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(54) **DOSAGE DEVICE**

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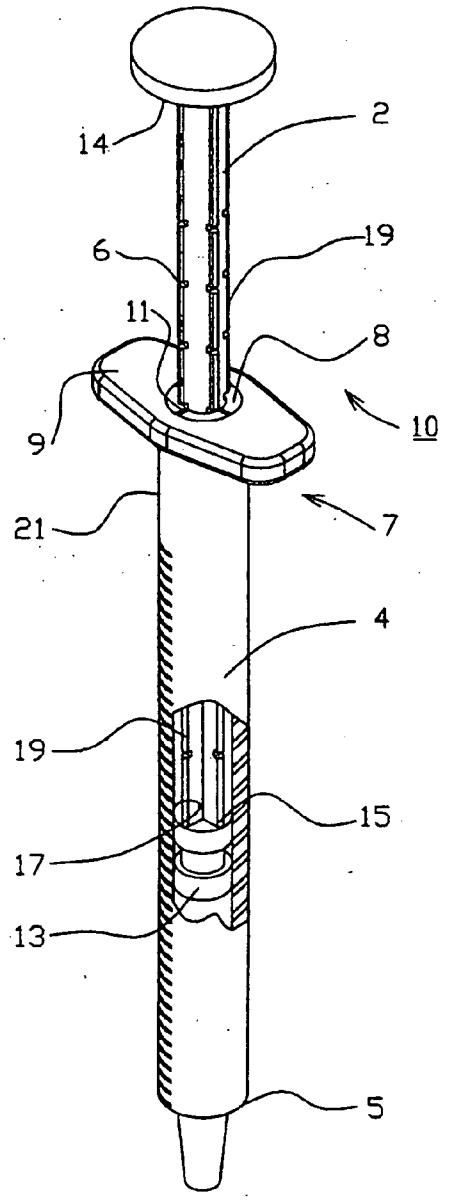
(57) **ABSTRACT**

A dosage device has a hollow barrel and a plunger slidable within the barrel, and a plurality of formations provided on the barrel and plunger and cooperating with one another to produce a sound signal, which corresponds to a predetermined dosage of fluid drawn into or displaced from the barrel. At least one of the barrel and plunger formations is configured to have a plurality of spaced-apart segments shaped and dimensioned to improve the quality of the sound signal.



