

E. B. CHAPMAN.
SURGICAL APPLIANCE.

APPLICATION FILED OCT. 10, 1912. RENEWED APR. 2, 1917.

1,248,613.

Patented Dec. 4, 1917.
3 SHEETS—SHEET 1.

FIG. I.

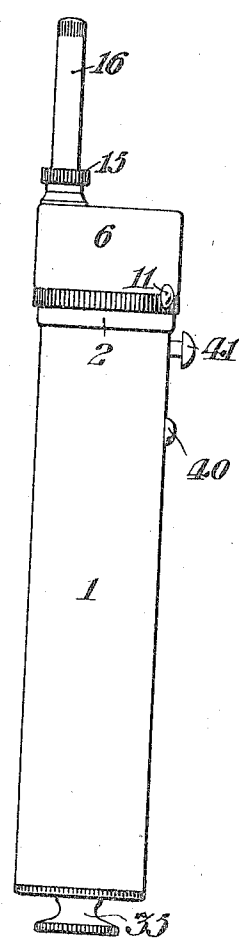


FIG. II.

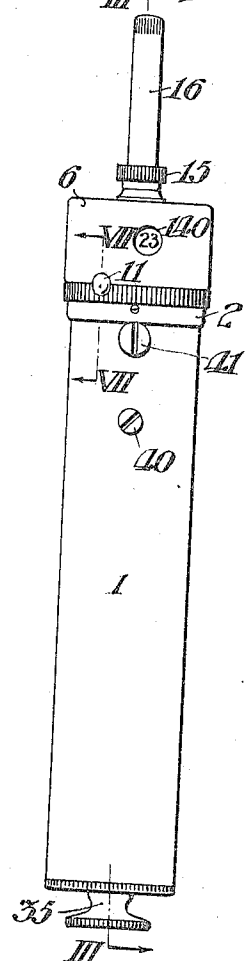


FIG. III.

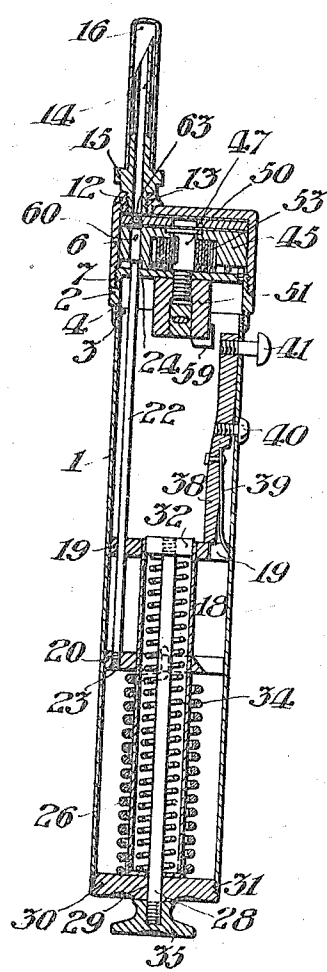


FIG. V.

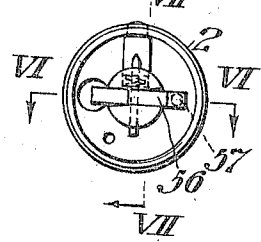


FIG. VI.

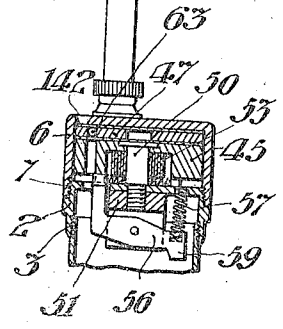
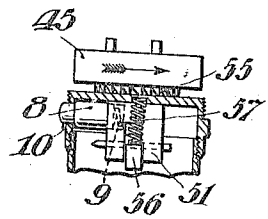


FIG. VII.



WITNESSES:
R. Schleicher
James M. Cobb

INVENTOR:
Ernest B. Chapman
By Arthur E. Pritz
Attorney

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3 SHEETS—SHEET 2.

FIG. IV.

