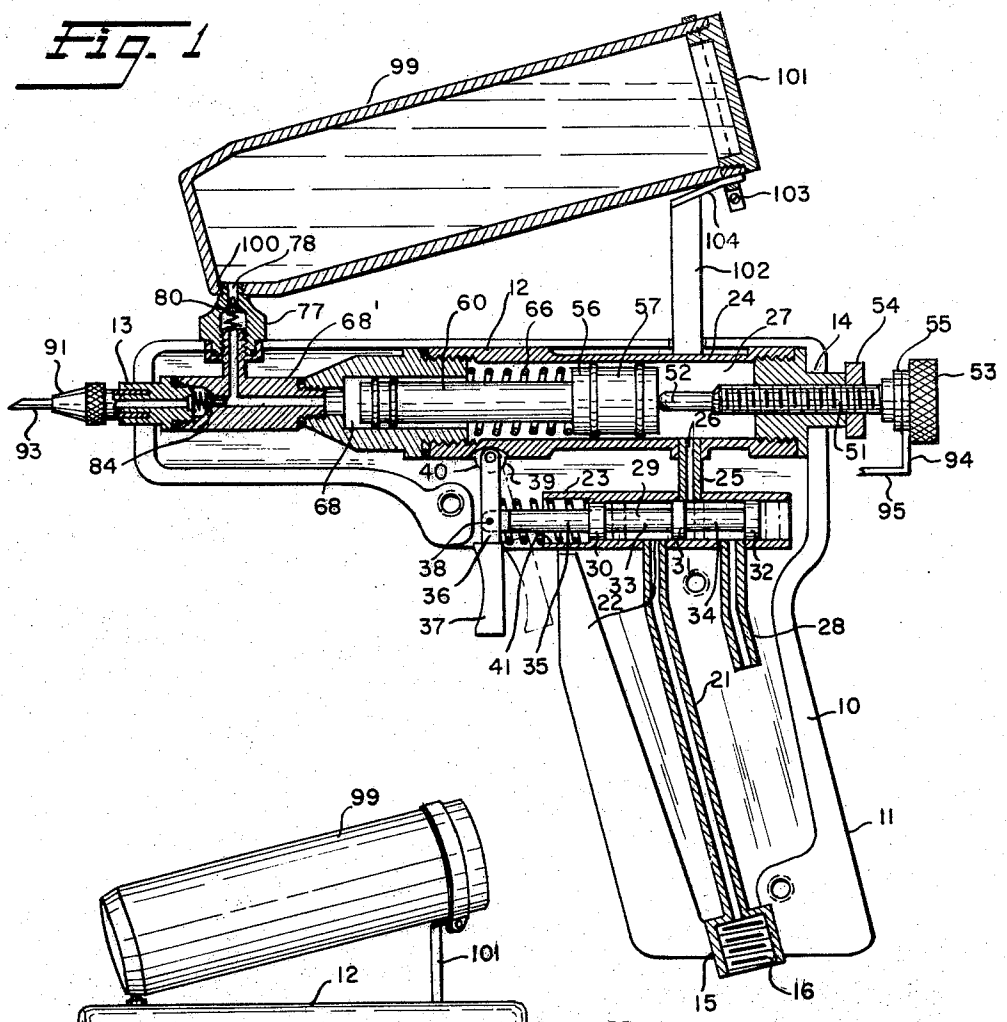
Nov. 21, 1967 G. W. KNOX ET AL 3,353,537

AUTOMATIC MULTI-DOSAGE INOCULATING INSTRUMENT

Filed Aug. 11, 1965 3 Sheets-Sheet 1

Fig. 1



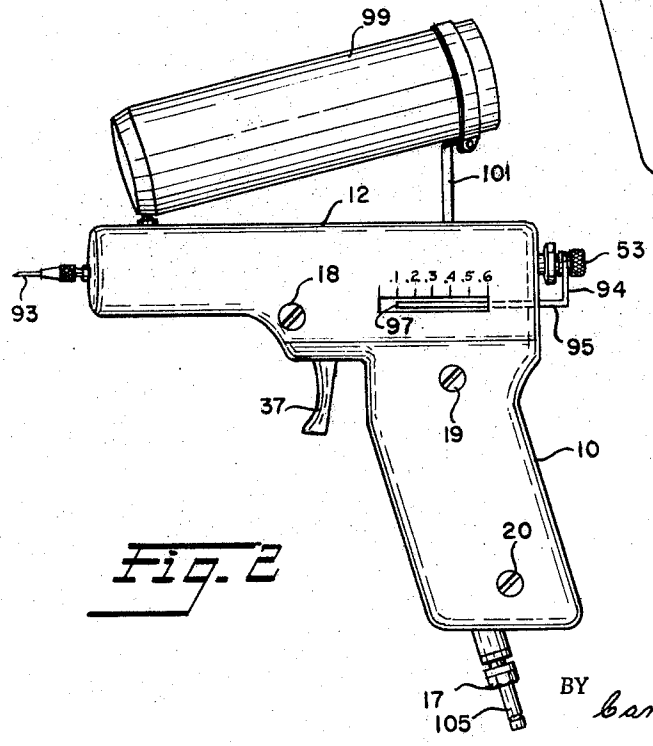


Fig. 2

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Filed Aug. 11, 1965 3 Sheets-Sheet 2