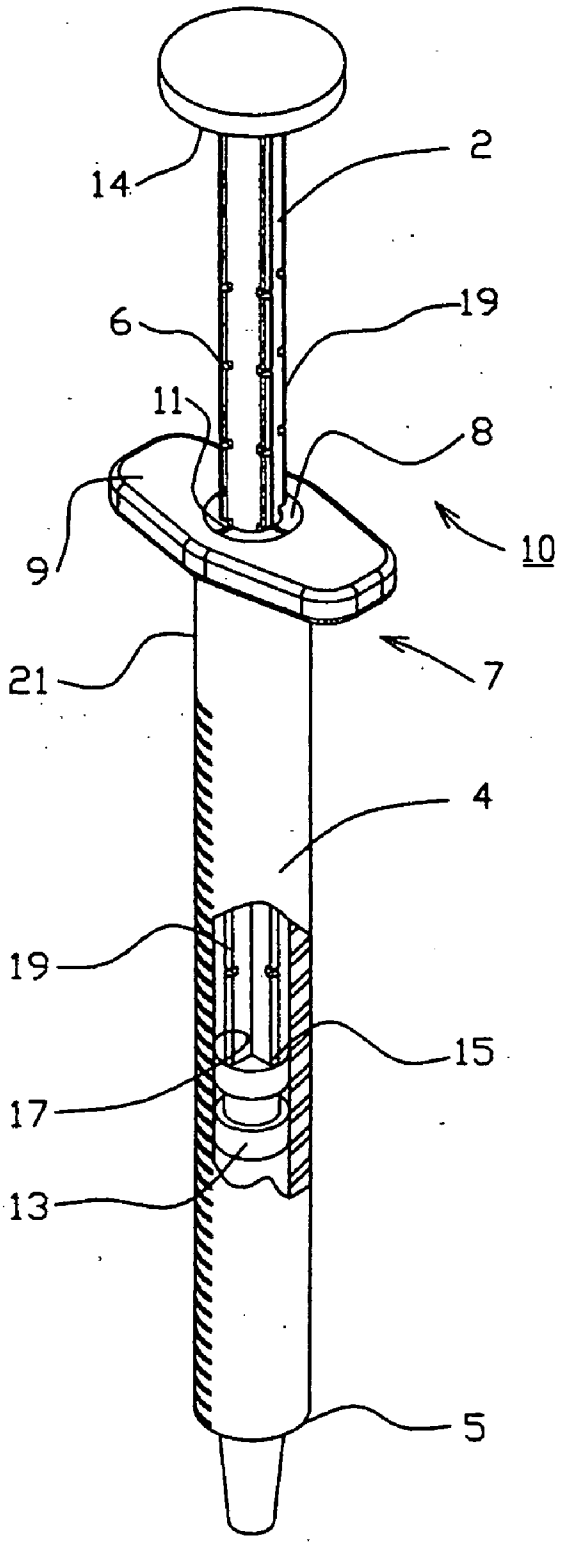


FIG. 1

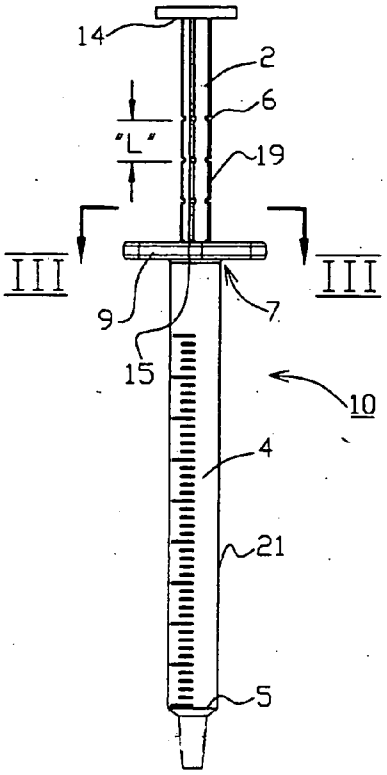


FIG. 2

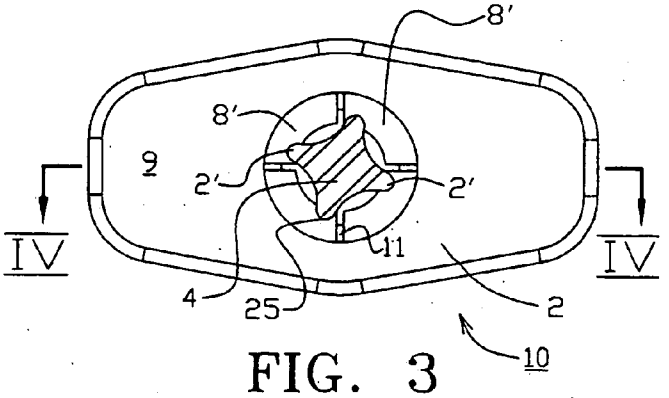


FIG. 3

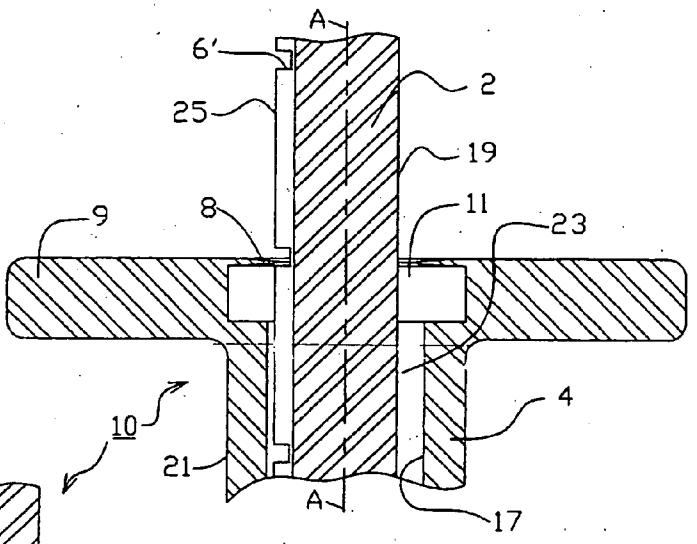


FIG. 4

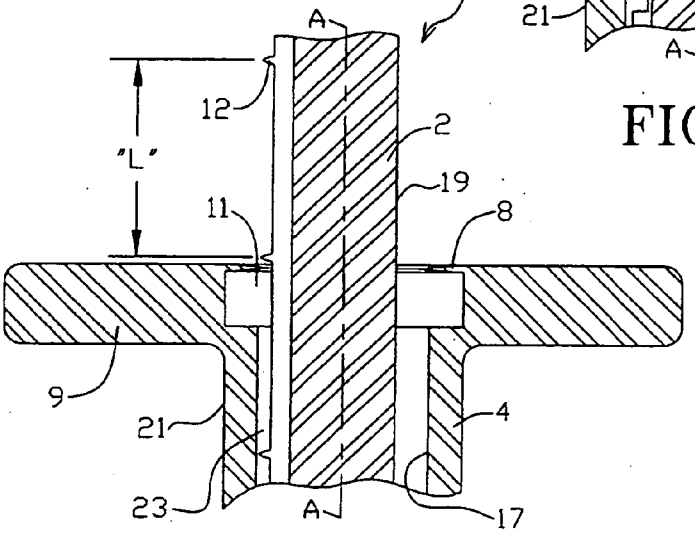


FIG. 5

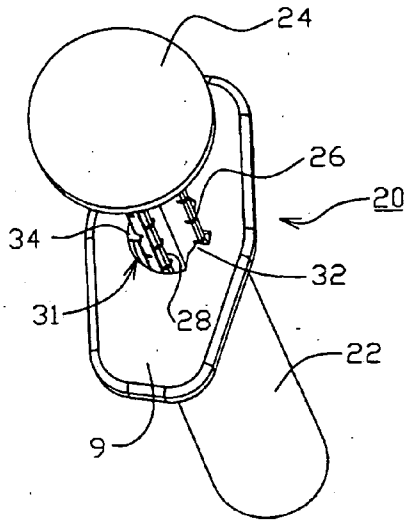


FIG. 6

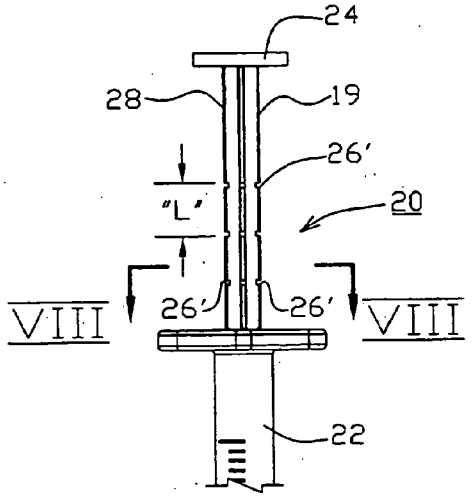


FIG. 7

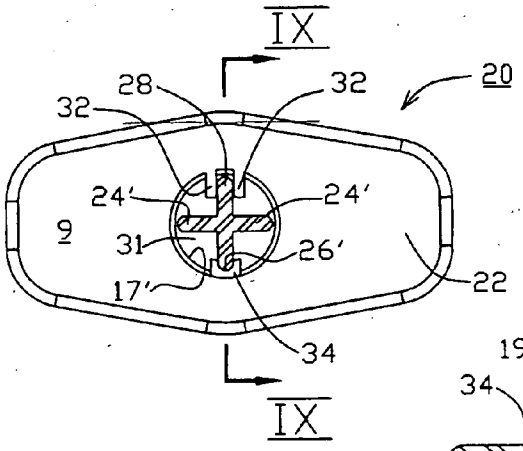


FIG. 8

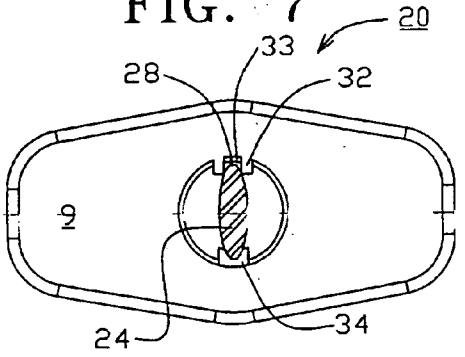


FIG. 8A

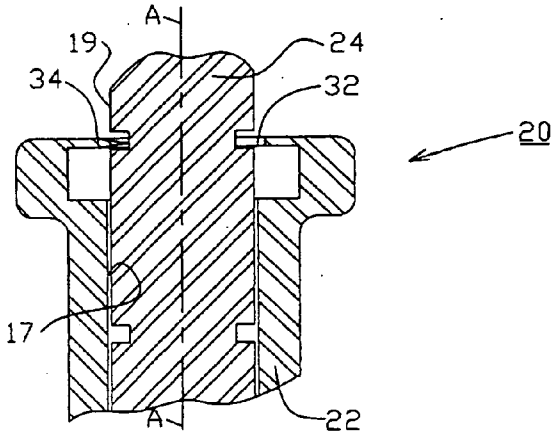


FIG. 9

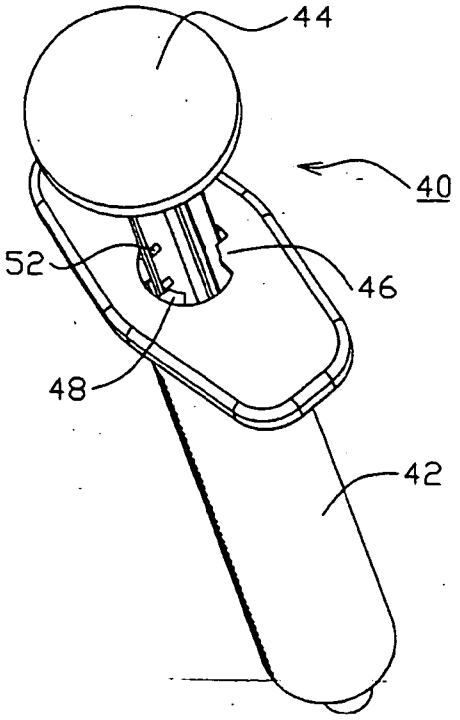


FIG. 10

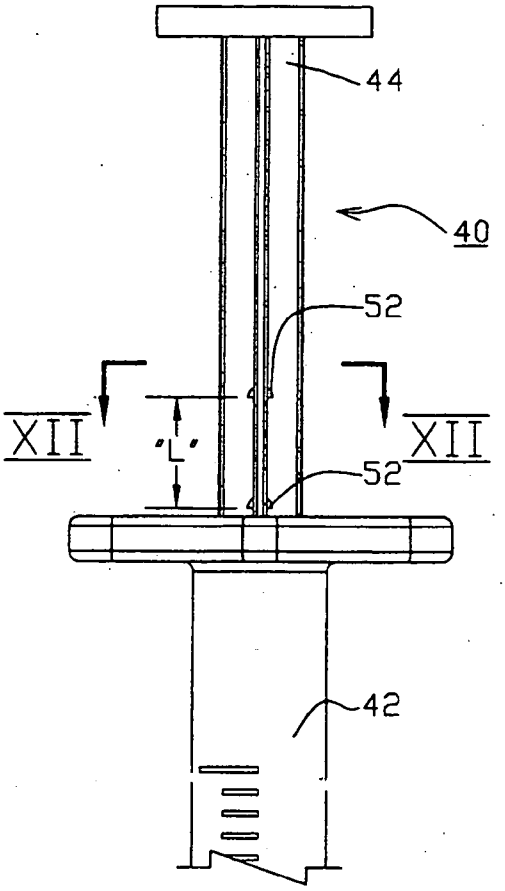


FIG. 11

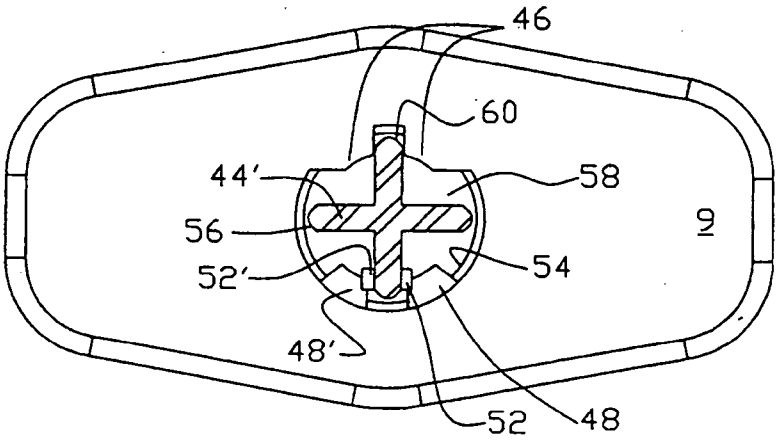


FIG. 12

DOSAGE DEVICE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] This invention relates to fluid dispensing devices. More particularly, the invention relates to dosage devices for storing and administering a predetermined dosage of fluid.

[0003] 2. Discussion of Related Prior Art

[0004] Devices for administering predetermined amounts or dosages of fluid are widely used in a variety of industries including, but not limited to, medicine. Dosage devices, such as hypodermic syringes, administer the drug directly in the bloodstream or in the tissue of the patient, who is thus directly affected by the drug. As a result, it is very important to assure that the precise dosage is administered at all times.

[0005] Commonly, hypodermic syringes include a graduated scale disposed on the body of the syringe. Utilizing the scale, an individual administering a drug will draw a quantity of the drug from a vial into the syringe, and then expel quantities of the drug until the precise dosage is achieved. This common measurement procedure can often be difficult and time-consuming, and most importantly can be quite wasteful as a quantity of the drug is expelled in order to achieve the appropriate dosage.

[0006] Quite often, medical professionals administering an injection may not have a clear view of the targeted body part of the patient. In this case, many rely on their experience to administer the desired dosage, which still may not be precise. Furthermore, those individuals who self-administer drugs may experience even more inconvenience than the professionals. Diminished hearing, eyesight and/or diminished dexterity of the user may lead individuals to draw/dispense the imprecise dosage of the drug into or from the syringe.

