

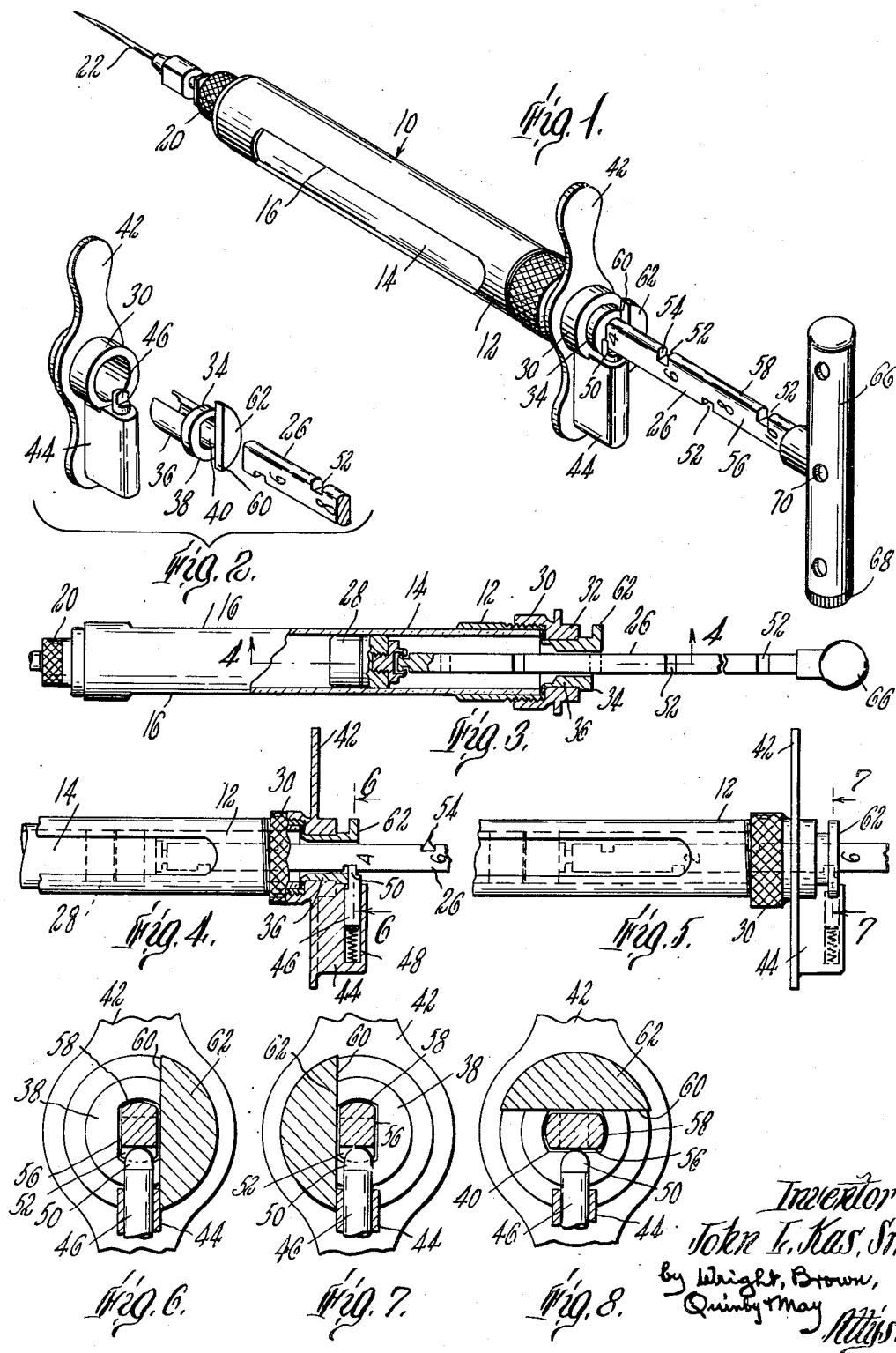
May 10, 1955

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2,707,954

DOSING SYRINGE

Filed May 5, 1954



1

2,707,954

DOSING SYRINGE

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Application May 5, 1954, Serial No. 427,729

