Jan. 21, 1958 W. A. TRATSCH 2,820,445

PISTOL ASSEMBLY FOR AMUSEMENT DEVICES

Filed March 24, 1955 2 Sheets-Sheet 1

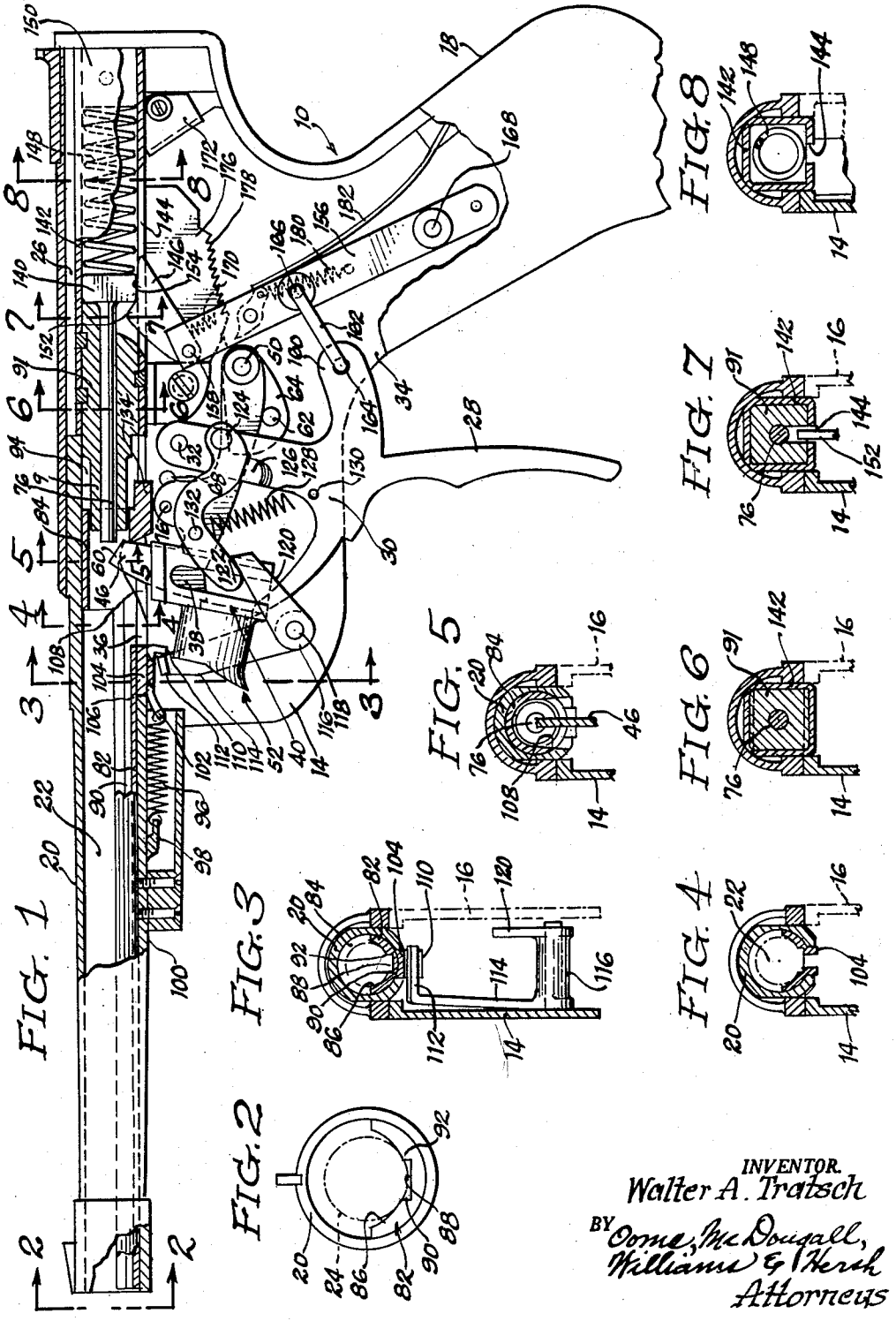


FIG. 1

FIG. 2

FIG. 3

FIG. 4

FIG. 5

FIG. 6

FIG. 7

FIG. 8

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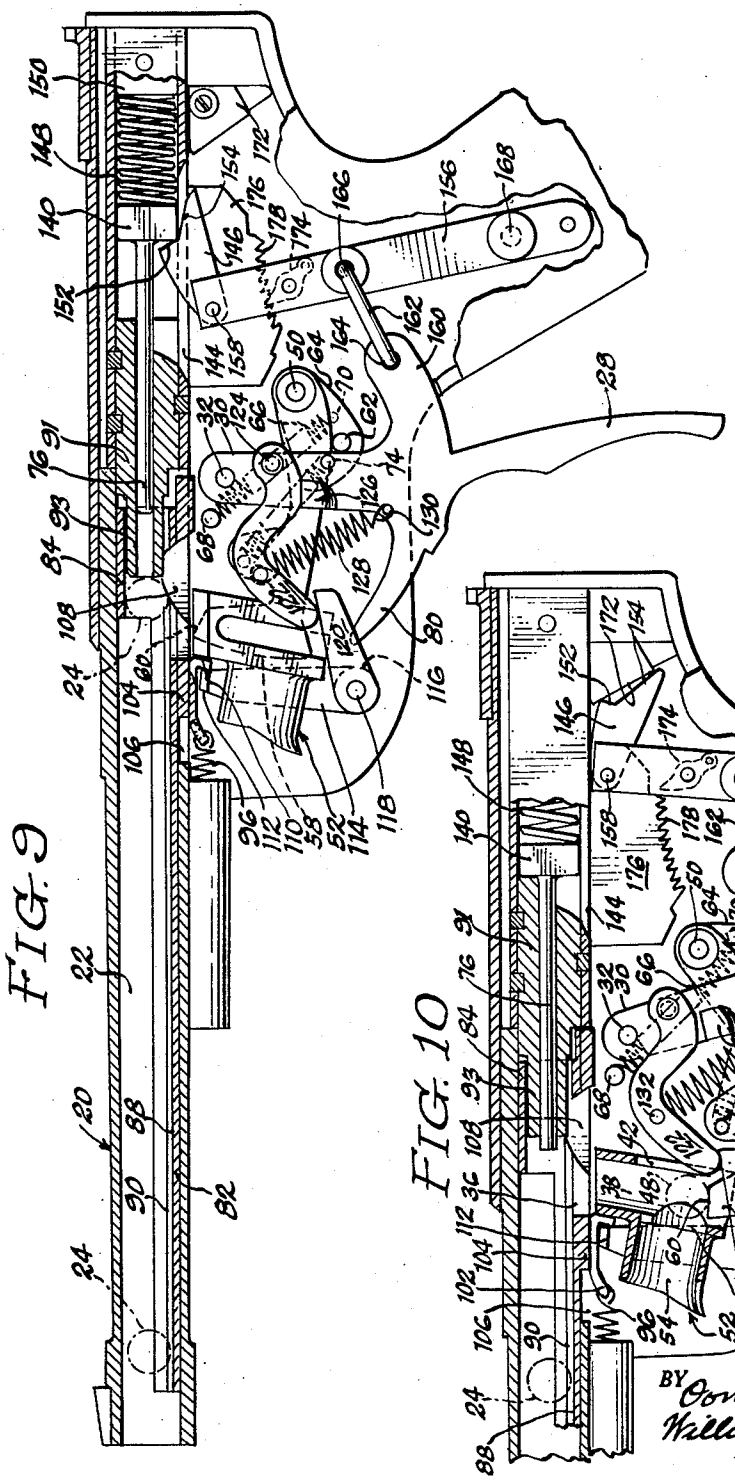


FIG. 9

FIG. 10

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United States Patent Office 2,820,445
Patented Jan. 21, 1958

2,820,445

PISTOL ASSEMBLY FOR AMUSEMENT DEVICES

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Application March 24, 1955, Serial No. 496,434

4 Claims. (Cl. 124—27)

This invention relates to a pistol for use in shooting a steel ball or the like and which is adapted for use in an amusement device in the form of an enclosed elongate cabinet having a target at one end and a pistol mounted at the other end in a trunnion to enable oscillating movements of the pistol for aiming the pistol at the target.