[0007] To minimize the above-mentioned inconveniences, some of the known dosage devices have been provided with a tactile mechanism operative to generate a sound signal and/or increased resistance indicating displacement of the desired dosage of fluid into and from the dosage device.

[0008] Typically, the tactile mechanism includes a combination of endless circular projections and indentations formed on the opposing surfaces of the syringe components, a plunger and barrel. Sometimes, loads acting upon the plunger are not uniform. As a result, the plunger may slightly deviate from the desired path within the barrel which leads to an unarticulated sound signal because only a portion of endless projection engages an indentation.

[0009] To provide the desired operation of the dosage device, typically, the distal end of the plunger has a sealing element pressing against the inner surface of the barrel so as to prevent flow communication between proximal and distal ends of the barrel. Often the users incidentally rotate the plunger relative to the barrel. This, in turn, may damage the sealing element. While some of the known dosage devices have a means for limiting relative rotation between the barrel and plunger, its structure is complicated.

[0010] A need thus exists for dosage devices that have a structure configured to reliably produce a distinct audible signal indicating the desired dosage of fluid drawn into or displaced from dosage devices in a reliable, simple manner.

[0011] A further need exists for dosage devices that have a simple structure minimizing the risk of damaging a seal between the barrel and plunger of dosage devices.

SUMMARY OF THE INVENTION

[0012] The present invention is directed to dosage devices that satisfy these needs. The invention includes a dosage device capable of producing a clear indicating signal, such as sound and/or pointed impulse sensed by the user while either forcing fluid into or displacing it from its barrel.