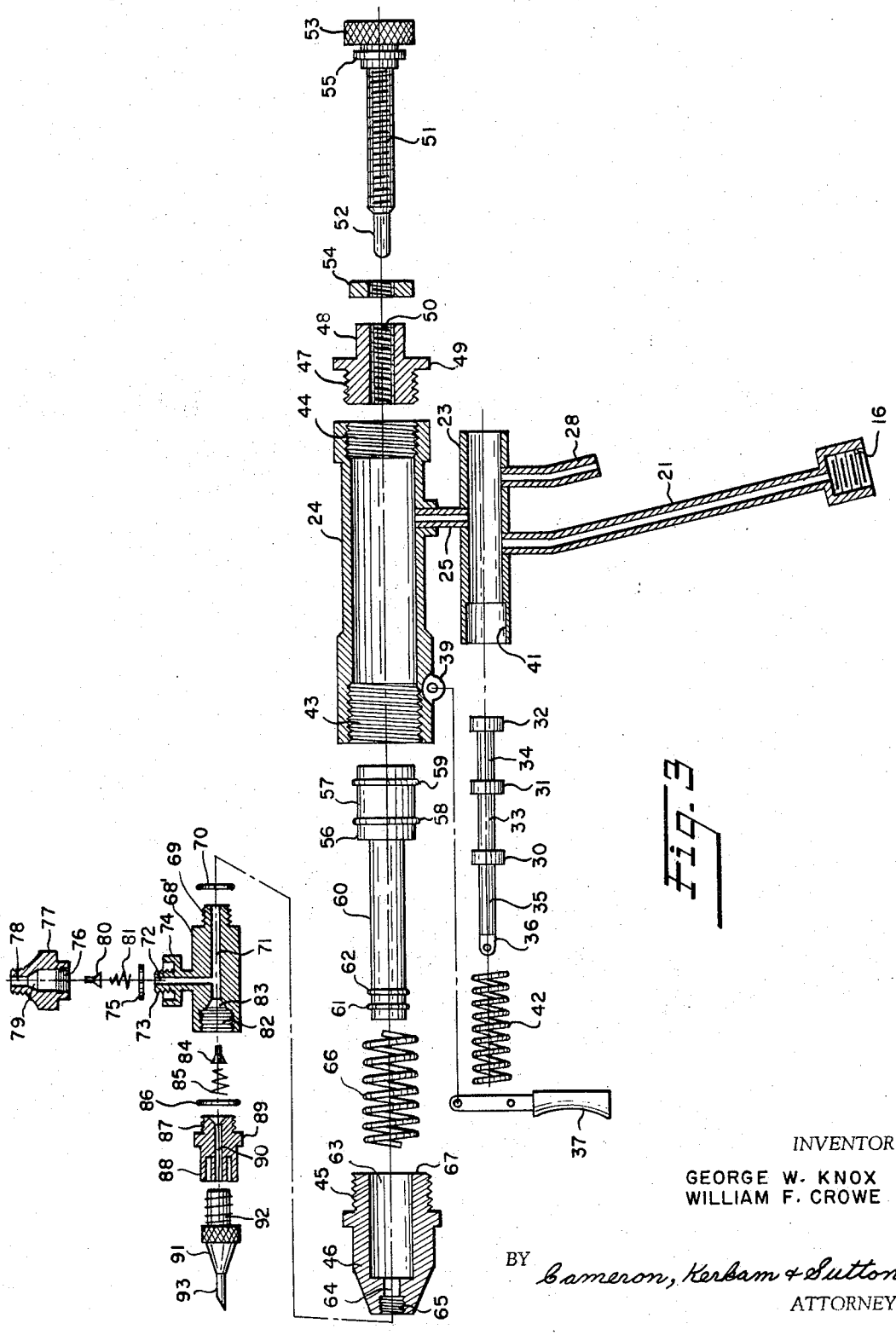

Fig. 3

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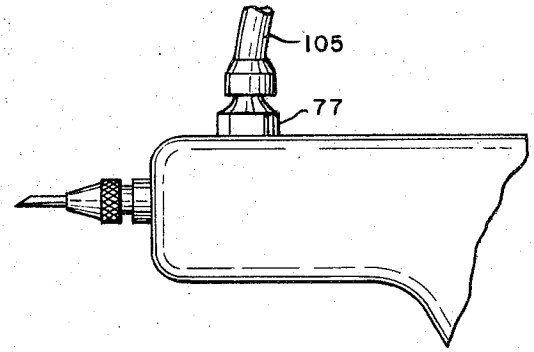