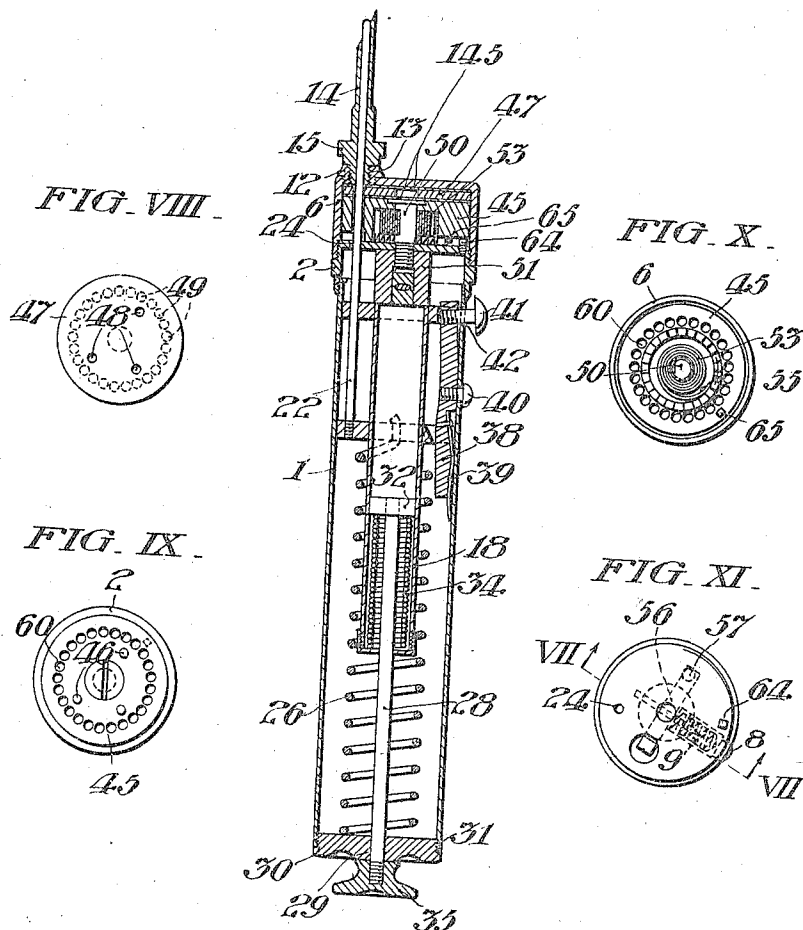


FIG. VIII.

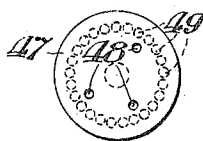


FIG. X.

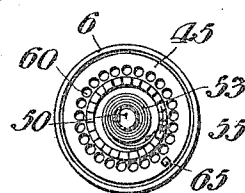


FIG. IX.

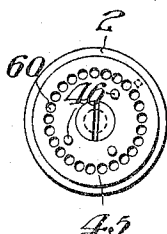


FIG. XI.

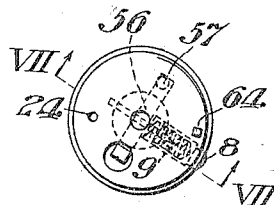


FIG. XVIII.

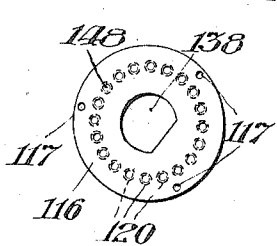


FIG. XIX.

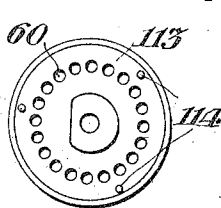
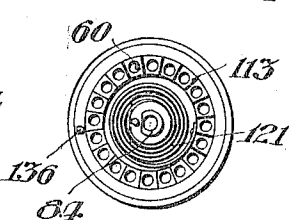


FIG. XX.



WITNESSES:

R. Schleicher
James Mc Caff.

INVENTOR:

Errett B. Chapman,
by Arthur E. Leig,
Attorney.

E. B. CHAPMAN.
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3 SHEETS—SHEET 3.

FIG. XII.

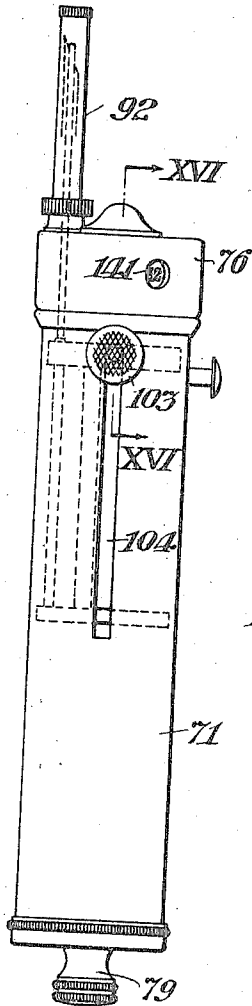


FIG. XIII.

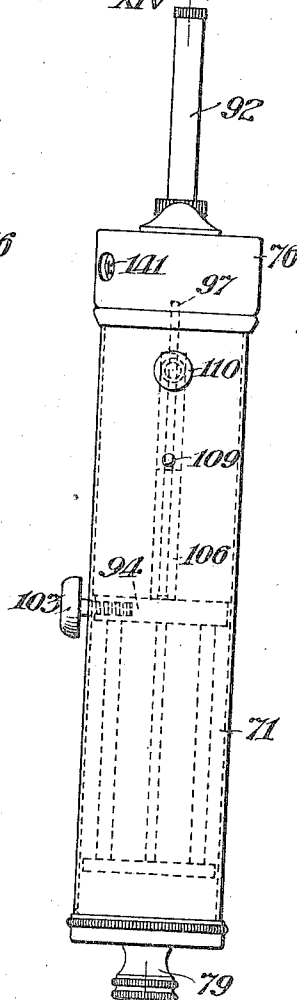


FIG. XIV.

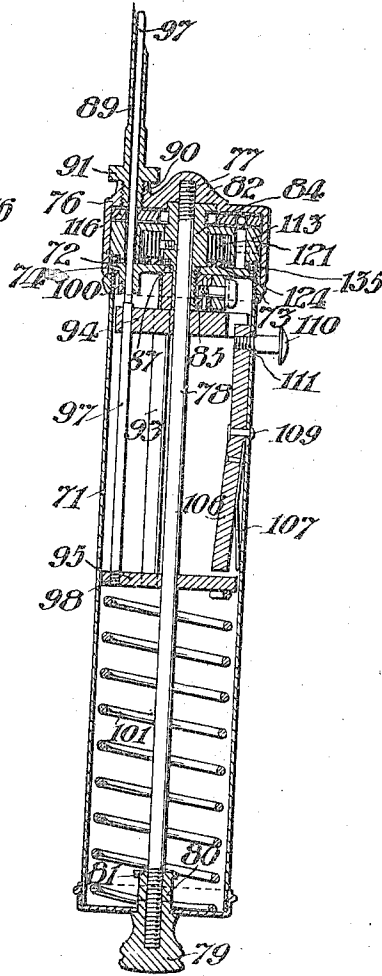


FIG. XV.

