

- [54] **IMPLANTER HAVING AN IMPROVED CARTRIDGE EJECTOR**
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- [52] U.S. Cl..... **128/217, 221/198, 124/27**
- [51] Int. Cl..... **A61m 5/00**
- [58] Field of Search..... **128/217, 264, 218 D, 128/218 F, 223, 238; 42/1 G, 25; 124/26, 27, 28, 29, 30 R, 41; 221/197, 198; 222/326**

821,087 9/1959 Great Britain..... 128/217

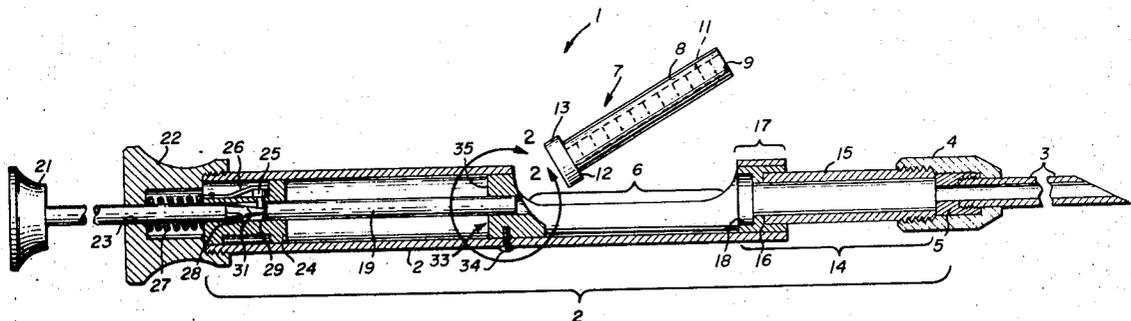
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[57] **ABSTRACT**

A pellet implanter includes a tubular body having a movable plunger therein extending from the rear end thereof through a hollow needle at the forward end thereof for pushing pellets from a pellet cartridge through the cartridge and through the hollow needle into the animal being treated. A side breech opening is provided in the body of the implanter. A cartridge ejector and stripper is provided proximate the rear end of the breech opening. The cartridge stripper and ejector includes a plug having a central bore for retaining the plunger therein against transverse translation. A forwardly projecting eccentric end portion of the ejector and stripper plug engages the rearwardly moving cartridge for stripping the cartridge from the plunger and for flipping the spent cartridge through the side breech opening, thereby ejecting same.

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6 Claims, 4 Drawing Figures



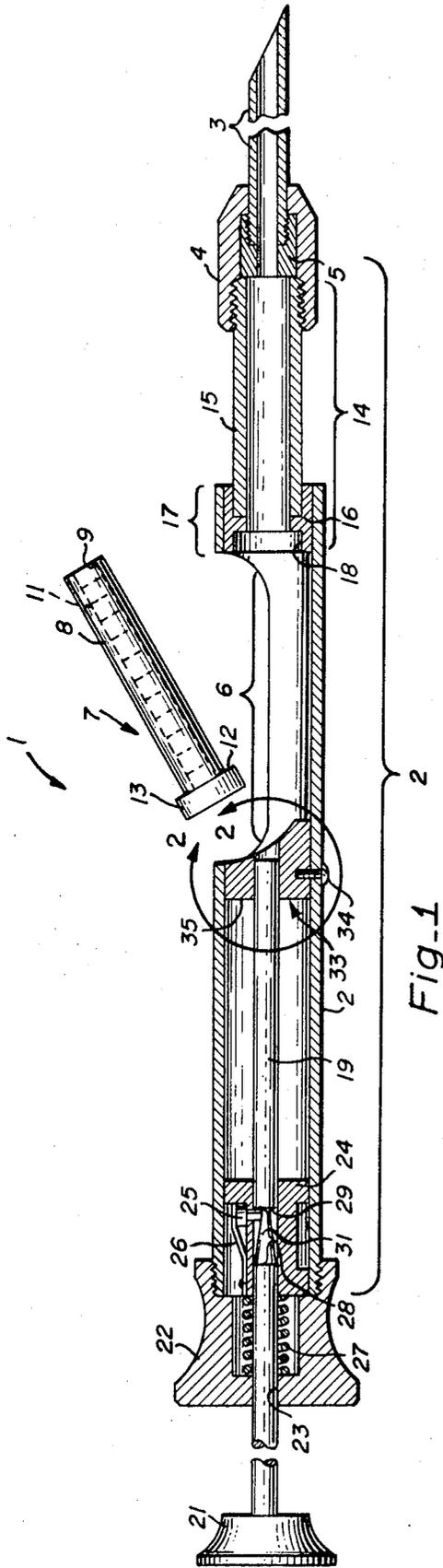
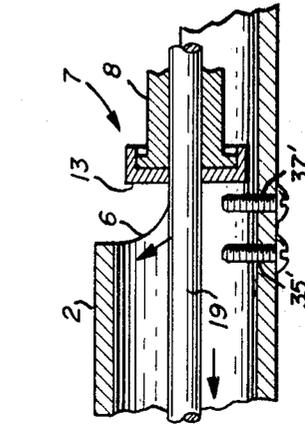


