June 27, 1950 M. R. FIELDS 2,513,014

APPARATUS FOR IMPLANTING MEDICINAL PELLETS SUBCUTANEOUSLY

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Fig. 1

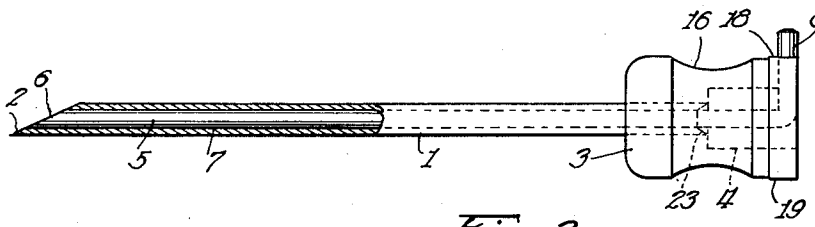


Fig. 2

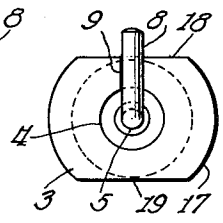


Fig. 3

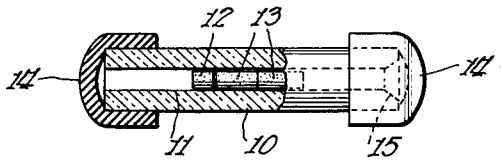
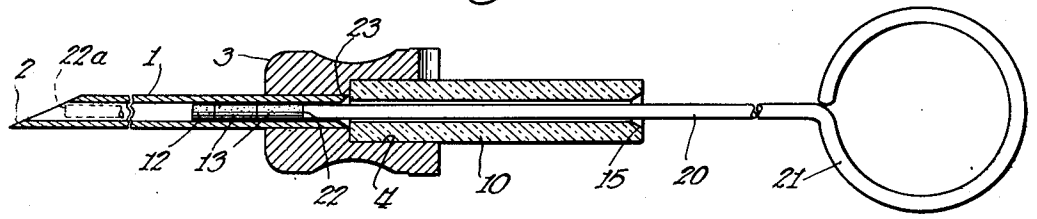


Fig. 4



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APPARATUS FOR IMPLANTING MEDICINAL PELLETS SUBCUTANEOUSLY

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2 Claims. (Cl. 128—217)

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This invention relates to apparatus for implanting medicinal pellets subcutaneously.

In the treatment of certain ailments by the use of therapeutic agents such as hormone principles, penicillin, streptomycin, and possibly other medicinal elements, it is highly desirable to maintain within the body a so-called tissue fluids and blood level of the medication in fixed proportions for a prolonged period. Most medicinal agents of the character indicated tend to dissipate rapidly through absorption into the body fluids, thereby necessitating a frequent administration of the desired medicinal agents in order to maintain the desired blood level. It has been found that it is possible to prepare medications of the type above referred to in the form of solid pellets, and to implant such pellets under the skin of a patient in such a manner that the circulation of body fluids will gradually dissolve the pellet and thereby, in effect, gradually administer the medication over an extended period of time. In some cases it has been found that medication so administered is present in the blood stream and tissue fluids at a required level for a period of several days.

The objects of the present invention are to provide a simple and easily manipulated means for implanting medicinal pellets subcutaneously; to provide such means whereby handling of the individual pellets is avoided with attendant benefits in respect of the preservation of the sterile or aseptic condition of the pellets; and to provide an improved pellet package whereby distribution of pellets of therapeutic agents of the character indicated in sterile or aseptic condition is greatly facilitated.

Other objects and advantages of the invention will be understood by reference to the following specification and accompanying drawing in which there is illustrated a selected form of the apparatus and a selected form of pellet package embodying the invention.

In the drawing:

Figs. 1 and 2 are side and end views respectively of a needle structure,

Fig. 3 is a side view partially in elevation and partially in section of a pellet package or cartridge, and

Fig. 4 is a sectional illustration of the manner in which the pellet cartridge of Fig. 3 and the needle structure of Fig. 1 are employed for the

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purpose of subcutaneously implanting medicinal pellets supplied to the physician in the packaged form illustrated in Fig. 3.