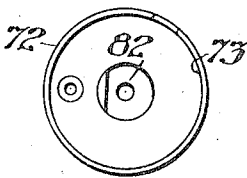


FIG. XVI.

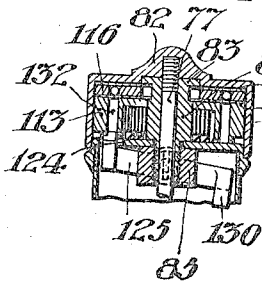
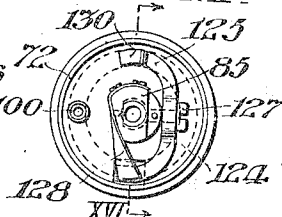


FIG. XVII.



WITNESSES:

R. Schleicher.
James M. Cady.

INVENTOR:

Everett B. Chapman,
by Arthur E. Vaig,
Attorney.

UNITED STATES PATENT OFFICE.

EVERETT BROWN CHAPMAN, OF PHILADELPHIA, PENNSYLVANIA.

SURGICAL APPLIANCE.

1,248,613.

Specification of Letters Patent.

Patented Dec. 4, 1917.

Application filed October 10, 1912, Serial No. 725,038. Renewed April 2, 1917. Serial No. 159,559.

To all whom it may concern:

Be it known that I, EVERETT B. CHAPMAN, of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Surgical Appliances, whereof the following is a specification, reference being had to the accompanying drawings.

My invention relates to an appliance for hypodermically injecting pellets, and may be employed with particular advantage in the treatment of cattle for what is known as "black leg".

As hereinafter described, my invention includes a reciprocatory plunger in concentric relation with a tubular hypodermic needle and adapted to thrust a pellet through said needle from what may be termed a magazine cartridge adapted to contain and normally retain a plurality of medicinal pellets.

Cartridges of the kind herein described form the subject matter of my application Serial No. 725,039, filed October 10, 1912, for Letters Patent of the United States and copending herewith. The present invention includes the various novel features of construction and arrangement hereinafter more definitely specified.

In the drawings, Figure I is an elevation of an appliance conveniently embodying my invention.

Fig. II is an elevation of said appliance as seen from the right hand side of Fig. I.

Fig. III is a central longitudinal sectional view of said appliance taken on the line III, III in Fig. II, the plunger being retracted.

Fig. IV is a sectional view similar to Fig. III except that the cover is removed from the hypodermic needle and the plunger projected therethrough.

Fig. V is an inverted plan view of the upper head of the casing shown in Fig. III.

Fig. VI is a fragmentary longitudinal sectional view of said appliance taken on the line VI, VI in Fig. V.

Fig. VII is a fragmentary longitudinal sectional view taken on the line VII, VII in Figs. II, V and XI.

Fig. VIII is a plan view of the cartridge shown in Figs. III and VI.

Fig. IX is a plan view of the cartridge carrier shown in Figs. III, VI and VII.

Fig. X is an inverted plan view of said carrier.

Fig. XI is a plan view of the upper casing head shown in Figs. III, V, VI and VII.

Fig. XII is an elevation of an appliance embodying a modified form of my invention, the plunger being in projected position.

Fig. XIII is an elevation of said appliance as seen from the right hand side of Fig. XII, but with the plunger in retracted position.

Fig. XIV is a central longitudinal sectional view of said appliance taken on the line XIV, XIV in Fig. XIII but with the plunger in the projected position indicated in Fig. XII and with the needle cover removed.

Fig. XV is an inverted plan view of the casing cap shown in Fig. XIV.

Fig. XVI is a fragmentary longitudinal sectional view of said appliance taken on the line XVI, XVI in Figs. XII and XVII.

Fig. XVII is an inverted plan view of the casing head shown in Figs. XIV and XVI.

Fig. XVIII is a plan view of the cartridge shown in Figs. XIV and XVI.

Fig. XIX is a plan view of the cartridge carrier shown in Figs. XIV and XVI.

Fig. XX is an inverted plan view of the cartridge carrier shown in Figs. XIV and XVI.

Referring to the form of my invention shown in Figs. I to XI inclusive; the casing 1 is provided with the removable head 2 which is conveniently attached thereto by the screw thread 3, indicated in Fig. III, and normally prevented from rotation thereon by the set screw 4.

Said head 2 is provided with the removable cap 6 conveniently connected therewith by the screw thread 7 and normally prevented from rotation thereon by the slide bolt 8, shown in Figs. VII and XI, provided with the spring 9 tending to thrust it outwardly in the bearing 10 in said head so as to project in the notch 11 in said cap 6 as shown in Figs. I and II. It is to be understood that said cap 6 may be unscrewed and thus removed when said slide bolt 8 is pressed inwardly far enough to permit said cap to turn over the rounded outer end of said slide bolt 8.

As shown in Fig. III said cap is con-

veniently provided with the removable screw nipple 12 having the screw threaded socket 13 in which the tubular hypodermic needle 14 is removably fitted. Said needle is conveniently provided with the milled flange 15, by which it may be inserted and removed, and the removable cover 16 by which the needle point is protected when not in use.

The carriage 18, comprising the central tube provided with the annular flanges 19 and 20 fitted to slide in said casing 1, is arranged to reciprocate in the latter and carry the plunger 22 which is removably secured therein, by its screw thread 23, in registry with said needle 14. Said plunger is retained in concentric relation with said needle by its engagement in the bearing 24 in said casing head 2, and, said carriage is provided with the spring 26 tending to normally thrust said plunger 22 through said needle 14 to the position shown in Fig. IV. However, said carriage is provided with means arranged to retract it and said plunger from said needle, under the pressure of said spring 26, including the connecting rod 28 which is mounted to reciprocate in the bearing 29 in the removable head 30 of said casing, which is conveniently detachably connected therewith by the screw thread 31. Said connecting rod 28 has the piston 32 fitted to reciprocate in said carriage tube 18, and, the spring 34 interposed between said connecting rod and said carriage tube to retract said rod within said casing, independently of said carriage, as shown in Figs. III and IV.