Fig-1



PRIOR ART

Fig-4

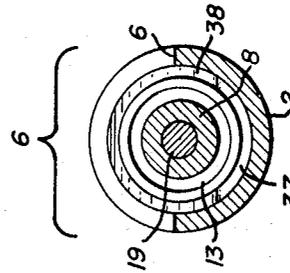


Fig-3

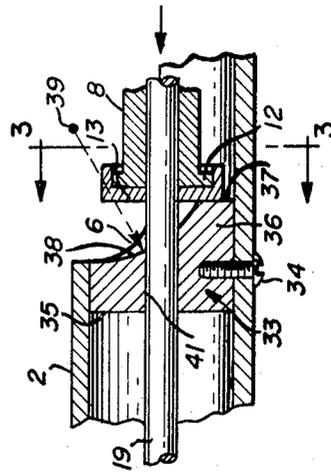


Fig-2

IMPLANTER HAVING AN IMPROVED CARTRIDGE EJECTOR

DESCRIPTION OF THE PRIOR ART

Heretofore, implanters have been utilized in which a tubular main body portion had an axially movable plunger extending into the tubular body from one end. The plunger was pushed through the body for expelling hormone pellets from within a cartridge through a hollow needle at the other end into the body of the animal being treated. Such an implanter is disclosed and claimed in U.S. Pat. No. 2,761,446 issued Sept. 4, 1956 and assigned to the same assignee as the present invention. In an improved version of this prior implanter, the main body of the implanter had a side breech opening through which the pellet filled cartridge was loaded into a chamber and through which the spent cartridge was expelled via a cartridge stripper and ejector. The cartridge stripper and ejector comprised a screw which projected into the hollow tubular body of the implanter near the rear end of the side breech opening. The stripper and ejector screw was disposed on the side of the plunger opposite to the side breech opening and projected toward the plunger. When the plunger was retracted, the spent pellet cartridge gripped the plunger, moving rearwardly therewith, until the cartridge was intercepted by the stripper and ejector screw which served to arrest further rearward movement of the cartridge, thereby stripping the spent cartridge from the plunger. In addition to stripping the cartridge from the plunger the eccentric position of the stripper screw served to impart a bending moment to the cartridge and plunger such that, when the plunger was totally withdrawn from the axis of the cartridge, the bending moment imparted by the screw served to flip the cartridge through the side breech opening for ejection thereof.

One of the problems with the prior art cartridge stripper and ejector was that in certain cases the cartridge could grip the plunger too tightly such that the cartridge, instead of being stripped from the plunger, would cause a transverse deflection of the cartridge and plunger such that the cartridge as carried back by the plunger, would ride over the ejector screw and become jammed in the body of the implanter. This necessitated disassembly of the implanter to remove the spent cartridge, thereby resulting in substantial inconvenience and loss of time to the operator.

SUMMARY OF THE PRESENT INVENTION

The principal object of the present invention is the provision of an implanter having an improved cartridge ejector.

In one feature of the present invention, the implanter includes a plunger retaining means disposed rearwardly of the cartridge stripper and ejector for restraining transverse translation of the plunger in a direction away from the eccentric cartridge stripping and ejector means, whereby jamming of the spent cartridge in the body is prevented in use.

