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H. C. PALMER ET AL

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HYPODERMIC PROJECTILE

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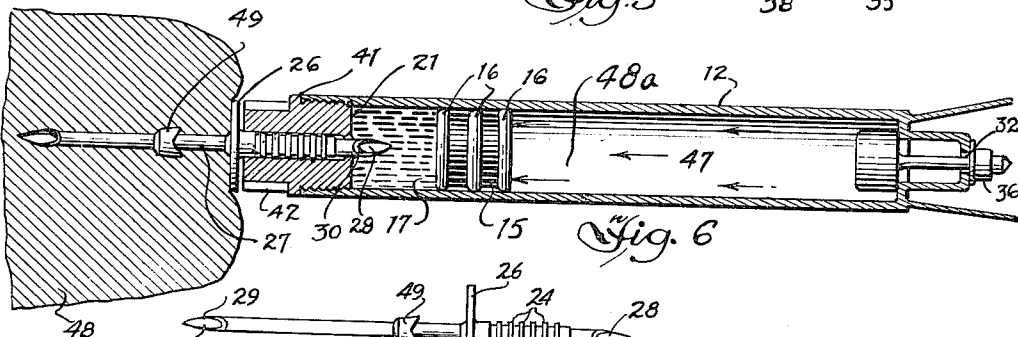
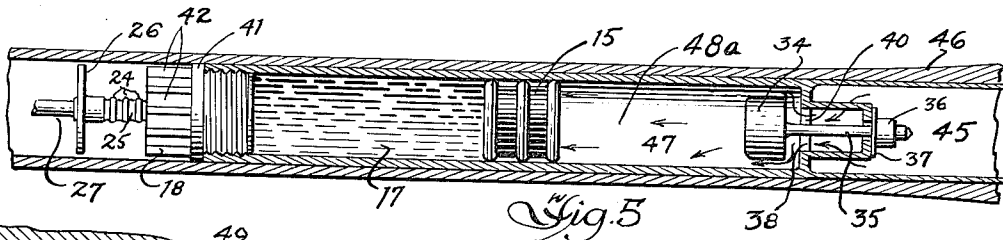
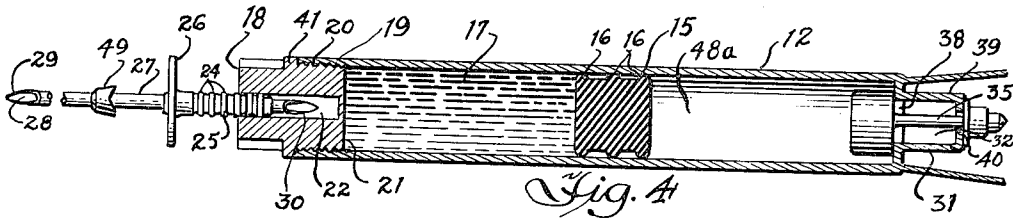
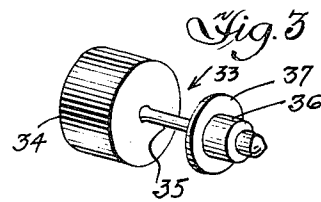
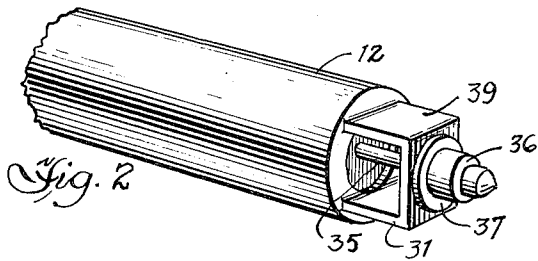
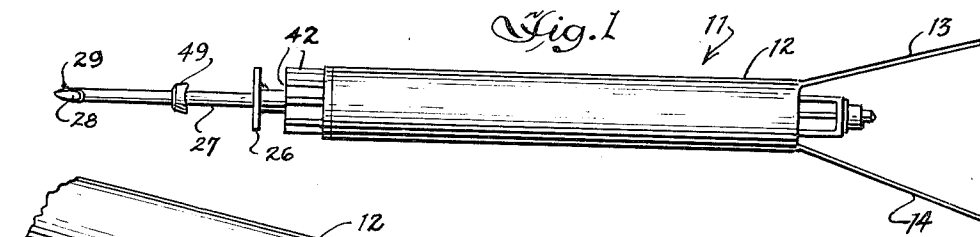


Fig. 7

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## HYPODERMIC PROJECTILE

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9 Claims. (Cl. 102—92)

This invention relates to a projectile which is utilized to deliver liquid drugs into animals while the operator is at a distance therefrom.