However, said connecting rod 28 is provided with the handle 35 exterior to said casing whereby it may be withdrawn, under pressure of both springs 26 and 34, to retract said plunger 22 from the needle 14 to the position shown in Fig. III. Said plunger 22 is detained in the retracted position shown in Fig. III, by the engagement of the detent 38 with the flange 19 of said carriage; the spring 39 carried by said detent tending to engage it as shown in Fig. III. Said detent is loosely pivotally connected with the casing 1 by the screw 40 and provided with means to release it from the carriage, including the push button 41 which is rigidly connected with said detent 38 at the upper end thereof and projects through the opening 42 in the casing 1 as shown in Figs. III and IV.

The cartridge carrier 45 is arranged to rotate on said head 2 in said cap 6 and is provided with three pins 46 projecting from the top thereof in unsymmetrical relation as shown in Fig. IX, to rotatably engage the cartridge 47 shown in Fig. VIII, which has the three openings 48 to receive said pins 46, and has the circular series of pellet sockets 49 opening therethrough parallel with the axis of said carrier 45 and adapted

to register with said needle 14 and plunger 22.

The axial stud 50 shown in Figs. III, IV and VI is detachably rigidly secured in said head 2, concentric with said carrier 45, by the screw nut 51 on said stud beneath said head. Said carrier is provided with means tending to rotate it, including the helical spring 53, best shown in Fig. X, having its outer end connected with said carrier 45 and its inner end connected with said stud 50, and, said carrier is provided with means controlling its rotary movement, including the circular ratchet 55 and the pawl 56 pivoted on said nut 51, as shown in Figs. V and VI, and adapted to engage said ratchet; said pawl being arranged to oscillate to and from engagement with said ratchet, both parallel with the axis of said carrier, and transversely with respect to said axis, the latter movement, being limited by the shape of the slot in which said pawl is fitted in said nut 51 as shown in Fig. V, being only sufficient to insure its engagement with successive teeth of said ratchet. Said pawl 56 is provided with the spring 57, which as shown in Fig. VII is disposed obliquely with respect to the axis of the casing so as to tend to not only engage said pawl in said ratchet but also turn it transversely to the limited extent permitted by the shape of the slot shown in Fig. V as aforesaid, and to the limit of such transverse oscillatory movement opposite to that in which it is shown in said figure; it being shifted to the position shown in said Fig. V, against the transverse thrust of said spring 57, by the turning movement of the carriage under pressure of said spring 53.

Said pawl 56, is provided with means arranged to release it from said ratchet 55 and thereby permit said cartridge carrier 45 to turn the space of one tooth of said ratchet at each reciprocation of said carriage 18, including the abutment 59, shown in Figs. III and VI, which projects below the nut 51 to such an extent that when said carriage is thrust to the upper limit of its stroke, which is limited by its encounter with said nut 51, said abutment is encountered and raised by the annular flange 19 of said carriage. However, before being thus released by said pawl 56, said carrier is secured against rotary movement by the projection of the plunger 22 through one of the circular series of openings 60 in said carrier in axial alinement with the needle 14; said openings 60 being respectively in axial alinement with the sockets 48 in said cartridge 47 when the latter is rotatably connected with the carrier by the engagement of the carrier pins 46 in the cartridge openings 49 as above described. While the carrier is thus secured against rotary movement by said plunger 22 said pawl 56 is not only withdrawn from

the ratchet as above described, but is turned transversely with respect to the axis of the ratchet by the oblique thrust of said spring 57 so as to insure its engagement with the next succeeding tooth in said ratchet at the beginning of the retraction of said carriage 18 and before said cartridge carrier 45 is released by said plunger 22.

Therefore, it may be observed that the arrangement above described is such as to automatically insure a positive step by step movement of said cartridge carrier 45 consequent upon successive movements of said carriage 18 and plunger 22, and, said cartridge 47 being provided with said circular series of sockets 49; the latter are successively presented in alinement with said plunger so that the pellets 63 are successively thrust through said needle 14 by said plunger.

The rotary movement of said carrier 45 is limited to slightly less than one revolution by the stop pin 64 which projects from the casing head 2 as shown in Figs. IV and XI in position to be encountered by the stop pin 65 which projects from the inner side of the carrier 45 as shown in Figs. IV and X.

Referring to the form of my invention shown in Figs. XII to XX inclusive; the casing 71 is provided with the removable head 72 which is conveniently attached thereto by the screw thread 73, indicated in Fig. XIV, and normally prevented from rotation thereon by the set screw 74.

Said head 72 is provided with the removable cap 76 conveniently connected therewith by the screw thread 77 engaging the rod 78 which extends centrally through the casing 71 and is provided with the knob 79 exterior thereto which is rigidly connected with said rod by the jam nut 80 which has the flange 81 limiting the axial movement of said rod 78. Said cap is normally prevented from rotation on said head by the engagement in its seat 82 of the unsymmetrical flange 83 on the axial stud 84 which is rigidly but detachably connected with said head 72 by the screw nut 85 on said stud beneath said head; said stud being prevented from turning in said head by the pin 87, carried by said stud, engaging an opening in said head as shown in Fig. XIV. It is to be understood that said rod 78 may be unscrewed from said cap 72 by rotation of said knob 79.