This invention represents an improvement over the construction described in my earlier issued Patent No. 1,551,858, September 1, 1925, wherein description is made of a pistol for use in an amusement device of the type described. It has been found that in structures of the type described in the aforementioned issued patent, the path of travel of the steel ball shot from the pistol is difficult accurately to control because of the inability to maintain full control of the position of the ball within the bore or barrel of the gun, because of the inability to control the position of the pin with which the ball is impacted for ejection of the ball lengthwise through the barrel, because of the difficulty of maintaining full control of the path of travel of the steel ball through the barrel, and because of the number of other variables that arise in locating the ball within the barrel for impacting and variables that arise in the travel of the ball through the barrel in shooting the ball towards the target. As a result, the accuracy in a device of the type described is less than that to be desired with the result that the skill of the operator is not accurately reflected by the score for marksmanship.

It is an object of this invention to produce an amusement device of the type described embodying improvements in the operation and construction of the pistol, which improves the accuracy by which the ball is shot from the pistol, which is sturdy in construction and more uniform in operation, which eliminates many of the variables effective to control the path of travel of the ball as it is shot from the pistol and which provides better control of the shot with the result that the marksmanship of the operator is more accurately reflected by the point of impact of the ball which is shot from the pistol.

These and other objects and advantages of this invention will hereinafter appear and for purposes of illustration, but not of limitation, an embodiment of the invention is shown in the accompanying drawings in which—

Figure 1 is an elevational view partially in section of a pistol embodying the features of the invention;

Figure 2 is an elevational view taken along the lines 2—2 of Figure 1;

Figure 3 is a sectional elevational view taken along the line 3—3 of Figure 1;

Figure 4 is a sectional view taken along the line 4—4 of Figure 1;

Figure 5 is a sectional view taken along the line 5—5 of Figure 1;

Figure 6 is a sectional view taken along the line 6—6 of Figure 1;

Figure 7 is a sectional view taken along the line 7—7 of Figure 1;

Figure 8 is a sectional view taken along the line 8—8 of Figure 1;

Figure 9 is an elevational view similar to that of Figure 1 illustrating the position of parts in an intermediate stage of operation for cocking the pistol, and

Figure 10 is a fragmentary sectional elevational view similar to that of Figures 1 and 9 illustrating the arrangement of parts immediately after the trigger has been displaced to operative position for shooting the ball from the pistol.

Description hereinafter will be made in detail of the portion of the pistol embodying the features of this invention which relates to the construction and operation of the elements for shooting the ball from the pistol. It will be understood that such elements may be used in combination with various escapement means for controlling the number of shots available from a pistol in a series, as when used in a coin-controlled amusement device, and it will be further understood that the pistol may be mounted for oscillating movements within a housing forming a part of such amusement device, but detailed description thereof will not be made since such other elements form no part of the inventive concepts being claimed.

As illustrated in the drawings, the pistol 10 comprises a metal member having a body portion in the form of a housing having side walls 14 and 16 spaced one from the other by an amount to provide a compartment concealed therebetween in which there is mounted the various operative elements which will hereinafter be described. Extending angularly downwardly from the rearward end portion of the housing is a handle portion 18 dimensioned comfortably to fit within the grasp in the palm of a hand and mounted within the handle portion is the escapement mechanism for counting off the number of shots to prevent operation beyond a predetermined limit without resetting.

Since the inventive concepts described and claimed herein do not reside in the escapement mechanism separate and apart from the pistol operating mechanism, detailed description thereof will not be made.

Rigid with the housing and extending forwardly from the upper end portion thereof is an elongate barrel 20 formed with a central bore 22 of uniform dimension through which a steel ball 24 or the like is adapted to be projected out of the pistol. Located rearwardly of the barrel 20 and in alignment therewith in an upper portion of the housing is a chamber 26 embodying means for impacting the ball when located in the rearward end portion of the barrel to project the ball through the barrel in response to the operation of the trigger 28 extending downwardly from a trigger arm 30 pivoted for rocking movement on a stud 32 extending inwardly from the housing wall 14 and in which the trigger portion 28 adapted to be engaged by the finger of the operator extends downwardly through an opening 34 in the lower end wall of the housing forwardly of the handle 18.