Fig. 4

Fig. 5

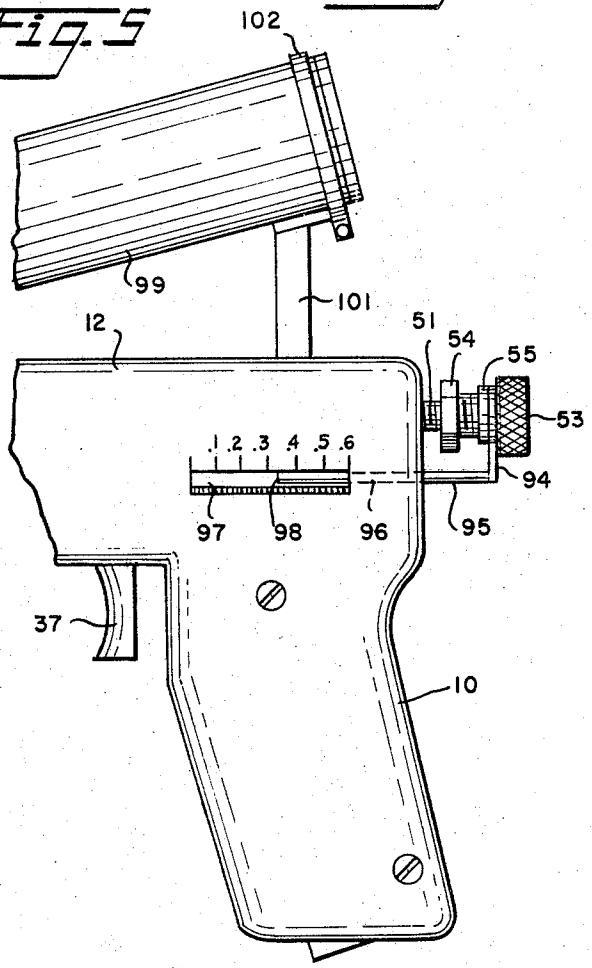
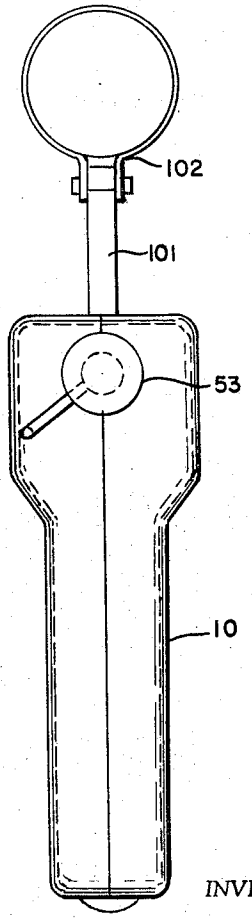


Fig. 6



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United States Patent Office 3,353,537
Patented Nov. 21, 1967

3,353,537

AUTOMATIC MULTI-DOSAGE INOCULATING INSTRUMENT

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Filed Aug. 11, 1965, Ser. No. 478,873
6 Claims. (Cl. 128—218)

This invention relates to high speed inoculating or vaccinating instrument particularly designed for use on chickens and other fowl, but which may also be used for other types of mass inoculation or vaccination.

The invention contemplates the provision of a high speed instrument, pneumatically actuated, wherein a trigger and piston valve means control the admission to a chamber behind an actuating piston of successive charges of compressed air which act to force the piston forwardly in a cylinder to inject successive, measured charges of a vaccine or inoculant through the forward extremity of the instrument and a hollow needle carried thereby into the fowl being inoculated. The instrument is so designed that the volume of each charge may be accurately measured by screw-adjusting the position of the master piston within the cylinder, thereby regulating the volume of the charge chamber at the forward extremity thereof.

The instrument is so designed that pressure exerted against the spring pressed trigger and piston mechanism therefor opens a passage into the pressure chamber behind the piston to allow ingress thereinto of compressed air to force the spring-loaded master piston forwardly to eject a measured charge through the forward extremity of the instrument and the hollow needle mounted thereon. Upon release of the trigger the trigger spring forces it and the control piston forwardly, closing the passage into the pressure chamber behind the master piston and opening an exhaust passage from the pressure chamber to atmosphere, to allow the escape of the compressed air within the chamber. The release of the pressure behind the master piston allows the master piston spring to force the piston rearwardly, opening the charge chamber and pulling a measured charge of inoculant thereinto from a communicating source of inoculant.

Two one-way valves are provided in the forward section of the instrument, one to control the egress of vaccine or inoculant from the inoculant chamber and the other lying between the vaccine or inoculant source and the chamber whereby on the forward or pressure stroke of the master piston the valve from the inoculant container to the chamber is closed and the valve between the chamber and the needle of the instrument is opened, allowing a measured charge of vaccine or inoculant to be forced outwardly therefrom through the hollow needle at the forward extremity of the instrument.

The instrument is so designed that by rapidly pressing and releasing the trigger mechanism and the spring pressed control piston governed thereby a high number of inoculations may be made therewith per minute.