The dosage device in accordance with the invention includes a barrel formation provided on a barrel and a plunger formation located on a plunger. The barrel and plunger formations are configured to engage one another during linear displacement of the plunger relative to the barrel and produce clear sound signals. One of the barrel and plunger formations is divided into a plurality of separate, spaced-apart segments. As a consequence, even if the plunger deviates from its predetermined path, a relatively short segment of one of the formations still produces a clear sound signal upon engaging the other formation as the plunger and barrel are linearly displaced relative to one another.

[0013] According to a further aspect of the invention, opposing inner and outer surfaces of the barrel and plunger, respectively, have regions shaped so that rotation between the plunger and barrel relative to one another is prevented. As a consequence, the integrity of a sealing element between the barrel and plunger is preserved.

[0014] These and other features and aspects of the present invention will be better understood with reference to the following description, figures, and appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] FIG. **1** is an isometric view of a dosage device configured with a plunger and barrel according the invention;

[0016] FIG. **2** is a side elevational view of the dosage device shown in FIG. **1**;

[0017] FIG. **3** is a cross-sectional view of the plunger of the dosage device taken along lines III-III, which are illustrated in FIG. **2**;

[0018] FIG. **4** is a sectional view of the dosage device taken along lines IV-IV, which are shown in FIG. **3**, and illustrating a projection that is formed on the barrel's inner surface, and an indentation that is provided on the plunger's outer surface;

[0019] FIG. **5** is a sectional view of the dosage device similar to FIG. **4**, but illustrating the projection, which is provided on the outer surface of the plunger and the indentation on the inner surface of the barrel;

[0020] FIG. **6** is an isometric view of the dosage device configured in accordance with another embodiment of the invention;