In another feature of the present invention, the cartridge stripper and ejector comprises an apertured member disposed in the body of the implanter proximate the rear end of the side breech opening with the aperture in the ejector member being in coaxial alignment with the plunger to receive said plunger slideably therethrough such that the inside wall of the apertured

member serves to restrain transverse translation of the plunger, whereby jamming of spent cartridges in the body of the implanter is prevented in use.

In another feature of the present invention, the cartridge ejector includes a cylindrical plug disposed in the body of the implanter proximate the rear end of the side breech opening, such cylindrical ejector plug including a central bore to slideably receive the plunger for restraining transverse translation thereof and including an eccentric end portion projecting forwardly therefrom and terminating in a forward stripping face to engage the rear end of the spent cartridge for stripping the cartridge from the plunger and for imparting a bending moment to the cartridge for flipping the stripped cartridge through the side breech opening.

Another feature of the present invention is the same as the preceding feature wherein the forward face of the cylindrical plug includes a second face portion slanting rearwardly from the stripping face toward the rear end of the side breech opening.

Other features and advantages of the present invention will become apparent upon a perusal of the following specification taken in connection with the accompanying drawings, wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a longitudinal sectional view of an implanter incorporating features of the present invention,

FIG. 2 is an enlarged detail view of a portion of the structure of FIG. 1 delineated by line 2—2 and depicting the cartridge stripping action of the ejector,

FIG. 3 is a sectional view of the structure of FIG. 2 taken along line 3—3 in the direction of the arrows, and

FIG. 4 is a view similar to that of FIG. 2 depicting the prior art cartridge ejector apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIG. 1, there is shown the implanter 1 incorporating features of the present invention. The implanter includes a tubular main body 2, as of 6 inches in length, 0.563 inch outside diameter, 0.040 inch wall thickness, and of nickel plated brass. A hollow needle 3 is mounted from the forward end of the body 2 via the intermediary of a needle gripping nut 4 threaded over the forward end of the body 2 and serving to clamp a brass collar 5, which has been crimped onto the end of the needle 3, between the gripping nut 4 and the end of the main body 2. In a typical example, the needle 3 as of stainless steel has a length as of 2.25 inches and an inside bore diameter of 0.125 inch.

A side breech opening 6 is provided in the main body 2 intermediate the length thereof and through which a pellet cartridge 7 is loaded into the main body and through which the spent cartridge 7 is ejected from the main body 2. In a typical example, the pellet cartridge 7 comprises a tubular main body portion 8, as of polyethylene 1.5 inches in length with an inside diameter of 0.125 inch and a wall thickness of approximately 0.035 inch. The forward end of the cartridge 7 has a plurality of minute protrusions projecting inwardly of the central bore of the tubular member 8 for retaining a plurality of pellets 11 such as eight hormone growth promoting pellets which are to be implanted under the skin of an animal. The rear end of the tubular cartridge body 8 includes an outwardly directed lip portion 12 serving to

retain a centrally apertured end cap 13 which is pressed into place over the end of the tubular member 8 after the pellets 11 have been loaded into the cartridge 7. In a typical example, the end cap 13 has an outside diameter of 0.375 inch and the central aperture in the cap 13 has a diameter of 0.125 inch.

A chamber portion 14 of the main body 2 is disposed intermediate the side breech opening 6 and the needle 3. The chamber portion 14 includes tubular adaptor 15 provided with threads on its forward end to receive the needle gripping nut 4 and having a collar 16 on the other end thereof to be crimped into the end of the adjoining portion of the tubular body 2 at 17. The collar 16 includes a rearward recess 18 to receive the lip 12 and cap 13 of the pellet cartridge 7.

A plunger rod 19, as of 0.100 inch in diameter and 8.5 inches in length is axially translatable along the central longitudinal axis of the main body 2 and through the needle 3 from the rear end of the main body 2. A plunger button 21 is affixed over the rear end of the plunger rod 19 and a finger gripping spool 22 is threaded over the rear end of the main body 2. The spool 22 includes a central aperture 23 through which the plunger 19 is translatable.