As shown in Fig. XIV said cap 76 carries the tubular hypodermic needle 89 removably connected therewith by its screw thread 90. Said needle is conveniently provided with the milled flange 91, by which it may be inserted and removed, and the removable cover 92 by which the needle point is protected when not in use.

The carriage 93, comprising the eccentric bar rigidly connecting the annular flanges

94 and 95 fitted to slide in said casing 71, is arranged to reciprocate in the latter and carry the plunger 97 which is removably secured therein, by its screw thread 98, in registry with said needle 89. Said plunger is retained in concentric relation with said needle by its engagement in the bearing 100 in said casing head 72, and, said carriage is provided with the spring 101 tending to normally thrust said plunger 97 through said needle 89 to the position shown in Figs. XII and XIV. However, said carriage is provided with means arranged to retract it and said plunger from said needle, under the pressure of said spring 101, including the handle 103, shown in Figs. XII and XIII, which is rigidly connected with said carriage flange 94 as shown in Fig. XIII and extends through the slot 104 in said casing 71 as shown in Fig. XII.

Said plunger 97 is detained in the retracted position shown in Fig. XIII, by engagement of the detent 106 with said flange 94 of said carriage; the spring 107 carried by said detent tending to engage it. Said detent is loosely pivotally connected with the casing 71 by the rivet 109 and provided with means to release it from the carriage, including the push button 110 which is rigidly connected with said detent 106 at the upper end thereof and projects through the opening 111 in the casing 71 as shown in Fig. XIV.

The cartridge carrier 113 is arranged to rotate on said head 72 in said cap 76 and is provided with three pins 114 projecting from the top thereof in unsymmetrical relation as shown in Fig. XIX, to rotatably engage the cartridge 116 shown in Fig. XVIII which has the three openings 117 to receive said pins 114, and has the circular series of pellet sockets 120 opening there-through parallel with the axis of said carrier 113 and adapted to register with said needle 89 and plunger 97.

Said carrier 113 is provided with means tending to rotate it including the helical spring 121, best shown in Fig. XX, having its outer end connected with said carrier 113 and its inner end connected with said axial stud 84, and, said carrier is provided with means controlling its rotary movement, including the circular ratchet 124, and the pawl 125 pivoted on said nut 85 as shown in Figs. XIV, XVI and XVII, and adapted to engage said ratchet. Said pawl is arranged to oscillate to and from engagement with said ratchet both parallel with the axis of said carrier, and transversely with respect to said axis, the latter movement being limited by the shape of the opening in said pawl fitting the fulcrum screw 127 as shown in Figs. XIV and XVII, being only sufficient to insure its engagement with successive teeth of said ratchet. Said pawl 125 is

provided with the spring 128 which, as shown in Fig. XVII extends obliquely with respect to the axis of the casing so as to tend to not only engage said pawl in said ratchet but also turn it transversely.

Said pawl 125 is provided with means arranged to release it from said ratchet 124 and thereby permit said cartridge carrier 113 to turn the space of one tooth of said ratchet at each reciprocation of said carriage 93, including the abutment 130 shown in Figs. XVI and XVII, which projects below the nut 85 to such an extent that when said carriage is thrust to the upper limit of its stroke, which is limited by its encounter with said nut 85, said abutment is encountered and raised by the annular flange 94 of said carriage. However, before being thus released by said pawl 125 said carrier 113 is secured against rotary movement by the projection of the plunger 97 through one of the circular series of openings 132 in said carrier in axial alinement with the needle 89; said openings 132 being respectively in axial alinement with the sockets 120 in said cartridge 116 when the latter is rotatably connected with the carrier by the engagement of the carrier pins 114 in the cartridge openings 117 as above described. While the carrier is thus secured against rotary movement by said plunger 97 said pawl 125 is not only withdrawn from the ratchet as above described, but is turned transversely with respect to the axis of the ratchet by the oblique thrust of said spring 128 so as to insure its engagement with the next succeeding tooth in said ratchet at the beginning of the retraction of said carriage 93 and before said cartridge carrier 113 is released by said plunger 97.

The rotary movement of said carrier 113 is limited to slightly less than one revolution by the stop pin 135 which projects from the casing head in position to be encountered by the stop pin 136 which projects from the inner side of the carrier 113 as shown in Fig. XX.

It may be observed that said cartridge 116 is provided with an unsymmetrical axial opening 138 fitted to said flange 83 on said axial stud 84 to insure that said cartridge may only be engaged with the mechanism with which it coöperates when the latter is in predetermined position, to wit, the initial position of the carrier 113, with the carrier spring wound up. It is to be understood that both of the carriers above described may be manually set to their initial position when the caps of their respective casings are removed.

Moreover, I find it advantageous to have the mechanism described manifest a distinctive number for each position in the step by step movement of the carrier, and, conveniently effect this result by providing the

perimeter of the carrier 45 with serial numbers, for instance, 1 to 25 inclusive, corresponding with and distinctively designating respective sockets 49 in the cartridge 47; said numbers being so arranged that in the initial position of the mechanism the number 25 is manifested at the opening 140 in the cap 6, shown in Fig. II, to indicate that 25 pellets are in the cartridge. In this form of my invention the first pellet projected is number 25 and upon such projection the number 24 is manifested to indicate that twenty-four pellets remain in the cartridge, and so on until the pellets are all discharged from the cartridge, when the latter is removed and replaced, by another fully charged. Similarly, in the form of my invention shown in Figs. XII to XX inclusive the twenty sockets in the cartridge 116 may be respectively designated by the serial numbers 1 to 20 inclusive on the perimeter of the cartridge carrier 113 and manifested at the opening 141 in the casing cap 76 as indicated in Figs. XII and XIII. However, such distinctive identification of the sockets may be otherwise manifested, for instance, the distinctive serial numbers may be marked upon the upper face of the cartridge 47 and manifested at the opening 142 shown in Fig. VI.