As aforesaid, pressure against the trigger, moving it and the air valve piston rearwardly, opens a passage from the compressed air source to the master actuating chamber behind the spring pressed master piston and release of the trigger, which is spring pressed forwardly, opens an exhaust vent from the master pressure chamber to atmosphere, allowing the master piston to be returned to initial position by its control spring. This return to "neutral" position of the master control piston acts to pull a measured charge of inoculant from the inoculant reservoir into the forward inoculant chamber, ahead of the master piston, thus preparing the instrument for another "shot."

A number of pertinent patents have been developed, none of which, however, disclose the novel structure of the present invention and none of which produce a high-

speed inoculating or vaccinating instrument anticipating the structure of the subject invention.

These patents are are follows:

Ziherl et al., 2,821,193, Jan. 28, 1958
Venditty et al., 2,928,390, Mar. 15, 1960
Rubery, 2,952,257, Sept. 13, 1960
Ismach, 3,057,349, Oct. 9, 1962

FIG. 1 is a partial longitudinal, vertical sectional view, partially in phantom, showing the case and operating mechanism of the instrument, with the trigger in forward position;

FIG. 2 is a side view of the instrument;

FIG. 3 is an exploded assembly view, partially in vertical, longitudinal section, of the component parts of the operating mechanism of the instrument;

FIG. 4 is a fragmentary side view of the forward extremity of the instrument showing the line to a master container of vaccine;

FIG. 5 is a fragmentary side view, partially in phantom, of the rear portion of the instrument showing the details of the calibrating scale mechanism therefor; and

FIG. 6 is an end view, taken from the rear extremity of the instrument, showing the disposition of the calibrating mechanism.

In the drawings, FIG. 1, **10** indicates a molded fiberglass or plastic casing for the instrument, preferably formed in two mating halves each comprising handle section **11** and barrel or tube section **12**, recessed at its forward and rear extremities at **13** and **14** to receive the end plugs of the main cylinder of the operating mechanism of the instrument. Handle **11** is provided at its lower extremity with a bore **15** which receives a screw-threaded socket **16** at the lower end of line **21**, into which is screwed the nipple of compressed air line **17**, from a compressed air pump, as will hereinafter be more fully described.

As aforesaid, casing **10** is preferably formed of fiberglass or plastic and is molded in the shape of a hand gun, as shown in FIGS. 1 and 2, and the two mating halves thereof are preferably joined together by screws **18**, **19** and **20** passed through orifices in one half of the mating shell and registering in screw-threaded sockets in the opposite half thereof. It will be noted that the two halves of the shell **10** are so designed and orificed as to closely receive and hold the working mechanism of the apparatus, as will hereinafter be discussed.

Extending upwardly from internally screw-threaded socket **16**, fitted within recess **15** in the base of hollow handle **11** of casing **10** of the gun structure is compressed air tube or line **21**, which, as shown, communicates through an orifice **22** with the interior of air valve cylinder **23** of the mechanism. Air valve cylinder **23** is connected at its upper, median surface to master cylinder **24** by means of communicating tube **25** which is disposed therebetween and carries bore **26** to provide communication between the interior of air valve cylinder **23** and pressure chamber **27** of main cylinder **24**.

Extending downwardly from the lower, rear extremity of air valve cylinder **23** is air exhaust tube **28** which communicates with the hollow interior of casing **10** to exhaust compressed air from chamber **27** to atmosphere.

It will be noted that air valve cylinder **23** is preferably in the form of an open cylinder. Valve piston **29** is provided within cylinder **23** and is longitudinally slidable therewithin. As shown, valve piston **29** is preferably provided with three equally spaced, enlarged cylindrical baffles **30**, **31** and **32** with reduced sections **33** and **34** lying respectively between baffles **30** and **31** and **31** and **32**, for a purpose hereinafter to be more fully discussed.

At its forward extremity, air valve piston **29** is provided with elongate, reduced arm **35** which is preferably

flattened and bored at its forward extremity at 36 for pivotal attachment to the center of trigger 37 by means of a pin 38. As shown, trigger 37 is preferably pivotally affixed at its upper extremity at 39 to a depending bored stud or projection 40 provided in the lower, forward surface of master cylinder 24. Trigger 37 is capable of forward and rearward movement through an angle of approximately 10°. When trigger 37 is pulled rearwardly it will thus slide air valve piston 29 to the rear in cylinder 23 and when urged forwardly it will move piston 29 forwardly. A vertical slot may be provided in the forward extremity of cylinder 23 to accommodate the upper, flattened section of trigger 37, when it is pulled rearwardly.