As illustrated in the drawing, the barrel 20 is formed with a feed opening 36 in the rearward end portion thereof in alignment with the upper outlet end of an elongate bore 38 in a feed head 40 in the form of a rectangularly shaped member rigidly mounted within the housing. The rectangularly shaped member 40 is formed with a slot 42 extending lengthwise through an intermediate portion of the rear wall for reciprocal movement of an arm 44 between normal and lowered or retracted positions of adjustment. The arm 44 is formed with a finger 46 extending upwardly from the forward end portion thereof into the bore 38 of the feed head 40 for

lifting a ball 48 through the head 40 and through the feed opening 36 into the bore 22 of the barrel 20 during rocking movement of the arm from its retracted to raised or normal positions of adjustment. The arm 44 is mounted for rocking movement on a stud 50 extending inwardly from the side wall 14 of the housing.

Extending forwardly from the lower end portion of the feed head and preferably from the side opposite the slotted portion 42 is a downwardly inclined feed tube 52 in which a plurality of steel balls are contained for supply to the feed head through which they are displaced by the finger 46 into the barrel. The opening 54 of the feed tube communicates directly with an opening 56 in the front wall of the feed head for passage of the steel balls from the tube into the head. The opening 56 is blocked by the forward edge portion 58 of the finger 46 when in other than retracted position thereby to prevent passage of a steel ball from the feed tube into the feed head until the upper end 60 of the finger clears the lower edge of the opening upon displacement of the finger to retracted position.

The arm 44 is resiliently displaced from retracted to raised or normal position by means of a stud 62 extending outwardly from a rocker plate 64 pivotally mounted on the same stud 50 on which the arm 44 is pivoted. The stud 62 extends into the path of the rearward edge portion of the trigger arm 30 offset from its pivot 32 so that the stud will be engaged by the trigger arm during rocking movement thereof in the counter-clockwise direction. The plate 64 and the arm 44 are interconnected by resilient means to cause the feed arm 44 to be rocked in the counterclockwise direction about its pivot to displace the feed finger 46 from raised to retracted position responsive to displacement of the plate 64 from its normal position. Such means include a coil spring 66 anchored at its upper end on a stud 68 extending laterally from the side wall 14 of the housing upwardly and forwardly of the pivot pin 50 while the rearward end of the spring 66 is hooked onto a stud 70 extending laterally from the plate 64 in a portion forwardly of the pivot 50 thereby constantly to urge the plate 64 to rock in a clockwise direction about its pivot to normal position. Another spring 72 is anchored at its rearward end on a stud 74 on the forward end portion of the plate 64 while the forward end of the spring 72 is anchored onto a stud 76 extending laterally from an arm 78 extending upwardly from an intermediate portion of the arm 44 thereby resiliently to urge the arm 44 to rock in the counterclockwise direction with the plate 64 until the lower end portion of the finger 46 is engaged by the member 80 extending from an intermediate portion of the trigger arm 30 into the path thereof when the finger reaches its retracted position, as illustrated in Figure 10. The resilient interconnection between the plate 64 and the arm 44 permits the plate to be continued to be displaced in the counterclockwise direction by the trigger arm 30 without causing simultaneous rocking movement of the arm 44 and finger 46 beyond its retracted position. The resilient engagement between the members also causes the stud 62 to bear against the rearward edge of the trigger arm 30 to control the rocking movement of the blade between its normal position, as illustrated in Figure 1, and its retracted position, as illustrated in Figure 10.