I find it convenient to provide said cartridges 47 and 116 with frangible means arranged to temporarily hold the pellets in the sockets thereof. For instance, said cartridge 47 is provided with frangible covers 145 for the opposite ends of its sockets, being sheets of paper secured to the opposite faces of the metallic cartridge disk by suitable adhesive, said paper being, preferably, transparent or translucent so that the operator may ascertain, visually, whether the sockets in the cartridge are empty or not. Said cartridge 116 is provided with covers of frangible fabric 146 and 147 which may be opaque being provided with perforations 148 registering with each of the sockets, through which the interior of the sockets may be inspected to ascertain whether they are empty or not.

It is to be understood that the metal disk members of the cartridges above described may be repeatedly used; the frangible covers or other means for holding the pellets in the sockets being replaced as required.

It may be observed that the provision of means to enable the operator to ascertain whether each socket in the cartridge contains a pellet or not is important because the operation of charging the cartridges with pellets requires such care that it is likely that a pellet may be occasionally omitted from a cartridge, and, if so, the hypodermic needle might be inserted and the mechanism operated to thrust the plunger through the empty socket without the operator being

aware that the operation had failed to inject a pellet as intended. However, I find it unnecessary to provide means for the operator to visually ascertain whether the sockets are empty or not, as the fact may be ascertained tactually if the fabric employed to cover the sockets is flexible enough to permit the operator to feel by finger pressure whether the pellets are contained in the cartridge or not.

Although, I prefer to employ the various features of construction above described by which certain movements of the mechanism are automatically effected; I do not desire to limit myself to the precise details of construction and arrangement herein set forth, as it is obvious that various modifications may be made therein without departing from the essential features of my invention as defined in the appended claims.

I claim:—

1. In a surgical appliance, the combination with a casing including a removable head; of a removable cap for said head; a removable tubular hypodermic needle carried by said cap; a removable cover fitted to said needle; a carriage arranged to reciprocate in said casing; a plunger removably connected with said carriage and arranged to extend through said needle; a spring tending to thrust said plunger through said needle; means arranged to retract said plunger from said needle under pressure of said spring, including a connecting rod mounted to reciprocate in said casing and having a handle exterior thereto; a spring interposed between said connecting rod and said carriage, tending to retract said rod within said casing independently of said carriage; a detent arranged to detain said carriage in retracted position; a spring carried by said detent tending to engage it with said carriage; means arranged to release said detent, including a push button; a cartridge carrier mounted to rotate on said head in said cap, and having means to engage a cartridge; an axial stud in said head concentric with said carrier; means detachably securing said stud in said head, including a screw nut on said stud; means tending to rotate said carrier, including a helical spring having its outer end connected with said carrier and its inner end connected with said stud; means controlling the rotary movement of said carrier, including a circular ratchet on said carrier and a pawl pivoted on said nut and adapted to engage said ratchet; said pawl being arranged to oscillate to and from engagement with said ratchet, both parallel with the axis of said carrier, and transversely with respect to said axis to a limited extent sufficient to insure its engagement with successive teeth of said ratchet; a spring tending to engage said pawl in said ratchet and also tending to turn

it transversely to said limited extent; means arranged to release said pawl and thereby permit said cartridge carrier to turn the space of one tooth of said ratchet at each reciprocation of said carriage, including an abutment on said pawl arranged to be encountered by said carriage; and a cartridge constructed and arranged to engage said cartridge carrier and having a circular series of pellet sockets parallel with the axis of said carrier and adapted to register with said needle and plunger; whereby said plunger may be operated to discharge pellets from said sockets in succession.

2. In a surgical appliance, the combination with a casing including a removable head; of a removable cap for said head; a removable tubular hypodermic needle carried by said cap; a carriage arranged to reciprocate in said casing; a plunger connected with said carriage and arranged to extend through said needle; a spring tending to thrust said plunger through said needle; means arranged to retract said plunger from said needle under pressure of said spring, including a connecting rod mounted to reciprocate in said casing and having a handle exterior thereto; a spring interposed between said connecting rod and said carriage, tending to retract said rod within said casing independently of said carriage; a detent arranged to detain said carriage in retracted position; a spring carried by said detent tending to engage it with said carriage; means arranged to release said detent; a cartridge carrier mounted to rotate on said head in said cap, and having means to engage a cartridge; means tending to rotate said carrier, including a spring; means controlling the rotary movement of said carrier, including a circular ratchet on said carrier and a pawl adapted to engage said ratchet; said pawl being arranged to oscillate to and from engagement with said ratchet, both parallel with the axis of said carrier, and transversely with respect to said axis to a limited extent sufficient to insure its engagement with successive teeth of said ratchet; a spring tending to engage said pawl in said ratchet and also tending to turn it transversely to said limited extent; means arranged to release said pawl and thereby permit said cartridge carrier to turn the space of one tooth of said ratchet at each reciprocation of said carriage, including an abutment on said pawl arranged to be encountered by said carriage; and, a rotary cartridge having a circular series of pellet sockets opening therethrough parallel with the axis of said carrier and adapted to register with said needle and plunger, and having means whereby it may be rotatably engaged for rotation by said carrier.