As shown, the forward extremity of air valve cylinder 23 is bored out and enlarged to provide a shouldered recess 41 for the reception of trigger spring 42 which is applied about the forward, reduced arm 35 of air valve piston 29, with its rear extremity bearing against the inner shoulder of spring recess 41 and its forward extremity bearing against trigger 37. Thus it will be seen that when trigger 37 is pulled rearwardly spring 42 will be compressed, as piston 29 moves rearwardly in cylinder 23, and that when trigger 37 is released compressed spring 42 will extend to force trigger 37 forwardly into forward position, as shown in FIG. 1 of the drawings. It will be noted that in this forward or neutral position of trigger 37 cylindrical baffle 31 of air valve piston 29 is disposed between orifice 22 of compressed air line 21 and orifice 26 of tube 25 between air valve cylinder 23 and pressure chamber 27 of master cylinder 24, thus closing communication therebetween and preventing ingress of compressed air from line 21 through line 25, into chamber 27. Also, with trigger 37 in forward or neutral position, line 25 from chamber 27 is open to outlet vent or pipe 28 to vent air pressure from chamber 27 through lines 25 and 28 to atmosphere.

Conversely, with trigger 37 pulled rearwardly to its fullest extent, it will be seen that cylindrical baffle 31 of air valve piston 29 is moved rearwardly to the dotted position shown in FIG. 1, thus opening communication between compressed air line 21, around reduced section 33 of piston 29, through duct 25 into compression chamber 27 and closing communication between duct 25 and exhaust vent 28. It will be noted from FIG. 1 that it is only necessary to move piston 29 a fraction of an inch, on the order of ¼", to open and close communication between compressed air line 21 and pressure chamber 27.

This air valve structure will be discussed at length further on in this specification.

Having described the air valve control cylinder and piston structure, the main cylinder and piston structure controlled thereby will now be described.

As shown in FIGS. 1 and 3, main piston cylinder 24 comprises a cylindrical length of tubing, preferably formed of steel or analogous material and screw-threaded internally at its forward and rear extremities at 43 and 44 to receive, respectively, the screw-threaded rear extremity 45 of forward plug 46 and the screw-threaded forward extremity 47 of closure plug 48.

As will be seen from FIG. 3, closure plug 48 is preferably shouldered at 49 and is provided with a central screw-threaded bore 50 to receive adjusting screw 51 provided with reduced nose portion 52 at its forward extremity and knurled knob 53 at its rear extremity. Locknut 54 is provided on screw 51, as shown, for a purpose hereinafter to be discussed at more length. A cylindrical shoulder 55 is provided about the rear extremity of screw 51 adjacent knob 53, for a purpose hereinafter to be more fully discussed.

Closely and slidably fitting within cylinder 24 is master piston 56 which, as shown, comprises an enlarged cylindrical rear section 57 provided with peripherally disposed plastic sealing rings 58 and 59, slidably sealing enlarged cylindrical section 57 within cylinder 24. Sealing rings 58 and 59 provide a complete seal for enlarged cylindrical section 57 within cylinder 24 and prevent the escape of compressed air therearound.

At its forward extremity, master piston 56 is provided with elongate cylindrical section 60, of reduced diameter, provided with plastic sealing gaskets or O-rings 61 and 62 about its forward extremity. Reduced section 60 of piston 56 is designed to closely and slidably engage within longitudinal bore 63 of the forward plug 46 of cylinder 24 when the cylinder and piston structure are assembled. It will be noted that plug 46 is provided at its forward extremity with a further reduced bore 64 extending into forward, screw-threaded recess 65.

Master pressure spring 66 is provided about the forward, reduced extremity 60 of piston 56, closely fitting within cylinder 24 and bearing at its forward extremity against the rear shoulder 67 of forward plug 46 and at its rear extremity against the forward surface of piston 57, as shown in FIG. 1.

Referring again to FIG. 1, it will be seen that with the master cylinder 24 and piston structure 56 assembled, a chamber 68 is provided within the forward section of bore 63 of forward plug 46 ahead of the forward extremity of reduced section 60 of master piston 56, which chamber 68 is designed for the reception of vaccine or other injectant, as will hereinafter be more fully discussed. It will further be noted that the length or volume of chamber 68 is directly controlled by the position of the nose 52 of adjusting screw 51, which regulates the position of piston 56 within cylinder 24. Chamber 68 is progressively enlarged as screw 51 is turned counterclockwise to move its forward extremity 52 rearwardly and is progressively decreased in size as screw 51 is turned in a clockwise direction to move its nose 52 and piston 56 forwardly in cylinder 24. This aspect of the invention will be discussed more fully further on in the specification.

Referring now to the vaccine feed and valve structure at the forward extremity of the instrument, forward valve plug 68' is provided, bearing at its rear extremity a screw-threaded nipple 69 designed to engage within forward screw-threaded recess 65 of plug 46, a washer 70 being provided about the base of nipple 69 to seal the connection between nipple 69 and screw-threaded recess 65 of plug 46. Plug 68', as shown, is provided with reduced longitudinal bore 71 and vertical bore 72, intersecting at right angles toward the forward extremity of plug 68'. Screw-threaded nipple 73 is provided extending upwardly at right angles to lug 68' about bore 72 and carries sealing cup 74 about its outer periphery, receiving plastic washer 75. Screw-threaded nipple 73 is designed to mate into internal screw threads 76 of vaccine connecting head 77 which is tightly screwed down thereover against sealing washer 75 within cup 74 thereof. At its upper extremity, vaccine head 77 is bored at 78 and provided with conical recess 79 at the lower extremity of bore 78 to receive a small, nosed conical valve member 80 which fits closely therewithin, as shown in FIG. 1. Valve spring 81 is provided under valve 80, on the upper surface of nipple 73, to maintain valve 80 seated in recess 79 and bore 78, as shown in FIG. 1.