[0021] FIG. **7** is a side elevational view of the dosage device shown in FIG. **6**;

[0022] FIG. **8** is a cross-sectional view of the plunger of the dosage device taken along lines VIII-VIII, which are shown in FIG. **7**;

[0023] FIG. **8**A is a cross-sectional view of the plunger having a cross-section different from the one illustrated in FIG. **8**;

[0024] FIG. **9** is a sectional view of the dosage device taken along lines IX-IX of FIG. **8** and illustrating a projection,

which is provided on the outer surface of the plunger, and an indentation, which is formed on the inner surface of the barrel;

[0025] FIG. **10** is an isometric view of the dosage device configured in accordance with a further embodiment of the invention;

[0026] FIG. **11** is a side elevational view of the dosage device shown in FIG. **10**; and

[0027] FIG. **12** is a cross-sectional view of the plunger of the dosage device taken along lines XII-XII of FIG. **11**.

DETAILED DESCRIPTION OF THE DRAWINGS

[0028] Reference will now be made in detail to several embodiments of the invention that are illustrated in the accompanying drawings. Wherever possible, same or similar reference numerals are used in the drawings and the description to refer to the same or like parts or steps. The drawings are in simplified form and are not to precise scale. For purposes of convenience and clarity only, directional terms, such as top, bottom, left, right, up, down, over, above, below, beneath, rear, and front may be used with respect to the drawings. These and similar directional terms should not be construed to limit the scope of the invention in any manner. The terms "dosage device" and "hypodermic syringe" are used interchangeably.

Referring more particularly to the drawings, FIGS. **1-5** illustrate a dosage device **10** including, but not limited to, a hypodermic syringe, which is operative to receive, store and dispense predetermined dosages of fluid. A clear sound signal accompanies each predetermined dosage drawn into the syringe or dispensed therefrom. Furthermore, the user experiences increased resistance during displacement of the components of the dosage device indicated by a pointed impulse every time the predetermined dosage of fluid has been displaced.

[0029] The hypodermic syringe **10** includes a hollow barrel **4**, which serves as a reservoir for fluid and slidably receives the plunger **2** acting as a means for displacing fluid into and out of the barrel **4**. A distal end **5** of the barrel **4** (FIGS. **1**, **2**) is coupled to a hypodermic needle traversed by fluid on its way in and out from the barrel **4**. Linear displacement of the plunger **2** from the distal end **5** of the barrel towards the barrel's proximate end **7** forces fluid into the barrel; the opposite direction of the plunger's displacement is associated with evacuation of the accumulated fluid from the barrel. To complete evacuation of fluid from the barrel **4**, the plunger **2** is displaced so that the plunger's distal end **15** is located next to the distal end **5** of the barrel. Conversely, to fully fill the barrel **4**, the plunger is displaced so that its distal end **15** is juxtaposed with the proximal end **7** of the barrel, as illustrated in FIG. **2**.

[0030] The proximal end **7** of the barrel **4** has a flange **9** configured to provide a support for the user's fingers, while the user actuates the plunger **2** to move linearly relative to the barrel **4**. The flange **9** extends radially beyond an outer surface **21** of the barrel **4** (FIGS. **1**, **4-5**) and thus has a sufficiently large support area for the user's convenience. The flange **9** has an opening **11** (FIGS. **1**, **2**) coaxial with a passage **23** (FIGS. **4**, **5**), which is defined by the inner surface **17** of the barrel **4**, and traversed by the plunger **2**. Dispensing of fluid associated with linear motion of the plunger **2** towards the distant end **5** of the barrel **4** is terminated when the proximal end **14** of the plunger reaches the top of the flange **9**.

The opening **11** of the flange **9** is dimensioned to be slightly larger than an outer surface **19** of the plunger **2** (FIGS. **1** and **3-5**). However, to guide the plunger **2** along the desired linear path through the flange **9**, the opening **11** is partially obstructed by a barrel formation **8** (FIGS. **1**, **3-5**) extending radially inwards from the opening's periphery. The barrel formation(s) **8** is made from flexible material, such as engineering plastics or rubber, and dimensioned to extend so that it terminates next to the outer surface **19** of the plunger. The plunger **2**, in turn, has a plurality of plunger formations **6** (FIGS. **1-4**) spaced from one another along an axis A-A (FIG. **4**) at a predetermined distance L (FIG. **2**). As the plunger **2** moves relative to the barrel formation **8**, each of the plunger formations **6** engages the barrel formation **8** to produce a sound signal. Consecutive sound signals and/or pointed impulses produced by the formations during displacement of the plunger **2** at the distance L indicate that a predetermined dosage of fluid has entered or exited the barrel **4**. Attempts to continue displacement of the plunger **2** after the formations **6**, **8** have been engaged are associated with a substantial effort necessary to overcome the resistance of the engaged formations. While the plurality of plunger formations **6** is shown in FIGS. **1-2** and **4**, a single plunger formation may be sufficient, if the device **10** is specifically designed to operate as a single dosage device.

[0031] To produce a distinct sound signal the barrel formation **8** is provided with multiple segments **8'** (FIG. **3**), which are spaced angularly around the periphery of the opening **11**. Thus, having multiple segments instead of a single endless formation allows a relatively small segment **8'** to be substantially more flexible than the endless formation and produce a clear sound signal upon engagement with the plunger formation **6**. Each segment **8'** may be curved, as shown in FIG. **3**, polygonal or have any other irregular shape subject only to reliable engagement with the formation **6**. Furthermore, the segments **8'** may be non-uniformly shaped and spaced angularly from one another at a non-uniform distance.