For penetrating the tissues, a needle 1 is employed, the said needle being a tubular member having a bevelled or sharpened end 2. At the other end, the needle 1 is provided with an enlargement or head 3 which is suitably secured rigidly on the blunt end portion of the needle preferably in co-axial relation thereto. The head is counterbored from its free outer or rear end as indicated at 4 for a purpose which will presently appear.

A stylet or removable core 5 is assocciated with the needle 1, said stylet having a bevelled end portion 6 which is normally in co-planar relation to the bevelled end 2 of the needle 1. Said stylet 5 is of a diameter which fits slidably within the lumen 7 of the needle so that the stylet may be readily inserted and withdrawn from the needle. The other end of the stylet is provided with a laterally bent end portion 8, and the head 3 of the needle is provided with a radially extending groove 9 for receiving said stylet end portion 8 to thereby rotatably position the stylet in the needle with the bevelled ends of the stylet and needle in the desired co-planar relationship.

The pellet cartridge shown in Fig. 3 comprises a tubular and preferably a transparent body 10 having a bore 11 of substantially the same diameter as the diameter of the lumen 7 of the needle. Some variation is permitted in this respect, but it is preferable that these diameters be approximately the same so that pellets such as represented at 12 and 13 fitting slidably in the bore of the cartridge body will also be slidable through the lumen of the needle. For closing the ends of the tubular cartridge body 10, caps or end closures 14—14 of rubber or other suitable material, preferably resilient material, are applied to the cartridge ends as shown. These caps 14—14 are preferably of such size that they may be stretched when applied to the cartridge ends to such an extent that they will frictionally grip the cartridge body end portions to thereby retain themselves in place while at the same time being readily removable when desired.

At one end, the cartridge body is provided with a flaring mouth entrance 15 to the bore 11 therein to facilitate insertion of the pellets such as 12 and

13 into the body. As represented in Fig. 3, the pellets 13 are about twice the length of the pellet 12. Other length relationship may, of course, be employed depending upon the dosage required.

With the described apparatus, medicinal pellets may be implanted under the skin as follows:

The assembled needle and stylet 1 and 5 in the relationship shown in Fig. 1 is first inserted through the tissues to locate the bevelled discharge end of the needle at the required place under the tissues. During insertion of the needle, the physician (or nurse) holds the head of the needle between the index and middle fingers while placing the thumb against the rear end of the head in overlying relation to the laterally extending end portion 8 of the stylet. By so holding the needle, the stylet is held against rearward displacement during the insertion of the needle. The head is of generally cylindrical form having a suitably grooved or recessed central annular portion 16 to facilitate holding of the needle between the index and middle fingers, and a rear flange portion 17 of the head has flattened edge portions 18 and 19 which are preferably arranged in planes which are parallel to the general plane of the bevelled ends of the needle and stylet. The groove 9 in the rear end of the needle head and the portion of the bent end 8 of the stylet which projects beyond the flattened edge 18 of the head, serve to indicate the position of the bevel of the needle. When the needle has been inserted to the proper position, the stylet is withdrawn leaving the hollow needle in place.

A cartridge 10 containing the desired pellet (or pellets) is then prepared for assembly with the needle by removing one of the end caps 14, and then inserting the open end of the cartridge body into the recess or socket 4 provided for that purpose in the head of the needle. The cartridge body 10 is preferably of cylindrical form corresponding to the cylindrical counterbore 4, and of an external diameter which will fit snugly in said counterbore so that when one end portion of the cartridge is inserted into the counterbore, the cartridge will be positioned with its bore 11 in the desired co-axial relationship to the lumen 7 of the needle. Thereupon the other end closure is removed from the cartridge and a plunger or piston 20 (Fig. 4) is inserted into and through the cartridge body and into and through the needle 1.