3. In a surgical appliance, the combination with a casing including a removable

head; of a removable cap for said head; a removable tubular hypodermic needle carried by said cap; a carriage arranged to reciprocate in said casing; a plunger connected with said carriage and arranged to
 5 extend through said needle; a spring tending to thrust said plunger through said needle; means arranged to retract said plunger from said needle under pressure of
 10 said spring, including a handle exterior to said casing; a detent arranged to detain said carriage in retracted position; a spring carried by said detent tending to engage it with said carriage; means arranged to re-
 15 lease said detent; a cartridge carrier mounted to rotate on said head in said cap, and having means to engage a cartridge; means tending to rotate said carrier, including a
 20 spring; means controlling the rotary movement of said carrier, including a circular ratchet on said carrier and a pawl adapted to engage said ratchet; said pawl being arranged to oscillate to and from engagement
 25 with said ratchet, both parallel with the axis of said carrier, and transversely with respect to said axis to a limited extent sufficient to insure its engagement with suc-
 cessive teeth of said ratchet; a spring tending to engage said pawl in said ratchet and also
 30 tending to turn it transversely to said limited extent; and means arranged to release said pawl and thereby permit said cartridge carrier to turn the space of one tooth of said ratchet at each reciprocation of said car-
 35 riage, including an abutment on said pawl arranged to be encountered by said carriage.

4. In a surgical appliance, the combination with a casing including a removable head; of a removable cap for said head; a
 40 removable tubular hypodermic needle carried by said cap; a carriage arranged to reciprocate in said casing; a plunger connected with said carriage and arranged to extend through said needle; a spring tending
 45 to thrust said plunger through said needle; means arranged to retract said plunger from said needle under pressure of said spring, including a handle exterior to said casing; a detent arranged to detain said carriage in
 50 retracted position; means arranged to release said detent; a cartridge carrier mounted to rotate on said head in said cap, and having means to engage a cartridge; means tending to rotate said carrier, including a
 55 spring; means controlling the rotary movement of said carrier, including a circular ratchet on said carrier and a pawl adapted to engage said ratchet; and means arranged to release said pawl and thereby permit
 60 said cartridge carrier to turn the space of one tooth of said ratchet at each reciprocation of said carriage, including an abutment on said pawl arranged to be encountered by said carriage.

65 5. In a surgical appliance, the combina-

tion with a casing including a removable head; of a removable cap for said head; a removable tubular hypodermic needle carried by said cap; a carriage arranged to reciprocate in said casing; a plunger connected with said carriage and arranged to
 70 extend through said needle; a spring tending to thrust said plunger through said needle; means arranged to retract said plunger from said needle under pressure of said spring, including a handle exterior to said casing; a detent arranged to detain said carriage in retracted position; means arranged to release said detent; a cartridge carrier mounted to rotate on said head in
 75 said cap, and having means to engage a cartridge; means tending to rotate said carrier, including a spring; means controlling the rotary movement of said carrier, including a circular ratchet on said carrier and a pawl adapted to engage said ratchet; and means arranged to release said pawl and thereby permit said cartridge carrier to turn the space of one tooth of said ratchet at each reciprocation of said carriage.

6. In a surgical appliance, the combination with a casing including a removable head; of a removable cap for said head; a removable tubular hypodermic needle carried by said cap; a carriage arranged to reciprocate in said casing; a plunger connected with said carriage and arranged to extend
 95 through said needle; a spring tending to thrust said plunger through said needle; means arranged to retract said plunger from said needle under pressure of said spring, including a handle exterior to said casing; a detent arranged to detain said carriage in retracted position; means arranged to release said detent; a cartridge carrier
 100 mounted to rotate on said head in said cap, and having means to engage a cartridge; means tending to rotate said carrier, including a spring; means controlling the rotary movement of said carrier, including a ratchet and a pawl; and means arranged to release said pawl and thereby permit said cartridge carrier to turn the space of one tooth of said ratchet at each reciprocation of said carriage.

7. In a surgical appliance, the combination with a casing; of a removable tubular hypodermic needle; a plunger arranged to reciprocate in said casing and extend through said needle; a spring tending to
 120 thrust said plunger through said needle; means arranged to retract said plunger from said needle under pressure of said spring, including a handle exterior to said casing; a detent arranged to detain said plunger in retracted position; means arranged to release said detent; a cartridge carrier having means to engage a cartridge arranged to carry a plurality of pellets in a circular series; means tending to rotate said carrier, 130

including a spring; and means controlling the rotary movement of said carrier, including a ratchet and a pawl; means arranged to release said pawl and thereby permit said cartridge carrier to turn the space of one tooth of said ratchet at each reciprocation of said plunger.

8. In a surgical appliance, the combination with a casing; of a tubular hypodermic needle; a plunger arranged to reciprocate in said casing and extend through said needle; a spring; means arranged to retract said plunger from said needle under pressure of said spring; a cartridge carrier having means to engage a cartridge arranged to carry a plurality of pellets in a circular series; means tending to rotate said carrier, including a spring; means controlling the rotary movement of said carrier, including a ratchet and a pawl; and means arranged to release said pawl and thereby permit said cartridge carrier to turn the space of one tooth of said ratchet at each reciprocation of said plunger.

9. In a surgical appliance, the combination with a casing; of a tubular hypodermic needle; a plunger arranged to reciprocate in said casing and extend through said needle; means arranged to retract said plunger from said needle; and a cartridge carrier having means to rotatably engage a cartridge arranged to carry a plurality of pellets in a circular series.

10. In a surgical appliance, the combination with a casing; of a tubular hypodermic needle; a plunger arranged to reciprocate in said casing and extend through said needle; means arranged to retract said plunger from said needle; and, means arranged to hold a pellet stationary in alinement with said plunger until displaced by the latter, whereby, said pellet may be thrust through said needle by said plunger.