[0032] Each of the plunger formations **6** may be segmented as well. Since, as shown in FIGS. **1-4**, the barrel formation **8** is configured as a projection, each plunger formation **6** includes an indent receiving the projection. The quality of sound or pointed impulses would not be affected if the plunger formation **6** were formed as an endless indentation or as a plurality of spaced angularly apart indentations, as shown in FIGS. **1** and **2**.

[0033] Referring to FIG. **5**, the plunger **2** has a plurality of the plunger formation **12** spaced from one another along the axis A-A and each configured as a respective projection with multiple segment, which are angularly spaced from one another. The formations **12** are made from flexible material producing sound signals and/or pointed impulses to the user's finger due the change of resistance caused by engagement between each plunger formations **12** and barrel formation **8**. In this case, the barrel formation may be made from either rigid or flexible material. The flange **9**, in turn, includes the barrel formation **8** configured as an endless or segmented indentation. Regardless of the specific configuration of the formations, the width of the indentation, as viewed along the longitudinal axis A-A (FIGS. **4**, **5**), is somewhat greater than the thickness of the projection **12** which improves the quality of sound signals.

[0034] Turning to FIGS. **3** and **4**, the plunger **2** is configured with a cross-section having a cross-like shape. Each of multiple legs **2'** of the plunger extends radially outwards towards

the periphery of the opening **11** provided with multiple segments **8'**. The legs **2'** and segments **8'** of the projection **8** are dimensioned to radially overlap, which allows the segments **8'** to penetrate the indentations **6'** (FIG. **4**) once the formations **6** and **8** are radially aligned. Four indentations **6'** forming the plunger formation **6** each are provided on a respective outer longitudinal edge **25** of the leg **2'** (FIGS. **3**, **4**). If a double or greater number of predetermined dosages of fluid is required, the user continues to move the plunger **2** to generate the desired number of consecutive sound signals. When not engaged within indentations **6'**, the segments **8'** (FIG. **3**) urge against the outer edges **25** of the legs **2'**, which define the outer surface **19** of the plunger **2**. The cross-section of the plunger **2** is not limited to the one shown in FIG. **3**, but can have any of circular, polygonal or irregular shapes.

[0035] Referring again to FIG. **1**, the distal end **15** of the plunger has a seal **13** typically made from polymer, such as rubber or plastic, and extending between the outer surface **19** of the plunger **2** and an inner surface **17** of the barrel **4**. Penetration of fluid through the seal **13** causes the syringe **10** to malfunction. Therefore, the seal **13**, displaceable with the plunger **2**, presses against the inner surface **17** of the barrel with a force sufficient to prevent fluid from penetration into a space between the seal **13** and the proximal end **7** of the barrel.

[0036] The components of the dosage device **10** are typically made from engineering plastics. However, various materials may be successfully utilized as well. For example, the plunger **2** and plunger **4** may be made from glass. Alternatively, material of one of these components may be glass, whereas the other component is made from plastic. Furthermore, material of the plunger and barrel may be different from material of the plunger and barrel formations. For example, while material of the plunger **2** may include glass, plunger's formations may be formed of plastic, and conversely. To implement such a modification technologically, the body of the barrel may be recessed at axially spaced-apart locations, and plastic segments may be removably or fixedly mounted to these recessed locations.

[0037] Referring to FIGS. **6-9**, a dosage device **20** is configured in accordance with a further embodiment of the invention. Similarly to the device **10** illustrated in FIGS. **1-5**, the dosage device **20** has a barrel **22**, receiving a plunger **24**, and barrel and plunger formations **34** and **26**, respectively. Displacement of the plunger **24** at a distance L (FIG. **7**) between axially adjacent plunger formations **26** corresponds to the predetermined fluid dosage entering or exiting the dosage device **20**.

[0038] Displacement of fluid into or from the barrel **22** is associated with sound signals produced by the engaged formations **26** and **34** and increased resistance to displacement of the plunger **24** as a result of engagement between these formations. The barrel formation **34** including a projection, which extends from an inner surface **17'** (FIG. **8**) of opening **31** towards the outer surface **19** of the plunger **24** (FIGS. **7**, **8**), is received by an opposing segment **26'** of the plunger formation **26**. Accordingly, each plunger formation **26** includes at least two indentations or segments **26'** each provided on respective longitudinal edge **28** (FIG. **7**) of a leg **24'** of the cross-shaped plunger.

[0039] As shown in FIG. **8**, a single barrel projections/formation **34** is sufficient to reliably engage and produce a sound signal. However, multiple projections may be spaced diametrically opposite one another or at any other angle differing from 180° and each received in a respective indentation **26'**.

[0040] In contrast to the barrel formation **8** illustrated in FIGS. **1-5**, the barrel formation **34** (FIGS. **6-9**) is not symmetrically arranged relative to axis A-A (FIG. **9**). The circumference of the inner surface **17'** of the opening **31** (FIGS. **6**, **8**) formed in the flange **9** has a circular portion and a pair of non-circular portions **32**. The non-circular portions **32** are configured to form a recess **33** dimensioned to receive the edge **28** of the plunger's leg **24'**. Engagement between the recess **33** and leg **24'** prevents relative rotation between the plunger **24** and barrel **22** about the axis A-A (FIG. **9**) preserves the integrity of the seal **13** (FIG. **1**). Although the recess **33** has a generally U-shaped cross-section, this shape can vary as long as the shapes of the edge **28** of the plunger and recess **33** are complementary.