The piston 20 may consist of a length of wire of a diameter which will fit freely through the bore of the cartridge and the lumen of the needle and it is provided with an eye 21 for facilitating handling thereof. The piston and eye are made so that when the end 22 of the piston reaches a predetermined relationship to the bevelled end of the needle as represented in dotted lines at 22*a*, movement of the piston will be stopped by engagement of a portion of the eye 21 with the then outer end of the cartridge 10. As the piston is advanced, the pellets 12 and 13 will, of course, be fed forwardly through and out of the cartridge and through the lumen of the needle. When the leading pellet reaches the bevelled end of the needle and the tissue barrier closing the same, movement of the piston is stopped and the needle is withdrawn while the piston is, in effect, held stationary so as to cause the pellets to be discharged from the needle, the pellets being thereby deposited in the space vacated by the needle before the muscular tissue (or fat) can return to its normal position and close said space. Physicians and others experienced in matters of this kind can determine by the formation of a visible hump in the patient's skin just when withdrawal of the needle should begin so as to leave the pellets in the desired location. Also, the length of plunger remaining between the outer or free end of the cartridge body and the adjacent portion of the eye 21 constitutes another indicator as to when withdrawal of the needle should begin. It will be observed that said distance between the cartridge and plunger eye is always equal to the combined length of the pellets remaining in the discharge end portion of the needle.

To facilitate the passage of pellets from the cartridge 10 into the lumen of the needle 1, the entrance end of the lumen is flared as indicated at 23. In the construction shown, the entrance end of the needle 1 communicates directly with the counterbore 4. This, of course, may be modified to provide the flared mouth 23 in a portion of the head 3, the needle receiving recess then terminating short of the bottom of the counterbore.

Present manufacturing equipment and processes indicate that the smallest diameter to which pellets of therapeutic agents of the kind referred to may be made is about 0.85 inch (slightly more than $\frac{5}{64}$ of an inch), the length being variable but preferably not much more than $\frac{1}{16}$ of an inch. The needle 1 to handle pellets of that size will, on the basis of present practical manufacturing procedures, have an external diameter of about .112 inch. For insertion of a needle of that size, it is, of course, preferable, if not necessary, that the affected body part be initially treated with a suitable anesthetic to prevent excessive pain. It should, however, be understood that as manufacturing equipment and processes improve, the indicated dimensions may be reduced to the end that a smaller needle may be employed without requiring the use of a local anesthetic.

Various changes in the described structure may be made without departing from the spirit of the invention as defined in the claims in this application.

I claim:

1. Apparatus for implanting a pellet subcutaneously, comprising an elongated hollow needle and a stylet extending through said needle, said needle and stylet having complementary sharpened ends for tissue penetration purposes, said needle having an enlarged head on its rear end substantially coaxial with said needle and provided with a socket in coaxial communication with the lumen of said needle, said socket being of substantially larger diameter than the lumen of said needle and adapted to receive an end portion of a pellet cartridge from which a pellet may be advanced into and through said needle, said stylet and needle being provided with interengaging means for removably positioning said stylet in said needle with the sharpened end of the stylet in cooperating complementary relationship to the sharpened end of said needle.

2. Apparatus for implanting a pellet subcutaneously, comprising an elongated hollow needle and a stylet extending through said needle, said needle and stylet having coplanar bevel-sharpened ends for tissue penetration purposes, said needle having an enlarged head on its rear end substantially coaxial with said needle and provided with a socket in coaxial communication with the lumen of said needle, said socket being of substantially larger diameter than the lumen of said needle and adapted to receive an end por-

tion of a pellet cartridge from which a pellet may be advanced into and through said needle, the rearmost portion of said head having a flattened side portion and, in its rear face, a slot extending radially of said head from said flattened side portion of said socket, said stylet having a laterally extended rear end portion removably fitted in said radial slot to position the bevelled end of the stylet in said coplanar relation to the bevelled end of said needle, and said laterally extending stylet portion projecting beyond said flattened side portion to facilitate withdrawal of said stylet from said needle.

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