At its forward extremity, and axially aligned with longitudinal bore 71, plug 68' is provided with an enlarged, screw-threaded recess 82 provided at its rear extremity with conical valve recess 83 for the reception of nosed conical valve 84 which fits closely therein. Valve spring 85 is provided within recess 82 behind screw-threaded rear extremity 87 of forward shouldered plug 88. As shown, plug 88 is provided with shoulder 89 ahead of screw threads 87, bearing flush against the forward face of plug 68' in sealing engagement therewith, sealing ring 86 being provided therebetween to perfect the seal. Forward plug 88 is provided with longitudinal bore 90 in extension of bore 71 of plug 68' in the forward portion of the instrument.

A needle assembly 91, longitudinally bored at 92, is

provided closely engaging in the forward extremity of plug 88 as by bayonet slots, to deliver serum or vaccine forced through bores 71 and 90, respectively, thereof, through hollow needle 93 to the subject.

Before going into the operation of the instrument, the indicating means for the dosages delivered thereby will be described. As shown in FIGS. 2, 5 and 6, this indicating means comprises ring means 94 freely engaged over the outer extremity of screw 51 between knob 53 and shoulder 55 thereof. At its lower extremity ring 94 is provided with rectangular rod means 95 which passes through a longitudinal orifice 96 in the rear, lateral surface of casing 10 which is provided with a calibrated open recess 97 into which the extremity 98 of rod 95 extends and is visible. As shown, orifice 97 provided in the lateral rear surface of casing 10 is appropriately calibrated, as shown, to designate dosages of .1 to .6 cc. of vaccine or serum. Any other desired calibration may be used, depending upon the desired size of dosages.

The rod 95 preferably should be of such length that its forward extremity 98 coincides in position with the forward extremity of reduced nose 52 of screw 51 whereby it will indicate the position of the extremity of nose 52 of screw 51 and thus the relative forward position of piston 56, the forward extremity of which defines the length of the serum chamber 68. Thus, when screw 51 is rotated counterclockwise and moved to its extreme rearward position, enlarging chamber 68 to its largest extent, the forward extremity of rod or pointer 95 will be retracted to the rearward extremity of slot 97, indicating the largest possible dosage, i.e., .6 cc. Conversely, when screw 51 is rotated clockwise and moved to its extreme forward position the forward extremity 98 of indicator 95 will move to the forward extremity of slot 97, designating the smallest possible dosage, i.e., .1 cc., and chamber 68 will be at its most reduced size.

Cylindrical vaccine reservoir 99 is shown, disposed above, and angularly inclined to, the barrel surface 12 of the instrument. Reservoir 99 is provided with a screw-threaded orifice 100 at its lower, forward extremity which engages over the upper, screw-threaded extremity of vaccine nipple 77. Reservoir 99 is closed at its upper extremity by a screw cap 101. A brace 102 is provided affixed to the upper, rear extremity of cylinder 24 extending upwardly through casing 12 and affixed by an appropriate clamp ring 103 at its rectangularly bent upper surface 104 to the rear extremity of reservoir 99 to support reservoir 99 at an angle of some 15° above the barrel of the instrument. Communication is provided between reservoir 99 and vaccine chamber 68 by way of passages 78, 72 and 71 of the forward plug structure of the instrument, when valve 80 of nipple 77 is opened.

If desired, as shown in FIG. 4, a tubing line 105 may be provided over nipple 77, leading to a master container of serum or inoculant, whereby inoculant container 99 may be eliminated, the inoculant being drawn into the instrument through line 105 from the aforesaid master container.

Container 99 may be of any desired size but is preferably of the relative size shown for easy handling in conjunction with the instrument.

The functioning of the instrument will now be described in detail.

In operation, the nozzle of compressed air line 17 from an air compressing pump, capable of producing pressures preferably of from 50 to 60 pounds per square inch, is first screwed into screw-threaded socket 16 at the base of line 21 in handle 10 of the instrument. The compressor is then started, making available compressed air of up to 60 pounds per square inch for the instrument. With the instrument connected with the source of compressed air, rearward movement of trigger 37 against the compression of spring 42 moves air valve piston 29 rearwardly, cylindrical baffle 31 thereof moving past line 25 and opening communication between line 21 and line 25 about reduced section 33 of air valve piston 29 and allowing a charge of compressed air to enter chamber 27 in cylinder 24 behind piston 56, the charge of compressed air driving piston 56 forwardly in cylinder 24. As piston 56 is driven forwardly in cylinder 24, the extremity of reduced section 60 thereof moves against the relatively incompressible inoculant fluid in chamber 68, forcing the highly compressed fluid forwardly through bore 71, forcing valve 84 into open position, and the compressed fluid passes it and passes through bore 90 of forward stud 88 and thence through hollow needle 93 into the subject. This compressing action of the fluid through bore 71 is also exerted upwardly through vertical bore 72, thus maintaining valve 80 closed, to prevent egress of fluid therethrough.