In the past, as described by the aforementioned issued patent, when the ball 24 is displaced by the feed finger 46 through the feed head 40 into the bore 22 of the barrel 20, the ball rolls rearwardly beyond the feed opening 36 in the barrel into contact with the forward end portion of a plunger or firing pin 76 by which it is projected lengthwise through the barrel upon release from its cocked position. Under such conditions, it will be apparent that upon impact of the ball for projection endwise through the barrel, the ball will of necessity cross over the feed opening with the result that engagements are possible with the edges thereof to deflect the ball in its path of travel through the barrel thereby to detract somewhat from the direction of flight of the ball from the barrel as distinguished from the aim of the pistol.

In addition, it has been found that the desired relationship between the bore through which the ball travels in the barrel and the diameter of the ball usually provides sufficient clearance whereby the ball is able to travel other than in a straight line through the barrel, possibly because of interferences with the ball during flight over the feed opening or because of the frictional engagement between the ball and the walls of the barrel with which it might come in contact during flight or because of various combinations of such and other factors. Whatever the reason, it has been found that the ball frequently leaves the barrel in a direction which represents a slight deviation from the axial and at a speed which may vary from one shot to the other with the result that it becomes difficult for an operator to compensate for such variables for purposes of improving his markmanship.

One of the important concepts of this invention is in the elimination of some of these variables whereby the variation between shots will be minimized, if not completely avoided, thereby to improve the performance of the pistol from the standpoint of accuracy and control. Another important concept is to increase the flight of the ball shot from the pistol and to eliminate any of the factors which have heretofore caused changes in the flight of the ball from the true aim of the pistol.

For this purpose, I have provided a separate member in the barrel dimensioned to extend substantially throughout the length thereof and to be slidably received in the bore for relative endwise movement. In the preferred embodiment the slide member 82 is formed with a short sleeve section 84 in the rearward end portion thereof while the remainder is formed with a cross section corresponding to that about the lower half of the bore with a central groove 86 extending lengthwise through the central portion in the upper wall thereof dimensioned in cross section to have a curvature greater than the curvature of the ball with a slot 88 extending downwardly contiguously from the central portion of the groove. The slot is formed to have a width less than that of the diameter of the ball and a depth greater than the portion of the ball extending downwardly into the groove when the ball is at rest upon the lateral edges 90 and 92 formed between the groove 86 and the slot 88.

The edges 90 and 92 which extend continuously throughout in spaced apart parallel relation throughout the barrel provide runways over which the ball travels in its flight through the barrel. Because of the point contact between the runways and the ball during flight, the frictional resistance to flight of the ball is kept to an extreme minimum with the result that the speed of flight of the ball from the pistol is not retarded to any great extent by engagements between the ball during its flight through the barrel with the result that the speed of the ball ejected from the barrel is considerably greater as compared to the speed of flight from barrels of the type heretofore employed which make use of comparable ejection forces. Because of the point contact between the ball and the aligned runways, little, if any, interference takes place with the direction of flight of the ball through the barrel by reason of frictional engagement by the sides of walls of the barrel thereby greatly to minimize if not eliminate such interferences or variables in flight.

Because of the care which must be exercised in alignment of the runways 90 and 92, the direction of flight of the balls over the runways is capable of accurate control so that the direction of flight of the balls from the pistol will accurately reflect the air of the pistol and the marksmanship of the operator.

To minimize the influence of the feed openings on the flight of the ball through the barrel during its initial displacement, means are provided to retract the runway sec-

tion 82 rearwardly sufficient to cause displacement of the ball from its feed position in the barrel to a position on the runways forwardly of the opening before impacting. In the embodiment illustrated, this is accomplished by forming the forward end portion of the plug or cylinder 91 through which the plunger 76 is shiftable endwise with an end portion 93 of smaller dimension than the barrel 20 so that a spaced relation 94 exists between the nose piece 93 and the barrel through which the sleeve section 84 on the rearward end portion of the runway section 82 may be displaced from its forward position illustrated in Figure 1 to its rearwardly displaced position illustrated in Figure 10.

For this purpose, the runway member 82 is resiliently urged toward its normal forwardly displaced position by means of a coil spring 96 anchored at one end upon a hook 98 depending from a forward portion of the bottom wall 100 of the barrel 20 while the other end of the spring is anchored on a finger 102 rigidly secured to the bottom side of a plate 104 which extends through an elongate slot 106 in the bottom wall of the barrel and is fixed to an underside of the runway slide 82.