6 Claims. (Cl. 128—218)

This invention relates to a hypodermic syringe designed to facilitate successive injections of a measured dosage of the liquid in the barrel of the syringe. It is an object of the invention to provide relatively simple means setting the stem of the plunger so that it can be freely reciprocated through its entire stroke or so that its axial movement is definitely limited in either direction. For this purpose the stem is provided with two parallel plane faces joined by cylindrical surface portions so that the cross-sectional contour has two straight parallel sides and two arcuate sides. Notches are cut in the arcuate sides of the stem, those notches being at equal intervals and staggered. A pawl is provided to hold the plunger against axial movement in either direction when engaged in one of the notches. If the stem is turned 180° the pawl is then engaging an unnotched portion of the opposite arcuate side. The stem can then be moved in or out until the pawl enters another notch. Stop means are provided which limit the turning of the stem to 180° and the stops are arranged so that the pawl engages one or the other notched edge of the stem when the latter is turned to either extreme angular position. According to the invention, furthermore, when the stem is turned 90° from either extreme position, it is then free to move axially throughout its entire stroke.

For a more complete understanding of the invention reference may be had to the following description thereof, and to the drawing, of which—

Figure 1 is a perspective view of a syringe embodying the invention;

Figure 2 is a fragmentary exploded perspective view of some of the parts shown in Figure 1;

Figure 3 is an elevational view of the syringe, a portion being broken away to show in section;

Figure 4 is a fragmentary elevation of the syringe, a portion being broken away to show in section in accordance with the line 4—4 of Figure 3;

Figure 5 is a fragmentary elevation of the syringe, viewed as in Figure 4, but with the stem turned to another angular position;

Figure 6 is a section on the line 6—6 of Figure 4, on a larger scale;

Figure 7 is a section on the line 7—7 of Figure 5, on a larger scale; and

Figure 8 is a section similar to Figures 6 and 7, except that the stem is in its intermediate angular position.

The syringe illustrated on the drawing has the usual barrel 10 consisting of an outer housing 12 with a transparent tubular lining 14 of glass or equivalent material which shows through elongated windows 16 in the housing 12, end fittings 20 at one end by which a hollow needle 22 can be secured to the barrel, and end fittings at the other end through which the stem 26 of a plunger slidably extends as hereinafter described. The plunger has a piston 28 which fits closely in the tubular liner 14 of the barrel to expel liquid from the barrel through the needle 22. Conversely, retraction of the piston 28 when the end of the needle is immersed in a liquid causes liquid

2

to be sucked up into the barrel. The amount of liquid expelled or sucked in, according to the direction of movement of the piston, is proportional to the distance of movement of the piston within the barrel. In the treatment of diseases it is often important that an accurate dosage of medicinal liquid be injected. It is also often desirable to draw into the barrel an exact predetermined quantity of liquid. According to the present invention, these objects can conveniently be attained by suitable notches in the stem cooperating with the structure of the end fitting through which the stem slides.

This end fitting comprises a thimble 30 which is screw-threaded or otherwise mounted on an end of the barrel housing 12. A portion 32 of the thimble 30 extends beyond the end of the housing 12 and liner 14, this extension having a smooth cylindrical bore in which is fitted a sleeve member 34. The member 34 has a split tubular portion 36 the extremity of which is slightly spun outward (not shown) so that the sleeve 34 is held releasably in the bore of the thimble 30 but can rotate freely therein. The sleeve member 34 also has a disk portion 38 through which is a non-round aperture 40 having a contour similar to and slightly larger than the cross-sectional shape of the stem 26, hereinafter described.

The thimble 30 has a pair of radial wings 42 projecting therefrom to serve as finger pieces when the syringe is in use. Fixed on one of these wings is a casing 44 which houses a spring pressed pawl 46. The pawl projects over the disk portion 38 of the sleeve member 34 and prevents accidental withdrawal thereof from the bore of the thimble 30. The pawl 46 is cylindrical except for one flat side which engages a corresponding face in the bore 48 of the casing 44 to prevent the pawl from turning on its axis. At the outer end of the pawl is a nose 50 with two parallel faces in planes perpendicular to the axis of the stem 26. This nose is adapted to enter any one of a number of notches 52 in the stem, each notch having two parallel shoulders 54 between which the nose 50 of the pawl enters. Thus when the pawl engages in any one of the notches 52, the stem is locked against movement in either direction.