[0041] Note that the cross-section of the plunger **24** is not limited to the cross-like shape and can be circular, elliptical, as shown in FIG. **8**A, polygonal or irregular. To prevent relative rotation between the plunger **24** and barrel **26**, edges **28** (FIG. **8**A) are dimensioned and shaped to engage the recess **33**. Other configurations of the plunger **24** can be provided with a radial extension, such as a rib, to function similarly to the edges **28** (FIGS. **6** and **8**A).

[0042] Moreover, instead of the recess **33** formed in the periphery of the opening **31** of the flange **9**, a short, relatively thick guide extending radially towards the plunger **24** can be provided on the opening's inner surface **17**. To limit relative rotation between the plunger and barrel **24**, **22**, the guide may be received in an axial groove formed along the plunger.

[0043] Referring to a further embodiment of a dosage device **40** configured in accordance with the invention and illustrated in FIGS. **10-12**, the device **40** includes a plunger **44** slidable within a hollow barrel **42**. Similarly to the previous embodiments, the plunger **44** has a plurality of plunger formations **52** spaced axially from one another at a distance L (FIG. **11**), and the barrel **42** is provided with a barrel formation **48** (FIGS. **10**, **12**). Displacement of the plunger **44** relative to the barrel **42** is accompanied by a sound signal when the barrel and plunger formations engage one another.

[0044] Turning to FIG. **12**, both the barrel formation **48** and plunger formation **52** project from respective inner and outer surfaces **54**, **56** of an opening **58** and plunger **44**, respectively. Also, each of the barrel and plunger formations is segmented. Segments **48'** of the barrel **42** are spaced angularly from one another at a distance sufficient for a leg **44'** of the plunger **44** to slide between these projections. Increased resistance to displacement of the plunger **44** and generation of sound signals are caused by segments or lips **52'** of the plunger formation **52**, which flank the leg **44'** and overlap the juxtaposed segments **48'** of the barrel formation **52**. Made from flexible material, all segments flex generating a sound signal upon engaging one another.

The surface **56** of the opening **58** of the flange **9** is shaped similarly to the opening **31** of FIGS. **6-9** and has a circular portion and two portions **46** defining a recess **60** which is dimensioned to receive a free end of the plunger's leg **44'**. As a result, the plunger **44** and barrel **42** are rotationally fixed to prevent the seal **13** (FIG. **1**) from damages.

[0045] In operation, the plunger is displaced towards and presses against the distal end of the barrel to assume an initial position. Displacement of the plunger towards the proximal end of the barrel is accompanied by a number of sound signals

as each of the plunger formations passes the formation formed on the barrel's flange. As disclosed, each sound and/or change of resistance is indicative of a predetermined dosage of fluid filling the barrel. Reverse displacement of the plunger towards the distal end of the barrel is also accompanied by indicating signals informing the user how much liquid has been administered.

[0046] While the dosage device of the invention has been described to be adapted for injection, it may be applicable to other systems, angiographic and otherwise. Furthermore, application of the inventive dosage device can be successfully utilized in various industries requiring a metered distribution of fluid. Thus the foregoing description and accompanying drawings set forth the preferred embodiment of the invention. Modifications, alternative designs will be apparent in light of the foregoing teaching without departing from the scope of the appended claims.

1. A dosage device, comprising:

a barrel extending along a longitudinal axis and having an inner surface;

a barrel formation extending circumferentially on the inner surface of the barrel;

a plunger received in and axially displaceable within the barrel; and

a plunger formation provided on an outer surface of the plunger, wherein the barrel formation is formed of a plurality of segments spaced angularly from one another and configured to selectively engage the plunger formation while generating an indicating signal corresponding to a predetermined dosage of fluid drawn into or dispensed from the barrel during axial displacement of the plunger.

2. The dosage device of claim **1**, further comprising at least one additional plunger formation spaced axially from the plunger formation at a distance corresponding to the predetermined dosage of fluid drawn into or dispensed from the barrel during displacement of the plunger.

3. The dosage device of claim **1**, wherein the at least one of the plunger and barrel formations includes an indent provided on one of the inner and outer surfaces of the barrel and plunger, respectively, the other one of the plunger and barrel formations including a projection, which upon engaging the indent produces the indicating signal.

4. The dosage device of claim **3**, wherein the indent is provided on the outer surface of the plunger and the projection is provided on the inner surface of the barrel.

5. The dosage device of claim **3**, wherein the indent is provided on the inner surface of the barrel and the projection is provided on the outer surface of the plunger.

6. The dosage device of claim **3**, wherein the projection is configured with the plurality of segments each having a cross-section, which is selected from the group consisting of a triangular shape, polygonal shape, semi-circular shape and a combination of these.

7. The dosage device of claim **3**, wherein the projection is configured with the plurality of segments spaced angularly at a uniform or nonuniform distance.

8. (canceled)

9. The dosage device of claim **6**, wherein the indent includes a plurality of recesses spaced angularly from one another and each receiving a respective segment of the plurality of segments.

10. The dosage device of claim **1**, wherein the plurality of segments each is made from flexible material.

11. The dosage device of claim **3**, wherein a width of the indent along the longitudinal axis is larger than a thickness of each of the plurality of segments to allow at least one of the plurality of segments to resiliently flex and create the indicating signal upon engagement thereof with the indent.

12. (canceled)

13. (canceled)

14. The dosage device of claim **1**, wherein the plunger has an X-shaped cross-section defined by a plurality of legs, at least two of the plurality of legs each having a respective indent facing the inner surface of the barrel and defining a plurality of segments configured to selectively engage one segment associated of the barrel formation to generate the indicating signal.