The runway slide 82 is formed with an opening 108 in the bottom wall in registry with the feed opening 36 in the barrel when the runway member is in its forward or loading position of adjustment. After the ball has been fed up into the barrel by the finger 46, the runway member is adapted to be displaced rearwardly in advance of the release of the plunger 76 to bring the ball into engagement with the front edge of the nose piece 93 and displace the ball forwardly beyond the opening onto the edges 90 and 92 as the runway member 82 is displaced rearwardly responsive to cocking of the pistol to displace the sleeve section 84 into the annular slot 94 about the nose piece. The runway member 82 is displaced rearwardly in advance of the release of the plunger by means of an operative connection between the trigger assembly and the slide 82 which includes an abutment 110 extending downwardly from the rearward edge portion of the plate 104 into the path of a flange 112 extending laterally from the free end portion of a vertically extending actuating arm 114 having a sleeve section 116 on the other end rotatably mounted on a shaft 118 extending laterally from the side wall 14 of the housing. Rigid with the sleeve 116 is a rearwardly and upwardly extending cam arm 120 which lies in the path of the free end of a curvilinear lever 122 pivoted for rocking movement on a stud 124 extending laterally from a portion of the trigger arm 30 offset below the pivot 32 so that the end of the lever arm 122 is rocked downwardly responsive to actuation of the trigger 28. An abutment 126 extends laterally from the trigger arm beyond the pivot to engage the underside of the lever arm 122 and stopping relative rotational movement thereof in the downward direction relative the trigger arm. The lever arm 122 is resiliently urged to rotate in a counterclockwise direction as seen in the figures of the drawing about its pivot into engagement with the stop 126 by means of a coil spring 128 anchored at one end in an opening 130 in the outer end portion of the trigger arm below the pivot while the other end of the spring 128 is anchored onto a stud 132 extending laterally from a forward end portion of the lever arm. As a result, the lever arm 122 is resiliently urged to follow the trigger arm.

The force of spring 128 is sufficient in effect to overcome the force of the spring 96 urging the slide toward its forward position of adjustment with the result that downward displacement of the lever arm 122 in control of the trigger 28 enables the lever arm 122 to cam the arm 120 about its pivot to effect rearward displacement of the slide member 82 from its forward to cocked positions of adjustment responsive to the engagement between the flange 112 and the abutment 110 until the rearward end portion 134 of the slide engages the forward end wall of the barrel housing.

In the past, use has been made of a plunger for impacting the ball wherein the plunger has been formed with a cylindrical head shiftable axially within a cylinder between operative and cocked positions of adjustment. It has been found that the end of the plunger with which the ball is impacted becomes deformed into various different contours and that the direction of flight of the ball through the barrel upon impact has been found to depend greatly on the contour of the end portion of the plunger which engages the ball. Thus the portion of the plunger impacting the ball provides further variables in the direction of flight of the ball through the barrel.

In accordance with the further practice of this invention, means are employed to permit free axial movement of the plunger between its cocked and uncocked positions but in a manner to prevent rotational movement of the plunger so that the same edge portion is brought into contact with the ball for projecting the ball in flight through the barrel thereby to eliminate this variable between shots.

For this purpose, the head 140 of the plunger 76 is formed of a slide portion which is preferably rectangular in cross section but may be formed of other non-circular shape and the section or sleeving 142 through which the block is slidable between cocked and uncocked positions comprises an elongate casing rigidly secured to the housing in axial alignment with the barrel having a bore shaped to correspond to the cross section of the head. The casing is formed with an elongate slot 144 extending lengthwise through the central portion of its bottom wall to enable the operating pawl 146 releasably to engage the head 140 of the plunger for displacement thereof from cocked to uncocked position. A coil spring 148 is located within the casing with one end bearing resiliently against the rearward wall of the head 140 while the other end bears against a plug 150 closing the rearward end of the casing. Thus the plunger is held against turning movement during use and is resiliently urged with considerable force toward its forwardly or uncocked position within the casing.