In what is now prior art, and disclosed in the United States Patents 2,854,925 issued Oct. 7, 1958; 2,923,243 issued Feb. 2, 1960; and 3,022,785 issued Feb. 27, 1962. A projectile and method is described which may be utilized to perform such delivery. Further improvements in this art are disclosed in the co-pending application of Jack A. Crockford, et al., Ser. No. 290,275 filed June 17, 1963

In all of the above structures a serious disadvantage exists in that the gas utilized to propel the liquid drug into the body of the animal must be created by gas producing means within the projectile. Since projectiles may be stored for a considerable period of time before use it sometimes happens that the gas producing means deteriorate or, in the case of the structure shown in the above-mentioned co-pending application, the device may not discharge because of ambient moisture or may be prematurely discharged by improper handling.

The device of the instant invention avoids the above-mentioned disadvantages. The gas pressures required are either positively produced immediately prior to firing the projectile or the pressures are produced simultaneously with the firing of the projectile. The means for permitting the gas pressures to expel the drug into the animal and the release of the same are positive and only rendered operative at the proper time.

The above constitutes a brief description of the instant invention and the advantages thereof.

The invention will now be further described by reference to the accompanying drawings which are made a part of this specification. In this connection however the reader is cautioned to note that the specific forms of this invention as set forth in said drawings and described in said specification are for illustrative purposes and for purposes of example only. Various changes and modifications may obviously be made within the spirit and scope of this invention and would occur to those skilled in this art.

FIG. 1 is a side view of the principal form of projectile made in accordance with this invention.

FIG. 2 is an enlarged fragmentary perspective view of one form of valve mechanism which may be utilized to permit pressure gas to enter the projectile.

FIG. 3 is a detail enlarged perspective view of one form of the mechanism disposed within the valve orifice controlling the admission and retention of pressure gas into the projectile.

FIG. 4 is an enlarged longitudinal sectional view of the form of projectile shown in FIG. 1. In this figure the parts are in the normal unfired position.

FIG. 5 is a fragmentary longitudinal sectional view of the projectile shown in FIG. 4 as it appears when placed within a gun and at the instant of firing showing the means whereby pressure gas enters the projectile.

FIG. 6 is a view similar to FIG. 4 but with the projectile shown in the position that the parts assume immediately after impact with the animal.

FIG. 7 is an enlarged perspective view of the needle and needle support utilized in connection with this invention.

The invention will now be further described by reference to the form thereof shown in the accompanying drawings which represent the best mode known to the inventors to take advantage of their invention.

The projectile 11 is formed with a body 12 having a pair of wing members 13 and 14 secured and projecting from the rear thereof. A propelling member 15 formed with a plurality of corrugations 16 is disposed within body 12 and is slidably movable therein.

A liquid drug 17 is disposed within body 12 forward of propelling member 15. The portion 48a behind member 15 within body 12 is called the "pressure chamber" in some of the claims. A front plug 18 is formed with threads 19 thereupon and a shoulder 41. Threads 19 mate with matching threads 20 disposed within the front portion of body 12. Plug 18 is also formed with a wall 21 which is normally imperforate.

Plug 18 is also provided with a recess 22 therewithin which extends from the front 23 of plug 18 to wall 21.

A needle support 25 is formed with a plurality of corrugations 24 thereupon and a shield 26. Needle support 25 is hollow and permits needle 27 to extend therethrough. Needle 27 is provided with an opening 28 extending therethrough and a plurality of points at opposite ends thereof 29 and 30. Normally member 25 extends partially within recess 22 and point 30 is normally spaced from wall 21.

Body 12 is provided with an orifice 38 at the rear thereof normally intervening members 13 and 14. Surrounding orifice 38 are upstanding projecting members 31 and 39 which are bent over at 40 and are provided with an additional recess 32. A mechanism 33 is provided with a base member 34 of larger diameter than orifice 38 and normally underlying the same. Stem 35 is connected to member 34 and also to cap 36. Shield 37 underlies cap 36 and overlies recess 40.

Member 18 is also provided with projections 42 upon its outer surface so that this member can be easily turned so as to remove and engage it from the front portion of body 12.

The operation of this invention will now be explained. Prior to the operation of the device plug 18 is removed therefrom so that the portion between drug propelling member 15 and the front of body 12 is open. A liquid drug 17 is then disposed within the opening and plug 18 screwed in place by the aid of projections 42 thereupon. At this point the parts take the position shown in FIG. 4.