When trigger 37 is released spring 42 forces trigger 37 forwardly, thus pulling piston 29 forwardly, closing the passage between lines 25 and 21 by means of baffle 31 and opening the passage from chamber 27 to atmosphere by way of line 25, about reduced bore 34 and out of exhaust duct 28. When pressure is relieved behind piston 56 by the opening of the exhaust port system, main spring 66 forces piston 56 rearwardly into contact with the forward nose 52 of screw 51. This rearward movement of piston 56 creates a partial vacuum in chamber 68, pulling valve 80 open, closing valve 84 and pulling a charge of vaccine from reservoir 99 into chamber 68 ahead of extension 60 of piston 56, to fill chamber 68.

Referring specifically to air valve piston 29, which slides in cylinder 23, it will be noted that piston 29 is provided rearwardly of arm section 35 with a first cylindrical baffle member 30 which closely and slidably engages the interior of cylinder 23. Piston 29 also is further provided with evenly spaced cylindrical baffles 31 and 32, between which are provided reduced sectors 33 and 34. Cylindrical forward baffle 30 closely and sealingly engages the inner walls of cylinder 23 and acts to seal the forward extremity of cylinder 23 to the escape of compressed air. Cylindrical baffle 32, at the rear end of piston 29 also closely and slidably engages the inner walls of cylinder 23 and acts to seal the rear extremity of cylinder 23 to the escape of compressed air from within cylinder 23. Lastly, central cylindrical control baffle 31, provided between cylindrical baffles 30 and 32, also closely and slidably engages the inner walls of cylinder 23 and it is this cylindrical baffle 31 which is the control or operating baffle of piston 29, acting to direct compressed air, when in rearward position, from duct 21 through duct 25 into chamber 27 of main cylinder 24, behind piston 56. In its forward position, with the trigger released, baffle 31 is disposed between pressure line 21 and line 25 to cut off the supply of compressed air to pressure chamber 27 and to open exhaust from chamber 27 through line 25 around reduced section 34 of piston 29 and out of exhaust vent 28 to atmosphere. It will thus be seen that forward cylindrical baffle 30 and rear cylindrical baffle 32 act, respectively, to seal the forward and rear extremities of cylinder 23 and center cylindrical baffle 31 acts to control the flow of compressed air into and out of pressure chamber 27 in cylinder 24, behind piston 56.

Further, due to the extremely short travel of piston 29, i.e., on the order of ¼" between "power" and "exhaust", it will be seen that great rapidity of actuation is possible. Thus, trigger 37, may actually be "tapped" rapidly with the finger to produce an extremely rapid succession of "shots".

As has previously been indicated, the size of the vaccine chamber 68 is directly controlled by means of adjusting screw 51, which is provided with the indicating system previously discussed comprising ring 94, rod 95 and calibrated orifice 97, the extremity 98 of the indicator 95 preferably coinciding with the extremity of the nose 52 of screw 51. Thus, clockwise rotation of the knob 53 of screw 51 moves the nose 52 thereof forwardly in chamber 27, forcing piston 56 forwardly against the

pressure of spring **66** and progressively reducing the size of chamber **68**, which is defined by the forward wall of extremity **60** of piston **56** and the forward shouldered portion of the bore **63** of plug **46**. Conversely, counterclockwise rotation of screw **51** pulls its nose **52** rearwardly in chamber **27**, allowing piston **56** to move rearwardly therein under the action of spring **66** and progressively enlarging the size of chamber **68**, the extremity **98** of pointer **95** moving correspondingly rearwardly in orifice **97** to indicate the increased dosage.

Obviously, the instrument may be calibrated in other ways and it is not essential that the extremity **98** of indicator rod **95** be in alignment with the inner extremity of screw **51**. The screw **51** may be calibrated with peripheral markings to subtend the same purpose.

As has previously been indicated, locking nut **54** is provided on screw **51** whereby once the desired setting of screw **51** has been obtained locknut **54** may be turned forwardly against the rear shoulder of plug **48** to lock screw **51** in desired position and to prevent its dislocation therefrom.

With the instrument of the present invention a rapid succession of dosages of from .1 cc. to .6 cc. may be dispensed under high pressure with a recovery time of less than 100 milliseconds, even at the maximum dosage of .6 cc. This high speed operation thus allows a greatly increased number of fowls to be inoculated in a given period of time, greatly increasing the efficiency of the inoculation operation and decreasing cost.

As aforesaid, when utilizing individual lines **105** to a number of inoculating guns, a number of guns may be provided with vaccine from the same master source through said lines and high order of efficiency results, it not being necessary to suspend operation to refill reservoirs **99**, thus permitting many times the number of fowls to be inoculated as was previously possible in a given time.