The head and plunger 140 is displaced rearwardly in the casing to cocked position by means of the pawl 146 having an end portion contoured to provide a stop 152 extending upwardly from a cam edge 154 through the slot into engagement with the forward shoulder formed between the head and the plunger. The rearward end portion on pawl 146 extends between a yoke on the end of a rocker arm 156 and is pivoted for rocking movement upon a pin 158 extending crosswise through the yoke. The rocker arm 156 is interconnected with a section 160 extending rearwardly from an intermediate portion of the trigger arm 30 by means of a link 162 having forwardly extending fingers which are received in openings 164 and 166 in the arm and trigger to cause the arm and trigger to rock together about their pivots. The rocker arm is pivoted on a stud 168 extending laterally from a side wall 14 in the handle portion of the housing and the pawl 146 is constantly urged to its raised position into engagement with the head of the plunger by means of a coil spring 170 anchored at one end against the bottom side of the pawl 146 while the other end is secured onto a hook in a spaced portion of the rocker arm 156.

A cam plate 172 is fixed to the rear wall of the housing in position to be engaged by the cam edge 154 of the pawl to cause rocking movement of the pawl in a downward direction about its pivot upon engagement with the plate, as illustrated in Figure 10, to withdraw the abutment 152 from the path of the head 140 thereby to release the head and plunger from its cocked position for return by spring 148 to its uncocked position for impacting the ball resting on the runways in alignment with the end of the plunger.

To prevent inadvertent release of the plunger during operation of the trigger, means are provided to latch the rocker arm 156 upon displacement from normal position to prevent return until the shot has been completed. For

this purpose, a pawl 174 is mounted on the rocker arm 156 immediately below a rack bar 176 having rack teeth 178 extending downwardly therefrom into the path of the end of the pawl 174 to engage the pawl when the rocker arm is displaced from normal position to prevent return until the pawl 174 passes beyond the rack teeth whereby the coil spring 180 is effective to rock the pawl in the clockwise direction so that the rocker arm may be returned freely to its starting position.

The rocker arm 156 is constantly urged to its normal position by means of the leaf spring 182 having one end which rests upon a ledge within the handle portion of the pistol while the other end bears against the rearward edge of the rocker arm. The trigger arm is independently urged to return to its normal position by means of a coil spring 128 which connects an intermediate portion of the arm with a stud 132 secured to the lever arm 122 as previously described.

In operation, a plurality of steel balls are located within the feed chute 52 for locating the balls one at a time in the feed head 40.

At the start of the cycle, the elements are in the normal positions illustrated in Figure 1 of the drawings with the upper edge 60 of the feed finger 46 extending through the aligned openings 36 and 108 of the barrel and runway slot to locate a ball 24 within the barrel.

As the trigger 28 is drawn rearwardly about the pivot 32, the feed finger is displaced downwardly in response to resilient action through the displacement of the plate 64 by the trigger arm to withdraw the finger through the feed openings within the barrel. Simultaneous to the withdrawal of the feed finger, lever arm 122 is rocked in a counterclockwise direction with the trigger to cam the arm 120 in the clockwise direction about its pivot to cause rearward displacement of the runway slide whereby the opening 108 of the runway slide is displaced rearwardly out of alignment with the opening 36 in the barrel to prevent return of the ball therethrough. Continued movement of the trigger 28 rearwardly causes displacement of the runway slide rearwardly to its fullest extent to position the sleeve 84 within the annular space 94 whereby the ball is engaged by the nose piece 92 to shift the ball forwardly out of the feed opening and onto the runway in alignment with the end of the plunger thereby properly to locate the ball in advance of the feed opening on the runway for unhindered movement endwise through the barrel.

Simultaneously with the withdrawal of the feed finger 46 and the rearward displacement of the runway slide 82, the rocker arm 156 is displaced in the clockwise direction about its pivot 168 to bring the abutment 152 into operative engagement with the head 140 for causing rearward displacement of the head and plunger toward its cocked position with concurrent contraction of the expansion coil spring 148. Upon substantial completion of the rearward displacement of the trigger 128, the cam edge 154 of the pawl 146 engages the cam blade 172 to deflect the pawl 146 in the clockwise direction about its pivot 136 whereby the abutment 152 is withdrawn from the path of the head 40 to free the plunger for return by the tensioned coil spring 148. At this time the ball has been displaced forwardly onto the runway and is in position to be engaged by the released plunger which comes forwardly suddenly to impact the ball and project the ball lengthwise through the barrel toward the target.