The projectile is then placed within a gun, the gun aimed at an animal and fired. At this point, as shown in FIG. 5, a portion of the pressure gas 45 which is normally utilized to expel projectile 11 from the barrel of the gun 46 exerts pressure on base member 34 which is thereafter stretched because stem 35 is made of resilient material. An opening now exists wherein a portion of the pressure gas 45, represented as 47, enters body 12 into pressure chamber 48 behind propelling member 16. This pressure gas cannot move propelling member 16 forwardly because wall 21 blocks the escape of drug 17 and liquid is normally incompressible. As projectile 11 leaves gun 46 needle 27 strikes animal 48 and enters the body of said animal. Point 29 enters the animal's body and is retained therein by barb 49. As a result shield 26, which is too large to enter the animal's body, is stopped on the outside and the inertia of body 12 causes the needle support to move rearwardly and thus causes point 30 of needle 27 to puncture wall 21. As a result liquid 17 now can pass through opening 28 within needle 27 and the reduction of pressure therein occasioned causes gas 47 to move propelling member 15 forwardly and inject the liquid drug into the body of the animal.

The body 12 can most appropriately be manufactured

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of moldable thermoplastic material such as polypropylene, polyethylene or similar thermoplastic resin. The needle support, needle and associated parts are preferably made of metal. The front support is likewise preferably made of a thermoplastic material. The mechanism utilized in the structure shown as the valving means is preferably made of rubber. The drug propelling member is likewise preferably made of rubber.

The foregoing illustrates how the objects of this invention are achieved.

We claim:

1. A projectile adapted to be fired from a gun by the impingement of the pressure gas produced by the firing of said gun, said projectile comprising a hollow body having a puncturable wall therewithin, said body being also provided with a drug holding portion therewithin adapted to contain a liquid drug on one side of said wall, a forwardly projecting movable hollow needle at one end of said body and at the opposite side of said wall, stabilizing means at the opposite end of said body, a valve orifice within said drug holding portion adjacent said stabilizing means, said valve orifice constituting entry means for pressure gas into said projectile, a normally closed pressure valve openable by the pressure gas produced within said gun by the firing thereof, said pressure valve disposed within said valve orifice operatively connected with said drug holding portion permitting pressure gas to enter said drug holding portion and be retained therein, so that the liquid drug contained within said drug holding portion can be pressurized, and control means upon said needle adapted to puncture said wall and thus allow communication between said needle and said drug holding portion, said control means being actuated upon impact of said needle with an animal.

2. A projectile adapted to be fired from a gun by the impingement of the pressure gas produced by the firing of said gun, said projectile comprising a hollow body having a puncturable wall therewithin, said body being also provided with a drug holding portion therewithin adapted to contain a liquid drug on one side of said wall, a slidably movable propelling member within said drug holding portion, a support member secured to one end of said body and at the opposite side of said wall, said support member provided with a slot therethrough, a needle support movable within said slot, a projecting hollow needle having points at opposite ends thereof disposed within said support member, stabilizing means at the opposite end of said body, a valve orifice within said drug holding portion adjacent said stabilizing means, said valve orifice constituting entry means for pressure gas into said projectile, a normally closed pressure valve openable by the pressure gas produced within said gun by the firing thereof, said pressure valve disposed within said valve orifice operatively connected with said drug holding portion permitting pressure gas to enter said drug holding portion and be retained therein, so that the liquid drug contained within said drug holding portion can be pressurized, said needle support being rearwardly movable upon impact of said projectile with the body of an animal so that one point of said needle punctures said wall and permits communication between said needle and said drug holding portion.

3. A projectile comprising a hollow body having a puncturable wall therewithin, said body being provided with a liquid drug holding portion therewithin on one side of said wall, a slidably movable propelling member within said drug holding portion having corrugations thereupon within said drug holding portion, a front support member threadedly secured to one end of said body and at the opposite side of said wall, said front support member provided with a slot therethrough, a needle support having opposite ends portions, a shield member intervening said opposite end portions, said portion of said needle support behind said shield member movable within said slot and having a corrugated outer surface, a for-

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wardly projecting hollow needle having points at opposite ends thereof disposed within said support member, a pair of spaced stabilizers at the opposite end of said body, a valve orifice behind said propelling member and within said drug holding portion between said stabilizers, a normally closed but openable pressure valve within said valve orifice operatively connected with said drug holding portion permitting pressure gas to enter said drug holding portion and be retained therein, said valve comprising an enlarged base member of greater diameter than said orifice and a resilient valve support attached to said base member, said valve support being also secured to said hollow body; said needle support being rearwardly movable upon impact of said shield member with the body of an animal so that the rear point of said needle punctures said wall and permits communication between said needle and said drug holding portion so that said propelling member is moved forwardly under the pressure of said pressure gas and propels said drug into said animal through said needle.