If desired, the needle **93** may be eliminated and a jet orifice substituted therefor.

The invention is susceptible of numerous alternative embodiments without departing from the spirit thereof. The trigger and valve structures may be modified, as may the control structure for the vaccine chamber without departing from the spirit of the invention.

Attention is directed to the appended claims for a limitation of the scope of this invention.

What is claimed is:

1. In a high speed inoculating gun, a hollow casing in the shape of a hand gun, a handle section on said casing, a main cylinder affixed and extending longitudinally within the upper portion of said casing, a piston slidable within said cylinder, spring means ahead of said piston in said cylinder forcing said piston rearwardly, a forward plug closing the forward end of said cylinder and provided with a reduced axial bore, an elongate section of reduced diameter extending forwardly from said piston and closely fitting in the axial bore of said forward plug, a plug in the rear end of said cylinder, a screw passing through said rear plug and contacting said piston to limit the rearward movement thereof, a vaccine container mounted on said casing and communicating with the forward end of said reduced bore, a one way valve spring pressed upwardly between said vaccine container and said bore, a second forward plug means provided with a central bore affixed to the forward extremity of said first forward plug communicating with said reduced bore of said plug, a one way valve spring pressed rearwardly in said central bore, a needle affixed to the forward extremity of said plug, trigger means pivotally affixed at its upper extremity in the lower surface of said cylinder extending downwardly therefrom and outwardly of said casing, an air valve cylinder affixed beneath said main cylinder parallel thereto and in communication therewith, a compressed air line extending upwardly in the handle portion of said casing and communicating with said air valve cylinder, an exhaust vent extending downwardly from said air valve cylinder spaced rearwardly from said compressed air line, a line communicating between said air valve cylinder and said main cylinder behind said piston, a control piston slidably mounted in said air valve cylinder and pivotally connected to said trigger at its forward extremity, spring means within said air valve cylinder forcing said trigger and piston forwardly, three equally spaced cylindrical baffles on said air valve piston closely and slidably fitting within said air valve cylinder and so positioned therein that when said trigger is in forward position the center baffle of said three baffles lies between said compressed air line and the line communicating between the air valve cylinder and the main cylinder, cutting off communication therebetween, and when said trigger is in rear position said center baffle is moved rearwardly opening communication between the compressed air line and said master cylinder behind said main piston, whereby when said trigger is moved rearwardly a charge of compressed air will be delivered to said cylinder behind said piston to force said piston forwardly in said cylinder and deliver a charge of vaccine through said needle.

2. In a high speed inoculating gun, a hollow casing in the form of a hand gun comprising a handle portion and a barrel portion, a compressed air line extending upwardly in said handle portion, an air valve cylinder disposed normally to said compressed air line at the upper extremity thereof and connected thereto, a piston slidable in said air valve cylinder, an exhaust duct extending from said air valve cylinder adjacent its rear extremity, a main cylinder disposed above and parallel to said air valve cylinder within the barrel portion of said casing and affixed in the extremities thereof, an air line connecting said cylinders, a piston slidable in said main cylinder, a spring in said cylinder ahead of said piston forcing it rearwardly therein, plug means in the rear extremity of said main cylinder provided with a screw-threaded axial orifice, a screw working in said orifice bearing at its forward extremity against said piston regulating its longitudinal position in said main cylinder, an air chamber provided in said main cylinder behind said piston, a vaccine chamber in said main cylinder ahead of said piston, a source of vaccine connected to said vaccine chamber, a one way valve spring pressed upwardly between said vaccine chamber and said vaccine source, a forward plug means screw-threadedly engaging the forward extremity of said main cylinder, an axial bore therethrough extending through the forward portion of the instrument, a one way valve spring pressed rearwardly in said bore, a needle assembly at the forward end of said bore, trigger means pivotally affixed at the underside of said main cylinder depending therefrom outwardly of said casing and pivotally attached to the forward extremity of the piston in said air valve cylinder, a spring within the forward extremity of said air valve cylinder about the forward extremity of said piston urging said trigger and piston forwardy, three equally spaced cylindrical baffles on said air valve cylinder piston closely and sealingly engaging the inner walls of said air valve cylinder, the central of said baffles lying between said compressed air line and the line to said main cylinder when the trigger is in forward position whereby upon depression of said trigger a charge of compressed air will be delivered to said main cylinder behind said piston, driving it forwardly to deliver a charge of vaccine from said vaccine chamber through said needle.

3. A claim in accordance with claim **2** wherein said vaccine source comprises a line from said instrument to a master container of vaccine.

4. A claim in accordance with claim **2** wherein an indicating means is affixed to the extremity of said screw and registers in a scaled orifice in said casing to indicate the size of the dosage delivered.

5. A claim in accordance with claim **2** in which the screw is peripherally calibrated to indicate the size of the dosage.

6. A claim in accordance with claim 2 in which the needle is substituted by a jet orifice.

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