15. The dosage device of claim **14**, wherein the at least two legs of the plunger extend diametrically opposite to one another or at an angle differing from a 180° angle.

16. The dosage device of claim **1**, wherein the plurality of segments of the barrel formation includes at least two projections, the plunger formation including at least two angularly spaced lips each configured to engage a respective one of the plurality of barrel segments to produce the indicating signal.

17. The dosage device of claim **1**, wherein the barrel has a distal end and a proximal end located axially opposite to the distal end, the proximal end having a flange traversed by the plunger and provided with the barrel formation.

18. The dosage device of claim **1**, wherein the indicating signal is selected from the group consisting of an audible signal, pointed impulse to a user's hand and a combination thereof.

19. A dosage device, comprising:

a barrel having an inner surface defining a passage, which extends between a proximal and distal ends of the barrel; and

a plunger mounted within the passage and slidable therein between the proximal and distal ends of the barrel to force fluid into and out of the barrel, the outer and inner surfaces of the plunger and barrel being configured to prevent rotation of the barrel and plunger relative to one another.

20. The dosage device of claim **19**, further comprising a barrel formation formed on the inner surface of the barrel in a close proximity to the proximal end of the barrel, and a plunger formation provided on the outer surface of the plunger between proximal and distal ends of the plunger, at least one of the plunger and barrel formations having a plurality of segments spaced angularly from one another and configured to selectively engage the other formation while generating an indicating signal corresponding to a predetermined dosage of fluid drawn into or dispensed from the barrel during axial displacement of the plunger

21. The dosage device of claim **19**, further comprising a seal provided on the distal end of the plunger and displaceable therewith to prevent flow communication between the proximal and distal ends of the barrel.

22. The dosage device of claim **19**, wherein the proximal end of the barrel has a flange provided with an opening, which is coaxial with the passage and provided with a periphery, the periphery of the opening having a recess configured to engage the plunger so that relative rotation between the plunger and barrel is prevented.

23. The dosage device of claim **22**, wherein the plunger is provided with a plurality of legs, one of the plurality of legs having a respective free end engaging the recess provided on the periphery of the opening.

24. The dosage device of claim **19**, wherein the proximal end of the barrel has a flange provided with an opening, which is coaxial with the passage and traversed by the plunger, a periphery of the opening having a guide extending radially inwards towards and engaging an outer surface of the plunger so that relative rotation of the plunger and barrel is prevented.

25. The dosage device of claim **24**, wherein the guide extend axially and terminates close to the proximal end of the barrel, the plunger being provided with a groove configured to receive the guide so that relative rotation of the barrel and plunger is prevented.

26. The dosage device of claim **19**, wherein the plunger has a cross-section selected from the group consisting of a polygonal, elliptical, circular and irregular shape.

27. A dosage device comprising:

a barrel having an opening at a proximal end that forms an entrance into an interior of the barrel, wherein the opening has an irregular shape;

a first engagement member extending inwardly into the barrel opening;

a plunger received in and axially displaceable within the interior of the barrel;

a second engagement member that is complementary to the first engagement member and is formed as part of the plunger for selectively engaging the first engagement member so as to generate an indicating signal corresponding to a predetermined dosage of fluid drawn into or dispensed from the barrel during axial displacement of the plunger; and

a first locator feature formed as part of the barrel opening and contributing to the irregular shape thereof, wherein the plunger is configured to mate with the first locator member so as to prevent rotation of the plunger and barrel with respect to one another.

28. The dosage device of claim **27**, wherein the first engagement member comprises one or more flexible flanges that extend inwardly into the barrel opening.

29. The dosage device of claim **28**, wherein there is a plurality of flexible flanges spaced circumferentially about the barrel opening and the second engagement member comprises a notch whereupon the engagement of one flexible flange within one notch produces the indicating signal.

30. The dosage device of claim **27**, wherein the first locator feature is located opposite the one first engagement member.

31. The dosage device of claim **27**, wherein the first locator feature comprises a recess that opens into the barrel opening and extends radially outward therefrom and the plunger includes a second locator feature in the form of a projection that is received within the recess.

32. The dosage device of claim **27**, wherein the first locator feature comprises a guide member that projects radially inward into the barrel opening and the plunger includes a second locator feature in the form of an axial groove formed longitudinally along a length of the plunger and configured to receive the guide member.

33. The dosage device of claim **27**, wherein the irregular shape of the barrel opening is defined by an arcuate portion and an irregular portion, with the locator feature being formed in the irregular portion.

34. A dosage device comprising:

a barrel having an opening at a proximal end that forms an entrance into an interior of the barrel;

a plurality of first engagement members extending inwardly into the barrel opening, the first engagement members being circumferentially spaced apart from one another about the barrel opening and arranged in an asymmetric manner;

a plunger received in and axially displaceable within the interior of the barrel;

a second engagement member that is complementary to one first engagement member and is formed as part of the plunger for selectively engaging the first engagement member so as to generate an indicating signal corresponding to a predetermined dosage of fluid drawn into or dispensed from the barrel during axial displacement of the plunger.

35. The dosage device of claim **34**, wherein the barrel opening has an irregular shape and the device further includes:

a first locator feature formed as part of the barrel opening and contributing to the irregular shape thereof, wherein the plunger is configured to mate with the first locator member so as to prevent rotation of the plunger and barrel with respect to one another.

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