4. A projectile adapted to be fired from a gun by the impingement of the pressure gas produced by the firing of said gun, said projectile comprising a hollow body carrying injection means thereupon and a drug holding portion adapted to contain a liquid drug therewithin, entry means for said pressure gas into said drug holding portion so that the liquid drug normally contained therewithin can be pressure controlled, and means allowing communication between said drug holding portion and said injection means after said injection means have penetrated into the body of an animal.

5. A projectile adapted to be fired from a gun by the impingement of the pressure gas produced by the firing of said gun, said projectile comprising a hollow body having injection means thereupon and dividing means therewithin, a drug holding portion adapted to contain a liquid drug on one side of said dividing means, a pressure chamber on the other side of said dividing means, entry means for said pressure gas into said pressure chamber so that the liquid drug normally contained within said drug holding portion can be pressure controlled, and means allowing communication between said drug holding portion and said injection means after said injection means have penetrated into the body of an animal.

6. A projectile adapted to be fired from a gun by the impingement of the pressure gas produced upon firing of said gun said projectile comprising a hollow body having injection means thereupon and dividing means therewithin, a drug holding portion adapted to contain a liquid drug on one side of said dividing means, a pressure chamber on the opposite side of said dividing means, entry means for said pressure gas into said pressure chamber carried by said projectile, entry and retention means for said pressure gas in said pressure chamber carried by said projectile so that the liquid drug contained within said drug holding portion can be pressure controlled, and means allowing communication between said drug holding portion and said injection means after said injection means have penetrated into the body of an animal.

7. A projectile adapted to be fired from a gun by the impingement of the pressure gas produced by the firing of said gun, said projectile comprising a hollow body having a drug holding portion therewithin adapted to contain a liquid drug, a forwardly projecting hollow needle carried by one end of said body normally spaced from said drug holding portion, stabilizing means on the opposite end of said body, a normally closed pressure valve member openable by the gas produced within said gun by the firing thereof, said pressure valve operatively connected with said drug holding portion constituting entry means for said pressure gas and permitting said pressure gas to enter said drug holding portion and be retained therein so as to pressurize the liquid drug normally contained within said drug holding portion, and means allowing communication

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between said drug holding portion and said needle after said needle has penetrated into the body of an animal.

8. A projectile adapted to be fired from a gun by the impingement of the pressure gas produced by the firing of said gun, said projectile comprising a hollow body having puncturable separating means therewithin, said body being also provided with a drug holding portion adapted to contain a liquid drug therewithin on one side of said separating means, a forwardly projecting movable hollow needle at one end of said body on the opposite side of said separating means, stabilizing means on the opposite end of said body, a normally closed pressure valve member openable by the gas produced within said gun by the firing thereof, said pressure valve operatively connected with said drug holding portion constituting entry means for said pressure gas and permitting said pressure gas to enter said drug holding portion and be retained therein thus pressurizing the liquid drug normally contained within said drug holding portion, and piercing means upon said needle adapted to puncture said separating means and thus allow communication between said needle and said drug holding portion, said piercing means being actuated upon impact of said needle with an animal.

9. A projectile adapted to be fired from a gun by the impingement of the pressure gas produced by the firing of said gun, said projectile comprising a hollow body having puncturable separating means thereupon and dividing means therewithin, said body being also provided with a drug holding portion therewithin adapted to contain a

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liquid drug on one side of said separating means and on one side of said dividing means, a pressure chamber on the opposite side of said dividing means, a forwardly projecting movable hollow needle at one end of said body on the opposite side of said separating means, stabilizing means on the opposite end of said body, a normally closed pressure valve member openable by the gas produced within said gun by the firing thereof, said pressure valve operatively connected with said pressure chamber constituting entry means for said pressure gas and permitting said pressure gas to enter said pressure chamber and be retained therein thus pressurizing the liquid drug normally contained within said pressure chamber, and piercing means upon said needle adapted to puncture said separating means and thus allow communication between said needle and said drug holding portion, said piercing means being actuated upon impact of said needle with an animal.

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