Upon completion of the initial stroke for positioning the trigger in its rearward position of adjustment, the end 60 of the feed finger 46 has been displaced to its retracted position whereby the opening communicating the feed tube 52 with the feed head 40 permits the next ball to be displaced inwardly into the feed head. Upon release of the trigger 128 for return to normal position, the arm 44 is rocked with the plate 64 in the clockwise direction about its pivot so that the feed finger 146 displaces the ball upwardly through the feed head and through the feed opening. Simultaneously, the runway slide is displaced forwardly to its original position of adjustment so that the feed opening therein is in alignment with the feed opening in the barrel to enable the finger 46 to displace the ball to reposition the ball within the barrel in preparation for the next cycle of operation.

It will be apparent from the foregoing that I have provided various improvements in the construction and operation of a pistol device of the type described whereby many of the variables heretofore existing in structures of the type described are substantially completely eliminated thereby to improve the accuracy of the shot from the pistol and thereby also to improve the speed of the shot ejected from the pistol.

It will be understood that the runway slide may be formed of a sleeve member which extends continuously throughout its length and in which the sleeve section is of a larger diameter than the ball but in which the slot extending contiguously from the lower edge portion of the bore through the sleeve embodies the dimensional characteristics previously described to provide runway edges over which the steel ball travels in flight through the barrel.

It will be understood that other changes may be made in the details of construction, arrangement and operation without departing from the spirit of the invention, especially as defined in the following claims.

I claim:

1. In a pistol assembly of the type described for shooting a spherical member and having an elongate barrel formed with a bore dimensioned in cross section to be greater than that of the spherical member and with a feed opening in the rearward end portion thereof for introducing the spherical members into the barrel and having a plunger shiftable axially in alignment with the barrel between cocked and uncocked positions for engagement with the spherical member in the rearward end portion of the barrel, a slide member separate and apart from the barrel and shiftable lengthwise within the barrel between a retracted and an extended position of adjustment and extending substantially throughout the length of the barrel, a slot extending continuously lengthwise through the upper surface of the slide member to provide a pair of laterally spaced apart edges extending continuously in parallel relation lengthwise through the barrel and spaced apart by a distance substantially less than the diameter of the spherical member to provide a pair of runway edges on which the spherical member is supported during travel through the barrel, a feed opening through the underside of the slide member in the rearward end portion thereof in alignment with the feed opening through the barrel when the slide member is in normal position of adjustment, means for displacing the slide runway member rearwardly to retracted position within the barrel responsive to displacement of the plunger to cocked position whereby the feed opening in the slide member is offset rearwardly from the feed opening in the barrel, and means for engaging the spherical member during displacement of the slide member from normal to retracted position whereby the spherical member is displaced forwardly on the slide member beyond the feed opening and onto the runway edges.

2. A pistol assembly as claimed in claim 1 in which the runway slide member comprises an elongate member of semi-spherical section throughout the forward portion thereof with a curvilinear top wall having a curvature greater than that of the spherical member and a slot extending downwardly contiguously from the central portion of the curvilinear top wall to provide the pair of spaced runway edges on which the spherical member is supported.

3. A pistol assembly as claimed in claim 2 in which the slot is formed with vertically disposed side walls to form sharp runway edges with the curvilinear wall of the slide member.

4. A pistol assembly as claimed in claim 1 in which

the means for displacing the spherical member forwardly onto the runways during displacement of the slide member from normal to retracted position comprises a cylindrical nose piece through which the plunger is shiftable axially between cocked and uncocked positions and which is dimensioned to be smaller than the dimension of the barrel to provide an annular space therebetween into which the rearward end portion of the runway slide is shiftable during movement from normal to retracted positions of adjustment.

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