A sliding bearing block 24 is slideable within the tubular body 2 and on the plunger rod 19. The sliding bearing block 24 includes a detent pin 25 which rides on the plunger rod 19 and is spring biased toward the rod 19 via a leaf spring 26 carried from the sliding bearing block 24. The detent pin 25 projects through a radial bore in the sliding bearing block 24. A coil spring 27 is captured on the plunger rod 19 and is compressible between the end wall of the finger gripping spool 22 and the sliding bearing block 24. The plunger rod 19 includes an annular recess about 2 inches from the forward end thereof at 28 to define a shoulder 29 and a tapered ramp portion 31 extending rearwardly from the shoulder 29.

A centrally bored cartridge stripper and ejector plug 33 is disposed in the main body 2 proximate the rear end of the side breech opening 6. The plug 33 is fixedly held in position via the intermediary of a holding screw 34 passing through the wall of the main body 2 into a tapped hole in the stripper and ejector plug 33.

In operation, the plunger rod 19 is retracted to its rearward most position, as shown in FIG. 1, by pulling knob 21 away from the body 2. As the plunger rod 19 is retracted the sliding bearing block slides on the plunger rod 19 until such time as the detent 25 rides down the inclined ramp portion 31 into contact with shoulder 29. Further retraction of the plunger rod 19 causes the sliding bearing block to be pulled rearwardly with the rod and to compress the coil spring 27. With the plunger rod 19 fully retracted, a loaded cartridge 7 is loaded into the chamber 14 through the side loading breech 6. The plunger rod 19 is then allowed to move forwardly due to the expansive forces of the compressed coil spring 27. The spring 27 pushes the plunger rod 19 forward until the sliding bearing block comes into contact with the rear face 35 of the cylindrical ejector plug 33. At this point, the forward end of the plunger rod 19 is disposed proximate the end cap 13 of the loaded cartridge 7.

The operator inserts the hollow needle 3 under the skin of the animal to be treated with the pellets 11. After the needle 3 has been inserted, the operator grips finger gripping spool 22 between two fingers and with

his thumb pushes the plunger button 21 to cause the plunger rod 19 to move forwardly through the loaded cartridge 7 and the hollow needle 3 for pushing the pellets 11 from the cartridge 7 through the needle 3 and under the skin of the animal being treated. After the pellets have been implanted, the needle 3 is withdrawn.

The spent cartridge 7 is ejected by pulling the plunger button 21 and attached rod 19 rearwardly. The spent cartridge 7 grips the rod 19, due to an interference fit therebetween, causing the spent cartridge to be retracted from the chamber 14 with the rod 19.

Referring now to FIG. 2, the hollow cylindrical ejector plug 33 includes a forwardly projecting eccentric end portion 36 which projects from the rear end of the side breech opening 6 into the breech region on the side of the plunger rod 19 opposite to the opening 6. As the cartridge 7 moves rearwardly with the plunger rod 19, the cap 13 of the cartridge 7 first engages a forward most eccentrically located stripper face 37 of the ejector plug 33. On contact between the cartridge 7 and the stripping face 37, the rearward motion of the cartridge 7 is arrested and the cartridge is thus stripped from the plunger rod 19.

In addition, the forward face of the ejector plug 33 includes a rearwardly inclined inwardly dished surface portion 38 which is preferably of a cylindrical section with an axis of revolution transverse to the longitudinal midplane of the side breech opening 6 with the axis of revolution 39 being on the side of the plunger rod 19 opposed to the stripping face 37. In a typical example, a radius of curvature R of the cylindrical surface 38 is approximately 0.437 inch.

Thus, due to the eccentric projection of the stripping face 37 and the rearward inclination of face 38 a bending moment is imparted via the stripping face 37 to the cartridge 7 through the intermediary of the cap 13. While the cartridge 7 is retained on the plunger rod 19, the imparted bending moment is counteracted by the stiffness of the plunger rod 19 and the restraining force on the rod preventing the transverse translation thereof due to the provision of the central retaining bore 41 in the ejector plug 33. When the cartridge 7 is stripped from the rod 19, the counter force of the rod is no longer provided thereby causing the applied bending moment to flip the spent cartridge 7 away from the stripping face 37 through the side breech opening 6. The rearwardly inclined face 38 of the ejector plug 33 serves to block entrance of the ejected cartridge 7 into the space between the plunger rod 19 and the inside bore of the body 2.