The cross-sectional shape of the stem 26 is similar to the contour of the aperture 40 in the sleeve member 34, both being non-round so that the stem and sleeve will necessarily rotate together. Many suitable shapes are possible. The one illustrated is bounded by two straight parallel sides and two arcuate sides, the stem itself thus being a cylinder modified by flattening two opposite sides 56 into parallel planes connected by arcuate surfaces 58 which may be called edges of the stem. The notches 52 are cut in both edges 58 of the stem, thus forming two series of notches which are uniformly spaced and staggered as indicated in Figure 1. Stop elements 60 are mounted on the sleeve member 34 to limit the angle of rotation of the sleeve member and hence of the stem 26. The stop elements illustrated on the drawing are the horns of a semi-circular plate 62 mounted on or integral with the sleeve member 34. These horns hit against the casing 44 when the sleeve and stem are turned one way or the other and are arranged to limit such turning movements to 180°. When either limit of turn is reached, one or the other of the edges 58 of the stem is presented to the pawl 46. If however the stem is turned 90° from either limiting position, a flat side 56 is presented to the pawl which cannot then enter any of the notches 52. The stem is then free to be reciprocated over its entire stroke.

The spacing between successive notches on the stem is so related to the bore of the lining 14 of the barrel that any movement of the stem through the distance necessary to bring the next successive notch 52 to the pawl 46 will result in the displacement of a volume in the barrel of a predetermined magnitude, e. g., 2 cc.

3

A thumb piece is mounted on the outer end of the stem 26. As shown, this may take the form of a hollow cylinder 66 which may be used to store a supply of needles 22. A removable plug 68 may be screwed into an end of the cylinder and ventilation holes 70 may be provided.

In operating the syringe, the stem is turned to the mid position shown in Figure 8, freeing the stem for reciprocation. The stem is moved in as far as it will go and is then retracted after the end of the needle 22 has been immersed in the liquid to be used. This fills the barrel with the liquid. The stem is then turned to the limiting position shown, for example, in Figure 6, which will bring a notch 52 opposite the nose 50 of the pawl. When the nose enters the notch, the stem is locked against axial movement. The needle can then be thrust in for an injection without danger of a premature discharge of liquid from the barrel. As soon as the needle is in, the stem is rotated 180° to its other limiting position, thus presenting an unnotched portion of the opposite edge 58 of the stem to the pawl 46. The thumb piece is then pushed to cause the plunger to expel liquid through the needle 22 until the nose 50 of the pawl enters the next notch 52 which comes to it (Figure 7). By this time a measured amount of liquid has been expelled from the barrel and the stem is locked against further axial movement. As soon as the needle is inserted for the next injection, the stem is turned back 180° to the first position and the plunger is pushed in until the next notch 52 reaches the pawl 46. In this way a succession of accurately metered doses may be injected by simply turning the stem 180° between each two inoculations.

I claim:

1. In a hypodermic syringe having a barrel and a plunger reciprocable therein, means operable to limit the axial movements of said plunger to predetermined distances, said means comprising a member with a non-round aperture therethrough mounted at one end of the

4

barrel for rotation but held against axial movement relative to the barrel, said plunger having a stem slidably fitted in said member and rotatable therewith, said stem having two series of spaced lateral notches, the notches of the two series being staggered, a spring pressed pawl mounted on said barrel to press against said stem and to enter any one of said notches presented thereto, and stop elements on said member arranged to limit the rotation of said member and stem in both directions, said elements being so located that when said stem is in either limiting position of rotation, the notches of one of said series are in line with said pawl.

2. Apparatus as in claim 1, said stem having a cross-sectional shape with two straight parallel sides and two arcuate sides.

3. Apparatus as in claim 1, the notches in said stem having parallel sides whereby axial movement of said stem in either direction is prevented by the engagement of said pawl in one of said notches.

4. Apparatus as in claim 3, said apertured member comprising a sleeve extending into an end of said barrel.

5. Apparatus as in claim 4, said pawl being disposed in a housing mounted at the end of said barrel.

6. Apparatus as in claim 5, said stop elements consisting of portions of a semicircular disk mounted on said sleeve to turn therewith, said pawl housing being arranged to be touched by said stop elements when the stem and sleeve are turned to their limiting positions.

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