that the material forming piston rod 24 keys around undulated portions 27 of cannula 25.

A preferably annular flange 28 extends outwardly from and about casing 16 at a point intermediate the ends of casing 16. Thus, an operator, by placing the second and third fingers of his hand against flange 28 and his thumb in the recessed portion of end wall 12 of barrel 10 can cause barrel 10 to telescope within casing 16.

It is apparent that when barrel 10 and casing 16 are telescoped with respect to each other, the pointed end 26 of cannula 25 will penetrate piston 14 so that pointed end 26 will lie within centrally located recess 15 of piston 14. Continued telescopic movement of the barrel within the casing will cause the end of piston rod 24 to abut against piston 14 to project the latter through the bore of barrel 10, thereby causing fluid medicament to flow through cannula 25 and be dispensed from trap 19.

The dispenser is preferably provided with means by which the telescopic movement of the barrel with respect to the casing is controlled so that a predetermined metered amount or dosage of fluid medicament is dispensed when force is applied to the dispenser to urge the barrel into the casing. Accordingly, within bore 17 of casing 16 at a position near the open end of the bore is projecting means which takes the form of a key or lug 29 which is rigidly connected to the side wall of the bore. Referring to Figure 3, lug 29, preferably, is of a configuration such that its cross-section in planes passing transversely through the longitudinal axis of the casing is

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a relatively short sector of an annulus. The lug extends for but a relatively short distance axially of casing 16 as is illustrated particularly in Figures 1 and 4. The exterior cylindrical surface of barrel 10 is provided with a plurality of connected channels having a walled portion extending substantially longitudinally and a walled portion extending substantially transversely of barrel 10, which channels receive lug 29 in sliding engagement.

Referring more particularly to Figure 6, the exterior cylindrical surface of body member or barrel 10 is provided with a plurality of connected substantially rectangular shaped grooves which operably receive lug 29 in sliding engagement. As is indicated by the illustration, all of the grooves have substantially the same width measured in a direction substantially transversely of the axis of barrel 10; however, all of the grooves do not have the same length measured axially of barrel 10. For example, grooves 30, that is the grooves for controlling telescopic movement between the barrel and casing to cause metered amounts of fluid medicament to be dispensed, have substantially the same length, which length is somewhat shorter than the length of grooves 31 and 32. The grooves consist of a longitudinally extending walled portion 33, and a transversely extending walled portion 34. The width of the grooves measured at the longitudinally extending walled portion should be such that rotation of the barrel with respect to the casing is substantially prevented by lug 29 slidably engaging walled portions 33. Each groove is connected to adjacent grooves at two opposing diagonal corners and preferably the grooves form a helix about barrel 10. Each groove preferably is in communication with an adjacent groove so that longitudinally extending walled portions of two adjacent grooves lie in substantially the same line extending longitudinally of barrel 10, and the extent of communication or overlap in a longitudinal direction between two adjacent grooves is at least about equal to the thickness of lug 29 measured in a direction longitudinally of casing 16. Thus, when lug 29 abuts a transversely extending walled portion 34 of a groove, the lug can be caused to travel from one groove to an adjacent groove by rotating the body members or casing and barrel with respect to each other. Lug 29 is introduced into this helix of connected grooves through groove 32, a transverse edge of which coincides with the transverse open end edge of barrel 10. Groove 32 extends longitudinally of barrel 10 for a distance such that when lug 29 is in contact with transverse walled portion 34 of groove 32, barrel 10 and casing 16 are in the relative positions illustrated in Figures 1 and 2. Groove 31, which is immediately adjacent groove 32, is of greater value or length than groove 32. Groove 31 is followed by a plurality of grooves 30, all of substantially equal value in length, and of a lesser value or length than groove 31.

With barrel 10 filled with fluid medicament and sealed by piston 14 and barrel 10 and casing 16 disposed in the manner shown in Figures 1 and 2, it is apparent that the medicament will remain in stable condition for substantial periods of time. In this connection, it will be appreciated that the parts of the dispenser will have been initially sterilized. With lug 29 resting against transverse walled portion 34 of groove 32, pointed end 26 of cannula 25 will be merely in contact with or slightly imbedded in piston 14. With lug 29 in this position, further telescoping of the barrel and casing is prevented and there is no danger that medicament will be accidentally discharged from the dispenser as a consequence of the application of casual pressure to the body parts.