The ejector plug 33 of the present invention eliminates the cartridge ejection problems encountered in the prior art structure, as shown in FIG. 4. More particularly, in the prior art structure, as the spent cartridge 7 was retracted with the rod 19 the cap 13 came into contact with a stripping screw 37' which was eccentrically positioned in the central bore of the main body 2 to be on the opposite side of the plunger 19 from the side breech opening 6 and to be slightly forward of the rear end of the breech opening 6. The stripping screw 37' served to strip the spent cartridge 7 from the plunger 19 and to impart a bending moment to the cartridge as aforescribed with regard to FIG. 2. However, because the rod 19 was not restrained against transverse translation, when the gripping action of the spent cartridge 7 on the rod 19 was sufficiently strong and the rod neared its rearward most extent of travel,

such that the bearing block 24 was furthest from the stripping screw 37', the bending moment produced sufficient deflection of the rod 19 and deformation of the cap 13 and lip 12 of the cartridge to allow the cartridge 2 to ride over the stripping screw 37' and to be lodged in the tubular body 2, thereby jamming operation of the implanter 1.

What is claimed is:

1. In an implanter, a tubular body member, a plunger extending into said tubular body from a rear end thereof and being axially movable within said body, a hollow needle member extending from the forward end of said tubular body, said tubular body including a side breech opening disposed intermediate the length of said body for loading and ejecting spent pellet cartridges from said body, said tubular body including a pellet cartridge receiving chamber portion disposed between said side breech portion and said hollow needle for receiving and holding a pellet filled cartridge, said plunger being of a length sufficient to extend from the rear end of said body at least substantially through said hollow needle and being axially movable forwardly toward said hollow needle for pushing pellets contained in the pellet cartridge in said chamber from the cartridge and through said hollow needle, said plunger being axially retractable rearwardly of said body for pulling the spent cartridge, which clings to said plunger, from said chamber and for retracting said plunger to allow loading of a replacement cartridge, a cartridge ejector means disposed within said body proximate the rear end of said breech opening for stripping the spent pellet cartridge from the rearwardly moving plunger and for ejecting the spent cartridge from said body through said side breech opening, said cartridge ejector means including a cartridge stripping means inwardly protruding eccentrically of said body toward said plunger on the side thereof remote from the breech opening and being disposed forwardly of the rear end of said side breech opening for engaging the rear end of a spent cartridge for stripping the cartridge from the plunger and for flipping the stripped cartridge through said side breech opening, and generally fixed plunger retaining means disposed rearwardly of said

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stripping means proximate the rear end of said side breech opening for restraining transverse translation of said plunger in a direction away from said cartridge stripping means, whereby jamming of the spent cartridge in the body is prevented.

2. The apparatus of claim 1 wherein said plunger retaining means includes an apertured member disposed in said body proximate the rear end of said side breech opening with the aperture of said member being in coaxial alignment with said plunger to receive said plunger slideably therethrough and with the inside wall of said aperture serving to restrain transverse translation of said plunger.

3. The apparatus of claim 2 wherein said apertured member is a hollow cylindrical plug, and wherein said cartridge stripping means includes an eccentric end portion of said plug which projects forwardly therefrom into a region of said body in the rear portion of said side breech opening, said forwardly projecting portion of said plug terminating in a forward stripping face to engage the rear end of the spent cartridge, said forward stripping face being disposed on the side of said plunger opposite to said side breech opening.

4. The apparatus of claim 3 wherein said forward end of said plug includes a second face portion intersecting said forward stripping face portion, and said second face portion being slanted rearwardly from the intersection thereof with said stripping face portion toward the rear end of said side breech opening.

5. The apparatus of claim 4 wherein said second face portion of said plug is a section of a cylindrical surface, said cylindrical surface being inwardly dished of said plug and having an axis of revolution disposed forwardly of said plug on the side of said plunger opposite from said stripping face, and said axis of revolution being directed generally perpendicular to a longitudinal midplane of said side breech opening which includes the longitudinal axis of said plunger.

6. The apparatus of claim 1 wherein said plunger retaining means is disposed at the rear end of said side breech opening.

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