11. In a surgical appliance, the combination with a cartridge for medicinal pellets, of a cartridge carrier having means arranged to detachably engage a cartridge arranged to carry a plurality of pellets in a circular series; means tending to rotate said carrier, including a helical spring; means controlling the rotary movement of said carrier, including a circular ratchet on said carrier and a pawl adapted to engage said ratchet; said pawl being arranged to oscillate to and from engagement with said ratchet, both parallel with the axis of said carrier, and transversely with respect to said axis to a limited extent sufficient to insure its engagement with successive teeth of said ratchet; and, a spring tending to engage said pawl in said ratchet and also tending to turn it transversely to said limited extent.

12. In a surgical appliance, the combination with a cartridge for medicinal pellets, of a cartridge carrier having means ar-

ranged to detachably engage a cartridge arranged to carry a plurality of pellets in a circular series; means tending to rotate said carrier, including a spring; means controlling the rotary movement of said carrier, including a ratchet and a pawl adapted to engage said ratchet; said pawl being arranged to oscillate to and from engagement with said ratchet, both parallel with the axis of said carrier, and transversely with respect to said axis to a limited extent sufficient to insure its engagement with successive teeth of said ratchet; and, a spring tending to engage said pawl in said ratchet and also tending to turn it transversely to said limited extent.

13. In a surgical appliance, the combination with a cartridge for medicinal pellets, of a cartridge carrier having means arranged to detachably engage a cartridge arranged to carry a plurality of pellets in a circular series; means tending to rotate said carrier, including a spring; means controlling the rotary movement of said carrier, including a ratchet and a pawl adapted to engage said ratchet; said pawl being arranged to oscillate to and from engagement with said ratchet, both parallel with the axis of said carrier, and transversely with respect to said axis to a limited extent sufficient to insure its engagement with successive teeth of said ratchet; and, a spring tending to engage said pawl in said ratchet and also tending to turn it transversely to said limited extent.

14. In a surgical appliance, the combination with a cartridge carrier having means arranged to detachably engage a cartridge arranged to carry a plurality of pellets in a circular series; of means tending to rotate said carrier; means controlling the rotary movement of said carrier, including a ratchet and a pawl adapted to engage said ratchet; said pawl being arranged to oscillate to and from engagement with said ratchet, both parallel with the axis of said carrier, and transversely with respect to said axis to a limited extent sufficient to insure its engagement with successive teeth of said ratchet; and, a spring tending to engage said pawl in said ratchet and also tending to turn it transversely to said limited extent.

15. In a surgical appliance, the combination with a casing and mechanism including a plunger and means to reciprocate the same inclosed therein; of a cap having a notch, and provided with a tubular hypodermic needle arranged to register with said plunger; means detachably connecting said cap with said casing, including a screw thread; and, a spring pressed slide bolt carried by said casing adapted to engage said notch; whereby said cap is held on said casing with said needle in axial alinement with said plunger.

16. In a surgical appliance, the combination with a casing and mechanism including a plunger and means to reciprocate the same inclosed therein; of a cap provided with
 5 a tubular hypodermic needle; means detachably connecting said cap with said casing including a screw thread; and, a spring pressed side bolt; whereby said cap is held
 10 on said casing with said needle in axial alinement with said plunger.

17. In a surgical appliance, the combination with a casing having a removable head and mechanism including a plunger and means to reciprocate the same inclosed there-
 15 in; of a cap fitted to said head and provided with a tubular hypodermic needle and having a notch; screw threads detachably connecting said casing, head, and cap; means normally preventing rotation of said
 20 head on said casing; and, means normally preventing rotation of said cap on said head; whereby said cap is held on said casing with said needle in axial alinement with said plunger.

25 18. In a surgical appliance, the combination with a casing and mechanism including a plunger and means to reciprocate the same inclosed therein; of means arranged to carry a series of medicinal pellets arranged
 30 for successive presentation in alinement with said plunger; and, means in said casing whereby said pellet carrying means is prevented from being inserted or removed except when in predetermined coöperative
 35 position.

19. In a surgical appliance, the combination with a casing; of a tubular hypodermic needle; a plunger arranged to reciprocate in said casing and said needle; means arranged to retract said plunger from said
 40 needle; and, means arranged to hold a pellet stationary in alinement with said plunger until displaced by the latter, whereby, said

pellet may be thrust through said needle by said plunger.

20. The combination with a casing; of a tubular needle; a plunger arranged to reciprocate in said casing and said needle; and, means arranged to hold a pellet stationary in alinement with said plunger until
 50 displaced by the latter whereby said pellet may be thrust into said needle by said plunger.

21. In a surgical appliance, the combination with a casing and mechanism including
 55 a plunger and means to reciprocate the same inclosed therein; of means arranged to carry a series of medicinal pellets arranged for successive presentation in alinement with said plunger; and, means in said casing
 60 whereby said pellet carrying means is prevented from being inserted or removed except when in predetermined coöperative position, including an axial stud fitted to an unsymmetrical axial opening in said carry-
 65 ing means.

22. In a surgical appliance, the combination with a casing and mechanism including
 70 a plunger and means to reciprocate the same inclosed therein; of means arranged to carry a series of medicinal pellets arranged for successive presentation in alinement with said plunger; and, means in said casing
 75 whereby said pellet carrying means is prevented from being inserted or removed except when in predetermined coöperative position, including an axial stud.

In testimony whereof, I have hereunto signed my name at Philadelphia, Pennsylvania, this nineteenth day of September, 80
 1912.

EVERETT BROWN CHAPMAN.

Witnesses:

ARTHUR E. PAIGE,
 WILLIAM A. RANDALL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."