When it is desired to use the dispenser, stopper 20 is removed, and barrel 10 is rotated with respect to casing 16. Rotation of the barrel with respect to the casing causes lug 29 to pass from groove 32 into groove 31. Thereupon, axial force can be exerted upon barrel 10 to cause the barrel to telescope in casing 16. Telescoping

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movement of the case and barrel continues until further movement is prevented by lug 29 coming in contact with the inner transverse walled portion 34 of groove 31, at which point the dispenser body parts are in the position illustrated in Figures 4 and 5. During this movement, point 26 of cannula 25 is caused to penetrate the diaphragm portion of piston 14 and when lug 29 abuts the inner transverse walled portion 34 of slot 31, the end of the cannula lies within the cavity or recess 15 of piston 14, and the end of piston rod 24 is adjacent piston 14. The length of slot 31 should be such that the pointed end of the cannula is permitted to pass completely through piston 14, and piston rod 24 merely engages but does not project piston 14 through the bore of barrel 10 to any substantial degree. With the body members in this position no medicament will have been dispensed.

If the barrel and case are now rotated with respect to each other, lug 29 will move in a transverse direction from slot 31 to the first of a series of connected slots 30. Thereupon, by exerting axial pressure, lug 29 will traverse slot 30 as the body parts of the dispenser are further telescoped. This movement of the body parts causes piston rod 24 to project piston 14 through the bore of barrel 10 and a predetermined metered amount of fluid medicament, e. g. one or two drops, are forced through the cannula into trap 19. Further telescopic movement between the body members is prevented by lug 29 engaging a transverse walled portion 34 and thus only a metered amount of medicament is dispensed. With the nose or dispensing end 18 of the case disposed either adjacent or in contact with the desired surfaces of the patient, the medicament will be discharged onto those surfaces or may be inhaled so as to contact the surfaces of the nasal passages. A further measured dose can be obtained by again rotating the body members with respect to each other and thereafter moving them axially to further telescope them. Such axial movement in each instance after the aforescribed penetration of the piston 14 by cannula 25, results in piston rod 24 projecting piston 14 through the bore of barrel 10 a measured distance to dispense fluid medicament.

With the instant device, excess dosages are prevented from being dispensed. Also, after one dose has been dispensed, the user may reseal the dispenser by applying the stopper assembly thereto. The dispenser may be carried in a person's pocket without fear of accidental discharge of medicament occurring. Further dosages can be subsequently dispensed by simply removing the stopper and operating the dispenser in the manner heretofore described. After the contents of the barrel have been discharged, the latter may be discarded. The casing 16 may be subsequently cleaned if desired and reused with any number of new barrels. Also, the dispenser may be used in conjunction with an ampule having a bore therethrough, which bore is sealed by a piston similar to the piston heretofore described which can be projected through the bore of the ampule. When using the dispenser with such an ampule, the ampule will be inserted into the bore of barrel 10 and the body parts of the dispenser caused to telescope as indicated above. When such ampules are used, the cross-section of the piston rod should be sufficiently small to be capable of projection through the barrel of the ampule.

Obviously, numerous changes in the construction and measurements of the parts of the dispenser may be resorted to without departing from the spirit of the invention as defined by the claim.

It is claimed:

A dispenser for fluid medicaments including a first body member enclosed by an external wall and having an internal wall defining an axial passage in said member, said passage being open at one end thereof and being closed at the other end thereof, a piston positioned in said passage in sliding contact with said internal wall, a second body member having an internal wall defining an

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axial passage, said passage in second member being open at one end thereof and closed at the other end thereof, said first member being received in the open end of said axial passage in said second member with the external wall of said first member in sliding contact with the internal wall of said second member and with the open end of said passage in said first member directed inwardly of said passage into said second member, a rod structurally integral with said second member disposed axially within said axial passage in said second member and connected at one end to said member at the closed end of said passage, the other end of said rod projecting into the open end of said axial passage in said first member for projecting said piston through said passage in said first member, a cannula positioned lengthwise within said rod, one end of said cannula being pointed and projected from said other end of said rod for piercing said piston when said rod and piston are in abutting contact, the other end of said cannula opening exteriorly of said second member, cooperating means formed in the internal wall of said second member and in the external wall of said first member for limiting axial movement of said first member with respect to said second member to a series of short steps interrelated by rotational movement of said first member with respect to said second member, said means comprising a channel defined in one of said

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pair of cooperating walls and a lug slidably received by said channel projecting from the other of said cooperating walls, said channel including a series of rectangularly shaped portions interconnected at diagonally opposite corners and thereby disposed in a helical pattern, said rectangular portions each having sufficient length for said lug to slide lengthwise therein affording discrete axial movement of said first member with respect to said second member, each interconnected pair of said portions overlapping lengthwise for said lug to slide transversely from one said portion to the other affording discrete angular movement of said first member with respect to said second member.

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